AGENDA
HAILEY PLANNING & ZONING COMMISSION
SPECIAL MEETING
Monday, August 1, 2016
Hailey City Hall
5:30 p.m. (start time is approximate)

Call to Order

Public Comment for items not on the agenda

Consent Agenda

CA 1 Motion to approve minutes of July 11, 2016

CA 2 Motion to approve Findings of Fact and Conclusions of Law for an application by Linda Bergerson for a new 1,304 square foot single family residence on a 4,826 square foot lot, located at 109 North 5th Avenue (Lot 3A, Block 96) in the Limited Residential (LR-1) and Townsite Overlay (TO) Zoning Districts.

CA 3 Motion to approve Findings of Fact and Conclusions of Law for an application by Wise Guy Pizza Pie, represented by Jay Cone of Jay Cone Architecture, for a new 3,003 square foot pizzeria located at 411 Main Street (S. ½ of Lot 3, Lots, 4, 5, Block 56 Hailey Townsite) in the Business (B) and Townsite Overlay (TO) Zoning Districts.

New Business and Public Hearings

NB 1 Consideration of a Planned Unit Development (PUD) and Subdivision Preliminary Plat, the Quigley Farm PUD. This is an application to Blaine County by Quigley Farm & Conservation Community, LLC, represented by Hennessy Company and SERA Architects. The proposed project would consist of 51 units (rounded up to):

- 7 Large Lot Dwellings
- 9 Medium Lot Dwellings
- 10 Cottage Unit Dwellings *(4 of which are identified for community housing)*
- 6 Town House Sublot Dwellings *(2 of which are identified for community housing)*
- 9 Live/Work Mixed Use Dwellings
- 10 Multi-Family Dwellings *(2 of which are identified for community housing)*
- Future hospitality site of 1.38 acres
- Future Sage School site of 6.17 acres
- Open Space and common area
- Bike/pedestrian pathways and trails
- Working Agriculture

The proposed project will be located on a single 205.3-acre tax lot, which is referenced as T2N R18E Sections 3 & 10 Tax Lot 8368. The City of Hailey is not a decision-making body and shall only make recommendations to Blaine County. The Hailey Planning and Zoning Commission will review the project, and make recommendations to the Hailey City Council.

For further information regarding this agenda, or for special accommodations to participate in the public meeting, please contact planning@haileycityhall.org or (208) 788-9815.

Old Business
Commission Reports and Discussion

Staff Reports and Discussion

SR 1 Discussion of current building activity, upcoming projects, and zoning code changes.
(no documents)

SR 2 Discussion of the next Planning and Zoning meeting: Monday, August 22, 2016.
(no documents)

Adjourn

For further information regarding this agenda, or for special accommodations to participate in the public meeting, please contact planning@haileycityhall.org or (208) 788-9815.

MINUTES OF THE MEETING OF THE
HAILEY PLANNING AND ZONING COMMISSION
Monday, July 11, 2016
5:30pm

Present: Richard Pogue, Janet Fugate, Dan Smith, Jeff Engelhardt, Owen Scanlon
Staff: Lisa Horowitz, Robyn Davis

Call to Order
5:28:49 PM Fugate called meeting order

Public Comment
No public comments.

Consent Agenda
No public comments.

CA 1 Motion to approve minutes of June 22, 2016

CA 2 Motion to approve FF for Capstone Development – will be approved as modified.

CA 3 Motion to approve FF for Old Cutters, Inc

5:30:50 PM **Dan Smith moved to approve all consent agenda items. Richard Pogue seconded and the motion passed unanimously.**

New Business and Public Hearings

NB 1 *Consideration for a Design Review Application by Linda Bergerson for a new 1,304 square foot single family residence on a 4,826 square foot lot, located at 109 North 5th Avenue (Lot 3A, Block 96) in the Limited Residential (LR-1) and Townsite Overlay (TO) Zoning Districts.*
5:31:13 PM Chair Fugate opened the item for public hearing. Linda Bergerson introduced her project to the Commission. Lisa Horowitz noted that the garage would be accessed from the alley way (per recommendation by City of Hailey).
5:37:17 PM Owen Scanlon inquired about flashing on house. Bergerson informed the Commission of plans to focus on triangular shape for house.
5:40:30 PM Chair Fugate closed the meeting for public comment.
5:41:29 PM Jeff Engelhardt questioned the dimensions of front entrance. Horowitz reiterated that the house is modest and efficient in design, and informed the Commission that the front entrance is consistent in rulings, in that the proposed house is oriented with respect to the existing grid pattern, and the front wall plane is aligned to the street.
5:49:31 PM Richard Pogue motioned to approve the application by Linda Bergerson for a new 1,304 square foot single family residence on a 4,826 square foot lot, located at 109 North 5th

Avenue (Lot 3A, Block 96) in the Limited Residential (LR-1) and Townsite Overlay (TO) Zoning Districts. Owen Scanlon seconded and the motion carried.

NB 2 *Consideration for a Design Review Application by Wise Guy Pizza Pie, represented by Jay Cone of Jay Cone Architecture, for a new 3,003 square foot pizzeria located at 411 Main Street (S. ½ of Lot 3, Lots 4, 5, Block 56, Hailey Townsite) in the Business (B) and Townsite Overlay (TO) Zoning Districts.*

5:50:50 PM Chair Fugate opened the meeting for public comment. Jay Cone, from Jay Cone Architecture, introduced the site plan, sidewalk construction and marquee details. Horowitz informed the Commissioners of the proposed signs: one projecting neon sign and a flat sign that will be affixed to the front canopy.

5:57:19 PM Scanlon inquired about the marquee and whether or not it would be on property line, as well as the interference of existing vegetation, if any. Cone informed the Commissioners that the Owner intends to keep all existing vegetation, included trees, with the exception of one. Cone informed Commission that a plan is in place to evaluate the health of all trees and remove one of the front trees, as it obscures the view of the store front and proposed signage. Horowitz clarified that the trees located on the front of property, facing Main Street, are all City trees, which accounts for a 4.5 foot planning strip. Cone confirmed that the proposed signage would be on the property line and the City trees would be out from under the proposed signage. Staff to clarify process on City trees with the City Attorney.

5:59:31 PM Cone went on to explain the details of the entry and porch, which is supported by two posts and will mostly be covered.

6:03:31 PM Scanlon questioned the percentage of snow storage compared to parking and wanted to know what Cone had in mind for ground cover. Cone reassured the Commissioners that he incorporated more than enough snow storage in plan and will likely utilize gravel or pavers for ground cover. Cone also reiterated that the building, in scale and size, compliments downtown Hailey; materials are also complimentary and indicative of the turn of the century.

6:17:43 PM In wrapping up, Horowitz informed the Commissioners that the Tree Committee recommended that the tree, the one that obscures the view of the proposed signage, remain, as all trees in the area were planted during the same time with intentional spacing, and the removal of one tree would create a 'gap' in the pattern.

6:19:24 PM Chair Fugate asked Jay Cone to respond in the event the tree was not approved for removal. Cone responded with an agreement. Cone would like to come to an agreement with the City and Tree Committee, as well as discuss his options (i.e., replacement trees, relocate tree, adjust spacing of trees to expose façade, etc.). Scanlon questioned the process of removing City trees. Horowitz replied that she would follow up with City Attorney regarding process on City trees.

6:28:42 PM Scanlon also mentioned that he would like to see a horizontal element of some sort across the back façade, as he believes it to be a glaring contrast from the front design.

6:28:42 PM Chair Fugate opened the meeting for public hearing.

6:28:57 PM Scanlon remarked that he believes the building and design are nice, complimentary with the architecture currently on Main Street, but is concerned about removing one of the street trees. Chair Fugate would like to know and be interested in whether or not the Tree Committee has determined a monetary value for this particular tree.

6:32:20 PM Scanlon reiterated that he would like to see a gable, artificial vent or wainscoting on the west elevation.
6:36:21 PM Jay Cone replied to comments with a possible condition of approval where parties could meet with Tree Committee to discuss removal of street tree and/or other options, as well as develop a plan for future use.
6:39:14 PM Tony Evans noted that removing a City tree sets a precedent and believes that when people start removing trees for aesthetic purposes, other business and people will do the same. Tony noted that the trees on Main Street are what make Hailey, Hailey. Tony would rather see that the marquee be moved back to accommodate the tree.
6:40:10 PM Chair Fugate replied that, aside from the tree issue, the building is nice and well thought out. Engelhardt noted that the new Wise Guy building will be a wonderful asset to the City and would like to see the City work with the owner regarding the tree, to support a valuable business in the valley. Engelhardt also noted that the back façade doesn't bother him.
6:42:38 PM Chair Fugate noted that should the tree be removed, the cost should not be borne by the City. Horowitz confirmed that this cost would not be the City's responsibility. Horowitz also presented notes on a new condition, Condition (i). Per Horowitz, the new condition would read. 'A gable and element, such as a foe vent, shall be added on the west elevation.' Horowitz suggested that the Commission deliberate Condition (h), which states, 'All City street trees shall be retained and the marquee shall be reconfigured to accommodate.' Cone clarified that the marquee would not need to be reconfigured and would like to edit Condition (h) to reflect that. Cone also noted that if the Commission decides to retain tree, City tree would only obscure marquee. No reconfiguration would be needed.
6:44:13 PM Dan Smith stated that the area would look weird if the block had a string of trees with one missing. Smith also noted that there are other ways to accommodate the visibility of the proposed signage/building and retain the tree. Richard Pogue agreed and noted that he would rather see the tree retained, and allow the applicant to negotiate with the City to prune the tree. Scanlon agreed and reiterated that the key is to negotiate with the City regarding matter. Scanlon asked applicant whether or not rephrasing Condition (h) to state, 'the marquee *will* accommodate the existing street tree…' instead of *reconfigured*.
6:46:25 PM Cone noted that the words accommodate and reconfigure make it sound like changes need to be made to the footprint and wanted to confirm with Commission that architectural changes to the marquee do not need to be made. Commissioners agreed to strike language from Condition (h). Commissioners agreed to keep Condition (h), as, 'All street trees shall be retained.' Chair Fugate noted that she would like to explore possibilities of pruning the street tree. Pogue and Smith agreed.
6:48:09 PM Owen Scanlon motioned to approve the application by Wise Guy Pizza Pie, represented by Jay Cone of Jay Cone Architecture, for a new 3,003 square foot pizzeria located at 411 Main Street (S. ½ of Lot 3, Lots 4, 5, Block 56, Hailey Townsite) in the Business (B) and Townsite Overlay (TO) Zoning Districts, provided that conditions (a) through (h) are met. Dan Smith seconded and the motion carried.

NB 3 *Consideration for a Design Review Application by D.L. Evans Bank, represented by Tom Lennon and Andy Erstad of Erstad Architects, for a new 4,595 square foot bank branch to*

be located at 609 South Main Street (Lots 1-8, Block 5, Hailey Townsite) and 611 South Main Street in the Business (B) and Townsite Overlay (TO) Zoning Districts.

7:03:02 PM Chair Fugate called the meeting to order. Andy Erstad introduced the project and noted his concerns regarding the street trees on Main Street. Erstad would like to remove the existing trees and replace the trees with other, heartier trees; trees that will sustain winter and road conditions better than what is currently on the lot and on the street. Erstad mentioned that existing trees remain, the trees would be set below the grade of the new building, 24 inches in some places, and thinks it best to remove and replace with other trees. Erstad noted that each tree was evaluated and in summary, overall conditions of trees were noted to be in fair to poor health.

7:04:59 PM Erstad informed the Commission that D.L. Evans would like to extend parking to the south to accommodate for more customers, employees and visitors. Erstad informed the Commission that access on Main Street would be eliminated to meet the request of the City and customers would utilize the alleyway. Chair Fugate questioned how many parking spaces that would be in total as well as how many employees will be working at one time. Erstad noted that parking total would be 22 spaces and the future branch plans to have as many as 12 employees working at one time. Per D.L. Evans representatives, D.L. Evans hops to expand and accommodate future business operations, as clientele come from around Wood River Valley, Shoshone, Picabo, Carey and more. Erstad noted that by increasing the number of parking spaces, it would avoid customers parking in the street and/or blocking residential driveways.

7:07:54 PM Per the Hailey Tree Commission report, differences were noted in health status of the Shubert Chokecherries on Main Street and believe the trees all in good condition and should be retained.

7:14:11 PM Terry King introduced the landscape plan and noted that there are better choices for street trees. King noted that the root zones are growing toward the property boundary. King would like to see similar trees to Albertson's and would be willing to modify site plan to maintain a consistent look and feel to Hailey.

7:19:05 PM Scanlon questioned the total number of trees to be removed. King informed the Commission that 19 trees would be removed; 9 of them being street trees. King noted that D.L. Evans would be willing to plant trees elsewhere to offset the removal and proposing to plant trees larger in caliber instead of the minimum the City requires.

7:24:56 PM Mark Martins presented information to the Commissioners on the overall health of the street trees, noting each to be in poor to fair condition. Martins also noted the difficulty in working around the oak tree; a 6 to 12 foot construction zone would be required to maintain the health and longevity of the tree.

7:29:10 PM Scanlon inquired about the trees health and posed that if the Commissioners decided to leave the trees as is and require D.L. Evans to work around them, what would happen. Martins noted, "Trees in which are planted low, will die slow; trees planted high will never die." Horowitz noted that three of the trees were not covered in the report and would like to see the three trees included. Per Martins, trees 2, 3, 4, 5 are below grade and trees 6, 7, 8, 9, 10 are at grade.

7:32:21 PM Erstad noted that D.L. Evans would like to remove the trees that are in poor condition and begin to create a street tree that is more consistent with others in Hailey.

7:33:02 PM Pogue clarified with D.L. Evans that they are proposing to remove nine chokecherry trees and one oak.
7:34:42 PM Erstad confirmed and also noted that the site plan would be adjusted accordingly, and that all trees would be placed in tree grates, new trees would be planted in various locations to account for the removal of street trees, and that they would be willing to work with staff/transit group to have an approved bus stop location in front of building.
7:36:08 PM Chair Fugate questioned transactions times if 12 employees are working. D.L. Evans employee stated that transactions times can range from 30 seconds to one minute, unless they are more complex (i.e., mortgages, home loans, investments, etc.). Jessica Aguilar shared the proposal of a large community room, which they hope would bring more people to the location.
7:39:25 PM Horowitz reminded the Commissioners that parking standards are based on square footage, not on the applicant's goals, intentions, or number of employees.
7:40:41 PM Smith noted that the requirement for parking, when adjacent to residential zones, is to screen the parking area from the residential zone. Erstad noted his concerns of having a screened parking area, as the alleyway is a point of access for customers and employees. Horowitz would like to consult with the City Attorney on the definition of *adjoins, abut* and *faces* to more accurately determine how this language applies.
7:43:39 PM Pogue revisited the conversation regarding the trees on site and questioned the health status of each. It was noted that three Evergreens and a few Crabapple trees are currently on second lot, with two Elms that rooted there naturally.
7:49:18 PM Scanlon noted the design and architecture of the building, complimenting Erstad; however, disagreed with design of drive-thru. Scanlon suggested that the drive-thru be redesigned to better fit the building design and Hailey. Erstad noted that he would consider augmenting the design.
7:51:46 PM Chair Fugate opened the item for public comment. Peter Lobb wanted clarification on whether or not applicant has right to cut down trees on own property. Lobb noted that if decision is between a new City pole and retaining the oak tree, Lobb would like to see the oak tree retained. Lobb also noted the discrepancies in health reports from the Tree Committee and Arborist. Lobb believes the City needs to make a determination regarding the trees and maintain consistency throughout the City. Lobb also believes having a variety of trees planted throughout downtown Hailey is more aesthetic than having one specific tree or type of species. Lobb would like to have another professional examine the trees, to clarify any and all discrepancies in health of trees.
7:54:52 PM Tony Evans agreed that chokecherry trees are messy and agreed with applicant in that there are other, more appropriate trees for the lots.
7:56:10 PM Russell Moreno shared his concerns with parking and alleyway access. Moreno agreed in that a screen for the parking area needs to be considered. Moreno also questioned the visibility of the trash receptacles.
7:57:43 PM Jay Cone encouraged the Commissioners to discuss how the building complies with Design Review Standards. Cone noted that the building has a nice design and is contemporary in nature, which could help bridge the gap from historic to modern.
7:59:07 PM Chair Fugate closed the item for public comment. Chair Fugate replied that per City Code, trash receptacles are required to be screened. Fugate also noted that a Lighting Plan nor a Roof Plan has been seen and Commissioners would like to see those plans. Smith agreed and

also stated that a staging and contractor plan would need to be present prior to construction. Chair Fugate recommended a site visit to visualize trees and plants, and gain a better understanding of proposed plan.
8:02:32 PM Scanlon agreed to a site visit and noted the design and architecture as being a good balance to Natural Grocers (on south end of Hailey). Scanlon liked the contemporary design and believes it will fit nicely within the community.
8:05:32 PM Pogue complimented that the bank is a good quality design and believes it to be an excellent addition to Hailey. Pogue is not concerned with the architecture of the building, but would like to see a more in-depth landscaping plan and continue the discussion regarding the trees.
8:09:27 PM Erstad agreed that a site visit would be appropriate and mentioned his willingness to work with Commissioners and City on project. Erstad would also like more information and a decision made on the banner pole.
8:13:25 PM Horowitz informed Commissioners that the City Council will ask the Planning and Zoning Commission for their input regarding the City trees. Scanlon noted that prior to making a decision, he'd like to know what all of the options are, and what can or cannot be done.
8:14:54 PM Engelhardt requested that elevation tape be used during site visit to show proposed grade.
8:22:13 PM Chair Fugate stated that she would like to have *adjoins, abuts* and *faces* defined prior to next meeting.
8:27:50 PM Dan Smith motioned to continue the discussion regarding the application submitted by D.L. Evans Bank, represented by Tom Lennon and Andy Erstad of Erstad Architects, for a new 4,595 square foot bank branch to be located at 609 South Main Street (Lots 1-8, Block 5, Hailey Townsite) and 611 South Main Street in the Business (B) and Townsite Overlay (TO) Zoning Districts, to 08/22/2016, and to convene onsite at 609 South Main Street for a site visit. Jeff Engelhardt seconded and the motion carried.

NB 4 *Consideration of a staff-initiated text amendment to Title 18, Mobility Design, Section 18.14.014; Exemptions, to clarify exemptions for construction and reconstruction projects, and Section 18.04.016, approval by the Planning and Zoning Commission.*
8:30:30 PM Horowitz informed the Commissioners that Public Works finds that the current language is constraining and inhibits the department from conducting routine maintenance. Horowitz noted that Public Works has suggested revising current language to say:

> 18.04.014 Exemptions: A. Design: Ordinary maintenance activities designed to keep assets in serviceable condition, including but not limited to: sections of sidewalk and asphalt replacement that do not present design changes in excess of 30 linear feet; any maintenance to dirt or gravel streets, alleys, or pathways that does not present design changes; mowing; cleaning; sweeping; chip sealing; fog coating or spot repair; and emergency infrastructure projects necessary to guard against imminent peril, are exempt from the provision of this title.

8:32:08 PM Chair Fugate opened the item for public hearing. No public comment made.
8:33:45 PM Richard Pogue motioned to approve the staff-initiated text amendment to Title 18, Mobility Design, Section 18.14.014; Exemptions, to clarify exemptions for construction

and reconstruction projects, and Section 18.04.016, approval by the Planning and Zoning Commission. Dan Smith seconded and the motion carried.

NB 5 *Continuation of a City-initiated Text Amendment to Title 17, Section 17.05, District Use Matrix, to clarify: Parcel Delivery and Shipping Services; Dance, Martial Arts and Fitness Facilities, Recreational Facility, Indoor and Outdoor, Performing Arts Center, Studio Artist, and amendments to Title 17, Section 17.02, Definitions to add or modify definitions related to the above. Work Session to also include discussion of a variety of implementation issues and questions regarding Title 17, Section 17.05, District Use Matrix and Title 17, Section 17.02, Definitions.*

8:35:51 PM Continuation of a City-initiated Text Amendment from the May 9, 2016 Planning and Zoning meeting regarding Parcel Delivery and Shipping. Horowitz re-introduced text amendment and informed Commissioners that a decision needs to be made to either label text amendment as a Conditional Use or a Not-Permitted Use. Chair Fugate questioned whether or not, if labeled Not-Permitted Use, a timeframe could be established before the Ordinance change becomes effective to allow parcel delivery services a chance to relocate and/or serve the valley during another holiday season.

8:39:51 PM Engelhardt inquired about when the use was approved the first time by the City. Horowitz confirmed that no record has been found regarding first approval of Conditional Use, but the business has been in its current location since 1983.

8:41:10 PM Chair Fugate reminded the Commission that it is their job to consider the City of Hailey, not just a business or person. We need to do what we think is right. Smith shared his concerns: Is it the kind of business you want to see in downtown Hailey? Is it the best use of the space and zone?

8:43:33 PM Engelhardt noted that he would prefer to maintain Conditional Use. Chair Fugate posed questions like, 'what if DHL came and wanted to have a business in a similar zone?' Engelhardt doesn't believe there is logic in allowing that.

8:47:19 PM Scanlon recommended that the Commissioners review the conditions and decide what would be best for the City of Hailey. Smith noted that the decision would not be etched in stone; it could change in the future.

8:49:53 PM Chair Fugate opened the item for public comment. Julie Corde questioned whether or not the Commissioners and the City could assume it's a Conditional Use, as UPS is currently operating in that location. Horowitz explained that Commissioners can alter code if it is in the best interest of the City. Corde noted the importance of having a business that wants to continue to serve the area and has been in place for 28 years. Corde stated that if Commissioners recommended a Not-Permitted Use, the lot could stay vacant for several years, like many other vacant lots and building spaces in Hailey.

8:58:37 PM Chair Fugate closed meeting for public hearing. Scanlon motioned to incorporate timeframe and a Not-Permitted Use amendment to Title 17, Section 17.05, District Use Matrix, to clarify: Parcel Delivery and Shipping Services. Timeframe to be effective 03/2017. Pogue seconded and the motion carried.

9:05:16 PM Horowitz recommended a continuation for City-initiated Text Amendment to Title 17, Section 17.05, District Use Matrix, to clarify: Dance, Martial Arts and Fitness Facilities, Recreational Facility, Indoor and Outdoor, Performing Arts Center, Studio Artist, and

amendments to Title 17, Section 17.02, Definitions to add or modify definitions related to the above. Work Session to also include discussion of a variety of implementation issues and questions regarding Title 17, Section 17.05, District Use Matrix and Title 17, Section 17.02, Definitions, until September 12, 2016 Planning and Zoning Meeting.

Old Business
Commission Report and Discussion

Staff Reports and Discussion

SR1 Discussion of current building activity, upcoming projects, and zoning code changes.
(No documents)

SR2 Discussion of the next Planning and Zoning Meeting: Monday, August 1, 2016.
(No documents)

Adjourn
9:06:45 PM Owen Scanlon motioned to adjourn. Dan Smith seconded and all were in favor.

Return to Agenda

FINDINGS OF FACT, CONCLUSIONS OF LAW AND DECISION

On June 22, 2016, the Hailey Planning and Zoning Commission considered a Design Review application by Linda Bergerson for a new single family residence to be located on Lot 3A, Block 96 of the Hailey Townsite (109 N. 5th Street) within the Limited Residential-1 (LR-1) District and the Townsite Overlay (TO).

Notice

Notice for the public hearing was published in the Idaho Mountain Express on June 17, 2016 and mailed to property owners within 300 feet on June 22, 2016.

Application

One single-family dwelling located on Lot 3A, Block 96 of the Hailey Townsite (109 N. 5th Street) Lot 3A is 4826 square feet (66.62' by 72.48'). The single family dwelling is two-story with 664 sf on the main level and 360 on the second level for a total living space of 944 square feet. The attached garage is designed for one car and comprises 280 square feet.

Procedural History

The application was submitted on June 3, 2016 and certified complete on June 6, 2016. A public hearing before the Planning and Zoning Commission for approval or denial of the project will be held on July 11, 2016, at 5:30 pm in the Council Chambers.

General Requirements for all Design Review Applications				
Compliant			Standards and Staff Comments	
Yes	No	N/A	City Code	City Standards and *Staff Comments*
☒	☐	☐	17.06.050	**Complete Application**
☒	☐	☐	Depart-ment Comments	**Engineering:** *No concerns*
				Life/Safety: *No concerns*
				Water and Sewer: *No concerns*
				Building: *No concerns*
				Streets: *No concerns*
☐	☐	☒	17.08A Signs	**8.2 Signs: The applicant is hereby advised that a sign permit is required for any signage exceeding four square feet in sign area. Approval of signage areas or signage plan in Design Review does not constitute approval of a sign permit.**

			Staff Comments	*Signage is prohibited in residential zones.*
☒	☐	☐	**917.09.040 On-site Parking Req.**	**See Section 9.4 for applicable code.**
			Staff Comments	• *Per 9.4.1, two spaces per dwelling are required with a maximum of 6.* • *Home will have a 1-car garage and the following:* o *Space in driveway for one additional car to park*
☒	☐	☐	**17.08C.040 Outdoor Lighting Standards**	**8B.4.1 General Standards** **a) All exterior lighting shall be designed, located and lamped in order to prevent:** **1. Overlighting;** **2. Energy waste;** **3. Glare;** **4. Light Trespass;** **5. Skyglow.** **b) All non-essential exterior commercial and residential lighting is encouraged to be turned off after business hours and/or when not in use. Lights on a timer are encouraged. Sensor activated lights are encouraged to replace existing lighting that is desired for security purposes.** **c) Canopy lights, such as service station lighting shall be fully recessed or fully shielded so as to ensure that no light source is visible from or causes glare on public rights of way or adjacent properties.** **d) Area lights. All area lights are encouraged to be eighty-five (85) degree full cut-off type luminaires.** **e) Idaho Power shall not install any luminaires after the effective date of this Article that lights the public right of way without first receiving approval for any such application by the Lighting Administrator.**
			Staff Comments	*Applicant will install Dark Sky compliant fixtures, as detailed in the submittal documents. Lights will be:* - *Wall-mounted LED lights*
☒	☐	☐	**Bulk Requirements**	**See 4.13.6, Zoning Ordinance**
			Staff Comments	*Zoning District: General Residential in the Townsite Overlay. Townsite Overlay bulk requirements apply.* - *Max Height: 30'.* o *Proposed building 27'-6" to the peak of the roof* o *Max wall height is 27'-6" high* - *Front Setbacks: TO: 12' from the street. Garage doors must be set back 20' from the front property line facing the street.* o *The proposed house is located 20' from the front property line. The garage is accessed from the alley.* - *Side Setback: 15% of lot width, no less than 6' and 10' is the maximum required* o *Lot 3A is 66.62' wide, therefore the minimum setback is 9.99'* o *The proposed Lot 3A structure is compliant on all side setbacks. This is derived from the following formula: (66.62' X 15% = 9.99'). The plans show a minimum of 14' setback on the north side and 20' setback on the south side.* o *With a 10' setback, on the tallest gable end of the exposed wall, the applicant is allowed a maximum wall height of 30 feet, which is the maximum for the zone. The tallest wall height is 24'-6"* - *Alley Setback: 6'*

				- *The structure is set back 10' from the alley.* - *Maximum Lot coverage: 30% in GR for a two-story dwelling with a garage* o *The lot is 4,826 square feet; therefore the maximum lot coverage is 1,592.6 square feet.* o *All structures shown on site will cover 944 square feet. A maximum of 1,592.6 is permitted.*
☒	☐	☐	**17.06.070 (A)1 Required Street Improvements Required**	**Sidewalks and drainage improvements are required in all zoning districts, except as otherwise provided herein.**
			Staff Comments	- *A 5 foot (5') sidewalk is required.* - *No sidewalks exist on either side of the subject property. Staff has added a condition of approval requiring either sidewalk installation or an in lieu payment for the sidewalk in front of the lot prior to issuance of the Certificate of Occupancy for this project.* - *Applicant has been advised that on-site retention is required for all drainage on the property. Drainage will not be allowed to encroach on adjacent properties or into the public right of way. Drainage on Fifth Street may need to be clarified.*
☐	☐	☒	**6A.7 (B) Required Water System Improvements**	**In the Townsite Overlay District, any proposal for new construction or addition of a garage accessing from the alley, where water main lines within the alley are less than six (6) feet deep, the developer shall install insulating material (blue board insulation or similar material) for each and every individual water service line and main line between and including the subject property and the nearest public street, as recommended by the City Engineer.**
			Staff Comments	- *This will be made a condition of approval.*
Title 18: Mobility Design Ordinance Requirements				
☒	☐	☐	**18.06.010 Street Classifications, Types, and Designations**	
			Staff Comments	• *The primary access to the site is from North Fifth Avenue, which is a Residential Local road classification according to 18.06.010. Secondary access is from the unimproved alley.*
☒	☐	☐	**18.06.012 Street Design and Guideline Standards**	
			Staff Comments	• *No sidewalks exist adjacent to this property- see notes about regarding the sidewalk requirement.*
☐	☐	☒	**18.06.016 Traffic Calming**	
			Staff Comments	• *No traffic calming improvements are proposed. All improvements are located on-site and off the public right of way.*
☒	☐	☐	**18.06.022 Pedestrian Facility Design Guidelines and Standards**	
			Staff Comments	• *A 5' minimum pedestrian zone is required. An in lieu payment is recommended.*
☐	☐	☒	**18.06.024 Bicycle Facility Design Guidelines and Standards**	
			Staff Comments	• *The applicant is not proposing any public bike racks for the single family dwelling. Per Article 9.4.7, no bike racks are required.*
☐	☐	☒	**18.06.026 Street Tree Guidelines and Standards**	
			Staff Comments	• *No street trees are proposed.*

☐	☐	☒	**18.06.028 Streetscape Elements Guidelines and Standards**	
			Staff Comments	• *No streetscape elements are proposed*

Design Review Guidelines for Residential Buildings in the Townsite Overlay District (TO): 17.06.090

1. Site Planning: 17.09.090(C).1

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**Guideline**	**City Standards and *Staff Comments***
☒	☐	☐		**The pattern created by the Old Hailey town grid should be respected in all site planning decisions.**
			Staff Comments	• *The existing lot is configured in a grid pattern.*
☒	☐	☐		**Site planning for new development and redevelopment shall address the following:** • **scale and massing of new buildings consistent with the surrounding neighborhood;** • **building orientation that respects the established grid pattern of Old Hailey;** • **clearly visible front entrances;** • **use of alleys as the preferred access for secondary uses and automobile access;** • **adequate storage for recreational vehicles;** • **yards and open spaces;** • **solar access on the site and on adjacent properties where feasible, and where such decisions do not conflict with other Design Guidelines;** • **snow storage appropriate for the property;** • **underground utilities for new dwelling units.**
			Staff Comments	• *The proposed site plan and development is consistent with the required site planning guidelines.* • *All utilities will be located underground as shown on the site plan. Existing power poles in the alley will remain.*
☒	☐	☐	**6A.9.C.1**	**The use of energy-conserving designs that are compatible with the character of Old Hailey are encouraged. The visual impacts of passive and active solar designs should be balanced with other visual concerns outlined in these Design Guidelines.**
			Staff Comments	• *The structure is designed to maximize solar exposure to the south facing sides on Lot 3A as much as possible, while retaining privacy.*

2. Bulk Requirements (Mass and Scale, Height, Setbacks): 17.09.090(C).2

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***
				The perceived mass of larger buildings shall be diminished by the design.

☒	☐	☐	***Staff Comments***	• *The proposed structure is not a large building: it is consistent in size and mass to the surrounding structures and with the surrounding neighborhood.*

3. Architectural Character: 17.09.090(C).3

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***
☒	☐	☐	**a.**	**General: New buildings should be respectful of the past, but may offer new interpretations of old styles, such that they are seen as reflecting the era in which they are built.**
			Staff Comments	• *Architectural style is a two-story bungalow with themes currently found in Old Hailey.*
☒	☐	☐	**b.**	**Building Orientation: The front entry of the primary structure shall be clearly identified such that it is visible and inviting from the street.**
			Staff Comments	• *This home is located on a street. A pedestrian entrance accesses from the street and is visible from the street.* • *Unrestricted pedestrian access is provided to the front door and from Croy Street.* • *The Commission confirmed that the front entry is clearly enough defined to meet this standard.*
☒	☐	☐	**b.**	**Building Orientation: Buildings shall be oriented to respect the existing grid pattern. Aligning the front wall plane to the street is generally the preferred building orientation.**
			Staff Comments	• *The proposed house accesses from the street, with a wall plane along the street.*
☒	☐	☐	**c.**	**Building Form: The use of building forms traditionally found in Old Hailey is encouraged. Forms that help to reduce the perceived scale of buildings shall be incorporated into the design.**
			Staff Comments	• *Varied roof lines break up the lines of the building. This is consistent with styles and forms found in Old Hailey*
☒	☐	☐	**d.**	**Roof Form: Roof forms shall define the entry to the building, breaking up the perceived mass of larger buildings, and to diminish garages where applicable.**
			Staff Comments	• *A single roof from covers the front of the house; the building is small in scale so perceived mass is not an issue. The garage is accessed form the alley.*
☒	☐	☐	**d.**	**Roof Form: Roof pitch and style shall be designed to meet snow storage needs for the site.** • **Roof pitch materials and style shall retain snow on the roof, or allow snow to shed safely onto the property, and away from pedestrian travel areas.** • **Designs should avoid locating drip lines over key pedestrian routes.** • **Where setbacks are less than ten feet, special attention shall be given to the roof form to ensure that snow does not shed onto adjacent properties.**
			Staff Comments	• *Roof materials: corrugated metal roof. All pedestrian areas are protected.* • *Roof Pitch: 10:12*

☒	☐	☐	**d.**	**Roof Form: The use of roof forms, roof pitch, ridge length and roof materials that are similar to those traditionally found in the neighborhood are encouraged.**
			Staff Comments	• *The following forms are currently found in the neighborhood:* o *Architectural asphalt shingles and metal roofs* o *gable end roofs* o *Shed dormers.* • *The application is consistent with the neighborhood in regards to roof forms and materials*
☒	☐	☐	**d.**	**Roof Form: The roof pitch of a new building should be compatible with those found traditionally in the surrounding neighborhood.**
			Staff Comments	• *Roof pitch is 10:12*
☒	☐	☐	**e.**	**Wall Planes: Primary wall planes should be parallel to the front lot line.**
			Staff Comments	• *Primary wall planes are sited parallel to the front lot line. The applicant clarified in the meeting that the fascia goes up to the flashing strip, and that the gable does not cantilever out.*
☒	☐	☐	**e.**	**Wall Planes: Wall planes shall be proportional to the site, and shall respect the scale of the surrounding neighborhood.**
			Staff Comments	• *Proposed structure utilizes a pitched roof over the covered to break up the wall plane of the building.*
☒	☐	☐	**e.**	**Wall Planes: The use of pop-outs to break up longer wall planes is encouraged.**
			Staff Comments	• *Pop-outs are not used on this structure.*
☒	☐	☐	**f.**	**Windows: Windows facing streets are encouraged to be of a traditional size, scale and proportion.**
			Staff Comments	• *Windows are a mix of traditional and modern with several windows wider than they are tall, but still in scale with the wall planes.*
☒	☐	☐	**g.**	**Windows: Windows on side lot lines adjacent to other buildings should be carefully planned to respect the privacy of neighbors.**
			Staff Comments	• *Windows on side lot lines respect adjacent development.*
☐	☐	☒	**g.**	**Decks and Balconies: Decks and balconies shall be in scale with the building and the neighborhood.**
			Staff Comments	• *No decks or balconies are proposed.*
☐	☐	☒	**g.**	**Decks and Balconies: Decks and balconies should be designed with the privacy of neighbors in mind when possible.**
			Staff Comments	• *No decks or balconies proposed*
☒	☐	☐	**h.**	**Building Materials and Finishes: Materials and colors shall be selected to avoid the look of large, flat walls. The use of texture and detailing to reduce the perceived scale of large walls is encouraged.** **Building Materials and Finishes: Large wall planes shall incorporate more than one material or color to break up the mass of the wall plane.**
			Staff Comments	- *Wall Materials: Hardy board lap siding (see materials) and wood board and batt* - *Fascia: stained cedar* - *Roof Material: metal roofing*
☒	☐	☐	**h.**	**Building Materials and Finishes: Large wall planes shall incorporate more than one material or color to break up the mass of the wall plane.**

			Staff Comments	- *Board and batt and hardy board siding will be present on the front façade. Also, window accents on front façade to break up the wall plane.*
☒	☐	☐	**i.**	**Ornamentation and Architectural Detailing: Architectural detailing shall be incorporated into the front wall plane of buildings.**
			Staff Comments	• *Board and batt and hardy board siding are proposed on the front façade. Also, window accents on front façade to break up the wall plane.*
☒	☐	☐	**i.**	**Ornamentation and Architectural Detailing: The use of porches, windows, stoops, shutters, trim detailing and other ornamentation that is reminiscent of the historic nature of Old Hailey is encouraged.**
			Staff Comments	• *Proposed front entry is tucked under the roof line.*
☒	☐	☐	**i.**	**Ornamentation and Architectural Detailing: Architectural details and ornamentation on buildings should be compatible with the scale and pattern of the neighborhood.**
			Staff Comments	• *See above notes.*

4. Circulation and Parking: 17.09.090(C).4

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***
☒	☐	☐	**4.**	**Guideline: Safety for pedestrians shall be given high priority in site planning, particularly with respect to parking, vehicular circulation and snow storage issues.**
			Staff Comments	• *Adequate parking has been provided and, once the sidewalk is installed or an in lieu payment received, pedestrian access off the adjacent streets is provided and does not interfere with traffic from the streets.*
☒	☐	☐	**4.**	**Guideline: The visual impacts of on-site parking visible from the street shall be minimized.**
			Staff Comments	• *No parking is visible from the street.*
☒	☐	☐	**6A.9.C.4**	**Guideline: As a general rule, garages and parking should be accessed from the alley side of the property and not the street side.**
			Staff Comments	• *The garage is accessed from the alley.*
☐	☐	☒	**.4**	**Guideline: Detached garages accessed from alleys are strongly encouraged.**
			Staff Comments	- *Proposed garage is attached, but is accessed from the alley and will not be visible from the street.*
☐	☐	☒	**4.**	**Guideline: When garages must be planned on the street side, garage doors shall be set back and remain subordinate to the front wall plane.**
			Staff Comments	• *Garage is not on the street side and is not adjacent to a street.*
☐	☐	☒	**4.**	**Guideline: When garages and/or parking must be planned on the street side, parking areas are preferred to be one car in width. When curb cuts must be planned, they should be shared or minimized.**
			Staff Comments	• *No curb cuts are planned street side.*
☐	☐	☒	**4.**	**Guideline: Off-street parking space for recreational vehicles should be developed as part of the overall site planning.**
			Staff Comments	• *No RV parking is proposed*

5. Alleys: : 17.09.090(C).5

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***
☒	☐	☐	**6A.9.C.5**	**Guideline: Alleys shall be retained in site planning. Lot lines generally shall not be modified in ways that eliminate alley access to properties.**
			Staff Comments	- *The alley will be sued to access the garage.*
☒	☐	☐	**6A.9.C.5**	**Guideline: Alleys are the preferred location for utilities, vehicular access to garages, storage areas (including recreational vehicles) and accessory buildings. Design and placement of accessory buildings that access off of alleys is encouraged.**
			Staff Comments	• *The garage and the utilities will be located off of the alley.*
☒	☐	☐	**6A.9.C.5**	**Guideline: Generally, the driving surface of alleys within Limited Residential and General Residential may remain a dust-free gravel surface, but should be paved within Business, Limited Business, and Transitional. The remainder of the City alley should be managed for noxious weed control, particularly after construction activity.**
			Staff Comments	• *The alley is currently undeveloped, and is best accessed from the south. Various branch trimming in the vicinity will be needed.*
☒	☐	☐	**6A.9.C.5**	**Guideline: Landscaping and other design elements adjacent to alleys should be kept simple, and respect the functional nature of the area and the pedestrian activity that occurs.**
			Staff Comments	- *Alley design is simple and functional.*

6. Accessory Structures: : 17.09.090(C).6

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***
☒	☐	☐	**6A.9.C.6**	**Guideline: Accessory buildings shall appear subordinate to the main building on the property in terms of size, location and function.**
			Staff Comments	- *A small gardening shed is sown off the alley.*
☒	☐	☐	**6A.9.C.6**	**Guideline: In general, accessory structures shall be located to the rear of the lot and off of the alley unless found to be impractical.**
			Staff Comments	- *The gardening shed is proposed to the rear of the lot*

7. Snow Storage: : 17.09.090(C).7

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***
☒	☐	☐	**6A.9.C.7**	**Guideline: All projects shall be required to provide 25% snow storage on the site.**
			Staff Comments	• *A snow storage area has been shown on the site plan. Paved and walkway areas equal 260 square feet; snow storage area is shown at 340 square feet.*
☒	☐	☐	**6A.9.C.7**	**Guideline: A snow storage plan shall be developed for every project showing:** • **Where snow is stored, key pedestrian routes and clear vision triangles.** • **Consideration given to the impacts on adjacent properties when planning snow storage areas.**
			Staff Comments	• *See above.*

8. Existing Mature Trees and Landscaping: : 17.09.090(C).8

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***
☐	☐	☒	**6A.9.C.8**	**Guideline: Existing mature trees shall be shown on the site plan, with notations regarding retention, removal or relocation. Unless shown to be infeasible, a site shall be carefully planned to incorporate existing mature trees on private property into the final design plan.**
			Staff Comments	- *A fruit tree and some shrubs exist on this lot. They will be retained and pruned.*
☐	☐	☒	**6A.9.C.8**	**Guideline: Attention shall be given to other significant landscape features which may be present on the site. Mature shrubs, flower beds and other significant landscape features shall be shown on the site plan and be incorporated into the site plan where feasible.**
			Staff Comments	- *No significant landscape features exist on this lot.*
☒	☐	☐	**6A.9.C.8**	**Guideline: Noxious weeds shall be controlled according to State Law.**
			Staff Comments	- *Noxious weeds are not present on the site.*

9. Fences and Walls: : 17.09.090(C).9

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***
☐	☐	☒	**6A.9.C.9**	**Guideline: Fences and walls that abut public streets and sidewalks should be designed to include fence types that provide some transparency, lower heights and clearly marked gates.**
			Staff Comments	- *No fences are proposed*
☐	☐	☒	**6A.9.C.9**	**Guideline: Retaining walls shall be in scale to the streetscape.**
			Staff Comments	- *No retaining walls are proposed*

11. Historic Structures: 17.09.090(C).11 (NOTE: Applicable only to structures built prior to 1940)

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***
☐	☐	☒	**6A.9.C.10**	**General Guidelines: Any alteration to the exterior of a Historic Structure requiring design review approval shall meet the following guidelines:** • **The alteration should be congruous with the historical, architectural, archeological, educational or cultural aspects of other Historic Structures within the Townsite Overlay District, especially those originally constructed in the same Period of Significance.** • **The alteration shall be contributing to the Townsite Overlay District. Adaptive re-use of Historic Structures is supported while maintaining the architectural integrity of the original structure.**
			Staff Comments	- *Structure is not historic.*
☐	☐	☒	**6A.9.C.9**	**Specific Guidelines. Any alteration to the exterior of a Historic Structure requiring design review approval shall meet the following specific guidelines:**

				• **The design features of repairs and remodels including the general streetscape, materials, windows, doors, porches, and roofs shall not diminish the integrity of the original structure.** • **New additions should be designed to be recognizable as a product of their own Period of Significance with the following guidelines related to the historical nature of the original structure:** o **The addition should not destroy or obscure important architectural features of the original building and/or the primary façade;** o **Exterior materials that are compatible with the original building materials should be selected;** o **The size and scale of the addition should be compatible with the original building, with the addition appearing subordinate to the primary building;** o **The visual impact of the addition should be minimized from the street;** o **The mass and scale of the rooftop on the addition should appear subordinate to the rooftop on the original building, and should avoid breaking the roof line of the original building;** o **The roof form and slope of the roof on the addition should be in character with the original building;** **The relationship of wall planes to the street and to interior lots should be preserved with new additions.**
			Staff Comments	- *Structure is not historic.*

6A.6 Criteria.

A. The Commission or Hearing Examiner shall determine the following before approval is given:

1. **The project does not jeopardize the health, safety or welfare of the public.**
2. **The project conforms to the applicable specifications outlined in the Design Review Guidelines, as set forth herein, applicable requirements of the Zoning Ordinance, and City Standards.**

B. Conditions. The Commission or Hearing Examiner may impose any condition deemed necessary. The Commission or Hearing Examiner may also condition approval of a project with subsequent review and/or approval by the Administrator or Planning Staff. Conditions which may be attached include, but are not limited to those which will:

1. **Ensure compliance with applicable standards and guidelines.**
2. **Require conformity to approved plans and specifications.**
3. **Require security for compliance with the terms of the approval.**
4. **Minimize adverse impact on other development.**
5. **Control the sequence, timing and duration of development.**
6. **Assure that development and landscaping are maintained properly.**
7. **Require more restrictive standards than those generally found in the Zoning Ordinance.**

C. Security. The applicant may, in lieu of actual construction of any required or approved improvement, provide to the City such security as may be acceptable to the City, in a form and

in an amount equal to the cost of the engineering or design, materials and installation of the improvements not previously installed by the applicant, plus fifty percent (50%), which security shall fully secure and guarantee completion of the required improvements within a period of one (1) year from the date the security is provided.

1. **If any extension of the one year period is granted by the City, each additional year, or portion of each additional year, shall require an additional twenty percent (20%) to be added to the amount of the original security initially provided.**
2. **In the event the improvements are not completely installed within one (1) year, or upon the expiration of any approved extension, the City may, but is not obligated, to apply the security to the completion of the improvements and complete construction of the improvements.**

CONCLUSIONS OF LAW

Based upon the above Findings of Fact, the Commission makes the following Conclusions of Law:

1. Adequate notice, pursuant to Title 17, Section 17.06.040(D), was given.
2. The project is in general conformance with the Hailey Comprehensive Plan.
3. The project does not jeopardize the health, safety, or welfare of the public.
4. Upon compliance with the conditions set forth, the project conforms to the applicable standards of Article 6A, Design Review, other Articles of the Zoning Ordinance and City Standards.

DECISION

The Design Review application submitted by Design Review application submitted by Linda Bergerson for a new single family residence to be located on Lot 3A, Block 96 of the Hailey Townsite (109 N. 5th Street) within the Limited Residential-1 (LR-1) District and the Townsite Overlay (TO), finding that the project does not jeopardize the health, safety or welfare of the public and the project conforms to the applicable specifications outlined in the Design Review Guidelines, applicable requirements of the Zoning Ordinance, and City Standards, provided conditions (a) through (h) are met.

The following conditions are suggested to be placed on any approval of this application:

a) All applicable Fire Department and Building Department requirements shall be met.
b) Any change in use or occupancy type from that approved at time of issuance of Building Permit may require additional improvements and/or approvals. Additional parking may also be

required upon subsequent change in use, in conformance with Hailey's Zoning Ordinance at the time of the new use.

c) All City infrastructure requirements shall be met. Detailed plans for all infrastructure to be installed or improved at or adjacent to the site shall be submitted for Department Head approval and shall meet City Standards where required. Infrastructure to be completed at the applicant's sole expense include, but will not be limited to, the following requirements and improvements: 1) an In Lieu payment for the required sidewalk along the length of Fifth Avenue prior to the issuance of the Certificate of Occupancy, and ; 2) if water main lines within the alley are less than six (6) feet deep, the applicant shall install insulating material (blue board insulation or similar material) for each and every individual water service line and main line between and including the subject property and the nearest public street, as recommended by the City Engineer.

d) The project shall be constructed in accordance with the application or as modified by these Findings of Fact, Conclusions of Law and Decision.

e) All new and existing exterior lighting shall comply with the Outdoor Lighting Ordinance.

f) Except as otherwise provided, all the required improvements shall be constructed and completed, or sufficient security provided as approved by the City Attorney, before a Certificate of Occupancy can be issued.

g) This Design Review approval is for plans as reviewed by the Commission on July 11, 2016. The Planning & Zoning Administrator has the authority to approve minor modifications to this project prior to, and for the duration of a valid Building Permit.

h) All utilities will be located underground.

Signed this _____ day of _____, 2016.

_____
Janet Fugate, Chair

Attest:

_____
Robyn Davis, Community Development Assistant

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FINDINGS OF FACT, CONCLUSIONS OF LAW AND DECISION

On June 22, 2016, the Hailey Planning and Zoning Commission considered a Design Review application Wise Guy Pizza Pie, represented by Jay Cone of Jay Cone Architecture, for a new 3,003 square foot pizzeria

Notice

Notice for the public hearing was published in the Idaho Mountain Express on June 22, 2106 and mailed to property owners within 300 feet on June 22, 2016.

Application

Wise Guy Pizza Pie, represented by Jay Cone of Jay Cone Architecture, plans to construct a new 3,003 square foot pizzeria. The existing building (home of the old Power House) is currently being demolished. The building enters off of Main Street, and contains outside patio seating under a covered shed roof on the south side. Parking and service areas are located off of the alley.

Procedural History

The application was submitted on December 22, 2015 and certified complete on the same date. A public hearing before the Planning and Zoning Commission for approval or denial of the project was held on January 28, 2016, in the Hailey City Council Chambers.

General Requirements for all Design Review Applications

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and** *Staff Comments*
☒	☐	☐	**17.06.050**	**Complete Application**
☒	☐	☐	**Department Comments**	**Engineering**: *See comments under landscape section regarding existing irrigation and City street trees. Drawings should clarify that drainage on the north side of the property will remain on-site.* *The city Engineer confirmed via email to staff prior to the meeting that the front property line is approximately 4'-6" back from the sidewalk, and that all of the trees in the area adjacent to the sidewalk are City Trees.*
				Life/Safety: *No comments*
				Water and Sewer: *The project will comply with all City water and sewer standards. Two* water *meter vaults exist for this property: applicant will either need to use both of them (i.e. one for in the building and the other for irrigation) or abandon one of them at the water main.*
				Building*: No comments*
				Streets: *No comments*

				Tree Committee: *Recommendations sent in via email, attached to the staff report*
☒	☐	☐	**17.08A Signs**	**17.08A Signs: The applicant is hereby advised that a sign permit is required for any signage exceeding four square feet in sign area. Approval of signage areas or signage plan in Design Review does not constitute approval of a sign permit.**
			Staff Comments	*Two new signs are proposed: one a projecting neon sign (historic style) and a flat sign will be affixed to the front canopy. Both signs will conform to City regulations.*
☒	☐	☐	**17.09.040 On-site Parking Req.**	**See Section 17.09.040 for applicable code.** **9.4.5, 1 space per 1,000 square feet. 9.4.A.1, fractional spaces are rounded down**
			Staff Comments	*The site plan shows six (6) head-in parking spaces off of the alley. Three spaces are required for this project.*
☒	☐	☐	**17.08C.040 Outdoor Lighting Standards**	**17.08C.040 General Standards** **a. All exterior lighting shall be designed, located and lamped in order to prevent:** **1. Overlighting;** **2. Energy waste;** **3. Glare;** **4. Light Trespass;** **5. Skyglow.** **b. All non-essential exterior commercial and residential lighting is encouraged to be turned off after business hours and/or when not in use. Lights on a timer are encouraged. Sensor activated lights are encouraged to replace existing lighting that is desired for security purposes.** **c. Canopy lights, such as service station lighting shall be fully recessed or fully shielded so as to ensure that no light source is visible from or causes glare on public rights of way or adjacent properties.** **d. Area lights. All area lights are encouraged to be eighty-five (85) degree full cut-off type luminaires.** **e. Idaho Power shall not install any luminaires after the effective date of this Article that lights the public right of way without first receiving approval for any such application by the Lighting Administrator.**
			Staff Comments	*The applicant is proposing four (4) styles of new lighting fixtures, to be located over the front canopy, and various locations on the building as shown on Sheet A-101. The fixture designs are compliant with City Standards. Various recessed cans are also proposed under the front and side canopies.*
☒	☐	☐	**Bulk Requirements**	**(Insert sections from applicable zoning district)**
			Staff Comments	*The District Use matrix has zero front, side and rear setbacks in the B Zone. The building is within all of these setbacks. The building is proposed to be 29'-10.5", which is within the 35' allowed.*
☒	☐	☐	**17.06.070(A)1 Street Improvements Required**	**Sidewalks and drainage improvements are required in all zoning districts, except as otherwise provided herein.** *Sidewalks and street trees are existing. No changes are recommended to the existing sidewalk on Main Street.*
			Staff Comments	
☒	☐	☐	**17.06.070(B) Required Water System Improvements**	**In the Townsite Overlay District, any proposal for new construction or addition of a garage accessing from the alley, where water main lines within the alley are less than six (6) feet deep, the developer shall install insulating material (blue board insulation or similar material) for each and every individual water service line and main line between and including the subject property and the nearest public street, as recommended by the City Engineer.**
			Staff Comments	*This will be made a condition of approval.*

Design Review Requirements for Non-Residential, Multifamily, and/or Mixed Use Buildings within the City of Hailey

1. Site Planning: 17.06.080(A)1, items (a) thru (n)

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***
☒	☐	☐	**17.06.080(A)1a**	**a. The location, orientation and surface of buildings shall maximize, to the greatest extent possible sun exposure in exterior spaces to create spaces around buildings that are usable by the residents and allow for safe access to buildings**
			Staff Comments	*The proposed building follows the grid pattern in downtown Hailey. Outdoor seating is planned on the south side, and a porch on the west side will allow afternoon sun.*
☒	☐	☐	**17.06.080(A)1b**	**b. All existing plant material shall be inventoried and delineated, to scale, and noted whether it is to be preserved, relocated or removed. Removal of trees larger than 6 inch caliper proposed to be removed require an arborist review. Any tree destroyed or mortally injured after previously being identified to be preserved, or removed without authorization, shall be replaced with a species of tree found in the Tree Guide and shall be a minimum of 4 inch caliper.**
			Staff Comments	*The site contains a variety of landscaping, shown on Sheet A-101. Five deciduous trees are proposed to be removed. One of these is a mature City Street tree. The Hailey Tree Committee members have commented, and recommend that this tree be retained, as it is in good health, is one of the nicer street trees on Main Street, and that this linden tree is part of a formal street tree design that places trees at regular intervals up and down the block, that this street tree pattern is in front of many buildings on this block, that the trees on main street create a pleasant Main Street environment, that it would set a bad precedent o allow this tree to be removed, and that it will be an asset over time for adjacent properties. Street Department staff has noted that irrigation located under the sidewalk associated with this tree could undermine the sidewalk if removed. Comments from Tree Committee members are attached to this report. The Commission confirmed that the City street trees shall remain, and that this item will be made a Condition of Design Review approval.* *An inventory of existing plant material has not been prepared. The Chair noted that the street trees have monetary value in addition to the above, and does staff know the value of this tree.*
☒	☐	☐	**17.06.080(A)1c**	**c. Site circulation shall be designed so pedestrians have safe access to and through the site and to building.**
			Staff Comments	*Pedestrians access the building from the front sidewalk or the back parking area in a safe manner. The east side of the building allows access via a striped path through the parking. Access to the second floor is by an exterior stair at the West side of the building.* -

☒	☐	☐	**17.06.080(A)1d**	**d. Building services including loading areas, trash storage/pickup areas and utility boxes shall be located at the rear of a building; the side of the building adjacent to an internal lot line may be considered as an alternate location. These areas shall be designed in a manner to minimize conflict among uses and shall not interfere with other uses, such as snow storage. These areas shall be screened with landscaping, enclosures, fencing or by the principal building.**
			Staff Comments	*Trash receptacles will be stored within a fenced enclosure on the West side of the building adjacent to the alley for easy pick-up. Commissioners questioned if the trash enclosure area could be relocated to the north side of the lot (near the alley) which would be farther away from the outside seating/lawn area.*
☒	☐	☐	**17.06.080(A)1e**	**e. Where alleys exist, or are planned, they shall be utilized for building services.**
			Staff Comments	- *The alley will be utilized for utilities and parking.*
☐	☐	☒	**17.06.080(A)1f**	**f. Vending machines located on the exterior of a building shall not be visible from any street.**
			Staff Comments	
☒	☐	☐	**17.06.080(A)1g**	**g. On-site parking areas shall be located at the rear of the building and screened from the street. Parking and access shall not be obstructed by snow accumulation. *(NOTE: If project is located in Airport West Subdivision, certain standards may apply that are not listed here. See code for details.)*** **i. Parking areas located within the SCI zoning district may be located at the side or rear of the building.** **ii. Parking areas may be considered at the side of buildings within the B, LB, TI and LI zoning districts provided a useable prominent entrance is located on the front of the building and the parking area is buffered from the sidewalk adjacent to the street.**
			Staff Comments	*Six parking spaces are provided at the back of the building off the alley. A snow storage area is provided at the Southwest corner of the property at the end of the parking stalls.*
☐	☐	☒	**17.06.080(A)1h**	**h. Access to on-site parking shall be from the alley or, if the site is not serviced by an alley, from a single approach to the street to confine vehicular/pedestrian conflict to limited locations, allow more buffering of the parking area and preserve the street frontage for pedestrian traffic.**
			Staff Comments	*N/A*
☒	☐	☐	**17.06.080(A)1i**	**i. Snow storage areas shall be provided on-site where practical and sited in a manner that is accessible to all types of snow removal vehicles of a size that can accommodate moderate areas of snow.**
			Staff Comments	*53% of the parking, vehicle and pedestrian areas are provided as a snow storage area.*
☒	☐	☐	**17.06.080(A)1j**	**j. Snow storage areas shall not be less than 25% of the improved parking and vehicle and pedestrian circulation areas.**
			Staff Comments	*See Standard (i) above.*
☒	☐	☐	**17.06.080(A)1k**	**k. A designated snow storage area shall not have any dimension less than 10 feet.**
			Staff Comments	*Snow storage area is 30' wide.*
☐	☐	☒	**17.06.080(A)1l**	**l. Hauling of snow from downtown areas is permissible where other options are not practical.**

			Staff Comments	*Snow will not be hauled off site.*
☒	☐	☐	**17.06.080(A)1m**	**m. Snow storage areas shall not impede parking spaces, vehicular and pedestrian circulation or line of sight, loading areas, trash storage/pickup areas, service areas or utilities.**
			Staff Comments	*Snow storage areas do not impede parking or pedestrian areas.*
☒	☐	☐	**17.06.080(A)1n**	**n. Snow storage areas shall be landscaped with vegetation that is salt-tolerant and resilient to heavy snow.**
			Staff Comments	*Snow storage areas will be seeded with grass only.*

2. Building Design: 17.06.080(A)2, items (a) thru (m)

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***
☒	☐	☐	**17.06.080(A)2a**	**a. The proportion, size, shape and rooflines of new buildings shall be compatible with surrounding buildings.**
			Staff Comments	*The proposed gable roof is similar to multiple residential structures in the downtown area. The Commission discussed the addition of a gable element on the west elevation similar to the gable element on the east elevation.*
☐	☐	☒	**17.06.080(A)2b**	**b. Standardized corporate building designs are prohibited.**
			Staff Comments	
☐	☐	☒	**17.06.080(A)2c**	**c. At ground level, building design shall emphasize human scale, be pedestrian oriented and encourage human activity and interaction.**
			Staff Comments	*The building features a modest profile. The deck, signage and lighting will add to the human scale. It was clarified in the meeting that the roll-up doors facing south to the patio will be glass.*
☒	☐	☐	**17.06.080(A)2d**	**d. The front façade of buildings shall face the street and may include design features such as windows, pedestrian entrances, building off-sets, projections, architectural detailing, courtyards and change in materials or similar features to create human scale and break up large building surfaces and volumes.**
			Staff Comments	*The main entry / front façade faces Main Street and has multiple windows sheltered by a marquis roof which breaks up the larger gable form above.*
☐	☐	☒	**17.06.080(A)2e**	**e. Any addition onto or renovation of an existing building shall be designed to create a cohesive whole.**
			Staff Comments	
☒	☐	☐	**17.06.080(A)2f**	**f. All exterior walls of a building shall incorporate the use of varying materials, textures and colors.**
			Staff Comments	*Three materials will be used on the exterior: Board and Batten, corrugated siding and smooth siding. The Commission discussed various design elements that could be added on the north and west facades, such as a horizontal element, gable vent on the west elevation, or windows. A gable element was determined to be an appropriate addition to meet this standard.*

☒	☐	☐	**17.06.080(A)2g**	**g. Exterior buildings colors and materials shall be integrated appropriately into the architecture of the building and be harmonious within the project and with surrounding buildings.**
			Staff Comments	*Muted dark red and charcoal seek to enhance the historical detail and form of the building. See color and material samples for additional information.*
☐	☐	☒	**17.06.080(A)2h**	**h. Flat-roofed buildings over two stories in height shall incorporate roof elements such as parapets, upper decks, balconies or other design elements.**
			Staff Comments	*The proposed building does not have a flat roof.*
☒	☐	☐	**17.06.080(A)2i**	**i. All buildings shall minimize energy consumption by utilizing alternative energy sources and/or passive solar techniques. At least three (3) of the following techniques, or an approved alternative, shall be used to improve energy cost savings and provide a more comfortable and healthy living space:** **i) Solar Orientation. If there is a longer wall plane, it shall be placed on an east-west axis. A building's wall plane shall be oriented within 30 degrees of true south.** **ii) South facing windows with eave coverage. At least 40% of the building's total glazing surface shall be oriented to the south, with roof overhang or awning coverage at the south.** **iii) Double glazed windows.** **iv) Windows with Low Emissivity glazing.** **v) Earth berming against exterior walls** **vi) Alternative energy. Solar energy for electricity or water heating, wind energy or another approved alternative shall be installed on-site.** **vii) Exterior light shelves. All windows on the southernmost facing side of the building shall have external light shelves installed.**
			Staff Comments	*The south wall is the long axis and is oriented to the south. Doors on the south add to the glazing.*
☒	☐	☐	**17.06.080(A)2j**	**j. Gabled coverings, appropriate roof pitch, or snow clips and/or gutters and downspouts shall be provided over all walkways and entries to prevent snow from falling directly onto adjacent sidewalks.**
			Staff Comments	*Snow clips will be placed on the roof over entrances and pedestrian areas. Gutters will be located along eave lines on the South side of the building to protect the yard and patio.*
☒	☐	☐	**17.06.080(A)2k**	**k. Downspouts and drains shall be located within landscape areas or other appropriate locations where freezing will not create pedestrian hazards.**
			Staff Comments	*Downspouts will be routed underground to a drywell.*
☐	☐	☒	**17.06.080(A)2l**	**l. Vehicle canopies associated with gas stations, convenience stores or drive-through facilities shall have a minimum roof pitch of 3/12 and be consistent with the colors, material and architectural design used on the principal building(s).**
			Staff Comments	
☐	☐	☒	**17.06.080(A)2m**	**m. A master plan for signage is required to ensure the design and location of signs is compatible with the building design and compliance with Article 8.**
			Staff Comments	*A Master signage plan is not required of a single-tenant building.*

3. Accessory Structures, Fences and Equipment/Utilities: 17.06.080(A)3, items (a) thru (i)

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***
☐	☐	☒	**17.06.080(A)3a**	**a. Accessory structures shall be designed to be compatible with the principal building(s).**
			Staff Comments	*No accessory structures are planned.*
☐	☐	☒	**17.06.080(A)3b**	**b. Accessory structures shall be located at the rear of the property.**
			Staff Comments	*N/A*
☒	☐	☐	**17.06.080(A)3c**	**c. Walls and fences shall be constructed of materials compatible with other materials used on the site.**
			Staff Comments	*The fence around the trash enclosure will be painted to match the building.*
☒	☐	☐	**17.06.080(A)3d**	**d. Walls and fencing shall not dominate the buildings or the landscape. Planting should be integrated with fencing in order to soften the visual impact.**
			Staff Comments	*Fencing at the front of the building will be softened by existing landscaping and will be a weathered color or other to work with the building*
☐	☐	☒	**17.06.080(A)3e**	**e. All roof projections including, roof-mounted mechanical equipment, such as heating and air conditioning units, but excluding solar panels and Wind Energy Systems that have received a Conditional Use Permit, shall be shielded and screened from view from the ground level of on-site parking areas, adjacent public streets and adjacent properties.**
			Staff Comments	
☐	☐	☒	**17.06.080(A)3f**	**f. The hardware associated with alternative energy sources shall be incorporated into the building's design and not detract from the building and its surroundings.**
			Staff Comments	
☒	☐	☐	**17.06.080(A)3g**	**g. All ground-mounted mechanical equipment, including heating and air conditioning units, and trash receptacle areas shall be adequately screened from surrounding properties and streets by the use of a wall, fence, or landscaping, or shall be enclosed within a building.**
			Staff Comments	*Heating and air conditioning will be interior; the trash area will be screened.*
☒	☐	☐	**17.06.080(A)3h**	**i. All service lines into the subject property shall be installed underground.**
			Staff Comments	*All services lines are underground.*
☐	☐	☒	**17.06.080(A)3i**	**j. Additional appurtenances shall not be located on existing utility poles.**
			Staff Comments	

4. Landscaping: 17.06.080(A)4, items (a) thru (n)

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***

☒	☐	☐	**17.06.080(A)4a**	**a. Only drought tolerant plant species and/or xeriscape specific plant materials shall be used, as specified by the Hailey Landscaping Manual or an approved alternative.**
			Staff Comments	*Plant materials will be appropriate for the environment.*
☒	☐	☐	**17.06.080(A)4b**	**b. All plant species shall be hardy to the Zone 4 environment.**
			Staff Comments	
☒	☐	☐	**17.06.080(A)4c**	**c. At a minimum, a temporary irrigation system that fully operates for at least two complete growing seasons is required in order to establish drought tolerant plant species and/or xeriscape specific plant materials. Features that minimize water use, such as moisture sensors, are encouraged.**
			Staff Comments	*An automatic drip irrigation system on a timer is planned.*
☒	☐	☐	**17.06.080(A)4d**	**d. Landscaped areas shall be planned as an integral part of the site with consideration of the urban environment. A combination of trees shrubs, vines, ground covers and ornamental grasses shall be used. New landscaped areas having more than 10 trees, a minimum of 10% of the trees shall be at least 4-inch caliper, 20% shall be at least 3-inch caliper, and 20% shall be at least 2½ inch caliper and a maximum of 20% of any single tree species may be used in any landscape plan (excluding street trees). New planting areas shall be designed to accommodate typical trees at maturity. Buildings within the LI and SCI-I zoning district are excluded from this standard.**
			Staff Comments	*Much of the existing landscaping is to be retained. Staff concurs with the Tree Committee and recommends that the existing street tree be retained. See standard 17.06.080(A)1b for the rationale behind the Condition of Approval to retain the City street tree in front of the proposed building.*
☐	☐	☒	**17.06.080(A)4e**	**e. Seasonal plantings in planter boxes, pots, and/or hanging baskets shall be provided to add color and interest to the outside of buildings in the LI and SCI-I zoning districts.**
			Staff Comments	
☒	☐	☐	**17.06.080(A)4f**	**f. Plantings for pedestrian areas within the B, LB, TN and SCI-O zoning districts shall be designed with attention to the details of color, texture and form. A variety of trees, shrubs, perennials, ground covers and seasonal plantings, with different shapes and distinctive foliage, bark and flowers shall be used in beds, planter boxes, pots, and/or hanging baskets.**
			Staff Comments	*Existing landscaping is varied. The formal City street tree pattern in this area is well established, and creates a canopy of street trees for this block.*
☐	☐	☒	**17.06.080(A)4g**	**g. Storm water runoff should be retained on the site wherever possible and used to irrigate plant materials.**
			Staff Comments	
☒	☐	☐	**17.06.080(A)4h**	**h. A plan for maintenance of the landscaping areas is required to ensure that the project appears in a well maintained condition (i.e., all weeds and trash removed, dead plant materials removed and replaced).**
			Staff Comments	*The applicant will be responsible for maintaining plant material in healthy condition. The City maintains the City street trees, including irrigation, pruning, holiday lighting and any other needs.*
☐	☐	☒	**17.06.080(A)4i**	**i. Retaining walls shall be designed to minimize their impact on the site and the appearance of the site.**
			Staff Comments	
☐	☐	☒	**17.06.080(A)4j**	**j. Retaining walls shall be constructed of materials that are utilized elsewhere on the site, or of natural or decorative materials.**
			Staff Comments	
☐	☐	☒	**17.06.080(A)4k**	**k. Retaining walls, where visible to the public and/or to residents or employees of the project, shall be no higher than four feet or terraced with a three foot horizontal separation of walls.**

			Staff Comments	
☐	☐	☒	**17.06.080(A)4l**	**l. Landscaping should be provided within or in front of extensive retaining walls.**
			Staff Comments	
☐	☐	☒	**17.06.080(A)4m**	**m. Retaining walls over 24" high may require railings or planting buffers for safety.**
			Staff Comments	
☐	☒	☐	**17.06.080(A)4n**	**n. Low retaining walls may be used for seating if capped with a surface of at least 12 to 16 inches wide.**
			Staff Comments	

Additional Design Review Requirements for Non-Residential Buildings Located within B, LB, or TN

1. Site Planning: 17.06.080(B)1, items (a) thru (b)

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***
☒	☐	☐	**17.06.080(B)1a**	**a. The site shall support pedestrian circulation and provide pedestrian amenities. Sidewalks shall be provided along building fronts.**
			Staff Comments	*A sidewalk and street trees currently exist on the building front. The street trees provide a shade canopy on this portion of Main Street.*
☒	☐	☐	**17.06.080(B)1b**	**b. Wider sidewalks are encouraged to provide additional amenities such as seating areas and bicycle racks.**
			Staff Comments	*The Commission did not require the applicant to widen the sidewalk in this area.*

2. Building Design: 17.06.080(B)2, items (a) thru (c)

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***
☒	☐	☐	**17.06.080(B)2a**	**a. The main facade shall be oriented to the street. The main entrance(s) to the building shall be located on the street side of the building. If the building is located on a corner, entrances shall be provided on both street frontages. If the design includes a courtyard, the main entrance may be located through the courtyard. Buildings with more than one retail space on the ground floor are encouraged to have separate entrances for each unit.**
			Staff Comments	*The entrance to the building is on Main Street.*
☐	☐	☒	**17.06.080(B)2b**	**b. Multi-unit structures shall emphasize the individuality of units or provide visual interest by variations in roof lines or walls or other human scale elements. Breaking the facades and roofs of buildings softens the institutional image which may often accompany large buildings.**
			Staff Comments	
☒	☐	☐	**17.06.080(B)2c**	**c. Building designs shall maximize the human scale of buildings and enhance the small town "sense of place". This can be achieved by utilizing voids and masses, as well as details, textures, and colors on building facades. Human scale can also be achieved by incorporating structural elements such as colonnades and covered walkways, overhangs, canopies, entries, and**

				landscaping. Particular attention should be paid to creating interest at the street level.
			Staff Comments	*Pedestrian access is from sidewalks on the east side of the building. Street trees add to the vegetative canopy in this portion of Main Street.*
☐	☐	☒	**17.06.080(B)2d**	**d. Buildings that exceed 30 feet in height, the entire roof surface shall not project to the highest point of the roof. The Commission shall review building height relative to the other dimensions of width and depth combined with detailing of parapets, cornices, roof, and other architectural elements.**
			Staff Comments	
☐	☐	☒	**17.06.080(B)2e**	**e. Livable outdoor spaces in multi-story buildings that create pleasing elements and reduce the mass of taller buildings are encouraged.**
			Staff Comments	
☒	☐	☐	**17.06.080(B)2f**	**f. Fire department staging areas shall be incorporated into the design elements of the building.**
			Staff Comments	*The building is within 150' of the street.*
☐	☐	☒	**17.06.080(B)2g**	**g. New buildings adjacent to residential areas shall be designed to ensure that building massing and scale provide a transition to adjoining residential neighborhoods. Possible mitigation techniques include, but are not limited to the following:** **i. Locating open space and preserving existing vegetation on the edge of the site to further separate the building from less intensive uses;** **ii. Stepping down the massing of the building along the site's edge; and** **iii. Limiting the length of or articulating building facades to reflect adjacent residential patterns**
			Staff Comments	
Compliant				
Yes	**No**	**N/A**		
☐	☐	☒		

6A.6 Criteria.

A. The Commission or Hearing Examiner shall determine the following before approval is given:

1. **The project does not jeopardize the health, safety or welfare of the public.**
2. **The project conforms to the applicable specifications outlined in the Design Review Guidelines, as set forth herein, applicable requirements of the Zoning Ordinance, and City Standards.**

B. Conditions. The Commission or Hearing Examiner may impose any condition deemed necessary. The Commission or Hearing Examiner may also condition approval of a project with subsequent review and/or approval by the Administrator or Planning Staff. Conditions which may be attached include, but are not limited to those which will:

1. **Ensure compliance with applicable standards and guidelines.**
2. **Require conformity to approved plans and specifications.**
3. **Require security for compliance with the terms of the approval.**
4. **Minimize adverse impact on other development.**

5. **Control the sequence, timing and duration of development.**
6. **Assure that development and landscaping are maintained properly.**
7. **Require more restrictive standards than those generally found in the Zoning Ordinance.**

C. **Security. The applicant may, in lieu of actual construction of any required or approved improvement, provide to the City such security as may be acceptable to the City, in a form and in an amount equal to the cost of the engineering or design, materials and installation of the improvements not previously installed by the applicant, plus fifty percent (50%), which security shall fully secure and guarantee completion of the required improvements within a period of one (1) year from the date the security is provided.**

1. **If any extension of the one year period is granted by the City, each additional year, or portion of each additional year, shall require an additional twenty percent (20%) to be added to the amount of the original security initially provided.**
2. **In the event the improvements are not completely installed within one (1) year, or upon the expiration of any approved extension, the City may, but is not obligated, to apply the security to the completion of the improvements and complete construction of the improvements.**
3.

CONCLUSIONS OF LAW

Based upon the above Findings of Fact, the Commission makes the following Conclusions of Law:

1. Adequate notice, pursuant to Title 17, Section 17.06.040(D), was given.
2. The project is in general conformance with the Hailey Comprehensive Plan.
3. The project does not jeopardize the health, safety, or welfare of the public.
4. Upon compliance with the conditions set forth, the project conforms to the applicable standards of Article 6A, Design Review, other Articles of the Zoning Ordinance and City Standards.

DECISION

The Design Review application submitted by Design Review application submitted by Wise Guy Pizza Pie, represented by Jay Cone Architecture, to construct a new 3,003 square foot pizzeria, located at 411 Main Street (S. ½ of Lot 3, Lots, 4, 5, Block 56 Hailey Townsite), is hereby approved, finding that the project does not jeopardize the health, safety or welfare of the public and the project conforms to the applicable specifications outlined in the Design Review Guidelines, applicable requirements of the Zoning Ordinance, Title 18, and City Standards, provided conditions (a) through (h) are met.

a) All applicable Fire Department and Building Department requirements shall be met.
b) Any change in use or occupancy type from that approved at time of issuance of Building Permit may require additional improvements and/or approvals. Additional parking may also be required upon subsequent change in use, in conformance with Hailey's Zoning Ordinance at the time of the new use.

a) All City infrastructure requirements shall be met. Detailed plans for all infrastructure to be installed or improved at or adjacent to the site shall be submitted for Department Head approval and shall meet City Standards where required. Infrastructure to be completed at the applicant's sole expense include, but will not be limited to, the following requirements and improvements: 1) applicant will either utilize both water mains (i.e. one for in the building and the other for irrigation) or abandon one of them at the water main, and 2)) if water main lines within the alley are less than six (6) feet deep, the applicant shall install insulating material (blue board insulation or similar material) for each and every individual water service line and main line between and including the subject property and the nearest public street, as recommended by the City Engineer.
c) The project shall be constructed in accordance with the application or as modified by these Findings of Fact, Conclusions of Law and Decision.
d) All new and existing exterior lighting shall comply with the Outdoor Lighting Ordinance.
e) Except as otherwise provided, all the required improvements shall be constructed and completed, or sufficient security provided as approved by the City Attorney, before a Certificate of Occupancy can be issued.
f) This Design Review approval is for the date the Findings of Fact are signed. The Planning & Zoning Administrator has the authority to approve minor modifications to this project prior to, and for the duration of a valid Building Permit.
g) All City street trees shall be retained.
h) A gable end element shall be added to the west elevation.

Signed this _____ day of _____, 2016.

_____
Janet Fugate, Chair

Attest:

_____
Robyn Davis, Community Development Assistant

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Quigley Quick Links

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P-2	Preliminary Plat.....
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C-4	Preliminary Grading and Drainage Plan.....
C-5	Preliminary Water Plan.....
C-6	Preliminary Road Sections .....
C-7	Preliminary Details.....
W-1	Wastewater Infrastructure Plan .....
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L-2	Detail Landscape Plan.....
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Water Supply Adequacy Report for Quigley Farm PUD
Quigley Farm Wastewater Infrastructure Schematic Design Report
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4. Utilities .....C-
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12. Description and date of water rights ..... C-
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STAFF REPORT

TO: Hailey City Council or Hailey Planning & Zoning Commission

FROM: Lisa Horowitz, Community Development Director

RE: Preliminary Plat – Quigley Farm Subdivision

HEARING: August 1, 2016

Applicant: **Quigley Farm & Conservation Community, LLC**

Project: Quigley Farms

Request: Preliminary Plat

Location: SESE Section 3 & NE & N1/2SE Section 10

Map 2N R18E Section 3 & 10, Tax Lot 8368

Property Address: 1300 Fox Acres Road

Size: 205.22 Acres

Zoning: Residential/Agricultural (R-5)
Residential 10 (UIB)
Mid-Density Residential (R-.40)
Rural Density (R-40)

Background

In November, 2007, the City of Hailey received an application to annex this property, as well as adjacent property to the east (total application area 1,109 acres). In its initial review, the Commission evaluated a proposed 379 lot development with an 18-hole golf course and in September, 2008 recommended approval of the application subject to 54 conditions. Following the Commission's recommendation, the Council evaluated the application. During the Council's review, the Applicant agreed to eliminate any development above the Quigley pond and seek only one home site in Deadman's Gulch under the jurisdiction of Blaine County. The property proposed to be annexed was reduced to 912 acres ("Quigley Property"). The Council eventually evaluated the application and generally found the application conformed to the Hailey Comprehensive Plan. The Council instructed staff to negotiate with the Applicant and to forward a proposed annexation agreement to the Council so the Council could better evaluate the fiscal impacts of the application. During this time, the Applicant elected to revise the application by deleting the 18-hole golf course and by increasing the property density to 444 lots. In addition, the Applicant eliminated a separate pressurized irrigation system. The Council conducted several more hearings and remanded the application to the Commission to review the changes to the application and to make a recommendation to the Council regarding land use issues and compliance

with the Hailey Comprehensive Plan. Consistent with Council's instructions, the Commission evaluated the revised application and in November, 2011, the Commission submitted a recommendation to the Council. Following receipt of the Commission's recommendation of the 444 lot application, the Council considered testimony of the Blaine County Planning Director, Tom Bergin, who evaluated the potential development density if the Applicant's land was developed in Blaine County. Mr. Bergin explained that the property has a maximum density of 105 lots as a straight lot subdivision and 129 lots as a PUD subdivision. The annexation application was denied on June 28, 2012. The Findings of Fact for that denial are attached to this report.

A significantly modified Preliminary Plat and PUD were filed with Blaine County in April/May of 2016. On May 26, the County determined that the application materials were sufficient to proceed with the agency comment period.

This property is within Hailey Area of City Impact. The City and County have an adopted Area of City Impact Agreement, adopted by the City on November 14, 1994 as Ordinance 649. The Area of City Impact Agreement provides "[t]he City of Hailey's Subdivision rules and regulations shall prevail with the exceptions that the Blaine County Environmental regulations, Flood Plain and Hillside, contained in Blaine County Development Ordinances, shall prevail." Some of the provisions of this Ordinance have been rendered no longer valid by Idaho court decisions. Staffs, the Hailey City Attorney and the County Attorney have met, and determined that 1) Blaine County is the decision-maker for the current application, which was filed with Blaine County but 2) the Hailey Subdivision regulations (except for environmental, floodplain and hillside regulations) apply. Therefore, Hailey is a commenting agency to Blaine County, and the standards of review are, for the most part, the Hailey Subdivision standards.
The City of Hailey considered an annexation for this property, as well as adjacent property to the east (total application area 1,109 acres) in 2011-2012. The proposal was for a 444-lot residential development. This application was denied on June 28, 2012. The Findings of Fact for that denial are attached to this report.

Notice

Notice for the public hearing was published in the Idaho Mountain Express on July 13, 2016; the notice was mailed to property owners within 300 feet on July 13, 2016.

Application

Listed below is a summary of the development team members for the Quigley Farm Planned Unit Development and Preliminary Plat proposal.

Owner:

Quigley Farm & Conservation Community, LLC
PO Box 2720
Ketchum, ID 83340
Contact: Dave Hennessy
Telephone: (208) 725-2256
Email: dhennessy@hennessyco.com

Developer:

Hennessy Company
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Ketchum, ID 83340
Contact: Dave Hennessy
Telephone: (208) 725-2256
Email: dhennessy@hennessyco.com

Planning:

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359 NW 5th Avenue
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Email: jeffr@serapdx.com

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Ketchum, Idaho 83340
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Geotechnical Engineers:

Butler Associates
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Email: svgeotech@gmail.com

Wastewater & Environmental

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Environmental:

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Traffic

Lochner Engineering
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Meridian, Idaho 93642
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2. Applicants Written Statement

The Owner/Applicant is requesting a Planned Unit Development (PUD) and Preliminary Plat approval from Blaine County for the Quigley Farm PUD project. The proposed project will be located on a single tax lot which is referenced as T2N R18E Sections 3 & 10 Tax Lot 8368.

Based on the proposed plan, the maximum density calculations are identified below:

Use Type	**Area Summary (Acres)**	**Total**		
		Base Density (Dwelling Units)	**Bonus Density (Dwelling Units)**	**Total Dwelling Units**
Mid-Density (R-.40)	4.7	11.75	2.35	14.10
Residential/Agriculture (R-5)	105.7	21.16	5.29	27.51
Residential 10 (UIB)	19.4	1.94		1.94
Rural Density (R-40)	75.4	1.89		1.89
Subtotal	*205.3*	*36.74*		*45.44*
Community Housing Bonus @ 20%		**7.35**		**7.35**
Total	**205.3**	**44.09**		**51**

Based on the number of allowable dwelling units (rounded up to 51 units in total), the Owner/Applicant is proposing the following breakdown of unit types:

- 7 Large Lot Dwellings
- 9 Medium Lot Dwellings
- 10 Cottage Unit Dwellings *(4 of which are identified for community housing)*
- 6 Town House Sublot Dwellings *(2 of which are identified for community housing)*
- 9 Live/Work Mixed Use Dwellings
- 10 Multi-Family Dwellings *(2 of which are identified for community housing)*
- Mixed Live/work uses
- School Use
- Hospitality/Inn Site

In addition to the various land uses, the project will include network of roads, open space, paved and non-paved trails, an area for an active sports complex, winter and summer trailhead parking area, area for kids sledding and an area for winter Nordic. The project incorporates agriculture as a key project concept. Refer to Sheet C-2 for the conceptual layout of the proposed land uses. Also, refer to Sheets P-0 through P-4 for the Preliminary Plat layout.

The table of contents of this application outlines all the application criteria, impact study, exhibit drawings and appendices submitted for review and approval. Please refer to these sections for more detailed information regarding the project.

Standards of Evaluation for a Subdivision

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***
☒	☐	☐	**16.04.010 Development Standards**	**Applicability: The configuration and development of proposed subdivisions shall be subject to and meet the provisions and standards found in this Title, the Zoning Title and any other applicable Ordinance or policy of the City of Hailey, and shall be in accordance with general provisions of the Comprehensive Plan.**
			Staff Comments	*Hailey Comprehensive Plan:* *The 2012 Hailey Comprehensive Plan identifies Quigley Canyon as a Neighborhood Service Center. The Comprehensive Plan Land Use Map is attached to this report. A neighborhood Service Center is defined as follows:* ***5.1.g Neighborhood Service Centers – Small commercial areas serving residents within walking distance (¼ to ½ mile) where commercial use is subordinate to residential uses and to Downtown or Community Activity Areas.*** *More detail is needed to fully evaluate the following proposed uses: future inn-hospitality site and mixed-use commercial core. The following policies from the Comprehensive Plan are relevant to this project. Staff comments follow each policy.* ***5.4 Protect open space within and surrounding Hailey, including visible ridgelines, undeveloped hillsides and agricultural areas which help define the unique character of Hailey.*** *No development is proposed on ridgelines or hillsides. The Concept Plan incorporates agriculture as a long-term component of the site.* ***5.6 Manage and accommodate population growth by infill development and, when appropriate, minimal expansion by annexation and/or density increases.*** *The proposal is significantly smaller at 51 units than the 444-lot development reviewed by the City in 2012. Buildout in subsequent phases could allow for a total of 129 units, which is 29% of the previous proposal.* ***5.7 Encourage development at the densities allowed in the Zoning Code.*** *Staff has identified which city zoning districts may be appropriate if the project were developed under City codes. See Section 16.04.050 of this report.* ***8.1 Encourage development that provides opportunities for home ownership and rental homes for individuals and families of all socio-economic levels.***

				The project provides for home ownership, and contains eight (8) community housing units: Block 2, Lot 8 (2 units), Block 3, Lot 6 (duplex), and Block 4 Los 4,5,6 and 7. ***9.1 Plan for the long-term utilities, service and facility needs of the City while minimizing impacts to the greatest extent possible.*** *This question is central to the City's review of this plan. Comments in this staff report related to utilities, particular water, sewer and roads, will help the Commission determine if this policy has been met.* ***10.1 Create and maintain a pedestrian and bicycle-friendly community that provides a safe, convenient and efficient multi-modal transportation system for all Hailey residents*** *A variety of bicycle-pedestrian links are shown on the site plan. They facilities need to be linked back in to City bicycle-pedestrian infrastructure.* ***12.1 Evaluate whether proposed regulatory or administrative actions may result in an unconstitutional taking of private property.*** *No actions have been taken at this time.* ***13.1 Encourage and facilitate the development of school facilities that are planned consistently with the city's other land use policies.*** *A future school site for the Sage School is shown on the site plan, but no information on building size, parking or site planning has been shown.*

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***
☐	☒	☐	**16.04.020**	**Streets: Streets shall be provided in all subdivisions where necessary to provide access and shall meet all standards below.**
			Staff Comments	1. *As set forth below, several of the standards in the following sections are not met, such as right of way width, typical section, intersection spacing, drainage components.*

				2. *The City will not maintain the sidewalks during winter months, and no on street parking is allowed during snow removal periods.* 3. *Maintenance of any landscaping within the right of way shall be the responsibility of the development.* 4. *Other comments specific to the typical section include:* *70' ROW with CURB & GUTTER: Drainage Swale will not work properly during winter months. No maintenance on Sidewalks during winter months.* *60' ROW with ON STREET PARKING: Sidewalks in these areas will be covered with snow during snow removal activities.* *50' ROW with CURB & GUTTER: Trees along the curb line will impede snow removal and restrict snow storage.* *40' ROW: Asphalt travel lanes should be no less than 12' for current snow removal equipment.* 5. *20' ROW for "Private Drive/Public Alley": Alley's should be private and maintained by the development. In addition to other alley deficiencies discussed in following standards, inverted crowns will build ice pack because of water during winter months.* *Snow storage easements, no less than 10 feet wide, shall be established adjacent to all right of ways and private alleys, on future plats.* 6. *Huckleberry Trail (road) serves the "potential trail head parking area", but is shown as a private. This area should be privately maintained with a public access easement.* 7. *Roadway cross sections on sheet C-6 show a "geothermal line" but no geothermal sources are identified.*
☐	☒	☐	**A.**	**Development Standards: All streets in the subdivision must be platted and developed with a width, alignment, and improvements such that the street is adequate to safely accommodate existing and anticipated vehicular and pedestrian traffic and meets City standards. Streets shall be aligned in such a manner as to provide through, safe and efficient access from and to adjacent developments and properties and shall provide for the integration of the proposed streets with the existing pattern.**
			Staff Comments	*Street alignment is acceptable; width and typical section are not acceptable as discussed below. In addition, the developer will be responsible for providing the first "chip and fog seal" on the roadways after construction. Some off-site improvements are needed on Quigley Road and on Fox Acres to provide integration of proposed streets into the existing street pattern and to minimize traffic impacts on city streets. See Section 16.04.070 (C) of this report.*
?	☐	☐	**B.**	**Cul-De-Sacs; Dead-End Streets: Cul-de-sacs or dead end streets shall be allowed only if connectivity is not possible due to surrounding topography or existing platted development. Where allowed, such cul-de-sacs or dead end streets shall comply with all regulations**

				set forth in the IFC and other applicable codes and ordinances. Street rights-of-way extended into un-platted areas shall not be considered dead end streets.
			Staff Comments	• *Roundabouts need to be designed and constructed to accommodate loaders and other vehicles with wider turning radius for snow removal and other work.* • *No Cul-De-Sacs or Dead End Streets are proposed. Some streets are stubbed for future connection to another phase of development. See comments in this report about the need for additional connectivity to Quigley Road from one or more of these stub-end streets.*
			C.	**Access: More than one access may be required based on the potential for impairment of a single access by vehicle congestion, terrain, climatic conditions or other factors that could limit access.**
			Staff Comments	*The primary project access is shown from Fox Acres Road. Staff finds this to be the most appropriate location for the primary project access. A secondary emergency access is proposed from Fox Acres Road to Quigley Road at the east end of the project. This emergency access will need to be compliant with an all-weather/all-season surface for emergency access and maintained year round. Quigley Road up to the new access will also need to meet the same standards. These improvements have not yet been shown on the plans. The Commission should discuss: 1) whether this access should be paved. It could provide an excellent alternative route to the High School, alleviating traffic on Buckhorn Drive. 2) whether a bike lane and/or sidewalk are merited to connect to Quigley Road. Staff recommends that the separated bike path coming from Fox Acres be continued through to the paved portion of Quigley Road to provide an alternate route to the High School and Community Campus.* *Mixed use commercial, an inn/hospitality development, and a future school are all proposed at the far easterly end of the development. These uses are proposed to be served off a single access (Quigley Farm Road) with no secondary access. Staff recommends Quigley Farm Road and the multi-use trail be extended for connection with Quigley Road to provide access on the eastern end of the project before this area can be developed. This access would offset some of the traffic impacts along Fox Acres Road and Buckhorn Drive, which both see substantial traffic during school days. Offsite Quigley Road will likely need substantial upgrades to be compliant with an all-weather/all-season surface for emergency access and will need to be maintained year round.*
☐ ?	☐	☐	**D.**	**Design: Streets shall be laid out so as to intersect as nearly as possible at right angles and no street shall intersect any other street at less than eighty (80) degrees. Where possible, four way intersections shall be used. A recommended distance of 500 feet, with a maximum of 750 feet, measured from the center line, shall separate any intersection. Alternatively, traffic calming measures including but not limited to speed humps, speed tables, raised intersections, traffic circles or roundabouts, meanderings, chicanes, chokers, and/or neck-downs shall be a part of the street design. Alternate traffic calming measures may be approved with a recommendation by the City Engineer. Three way intersections shall only be permitted where most appropriate or where no other configuration is possible. A minimum distance of 150 feet, measured from the center line, shall separate any 2 three-way**

				intersections.
			Staff Comments	*Several lots access exclusively from a private alley and do not front on a public or private street as required by 16.04.060.E. If alleys are to function as streets and are recognized as such, then intersection separations, right of way widths, and road typical section requirements are not met.*
☒ ?	☐	☐	**E.**	**Centerlines: Street centerlines which deflect more than five (5) degrees shall be connected by a curve. The radius of the curve for the center line shall not be more than 500 feet for an arterial street, 166 feet for a collector street and 89 feet for a residential street. Alternatively, traffic calming measures including but not limited to speed humps, speed tables, raised intersections, traffic circles or roundabouts, meanderings, chicanes, chokers, and/or neck-downs shall be a part of the street design. Alternate traffic calming measures may be approved with a recommendation by the City Engineer.**
			Staff Comments	*Residential street curves exceed the maximum 89' centerline radius, although this design element can likely be remedied. Roundabouts are part of the street design.*
☐	☒	☐	**F.**	**Width: Street width is to be measured from property line to property line. The minimum street width, unless specifically approved otherwise by the Council, shall be as specified in City Standards for the type of street.**
			Staff Comments	*Most streets do not conform to City Right of Way requirements from section 18.06.012.C.* *As an example, Fox Acres Road is proposed as a 70' wide right of way whereas existing Fox Acres Road adjacent to the development is a 125' wide right of way (80' ROW is required for residential collectors).* *Other roads within the development only propose a 50' wide right of way whereas 60' is required per City Ordinance for residential streets. The design as proposed will not connect cleanly to Fox Acres Road, and may not provide for adequate snow storage.*
☒ ?	☐	☐	**G.**	**Roadways: Roadway, for the purpose of this section, shall be defined as the area of asphalt from curb face to curb face or edge to edge. Roadway includes areas for vehicle travel and may include parallel or angle in parking areas. The width of roadways shall be in accordance with the adopted City Standards for road construction.**
			Staff Comments	*Roadway travel surface widths meet the City Standards. The alleys are shown as 20' width. However, if alleys are functioning as residential streets and emergency access then the widths are insufficient.*
☒	☐	☐	**H.**	**Road Grades: Road Grades shall be at least two percent (2%) and shall not generally exceed six percent (6%). Grade may exceed 6%, where necessary, by 1% (total 7%) for no more than 300 feet or 2% (total 8%) for no more than 150 feet. No excess grade shall be located within 200 feet of any other excess grade nor there any horizontal deflection in the roadway greater than 30 degrees within 300 feet of where the excess grade decreases to a 2% slope.**

			Staff Comments	*Roadway grades meet the City Standards.*
☐	☒	☐	**I.**	**Runoff: The developer shall provide storm sewers and/or drainage areas of adequate size and number to contain any runoff within the streets in the subdivision in conformance with the applicable Federal, State and local regulations. The developer shall provide copies of state permits for shallow injection wells (drywells). Drainage plans shall be reviewed by City Staff and shall meet the approval of the City Engineer. Developer shall provide a copy of EPA's "NPDES General Permit for Storm water Discharge from Construction Activity" for all construction activity affecting more than one acre**.
			Staff Comments	*A system of curbs, catch basins, drywells, and drainage swales are shown on the plans. The details for catch basins and drywells do not adhere to the City Standards and should be modified to conform. Run off swales drain into the catch basins which may be buried under snow storage on the roadsides, resulting in drainage structures that are inaccessible and poorly performing during key winter transitional months. In addition, the swales on the 70' ROW will only be approximately 1.0' lower than the curb flow line which results in the potential for drainage to encroach onto the roadway during winter months. Drainage structures need to be re-located so they collect runoff from the curb and gutter directly and so they are accessible during winter months.*
☒ ?	☐	☐	**J.**	**Signage: The developer shall provide and install all street and traffic control signs in accordance with City Standards.**
			Staff Comments	*Street and traffic signage is not shown on the Roadway Plan will need to be provided at final design. Street name signs shall have a blue background and be per City Standard.*
☐	☒	☐	**K.**	**Dedication; Names: All streets and alleys within any subdivision shall be dedicated for public use, except as provided herein. New street names (public and private) shall not be the same or similar to any other street names used in Blaine County.**
			Staff Comments	1. *Alley ways would be better suited as private and maintained by home Owners association.* • *The inverted crowns shown for the alleys are hard to remove snow from with the city's current equipment* • *Utilities should run down alley ways for service connections when possible.* 2. *Streets are dedicated public right of way, alleys are private easements.*
☐ ?	☐	☐	**L.**	**Private Streets:**
			Staff Comments	1. *Private street signs shall be blue in background with white lettering per City Standard* 2. *Huckleberry Trail is the only private street proposed, but it serves a public parking area.* 3. *Private alley easements are proposed, and these alleys appear to function as a private street. The private alleys functioning in lieu of private streets do not conform to the requirements below.*

☐	☒	☐	**L. 1.**	**Private streets may be allowed (a) to serve a maximum of five (5) residential dwelling units, (b) within Planned Unit Developments, or (c) within commercial developments in the Business, Limited Business, Neighborhood Business, Light Industrial, Technological Industry, and Service Commercial Industrial districts. Private streets are allowed at the sole discretion of the Council, except that no Arterial or Major Street, or Collector or Secondary Street may be private. Private streets shall have a minimum total width of 36 feet, shall be constructed to all other applicable City Standards including paving, and shall be maintained by an owner's association.**
			Staff Comments	*According to the plat, the alleys are private easements. The alleys as designed are functioning as private streets and the sole access to several of the lots. The alleys are serving more than five lots, and do not meet minimum lot width, and are deficient in width for EMS. Alleys have no adjacent snow storage.*
☒	☐	☐	**L. 2.**	**Private streets, wherever possible, shall provide interconnection with other public streets and private streets.**
			Staff Comments	*The alleys connect with the proposed public streets.*
☐	☒	☐	**L. 3.**	**The area designated for private streets shall be platted as a separate parcel according to subsection 16.04.060C below. The plat shall clearly indicate that the parcel is unbuildable except for public vehicular and public pedestrian access and ingress/egress, utilities or as otherwise specified on the plat.**
			Staff Comments	*If the alleys remain as designed, they should be platted as a separate parcel.*
☒	☐	☐	**L. 4.**	**Private street names shall not end with the word "Road", "Boulevard", "Avenue", "Drive" or "Street". Private streets serving five (5) or fewer dwelling units shall not be named.**
			Staff Comments	*Street names are not shown on the alleys.*
☐	☒	☐	**L. 5.**	**Private streets shall have adequate and unencumbered 10-foot wide snow storage easements on both sides of the street, or an accessible dedicated snow storage easement representing not less than twenty five percent (25%) of the improved area of the private street. Private street snow storage easements shall not be combined with, or encumber, required on-site snow storage areas.**
			Staff Comments	*Alleys are functioning as private streets and no snow storage is provided.*
☐	☒	☐	**L. 6.**	**Subdivisions with private streets shall provide two (2) additional parking spaces per dwelling unit for guest and/or overflow parking. These spaces may be located (a) within the residential lot (*e.g.*, between the garage and the roadway), (b) as parallel spaces within the street parcel or easement adjacent to the travel lanes, (c) in a designated guest parking area, or (d) as a combination thereof. Guest/overflow parking spaces are in addition to the minimum number of parking spaces required pursuant to chapter 17.09 of this code. The dimension of guest/overflow parking spaces shall be no less than ten feet by twenty feet (10'x20') if angle parking, or ten feet by twenty four feet (10'x24') if parallel. Guest overflow parking spaces shall be improved with asphalt, gravel, pavers, grass block, or other all-weather dustless surface. No part of any required guest/overflow parking spaces shall be utilized for snow storage.**

			Staff Comments	*Many of the streets as proposed are not wide enough for on-street parking.*
☐ ?	☐	☐	**M.**	**Driveways:**
			Staff Comments	*No driveways are proposed at this time. Public streets bordering the large lots should have controlled access. It is possible upon future development of the large lots that an internal street and alleyway system may tie into the currently proposed streets (similar to the Airport West development). Because of this, approach locations should be carefully planned and designated on the plat to limit the size, location, and number of approaches. These approaches should be located far enough away from proposed intersections to prevent conflict and driver distraction.*
☐	☐	☒	**M. 1.**	**Driveways may provide access to not more than two (2) residential dwelling units. Where a parcel to be subdivided will have one lot fronting on a street, not more than one additional single family lot accessed by a driveway may be created in the rear of the parcel. In such a subdivision, where feasible (*e.g.*, no driveway already exists), both lots shall share access via a single driveway. Driveways shall not be named.**
			Staff Comments	*No driveways are proposed at this time.*
☐	☐	☒	**M. 2.**	**Driveways shall be constructed with an all-weather surface and shall have the following minimum roadway widths:** **a. Accessing one residential unit: twelve feet (12')** **b. Accessing two residential units: sixteen feet (16')** **No portion of the required fire lane width of any driveway may be utilized for parking, above ground utility structures, dumpsters or other service areas, snow storage or any other obstructions.**
			Staff Comments	*No driveways are proposed at this time.*
☐	☐	☒	**M. 3.**	**Driveways longer than 150 feet must have a turnaround area approved by the Fire Department. Fire lane signage must be provided as approved by the Fire Department.**
			Staff Comments	*No driveways are proposed at this time.*
☐	☐	☒	**M. 4.**	**Driveways accessing more than one residential dwelling unit shall be maintained by an owner's association, or in accordance with a plat note.**
			Staff Comments	*No driveways are proposed at this time.*
☐	☐	☒	**M. 5.**	**The area designated for a driveway serving more than one dwelling unit shall be platted as a separate unbuildable parcel, or as a**

				dedicated driveway easement. Easements and parcels shall clearly indicate the beneficiary of the easement or parcel and that the property is unbuildable except for ingress/egress, utilities or as otherwise specified on the plat. A building envelope may be required in order to provide for adequate building setback.
			Staff Comments	*No driveways are proposed at this time.*
☒	☐	☐	**M. 6.**	**No driveway shall interfere with maintenance of existing infrastructure and shall be located to have the least adverse impact on residential dwelling units, existing or to be constructed, on the lot the easement encumbers and on adjacent lots.**
			Staff Comments	1. *No paving within 10' of any property line in the city right of ways.* 2. *No driveways are shown, but it is likely these standards can be achieved.*
☐ ?	☐	☐	**N.**	**Parking Access Lane: A parking access lane shall not be considered a street, but shall comply with all regulations set forth in the IFC and other applicable codes and ordinances.**
			Staff Comments	*The only parking access lanes are located within the BCRD trailhead parking lot. The width of those access lanes is not shown. A parking lot for the sports complex should also be considered.*
☐	☒	☐	**O.**	**Fire Lanes: Required fire lanes, whether in private streets, driveways or parking access lanes, shall comply with all regulations set forth in the IFC and other applicable codes and ordinances.**
			Staff Comments	1. *Private alley easements - functioning as streets - are providing sole access to several lots - and are deficient in width for compliance with emergency vehicular access. Additional EMS conflicts could occur within these narrow alleys such as snow removal and parking.* 2. *Public Streets - With the exception of the 40' ROW section, all streets provide 13' travel lanes which is acceptable. The 40' ROW section must be reviewed by the Fire Department for comment.* 3. *All roads except the 60' ROW sections do not have parking, and "No Parking" signage must be provided on those streets. Most City streets allow for on-street parking, so this concept should be discussed.*

16.04.060: Sidewalks and Drainage Improvements

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***
☐	☒	☐	**A.**	**Sidewalks and drainage improvements are required in all zoning districts and shall be located and constructed according to applicable city standards, except as otherwise provided herein.**
			Staff Comments	*60' ROW with on street parking*

				1. Sidewalk will be covered with snow during snow removal events *2. No winter maintenance during winter months.* *<u>70' ROW CURB & GUTTER</u>* *No winter maintenance on Sidewalks* *<u>Other:</u> Sidewalks are shown adjacent to most streets but are missing on Huckleberry Trail (road). However, an asphalt pathway is provided generally along one side and a gravel pathway along the other.* *A system of Catch Basins, Drywells, and Drainage Swales are shown on the plans. The details for Catch Basins and Drywells do not adhere to the City Standards but could potentially be modified to conform. More detail and review will be necessary at final design.*
☒	☐	☐	**B.**	**The length of sidewalks and drainage improvements constructed shall be equal to the length of the subject property line(s) adjacent to any public street or private street.**
			Staff Comments	*With the exception of Huckleberry Trail (road) all streets have adjacent sidewalks. Additional sidewalks and pathways occur throughout the development. Huckleberry Trail will require a sidewalk. The width of all sidewalks shall be defined by Title 18, Mobility Design and will be based on the classification of the road and other standards.*
☐ ?	☐	☐	**C.**	**New sidewalks shall be planned to provide pedestrian connections to any existing and future sidewalks adjacent to the site.**
			Staff Comments	*Pedestrian circulation and connectivity within the site is well planned. However, the following connections are needed:* *1) A pedestrian/bicycle connection should be completed out to Quigley Road.* *2) A striped bike lane is needed on Quigley Road to connect from the new Quigley neighborhood west to the Wood River Trail.* *3) A revised parking striping plan is needed on Fox Acres Road from the project entrance south to the Community Campus. An additional crossing of the floodway drainage swale is merited, and is shown on the plans. A sidewalk on the east side of Fox Acres Road should be discussed. (Note that if the Toe of the Hill trail is extended, this could be considered in lieu of a sidewalk on Fox Acres.)* *4) See also comments under 16.04.110, Parks, Pathways and Other Green Spaces regarding the need for a nonmotorized connection from the Community Campus along the east border, the completion of the Toe of the Hill Trail.*
☐ ?	☐	☐	**D.**	**Sites located adjacent to a public street or private street that are not currently through streets, regardless whether the street may provide a connection to future streets, shall provide sidewalks to facilitate future pedestrian connections.**
			Staff Comments	*Sidewalks are located adjacent to internal street stubs for future connectivity, except:* *1) The sidewalks north of the Fox Acres Roundabout should be extended to the end of the asphalt*

				2) A pedestrian connection should be provided from Antler Drive in the area shown as Open Space/Potential Recreation Use. *3) Pedestrian connections from Quigley Road should be discussed by the Commission.*
☐	☐	☒	**E.**	**The requirement for sidewalk and drainage improvements are not required for any lot line adjustment.**
			Staff Comments	*Not Applicable*

16.04.040: Alleys and Easements

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***
☐	☒	☐	**A.**	**Alleys:**
			Staff Comments	*According to the plat alleys are private easements. Alleys are functioning as private streets and the sole access to several of the lots. Alleys are serving more than five lots. Alleys are deficient in width for EMS. Alleys have no adjacent snow storage.*
☐ ?	☐	☐	**A. 1.**	**Alleys shall be provided in all Business District and Limited Business District developments where feasible.**
			Staff Comments	*1. Inverted crowns are hard to remove snow from with the city's current equipment.* *2. Utilities should run down alley ways for service connections when possible.* *3. The Mixed Use portions of the proposal would likely be zoned Limited Business if City zoning were applied. These areas are currently proposed as large lots and are expected to provide greater detail at time of design review or re-subdivision.*
☐	☒	☐	**A. 2.**	**The minimum width of an alley shall be twenty six (26') feet.**
			Staff Comments	*Private alley easements are proposed as 20'.*
☐	☒	☐	**A. 3.**	**All alleys shall be dedicated to the public or provide for public access.**
			Staff Comments	*Alleys are proposed as private drive easements and public utility easements according to the plat, but they are annotated as "public alley" on the cross sections shown on sheet C-6. Alleys should remain private and should be maintained by the Home Owners Association. An easement shall cover the area of the alley and shall be dedicated to utilities and public access.*
☐	☐	☐	**A. 4.**	**All infrastructures to be installed underground shall, where possible, be installed in the alleys platted.**

?			***Staff Comments***	*2. Water and sewer lines and service connections should be located in alley ways where possible.* *2. Additional infrastructure (cable, utilities) could be placed in the alleys instead of the streets.*
☐ ?	☐	☐	**A. 5.**	**Alleys in commercial areas shall be improved with drainage as appropriate and which the design meets the approval of the City Engineer. The Developer shall provide storm sewers and/or drainage areas of adequate size and number to contain any runoff within the streets in the subdivision upon the property in conformance with the latest applicable Federal, State and local regulations. The developer shall provide copies of state permits for shallow injection wells (drywells). Drainage plans shall be reviewed by City Staff and shall meet the approval of the City Engineer.**
			Staff Comments	*No alleys are shown at this time in what may be neighborhood commercial areas*
☐	☒	☐	**A. 6.**	**Dead-end alleys shall not be allowed.**
			Staff Comments	*No dead end alleys are shown (other than stubs for future phases).*
☒	☐	☐	**A. 7.**	**Where alleys are not provided, easements of not less than ten (10) feet in width may be required on each side of all rear and/or side lot lines (total width = 20 feet) where necessary for wires, conduits, storm or sanitary sewers, gas and water lines. Easements of greater width may be required along lines, across lots, or along boundaries, where necessary for surface drainage or for the extension of utilities.**
			Staff Comments	*Alleys are not platted in all locations, and side/rear yard easements are not generally shown. However, it does not appear these easements are necessary as the utility layout can be accommodated in the adjacent streets.*
☐	☒	☐	**B.**	**Easements. Easements, defined as the use of land not having all the rights of ownership and limited to the purposes designated on the plat, shall be placed on the plat as appropriate. Plats shall show the entity to which the easement has been granted. Easements shall be provided for the following purposes:**
			Staff Comments	*Snow storage easements are not provided. If the alleys serve as exclusive access to several lots snow storage will be necessary. Frequently a 10' snow storage easement is reserved along public ROW's, and should be considered adjacent the alleys as well, regardless of whether they remain public or are made private.*
☐	☒	☐	**B. 1.**	**To provide access through or to any property for the purpose of providing utilities, emergency services, public access, private access, recreation, deliveries or such other purpose. Any subdivision that borders on the Big Wood River shall dedicate a 20-foot wide fisherman's access easement, measured from the Mean High Water Mark, which shall provide for non-motorized public access. Additionally, in appropriate areas, an easement providing non-motorized public access through the subdivision to the river shall be required as a sportsman's access.**

			Staff Comments	*See numerous previous comments regarding alley deficiencies.*
☐ ?	☐	☐	**B. 2.**	**To provide protection from or buffering for any natural resource, riparian area, hazardous area, or other limitation or amenity on, under, or over the land. Any subdivision that borders on the Big Wood River shall dedicate a one hundred (100) foot wide riparian setback easement, measured from the Mean High Water Mark, upon which no permanent structure shall be built, in order to protect the natural vegetation and wildlife along the river bank and to protect structures from damage or loss due to river bank erosion. A twenty-five (25) foot wide riparian setback easement shall be dedicated adjacent to tributaries of the Big Wood River. Removal and maintenance of live or dead vegetation within the riparian setback easement is controlled by the applicable bulk requirement of the Flood Hazard Overlay District. The riparian setback easement shall be fenced off during any construction on the property.**
			Staff Comments	*Section 5.6.2 of the Area of City Impact Agreement states that "the City of Hailey's Subdivision rules and regulations shall prevail with exceptions that the Blaine County Environmental regulations, Floodplain, and Hillside, contained in Blaine County Development Ordinances shall prevail". Therefore, riparian areas and the Quigley Creek Floodplain will be reviewed by Blaine County.*
☐	☒	☐	**B. 3.**	**To provide for the storage of snow, drainage areas or the conduct of irrigation waters. Snow storage areas shall be not less than twenty-five percent (25%) of parking, sidewalk and other circulation areas. No dimension of any snow storage area may be less than 10 feet. All snow storage areas shall be accessible and shall not be located over any above ground utilities, such as transformers.**
			Staff Comments	1. *Snow storage easements are provided, but area calculations are not. Additional information will be necessary to determine compliance.* 2. *Snow storage areas should not have encroachments impeding snow storage.*

16.04.050: Blocks

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***
☐ ?	☐	☐	**16.04.050**	**Blocks: The length, width and shape of blocks shall be determined with due regard to adequate building sites suitable to the special needs of the type of use contemplated, the zoning requirements as to lot size and dimensions, the need for convenient access and safe circulation and the limitations and opportunities of topography.**
			Staff Comments	*Staff recommends the following zoning designations:* 1. *<u>Future School Site</u> (6.17 acres): General Residential (GR): GR is a common school zone district in Hailey. The proposed school site is relatively flat, and will require a connection to Quigley Road. Internal circulation and site planning considerations have not been provided and cannot be evaluated at this time. The school may or may not need a Conditional Use Permit, depending*

				on City or County zoning rules. 2. *Mixed Use Commercial Core (2 parcels, .92 acres and 1.33 acres, total of 9 live work units): Limited Business (LB): LB allows for Dwelling Units in Mixed Use buildings, multifamily and a variety of ground floor live-work businesses. Permitted density: 20 units/acre. Alleys and internal circulation will be needed for these lots. Design cannot be evaluated at this time.* 3. *Future Inn/Hospitality Site (1 parcel. 1.3 acres): Limited Business provides for Bed and breakfast/Inns, and Hotels. This site is bisected by the Mountain Overlay District. It is not clear how the shape of the parcel with regards to the hillside will accommodate the proposed use.* 4. *Multifamily Housing (.83 acres): General Residential (GR): Allows for multifamily as a permitted use at 10 units/acre. Need to address minimum lot size of 6,000 square feet (proposal has an average lot size of 4,032 square feet).* 5. *Cottage Units (10 lots ranging from 6,500-8,000 lot size): General Residential (GR). Minimum lot size of 6,000 square feet works well.* 6. *Townhouses (3 duplex lots of 10,99_ ? -12,582 square feet, total of 6 units: General Residential (GR). Minimum lot size of 6,000 square feet works well; multifamily/duplex is permitted.* 7. *Small Lot Single Family (9 lots, lot sizes 9,541-12,734): Limited Residential 1 (LR-1) or General Residential (GR): minimum lot size on either zone district fits (LR-1- 8,000 square feet, GR- 6,000 square feet). GR allows for an ADU.* 8. *Large Lot Single Family (7 lots, 30,928-40,510 square feet): Limited Residential 2 (LR-2): minimum lot size of 12,000 square feet works well.*

16.04.060: Lots

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***
☒	☐	☐	**16.04.060**	**Lots: All lots shown on the subdivision plat must conform to the minimum standards for lots in the District in which the subdivision is planned. The City will generally not approve single-family residential lots larger than one-half (1/2) acre (21,780 square feet). In the event a single-family residential lot greater than one-half (1/2) acre is platted, irrigation shall be restricted to not more than one-half (1/2) acre, pursuant to Idaho Code §42-111, and such restriction shall be included as a plat note. District regulations are found in the Zoning Chapter.**
			Staff Comments	*See above; irrigation should be restricted on the Large Lot SF lots.*
☒	☐	☐	**A.**	**If lots are more than double the minimum size required for the zoning district, the Developer may be required to arrange lots in anticipation of future re-subdivision and provide for future streets where necessary to serve potential lots, unless the plat restricts further subdivision.**
			Staff Comments	*Lots identified for Mixed Use, Future Inn/Hospitality and Multifamily Housing may be re-subdivided in the future.*

☒	☐	☐	**B.**	**Double frontage lots shall be prohibited except where unusual topography, a more integrated street plan, or other conditions make it undesirable to meet this requirement. Double frontage lots are those created by either public or private streets, but not by driveways or alleys. Subdivisions providing a platted parcel of 25 feet or more between any street right-of-way and any single row of lots shall not be considered to have platted double frontage lots. The 25-foot wide parcel provided must be landscaped to provide a buffer between the street and the lot(s).**
			Staff Comments	*No double frontage lots are proposed, unless alleys are converted into streets.*
☒	☐	☐	**C.**	**No unbuildable lots shall be platted. Platted areas that are not buildable shall be noted as such and designated as "parcels" on the plat. Green Space shall be clearly designated as such on the plat.**
			Staff Comments	*Green space and open space parcels are delineated. It is not clear how many of these open space parcels will be used.*
☐	☐	☒	**D.**	**A single flag lot may be permitted at the sole discretion of the Hearing Examiner or Commission and Council, in which the "flagpole" projection is serving as a driveway as provided herein, providing connection to and frontage on a public or a private street. Once established, a flag lot may not be further subdivided, but a lot line adjustment of a flag lot is not considered a further subdivision. The "flagpole" portion of the lot shall be included in lot area, but shall not be considered in determining minimum lot width. The "flagpole" shall be of adequate width to accommodate a driveway as required by this ordinance, fire and other applicable codes. Flag lots within the Townsite Overlay District are not allowed, except where parcels do not have street access, such as parcels adjacent to the ITD right-of-way.**
			Staff Comments	*No flag lots are shown.*
☐	☒	☐	**E.**	**All lots shall have frontage on a public or private street. No frontage width shall be less than the required width of a driveway as provided under Sections 4.1.11.1 and 4.5.4 of this Ordinance. Townhouse Sub-Lots are excluded from this requirement; provided, however, that Townhouse Developments shall have frontage on a street.**
			Staff Comments	*Lots in Block 4 should be modified to all have access on a public street. Access just to the alley does not meet this standard.*
☐	☐	☒	**F.**	**In the Townsite Overlay District, original Townsite lots shall be subdivided such that the new platted lots are oriented the same as the original lots, i.e. lots shall be subdivided in such a way as to maintain frontage on both the street and alley. Exceptions may be made for corner properties with historic structures.**
			Staff Comments	*N/A*

16.04.070: Orderly Development				
Compliant			**Standards and Staff Comments**	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***
☐	☐	☐	**A.**	**Phasing Required: Development of subdivisions shall be phased to avoid the extension of City services, roads and utilities through undeveloped land.**
			Staff Comments	*Future phases are clearly anticipated. A concept plan has been submitted, and is attached to this report. For purposes of analysis at this time, buildout is analyzed at 129 lots, which is the maximum permitted under the County PUD Ordinance. However, this has not been spelled out in the application materials. It is also unclear at this time what the total square footage associated with mixed use, hospitality and school uses would be.* *Items shown on the Concept Plan but not analyzed at this time due to very limited information provided include Outdoor Amphitheater, Agriculture and Large Lot development.* *Staff recommends that the Commission consider requesting the applicant to show buildout of the phase just north of the current phase, on the portion of the site connecting to Quigley Road. The site plan is relatively incomplete without a sense of how this second phase lays out.* *Tax Lot 8370 should also be discussed. This lot is southeast of the proposed PUD, behind the High School. It is a key lot for recreational development of trails and access to BLM. It is not clear if it is intended to be retained as a developable parcel or not. While it is not under the same ownership, it appears more tied to this Phase of development than Tax Lot 8369, which is further east out Quigley Canyon.*
☐	☒	☐	**B.**	**<u>Agreement:</u> Developers requesting phased subdivisions shall enter into a phasing agreement with the City. Any phasing agreement shall be approved and executed by the Council and the Developer on or before the preliminary plat approval by the Council.**
			Staff Comments	*No phasing plans have been provided. This would be a requirement for the area under one ownership (area just north of the current phase).*
☐	☒	☐	**C.**	**<u>Mitigation of Negative Effects:</u> No subdivision shall be approved which affects the ability of political subdivisions of the state, including school districts, to deliver services without compromising quality of service delivery to current residents or imposing substantial additional public costs upon current residents, unless the Developer provides for the mitigation of the effects of subdivision. Such mitigation may include, but is not limited to the following:** **1. Provision of on-site or off-site street or intersection improvements.** **2. Provision of other off-site improvements.** **3. Dedications and/or public improvements on property frontages.** **4. Dedication or provision of parks or green space.**

				5. Provision of public service facilities. **6. Construction of flood control canals or devices.** **7. Provisions for ongoing maintenance.**
			Staff Comments	**1. Provision of on-site or off-site street or intersection improvements** *A Traffic Impact Study (TIS) has been provided that proposes offsite improvements to mitigate development traffic. These improvements include:* • *An additional west bound right turn lane at the Fox Acres/SH-75 intersection* • *A North bound to West bound "acceptance" lane at the Fox Acres/Creekside intersection* *The TIS is reasonably complete, although the list of needed off-site improvements should be expanded. The TIS does not contemplate traffic traveling down Quigley Road should that connection be established, and may need to expand to analyze that area if the connection is provided. In particular, a striped bike lane is needed on Quigley Road, connecting to the Wood River Trail.* *The TIS shows very minor unmitigated delay at other Fox Acres intersections for the full horizon year.* *Offsite Considerations on Fox Acres: During sporting or special events numerous vehicles attempt to park on existing Fox Acres Road west of the High School in either the currently striped portion (which is not stripped for parking), or in the un-striped portion (which becomes disorganized). There is no pedestrian walkway along those portions of the road that are heavily utilized during these events and there is significant potential for conflict between pedestrians and vehicles at peak times. A sidewalk adjacent to existing Fox Acres Road from the community campus entrance to this development may be desirable. In addition, this 44' wide section of roadway contains a two way left turn bay that is an in-efficient use of roadway area. This area could be restriped to either:* *Alternate A: one 12' lane in each direction plus head in 60° parallel parking(20') on the east side* *Alternate B: one 12' lane in each direction plus a 10' parallel parking lane on each side (preferred if bike lanes are added in the future)* *Alternate C: TBD* *A 5' concrete sidewalk adjacent to the east side is desired although landscape, berms, and right of way may limit the feasibility of this component. (This component could be added interior to the existing curb line by elimination of parallel parking on one side in Alternative B.) Alternately, the Commission should discuss whether completion of the Toe of the Hill Trail is a higher priority than this sidewalk.* **2. Provision of other off-site improvements.** *Water: If the project is connected to municipal water, well site(s) could be located on the subject property.* *Sewer: With regards to wastewater provision, off-site improvements to upgrade one or more sewer lines may be needed. There may be issues with the collection system such as a potential bottleneck through a 6 inch "high school" mainline and an 8" mainline in Fox Acres south to the Countryside mainline. A viable option to the potential bottleneck in the 8" mainline is the construction of a new bypass*

				parallel to the Wood River Trail at Fox Acres. Analysis on how this project affects municipal sewer service has not been provided at this time by the applicant. **3. Dedications and/or public improvements on property frontages.** *As noted above, nonmotorized and vehicular improvements at the entrance to the project on Fox Acres Road, nonmotorized improvements at Antler Drive and nonmotorized and vehicular improvements on Quigley Road to the second entrance (location to be determined) are appropriate.* **4. Dedication or provision of parks or green space.** *The proposed Open Space/Potential Outdoor Recreation Use parcel at the eastern project boundary has been discussed as possibly being dedicated to the Blaine County School District, although this is not delineated on the plans. This dedication should be clearly spelled out as part of any project approvals. Note that development of this land into a sports complex, including developed sports fields, parking and restrooms is a great need, further impacted by full buildout of this project, and should be discussed.* *Various other recreational commitments are made via this PUD, most of which are spelled out in the letter from Blaine County Recreation District and the related attachments.* **5. Provision of public service facilities.** *See comments above regarding water, sewer and roads. Additionally, all municipal services are anticipated to be impacted if this project remains in the County. City Police and Fire will likely be first responders to incidents due to the proximity of the property. All city streets and neighborhoods will be impacted by vehicular travel, as the only routes in to and out of the project are from City streets. If the project remains in the County the City will not have the benefit of any financial resources typically associated with building permit fees, development impact fees and property tax values to offset impacts to public services.* **6. Construction of flood control canals or devices.** *This will be analyzed by the County review of the project per the City Area of City Impact Agreement.* **7. Provisions for ongoing maintenance.** *The biggest issue relative to this standard is the ability of the Homeowners Association or other entity to adequately maintain the private sewer system as currently proposed. Implications of errors are extremely high for City municipal water supply.* *It has not been finalized how all of the public trails are to be maintained by other entities, such as the BCRD, or how the Open Space Parcel on the east side is to be developed and maintained.*

☐	☒	☐	**D.**	**When the developer of contiguous parcels proposes to subdivide any portion of the contiguous parcels, an area development plan shall be submitted and approved. The Commission and Council shall evaluate the following basic site criteria and make appropriate findings of fact:** **1. Streets, whether public or private, shall provide an interconnected system and shall be adequate to accommodate anticipated vehicular and pedestrian traffic.** **2. Non-vehicular circulation routes shall provide safe pedestrian and bicycle ways and provide an interconnected system to streets, parks and green space, public lands, or other destinations.** **3. Water main lines and sewer main lines shall be designed in the most effective layout feasible.** **4. Other utilities including power, telephone, cable, and gas shall be designed in the most effective layout feasible.** **5. Park land shall be most appropriately located on the Contiguous Parcels.** **6. Grading and drainage shall be appropriate to the Contiguous Parcels.** **7. Development shall avoid easements and hazardous or sensitive natural resource areas.** **The commission and council may require that any or all contiguous parcels be included in the subdivision.**
			Staff Comments	*Future phases are clearly anticipated. A concept plan has been submitted, and is attached to this report. For purposes of analysis at this time, buildout is analyzed at 129 lots, which is the maximum permitted under the County PUD Ordinance. However, this has not been spelled out in the application materials. It is also unclear at this time the total square footage associated with mixed use, hospitality and school uses. Staff understands that the current applicant does not own all of the contiguous parcels to the east of the current phase. It may be possible to leave details of these phases to future developers, so long as buildout maximums (total number of units, and square footage by use) are established at this time for the purposes of analysis.* *Items shown on the Concept Plan but not analyzed at this time due to very limited information provided include Outdoor Amphitheater, Agriculture and Large Lot development.* *Staff recommends that the Commission consider requesting the applicant to show buildout of the phase just north of the current phase, on the portion of the site connecting to Quigley Road. This parcel is owned by the Applicant. The site plan is relatively incomplete without a sense of how this phase lays out. A full subdivision design is not needed at this time, but a preliminary layout and maximum number of units and square footage by use would allow for a more complete analysis of the project.* *Tax Lot 8370 should also be discussed. This lot is southeast of the proposed PUD, behind the High School. It is a key lot for recreational development of trails and access to BLM. It is not clear if it is intended to retain a developable parcel on this lot or not. While it is not under the same ownership, it appears more tied to this Phase of development than Tax Lot 8369, which is further east out Quigley Canyon.*
16.04.080: Perimeter Walls, Gates and Berms				

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***
☒ ?	☐	☐	**16.04.080**	**The City of Hailey shall not approve any residential subdivision application that includes any type of perimeter wall or gate that restricts access to the subdivision. This regulation does not prohibit fences on or around individual lots. The City shall also not allow any perimeter landscape berm more than 3' higher than the previously existing (original) grade.**
			Staff Comments	*No perimeter gate is proposed. The perimeter berm on the southeast corner of the project separating the existing soccer fields from the proposed Future Open Space should be removed, as it unnecessarily separates like uses. The perimeter berm on the south side adjacent to the football field seems appropriate to remain in place.*

16.04.090: Cuts, Fills, Grading and Drainage

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***
☐ ?	☐	☐	**A.**	**Plans Required: Proposed subdivisions shall be carefully planned to be compatible with natural topography, soil conditions, geology and hydrology of the site, as well as to minimize cuts; fills, alterations of topography, streams, drainage channels; and disruption of soils or vegetation. Fill within the floodplain shall comply with the requirements of the Flood Hazard Overlay District of the Zoning Ordinance.**
			Staff Comments	*Grading generally appears to be relatively minor relative to existing conditions.* *When Quigley Creek is crossed culverts are proposed and minor grading will be necessary.* *Grading near the existing stream may fall within a currently designated floodplain (current FEMA flood plain is not shown on the plans). Although the application contains a site specific flood plain study, that study does not represent a regulatory flood plain until adopted by FEMA. This will be further reviewed per the County standards as called for in the Area of City Impact Agreement.* *There is substantial cut into the hillside adjacent to Huckleberry Trail (road) on the easterly end of this phase. The reason for the necessity of this cut is unclear, as the roadway could be located outside of the hillside area. Additionally, the grading plan will need to be completed at the far east end where the contours are truncated.* *There is an existing berm at the south end of the playfields on Parcel A. Consideration should be given for the removal of this berm to facilitate greater connectivity to the existing playfields immediately to the south. This berm does not comply with 16.04.080.*
☒	☐	☐	**A. 1.**	**A preliminary soil report prepared by a qualified engineer may be required by the Hearing Examiner or Commission and/or Council as part of the preliminary plat application.**

			Staff Comments	*A geotechnical report has been submitted. Soils report may be necessary at final design but is not requested at this time.*
☒	☐	☐	**A. 2.**	**A preliminary grading plan prepared by a civil engineer may be required by the Hearing Examiner or Commission and/or the Council as part of the preliminary plat application, to contain the following information:** **a. Proposed contours at a maximum of two (2) foot contour intervals;** **b. Cut and fill banks in pad elevations;** **c. Drainage patterns;** **d. Areas where trees and/or natural vegetation will be preserved;** **e. Location of all street and utility improvements including driveways to building envelopes; and** **f. Any other information which may reasonably be required by the Administrator, Hearing Examiner, Commission and/or Council.**
			Staff Comments	*Preliminary plat content appears sufficient but additional details will be necessary at final design.*
☐	☐	☐	**B.**	**Design Standards: The proposed subdivision shall conform to the following design standards:**
			Staff Comments	
			B. 1.	**Grading shall be designed to blend with natural land forms and to minimize the necessity of padding or terracing of building sites, excavation for foundations, and minimize the necessity of cuts and fills for streets and driveways.**
☐	☒	☐	**B. 2.**	**Areas within a subdivision which are not well suited for development because of existing soil conditions, steepness of slope, geology or hydrology shall be allocated for Green Space for the benefit of future property owners within the subdivision.**
			Staff Comments	*There is substantial cut into the hillside adjacent to Huckleberry Trail (road).*
☐	☒	☐	**B. 3.**	**Where existing soils and vegetation are disrupted by subdivision development, provision shall be made by the Developer for Revegetation of disturbed areas with perennial vegetation sufficient to stabilize the soil upon completion of the construction, including temporary irrigation for a sufficient period to establish perennial vegetation. Until such time as the vegetation has been installed and established, the Developer shall maintain and protect all disturbed surfaces from erosion.**
			Staff Comments	*No post construction re-vegetation details were identified. Because large portions of this property are either open space, play fields, or right of way, a post construction re-vegetation plan should be considered.*
☒ ?	☐	☐	**B. 4.**	**Where cuts, fills or other excavation are necessary, the following development standards shall apply:** **a. Fill areas for structures or roads shall be prepared by removing all organic material detrimental to proper compaction for soil stability.**

				b. Fill for structures or roads shall be compacted to at least 95 percent of maximum density as determined by American Association State Highway Transportation Officials (AASHTO) and American Society of Testing & Materials (ASTM). **c. Cut slopes shall be no steeper than two horizontal to one vertical. Subsurface drainage shall be provided as necessary for stability.** **d. Fill slopes shall be no steeper than three horizontal to one vertical. Neither cut nor fill slopes shall be located on natural slopes of three to one or steeper, or where fill slope toes out within twelve (12) feet horizontally of the top of existing or planned cut slope.** **e. Tops and toes of cut and fill slopes shall be set back from structures and property lines as necessary to accommodate drainage features and drainage structures.**
			Staff Comments	*There are steep slopes at the east end of Huckleberry Trail (road), but the actual gradient is difficult to calculate due to the scale of the plans.*
☒ ?	☐	☐	**B. 5.**	**The developer shall provide storm sewers and/or drainage areas of adequate size and number to contain the runoff upon the property in conformance with the applicable Federal, State and local regulations. The developer shall provide copies of state permits for shallow injection wells (drywells). Drainage plans shall be reviewed by planning staff and shall meet the approval of the city engineer. Developer shall provide a copy of EPA's "NPDES General Permit for Storm-water Discharge from Construction Activity" for all construction activity affecting more than one acre.**
			Staff Comments	*Drainage structures are shown on the plans. In general, they seem likely to contain the site runoff but future calculations and final details will need to be developed for final design.* *A Storm Water Pollution Prevention Plan (SWPPP) will be necessary for any disturbances greater than 1 acre, and should be provided at final design.*

16.04.100: Overlay Districts

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***
☐ ?	☐	☒	**A.**	**Flood Hazard Overlay District:**
			Staff Comments	*General notes:* *Per "Flood Hazard Analysis" page 7 by Brockway Engineering: "Flood Plain delineation, and BFE's. . . have not been adopted by FEMA. . . A Letter of Map Revision (LOMR) must be submitted. . ."*

				The current 2010 FEMA floodplain must be used for regulatory purposes until a LOMR is approved or approval shall be a condition of approval. The existing 2010 FEMA floodplain is much wider and more extensive than the proposed LOMR floodplain. *The City may want to consider participating in the LOMR to update Quigley creek to reflect the channel and culverts constructed along Fox Acres Road by the High School, adjacent to the project.*
☐	☐	☒	**A. 1.**	**Subdivisions or portions of subdivision located within the Flood Hazard Overlay District shall comply with all provisions of Section 4.10 of the Zoning Ordinance.**
			Staff Comments	*Section 5.6.2 of the Area of City Impact Agreement states that "the City if Hailey's Subdivision rules and regulations shall prevail with exceptions that the Blaine County Environmental regulations, Floodplain, and Hillside, contained in Blaine County Development Ordinances shall prevail". Therefore, riparian areas and the Quigley Creek Floodplain will be reviewed by Blaine County.*
☐	☐	☒	**A. 2.**	**Subdivisions located partially in the Flood Hazard Overlay District shall have designated building envelopes outside the Flood Hazard Overlay District to the extent possible.**
			Staff Comments	*Section 5.6.2 of the Area of City Impact Agreement states that "the City if Hailey's Subdivision rules and regulations shall prevail with exceptions that the Blaine County Environmental regulations, Floodplain, and Hillside, contained in Blaine County Development Ordinances shall prevail". Therefore, riparian areas and the Quigley Creek Floodplain will be reviewed by County staff under the County environmental regulations.*
☐	☐	☒	**A. 3.**	**Any platted lots adjacent to the Big Wood River or its tributaries shall have designated building envelopes.**
			Staff Comments	*Section 5.6.2 of the Area of City Impact Agreement states that "the City if Hailey's Subdivision rules and regulations shall prevail with exceptions that the Blaine County Environmental regulations, Floodplain, and Hillside, contained in Blaine County Development Ordinances shall prevail". Therefore, riparian areas and the Quigley Creek Floodplain will be reviewed by County staff under the County environmental regulations.*
☐	☐	☒	**B.**	**Hillside Overlay District:**
			Staff Comments	*Section 5.6.2 of the Area of City Impact Agreement states that "the City if Hailey's Subdivision rules and regulations shall prevail with exceptions that the Blaine County Environmental regulations, Floodplain, and Hillside, contained in Blaine County Development Ordinances shall prevail". Therefore, hillside will be reviewed by Blaine County. See notes below regarding road cuts.*
☐	☐	☒	**B. 1.**	**Subdivisions or portions of subdivisions located within the Hillside Overlay District shall comply with all provisions of Section 4.14, of the Zoning Ordinance.**
			Staff Comments	*See above comments in Section 16.04.100(B).*

				There are no details regarding proposed recreation trails or activity in areas like Parcel G, which will fall on steep hillsides. It is assumed all trails will be designed using best practices.
☐	☐	☒	**B. 2.**	**Subdivisions located partially in the Hillside Overlay District shall have designated building envelopes outside the Hillside Overlay District.**
			Staff Comments	*See above comments in Section 16.04.100(B).*
☐	☐	☒	**B. 3.**	**All approved subdivisions shall contain a condition that a Site Alteration Permit is required before any development occurs.**
			Staff Comments	*This standard can be addressed at a later time.*

16.04.110: Parks, Pathways and Other Green Spaces

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***
☒ ?	☐	☐	**A.**	**Parks and Pathways: Unless otherwise provided, every subdivision shall set aside a Park and/or Pathway(s) in accordance with standards set forth herein.**
			Staff Comments	*Numerous open space parcels and pathways are shown on the plans, creating the feel of a pedestrian-oriented development. A letter from Blaine County Recreation District (BCRD) to Blaine County regarding the recreational opportunities presented by this project are attached to this report. Two significant recreational facilities are contemplated:* *1) The 6.93 -acre parcel on the southeast side of the property titled "Open Space Potential Outdoor Recreation Use" has verbally been discussed as a parcel to be dedicated to the Blaine County School District for use as an expanded sports complex. This facility is needed, with demand increased by buildout of this project. Currently, city and school district sports fields are heavily used and seasonally in high demand. BCRD has noted over 800 individual enrollments per year in youth soccer and baseball combined. Full development of this parcel would include sports field construction, landscaping, irrigation, restrooms, additional parking, a nonmotorized connection to Antler Lane and removal of the berm at the south which separates this area from the current developed fields. Agreements and plat restrictions would need to be developed regarding the drain field located under this open space if this type of wastewater system is ultimately approved.* *2) The area labeled, "Potential BCRD trailhead Parking Lot" could serve as a regional summer hiking biking trailhead, and a winter Nordic trailhead. The BCRD has noted close to 10,000 south valley Nordic skier days in their correspondence to the County. The connectivity to the High School and the Community Campus creates a strong synergistic link with other youth programs. This*

				trailhead could provide access to a whole new network of single track trails, tied in with the completion if the BLM Travel Management Plan (currently underway). A written statement from the applicant to the BCRD Board is attached to the BCRD letter in this packet. The BCRD has requested that the parking area, multi-use trail easement and Huckleberry Road be moved 20-30 feet northwest to accommodate recreational programming on Parcel G. Parcel G is needed to complete this recreational amenity (approximately 9 acres). The BCRD also believes that the Tax Lot directly south of the current application (owned by Quigley Green, not by Quigley Farms), is needed for long term summer and winter access easements.
☒	☐	☐	**A. 1.**	**Parks:**
?			***Staff Comments***	*The 6.93-acre parcel on the southeast side of the property titled "Open Space Potential Outdoor Recreation Use" has verbally been discussed as a parcel to be dedicated to the Blaine County School District for use as an expanded sports complex. This facility is needed, with demand increased by buildout of this project. Currently, city sports fields are heavily used and seasonally in high demand. (See statistics on program enrollment in the letter from BCRD included in this report). Full development of this parcel would include sports field construction, landscaping, irrigation, restrooms, additional parking, a nonmotorized connection to Antler Lane and removal of the berm at the south which separates this area from the current developed fields. Agreements and plat restrictions would need to be developed regarding the drain field located under this open space if this type of wastewater system is ultimately approved, including impacts on the use of the fields if drain field problems were to occur.*
☒	☐	☐	**A. 1. a.**	**The developer of any subdivision, or any part thereof, consisting of three (3) or more residential lots, including residential townhouse sub-lots and residential condominium units, without regard to the number of phases within the subdivision, shall set aside or acquire land area within, adjacent to or in the general vicinity of the subdivision for Parks. Parks shall be developed within the City of Hailey and set aside in accordance with the following formula:** **P = x multiplied by .0277** **"P" is the Parks contribution in acres** **"x" is the number of single family lots, residential townhouse sub-lots or residential condominium units contained within the plat. Where multi-family lots are being platted with no fixed number of units, "x" is maximum number of residential lots, sub-lots, and units possible within the subdivision based on current zoning regulations**
			Staff Comments	*Mathematical calculations of this formula result in the following requirements:* *Current Phase: .0277 x 51 = 1.4127 acres* *Project Buildout: .0277 x 129 = 3.5733 acres* *Clearly the project exceeds this standard between the combination of the sports complex and the summer/winter trailhead. Note that City standards herein would direct that dedicated parks be fully developed by the developer.*

☒ ?	☐	☐	**A.1.b**	**In the event the subdivision is located in the Business (B), Limited Business (LB), Neighborhood Business (NB), or Transitional (TN) zoning districts, the area required for a Park shall be reduced by 75%, but in no event shall the area required for a Park/Cultural Space exceed 17.5% of the area of the lot(s) being developed.**
			Staff Comments	*Although these zone districts are not contemplated at this time, LB zoning is a possibility for some of the uses proposed. The project likely exceeds this standard.*
☒ ?	☐	☐	**A. 2.**	**Pathways: The developer of any subdivision, or any part thereof, shall provide pathways for all trails and paths identified in the master plan that are located on the property to be subdivided or on city property adjacent to the property to be subdivided, and sidewalks required by this ordinance.**
			Staff Comments	1. *There is an asphalt pathway currently existing along the west side of Fox Acres Road (south of the development), but it is separated from the roadway by a drainage channel and is difficult to access from the roadway. Persons attempting to access the existing playfields to the west of the roadway, (or persons traveling along the pathway attempting to access the road), must cross steep slopes with unstable rock and undesirable vegetation. The project proposes to connect to this existing pathway and will provide a connection from that pathway to Fox Acres Road near the southern boundary of the site.* *The new "pathway" along Fox Acres Road is proposed as a 6' concrete sidewalk, whereas the existing pathway west of the drainage easement on Fox Acres Road is an approximately 9-10' wide asphalt path. A 9-10' asphalt path is likely more appropriate. The primary multi-use path planned by the applicant in collaboration from BCRD swings through the site to the east. The path along Fox acres is designed as a lesser path. Additionally, the proposed secondary path terminates at Quigley Road but continuing the pathway to Quigley Road is recommended. Correspondence between the BCRD and the applicant confirm that the primary multiuse path will be designed and constructed to BCRD standards, and dedicated to BCRD via a permanent easement for management and maintenance.* 2. *The BCRD has indicated a desire to complete the Toe of the Hill Trail connecting the community campus to the `summer/winter trailhead. This could also serve the High School.* 3. *Offsite Considerations on Fox Acres: During sporting or special events numerous vehicles attempt to park on existing Fox Acres Road west of the High School in either the currently striped portion (which is not striped for parking), or in the un-striped portion (which becomes disorganized). There is no pedestrian walkway along those portions of the road that are heavily utilized during these events and there is significant potential for conflict between pedestrians and vehicles at peak times. A sidewalk adjacent to existing Fox Acres Road from the community campus entrance to this development may be desirable. In addition, this 44' wide section of roadway contains a two way left turn bay that is an in-efficient use of roadway area. This*

				area could be restriped to either: *Alternate A: one 12' lane in each direction plus head in 60° parallel parking (20') on the east side* *Alternate B: one 12' lane in each direction plus a 10' parallel parking lane on each side (preferred if bike lanes are contemplated in the future)* *Alternate C: TBD* *A 5' concrete sidewalk adjacent to the east side is desired although landscape, berms, and right of way may limit the feasibility of this component. (This component could be added interior to the existing curb line by elimination of parallel parking on one side in Alternative B.) Note that the Commission should discuss if the completion of the Toe of the Hill Trail, connecting the Community Campus to the summer/winter trailhead is of a higher priority.* *4. A striped bike lane is needed on Quigley Road, connecting from the current Phase to the Wood River Trail. Further analysis is needed to determine if enough paved area exists to accommodate the bike lanes within the current paved road.*
☐	☐	☐	**B.**	**Multiple Ownership: Where a parcel of land is owned or otherwise controlled, in any manner, directly or indirectly:** **1. By the same individual(s) or entity(ies), including but not limited to corporation(s), partnership(s), limited liability company(ies) or trust(s), or** **2. By different individuals or entities, including but not limited to corporations, partnerships, limited liability companies or trusts where a) such individual(s) or entity(ies) have a controlling ownership or contractual right with the other individual(s) or entity(ies), or b) the same individual(s) or entity(ies) act in any manner as an employee, owner, partner, agent, stockholder, director, member, officer or trustee of the entity(ies),** **3. Multiple subdivisions of the parcel that cumulatively result in three (3) or more residential lots, townhouse sub-lots or condominium units, are subject to the provisions of this ordinance, and shall provide the required improvements subject to the required standards at or before the platting or development of the lots, sub-lots or units.** **4. Parks and Lands Board: The parks and lands board shall review and make a recommendation to the hearing examiner or commission and council regarding each application subject to the provisions of Section 4.10 of this ordinance. Such recommendation will be based on compliance with the master plan and provisions of this ordinance.**
			Staff Comments	*Future phases are clearly anticipated. A concept plan has been submitted, and is attached to this report. For purposes of analysis at this time. Buildout is analyzed at 129 lots, which is the maximum permitted under the County PUD Ordinance. However, this has not been spelled out in the application materials. At this time, it is also unclear what are the total square footage associated with mixed use, hospitality and school uses. Staff understands that the current applicant does not own all of the contiguous parcels to the east of the current phase. It may be possible to leave details of these phases to future developers, so long as buildout maximums (total number of units, and square footage by use) are established at this time for the purposes of analysis.*

				Recreational amenities shown on the Concept Plan but not analyzed at this time due to very limited information provided include Outdoor Amphitheater and Nordic trails. *Staff recommends that the Commission consider requesting the applicant to show buildout of the phase just north of the current Phase, on the portion of the site connecting to Quigley Road. This parcel is owned by the Applicant. The site plan is relatively incomplete without a sense of how this Phase lays out. A full subdivision design is not needed at this time, but a preliminary layout and maximum number of units and square footage by use would allow for a more complete analysis of the project.* *Parcel G is needed to complete the summer winter trailhead recreational amenity (approximately 9 acres). The BCRD also believes that the Tax Lot directly south of the current application (owned by Quigley Green, not by Quigley Farms), is needed for long term summer and winter access easements.* *City of Hailey Parks and Lands Board review is planned for early September.*
☐	☐	☐	**C.**	**Parks and Lands Board: The parks and lands board shall review and make a recommendation to the hearing examiner or commission and council regarding each application subject to the provisions of Section 4.10 of this ordinance. Such recommendation will be based on compliance with the master plan and provisions of this ordinance.**
			Staff Comments	*Parks and Lands Board review is planned for early September.*
			D.	**Minimum Requirements:**
☐	☐	☐	**D. 1.**	**Private Green Space: Use and maintenance of any privately owned green space shall be controlled by recorded covenants or restrictions which run with the land in favor of the future owners of the property within the tract and which cannot be modified without the consent of the council.**
			Staff Comments	*A number of Open Space parcels are shown on the plat, but not shown how they would be programmed or used. It is assumed that these parcels (with the exception of the 6.93 acre Open Space parcel at the south, and the BCRD trailhead parking area) would be managed by the Homeowners Association.*
☐	☐	☐	**D. 2.**	**Neighborhood Park: A neighborhood park shall include finished grading and ground cover, large grassy areas, trees and shrubs, sheltered picnic table(s), trash container(s), dog station(s), bike racks, park bench(es), parking as required by ordinance, and two or more of the following: play structure, restrooms, an athletic field, trails, hard surface multiple use court (tennis or basketball courts), or gardens that demonstrate conservation principles. Neighborhood Parks shall provide an average of 15 trees per acre, of which at least 15% shall be of 4" caliper or greater. A maximum of 20% of any single tree species may be used. Landscaping and irrigation shall integrate water conservation. A neighborhood park shall be deeded to the City upon completion, unless otherwise agreed upon by the developer and City.**
			Staff Comments	*The 6.93-acre parcel on the southeast side of the property titled "Open Space Potential Outdoor Recreation Use" has verbally been discussed as a parcel to be dedicated to the Blaine County School District for use as an expanded sports complex. This facility is needed, with demand increased by buildout of this project. Currently, city sports fields are heavily used and seasonally in high demand. (See*

				statistics outlined in the letter from BCRD to Blaine County). Full development of this parcel would include sports field construction, landscaping, irrigation, restrooms, additional parking, a nonmotorized connection to Antler Lane and removal of the berm at the south which separates this area from the current developed fields. Agreements and plat restrictions would need to be developed regarding the drain field located under this open space if this type of wastewater system is ultimately approved, including impacts on the use of the fields if drain field problems were to occur. *The parcel, if fully developed, would meet the criteria for a "Neighborhood Park" as contemplated in the Subdivision Ordinance.*
☐	☐	☐	**D. 3.**	**Mini Park: A mini park shall include finished grading and ground cover, trees and shrubs, picnic table(s), trash container(s), dog station(s), bike racks and park bench(es). All mini parks shall provide an average of 15 trees per acre, of which at least 15% shall be of 4" caliper or greater. A maximum of 20% of any single tree species may be used. Landscaping and irrigation shall integrate water conservation.**
			Staff Comments	*A Neighborhood Park is more appropriate for this scale of development proposal than a mini park.*
☐	☐	☐	**D. 4.**	**Park/Cultural Space: A park/cultural space shall include benches, planters, trees, public art, water features and other elements that would create a gathering place. Connective elements, such as parkways or enhanced sidewalks may also qualify where such elements connect two or more parks or park/cultural spaces.**
			Staff Comments	*The Outdoor Amphitheater identified on the Concept Plan would meet this criteria. That facility has not been analyzed at this time due to limited details provided.*
☐	☐	☐	**D. 5.**	**Pathway: Pathways shall have a minimum twenty foot (20') right-of-way width and shall be paved or improved as recommended by the Parks and Lands Board. Construction of Pathways shall be undertaken at the same time as other public improvements are installed within the development, unless the Council otherwise allows when deemed beneficial for the project. The Developer shall be entitled to receive a Park dedication credit only if the Developer completes and constructs a Pathway identified in the Master Plan, or completes and constructs a Pathway not identified in the Master Plan where the Pathway connects to existing or proposed trails identified in the Master Plan. The City may permit easements to be granted by Developers for Pathways identified in the Master Plan, thereby allowing the Developer to include the land area in the determination of setbacks and building density on the site, but in such cases, a Park dedication credit will not be given. A Developer is entitled to receive a credit against any area required for a Park for every square foot of qualified dedicated Pathway right-of-way.**
			Staff Comments	*The primary pathway planned to be built to BCRD multiuse trail standards, and dedicated via easement to BCRD for maintenance and programming, is shown within a 20' easement. BCRD has asked that this easement location be shifted slightly, as noted in their correspondence attached to this Report. City of Hailey Parks and Lands Board review is contemplated in September. Other pathway comments include:* *1. There is an asphalt pathway currently existing along the west side of Fox Acres Road (south of the development), but it is*

				separated from the roadway by a drainage channel and is difficult to access from the roadway. Persons attempting to access the existing playfields to the west of the roadway, (or persons traveling along the pathway attempting to access the road), must cross steep slopes with unstable rock and undesirable vegetation. The project proposes to connect to this existing pathway and will provide a connection from that pathway to Fox Acres Road near the southern boundary of the site. 2. *The new "pathway" along Fox Acres Road is proposed as a 6' concrete sidewalk, whereas the existing pathway west of the drainage easement on Fox Acres Road is an approximately 9-10' wide asphalt path. This is a secondary path, stemming from the primary multi-use trail to be dedicated to the BCRD. Additionally, the proposed path terminates at Quigley Farm Road but continuing the pathway to Quigley Road is recommended. Maintenance responsibility for the entire pathway has not been spelled out in detail, but is likely recommended to be assigned to the BCRD.* 3. *Offsite Considerations on Fox Acres: During sporting or special events numerous vehicles attempt to park on existing Fox Acres Road west of the High School in either the currently striped portion (which is not striped for parking), or in the un-striped portion (which becomes disorganized). There is no pedestrian walkway along those portions of the road that are heavily utilized during these events and there is significant potential for conflict between pedestrians and vehicles at peak times. A sidewalk adjacent to existing Fox Acres Road from the community campus entrance to this development is desired. In addition, this 44' wide section of roadway contains a two way left turn bay that is an in-efficient use of roadway area. This area could be restriped to either:* • *Alternate A: one 12' lane in each direction plus head in 60° parallel parking (20') on the east side* • *Alternate B: one 12' lane in each direction plus a 10' parallel parking lane on each side* • *Alternate C: TBD* 4. *A 5' concrete sidewalk adjacent to the east side is desired although landscape, berms, and right of way may limit the feasibility of this component. (This component could be added interior to the existing curb line by elimination of parallel parking on one side in Alternative B.) Alternately, the Commission could recommend the nonmotorized connection that would complete the Toe of the Hill trail, in lieu of this sidewalk.* 5. *A 4'-wide striped bike lane is needed on Quigley Road, connecting to the Wood River Trail (in accordance with MUTCD Standards).* 6. *The 10' Multi use path should have a constant cross slope. Crowned path ways will complicate snow removal.* 7. *A winter maintenance plan for pathways has not been determined at this time, but will ultimately be determined by the BCRD.*
☐	☐	☐	**E.**	**Specific Park Standards: All Parks shall meet the following criteria for development, location and size (unless unusual conditions exist**

				that prohibit meeting one or more of the criteria):
			Staff Comments	*This standard is not analyzed at this time.*
☐	☐	☐	**E. 1.**	**Shall meet the minimum applicable requirements required by 4.10.04 of this section.**
			Staff Comments	*This standard is not analyzed at this time.*
☐	☐	☐	**E. 2.**	**Shall provide safe and convenient access, including ADA standards.**
			Staff Comments	*This standard is not analyzed at this time.*
☒	☐	☐	**E. 3.**	**Shall not be gated so as to restrict access and shall not be configured in such a manner that will create a perception of intruding on private space. If a Park is privately owned and maintained, the use of the park shall not be exclusive to the homeowners, residents or employees of the development.**
			Staff Comments	*None of the open space is proposed to be gated.*
☐	☐	☐	**E. 4.**	**Shall be configured in size, shape, topography and improvements to be functional for the intended users. To be eligible for Park dedication, the land must, at a minimum, be located on slopes less than 25 degrees, and outside of drainways, floodways and wetland areas. Mini Parks shall not be occupied by non-recreational buildings and shall be available for the use of all the residents or employees of the proposed subdivision.**
			Staff Comments	*The size, shape and location of the 6.93-acre parcel that could be used as a school district sports complex is in a good location relative to the adjacent sports fields. Discussion of impacts of the wastewater drain fields (if approved) should be undertaken.*
☐	☐	☐	**E. 5.**	**Shall not create undue negative impact on adjacent properties and shall be buffered from conflicting land uses.**
			Staff Comments	*The 6.93-acre parcel under consideration as a school sports complex is adjacent to the existing Deerfield neighborhood. Staff recommends a pedestrian/nonmotorized connection from Antler Drive. A vehicular connection could result in this access point being used for sports events. Fox Acres is the more appropriate access point, and connects these fields to the other sports fields owned and managed by the School District. The District has verbally indicated that the fields would not be lit.* *If the sport fields are not connected to the city water services, the City will not have any means to limit or restrict watering times and days, nor will it have a mechanism to incentivize reduced watering through a tiered rate structure or any payment for water consumption. The city's groundwater resources may be impacted by usage from a shared aquifer, if reuse/reclaimed grey water is not applied to the irrigated areas.*

				Impacts of the proposed Outdoor Amphitheater are not known at this time.
☐	☐	☐	**E. 6.**	**Shall require low maintenance, or provide for maintenance or maintenance endowment.**
			Staff Comments	*Verbal discussions have taken place with BCSD regarding the sports complex and BCRD regarding the Nordic trails, paved trails and parking lot. Various commitments from the applicant to the BCRD are outlined in the letter from the applicant to the BCRD Board. Final details are yet to be determined.*
☐	☐	☐	**F.**	**Specific Pathway Standards: All Pathways shall meet the following criteria for development, location and size (unless unusual conditions exist that prohibit meeting one or more of the criteria):**
			Staff Comments	*See earlier comments in this report regarding pathways.*
☐	☐	☐	**F. 1.**	**Shall meet the minimum applicable requirements required by section 4.10.04 of this section.**
			Staff Comments	*See earlier comments in this report regarding pathways.*
☐	☐	☐	**F. 2.**	**Shall be connected in a useful manner to other Parks, Pathways, Green Space and recreation and community assets.**
			Staff Comments	*See earlier comments in this report regarding pathways, and various needed connections to Fox Acres Road, Quigley Road and Antler Drive.*
☐	☐	☐	**G.**	**Specific Green Space Standards: If green space is required or offered as part of a subdivision, townhouse or condominium development, all green space shall meet the following criteria for development, location and size (unless unusual conditions exist that prohibit meeting one or more of the criteria):**
			Staff Comments	*See earlier comments in this report regarding open space.*
☐	☐	☐	**G. 1.**	**Shall meet the minimum applicable requirements required by section 4.10.04 of this section.**
			Staff Comments	*See earlier comments in this report regarding open space.*
☐	☐	☐	**G. 2.**	**Public and private green spaces on the same property or adjacent properties shall be complementary to one another. Green space within proposed developments shall be designed to be contiguous and interconnecting with any adjacent Green Space (both existing and potential future space).**
			Staff Comments	*Staff recommends that the Commission consider requesting the applicant to show buildout of the phase just north of the current Phase, on the portion of the site connecting to Quigley Road. This parcel is owned by the Applicant. The site plan is relatively incomplete without a sense of how this Phase lays out. It is not clear if future green spaces are anticipated in this Phase, or not.* *Parcel G is needed to complete the summer winter trailhead recreational amenity (approximately 9 acres). The BCRD also believes that the Tax Lot directly south of the current application (owned by Quigley Green, not by Quigley Farms), is needed for long term summer*

				and winter access easements.
☐	☐	☐	**G. 3.**	**The use of the private green space shall be restricted to Parks, Pathways, trails or other recreational purposes, unless otherwise allowed by the City.**
			Staff Comments	*It is not clear at this time how the proposed Amphitheater might relate to this standard.*
☐	☐	☐	**G. 4.**	**The private ownership and maintenance of green space shall be adequately provided for by written agreement.**
			Staff Comments	*This will be addressed in future review.*
☐	☐	☐	**H.**	**In-Lieu Contributions:**
			Staff Comments	
☐	☐	☒	**H. 1.**	**After receiving a recommendation by the Parks and Lands Board, the Council may at their discretion approve and accept voluntary cash contributions in lieu of Park land dedication and Park improvements.**
			Staff Comments	*Cash contributions are not anticipated for this project.*
☐	☐	☒	**H. 2.**	**The voluntary cash contributions in lieu of Park land shall be equivalent to the area of land (*e.g.*, square footage) required to be dedicated under this ordinance multiplied by the fair market value of the land (*e.g.*, $/square foot) in the development at the time of preliminary plat approval by the Council. The City shall identify the location of the property to be appraised, using the standards in Sections 4.10.5.4 and 4.10.5.5 of this ordinance. The appraisal shall be submitted by a mutually agreed upon appraiser and paid for by the applicant.**
			Staff Comments	*See above.*
☐	☐	☒	**H. 3.**	**Except as otherwise provided, the voluntary cash contribution in lieu of Park land shall also include the cost for Park improvements, including all costs of acquisition, construction and all related costs. The cost for such improvements shall be based upon the estimated costs provided by a qualified contractor and/or vendor. In the Business (B), Limited Business (LB), Neighborhood Business (NB) and Transitional (TN) zoning districts, in-lieu contributions will not include the cost for Park improvements.**
			Staff Comments	*See above.*
☐	☐	☒	**H. 4.**	**In-lieu contributions must be segregated by the City and not used for any other purpose other than the acquisition of Park land and/or Park improvements, which may include upgrades and replacement of Park improvements. Such funds should be used, whenever feasible or practicable, on improvements within walking distance of the residents of the subdivision.**

			Staff Comments	*See above.*

16.05: Improvements Required:

Compliant			Standards and Staff Comments	
Yes	**No**	**N/A**	**City Code**	**City Standards and *Staff Comments***
☐	☐	☐	**16.05.010**	**Minimum Improvements Required: It shall be a requirement of the Developer to construct the minimum infrastructure improvements set forth herein and any required infrastructure improvements for the subdivision, all to City Standards and procedures, set forth in Title 18 of the Hailey Municipal Code and adopted by ordinance in accordance with the notice and hearing procedures provided in Idaho Code §67-6509. Alternatives to the minimum improvement standards may be recommended for approval by the City Engineer and approved by the City Council at its sole discretion only upon showing that the alternative is clearly superior in design and effectiveness and will promote the public health, safety and general welfare.**
			Staff Comments	*See discussion below.*
☐	☐	☒	**A.**	**Plans Filed, Maintained: Six (6) copies of all improvement plans shall be filed with the City Engineer and made available to each department head. Upon final approval two (2) sets of revised plans shall be returned to the Developer at the pre-construction conference with the City Engineer's written approval thereon. One set of final plans shall be on-site at all times for inspection purposes and to note all field changes upon.**
			Staff Comments	*N/A at this time: this will be required if this becomes a City project.*
☐	☐	☒	**B.**	**Preconstruction Meeting: Prior to the start of any construction, it shall be required that a pre-construction meeting be conducted with the Developer or his authorized representative/engineer, the contractor, the City Engineer and appropriate City departments. An approved set of plans shall be provided to the Developer and contractor at or shortly after this meeting.**
			Staff Comments	*N/A at this time: this will be required if this becomes a City project.*
☐	☐	☒	**C.**	**Term Of Guarantee Of Improvements: The developer shall guarantee all improvements pursuant to this Section for no less than one year from the date of approval of all improvements as complete and satisfactory by the city engineer, except that parks shall be guaranteed and maintained by the developer for a period of two years.**
			Staff Comments	*N/A at this time: this will be required if this becomes a City project.*

16.05.020: Streets, Sidewalks, Lighting, Landscaping

☒	☐	☐	**16.05.020**	**Streets, Sidewalks, Lighting, Landscaping: The developer shall construct all streets, alleys, curb and gutter, lighting, sidewalks, street**

?				**trees and landscaping, and irrigation systems to meet City Standards, the requirements of this ordinance, the approval of the Council, and to the finished grades which have been officially approved by the city engineer as shown upon approved plans and profiles. The developer shall pave all streets and alleys with an asphalt plant-mix, and shall chip-seal streets and alleys within one year of construction.**
			Staff Comments	*1. Careful consideration should be given in tree placement next to road ways so the trees do not impede snow storage and removal.* *2. Trees shall be selected from the list provided in the 2013 Wood River Valley Tree Guide and shall be appropriate for areas adjacent to ROWs, when installed along pathways, sidewalks, etc.* *3. Tree placement should be considered in the vision triangle of any intersection.* *4. Tree placement shall not block sight lines of any regulatory or guidance.* *5. No street lighting, street trees, irrigation system details are shown. Other details such as typical street sections and components will need to be revised to conform to City Standards.*
☐	☐	☒	**A.**	**Street Cuts: Street cuts made for the installation of services under any existing improved public street shall be repaired in a manner which shall satisfy the Street Superintendent, shall have been approved by the Hailey City Engineer or his authorized representative, and shall meet City Standards. Repair may include patching, skim coats of asphalt or, if the total area of asphalt removed exceeds 25% of the street area, the complete removal and replacement of all paving adjacent to the development. Street cut repairs shall also be guaranteed for no less than one year. (Ord. 1191, 2015)**
			Staff Comments	*No street cuts are proposed.*
☒ ?	☐	☐	**B.**	**Signage: Street name signs and traffic control signs shall be erected by the Developer in accordance with City Standard, and the street name signs and traffic control signs shall thereafter be maintained by the City.**
			Staff Comments	*1. Plans indicating Road Markings and signage will need to be supplied for review.* *2. No signage is shown.*
☐	☐	☒	**C.**	**Streetlights: Street lights in the Recreational Green Belt, Limited Residential, General Residential, and Transitional zoning districts are not required improvements. Where proposed, street lighting in all zoning districts shall meet all requirements of Chapter VIIIB of the Hailey Zoning Ordinance.**
			Staff Comments	*No street lights are shown.*

16.05.030: Sewer Connections				
☐	☒	☐	**16.05.030**	**Sewer Connections: The developer shall construct a municipal sanitary sewer connection for each and every developable lot within the development. The developer shall provide sewer mains of adequate size and configuration in accordance with City standards, and all federal, state, and local regulations. Such mains shall provide wastewater flow throughout the development. All sewer plans shall be submitted to the city engineer for review and approval. At the city engineer's discretion, plans may be required to be submitted to the Idaho Department of Environmental Quality (DEQ) for review and comments.**
			Staff Comments	*A private "decentralized" onsite community sewer system is proposed rather than a connection to the City of Hailey municipal system.* *<u>Summary of Proposed Treatment System:</u>* *The onsite system will generally consist of individual structures or houses connected to a septic tank/effluent pump chamber. Effluent is then transmitted via a small diameter collection system to an onsite treatment facility consisting of a pre-filter followed by a constructed wetland and then subsurface infiltration. This system will service properties within development Phases 1 & 2. Future phase 3 will be served by one of three cluster wastewater treatment systems. The infiltration system for Phases 1 & 2 is located on Parcel A Block 1. The location of the other three systems is not determined.* *<u>Issues identified with the proposed Treatment System:</u>* • *Is located **WITHIN the Wellhead Protection Zone** (upstream of a City well)* • *May not have a staff of full time operators constantly monitoring the treatment process* • *May not be able to generate the funding necessary for immediate repairs or responses to catastrophic failures* • *Uses equipment and technology inconsistent with current City infrastructure, resulting in additional training, acquisitions, and effort if the City is to become involved in the operation of the facility (which is not recommended)* • *If adopted, the concept of decentralized treatment could result in many dissimilar systems throughout the City* • *Relies on a constructed wetland process not typically used in the Wood River Valley* • *Is located immediately adjacent to the City boundary and disposes of effluent with no opportunity for additional groundwater dilution before migration into City borders* *The system is located immediately adjacent to the City boundary. While a DEQ Level 1 Nutrient Pathogen Study has received preliminary review by DEQ, additional study is necessary. The Level 1 spreadsheet does not directly identify groundwater nitrate plumes, and due to the location of the proposed system it is likely this plume will migrate into the City Limits. A DEQ Level 2 Nutrient Pathogen study must be performed to demonstrate the plume will not encroach into City boundaries.* *The existing municipal sewer system appears to have sufficient treatment capacity. The current "FIRM" capacity is 0.7 mgd, max capacity is 1.2 mgd, operating around 0.6 mgd currently. Nonetheless, the city should evaluate future infill within the existing City limits*

				in addition to the proposed development. There may be issues with the collection system such as a potential bottleneck through a 6 inch "high school" mainline and an 8" mainline in Fox Acres south to the Countryside mainline. A viable option to the potential bottleneck in the 8" mainline is the construction of a new bypass parallel to the Wood River Trail at Fox Acres. *The City standard above requires the project to connect to municipal waste water, but no connection is proposed. Staff recommends connection to the city system. The city's collection system and treatment capacity should be further reviewed and an adequate solution should be determined. Each of the above options would need to be considered for full build-out within the current City limits and all phases of the proposed project area.* *<u>Additional Comments:</u>* *1. Other staff comments such as sewer service locations, system materials, locations, etc., would need to be in conformance with City standards.* *2. Woodside pump house:* *a. The proximity of proposed drain fields to Woodside pump house is of concern for the City's well head protection plan.* *b. Woodside and 3rd are routinely measuring at highest Nitrate levels every year. It is not known if this is a direct correlation with the farm fields out Quigley, and if homes and drain fields are introduced, what the impacts will be on nitrate levels for these two wells.* *3. If served by the City, all sewer lines should be gravity fed into the City's collection system without the use of lift stations. Sewer mains shall be 8" gravity mains in conformance with City standards.* *4. If not served by the City, test wells should be installed downstream of the drain fields to monitor water quality before occupancy to establish a baseline, then continuously monitored after occupancy to ensure no contamination.* *5. All construction shall have DEQ approval.*
16.05.040: Water Connections				
☐	☒	☐	**A.**	**Requirements: The developer shall construct a municipal potable water connection, water meter and water meter vault in accordance with City Standards, or other equipment as may be approved by the city engineer, for each and every developable lot within the development. The developer shall provide water mains and services of adequate size and configuration in accordance with City Standards, and all federal, state, and local regulations. Such water connection shall provide all necessary appurtenances for fire protection, including fire hydrants, which shall be located in accordance with the IFC and under the approval of the Hailey Fire Chief. All water plans shall be submitted to the city engineer for review and approval. At the City Engineer's discretion, plans may be required to be submitted to the Idaho Department of Environmental Quality (DEQ) for review and comments.**
			Staff Comments	*A private onsite community potable water system is proposed rather than a connection to the City of Hailey municipal system. The proposed potable water system consists of two wells and the associated distribution system. The development also proposes a separate*

				irrigation/fire protection system supplied by a third well. A reuse system is also proposed that will distribute treated effluent for use as irrigation water via a separate small diameter pressure pipe. *Per the report prepared by Brockway Engineering:* *"water rights on the project are adequate for irrigation and mitigation for a new water right for potable supply. . . The development has existing water rights to irrigate 276.5 acres of land. . . The project will develop 43 acres of the 276.5 acres, and approximately 12 acres will be retired. . .The available water supply for the project is adequate and reliable to meet all demands for irrigation, potable, and fire suppression requirements." pages 16 & 17.* *1. Well Impacts Per the report prepared by Brockway Engineering:* *Drawdown associated with operational maximum day demand has an insignificant (< 0.5 feet) effect beyond 500 feet from the well site. Hydraulic conductivities used for the Brockway analysis are from 11 to 150 ft/day. However, staff notes the hydraulic conductivity used for the Nutrient Pathogen Study submitted by the developer is 3000 ft/day. This discrepancy should be explained by the applicant.* *2. The required fire flow is 1500 gpm for two hours, based upon review by the Wood River Fire District. Fire flows will be provided by the non-potable irrigation water system.* *3. All construction and operations shall have DEQ and City approval.* *4. The development should install City compliant water vaults at time of development, but meters are not necessary unless connected to the City system.* *5. Road typical sections show a "geothermal" line but no resources are present.* *6. An inspector shall be selected by the City and paid for by the applicant for City inspection of all water, sewer, and roadway infrastructure during construction.* *7. Quigley Tank* *a. Quigley canyon will be open public access as a result of this project. A fence and other security measures around the tank will be needed.* *b. The drain and over flow for the tank flow down the canyon and under the existing dirt road into the canal. A modified easement for water drainage may be needed.* *c. The City will need to maintain access to the tank though out the construction of the development.* *8. Distribution system* *a. Plans should show main line valves and sizes of mains (most likely 8")* *b. If served by municipal water, the developer will need to install individual services lines for each lot.* *c. Separation of irrigation lines from potable water is a desirable component of the proposed design. These lines need to maintain all the same separation requirements as WW. If irrigation systems use potable water, backflow assemblies,*

				per the City Standards, shall be installed and inspected. *d. The fire hydrants off of the non-potable water line will need to be painted purple (represents non-potable water)* *e. The water services should not go through parcels J and K.* *9. There should not be a dead end main line to feed one service.* *The City standard above requires the project to connect to municipal water but no connection is proposed. If the City decides that connection to the city's system is preferred, staff recommends the development's potable water system become a public system connected to the City of Hailey municipal system and the well ownership/operation transferred to the City, which would allow for fire protection off of the potable supply system (applicable water rights would also need to be transferred to the City). These new wells should be constructed to deliver 1500 gpm and be platted on well parcels transferred to the City. The well parcels shall provide DEQ compliant size and setbacks. The irrigation system would continue to be a separate system operated by the development.*
☐	☐	☒	**B.**	**Townsite Overlay: Within the Townsite Overlay District, where water main lines within the alley are less than six (6) feet deep, the developer shall install insulating material (blue board insulation or similar material) for each and every individual water service line and main line between and including the subject property and the nearest public street, as recommended by the City Engineer.**
			Staff Comments	*Not Applicable*
16.05.050: Drainage				
☒ ?	☐	☐	**16.05.050**	**Drainage: The developer shall provide drainage areas of adequate size and number to meet the approval of the street superintendent and the city engineer or his authorized representative. (Ord. 1191, 2015)**
			Staff Comments	*Generally speaking, the overall concept appears acceptable but specific components such as Catch Basins and Drywells are not compliant with City Standard and will need to be changed.* *Storm water infiltration beds must be located at least 25' from public water supply components. The scale of the plans makes this difficult to confirm and will need to be evaluated at final design.* *Additional details, and storm drain area/infiltration calculations, etc. will be required at final design.*
16.05.060: Utilities				
☐	☐	☐	**16.05.060**	**Utilities: The developer shall construct each and every individual service connection and all necessary trunk lines, and/or conduits for**

				those improvements, for natural gas, electricity, telephone, and cable television to the property line before placing base gravel for the street or alley.
			Staff Comments	*The concept appears to generally address these issues. Additional utility company comment and engineering details will be required at final design.*
16.05.070: Parks, Green Space				
☐	☒	☐	**16.05.070**	**Parks, Green Space: The developer shall improve all parks and green space areas as presented to and approved by the hearing examiner or commission and council.**
			Staff Comments	*Development of the proposed Parks and Green space areas are not shown at this time. Development of the sports complex as part of this approval process is highly desirable.*
16.05.080: Installation To Specifications; Inspections				
☒ ?	☐	☐	**16.05.080**	**Installation to Specifications; Inspections: All improvements are to be installed under the specifications and inspection of the city engineer or his authorized representative. The minimum construction requirements shall meet City Standards or the Department of Environmental Quality (DEQ) standards, whichever is the more stringent.**
			Staff Comments	*An inspection schedule will be established for any/all components at final design. All infrastructure must meet City of Hailey Specifications and will be further evaluated in greater detail at final design.* *The City will need to select an inspector, to be paid for by the applicant, for all water, sewer, and roadway infrastructure during construction.*
16.05.090: Completion; Inspections; Acceptance				
☐	☐	☒	**A.**	**Installation of all infrastructure improvements must be completed by the developer, and inspected and accepted by the City prior to signature of the plat by City representatives, or according to a phasing agreement. A post-construction conference shall be requested by the developer and/or contractor and conducted with the developer and/or contractor, the city engineer, and appropriate City departments to determine a punch list of items for final acceptance.**
			Staff Comments	*This would be required if this were to become a municipal project.*

☐	☐	☒	**B.**	**The developer may, in lieu of actual construction, provide to the City security pursuant to Section 3.3.7, for all infrastructure improvements to be completed by developer after the final plat has been signed by City representatives. (Ord. 1191, 2015)**
			Staff Comments	*Completion of all major infrastructure by the developer is preferred over bonding.*
16.05.100: As Built Plans and Specifications				
☐	☐	☒	**16.05.100**	**As Built Plans and Specifications: Prior to the acceptance by the City of any improvements installed by the developer, three (3) sets of "as-built plans and specifications" certified by the developer's engineer shall be filed with the city engineer. (Ord. 1191, 2015)**
			Staff Comments	*As-builts will be required if this becomes a municipal project.*

Motion Language:

Recommendation to the City Council: Pursuant to the City Area of City Impact Agreement, move to make a recommendation to the City Council on the proposed PUD subdivision shown on the proposed Quigley Farms Preliminary Plat located at SESE Section 3 & NE & N1/2SE Section 10, Map 2N R18E Section 3 & 10, Tax Lot 8368, based on deliberations herein.

Recommendation for Continuation: Move to continue the proposed PUD subdivision shown on the proposed Quigley Farms Preliminary Plat located at SESE Section 3 & NE & N1/2SE Section 10, Map 2N R18E Section 3 & 10, Tax Lot 8368 to the regular Planning and Zoning Commission meeting of September 12, 2016.

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BEFORE THE HAILEY CITY COUNCIL

In the Matter of the Application by Quigley Green Owners, LLC, for Annexation and Zoning	**FINDINGS OF FACT, CONCLUSIONS OF LAW AND DECISION**

I. PROCEDURAL HISTORY AND PERTINENT FACTS

In November, 2007, Hailey received an application by Quigley Green Owners, LLC ("Applicant") for annexation of approximately 1,109 acres into Hailey and for zoning of the parcel. Hailey has held numerous public hearings before the Hailey Planning and Zoning Commission ("Commission") and the Hailey City Council ("Council").

In its initial review, the Commission evaluated a proposed 379 lot development with an 18 hole golf course and recommended approval of the application subject to 54 conditions. *See Findings of Fact and Recommendation to City Council dated September 17, 2008.* Following the Commission's recommendation, the Council evaluated the application. During the Council's review, the Applicant agreed to eliminate any development above the pond and seek only one home site in Deadman's Gulch under the jurisdiction of Blaine County. The property proposed to be annexed was reduced to 912 acres ("Quigley Property"). The Council eventually evaluated the application and generally found the application conformed with the Hailey Comprehensive Plan. The Council instructed staff to negotiate with the Applicant and to forward a proposed annexation agreement to the Council so the Council could better evaluate the fiscal impacts of the application. During this time, the Applicant elected to revise the application by deleting the 18 hole golf course and by increasing the property density to 444 lots. In addition, the Applicant eliminated a separate pressurized irrigation system. At this time, the Applicant submitted a draft Annexation and Development Agreement. The Council conducted several more hearings and remanded the application to the Commission to review the changes to the application and to make a recommendation to the Council regarding land use issues and compliance with the Hailey Comprehensive Plan. Consistent with Council's instructions, the Commission evaluated the revised application and submitted a recommendation to the Council. *See Findings of Fact and Recommendation to City Council dated November 21, 2011.* At no time did the Applicant express a willingness to reduce the density proposed in the application.

Following receipt of the Commission's recommendation of the 444 lot application, the Council considered testimony of the Blaine County Planning Director, Tom Bergin, who evaluated the potential development density if the Applicant's land was developed in Blaine County. Mr. Bergin explained that the property has a maximum density of 105 lots as a straight lot subdivision and 129 lots as a PUD subdivision.

Following receipt of the Commission's recommendation, the Council also received a fiscal analysis and a water appraisal. *See Quigley Canyon Ranch Cost/Benefit Study (April 26, 2012)("Fiscal Study") and Quigley Canyon Ranch Water Rights Valuation (February 10, 2012) ("Water Appraisal").* The Fiscal Study recommended an annexation fee of $2,548.560, a water

annexation fee of $898,190 and a waste water annexation fee of $3,084,150. The water and wastewater annexation fees were derived from the estimated costs of on-site and off-site water and wastewater capital projects. *See Fiscal Study, pp. 27-28, Tables T and U.*

The Water Appraisal evaluated all of the Applicant's surface and ground water rights. The evaluation of the water rights by an independent engineering firm, SPF Engineering, was used in the appraisal of the water rights. The Water Appraisal concluded that the highest and best use of the water rights was for mitigation, not necessarily irrigation. As explained by the Director of IDWR, Hailey would have to obtain a permit to use the Quigley water for mitigation. Hailey was advised by SPF that a permit for mitigation is feasible, but it was unclear how much of the 1880 water could be used for mitigation and how much it will cost to obtain such a permit. Water Right No. 37-19736 was recommended to be used as the mitigation water right. This water right has a very early and valuable priority date of 1880, has a diversion rate of 2.28 cfs and is appurtenant to 276 .5 acres. The flow data between 2007 and 2011 demonstrated that the flow in the Quigley stream was less than the 2.28 cfs flow rate during some of the summer months. *See SFP Memo (December 31, 2008), p. 11 and Water Appraisal, p. 16, Figure 2.* Ultimately, the Water Appraisal valued the 1880 surface water right between $2,212,000 and $3,318,000.

The Applicant was asked to explain what it felt were the appropriate annexation fees and how the Applicant proposed to fund the annexation fees. Immediately before the scheduled conclusion of the hearings, the Applicant provided the following list of contributions if the property was annexed into the City of Hailey.

Monetary

Description	Amount
Annexation Fee	$ 2,548,560
Water annexation Fee	$ 898,190
Wastewater Annexation Fee	$ 3,084,150
Building Permit and DIF	$ 2,421,180
Water Connection Fee	$ 1,694,748
Wastewater Connection Fee	$ 1,455,876
Meter and Inspection Fees	$ 222,000
Net Revenue to General Fund	$ 1,711,528
School Site	$ 2,083,692
Public Transit Contribution	$ 94,057
Library Contribution	$ 47,068
Well – City Portion	$ 61,000
Offsite Street Improvement – City Portion	$ 247,500
	$ 16,569,549

Non-Monetary

Water Rights
Open Space/Parks (470.75 acres)
Bike Paths and Trails

During the May 12, 2012 hearing, the Applicant stated it felt the annexation fee of $2,548,560 should be approximately $2,000,000 but did not address the water annexation fee and wastewater annexation fee. At the May 12, 2012, hearing, the Applicant also stated that the City would be provided with assurances to pay all the fees but did not specify how the assurances would be made (*e.g.*, cash payment, letter of credit, payment bond or performance bond).

On May 23, 2012, the Council made oral findings of fact and conclusions of law. This Decision sets for the Council's formal findings of fact and conclusions of law.

II. FINDINGS OF FACT

A. Relevant Standards. Under §14.01.090(C) of the Hailey Municipal Code, the Council shall make findings of fact and conclusions of law to determine:

1) whether the proposed application will be harmonious and in accordance with the goals and policies of applicable components of the Hailey Comprehensive Plan,

2) whether the proposed annexation would be in the best interests of the citizens of Hailey, and

3) to the extent possible, whether the proposed annexation will have a negative fiscal impact upon the existing citizens of Hailey at the time of an annexation and in the future.

B. Comprehensive Plan Standard. A majority of the Council and Mayor finds that the proposed application will not be harmonious and not in accordance with the goals and policies of applicable components of the Hailey Comprehensive Plan. Council Members Brown and Burke find that the application general complies with the Hailey Comprehensive Plan which calls for compact and diverse neighborhoods and phased development. *See e.g., Hailey Comprehensive Plan, §§5.4, 5.4.7, 10.1.5, and 12.1.2.* Council Members Keirn and Cooley and Mayor Haemmerle find the density of the proposed development is too great, which in turn creates undue demand on city streets. *See e.g., Hailey Comprehensive Plan §§10.3, 12.1 and 12.1.1.*

C. Best Interests Standard. All of the Council Members and the Mayor find that the proposed annexation will not be in the best interests of the citizens of Hailey. Even though all of the Council and the Mayor believe it is appropriate that the Quigley Property be annexed into the City of Hailey, the Council as a whole does not believe it is in the best interest to annex the Quigley Property now and at the proposed density. Each council member's findings on the best interest standard are set forth in the following separate paragraphs.

Council Member Brown finds that the timing of this application is not right. Even though there has been some evidence of increased home sales over the last few months, there is not enough data to show a sustainable trend. The timing is also flawed in light of the uncertainty of the Cutters lawsuit. Moreover, the uncertain fiscal impact of the proposed annexation weighs against a finding that the application is in the best interests of the citizens of Hailey.

Council Member Keirn finds that the proposed density has significant impact on the city streets, especially when there is still considerable available infill development (*e.g.*, Dumke property). The timing of this application is also a problem because Hailey is having a difficult time funding needed capital projects. The uncertain fiscal impact of the proposed development weighs against a finding that the application is in the best interests of the citizens of Hailey.

Council Member Cooley finds that the proposed density is the primary reason he cannot find compliance with the best interest standard. In particular, the traffic study demonstrates that there would be an unacceptable level of service even with the projected 15% decrease in traffic from the earliest plan which included a golf course. Annexation is not appropriate at this time with the proposed density even though recreation benefits are significant and even though a county development may be approved with individual wells and septic systems adjacent to the city boundaries.

Council Member Burke finds that many components of the proposed annexation are in the best interests of the city, such the recreational benefits and the associated economic benefits, but the present fiscal condition of the city weighs against a finding of compliance with the best interest standard.

For several reasons, Mayor Haemmerle finds the application as proposed is not in the best interests of the citizens of Hailey. The density of 444 lots is too dense. The city streets, especially Quigley Street, are not adequate for the density. The timing of the annexation is problematic because of the overall fiscal health of the City, because there is significant infill which can occur in the City and because present residential development is stagnant.

D. Fiscal Impact Standard. A majority of the Council and Mayor find that the proposed annexation will have a negative fiscal impact upon the existing citizens of Hailey at the time of an annexation and in the future. Council Member Burke finds the application will not have a negative fiscal impact upon the citizens of Hailey, while the remaining members of the Council and the Mayor find that the application will have a negative fiscal impact upon the citizens of Hailey.

The Quigley Canyon Ranch Cost/Benefit Study estimates the annexation fee to be $2,548, 560. The Applicant has suggested that it receive a credit against the annexation fee equivalent to the value of the water rights to be conveyed to the City. The water rights have been valued between $2,212,000 and $3,318,000. *See Water Appraisal.* The Council Members and the Mayor found that the Quigley Canyon Ranch Cost/Benefit Study was problematic based on the values used by the consultant and incomplete data. Given the complexity of the water law and the range of values by the appraisal, Council Members and the Mayor also found that the valuation of the water rights was difficult to ascertain.

In addition to any annexation fee, water and wastewater improvements and other off-site street improvements will need to be paid. The improvements include water improvements estimated to be $898,190, wastewater improvements estimated to be $3,084,150, and street improvements to Quigley Road, Deerfield and Fox Acres estimated to be $1,050,000. *See Fiscal Study, Tables T & U, pp. 27-28; see also Draft Annexation and Development Agreement, pp.3-5.*

The Applicant has proposed to fund any monies to be paid in the future with a Community Infrastructure District formed under Idaho Code §§50-3101 *et seq.* After being asked how the Applicant intended to pay any fees on May 7, 2012, the Applicant generally stated in the May 21, 2012, hearing that the City would be provided with assurances to pay the monies in the future. Hailey is currently involved in adversary proceedings in the federal bankruptcy court in which the developer of Cutters Subdivision and a lender are asserting that the annexation fees are illegal. The Cutters annexation fees are secured and are to be paid in installments over time. In light of the Cutters lawsuits, Hailey wishes to be paid on or before any annexation and does not wish to become a creditor, secured or unsecured. A general assurance that monies will be paid in the future is insufficient to establish compliance with the fiscal impact standard.

§14.01.090 of the Hailey Municipal Code provides that a study, such as the Fiscal Study, recommends a base amount of annexation fees and that the Council retains the right to require further monetary or non-monetary contributions. Based on the reasons set forth herein, the Council did not address the need for further monetary or non-monetary contributions under §14.01.090 of the Hailey Municipal Code.

The Applicant has provided a list of contributions which total $16,569,549. Many of the items on the list are not properly classified as contributions to Hailey. For example, the school site estimated at $2,083,692, is a benefit to the Blaine County School District, not the City of Hailey. In addition, some of the items are characterized as fees but are really estimates of costs of certain water and wastewater projects which the applicant proposes to be constructed by the City of Hailey. *Fiscal Study, Table U, p. 28.* Some of the improvements are required for the development (*e.g.* Woodside trunk line and much of the city well). Other sources of revenue are designed to be regulatory fees which are designed to cover the later costs of inspections and enforcement. (*e.g.* building and inspection fees). The water and wastewater connection fees are designed to cover the cost of water and wastewater improvements. *Hailey Municipal Code, §13.04.140.*

Council Member Brown noted that the value of the water rights proposed to be conveyed to Hailey is uncertain because a permit must be issued for any mitigation right and it is unknown whether there will be a one for one transfer of the surface irrigation right to the mitigation right. Council Member Keirn noted that Hailey will incur actual costs to provide municipal services and the conveyance of water rights as a credit to any annexation fee will not pay for the municipal costs to be incurred upon annexation. Council Member Burke noted that the Quigley Canyon Ranch Cost/Benefit Study found that this proposed development would generate a positive cash flow for the first twenty-five years. *See Fiscal Study, p. 29, Table V.* Mayor Haemmerle noted that the uncertain assurance to pay for costs almost makes it impossible to approve this application.

E. Concurrent Zoning Application. In light of the decision not to annex the Quigley Property, it is not necessary to adopt zoning districts for the property.

III. CONCLUSIONS OF LAW AND DECISION

Based on the findings of fact stated on the record and in these Findings of Fact, Conclusions of Law and Decision, the Council makes the following conclusions of law:

1) the proposed application is not harmonious and not in accordance with the goals and policies of applicable components of the Hailey Comprehensive Plan,

2) the proposed annexation is not in the best interests of the citizens of Hailey, and

3) the proposed annexation will have a negative fiscal impact upon the existing citizens of Hailey at the time of an annexation and in the future.

Accordingly, the Council and the Mayor unanimously deny the application by Quigley Green Owners, LLC, to annex the Quigley Property.

Dated this 28th day of June, 2012.

Fritz X. Haemmerle, Mayor

ATTEST:

Mary Cone, Clerk

CITY OF HAILEY Seal BLAINE COUNTY, IDAHO

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that on this 29th day of June, 2012, I caused to be served a true copy of the foregoing document by the method indicated below, and addressed to each of the following:

☒ U.S. Mail ☐ Facsimile ☐ Hand Delivered ☐ E-Mail	J. Evan Robertson, Esq. Robertson & Slette, PLLC P.O. Box 1906 Twin Falls, ID 83303-1906
☒ U.S. Mail ☐ Facsimile ☐ Hand Delivered ☐ E-Mail	Dave Hennessy Hennessy Property Management PO Box 2720 Ketchum, ID 83340-2720

Mary Cone, Clerk

CITY OF HAILEY
Seal
BLAINE COUNTY, IDAHO

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Hailey Comprehensive Plan
Land Use Map
Resolution 2010-18

Land Use

- Hailey City Limits
- 1/2 Mile Service Area
- 1/4 Mile Service Area
- Parks Activity
- Community Gateways
- Main Street Corridor
- Downtown
- Community Activity Areas
- High Density Residential
- Residential Buffer
- Traditional Residential
- Light Industrial/Business Park
- Airport Site Redevelopment
- Neighborhood Service Centers

Parks & Green Space

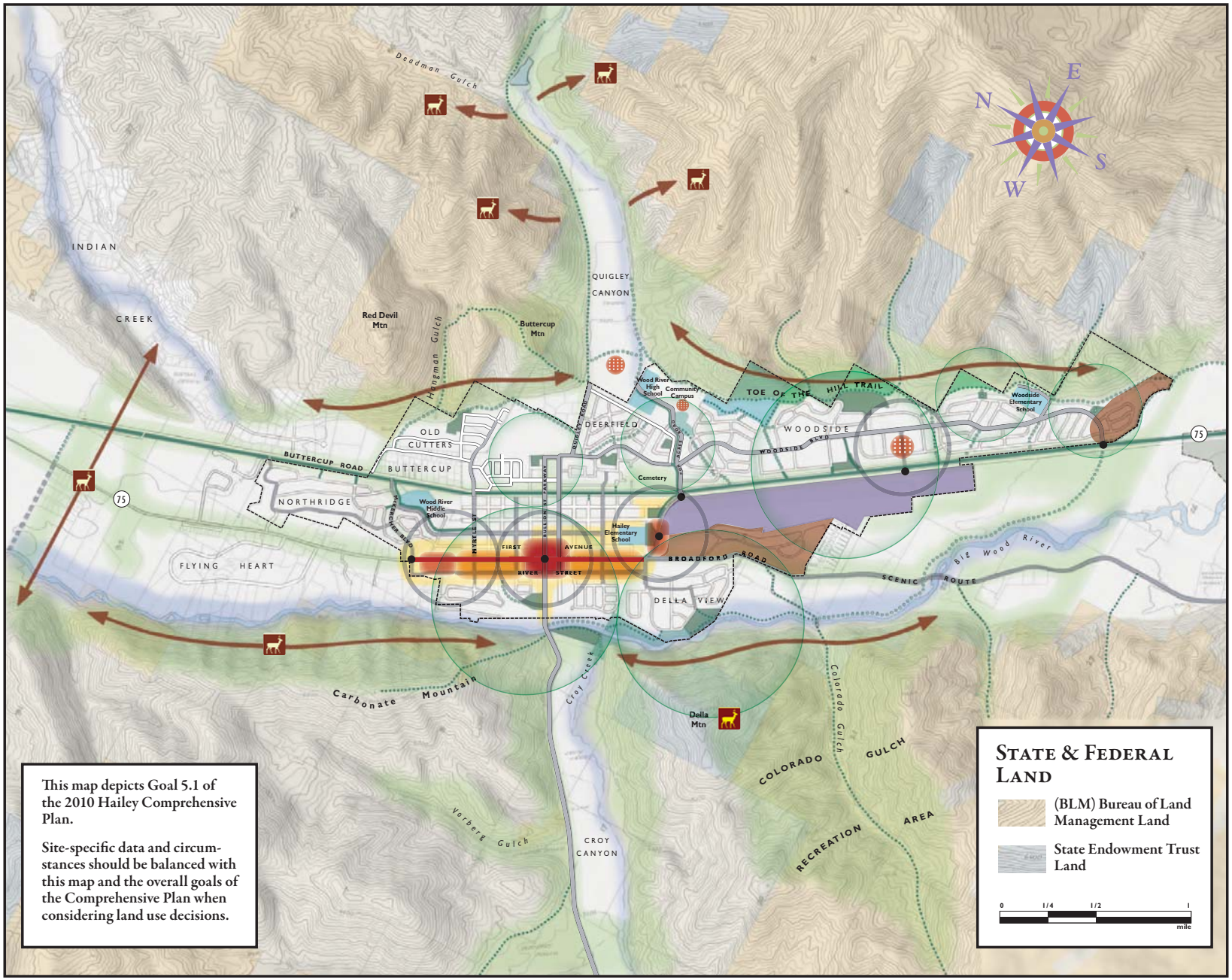
- Existing Parks
- Hillside Green Space
- School Playing Fields
- Other Public Green Space

Hailey Trails

- Paved Separated Pathways
- Pedestrian & Bicycle Routes
- Trails
- Potential or Proposed Trails

Natural Resources

- Floodplains, Floodways, Waterways and Wetlands
- Open space, Green Space, Greenways and Scenic Corridors
- Wildlife Corridors/Winter Range Areas



A.
Introduction

1. **Development Team Members**

2. **Property and Zoning Summary**

3. **Applicants Written Statement**

4. **Land Use Reviews Requested**

5. **Application Fee Calculation**

1. Development Team Members:

Listed below is a summary of the development team members for the Quigley Farm Planned Unit Development and Preliminary Plat proposal.

Owner:	**Quigley Farm & Conservation Community, LLC** PO Box 2720 Ketchum, ID 83340 Contact: Dave Hennessy Telephone: (208) 725-2256 Email: dhennessy@hennessyco.com
Developer:	**Hennessy Company** PO Box 2720 Ketchum, ID 83340 Contact: Dave Hennessy Telephone: (208) 725-2256 Email: dhennessy@hennessyco.com
Planning:	**SERA Architects, Inc.** 359 NW 5th Avenue Portland, OR 97209 Telephone: (503) 445-7324 Contact: Jeff Roberts Email: jeffr@serapdx.com
	WH Pacific, Inc. 9755 SW Barnes Road, Suite 300 Portland, OR 97225 Telephone: (503) 626-0455 Contact: Tom Jones/Kevin Apperson Email: tjones@whpacific.com/ kapperson@whpacific.com
Civil Engineering & Survey:	**Benchmark Associates, PA** 100 Bell Drive Ketchum, Idaho 83340 Telephone: (208) 726-9512 Contact: Garth McClure Email: garth@bma5b.com
Geotechnical Engineers:	**Butler Associates** PO Box 1034 Ketchum, Idaho 83340 Contact: Steve Butler Telephone: (208) 720-6432 Email: svgeotech@gmail.com

Wastewater & Environmental	**Biohabitats** 412 NW Couch Street, Suite 202 Portland, OR 97209 Telephone: (800) 220-0919 Contact: Pete Munoz Email: pmunoz@biohabitats.com
Environmental:	**Sawtooth Environmental Consulting, LLC** PO Box 2707 Ketchum, Idaho 83340 Contact: Trent Stumph Telephone: (208) 727-9748 Email: trentstumph@cox-internet.com
Traffic	**Lochner Engineering** 941 S Industry Way Meridian, Idaho 93642 Telephone: (208) 336-2983 Contact: Vance Henry Email: pmunoz@biohabitats.com

2. Property and Zoning Summary

Legal Description:	SESE Section 3 & NE & N1/2SE Section 10
	Map 2N R18E Section 3 & 10, Tax Lot 8368
Property Address:	1300 Fox Acres Road
Size:	205.22 Acres
Zoning:	Residential/Agricultural (R-5) Residential 10 (UIB) Mid-Density Residential (R-.40) Rural Density (R-40)

3. Applicants Written Statement

The Owner/Applicant is requesting a Planned Unit Development (PUD) and Preliminary Plat approval from Blaine County for the Quigley Farm PUD project. The proposed project will located on a single tax lot which is referenced as T2N R18E Sections 3 & 10 Tax Lot 8368.

Specific acreage and density calculation areas are identified below:

Use Type	Area Summary (Acres)	Total		
		Base Density (Dwelling Units)	Bonus Density (Dwelling Units)	Total Dwelling Units
Mid-Density (R-.40)	4.7	11.75	2.35	14.10
Residential/Agriculture (R-5)	105.7	21.16	6.35	27.51
Residential 10 (UIB)	19.4	1.94		1.94
Rural Density (R-40)	75.4	1.89		1.89
Subtotal	*205.3*	*36.74*		*45.44*
Community Housing Bonus @ 20%		**7.35**		**7.35**
Total	**205.3**	**44.09**	**8.70**	**52.79**

Based on the number of allowable dwelling units (rounded up to 53 units in total), the Owner/Applicant is proposing the following breakdown of unit types:

- 7 Large Lot Dwellings
- 9 Medium Lot Dwellings
- 10 Cottage Unit Dwellings *(4 of which are identified for community housing)*
- 6 Town House Sublot Dwellings *(2 of which are identified for community housing)*
- 11 Live/Work Mixed Use Dwellings
- 10 Multi-Family Dwellings *(2 of which are identified for community housing)*

In addition to the various dwelling, the project will include network of roads, open space and trails. Refer to Sheet C-2 for the conceptual layout of the proposed land uses. Also, refer to Sheets P-0 through P-4 for the Preliminary Plat layout.

The table of contents of this application outlines all the application criteria, impact study, exhibit drawings and appendices submitted for review and approval. Please refer to these sections for more detailed information regarding the project.

4. Land Use Reviews Requested

The Blaine County Code identifies the review procedures based upon the type of land use action being requested. For this application, the Applicant/Owner is requesting a Planned Unit Development (PUD) and Preliminary Plat approval. Both will be review by the Blaine County Planning and Zoning Commission (BCPZC) and the Blaine County Board of County Commissioners (BCBCC).

Land Use Type	Type
PUD & Preliminary Plat	BCPZC, BCBCC

5. Fee Calculations:

Based on Resolution 2014-17, the following fees are applicable to the application submittal:

Fee Type	Fee
Planning and Zoning Fees *(PUD Subdivision)*	
($250 each for first 10 lots and $175 per lot thereafter per development)	(10 Qty.) $ 2,500.00 (43 Qty.) $ 7,525.00
Fire Department Plan Review Fee *(40% of Planning and Zoning Fees)*	$4,010.00
Notice Board Fee	$50.00
Landowner Notices (Estimate 44 owner * ($0.49 + $0.15) * 4 mailings	$112.64
Total	**$ 14,197.64**

Return to Agenda

QUIGLEY

CONCEPT PLAN

21 AUGUST 2015

QUIGLEY FARM P.U.D.

FEBRUARY 2016

OWNER
QUIGLEY FARM & CONSERVATION COMMUNITY LLC
P.O. BOX 2720
HAILEY, IDAHO
83333
(208) 725-2256
CONTACT: DAVE HENNESSY

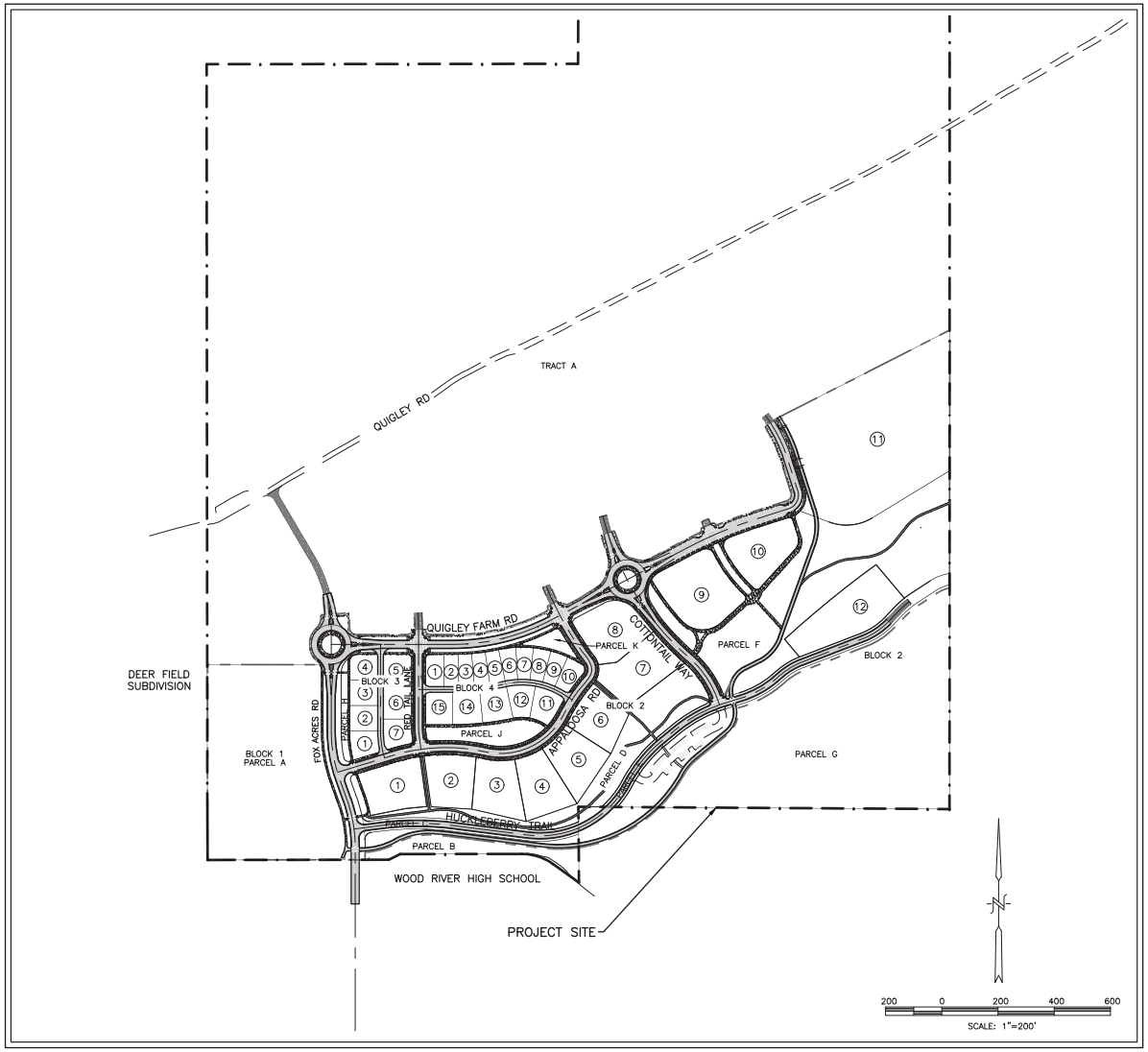
DEVELOPER
HENNESSY COMPANY
P.O. BOX 2720
HAILEY, IDAHO
83333
(208) 725-2256
CONTACT: DAVE HENNESSY

CIVIL ENGINEERING & SURVEYING
BENCHMARK ASSOCIATES, P.A.
100 BELL DRIVE
KETCHUM, IDAHO
83340
(208) 726-9512
CONTACT: GARTH MCCLURE, A.I.C.P, PRINCIPAL

GEOTECHNICAL ENGINEERING
BUTLER AND ASSOCIATES
BITTERROOT SQUARE
KETCHUM, IDAHO
83340
(208) 720-6432
CONTACT: STEVE BUTLER, P.E.

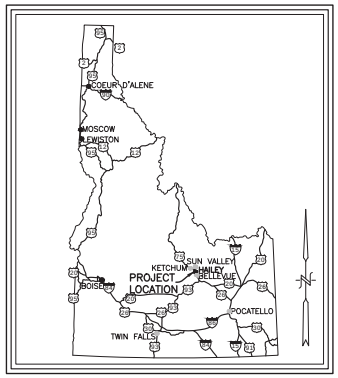
WASTEWATER & ENVIRONMENTAL ENGINEERING
BIOHABITATS
412 NW COUCH ST, SUITE 202
PORTLAND, OR
97209
(800) 220-0919
CONTACT: PETE MUNOZ, P.E.

PLANNING
SERA
359 NW 5TH AVENUE
PORTLAND, OR
97209
(503) 445-7324
CONTACT: JEFF ROBERTS, SENIOR DESIGNER



SITE MAP

SHEET INDEX	
SHEET NUMBER	SHEET TITLE
C-0	COVER SHEET
–	BOUNDARY SURVEY
C-1	EXISTING CONDITIONS PLAN
C-2	LAND USE SITE PLAN
P-0	PRELIMINARY PLAT
P-1	PRELIMINARY PLAT
P-2	PRELIMINARY PLAT
P-3	PRELIMINARY PLAT
P-4	PRELIMINARY PLAT
C-3	PERLIMINARY ROADWAY PLAN
C-4	PRELIMINARY GRADING AND DRAINAGE PLAN
C-5	PRELIMINARY WATER PLAN
C-6	PRELIMINARY ROAD SECTIONS
C-7	PRELIMINARY DETAILS
W-1	WASTEWATER INFRASTRUCTURE PLAN
L-1	OVERALL LANDSCAPE PLAN
L-2	DETAIL LANDSCAPE PLANS



VICINITY MAP

P.U.D. SUBMITTAL 02/19/16

REVISIONS		
No.	DESCRIPTION	DATE	BY

PREPARED BY:
BENCHMARK ASSOCIATES, P.A.
P.O. BOX 733 100 BELL DRIVE
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FAX 726-9514
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COVER SHEET

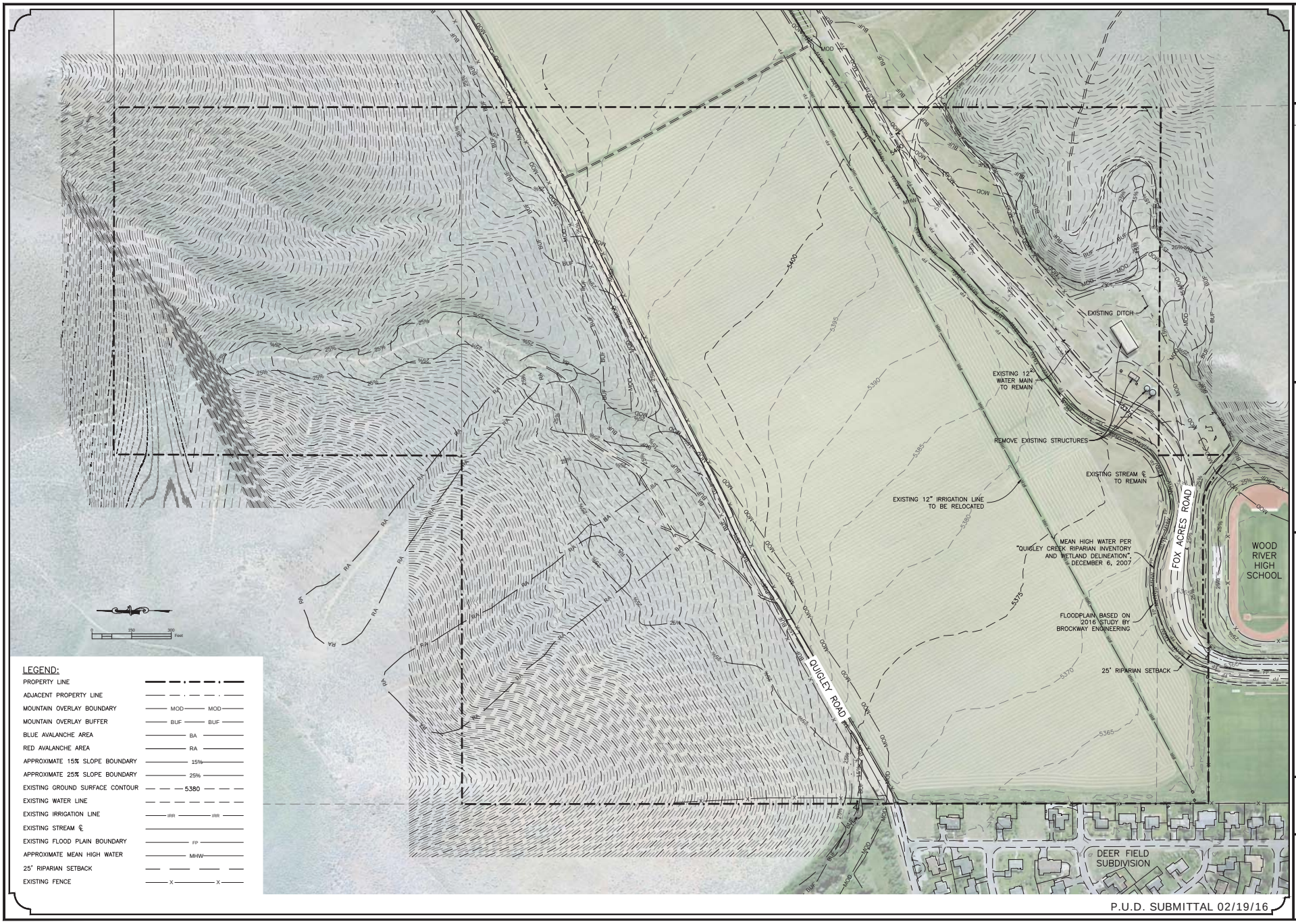
QUIGLEY FARM P.U.D.
T2N, R18E, SEC 10, B.M., BLAINE COUNTY, IDAHO

PREPARED FOR: HENNESSY COMPANY

DRAWN BY: SKS
DESIGNED BY: JPG
CHECKED BY: SB
DATE: 02/19/16
PROJECT NO.: 15222

SHEET NUMBER

C-0



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REVISIONS

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EXISTING CONDITIONS PLAN

QUIGLEY FARM P.U.D.

T2N, R18E, SEC 10, B.M., BLAINE COUNTY, IDAHO

PREPARED FOR: HENNESSY COMPANY

DRAWN BY: SKS
DESIGNED BY: JPG
CHECKED BY: SB
DATE: 02/19/16
PROJECT NO.: 15222

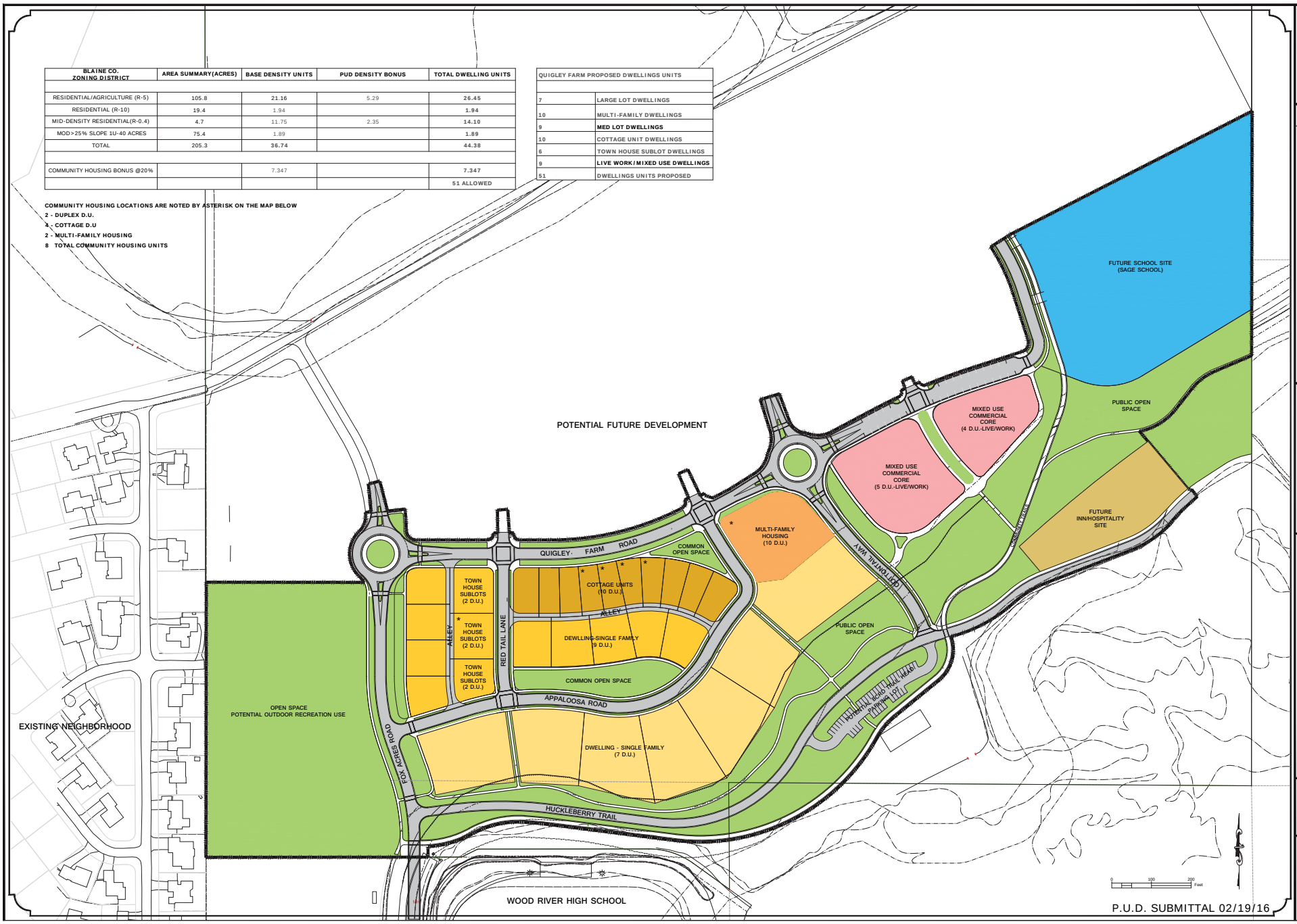
SHEET NUMBER

C-1

BLAINE CO. ZONING DISTRICT	AREA SUMMARY(ACRES)	BASE DENSITY UNITS	PUD DENSITY BONUS	TOTAL DWELLING UNITS
RESIDENTIAL/AGRICULTURE (R-5)	105.8	21.16	5.29	26.45
RESIDENTIAL (R-10)	19.4	1.94		1.94
MID-DENSITY RESIDENTIAL(R-0.4)	4.7	11.75	2.35	14.10
MOD>25% SLOPE 1U-40 ACRES	75.4	1.89		1.89
TOTAL	205.3	36.74		44.38
COMMUNITY HOUSING BONUS @20%		7.347		7.347
				51 ALLOWED

QUIGLEY FARM PROPOSED DWELLINGS UNITS	
7	LARGE LOT DWELLINGS
10	MULTI-FAMILY DWELLINGS
9	MED LOT DWELLINGS
10	COTTAGE UNIT DWELLINGS
6	TOWN HOUSE SUBLOT DWELLINGS
9	LIVE WORK/MIXED USE DWELLINGS
51	DWELLINGS UNITS PROPOSED

COMMUNITY HOUSING LOCATIONS ARE NOTED BY ASTERISK ON THE MAP BELOW
2 - DUPLEX D.U.
4 - COTTAGE D.U
2 - MULTI-FAMILY HOUSING
8 TOTAL COMMUNITY HOUSING UNITS



P.U.D. SUBMITTAL 02/19/16

No.	DESCRIPTION	DATE	BY

REVISIONS

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LAND USE SITE PLAN

QUIGLEY FARM P.U.D.
T2N, R18E, SEC 10, B.M., BLAINE COUNTY, IDAHO

PREPARED FOR: HENNESSY COMPANY

DRAWN BY: JF
DESIGNED BY: MVL
CHECKED BY: JDR
DATE: 02/19/16
PROJECT NO.: 15222

SHEET NUMBER

C-2

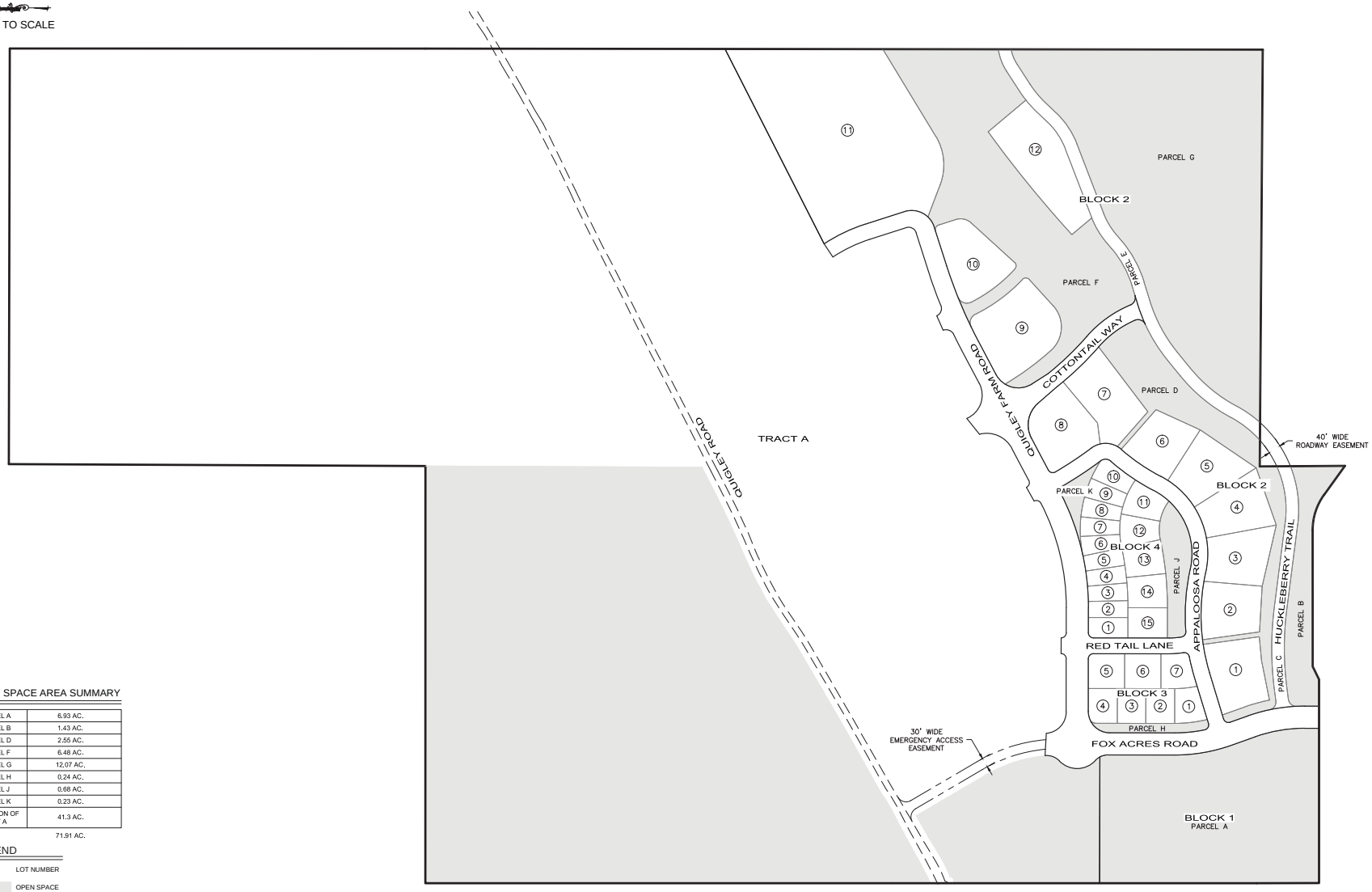
QUIGLEY FARM P.U.D.

LOCATED WITHIN: T2N, R18E, SECTION 10, BLAINE COUNTY, IDAHO.
WHEREIN TAXLOT 8368 IS SUBDIVIDED CREATING 4 BLOCKS AND TRACT A.

FEBRUARY 2016

PRELIMINARY PLAT

NOT TO SCALE



OPEN SPACE AREA SUMMARY

PARCEL A	6.93 AC.
PARCEL B	1.43 AC.
PARCEL D	2.55 AC.
PARCEL F	6.48 AC.
PARCEL G	12.07 AC.
PARCEL H	0.24 AC.
PARCEL J	0.68 AC.
PARCEL K	0.23 AC.
PORTION OF TRACT A	41.3 AC.
TOTAL	71.91 AC.

LEGEND

(#) LOT NUMBER

OPEN SPACE

PREPARED BY: BENCHMARK ASSOCIATES, P.A.
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PHONE (208)726-9512 FAX (208)726-9514 EMAIL:mail@bma5b.com
WEB: http://benchmark-associates.com/

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P.U.D. SUBMITTAL 02/19/16

REVISIONS

No.	DESCRIPTION	DATE	BY
A	ADDED OPEN SPACE AREA SUMMARY	04/25/16	SKS

PREPARED BY:
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PRELIMINARY PLAT

QUIGLEY FARM P.U.D.

T2N, R18E, SEC 10, B.M., BLAINE COUNTY, IDAHO

PREPARED FOR: HENNESSY COMPANY

DRAWN BY:	CMM
DESIGNED BY:	CMM
CHECKED BY:	CMM
DATE:	02/19/16
PROJECT NO.:	15222

SHEET NUMBER

P-0

0' 200' 400' 600'

SCALE: 1" = 200'

LEGEND

- PROPERTY LINE
- LOT LINE
- ADJOINING PROPERTY LINE
- RA — RED AVALANCHE AREA
- BA — BLUE AVALANCHE AREA
- BLAINE COUNTY ZONING LINE
- MOD — MOD — MOUNTAIN OVERLAY BOUNDARY
- BUF — BUF — MOUNTAIN OVERLAY BUFFER
- FP — FP — FLOOD PLAIN BOUNDARY
- MHW — APPROXIMATE MEAN HIGH WATER
- 25' RIPARIAN SETBACK
- 25% — APPROXIMATE 25% SLOPE BOUNDARY
- BRASS CAP
- ALUMINUM CAP
- PROPOSED 5/8" REBAR
- FOUND 5/8" REBAR

NOTES

1. BASIS OF BEARINGS IS IDAHO STATE PLANE COORDINATE SYSTEM, NAD83, CENTRAL ZONE AS DERIVED BY GPS OBSERVATIONS. ALL BEARINGS SHOWN ARE GRID AZIMUTH.
2. ALL DISTANCES SHOWN ARE GROUND DISTANCES IN U.S. SURVEY FEET.
3. ELEVATIONS BASED ON NAVD 88 (GEOID03) DATUM.
4. THE FLOOD PLAIN BOUNDARY AREA DESIGNATED ON THIS MAP IS CONSIDERED REASONABLE FOR REGULATORY PURPOSES. HOWEVER, BENCHMARK ASSOCIATES NEITHER REPRESENTS, GUARANTEES, WARRANTS NOR IMPLIES THAT AREAS OUTSIDE OF THE DESIGNATED FLOOD PLAIN AREA ARE SAFE AND FREE FROM FLOODS OR FLOOD DANGER.

   FLOOD PLAIN INFORMATION:
   FLOOD INFORMATION IS BASED ON A FLOOD STUDY CONDUCTED BY BROCKWAY ENGINEERING IN 2016.

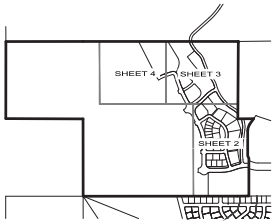
   MEAN HIGH WATER INFORMATION:
   MEAN HIGH WATER IS PER "QUIGLEY CREEK RIPARIAN INVENTORY AND WETLAND DELINEATION", DECEMBER 6, 2007
5. RED AND BLUE AVALANCHE AREA DIGITIZED FROM "SNOW AVALANCHE HAZARD & MAPPING ANALYSIS: QUIGLEY CANYON RANCH, BLAINE COUNTY, IDAHO" BY ARTHUR I. MEARS P.E., INC. DECEMBER 2007.
6. ALL RIGHTS-OF-WAY SHALL BE DEDICATED TO BLAINE COUNTY.

LINE TABLE

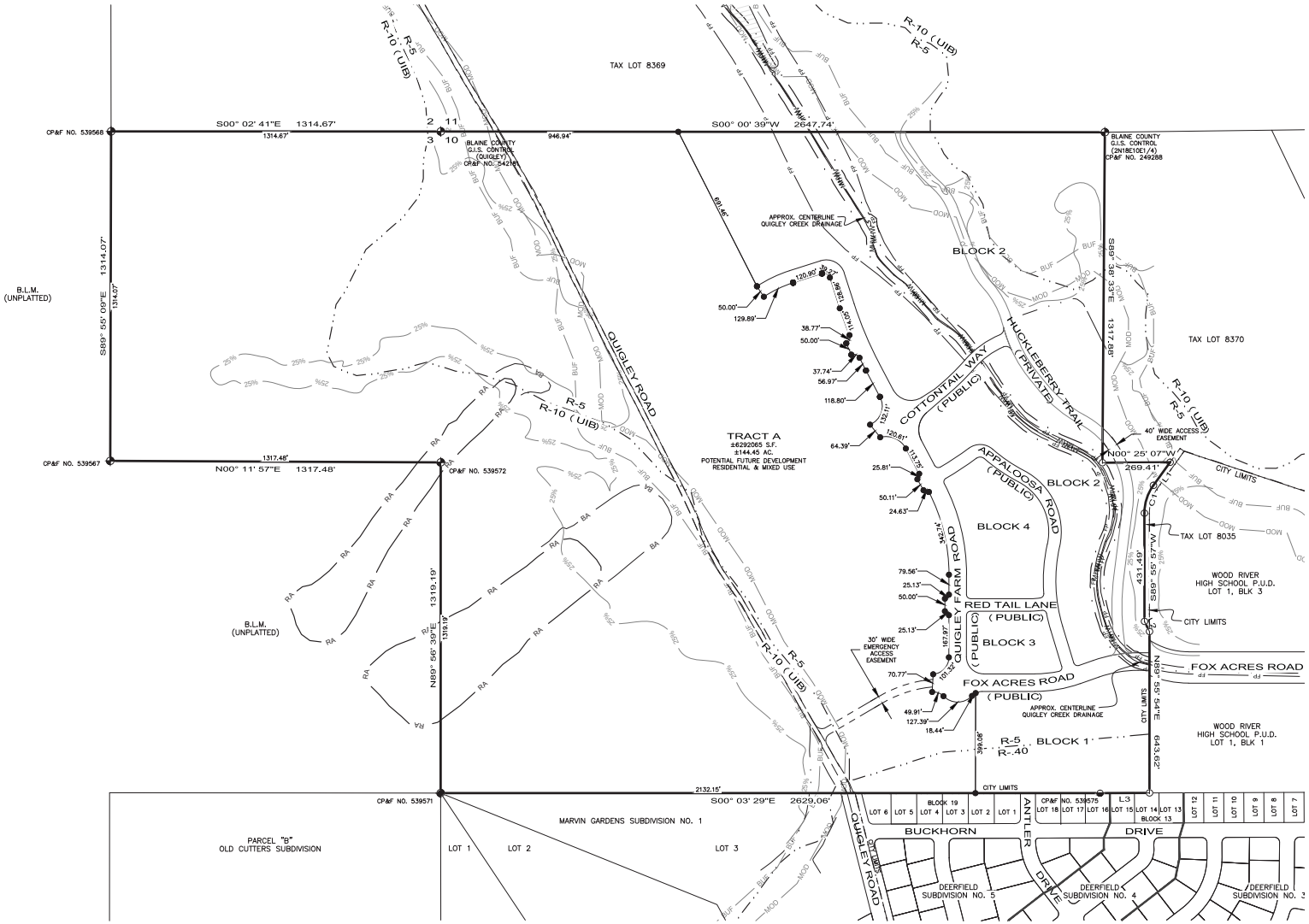
LINE NO.	DIRECTION	LENGTH
L1	N54°17'50"W	113.38'
L2	S63°43'18"W	45.28'
L3	S00°16'19"E	197.08'

CURVE TABLE

CURVE NO.	LENGTH	RADIUS	DELTA	CHORD DIRECTION	CHORD
C1	118.62'	190.00'	35°46'13"	N72°10'56"W	116.70'



KEY MAP
N.T.S.



P.U.D. SUBMITTAL 02/19/16

REVISIONS			
No.	DESCRIPTION	DATE	BY

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PRELIMINARY PLAT

QUIGLEY FARM P.U.D.

T2N, R18E, SEC 10, B.M., BLAINE COUNTY, IDAHO

PREPARED FOR: HENNESSY COMPANY

DRAWN BY:	CMM
DESIGNED BY:	CMM
CHECKED BY:	CMM
DATE:	02/19/16
PROJECT NO.:	15222

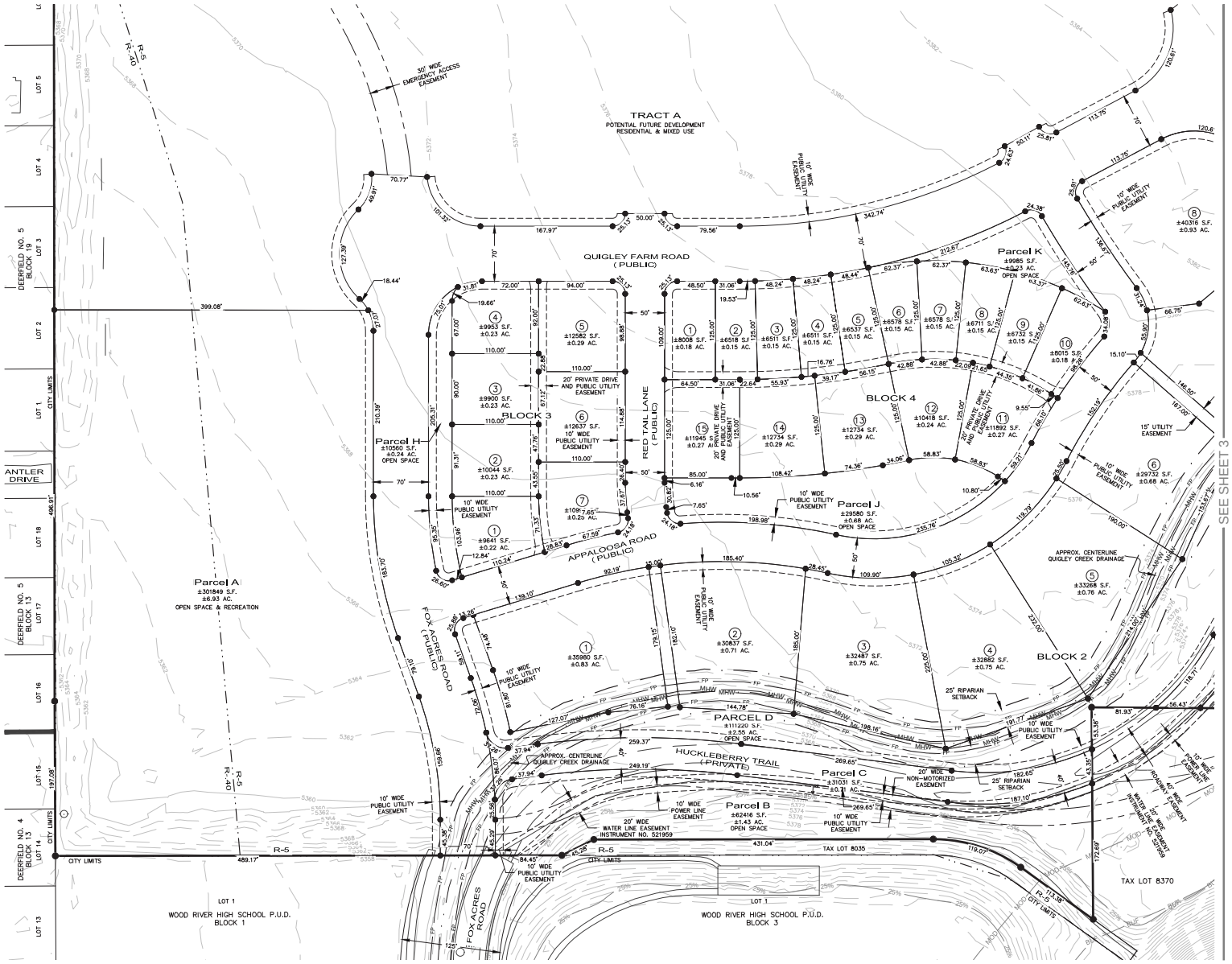
SHEET NUMBER

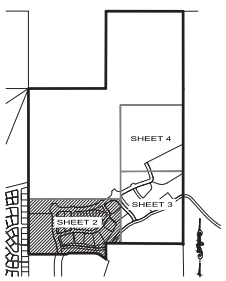
P-1

SCALE: 1" = 60'
CONTOUR INTERVAL = 2'

LEGEND

- PROPERTY LINE
- LOT LINE
- ADJOINING PROPERTY LINE
- EASEMENT
- NON-MOTORIZED EASEMENT
- RA — RED AVALANCHE AREA
- BA — BLUE AVALANCHE AREA
- BLAINE COUNTY ZONING LINE
- MOD — MOUNTAIN OVERLAY BOUNDARY
- BUF — MOUNTAIN OVERLAY BUFFER
- FP — FLOOD PLAIN BOUNDARY
- MHW — APPROXIMATE MEAN HIGH WATER
- 25' RIPARIAN SETBACK
- 25% — APPROXIMATE 25% SLOPE BOUNDARY
- BRASS CAP
- ALUMINUM CAP
- PROPOSED 5/8" REBAR
- FOUND 5/8" REBAR
- (#) LOT NUMBER





KEY MAP
N.T.S.

P.U.D. SUBMITTAL 02/19/16

REVISIONS			
No.	DESCRIPTION	DATE	BY

BENCHMARK ASSOCIATES
PREPARED BY:
BENCHMARK ASSOCIATES, P.A.
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PRELIMINARY PLAT

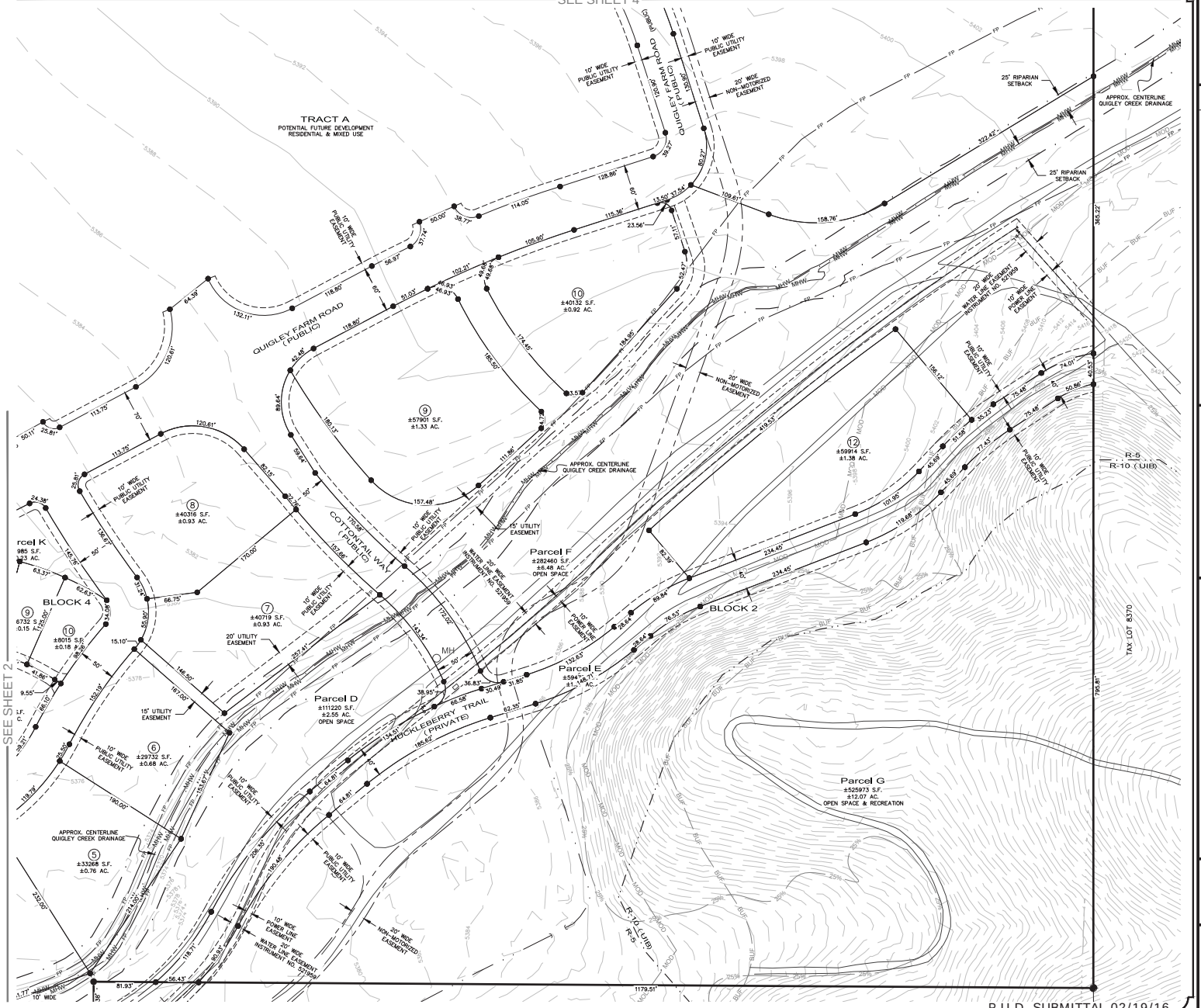
QUIGLEY FARM P.U.D.
T2N, R18E, SEC 10, B.M., BLAINE COUNTY, IDAHO

PREPARED FOR: HENNESSY COMPANY

DRAWN BY:	CMM
DESIGNED BY:	CMM
CHECKED BY:	CMM
DATE:	02/19/16
PROJECT NO.:	15222

SHEET NUMBER

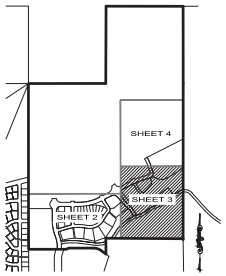
P-2



SCALE: 1" = 60'
CONTOUR INTERVAL = 2'

LEGEND

- PROPERTY LINE
- LOT LINE
- ADJOINING PROPERTY LINE
- EASEMENT
- NON-MOTORIZED EASEMENT
- RA — RED AVALANCHE AREA
- BA — BLUE AVALANCHE AREA
- BLAINE COUNTY ZONING LINE
- MOD — MOUNTAIN OVERLAY BOUNDARY
- BUF — MOUNTAIN OVERLAY BUFFER
- FP — FLOOD PLAIN BOUNDARY
- MHW — APPROXIMATE MEAN HIGH WATER
- 25' RIPARIAN SETBACK
- 25% — APPROXIMATE 25% SLOPE BOUNDARY
- BRASS CAP
- ALUMINUM CAP
- PROPOSED 5/8" REBAR
- FOUND 5/8" REBAR
- # — LOT NUMBER



KEY MAP
N.T.S.

P.U.D. SUBMITTAL 02/19/16

REVISIONS			
No.	DESCRIPTION	DATE	BY

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PRELIMINARY PLAT

QUIGLEY FARM P.U.D.

T2N, R18E, SEC 10, B.M., BLAINE COUNTY, IDAHO

PREPARED FOR: HENNESSY COMPANY

DRAWN BY:	CMM
DESIGNED BY:	CMM
CHECKED BY:	CMM
DATE:	02/19/16
PROJECT NO.:	15222

SHEET NUMBER

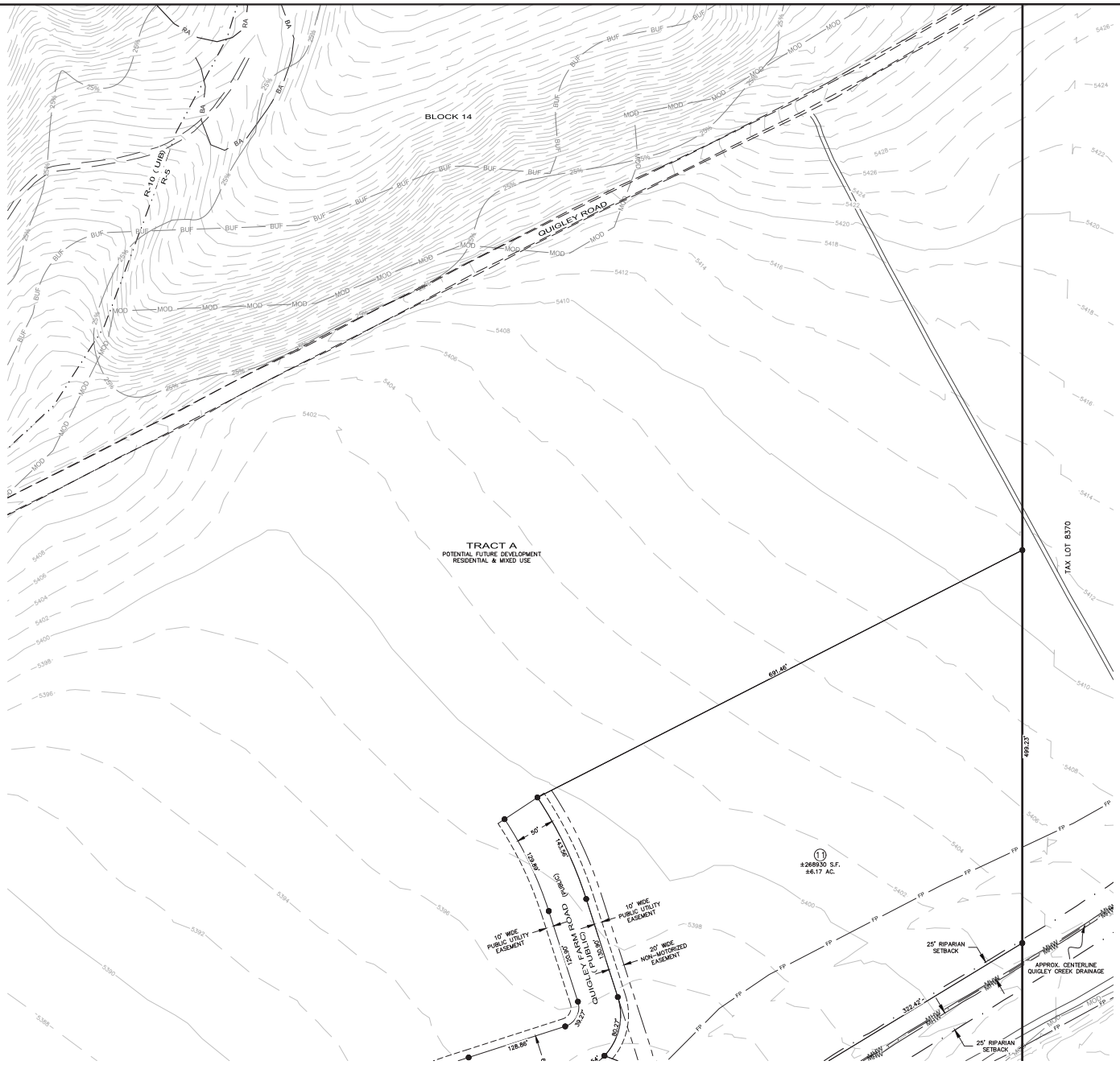
P-3

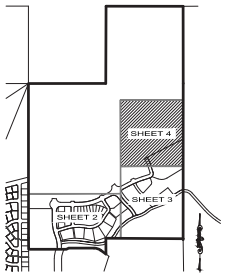
0' 60' 120' 180'

SCALE: 1" = 60'
CONTOUR INTERVAL = 2'

LEGEND

	PROPERTY LINE
	LOT LINE
	ADJOINING PROPERTY LINE
	EASEMENT
	NON-MOTORIZED EASEMENT
RA	RED AVALANCHE AREA
BA	BLUE AVALANCHE AREA
	BLAINE COUNTY ZONING LINE
MOD	MOUNTAIN OVERLAY BOUNDARY
BUF	MOUNTAIN OVERLAY BUFFER
FP	FLOOD PLAIN BOUNDARY
MHW	APPROXIMATE MEAN HIGH WATER
	25' RIPARIAN SETBACK
25%	APPROXIMATE 25% SLOPE BOUNDARY
	BRASS CAP
	ALUMINUM CAP
	PROPOSED 5/8" REBAR
	FOUND 5/8" REBAR
#	LOT NUMBER





KEY MAP
N.T.S.

SEE SHEET 3

P.U.D. SUBMITTAL 02/19/16

REVISIONS			
No.	DESCRIPTION	DATE	BY

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PRELIMINARY PLAT

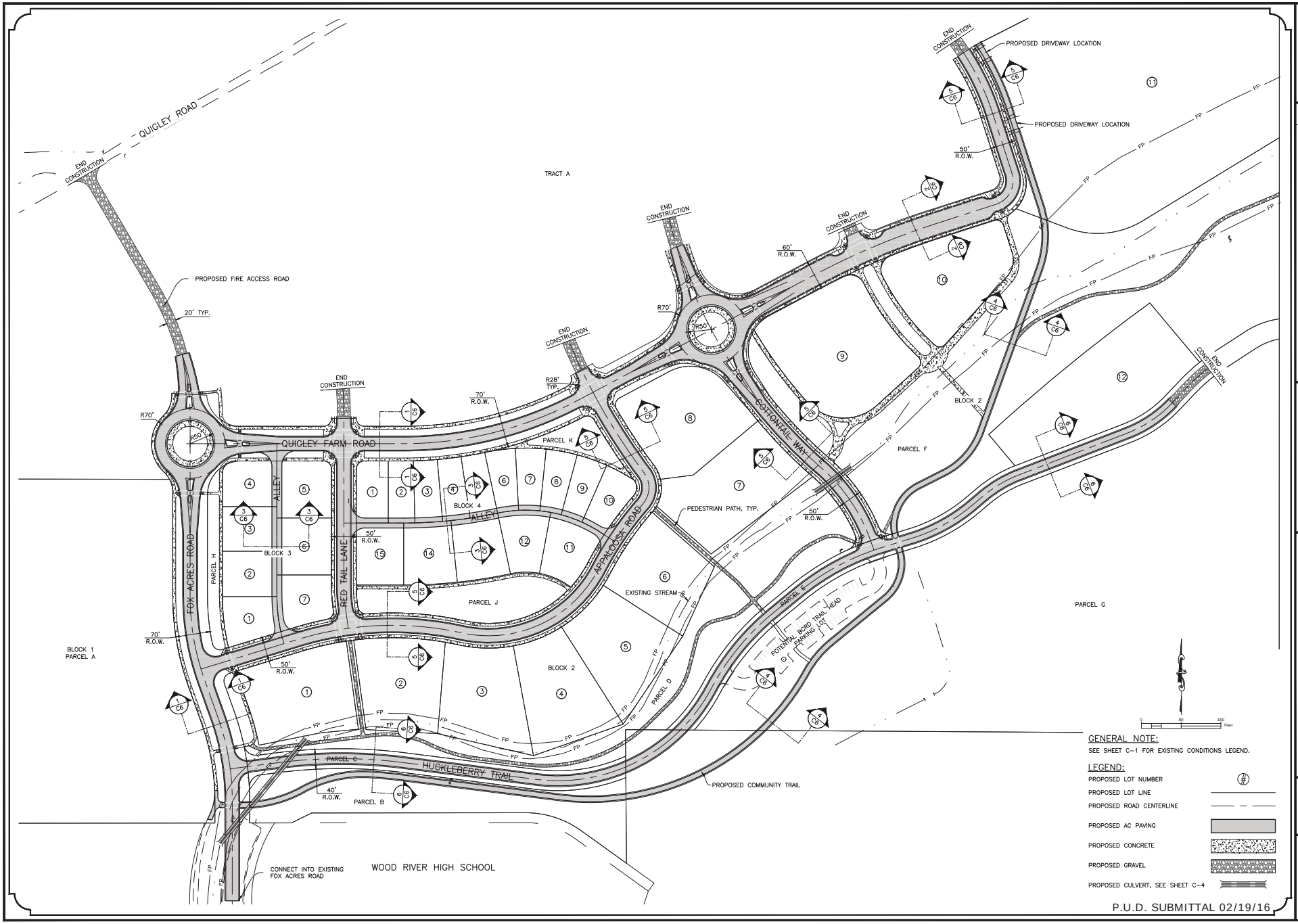
QUIGLEY FARM P.U.D.
T2N, R18E, SEC 10, B.M., BLAINE COUNTY, IDAHO

PREPARED FOR: HENNESSY COMPANY

DRAWN BY:	CMM
DESIGNED BY:	CMM
CHECKED BY:	CMM
DATE:	02/19/16
PROJECT NO.:	15222

SHEET NUMBER

P-4



REVISIONS

No.	DESCRIPTION	DATE	BY

PREPARED BY:
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PRELIMINARY ROADWAY PLAN

QUIGLEY FARM P.U.D.

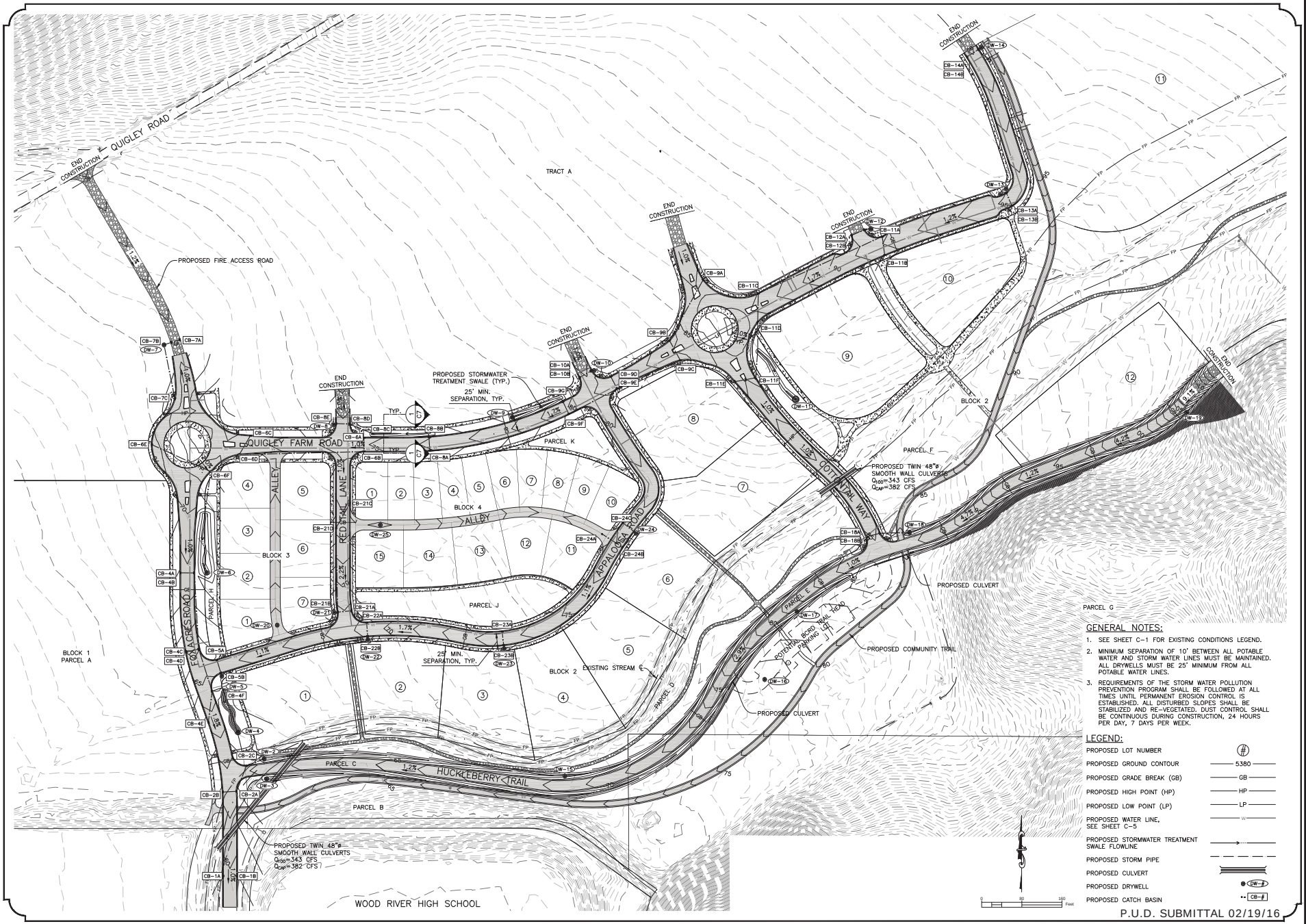
T2N, R18E, SEC 10, B.M., BLAINE COUNTY, IDAHO

PREPARED FOR: HENNESSY COMPANY

DRAWN BY:	SKS
DESIGNED BY:	JPG
CHECKED BY:	SB
DATE:	02/19/16
PROJECT NO.:	15222

SHEET NUMBER

C-3



GENERAL NOTES:

1. SEE SHEET C-1 FOR EXISTING CONDITIONS LEGEND.
2. MINIMUM SEPARATION OF 10' BETWEEN ALL POTABLE WATER AND STORM WATER LINES MUST BE MAINTAINED. ALL DRYWELLS MUST BE 25' MINIMUM FROM ALL POTABLE WATER LINES.
3. REQUIREMENTS OF THE STORM WATER POLLUTION PREVENTION PROGRAM SHALL BE FOLLOWED AT ALL TIMES UNTIL PERMANENT EROSION CONTROL IS ESTABLISHED. ALL DISTURBED SLOPES SHALL BE STABILIZED AND RE-VEGETATED. DUST CONTROL SHALL BE CONTINUOUS DURING CONSTRUCTION, 24 HOURS PER DAY, 7 DAYS PER WEEK.

LEGEND:

PROPOSED LOT NUMBER	#
PROPOSED GROUND CONTOUR	5380
PROPOSED GRADE BREAK (GB)	GB
PROPOSED HIGH POINT (HP)	HP
PROPOSED LOW POINT (LP)	LP
PROPOSED WATER LINE, SEE SHEET C-5	W
PROPOSED STORMWATER TREATMENT SWALE FLOWLINE	
PROPOSED STORM PIPE	
PROPOSED CULVERT	
PROPOSED DRYWELL	DW-#
PROPOSED CATCH BASIN	CB-#

P.U.D. SUBMITTAL 02/19/16

REVISIONS

No.	DESCRIPTION	DATE	BY

BENCHMARK ASSOCIATES

PREPARED BY:
BENCHMARK ASSOCIATES, P.A.
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KETCHUM, IDAHO 83340
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WEB: WWW.BMA5B.COM
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PRELIMINARY GRADING AND DRAINAGE PLAN

QUIGLEY FARM P.U.D.

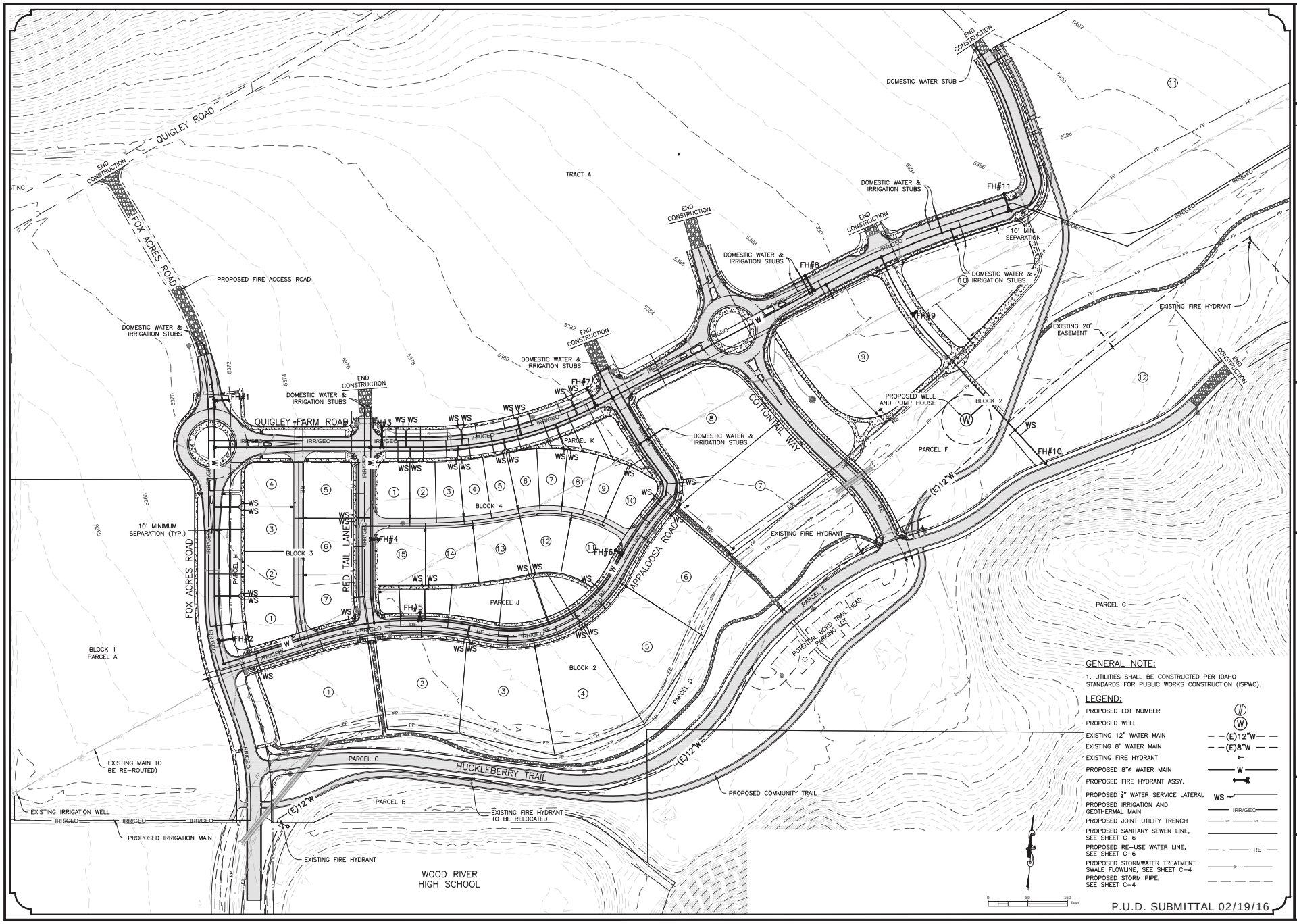
T2N, R18E, SEC 10, B.M., BLAINE COUNTY, IDAHO

PREPARED FOR: HENNESSY COMPANY

DRAWN BY: JPG
DESIGNED BY: JPG
CHECKED BY: SB
DATE: 02/19/16
PROJECT NO.: 15222

SHEET NUMBER

C-4



REVISIONS

No.	DESCRIPTION	DATE	BY

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PRELIMINARY WATER PLAN

QUIGLEY FARM P.U.D.

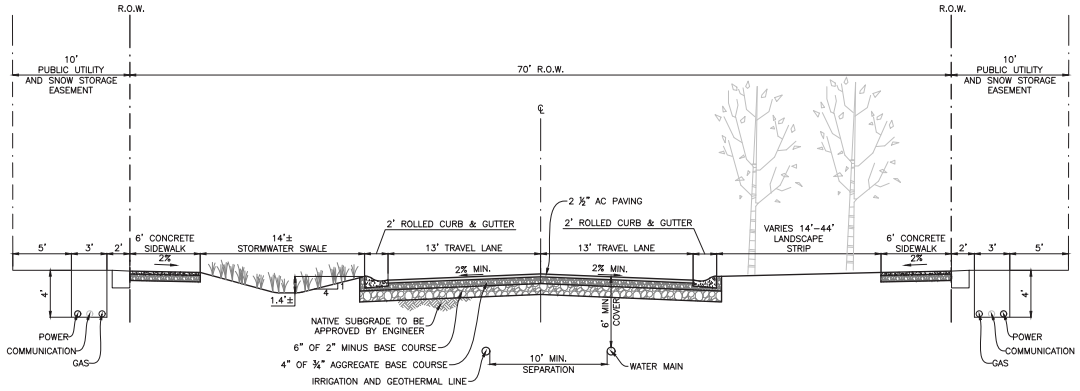
T2N, R18E, SEC 10, B.M., BLAINE COUNTY, IDAHO

PREPARED FOR: HENNESSY COMPANY

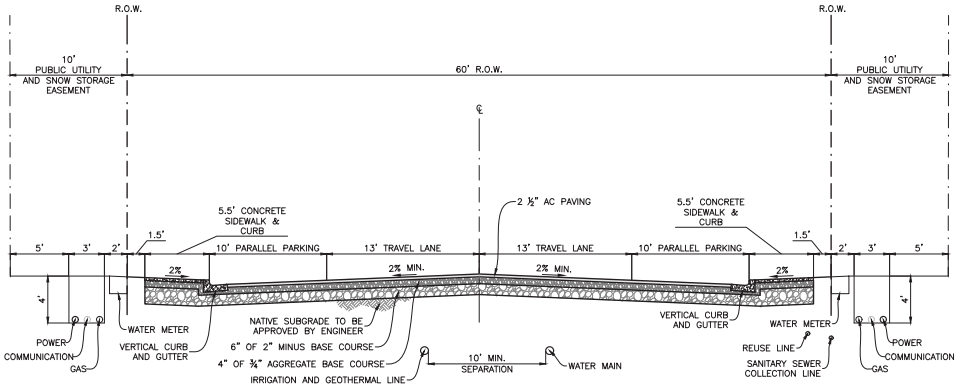
DRAWN BY:	JPG
DESIGNED BY:	JPG
CHECKED BY:	SB
DATE:	02/19/16
PROJECT NO.:	15222

SHEET NUMBER

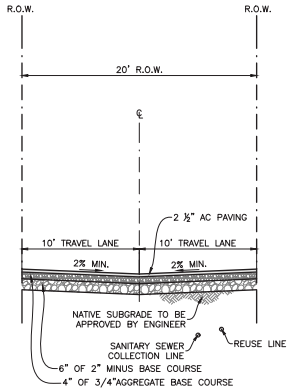
C-5



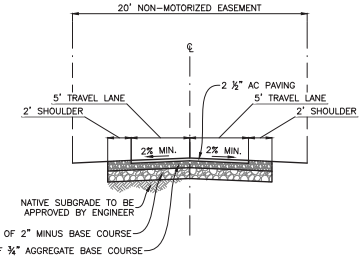
1 C6 70' R.O.W.– CURB & GUTTER
SCALE: N.T.S.



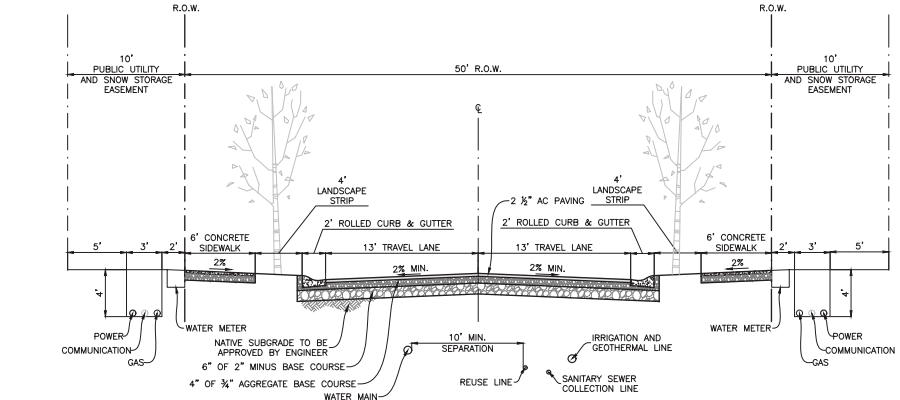
2 C6 60' R.O.W.– ON STREET PARKING
SCALE: N.T.S.



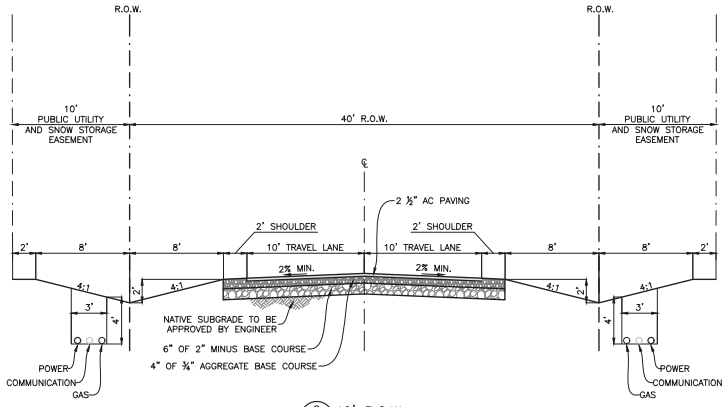
3 C6 20' PUBLIC ALLEY
SCALE: N.T.S.



4 C6 10' MULTI-USE PATH
SCALE: N.T.S.



5 C6 50' R.O.W.– CURB & GUTTER
SCALE: N.T.S.



6 C6 40' R.O.W.
SCALE: N.T.S.

P.U.D. SUBMITTAL 02/19/16

REVISIONS

No.	DESCRIPTION	DATE	BY

PREPARED BY:
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PRELIMINARY ROAD SECTIONS

QUIGLEY FARM P.U.D.

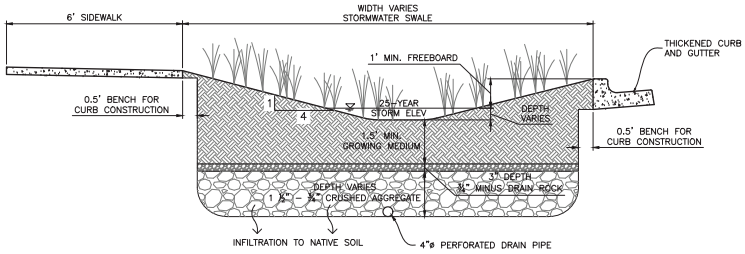
T2N, R18E, SEC 10, B.M., BLAINE COUNTY, IDAHO

PREPARED FOR: HENNESSY COMPANY

DRAWN BY: SKS
DESIGNED BY: JPG
CHECKED BY: SB
DATE: 02/19/16
PROJECT NO.: 15222

SHEET NUMBER

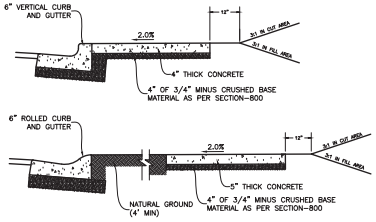
C-6



DESIGN CRITERIA:

1. WATER QUALITY STORM INTENSITY= 0.34 IN/HR (BOISE STORMWATER DESIGN MANUAL)
2. MINIMUM RESIDENCE TIME FOR WATER QUALITY STORM= 9 MINUTES
3. MAXIMUM VELOCITY= 0.9 FT/S
4. MINIMUM FREEBOARD= 1 FOOT ABOVE 25-YEAR STORM

1 C7 WATER QUALITY SWALE SECTION
SCALE: N.T.S.



NOTES:

(A) LOCATION GRADE AND WIDTH TO BE ESTABLISHED OR APPROVED BY THE OWNER.

(B) BASE TO BE COMPACTED TO EXCEED 95% OF STANDARD DENSITY.

(C) SLOPE SIDEWALK TOWARD THE STREET NOT TO EXCEED 1/4" PER FOOT (0.02 FT/FT) UNLESS OTHERWISE SPECIFIED BY THE OWNER.

(D) SCORE AT INTERVALS TO MATCH WIDTH OF WALK NOT TO EXCEED 5 FEET SPACING.

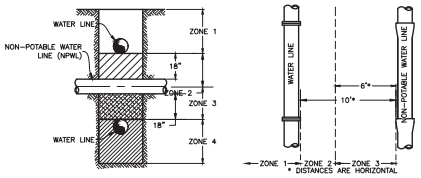
(E) 1/2-INCH TRANSVERSE PREFORMED BITUMINOUS JOINTS AT THE TERMINUS POINTS FOR CURVE AND WHERE SIDEWALK IS PLACED BETWEEN TWO PERMANENT FOUNDATIONS, PLACE 1/2-INCH EXPANSION JOINT MATERIAL ALONG THE BACK OF WALK THE FULL LENGTH.

(F) MATERIALS AND CONSTRUCTION ACCORDING TO DIVISION 700 AND AS FOLLOWS:

RESIDENTIAL	4" MIN.
COLLECTOR AND ARTERIAL	5" MIN.
BUSINESS DISTRICT	AS SPECIFIED BY OWNER

(G) SIDEWALK WITH BOULEVARD STRIP AND 3" ROLLED CURB HAS A THICKNESS OF 5-INCHES.

2 C7 CONCRETE SIDEWALK DETAIL
SCALE: N.T.S.



VERTICAL SEPARATION REQUIREMENTS

ZONE 1: A) WATER AND NPWL MUST BE SEPARTED BY AT LEAST 18 INCHES AND B) ONE FULL, UNCUT LENGTH OF WATER PIPE MUST BE CENTERED OVER THE CROSSING SO THAT THE JOINTS ARE AS FAR AS POSSIBLE FROM THE NPWL.

ZONE 2: A) ONE FULL, UNCUT LENGHT OF WATER PIPE MUST BE CENTERED OVER THE CROSSING SO THAT THE JOINTS ARE AS FAR AS POSSIBLE FROM THE NPWL.

AND EITHER B) NPWL MAIN MUST BE CONSTRUCTED TO WATER MAIN STANDARDS AND PRESSURE TESTED FOR WATER TIGHTNESS FOR A HORIZONTAL DISTANCE OF 10 FEET ON BOTH SIDES OF THE CROSSING.

OR C) EITHER THE NPWL OR WATER MAIN OR BOTH MUST BE ENCASED WITH A SLEEVING MATERIAL ACCEPTABLE TO DEQ FOR A HORIZONTAL DISTANCE OF 10 FEET ON BOTH SIDES OF THE CROSSING.

ZONE 3: SAME REQUIREMENTS AS ZONE 2 EXCEPT THE NPWL MUST ALSO BE SUPPORTED ABOVE THE CROSSING TO PREVENT SETTLING.

ZONE 4: SAME REQUIREMENTS AS ZONE 1 EXCEPT THE NPWL MUST ALSO BE SUPPORTED ABOVE THE CROSSING TO PREVENT SETTLING.

HORIZONTAL SEPARATION REQUIREMENTS

ZONE 1: A) NO SPECIAL REQUIREMENTS

ZONE 2: A) WATER AND NPWL SEPARTED BY AT LEAST 6 FEET AT OUTSIDE WALLS.

AND B) WATER AT LEAST 18-INCHES HIGHER IN ELEVATION THAN THE NPWL.

AND EITHER C) NPWL CONSTRUCTED TO WATER MAIN STANDARDS AND PRESSURE TESTED FOR WATER TIGHTNESS.

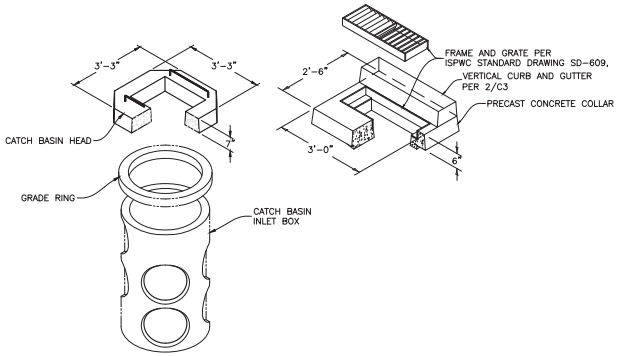
OR D) NPWL ENCASED WITH A SLEEVING MATERIAL ACCEPTABLE TO DEQ.

OR E) SITE SPECIFIC REQUIREMENTS APPROVED BY DEQ.

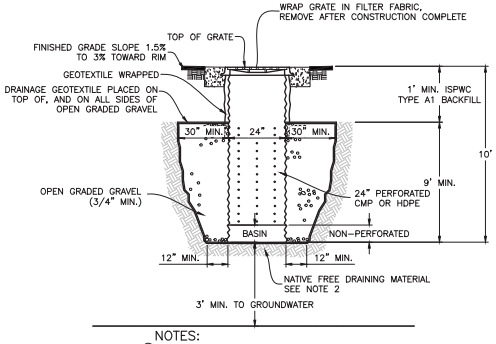
ZONE 3: NOT ALLOWED.

NOTE: SANITARY SEWER FORCE MAINS MUST HAVE MIN. 10' HORIZONTAL SEPERATION AND 18" VERTICLE SEPARATION. ZONE 2 AND ZONE 3 PLACEMENTS ARE NOT ALLOWED.

3 C7 NON-POTABLE WATER LINE (NPWL) SEPARATION
SCALE: N.T.S.



4 C7 TYPICAL CATCH BASIN DETAIL
SCALE: N.T.S.



NOTES:

(1) ALL PRODUCTS AS NOTED OR APPROVED SUBSTITUTION.

(2) GRAVEL DEPTH MUST REACH FREE-DRAINING MATERIAL PER ENGINEER APPROVAL.

5 C7 TYPICAL DRYWELL DETAIL
SCALE: N.T.S.

Infiltration System Sizing Worksheet

The proposed infiltration system design below allows for infiltration of a contributory area feeding one 10' deep drywell. Some basins have been combined for conveyance to water quality swales, and associated drywells may be larger than calculated below.

Onsite Native Soil Infiltration

Infiltration Rate:	120	in/hr
Factor of Safety:	1	
Design Infiltration Rate:	120	**in/hr**

Assumed T_c:	15 min
Intensity (25-yr, 15 min):	0.46 in/hr
Intensity (25-yr, 1 hr):	1.84 in/hr

Site Infiltration Sizing

Total Area	0.50	ac
Roadway Area	0.369	ac
Impervious Area:	0.302	ac
Runoff Coefficient (Perv):	0.300	
Runoff Coefficient (Imp.):	0.98	
25-Year Design Runoff:	0.657	cfs

70' R.O.W. 314

Drywell Structure Dimensions

Drywell Manhole Diameter:	24	in
Drain Rock Thickness:	30	in
Drain Rock Void Ratio:	0.4	
Drywell Rim Elevation:	100.0	
Lowest Inlet Invert Elevation:	99.0	
Depth to Bottom of Drywell:	10.0	ft
Bottom Elevation:	90.0	

Drywell Stage-Storage-Discharge

Drywell Stage (ft)	Water Surface Depth (ft)	Elevation	Storage in Min (cf)	Storage in Drain Rock (cf)	Total Storage (cf)	Bottom Wetted Area (sf)	Side Wetted Area (sf)	Total Wetted Area (sf)	Drywell Infiltration Flow Rate (cfs)
0.00	10.00	90.00	0.0	0.0	0.0	38.5	0.0	38.5	0.107
0.90	9.10	90.90	2.8	12.7	15.6	38.5	19.8	58.3	0.162
1.80	8.20	91.80	5.7	25.4	31.1	38.5	39.6	78.1	0.217
2.70	7.30	92.70	8.5	38.2	46.7	38.5	59.4	97.9	0.272
3.60	6.40	93.60	11.3	50.9	62.2	38.5	79.2	117.7	0.327
4.50	5.50	94.50	14.1	63.6	77.8	38.5	99.0	137.4	0.382
5.40	4.60	95.40	17.0	76.3	93.3	38.5	118.8	157.2	0.437
6.30	3.70	96.30	19.8	89.1	108.9	38.5	138.5	177.0	0.492
7.20	2.80	97.20	22.6	101.8	124.4	38.5	158.3	196.8	0.547
8.10	1.90	98.10	25.4	114.5	140.0	38.5	178.1	216.6	0.602
9.00	**1.00**	**99.00**	**28.3**	**127.2**	**155.5**	**38.5**	**197.9**	**236.4**	**0.657**

Drywell Design

Quigley Farm PUD
T4N, R18E, SEC 18, B.M., Blaine County, ID
BY: SKS DATE: 01/19/16

P.U.D. SUBMITTAL 02/19/16

REVISIONS			
No.	DESCRIPTION	DATE	BY

PREPARED BY:
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PRELIMINARY DETAILS

QUIGLEY FARM P.U.D.
T2N, R18E, SEC 10, B.M., BLAINE COUNTY, IDAHO

PREPARED FOR: HENNESSY COMPANY

DRAWN BY: SKS
DESIGNED BY: JPG
CHECKED BY: SB
DATE: 02/19/16
PROJECT NO.: 15222

SHEET NUMBER

C-7

LEGEND

- COLLECTION LINE
- REUSE LINE
- IN LINE CLEAN OUT
- END OF LINE CLEANOUT
- SERVICE LATERAL
- REUSE VALVE BOX

P.U.D. SUBMITTAL 02/19/16

REVISIONS

No.	DESCRIPTION	DATE	BY

Biohabitats

PREPARED BY:

BIOHABITATS, INC.
412 NW COUCH ST, STE. 202
PORTLAND, OR 97209
(800) 220-0919
WEB: WWW.BIOHABITATS.COM

WASTEWATER INFRASTRUCTURE PLAN

QUIGLEY FARM P.U.D.

T2N, R18E, SEC 10, B.M., BLAINE COUNTY, IDAHO

PREPARED FOR: HENNESSY COMPANY

DRAWN BY:	CG
DESIGNED BY:	PM
CHECKED BY:	EE
DATE:	02/05/16
PROJECT NO.:	15222

SHEET NUMBER

W-1

P.U.D. SUBMITTAL 02/19/16

REVISIONS			
No.	DESCRIPTION	DATE	BY

PREPARED BY:
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OVERALL LANDSCAPE PLAN

QUIGLEY FARM P.U.D.

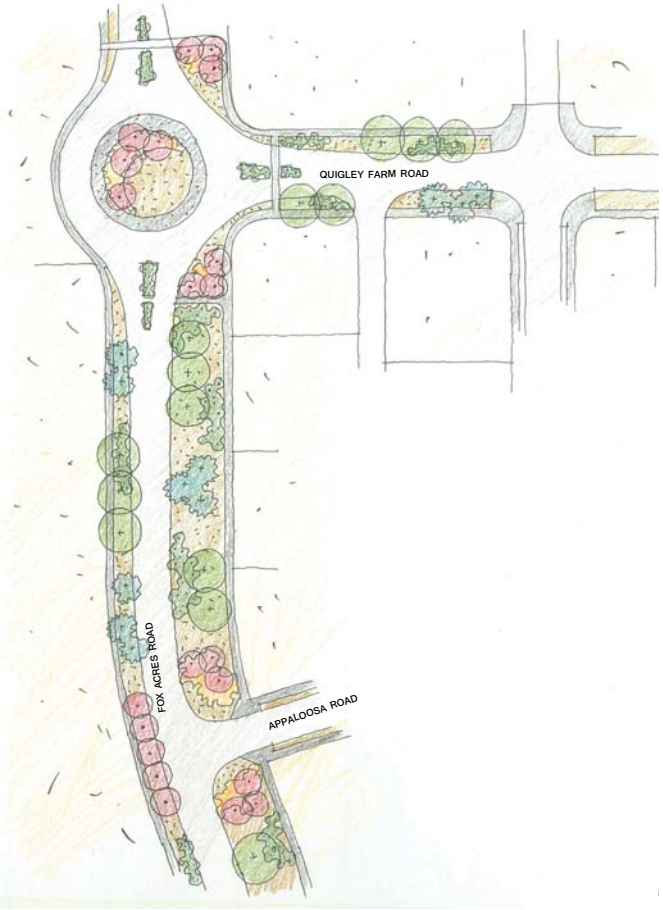
T2N, R18E, SEC 10, B.M., BLAINE COUNTY, IDAHO

PREPARED FOR: HENNESSY COMPANY

DRAWN BY:	DJ/JF
DESIGNED BY:	DJ
CHECKED BY:	JDR
DATE:	02/19/16
PROJECT NO.:	15222

SHEET NUMBER

L-1



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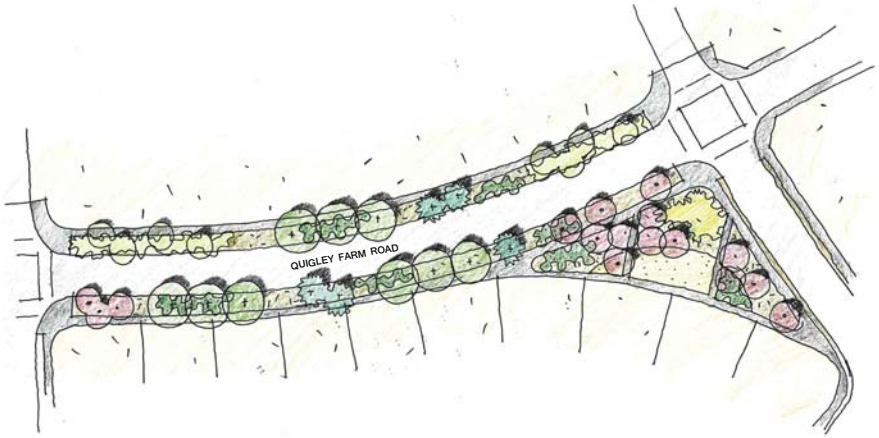

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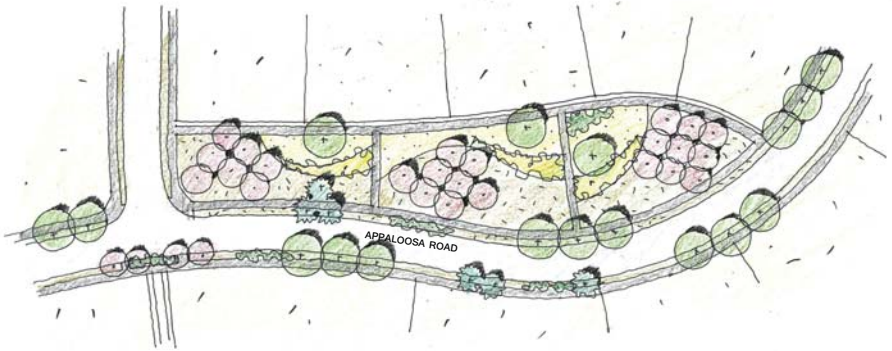

3

SHADE/CANNOPY TREE
ORNAMENTAL/FRUIT TREE
EVERGREEN
NATIVE SHRUB BED
NATIVE GRASS MIX
ROUGH SEED TURF
DROUGHT TOLERANT PERENNIAL
STORMWATER TREATMENT

P.U.D. SUBMITTAL 02/19/16

REVISIONS

No.	DESCRIPTION	DATE	BY

PREPARED BY:
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DETAIL LANDSCAPE PLANS

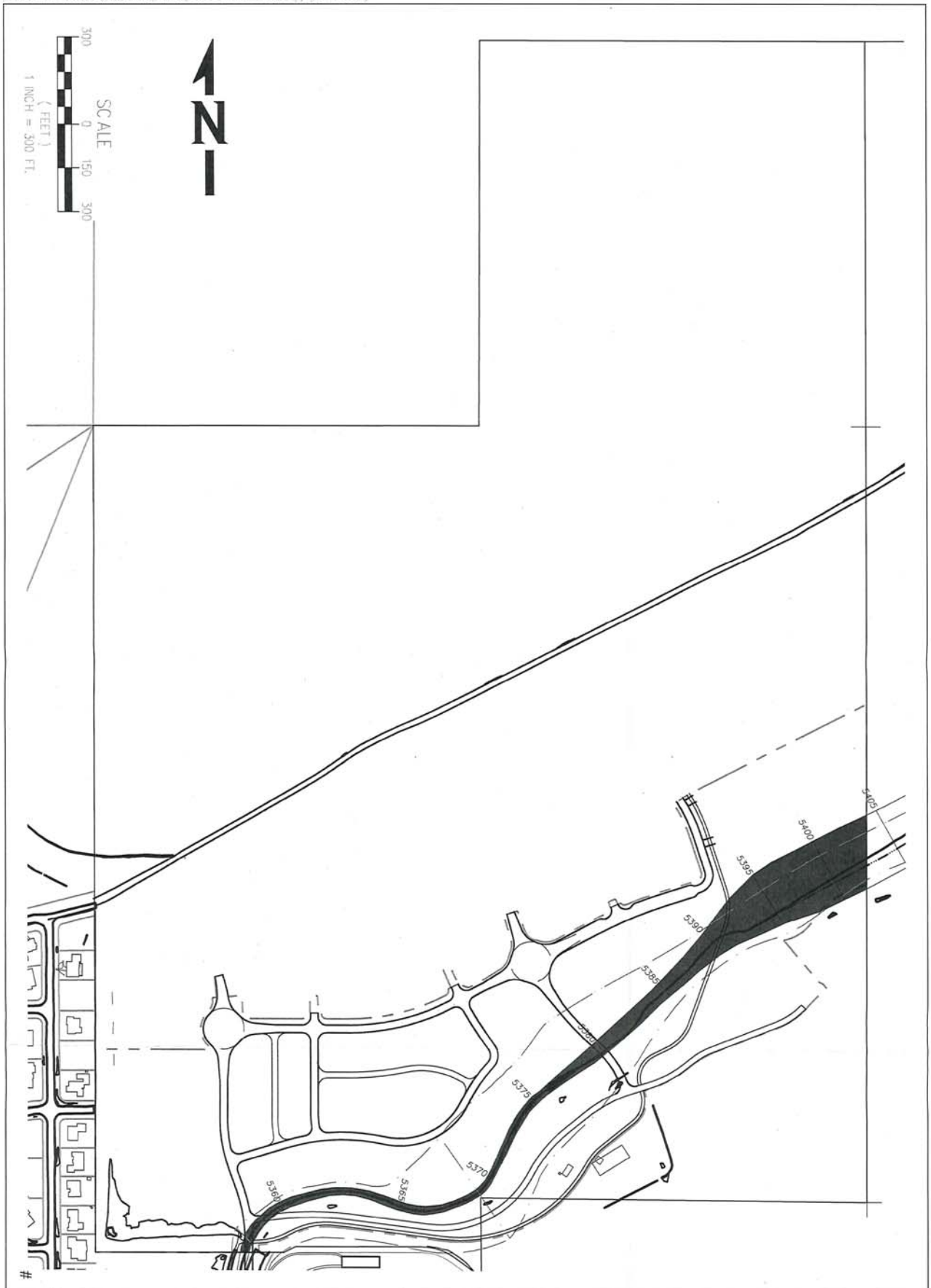
QUIGLEY FARM P.U.D.
T2N, R18E, SEC 10, B.M., BLAINE COUNTY, IDAHO

PREPARED FOR: HENNESSY COMPANY

DRAWN BY: DJ/JF
DESIGNED BY: DJ
CHECKED BY: JDR
DATE: 02/19/16
PROJECT NO.: 15222

SHEET NUMBER

L-2



SHEET NUMBER									
FH 1.0	Flood Hazard Analysis Quigley Farm & Conservation Community, LLC Planned Unit Development and Preliminary Plat			SHEET INFO		REVISIONS			
				########	###	NO.	BY	DATE	REMARKS
				DRAWN	###				
				CHECKED	###				
				APPROVED	###				
				LAST EDIT	3/2/2016				
	PROJECT NUMBER 9167W	DRAWING FILE NAME QUIGLEY BASE EX02	SCALE 1"=300'	PLOT DATE	3/2/2016				
				SUBMITTAL					

BCRD

BLAINE COUNTY
RECREATION DISTRICT

July 5, 2016

Kathy Grotto
Tom Bergin
Blaine County Land Use Services
219 1st Ave. So., Ste 208, Hailey

Re: Quigley Farm Recreation Plan

Dear Kathy and Tom,

The BCRD (Blaine County Recreation District) would like to thank county staff, members of the county Planning and Zoning Commission and Quigley Farm for the opportunity to comment on the current recreational plan of the Quigley Farm Planned Unit Development(PUD).

The BCRD has been actively involved in recreation opportunities associated with Quigley Canyon for over fifteen years. Until 2012, the BCRD operated "Quigley Nordic" during the winter months at Quigley Canyon under a Conditional Use Permit with Blaine County. Quigley Green offered access to the community for over thirteen kilometers of groomed cross country skiing trails until 2012. At its peak, "Quigley Nordic" experienced close to thirteen thousand skier days in a single season. The BCRD, in partnership with the Sun Valley Ski Education Foundation and other landowners, now operates close to nine kilometers of cross country trails at the mouth of Croy Canyon.

The BCRD has also offered recommendations and comment during previous annexation proposals of Quigley Green to the City of Hailey. The existing plan submitted by Quigley Farm to Blaine County as a Planned Unit Development continues to include key components of the most recent recreation plans previously proposed at Quigley Canyon. The BCRD is confident that the community need, as evidenced by recent survey work done through the Recreation Chapter planning process of the Blaine County Comprehensive Plan, has only strengthened for these types of healthy, active recreation.

These comments capture the details of the recreation components of the Quigley Farm PUD application submitted to Blaine County in late spring of 2016. We are aware the proposed plan may be reviewed against the subdivision standards of the City of Hailey. At this point, we have focused these comments on the ability of the current recreation plan to meet reported needs of the greater Blaine County community and the plan's relevance to the Recreation Chapter of the Blaine County Comprehensive Plan and PUD standards. We look forward to providing input on Hailey subdivision recreation standards on going. In our comments, we also suggest critical next steps to fully realize all of the potential value of recreation in and around the Quigley Farm Planned Unit Development area. Overall, the BCRD is confident that Quigley Farm is proposing

a very strong and high value recreation plan. The BCRD is optimistic we can resolve final options under discussion with Quigley Farm and Quigley Green during this process.

Proposed Recreation Plan

1) **<u>Multi-Use Path & Bicycle and Pedestrian Connectivity</u>**

The Quigley Farm PUD Preliminary PLAT (Exhibit A, B) indicates a 20-foot-wide non-motorized easement from the existing terminus of the City of Hailey multi-use path along Fox Acres Road to the Sage School site. Per the memo to BCRD dated 6/29/2016 (Exhibit G), the Quigley Farm team plans to construct the path to BCRD standards and to provide BCRD a permanent easement for management and maintenance. The plan is to build the path to the Sage School site during the first phase as provided in the application materials and connect the path further to Quigley Road during subsequent development phases.

The BCRD fully supports the construction and dedication of a multi-use non-motorized path as part of this application. As measured in the Recreation Chapter of the Blaine County Comprehensive Plan, multi-use paths of this kind in Blaine County experience about 400,000 visits on an annual basis making this recreation category the largest in terms of annual recorded visits. The Recreation Chapter Needs Assessment Survey also indicates that over 46% of respondents describe multi use non-motorized pathways as of "high need" or "highest need" of all recreation categories (Exhibit E). Connections from the main population centers like Hailey to the eastern and western canyons represent areas of critical importance. The Bicycle and Pedestrian Master Plan denotes key connections off main population centers as key considerations for future recreation and active transportation planning. The strategic investment in additional multi-use separated pathways also encourages non-motorized transportation, alleviates some parking infrastructure needs, and connects existing recreation and education centers like The Community Campus, Wood River High School, and the potential Sage School location. In addition, the bike path could be groomed for winter use by the BCRD and create, pending City of Hailey consideration, an uninterrupted groomed surface from the main north-south Wood River Trail into the Quigley Farm PUD area and a connection to additional Nordic skiing trails further east in the canyon.

In the memo dated 6/29/2016, Quigley Farm also indicates willingness to offer pedestrian access from Wood River High School and the Community Campus across the Quigley Farm PUD area to the planned multi use path. That access would enable a direct connection along the eastern sides of these institutions pending Blaine County School District approval and consideration. It is the opinion of the BCRD that this access enables physical connectivity to a Trails Park/Trailhead on Parcel G and active playing field space on Parcel A. It also enriches options for physical and outdoor education programming for both Wood River High School students and patrons of the Community Campus. This pedestrian access would complement the multi-use path proposal and the sidewalk plan inherent in the PUD proposal.

The BCRD has requested that the multi-use easement location, Huckleberry Trail Road, and the Trail Head Parking lot(Exhibit B) be moved approximately twenty to thirty feet to the northwest. This shift would enable more recreational use of Parcel G as a winter and summer Trail Park area for activities such as cross country skiing, biking, hiking,

and summer youth programming. The Quigley Farm team has indicated in their 6/29/2016 memo(Exhibit G) that they are amenable to adjusting the road, multi use path and parking location as described during any future revisions of the plan.

The BCRD is confident the multi-use pathway and bicycle-pedestrian plan meet the following desired outcomes of the Recreation Chapter of the Blaine County Comprehensive Plan:

B-2: Clearly delineate responsibility for provision and maintenance of recreational assets in new developments.

B-3: Support ongoing development and maintenance of the Wood River Trail System and collector trails by requiring easements or rights-of-way within new subdivisions. Continue to protect the integrity of the Wood River Trail by strictly limiting new crossings of the trail by roadways.

C-1: Support bicycle/pedestrian improvements, with a focus on those identified in the Community Bicycle and Pedestrian Master Plan. Respectfully consider private property concerns.

C-3: Consider affordability of recreational assets as an important value. Assets should be accessible to families.

E-3: Always consider pedestrians and other non-mechanized users as legitimate users of non- motorized multi-use paths.

E-5: Develop a range of transportation opportunities, including public transit, to get people to and from key recreational locations and trailheads.

* Recreation Chapter of Blaine County Comprehensive Plan:
http://www.co.blaine.id.us/vertical/sites/%7BBB2A7BCF-1E38-4DB2-AE8E-3A22829A1987%7D/uploads/Recreation_as_approved_BCC_5-10-16(1).pdf

2) Winter & Summer Trail Park/Trailhead (Parcel G)

The current PUD application and attached memo to the BCRD (Exhibit G) indicate the intent of the Quigley Farm team to deed Parcel G to the BCRD on behalf of the community at the time of the final PLAT. Parcel G is approximately 9 acres and forms the southeast corner of the PUD boundary. The land includes both flat terrain at the toe of the hillside, once used for cross country skiing, and hilly terrain with about 80 feet of elevation gain.

The memo also documents the intent to offer the parcel (not included in this PUD) of Quigley Green property directly to the south of Parcel G to the BCRD in a future PUD proposal associated with the overall Quigley Farm Master Plan (Exhibit C). That Parcel is marked as RP02N180107200 on the Blaine County GIS parcel information map. Pending potential approval of this PUD and before another PUD application, the Quigley Farm team has indicated they would work with Quigley Green to provide long-term summer and winter easements or access agreements to the BCRD on Parcels RP02N180107200 and RP02N18011333E. Combined, these two parcels afford greater

recreation use off of the canyon floor and directly establish a connection to BLM land on and around Patterson Peak. Quigley Green has expressed that they are amenable to this access agreement. They have requested that BCRD provide specific easement locations and recommended usage plans for the Quigley Green parcels noted as well as associated commitments in infrastructure like parking, signage, trail construction, or bathroom facilities from the BCRD that would trigger the easement.

The efforts to secure recreational usage for the public in this particular drainage and to establish long term access to BLM land are critical to the realization of both a Trailhead and Trail Park in winter and summer. That Trail Park, bordering the multi-use path, would serve as the base location for non-motorized activities including cross country skiing, sledding, biking, bike park, hiking, equestrian activity, and summer youth programming. Parking facilities and bathroom facilities are possible pending community investment and secured access outside the parcel. Bordering the Wood River High School, Community Campus, and potential Sage School location, the site could also enhance the alternative physical education, recreation, and outdoor education programming in those locations.

Access to public land (BLM) can also be established on the north side of the canyon. The existing northern PUD boundary proposed in the application ties directly into BLM land. This access on the north complements continued access to Quigley Road as a recreational amenity. Quigley Road is now one of the most popular walking, biking destinations for existing residents of Blaine County. In addition, Quigley Road connects the community to recreational access and public land to the east of Quigley Green parcels. Popular recreation afforded by Quigley Road access to the east of Quigley Green land includes snowmobiling, biking, hiking, back country skiing, hunting, fishing, nature viewing, equestrian use, and other summer motorized activity.

The Recreation Chapter of the Blaine County Comprehensive Plan defines access to public land as a key desired outcome in appropriate locations. The chapter also defines working with the BLM travel planning process as a desired outcome. This PUD plan enables the possibility of sustainable long term access to BLM lands east of Hailey and affords the possibility of direct integration and trail planning with the BLM Travel Plan. That travel planning process is slated for further public review and engagement during the fall of 2016. Travel planning will include consideration of sustainable trail development in the assessed areas east and southeast of Hailey and Bellevue.

The BCRD has provided to Quigley Farm and Quigley Green an initial Trail Park conceptual plan (Exhibit D) at their request to facilitate planning and enable further discussion about potential easements through Parcels RP02N180107200 and RP02N18011333E. The intent of the BCRD is, through the PUD process, to secure the option for recreational offers on the Trail Park site and access from the Trail Park site. Pending review and potential approval, the BCRD would seek public engagement and BCRD Board of Directors consideration on final trail park design and construction.

The BCRD is confident the Trailhead and Trail Park opportunities combined with northern access meet the following desired outcomes of the Recreation Chapter of the Blaine County Comprehensive Plan:

A-2: Continue strong collaborative efforts with the primary agencies whose assets have the largest impact on recreation in unincorporated lands: US Forest Service, BLM and BCRD, as well as other partners such as cities, Idaho Fish and Game, Idaho Transportation Department, The Nature Conservancy, Wood River Land Trust, Idaho Department of Lands, Idaho Department of Water Resources, and neighboring counties.

A-5: Engage in the travel management planning process with BLM and USFS. Encourage and support the completion of the BLM Travel Study as a crucial tool in the development of additional trails and management of motorized uses north of Highway 20.

B-2: Clearly delineate responsibility for provision and maintenance of recreational assets in new developments.

C-2: Support efforts by recreational providers to diversify recreational assets based on changing community needs and demands, and environmental influences such as climate change.

C-3: Consider affordability of recreational assets as an important value. Assets should be accessible to families.

D-1: Assure that new developments adjacent to public lands provide access to public lands and waterways, and, where appropriate, acreage for trailhead facilities such as parking. Wherever possible, funding for ongoing maintenance should be established. Work with homeowners' associations on ongoing funding.

E-4: Encourage and support the development of trails and recreation sites that are easily accessible from residential areas and communities, especially those that connect to existing trail systems. All new trails should respect the natural environment and private property, as well as be sustainable and consistent with this Plan.

* Recreation Chapter of Blaine County Comprehensive Plan:
http://www.co.blaine.id.us/vertical/sites/%7BBB2A7BCF-1E38-4DB2-AE8E-3A22829A1987%7D/uploads/Recreation_as_approved_BCC_5-10-16(1).pdf

3) Non-Motorized Hiking, Biking and Equestrian Single-track Trails

The current Trail Park proposal could enable improved public access to non-motorized single-track trails in the mid and south valley. The current attached memo dated 6/29/16 (Exhibit G) and the PUD application document the intention of Quigley Farm to build portions of a perimeter trail near the base of the canyon within the PUD boundary. The memo also documents the intention to provide extension of this perimeter trail to the eastern edges of the canyon pending future PUD applications related to the overall master plan (Exhibit C). If access to BLM lands is fully established with Quigley Green, the Trail Park would assure access to significant trail opportunities in and around Patterson Peak. Consideration and review of all travel related use of BLM land would commence during the BLM Travel Planning Process.

Special consideration is merited of both mule deer and elk winter habitat areas during future trail design and placement. The BCRD recommends respecting these habitat areas and avoiding wildlife winter habitat areas and key south facing slopes on the north side of the canyon with trail placement if possible. A focus on Trail Park/Trailhead activity and access on the south side of the canyon originating at Parcel G near the mouth of the canyon is a sound strategy to respect large game winter habitats predominantly designated directly to the north of Quigley Canyon.

The Recreation Needs Assessment survey of the Blaine County Comprehensive Plan cites 60% of respondents indicated that "single track non-motorized trails" were either a "high need" or "highest need" of all recreation categories in the survey (Exhibit E). That result ranked highest in terms of need among all the recreation categories in the survey. In addition, Hailey and Bellevue ranked highest among all county locations in the survey in terms of reported need for more recreational capacity or other improvements in the future (Exhibit F).

The BCRD strongly supports the plan for incremental access and the single-track non-motorized trail development potentially made possible by the Quigley Farm PUD application.

The BCRD will continue to engage in the PUD review process to explore options for long term access for single-track trails with both Quigley Farm and Quigley Green.

The BCRD is confident the single-track trail development opportunities could meet the following desired outcomes of the Recreation Chapter of the County Comprehensive Plan:

C-4: Give high priority to additional recreational assets in the Hailey/Bellevue area.

C-9 Support new residential development providing recreation opportunities that are appropriate to the size, type and location of development.

D-2: Support design and construction of sustainable trails for motorized, mechanized and non- mechanized use adjacent to cities and County neighborhoods in appropriate locations.

D-3: Provide connectivity to designated trails on public lands by working to establish easements through private property or other tools that respect private property concerns.

D-4: Encourage landowners to participate in the Access Yes! program which provides respectful access to private property for hunting and fishing.

D-5: Identify and designate areas where trailhead facilities are necessary to support designated trail systems, on private or public land, in existing neighborhoods and in new subdivisions.

D-7: Always consider wildlife in travel management and trail planning especially with respect to nesting and wintering wildlife.

E-4: Encourage and support the development of trails and recreation sites that are easily accessible from residential areas and communities, especially those that connect to existing trail systems. All new trails should respect the natural environment and private property, as well as be sustainable and consistent with this Plan.

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4) Cross Country Skiing Trails/Winter Recreation

The existing PUD recreation plan and memo to BCRD dated 6/29/2016 (Exhibit G) encourage consideration of cross country skiing trails in Quigley Canyon. Specifically, the intent to deed Parcel G to BCRD enables the possibility of a trailhead, parking, and bathrooms for cross country skiing, sledding and snowshoeing in the winter. In addition, this parcel and the multi-use path in the Preliminary PLAT enable a starting point for access to more winter trails in the non-developed open space in the eastern regions of the canyon. Quigley Green has indicated through the attached memo (Exhibit G) that they are amenable to long-term access agreements or easements for these trails pending BCRD providing suggested commitments in infrastructure to trigger the access.

The BCRD currently offers close to 9 kilometers of groomed trails at "Croy Nordic." South valley cross country ski trails usually experience close to 10 thousand annual skier days during years when sufficient snow is available. In association with the BCRD, the Sun Valley Ski Education uses "Croy Nordic" as its base of operations to offer quality youth development programs to south valley children. Sustaining affordable, accessible cross country skiing in the south valley is a key objective of the BCRD, and Quigley Canyon represents the best long term location with the greatest opportunity for sustainable access. The cross country plan recommended to Quigley Farm involves close to 4 kilometers of skiable terrain in the trailhead drainage with valuable training terrain with some elevation gain. The plan recommended also involves another 5 to 6 kilometers outside the PUD boundary in the eastern floor of the canyon. Quigley Green is amenable to long term access agreements in these areas and the BCRD would require access in the eastern canyon to invest in winter recreation infrastructure. Another critical need is to establish a trail connection from the trailhead area on Parcel G to the outer canyon without a break in the groomed snow surface. The current application includes a crossing of the multi-use path/ Nordic trail under or over the service road (Parcel E) connecting to city water facilities.

The BCRD offers approximately 3000 annual season passes for its overall winter cross country and snowshoe operation. Cross country skiing overall sees close to 80 thousand annual skier days throughout the county. Cross country skiing at Quigley offers the opportunity to sustain this recreation longer term and further connect to the programming in the Wood River High School and Community Campus. The Community Campus also serves as a transportation HUB for elementary and middle school children of the Blaine County School District. 40% of respondents to the Needs Assessment Survey of the Recreation Chapter of the Blaine County Comprehensive

Plan rate cross country skiing as a category of either "high need" or "highest need" for improvements or additional capacity. That makes this category among the top 6 in terms of reported need among over 29 categories in the survey (Exhibit E).

The proposed Trail Park concept on Parcel G could also establish a sledding destination adjacent to cross country skiing and access to the single-track trails for potential snowshoeing. In addition, Quigley Farm has indicated in its memo to the BCRD Board of Directors that they are willing to provide limited water rights and services like power to the site. This could potentially enable an option by the BCRD and other partners to consider an investment in a limited snowmaking operation on Parcel G at the trailhead and "stadium" area. Given the recent trends and impacts to snow levels, especially in south valley locations, an investment in a limited 1-3 kilometer man-made snow loop would help to meet the needs of the community and further sustain critical programs like the Development Team of the Sun Valley Ski Education Foundation.

The BCRD also is confident the winter recreation/cross country opportunities described meet the following desired outcomes of the Recreation Chapter of the County Comprehensive Plan:

A-1: Continue collaboration of public and private recreational providers through regular meetings, dialogue and partnerships. The County should participate in these collaborations, particularly those involving access to public land from unincorporated areas and recreational uses on unincorporated lands and waterways.

B-2: Clearly delineate responsibility for provision and maintenance of recreational assets in new developments.

C-2: Support efforts by recreational providers to diversify recreational assets based on changing community needs and demands, and environmental influences such as climate change.

C-3: Consider affordability of recreational assets as an important value. Assets should be accessible to families.

E-4: Encourage and support the development of trails and recreation sites that are easily accessible from residential areas and communities, especially those that connect to existing trail systems. All new trails should respect the natural environment and private property, as well as be sustainable and consistent with this Plan.

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5) Active Playing Field Space

The memo to the BCRD Board of Directors (Exhibit G) documents the intention to donate 6.93 acres of land shown as Parcel A, Block 1 on the Preliminary PLAT to the Blaine County School District for use as active playing fields and usable green space. The facility, if brought to full funding and construction by the Blaine County School District and its

partners, could offer significantly improved youth baseball programming. Focus on this site for youth baseball would also enable less in season conflict between youth soccer and youth baseball at Nelson Field. Increased parking at Nelson for Wertheimer Park facilities would still enable as many youth soccer facilities for programs like BCRD youth soccer, Sawtooth United, and other local leagues. The proposed location would be adjacent to existing school district facilities, connected to the community through a multi-use pathway, and complimentary to the programming in the Community Campus and Wood River High School.

Youth soccer and youth baseball account together for close to 800 BCRD individual enrollments in any given year. These two sports have the highest enrollment of any BCRD recreation program and the need for active playing field space as well as tournament and event venues continues to scale.

The BCRD supports the deeding of Parcel A and the open space directly to the north of Parcel A to the Blaine County School District for incremental active playing field space. The option would add significant value to residents of Blaine County.

The BCRD is confident the proposed offer of land meets the following desired outcomes of the Recreation Chapter of the County Comprehensive Plan:

C-3: Consider affordability of recreational assets as an important value. Assets should be accessible to families.

C-4: Give high priority to additional recreational assets in the Hailey/Bellevue area.

C-5: Encourage recreational providers to create additional active-sports facilities.

* Recreation Chapter of Blaine County Comprehensive Plan:
http://www.co.blaine.id.us/vertical/sites/%7BBB2A7BCF-1E38-4DB2-AE8E-3A22829A1987%7D/uploads/Recreation_as_approved_BCC_5-10-16(1).pdf

Summary

Overall, the BCRD supports the recreational plan being proposed as part of this development proposal. We are confident the plan adds significant recreational value and indirect economic benefit to residents of the City of Hailey and Blaine County. Quigley Canyon sits in a unique location bridging the City of Hailey neighborhoods directly with the natural environment and recreation opportunity to the east. Thus, there is a significant and unique opportunity to develop a sustainable recreation plan that complements the identity of the Quigley Farm project while completing this bridge in a sustainable and responsible manner. We look forward to working with Quigley Farm, Quigley Green, Blaine County, and the City of Hailey to fully research and identify options to realize the full potential of this recreation plan.

The staff and Board of Directors of the BCRD would like to thank both Quigley Farm and Blaine County for the opportunity to comment and provide input on this proposal.

Sincerely Yours,

Jim Keating
Executive Director
Blaine County Recreation District

Cc: Board of Directors, Blaine County Recreation District

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Exhibit A

Proposed Quigley FARM PUD Preliminary PLAT

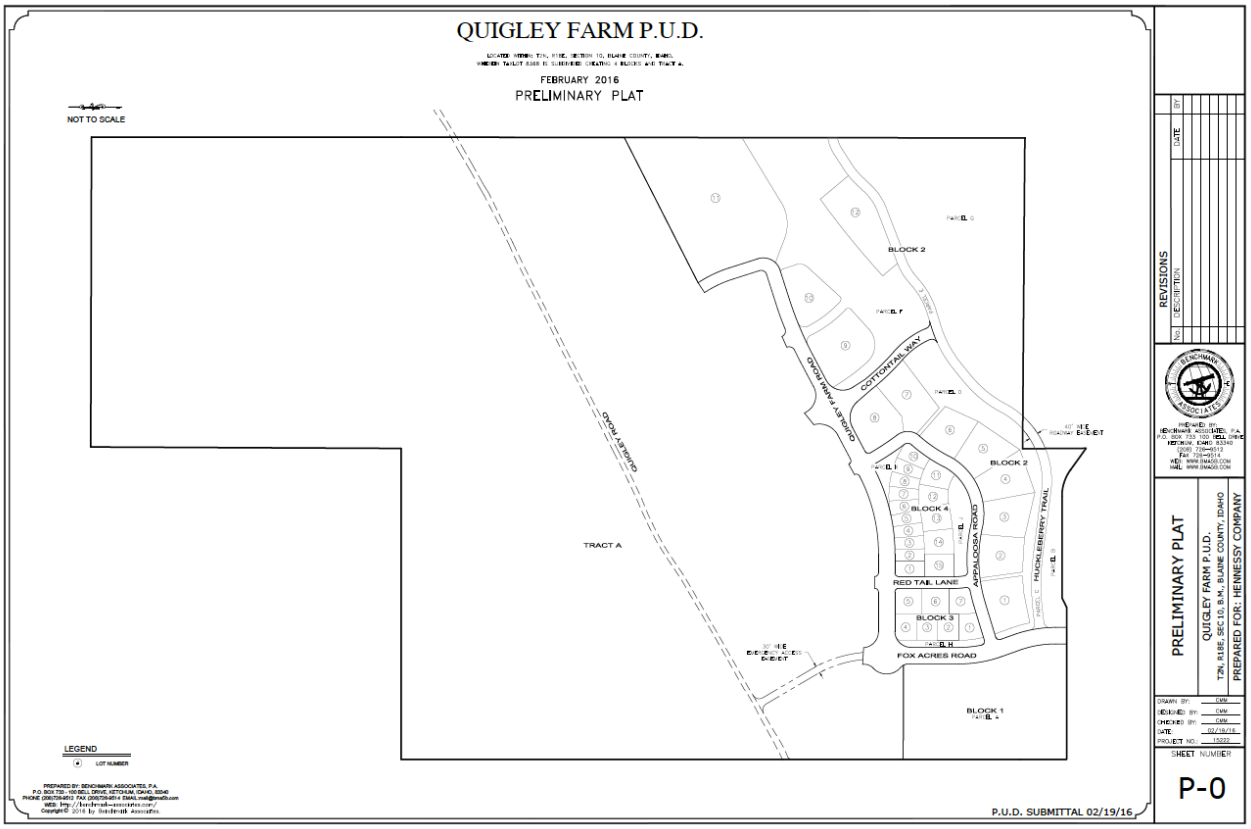


Exhibit B

Roadway Plan (includes pathway design)

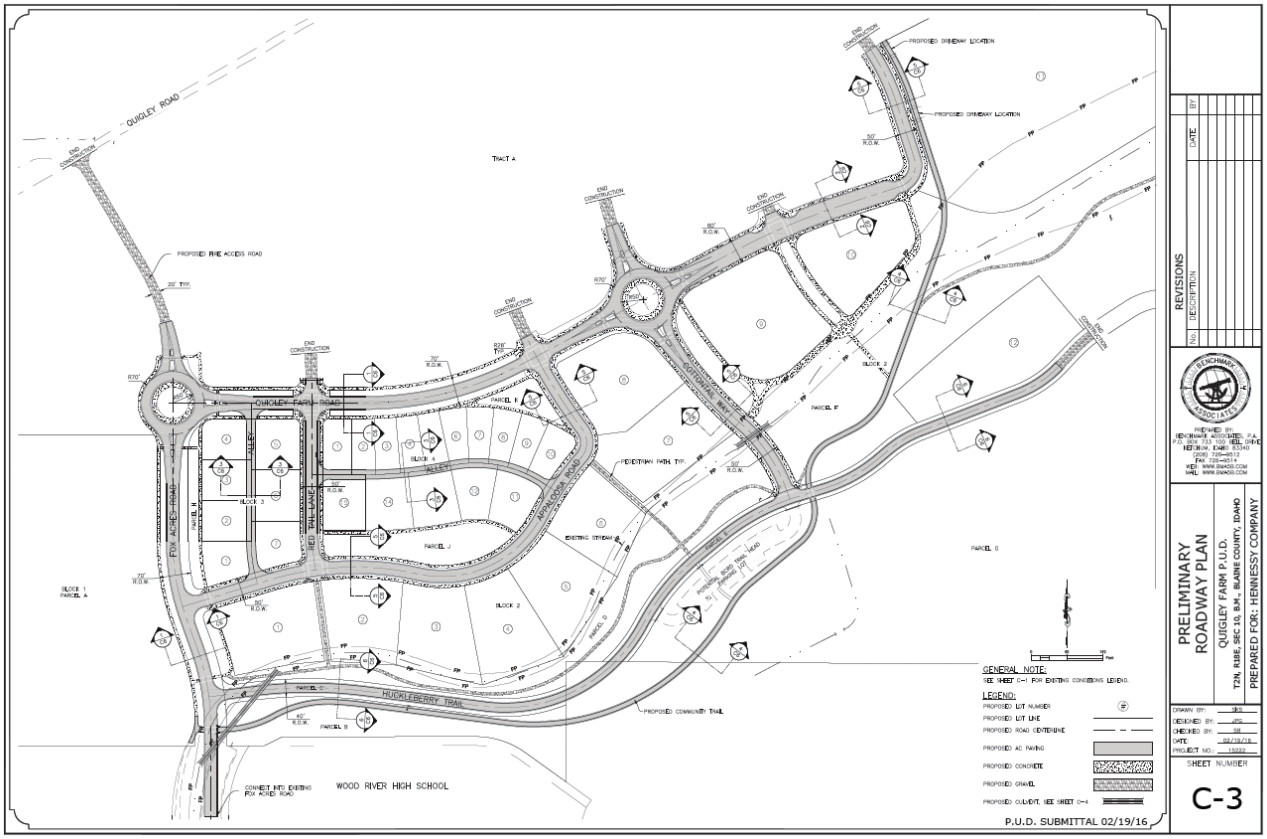
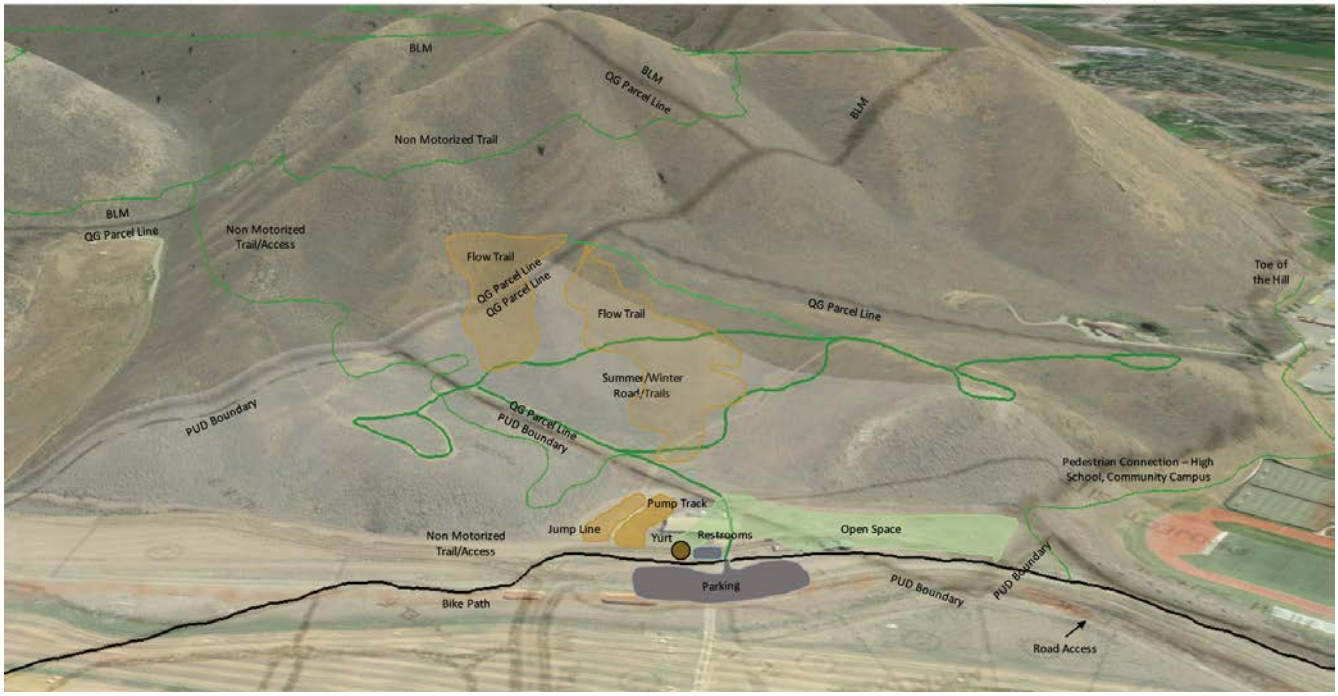


Exhibit C
Quigley Farm Concept Plan

Exhibit D

BCRD Conceptual Design - Trail Park/Trailhead Area Parcel G

SUMMER TRAIL PARK
(Concept Plan)



WINTER TRAIL PARK
(Concept Plan)

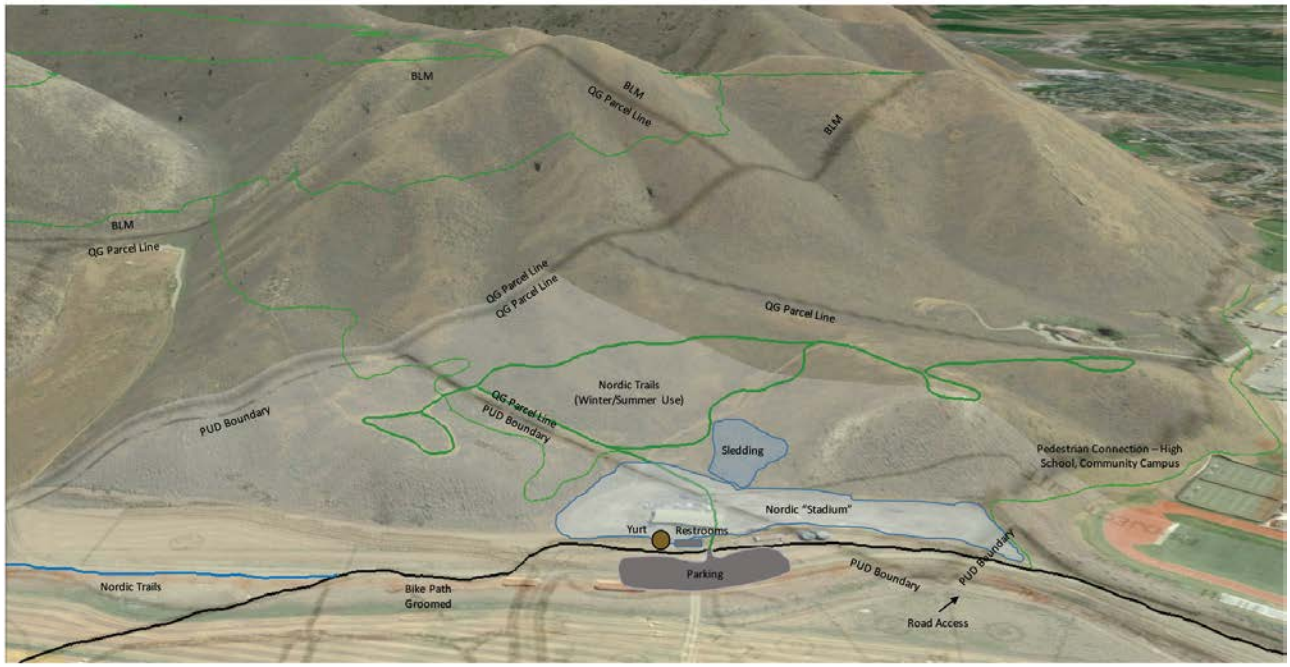
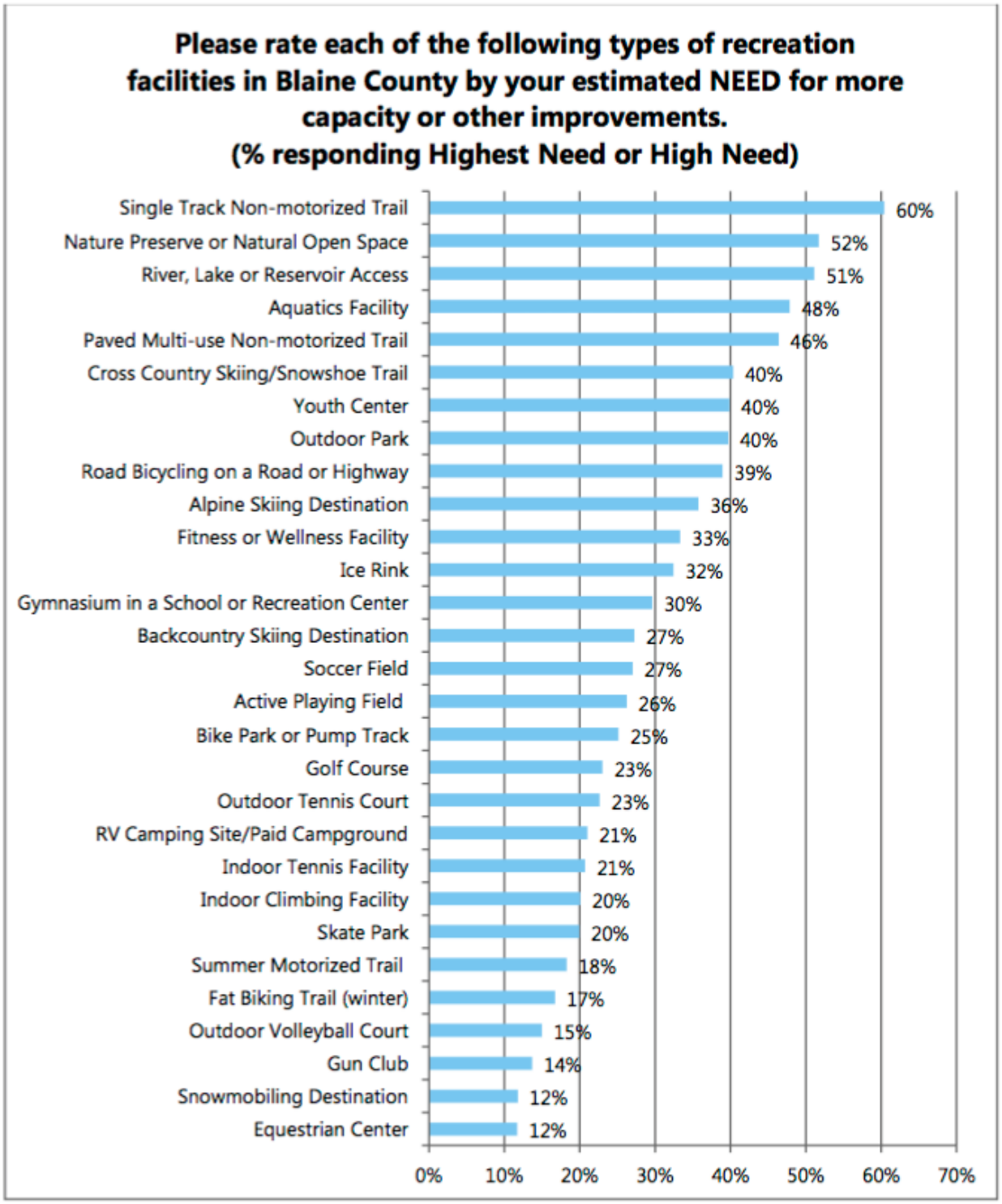


Exhibit E

Needs Assessment by Category – Recreation Chapter Blaine County Comprehensive Plan

Chart 5: 2015 Recreation Survey Overall Needs (n=975)

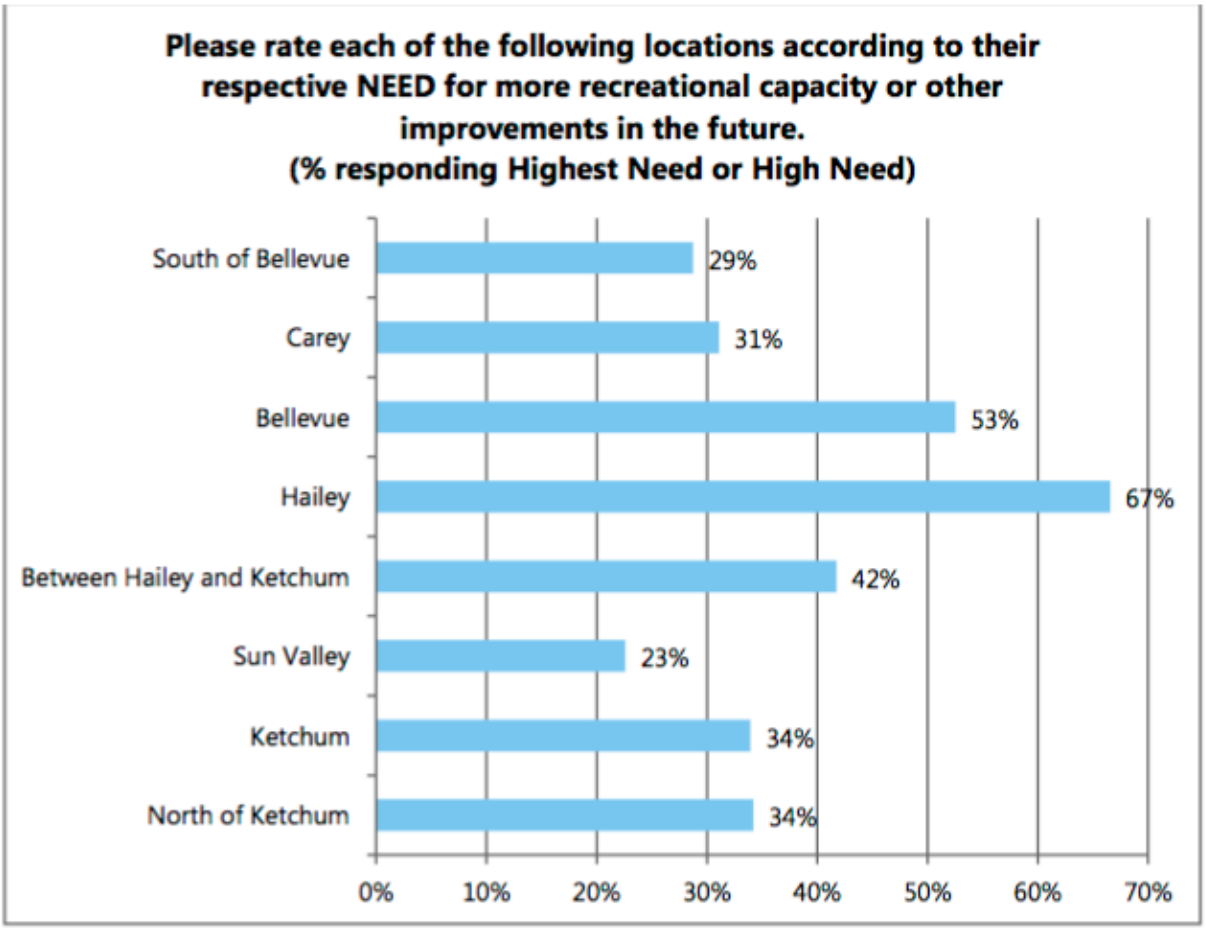


Source: 2015 Blaine County Online Recreation Survey

Exhibit F

Needs Assessment by Geographic region – Recreation Chapter Blaine County Comprehensive Plan

Chart 6: 2015 Blaine County Comprehensive Plan Recreation Survey Needs (n=975)



Source: 2015 Blaine County Online Recreation Survey

Exhibit G

Memorandum Quigley Farm Partner David Hennessy to BCRD Board of Directors

Dated 6/29/2016

(attached)

HENNESSY COMPANY

INTEROFFICE MEMORANDUM

TO: JIM KEATING - BCRD

FROM: DAVID B. HENNESSY

SUBJECT: QUIGLEY FARM PUD

DATE: 6/29/2016

CC: MIKE BURCHMORE

Jim:

Thanks for allowing me to discuss the project with the Board of BCRD on 4/11/16. As requested at the meeting, I have had some additional discussions with Quigley Green Owner LLC concerning access to the property outside of our PUD submittal. Quigley Green is amenable to providing access through either easements or access agreement to their property as an extension of the trails included in the PUD area. They have requested that BCRD provide some specificity to what areas to which you would like access as well as a commitment from BCRD concerning the operation of the recreational amenities in those areas. There could perhaps be a phased approach to this access whereby BCRD lays out the overall plan and then provides a timeline for when each piece would be implemented. I would then work with Quigley Green to agree to the timing and milestones. I hope this provides a mechanism to providing a very valuable recreational amenity for the county.

Below is a listing of the specific components we previously discussed for your reference:

Multi Use Bike Path - We plan on constructing the path to BCRD standards and providing a permanent easement to BCRD for management and maintenance. We will construct the sections included in our submitted development plan and subsequent sections that are included in potential future phases.

Non-motorized Hiking, Biking, Equestrian Trails – We plan on constructing the trails that are located within the PUD boundary as part of this initial work and will work to provide a perimeter trail around the canyon. We can provide access in perpetuity from the land within the PUD submittal area.

Parcel G Trails HUB - We will provide to BCRD, Parcel G at the time of final plat and plan on providing additional land to the south as part of subsequent phases. We will also work with BCRD to provide limited water rights for snowmaking from our existing irrigation rights and will also work with BCRD to adjust the road location to the north to provide additional area to BCRD. As we noted, this move will have to take place during any revisions to the plan.

Nordic Trails – We anticipate the access agreements for Nordic skiing being similar to the ones previously executed between BCRD and Quigley Green Owners LLC. With this in mind, along with the fact that this area is outside of our PUD submittal area, we can't really comment on the general

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kilometers of trails but will work with BCRD and Quigley Green Owners to achieve a mutual agreement to provide this access. We will also work with BCRD to design permanent access points in any potential future phases.

Pedestrian Access to Wood River High School, Community Campus – We are happy to provide pedestrian access to Wood River High School and Community Campus and have discussed this with the School District.

Bathrooms and Parking - We can't at this time construct the parking or bathroom facilities in Parcel G but will provide the services to that location and work with BCRD to build these as efficiently as possible.

Blaine County School District – As part of our PUD Submittal, we have included 6.93 acres to be donated to the Blaine County School District for additional playing fields shown as Parcel A, Block 1 on our submittal.

Thanks for your help in designing these recreational amenities and for your support of the overall project.

Please let me know if you have any questions or need any additional information.

Return to Agenda

Project No. 1094-03-2016

Water Supply Adequacy Report for Quigley Farm PUD

Prepared for:

Quigley Farm PUD
Hennessy Corporation
PO Box 2720
Ketchum, ID 83340

PROFESSIONAL ENGINEER
LICENSED
04/22/2016
16715
STATE OF IDAHO
HATTIE ZOBOTT

April 22, 2016

For information concerning this report, contact

Hattie Zobott, M.S., P.E.

BROCKWAY ENGINEERING PLLC

CHARLES E. BROCKWAY, PH.D., P.E.
CHARLES G. BROCKWAY, PH.D., P.E.

2016 NORTH WASHINGTON, SUITE 4
TWIN FALLS, IDAHO 83301

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Appendix B. Wood River Fire District Letter

Appendix C. Vicinity Well Logs

Appendix D. Aquifer Parameters and Drawdown Modeling

Appendix E. Quigley Creek Flow Measurements-Trent Stumph Data

Appendix F. Typical Well Design

Appendix G. Water Quality for Quigley Canyon (Hopkins and Bartolino 2013)

Evaluation of Water Supply Adequacy for Quigley Farm PUD

Brockway Engineering, PLLC
Hattie R. Zobott, P.E.
April 22, 2016

Project No. 1094-03-2016

A. Overview

The proposed Quigley Farm PUD (Project) will be a residential development in Quigley Canyon, East of Hailey, Idaho, and located in Section 10 of Township 2 North and 10 East. Phase 1 will develop approximately 43 acres of farm ground into Quigley Farm PUD, and will predominantly be within the SWNE Quarter-Quarter of Section 10 of the farm. In-house and commercial water will be provided to each service via a central system supplied by at least two dedicated potable water wells. Irrigation and fire suppression water will be provided via a separate non-potable system. The purpose of this report is to 1) Identify the available water sources for the development 2) describe the anticipated water supply provisions for in house use 3) describe the hydrogeology and aquifer parameters for the project location 4) determine the sufficiency of the water supply, and 5) describe a well design and location to meet water needs.

B. Existing Water Rights

Quigley Farm includes water rights for 276.5 acres of irrigation. Water is supplied by Quigley Creek, a tributary to the Big Wood River, and groundwater. The groundwater supplements the surface water. The water rights for the farm are summarized below in Table 1.

The senior water right for Quigley Creek is 37-19736 and accounts for the full base flow of Quigley Creek of 1,023 gallons per minute (gpm) (2.28 cfs) during the irrigation season from April 15th through October 31st. Additional water rights were developed to enable irrigation storage, and irrigation from storage in order to deliver water throughout the irrigation season. A total diversion of up to 2,365 gpm (5.27 cfs) from Quigley Creek is allowable to

meet irrigation needs. An irrigation pond stores up to 30 acre feet on the property or 10.2 million gallons of water. The Quigley Creek water rights allow for the irrigation of 276.5 acres, including the Project area. Irrigable acreage within the project area for Phase 1 is estimated at 38 acres.

The existing irrigation well was drilled in 1966. Additional groundwater rights were developed, and the combined diversion of 902 gpm (2.01 cfs) is allowed for up to 123.4 acres of the farm. When developed, the well produced 996 gpm (2.22 cfs). The well was licensed for 902 gpm (2.01 cfs) for 123.4 acres with a maximum diversion volume of 431.9 acre-feet per year, or up to 3.5 acre-feet per acre (Combination of Water Rights: 37-20902, 37-21349, 37-21348). The place of use for the groundwater is within the lower half of the farm and overlaps the proposed Project (Figure 1).

The final water right, 37-8283, allows for the aesthetic and recreation storage of Quigley Creek water on the property. Storage may be accomplished within two ponds and can be maintained throughout the year. The ponds are filled within the irrigation season using the existing diversion and then are permitted to remain full throughout the year.

Quigley Farm has sufficient water rights to irrigate the property. Storage water rights exist for up to 41.7 acre feet of water for irrigation, aesthetic and recreation storage uses. The farm can divert up to 2,365 gpm (5.27 cfs) of Quigley Creek and 902 gpm (2.01 cfs) of groundwater on a total of 276.5 acres, for a per-acre rate of 0.0263 cfs/acre which is more than adequate.

Table 1: Water Rights for Quigley Farm LLC

Water Right Owner	Quigley Green Owner LLC C/O Greenfield Partners												
Source	Quigley Creek						Groundwater				Quigley Creek		
WATER RIGHT	37-2784A		37-7693			37-19736	37-20902		37-21349	37-21348	37-8283		
PRIORITY DATE	1/3/1967		12/16/1977			4/15/1880	7/21/1966		4/15/1985	10/28/1969	9/23/1986		
DECREE DATE	7/29/2011		7/29/2011			7/29/2011	7/29/2011		7/29/2011	7/29/2011	License		
BENEFICIAL USE	Irr. Stor	Irr. from Stor	Irrigation	Irr. Storage	Irr. from Storage	Irrigation	Irr.	Stock-water	Irrigation	Irrigation	Stock-water	Rec. Storage	Aesthetic Storage
PERIOD OF USE	4/1-11/1	4/1-11/1	4/1-11/1	3/1-9/30	3/1-9/30	4/15-10/31	6/1-10/1	1/1-12/31	4/15-10/31	4/15-10/31	01/1-12/31		
CFS			5.27			2.28	2.01	0.12	0.16	2.01	0.12		
AFA	16	16	900	30	30		340.2		35	56.7	6.7	35	35
ACRES	154		276.5			276.5	113.4		10	113.4			
Individual			5.27 cfs			2.28 cfs	2.01 cfs	0.12 cfs	0.16 cfs	2.01 cfs	0.12 cfs		
Total	5.53 CFS						2.01 CFS				0.12 CFS		
Individual	16.0 AFA	16.0 AFA	900.0 AFA	30.0 AFA	30.0 AFA		340.2 AFA		35.0 AFA	56.7 AFA	6.7 AFA	35.0 AFA	35.0 AFA
Total	967.7 AFA										41.7 AFA		
Individual	154.0 ac		276.5 Acres			276.5 Acres	113.4 Acres		10.0 Acres	113.4 Acres			
Combination	276.5 Acres						123.4 Acres						
Total	276.5 Acres												

C. Water Requirements

The Project will displace approximately 38 acres of irrigation within Phase 1 that was historically irrigated with Quigley Creek and groundwater sources. Phase 1 will include 51 dwelling units of varying categories and sizes. Irrigation demands will be met by a separate, non-potable irrigation system using surface water from Quigley Creek that is supplemented by groundwater from an existing well. The acreage of land that will not be irrigable as a result of development is approximately 13 acres, and includes 6 acres that will be covered by houses and buildings and 7 acres of roads and paths. The remaining 24 acres of the subdivision will be irrigated using water from the irrigation rights as described above. The remaining 13 acres of irrigation water rights can be put towards new permit mitigation or other uses.

Consumptive use for irrigation results from the evaporation and transpiration for the typical crop. The specific plantings for the project are unknown at this time. The consumptive use for the project was determined by assuming turf as the primary vegetative cover, to be conservative. The precipitation deficit for turf near Hailey is 597 mm/year or 23.5 inches (1.96 ft/acre) (Allen and Robison 2012). Irrigation of 24 acres of turf will consume a maximum of 47 acre-feet per year.

Estimates of average annual domestic wastewater volumes are typically empirical in nature, based on studies of water use from various types of residential areas. The most detailed study to date is Opitz et al. (1999), as reported in EPA (2002). This study is commonly known as the Residential End Uses of Water Study, funded by the American Water Works Association Research Foundation (AWWARF). The study resulted in mean daily in-house water use for 12 study communities, and a standard deviation of the daily volume to allow determination of statistical exceedance levels. In this study, the mean daily in-house use ranged from 57.1 gpcd in larger urban communities to 83.5 gpcd in smaller, less dense residential areas. For all study sites, the mean was 69.3 gpcd and the standard deviation was 42.6 gpcd. Domestic use inversely varies with occupancy with efficiency increasing with occupancy.

Three methods were used and then compared to determine the design average per capita volume for in house use. The first method used the 90% exceedance of the AWWARF study of 120 gpcd. Average occupancy for Phase 1 was estimated at 2.6 people per dwelling unit. The resulting in house use was estimated at 312 gpd based on 90% exceedance of the 69.3 gpcd average. The standard wastewater design discharge used by IDEQ for a 4-bedroom household is 300 gpd, and is comparable to the 90% exceedance value. Method two evaluated use from the AWWARF regression equation relating in house use to occupancy. The resulting in house use per household was estimated at 180 gpd using the AWWARF regression and 3 occupants per household. The project anticipates actual use similar to the AWWARF regression result of 180 gpd per household due to water conserving design practices that will be implemented. Water sufficiency will be evaluated using the highest estimated per household use of 312 gpd to ensure a conservative maximum design value. The resulting average withdrawal from the aquifer to support domestic, in house needs will be a maximum 15,912 gpd or 17.8 acre-feet per year for 51 dwelling units.

Peak use calculations were evaluated using three separate models. The IDWR maximum diversion for in house use estimates 153 gpm (0.34 cfs) to support peak demand (IDWR Memo dated 06-04-1980); however, the IDWR allowance is for water right permitting purposes and generally overestimates the peak demand to a large degree. Using an empirical model developed by Johns Hopkins University, and adopted by the IDEQ, a peak demand of 67 gpm (0.15 cfs) was estimated. The third model uses a max day and a peaking factor proportional to the number of users, resulting in an estimate 100 gpm for the peak hourly withdrawal. The peak demand will likely be between 100-150 gpm, and 120 gpm was used as a conservative maximum design value for residential.

Consumptive use is typically considered to be a maximum of 15% of total use for domestic purposes. Quigley Farm will treat a portion of the wastewater using an engineered wetland of approximately 15,000 square feet (0.34 acres). The resulting maximum consumptive use for domestic, in-house use, is anticipated to be less than 2.67 acre-feet per year. Consumptive use for wetlands is higher than the typical crop of alfalfa near Hailey. The precipitation deficit is 2.10 acre-feet per acre annually (Allen and Robison 2012). Consumptive use for 0.34 acres of alfalfa is 0.70 acre-feet annually, while consumptive use for the same acreage in wetlands is 0.71 acre-feet. The difference of 0.01 acre-feet is the

additional consumptive for the conversion of alfalfa to wetland per year. Total consumptive use will be 2.68 acre-feet, 2.7 acre feet will be used. The full analysis on domestic use is available in Appendix A.

A new permit for groundwater will be needed for the public water supply sources because a portion of the in-house use will be considered consumptive. Mitigation will likely be required to offset the in-house consumptive use by reducing the total acreage irrigated on the property under the existing groundwater irrigation rights. The mitigation will also cover the planned wetlands development described above. This analysis must consider both historical beneficial use of the acreage and groundwater / surface water overlap to determine the allowed per-acre consumptive use for mitigation. The typical crop for the farm is alfalfa, and using Allen and Robison (2012) data for "alfalfa - less frequent cuttings" at the Hailey station, the historical consumptive use is for the land is 2.06 acre-feet per acre. Since the groundwater well is supplemental to the surface water and has not historically provided the full per-acre crop demand, the actual beneficial use from the well must be evaluated. Available data on well production during 2010 and 2011 indicate that the per-acre consumptive volume attributable to the groundwater is approximately 1.4 ac-ft/acre. Therefore, the estimated mitigation requirement for domestic consumptive use of 2.7 acre feet is 1.9 acres.

The subdivision has an estimated 13 acres of land that will no longer be irrigated as a result of development. Therefore the subdivision will be able to fully mitigate the domestic consumptive use of the development with existing water rights. There are sufficient irrigation water rights to irrigate the irrigable portions of the development.

Phase 1 anticipates commercial development within the Mixed Use Commercial Core. A school is also proposed. The specific breakdown and building footprints for commercial uses are unknown at this time. The following uses were investigated to understand if the development could support commercial and school use: restaurant, market, shopping, hotel and a school. The companion study by AWWARF for *Commercial and Institutional End Uses of Water* was used to determine water use per square foot per day (Dziegilewski 2000) for all of the above uses except shopping. The assumed daily use of 50 gallons per day per shop was used as public restrooms are not required in shops.

Three lots are shown on the Quigley Farm PUD for commercial and institutional use. Mixed Use Commercial Core is approximately two (2) acres, the Inn/Hospitality lot is approximately one (1) acres, and the Future School Site lot is a little over six (6) acres. Building size and final use is not known at this time. The commercial building footprint is assumed to be 75% of the lot and the use breakdown within the building was assumed as follows: 5% restaurant space, 32% office space, 3% market space, and 59% is shopping. Commercial units are assumed to be 2,000 square foot areas of the building footprint and were used to determine the total square footage attributable to each use described above. The Inn is assumed to occupy 50 % of the lot space and provide 25-30 rooms. The School is assumed to occupy about 10% of the lot space for a 200 students. Actual building sizes will vary, but the estimated use provides a conservative model for the effect of commercial and institutional water use on the Quigley Farm PUD.

The total commercial and institutional daily withdrawal from the aquifer resulting from the uses described above is estimated to be 28,000 gallons per day. Average daily demand is expected to be approximately 20 gpm, and peak hourly demand of approximately 100 gpm. Actual values will vary from the above estimates, but the estimates are conservative and should be similar to actual values. The demand for commercial use is approximately equal to residential demand. The peak hours may slightly overlap and an additional well may be needed to meet peak hourly demands for the potable water supply.

The consumptive use resulting from commercial development can be mitigated for using existing irrigation water rights for the project. The mitigation plan will be the same as the domestic use mitigation plan and commercial use will offset additional irrigation acreage to remain within historical consumptive use limits. Consumptive use is assumed to be 15%. The total consumptive use for commercial and institutional use above would be 4.7 afa, and would require 3.4 acres of mitigation. The final values will vary, and additional acreage may be required for mitigation.

The total available acreage for mitigation within the irrigation water rights are estimated at 13 acres. Residential mitigation will require 2.0 acres of irrigation to be reduced. The commercial and institutional use will require an additional 3.4 acres of mitigation. The

estimated mitigation required for consumptive in house and in building uses is approximately 5.4 acres. The remaining 7.6 acres of irrigation water rights available for other uses, or to mitigate for commercial use that exceeds the estimates described above (Appendix A).

Fire protection provided from a non-potable water loop will be under the authority of the Wood River Fire District. The Project was reviewed by the fire district and the required fire flow will be 1,500 gpm for 2 hours (Appendix B). Fire flow will be met using a combination of sources in a closed loop, or developing new well(s) capable of producing the full fire flow.

No additional water rights are needed to provide for irrigation use as there are sufficient water rights available. Diversion from a groundwater sources for fire protection alone does not require a water right under current IDWR policy.

D. Hydrogeological Setting

D.1. Geology

The project area is at the mouth of a tributary canyon of the Big Wood River called Quigley Canyon. Undifferentiated, Quaternary sediments comprise the uppermost layers of the lithology and are typically alluvial material deposited by the Big Wood River (Bartolino and Adkins 2012). Bedrock formations underlie the alluvial deposits and include two formations of varying lithology: the Milligen Formation and the Wood River Formation (Worl and Johnson 1995).

The alluvial layers include gravels, cobbles, sand, and some fine sediments like clay. The bedrock lithology is made of sedimentary rock types of the Milligen and Wood River Formations that are found within tributary canyons on the eastern slopes of the Wood River Valley (Bartolino 2012). The Milligen formation includes a variety of rock types including siltstone, limestone, quartzite, and others (Hall 1985). The Wood River Formation is typically comprised of siliceous conglomerate overlain by sequences of sandstone, limestone, and quartzite (Hall 1985).

D.2. General Aquifer Description

The water source for the wells for the project is the Big Wood River valley aquifer. The aquifer definition used here will be as described by Skinner et al. (2007) and includes the alluvium and underlying bedrock. This aquifer is generally comprised of alluvial deposits of sand and gravel, with some relatively thin strata of fine-grained materials. The aquifer is generally unconfined, with a saturated depth of approximately 30 to 60 feet north of Ketchum and approximately 180 feet just north of Hailey (Luttrell and Brockway, 1984). The ground water within the aquifer flows to the south and is readily recharged via precipitation, underflow from tributary canyons, and leakage from multiple surface water sources (i.e. Big Wood River, Clear Creek, Glendale Canal, etc.) (Bartolino 2009).

The Big Wood River Aquifer extends throughout the project area as shown by Bartolino and Adkins (2012), although the project is near the boundary of the aquifer (Figure 2). The average thickness of the alluvium in this area is expected to be 150 feet (Bartolino and Adkins 2012), but well logs indicate depths up to 180 feet for wells drilled within the valley (Appendix B). Wells in the project location may be completed in either the alluvium or the underlying bedrock formations (Bartolino and Adkins 2012).

The hydraulic conductivity of the water-bearing alluvium is very high. Estimates range from 150 ft/day to 500 ft/day (Frenzel, 1989; Smith, 1959). The bedrock has varying lithology in the vicinity of the project. Hydraulic conductivity for similar sedimentary rock types varied from 0.03-1.3 ft/day (Belcher et al. 2001).

D.3. Aquifer Properties

A subset of well logs and research were analyzed to determine the lithology and common aquifer characteristics for the project vicinity (Figure 2). Well logs at the mouth of Quigley Canyon, and within Quigley Canyon were very limited. Therefore, well logs for the area east of the Wood River Trail, and within 2 miles north and south of the project were collected from the IDWR GIS Well Log dataset (accessed March 2016) (Appendix B). Only well logs that included both yield and drawdown were evaluated. Additional research on high yielding wells near Quigley Canyon and east of the Wood River were also collected from the Big Wood River Groundwater Model (Powell et al 2009). The values were compared against the average values for the Wood River Valley Aquifer (Bartolino 2012).

From the well logs near the project area, the static water level is between 45-65 feet below ground surface. Bedrock was observed between 156-180 feet below the ground surface. The elevation for an adjacent well, Blaine County School District #61, is 5,353 feet above sea level and the bedrock elevation is 5,183 ft (NAVD88) (Appendix A of Bartolino 2012). From groundwater contours mapped by Bartolino, the estimated elevation of the Big Wood River Valley Aquifer near the proposed well site will be 5,283 ft (NAVD88) indicating an aquifer open interval of nearly 100 feet available (2012). The well log for the existing irrigation well on the proposed subdivision site does not reach the bedrock with total well depth of 153 feet and a static water level of 55 feet (John Fox Well Log—Appendix C).

Quigley Canyon has one domestic well log for Tom Pyle (Appendix C). The location appears to be incorrect as there are no known wells in the NENE Quarter-Quarter of Section 10. A domestic well does exist near the hay barn on the property. The Tom Pyle well drilling record is assumed to represent this Hay Barn well. The static water level is 60 feet below the ground surface and the total well depth is 92 feet with no bedrock indicated and apparently productive alluvium present.

Well logs adjacent to the recommended PWS POD location shown in figure 1 include the John Fox well log and the Blaine County School District #61 well logs. Five wells were drilled for Blaine County School District #61 in 2011 and bedrock was reached at an average of 178 feet below ground surface. Well yield was highest for the John Fox well (existing irrigation well supply 906 gpm) and lowest for the school district well drilled in 2003 (50 gpm).

Wells within the project bounds are typically completed in alluvium (Appendix C). The well logs indicate the upper layers of the aquifer may be occluded with clay layers up to 125 feet below ground surface as indicated by the Blaine County School District Well Logs, and could reduce the open interval to 50 feet instead of the 100 feet described above. The Fox well log indicates heterogeneous alluvial deposits with an open interval of 80 feet. The open interval of the Pyle well is estimated at 40 feet.

The well logs were analyzed to determine the open interval, drawdown, pumping rate, and pumping period. Aquifer depth was determined on an individual well basis based on the depth to bedrock and reported bedrock depth in Bartolino and Adkins (2012). The previous information was used to estimate the hydraulic conductivity for a well within the project by applying the Bradbury and Rothschild method for partially penetrating wells (1985). The highest values were excluded from the statistics because the drawdown information did not appear to be accurate. Wells along the eastern border of the Wood River Valley had an estimated hydraulic conductivity that varied from 2-43 ft/day with the average hydraulic conductivity estimated at 11 ft/day. Wells within the main valley of had much higher hydraulic conductivities that ranged from 15-200 ft/day. The reported values in recent scientific investigations estimate the hydraulic conductivity between 50-99 ft/day and 100-499 ft/day (Bartolino 2012). The tabulated results for hydraulic properties are available in Appendix C.

The public water system wells should be drilled within the shaded area shown on Figure 1. The thickness of the alluvium is highest within this area, and the transmissivities will likely be higher as the area is nearer the Wood River Valley, and near the center of Quigley Canyon where alluvial deposits from Quigley Creek exist. Two wells will be drilled, but only one well will be operated at a time. Wells within the PWS area will permit compliance with regulatory setbacks from the Large Absorption Drainage Fields, Engineered Wetlands, and property lines.

D.4. Estimated Drawdown

The water for Quigley Farm will be supplied by Quigley Creek from a minimum of two groundwater wells as required for a public water system designated by IDEQ as a "community" system. The estimated drawdown for a new, public water supply well was evaluated to establish the feasibility of the well and the potential impacts local ground water levels during each year. Drawdown estimates were calculated using the Theis Method (Theis et al., 1935). The observed drawdown for a pumping well is a function of pumping rate, pumping time, hydraulic conductivity, and radius—or distance from the well. The radius from a well is the distance from the centerline of a well to a feature of concern, typically another well or hydraulic feature. Impact of wells was evaluated for two scenarios to determine feasibility of delivering water to the project: 1) Drawdown within the well at a

radius of 0.5 feet to determine well design and yield feasibility 2) Drawdown resulting from the average daily withdrawal of residential, commercial, and institutional activities for 30 days of continuous pumping. The result of the two scenarios will describe the likely impact of development of the groundwater resources needed to supply potable water to the project.

The only developed wells within the area are owned by the developers and will be part of the project. The closest neighboring wells not owned or operated by the Project are the Blaine County School District # 61 wells. The wells are south of the PWS POD area approximately ½ mile.

Scenario 1 was evaluated for wells that are drilled within the mouth of Quigley Canyon. There is not a lot of information available for this area due to the lack of development. One well is log available within the project reach of Quigley Canyon (Tom Pyle-Appendix C). Scenario 1 will use the information provided by the only available well log, although the well is further from the Big Wood River Valley Aquifer proper. The results of Scenario1 are therefore, conservative as wells drilled within the mouth of Quigley Canyon will be more similar to typical, high yielding wells in the Big Wood River Valley Aquifer. The well log indicates alluvium—as expected, and the static water level was observed at 60 feet in 1988 when drilled. The flow rate was estimated as 50 gpm at a level of 90 feet when the well was pressurized with air. Bartolino estimates that bedrock is near 100 feet below ground surface for this area (2012). The total available saturated depth of alluvium within the canyon, therefore, will average less than 40 feet. The hydraulic conductivity will also decrease further east within the canyon with anticipated values near 11 ft/day (Appendix A). The resulting drawdown within a well for the peak hourly discharge of 120 gpm would be 29 feet (assuming one hour of pumping), resulting in a pumping level of 89 feet. The discharge of 120 gpm is the anticipated peak discharge of residential or commercial pumping. Multiple wells are necessary to support peak demand assuming the low hydraulic conductivity of 11 ft/day as described above. If the production wells have higher conductivities the yields will be much higher and drawdowns will be lower or equivalent. The value of 120 gallons per day also represents a maximum yield if the hydraulic conductivity is low and is a conservative value for design and planning purposes.

Scenario 2 evaluates the local annual impacts of groundwater withdrawal for the residential, commercial and institutional development of the project. The estimated residential withdrawal of 15,912 gallons per day at an average rate of 12 gpm for 30 days will result in an estimated 5.5 feet of drawdown within the well. The additional 28,190 gallons per day of commercial and institutional use will contribute another 19 gpm of average discharge. The cumulative effect of pumping for all uses will result in estimated drawdown of 14 feet per day within the well. The combined average discharge of both residential and other uses is 31 gpm. The resulting in a pumping level is estimated to be 75 feet below ground surface at the end of 30 days of continuous pumping. The results represent a worst case scenario as the modeled hydraulic conductivity is 11 ft/day and will likely be closer to 100 ft/day. Drawdown after 30 days with the anticipated hydraulic conductivity of 100ft/day and a pumping rate of 31 gpm within the well will be approximately 2 feet. The range of drawdown is therefore between 2-14 feet of drawdown for average use.
Drawdown at 100 feet from the well using the average discharge of 31 gpm and the conservative hydraulic conductivity value of 11 ft/day is 3.3 feet, and at 500 feet it is 0.4 feet. If either one of the PWS wells does not meet the peak demand estimate of 220 gpm, three wells can be drilled and used in parallel when needed to meet peak demand assuming a conservative yield of 110 gpm.

The highest pumping demand will be for the fire flow of 1,500 gpm (3.34 cfs) for 2 hours. The irrigation well within the valley will be the source. At this location, higher hydraulic conductivity and saturated depth are expected, which are the main factors affecting well yield. There is some uncertainty for the both parameters in the case of Quigley Canyon because very few wells are in the immediate vicinity. The alluvial material is heterogeneous, and hydraulic conductivities vary throughout the valley. Therefore, drawdown was evaluated for the fire flow of 1,500 gpm for a range of hydraulic conductivities 50-150 ft/day. The range was based on the yield of the irrigation well and the transmissivities of the large wells from the City of Hailey. Using the higher hydraulic conductivities typical of the Wood River Valley near Hailey is appropriate because the proposed location of the new well will be protruding into the Wood River Valley. The hydraulic conductivities in the valley are higher because of increased depth of the alluvial deposits. The values are sufficiently conservative based on the high yield of the irrigation well.

Drawdown will increase with decreasing hydraulic conductivity. The maximum drawdown in the well bore for fire flow pumped at 1,500 gpm for 2 hours, and the lowest expected hydraulic conductivity of 50 ft/day, is 48 feet. Assuming a static water level of 60 feet, the resulting pumping level would be 107 feet. The bedrock is expected to be near 176 feet below ground surface indicating that the new well will be able to supply required fire flow with approximately 69 feet of head over a pump. The well will likely have a higher hydraulic conductivity of approximately 150 feet/day. The resulting drawdown of the higher hydraulic conductivity is 18 feet, and the resulting pumping level would be 78 feet below ground surface. The existing well may be able to meet this demand with an upgrade to the existing pump. Alternatively, modification to the well perforations or deepening of the well may be needed.

No active wells are believed to be within a radius of 500 feet of the proposed well location (Figure 1). Fire flow will not affect local wells due low probability of use.

The full drawdown results are available in Appendix D.

E. Water Sufficiency

The Project is located in an undeveloped, tributary canyon of the Big Wood River Valley Aquifer called Quigley Creek. Approximately 7,000 acre-feet of recharge to the Big Wood River Valley Aquifer results from Quigley Creek (Bartolino 2009). The water level has remained fairly constant within the irrigation well for the development since the irrigation well was drilled in 1966. The irrigation well is located at the mouth of Quigley Canyon within the Big Wood River Valley Aquifer, proper. Recent measurements indicate the static water level is between 52-63 feet for the vicinity with decline of 3.5 feet from 2006-2012 (Bartolino 2014). The declines are similar to the average decline 3 feet observed within the aquifer from 2006-2012 (Bartolino 2014). No measurements were made in wells completely within Quigley Canyon.

Two water sources are developed and available to the development. The first source is Quigley Creek that provides an average flow of 1,023-1,090 gpm (2.28-2.43 cfs) (WR 37-19736 detail and Trent Stumph Data 2007-2011Appendix E). Although not typically

available, up to 2,482 gpm (5.53 cfs) can be diverted from Quigley Creek, for irrigation and storage purposes. The irrigation flows supplied by Quigley Creek are supplemented by groundwater from the Big Wood River Valley Aquifer. The high yielding irrigation well described above was developed in 1966 and continues to produce 900 gpm for irrigation needs.

A minimum of two new wells should be drilled to deliver the public water supply for the Project. The wells should be placed within the shaded area, as shown in Figure 1, to ensure that the deepest alluvial deposits are encountered during drilling with the highest hydraulic conductivity. The new wells will supply domestic, in house use for 53 dwelling units with a peak demand of 120 gpm. Additional commercial use may be supplied within the public water supply and estimated peak hourly demand is estimated at 100 gpm. An additional well may be needed to meet peak hourly demand of over 220 gpm, depending on well yield.

Irrigation will be supplied from the irrigation well and the surface water from Quigley Creek. The fire flow of 1,500 gpm will also be delivered from the irrigation loop. Although the well does not currently deliver the required yield, the modeling indicates that the aquifer is capable of yielding the desired flow. Modifying the well and/or changing the pump will be necessary to meet fire flow requirements.

Mitigation for the project will offset all of the consumptive use expected to result from development. Only the consumptive use will be mitigated for. Adequate resources are available for mitigation because development will dry up approximately 12 acres of farm ground that will no longer be irrigable. Approximately 2.0 acres of mitigation will be required for Phase 1 in house residential use and approximately 4.5 acres of mitigation will be required for Phase 1 commercial and institutional use.

Quigley Farm is somewhat unique in that it has the ability to fully mitigate for the development with existing water rights.

In summary, the Quigley Farm PUD will have sufficient water to support development. The fire flow can be met with a new well designed to yield 1,500 gpm. Peak demand for the Project will be approximately 220 gpm. Irrigation will be supplied by existing water rights

from Quigley Creek and groundwater. The allocated water for irrigation is more than sufficient for the development.

F. Potable Well Design

The new public water supply well will adhere to state and national requirements for a Public Drinking Water System.

The total depth of the well is estimated to be 100 feet below ground surface and the static water level will be near 60 feet below ground surface. The expected open interval is approximately 40 feet of heterogeneous alluvial material. Maximum drawdown, as described above, of 29 feet results in a pumping level of 89 feet. The estimated total dynamic head to deliver 120 gpm at 30 psi to the surface, including friction losses in the pump column, is 167 feet.

Well design will include perforated casing or stainless steel screen set through the alluvium to bedrock. The surface seal will have minimum depth of 58 feet below ground surface. The well diameter will be 8-inch with a telescoping screen or perforations within the water bearing regions. The pump size will be between 6-inch submersible pump to deliver 120 gpm. The conceptual well design is in Appendix F.

G. Water Quality

The quality of water in the aquifer underlying the proposed subdivision is excellent. Hopkins and Bartolino analyzed groundwater quality most recently in the Wood River Valley (2008). For wells within the region of Quigley, water quality was excellent with levels well below the maximum contaminant levels outline by the EPA for primary and secondary contaminants (Appendix G).

H. Conclusions

1. The development has existing water rights to irrigate 276.5 acres of land. Water sources include both Quigley Creek and supplemental groundwater. The Project will develop 43 acres of the 276.5 acres, and approximately 12 acres will be retired as a

result of irrigation and will be available for mitigation or future water needs.

2. Water rights on the project are adequate for irrigation and mitigation of a new water right for potable supply.

3. The Project lies within the Big Wood River Valley Aquifer. The anticipated hydraulic conductivity at the west end of the site is between 50-150 ft/day. A well with a yield of 1,500 gpm can be developed with an estimated maximum drawdown of 59 feet in the well bore to meet the required fire flow.

4. Hydraulic conductivities with the POD PWS Area are estimated to be around 11 ft/day. Two municipal wells will be developed within this area for a Public Water System. A well delivering a peak discharge of 120 gpm will result in 29 feet of drawdown. A minimum of two wells will be needed to meet the additional commercial demand. Drawdown when pumping the operational maximum-day demand (not fire flow) is 14 feet at within the well, 3.3 feet at 100 a radius of feet from the well and 0.4 feet at a radius of 500 feet from the well. No active wells are believed to lie within 500 feet of the proposed well location.

5. The available water supply for the Project is adequate and reliable to meet all demands for irrigation, potable, and fire suppression requirements.

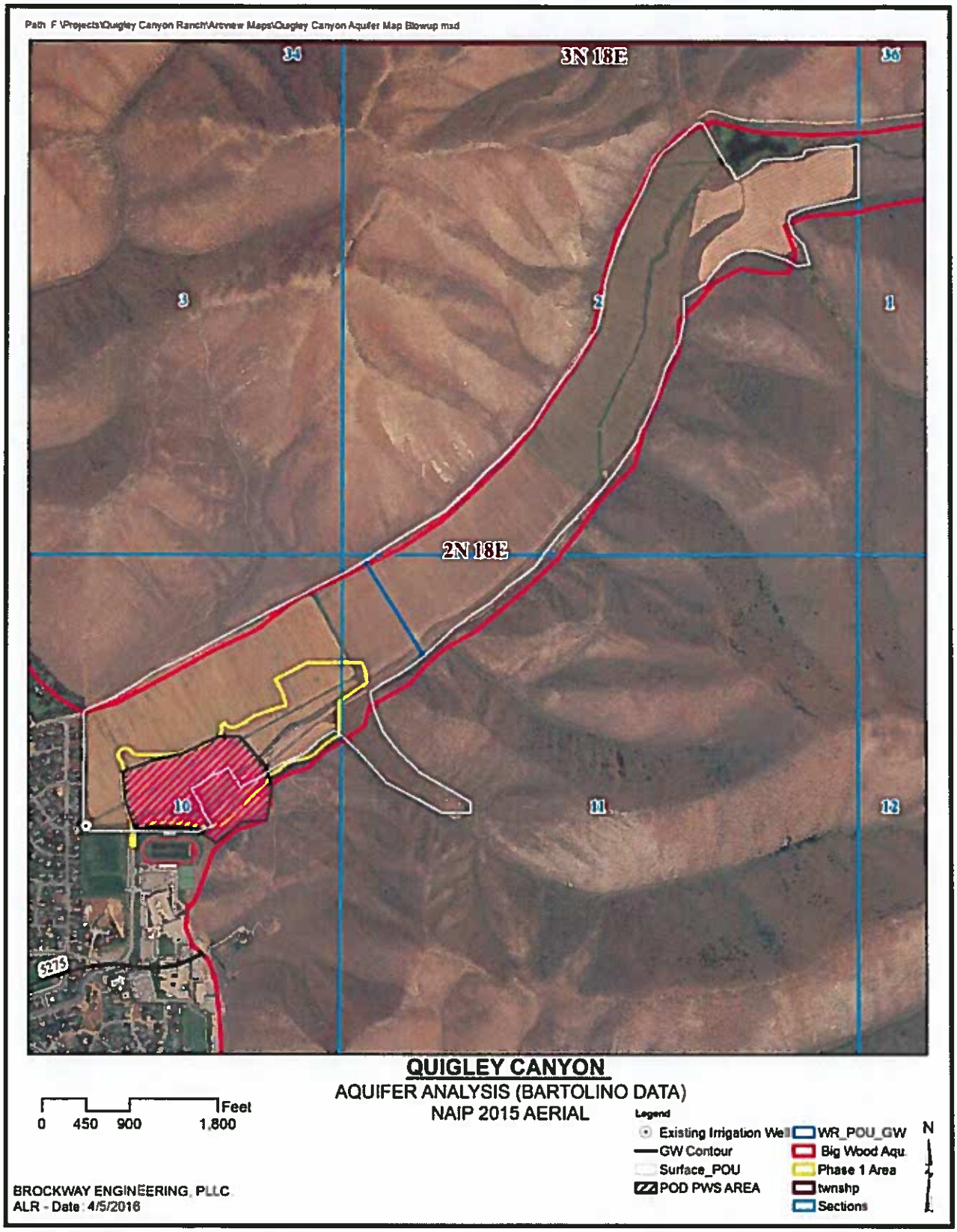

Figure 1: Quigley Farm water rights with Phase 1 overlay and recommended area, POD PWS Area, to drill a municipal well.

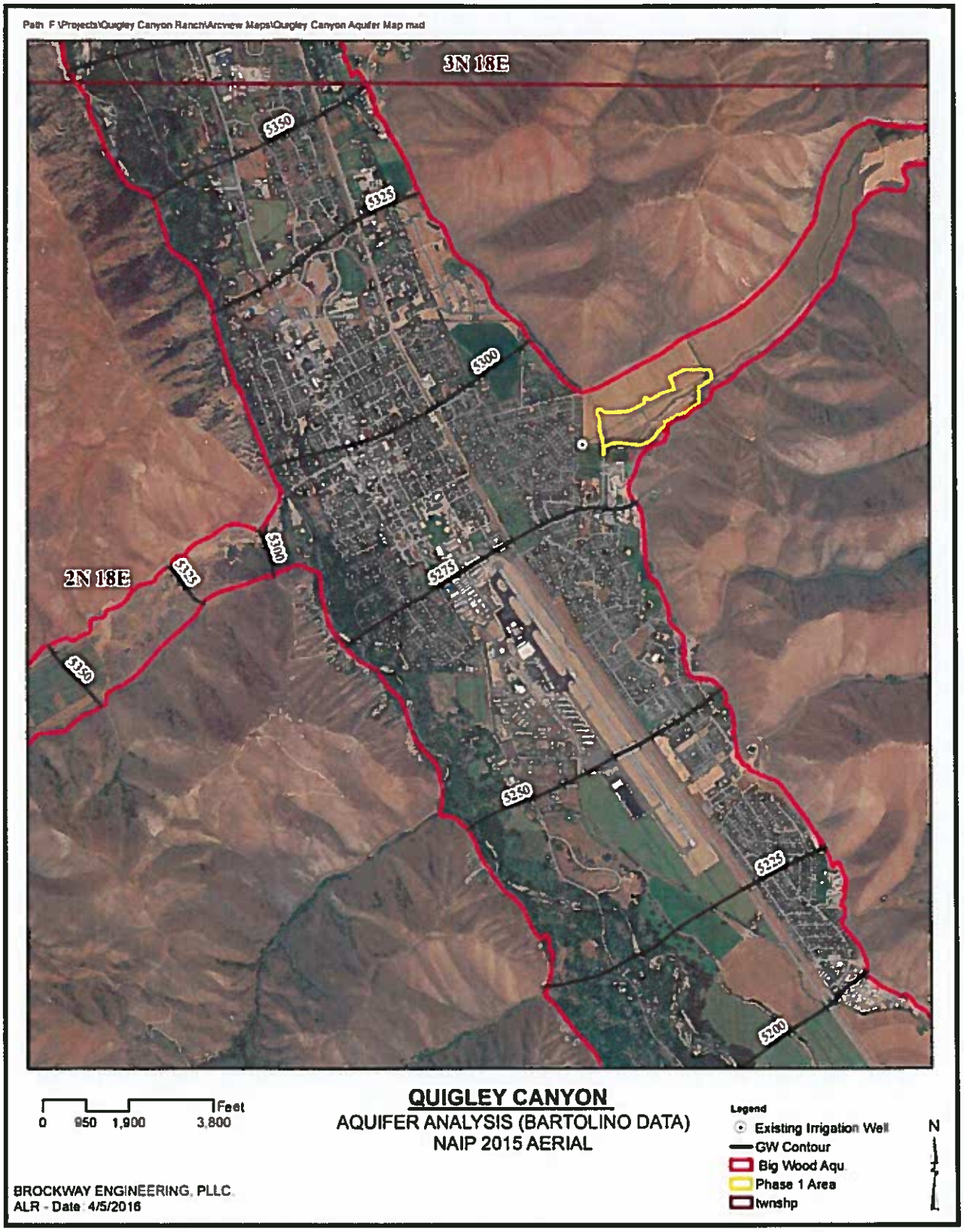

Figure 2: Location of Quigley Farm PUD, Phase 1, within the Big Wood River Valley Aquifer (Bartolino 2014).

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Appendix A
Domestic and Irrigation Water Use Analysis

PEAK WATER REQUIREMENTS ESTIMATION
RESIDENTIAL SUBDIVISION -- POTABLE AND IRRIGATION DEMAND

PROJECT: Quigley Farm PUD

Brockway Engineering

Hattie Zobott--Based on drawings by Benchmark Associates

Assumptions or changes made for water demand calculations

Residential indoor water use		120	
Persons per unit		2.6	Based on dwelling unit average below
	1.3	70%	Sprinklers
Average per unit demand		312	average gallons per unit per day

QUIGLEY FARM PROPOSED DWELLINGS UNITS

Description	DU	Bedrooms	People	Total People
LARGE LOT DWELLINGS	7	5	3.75	26.25
MULTI-FAMILY DWELLINGS	10	3	3	30
MED LOT DWELLINGS	9	3	3	27
COTTAGE UNIT DWELLINGS	10	2	2	20
TOWN HOUSE SUBLOT DWELLINGS	6	2	2	12
LIVE WORK/MIXED USE DWELLINGS	11	2	2	22
DWELLINGS UNITS PROPOSED	53			137.25
People/Dwelling Unit	2.6			

DOMESTIC

Number of lots	51	Dwelling units
Average per-capita demand	120.0	gpcd
Average daily demand	15912	gpd
Average continuous pumping demand	11.05	gpm
Total annual withdrawal	17.8	acre-feet/year
Consumptive use fraction	0.15	
Total consumptive use	2.7	acre-feet/year
		flow for
	0.34	in house
	152.6	gpm
Max day : average factor	3	
Max daily withdrawal	47736	gpd
Max daily continuous withdrawal	33	gpm
Peak hour : average factor	9	
Peak hourly withdrawal	99.5	gpm
	0.22	cfs

PEAK WATER REQUIREMENTS ESTIMATION
RESIDENTIAL SUBDIVISION -- NONPOTABLE RRIGATION DEMAND

PROJECT: Quigley Farm PUD

IRRIGATION

Project irrigated area	24.0	acres
Seasonal ET -Turf (Allen and Robison 2012)	**597**	mm
	23.50	inches or
Total Irrigation Consumptive Use	**47.0**	**acre-feet**
Irrigation Application Efficiency	70%	
Irrigation Water Requirement	33.58	inches
Total Annual Irrigation Volume	67.2	acre-feet/year
Peak Monthly ET-July	**5.51**	mm/day
	0.22	in/day
Standard Deviation of Peak ET	**0.58**	mm/day
	0.02	in/day
Design Probability Level	**95%**	
Peak Day: Peak Month Factor	**1.4**	
Design Peak ET	0.356	in/day
Design Peak Application Rate	0.509	in/day
Design Peak Flow Rate	0.51	cfs
	230.3	gpm
	0.021	cfs/acre

COMMERCIAL AND INSTITUTIONAL WATER REQUIREMENTS ESTIMATION

PROJECT: Quigley Farm PUD

Hattie Zobott--Based on drawings by Benchmark Associates

Commercial Use Breakdown

Lot Portion by Use	Area by Use (sf)	Lot (sf)	Acres	% Lot
Mixed Use Footprint		98,201	2.25	
Commercial Footprint Unoccupied space	24,201			
Total Commercial Space For Units *	74,000			75%
Inn Lot		58,201	1.34	
Inn Buildings	29,101			50%
Inn Unoccupied space (sidewalks, porches, greenspace)	29,101			50%
School Lot		268,954	6.17	
School Building ** See below	20,000			7%
School Lot Open Space	248,954			93%
Total	156,402	425,356	9.76	

Sf/Unit	sf/Unit	Units	Building sf
*Average Square Footage/Commercial Unit	2,000	37	74,000
**School Building Square Footage/Student	100	200	20,000

Commercial Use Water Demand

Commercial Use	Use % of Building	Square Feet	Daily Use (gal/sf/day)	Total Daily Use (gal/day)
Restaurant	5%	4,000	1.1	4,400
Office Building	32%	24,000	0.2	4,800
Market	3%	2,000	0.2	400
Shopping	59%	44,000	0.02	950
Mixed Use Footprint	Subtotal	74,000	0.14	10,550
Inn	3%	29,101	0.4	11,640
School	1%	20,000	0.3	6,000
	Total	197,101	0.14	28,190

Average Flow Rate	19.6 gpm
Peak Flow Factor	5
Commercial Peak	97.9 gpm

Commercial Use Consumptive Use and Mitigation Acreage

% Consumptive Use	15%
Per Year Total Use	10,289,430 gal/year
	1,375,592 cf/year
	31.6 afa
Per Year Consumptive Use	**4.7 afa**
Historical Use	1.4 acre-ft/acre
Mitigation Acreage for Commercial and Institutional Consumptive Use	**3.4 acres**

COMMERCIAL AND INSTITUTIONAL WATER REQUIREMENTS ESTIMATION

PROJECT: Quigley Farm PUD

Hattie Zobott--Based on drawings by Benchmark Associates

Water Use Summary For Quigley Farm PUD

Potable Demand	17.8 acre-feet/year
Irrigation Demand	67.2 acre-feet/year
Commercial /Institutional Demand	31.6 acre-feet/year
Total water use demand	116.6 acre-feet/year
Potable Consumptive Use	2.67 acre-feet/year
Irrigation Consumptive Use	47.0 acre-feet/year
Commercial /Institutional Consumptive Use	4.7 acre-feet/year
Total Project Consumptive Use	54.4 acre-feet/year
Residential continuous demand for potable	11.1 gpm
Commercial/Institutional continuous demand	19.6 gpm
Average continuous demand for potable	30.6 gpm
Residential peak hourly demand for potable	99.5 gpm
Commercial/Institutional peak hourly demand	97.9 gpm
Peak hourly demand for potable	197.3 gpm
Average continuous demand irrigation demand	230.3 gpm

Appendix B

Wood River Fire District Letter

March 3, 2016

Blaine County Land Use and Building Services
219 1st Avenue South, Suite 208
Hailey, ID 83333
Attention Kathy Grotto

Reference: Agency Review, Planned Unit Development (PUD) and Preliminary Plat, Quigley Farm & Conservation Community, LLC.

The Wood River Fire Protection District has been requested to submit written comment on an application for the above named project.

We have met with the applicant on one occasion and reviewed a very preliminary site map of a large subdivision broken into two (2) phases of development. With the limited information provided to us at this time we are unable to provide your office with much information but would like to share the following comments:

Several fire protection requirements were discussed with the applicant and they included the following:

1. The fire flow requirements in this subdivision are one thousand- five hundred (1,500) gallons per minute for a minimum of two (2) hours with backup generated power. Section 507, *Appendix D International Fire Code (IFC)*
2. A site plan showing pressurized fire hydrant locations, distribution shall be provided to our office for review and approval. All fire hydrant systems installed in the Wood River Fire District shall be in accordance with Section 507 and Appendix C, IFC.
3. Fire apparatus access roads including widths, turnarounds, surfaces, grades, load limits, and street signs shall comply fully with Section 503 and Appendix D of the IFC.
4. All fire protection water supplies and roads will be inspected and tested by the Wood River Fire department prior to final approval by Blaine County Land Use and Building Services.

The Fire District asks that "Plat Notes" be inserted into the plat and contain the following language: "Fire Protection requirements are those of the Wood River Fire Protection District, Blaine County Fire Protection Ordinance and the International Fire and Building Code and shall be complied with prior to final subdivision approval and combustible construction."

Please note that any changes to this application may require further review and approval from the Fire Code Official. New conditions or requirements may be imposed as a result of any changes or new information regarding this project. All conditions noted in this review retain to this project, to and through its completion and intended use.

Feel free to contact me if you have any questions,

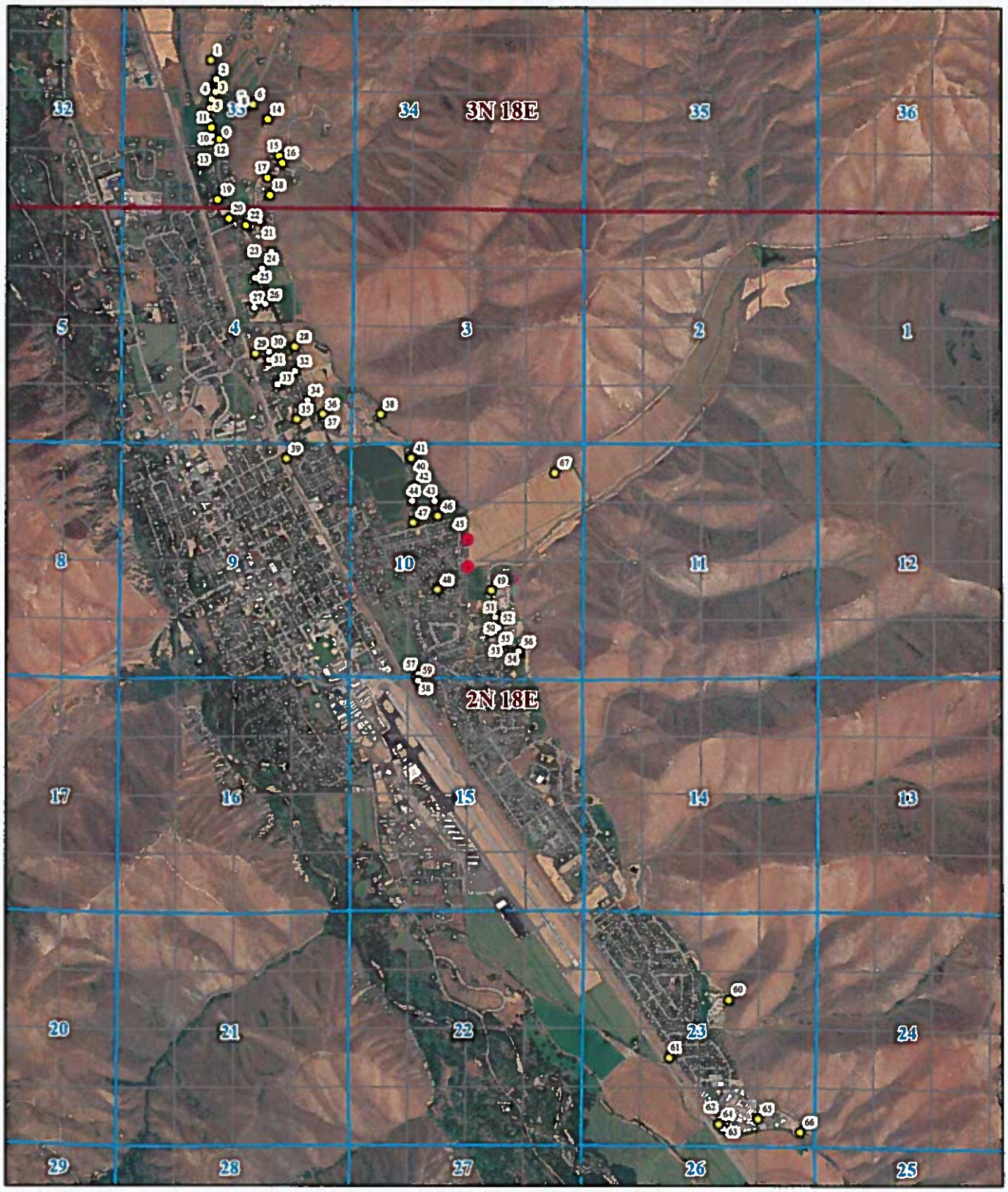
Sincerely,

Bart Lassman
Chief of Fire and
Emergency Medical Services

Copy: 2016 reviews

Appendix C
Vicinity Well Logs

Path: F:\Projects\Quigley Canyon Ranch\Arcview Maps\Quigley Canyon Well logs.mxd



0 1,000 2,000 4,000 Feet

QUIGLEY CANYON

WELL LOGS STUDY
NAIP 2015 AERIAL

Legend
- Quigley PODs
- Wells
- twnshp
- Sections
- ladesc

N

BROCKWAY ENGINEERING, PLLC.
ALR - Date: 3/29/2016

Well Logs All From GIS Dataset

MAP	Location	Constructed	Owner	Production (gpm)	Static Water Level (ft) BGS	Casing Diam (in)	Casing Depth (ft) BGS	TotalDepth	Latitude	Longitude
1	Township 03N Range18E Section 33 SENW	7/14/1997	MICHEL MARTEL	20	90	6	120	0	43.551199	-114.319069
2	Township 03N Range18E Section 33 NESW	10/28/1978		0	82	0	0	113	43.547584	-114.319087
3	Township 03N Range18E Section 33 NESW	9/12/1983	JIM BISHOP	25	76	6	140	0	43.547584	-114.319087
4	Township 03N Range18E Section 33 NESW	5/18/1999	JIM CURRAN	35	70	6	140	0	43.547584	-114.319087
5	Township 03N Range18E Section 33 NESW	6/12/1993	CARON HALLE	60	91	6	156	0	43.547584	-114.319087
6	Township 03N Range18E Section 33 NWSE	6/30/1993	ART THEIDE	20	68	6	80	0	43.548478	-114.315383
7	Township 03N Range18E Section 33	8/8/1979	RICHARD HESSE	0	120	0	0	200	43.549396	-114.316621
8	Township 03N Range18E Section 33 NESW	7/17/1984	RICHARD HESSE	20	0	8	109	0	43.547584	-114.319087
9	Township 03N Range18E Section 33 NESW	10/29/1986	RICHARD HESSE	0	104	0	0	260	43.547584	-114.319087
10	Township 03N Range18E Section 33 NESW	9/27/2000	MATT BARRIE	40	74	8	160	160	43.547584	-114.319087
11	Township 03N Range18E Section 33 NESW	9/26/1985	DWIGHT SMITH	0	52	0	0	122	43.547584	-114.319087
12	Township 03N Range18E Section 33 NESW	4/25/1987	BING COPLAND	0	70	0	0	127	43.547584	-114.319087
13	Township 03N Range18E Section 33 NESW	4/18/1989	BRUCE MALLERY	20	70	6	120	0	43.547584	-114.319087
14	Township 03N Range18E Section 33 NWSE	4/2/1994	MIKE PARMILLER	55	75	6	105	0	43.547574	-114.314129
15	Township 03N Range18E Section 33 SWSE	7/19/1995	ROB REED	50	130	6	260	0	43.543966	-114.314140
16	Township 03N Range18E Section 33 SWSE	5/24/1994	LOU MACE	20	205	6	160	0	43.544878	-114.312894
17	Township 03N Range18E Section 33 SWSE	10/2/1993	RON CARRINGTON	25	25	6	100	0	43.543966	-114.314140
18	Township 03N Range18E Section 33 SWSE	8/29/1989	MATT MINOR	12	130	6	140	0	43.543966	-114.314140
19	Township 02N Range18E Section 4 NENW	9/8/1999	JIM KUKURIN	35	55	6	160	0	43.542595	-114.318346
20	Township 03N Range18E Section 33 SESW	8/30/2006	BLAIR CLARK	30	51	6	102	120	43.544799	-114.317633
21	Township 02N Range18E Section 4 NWNE	9/7/2004	CHRISTIAN NICKUM	30	94	6	240	240	43.541291	-114.314757
22	Township 02N Range18E Section 4 NWNE	9/29/2008	KEN COLLINS	40	80	6	240	260	43.541049	-114.315933
23	Township 02N Range18E Section 4 NWNE	7/14/1992	RANDY E CORIELL	30	47	6	110	0	43.540293	-114.314162
24	Township 02N Range18E Section 4 SWNE	8/26/2003	PETER KOSS	30	68	10	141	141	43.538455	-114.314631
25	Township 02N Range18E Section 4 SWNE	7/11/2002	RONALD G WICOX	60	51	10	143	143	43.537787	-114.315103
26	Township 02N Range18E Section 4 SWNE	5/28/1985	NORMAN H MALONE	0	50	0	0	109	43.537787	-114.315103
27	Township 02N Range18E Section 4 SWNE	1/20/1998	LORRAINE WILCOX	50	69	6	130	0	43.537787	-114.315103
28	Township 02N Range18E Section 4 NESE	5/27/1993	THAD BLANTON	40	60	6	100	0	43.533020	-114.309273
29	Township 02N Range18E Section 4 NWSE	10/10/1995	DOUGLAS H NIEDRICH	25	60	6	105	0	43.533111	-114.315083
30	Township 02N Range18E Section 4 NWSE	9/26/2012	PAUL KETTLEBAND	60	65	6	133	133	43.533233	-114.313883
31	Township 02N Range18E Section 4 NWSE	7/18/2005	WILLIAM K SULLIVAN	60	65	6	103	103	43.533019	-114.314256
32	Township 02N Range18E Section 4 SESE	5/5/1992	LORRAINE WILCOX	60	58	8	90	0	43.529385	-114.309315
33	Township 02N Range18E Section 4 NWSE	11/11/2004	GARTH CALLINGHAN CONSTRUCTION	50	64	6	103	103	43.531237	-114.313145
34	Township 02N Range18E Section 4 SESE	9/13/1991	LORRAINE WILCOX	55	45	8	80	0	43.529385	-114.309315
35	Township 02N Range18E Section 4 SESE	9/27/1996	BRAD BJORSNESS	70	50	6	100	0	43.529385	-114.309315
36	Township 02N Range18E Section 4 SESE	5/29/2007	IDAHO RANCH ESTATES	0	0	10	0	140	43.529385	-114.309315
37	Township 02N Range18E Section 4 SESE	5/29/1980	RALPH P DAVIDSON	0	5	0	0	52	43.529385	-114.309315
38	Township 02N Range18E Section 3 SWSW	5/26/1989	IDAHO RANCH ESTATES INC	60	50	10	141	0	43.529397	-114.304371
39	Township 02N Range18E Section 9 NWNE	8/1/2012	INTERMOUNTAIN GAS CO	15	48	6	98	100	43.526616	-114.312366
40	Township 02N Range18E Section 10 NENW		CHARLES M JOHNSON	0	0	0	0	0	43.524882	-114.300680
41	Township 02N Range18E Section 10 NENW	7/27/1990	CHARLES M JOHNSON	60	55	8	126	0	43.524882	-114.300680
42	Township 02N Range18E Section 10 NENW	5/29/1989	LESLIE CONNER	100	50	8	85	0	43.524882	-114.300680
43	Township 02N Range18E Section 10 NENW	5/30/1973	HOWARD KNIGHT	24	18	0	0	61	43.524074	-114.299769
44	Township 02N Range18E Section 10 NENW	5/1/1989	DAVID TOWN	30	60	6	76	0	43.524882	-114.300680
45	Township 02N Range18E Section 10 SWNW	6/18/1981	JIM PHILLIPS	0	35	0	0	77	43.522168	-114.304439
46	Township 02N Range18E Section 10 NENW	3/28/1982	HOWARD KNIGHT	0	33	0	0	90	43.524882	-114.300680
47	Township 02N Range18E Section 10 SWNW	4/11/1991	ALMA MILLS	35	53	6	80	0	43.522168	-114.304439
48	Township 02N Range18E Section 10 NESW	6/26/1973	WESLEY C PROUTY	25	59	0	0	106	43.518565	-114.299487
49	Township 02N Range18E Section 10 NWSE	8/15/2003	BLAINE COUNTY SCHOOL DISTRICT #61	50	65	10	174	174	43.518527	-114.294878
50	Township 02N Range18E Section 10 NWSE	6/24/2011	#61	400	60	12	182	180	43.517300	-114.294766
51	Township 02N Range18E Section 10 NWSW	6/24/2011	#61	400	64	12	190	190	43.516866	-114.294550
52	Township 02N Range18E Section 10 SWSE	6/30/2011	#61	400	64	12	166	169	43.516249	-114.294300
53	Township 02N Range18E Section 10 SWSE	7/13/2011	BLAINE COUNTY SCHOOL DISTRICT #61	500	61	12	170	177	43.515899	-114.294933
54	Township 02N Range18E Section 10 SWSE	7/15/2011	BLAINE COUNTY SCHOOL DISTRICT #61	500	62	12	175	175	43.515299	-114.293883
55	Township 02N Range18E Section 10 SWSE	12/4/1974	MC CULLOCH PROPERTIES INC	50	61	0	0	93	43.514956	-114.294460
56	Township 02N Range18E Section 10 SWSE	6/16/2011	BLAINE COUNTY SCHOOL DISTRICT #61	5	60	12	182	195	43.514766	-114.292516
57	Township 02N Range18E Section 10 SESW	9/17/1986	JOHN C FOX	0	55	0	0	153	43.513796	-114.300046
58	Township 02N Range18E Section 15 NENE	10/9/1995	BLAINE COUNTY SCHOOL DISTRICT #61	300	57	10	159	0	43.512060	-114.291925
59	Township 02N Range18E Section 15 SWNE	10/24/1973	KEY AIR LINES	35	41	0	0	64	43.507755	-114.294476
60	Township 02N Range18E Section 23 SWNE	7/3/2005	BLAINE COUNTY SCHOOL DISTRICT #61	100	34	8	135	155	43.493293	-114.274539
61	Township 02N Range18E Section 23 NESW	7/18/2001	FLYING HAT RANCH	0	27	28	180	181	43.489703	-114.279584
62	Township 02N Range18E Section 23 SWSE	9/28/1993	INTERMOUNTAIN GAS CO	100	57	8	150	0	43.486072	-114.274658
63	Township 02N Range18E Section 23 SWSE	8/8/2002	FLYING HAT RANCH	2400	39	20	0	127	43.486072	-114.274658
64	Township 02N Range18E Section 23 SWSE	11/20/1964	S A GAGE	0	35	0	0	148	43.485638	-114.275389
65	Township 02N Range18E Section 23 SESE	12/25/1973	MC CULLOCH PROPERTIES INC	0	0	0	0	60	43.485154	-114.268400
66	Township 02N Range18E Section 23 SESE	10/2/1987	CITY OF HAILEY	5	55	6	69	0	43.485154	-114.268400
67	Township 02N Range18E Section 10 NENE	5/5/1988	THOMAS A PYLE	50	60	6	92	0	43.525810	-114.289483

Form 238-7
9/82

26 Sept

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

USE TYPEWRITER OR BALLPOINT PEN

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

PH
73

1. WELL OWNER

Name Tom Pyle

Address Box 94 Ketchum Idaho

Owner's Permit No. 37-88-S-030

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)

3. PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

4. METHOD DRILLED

☒ Rotary ☐ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other _____

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other _____

Thickness	Diameter	From	To
.250 inches	6 inches +	1 feet	92 feet
inches	inches	feet	feet
inches	inches	feet	feet
inches	inches	feet	feet

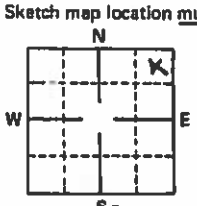
Was casing drive shoe used? ☒ Yes ☐ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch
Size of perforation _____ inches by _____ inches

Number	From	To
perforations	feet	feet
perforations	feet	feet
perforations	feet	feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name _____
Type _____ Model No. _____
Diameter ____ Slot size ____ Set from ____ feet to ____ feet
Diameter ____ Slot size ____ Set from ____ feet to ____ feet
Gravel packed? ☐ Yes ☒ No ☐ Size of gravel _____
Placed from _____ feet to _____ feet
Surface seal depth 20 Material used in seal: ☐ Cement grout ☒ Bentonite ☐ Puddling clay ☐ _____
Sealing procedure used: ☐ Slurry pit ☐ Temp. surface casing ☒ Overbore to seal depth
Method of joining casing: ☐ Threaded ☒ Welded ☐ Solvent Weld ☐ Cemented between strata
Describe access port _____

6. LOCATION OF WELL

Sketch map location must agree with written location.



Subdivision Name _____

Lot No. _____ Block No. _____

County Blaine

NE ¼ NE ¼ Sec. 10, T. 2 N.S., R. 18 E.W.

7. WATER LEVEL

Static water level 60 feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow _____
Artesian closed-in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature ____ °F. Quality good
Describe artesian or temperature zones below.

8. WELL TEST DATA

☐ Pump ☐ Bailer ☒ Air ☐ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped
50	90	1

9. LITHOLOGIC LOG

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
8	0	8	Top soil		x
8	8	20	Glacier rock and dirt		x
6	20	60	" " " " " " " " "		x
6	60	70	Sand		x
6	70	80	Water and sand	x	
6	80	92	Water and gravel	x	

RECEIVED
JUN 22 1988
Department of Water Resources
Southern Region Office

RECEIVED
JUN 27 1988
Department of Water Resources

10. Work started May 4, 1988 finished May 5, 1988

11. DRILLERS CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name WOOD RIVER DRILLING AND PUMP Firm No. 265
BOX 1165 788-2163
Address HAILEY, IDAHO 83333 Date 6-1-88

Signed by (Firm Official) Ken Smith
and
(Operator) Gary Adams

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Form 238-7
7/94

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

064537

Use Typewriter or Ball Point Pen

1. DRILLING PERMIT NO. 37.95.S.0179.000
Other IDWR No. 37-08821

2. OWNER:
Name: Blaine County School Dist. #61
Address: P.O. Box 1008
City: Hailey State: ID Zip: 83333

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

N / W / E / S — X

Twp. 2 North ☑ or South ☐
Rge. 18 East ☑ or West ☐
Sec. 15 NW 1/4 (10 acres) NE 1/4 (40 acres) NE 1/4 (160 acres)
Gov't Lot ____ County: Blaine

Address of Well Site: Wood River High School, Fox Acres Rd City: Hailey
(Give at least name of road + Distance to Road or Landmark)

Lt. ____ Blk. ____ Sub. Name ____

4. PROPOSED USE:
☐ Domestic ☐ Municipal ☐ Monitor ☑ Irrigation
☐ Thermal ☐ Injection ☐ Other ____

5. TYPE OF WORK
☑ New Well ☐ Modify or Repair ☐ Replacement ☐ Abandonment

6. DRILL METHOD
☐ Mud Rotary ☑ Air Rotary ☐ Cable ☐ Other ____

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT Sacks or Pounds	METHOD
Cement Grout Neat	0	20	8 1/5 sacks	Pumped in overbore with 20 ft 16" Conductor

Was drive shoe used? ☑ Y ☐ N Shoe Depth(s) ____
Was drive shoe seal tested? Y ☐ N ☑ How? ____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
10	+1 1/2	159	.250	STEEL	☑	☐	☑	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe ____ Length of Tailpipe ____

9. PERFORATIONS/SCREENS
☑ Perforations Method: Knife
☐ Screens Screen Type ____

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
110	155	3"	2640	1/4	STEEL	☑	☐
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
57 ft. below ground Artesian pressure ____ lb.
Depth flow encountered ____ ft. Describe access port or control devices: ____

11. WELL TESTS:
☐ Pump ☐ Bailer ☑ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
300		150	1

Water Temp. ____ Bottom hole temp. ____
Water Quality test or comments: ____

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
18	0	4	TOP SOIL		✓
18	4	12	CLAY & GRAVEL		✓
18	12	21	SUBSOIL & CLAY		✓
10	21	60	CLAY & GRAVEL		✓
10	60	85	GRAVEL & SAND	✓	
10	85	93	CLAY & GRAVEL		✓
10	93	97	RED SAND & GRAVEL	✓	
10	97	110	SAND & GRAVEL	✓	
10	110	133	CLAY & GRAVEL	✓	
10	133	159	GRAVEL	✓	

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OCT 12 1995
Department of Water Resources
Southern Region

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MICROFILMED
OCT 13 1995
Department of Water Resources

Completed Depth 159 (Measurable)
Date: Started 10-3-95 Completed 10-9-95

13. DRILLER'S CERTIFICATION
I/We certify that all WRD minimum well construction standards were complied with at the time the rig was removed.

Firm Name: WOOD RIVER DRILLING & PUMP BOX 837 BELLEVUE, ID 83313 Firm No. 265
Firm Official: Ken Smith Date: 10-11-95
and
Supervisor or Operator: Ron McDonald Date: 10-11-95
(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

Form 238-7
9/82

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

USE TYPEWRITER OR BALLPOINT PEN

C

Klq

1. WELL OWNER

Name Leslie Conner

Address Box 1623-Hailey, ID 83333

Owner's Permit No. 37-W-89-001

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)

3. PROPOSED USE

☒ Domestic ☒ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

4. METHOD DRILLED

☒ Rotary ☒ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other _____

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other _____

Thickness	Diameter	From	To
.250 inches	8 inches +	1 feet	85 feet
inches	inches	feet	feet
inches	inches	feet	feet
inches	inches	feet	feet

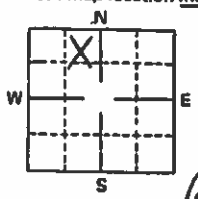
Was casing drive shoe used? ☒ Yes ☐ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch
Size of perforation _____ inches by _____ inches

Number	From	To
perforations	feet	feet
perforations	feet	feet
perforations	feet	feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name _____
Type _____ Model No. _____
Diameter ___ Slot size ___ Set from ___ feet to ___ feet
Diameter ___ Slot size ___ Set from ___ feet to ___ feet
Gravel packed? ☐ Yes ☒ No ☐ Size of gravel _____
Placed from _____ feet to _____ feet
Surface seal depth 20 Material used in seal: ☐ Cement grout ☒ Bentonite ☐ Puddling clay ☐ _____
Sealing procedure used: ☐ Slurry pit ☐ Temp. surface casing ☒ Overbore to seal depth
Method of joining casing: ☐ Threaded ☒ Welded ☐ Solvent Weld ☐ Cemented between strata
Describe access port _____

6. LOCATION OF WELL

Sketch map location must agree with written location.



Subdivision Name Marvin Gardens
Lot No. 9 Block No. _____
County Blaine
NE ¼ NW ¼ Sec. 10, T. 2 N/S, R. 18 E/W.

7. WATER LEVEL

Static water level 50 feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow _____
Artesian closed-in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature ___ °F. Quality good
Describe artesian or temperature zones below.

8. WELL TEST DATA

☐ Pump ☐ Bailer ☒ Air ☐ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped
100	76	1

9. LITHOLOGIC LOG 78356

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
10	0	10	Top soil		x
10	10	20	Gravel set in clay		x
8	20	65	" " " " " " "		x
8	65	75	Clay		x
8	75	85	Gravel and water	x	

RECEIVED
JUN 12 1989
Department of Water Resources

RECEIVED
JUN 15 1989
Department of Water Resources
Southern Region Office

10.

Work started May 29, 89 finished May 29, 89

11. DRILLERS CERTIFICATION DL

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

WOOD RIVER DRILLING AND PUMP
Firm Name
BOX 1165 788-3163 Firm No. 265
HAILEY, IDAHO 83333
Address Date 6-7-89

Signed by (Firm Official) Ken Smith
and
(Operator) Gary Jones

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Form 238-7
6/89

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

USE TYPEWRITER OR BALLPOINT PEN

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

1. WELL OWNER

Name Charles M. Johnson

Address Box 1883 Hailey, Id. 83333

Owner's Permit No. 37-90-S-096 DK

2. NATURE OF WORK W.R. 37-08657

☒ New well ☐ Deepened ☐ Replacement
☐ Well diameter increase
☐ Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)

3. PROPOSED USE

☐ Domestic ☒ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

4. METHOD DRILLED

☒ Rotary ☐ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other _____

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other _____

Thickness	Diameter	From	To
.250 inches	8 inches +	1½ feet	125½ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet

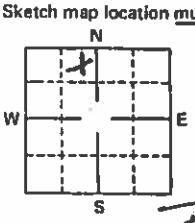
Was casing drive shoe used? ☒ Yes ☐ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☒ Yes ☐ No
How perforated? ☐ Factory ☒ Knife ☐ Torch ☐ Gun
Size of perforation 1/3" inches by 1/8" inches

Number		From	To
.250	perforations	50 feet	80 feet
_____	perforations	_____ feet	_____ feet
_____	perforations	_____ feet	_____ feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name _____
Type _____ Model No. _____
Diameter ____ Slot size ____ Set from ____ feet to ____ feet
Diameter ____ Slot size ____ Set from ____ feet to ____ feet
Gravel packed? ☐ Yes ☒ No ☐ Size of gravel _____
Placed from _____ feet to _____ feet
Surface seal depth 20 Material used in seal: ☐ Cement grout
☒ Bentonite ☐ Puddling clay ☐ _____
Sealing procedure used: ☐ Slurry pit ☐ Temp. surface casing
☒ Overbore to seal depth
Method of joining casing: ☐ Threaded ☒ Welded ☐ Solvent Weld
☐ Cemented between strata
Describe access port _____

6. LOCATION OF WELL

Sketch map location must agree with written location.



Subdivision Name MARVIN GARDENS SUB
Lot No. 1 Block No. 1
County BLAINE
NE ¼ NW ¼ Sec. 10, T. 2 N ☒ S ☐ R. 18 E ☒ W ☐

7. WATER LEVEL

Static water level 55 feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow _____
Artesian closed-in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature ____ °F. Quality good
Describe artesian or temperature zones below.

8. WELL TEST DATA

☐ Pump ☐ Bailer ☒ Air ☐ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped
60	85	1

9. LITHOLOGIC LOG

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
10	0	3	Topsoil		x
10	3	15	Gravel		x
10	15	27	Sand and gravel		x
8	27	43	Gravel and boulders		x
8	43	79	Gravel and brown shale	x	
8	79	127	Brown shale	x	

RECEIVED
AUG 06 1990
Department of Water Resources
Southern Region Office

10.

Work started 7-25-90 finished 7-27-90

11. DRILLERS CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name WOOD RIVER DRILLING AND PUMP Firm No. 265
Address BOX 1165 788-3163 HAILEY, IDAHO 83333 Date 8-2-90
Signed by (Firm Official) Ken Smith
and
(Operator) Pete McDougle

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Form 238-7
3/95

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT
Use Typewriter or Ballpoint Pen

057378

Office Use Only
Inspected by _____
Twp ____ Rge ____ Sec ____
____1/4 ____1/4 ____1/4
Lat: : : Long: : :

1. DRILLING PERMIT NO. 37 - 96 - S - 0125 - 000
Other IDWR No. _____

2. OWNER:
Name BJORSNESS, BRAD/CAROL MOR
Address P.O. BOX 5288
City KETCHUM State ID Zip 83340

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

N / W / E / S — X

Twp. 2 North ☒ or South ☐
Rge. 18 East ☒ or West ☐
Sec. 4 _____ 1/4 SE (10 acres) 1/4 SE (40 acres) 1/4 (160 acres)
Gov't Lot ____ County BLAINE
Lat: : : Long: : :
Address of Well Site 105 SOUTH HIAWATHA
(Give at least name of road + Distance to Road or Landmark) City HAILEY
Lt. 3 Blk. _____ Sub. Name SILVER MEDAL SUB.

4. USE:
☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other _____

5. TYPE OF WORK check all that apply (Replacement etc.)
☒ New Well ☐ Modify ☐ Abandonment ☐ Other _____

6. DRILL METHOD
☒ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other _____

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT Sacks or Pounds	METHOD
BENTONITE	0	20	8SKS	OVERBORE

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) _____
Was drive shoe seal tested? ☐ Y ☒ N How? _____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
6	+1.5	100	.250	STEEL	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe _____ Length of Tailpipe _____

9. PERFORATIONS/SCREENS
☐ Perforations Method _____
☐ Screens Screen Type _____

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
						☐	☐
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
50 ft. below ground Artesian pressure _____ lb.
Depth flow encountered _____ ft. Describe access port or control devices: _____

11. WELL TESTS:
☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
70		90	1

Water Temp. _____ Bottom hole temp. _____
Water Quality test or comments: _____
Depth first Water Encountered _____

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
8	0	4	TOPSOIL		X
8	4	20	GRAVEL & CLAY & SAND		X
6	20	30	GRAVEL & CLAY & SAND		X
6	30	60	GRAVEL & SAND & CLAY		X
6	60	70	SAND & CLAY		X
6	70	90	GRAVEL & SAND & CLAY	X	
6	90	100	GRAVEL & SAND	X	

RECEIVED
OCT 07 1996
Department of Water Resources
Southern Region

RECEIVED
OCT 21 1996
Department of Water Resources

MICROFILMED
DEC 06 1996

Completed Depth 100 (Measurable)
Date: Started 09/26/96 Completed 09/27/96

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name WOOD RIVER DRILLING INC. Firm No. 265
Firm Official KEN SMITH Ken Smith Date 10/02/96
and
Supervisor or Operator [signature] Date 10/2/96
(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

Form 238-7
8/90

C

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

USE TYPEWRITER OR BALLPOINT PEN

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

1. WELL OWNER

Name: Ron Wilcox & Lorraine
Address: P.O. Box 1255 Sun Valley Idaho
Drilling Permit No. 37-91-S-087 MK
Water Right Permit No.

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Well diameter increase
☐ Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)

3. PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

4. METHOD DRILLED

☒ Rotary ☒ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other

Thickness	Diameter	From	To
.250 inches	8 inches +	1 feet	80 feet
inches	inches	feet	feet
inches	inches	feet	feet
inches	inches	feet	feet

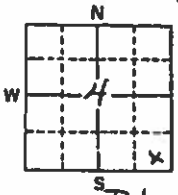
Was casing drive shoe used? ☒ Yes ☐ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch ☐ Gun
Size of perforation ____ inches by ____ inches

Number	From	To
perforations	feet	feet
perforations	feet	feet
perforations	feet	feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name
Type Model No.
Diameter ____ Slot size ____ Set from ____ feet to ____ feet
Diameter ____ Slot size ____ Set from ____ feet to ____ feet
Gravel packed? ☐ Yes ☒ No ☐ Size of gravel
Placed from feet to feet
Surface seal depth 20 Material used in seal: ☐ Cement grout ☒ Bentonite ☐ Puddling clay ☐
Sealing procedure used: ☐ Slurry pit ☒ Temp. surface casing ☒ Overbore to seal depth
Method of joining casing: ☐ Threaded ☒ Welded ☐ Solvent Weld ☐ Cemented between strata
Describe access port Sanitary Well Cap

6. LOCATION OF WELL

Sketch map location must agree with written location



Subdivision Name
Buckhorn
Lot No. 4 Block No. 2
County Blaine
SE ¼ SE ¼ Sec. 4, T. 2 N ☒ S ☐ R. 18 E ☒ W ☐

MICROFILMED
MAY 05 1992

7. WATER LEVEL

Static water level 45' feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow —
Artesian closed-in pressure — p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature — °F. Quality Good
Describe artesian or temperature zones below

8. WELL TEST DATA

☐ Pump ☐ Bailer ☒ Air ☐ Other

Discharge G.P.M.	Pumping Level	Hours Pumped
50-55	75'	1
+ -		

9. LITHOLOGIC LOG

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
8	0	2	gravel - Dirt fill		✓
	2	3	Brown Dirt		✓
	3	7	Brown Dirt - Hardpan		✓
	7	20	Clay - gravel		✓
	20	24	" "		✓
	24	35	gravel - Sand		✓
	35	40	gravel - Sand	✓	
	40	60	Red Rock - Red clay		✓
	60	75	Red Sand Rock. Broken clay		✓
	75	85	gravel - Sand	✓	

RECEIVED
SEP 23 1991
Department of Water Resources
Southern Region Office

RECEIVED
SEP 27 1991
Department of Water Resources

10.

Work started 9-12-91 finished 9-13-91

11. DRILLERS CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Scott Drilling & Pump Firm No. 327
Address P.O. Box 377 Hailey, Idaho 83333 (208) 788-5019 9-13-91
Signed by (Firm Official) John A. Scott
and
(Operator) J. Scott

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Form 238-7
6/89

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

USE TYPEWRITER OR BALLPOINT PEN

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

1. WELL OWNER

Name Rod & Lorraine Wilcox

Address P.O. Box 1255 Sun Valley 83353

Owner's Permit No. 37-92-5-050

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Well diameter increase
☐ Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)

3. PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

4. METHOD DRILLED

☒ Rotary ☒ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other _____

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☒ Other P.V.C

Thickness	Diameter	From	To
250 inches	8 inches +	1 feet	90 feet
Sch 40 inches	6" inches	85 feet	130 feet
inches	inches	feet	feet
inches	inches	feet	feet

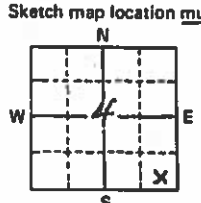
Was casing drive shoe used? ☒ Yes ☐ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☒ Yes ☐ No SAW
How perforated? ☐ Factory ☐ Knife ☐ Torch ☐ Gun
Size of perforation 1/8 inches by 6 inches

Number	From	To
50 perforations	90 feet	110 feet
50 perforations	110 feet	130 feet
perforations	feet	feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name _____
Type _____ Model No. _____
Diameter ___ Slot size ___ Set from ___ feet to ___ feet
Diameter ___ Slot size ___ Set from ___ feet to ___ feet
Gravel packed? ☐ Yes ☒ No ☐ Size of gravel _____
Placed from _____ feet to _____ feet
Surface seal depth 25 Material used in seal: ☐ Cement grout
☒ Bentonite ☐ Puddling clay ☐ _____
Sealing procedure used: ☐ Slurry pit ☒ Temp. surface casing
☒ Overbore to seal depth
Method of joining casing: ☐ Threaded ☒ Welded ☒ Solvent Weld
☐ Cemented between strata
Describe access port Sanitary well cap

6. LOCATION OF WELL

Sketch map location must agree with written location.



Subdivision Name Buckhorn Hiawatha Ovrin
Lot No. 4 Block No. 2
County Blaine
SE ¼ SE ¼ Sec. 4, T. 2 N ☒ S ☐ R. 18 E ☒ W ☐

7. WATER LEVEL

Static water level 58' feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow —
Artesian closed-in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature ___ °F. Quality Good
Describe artesian or temperature zones below.

8. WELL TEST DATA

☐ Pump ☐ Bailer ☒ Air ☐ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped
55-60	100'	1

082526

9. LITHOLOGIC LOG

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
	0	3	Brown Dirt		—
	3	15	Brown Dirt - Gravel		—
	15	22	Gravel - Sand		—
	22	60	Gravel - Cobble Rock -		—
	60	90	Gravel & Sand	—	
	90	100	Brown Clay		—
	100	120	Gray Rock		—
	120	130	Gray Broken Rock	—	

RECEIVED
MAY 20 1992
Department of Water Resources
Southern Region Office

RECEIVED
DEC 03 1992
Department of Water Resources

10. Work started 5-1-92 finished 5-5-92

11. DRILLERS CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Scott Drilling & Pump Firm No. 327
Address Hailey, Idaho 83333 Date 5-6-92
(208) 788-5019
Signed by (Firm Official) _____
and
(Operator) _____

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Form 238-7
6/07

Extraction well #3

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

1. WELL TAG NO. D 0059614
Drilling Permit No. 861331
Water right or injection well # 37-22-545

2. OWNER:
Name Blaine Co. School District #61
Address 118 W. Bullion St.
City Hailey State ID Zip 83333

3. WELL LOCATION:
Twp. 2 North ☒ or South ☐ Rge. 18 East ☒ or West ☐
Sec. 10 ___ 1/4 (10 acres) SW 1/4 (40 acres) SE 1/4 (160 acres)
Gov't Lot ___ County Blaine
Lat. 43° 31.040 (Deg. and Decimal minutes)
Long. 114° 17.688 (Deg. and Decimal minutes)
Address of Well Site 1050 Fox Acres Rd.
(Give at least name of road + Distance to road or Landmark) City Hailey
Lot. ___ Blk. ___ Sub. Name ___

4. USE:
☐ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation ☐ Thermal ☐ Injection
☒ Other Heat Pump

5. TYPE OF WORK:
☒ New well ☐ Replacement well ☐ Modify existing well
☐ Abandonment ☐ Other ___

6. DRILL METHOD:
☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other ___

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method/procedure
Bentonite	0'	40'	1450#	Temporary Casing

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
12"	+2'	182'	.25	steel	☒	☐	☐	☒
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) ___

9. PERFORATIONS/SCREENS:
Perforations ☒ Y ☐ N Method Perforator
Manufactured screen ☐ Y ☒ N Type ___
Method of installation ___

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule
125'	175'	1/4" x 1"	1700	12"	steel	

Length of Headpipe ___ Length of Tailpipe ___
Packer ☐ Y ☐ N Type ___

10. FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method

11. FLOWING ARTESIAN:
Flowing Artesian? ☐ Y ☐ N Artesian Pressure (PSIG) ___
Describe control device ___

12. STATIC WATER LEVEL and WELL TESTS:
Depth first water encountered (ft) 60' Static water level (ft) 60'
Water temp. (°F) ___ Bottom hole temp. (°F) ___
Describe access port ___

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)
—	400+	60

Test method: Pump ☐ Bailer ☐ Air ☒ Flowing artesian ☐

Water quality test or comments: ___

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
16"	0'	3'	Overburden		
	3'	18'	Gravel & Clay		
	18'	23'	Clay		
	23'	48'	Gravel & Clay		
12"	48'	125'	Gravel & Clay		
	125'	176'	Gravel & Sediment		
	176'	180'	Rock / Brown Shale (caving)		

Completed Depth (Measurable): 180'
Date Started: 6/16/11 Date Completed: 6/24/11

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14. DRILLER'S CERTIFICATION:
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Jody Denning Drilling Co. No. 519
*Principal Driller Jed Denning Date ___
*Driller ___ Date ___
*Operator II Jed Denning Date 6/27/11
Operator I ___ Date ___

* Signature of Principal Driller and rig operator are required.

861331

Form 238-7
6/07

Extraction Well #

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

AD

1. WELL TAG NO. D 0059615

Drilling Permit No. 841332

Water right or injection well # 37-22-545

2. OWNER:

Name Blaine Co. School District #61

Address 118 W. Bullion St.

City Hailey State ID Zip 83333

3. WELL LOCATION:

Twp. 2 North ☒ or South ☐ Rge. 18 East ☒ or West ☐

Sec. 10 ___ 10 acres 1/4 NW 40 acres 1/4 SE 160 acres 1/4

Gov't Lot ___ County Blaine

Lat. 43 ° 31.012 (Deg. and Decimal minutes)

Long. 114 ° 17.673 (Deg. and Decimal minutes)

Address of Well Site 1050 Fox Acres Rd.

(Give at least name of road + Distance to road or Landmark) City Hailey

Lot ___ Blk. ___ Sub. Name ___

4. USE:

☐ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation ☐ Thermal ☐ Injection

☒ Other Heat Pump

5. TYPE OF WORK:

☒ New well ☐ Replacement well ☐ Modify existing well

☐ Abandonment ☐ Other ___

6. DRILL METHOD:

☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other ___

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method/procedure
Bentonite	0'	40'	1400#	1 emporary Casing

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
12"	+2'	190	.25	steel	☒	☐	☐	☒
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) ___

9. PERFORATIONS/SCREENS:

Perforations ☒ Y ☐ N Method Perforator

Manufactured screen ☐ Y ☐ N Type ___

Method of installation ___

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule
130'	180'		1800	12"	steel	.250

Length of Headpipe ___ Length of Tailpipe ___

Packer ☐ Y ☐ N Type ___

10. FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method

11. FLOWING ARTESIAN:

Flowing Artesian? ☐ Y ☐ N Artesian Pressure (PSIG) ___

Describe control device ___

12. STATIC WATER LEVEL and WELL TESTS:

Depth first water encountered (ft) 64' Static water level (ft) 64'

Water temp. (°F) ___ Bottom hole temp. (°F) ___

Describe access port ___

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)
—	400+	60

Test method: Pump ☐ Bailer ☐ Air ☒ Flowing artesian ☐

Water quality test or comments: ___

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
16"	0'	3'	Overburden		
	3'	10'	Gravel & Clay		
	10'	20'	Clay		
	20'	48'	Gravel & Clay		
12"	48'	125	Gravel & Clay		
	125'	180'	Gravel & Sediment		
	180'	190'	Rock (Golden) Brown Shale		
			caving		

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Completed Depth (Measurable): 188'

Date Started: 6/16/11 Date Completed: 6/24/11

14. DRILLER'S CERTIFICATION:

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Dennis Drilling Co. No. 519

*Principal Driller Dennis Date ___

*Driller ___ Date ___

*Operator II Ed Dennis Date 6/24/11

Operator I ___ Date ___

* Signature of Principal Driller and rig operator are required.

Form 238-7
6/07

Extraction Well #1

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

AP

1. WELL TAG NO. D 0059616
Drilling Permit No. 861333
Water right or injection well # 37-22-545

2. OWNER:
Name Blaine Co. School District #61
Address 118 W. Bullion St.
City Hailey State ID Zip 83333

3. WELL LOCATION:
Twp. 2 North ☒ or South ☐ Rge. 18 East ☒ or West ☐
Sec. 10 ____ 1/4 (10 acres) NW 1/4 (40 acres) SE 1/4 (160 acres)
Gov't Lot ____ County Blaine
Lat. 43 ° 30.975 (Deg. and Decimal minutes)
Long. 114 ° 17.658 (Deg. and Decimal minutes)
Address of Well Site 1050 Fox Acres Rd.
(Give at least name of road + Distance to Road or Landmark) City Hailey
Lot. ____ Blk. ____ Sub. Name ____

4. USE:
☐ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation ☐ Thermal ☐ Injection
☒ Other Heat Pump

5. TYPE OF WORK:
☒ New well ☐ Replacement well ☐ Modify existing well
☐ Abandonment ☐ Other ____

6. DRILL METHOD:
☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other ____

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method/procedure
Bentonite	0'	40'	1500#	Temporary Casing

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
12"	+2'	116'	.25	steel	☒	☐	☐	☒
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) ____

9. PERFORATIONS/SCREENS:
Perforations ☒ Y ☐ N Method Perforator
Manufactured screen ☐ Y ☐ N Type ____
Method of installation ____

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule
115'	165'	1/4"x1"	1700	12"	steel	

Length of Headpipe ____ Length of Tailpipe ____
Packer ☐ Y ☐ N Type ____

10. FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method

11. FLOWING ARTESIAN:
Flowing Artesian? ☐ Y ☐ N Artesian Pressure (PSIG) ____
Describe control device ____

12. STATIC WATER LEVEL and WELL TESTS:
Depth first water encountered (ft) 64' Static water level (ft) 64'
Water temp. (°F) ____ Bottom hole temp. (°F) ____
Describe access port ____

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)
—	400+	60 min

Test method: Pump ☐ Bailer ☐ Air ☒ Flowing artesian ☐

Water quality test or comments: ____

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
16"	0'	3'	Overburden		
	3'	15'	Gravel & Clay		
	15'	21'	Clay		
	21'	48'	Gravel & Clay		
12"	48'	105'	Gravel & Clay (soft)		
	105'	120'	Gravel & Sediment (hard)		
	120'	158'	Gravel & Sediment		
	158'	166'	Shale (brown)		
	166'	169'	Hard Shale rock		

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Eastern Region

Completed Depth (Measurable): 169'
Date Started: 6/16/11 Date Completed: 6/30/11

14. DRILLER'S CERTIFICATION:
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Jody Denning Drilling Co. No. 519
*Principal Driller Jody Denning Date ____
*Driller ____ Date ____
*Operator II Jed Denning Date 6/30/11
Operator I ____ Date ____

* Signature of Principal Driller and rig operator are required.

Form 238-7
6/07

Injection Well #1

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

AD

1. WELL TAG NO. D 0058709
Drilling Permit No. 861264
Water right or injection well # 37 W 0086 001

2. OWNER:
Name Blaine Co. School District #61
Address 118 W. Bullion St.
City Hailey State ID Zip 83333

3. WELL LOCATION:
Twp. 2 North ☒ or South ☐ Rge. 18 East ☒ or West ☐
Sec. 10 NW 1/4 (10 acres) SW 1/4 (40 acres) SE 1/4 (160 acres)
Gov't Lot _____ County Blaine
Lat. 43° 30.954 (Deg. and Decimal minutes)
Long. 114° 17.696 (Deg. and Decimal minutes)
Address of Well Site 1050 Fox Acres Rd.
(Give at least name of road + Distance to Road or Landmark) City Hailey
Lot. _____ Blk. _____ Sub. Name _____

4. USE:
☐ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation ☐ Thermal ☒ Injection
☐ Other _____

5. TYPE OF WORK:
☒ New well ☐ Replacement well ☐ Modify existing well
☐ Abandonment ☐ Other _____

6. DRILL METHOD:
☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other _____

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method/procedure
Bentonite	0'	40'	1550#	Temporary Casing

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
12"	+2'	170'	.25	steel	☒	☐	☐	☒
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) _____

9. PERFORATIONS/SCREENS:
Perforations ☒ Y ☐ N Method Perforator
Manufactured screen ☐ Y ☐ N Type _____
Method of installation _____

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule
100'	175'	+1"	2240	12"	steel	

Length of Headpipe _____ Length of Tailpipe _____
Packer ☐ Y ☐ N Type _____

10. FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method

11. FLOWING ARTESIAN:
Flowing Artesian? ☐ Y ☐ N Artesian Pressure (PSIG) _____
Describe control device _____

12. STATIC WATER LEVEL and WELL TESTS:
Depth first water encountered (ft) 61' Static water level (ft) 61
Water temp. (°F) _____ Bottom hole temp. (°F) _____
Describe access port _____

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)
—	500+	3hrs

Test method: Pump ☐ Bailer ☐ Air ☒ Flowing artesian ☐

Water quality test or comments: _____

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
16"	0'	5'	Overburden		
	5'	48'	Gr & Clay		
12"	48'	55'	Clay		
	55'	148'	Gravel & Clay		
	148'	170'	Gravel & Sediment		
	170'	175'	Sandy Mudstone		

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Eastern Region

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SOUTHERN REGION

Completed Depth (Measurable): 175'
Date Started 6/9/11 Date Completed: 7/13/11

14. DRILLER'S CERTIFICATION:
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Jody Denning Drilling Co. No. 519
*Principal Driller Jody Denning Date _____
*Driller _____ Date _____
*Operator II Ted Denning Date 7/18/11
Operator I _____ Date _____

* Signature of Principal Driller and rig operator are required.

Injection Well #2

Form 238-7
6/07

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

AD

1. WELL TAG NO. D 0058710
Drilling Permit No. 36125
Water right or Injection well # 37 W 086-002

2. OWNER:
Name Blaine Co. School District #61
Address 118 W. Bullion St.
City Hailey State ID Zip 83333

3. WELL LOCATION:
Twp. 2 North ☒ or South ☐ Rge. 18 East ☒ or West ☐
Sec. 10 NW 1/4 (10 acres) SW 1/4 (40 acres) SE 1/4 (160 acres)
Gov't Lot ___ County Blaine
Lat. 43° 30.918 (Deg. and Decimal minutes)
Long. 114° 17.633 (Deg. and Decimal minutes)
Address of Well Site 1050 Fox Acres Rd.
(Give at least name of road + Distance to Road or Landmark) City Hailey
Lot. ___ Blk. ___ Sub. Name ___

4. USE:
☐ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation ☐ Thermal ☒ Injection
☐ Other ___

5. TYPE OF WORK:
☒ New well ☐ Replacement well ☐ Modify existing well
☐ Abandonment ☐ Other ___

6. DRILL METHOD:
☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other ___

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method/procedure
Bentonite	0'	40'	450#	Temporary Casing

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
12"	+2'	175'	.25	steel	☒	☐	☐	☒
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) ___

9. PERFORATIONS/SCREENS:
Perforations ☒ Y ☐ N Method Perforator
Manufactured screen ☐ Y ☐ N Type ___
Method of installation ___

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule
100'	175'	1/4"x1"	2310	12"	steel	

Length of Headpipe ___ Length of Tailpipe ___
Packer ☐ Y ☐ N Type ___

10. FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method

11. FLOWING ARTESIAN:
Flowing Artesian? ☐ Y ☐ N Artesian Pressure (PSIG) ___
Describe control device ___

12. STATIC WATER LEVEL and WELL TESTS:
Depth first water encountered (ft) 62' Static water level (ft) 62'
Water temp. (°F) ___ Bottom hole temp. (°F) ___
Describe access port ___

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)
—	500+	3 hrs

Test method: Pump ☐ Bailer ☐ Air ☒ Flowing artesian ☐

Water quality test or comments: ___

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
16"	0'	5'	Overburden		
	5'	48'	Gravel & Clay		
12"	48'	55'	Clay		
	55'	130'	Gravel & Clay		
	130'	160'	Gravel & Sediment		
	160'	163'	Conglomerated		
	163'	175'	Gravel & Sediment		
	175'		Mudstone		

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SOUTHERN REGION

Completed Depth (Measurable): 175'
Date Started: 6/9/11 Date Completed: 7/15/11

14. DRILLER'S CERTIFICATION:
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Jed Denning Drilling Co. No. 519
*Principal Driller Jed Denning Date ___
*Driller ___ Date ___
*Operator II Jed Denning Date 7/18/11
Operator I ___ Date ___

* Signature of Principal Driller and rig operator are required.

Form 238-7
6/07

Injection Well #3

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

AD

1. WELL TAG NO. D 0058711

Drilling Permit No. _____

Water right or injection well # 37 W 086-003

2. OWNER:

Name Blaine Co. School District #61

Address 118 W Bullion St.

City Hailey State ID Zip 83333

3. WELL LOCATION:

Twp. 2 North ☒ or South ☐ Rge. 18 East ☒ or West ☐

Sec. 10 NW 1/4 (10 acres) SW 1/4 (40 acres) SE 1/4 (160 acres) 1/4

Gov't Lot _____ County Blaine

Lat. 43° 30.885 (Deg. and Decimal minutes)

Long. 114° 17.551 (Deg. and Decimal minutes)

Address of Well Site 1050 Fox Acres Rd.

(Give at least name of road + Distance to Road or Landmark) City Hailey

Lot. _____ Blk. _____ Sub. Name _____

4. USE:

☐ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation ☐ Thermal ☒ Injection
☐ Other _____

5. TYPE OF WORK:

☒ New well ☐ Replacement well ☐ Modify existing well
☐ Abandonment ☐ Other _____

6. DRILL METHOD:

☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other _____

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method/procedure
Bentonite	0'	40'	1750#	Temporary Casing

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
12"	+2'	182'	.25	steel	☒	☐	☐	☒
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) _____

9. PERFORATIONS/SCREENS:

Perforations ☒ Y ☐ N Method Perforator

Manufactured screen ☐ Y ☒ N Type _____

Method of installation _____

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule
130'	180'	1/16"x1"	1400	12"	steel	

Length of Headpipe _____ Length of Tailpipe _____

Packer ☐ Y ☐ N Type _____

10. FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method

11. FLOWING ARTESIAN:

Flowing Artesian? ☐ Y ☐ N Artesian Pressure (PSIG) _____

Describe control device _____

12. STATIC WATER LEVEL and WELL TESTS:

Depth first water encountered (ft) 60' Static water level (ft) 60'

Water temp. (°F) _____ Bottom hole temp. (°F) _____

Describe access port _____

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)
–	5+	5 hrs

Test method: Pump ☐ Bailer ☐ Air ☒ Flowing artesian ☐

Water quality test or comments: _____

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
16"	0'	3'	Overburden		
	3'	13'	Gravel & Clay		
	13'	18'	Clay		
	18'	25'	Gravel & Clay		
	25'	31'	Clay		
	31'	48'	Gravel & Clay		
12"	48'	130'	Gravel & Clay		
	130'	180'	Gravel & Sediment		
	180'	182'	Rock		
10"	182'	195'	Rock		

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SOUTHERN REGION

Completed Depth (Measurable): 195'

Date Started: 6/13/11 Date Completed: 6/16/11

14. DRILLER'S CERTIFICATION:

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Jay Denning & Drilling Co. No. 519

*Principal Driller Jay Denning Date _____

*Driller _____ Date _____

*Operator II Jed Denning Date 6/17/11

Operator I _____ Date _____

* Signature of Principal Driller and rig operator are required.

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DEC 29 1966
Department of Reclamation

Location Corrected by IDWR To:
T02N R18E Sec. 10 SWSESW
By: mciscell 2012-08-28

REPORT OF WELL DRILLER
State of Idaho

State law requires that this report shall be filed with the State Reclamation Engineer within 30 days after completion or abandonment of the well.

WELL OWNER:
Name MXXXXX JOHN FOX

Address HAILEY, IDAHO

Owner's Permit No. 9-38032
NATURE OF WORK (check): Replacement well ☐
New well ☒ Deepened ☐ Abandoned ☐

Water is to be used for: IRRIGATION

METHOD OF CONSTRUCTION: Rotary ☐ Cable ☒
Dug ☐ Other _____
(explain)

CASING SCHEDULE: Threaded ___ Welded X
____"Diam. from ____ ft. to ____ ft.
____"Diam. from ____ ft. to ____ ft.
____"Diam. from ____ ft. to ____ ft.
____"Diam. from ____ ft. to ____ ft.
Thickness of casing: 3/8" Material:
Steel ☒ concrete ☐ wood ☐ other ☐

(explain)
PERFORATED? Yes ☒ No ☐ Type of perforator used: MILLS

Size of perforations: 3/8 W" by 2 1 "
~~150~~ 160 perforations from 69 ft. to 134 ft.
____ perforations from 134 ft. to 149 ft.
____ perforations from ____ ft. to ____ ft.
____ perforations from ____ ft. to ____ ft.
WAS SCREEN INSTALLED? Yes ☐ No ☒
Manufacturer's name _____
Type _____ Model No. _____
Diam. ____ Slot size ____ Set from ____ ft. to ____ ft.
Diam. ____ Slot size ____ Set from ____ ft. to ____ ft.

CONSTRUCTION: Well gravel packed? Yes ☐
No. ☐ size of gravel _____ Gravel placed from ____ ft. to ____ ft. Surface seal provided? Yes ☐ No ☐ To what depth? ____ ft. Material used in seal: _____

Did any strata contain unusable water? Yes ☐
No. ☐ Type of water: _____
Depth of strata _____ ft. Method of sealing strata off: _____

Surface casing used? Yes ☐ No. ☐
Cemented in place? Yes ☐ No ☐

Locate well in section

WE WERE UNABLE TO GET THE LOCATION AS TO THE QUARTERS IN WHICH THIS WELL WAS LOCATED.

Sec.

LOCATION OF WELL: County BLAINE
~~NE ¼ SE ¼~~ Sec. 10 T. 2 N/~~S~~ R. 18 E/~~W~~
3 M 18 E

Size of drilled hole: 16" Total depth of well: 153 Standing water level below ground: 55 Temp. Fahr. _____ ° Test delivery: _____ gpm or _____ cfs Pump? ☐ Bail ☐
Size of pump and motor used to make test:

Length of time of test: ____ Hrs. ____ Min.
Drawdown: ____ ft. Artesian pressure: ft. above land surface ____ Give flow ____ cfs or ____ gpm. Shutoff pressure:
Controlled by: Valve ☐ Cap ☐ Plug ☐
No control ☐ Does well leak around casing? Yes ☐ No ☐

39671

DEPTH FROM FEET	DEPTH TO FEET	MATERIAL	WATER YES OR NO
0	3	TOPSOIL	
3	20	CLAY AND GRAVEL	
20	25	BOULDERS AND CLAY	
25	63	CLAY AND GRAVEL	
63	65	SAND	YES
65	69	CLAY	
69	82	COURSE GRAVEL, SOME CLAY	
~~82~~ 80			
82	90	SMALL GRAVEL AND SOME CLAY	
90	120	GRAVEL, SAND AND CLAY	
120	153	CLAY, GRAVEL, SAND	YES

Work started: 8-22-66
Work finished: 9-17-66
Well Driller's Statement: This well was drilled under my supervision and this report is true to the best of my knowledge.
Name: SMITH DRILLING AND PUMP CO. INC.
Address: 365 WEST MAIN JEROME, IDAHO
Signed by: [signature]
License No. 11 Date: 12-23-66

Use other side for additional remarks

USGS

Form 238-W
7/94

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

064537

Use Typewriter or Ball Point Pen

1. DRILLING PERMIT NO. 37.95.S.0179.000
Other IDWR No. 37-0882

2. OWNER:
Name: Blaine County School Dist. #61
Address: P.O. Box 1008
City: Hailey State: ID Zip: 83333

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

N / W / E / S

Twp. 2 North ☑ or South ☐
Rge. 18 East ☑ or West ☐
Sec. 15 NW 1/4 (10 acres) NE 1/4 (40 acres) NE 1/4 (160 acres)
Gov't Lot ____ County: Blaine

Address of Well Site: Wood River High School, Fox Acres Rd City: Hailey
(Give at least name of road + Distance to Road or Landmark)

Lt. ____ Blk. ____ Sub. Name ____

4. PROPOSED USE:
☐ Domestic ☐ Municipal ☐ Monitor ☑ Irrigation
☐ Thermal ☐ Injection ☐ Other ____

5. TYPE OF WORK
☑ New Well ☐ Modify or Repair ☐ Replacement ☐ Abandonment

6. DRILL METHOD
☐ Mud Rotary ☑ Air Rotary ☐ Cable ☐ Other ____

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT Sacks or Pounds	METHOD
Cement Grout Neat	0	20	8/5 sacks	Pumped in overbore with 20 ft 16" conductor

Was drive shoe used? ☑ Y ☐ N Shoe Depth(s) ____
Was drive shoe seal tested? Y ☐ N ☑ How? ____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
10	+1 1/2	159	.250	STEEL	☑	☐	☑	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe ____ Length of Tailpipe ____

9. PERFORATIONS/SCREENS
☑ Perforations Method: Knife
☐ Screens Screen Type ____

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
110	155	3"	2640	1/4	STEEL	☑	☐
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
57 ft. below ground Artesian pressure ____ lb.
Depth flow encountered ____ ft. Describe access port or control devices: ____

11. WELL TESTS:
☐ Pump ☐ Bailer ☑ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
300		150	1

Water Temp. ____ Bottom hole temp. ____
Water Quality test or comments: ____

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
18	0	4	TOP SOIL		✓
18	4	12	CLAY & GRAVEL		✓
18	12	21	SUBSOIL & CLAY		✓
10	21	60	CLAY & GRAVEL		✓
10	60	85	GRAVEL & SAND	✓	
10	85	93	CLAY & GRAVEL		✓
10	93	97	RED SAND & GRAVEL	✓	
10	97	110	SAND & GRAVEL	✓	
10	110	133	CLAY & GRAVEL	✓	
10	133	159	GRAVEL	✓	

RECEIVED
OCT 12 1995
Department of Water Resources
Southern Region

MICROFILMED
RECEIVED
OCT 2 1995
Department of Water Resources

Completed Depth 159 (Measurable)
Date: Started 10-3-95 Completed 10-9-95

13. DRILLER'S CERTIFICATION
I/We certify that all Water Department construction standards were complied with at the time the rig was removed.

Firm Name: WOOD RIVER DRILLING & PUMP BOX 837 BELLEVUE, ID 83313 Firm No. 265
Firm Official: Ken Smith Date: 10-11-95
and
Supervisor or Operator: [illegible] Date: 10-11-95
(Sign once if Firm Official is Operator)

FORWARD WHITE COPY TO WATER RESOURCES

App 889016

Form 238-7
3 95-C96

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

Office Use Only
Inspected by _____
Twp _____ Rge _____ Sec _____
_____ 1/4 _____ 1/4 _____ 1/4
Lat: : : Long: : :

1. DRILLING PERMIT NO _____
Other IDWR No. D0036626 833981

2. OWNER:
Name Blaine County School District
Address 118 W Bullion St
City Hailey State ID Zip 83333

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location

N
W E
S

Twp. 2 North ☒ or South ☐
Rge. 18 East ☒ or West ☐
Sec. 23 1/4 (10 acres) SW 1/4 (40 acres) NE 1/4 (160 acres)

Gov't lot _____ County Blaine
Lat: : : Long: : :
Address of Well Site Woodside Elementary
Woodside Blvd City Hailey
(Give at least name of road + Distance to Road or Landmark)

Lt. _____ Blk. _____ Sub. Name _____

4. USE:
☐ Domestic ☐ Municipal ☐ Monitor ☒ Irrigation
☐ Thermal ☐ Injection ☐ Other _____

5. TYPE OF WORK check all that apply (Replacement etc.)
☒ New Well ☐ Modify ☐ Abandonment ☐ Other _____

6. DRILL METHOD
☒ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other _____

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT Sacks or Pounds	METHOD
Bentonite	0	23	4000 lbs	Overhore

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) 135
Was drive shoe seal tested? ☐ Y ☒ N How?

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
8 5/8	+2	135	322	Steel	☒	☐	☒	☐
6 5/8	126	135	250	Steel	☐	☒	☒	☐
					☐	☐	☐	☐

Length of Headpipe 9 ft Length of Tailpipe n/a

9. PERFORATIONS/SCREENS
☐ Perforations Method _____
☒ Screens Screen Type johnson

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
135	155	.060		6 5/	SS	☐	☒
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
34 ft. below ground Artesian Pressure ____ lb
Depth flow encountered ____ ft. Describe access port or control devices: _____

11. WELL TESTS:
☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal/min.	Drawdown	Pumping Level	Time
100 gpm			

Water Temp. _____ Bottom hole temp. _____
Water Quality test or comments: _____
Depth first Water Encountered _____

12. LITHOLOGIC LOG: (Describe repair or abandonment)

Bore Dia	From	To	Remarks: Lithology, Water Quality & Temp.	Water Y	Water N
12"	0	2	Top soil		☒
12"	2'	20'	Tan sand		☒
12"	20'	23'	Tan Clay		☒
8"	23'	50'	Sand & Gravels		☒
8"	50'	145'	Tan Gravels and sand	☒	
8"	145'	155'	Black gravels	☒	

RECEIVED
MAR 31 2006
DEPT. OF WATER RESOURCES
SOUTHERN REGION

Completed Depth 155 (Measurable)
Date Started 06-23-05 Completed 07-03-05

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Hiddleston & Son, Inc. Firm No. 35
Firm Official John Sullivan JKS Date 1-30-06
Supervisor or Operator John Smith JKS Date _____
(Sign once if Firm Official & Operator)

Form 238-7
11/97

Owner - App 844168 Per 768914 JP 340907 768914

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

C

Office Use Only
Inspected by _____
Twp ____ Rge ____ Sec ____
____ 1/4 ____ 1/4 ____ 1/4
Lat: : : Long: : :

1. WELL TAG NO. D0016351

DRILLING PERMIT NO. ~~37-02713~~ ~~37-073~~
Other IDWR No. ~~340907~~

2. OWNER:
Name FLYING HAT RANCH
Address c/o BROCKWAY ENGINEERING
City 2016 N. WASHINGTON ST, Ste SUITE 4
TWIN FALLS IDAHO 83301

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

N / W / E / S

Twp. 2 North ☒ or South ☐
Rge. 18 East ☒ or West ☐
Sec. 23, ____ 1/4 NE 1/4 SW 1/4
Gov't Lot ____ County BLAIN
Lat: : : Long: : :
Address of Well Site 200 west of hwy 75 at ranch house pond City HAILEY ID.
(Give at least name of road + Distance to Road or Landmark)

Lt. ____ Blk. ____ Sub. Name ____

4. USE:
☐ Domestic ☐ Municipal ☐ Monitor ☒ Irrigation
☐ Thermal ☐ Injection ☐ Other ____

5. TYPE OF WORK check all that apply (Replacement etc.)
☒ New Well ☐ Modify ☐ Abandonment ☒ Other ____

6. DRILL METHOD
☐ Air Rotary ☒ Cable ☐ Mud Rotary ☐ Other ____

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT Sacks or Pounds	METHOD
cement	19	27	10sacks	overbore
bentonite	0	19	37sacks	"

Was drive shoe used? ☐ Y ☒ N Shoe Depth(s) ____
Was drive shoe seal tested? ☐ Y ☒ N How? bailer

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
20"	+3	137	250	steel	☒	☐	☒	☐
20"	167	180	250	steel	☒	☐	☒	☐
20"					☐	☐	☐	☐

Length of Headpipe ____ Length of Tailpipe ____

9. PERFORATIONS/SCREENS
Perforations Method factory
Screens Screen Type low carbon hi capacity steel screen

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
37	137	1/4	40 ft	20	steel	☒	☐
167	180	1/4	40	20	steel	☒	☐
137	167	100	screen	18		☒	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
27 ft. below ground Artesian pressure ____ lb.
Depth flow encountered ____ ft. Describe access port or control devices: 2" pipe

11. WELL TESTS:
☒ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time

Water Temp. ____ Bottom hole temp. ____
Water Quality test or comments: ____
Depth first Water Encounter ____

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
28	0	8	soil, gravel & boulders		
	8	19	gravel & cobbles		
24	19	28	silt ,gravel & large gravel		
	28	41	mud & gravel		
	41	43	clean gravel	x	
	43	69	sandy silt, large & small gravel		
	69	76	clay & gravel		
	76	118	sandy clay & gravel		
	118	121	small gravel		
	121	139	large gravel & some clay		
	139	166	large & small gravel & water sand some clay		
	166	178	large & small gravel & water sand		
	178	181	claystone & clay		
	181		bedrock		
			gravel packed well and pulled 24" casing from well		

RECEIVED
SEP 07 2001
Department of Water Resources
Southern Region

Completed Depth 181 (Measurable)
Date: Started 5-25-2001 Completed 7-18-2001

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name COUCH WELL DRILLING INC. No. 161
Firm Official [signature] Date 8-10-2001
and
Driller or Operator [signature] Date ____
(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

Form 238-7
6/93

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DEC 20 1993
Department of Water Resources

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

Use Typewriter or Ball Point Pen

RECEIVED
OCT 20 1993
Department of Water Resources
Regional Office

103881

1. DRILLING PERMIT NO. 37- 93 - S - 0141 - 000
Other IDWR No. _____

2. OWNER:
Name Intermountain Gas Company
Address 687 Blue Lakes Blvd. No.
City Twin Falls State ID Zip 83301

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

N / W / E / S

T. 2 North ☒ or South ☐
R. 18 East ☒ or West ☐
Sec. 23, SW 1/4 (10 acres) SE 1/4 (40 acres) ____ 1/4 (160 acres)
Gov't Lot ____ County Blaine

Address of Well Site Woodside Blvd. & Hwy 75
(Give at least Direction + Distance to Road or Landmark)

Lot No. _____ Block No. _____ Subd. Name _____

4. PROPOSED USE:
☐ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☒ Other Cathodic Protection

5. TYPE OF WORK
☒ New Well ☐ Modify or Repair ☐ Replacement ☐ Abandonment

6. DRILL METHOD
☐ Mud Rotary ☒ Air Rotary ☐ Cable ☐ Other _____

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT Sacks or Pounds	METHOD
Bentonite	0	19	200#	Overbore

Was drive shoe seal tested? Y☐ N☐ How? _____

8. CASING/LINER:

Diameter	From	To	Guage	Casting	Liner	Steel	Plastic	Welded	Threaded
8.625	+1	150	.250			☒	☐	☒	☐
						☐	☐	☐	☐
						☐	☐	☐	☐
						☐	☐	☐	☐

Final location of shoes _____
Top Packer or Headpipe _____ Bottom Tailpipe _____

9. PERFORATIONS/SCREENS
☐ Perforations Method _____
☐ Screens Type _____ Material _____

From	To	Slot Size	Number	Diameter	Tele/Pipe Size	Casting	Liner
						☐	☐
						☐	☐
						☐	☐
						☐	☐

10. WELL TESTS:
☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown ft.	Pump Depth	Time
± 100			

Temperature of water 48 Was a water analysis done? Yes ☐ No ☐
By whom? _____
Water Quality (odor, etc.) _____
Bottom Hole Temperature _____

11. STATIC WATER LEVEL:
57 ft. below surface Depth artesian flow found _____
Artesian pressure _____ lb. Describe access port _____
Describe Controlling Devices: _____

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	GPM	SWL
9¾	0	3	Soil w/ gravel & boulders		
	3	17	Boulders w/ sand & gravel		
	17	27	Clay & gravel		
	27	58	Clay, gravel & sand		
	58	78	Gravel & sand	X	
	78	95	Clay & gravel	?	
	95	108	Gravel & clay	X	
	108	120	Gravel	X	
	120	150	Coarse gravel & sand	X	

MICROFILMED
FEB 28 1994

Date: Started 9/27/93 Completed 9/28/93

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Walker Water Systems, Inc. Firm No. 15
624 Liberty Street
Twin Falls, Idaho 83301
Firm Official _____ Date 9/29/93
and
Supervisor or Operator Paul Walk Date _____
(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

App872558

Form 238-7
11/97

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

CA

Office Use Only
Inspected by _____
Twp ____ Rge ____ Sec ____
____ 1/4 ____ 1/4 ____ 1/4
Lat: : : Long: : :

1. WELL TAG NO. D 0023240
DRILLING PERMIT NO. 780767 - - -
Other IDWR No. ~~37-7356, 37-2713 well ID~~ # 351858

2. OWNER:
Name FLYING HAT RANCH C/O BROCKWAY ENG.
Address 2016 N WASHINGTON ST. STE 4
City TWIN FALLS IDAHO State ___ Zip 83301

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

N / W / E / S

Twp. 2 North ☒ or South ☐
Rge. 18 East ☒ or West ☐
Sec. 23, ____ 1/4 (10 acres) SW 1/4 (40 acres) SE 1/4 (160 acres)
Gov't Lot ____ County BLAINE
Lat: : : Long: : :
Address of Well Site tax lot 7134
City _____
(Give at least name of road + Distance to Road or Landmark)

Lt. _____ Blk. _____ Sub. Name _____

4. USE:
☐ Domestic ☐ Municipal ☐ Monitor ☒ Irrigation
☐ Thermal ☐ Injection ☐ Other _____

5. TYPE OF WORK check all that apply (Replacement etc.)
☐ New Well ☒ Modify ☐ Abandonment ☐ Other _____

6. DRILL METHOD
☐ Air Rotary ☒ Cable ☐ Mud Rotary ☐ Other _____

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT Sacks or Pounds	METHOD
just modifed				

Was drive shoe used? ☐Y ☐ N Shoe Depth(s) _____
Was drive shoe seal tested? ☐ Y☐ N How? _____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe _____ Length of Tailpipe _____

9. PERFORATIONS/SCREENS
Perforations Method mills
Screens Screen Type _____

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
43	127	3/8	7-8	20"	steel	☒	☐
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
39 ft. below ground Artesian pressure ____ lb.
Depth flow encountered _____ ft. Describe access port or control devices: 2" pipe

11. WELL TESTS:
☒ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal./min	Drawdown	Pumping Level	Time
2400			

Water Temp. _____ Bottom hole temp. _____
Water Quality test or comments: _____
Depth first Water Encounter _____

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
20	43	127	mills perforated well		
			~~after perforating well~~		
			surged well & cleaned		
			out sand down to 149		
			casing was bent & leaked		
			some sand around bottom		
			well was filled backed		
			to 140 by morning		

RECEIVED
OCT 01 2002
Department of Water Resources
Southern Region

Completed Depth 140 (Measurable)
Date: Started 7-6-2002 Completed 8-8-2002

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name COUCH WELL DRILLING INC No. 161
Firm Official Sherman Couch Date 9-14-2002
and
Driller or Operator Sherman Couch
(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

Form 238-7
9/82

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

USE TYPEWRITER OR BALLPOINT PEN

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

1. WELL OWNER

Name: City of Hailey

Address: Hailey Idaho

Owner's Permit No. 37-87.2-002 ok MB

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)

3. PROPOSED USE

☐ Domestic ☐ Irrigation ☒ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other Monitor (specify type)

4. METHOD DRILLED

☒ Rotary ☐ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other Plastic

Thickness	Diameter	From	To
.250 inches	6 inches +	2 feet	69 feet
inches	inches	feet	feet
inches	inches	feet	feet
inches	inches	feet	feet

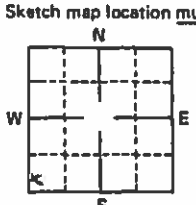
Was casing drive shoe used? ☐ Yes ☒ No
Was a packer or seal used? ☐ Yes ☐ No
Perforated? ☒ Yes ☐ No
How perforated? ☒ Factory ☐ Knife ☐ Torch
Size of perforation 1 inches by 3 inches

Number	From	To
80 perforations	55 feet	65 feet
perforations	feet	feet
perforations	feet	feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name
Type Model No.
Diameter Slot size Set from feet to feet
Diameter Slot size Set from feet to feet
Gravel packed? ☒ Yes ☐ No ☒ Size of gravel 1/8"
Placed from 20 feet to 69 feet
Surface seal depth 18 Material used in seal: ☒ Cement grout ☒ Bentonite ☐ Puddling clay ☐
Sealing procedure used: ☐ Slurry pit ☐ Temp. surface casing ☒ Overbore to seal depth
Well has 2 ft. Cement Aug in Bottom
Method of joining casing: ☐ Threaded ☐ Welded ☒ Solvent Weld ☐ Cemented between strata
Describe access port

6. LOCATION OF WELL

Sketch map location must agree with written location.



Subdivision Name
Lot No. Block No.

County Blaine 2 N
SE SE SE ¼ ¼ ¼ Sec. 23, T. 2 (N) S, R 18 (E) W.

7. WATER LEVEL

Static water level 55 feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow
Artesian closed-in pressure p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature °F. Quality
Describe artesian or temperature zones below.

8. WELL TEST DATA

☐ Pump ☐ Bailer ☒ Air ☐ Other

Discharge G.P.M.	Pumping Level	Hours Pumped
5	64 ft.	One

9. LITHOLOGIC LOG

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
12	1	8	Top Soil		x
12	8	20	Boulder's		x
12	20	30	Conglomerate		x
12	30	40	" "		x
12	40	50	Clay and gravel		x
12	50	60	" "		x
12	60	69	Boulder's		

RECEIVED APR 4 1988 Department of Water Resources

RECEIVED FEB 25 1988 Department of Water Resources

10. Work started Sept. 26 finished Oct. 2, 1987

11. DRILLERS CERTIFICATION

We certify that all minimum well construction standards were complied with at the time the rig was removed.

GOOD RIVER DRILLING AND PUMP
Firm 1165 785
HAILEY IDAHO 83333
Address
Firm No. 265
Date Nov 1-87
Signed by (Firm Official) Ken Smith
and
(Operator) Gary Jones

MICROFILMED DEC 12 1988

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Appendix D

Aquifer Parameters and Drawdown Modeling

Transmissivity Estimation with Partial Penetration

Bradbury and Rothschild (1985) specific capacity method.
Suitable for situations where a single time and drawdown measurement is available.
Includes effects of partial penetration using Sternberg (1973) approach.

Enter data in blue, pay attention to units. Vary "Trial T" until equal to "Calc T".
HRZ 03/30/2016

Subset of Well Logs with Drawdown Information Along East Boundary of Valley

Well No.	Name	Location*	Pumping Rate [gpm]	Drawdown [ft]	Time [min]	Well radius [in]	Storativity	SWL [ft]	Aquifer bottom [ft]	Avg open interval [ft]	Average aquifer thickness [ft]	Specific capacity	L/b	G	sp	Trial T (vary) [ft2/d]	Calc T [ft2/d]	Calc K [ft/d]	ln K
42	LESLIE CONNER	02N 18E Section 10 SWNE	100	26	60	4	0.15	50	150	10	87	3.8	0.11	2.25	25.55	3595.0	3595.6	41.3	3.72
58	E COUNTY SCHOOL DISTRI	02 N 18E Section 15 NENE	300	93	60	5	0.15	57	180	81	76.5	3.2	1.06	2.44	-0.15	334.0	335.2	4.4	1.48
30	PAUL KETTLEBAND	02N 18E Section 4 NWSE	60	65	30	3	0.15	65	150	55	52.5	0.9	1.05	2.42	-0.13	83.0	81.5	1.6	0.44
32	LORRAINE WILCOX	02N 18E Section 4 SESE	60	42	60	4	0.15	58	150	30	71	1.4	0.42	1.53	5.24	398.0	398.1	5.6	1.72
34	LORRAINE WILCOX	02N 18E Section 4 SESE	55	30	60	4	0.15	45	150	10	90	1.8	0.11	2.26	26.67	1765.0	1756.5	19.5	2.97
35	BRAD BJORSNESS	02N 18E Section 4 SESE	70	40	60	3	0.15	50	150	30	80	1.8	0.38	1.55	7.03	611.0	610.7	7.6	2.03
41	CHARLES M JOHNSON	02N 18E Section 10 NENW	60	30	60	4	0.15	55	150	83	80	2.0	1.04	2.41	-0.11	211.0	210.1	2.6	0.97
67	THOMAS A PYLE	02N 18E Section 10 NENE	50	30	60	3	0.15	60	150	32	75	1.7	0.43	1.53	5.61	504.0	504.3	6.7	1.91
																Mean	1233.4	11.2	1.9
																Median	398.1	5.6	1.7
																Max	3595.6	41.3	3.7
																Min	81.5	1.6	0.4
																Std dev	1473.5	14.3	1.1

Subset From the Big Wood River Groundwater Model (Powell et al. 2009) Wells Within Valley Near Quigley Canyon

Well	Local Name	Location	Well pumping rate (gpm)	Drawdown (ft)	Time (min)	Well radius (inches)	Storativity	Open interval (ft)	Aquifer thickness (ft)	Specific capacity (gpm/ft)	L/b	G	sp	Trial T [ft2/d]	Calc T [ft2/d]	Calc K [ft/d]	
306	Tom Richmond	2N18E4NWNW	667	73	540	6	0.15	100	85	9.137	1.176	2.517	-0.393	1333	1333	15.7	2.75
332	EMB Hailey	2N18E4NESW	825	16	30	8	0.15	70	135	51.56	0.519	1.556	3.486	12694	12694	94.0	4.54
396	Flying Hat/ Brockway	2N18E15NWSW	2400	16	480	12	0.15	130	140	150.00	0.929	2.238	0.208	28202	28202	201.4	5.31
403*	FH Airport Well	2N18E15SWNW	4400	30	180	10	0.15	94	120	146.67	0.783	1.957	0.833	29068	29068	242.2	5.49
573	Hailey River St Well	2N18E4NWSW	2690	30	285	8	0.15	92	100	89.67	0.92	2.22	0.2425	16625	16625	166.3	5.11
														Mean	3835.5	143.9	3.3
														Median	1473.5	166.3	3.7
														Max	12693.8	242.2	5.5
														Min	81.5	15.7	0.4

Valley Pump Test Calculations for Hydraulic Conductivity (Powel et al 2009)											Calculations:						
Well	Use	Local Name	Location	Well pumping rate (gpm)	Drawdown (ft)	Time (min)	Well radius (inches)	Storativity	Aquifer thickness (ft)	Open interval (ft)	Specific capacity (gpm/ft)	L/b	G	sp	Trial T [ft2/d]	Calc T [ft2/d]	Calc K [ft/d]
24	Subdivision	Smokey Mountain Associates #1	3N18E18NENE	66	32	480	6	0.15	83	28	2.063	0.337	1.587	6.923	741	741	8.9
30	Subdivision	Smokey Mountain Associates #2	3N18E18NENE	635	13	480	5	0.15	83.4	5	48.846	0.060	2.547	43.158	75510	75510	905.4
60	Municipal	Heatherlands Subdivision	3N18E17SESW	530	10	480	6	0.15	35	34	53.000	0.971	2.312	0.057	10003	10003	285.8
71	Domestic		3N18E19NENE	25	113	60	3	0.15	61	10	0.221	0.164	2.028	17.693	145	145	2.4
77	Irrigation	Mizer Brothers	3N18E20SENW	1800	88	300	10	0.15	70	129	20.455	1.843	-1.004	-2.486	1111	1111	15.9
83	Domestic/Irrigation/ Municipal	Star Weather Subdivision #1	3N18E20NWNW	1600	14	360	6	0.15	35	20	114.286	0.571	1.606	1.982	29713	29713	849.0
84	Domestic/Irrigation/ Municipal	Star Weather Subdivision #2	3N18E20NWNW	1600	14	360	6	0.15	35	20	114.286	0.571	1.606	1.982	29713	29713	849.0
86	Domestic		3N18E20SWNE	507	36	450	6	0.15	40	66	14.083	1.650	0.963	-1.347	1650	1650	41.2
87	Domestic		3N18E20SENW	657	31	450	5	0.15	40	72	21.194	1.800	-0.482	-2.243	2097	2097	52.4
98	Test	Deer Creek Ranch	3N18E30SESE	294	5	600	4	0.15	67.7	68	58.800	1.004	2.364	-0.013	12073	12073	178.3
155	Subdivision	Rod Overfield	3N18E32NWSE	60	7	360	5	0.15	30	8	8.571	0.267	1.710	7.059	3322	3322	110.7
157	Domestic/Irrigation/Fire Protection	Idaho Power	3N18E32SESE	475	40	282	6	0.15	77	37	11.875	0.481	1.534	3.787	3300	3300	42.9
180	Domestic		3N18E32NENW	300	20	480	5	0.15	22	10	15.000	0.455	1.527	2.927	4025	4025	182.9
260	Municipal	Flying Hat (FH)	2N18E5SWNW	530	5	360	6	0.15	90	20	106.000	0.222	1.826	11.785	60554	60554	672.8
289	Domestic		2N18E4NWNW	30	1	60	3	0.15	85	18	30.000	0.212	1.858	14.782	19178	19178	225.6
306	Fire Protection	Tom Richmond	2N18E4NWNW	667	73	540	6	0.15	85	100	9.137	1.176	2.517	-0.393	1333	1333	15.7
328	Domestic		2N18E4NWNW	90	3	480	4	0.15	90	10	30.000	0.111	2.265	26.669	31016	31016	344.6
332	Municipal	EMB Hailey	2N18E4NESW	825	16	30	8	0.15	135	70	51.563	0.519	1.556	3.486	12694	12694	94.0
396	Irrigation	Flying Hat/ Brockway	2N18E15NWSW	2400	16	480	12	0.15	140	130	150.000	0.929	2.238	0.208	28202	28202	201.4
403*	Irrigation	FH Airport Well	2N18E15SWNW	4400	30	180	10	0.15	120	94	146.667	0.783	1.957	0.833	29068	29068	242.2
440*	Irrigation	FH Industrial Park Well	2N18E23SESWSE	2300	17	165	10	0.15	177	100	135.294	0.565	1.599	2.895	35600	35600	201.1
466	Municipal	City of Bellevue	2N18E25SWSW	1740	116	720	8	0.15	189	53	15.000	0.280	1.680	10.179	7374	7374	39.0
505*	Domestic/Industrial	Broadford Mine	2N18E35NWNW	450	4	180	5	0.15	87	15	112.500	0.172	1.995	16.063	78904	78904	906.9
506	Industrial		2N18E35NWNW	450	4	180	5	0.15	86.8	22	112.500	0.253	1.741	10.598	59581	59581	686.4
572	Municipal	City of Hailey	2N18E9	2000	60	360	5	0.15	100	97	33.3333333	0.970	2.310	0.098	6122	6122	61.2
573	Irrigation	Hailey River St Well	2N18E4NWSW	2690	30	285	8	0.15	100	92	89.6666667	0.92	2.222414	0.242454	16625	16625	166.3
579	Municipal	3rd Ave Well	2N18E9SESE	2300	37.5	300	10	0.15	109.5	66	61.3333333	0.60274	1.644971	2.131022	17759	14612	133.4
574	11	FH-Ranch House	2N18E23SWNESW														220.0
575	12	FH-Well #3	2N18E23NWNWSW														380.0
576	13	FH-Industrial Park	2N18E23SESWSE														175.0
577	14	FH-"800 gpm"	2N18E15SWSWSE														480.0
578	15	City of Bellevue	2N18E36NWNWNW														78.0

Average T and K from all well logs	21525	277
Average T and K with all flow values over 100 gpm	24060	302
Average T and K values with no Domestic Wells	25077	308
Minimums	145	2
Maximums	78904	907

WELL DRAWDOWN ESTIMATION
Quigley Farm PUD
3/30/2016

Drawdown estimated using Theis approach
Brockway Engineering, PLLC
HRZ

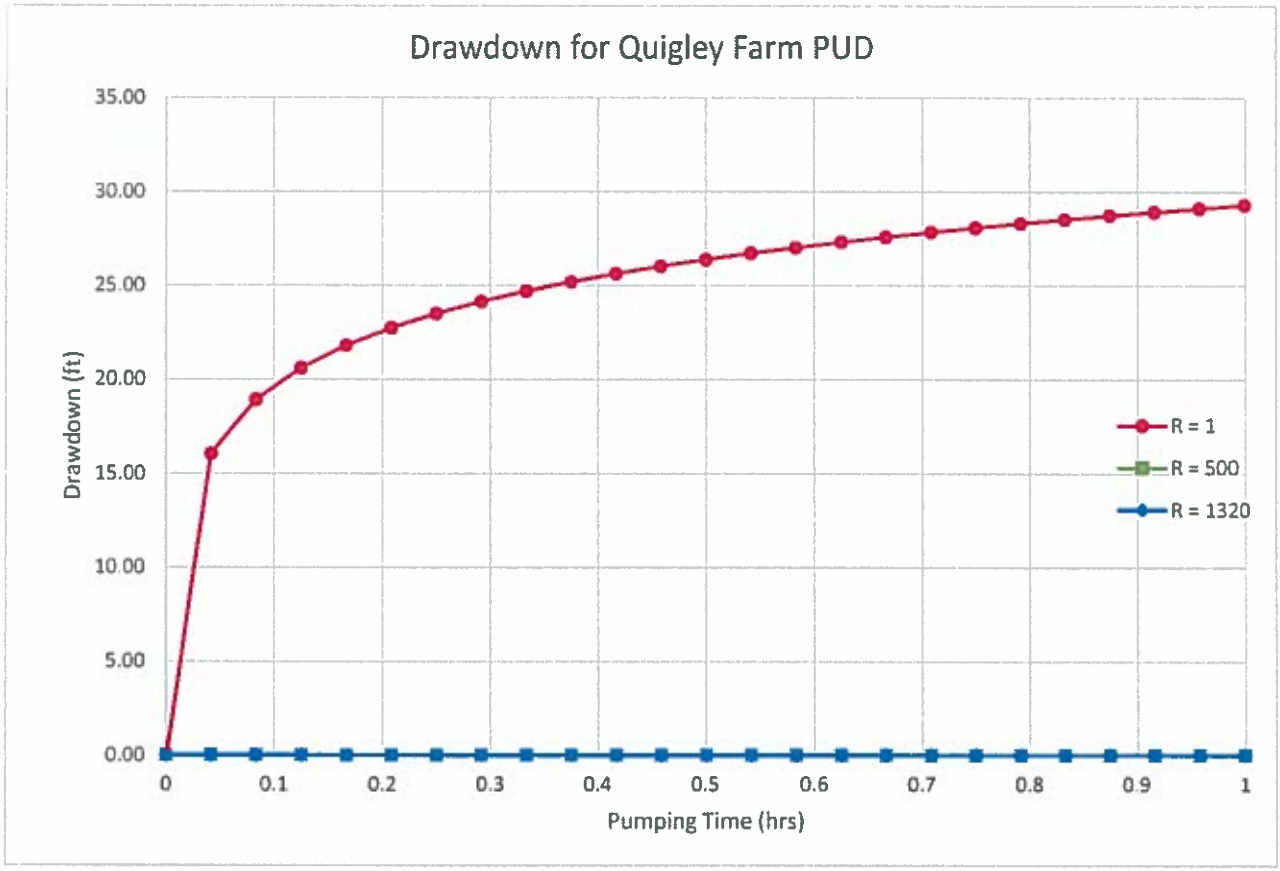
Hydraulic conductivity	11	ft/day				
Saturated thickness	40	feet				
Transmissitivity	3291.2	gpd/ft	Pumping rate	0.27	cfs or	120 gpm
Storage coefficient	0.15		Pumping time	1	hrs	
SWL	60	ft				
Pumping Level	89.26	ft				
Max drawdown	100.00					

Time		R = 1 feet			R = 500 feet			R = 1320 feet		
(days)	(hrs)	u	W(u)	z (feet)	u	W(u)	z (feet)	u	W(u)	z (feet)
0.00	0	--	--	0.00	--	--	0.00	--	--	0.00
0.00	0.041667	1.2E-02	3.835	16.03	1.2E+04	0.000	0.00	8.6E+04	0.000	0.00
0.00	0.083333	6.1E-03	4.522	18.90	6.1E+03	0.000	0.00	4.3E+04	0.000	0.00
0.01	0.125	4.1E-03	4.926	20.58	4.1E+03	0.000	0.00	2.9E+04	0.000	0.00
0.01	0.166667	3.1E-03	5.213	21.78	3.1E+03	0.000	0.00	2.1E+04	0.000	0.00
0.01	0.208333	2.5E-03	5.435	22.71	2.5E+03	0.000	0.00	1.7E+04	0.000	0.00
0.01	0.25	2.0E-03	5.617	23.47	2.0E+03	0.000	0.00	1.4E+04	0.000	0.00
0.01	0.291667	1.8E-03	5.771	24.11	1.8E+03	0.000	0.00	1.2E+04	0.000	0.00
0.01	0.333333	1.5E-03	5.904	24.67	1.5E+03	0.000	0.00	1.1E+04	0.000	0.00
0.02	0.375	1.4E-03	6.022	25.16	1.4E+03	0.000	0.00	9.5E+03	0.000	0.00
0.02	0.416667	1.2E-03	6.127	25.60	1.2E+03	0.000	0.00	8.6E+03	0.000	0.00
0.02	0.458333	1.1E-03	6.222	26.00	1.1E+03	0.000	0.00	7.8E+03	0.000	0.00
0.02	0.5	1.0E-03	6.309	26.36	1.0E+03	0.000	0.00	7.1E+03	0.000	0.00
0.02	0.541667	9.4E-04	6.389	26.70	9.4E+02	0.000	0.00	6.6E+03	0.000	0.00
0.02	0.583333	8.8E-04	6.463	27.01	8.8E+02	0.000	0.00	6.1E+03	0.000	0.00
0.03	0.625	8.2E-04	6.532	27.29	8.2E+02	0.000	0.00	5.7E+03	0.000	0.000
0.03	0.666667	7.7E-04	6.597	27.56	7.7E+02	0.000	0.00	5.3E+03	0.000	0.00
0.03	0.708333	7.2E-04	6.657	27.82	7.2E+02	0.000	0.00	5.0E+03	0.000	0.00
0.03	0.75	6.8E-04	6.714	28.05	6.8E+02	0.000	0.00	4.8E+03	0.000	0.00
0.03	0.791667	6.5E-04	6.768	28.28	6.5E+02	0.000	0.00	4.5E+03	0.000	0.00
0.03	0.833333	6.1E-04	6.820	28.49	6.1E+02	0.000	0.00	4.3E+03	0.000	0.00
0.04	0.875	5.8E-04	6.868	28.70	5.8E+02	0.000	0.00	4.1E+03	0.000	0.00
0.04	0.916667	5.6E-04	6.915	28.89	5.6E+02	0.000	0.00	3.9E+03	0.000	0.00
0.04	0.958333	5.3E-04	6.959	29.08	5.3E+02	0.000	0.00	3.7E+03	0.000	0.00
0.04	1	5.1E-04	7.002	29.26	5.1E+02	0.000	0.00	3.6E+03	0.000	0.00
0.04	1.041667	4.9E-04	7.043	29.43	4.9E+02	0.000	0.00	3.4E+03	0.000	0.00

WELL DRAWDOWN ESTIMATION
Quigley Farm PUD
3/30/2016

Drawdown estimated using Theis approach
Brockway Engineering, PLLC
HRZ

Hydraulic conductivity	11 ft/day				
Saturated thickness	40 feet				
Transmissitivity	3291.2 gpd/ft	Pumping rate	0.27 cfs or	120 gpm	
Storage coefficient	0.15	Pumping time	1 hrs		
SWL	60 ft				
Pumping Level	89.26 ft				



WELL DRAWDOWN ESTIMATION
Quigley Farm PUD
3/30/2016

Drawdown estimated using Theis approach
Brockway Engineering, PLLC
HRZ

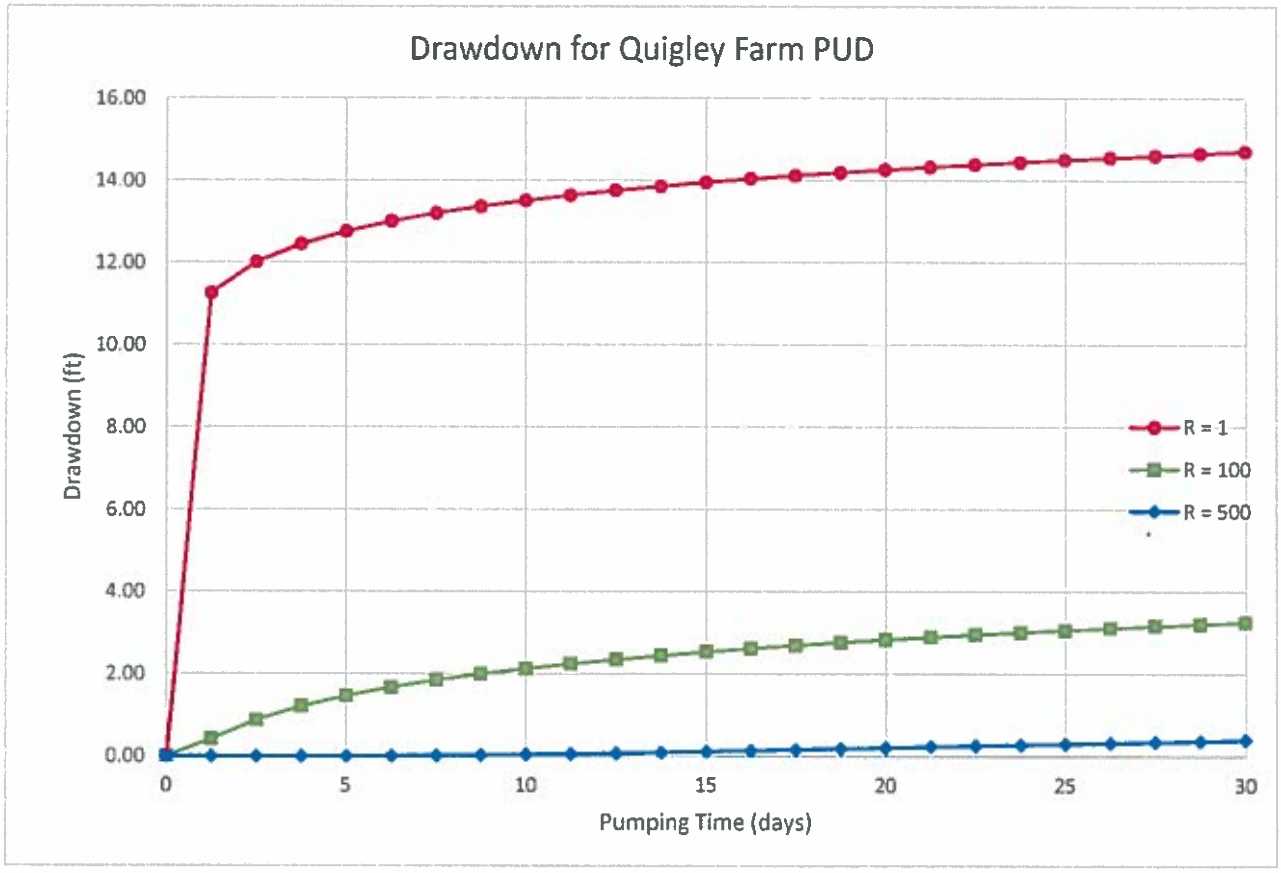
Hydraulic conductivity	11 ft/day				
Saturated thickness	40 feet				
Transmissitivity	3291.2 gpd/ft	Pumping rate	0.07 cfs or	31 gpm	
Storage coefficient	0.15	Pumping time	720 hrs		
SWL	60 ft				
Pumping Level	74.71 ft				
Max drawdown	100.00				

Time		R = 1 feet			R = 100 feet			R = 500 feet		
(days)	(hrs)	u	W(u)	z (feet)	u	W(u)	z (feet)	u	W(u)	z (feet)
0.00	0	--	--	0.00	--	--	0.00	--	--	0.00
1.25	30	1.7E-05	10.402	11.26	6.8E-01	0.387	0.42	1.7E+01	0.000	0.00
2.50	60	8.5E-06	11.096	12.02	3.4E-01	0.813	0.88	8.5E+00	0.000	0.00
3.75	90	5.7E-06	11.501	12.45	2.3E-01	1.119	1.21	5.7E+00	0.000	0.00
5.00	120	4.3E-06	11.789	12.77	1.7E-01	1.356	1.47	4.3E+00	0.003	0.00
6.25	150	3.4E-06	12.012	13.01	1.4E-01	1.547	1.68	3.4E+00	0.008	0.01
7.50	180	2.8E-06	12.194	13.21	1.1E-01	1.708	1.85	2.8E+00	0.016	0.02
8.75	210	2.4E-06	12.348	13.37	9.7E-02	1.847	2.00	2.4E+00	0.027	0.03
10.00	240	2.1E-06	12.482	13.52	8.5E-02	1.969	2.13	2.1E+00	0.041	0.04
11.25	270	1.9E-06	12.600	13.64	7.6E-02	2.077	2.25	1.9E+00	0.057	0.06
12.50	300	1.7E-06	12.705	13.76	6.8E-02	2.175	2.36	1.7E+00	0.074	0.08
13.75	330	1.5E-06	12.800	13.86	6.2E-02	2.265	2.45	1.5E+00	0.093	0.10
15.00	360	1.4E-06	12.887	13.96	5.7E-02	2.347	2.54	1.4E+00	0.113	0.12
16.25	390	1.3E-06	12.967	14.04	5.2E-02	2.423	2.62	1.3E+00	0.133	0.14
17.50	420	1.2E-06	13.041	14.12	4.9E-02	2.493	2.70	1.2E+00	0.154	0.17
18.75	450	1.1E-06	13.110	14.20	4.5E-02	2.559	2.77	1.1E+00	0.175	0.190
20.00	480	1.1E-06	13.175	14.27	4.3E-02	2.621	2.84	1.1E+00	0.197	0.21
21.25	510	1.0E-06	13.236	14.33	4.0E-02	2.679	2.90	1.0E+00	0.218	0.24
22.50	540	9.5E-07	13.293	14.39	3.8E-02	2.734	2.96	9.5E-01	0.240	0.26
23.75	570	9.0E-07	13.347	14.45	3.6E-02	2.786	3.02	9.0E-01	0.262	0.28
25.00	600	8.5E-07	13.398	14.51	3.4E-02	2.835	3.07	8.5E-01	0.283	0.31
26.25	630	8.1E-07	13.447	14.56	3.2E-02	2.883	3.12	8.1E-01	0.304	0.33
27.50	660	7.7E-07	13.493	14.61	3.1E-02	2.928	3.17	7.7E-01	0.325	0.35
28.75	690	7.4E-07	13.538	14.66	3.0E-02	2.971	3.22	7.4E-01	0.346	0.37
30.00	720	7.1E-07	13.580	14.71	2.8E-02	3.012	3.26	7.1E-01	0.367	0.40
31.25	750	6.8E-07	13.621	14.75	2.7E-02	3.052	3.30	6.8E-01	0.387	0.42

WELL DRAWDOWN ESTIMATION
Quigley Farm PUD
3/30/2016

Drawdown estimated using Theis approach
Brockway Engineering, PLLC
HRZ

Hydraulic conductivity	11	ft/day				
Saturated thickness	40	feet				
Transmissitivity	3291.2	gpd/ft	Pumping rate	0.07	cfs or	31 gpm
Storage coefficient	0.15		Pumping time	720	hrs	
SWL	60	ft				
Pumping Level	74.71	ft				
Max drawdown	100.00					



WELL DRAWDOWN ESTIMATION
Quigley Farm PUD
3/30/2016

Drawdown estimated using Theis approach
Brockway Engineering, PLLC
HRZ

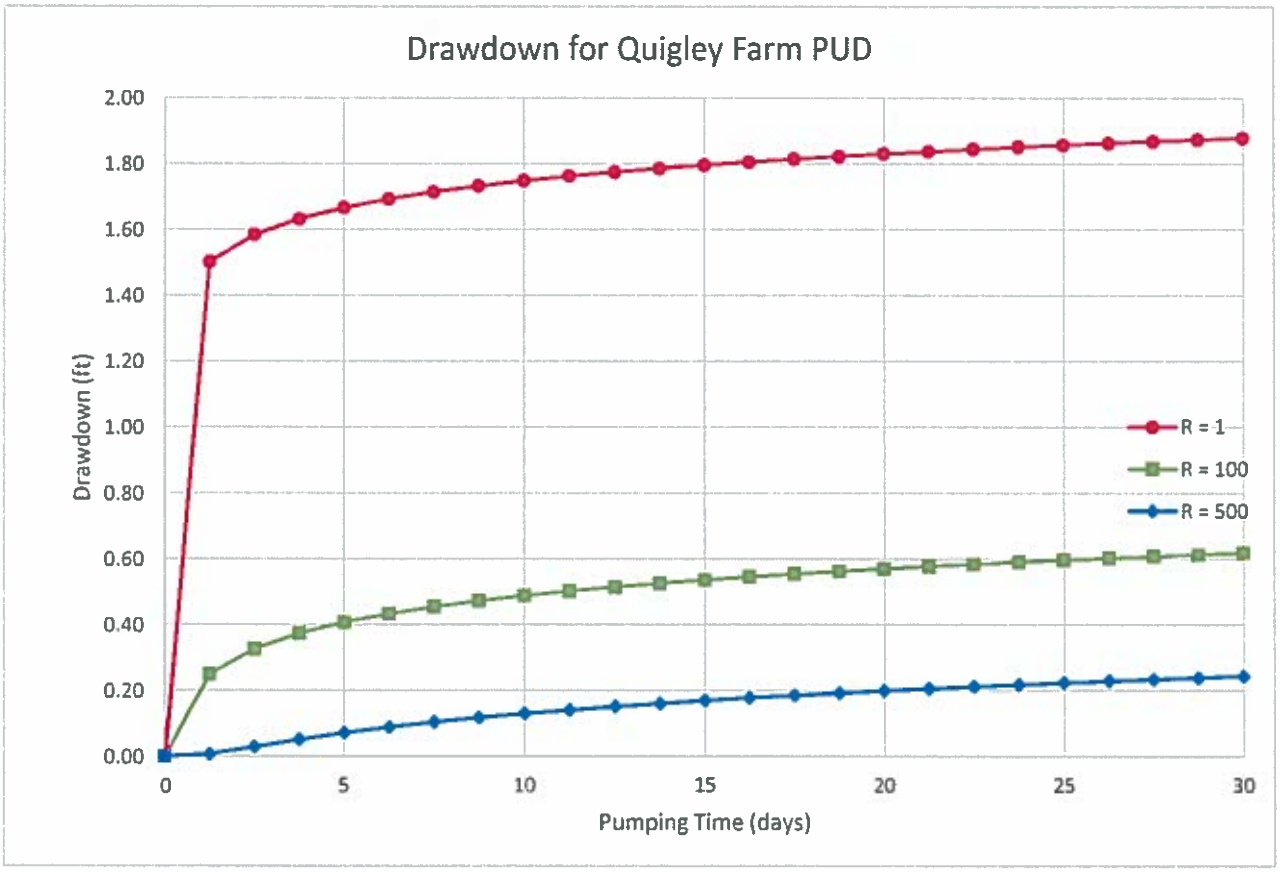
Hydraulic conductivity	100 ft/day				
Saturated thickness	40 feet				
Transmissitivity	29920 gpd/ft	Pumping rate	0.07 cfs or	31 gpm
Storage coefficient	0.15	Pumping time	720 hrs	
SWL	60 ft			
Pumping Level	61.88 ft			
Max drawdown	100.00			

Time		R = 1 feet			R = 100 feet			R = 500 feet		
(days)	(hrs)	u	W(u)	z (feet)	u	W(u)	z (feet)	u	W(u)	z (feet)
0.00	0	--	--	0.00	--	--	0.00	--	--	0.00
1.25	30	1.9E-06	12.610	1.50	7.5E-02	2.087	0.25	1.9E+00	0.058	0.01
2.50	60	9.4E-07	13.303	1.58	3.8E-02	2.743	0.33	9.4E-01	0.244	0.03
3.75	90	6.3E-07	13.708	1.63	2.5E-02	3.137	0.37	6.3E-01	0.432	0.05
5.00	120	4.7E-07	13.996	1.67	1.9E-02	3.418	0.41	4.7E-01	0.600	0.07
6.25	150	3.8E-07	14.219	1.69	1.5E-02	3.637	0.43	3.8E-01	0.746	0.09
7.50	180	3.1E-07	14.401	1.72	1.3E-02	3.817	0.45	3.1E-01	0.876	0.10
8.75	210	2.7E-07	14.556	1.73	1.1E-02	3.970	0.47	2.7E-01	0.991	0.12
10.00	240	2.3E-07	14.689	1.75	9.4E-03	4.102	0.49	2.3E-01	1.095	0.13
11.25	270	2.1E-07	14.807	1.76	8.3E-03	4.219	0.50	2.1E-01	1.189	0.14
12.50	300	1.9E-07	14.912	1.78	7.5E-03	4.323	0.51	1.9E-01	1.276	0.15
13.75	330	1.7E-07	15.008	1.79	6.8E-03	4.418	0.53	1.7E-01	1.356	0.16
15.00	360	1.6E-07	15.095	1.80	6.3E-03	4.504	0.54	1.6E-01	1.429	0.17
16.25	390	1.4E-07	15.175	1.81	5.8E-03	4.584	0.55	1.4E-01	1.498	0.18
17.50	420	1.3E-07	15.249	1.82	5.4E-03	4.657	0.55	1.3E-01	1.563	0.19
18.75	450	1.3E-07	15.318	1.82	5.0E-03	4.726	0.56	1.3E-01	1.623	0.193
20.00	480	1.2E-07	15.382	1.83	4.7E-03	4.790	0.57	1.2E-01	1.681	0.20
21.25	510	1.1E-07	15.443	1.84	4.4E-03	4.851	0.58	1.1E-01	1.735	0.21
22.50	540	1.0E-07	15.500	1.85	4.2E-03	4.908	0.58	1.0E-01	1.786	0.21
23.75	570	9.9E-08	15.554	1.85	3.9E-03	4.961	0.59	9.9E-02	1.835	0.22
25.00	600	9.4E-08	15.605	1.86	3.8E-03	5.013	0.60	9.4E-02	1.882	0.22
26.25	630	8.9E-08	15.654	1.86	3.6E-03	5.061	0.60	8.9E-02	1.926	0.23
27.50	660	8.5E-08	15.701	1.87	3.4E-03	5.108	0.61	8.5E-02	1.969	0.23
28.75	690	8.2E-08	15.745	1.88	3.3E-03	5.152	0.61	8.2E-02	2.010	0.24
30.00	720	7.8E-08	15.788	1.88	3.1E-03	5.194	0.62	7.8E-02	2.049	0.24
31.25	750	7.5E-08	15.829	1.89	3.0E-03	5.235	0.62	7.5E-02	2.087	0.25

WELL DRAWDOWN ESTIMATION
Quigley Farm PUD
3/30/2016

Drawdown estimated using Theis approach
Brockway Engineering, PLLC
HRZ

Hydraulic conductivity	100	ft/day				
Saturated thickness	40	feet				
Transmissitivity	29920	gpd/ft	Pumping rate	0.07	cfs or	31 gpm
Storage coefficient	0.15		Pumping time	720	hrs	
SWL	60	ft				
Pumping Level	61.88	ft				
Max drawdown	100.00					



WELL DRAWDOWN ESTIMATION
Quigley Farm PUD
3/30/2016

Drawdown estimated using Theis approach
Brockway Engineering, PLLC
HRZ

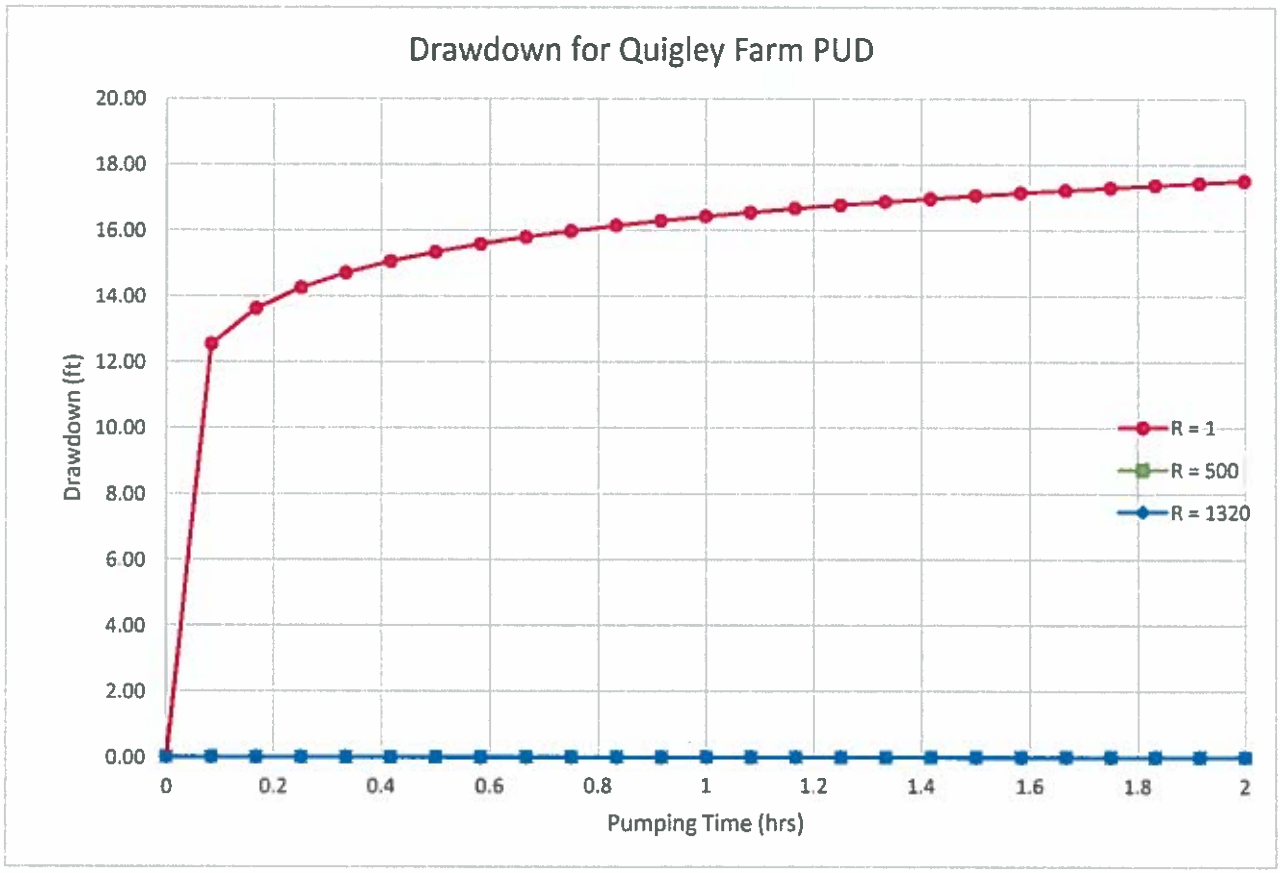
Hydraulic conductivity	150 ft/day				
Saturated thickness	98 feet				
Transmissitivity	109956 gpd/ft	Pumping rate	3.34 cfs or	1500 gpm
Storage coefficient	0.15	Pumping time	2 hrs	
SWL	60 ft			
Pumping Level	77.51 ft			

Time		R = 1 feet			R = 500 feet			R = 1320 feet		
(days)	(hrs)	u	W(u)	z (feet)	u	W(u)	z (feet)	u	W(u)	z (feet)
0.00	0	--	--	0.00	--	--	0.00	--	--	0.00
0.00	0.083333	1.8E-04	8.025	12.55	1.8E+02	0.000	0.00	1.3E+03	0.000	0.00
0.01	0.166667	9.2E-05	8.718	13.63	9.2E+01	0.000	0.00	6.4E+02	0.000	0.00
0.01	0.25	6.1E-05	9.124	14.26	6.1E+01	0.000	0.00	4.3E+02	0.000	0.00
0.01	0.333333	4.6E-05	9.411	14.71	4.6E+01	0.000	0.00	3.2E+02	0.000	0.00
0.02	0.416667	3.7E-05	9.635	15.06	3.7E+01	0.000	0.00	2.6E+02	0.000	0.00
0.02	0.5	3.1E-05	9.817	15.35	3.1E+01	0.000	0.00	2.1E+02	0.000	0.00
0.02	0.583333	2.6E-05	9.971	15.59	2.6E+01	0.000	0.00	1.8E+02	0.000	0.00
0.03	0.666667	2.3E-05	10.105	15.80	2.3E+01	0.000	0.00	1.6E+02	0.000	0.00
0.03	0.75	2.0E-05	10.222	15.98	2.0E+01	0.000	0.00	1.4E+02	0.000	0.00
0.03	0.833333	1.8E-05	10.328	16.15	1.8E+01	0.000	0.00	1.3E+02	0.000	0.00
0.04	0.916667	1.7E-05	10.423	16.29	1.7E+01	0.000	0.00	1.2E+02	0.000	0.00
0.04	1	1.5E-05	10.510	16.43	1.5E+01	0.000	0.00	1.1E+02	0.000	0.00
0.05	1.083333	1.4E-05	10.590	16.56	1.4E+01	0.000	0.00	9.8E+01	0.000	0.00
0.05	1.166667	1.3E-05	10.664	16.67	1.3E+01	0.000	0.00	9.1E+01	0.000	0.00
0.05	1.25	1.2E-05	10.733	16.78	1.2E+01	0.000	0.00	8.5E+01	0.000	0.000
0.06	1.333333	1.1E-05	10.798	16.88	1.1E+01	0.000	0.00	8.0E+01	0.000	0.00
0.06	1.416667	1.1E-05	10.858	16.98	1.1E+01	0.000	0.00	7.5E+01	0.000	0.00
0.06	1.5	1.0E-05	10.916	17.06	1.0E+01	0.000	0.00	7.1E+01	0.000	0.00
0.07	1.583333	9.7E-06	10.970	17.15	9.7E+00	0.000	0.00	6.7E+01	0.000	0.00
0.07	1.666667	9.2E-06	11.021	17.23	9.2E+00	0.000	0.00	6.4E+01	0.000	0.00
0.07	1.75	8.7E-06	11.070	17.31	8.7E+00	0.000	0.00	6.1E+01	0.000	0.00
0.08	1.833333	8.3E-06	11.116	17.38	8.3E+00	0.000	0.00	5.8E+01	0.000	0.00
0.08	1.916667	8.0E-06	11.161	17.45	8.0E+00	0.000	0.00	5.6E+01	0.000	0.00
0.08	2	7.7E-06	11.203	17.51	7.7E+00	0.000	0.00	5.3E+01	0.000	0.00
0.09	2.083333	7.3E-06	11.244	17.58	7.3E+00	0.000	0.00	5.1E+01	0.000	0.00

WELL DRAWDOWN ESTIMATION
Quigley Farm PUD
3/30/2016

Drawdown estimated using Theis approach
Brockway Engineering, PLLC
HRZ

Hydraulic conductivity	150 ft/day				
Saturated thickness	98 feet				
Transmissitivity	109956 gpd/ft	Pumping rate	3.34 cfs or	1500 gpm
Storage coefficient	0.15	Pumping time	2 hrs	
SWL	60 ft			
Pumping Level	77.51 ft			



WELL DRAWDOWN ESTIMATION
Quigley Farm PUD
3/30/2016

Drawdown estimated using Theis approach
Brockway Engineering, PLLC
HRZ

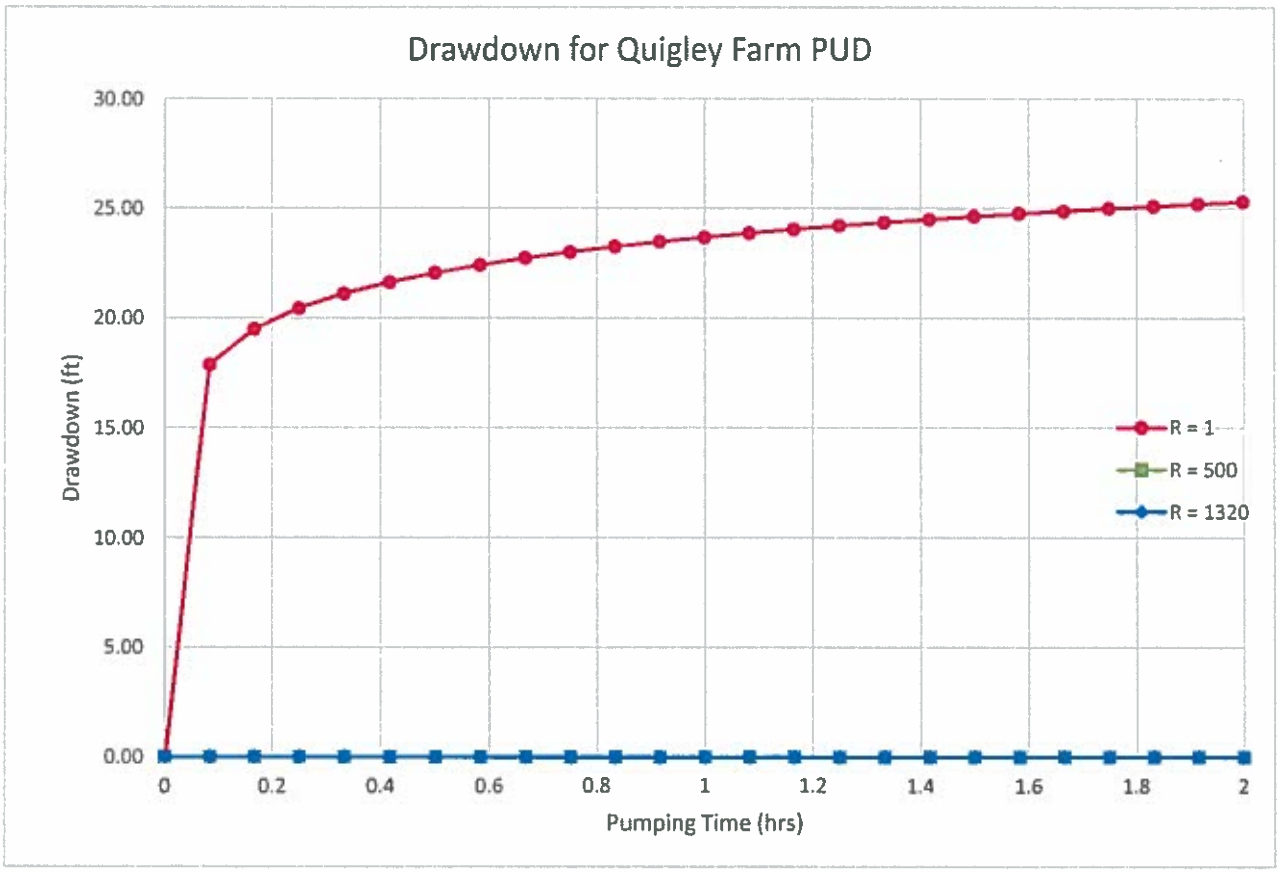
Hydraulic conductivity	100 ft/day				
Saturated thickness	98 feet				
Transmissitivity	73304 gpd/ft	Pumping rate	3.34 cfs or	1500 gpm
Storage coefficient	0.15	Pumping time	2 hrs	
SWL	60 ft			
Pumping Level	85.32 ft			

Time		R = 1 feet			R = 500 feet			R = 1320 feet		
(days)	(hrs)	u	W(u)	z (feet)	u	W(u)	z (feet)	u	W(u)	z (feet)
0.00	0	--	--	0.00	--	--	0.00	--	--	0.00
0.00	0.083333	2.8E-04	7.620	17.87	2.8E+02	0.000	0.00	1.9E+03	0.000	0.00
0.01	0.166667	1.4E-04	8.313	19.49	1.4E+02	0.000	0.00	9.6E+02	0.000	0.00
0.01	0.25	9.2E-05	8.718	20.44	9.2E+01	0.000	0.00	6.4E+02	0.000	0.00
0.01	0.333333	6.9E-05	9.006	21.12	6.9E+01	0.000	0.00	4.8E+02	0.000	0.00
0.02	0.416667	5.5E-05	9.229	21.64	5.5E+01	0.000	0.00	3.8E+02	0.000	0.00
0.02	0.5	4.6E-05	9.411	22.07	4.6E+01	0.000	0.00	3.2E+02	0.000	0.00
0.02	0.583333	3.9E-05	9.566	22.43	3.9E+01	0.000	0.00	2.7E+02	0.000	0.00
0.03	0.666667	3.4E-05	9.699	22.74	3.4E+01	0.000	0.00	2.4E+02	0.000	0.00
0.03	0.75	3.1E-05	9.817	23.02	3.1E+01	0.000	0.00	2.1E+02	0.000	0.00
0.03	0.833333	2.8E-05	9.922	23.27	2.8E+01	0.000	0.00	1.9E+02	0.000	0.00
0.04	0.916667	2.5E-05	10.018	23.49	2.5E+01	0.000	0.00	1.7E+02	0.000	0.00
0.04	1	2.3E-05	10.105	23.70	2.3E+01	0.000	0.00	1.6E+02	0.000	0.00
0.05	1.083333	2.1E-05	10.185	23.88	2.1E+01	0.000	0.00	1.5E+02	0.000	0.00
0.05	1.166667	2.0E-05	10.259	24.06	2.0E+01	0.000	0.00	1.4E+02	0.000	0.00
0.05	1.25	1.8E-05	10.328	24.22	1.8E+01	0.000	0.00	1.3E+02	0.000	0.000
0.06	1.333333	1.7E-05	10.392	24.37	1.7E+01	0.000	0.00	1.2E+02	0.000	0.00
0.06	1.416667	1.6E-05	10.453	24.51	1.6E+01	0.000	0.00	1.1E+02	0.000	0.00
0.06	1.5	1.5E-05	10.510	24.65	1.5E+01	0.000	0.00	1.1E+02	0.000	0.00
0.07	1.583333	1.5E-05	10.564	24.77	1.5E+01	0.000	0.00	1.0E+02	0.000	0.00
0.07	1.666667	1.4E-05	10.615	24.89	1.4E+01	0.000	0.00	9.6E+01	0.000	0.00
0.07	1.75	1.3E-05	10.664	25.01	1.3E+01	0.000	0.00	9.1E+01	0.000	0.00
0.08	1.833333	1.3E-05	10.711	25.12	1.3E+01	0.000	0.00	8.7E+01	0.000	0.00
0.08	1.916667	1.2E-05	10.755	25.22	1.2E+01	0.000	0.00	8.3E+01	0.000	0.00
0.08	2	1.1E-05	10.798	25.32	1.1E+01	0.000	0.00	8.0E+01	0.000	0.00
0.09	2.083333	1.1E-05	10.839	25.42	1.1E+01	0.000	0.00	7.7E+01	0.000	0.00

WELL DRAWDOWN ESTIMATION
Quigley Farm PUD
3/30/2016

Drawdown estimated using Theis approach
Brockway Engineering, PLLC
HRZ

Hydraulic conductivity	100	ft/day				
Saturated thickness	98	feet				
Transmissitivity	73304	gpd/ft	Pumping rate	3.34	cfs or	1500 gpm
Storage coefficient	0.15		Pumping time	2	hrs	
SWL	60	ft				
Pumping Level	85.32	ft				



WELL DRAWDOWN ESTIMATION
Quigley Farm PUD
3/30/2016

Drawdown estimated using Theis approach
Brockway Engineering, PLLC
HRZ

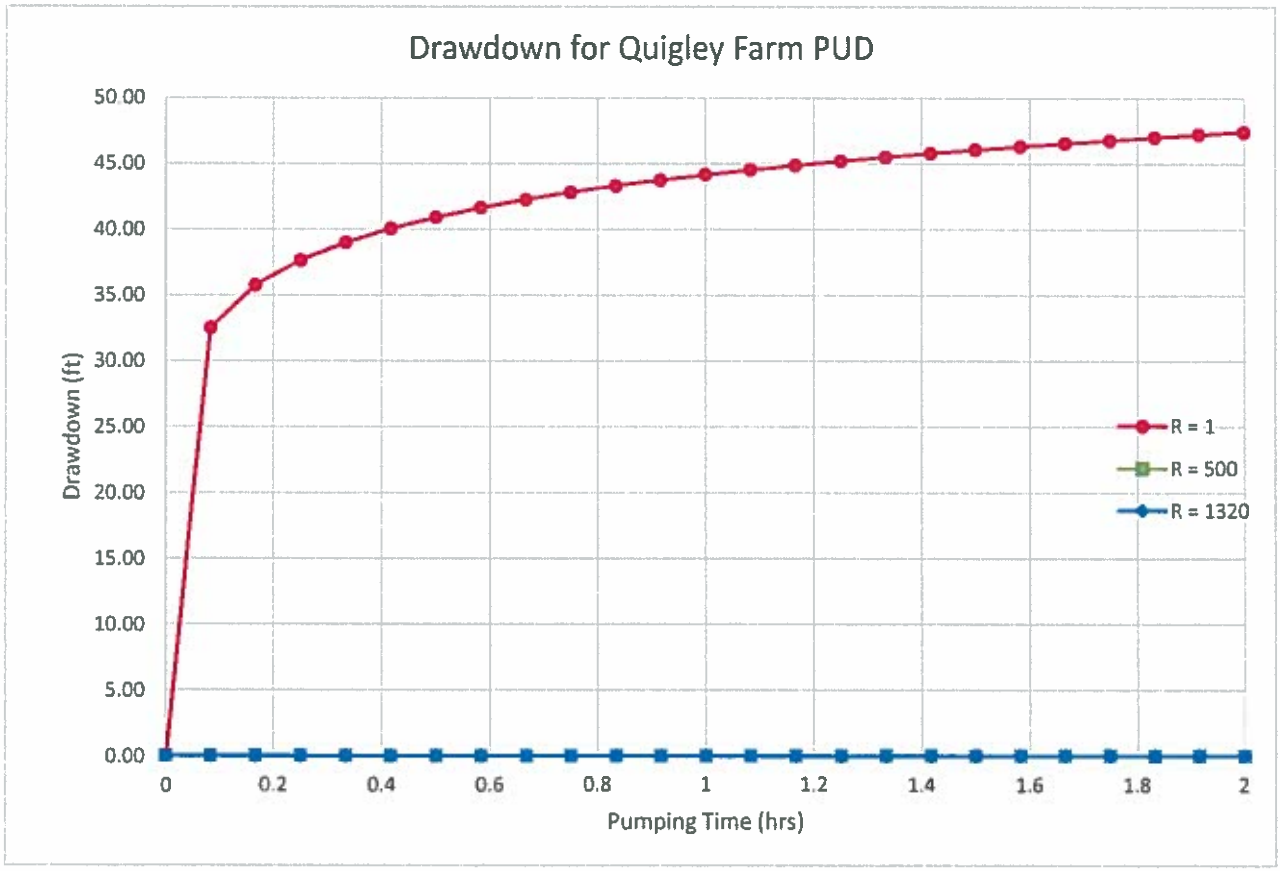
Hydraulic conductivity	50 ft/day				
Saturated thickness	98 feet				
Transmissitivity	36652 gpd/ft	Pumping rate	3.34 cfs or	1500 gpm	
Storage coefficient	0.15	Pumping time	2 hrs		
SWL	60 ft				
Pumping Level	107.39 ft				

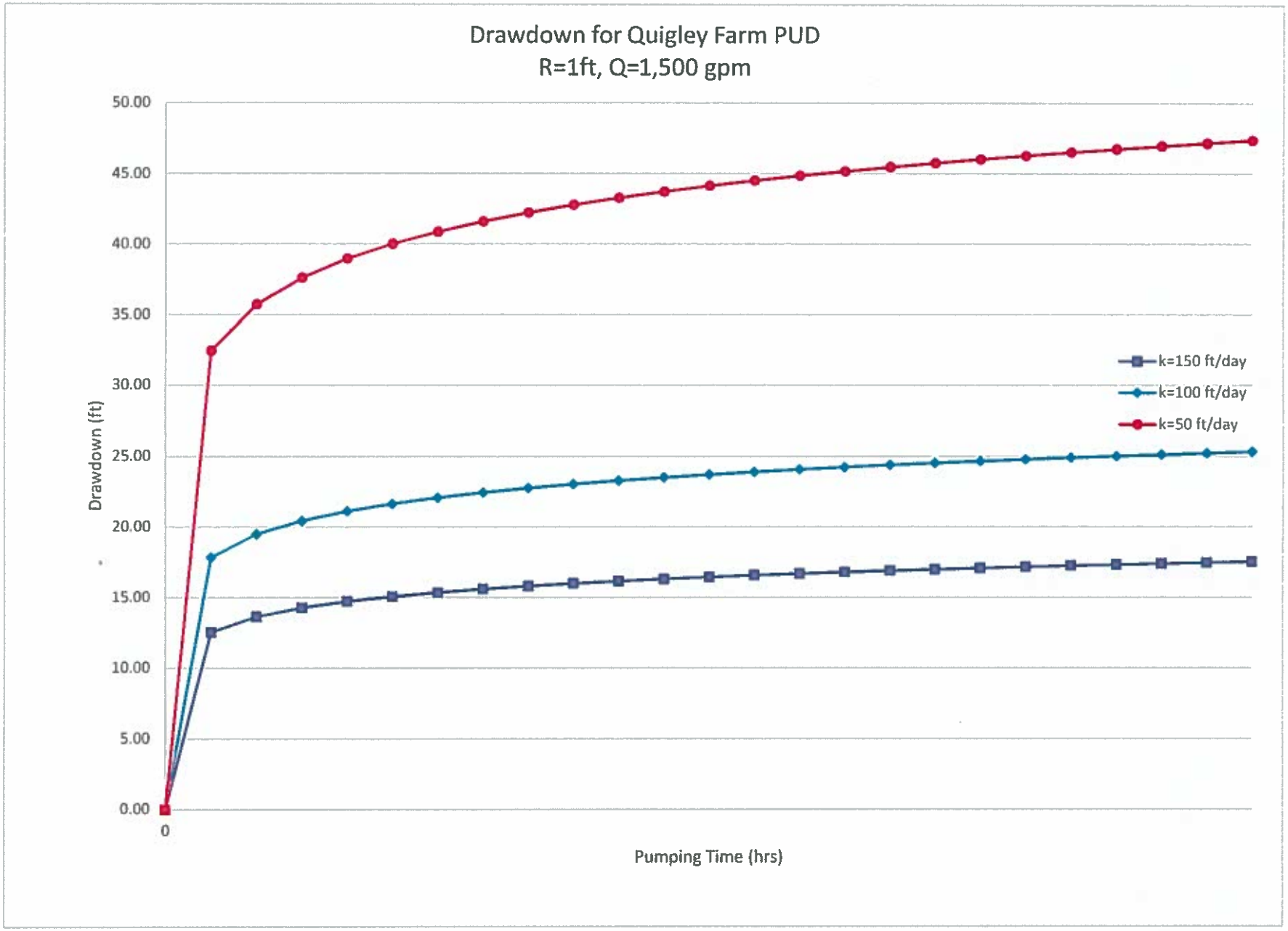
Time		R = 1 feet			R = 500 feet			R = 1320 feet		
(days)	(hrs)	u	W(u)	z (feet)	u	W(u)	z (feet)	u	W(u)	z (feet)
0.00	0	--	--	0.00	--	--	0.00	--	--	0.00
0.00	0.083333	5.5E-04	6.927	32.49	5.5E+02	0.000	0.00	3.8E+03	0.000	0.00
0.01	0.166667	2.8E-04	7.620	35.74	2.8E+02	0.000	0.00	1.9E+03	0.000	0.00
0.01	0.25	1.8E-04	8.025	37.64	1.8E+02	0.000	0.00	1.3E+03	0.000	0.00
0.01	0.333333	1.4E-04	8.313	38.99	1.4E+02	0.000	0.00	9.6E+02	0.000	0.00
0.02	0.416667	1.1E-04	8.536	40.03	1.1E+02	0.000	0.00	7.7E+02	0.000	0.00
0.02	0.5	9.2E-05	8.718	40.89	9.2E+01	0.000	0.00	6.4E+02	0.000	0.00
0.02	0.583333	7.9E-05	8.873	41.61	7.9E+01	0.000	0.00	5.5E+02	0.000	0.00
0.03	0.666667	6.9E-05	9.006	42.24	6.9E+01	0.000	0.00	4.8E+02	0.000	0.00
0.03	0.75	6.1E-05	9.124	42.79	6.1E+01	0.000	0.00	4.3E+02	0.000	0.00
0.03	0.833333	5.5E-05	9.229	43.29	5.5E+01	0.000	0.00	3.8E+02	0.000	0.00
0.04	0.916667	5.0E-05	9.324	43.73	5.0E+01	0.000	0.00	3.5E+02	0.000	0.00
0.04	1	4.6E-05	9.411	44.14	4.6E+01	0.000	0.00	3.2E+02	0.000	0.00
0.05	1.083333	4.2E-05	9.492	44.52	4.2E+01	0.000	0.00	3.0E+02	0.000	0.00
0.05	1.166667	3.9E-05	9.566	44.86	3.9E+01	0.000	0.00	2.7E+02	0.000	0.00
0.05	1.25	3.7E-05	9.635	45.19	3.7E+01	0.000	0.00	2.6E+02	0.000	0.000
0.06	1.333333	3.4E-05	9.699	45.49	3.4E+01	0.000	0.00	2.4E+02	0.000	0.00
0.06	1.416667	3.2E-05	9.760	45.77	3.2E+01	0.000	0.00	2.3E+02	0.000	0.00
0.06	1.5	3.1E-05	9.817	46.04	3.1E+01	0.000	0.00	2.1E+02	0.000	0.00
0.07	1.583333	2.9E-05	9.871	46.30	2.9E+01	0.000	0.00	2.0E+02	0.000	0.00
0.07	1.666667	2.8E-05	9.922	46.54	2.8E+01	0.000	0.00	1.9E+02	0.000	0.00
0.07	1.75	2.6E-05	9.971	46.76	2.6E+01	0.000	0.00	1.8E+02	0.000	0.00
0.08	1.833333	2.5E-05	10.018	46.98	2.5E+01	0.000	0.00	1.7E+02	0.000	0.00
0.08	1.916667	2.4E-05	10.062	47.19	2.4E+01	0.000	0.00	1.7E+02	0.000	0.00
0.08	2	2.3E-05	10.105	47.39	2.3E+01	0.000	0.00	1.6E+02	0.000	0.00
0.09	2.083333	2.2E-05	10.145	47.58	2.2E+01	0.000	0.00	1.5E+02	0.000	0.00

WELL DRAWDOWN ESTIMATION
Quigley Farm PUD
3/30/2016

Drawdown estimated using Theis approach
Brockway Engineering, PLLC
HRZ

Hydraulic conductivity	50 ft/day				
Saturated thickness	98 feet				
Transmissivity	36652 gpd/ft	Pumping rate	3.34 cfs or	1500 gpm
Storage coefficient	0.15	Pumping time	2 hrs	
SWL	60 ft			
Pumping Level	107.39 ft			




Drawdown for Quigley Farm PUD
R=1ft, Q=1,500 gpm
50.00
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
0
Drawdown (ft)
Pumping Time (hrs)
k=150 ft/day
k=100 ft/day
k=50 ft/day

Appendix E

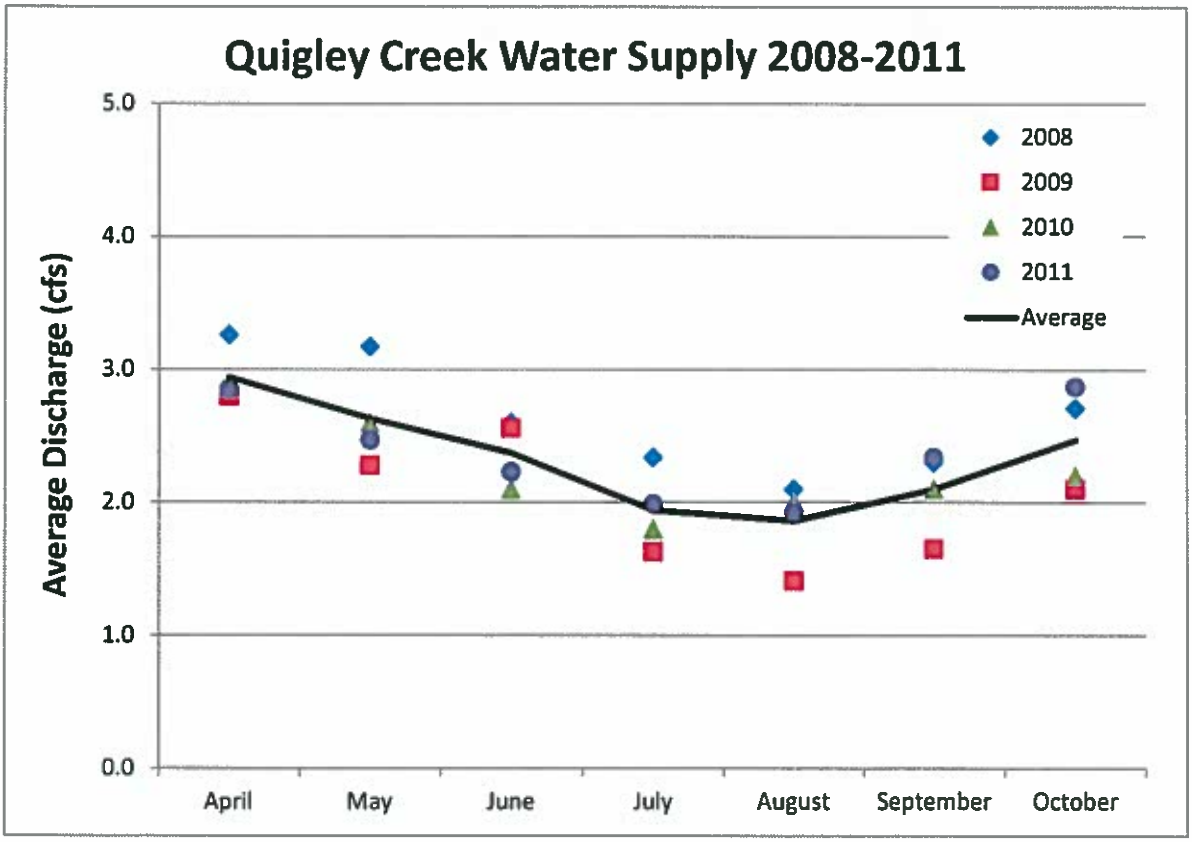
Quigley Creek Flow Measurements-Trent Stumph Data

Quigley Creek Flow Data from Trent Stumph
Oct. 2007 - Oct 2011

	2008	2009	2010	2011	Average	
April	3.3	2.8	2.9	2.9	2.9	cfs
May	3.2	2.3	2.6	2.5	2.6	cfs
June	2.6	2.6	2.1	2.2	2.4	cfs
July	2.3	1.6	1.8	2.0	1.9	cfs
August	2.1	1.4	2.0	1.9	1.9	cfs
September	2.3	1.7	2.1	2.3	2.1	cfs
October	2.7	2.1	2.2	2.9	2.5	cfs

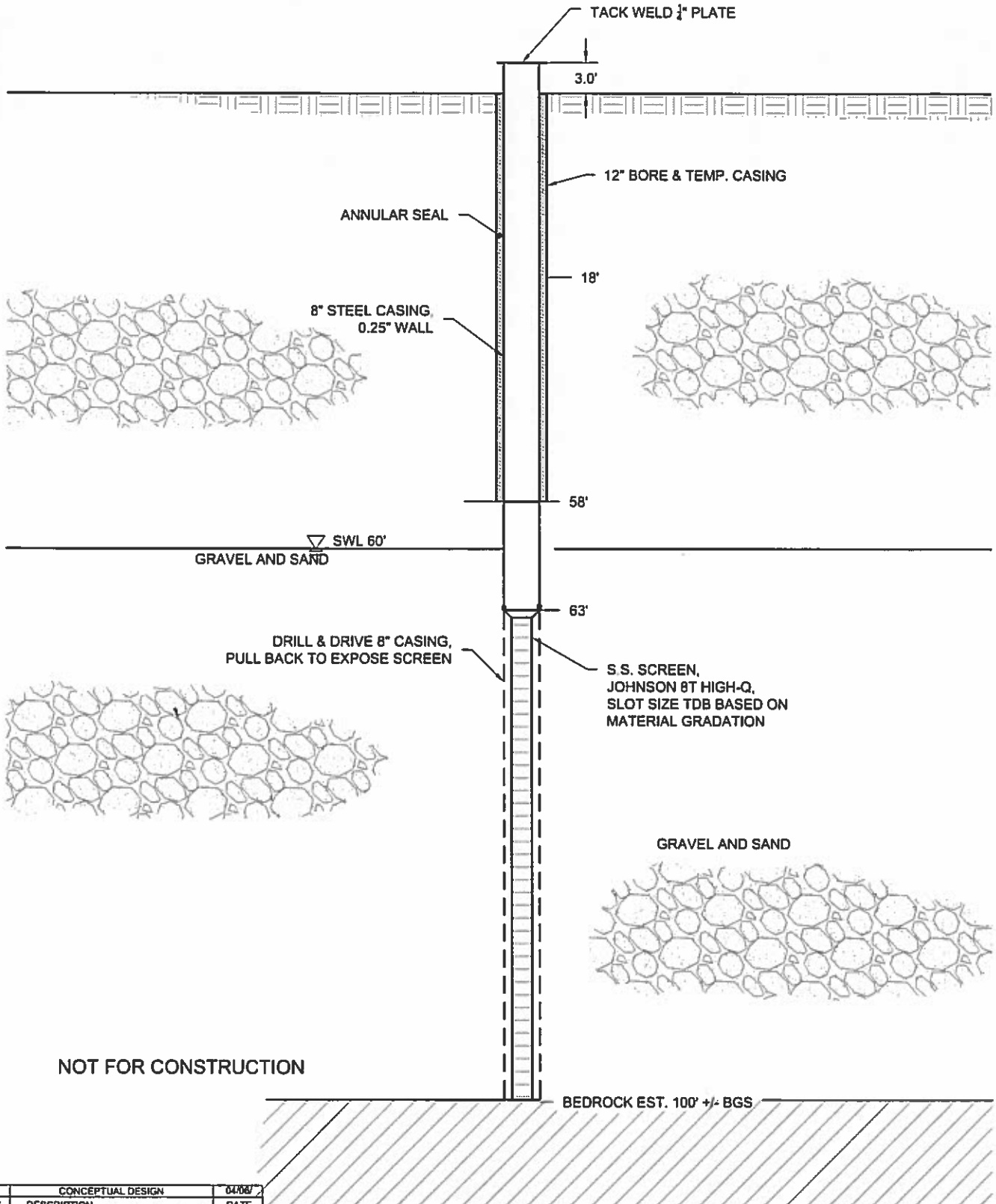
Flows in cubic feet per second (cfs)

5 yr Average	2.3	cfs
Standard Deviation	0.5	cfs



Brockway Engineering, PLLC
F:\Projects\Quigley Canyon Ranch\Water supply adequacy 2016\
Hennesey-Flow Sumary Transect 2 (T2).xlsx
4/7/2016

Appendix F
Typical Well Design



REV	DESCRIPTION	DATE
A	CONCEPTUAL DESIGN	04/06/

THIS DRAWING HAS BEEN PREPARED BY BROCKWAY ENGINEERING, PLLC FOR A SPECIFIC PROJECT TAKING INTO ACCOUNT THE SPECIFIC AND UNIQUE REQUIREMENTS OF THE PROJECT. REUSE OF THIS DRAWING FOR ANY PURPOSE IS PROHIBITED UNLESS WRITTEN PERMISSION FROM BOTH BROCKWAY ENGINEERING & THE CLIENT IS GRANTED.

SCALE N.T.S.

DESIGNED BY HRZ

DRAFTED BY HRZ/ALR

BROCKWAY ENGINEERING, PLLC
HYDRAULICS - HYDROLOGY - WATER RESOURCES
2016 NORTH WASHINGTON, SUITE 4
WTIN FALLS, ID 83301
(208) 736-8543

QUIGLEY FARM PUD

PWS WELL DIAGRAM

PROJECT # 1094-02-2016

DWG# 1

REV A

Appendix G

Water Quality for Quigley Canyon (Hopkins and Bartolino 2013)

Table 5. Nutrient concentrations and bacteria counts in groundwater and surface-water samples, Wood River Valley, south-central Idaho, July and August 2012.

[Site locations are shown in figure 2. Values exceeding U.S. Environmental Protection Agency guidelines in bold. Alternate name: C, confined aquifer; SW, surface water; T, bedrock aquifer in tributary canyon; U, unconfined aquifer. Abbreviations: *E. coli*, *Escherichia coli*; mg/L, milligram per liter; mL, milliliter; N, nitrogen; P, phosphorous; <, less than; –, no data available]

Site identification name or No.	Alternate name	Ammonia as N (mg/L)	Nitrate + Nitrite as N (mg/L)	Orthophosphate as P (mg/L)	*E. coli*, most probable number per 100 mL	Total coliform, most probable number per 100 mL
Big Wood River near Ketchum, Idaho	SW5	<0.010	<0.040	0.004	8.0	–
Warm Springs Creek near Ketchum, Idaho	SW4	<0.010	<0.040	0.008	11	–
East Fork Big Wood River at Gimlet, Idaho	SW3	<0.010	<0.040	0.005	2.0	–
Big Wood River at Hailey, Total Flow	SW2	<0.010	0.086	0.005	16	–
Big Wood River at Stanton Crossing near Bellevue, Idaho	SW1	<0.010	<0.040	0.008	39	–
01S 20E 30BAD1	C1	0.012	0.42	0.01	8.0	<1.0
01S 19E 21AAA1	C2	<0.010	0.38	0.01	<1.0	<1.0
01S 19E 20ABB1	C3	<0.010	0.32	0.01	<1.0	<1.0
01S 18E 13CCC1	C4	<0.010	0.64	0.01	<1.0	<1.0
01N 19E 29BAB1	C5	<0.010	0.87	0.008	<1.0	<1.0
03N 17E 25BDD1	T1	<0.010	0.72	0.02	<1.0	<1.0
03N 18E 09ADB1	T2	<0.010	0.19	0.005	<1.0	<1.0
03N 18E 03CAB1	T3	<0.010	<0.040	<0.004	<1.0	<1.0
04N 17E 15CCC1	T4	<0.010	0.30	0.007	<1.0	<1.0
05N 17E 36ABB1	T5	<0.010	<0.040	0.05	<1.0	–
05N 17E 14ADD1	T6	<0.010	0.23	0.007	<1.0	–
06N 17E 34DCB1	T7	<0.010	0.15	0.006	<1.0	<1.0
01S 20E 20CAB1	U1	0.019	0.60	0.006	55	2,400
01S 19E 03DDC3	U2	<0.010	2.3	0.01	<1.0	<1.0
01N 18E 36DDD1	U3	<0.010	1.1	0.007	<1.0	<1.0
01N 18E 35ACB1	U4	<0.010	1.6	0.01	<1.0	4.0
01N 18E 27AAA2	U5	<0.010	1.1	0.01	<1.0	<1.0
01N 18E 14DDB1	U6	<0.010	0.24	0.009	<1.0	<1.0
01N 19E 07BAC1	U7	<0.010	0.68	0.009	<1.0	<1.0
02N 18E 35DCD1	U8	<0.010	0.12	0.009	<1.0	<1.0
02N 18E 36DCA1	U9	<0.010	0.48	0.02	<1.0	<1.0
02N 18E 36ADC1	U10	0.017	0.75	0.009	<1.0	<1.0
02N 18E 22DDB1	U11	<0.010	0.31	0.009	<1.0	<1.0
02N 18E 19ABB1	U12	<0.010	1.2	0.02	<1.0	<1.0
02N 18E 15CCA1	U13	<0.010	0.98	0.01	<1.0	<1.0
02N 18E 10DBC1	U14	<0.010	0.89	0.02	<1.0	<1.0
03N 18E 33CAB1	U15	<0.010	1.9	0.013	<1.0	<1.0
03N 18E 32DBA1	U16	<0.010	0.56	0.008	<1.0	<1.0
03N 18E 29CCD1	U17	<0.010	0.31	0.01	<1.0	<1.0
03N 18E 29BDA1	U18	<0.010	0.52	0.009	<1.0	1.0
03N 18E 20DCC1	U19	<0.010	0.59	0.009	<1.0	<1.0
03N 18E 18AAA1	U20	<0.010	0.093	0.006	<1.0	<1.0
03N 18E 08BCC1	U21	<0.010	0.21	0.008	<1.0	2.0
04N 18E 31DDC1	U22	<0.010	0.11	0.008	<1.0	<1.0
04N 18E 30ADB3	U23	<0.010	0.14	0.009	<1.0	<1.0
04N 18E 19DCDC1	U24	<0.010	0.19	0.01	<1.0	<1.0
04N 17E 24AAA1	U25	<0.010	0.25	0.008	<1.0	–
04N 17E 13ABA1	U26	<0.010	0.15	0.01	<1.0	<1.0
04N 17E 12CDD1	U27	<0.010	1.5	0.02	<1.0	<1.0
04N 18E 07DCA1	U28	<0.010	0.18	0.01	<1.0	<1.0
04N 17E 01DCA1	U29	<0.010	0.11	0.008	<1.0	<1.0
04N 18E 05CAA1	U30	0.024	0.044	<0.004	<1.0	<1.0
04N 17E 01BBD1	U31	<0.010	0.23	0.02	<1.0	<1.0
05N 17E 36CBD1	U32	<0.010	0.30	0.02	<1.0	<1.0
05N 17E 14CBC1	U33	<0.010	0.17	0.005	<1.0	–

Table 4. Major ion and selected trace element concentrations in groundwater and surface-water samples, Wood River Valley, south-central Idaho, July and August 2012.

[Site locations are shown in figure 2. Values exceeding U.S. Environmental Protection Agency guidelines in bold. Alternate name: C, confined aquifer; SW, surface water; T, bedrock aquifer in tributary canyons; U, confined aquifer. Abbreviations: mg/L, milligram per liter; µg/L, microgram per liter; SiO_2, silicon dioxide; <, less than; –, no data available]

Site identification name or No.	Alternate name	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Fluoride (mg/L)	Silica, as SiO_2 (mg/L)	Boron (µg/L)	Iron (µg/L)	Manganese (µg/L)
Big Wood River near Ketchum, Idaho	SW5	27	2.4	2.8	0.33	0.88	4.6	0.18	11	4.1	4.2	0.97
Warm Springs Creek near Ketchum, Idaho	SW4	33	5.4	9.9	0.89	1.8	12	0.97	21	21	8.9	1.9
East Fork Big Wood River at Gimlet, Idaho	SW3	41	12	1.7	1.5	0.84	18	0.06	7.9	5.0	<3.2	1.1
Big Wood River at Hailey, Total flow	SW2	42	8.0	4.7	0.86	2.2	13	0.32	12	9.4	3.5	0.74
Big Wood River at Stanton Crossing near Bellevue, Idaho	SW1	46	8.8	5.5	1.2	2.3	12	0.30	16	13	23	33
01S 20E 30BAD1	C1	53	12	6.1	1.1	2.5	17	0.29	18	14	17	6.3
01S 19E 21AAA1	C2	46	8.9	4.6	0.87	2.2	16	0.27	14	8.4	<3.2	<0.16
01S 19E 20ABB1	C3	45	8.7	4.3	0.79	2.1	17	0.26	14	8.2	<3.2	<0.16
01S 18E 13CCC1	C4	48	8.9	3.9	0.75	2.6	17	0.26	15	8.2	<3.2	<0.16
01N 19E 29BAB1	C5	54	12	4.8	1.0	3.3	16	0.27	14	12	12	0.61
03N 17E 25BDD1	T1	56	4.9	6.1	0.99	1.8	18	0.66	24	13	7.9	0.54
03N 18E 09ADB1	T2	59	15	2.7	1.8	1.8	30	0.11	8.8	7.2	10	8.2
03N 18E 03CAB1	T3	69	19	5.0	2.9	3.7	41	0.12	11	8.1	1,200	16
04N 17E 15CCC1	T4	49	7.0	2.5	2.1	1.6	5.7	0.09	9.8	7.0	6.3	<0.16
05N 17E 36ABB1	T5	1.3	0.12	65	0.58	1.5	2	0.19	50	22	36	2.5
05N 17E 14ADD1	T6	46	15	1.4	0.70	0.69	15	0.07	6.1	5.3	<3.2	0.84
06N 17E 34DCB1	T7	47	14	1.0	0.49	0.57	14	0.08	6.5	3.8	<3.2	<0.16
01S 20E 20CAB1	U1	60	21	6.3	1.5	4.3	19	0.19	16	15	58	3.2
01S 19E 03DDC3	U2	76	15	5.0	1.2	4.6	17	0.18	17	11	<3.2	<0.16
01N 18E 36DDD1	U3	49	9.1	4.6	0.90	2.5	16	0.21	16	10	<3.2	1.5
01N 18E 35ACB1	U4	56	11	4.4	0.92	3.5	16	0.18	17	11	3.3	<0.16
01N 18E 27AAA2	U5	52	9.6	4.3	0.90	2.6	16	0.24	16	11	4.3	<0.16
01N 18E 14DDB1	U6	37	7.1	4.6	0.93	2.1	13	0.32	13	9.2	<3.2	<0.16
01N 19E 07BAC1	U7	57	12	5.1	0.96	4.5	17	0.25	15	11	4.2	<0.16
02N 18E 35DCD1	U8	63	12	5.4	1.3	2.5	42	0.38	13	11	26	1.1
02N 18E 36DCA1	U9	69	13	6.0	1.0	5.4	16	0.31	12	12	3.7	0.18
02N 18E 36ADC1	U10	42	19	5.5	1.1	3.1	12	0.17	12	16	<3.2	0.29
02N 18E 22DDB1	U11	62	11	5.7	1.3	4.0	16	0.41	13	12	14	0.69
02N 18E 19ABB1	U12	53	6.6	4.1	0.81	2.6	19	0.09	27	10	8.4	0.96
02N 18E 15CCA1	U13	70	14	7.4	1.6	15	19	0.27	14	14	<3.2	<0.16
02N 18E 10DBC1	U14	56	25	13	2.2	5.4	34	0.46	17	37	<3.2	<0.16
03N 18E 33CAB1	U15	57	19	4.9	1.3	4.1	16	0.10	15	14	<3.2	2.3
03N 18E 32DBA1	U16	57	13	5.0	1.1	4.8	18	0.33	12	12	19	1.1
03N 18E 29CCD1	U17	43	7.6	5.3	0.90	1.6	14	0.42	15	11	<3.2	<0.16
03N 18E 29BDA1	U18	51	14	4.5	1.2	3.2	21	0.27	11	11	4.3	<0.16
03N 18E 20DCC1	U19	54	13	5.9	1.1	7.0	19	0.35	12	13	<3.2	0.78
03N 18E 18AAA1	U20	50	8.8	4.9	0.73	2.3	11	0.38	13	10	<3.2	<0.16
03N 18E 08BCC1	U21	60	9.5	5.5	0.85	3.3	12	0.39	12	11	<3.2	<0.16
04N 18E 31DDC1	U22	44	10	4.3	0.80	2.8	15	0.36	11	9.5	<3.2	<0.16
04N 18E 30ADB3	U23	41	11	4.1	1.0	2.4	15	0.38	11	11	5.3	<0.16
04N 18E 19DCDC1	U24	42	11	3.8	1.1	2.3	16	0.27	12	9.5	<3.2	<0.16
04N 17E 24AAA1	U25	46	7.4	5.5	0.92	3.3	12	0.45	13	13	<3.2	<0.16
04N 17E 13ABA1	U26	42	6.2	3.0	0.62	1.8	8.5	0.13	12	5.4	7.9	<0.16
04N 17E 12CDD1	U27	54	8.0	15	1.3	7.9	18	1.3	22	31	<3.2	<0.16
04N 18E 07DCA1	U28	54	20	2.1	1.28	1.2	29	0.12	8.8	8.0	<3.2	<0.16
04N 17E 01DCA1	U29	42	8.3	3.0	0.48	2.6	9.8	0.13	12	5.6	3.8	<0.16
04N 18E 05CAA1	U30	190	71	16	9.8	9.8	300	0.32	10	33	96	49
04N 17E 01BBD1	U31	42	8.9	2.9	0.70	2.0	8.5	0.11	12	5.7	<3.2	<0.16
05N 17E 36CBD1	U32	45	10	3.1	0.79	2.4	9.6	0.10	14	6.0	<3.2	<0.16
05N 17E 14CBC1	U33	44	6.8	4.5	0.55	3.9	7.4	0.16	11	6.9	<3.2	<0.16

Table 3. Physical parameters of groundwater and surface-water samples, Wood River Valley, south-central Idaho, July and August 2012.—Continued

[Site locations are shown in figure 2. Values exceeding U.S. Environmental Protection Agency guidelines (from table 2) in bold. Alternate name: C, confined aquifer; SW, surface water; T, bedrock aquifer in tributary canyon, U, unconfined aquifer. Abbreviations: $CaCO_3$, calcium carbonate; °C, degrees Celsius; HH MM, hour minute; mg/L, milligram per liter; µS/cm, microsiemens per centimeter at 25 degrees Celsius, M, presence verified but not quantified, –, no data available]

Site identification name or No.	Alternate name	Sample date	Sample time	Water temperature, field (°C)	Specific conductance, field (µS/cm)	Dissolved oxygen (mg/L)	pH	Total dissolved solids (mg/L)	Alkalinity (mg/L as $CaCO_3$)
01S 20E 30BAD1	C1	07-18-2012	1230	11.6	341	7.5	8.6	216	176
01S 19E 21AAA1	C2	07-18-2012	0820	8.9	272	7.7	7.8	172	129
01S 19E 20ABB1	C3	07-16-2012	0845	9.1	288	9.3	6.9	177	141
01S 18E 13CCC1	C4	07-18-2012	1000	9.8	296	9.9	9.8	180	135
01N 19E 29BAB1	C5	07-25-2012	1005	11.1	349	7.9	8.0	205	159
03N 17E 25BDD1	T1	07-17-2012	1530	9.0	333	8.1	9.0	220	172
03N 18E 09ADB1	T2	07-12-2012	0915	8.8	371	6.2	8.0	222	170
03N 18E 03CAB1	T3	07-17-2012	1235	10.8	464	<2	7.9	276	205
04N 17E 15CCC1	T4	07-25-2012	1205	11.9	287	5.7	8.1	146	112
05N 17E 36ABB1	T5	07-09-2012	1035	13.6	259	0.40	9.7	206	142
05N 17E 14ADD1	T6	07-09-2012	1310	9.4	314	8.0	7.7	182	160
06N 17E 34DCB1	T7	07-19-2012	1500	13.9	303	8.4	7.5	185	168
01S 20E 20CAB1	U1	07-18-2012	1205	18.8	429	8.4	8.6	257	211
01S 19E 03DDC3	U2	07-16-2012	1415	11.2	460	8.2	7.8	268	204
01N 18E 36DDD1	U3	07-23-2012	1520	11.1	311	8.2	7.4	186	138
01N 18E 35ACB1	U4	07-16-2012	1235	11.8	348	9.9	8.0	208	155
01N 18E 27AAA2	U5	07-12-2012	1445	12.0	315	8.8	7.6	196	150
01N 18E 14DDB1	U6	07-24-2012	1245	8.5	232	8.9	6.3	146	112
01N 19E 07BAC1	U7	07-16-2012	1045	11.0	367	6.7	8.0	213	165
02N 18E 35DCD1	U8	07-12-2012	1215	9.5	387	4.7	7.8	157	29.0
02N 18E 36DCA1	U9	07-12-2012	1335	8.9	400	4.3	7.9	248	204
02N 18E 36ADC1	U10	07-25-2012	0850	14.0	340	9.4	8.0	181	139
02N 18E 22DDB1	U11	07-12-2012	1050	8.1	376	3.1	7.9	224	181
02N 18E 19ABB1	U12	07-23-2012	1320	10.5	301	7.7	7.6	189	120
02N 18E 15CCA1	U13	07-17-2012	1400	10.4	458	5.8	8.0	265	200
02N 18E 10DBC1	U14	07-24-2012	1345	14.6	487	8.3	8.3	283	212
03N 18E 33CAB1	U15	07-11-2012	1250	10.5	407	7.6	8.0	246	199
03N 18E 32DBA1	U16	07-10-2012	1530	13.9	363	5.1	7.8	219	176
03N 18E 29CCD1	U17	07-10-2012	1150	9.1	267	5.5	8.2	162	122
03N 18E 29BDA1	U18	07-11-2012	1050	9.7	344	4.8	8.1	201	156
03N 18E 20DCC1	U19	07-11-2012	1430	9.5	358	–	8.1	213	165
03N 18E 18AAA1	U20	07-19-2012	1000	8.7	304	7.0	8.1	176	142
03N 18E 08BCC1	U21	07-11-2012	0920	8.5	365	4.6	7.8	209	174
04N 18E 31DDC1	U22	07-10-2012	1015	7.6	290	3.8	8.0	171	137
04N 18E 30ADB3	U23	07-10-2012	0900	7.9	282	4.7	8.1	168	137
04N 18E 19DCDC1	U24	07-23-2012	1120	10.9	290	5.5	8.1	160	117
04N 17E 24AAA1	U25	07-23-2012	1055	8.5	284	4.6	8.0	166	128
04N 17E 13ABA1	U26	07-24-2012	1000	7.8	247	5.1	7.8	151	127
04N 17E 12CDD1	U27	07-24-2012	1020	11.9	361	8.0	7.9	233	166
04N 18E 07DCA1	U28	07-23-2012	1020	8.8	393	8.2	–	220	172
04N 17E 01DCA1	U29	07-24-2012	1050	7.1	260	6.1	8.0	156	129
04N 18E 05CAA1	U30	07-10-2012	1345	11.6	1,210	1.4	6.8	863	426
04N 17E 01BBD1	U31	07-18-2012	1420	8.9	259	5.8	8.9	154	127
05N 17E 36CBD1	U32	07-18-2012	1500	7.5	290	6.2	8.5	168	135
05N 17E 14CBC1	U33	07-09-2012	0900	9.2	266	5.3	8.0	158	130

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February 2016

QUIGLEY FARM
WASTEWATER TREATMENT SYSTEM
HAILEY, IDAHO

Wastewater Infrastructure

Schematic Design Report

Omega Institute, Rhinebeck, NY

Omnilife Stadium, Jalisco, Mexico

Biohabitats
CASCADIA BIOREGION

Design Team Contributors:

Biohabitats, Inc.
SERA Architects
WH Pacific
Benchmark Associates
Butler Associates, Inc.

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Acronyms and Abbreviations

BOD	Biochemical Oxygen Demand
BEG	Below Existing Grade
CFS	Cubic Feet per Second
DO	Dissolved oxygen
FOG	Fats, Oils, and Grease
GPD	Gallons per Day
GPM	Gallons per Minute
HRT	Hydraulic retention time
IDAPA	Idaho Administrative Code
IDEQ	Department of Environmental Quality (Idaho)
IDEQ TGM	IDEQ Individual and Subsurface Sewage Disposal System Technical Guidance Manual
LSAS	Large Soil Absorption System
NGVD	National Geodetic Vertical Datum
NH_4	Ammonia Nitrogen
NO_3	Nitrate Nitrogen
NOAA	National Oceanic and Atmospheric Administration
NSF	Net square feet
NTU	Nephelometric Turbidity Units
Org. N	Organic Nitrogen
PPM	Parts per Million
SDC	System Development Charge
TN	Total Nitrogen
TP	Total Phosphorous
TSS	Total Suspended Solids
UIC	Underground Injection Control
USEPA	United States Environmental Protection Agency
UV	Ultraviolet
WWTF	Wastewater Treatment Facility

1 Overview

1.1 Background and Purpose

Quigley Farm is a rural neighborhood development dedicated to building a thriving and restorative community through collaborations and partnerships that produce sustainable economic, social, and environmental benefits. Quigley Farm is located within Quigley Canyon, which lies immediately adjacent to the eastern edge of the City of Hailey. The project encompasses over 1,500 acres of mixed agricultural, sage, and forested land nestled into the rolling hills and smaller side canyons that comprise the foothills of the Pioneer Mountains. The site has a water right from 1880 and perennial stream flowing through the property.

The full buildout of the development includes the following elements:

- Residential: 136 lots, ranging in size from 5,000 square feet to 5 acres.
- Mixed Use Village Core: 40,000 square feet of retail and office space
- Inn/Hotel: 25 keys
- Sage School: Relocating existing school to serve grades 6-12 and 4 associated residential lots for school housing
- Higher Education Campus
- Event Space: capacity for 250 guests
- Community Park: ballfields and green space
- Trailhead: access to trails with public restrooms open year round
- Greenhouses and Community Agriculture

Construction of the development will occur in three phases. Phases 1 and 2 are located on the west side of the development and encompass the majority of the project elements listed above. Phase 3 consists of three clusters of eight larger residential lots on the northeast side of the development. Figure 1 depicts the three phases.

Although the project site is located outside of the city limits of Hailey, there is an existing city owned well and water infrastructure on the site and the project will utilize either the municipal water supply or a privately owned well onsite. The project will follow the Idaho Administrative Code (IDAPA) 58.01.03 – Individual/Subsurface Sewage Disposal Rules, IDAPA 58.01.16 – Wastewater Rules, IDAPA 58.01.17 – Recycled Water Rules, and *Idaho Department of Environmental Quality (IDEQ) Technical Guidance Manual for Individual and Subsurface Sewage Disposal Systems* (April 2015) for large soil absorption systems (LSAS).

Wastewater will be collected, treated, and dispersed or reused onsite. Wastewater will be collected from residences, commercial properties, schools, and public restrooms via a Small Diameter Collection System that utilizes STEP/STEG technology (septic tank effluent pumping / septic tank effluent gravity tanks). There will be a community-scale wastewater treatment system located near the Community Park/Ballfields to serve Phases 1 and 2, engineered to produce a Class A non-potable water supply. Residential lots in Phase 3 will be served by one of three cluster wastewater treatment systems. The wastewater treatment systems will be sized and designed to meet the demands of the full buildout. Construction of wastewater infrastructure will likely occur with the phases of development, with additional land area set aside to meet future development.

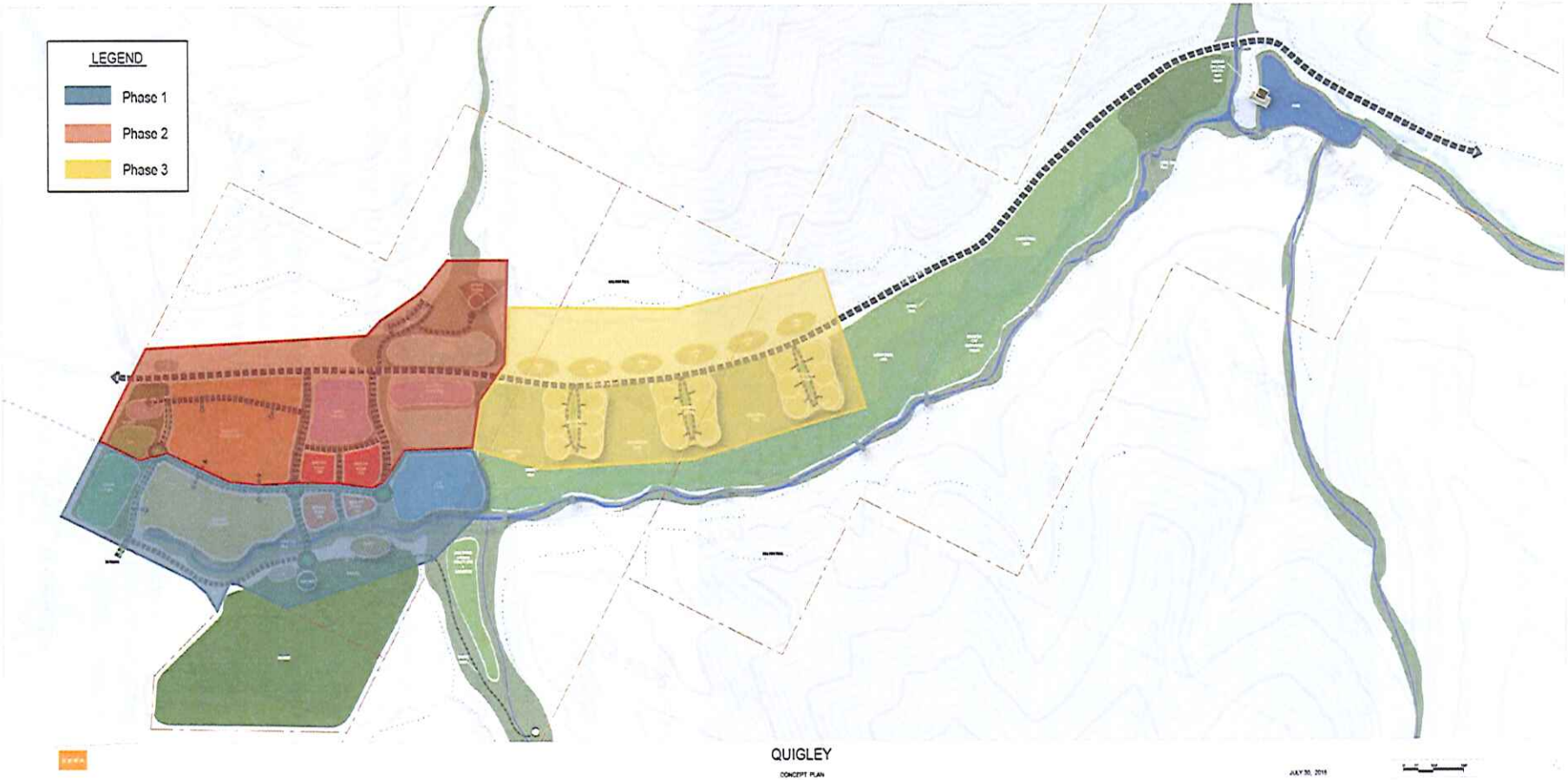


Figure 1. Quigley Farm Development Phasing

1.2 Site Location and General Description

The Quigley Farm project site is located within Quigley Canyon, immediately adjacent to the eastern edge of the City of Hailey, Blaine County, Idaho. Quigley Drive (NF-115) currently runs along the north property line into the canyon. Quigley Creek flows into the property from the west into Quigley Pond.

Figure 2. Quigley Farm project site

2 Design Principles

The following design criteria were used in developing a viable decentralized water infrastructure strategy that meets the project objectives and goals and satisfies water quality requirements set forth by the regulating authority.

Simple to construct - local contractors should be able to build the system without resorting to specialized equipment or contractors. The design should avoid proprietary equipment that requires specially trained repairmen.

Simple to operate - the system should require minimal operator involvement. High rate processes should be avoided, as they require near-constant supervision. The design should rely on biologically robust, low-energy technologies with relatively longer detention times. Mechanically simple systems have fewer pieces of complex equipment that will need to be repaired or replaced.

Simple to maintain - small community and building-specific wastewater systems should be designed to operate using equipment that is readily available from the local suppliers. Ideally, no piece of equipment should be more complicated than a pump.

3 Site Analysis

3.1 Climate Influences

Hailey, Idaho is located at an elevation of approximately 5,300 feet above sea level and characterized by cold, snowy winters and warm, dry summers. The snowy season is generally October to April and the dry, warm season is generally May to September. The nearest NOAA weather station is located at the Ketchum Ranger Station, approximately 18 miles north of the project site. The elevation of the weather station is 5,890 feet, latitude 43.6840° N, longitude 114.3600° W, GHCND:USC00104845. The retrieved data set is from 1981-2010.

Average annual snowfall is 113 inches and average annual precipitation (which includes snowmelt) is 18 inches. Reference grass evapotranspiration (ET_0), a baseline measure of potential water used by a well-watered green field, was estimated for the site by the ASCE Standardized Penman-Monteith method. Average annual reference evapotranspiration is 39.7 inches. 79% of the annual evapotranspiration occurs during the dry summer months of May to September. Monthly temperature, relative humidity, precipitation, and evaporation rates are presented in Figures 2 and 3.

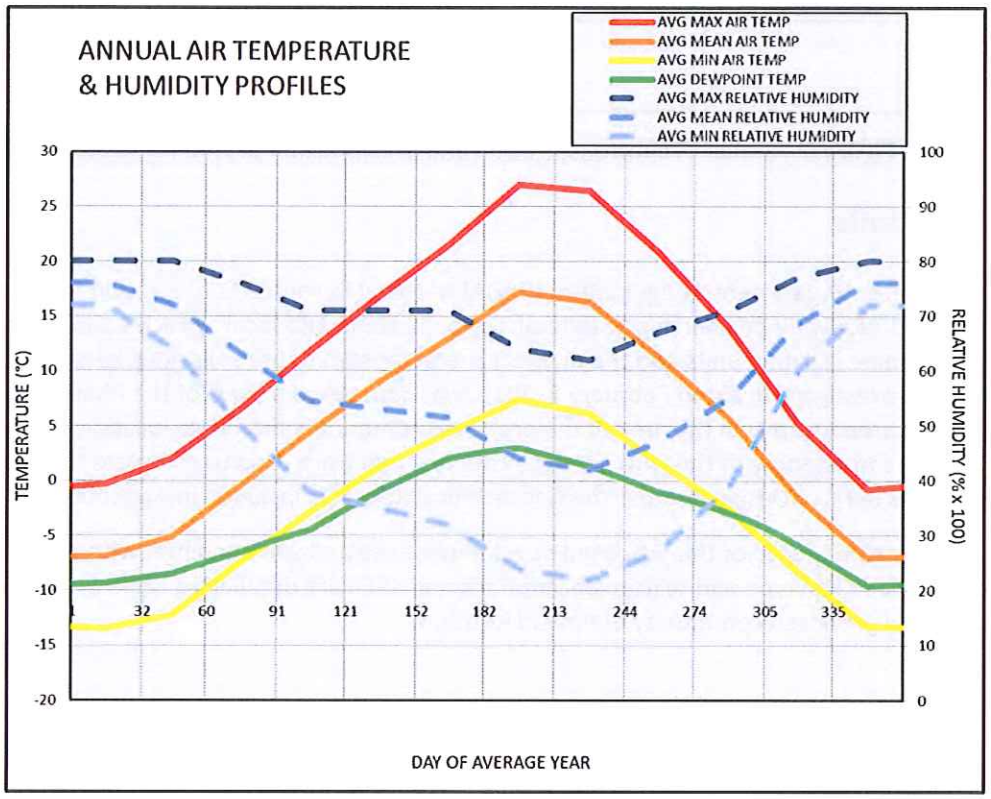


Figure 2. Annual air temperature and humidity profile for Ketchum, ID

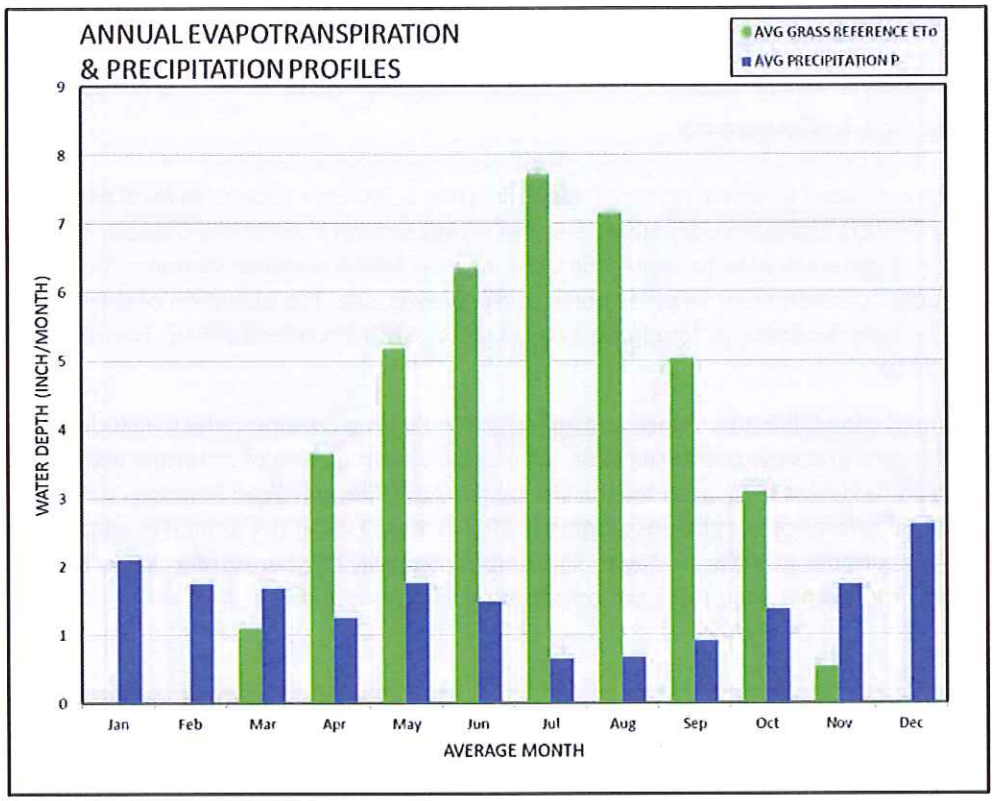


Figure 3. Annual evapotranspiration and precipitation profile for Ketchum, ID

3.2 Site Soils

The United States Department of Agriculture (USDA) National Resource Conservation Service (NRCS) Web Soil Survey, a nationwide partnership of federal, regional, state, and local agencies and institutions, was used to determine soil map units and the physical characteristics of the soils at Quigley Farm. A Geotechnical Investigation, dated February 2, 2016, was completed as part of the Phase 1 PUD application, and included three test pits in the area of the proposed community drainfield location for Phases 1 & 2. Findings were consistent with the NRCS Web Soil Survey, and were used to complete the preliminary design outlined in this Basis of Design Report. The Geotechnical Report is included in Appendix A.

Figure 4 is a satellite photo of the proposed development site and surroundings, with representative NRCS soil types labeled. Soil type and texture descriptions per NRCS are detailed in Table 1. Figure 5 presents the test pit and proposed community drainfield location.

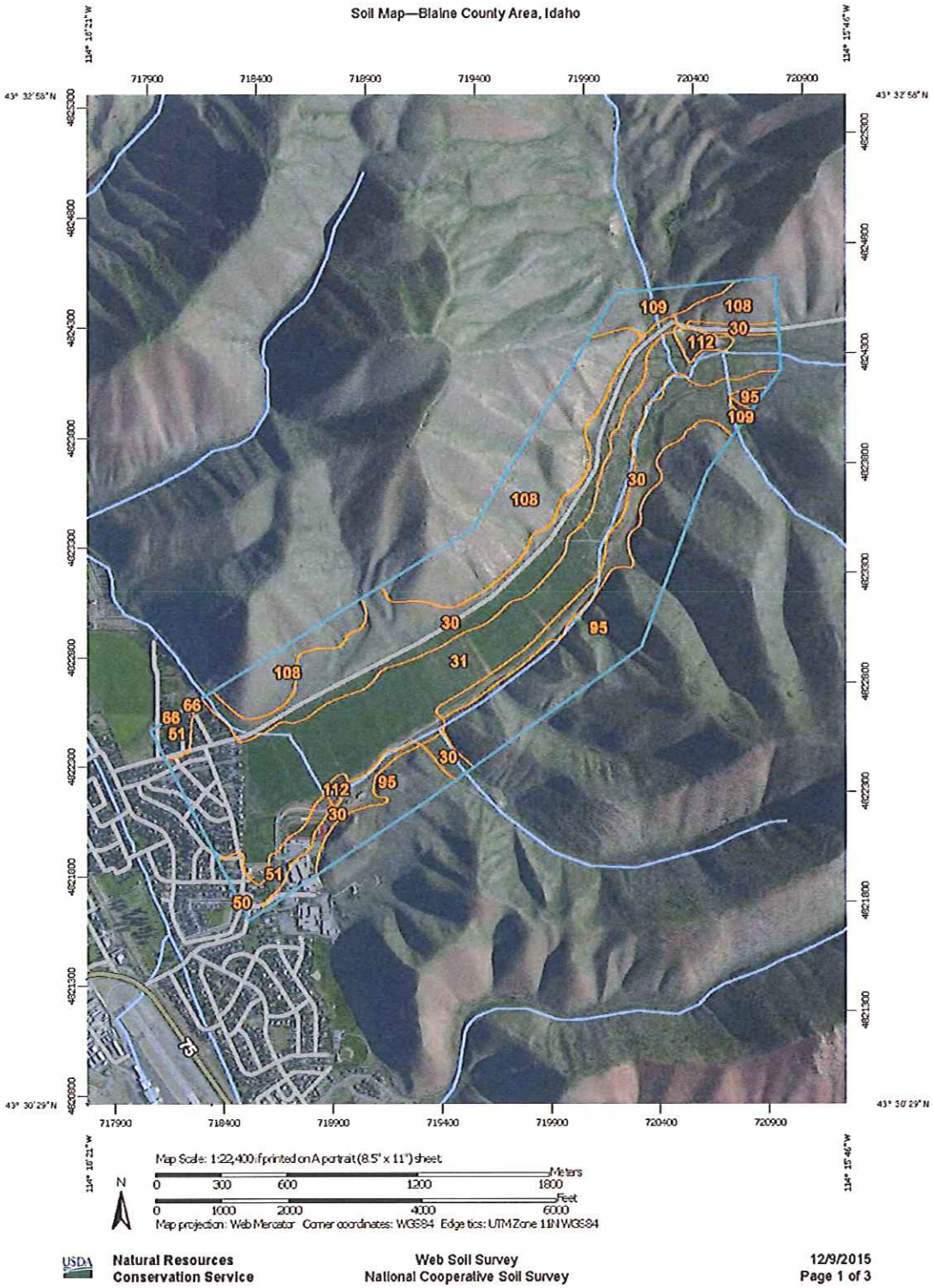


Figure 4. USDA NRCS soil map for Quigley Farm and surrounding areas

Table 1 – Site and adjacent land soil types

SYMBOL	*UNIT NAME*	*SURFACE TEXTURE*
30	Drage gravelly loam, cool, 2-15% slopes	Gravelly loam
31	Drage very gravelly loam, cool, 0-3% slopes	Very gravelly loam
50	Hutton variant clay loam, 0-2% slopes	Clay loam
51	Isknat gravelly clay loam, 0-2% slopes	Gravelly clay loam
66	Little Wood very gravelly loam, 0-2% slopes	Very gravelly loam
95	Povey-Vitale association, 30-60% slopes	Gravelly loam
108	Vitale-Milligan complex, 30-60% slopes	Very gravelly loam
109	Vitale-Povey association, 30-60% slopes	Very gravelly loam
112	Water	

The project site is composed of predominately Drage very gravelly loam (0-3 percent slope), and this soil series is mapped in the areas of the proposed drainfields.

Drage soils are very deep, well drained soils found on stream terraces at elevations of 5,000 to 6,100 feet. The soils are greyish brown to brown in color. A typical profile is as follows:

- 0 to 14 inches: very gravelly loam
- 14 to 30 inches: very gravelly clay loam
- 30 to 61 inches: extremely gravelly sandy loam.

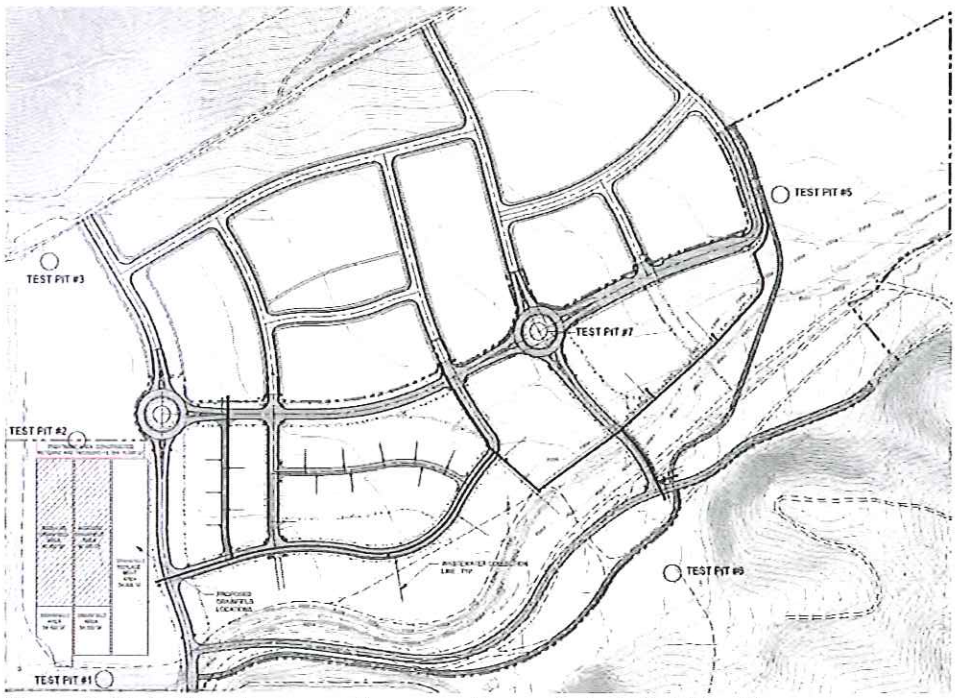


Figure 5. Test pit and proposed community-scale drainfield location

Three test pits were completed in the area of the proposed primary, secondary, and reserve drainfields (test pit #s 1, 2, and 3 in Geotechnical Report prepared by Butler and Associates). A sieve analysis was also conducted for test pits 1 and 2 from a sample collected at 4 feet below existing grade (BEG) and 3 feet BEG,

respectively. The results of the sieve analysis are summarized in Table 2. The soil logs and sieve analysis reports are included in Appendix A.

Table 2 – Test pit sieve analysis results

TEST PIT #	*% SAND*	*% SILT*	*% CLAY*	*% GRAVEL*	*SOIL TEXTURAL CLASS*	*DESIGN SUBGROUP*	*LOADING RATE[1] (gpd/ft²)*
1	88	6	7	85	Extremely gravelly coarse sand	NA[2]	NA[2]
2	46	36	19	18	Gravelly loam	B-2	0.6

[1] Based on the secondary biological treatment system hydraulic loading rates outlined in the IDEQ Individual and Subsurface Sewage Disposal System Technical Guidance Manual (Jan 2016).
[2] Sample contained too much gravel to assign a design subgroup.

The design sub-group could not be determined for test pit #1 due to the high percentage of gravel. After consultation with Bob Erickson, Environmental Health Specialist at the South Central Public Health District, the conceptual drainfield required for the Phase 1 PUD submittal is sized based on test pit #2 for B-2 soils. Additional test pits will be examined during the design of the community wastewater treatment system.

RUNOFF POTENTIAL

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups (A, B, C, or D) and three dual classes (A/D, B/D, and C/D) according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

Drage very gravelly loam is classified as a Group C soil. Group C Soils have a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission. Hydrologic soil group data for Drage soils is summarized in Table 3 – Site Soil Conditions.

DRAINAGE CLASS

Drainage class (natural) refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, and not a consideration unless they have significantly changed the soil morphology. Seven classes of natural soil drainage are recognized – excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. Drainage class data for Drage soils is summarized below in Table 3 – Site Soil Conditions.

SATURATED HYDRAULIC CONDUCTIVITY

Saturated hydraulic conductivity (K_{sat}) is a soil characteristic describing the estimated maximum rate at which water is transmitted by the soil pores. Saturated conductivity is an important soil characteristic for the design of soil drainage systems and land application of wastewater. Saturated hydraulic conductivity data for Drage soils is summarized below in Table 3 – Site Soil Conditions.

AVAILABLE WATER CAPACITY

Available water capacity is a measure of the quantity of water that the soil is capable of storing for use by plants. It is the percentage of a given depth of soil that can hold water in a way that is available for plant roots. The capacity varies, depending on soil properties, of which the most important are organic matter content, soil texture, structure, and bulk density, with corrections for rock fragments and salinity. Available

water capacity is an important characteristic in the design of landscape, irrigation, and land application systems. Available water capacity data is summarized below in Table 3 – Site Soil Conditions.

DEPTH TO WATER TABLE

Water table refers to a saturated zone in the soil. It may occur year-round or only during some months. A saturated zone that lasts less than a month is not considered a water table. Estimates of the depth to the upper boundary of a seasonal or permanent water table are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. Depth to water table data is summarized below in Table 3 – Site Soil Conditions. Test pits 1-3 were dug to a depth of 19-20 feet and groundwater was not encountered in any of the three test pits.

SODIUM ADSORPTION RATIO

Sodium adsorption ratio (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. The soil adsorption ratio is an important term in designing wastewater disposal systems and irrigation systems using reclaimed wastewater. Soils that have SAR values of 13 or more are typically characterized by an increased dispersion of organic matter and clay particles, reduced saturated hydraulic conductivity (K_{sat}), reduced aeration performance, and a general degradation of soil structure. Sodium adsorption ratio data is summarized below in Table 3 – Site Soil Conditions.

Table 3 – Site soil conditions

SYMBOL	*HYDROLOGIC SOIL GROUP*	*DRAINAGE CLASS (NATURAL)*	*SATURATED HYDRAULIC CONDUCTIVITY (IN TOP 36") (IN/HR)*	*AVAILABLE WATER CAPCITY IN TOP 60" OR TO LIMITING LAYER (IN.)*	*DEPTH TO WATER TABLE (IN.)*	*SODIUM ADSORPTION RATIO (IN TOP 24")*
30	C	Well drained	0.20 – 0.60	4.6	80+	5.0
31	C	Well drained	0.20 – 0.60	4.6	80+	5.0

4 Wastewater Generation

4.1 Flow Estimation

Biohabitats estimated total expected water consumption and wastewater generation using three different methods for all phases of the development. Each method is based on the same building program and use profile, outlined in Tables 4 and 5. The different methodologies include typical textbook wastewater generation rates, State of Idaho Department of Environmental Quality (IDEQ) generation rates, and generation rates based on unit density developed by Biohabitats. The recommended methodology used throughout this report is the generation rate based on unit density. Wastewater generation rates (gallons per day/person) for each methodology used are outlined in Table 6.

Table 4 – Building program & use profile (number of users)[1]

RESIDENCE TYPE	*UNIT DENSITY (# PEOPLE/UNIT)*	*TOTAL UNITS*
Medium Density Lots	2	30
Low Density Lots	3	53
Cottages	2	19
Large Lots	2.5	28
Farm Lots	3	6
Sage School Lots	2	4
TOTAL		**140**

[1]Residential unit density and number of units per SERA Architects on 11.10.2015.

Table 5 – Quigley Farm building program & use profile (number of users), by phase

	# OCCUPANTS/USERS			
BUILDING TYPE	*PHASE 1*	*PHASE 2*	*SUB-TOTAL*	*PHASE 3[7]*
Residential	134	156	290	63
Commercial[1]	40	99	139	
Sage School[2]	175	-	175	
Trailhead[3]	200	-	200	
Inn/Hotel Guest[4]	-	50	50	
Inn/Hotel Employee[5]	-	25	25	
Event Space[3]	-	250	250	
Higher Education[6]	-	200	200	
TOTAL			1,329	63

[1]Commercial areas include office and retail FTEs, and retail customers. Square feet/FTE multipliers from LEED Core and Shell calculations.
[2]School occupants include students and staff
[3]Maximum number of users per day.
[4]25-Key Hotel. Occupancy assumes 2 people per key.
[5]Assumes a ratio of 1 employee to 2 guests.
[6]Assumes 50,000 sq. ft. building for Higher Education program. Use commercial multiplier from LEED Core and Shell calculations.
[7]Phase 3 includes three identical clusters consisting of 6 large lots and 2 farm lots.

Table 6 – Per-capita wastewater generation (gallons per day per user)

METHODOLOGY	RESIDENTIAL	COMMERCIAL	SAGE SCHOOL	TRAILHEAD	HOTEL GUEST	HOTEL STAFF	EVENT SPACE	HIGHER EDUCATION
	Wastewater Generation (gallons per day/user)							
Textbook Rates [1]	65	10	19	3.8	53	8	10	10
IDEQ [2]	67[3]	20 / 2 [4]	28	1	60	15	5	20
Design Rate Based on Unit Density [5]	50	8	19	3.8	53	8	3	8

[1]Metcalf and Eddy, 5th Ed. (2014) Typical Wastewater Generation Rates, Tables 3-1 thru 3-5., pgs 186-192.
[2]Idaho Department of Environmental Quality IDAPA 58.01.03 Wastewater Flows from Various Establishments. Residential gallons per capita per day were calculated based on number of bedroom guidance and density estimates from SERA architects.
[3]IDEQ guidance calculates residential wastewater at 250 gallons per 3 bedroom unit +/- 50 gallons per bedroom. Assume residential lots have average of 2 bedrooms, 3 people per unit total.
[4]IDEQ guidance splits commercial generation rates into Office (20 gpd/employee) and Stores (2 gpd/employee).
[5]Developed by Biohabitats based on experience designing systems with high performance building fixtures and text book generation rates by Metcalf and Eddy.

Tables 7 is a summary of estimated daily flows to the main wastewater treatment system and each cluster treatment system using the recommended methodology, Design Rate Based on Unit Density. The 'Recommended' design flow of 24,900 gpd will be used as the forward flow to the main treatment system and 1,050 gpd will be used as the forward flow to each of the three cluster systems.

Table 7 – Flow estimates to community wastewater treatment system & cluster systems

METHODOLOGY	ESTIMATED WASTEWATER GENERATION RATES (gallons)	TOTAL (gal/day)
	Design Rate Based on Unit Density[1]	
Phase 1	11,076	24,900
Phase 2	13,824	
Phase 3 (per cluster)	1,050	3,150

[1] Developed by Biohabitats based on experience designing systems with high performance building fixtures and text book generation rates by Metcalf and Eddy.

4.2 Mass Balance

A mass balance approach was used to estimate the influent wastewater concentrations for typical treatment parameters. For this method per capita mass loading rates derived from published references were combined with the recommended flows estimated above for Phases 1 and 2 (main treatment system) to derive expected influent concentrations for BOD, TSS, TN, NO_3, NH_4, Org. N, and TP. Per capita mass loading rates were combined with recommended flows for each cluster system for Phase 3 to derive the expected influent concentrations for each localized system.

The estimation process took into account that treated effluent is potentially recycled back to the commercial buildings, Sage School, Higher Education building, and restrooms at the trailhead and Event Space for toilet flushing. Because recycled water contains a higher concentration of nitrate than potable water, its use for toilet flushing results in somewhat higher concentrations of nitrate in the influent to the treatment system than would result from flushing with potable water. The recycled flush water and the use of low flow fixtures both contribute to somewhat higher strength influent than typical published values for residential or commercial wastewaters. Table 8A presents the estimated raw wastewater and primary tank effluent characterization for the main wastewater treatment system. Table 8B presents the estimated raw

wastewater and primary tank effluent characterization for one of the Phase 3 cluster systems (each cluster system will have equal capacity).

Effluent concentrations from the primary treatment tanks were estimated using conservative removal rates for primary systems. Primary tanks equipped with effluent screens are typically able to achieve a 64% reduction in BOD and an 80% reduction in TSS (Bounds 1997). Phosphorus removal rates in primary treatment were taken from Toor et. al (2011). Organic nitrogen reduction was assumed to be 3%, and typical fats, oil and grease (FOG) concentrations after primary treatment were taken from Crites and Tchobanoglous (1998). Nitrate was assumed to be 100% denitrified in anoxic areas of the primary treatment tank, which is consistent with Biohabitats' experience elsewhere. Table 8A and 8B are a summary of the design concentrations leaving the primary treatment tanks.

Table 8A – Phase 1 & 2 expected wastewater quality

PARAMETER	*UNITS*	*RAW WASTEWATER [1,2]*	*PRIMARY TANK EFFLUENT*
BOD	mg/L	369	133[3]
TSS	mg/L	363	73[3]
TN	mg/L	80	78
NO3	mg/L	1	-
NH4	mg/L	49	48
Org. N	mg/L	30	29[4]
P	mg/L	12	10[5]
FOG	mg/L	90	17[4]

[1]Raw wastewater concentration (mg/L) based on per capita mass loadings derived from Crites and Tchobanoglous (1998) Table 4-11 and proposed flow per capita from Table 3. Raw wastewater concentration includes mass of pollutants from reclaimed water input to toilets, sinks and other waste drains.
[2]Raw wastewater concentration (mg/L) includes nutrient addition from the use of non-potable water in commercial, school, and public restrooms.
[3]Effluent concentrations estimated based on removal values for screened septic tanks from Bounds (1997).
[4]Effluent concentrations estimated based on removal values in Crites and Tchobanoglous (1998).
[5]Phosphorus values estimated from Toor, et. al (2011).

Table 8B – Cluster system wastewater quality

PARAMETER	*UNITS*	*RAW WASTEWATER [1]*	*PRIMARY TANK EFFLUENT*
BOD	mg/L	401	145[2]
TSS	mg/L	391	78[2]
TN	mg/L	70	69
NO3	mg/L	-	-
NH4	mg/L	41	41
Org. N	mg/L	29	28[3]
P	mg/L	11	10[4]
FOG	mg/L	90	17[3]

Raw wastewater concentration (mg/L) based on per capita mass loadings derived from Crites and Tchobanoglous (1998) Table 4-11 and proposed flow per capita from Table 3. Raw wastewater concentration includes mass of pollutants from reclaimed water input to toilets, sinks and other waste drains.
[2]Effluent concentrations estimated based on removal values for screened septic tanks from Bounds (1997).
[3]Effluent concentrations estimated based on removal values in Crites and Tchobanoglous (1998).
[4]Phosphorus values estimated from Toor, et. al (2011).

4.3 Wastewater System Effluent Criteria

Wastewater will be treated onsite to a Class A standard for reuse as a non-potable water supply. Possible uses of the non-potable supply include spray and subsurface drip irrigation, toilet flushing for the school, commercial, and public restrooms, and for making artificial snow. The Class A wastewater effluent reuse standard is detailed in the Idaho Administrative Code (IDAPA) 58.01.17, Recycled Water Rules, and is outlined below.

Water Quality Requirements:

- Median number of total coliform organisms does not exceed 2.2 organisms/100mL, as determined from the bacteriological results of the last 7 days for which analyses have been completed. No sample shall exceed 23 organisms/100mL in any confirmed sample.
- Daily arithmetic mean of all measurements of turbidity shall not exceed 2 NTU, and turbidity shall not exceed 5 NTU at any time.
- Total nitrogen shall not exceed 30 mg/L for residential irrigation and other non-recharge uses.
- pH shall be between 6.0 and 9.0.
- BOD_5 shall not exceed 10mg/L for residential irrigation and other non-recharge uses.

Monitoring Requirements:

- Monitoring for total coliform organisms shall occur daily, but may be decreased if still protective of public health per the requirements in IDAPA 58.01.17.601.
- Monitoring for turbidity must occur continuously.
- Monitoring for total nitrogen and BOD_5 must occur weekly, with the arithmetic mean calculated monthly.
- Monitoring for pH occur daily via a grab sample, or continuously with an inline pH meter.

Based on the current development program it is expected that on average approximately 4,953 gpd of treated wastewater will be reused for toilet flushing with any remaining treated wastewater used for seasonal irrigation between May and October. The community large soil absorption system (LSAS) is designed to handle 100% of the effluent. The system will include a valve to discharge treated wastewater not used for non-potable reuse or reuse water that doesn't meet regulatory requirements to a large soil application system (LSAS).

Biohabitats completed a full buildout Nutrient-Pathogen Study, as required by IDEQ, for the site, which is included in Appendix A.

5 Wastewater Infrastructure Approach

The wastewater infrastructure approach is composed of collection, treatment, and reuse/dispersal systems. The collection and primary treatment is achieved by a small diameter collection system using primary treatment tanks with effluent filters at each lot or group of lots. The secondary treatment system consists of processes designed to biologically remove BOD, TSS, and nutrients. The reuse system consists of microfiltration, disinfection, and repressurization equipment. The dispersal system drainfield consists of infiltrators or traditional gravel and perforated pipe.

The small diameter collection system routes pre-treated wastewater from the primary tanks to either the community-scale system (Phases 1 and 2) or one of the localized cluster treatment systems (Phase 3). The community-scale treatment system treats wastewater with a trickling filter and constructed wetland prior to polishing, disinfection, and reuse. The portion of treated wastewater not needed for reuse, as well as all treated wastewater from the localized cluster systems will be land applied using a large soil absorption system (LSAS) or localized drainfield, each sized to dispose of 100% of the forward flow. Figure 6 presents a schematic of the community-scale system design for Phases 1 and 2.

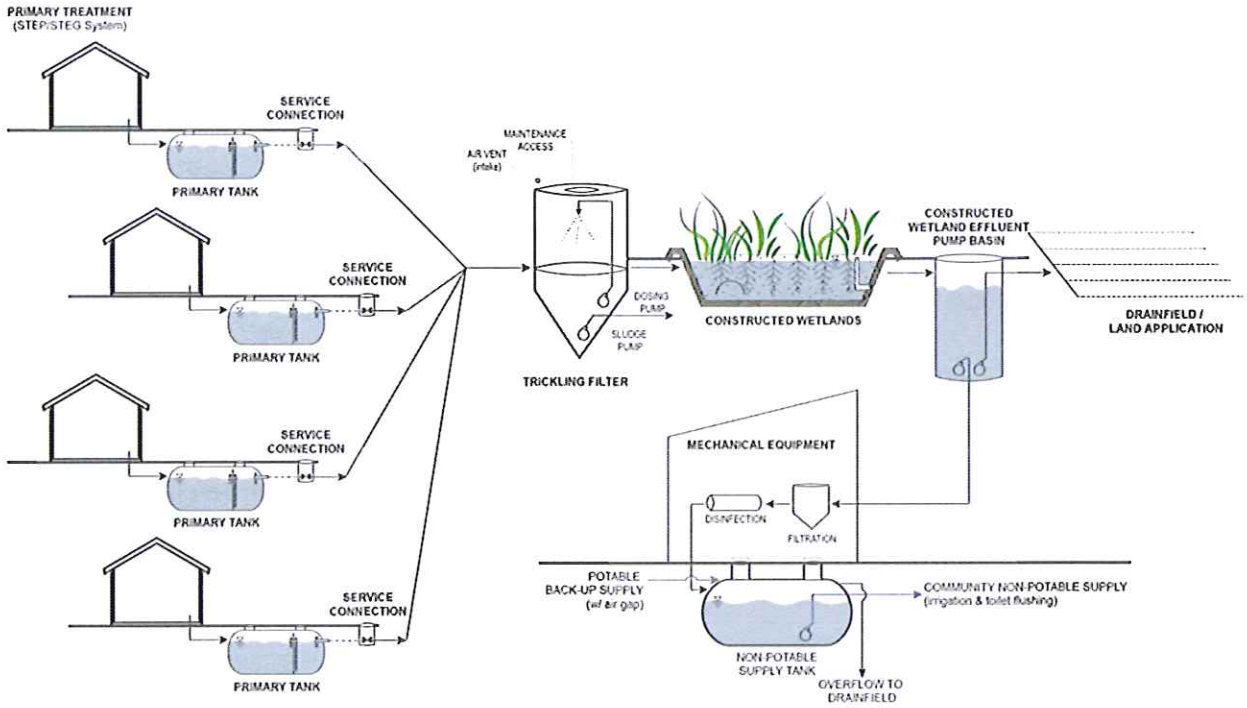


Figure 6. Phase 1 & 2 treatment schematic

Wastewater in Phase 3 will be treated with a constructed wetland prior to land application. Figure 7 is a schematic of one cluster system design for Phase 3.

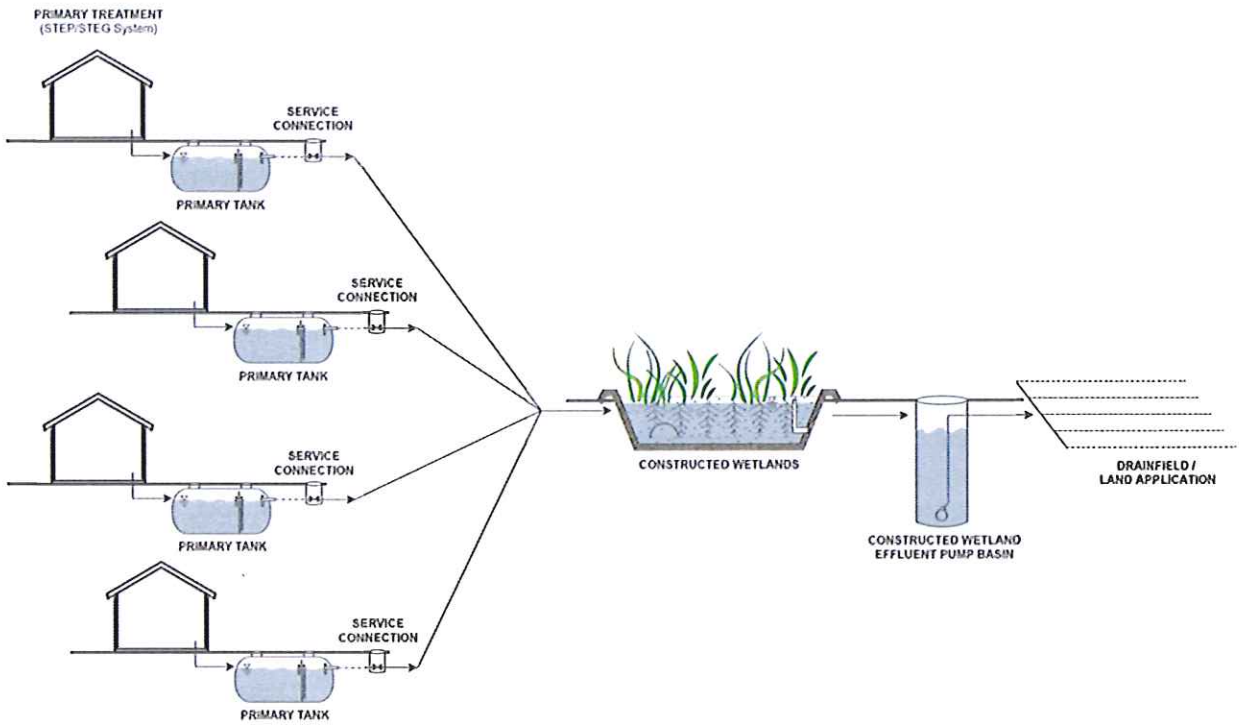


Figure 7. Phase 3 treatment schematic

The following sections briefly describe the wastewater infrastructure components

5.1 Collection – Small Diameter Collection System

PHASES 1, 2, 3

Each lot, or group of lots, will include a primary treatment tank (septic tank, Figure 8) to remove settable solids and equalize flow going to either the main treatment system or localized cluster system. The primary tanks have two principal functions, 1) separation of liquid and solid waste and 2) anaerobic digestion of collected sludge/solids. Solids and sludge that accumulate will be collected in the front portion of the tank and will need periodic removal by a licensed hauler. Quigley Farm will have an easement to each of the primary tanks, and manage the solids removal. Each tank passively vents back through the building plumbing roof vents.

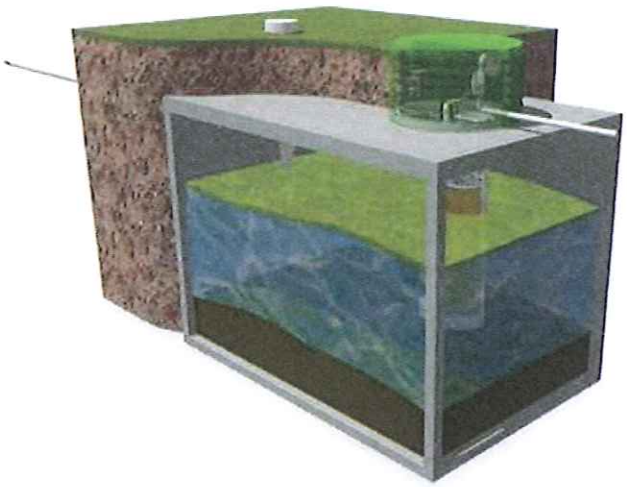


Figure 8. Typical septic tank

Effluent from each septic tank will gravity flow or be pumped to the treatment system via a network of small diameter pipes (generally 2 ½" – 6"). Where septic tanks can be installed above the hydraulic grade line of the collection system, effluent will flow by gravity to the secondary treatment area. Each septic tank effluent gravity (STEG) installation will have an effluent screen, which filters solids and reduces treatment and maintenance costs. STEG screens are removable for infrequent cleaning.

When gravity flow from the septic tank to the treatment system is not possible, a removable high-head submersible pump will be installed in a screened vault in the septic tank to pump effluent to the secondary treatment location. Septic tank effluent pump (STEP) systems equalize the septic tank discharge and can operate over variable grades.

STEP & STEG collection systems do not require manholes or vacuum trucks for cleaning. "Pigging" ports and one- and two-way cleanouts are installed along with air release valves where site conditions dictate. Figure 9 is a rendering of a STEP/STEG small diameter collection system.

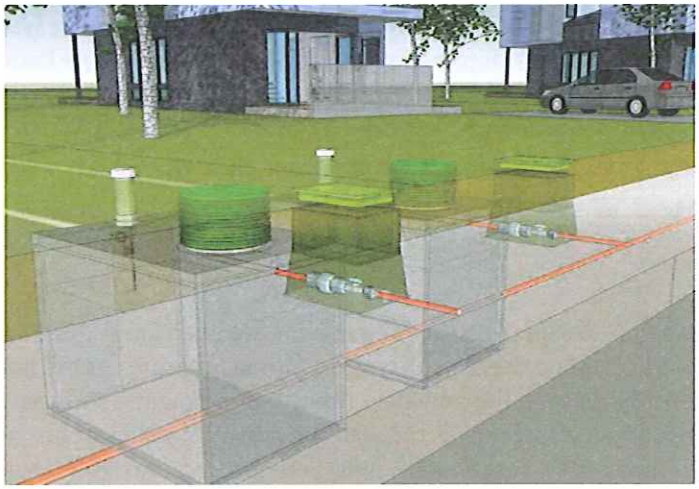


Figure 9. Small diameter collection system

5.2 Secondary Treatment – Trickling Filter

PHASES 1 & 2

Wastewater from the STEP/STEG collection system gravity flows to two to three trickling filter units (Figure 10). Trickling filters are very efficient in reducing soluble BOD, converting ammonia to nitrate, and when recirculation is employed, denitrifying wastewater effluent. Each unit will be a Bioclere™ model 36/30, and will be approximately 12 feet (4 meters) in diameter and 22 feet (7 meters) tall (mostly buried). Wastewater inside each trickling filter is pressure distributed over manufactured PVC randomly packed media to remove or convert constituents. The PVC media offers a large surface area to volume ratio, and provides for movement of air in the Bioclere tower. The cylindrical waterproof tower has a built in clarifier that collects sludge sloughing from the media. There is approximately 1,059 ft^3 of media with a surface area of 42.5 ft^2/ft^3 in the each waterproof tower.

Figure 10. Typical trickling filter

Each trickling filter contains three pumps. Two pumps form a duplex dosing system to spray wastewater over the packed plastic media. The third pump pumps accumulated sludge back into the companion anoxic tank for settling/digestion and to aid in denitrification.

5.3 Secondary Treatment – Horizontal Subsurface Flow (HSSF) Constructed Wetland

PHASES 1, 2, 3

Horizontal subsurface flow (HSSF) constructed wetlands are lined gravel filters planted with native wetland plant species (Figure 11). . Influent enters through a buried infiltrator at the head of the wetland cell. Water moves horizontally through the gravel, typically 4-6" below the surface, which ensures minimal risk of odor and safety issues. As water moves through the gravel and plant roots, attached-growth bacteria breakdown and/or remove BOD, suspended solids, and nitrogen. An HDPE (high density polyethylene) or PPE (polypropylene) liner will be used to provide a water-tight cell. Each cell has a freeboard (space above

the gravel) of at least 12". HSSF wetlands can be operated successfully for 40 years or more without media replacement if used in conjunction with a pretreatment system as is designed here. Design of native planting consider at minimum climate fluctuations, disease potential, seasonal conditions, and aesthetics.

Nitrogen and BOD removal are temperature dependent processes, and cold climate systems need to be larger and deeper to assure proper treatment and reduce the potential for short-circuiting. The constructed wetland will include a layer of mulch above the gravel layer to provide insulation during the cold winter months. Site specific climate data from late winter will be used to calculate the heat flow resistance provided by annual snow fall and snow cover, to determine the thickness of the mulch layer required to prevent ice formation.

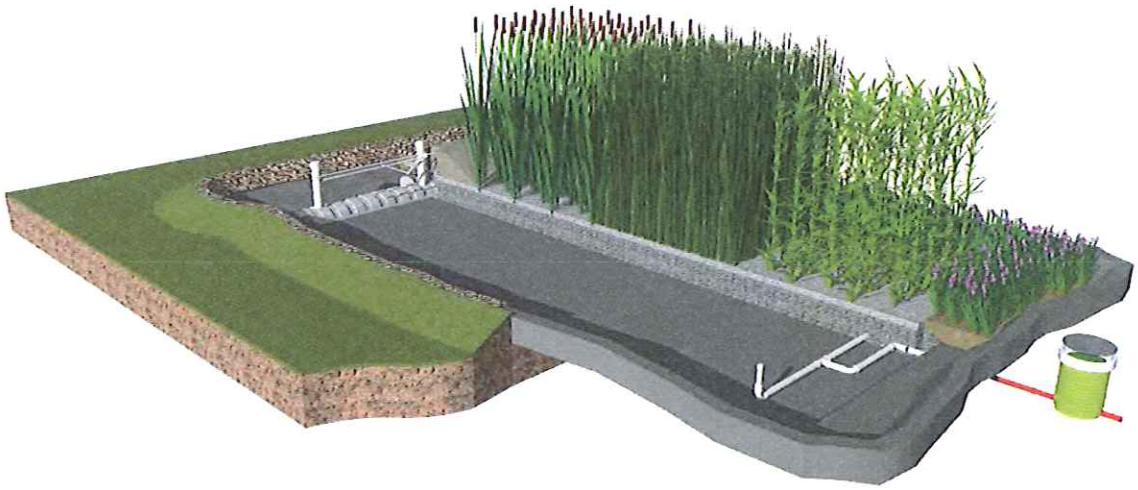


Figure 11. Horizontal subsurface flow constructed wetland

The community-scale wastewater treatment system constructed wetland will have a combined footprint of 32,150 square feet (Phase 1 = 11,870 square feet, Phase 2 = 20,280 square feet), and will be located adjacent to the athletic fields. This is an ideal location at the low point of the project site, and should maximize the number of properties that can gravity flow to the system. Each cluster system constructed wetland will have a footprint of 800 square feet, and will be located down gradient of each cluster to allow for gravity flow from the STEP/STEG system.

Effluent from the community-scale treatment system will gravity flow from the constructed wetland to the constructed wetland effluent pump basin, where it will either be pumped to the reuse system or to subsurface disposal. Effluent from the cluster treatment systems will gravity flow to a constructed wetland effluent pump basin to be pressure distributed to the subsurface disposal system.

5.4 Reuse – Filtration, Disinfection and Controls

PHASES 1 & 2

Filtration and disinfection is the final polishing step to achieve reuse water quality requirements (Figure 12). Effluent will flow through the equipment and be delivered to the non-potable supply tank. Filtration could include cloth media filters, mechanical screen filters, cartridge filters or a combination to remove suspended solids in order to manage turbidity and enable effective disinfection by ultraviolet radiation. A turbidimeter, with bubble removal system and self-cleaning lens, will sample the effluent at this point to

check for compliance with IDEQ water reuse standards. Recycled water is automatically diverted to the LSAS via a 3-way valve if clarity is not up to the desired standard.

An ultraviolet (UV) radiation unit will provide the principal disinfection of the effluent to destroy bacteria and viruses. Treated effluent is pumped through the UV disinfection system at a fixed rate. Uniform flow through the UV unit allows for a predictable level of disinfection. Intense ultraviolet light destroys fecal coliform bacteria and other pathogens as the water flows along the length of the UV light tube. The clarity of water and quantity of suspended solids in the water column affects the light intensity and disinfection rate in the unit. Typical removal rates are 99.99% (4 log).

The UV unit will be followed by an automated valve to reject water to the LSAS if the permissible turbidity level is exceeded. Water quality in the non-potable supply tank and distribution piping will be maintained by injecting chlorine into the treated effluent prior to entering the tank.

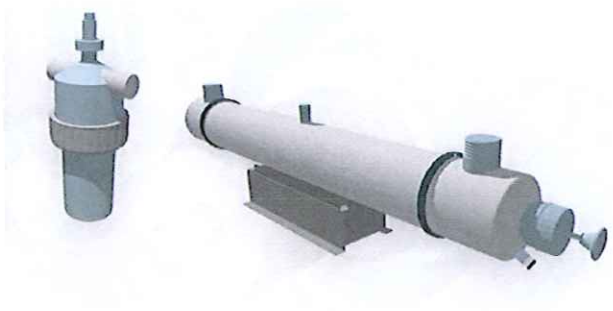


Figure 12. Mechanical filtration and UV disinfection unit

The wastewater mechanical building, located adjacent to the constructed wetlands, will house the filtration and disinfection equipment.

5.5 Reuse – Non-potable Supply Tank

PHASES 1 & 2

A non-potable supply tank will store treated, disinfected water for reuse in the development to meet commercial toilet flushing and community spray or subsurface drip irrigation. During winter months when there is an excess of treated wastewater available, the Class A water may be used for snowmaking. Should there be a shortage of treated wastewater available for community demands, potable make-up water is supplied to the tank with appropriate backflow prevention.

5.6 Dispersal – Land Application to Subsurface Disposal

PHASES 1, 2, 3

A large soil absorption system (LSAS) is the dispersal method for treated effluent from Phases 1 and 2 in excess of what is required to meet the community non-potable demand. The LSAS rules outlined in IDAPA 58.01.03 require that a minimum of two disposal systems sized to treat 100% of the daily flow be installed, for a total of 200% of the land area required to infiltrate the daily flow. Additionally, a drainfield replacement area sized to treat 100% of the daily flow must be protected for future use. The proposed dispersal system is a gravelless drainfield with infiltration chambers installed within the trenches.

Wastewater effluent will be pressure distributed to the drainfield modules via a set of duplex pumps in the constructed wetland effluent pump basin.

A localized subsurface trench drainfield is the dispersal method for all treated effluent from each cluster system in Phase 3. Each localized system will require one primary drainfield and reserved replacement area, sized to treat the daily flow of 1,005 gallons per day.

The subsurface dispersal system is sized according to soil loading rates. Based on the sieve analysis, B-2 soils are present on site and will be loaded at 0.6 gallons/sq.ft/day, using the hydraulic loading rates for secondary biological treatment systems described in the IDEQ Individual and Subsurface Sewage Disposal System Technical Guidance Manual (IDEQ TGM, Jan 2016). Table 9 is a summary of the required drainfield absorption area for the main wastewater treatment system and each localized cluster system. The use of gravelless drainfield technologies allows for a 25% reduction in installed absorption area, per Section 4.11 of the IDEQ TGM (Jan 2016). However, 100% of the required area must be protected for future use.

Figure 13. Gravelless drainfield infiltrator.

Table 9 – Drainfield absorption area

SYSTEM	*DAILY FLOW (gallons)*	*ABSORPTION AREA[4] – Design Soil Group B-2 (sq. ft)*	*TOTAL LAND AREA REQUIRED[5] – Design Soil Group B-2 (sq. ft)*
Community-Scale Treatment System (Phases 1 & 2)[1,2]	24,900	41,500	125,100
Localized Cluster System (Phase 3)[3]	1,050	1,750	4,800

[1]Community-scale treatment system falls under Large Soil Absorption System Rules (LSAS). Maximum module size is 10,000 gallons per day. Multiple modules will be required.
[2]LSAS systems are required to have a minimum of two disposal systems installed, each sized to accept the daily design flow. Absorption areas shown are for one disposal system.
[3]Daily flow and absorption area is for one localized cluster system, designed to treat eight residences. Each of the three clusters will require a drainfield with the absorption areas listed.
[4]Absorption area only includes required trench bottom to treat daily flow.
[5]Total land area required includes trench bottom and minimum 6' separation between trenches.

Drainfields that exceed 1,500 ft^2 of total trench bottom and LSAS systems are required to have pressure distribution . This system consists of small-diameter pipe with small orifices (1/8" holes) drilled every two feet along the pipe. Pressure distribution systems maintain a uniform application of effluent across each trench, and improve the performance and life span of the system. Trenches will be a maximum of 3 feet wide and 100 feet long. There is a minimum 6 feet separation between each trench (Figure 14).

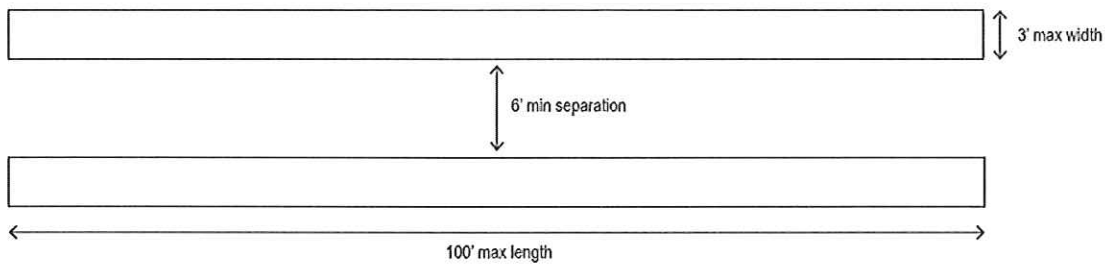


Figure 14. Typical drainfield trench plan.

The drainfield requires a minimum of 12" of cover. No other surface activities (parking, driving, stormwater infiltration, etc. should occur above this area.

6 Phase 1 Planned Urban Development

The Quigley Farm design team is preparing Phase 1 documents to submit to Blaine County for a Planned Urban Development (PUD). Figure 15 depicts the general location of the wastewater treatment system components to meet the demands of Phase 1 only. During the first phase of construction, a wastewater treatment and reuse system will be installed to meet the full demands of the phase programming with additional land area set aside for future development.

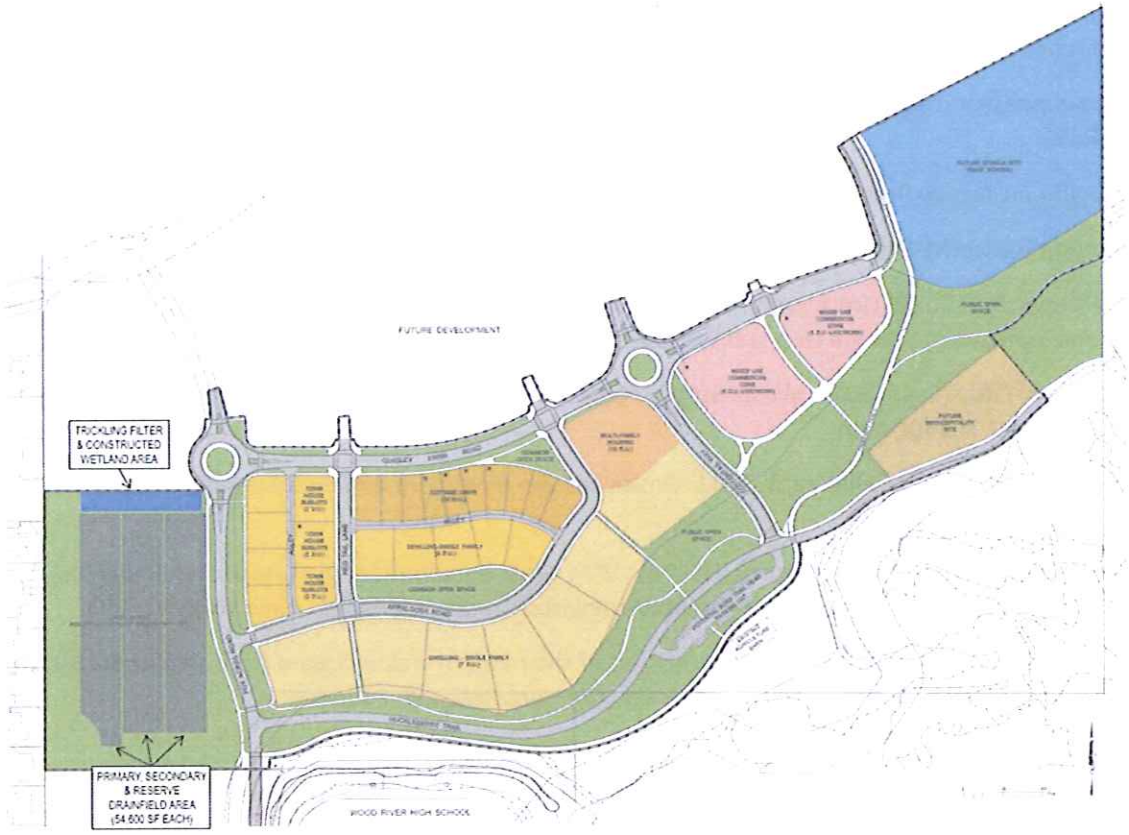


Figure 15. Phase 1 wastewater treatment component locations for PUD (reserve drainfield area located northeast of future school)

7 References

Bounds, T.R. 1997. Design and performance of septic tanks. In M.S. Bedinger, A.I Johnson, and J.S. Fleming (Eds.), *Site characterizatio and Design of onsite septic systems ASTM STP 901*. Philadelphia, PA: American Society for Testing Materials.

Crites, R. and Tchobanoglous, G. 1998. *Small and decentralized wastewater management systems*. San Francisco, CA: McGraw Hill.

Idaho Administrative Procedure Act (IDAPA) Chapter 58, 58.01.03. Individual/Subsurface Sewage Disposal Rules.

Idaho Administrative Procedure Act (IDAPA) Chapter 58, 58.01.16. Wastewater Rules.

Idaho Administrative Procedure Act (IDAPA) Chapter 58, 58.01.17. Recycled Water Rules.

Idaho Department of Environmental Quality (IDEQ). Jan 2016. Technical Guidance Manual for Individual and Subsurface Sewage Disposal Systems. Boise, ID: IDEQ.

Metcalf and Eddy (Eds.). 2014. *Wastewater Engineering. Treatment and Resource Recovery.* New York, NY: McGraw Hill Education.

Toor, G.S., Lusk, M., and Obreza, T. 2011. Onsite sewage treatment and disposal systems. University of Florida IFAS Extension.

US Environmental Protection Agency (USEPA). 1974. Flow equalization. In Metcalf and Eddy (Eds), *Process Design Manual for Upgrading Existing Wastewater Treatment Plants*. New York, NY: EPA.

WERF. 2009. Influent constituent characteristics of the modern waste stream from single sources. Report No. 04-DEC-01. Alexandria, VA: Water Environment Research Foundation.

Appendix A

Nutrient Pathogen Evaluation

Biohabitats
CASCADIA BIOREGION
412 NW Couch Street, Suite 202
Portland, OR 97209
800.220.0919
www.biohabitats.com

MEMORANDUM

Date: February 12, 2016

To: Brian Reed, Idaho DEQ

From: Pete Munoz, Biohabitats, Inc.

RE: Nutrient-Pathogen Study
Subject: Quigley Farm Nutrient-Pathogen Study Summary

Several existing data sources, as well as information gathered at the project site, have been used to develop a preliminary Level 1 Nutrient-Pathogen (N-P) Study for the Quigley Farm development. The development will be built in three phases. The N-P Study addresses full project build-out.

Data Sources and Relevant Information

Well Driller Reports
Approximately 19 wells are located within 1/2 mile radius of the project and are shown on the Site Map, located in Attachment A. Well driller Reports have been included in Attachment B.

Depth to Groundwater
The depth to groundwater reported on well driller reports for the location of the only well located on the project site (IDWR Well ID 314841) is approximately 60 feet below grade.

Soil and Surface geological conditions at the site
The NRCS Web Soil Survey identifies five soil types at the site. Drage very gravelly loam is the dominant soil type on site, with additional soil types including Drage gravelly loam, Povey-Vitale association, Isknat gravelly clay loam, and Vitale-Milligan complex. Drage very gravelly loam is in the C Hydrologic Soil Group and is well drained.

A Geotechnical Report was completed for the site on February 2, 2016 by Butler Associates, Inc. and is included in Attachment C. The hydraulic conductivity identified in this report for use in the N-P Study is 0.05 meter per second.

Test Pits
Seven test pits were excavated on site in January 2016. The Geotechnical Report in Attachment C describes the test pit findings.

Restore the Earth & Inspire Ecological Stewardship

Ground water quality

A USGS Report, ***Quality of Groundwater and Surface Water, Wood River Valley, South-Central Idaho, July and August 2012***, identifies wells and summarizes the groundwater quality near the project site. Existing wells closest to the project site are wells U14 and U15. Well U14 is downstream of the proposed project and U15 is located upstream. Information is provided in Attachment D.

Nitrogen Mass-Balance Spreadsheet

There were several site specific variables that were chosen for the mass-balance spreadsheet that best characterize the site and subsurface conditions. Justification has been provided, below, for variables that deviate from default values. The mass-balance spreadsheet is included in Attachment E.

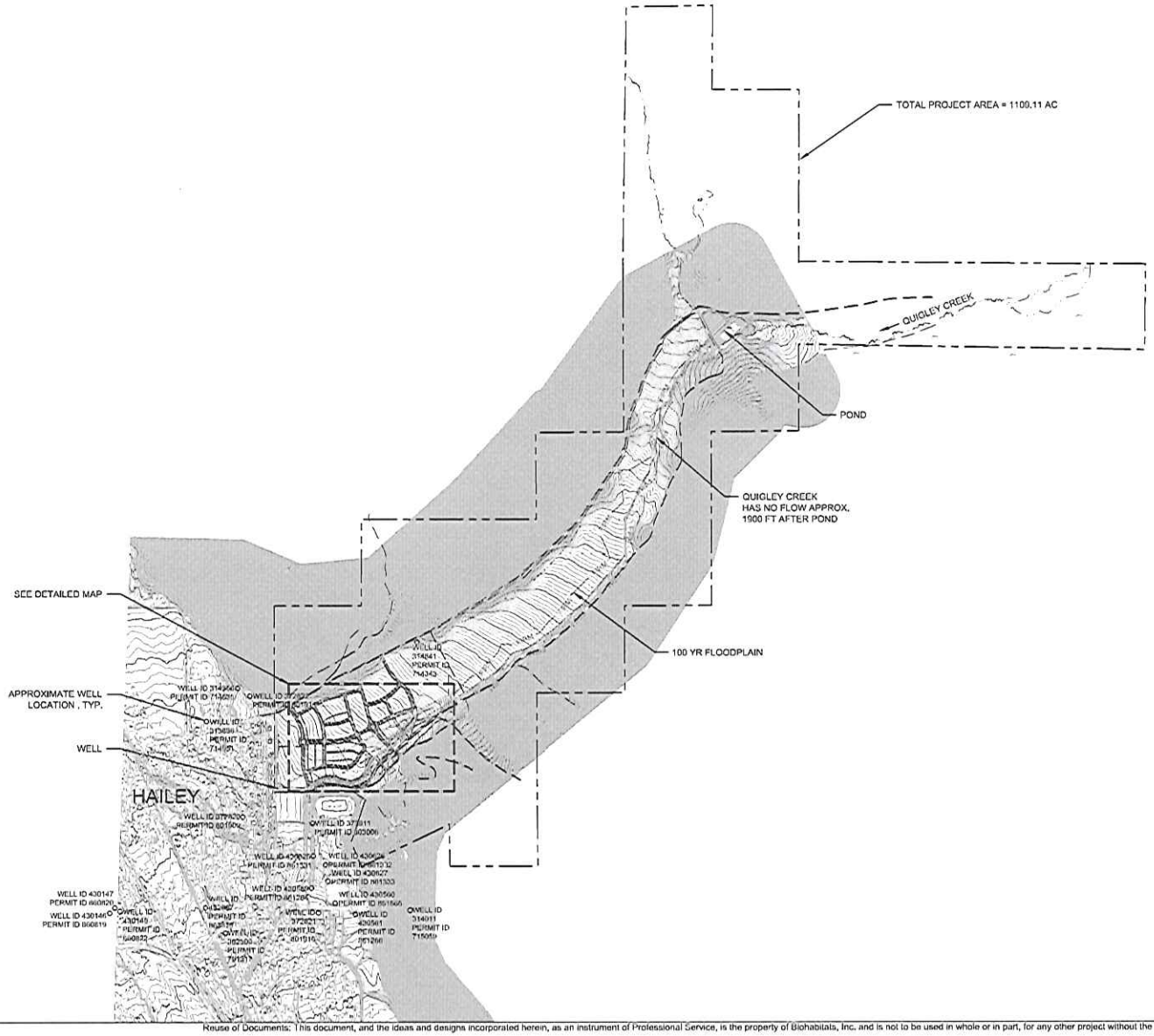
The septic tank effluent (gallons per home) has been preliminarily modeled at 200 gallons per residential unit, plus flow from variety of other community uses. This reduction is consistent with detailed wastewater generation estimates for the project, based on proposed programming.

The nitrate nitrogen concentration recorded for well U15 (1.9 mg/L), as reported in the ***Quality of Groundwater and Surface Water, Wood River Valley, South-Central Idaho, July and August 2012,*** and was used in the Nitrogen Mass-Balance Spreadsheet as the up-gradient nitrate-nitrogen groundwater concentration. The Point of Compliance Nitrate Concentration Goal was set at 1.0 mg/L higher than this value, at 2.9 mg/L.

Septic tank effluent concentrations have been kept at the default value of 45.0 mg/L, even though the proposed wastewater system is expected to provide additional treatment than a typical septic tank-drainfield scenario. Wastewater from homes will be collected in a primary tank, then directed to a trickling filter subsurface constructed wetland treatment system. Treated effluent will be filtered and disinfected for onsite reuse. Any unused treated effluent will be discharged to a drainfield.

The nitrogen mass-balance spreadsheet results show that the project will increase the nitrate level less than 1.0 mg/L.

ATTACHMENT A – MAPS



CLIENT

HENNESSY COMPANY

DATE	ISSUES / REVISIONS

Biohabitats
CASCADIA BIOREGION
412 NW Couch Street Suite 202
Portland, OR 97209 / ph: 919.518.0311
www.biohabitats.com
Restore the Earth & Inspire Ecological Stewardship

QUIGLEY FARM

TITLE
N-P STUDY MAP
SITE MAP

PROJECT NO. #	15501.01	SCALE	SCALE
SEAL		BY CG	CHECK PM
		DWG. NO.	1 OF 1

Reuse of Documents: This document, and the ideas and designs incorporated herein, as an instrument of Professional Service, is the property of Biohabitats, Inc. and is not to be used in whole or in part, for any other project without the written authorization of Biohabitats, Inc.

ATTACHMENT B – WELL DRILLER REPORTS

App 877066 ID 373911

Form 238-7
3/95-C96

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

Office Use Only
Inspected by _____
Twp _____ Rge _____ Sec _____
_____ 1/4 _____ 1/4 _____ 1/4
Lat: : : Long: : :

1. DRILLING PERMIT NO. 0-0- - -0
Other IDWR No. D0016722

2. OWNER:
Name Blaine County School Dist #61
Address 118 Bullion St.
City Hailey State ID Zip 83333

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location

N
W E
S

Twp. 2 North ☒ or South ☐
Rge. 18 East ☒ or West ☐
Sec. 10 1/4 (10 acres) NW 1/4 (40 acres) SE 1/4 (160 acres)
Gov't lot _____ County Blaine
Lat: : : Long: : :
Address of Well Site Box Acres Rd.
City Hailey
(Give at least name of road + Distance to Road or Landmark)
Lt. _____ Blk. _____ Sub. Name _____

4. USE:
☐ Domestic ☐ Municipal ☐ Monitor ☒ Irrigation
☐ Thermal ☐ Injection ☐ Other _____

5. TYPE OF WORK check all that apply (Replacement etc.)
☒ New Well ☐ Modify ☐ Abandonment ☐ Other _____

6. DRILL METHOD
☒ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other _____

7. SEALING PROCEDURES

SEAL/FILTER PACK			AMOUNT	METHOD
Material	From	To	Sacks or Pounds	
Bentonite	0	18	18 sacks	Overbore

Was drive shoe used? ☐ Y ☐ N Shoe Depth(s) _____
Was drive shoe seal tested? ☐ Y ☐ N How? _____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
10.75	+18"	156	.375	Steel	☒	☐	☒	☐
8.625	133	120	.250	Steel	☐	☒	☒	☐
8.625	170	174	.250	Steel	☐	☒	☒	☐

Length of Headpipe N/A Length of Tailpipe _____

9. PERFORATIONS/SCREENS
☐ Perforations Method _____
☐ Screens Screen Type _____

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
150	160	.030		8.62	SS	☐	☒
160	170	.125		8.62		☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
65 ft. below ground Artesian Pressure ____ lb
Depth flow encountered ____ ft. Describe access port or control devices: _____

11. WELL TESTS:
☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Pumping Level	Time
50			

Water Temp. _____ Bottom hole temp. _____
Water Quality test or comments: _____
Depth first Water Encountered _____

12. LITHOLOGIC LOG: (Describe repair or abandonment)

Bore Dia	From	To	Remarks: Lithology, Water Quality & Temp.	Water Y	Water N
14"	0	2	Fill		☒
~~14-10~~	~~2~~	~~60~~	~~Sand & Gravel~~		☒
10	60	150	Silty Gravel		☒
10	150	170	Big Gravel	☒	
10	170	174	Granite		☒

RECEIVED
SEP 03 2003
Department of Water Resources
Southern Region

Completed Depth: 174 (Measurable)
Date: Started 8-12-03 Completed 8-15-03

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Hiddleston & Son, Inc. Firm No. 35
Firm Official [signature] Date 9-02-03
Supervisor or Operator [signature] Date Aug 29-03
(Sign once if Firm Official & Operator)

USE TYPEWRITER OR BALL POINT PEN

State of Idaho
Department of Water Administration

RECEIVED JUL 19 Department of Water Administration

WELL DRILLER'S REPORT

State law requires that this report be filed with the State Reclamation Engineer within 30 days after completion or abandonment of the well.

1. WELL OWNER

Name Wesley Prouty

Address Hailey, Idaho

Owner's Permit No. _____

2. NATURE OF WORK

☑ New well ☐ Deepened ☐ Replacement

☐ Abandoned (describe method of abandoning)

3. PROPOSED USE

☑ Domestic ☐ Irrigation ☐ Test

☐ Municipal ☐ Industrial ☑ Stock

4. METHOD DRILLED

☑ Cable ☐ Rotory ☐ Dug ☐ Other

5. WELL CONSTRUCTION

Diameter of hole 6 inches Total depth 106 feet

Casing schedule: ☑ Steel ☐ Concrete

Thickness	Diameter	From	To
.250 inches	6 5/8 inches	+1 feet	105 feet
inches	inches	feet	feet
inches	inches	feet	feet
inches	inches	feet	feet
inches	inches	feet	feet

Was a packer or seal used? ☐ Yes ☑ No

Perforated? ☑ Yes ☐ No

How perforated? ☐ Factory ☑ Knife ☐ Torch

Size of perforation 5/16 inches by 2 inches

Number	From	To
16 perforations	94 feet	98 feet
perforations	feet	feet
perforations	feet	feet

Well screen installed? ☐ Yes ☑ No

Manufacturer's name _____

Type _____ Model No. _____

Diameter ___ Slot size ___ Set from ___ feet to ___ feet

Diameter ___ Slot size ___ Set from ___ feet to ___ feet

Gravel packed? ☐ Yes ☑ No Size of gravel _____

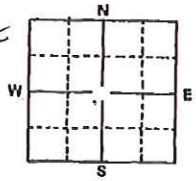
Placed from _____ feet to _____ feet

Surface seal? ☑ Yes ☐ No To what depth 20 feet

Material used in seal ☐ Cement grout ☐ Puddling clay

6. LOCATION OF WELL

Sketch map location must agree with written location.



County Blaine

NE ¼ SW ¼ Sec. 10, T. 2N N.B.M., R. 18E E.B.M.

7. WATER LEVEL

Static water level 59 feet below land surface

Flowing? ☐ Yes ☐ No G.P.M. flow _____

Temperature 52° F. Quality _____

Artesian closed-in pressure _____ p.s.i.

Controlled by ☐ Valve ☐ Cap ☐ Plug

8. WELL TEST DATA

☐ Pump ☑ Bailer ☐ Other

Discharge G.P.M.	Draw Down	Hours Pumped
25	10	3 hr

033637

9. LITHOLOGIC LOG

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
8	0	4	Surface		
8	4	20	Boulders		
6	20	40	Clay & Gravel		
6	40	87	Clay & Sand	✓	
6	87	96	Sand (Fine)	✓	
6	96	106	Gravel	✓	

10.

Work started June 16 finished June 26

11. DRILLER'S CERTIFICATION

This well was drilled under my supervision and this report is true to the best of my knowledge.

Eugene W. Walker 15
Driller's or Firm's Name Number

624 Pierce St.
Address

Frederick B. Walker 6-29-73
Signed By Date

USE ADDITIONAL SHEETS IF NECESSARY

FORWARD THE WHITE, BLUE, AND PINK COPIES TO THE DEPARTMENT

Form 238-7
9/82

26 Sec 10

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

USE TYPEWRITER OR BALLPOINT PEN

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

PH
B

1. WELL OWNER

Name Tom Pyle
Address Box 94 Ketchum Idaho
Owner's Permit No. 37-88-S-0300 18

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)

3. PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

4. METHOD DRILLED

☒ Rotary ☐ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other _____

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other _____

Thickness	Diameter	From	To
.250 inches	6 inches +	1 feet	92 feet
inches	inches	feet	feet
inches	inches	feet	feet
inches	inches	feet	feet

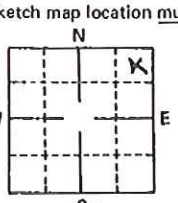
Was casing drive shoe used? ☒ Yes ☐ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch
Size of perforation _____ inches by _____ inches

Number	From	To
perforations	feet	feet
perforations	feet	feet
perforations	feet	feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name _____
Type _____ Model No. _____
Diameter ____ Slot size ____ Set from ____ feet to ____ feet
Diameter ____ Slot size ____ Set from ____ feet to ____ feet
Gravel packed? ☐ Yes ☒ No ☐ Size of gravel _____
Placed from _____ feet to _____ feet
Surface seal depth 20 Material used in seal: ☐ Cement grout ☒ Bentonite ☐ Puddling clay ☐ _____
Sealing procedure used: ☐ Slurry pit ☐ Temp. surface casing ☒ Overbore to seal depth
Method of joining casing: ☐ Threaded ☒ Welded ☐ Solvent Weld ☐ Cemented between strata
Describe access port _____

6. LOCATION OF WELL

Sketch map location must agree with written location.



Subdivision Name _____
Lot No. _____ Block No. _____

County Blaine
NE ¼ NE ¼ Sec. 10, T. 2 (N) S, R 18 (E) W.

7. WATER LEVEL

Static water level 60 feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow _____
Artesian closed-in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature ____ °F. Quality good
Describe artesian or temperature zones below.

8. WELL TEST DATA

☐ Pump ☐ Bailer ☒ Air ☐ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped
50	90	1

9. LITHOLOGIC LOG

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
8	0	8	Top soil		x
8	8	20	Glacier rock and dirt		x
6	20	60	" " " " " " " " "		x
6	60	70	Sand		x
6	70	80	Water and sand	x	
6	80	92	Water and gravel	x	

RECEIVED
JUN 22 1988
Department of Water Resources
Southern Region Office

RECEIVED
JUN 27 1988
Department of Water Resources

10.
Work started May 4, 1988 finished May 5, 1988

11. DRILLERS CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

WOOD RIVER DRILLING AND PUMP
Firm Name ~~BOX 1165 788-3163~~ Firm No. 265
HAILEY, IDAHO 83333
Address _____ Date 6-1-88
Signed by (Firm Official) Ken Smith
and
(Operator) Gary Jones

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

USE TYPEWRITER OR BALL POINT PEN

State of Idaho
Department of Water Administration

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Administration within 30 days after the completion or abandonment of the well.

RECEIVED
Department of Water Administration

1. WELL OWNER

Name McCulloch Properties Inc.
Address Hailey Ida.
Owner's Permit No.

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe method of abandoning)

3. PROPOSED USE

☐ Domestic ☐ Irrigation ☐ Test ☐ Other (specify type)
☒ Municipal ☐ Industrial ☐ Stock ☐ Waste Disposal or Injection

4. METHOD DRILLED

☒ Cable ☐ Rotary ☐ Dug ☐ Other

5. WELL CONSTRUCTION

Diameter of hole 6 3/4 inches Total depth 93 feet
Casing schedule: ☒ Steel ☐ Concrete

Thickness	Diameter	From	To
.277 inches	6 3/4 inches	+ 1 1/2 feet	93 feet
inches	inches	feet	feet
inches	inches	feet	feet
inches	inches	feet	feet
inches	inches	feet	feet

Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☒ Yes ☐ No
How perforated? ☐ Factory ☒ Knife ☐ Torch
Size of perforation inches by inches

Number		From	To
100	perforations	65 feet	90 feet
	perforations	feet	feet
	perforations	feet	feet

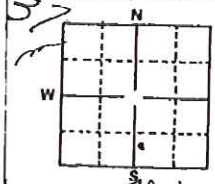
Well screen installed? ☐ Yes ☒ No
Manufacturer's name
Type Model No.
Diameter Slot size Set from feet to feet
Diameter Slot size Set from feet to feet

gravel plug - 93'/104'
Gravel packed? ☐ Yes ☐ No Size of gravel 3/8
Placed from 93 feet to 104 feet

Surface seal depth 20 Material used in seal ☒ Cement grout ☐ Puddling clay ☐ Well cuttings
Sealing procedure used ☐ Slurry pit ☒ Temporary surface casing ☐ Overbore to seal depth

6. LOCATION OF WELL

Sketch map location must agree with written location.



Subdivision Name Woodside
Lot No. Block No.
County Blaine Parcel CC PLAT 21
SE¼ SE¼ Sec. 10, T. 2 N/S, R. 18 E/W

7. WATER LEVEL

Static water level 61 feet below land surface
Flowing? ☐ Yes ☒ No G.P.M. flow
Temperature ° F. Quality
Artesian closed-in pressure p.s.i.
Controlled by ☐ Valve ☐ Cap ☐ Plug

8. WELL TEST DATA

☐ Pump ☒ Bailer ☐ Other

Discharge G.P.M.	Draw Down	Hours Pumped
50	0	2

9. LITHOLOGIC LOG 033638

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
6 5/8	0	20	Hard pan & Boulders		X
6 3/4	20	65	Hard pan, Rock Chips		X
6 3/4	65	81	gravel, Medium, Clay	X	
6 3/4	81	93	gravel, Clay, Sand	X	
6 3/4	93	104	Sand	X	

10.
Work started Nov 29 finished Dec 4

11. DRILLERS CERTIFICATION

Firm Name C. W. Roesler Firm No. 19
Address Box 514-A Ketchum Ida. Date 1/21/74
Signed by (Firm Official) Carl W. Roesler
and
(Operator) Carl W. Roesler

USE ADDITIONAL SHEETS IF NECESSARY FORWARD THE WHITE COPY TO THE DEPARTMENT

MICROFILMED

Form 238-7
9/82

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

USE TYPEWRITER OR BALLPOINT PEN

1. WELL OWNER

Name Leslie Conner

Address Box 1623-Hailey, ID 83333

Owner's Permit No. 37-N-89-001

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)

3. PROPOSED USE

☒ Domestic ☒ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

4. METHOD DRILLED

☒ Rotary ☒ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other _____

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other _____

Thickness	Diameter	From	To
.250 inches	8 inches +	1 feet	85 feet
inches	inches	feet	feet
inches	inches	feet	feet
inches	inches	feet	feet

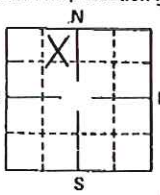
Was casing drive shoe used? ☒ Yes ☐ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch
Size of perforation _____ inches by _____ inches

Number	From	To
perforations	feet	feet
perforations	feet	feet
perforations	feet	feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name _____
Type _____ Model No. _____
Diameter ___ Slot size ___ Set from ___ feet to ___ feet
Diameter ___ Slot size ___ Set from ___ feet to ___ feet
Gravel packed? ☐ Yes ☒ No ☐ Size of gravel _____
Placed from _____ feet to _____ feet
Surface seal depth 20 Material used in seal: ☐ Cement grout
☒ Bentonite ☐ Puddling clay ☐ _____
Sealing procedure used: ☐ Slurry pit ☐ Temp. surface casing
☒ Overbore to seal depth
Method of joining casing: ☐ Threaded ☒ Welded ☐ Solvent Weld
☐ Cemented between strata
Describe access port _____

6. LOCATION OF WELL

Sketch map location must agree with written location.



Subdivision Name Marvin Gardens
Lot No. 9 Block No. _____
County Blaine
NE ¼ NW ¼ Sec. 10, T. 2 N/S, R. 18 E/W.

7. WATER LEVEL

Static water level 50 feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow _____
Artesian closed-in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature ___ °F. Quality good
Describe artesian or temperature zones below.

8. WELL TEST DATA

☐ Pump ☐ Bailer ☒ Air ☐ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped
100	76	1

9. LITHOLOGIC LOG 78356

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
10	0	10	Top soil		x
10	10	20	Gravel set in clay		x
8	20	65	" " " " " " "		x
8	65	75	Clay		x
8	75	85	Gravel and water	x	

RECEIVED JUN 21 1989 Department of Water Resources

RECEIVED JUN 15 1989 Department of Water Resources Southern Region Office

10. Work started May 29, 89 finished May 29, 89

11. DRILLERS CERTIFICATION DL

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

WOOD RIVER DRILLING AND PUMP
Firm Name ~~BOX 1135~~ ~~788-3163~~ Firm No. 265
HAILEY, IDAHO 83333
Address _____ Date 6-7-89
Signed by (Firm Official) Ron Smith
and
(Operator) Gary Jones

RECEIVED JUN 20 1991

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Form 238-7
8/90

V C

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

USE TYPEWRITER OR BALLPOINT PEN

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

1. WELL OWNER

Name: Les Dilley
Address: 7960 Farehome Drive Los angeles
Drilling Permit No. 37-91-S-165 Calif.
Water Right Permit No. ___

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Well diameter increase
☐ Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)

3. PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other ___ (specify type)

4. METHOD DRILLED

☒ Rotary ☒ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other ___

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other ___

Thickness	Diameter	From	To
.250 inches	6 inches +	1 feet	180 feet
___ inches	___ inches	___ feet	___ feet
.188 inches	~~[illegible]~~ inches	170 feet	270 feet
___ inches	___ inches	___ feet	___ feet

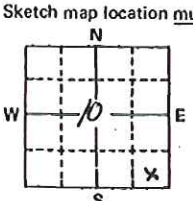
Was casing drive shoe used? ☒ Yes ☐ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☒ Yes ☐ No
How perforated? ☐ Factory ☐ Knife ☒ Torch ☐ Gun
Size of perforation ___ inches by ___ inches

Number	From	To
37 perforations	250 feet	270 feet
25 perforations	230 feet	250 feet
___ perforations	___ feet	___ feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name ___
Type ___ Model No. ___
Diameter ___ Slot size ___ Set from ___ feet to ___ feet
Diameter ___ Slot size ___ Set from ___ feet to ___ feet
Gravel packed? ☐ Yes ☒ No ☐ Size of gravel ___
Placed from ___ feet to ___ feet
Surface seal depth 40 Material used in seal: ☐ Cement grout
☒ Bentonite ☐ Puddling clay ☐ ___
Sealing procedure used: ☐ Slurry pit ☒ Temp. surface casing
☒ Overbore to seal depth
Method of joining casing: ☐ Threaded ☒ Welded ☐ Solvent Weld
☐ Cemented between strata
Describe access port: Sanitary well CAP

6. LOCATION OF WELL

Sketch map location must agree with written location.



Subdivision Name ___
Lot No. ___ Block No. ___

County Blaine
SE ¼ SE ¼ Sec. 10, T. 2N N☒ S☐ R. 18 E☒ W☐

7. WATER LEVEL

Static water level 185' feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow ___
Artesian closed-in pressure ___ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature ___ °F. Quality Good
Describe artesian or temperature zones below.

8. WELL TEST DATA

☐ Pump ☐ Bailer ☒ Air ☐ Other ___

Discharge G.P.M.	Pumping Level	Hours Pumped
25-30	250	3

075766

9. LITHOLOGIC LOG

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
6	0	5	Red Clay Sand Rock		✓
	5	40	Red Clay & Broken Rock		✓
	40	60	Red Clay		✓
	60	80	Red Clay		✓
	80	100	Red Clay		✓
	100	105	Red Clay		✓
	105	125	Gray Clay & Broken Rock		✓
	125	150	Gray Clay		✓
	150	170	Gray Clay		✓
	170	180	Broken Gray Rock		✓
	180	197	Sand Gray Rock		✓
	197	225	Brown Sand Stone	✓	
	225	245	Gray Rock		✓
	245	265	Gray Rock		✓
	265	280	Brown Sand Rock Broken	✓	

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APR 10 1992
Department of Water Resources
Southern Region Office

MICROFILMED
JUL 08 1992

10.

Work started 3-10-92 finished 4-1-92

11. DRILLERS CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Scott Drilling & Pump Firm No. 327
Address P.O. Box 577 Hailey, Idaho 83333 Date 4-1-92
(208) 788-5019
Signed by (Firm Official) [signature]
and
(Operator) [signature]

USE ADDITIONAL SHEETS IF NECESSARY -- FORWARD THE WHITE COPY TO THE DEPARTMENT

Form 238-7
6/80

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

USE TYPEWRITER OR BALLPOINT PEN

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

1. WELL OWNER

Name John & Alma Mills

Address P.O. Box 831 Ketchum ID 83340

Owner's Permit No. 37-91-S-056-880

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Well diameter increase
☐ Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)

3. PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

4. METHOD DRILLED

☒ Rotary ☒ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other _____

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other _____

Thickness	Diameter	From	To
.250 inches	6 inches +	1 feet	80 feet
____ inches	____ inches	____ feet	____ feet
____ inches	____ inches	____ feet	____ feet
____ inches	____ inches	____ feet	____ feet

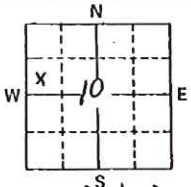
Was casing drive shoe used? ☒ Yes ☐ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch ☐ Gun
Size of perforation ____ inches by ____ inches

Number	From	To
____ perforations	____ feet	____ feet
____ perforations	____ feet	____ feet
____ perforations	____ feet	____ feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name _____
Type _____ Model No. _____
Diameter ____ Slot size ____ Set from ____ feet to ____ feet
Diameter ____ Slot size ____ Set from ____ feet to ____ feet
Gravel packed? ☐ Yes ☒ No ☐ Size of gravel _____
Placed from ____ feet to ____ feet
Surface seal depth 20 Material used in seal: ☐ Cement grout
☒ Bentonite ☐ Puddling clay ☐ _____
Sealing procedure used: ☐ Slurry pit ☒ Temp. surface casing
☒ Overbore to seal depth
Method of joining casing: ☐ Threaded ☒ Welded ☐ Solvent Weld
☐ Cemented between strata
Describe access port Sanitary well cap

6. LOCATION OF WELL

Sketch map location must agree with written location.



Subdivision Name Marvin Gardens
Lot No. 7 Block No. 1
County Blaine
SW ¼ NW ¼ Sec. 10, T. 2 N ☒ S ☐ R. 18 E ☒ W ☐

7. WATER LEVEL

Static water level 53' feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow _____
Artesian closed-in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature — °F. Quality Good
Describe artesian or temperature zones below.

8. WELL TEST DATA

☐ Pump ☐ Bailer ☒ Air ☐ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped
35	75	2

9. LITHOLOGIC LOG

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
6	0	1	Top soil		✓
	1	4	Dirt - clay		✓
	4	15	Dirt - clay - gravel		✓
	15	21	Clay - gravel		✓
	21	27	Cemented gravel		✓
	27	50	Sand & gravel		✓
	50	57	Sand & gravel		✓
	57	61	Red clay - sandstone		✓
	61	75	gravel & sand	✓	
	75	85	gravel & sand	✓	
	85	90	" "	✓	

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APR 16 1991
Department of Water Resources
Southern Region Office

10. Work started 4-11-91 finished 4-11-91

11. DRILLERS CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Scott Drilling & Pump Firm No. 327
Address P.O. Box 227 Hailey, Idaho 83333 (208) 788-5010 Date 4-11-91
Signed by (Firm Official) J Scott
and
(Operator) John Scott

USE ADDITIONAL SHEETS IF NECESSARY -- FORWARD THE WHITE COPY TO THE DEPARTMENT

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DEC 29 1966
Department of Reclamation

Location Corrected by IDWR To:
T02N R18E Sec. 10 SWSESW
By: mciscell 2012-08-28

REPORT OF WELL DRILLER
State of Idaho

State law requires that this report shall be filed with the State Reclamation Engineer within 30 days after completion or abandonment of the well.

WELL OWNER:
Name HXXXEX JOHN FOX

Address HAILEY, IDAHO

Owner's Permit No. 9-38032
NATURE OF WORK (check): Replacement well [ ]
New well [X] Deepened [ ] Abandoned [ ]

Water is to be used for: IRRIGATION

METHOD OF CONSTRUCTION: Rotary [ ] Cable [X]
Dug [ ] Other _____
(explain)

CASING SCHEDULE: Threaded [ ] Welded [X]
____"Diam. from ____ ft. to ____ ft.
____"Diam. from ____ ft. to ____ ft.
____"Diam. from ____ ft. to ____ ft.
____"Diam. from ____ ft. to ____ ft.
Thickness of casing: 3/8" Material:
Steel [X] concrete [ ] wood [ ] other [ ]

(explain)
PERFORATED? Yes [X] No [ ] Type of perforator used: MILLS

Size of perforations: 3/8 W" by 2 1 "
~~160~~ 1560 perforations from 69 ft. to 134 ft.
~~160~~ perforations from 134 ft. to 149 ft.
____ perforations from ____ ft. to ____ ft.
____ perforations from ____ ft. to ____ ft.
WAS SCREEN INSTALLED? Yes [ ] No [X]
Manufacturer's name _____
Type _____ Model No. _____
Diam. ____ Slot size ____ Set from ____ ft. to ____ ft.
Diam. ____ Slot size ____ Set from ____ ft. to ____ ft.

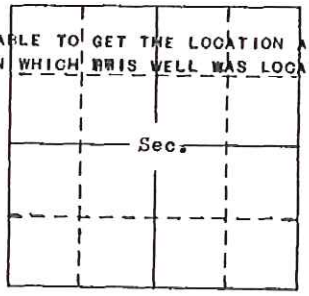
CONSTRUCTION: Well gravel packed? Yes [ ]
No. [X] size of gravel _____ Gravel placed from ____ ft. to ____ ft. Surface seal provided? Yes [ ] No [ ] To what depth? ____ ft. Material used in seal: _____

Did any strata contain unusable water? Yes [ ]
No. [ ] Type of water: _____
Depth of strata _____ ft. Method of sealing strata off: _____

Surface casing used? Yes [ ] No. [ ]
Cemented in place? Yes [ ] No [ ]

Locate well in section

WE WERE UNABLE TO GET THE LOCATION AS TO THE QUARTERS IN WHICH THIS WELL WAS LOCATED.



LOCATION OF WELL: County BLAINE
~~NW~~ ~~SE~~ ¼ Sec. 10 T. 2 N/~~S~~ R. 18 E/~~W~~
3N 18E

Use other side for additional remarks

Size of drilled hole: 16" Total depth of well: 158 Standing water level below ground: 55 Temp. Fahr. ____ ° Test delivery: ____ gpm or ____ cfs Pump? [ ] Bail [ ]
Size of pump and motor used to make test:

Length of time of test: ____ Hrs. ____ Min.
Drawdown: ____ ft. Artesian pressure: ____ ft. above land surface ____ Give flow ____ cfs or ____ gpm. Shutoff pressure:
Controlled by: Valve [ ] Cap [ ] Plug [ ]
No control [ ] Does well leak around casing?
Yes [ ] No [ ]

39671

DEPTH FROM FEET	DEPTH TO FEET	MATERIAL	WATER YES OR NO
0	3	TOPSOIL	
3	20	CLAY AND GRAVEL	
20	25	BOULDERS AND CLAY	
25	63	CLAY AND GRAVEL	
63	65	SAND	YES
65	69	CLAY	
69	82	COURSE GRAVEL, SOME CLAY	
~~82~~ ~~90~~			
82	90	SMALL GRAVEL AND SOME CLAY	
90	120	GRAVEL, SAND AND CLAY	
120	158	CLAY, GRAVEL, SAND	YES

Work started: 8-22-66
Work finished: 9-17-66
Well Driller's Statement: This well was drilled under my supervision and this report is true to the best of my knowledge.
Name: SMITH DRILLING AND PUMP CO. INC.
Address: 365 WEST MAIN JEROME, IDAHO
Signed by: J. Emmett Smith
License No. 11 Date: 12-23-66

USGS

Form 238-7
6/07

IDAHO DEPARTMENT OF WATER RESOU
WELL DRILLER'S REPORT

Location Corrected by IDWR To:
T06N R16E Sec. 13 NWSWNW
By: mciscell 2013-09-18

1. WELL TAG NO. D 0060751

Drilling Permit No. 863879

Water right or injection well # _____

2. OWNER:

Name Intermountain Gas

Address 687 Blue Lakes Blvd N, P. O. Box 68

City Twin Falls State ID Zip 83303

3.WELL LOCATION:

Twp. 2 North ☒ or South ☐ Rge. 18 East ☒ or West ☐

Sec. 10 ____ 1/4 SW 1/4 SW 1/4
(10 acres, 40 acres, 160 acres)

Gov't Lot _____ County Blaine

Lat. 43 ° 51445 (Deg. and Decimal minutes)

Long. 114 ° 303200 (Deg. and Decimal minutes)

Address of Well Site Fox Acres
(Give at least name of road + Distance to Road or Landmark) City Hailey

Lot _____ Blk. _____ Sub. Name _____

4. USE:
☐ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation ☐ Thermal ☐ Injection
☒ Other AC Mitigation

5. TYPE OF WORK:
☒ New well ☐ Replacement well ☐ Modify existing well
☐ Abandonment ☐ Other _____

6. DRILL METHOD:
☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other _____

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method/procedure
3/8" bentonite	0	20	21 bags	dry pour
chips				

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
6	+2	98	.250	steel	☒	☐	☐	☒
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Was drive shoe used? ☐ Y ☐ N Shoe Depth(s) _____

9. PERFORATIONS/SCREENS:

Perforations ☐ Y ☐ N Method _____

Manufactured screen ☐ Y ☐ N Type _____

Method of installation _____

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule

Length of Headpipe _____ Length of Tailpipe _____

Packer ☐ Y ☐ N Type _____

10.FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method

11. FLOWING ARTESIAN:

Flowing Artesian? ☐ Y ☐ N Artesian Pressure (PSIG) _____

Describe control device _____

12. STATIC WATER LEVEL and WELL TESTS:

Depth first water encountered (ft) 42 Static water level (ft) 51

Water temp. (°F) 52 Bottom hole temp. (°F) 52

Describe access port well cap steel

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)	Test method: Pump	Bailer	Air	Flowing artesian
80	30	30 minutes	☐	☐	☒	☐
			☐	☐	☐	☐

Water quality test or comments: _____

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
10	0	2	top soil & gravel		
10	2	19	gravel & sand		
6	19	51	gravel & sand		
6	51	64	gravel	X	
6	64	100	sand & gravel		

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AUG 27 2012
DEPT. OF WATER RESOURCES
SOUTHERN REGION

Completed Depth (Measurable): 100

Date Started: 07/20/2012 Date Completed: 07/21/2012

14. DRILLER'S CERTIFICATION:
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Eaton Drilling & Pump Ser. Co. No. 26

*Principal Driller _____ Date 8-20-12

*Driller _____ Date 8-16-12

*Operator II _____ Date _____

Operator I _____ Date 8-16-12

* Signature of Principal Driller and rig operator are required.

56879

USE TYPEWRITER OR BALL POINT PEN

State of Idaho
Department of Water Administration

WELL DRILLER'S REPORT

RECEIVED
JUL 2 1973
Department of Water Administration
Southern District Office

State law requires that this report be filed with the Director, Department of Water Administration within 30 days after the completion or abandonment of the well.

1. WELL OWNER

Name Howard Knight

Address Hailey Idaho

Owner's Permit No.

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement

☐ Abandoned (describe method of abandoning)

3. PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Test

☐ Municipal ☐ Industrial ☐ Stock

4. METHOD DRILLED

☒ Cable ☐ Rotory ☐ Dug ☐ Other

5. WELL CONSTRUCTION

Diameter of hole 6 inches Total depth 61 feet

Casing schedule: ☒ Steel ☐ Concrete

Thickness	Diameter	From	To
.250 inches	6 inches	+ 1 feet	61 feet
inches	inches	feet	feet
inches	inches	feet	feet
inches	inches	feet	feet
inches	inches	feet	feet

Was a packer or seal used? ☐ Yes ☒ No

Perforated? ☐ Yes ☒ No

How perforated? ☐ Factory ☐ Knife ☐ Torch

Size of perforation ____ inches by ____ inches

Number	From	To
perforations	feet	feet
perforations	feet	feet
perforations	feet	feet

Well screen installed? ☐ Yes ☒ No

Manufacturer's name

Type Model No.

Diameter ___ Slot size ___ Set from ___ feet to ___ feet

Diameter ___ Slot size ___ Set from ___ feet to ___ feet

Gravel packed? ☐ Yes ☒ No Size of gravel

Placed from feet to feet

Surface seal? ☒ Yes ☐ No To what depth 18 feet

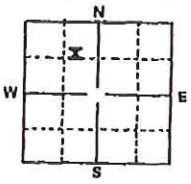
Material used in seal ☐ Cement grout ☒ Puddling clay

6. LOCATION OF WELL

Sketch map location must agree with written location.

D 1055

37



County Blaine

N.E. ¼ N.W. ¼ Sec. 10, T. 2 N. N/S, R. 18 E. E/W

7. WATER LEVEL

Static water level 18 feet below land surface

Flowing? ☐ Yes ☒ No G.P.M. flow

Temperature ____ ° F. Quality Good

Artesian closed-in pressure ____ p.s.i.

Controlled by ☐ Valve ☐ Cap ☐ Plug

8. WELL TEST DATA

☐ Pump ☒ Bailer ☐ Other

Discharge G.P.M.	Draw Down	Hours Pumped
24	6ft.	1

033639

9. LITHOLOGIC LOG

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
8	0	4	Top Soil		x
8	4	10	Gravel and clay		x
8	10	18	Gravel set in clay		x
6	18	22	" " " "		x
6	22	47	Yellow clay		x
6	47	52	Gravel set in clay		x
6	52	61	Coarse gravel with lots of water	x	

10. Work started May 28, 1973 finished May 30, 1973

11. DRILLER'S CERTIFICATION

This well was drilled under my supervision and this report is true to the best of my knowledge.

Claude Nicholson Well Drilling 159
Driller's or Firm's Name Number

Rt. 1. Dietrich Idaho 83324
Address

Kenneth R. Smith June 28, 1973
Signed By Date

USE ADDITIONAL SHEETS IF NECESSARY

FORWARD THE WHITE, BLUE, AND PINK COPIES TO THE DEPARTMENT

Form 238-7
6/07

860822

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

AD

1. WELL TAG NO. D 0057493

Drilling Permit No. 37W-085-001

Water right or injection well #

2. OWNER:

Name Blaine County School District #61

Address 118 W. Bullion St.

City Hailey State ID Zip 83333

3. WELL LOCATION:

Twp. 2 North ☒ or South ☐ Rge. 18 East ☒ or West ☐

Sec. 9 ___ 1/4 (10 acres) SE 1/4 (40 acres) SE 1/4 (160 acres)

Gov't Lot ___ County Blaine

Lat. 43° 30.930 (Deg. and Decimal minutes)

Long. 114° 18.525 (Deg. and Decimal minutes)

Address of Well Site 520 South 1st

(Give at least name of road + Distance to Road or Landmark) City Hailey

Lot. ___ Blk. ___ Sub. Name ___

4. USE:

☐ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation ☐ Thermal ☒ Injection
☐ Other

5. TYPE OF WORK:

☒ New well ☐ Replacement well ☐ Modify existing well
☐ Abandonment ☐ Other

6. DRILL METHOD:

☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method/procedure
Bentonite	0'	40'	1600#	Temporary Casing

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
12"	+2'	200'	.25	steel	☒	☐	☐	☒
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s)

9. PERFORATIONS/SCREENS:

Perforations ☒ Y ☐ N Method Perforator

Manufactured screen ☐ Y ☒ N Type

Method of installation

From (ft)	To (ft)	Slot size	Number	Diameter (nominal)	Material	Gauge or Schedule
85'	185'	1½ x 1/4"	2500	12"	steel	.250

Length of Headpipe ___ Length of Tailpipe ___

Packer ☐ Y ☐ N Type

10. FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method

11. FLOWING ARTESIAN:

Flowing Artesian? ☐ Y ☐ N Artesian Pressure (PSIG)

Describe control device

12. STATIC WATER LEVEL and WELL TESTS:

Depth first water encountered (ft) 50' Static water level (ft) 50'

Water temp. (°F) ___ Bottom hole temp. (°F) ___

Describe access port

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)
—	100+	2 hrs

Test method: Pump ☐ Bailer ☐ Air ☒ Flowing artesian ☐

Water quality test or comments:

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
18"	0'	4'	Overburden		
	4'	48'	Gravel & Sediment		/
12"	48'	200'	Gravel & Sediment	X	

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Completed Depth (Measurable): 200'

Date Started: 3/14/2011 Date Completed: 4/14/2011

14. DRILLER'S CERTIFICATION:

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Jody Denning & Drilling Co. No. 519

*Principal Driller Jody Denning Date

*Driller Date

*Operator II Ed Denning Date 4/15/11

Operator I Date

* Signature of Principal Driller and rig operator are required.

860822

Form 238-7
6/07

860820

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

AD 37

1. WELL TAG NO. D 0057492

Drilling Permit No. _____

Water right or injection well # 37-22514

2. OWNER:

Name Blaine County School District #61

Address 118 W. Bullion St.

City Hailey State ID Zip 83333

3. WELL LOCATION:

Twp. 2 North ☒ or South ☐ Rge. 18 East ☒ or West ☐

Sec. 9 _____ 10 acres 1/4 SE 40 acres 1/4 SE 160 acres 1/4

Gov't Lot _____ County Blaine

Lat. 43° 0 30.940 (Deg and Decimal minutes)

Long. 114° 0 18.552 (Deg. and Decimal minutes)

Address of Well Site 520 South 1st

(Give at least name of road + Distance to Road or Landmark) City Hailey

Lot. _____ Blk. _____ Sub. Name _____

4. USE:

☐ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation ☐ Thermal ☐ Injection

☒ Other Heating & Cooling

5. TYPE OF WORK:

☒ New well ☐ Replacement well ☐ Modify existing well

☐ Abandonment ☐ Other _____

6. DRILL METHOD:

☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other _____

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method/procedure
Bentonite	0'	40'	1500#	Temporary Casing

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
16"	+2'	117'	.25	steel	☒	☐	☐	☒
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) _____

9. PERFORATIONS/SCREENS:

Perforations ☐ Y ☐ N Method _____

Manufactured screen ☒ Y ☐ N Type 304 Stainless

Method of installation _____

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule
119'	179'	.060		8"	stainless	

Length of Headpipe 12' Length of Tailpipe 20'

Packer ☒ Y ☐ N Type Triple K

10. FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method

11. FLOWING ARTESIAN:

Flowing Artesian? ☐ Y ☒ N Artesian Pressure (PSIG) _____

Describe control device _____

12. STATIC WATER LEVEL and WELL TESTS:

Depth first water encountered (ft) 50' Static water level (ft) 50'

Water temp. (°F) _____ Bottom hole temp. (°F) _____

Describe access port _____

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)
–	100+	2 hrs

Test method: Pump ☐ Bailer ☐ Air ☒ Flowing artesian ☐

Water quality test or comments: _____

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
16"	0'	4'	Overburden		
	4'	48'	Gravel & Sediment		
	48'	150'	Gravel & Sediment		
	150'	160'	Conglomerate but soft		
	160'	180'	Conglomerated (Harder)		
	180'	199'	Gravel & Sediment lesser conglomerate		

Completed Depth (Measurable): 199'

Date Started: 3/14/2011 Date Completed: 4/14/2011

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860820

14. DRILLER'S CERTIFICATION:

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Jody Denning Drilling Co. No. 519

*Principal Driller Jody Denning Date _____

*Driller _____ Date _____

*Operator II Jody Denning Date 4/15/2011

Operator I _____ Date _____

* Signature of Principal Driller and rig operator are required.

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IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

AD 37

1. WELL TAG NO. D 0057491
Drilling Permit No. 860819
Water right or injection well # 37-22514

2. OWNER:
Name Blaine County School District #61
Address 118 W. Bullion St.
City Hailey State ID Zip 83333

3. WELL LOCATION:
Twp. 2 North ☒ or South ☐ Rge. 18 East ☒ or West ☐
Sec. 9 ___ 1/4 (10 acres) SE 1/4 (40 acres) SE 1/4 (160 acres)
Gov't Lot ___ County Blaine
Lat. 43° 30.912 (Deg. and Decimal minutes)
Long. 114° 18.566 (Deg. and Decimal minutes)
Address of Well Site 520 South 1st
(Give at least name of road + Distance to Road or Landmark) City Hailey
Lot. ___ Blk. ___ Sub. Name ___

4. USE:
☐ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation ☐ Thermal ☐ Injection
☒ Other Heating & Cooling

5. TYPE OF WORK:
☒ New well ☐ Replacement well ☐ Modify existing well
☐ Abandonment ☐ Other ___

6. DRILL METHOD:
☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other ___

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method/procedure
Bentonite	0'	40'	2700#	Temporary Casing

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
10"	+2'	135'	.25	steel	☒	☐	☐	☒
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) ___

9. PERFORATIONS/SCREENS:
Perforations ☐ Y ☐ N Method ___
Manufactured screen ☒ Y ☐ N Type 304 Stainless
Method of installation ___

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule
137'	177'	.060		8"	stainless	
189'	209'	.060		8"	stainless	

Length of Headpipe 120' Length of Tailpipe 10'
Packer ☒ Y ☐ N Type Triple K

10. FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method

11. FLOWING ARTESIAN:
Flowing Artesian? ☐ Y ☒ N Artesian Pressure (PSIG) ___
Describe control device ___

12. STATIC WATER LEVEL and WELL TESTS:
Depth first water encountered (ft) 51' Static water level (ft) 51'
Water temp. (°F) ___ Bottom hole temp. (°F) ___
Describe access port ___

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)
–	100+	2 hrs

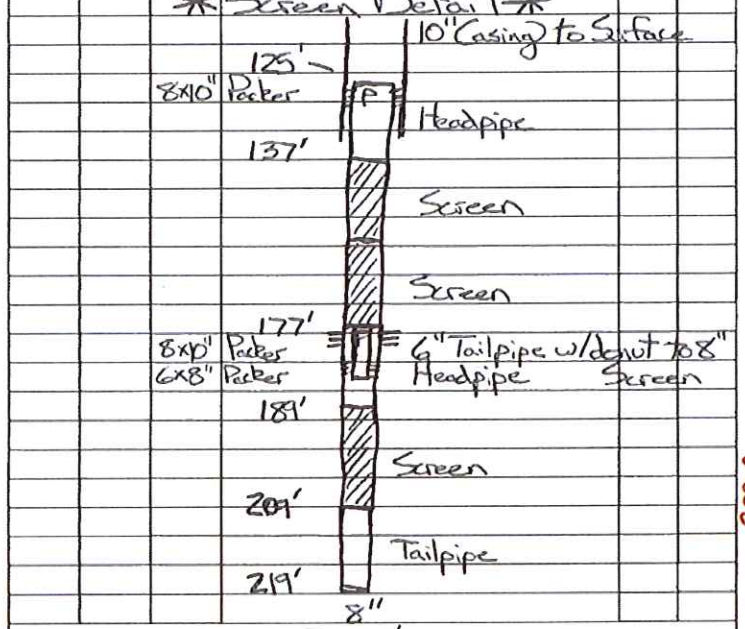
Test method: Pump ☐ Bailer ☐ Air ☒ Flowing artesian ☐

Water quality test or comments: ___

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
16"	0'	4'	Overburden		X
	4'	48'	Gravel & Sediment		X
10"	48'	143'	Gravel & Sediment		
	143'	147'	Conglomerated		
	147'	163'	Gravel & Clays		
	163'	168'	Conglomerated		
	168'	213'	Gravel & Sediment		
	213'	220'	Gravels w/more granite-hard		

* Screen Detail *



Completed Depth (Measurable): 219'
Date Started: 3/14/2011 Date Completed: 4/14/2011

14. DRILLER'S CERTIFICATION:
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Jody Dunning Drilling Co. No. 519
*Principal Driller Jody Dunning Date ___
*Driller ___ Date ___
*Operator II Jody Dunning Date 4/14/11
Operator I ___ Date ___

* Signature of Principal Driller and rig operator are required.

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Extraction Well # 1

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

AP

1. WELL TAG NO. D 0059616
Drilling Permit No. 861333
Water right or injection well # 37-22-545

2. OWNER:
Name Blaine Co. School District #61
Address 118 W. Bullion St.
City Hailey State ID Zip 83333

3. WELL LOCATION:
Twp. 2 North ☒ or South ☐ Rge. 18 East ☒ or West ☐
Sec. 10 ____ 10 acres 1/4 NW 40 acres 1/4 SE 160 acres 1/4
Gov't Lot ____ County Blaine
Lat. 43 ° 30.975 (Deg. and Decimal minutes)
Long. 114 ° 17.658 (Deg. and Decimal minutes)
Address of Well Site 1060 Fox Acres Rd.
(Give at least name of road + Distance to Road or Landmark) City Hailey
Lot. ____ Blk. ____ Sub. Name ____

4. USE:
☐ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation ☐ Thermal ☐ Injection
☒ Other Heat Pump

5. TYPE OF WORK:
☒ New well ☐ Replacement well ☐ Modify existing well
☐ Abandonment ☐ Other ____

6. DRILL METHOD:
☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other ____

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method/procedure
Bentonite	0'	40'	1500#	Temporary Casing

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
12"	+2'	166'	.25	steel	☒	☐	☐	☒
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) ____

9. PERFORATIONS/SCREENS:
Perforations ☒ Y ☐ N Method Perforator
Manufactured screen ☐ Y ☐ N Type ____
Method of Installation ____

From (ft)	To (ft)	Slot size	Number	Diameter (nominal)	Material	Gauge or Schedule
115'	165'	1/4 x 1"	1700	12"	steel	

Length of Headpipe ____ Length of Tailpipe ____
Packer ☐ Y ☐ N Type ____

10. FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method

11. FLOWING ARTESIAN:
Flowing Artesian? ☐ Y ☐ N Artesian Pressure (PSIG) ____
Describe control device ____

12. STATIC WATER LEVEL and WELL TESTS:
Depth first water encountered (ft) 64' Static water level (ft) 64'
Water temp. (°F) ____ Bottom hole temp. (°F) ____
Describe access port ____

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)
—	400+	60 min

Test method: Pump ☐ Bailer ☐ Air ☒ Flowing artesian ☐

Water quality test or comments: ____

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
16"	0'	3'	Overburden		
	3'	15'	Gravel & Clay		
	15'	21'	Clay		
	21'	48'	Gravel & Clay		
12"	48'	105'	Gravel & Clay (soft)		
	105'	120'	Gravel & Sediment (loose)		
	120'	158'	Gravel & Sediment		
	158'	166'	Shale (brown)		
	166'	169'	Hard Shale rock		

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Department of Water Resources
Eastern Region

Completed Depth (Measurable): 169'
Date Started: 6/16/11 Date Completed: 6/30/11

14. DRILLER'S CERTIFICATION:
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Jody Denning Drilling Co. No. 519
*Principal Driller ____ Date ____
*Driller ____ Date ____
*Operator II Jed Denning Date 6/30/11
Operator I ____ Date ____

* Signature of Principal Driller and rig operator are required.

Form 238-7
6/07

Extraction Well #

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

AD

1. WELL TAG NO. D 0059615
Drilling Permit No. B 861332
Water right or Injection well # 37-22-545

2. OWNER:
Name Blaine Co. School District #61
Address 118 W. Bullion St.
City Hailey State ID Zip 83333

3. WELL LOCATION:
Twp. 2 North ☒ or South ☐ Rge. 18 East ☒ or West ☐
Sec. 10 ___ 1/4 (10 acres) NW 1/4 (40 acres) SE 1/4 (160 acres)
Gov't Lot ___ County Blaine
Lat. 43 ° 31.012 (Deg. and Decimal minutes)
Long. 114 ° 17.673 (Deg. and Decimal minutes)
Address of Well Site 1050 Fox Acres Rd.
(Give at least name of road + Distance to Road or Landmark) City Hailey
Lot. ___ Blk. ___ Sub. Name ___

4. USE:
☐ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation ☐ Thermal ☐ Injection
☒ Other Heat Pump

5. TYPE OF WORK:
☒ New well ☐ Replacement well ☐ Modify existing well
☐ Abandonment ☐ Other ___

6. DRILL METHOD:
☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other ___

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method/procedure
Bentonite	0'	40'	1400#	Temporary Casing

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
12"	+2'	190	.25	steel	☒	☐	☐	☒
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) ___

9. PERFORATIONS/SCREENS:
Perforations ☒ Y ☐ N Method Perforator
Manufactured screen ☐ Y ☐ N Type ___
Method of Installation ___

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule
130'	180'		1800	12"	steel	.250

Length of Headpipe ___ Length of Tailpipe ___
Packer ☐ Y ☐ N Type ___

10. FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method

11. FLOWING ARTESIAN:
Flowing Artesian? ☐ Y ☐ N Artesian Pressure (PSIG) ___
Describe control device ___

12. STATIC WATER LEVEL and WELL TESTS:
Depth first water encountered (ft) 64' Static water level (ft) 64'
Water temp. (°F) ___ Bottom hole temp. (°F) ___
Describe access port ___

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)
—	400+	60

Test method: Pump ☐ Bailer ☐ Air ☒ Flowing artesian ☐

Water quality test or comments: ___

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
16"	0'	3'	Overburden		
	3'	10'	Gravel & Clay		
	10'	20'	Clay		
	20'	48'	Gravel & Clay		
12"	48'	125'	Gravel & Clay		
	125'	180'	Gravel & Sediment		
	180'	190'	Rock (Broken) Brown Shale caving		

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Completed Depth (Measurable): 188'
Date Started: 6/16/11 Date Completed: 6/24/11

14. DRILLER'S CERTIFICATION:
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Jody Denning Drilling Co. No. 519
*Principal Driller Jody Denning Date ___
*Driller ___ Date ___
*Operator II Ted Denning Date 6/24/11
Operator I ___ Date ___

* Signature of Principal Driller and rig operator are required.

Form 238-7
6/07

Extraction well #3

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

1. WELL TAG NO. D 0059614
Drilling Permit No. 861331
Water right or Injection well # 37-22-545

2. OWNER:
Name Blaine Co. School District #61
Address 118 W. Bullion St.
City Hailey State ID Zip 83333

3. WELL LOCATION:
Twp. 2 North ☒ or South ☐ Rge. 18 East ☒ or West ☐
Sec. 10 ___ 10 acres 1/4 SW 40 acres 1/4 SE 160 acres 1/4
Gov't Lot ___ County Blaine
Lat. 43° 31.040 (Deg. and Decimal minutes)
Long. 114° 17.688 (Deg. and Decimal minutes)
Address of Well Site 1050 Fox Acres Rd.
(Give at least name of road + Distance to Road or Landmark) City Hailey
Lot. ___ Blk. ___ Sub. Name ___

4. USE:
☐ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation ☐ Thermal ☐ Injection
☒ Other Heat Pump

5. TYPE OF WORK:
☒ New well ☐ Replacement well ☐ Modify existing well
☐ Abandonment ☐ Other ___

6. DRILL METHOD:
☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other ___

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method/procedure
Bentonite	0'	40'	1450#	Temporary (casing)

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
12"	+2'	182'	.25	steel	☒	☐	☐	☒
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) ___

9. PERFORATIONS/SCREENS:
Perforations ☒ Y ☐ N Method Perforator
Manufactured screen ☐ Y ☒ N Type ___
Method of installation ___

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule
125'	175'	1/4"x1"	1700	12"	steel	

Length of Headpipe ___ Length of Tailpipe ___
Packer ☐ Y ☐ N Type ___

10. FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method

11. FLOWING ARTESIAN:
Flowing Artesian? ☐ Y ☐ N Artesian Pressure (PSIG) ___
Describe control device ___

12. STATIC WATER LEVEL and WELL TESTS:
Depth first water encountered (ft) 60' Static water level (ft) 60'
Water temp. (°F) ___ Bottom hole temp. (°F) ___
Describe access port ___

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)
—	400+	60

Test method: Pump ☐ Bailer ☐ Air ☒ Flowing artesian ☐

Water quality test or comments: ___

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
16"	0'	3'	Overburden		
	3'	18'	Gravel & Clay		
	18'	23'	Clay		
	23'	48'	Gravel & Clay		
12"	48'	125'	Gravel & Clay		
	125'	176'	Gravel & Sediment		
	176'	180'	Rock / Brown Shale (caving)		

Completed Depth (Measurable): 180'
Date Started: 6/16/11 Date Completed: 6/24/11

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SOUTHERN REGION

14. DRILLER'S CERTIFICATION:
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Jody Denning Drilling Co. No. 519
*Principal Driller Jody Denning Date ___
*Driller ___ Date ___
*Operator II Jed Denning Date 6/27/11
Operator I ___ Date ___

* Signature of Principal Driller and rig operator are required.

Injection Well #2

Form 238-7
6/07

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

AD

1. WELL TAG NO. D 0058710

Drilling Permit No. 861245

Water right or injection well # 37W 086-002

2. OWNER:

Name Blaine Co. School District #61

Address 118 W. Bullion St.

City Hailey State ID Zip 83333

3. WELL LOCATION:

Twp. 2 North ☒ or South ☐ Rge. 18 East ☒ or West ☐

Sec. 10 NW 1/4 (10 acres) SW 1/4 (40 acres) SE 1/4 (160 acres)

Gov't Lot ___ County Blaine

Lat. 43° 30.918 (Deg. and Decimal minutes)

Long. 114° 17.633 (Deg and Decimal minutes)

Address of Well Site 1050 Fox Acres Rd.

(Give at least name of road + Distance to Road or Landmark) City Hailey

Lot. ___ Blk. ___ Sub. Name ___

4. USE:

☐ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation ☐ Thermal ☒ Injection
☐ Other ___

5. TYPE OF WORK:

☒ New well ☐ Replacement well ☐ Modify existing well
☐ Abandonment ☐ Other ___

6. DRILL METHOD:

☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other ___

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method/procedure
Bentonite	0'	40'	1450#	Temporary (casing)

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
12"	+2'	175'	.25	steel	☒	☐	☐	☒
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) ___

9. PERFORATIONS/SCREENS:

Perforations ☒ Y ☐ N Method Perforator

Manufactured screen ☐ Y ☐ N Type ___

Method of installation ___

From (ft)	To (ft)	Slot size	Number	Diameter (nominal)	Material	Gauge or Schedule
100'	175'	1/4"x1"	2310	12"	steel	

Length of Headpipe ___ Length of Tailpipe ___

Packer ☐ Y ☐ N Type ___

10. FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method

11. FLOWING ARTESIAN:

Flowing Artesian? ☐ Y ☐ N Artesian Pressure (PSIG) ___

Describe control device ___

12. STATIC WATER LEVEL and WELL TESTS:

Depth first water encountered (ft) 62' Static water level (ft) 62'

Water temp. (°F) ___ Bottom hole temp. (°F) ___

Describe access port ___

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)
—	500+	3 hrs

Test method: Pump ☐ Bailer ☐ Air ☒ Flowing artesian ☐

Water quality test or comments: ___

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
16"	0'	5'	Overburden		
	5'	48'	Gravel & Clay		
12"	48'	55'	Clay		
	55'	130'	Gravel & Clay		
	130'	160'	Gravel & Sediment		
	160'	163'	Conglomerated		
	163'	175'	Gravel & Sediment		
	175'		Mudstone		

RECEIVED
AUG 10 2011
Department of Water Resources
Eastern Region

RECEIVED
AUG 12 2011
DEPT. OF WATER RESOURCES
SOUTHERN REGION

Completed Depth (Measurable): 175'

Date Started: 6/9/11 Date Completed: 7/15/11

14. DRILLER'S CERTIFICATION:

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Jed Denning Drilling Co. No. 519

*Principal Driller Jed Denning Date ___

*Driller ___ Date ___

*Operator II Jed Denning Date 7/18/11

Operator I ___ Date ___

* Signature of Principal Driller and rig operator are required.

Form 238-7
6/07

Injection Well #1

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

AD

1. WELL TAG NO. D 0058709
Drilling Permit No. 861264
Water right or injection well # 37 W 086 001

2. OWNER:
Name Blaine Co. School District #61
Address 118 W. Bullion St.
City Hailey State ID Zip 83333

3. WELL LOCATION:
Twp. 2 North ☒ or South ☐ Rge. 18 East ☒ or West ☐
Sec. 10 NW 1/4 (10 acres) SW 1/4 (40 acres) SE 1/4 (160 acres)
Gov't Lot ____ County Blaine
Lat. 43° 30.954 (Deg. and Decimal minutes)
Long. 114° 17.696 (Deg. and Decimal minutes)
Address of Well Site 1050 Fox Acres Rd.
(Give at least name of road + Distance to Road or Landmark) City Hailey
Lot. ____ Blk. ____ Sub. Name ____

4. USE:
☐ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation ☐ Thermal ☒ Injection
☐ Other ____

5. TYPE OF WORK:
☒ New well ☐ Replacement well ☐ Modify existing well
☐ Abandonment ☐ Other ____

6. DRILL METHOD:
☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other ____

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method/procedure
Bentonite	0'	40'	1550#	Temporary Casing

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
12"	+2'	170'	.25	steel	☒	☐	☐	☒
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) ____

9. PERFORATIONS/SCREENS:
Perforations ☒ Y ☐ N Method Perforator
Manufactured screen ☐ Y ☐ N Type ____
Method of installation ____

From (ft)	To (ft)	Slot size	Number	Diameter (nominal)	Material	Gauge or Schedule
100'	175'	1/4 x 1"	2240	12"	steel	

Length of Headpipe ____ Length of Tailpipe ____
Packer ☐ Y ☐ N Type ____

10. FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method

11. FLOWING ARTESIAN:
Flowing Artesian? ☐ Y ☐ N Artesian Pressure (PSIG) ____
Describe control device ____

12. STATIC WATER LEVEL and WELL TESTS:
Depth first water encountered (ft) 61' Static water level (ft) 61
Water temp. (°F) ____ Bottom hole temp. (°F) ____
Describe access port ____

Well test:

Drawdown (feet)	Discharge or Yield (gpm)	Test duration (minutes)
—	500+	3hrs

Test method: Pump ☐ Bailer ☐ Air ☒ Flowing artesian ☐

Water quality test or comments: ____

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
16"	0'	5'	Overburden		
	5'	48'	Gr & Clay		
12"	48'	55'	Clay		
	55'	148'	Gravel & Clay		
	148'	170'	Gravel & Sediment		
	170'	173'	Conglo. Mudstone		

RECEIVED
AUG 10 2011
Department of Water Resources
Eastern Region

RECEIVED
AUG 12 2011
DEPT. OF WATER RESOURCES
SOUTHERN REGION

Completed Depth (Measurable): 175'
Date Started: 6/9/11 Date Completed: 7/13/11

14. DRILLER'S CERTIFICATION:
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Jody Denning Drilling Co. No. 519
*Principal Driller Jody Denning Date ____
*Driller ____ Date ____
*Operator II Jed Denning Date 7/18/11
Operator I ____ Date ____

* Signature of Principal Driller and rig operator are required.

ATTACHMENT C – GEOTECHNICAL REPORT

Return to Agenda

BUTLER ASSOCIATES, INC.
GEOTECHNICAL & CIVIL ENGINEERING & CONSULTING

P.O.B. 1034
Ketchum, Idaho 83340
Phone: 208.720.6432
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111 North 1st Ave, Hailey, ID 83333
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February 2, 2016

RE: GEOTECHNICAL REPORT
Quigley Farms P.U.D. Phase I
Quigley Canyon
Blaine County, Idaho

Dear Dave,

I have completed the authorized geotechnical investigation and report for the proposed Quigley Farms project in Blaine County, Idaho. This work was authorized during the project meeting on November 12, 2015.

This report summarizes the results of my field and laboratory testing and presents my geotechnical engineering opinions and recommendations. **It is my opinion that the site is suitable for the proposed water, sewer and street improvements for the multi-single family subdivision using native soils for structural backfill in the utility trenches and street construction and construction of the sewage treatment system.** I am providing the recommendations in this report for the water and sewer main installation, temporary utility trench excavation slopes, sewage treatment system design, street construction and grading and drainage.

I recommend that this office be retained to provide construction observations for placement of the structural fill in the utility trenches, temporary utility trench sloping and road construction. This work will be performed on a time and material basis and is not included in this scope of services. I understand that Biohabitats is designing the sewage treatment system based on the recommendations presented in this report . A copy of this report should be incorporated into the construction documents.

I appreciate this opportunity of working with you on this project. Please call me if you have any questions or comments.

Sincerely,

Steve Butler, P.E.

PROFESSIONAL ENGINEER
LICENSED
9392
STATE OF IDAHO
STEPHEN BUTLER

GEOTECHNICAL REPORT

Quigley Farms P.U. D. Phase I
Quigley Canyon
Blaine County, Idaho

Butler Associates, Inc.
P.O. Box 1034
Ketchum, Idaho 83340
February 2, 2016

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INTRODUCTION

This report represents the results of the soil and engineering evaluation for the proposed Quigley Farms P.U.D. Phase I in Blaine County, Idaho. The *Vicinity Map* shows the general location of the proposed project site.

The purpose of this evaluation was to assess the surface and subsurface soil and water conditions to prepare geotechnical engineering opinions and recommendations for the septic drainfield and street design for the proposed project. Before the subsurface investigation I reviewed the geotechnical report for previous Quigley Canyon Ranch project located in Quigley Canyon and geologic data pertinent to the site and general area. I performed a subsurface investigation by excavating seven test pits at the site using a track mounted excavator. The soils encountered in the test pits were visually identified and logged by a geotechnical engineer according to the Unified Soil Classification System (USCS) and United State Department of Agriculture (USDA) and analyzed to prepare this final report.

PROPOSED PROJECT

I understand that the proposed project will consist of up to 53 single family residences, a recreational trailhead, streets and sidewalks. The project will be serviced by private wells and a private septic system including individual residential septic tanks, a gravity sewer collection system, a wetlands biological pre-treatment system and treated effluent re-use system.

The primary views from the site are Quigley Canyon foothills to the north and east, the Wood River valley to the south and Della View, Croy Canyon and Carbonate ridge to the west.

The project is generally "rectangular shaped" and totals approximately 161 acres in size and has been divided into two development phases; Phase I encompasses approximately 50 acres and Phase 2 approximately 111 acres. The site is bordered by Blaine County G.I.S. Control 539572 CP & F and 542181 to the north, BLM land to the east, Tax Lots 8370 & 8035 and the Wood River High School P.U.D. Lot 1, Block 3 to the south and Deerfield Subdivisions No. 3, 4 & 5 to the west.

FIELD EXPLORATION

Seven test pits were excavated and observed at the site on January 7, 2016 using a track-mounted excavator. The test pits were excavated up to 21.5 feet below existing grade. Four piezometers were installed to approximately 20 feet below existing grade to monitor the groundwater during the spring snowmelt runoff with the purpose of designing the sewage treatment system. The *Test Pit Site Plan* shows the property lines, proposed lots and streets, existing contours and test pit locations. The *Test Pit Site Plan Photo* provides an aerial view of the test pit locations.

The soils in each test pit were evaluated and the soil profiles logged in the field by a geotechnical engineer in accordance with the Unified Soil Classification System (*USCS*) and United States Department of Agriculture (USDA). Sieve analyses were completed by a soil laboratory on four soil samples in the area of the proposed septic drainfields. The *Test Pit Site Plan*, *Test Pit Site Plan Photo, Test Pit Logs* and *Sieve Analysis'* are presented on pages 10, 11, 12-19 and 20-23, respectively. The *USCS* chart on page 24 should be used to interpret the terms on the test pit logs in this report.

At the conclusion of the subsurface evaluation, the test pits were loosely backfilled to match the existing ground surface. Any of the test pits located beneath areas proposed for foundations, streets, sidewalks or driveways will need to excavated and backfilled with structural fill in accordance with the *Public Street Construction* section of this report.

SUBSURFACE CONDITIONS

The soil profile encountered in the test pits revealed up to 5.1 feet of native, fine sand and silt with little gravel and clay and trace roots topsoil overlying native silty sand, gravel, cobble and occasional boulder with little silt and clay up to 21.5 feet below existing grade. The test pits were terminated due to the consistency of the soil between the test pits and reaching the capacity of the large excavator. Groundwater was not encountered in any of the test pits.

The geology of this area is mapped on the "Topographic, Geologic and Claim Map of the Mineral Hill Mining District, Blaine County, Idaho" as alluvium consisting of sand, gravel, and silt and clay soils deposited by Quigley Creek and the Big Wood River. Some of the surficial fine grain soils are classified as colluvium and were created as the overlying bedrock slopes eroded with the resultant soil being gravity deposited downslope.

OPINIONS AND RECOMMENDATIONS

General

It is the opinion of this office that the site is suitable from a geotechnical standpoint for the proposed residential development of 53 single family residences, roads, water and sewer mains and sewer treatment system supported by approved undisturbed native sand, gravel and cobble soils underlying the surficial fine grain soils or structural fill placed as outlined in this report.

All structural fill to be placed for the subdivision improvements should be approved on-site or imported sand and gravel soils underlying the native fine grain topsoil. All structural fill should be placed as outlined in the *Public Street Construction* and *Installation of Water, Sewer and Pre-treated Effluent Main* sections of this report. The recommendations contained in this report reflect my understanding of the existing surface and below grade conditions and reflect a straight-line interpolation and extrapolation of the subsurface conditions between and beyond test

pit locations. However, the soil conditions may vary at the proposed site. The various soil conditions will not be known until excavation for the structure is complete and may cause changes to construction plans and/or costs.

Wastewater Treatment System Design

I understand the proposed wastewater treatment system for Phase I will consist of individual septic tanks for each of the 53 residences, gravity sewer collection system, pumping station, constructed wetlands biological treatment system (CWBTS), treated effluent re-use system and a pressurized drainfield. The Idaho Technical Guidance Manual (TGM) indicates that for Large Soil Absorption Systems (LSAS) a primary and secondary drainfield must be constructed and an area for a tertiary drainfield set aside from development. The design for the CWBTS will be completed by Biohabitats, Inc.

Bob Erickson with the South Central Health District (SCHD) indicated that the TGM currently has not approved CWBTS in order for owners to take advantage of increased hydraulic application rates. However, Bob is on the review committee and CWBTS should be approved and included in the TGM by March 1, 2016. Once CWBTS are included in the TGM Brain Reed with the Department of Environmental Quality (DEQ) will review the proposed design.

Seven test pits were completed on January 7, 2016 with four of the test in areas proposed for the septic drainfields. The native soils encountered approximately 4 feet below existing grade were classified as B-2 and C-1 with an application rate of 0.45 and 0.30, respectively. The soil at 4 feet below existing grade in Test Pit #1 contained too much sand to be classified by the soil laboratory. Bob Erickson recommended that once the drainfields locations and sizes have been finalized soil samples should be retrieved at each location, reviewed by him and sent to a soils laboratory for a sieve analysis. He will review the new sieve analysis and verify the USDA soil classification to design the drainfields. If the drainfield locations remain the same from the map used during the January 7, 2016 subsurface investigation then only the a soil sample in the vicinity of Test Pit #1will have to be retrieved, reviewed by Bob and sent to the soil laboratory for a new sieve analysis.

A hydraulic conductivity value was not requested at the time of the January 7 subsurface investigation so a larger sample will have to be retrieved to complete a proper analysis. In the interim the soils lab indicated at a value of 0.05 m/s can be used for the NP study.

No groundwater was encountered in any of the test pits and piezometers were installed to approximately 20 feet below existing grade to monitor groundwater elevations during the spring snowmelt runoff. The vertical separation between the bottom of the drainfield and normal high groundwater is 3.0 feet for B-2 and C-1 soils and 2 feet for treated effluent and will have to be verified in the spring.

Bob Erickson has recommended the following waste water treatment system design parameters for the 53 Phase I residences incorporating a CWBTS:

1. Application rate of 0.6 gallons/s.f./day for B-2 soils. See page 4-130 TGM "Secondary Biological Treatment System Application Rates" included in this report.
2. Septic drainfields constructed using Infiltrators can incorporate an application area of 16 s.f /Infiltrator that includes a 25% reduction for the Infiltrator efficiency.

The drainfields should be installed as follows:

1. Remove all surficial fine grain topsoil (C-1) to expose underlying native sand and gravel soils (B-2).

2. Excavate Infiltrator trenches a minimum of 2.0 feet and a maximum of 4.0 feet below finish grade.

3. The drainfield are required to be a minimum of 200 feet from the Quigley Creek.

4. Install 4" diameter observation tubes over the last upward facing orifice at the end of each Infiltrator row.

5. Install a 6" diameter valve box over the observation tubes.

6. The bottom of each Infiltrator trench shall be level to minimize pooling. Individual rows can be installed at different elevations.

7. Pressure lateral shall be zipped tied to the top of the Infiltrators.

8. A minimum of 5 feet of residual head of pressurized effluent shall be observed above finish grade in the observation tubes.

Installation of Water, Sewer and Pre-treated Effluent Mains

The native silty sand and gravel soils underlying the surficial silty clayey fine sand topsoil will provide an adequate medium to support the water, sewer and treated effluent mains and can be used as structural backfill for the utility trenches to support the streets and sidewalks. The surficial silty clayey fine sand up to 5.1 feet below existing grade is moisture sensitive and should be removed from all street and sidewalk alignments prior to excavating the utility trenches so it does not contaminate the underlying sand and gravel soils. Failure to remove the silty clayey fine sand could result in contaminating the sand and gravel soils, rendering the material moisture sensitive and possibly unsuitable as structural fill. At minimum, contaminated sand and gravel soils will require more effort to obtain a proper moisture content to reach proper compaction. The surficial silty clayey fine sand should be reviewed by the landscape contractor to be used for

finish landscaping and stockpiled for non-structural landscaping uses.

I recommend the following construction sequencing for installation of the water, sewer and treated effluent mains:

1. All test pits should be accurately located in the field prior to commencing with the installation of utilities or road construction. Any test pit that is located within the street or sidewalk should be excavated and backfilled with structural fill in accordance with this report. This procedure should help reduce local settlement. The test pit locations are shown on the *Test Pit Site Plan.*

2. All native silty clayey fine sand should be removed from the street and sidewalk alignments to exposed the underlying silty sand and gravel soils. This will minimize the underlying silty sand and gravel from being contaminated and possibly compromised for use as structural fill by the moisture sensitive silty clayey fine sand.

3. Once the native silty sand and gravel is exposed several samples should be retrieved and sent to a soils laboratory to complete a Standard Proctor Test to obtain the maximum dry density of the material according to ASTM D-698. The maximum dry density values will be used to record density values with a nuclear density gauge during backfilling of the utility trenches. This office does not operate a nuclear density gauge but can provide the names of several testing companies in the Wood River Valley.

4. After 18" of the native silty sand and gravel structural fill is placed and compacted in several lifts over the mains density values should be recorded to ensure that the material is being compacted to at least 95% of the maximum dry density of the material. After several lifts of the structural fill has been placed to meet compaction requirements and the excavation contractor understands the amount of water that needs to be applied and the number of passes with a smooth drum roller to obtain compaction the frequency of density values recorded could be reduced at the owner's request. I recommend reviewing a density value recording schedule with this office to provide a level of testing the owner is satisfied with.

5. Backfilling of the utility trenches should continue until reaching the bottom of the structural road section.

Structural backfill for the utility trenches, street and sidewalk construction should be native silty sand and gravel or imported, pitrun sand and gravel (GW, GM or GP), crushed sand and gravel (roadmix) as described in the Unified Soil Classification System chart presented after the test pit logs. Granular structural fill should have no more than 10% passing the No. 200 sieve and a cobble size of no larger than 8 inches. Structural fill should be placed to the bottom of the structural street section subgrade elevation in uniform, maximum 10-inch deep, loose lifts and compacted to a minimum of 95% of the maximum dry density of the soil, as determined by

ASTM D 698 (Standard Proctor). This assumes that heavy compaction equipment such as smooth-drum, vibratory rollers with a minimum drum weight of 5 tons is used. The maximum loose lift thickness should be reduced to 6 inches where smaller and/or lighter compaction equipment is used (i.e. WACKER jumping jack). A vibrating plate tamper can be used to compact 6" lifts of washed rock but should not be used to compact pitrun sand & gravel. On-site native soils containing more than 10% should be reviewed by this office for use as structural fill.

Temporary Utility Trench Excavation Slopes

The native silty sand and gravel soils underlying the topsoil are classified by OSHA as Type B with recommended temporary excavation slopes of 1:1 (45°) for excavations less than 20 feet deep. Based on my geotechnical experience in the Wood River Valley I can recommend that the temporary excavation slopes can be increased to ¾ :1 and should include a minimum of 4 foot width at the bottom of the trench to install mains. After this office confirms the soil classification during the he initial trenching a letter can be completed addressing the increased temporary excavation slopes and maximum design depth. This letter should be kept on-site in the job office. Several projects in the Wood River Valley have been fined for not having this letter in the on-site office. Requesting the letter at the time of the OSHA site visit has typically resulted in fines being levied. This office should complete site visits throughout the trench excavation process to verify the native soils and required excavation slopes.

Public Street Construction

I understand that the subdivision streets will be dedicated to the County. The following site preparation recommendations should be completed prior to approving the construction of the street structural section:

1. Native silty clayey fine sand topsoil should be removed from all street and sidewalk alignments to expose the underlying silty sand and gravel soils and stockpiled for non-structural landscaping. The moisture sensitive topsoil can be very difficult to work with in inclement weather and could contaminate the underlying silty sand and gravel and make unsuitable as structural fill.

2. Following installation of the utilities and backfilling to bottom of the structural road section the exposed sand and gravel subgrade should be watered and compacted with multiple passes of a smooth drum roller to at least 95% of the maximum dry density of the material according to ASTM D-698.

3. Following compaction of the exposed subgrade this office should proof-roll the completed subgrade and density values could be recorded at the owner's request. Any unsuitable soils encountered during compaction of the foundation subgrade should be excavated to expose a competent subgrade and replaced with either on-site or imported sand and gravel structural fill.

4. If no soft areas are observed this office will approve the subgrade for construction of the structural road section.

5. 6" of approved on-site silty sand and gravel can be used for the sub-base and should be compacted to at 95% maximum density of the material as outlined in the previous section.

6. 4" of imported ¾" minus crushed sand and gravel roadmix base compacted to at 95% of the maximum density of the material according to ASTM D-698. A Standard Proctor Analysis ASTM D-698 should have been performed on the material within the last year.

7. 2 ½" of plantmix pavement.

8. See the *Public Street and Driveway Structural Section Profile* in this report.

Structural fill requirements are presented in the *Installation of Water, Sewer and Pre-treated Effluent Mains* section.

Surface Grading and Drainage

This office has been working with Benchmark Associates to complete a grading and drainage plan consisting finish grades directing runoff to a series of water quality swales and drywells. Below are general grading and drainage concepts based on the soils encountered in the test pits.

1. I recommend that surfaces adjacent to the proposed streets, sidewalks and structures be sloped away at a minimum 2% to prevent ponding.

2. The bottom of the drywells should be terminated at least 3 feet into the native silty sand and gravel underlying the silty clayey fine sand topsoil.

3. The native, silty sand and gravel soils encountered below the existing topsoil should provide an adequate capacity for disposing of runoff. The infiltration rate for the native free-draining sand and gravel soils is 2"/minute. This office should review the total areas of the hardscapes and roof areas to determine the size and number of drywells or if more one than drywell should be constructed. See the *Landscape Drywell Profile* and *Stormwater Drywell Profile* for design concepts.

CONSTRUCTION OBSERVATION AND MONITORING

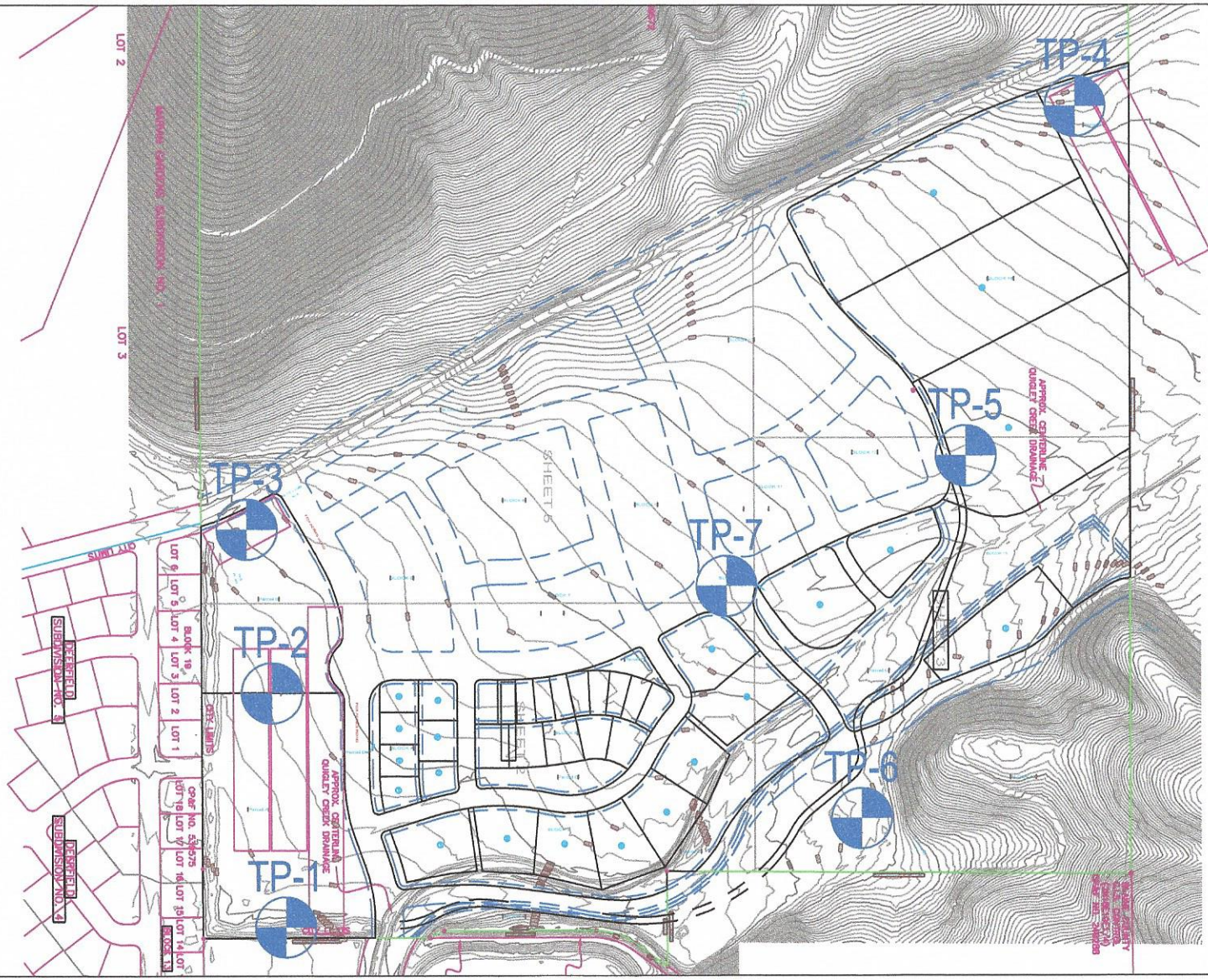
This report provides opinions and recommendations that are generally accepted geotechnical engineering principle and practices. I suggest this office is retained to provide construction monitoring and observation services in order to ensure that the recommendations outlined in this report are followed and the foundation building pad and drainage system is constructed properly. If this office is not retained to perform the recommended services, I cannot be responsible for soil engineering construction errors or omissions. The costs for the recommended services are not included with this report and would be incurred on a time and expense basis.

VICINITY MAP

Quigley Farms P.U.D. Phase I
Quigley Canyon
Blaine County, Idaho
43°31'17" N, 114°17'40" W

TEST PIT SITE PLAN PHOTO

Proposed Quigley Farms P.U.D. Phase I
Quigley Canyon
Blaine County, Idaho
Test pits excavated on January 7, 2016



TEST PIT SITE PLAN

Quigley Farms P.U.D. Phase I
Quigley Canyon
Blaine County, Idaho

Butler Associates, Inc.
Test pits excavated
on January 7, 2016

January 2016
Not to scale

EXPLORATORY TEST PIT #1

Quigley Farms P.U.D. Phase I
Quigley Canyon
Blaine County, Idaho

DEPTH (Feet)	USCS SOIL CLASS	USDA SOIL CLASS	SOIL DESCRIPTION
0.0-2.1	SM	B-2	Fine SAND and SILT, some Clay, some Gravel and trace Roots (NATIVE) Brown, loose, damp.
2.1-19.2	GM	N/A	SAND, GRAVEL, COBBLE & occasional BOULDER, little Silt and Clay, trace Roots (NATIVE) Brown, compact-dense, damp.

Test pit excavated on January 7, 2016.
See *Test Pit Site Plan* for test pit location.
Approximate test pit surface elevation is approximately 5366 feet based on the topographic survey by Benchmark Associates, Inc.
No groundwater encountered.
Test pit terminated at 19.2 feet below existing grade due to the consistency of soil between the test pits and loosely backfilled with test pit spoils.
No soil sample retrieved.
Piezometer installed to monitor groundwater.
Poor stability of test pit walls in native sand & gravel soils.
Excavation equipment: DEERE 50D track-mounted excavator.

EXPLORATORY TEST PIT #2

Quigley Farms P.U.D. Phase I
Quigley Canyon
Blaine County, Idaho

DEPTH (Feet)	USCS SOIL CLASS	USDA SOIL CLASS	SOIL DESCRIPTION
0.0-5.1	SM	B-2	Fine SAND and SILT, some Clay and Gravel, trace Roots (NATIVE) Brown, loose, damp.
5.1-21.5	GM	B-1/C-1	SAND, GRAVEL, COBBLE & occasional BOULDER, Little-some Silt and Clay, trace Roots (NATIVE) Brown, compact-dense, damp.

Test pit excavated on January 7, 2016.
See *Test Pit Site Plan* for test pit location.
Approximate test pit surface elevation is approximately 5366 feet based on the topographic survey by Benchmark Associates, Inc.
No groundwater encountered.
Test pit terminated at 21.5 feet below existing grade due to the consistency of soil between the test pits and loosely backfilled with test pit spoils.
No soil sample retrieved.
Piezometer installed to monitor groundwater.
Poor stability of test pit walls in native sand & gravel soils.
Excavation equipment: DEERE 50D track-mounted excavator.

EXPLORATORY TEST PIT #3

Quigley Farms P.U.D. Phase I
Quigley Canyon
Blaine County, Idaho

DEPTH (Feet)	USCS SOIL CLASS	USDA SOIL CLASS	SOIL DESCRIPTION
0.0-2.0	SM	B-2	Fine SAND and SILT, some Clay, some Gravel and trace Roots (NATIVE) Brown, loose, damp.
2.0-19.0	GM	B-1/C-1	SAND, GRAVEL, COBBLE & occasional BOULDER, Little-some Silt and Clay, trace Roots (NATIVE) Brown, compact-dense, damp.

Test pit excavated on January 7, 2016.
See *Test Pit Site Plan* for test pit location.
Approximate test pit surface elevation is approximately 5370 feet based on the topographic survey by Benchmark Associates, Inc.
No groundwater encountered.
Test pit terminated at 19.0 feet below existing grade due to the consistency of soil between the test pits and loosely backfilled with test pit spoils.
No soil sample retrieved.
Piezometer installed to monitor groundwater.
Poor stability of test pit walls in native sand & gravel soils.
Excavation equipment: DEERE 50D track-mounted excavator.

EXPLORATORY TEST PIT #4

Quigley Farms P.U.D. Phase I
Quigley Canyon
Blaine County, Idaho

DEPTH (Feet)	USCS SOIL CLASS	USDA SOIL CLASS	SOIL DESCRIPTION
0.0-4.6	SM	B-2	Fine SAND and SILT, some Clay, some Gravel and trace Roots (NATIVE) Brown, loose, damp.
4.6-19.2	GM	B-1/C-1	SAND, GRAVEL, COBBLE & occasional BOULDER, Little-some Silt and Clay, trace Roots (NATIVE) Brown, compact-dense, damp.

Test pit excavated on January 7, 2016.
See *Test Pit Site Plan* for test pit location.
Approximate test pit surface elevation is approximately 5425 feet based on the topographic survey by Benchmark Associates, Inc.
No groundwater encountered.
Test pit terminated at 19.2 feet below existing grade due to the consistency of soil between the test pits and loosely backfilled with test pit spoils.
No soil sample retrieved.
Piezometer installed to monitor groundwater.
Poor stability of test pit walls in native sand & gravel soils.
Excavation equipment: DEERE 50D track-mounted excavator.

EXPLORATORY TEST PIT #5

Quigley Farms P.U.D. Phase I
Quigley Canyon
Blaine County, Idaho

DEPTH (Feet)	USCS SOIL CLASS	USDA SOIL CLASS	SOIL DESCRIPTION
0.0-2.2	SC	C-1	Silty clayey fine SAND, trace Gravel-little and Roots (NATIVE) Brown, loose, damp.
2.2-10.8	GM	B-1/C-1	SAND, GRAVEL, COBBLE & occasional BOULDER, Little-some Silt and Clay, trace Roots (NATIVE) Brown, compact-dense, damp.

Test pit excavated on January 7, 2016.
See *Test Pit Site Plan* for test pit location.
Approximate test pit surface elevation is approximately 5397 feet based on the topographic survey by Benchmark Associates, Inc.
No groundwater encountered.
Test pit terminated at 10.8 feet below existing grade due to the consistency of soil between the test pits and loosely backfilled with test pit spoils.
No soil sample retrieved.
Piezometer installed to monitor groundwater.
Poor stability of test pit walls in native sand & gravel soils.
Excavation equipment: DEERE 50D track-mounted excavator.

EXPLORATORY TEST PIT #6

Quigley Farms P.U.D. Phase I
Quigley Canyon
Blaine County, Idaho

DEPTH (Feet)	USCS SOIL CLASS	USDA SOIL CLASS	SOIL DESCRIPTION
0.0-2.1	SC	C-1	Silty clayey fine SAND, trace Gravel-little and Roots (NATIVE) Brown, loose, damp.
2.1-10.2	GM	B-1/C-1	SAND, GRAVEL, COBBLE & occasional BOULDER, Little-some Silt and Clay, trace Roots (NATIVE) Brown, compact-dense, damp.

Test pit excavated on January 7, 2016.
See *Test Pit Site Plan* for test pit location.
Approximate test pit surface elevation is approximately 5385 feet based on the topographic survey by Benchmark Associates, Inc.
No groundwater encountered.
Test pit terminated at 10.2 feet below existing grade due to the consistency of soil between the test pits and loosely backfilled with test pit spoils.
No soil sample retrieved.
Piezometer installed to monitor groundwater.
Poor stability of test pit walls in native sand & gravel soils.
Excavation equipment: DEERE 50D track-mounted excavator.

EXPLORATORY TEST PIT #7

Quigley Farms P.U.D. Phase I
Quigley Canyon
Blaine County, Idaho

DEPTH (Feet)	USCS SOIL CLASS	USDA SOIL CLASS	SOIL DESCRIPTION
0.0-2.0	SC	C-1	Silty clayey fine SAND, trace Gravel-little and Roots (NATIVE) Brown, loose, damp.
2.0-10.0	GM	B-1/C-1	SAND, GRAVEL, COBBLE & occasional BOULDER, Little-some Silt and Clay, trace Roots (NATIVE) Brown, compact-dense, damp.

Test pit excavated on January 7, 2016.
See *Test Pit Site Plan* for test pit location.
Approximate test pit surface elevation is approximately 5386 feet based on the topographic survey by Benchmark Associates, Inc.
No groundwater encountered.
Test pit terminated at 10.0 feet below existing grade due to the consistency of soil between the test pits and loosely backfilled with test pit spoils.
No soil sample retrieved.
Piezometer installed to monitor groundwater.
Poor stability of test pit walls in native sand & gravel soils.
Excavation equipment: DEERE 50D track-mounted excavator.

SOILS
CLASSIFICATION / LEGEND

RELATIVE DENSITY OR CONSISTENCY
UTILIZING STANDARD PENETRATION TEST VALUES

COHESIONLESS SOILS (a)			COHESIVE SOILS (b)		
Density (c)	N. blows/ft. (c)	Relative Density (%)	Consistency	N. blows/ft. (c)	Undrained (d) Shear Strenth(psf)
Very loose	0 to 4	0 - 15	very soft	0 to 2	<250
Loose	4 to 10	15 - 35	soft	2 to 4	250-500
Compact	10 to 30	35 - 65	firm	4 to 8	500-1000
Dense	30 to 50	65 - 85	stiff	8 to 15	1000-2000
Very Dense	over 50	>85	very stiff	15 to 30	2000-4000
			Hard	over 30	>4000

(a) Soils consisting of gravel, sand, and silt, either separately or in combination, possessing no characteristics of plasticity and exhibiting drained behavior.

(b) Soils possessing the characteristics of plasticity and exhibiting undrained behavoir.

(c) Refer to text of ASTM D 1586-84 for a definition of N; in normally consolidated cohesionless soils Relative Densiy terms are based on N. values corrected for overburden pressures.

(d) Undrained shear strength = 1/2 unconfined compression strength.

COMPONENT DEFINITINS BY GRADATION

COMPONENT	SIZE RANGE
Boulders	Above 12 inches
Cobbles	3 inches to 12 inches
Gravel	3 inches to No. 4 (4.76 mm)
Coarse gravel	3 inches to 3/4 inch
Fine gravel	3/4 inch to No 4 (4.76mm)
Sand	No. 4 (4.76mm) to No. 200 (0.074mm)
Coarse sand	No. 4 (4.76) to No. 10. (2.0mm)
Medium sand	No. 10 (2.0mm) to No. 40 (0.42mm)
Fine sand	No. 40 (0.42) to No. 200 (0.074mm)
Silt & Clay	Smaller than No. 200 (0.074mm)

SILT & CLAY DESCRIPTIONS

DESCRIPTIONS	TYPICAL UNIFIED DESIGNATION
Silt	ML (non-plastic)
Clayey Silt	CL-ML (low plasticity)
Silty Clay	CL
Clay	CH
Plastic Silt	MH
Organic Soils	OL, OH, Pt

LABORATORY TESTS

TEST	DESIGNATION
Moisture	(1)
Density	D
Grain Size	G
Hydrometer	H
Atterberg Limits	(1)
Consolidation	C
Unconsifined	U
UU Triax	UU
CU Triax	CU
CD Triax	CD
Permeability	P

(1) Moisture & Atterberg Limits

SAMPLES

SS	SPT Samplers
HD	Heavy Duty Split Spoons
SH	Shelby Tube
P	Pitcher Sampler
B	Bulk
C	Cord

Unless otherwise noted, drive samples advanced with 140 lb. Hammer with 30 inch drop.

COMPONENT PROPORTIONS

DESCRIPTIONS	RANGE OF PROPORTION
Trace	0 - 5%
Little	5 - 12%
Some or Adjective (a)	12 - 30%
And	30 - 50%

(a) Use Gravelly, Sandy or Silty as appropriate.

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			SYMBOL	TYPICAL NAMES
COARSE GRAINED SOILS more than 50% retained on No. 200 Sieve	GRAVELS More than 50% of coarse fraction retained on No. 4 Sieve	CLEAN GRAVELS	GW	Well-Graded gravel
			GP	Poorly-graded gravels
		GRAVELS WITH FINES	GM	Gravel and Silt Mixtures
			GC	Gravel and Clay Mixtures
	SANDS 50% or more of coarse fraction passes No. 4 Sieve	CLEAN SANDS	SW	Well-graded Sands
			SP	Poorly-graded Sands
		SANDS WITH FINES more than 12% fines	SM	Sand and Silt Mixtures
			SC	Sand and Clay Mixtures
FINE GRAINED SOILS 50% or more passes the No. 200 Sieve	SILTS & CLAYS Liquid limit less than 50	INORGANIC	CL	Low-plasticity Clays
			ML	Non-plastic and Low-plasticity Silts
		ORGANIC	OL	Organic Silt and Clay of Low plasticity.
	SILTS & CLAYS Liquid limit less than 50	INORGANIC	CH	High Plasticity Clays
			MH	High Plasticity Silts
		ORGANIC	OH	High-plasticity-Organic Clays High-plasticity-Organic Silts
HIGHLY ORGANIC SOILS			PT	~~Peat, Muck and Other~~ Highly Organic Soils

STRATA

A PROFESSIONAL SERVICES CORPORATION

Integrity from the Ground Up

Project: Quigley Canyon
Client: Butler Associates, Inc.

Date: 1/21/2016
Project No: BO14290A

Material Source: Quigley Canyon, Hailey, ID
Date sampled: N/A
Sampled by: Client
Date received: 1/12/2016

TEST RESULTS

Test Method: ASTM D422
Soil Classification for USDA (based on 100% passing the #10 Screen, 2mm)

Sample Location:	TP-5 @ 4 ft BEG
Lab Number:	BO1600014D
USDA Classification	
Sand, %:	74
Silt, %:	12
Clay, %:	15
Soil Textural Class.:	Sandy Loam
Subgroup:	B-1
Retained on #10:	83% Gravel
Modifier:	Extremely Gravelly
Design Soil Subgroup:	**C-1**

15% - 35% Rock Volume (Gravelly)
* 35% - 60% Rock Volume (Very Gravelly), Lower One Design Soil Subgroup
**60% - 95% Rock Volume (Extremely Gravelly), Lower Two Design Soil Subgroups
Reference CDH Technical Guidance Manual.

Note: Classifications based on samples as received.

Reviewed By: _____

STRATA

A PROFESSIONAL SERVICES CORPORATION

Integrity from the Ground Up

Project: Quigley Canyon
Client: Butler Associates, Inc.

Date: 1/21/2016
Project No: BO14290A

Material Source: Quigley Canyon, Hailey, ID
Date sampled: N/A
Sampled by: Client
Date received: 1/12/2016

TEST RESULTS

Test Method: ASTM D422
Soil Classification for USDA (based on 100% passing the #10 Screen, 2mm)

Sample Location:	TP-1 @ 4 ft BEG
Lab Number:	BO1600014A
USDA Classification	
Sand, %:	88
Silt, %:	6
Clay, %:	7
Soil Textural Class.:	Coarse Sand
Subgroup:	N/A
Retained on #10:	85% Gravel
Modifier:	Extremely Gravelly
Design Soil Subgroup:	**N/A**

15% - 35% Rock Volume (Gravelly)
* 35% - 60% Rock Volume (Very Gravelly), Lower One Design Soil Subgroup
**60% - 95% Rock Volume (Extremely Gravelly), Lower Two Design Soil Subgroups
Reference CDH Technical Guidance Manual.

Note: Classifications based on samples as received.

Reviewed By: _____

STRATA

A PROFESSIONAL SERVICES CORPORATION

Integrity from the Ground Up

Project: Quigley Canyon
Client: Butler Associates, Inc.

Date: 1/21/2016
Project No: BO14290A

Material Source: Quigley Canyon, Hailey, ID
Date sampled: N/A
Sampled by: Client
Date received: 1/12/2016

TEST RESULTS

Test Method: ASTM D422
Soil Classification for USDA (based on 100% passing the #10 Screen, 2mm)

Sample Location:	TP-2 @ 3 ft BEG
Lab Number:	BO1600014B
USDA Classification	
Sand, %:	46
Silt, %:	36
Clay, %:	19
Soil Textural Class.:	Loam
Subgroup:	B-2
Retained on #10:	18% Gravel
Modifier:	Gravelly
Design Soil Subgroup:	**B-2**

15% - 35% Rock Volume (Gravelly)
* 35% - 60% Rock Volume (Very Gravelly), Lower One Design Soil Subgroup
**60% - 95% Rock Volume (Extremely Gravelly), Lower Two Design Soil Subgroups
Reference CDH Technical Guidance Manual.

Note: Classifications based on samples as received.

Reviewed By: _____

STRATA

A PROFESSIONAL SERVICES CORPORATION

Integrity from the Ground Up

Project: Quigley Canyon
Client: Butler Associates, Inc.

Date: 1/21/2016
Project No: BO14290A

Material Source: Quigley Canyon, Hailey, ID
Date sampled: N/A
Sampled by: Client
Date received: 1/12/2016

TEST RESULTS

Test Method: ASTM D422
Soil Classification for USDA (based on 100% passing the #10 Screen, 2mm)

Sample Location:	TP-4 @ 4 ft BEG
Lab Number:	BO1600014C
USDA Classification	
Sand, %:	37
Silt, %:	58
Clay, %:	5
Soil Textural Class.:	Silt Loam
Subgroup:	B-2
Retained on #10:	10% Gravel
Modifier:	None
Design Soil Subgroup:	**B-2**

15% - 35% Rock Volume (Gravelly)
* 35% - 60% Rock Volume (Very Gravelly), Lower One Design Soil Subgroup
**60% - 95% Rock Volume (Extremely Gravelly), Lower Two Design Soil Subgroups
Reference CDH Technical Guidance Manual.

Note: Classifications based on samples as received.

Reviewed By: _____

4.22.4 Drainfield Trenches

1. Distances shown in Table 4-22 must be maintained between the trench bottom and limiting layer.
2. Capping fill may be used to obtain adequate separation distance from limiting layers but must be designed and constructed according to the guidance for capping fill trenches in section 4.3.
3. Pressure distribution may be used with the following design considerations:
   a. The pressure distribution system related to the drainfield is designed according to section 4.19.
   b. The dosing chamber for the intermittent sand filter may not be used as the dosing chamber for the drainfield.
4. The drainfield shall be sized by dividing the maximum daily flow by the hydraulic application rate for the applicable soil design subgroup listed in Table 4-23.

Table 4-22. Intermittent sand filter vertical setback to limiting layers (feet).

Limiting Layer	Flow < 2,500 GPD	Flow ≥ 2,500 GPD
	All Soil Types	All Soil Types
Impermeable layer	2	4
Fractured rock or very porous layer	1	2
Normal high ground water	1	2
Seasonal high ground water	1	2

Note: gallons per day (GPD)

Table 4-23. Secondary biological treatment system hydraulic application rates.

Soil Design Subgroup	Application Rate (gallons/square foot/day)
A-1	1.7
A-2a	1.2
A-2b	1.0
B-1	0.8
B-2	0.6
C-1	0.4
C-2	0.3

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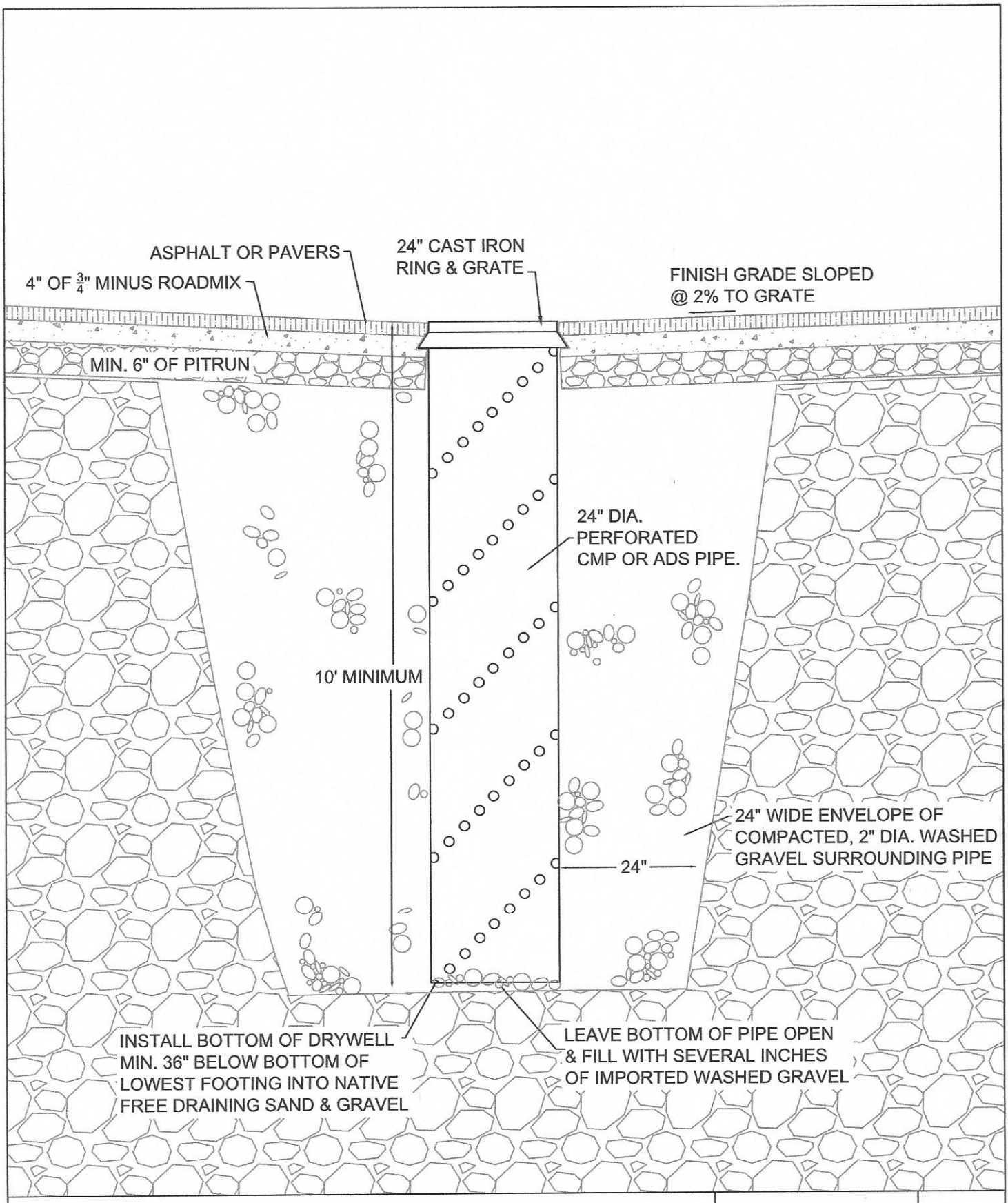


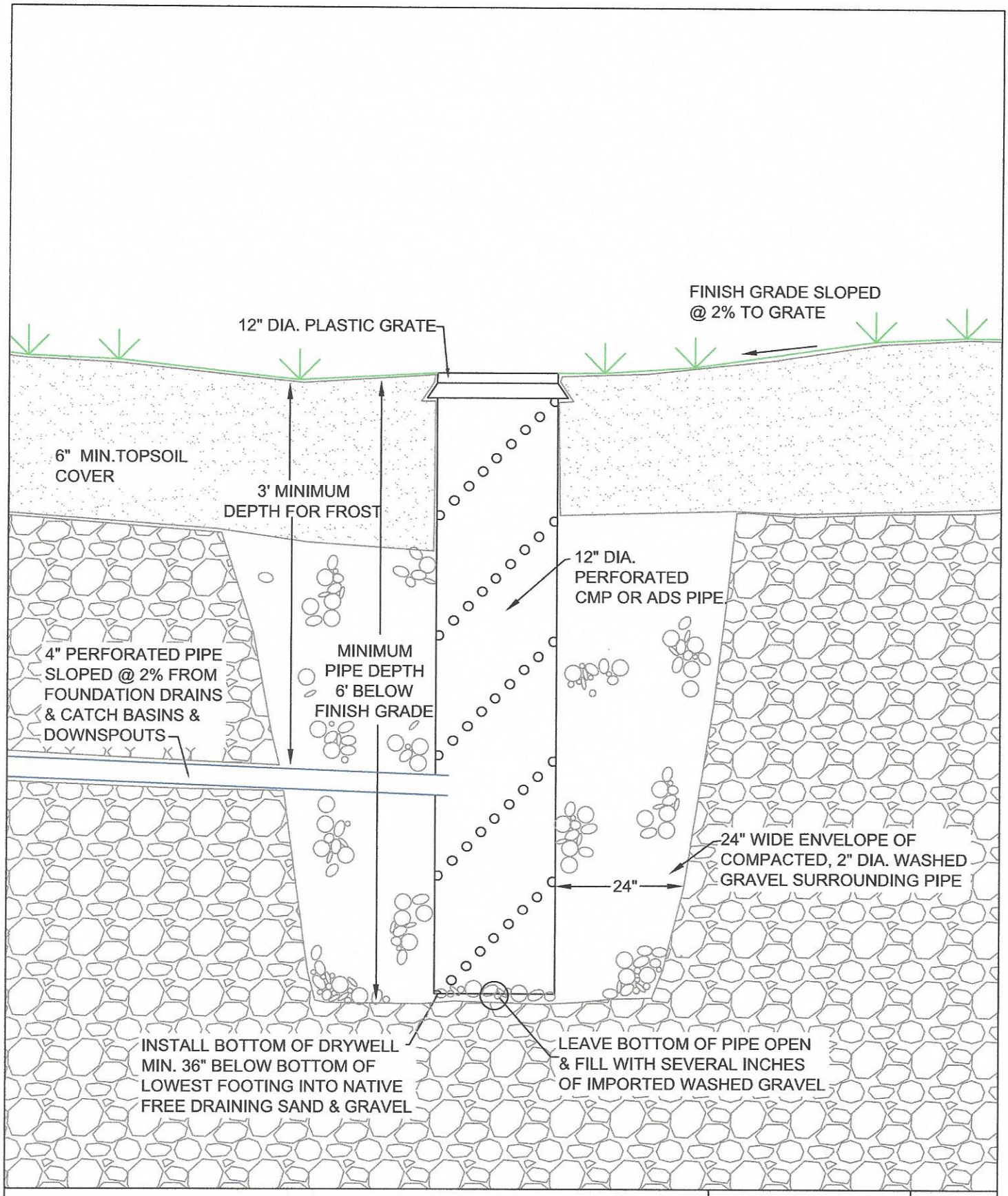
STORMWATER DRYWELL PROFILE

Quigley Farms P.U.D. Phase I
Quigley Canyon
Blaine County, Idaho

Butler Associates, Inc.
P.O.B. 1034
Ketchum, ID 83340
208.720.6432
svgeotech@gmail.com

1-28-16

Not To Scale



LANDSCAPE DRYWELL PROFILE

Quigley Farms P.U.D. Phase I
Quigley Canyon
Blaine County, Idaho

Butler Associates, Inc.
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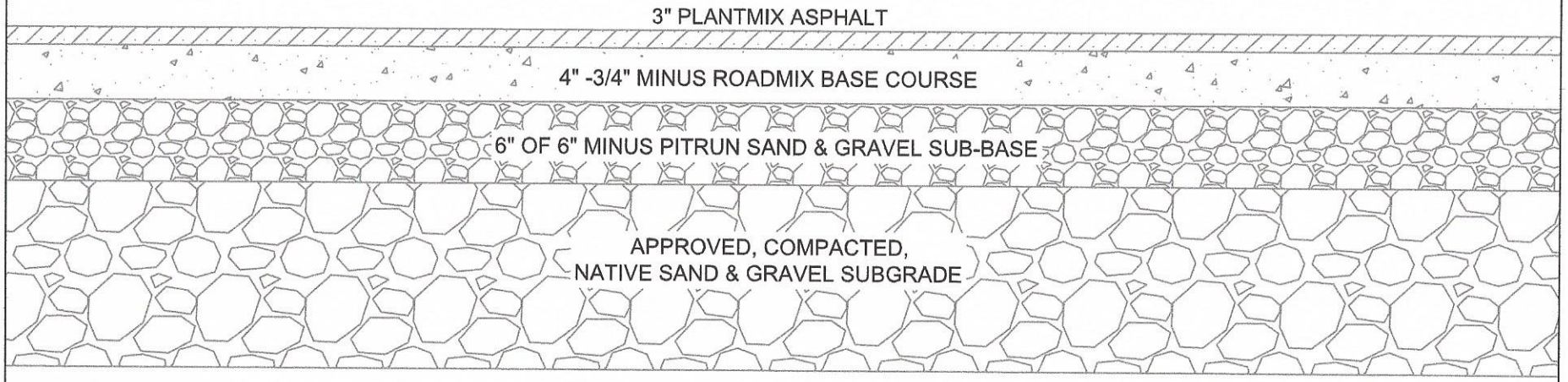
2-1-16

Not To Scale



NOTES:

1. All uncontrolled fill, organics & native silty sand soils shall be removed to expose free-draining sand & gravel subgrade.
2. If 18" of native silty sand soil is removed and subgrade is silty fine sand soil this office should proof-roll subgrade before approving construction of structural road section or authorizing the excavation of additional silty fine sand to expose a competent subgrade.
3. Exposed sand & gravel subgrade shall be watered and compacted with multiple passes of a 5-ton smooth drum roller.
4. The subgrade, sub-base and base course shall be compacted to at least 95% of the maximum dry density of the material according to ASTM D-698 and approved by this office before constructing subsequent layer of structural section.
5. Any soft areas shall be removed and backfilled with approved on-site or imported, sand and gravel structural fill compacted to at least.
6. This office shall observe exposed subgrade prior to constructing sub-base.
7. All imported structural fill or on-site sand and gravel structural fill shall be approved by this office prior to placing matreial.

PUBLIC STREET AND DRIVEWAY STRUCTURAL PROFILE

Quigley Farms P.U.D. Phase I
Quigley Canyon
Blaine County, Idaho

Butler Associates, Inc.
P.O.B. 1034
Ketchum, ID 83340
208.720.6432
svgeotech@gmail.com

2-1-16

Not To Scale

ATTACHMENT D – QUALITY OF GROUNDWATER AND SURFACE WATER, WOOD RIVER VALLEY, SOUTH-CENTRAL IDAHO

Table 5. Nutrient concentrations and bacteria counts in groundwater and surface-water samples, Wood River Valley, south-central Idaho, July and August 2012.

[Site locations are shown in figure 2. Values exceeding U.S. Environmental Protection Agency guidelines in **bold**. **Alternate name:** C, confined aquifer; SW, surface water; T, bedrock aquifer in tributary canyon; U, unconfined aqufer. **Abbreviations:** *E. coli*, *Escherichia coli*; mg/L, milligram per liter; mL, milliliter; N, nitrogen; P, phosphorous; <, less than; –, no data available]

Site identification name or No.	Alternate name	Ammonia as N (mg/L)	Nitrate + Nitrite as N (mg/L)	Orthophosphate as P (mg/L)	*E. coli*, most probable number per 100 mL	Total coliform, most probable number per 100 mL
Big Wood River near Ketchum, Idaho	SW5	<0.010	<0.040	0.004	**8.0**	–
Warm Springs Creek near Ketchum, Idaho	SW4	<0.010	<0.040	0.008	**11**	–
East Fork Big Wood River at Gimlet, Idaho	SW3	<0.010	<0.040	0.005	**2.0**	–
Big Wood River at Hailey, Total Flow	SW2	<0.010	0.086	0.005	**16**	–
Big Wood River at Stanton Crossing near Bellevue, Idaho	SW1	<0.010	<0.040	0.008	**39**	–
01S 20E 30BAD1	C1	0.012	0.42	0.01	**8.0**	<1.0
01S 19E 21AAA1	C2	<0.010	0.38	0.01	<1.0	<1.0
01S 19E 20ABB1	C3	<0.010	0.32	0.01	<1.0	<1.0
01S 18E 13CCC1	C4	<0.010	0.64	0.01	<1.0	<1.0
01N 19E 29BAB1	C5	<0.010	0.87	0.008	<1.0	<1.0
03N 17E 25BDD1	T1	<0.010	0.72	0.02	<1.0	<1.0
03N 18E 09ADB1	T2	<0.010	0.19	0.005	<1.0	<1.0
03N 18E 03CAB1	T3	<0.010	<0.040	< 0.004	<1.0	<1.0
04N 17E 15CCC1	T4	<0.010	0.30	0.007	<1.0	<1.0
05N 17E 36ABB1	T5	<0.010	<0.040	0.05	<1.0	–
05N 17E 14ADD1	T6	<0.010	0.23	0.007	<1.0	–
06N 17E 34DCB1	T7	<0.010	0.15	0.006	<1.0	< 1.0
01S 20E 20CAB1	U1	0.019	0.60	0.006	**55**	**2,400**
01S 19E 03DDC3	U2	<0.010	2.3	0.01	<1.0	<1.0
01N 18E 36DDD1	U3	<0.010	1.1	0.007	<1.0	<1.0
01N 18E 35ACB1	U4	<0.010	1.6	0.01	<1.0	**4.0**
01N 18E 27AAA2	U5	<0.010	1.1	0.01	<1.0	<1.0
01N 18E 14DDB1	U6	<0.010	0.24	0.009	<1.0	<1.0
01N 19E 07BAC1	U7	<0.010	0.68	0.009	<1.0	<1.0
02N 18E 35DCD1	U8	<0.010	0.12	0.009	<1.0	<1.0
02N 18E 36DCA1	U9	<0.010	0.48	0.02	<1.0	<1.0
02N 18E 36ADC1	U10	0.017	0.75	0.009	<1.0	<1.0
02N 18E 22DDB1	U11	<0.010	0.31	0.009	<1.0	<1.0
02N 18E 19ABB1	U12	<0.010	1.2	0.02	<1.0	<1.0
02N 18E 15CCA1	U13	<0.010	0.98	0.01	<1.0	<1.0
02N 18E 10DBC1	U14	<0.010	0.89	0.02	<1.0	<1.0
03N 18E 33CAB1	U15	<0.010	1.9	0.013	<1.0	<1.0
03N 18E 32DBA1	U16	<0.010	0.56	0.008	<1.0	<1.0
03N 18E 29CCD1	U17	<0.010	0.31	0.01	<1.0	<1.0
03N 18E 29BDA1	U18	<0.010	0.52	0.009	<1.0	**1.0**
03N 18E 20DCC1	U19	<0.010	0.59	0.009	<1.0	<1.0
03N 18E 18AAA1	U20	<0.010	0.093	0.006	<1.0	<1.0
03N 18E 08BCC1	U21	<0.010	0.21	0.008	<1.0	**2.0**
04N 18E 31DDC1	U22	<0.010	0.11	0.008	<1.0	<1.0
04N 18E 30ADB3	U23	<0.010	0.14	0.009	<1.0	<1.0
04N 18E 19DCDC1	U24	<0.010	0.19	0.01	<1.0	<1.0
04N 17E 24AAA1	U25	<0.010	0.25	0.008	<1.0	–
04N 17E 13ABA1	U26	<0.010	0.15	0.01	<1.0	<1.0
04N 17E 12CDD1	U27	<0.010	1.5	0.02	<1.0	<1.0
04N 18E 07DCA1	U28	<0.010	0.18	0.01	<1.0	<1.0
04N 17E 01DCA1	U29	<0.010	0.11	0.008	<1.0	<1.0
04N 18E 05CAA1	U30	0.024	0.044	<0.004	<1.0	<1.0
04N 17E 01BBD1	U31	<0.010	0.23	0.02	<1.0	<1.0
05N 17E 36CBD1	U32	<0.010	0.30	0.02	<1.0	<1.0
05N 17E 14CBC1	U33	<0.010	0.17	0.005	<1.0	–

ATTACHMENT E – IDEQ LEVEL 1 NUTRIENT-PATHOGEN NITROGEN MASS BALANCE SPREADSHEET

IDEQ LEVEL 1 NUTRIENT-PATHOGEN EVALUATION NITROGEN MASS-BALANCE SPREADSHEET

V. 1.3 5/2/2002

This spreadsheet is based on the mass balance approach documented in: 1985.Bauman, B.J. and W.M. Schaefer.Estimating Ground-Water Quality Impacts From On-Site Sewage Treatment Systems. In Proceedings of 5th Northwest On-Site Wastewater Treatment Shortcourse, September 10-11, 1985. University of Washington, Seattle, WA. Pages 23-41. See **Instructions for Use** below.

INPUT

Water Budget	Input Value	Default Value	
Hydraulic Conductivity (ft/day)	3000.000	Site-specific	
Hydraulic Gradient	0.03	Site-specific	
Mixing Zone Thickness (ft)	15	15	Default
Aquifer Width Perpendicular to Flow (ft)	1500	Site-specific	
Parcel Area (acres)	1100	Site-specific	
Percent of Parcel That Is Impervious (Percent)	5	Site-specific	
Current/Acceptable Number of Homes in Parcel	140.0	Site-specific	
Septic Tank Effluent (gallons/d/home)	200	300	Provide Justification
Natural Recharge rate (inches/yr)	1.4904	Site-specific	

Nitrogen Budget (all concentrations represent nitrate nitrogen)			
Upgradient Ground Water Concentration (mg/l)	1.9	Site-specific	
Septic Tank Effluent Concentration (mg/l)	45.0	45.0	Default
Denitrification Rate (decimal fraction)	0	0	Default
Nitrate in Natural Recharge (mg/l)	0.3	0.3	Default

OUTPUT

Yearly Water Budget	Volume (m^3)	% of Total
Ground Water	2.09E+07	99.1
Effluent	3.87E+04	0.2
Recharge	1.60E+05	0.8
Total Water Volume	**2.11E+07**	

Point of Compliance Nitrate Concentration Goal (mg/l)	2.9
Avg. Downgradient Nitrate Concentration in GW (mg/l)	2.0
Current/Acceptable Lot Size (Acres)	7.9

Yearly Nitrogen Budget	Mass (mg)	% of Total
Background GW Nitrate Mass	3.98E+10	95.7
Septic Tank Effluent Nitrate Mass	1.74E+09	4.2
Recharge Nitrate Mass	4.80E+07	0.1
Total Nitrate Mass	**4.16E+10**	

Instructions for Use

Input parameter values appropriate to conditions at the site under consideration are entered in the blue shaded cells on the *INPUT* side of the spreadsheet. These input values form the basis for calculating yearly water and nitrogen budgets. Default values for selected parameters are provided, as described in the accompanying N-P guidance. Selecting values other than these defaults will require providing adequate justification. Sources of water and nitrogen include ground water inflow from upgradient, natural recharge on pervious portions of the site, and from septic tank effluent. The total yearly nitrogen mass input is then divided by the total yearly volume of water available to recharge groundwater to arrive at an estimated **Average Downgradient Nitrate Concentration in GW** (shown in the *OUTPUT* side of the spreadsheet).

As values are input into the blue shaded cells the totals and percent of total for various components of the water and nitrogen budgets are calculated and shown on the *OUTPUT* side of the spreadsheet. The **Avg. Downgradient Nitrate Concentration in GW** is also calculated. The Density button allows the calculation of both the Acceptable Number of Homes in the Parcel (shown in the *INPUT* area) as well as the acceptable lot size. Clicking the Density button opens an input box that allows the input of the **Point of Compliance Nitrate Concentration Goal.** The number of homes in the parcel is then adjusted to meet the specified goal.This calculation can be redone iteratively along with changing other site input parameters to examine the resultant impact on nitrate concentrations.

Aquifer Width Perpendicular to Flow: For land development projects not completely oriented perpendicular to ground water flow, the site specific aquifer width value is determined using the average property width that is perpendicular to flow.

Ranges of Hydraulic Conductivity (K) for Unconsolidated Sediments (feet/day)	
Silt and sandy silt	0.003 to 0.3
Silty sands and fine sands	0.03 to 3
Well-sorted sands and glacial outwash	3 to 300
Well-sorted gravel	30 to 3000
Typical Range of Hydraulic Gradient	0.0001 to 0.1

Natural Recharge Rate (NRR) can be estimated from total annual precipitation (TAP) using the equation: NRR (inches/yr) = $(TAP)^2 * 0.0046$ TAP is input in inches/yr.

SITE INFORMATION

Quigley Farms	Site Name
Phases 1-3	Parcel Identification
1/4/2016	Date
Crystal Grinnell	Prepared By

Disclaimer: Considerable care was exercised in developing this software. However, the Idaho Department of Environmental Quality makes no warranty regarding its accuracy and shall not be held liable for any damages resulting from its use.

Appendix B

Cold Climate Wetlands Information

Cold Climate Constructed Wetlands

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WHAT ARE "CONSTRUCTED WETLANDS?"

In wetland ecosystems, there are biological, chemical, and physical processes that naturally clean and filter water. Constructed wetlands are designed to mimic natural wetlands. They use wetland plants, soils, and microorganisms to clean water in a way that is often less expensive than more traditional water treatment systems. When properly designed, built, and operated, constructed wetlands provide high quality water treatment, while also adding beauty and habitat to your site.

GREAT, BUT DO THEY WORK IN COLD CLIMATES?

Constructed wetlands work in all kinds of climates. All wastewater treatment is biologically based, and biological reactions slow down at low temperatures. The challenges presented in locations that experience cold seasons (temperatures below 0° C) are addressed through specific design considerations intended to negate any issues with performance.

WHAT VEGETATION IS APPROPRIATE FOR COLD CLIMATE CONSTRUCTED WETLANDS?

Cold climate constructed wetlands use native wetland vegetation to help naturally treat wastewater. In the winter, when plants are dorment, their roots still provide surface area for benficial attacted growth bacteria that aid in the treatment process. Areas with greater emergent wetland vegetation, for example cattails and rushes, tend to accumulate more snow around the dormant plants, which provides helpful insulation.

WHAT HAPPENS IF WE EXPERIENCE EXTREME COLD CONDITIONS?

If snow cover is limited or if extreme cold conditions are expected, additional challenges may be encountered:

- Ice formation could cause hydraulic short-circuiting or failure.
- Nitrogen and BOD removal are temperature dependent processes; cold climate systems need to be larger and deeper to assure proper treatment.

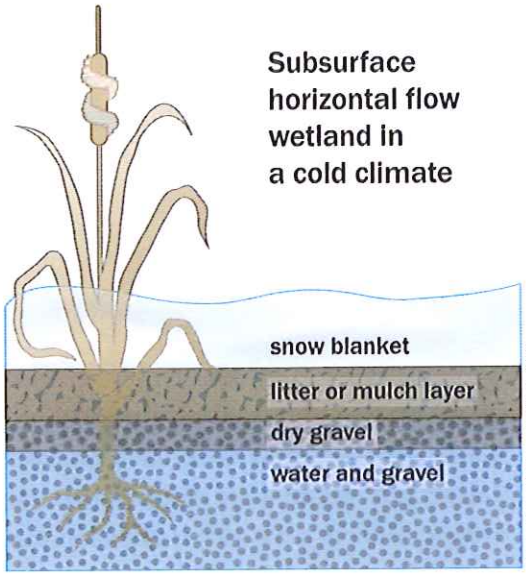
Strategies to address these challenges may include increasing treatment area, insulating from heat loss, deepening installation for freeze protection, and/or recirculating the water to keep it from freezing.

The constructed wetlands at the Omega Center for Sustainable Living in summer and winter

© Biohabitats, Inc.

HOW ARE CONSTRUCTED WETLANDS DESIGNED FOR COLD CLIMATES?

The temperature in a wetland is controlled by ground heat from the earth and loss of heat to the environment. Heat losses can be minimized during cold temperatures by insulation (e.g., vegetation litter, snow, mulch, dry gravel) to preventing ice formation and freezing. A combination of sources are available to provide insulation to a constructed wetland, including vegetation litter, snow, mulch, and dry gravel. The thickness of the mulch layer is calculated/modeled by determining the overall heat flow resistances of each material using the layer thickness and thermal conductivity. Site-specific climate data from late winter is used to calculate the heat flow resistance provided by annual snow fall and snow cover. February is typically the time of year when wetland water temperatures are still quite cold, but daytime solar radiation is increasing and melting snow cover, thus increasing the potential for ice to form on the wetland surface at night.



adapted from Kadlec & Wallace, 2009

WHERE ARE COLD CLIMATE CONSTRUCTED WETLANDS BEING USED SUCCESSFULLY?

Biohabitats has included a climate zone map showing sites that use cold climate constructed wetlands as a major wastewater treatment component. We have also included project profiles and performance data from some of our cold climate treatment systems.

The constructed wetlands at Sidwell Friends Middle School in summer and winter

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ADDITIONAL RESOURCES

Mander, Ü. and Jenssen, P. (eds.) (2003) *Constructed Wetlands for Wastewater Treatment in Cold Climates.*

Wallace, S. (2009) Constructed wetlands – how cold can you go? *Canadian Water Treatment.* pgs 14-15.

Kadlec R. and Wallace S. (2009) *Treatment Wetlands, 2nd Edition.* Section 4.4 Cold Climates.

COLD CLIMATE CONSTRUCTED WETLAND PROJECTS
by climate zone

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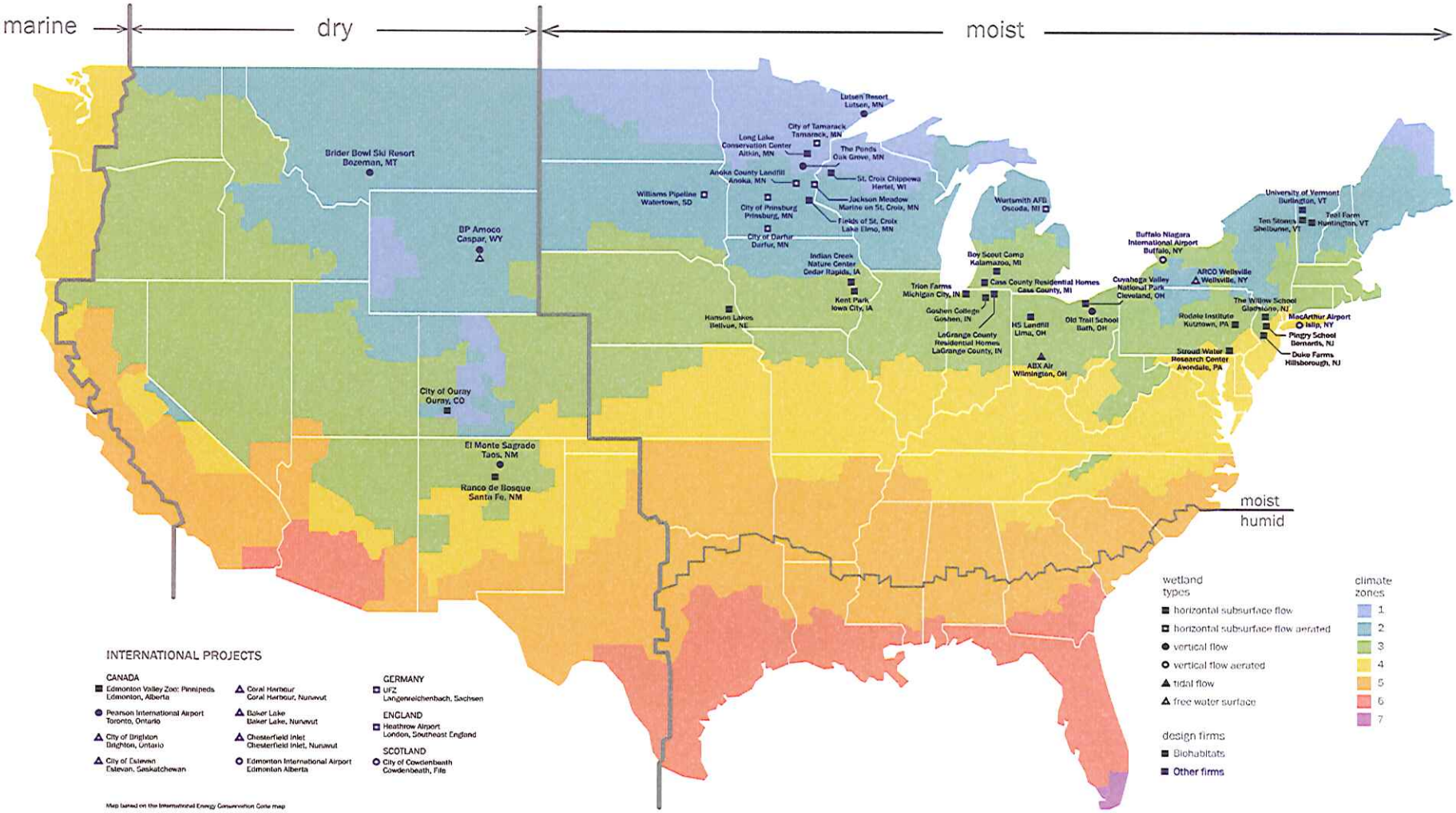


Appendix C

Precedent Projects

THE WILLOW SCHOOL

The Willow School: Campus Water Infrastructure

Gladstone, New Jersey

from top: Constructed wetland for wastewater treatment; Sunflowers growing in wastewater treatment dosing field; Newly installed 10,000 gallon cistern component of the harvested rainwater and treatment system

The Willow School, located on 34-acres of the New Jersey countryside, upholds a strong commitment to fostering academic excellence, a passion for learning, and an ethical approach to all relationships. The school views sustainability as a key element in students' relationships with the natural and with each other. Children learn to share intellectual resources with peers to sustain a community. They also learn to share, respect, and conserve nature's resources. Its buildings, landscape, curriculum, and programmatic advancements are helping to create a new generation of ecologically literate citizens.

Biohabitats helped the Willow School design sustainable water infrastructure that is in line with the school's founding philosophies. Water infrastructure for the campus includes onsite wastewater treatment and reuse, stormwater management, and rain harvesting and reuse. Current campus buildings include a LEED certified Gold Classroom Building (2004) and a LEED certified Platinum Art Barn (2005). Willow has built a Health, Wellness, and Nutrition Center that is seeking Living Building Challenge certification. Biohabitats has designed a rain water harvesting system and will reuse the water in the landscape and for toilet flushing.

STORMWATER

Instead of merely reducing the impact of stormwater runoff, Biohabitats designed a system of vegetated swales to replace expensive concrete pipes and catch basins. This, in combination with reduced paving and increased natural ground covers, helped recreate the original sponge-like character of the site. A detention pond with wetland plantings saved money and improved the environmental performance of the site significantly beyond that required by a town ordinance.

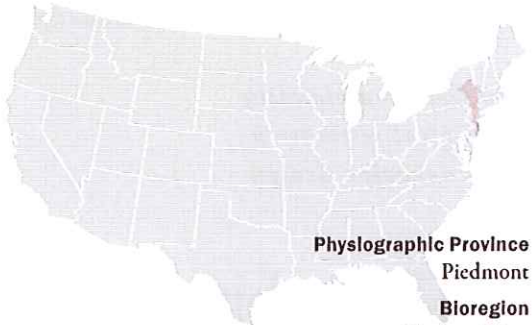
WASTEWATER

In addition, all human waste generated onsite is treated with an integrated system of constructed wetlands, trickle filter, and a sand filter. The treatment cycle is so effective that treated effluent can be reused on site for irrigation and protective groundwater recharge.

RAIN HARVESTING

Rain is harvested from the Art Barn Roof and the Health, Wellness, and Nutrition Center. Rain is treated in the buildings and reused as a non-potable supply for toilet flushing. Biohabitats currently has a maintenance contract to support routine and preventative maintenance on the treatment and reuse system.

conservation planning
ecological restoration
regenerative design



Physiographic Province
Piedmont

Bioregion
Hudson River

Watershed
Raritan

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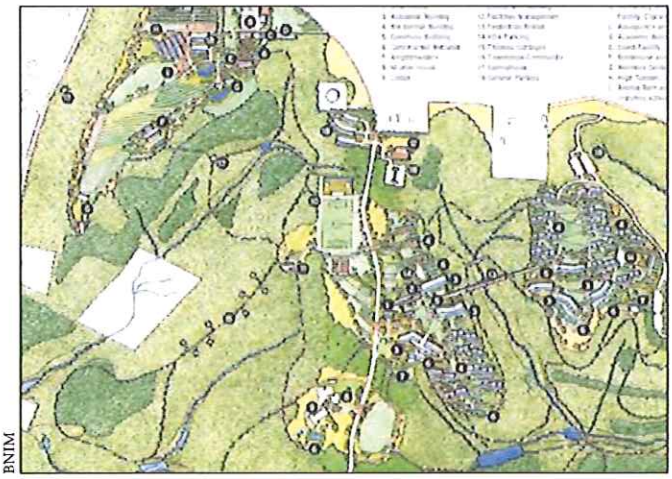
CHATHAM UNIVERSITY

Eden Hall Campus Master Plan & First Phases of Development

Pittsburgh, Pennsylvania

Mithun

Mithun



BNIM

from top: Rendering of constructed wetland at campus entrance and Field Lab; Campus-scale water treatment and reuse strategy; Detail of proposed master plan

Chatham's new Eden Hall campus is becoming a model of sustainability learning in higher education and features innovative ecological water recycling technologies.

When Pittsburgh's Chatham University was gifted the 388-acre Eden Hall Farm in 2008, they set out to create a model campus with sustainability as a core focus. Home to the new School of Sustainability and the Environment, the new campus includes an environmental learning lab, initiatives in sustainability and environmental studies, food studies, landscape architecture, and women's studies.

Biohabitats worked with the architectural team of BNIM and Andropogon Associates to create the campus master plan. Biohabitats created an extensive water balance for the site and applied an innovative water infrastructure approach that examined the integration of natural wastewater treatment and rainwater harvesting. Considerations such as nutrient cycling, agricultural linkages, and energy intensity of treatment options were included.

The project has now progressed to the first phases of development, which includes an eco-center, renovation of the farm's historic barn, an aquaponics field lab, a library/café, and a residence lodge. Working with Mithun (architect/landscape architect), Biohabitats engineered and permitted the advanced natural wastewater treatment systems, which are integrated closely with the learning landscape of the new campus. The high-quality reclaimed effluent is reused to supply 100% of the project's toilet flushing demand. Any excess unused effluent is slowly and safely dispersed back into the soils through subsurface irrigation systems.

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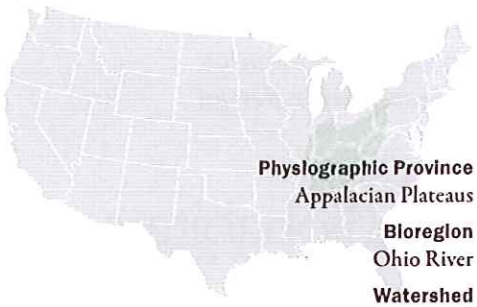

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Appalacian Plateaus

Bioregion
Ohio River

Watershed
Connoquenessing Creek

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TEN STONES COMMUNITY

Ten Stones Community Wastewater Treatment

Burlington, Vermont

The first constructed wetlands wastewater treatment system for a subdivision to be built in Vermont, Ten Stones Community paved the way for many others.

Biohabitats designed an innovative constructed wetland wastewater treatment system for the Ten Stones community subdivision. The developer's original design called for a more traditional leachfield with a large area set aside for replacing the eventually failing field. No city sewer infrastructure was nearby and it would have been cost prohibitive and impractical to connect to centralized sewer infrastructure. As an alternative to the leachfield or sewer connection, Biohabitats proposed a constructed wetlands to treat the 3,900 gallons per day of effluent and then dose the field.

The resulting system became the first constructed wetlands for wastewater treatment for a subdivision in Vermont, allowing for monitoring which helped regulators understand the system.

In response to client objectives and site conditions, Biohabitats developed a low-cost solution which blends with site aesthetics, and addresses site challenges such as shallow soils over bedrock, hilly terrain, and limited space –all while meeting state water quality standards for ground discharge. The wetland enhances the site and property values with ornamental vegetation and low operation and maintenance costs for the homeowners.

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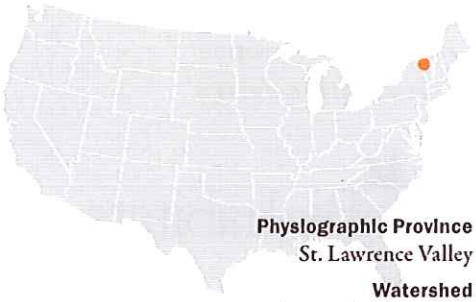

Physiographic Province
St. Lawrence Valley

Watershed
Northern Lake Champlain

STROUD WATER RESEARCH CENTER

Ecological Wastewater System Upgrades for a Water-Focused Research Center

Avondale, Pennsylvania

© Will Milliken

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The Stroud Water Research Center (SWRC) and its 800 ha, third-order drainage basin was designated in 1981 as an Experimental Ecological Reserve by the National Science Foundation. This designation recognizes that this field research facility is dedicated to long-term experimental research on an ecosystem that is an outstanding representative of its type. The East Branch of White Clay Creek is classified by the State of Pennsylvania as an "Exceptional Value" stream and watershed which is the highest classification given by the State. The designation affords the stream and its watershed special protection against environmental disturbance of anthropogenic origin.

When SWRC constructed its new lab, office, and classroom facility to expand their research capacity, they turned to Biohabitats to design a natural wastewater management system to process flows from the overall campus and replace outdated septic fields. The treatment system integrates directly into the landscape, providing a relevant and dramatic backdrop to the Center's research. The treatment system was designed to be highly protective of groundwater and nearby streams.

The treatment facility includes a primary treatment tank with built-in equalization to absorb flows from events and gatherings from the campus' various buildings. Secondary treatment is provided through a series of terraced subsurface flow constructed wetlands and a trickling filter tower. A recirculating sand filter polishes effluent prior to dispersal in a subsurface drip irrigation field. SWRC's research team will monitor the treatment system and drip dispersal field to evaluate performance.

Biohabitats collaborated with SWRC's internal team, M2 Architecture, Andropogon Associates (landscape architecture), Meliora Design (environmental permitting) and Lanchester Soil Consultants (drip irrigation). The wastewater system was funded in part by a state Growing Greener Grant.

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Physiographic Province
Piedmont
Bioregion
Chesapeake/Delaware Bays
Watershed
White Clay Creek

SIDWELL FRIENDS SCHOOL

Sidwell Friends Middle School Natural Wastewater and Stormwater Treatment Reuse System

Washington, DC

Sidwell Friends School (SFS) is deeply committed to practicing responsible environmental stewardship with curriculum grounded in learning about the natural world and their relationship to it. When the school decided to construct a new Middle School building, sustainable design was a logical expression of institutional values. Working with an integrated design team that included Kieran Timberlake Associates LLP, Andropogon Associates LTD, and JFW Project Management, Biohabitats contributed heavily to the water infrastructure. Biohabitats designed the wastewater and stormwater systems for the school, incorporating the design into the school yard and entrance. The final designs helped earn a LEED Platinum certification (first K-12 school in the world), an "AIA Top Ten" award and admiration of more than 10,000 visitors, since its construction.

The stormwater system captures runoff from a green roof, directs it through a series of artistic flow forms to a pond. The flow form sculpture welcomes visitors and aerates the water to support a healthy ecosystem for pond plants and animals. The pond, with access steps, doubles as an outdoor classroom. A small recirculation pump sends water back to the flow form for continual treatment and appeal. As rain water enters the system, the pond overflows into a beautiful floodplain that infiltrates water into the natural environment.

A 3,000 gallons-per-day wastewater system captures all wastewater from the building and cleans it through a series of natural treatment steps that mimic natural ecologies. Treatment components include a series of terraced constructed wetland cells, a trickling filter, a recirculating sand filter, and ultra violet (UV) disinfection, all tightly integrated into the building and site. This closed loop system recycles water for toilet flushing.

Planting native species and non-invasive adaptive plant varieties preserves local biodiversity and reintroduces natural pathways through the campus allowing birds and other animals to move between the neighboring watersheds of Rock Creek Park to Glover-Archibald Park.

Biohabitats continues to work with the Sidwell Friends School to maintain its environmental leadership through ongoing remote monitoring, quarterly maintenance visits, and technical support and engineering.

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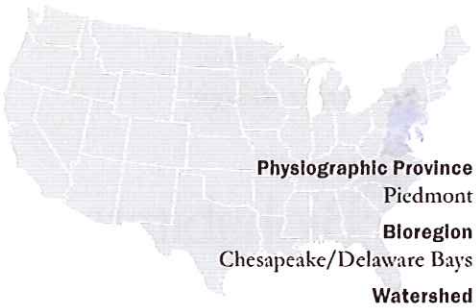
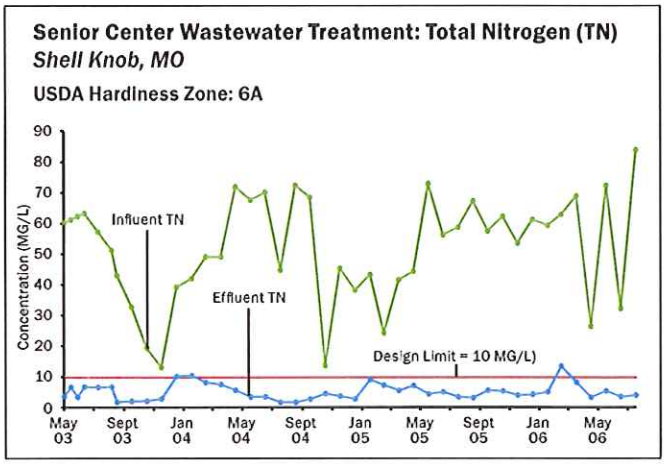


Physiographic Province
Piedmont
Bioregion
Chesapeake/Delaware Bays
Watershed
Rock Creek

SHELL KNOB SENIOR CORPORATION

Ozark Villas Natural Wastewater Treatment System

Shell Knob, Missouri



from top: Constructed wetlands; Comparison of influent nitrogen levels to effluent nitrogen levels.

This innovative, decentralized treatment facility manages phosphorus and other pollutants to serve an affordable, multi-family, senior housing community.

The Ozark Villas at the Shell Knob Senior Center and residential housing complex is a collection of 32 duplex units and 32 single-family homes. Discharge of its 12,000 gallons per day system is to the nearby, environmentally sensitive Table Rock Lake. Because of very real concerns with phosphorus, the Missouri Department of Natural Resources required a phosphorus limit of 0.5 mg/liter. Reaching these low levels had never before been achieved in Missouri through the use of a small wastewater treatment system.

Biohabitats was asked to design a demonstration facility that would be inexpensive to build and operate. Treatment elements consist of interceptor tanks with effluent filtering for every two units, a small diameter collection system (two inch sewer lines, no manholes), constructed wetlands with a gravel trickling filter (recycle mound), a recirculating sand filter, and an alum polymer for the phosphorus.

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Physiographic Province
Ozark Plateaus

Watershed
Table Rock Lake

PRIVATE OWNER

Serenbe Community Wastewater Collection, Treatment and Reuse System

Fulton County, Georgia

top: Photo simulation of land application in upper meadow
bottom: Recirculating sand filter

Located within a half-hour's drive from Atlanta's Hartsfield-Jackson International Airport, the 100-acre Serenebe community is a model for the future of balanced development in the U.S. Focused on land preservation, agriculture, energy efficiency, green and high density building, walkability, arts and culture, and community living for multiple generations, the development includes private residential homes, commercial space, art galleries, original shops, stables, and a 20-room inn with conference facilities.

Serenbe's land plan calls for the preservation of at least 70% of its acreage while accommodating as many, or more people as traditional subdivision-style developments, which typically disturb nearly 80%. 30 acres are devoted to farming. The Serenbe Farm is certified organic and biodynamic, with a thriving CSA program and Saturday markets. Dubbed "Sonoma for the New South" by the New York Times, the community is home to three thriving restaurants.

Biohabitats designed and permitted a community wastewater collection, treatment and reuse system that is in keeping with the development's environmental stewardship goals. A small diameter collection system minimized construction impact and damage to the environment by following the topography of the land and being kept within the roadways. The system consists of primary treatment (septic tanks at each home), subsurface flow constructed wetlands, recirculating sand filters and UV disinfection. Treated wastewater, reclaimed water, is supplied to a subsurface irrigation system in a beautiful pasture in the landscape. The current operating system has approximately 30,000 gallons per day. As additional phases of the project are developed, additional collection treatment system will go on line. Future systems will include a reuse water system that will deliver a non potable supply for landscape irrigation and toilet flushing throughout the development.

Serenebe has garnered numerous awards, including The Atlanta chapter of the Urban Land Institute's inaugural Sustainability Award, the Atlanta Regional Commission's "Development of Excellence." In 2008, it was named by EarthCraft Development of the Year.

conservation planning
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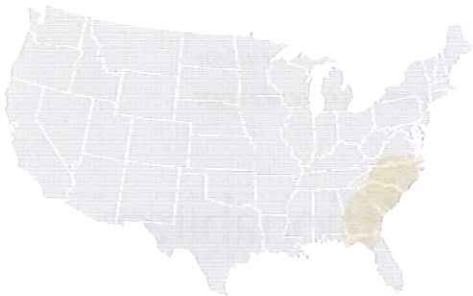

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OMEGA INSTITUTE

Omega Center for Sustainable Living

Rhinebeck, New York

The Omega Center for Sustainable Living (OCSL) is a new wastewater treatment and environmental education facility located at the Omega Institute for Holistic Studies, a New York-based wellness center.

BNIM Architects designed a new 6,200 square foot facility on a 4.5 acre site to house the ecological wastewater treatment facility and provide the dual functions of education and inspiration. The natural wastewater treatment facility was designed together with John Todd Ecological Design (JTED) to replace the Institute's existing wastewater infrastructure, which consisted of a network of aging septic systems.

The 52,000 gallon per day wastewater treatment system is a low energy and low maintenance system with six treatment steps. Components include primary treatment, an anoxic tank, subsurface flow constructed wetlands, an indoor aerated lagoon, a recirculating sand filter and subsurface dispersal.

The effluent water quality meets all of the State of New York water quality standards for the land application/subsurface disposal of treated effluent. This will allow the Institute to potentially reuse the water to irrigate 2.5 acres of the campus using a pressure-dosed subsurface irrigation system in the future.

The Omega Institute will use the wastewater facility as a teaching tool in their educational program designed around the ecological impact of their campus. The facility has been operational since July, 2009. The facility was awarded the AIA COTE 'Top 10 Green Projects' and LEED Platinum certification in 2010. The building was also one of the world's first (one of two) certified Living Buildings.

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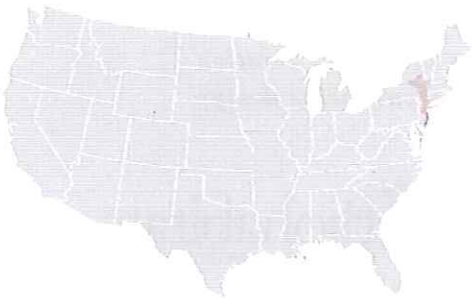
regenerative design



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DUKE FARMS

On-Site Wastewater Management System

Hillsborough, New Jersey

Duke Farms, a 2,742-acre property developed by tobacco and hydropower magnate James Buchanan Duke, includes nine lakes, 96 buildings, 18 miles of trails, and numerous fountains and sculptures. In the 1960s and 1970s, J.B. Duke's daughter, Doris Duke, purchased small, 19th century farms along the western boundary of the property, which represented the rapidly vanishing agricultural landscape that once characterized central New Jersey.

Today, with almost 1,000 acres open to public exploration, Duke Farms is a cultural landscape maintained by the Duke Farms Foundation. As Duke Farms planned to expand to provide environmental programming and increased access for over 250,000 annual visitors, it sought to provide healthy, sustainable habitat for native flora and fauna that would fully integrate with local, state, and regional environmental strategies.

This expansion necessitated a wastewater management system upgrade. Biohabitats was responsible for the overhaul and upgrade of the existing wastewater system, which included septic systems and sand mounds. The redesign includes a small diameter wastewater collection system for the farm's cottages and barn, and an onsite wastewater treatment system. The wastewater treatment system incorporates a primary treatment tank (interceptor tank) at each building, a constructed wetland with recirculation, an intermittent or recirculating sand filter, and a land application system incorporating pressure dosed sand mounds.

The four-step, low energy, low maintenance system (treatment capacity 12,500 gpd) can be constructed in phases to meet development growth. Water quality will meet or exceed all State of New Jersey water quality standards for the land application.

The Duke Farms project is an exciting collaboration between Biohabitats and the Duke Farms Foundation. Biohabitats is proud to assist in the stewardship of this important cultural asset.

Project partners:
Vitetta, project architect; LanganEngineering & Environmental Services, civil engineer; and Glen Likus, contractor.

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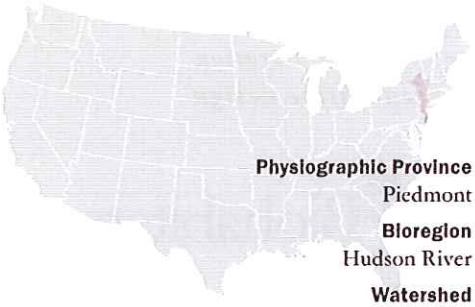

Physiographic Province
Piedmont

Bioregion
Hudson River

Watershed
Raritan Bay

CAMPHILL SOLTANE

Camphill Soltane Natural Wastewater Wetlands Treatment System

Glenmoore, Pennsylvania

The Camphill Soltane campus

A biologically robust, low-energy system allows a nonprofit to sustainably and efficiently manage wastewater on site as it expands campus facilities.

Camphill Soltane is a nonprofit organization that provides opportunities for young adults and adults with special needs to discover their talents and grow their capacities through educational and vocational programs. Care for the planet is a key principle of the organization's career development program.

Located on 50-acre landscape that features rolling hills, forest, and an apple orchard, the organization's main site includes nine residential houses, an apartment building, and three multi-use buildings. On-site sewage disposal systems and domestic water supply wells had adequately served the campus in the past, but when its Facility Master Plan called for seven additional residences and nine additional supporting structures, Camphill Soltane needed a new, upgraded strategy for treating and managing wastewater.

Biohabitats designed a sustainable, low-energy, on-site wastewater treatment system to process up to 11,500 gallons of wastewater per day, treat it to tertiary standards using biological and mechanical processes, and return it to groundwater. The system includes a constructed wetland planted with native vegetation, a small diameter collection system with primary treatment tanks and a network of pump tanks with effluent filters, a recirculating sand filter, mechanical filtration, and a land application dosing tank. Some of the existing septic tanks were able to be repurposed as part of the new system.

Once treated, effluent is dispersed via land application using a drip irrigation system to a 1.35-acre field, where it slowly infiltrates back into the land. Evans Mill Environmental, a local environmental engineering firm provided design of the land application system and collaboration on local permitting and construction administration.

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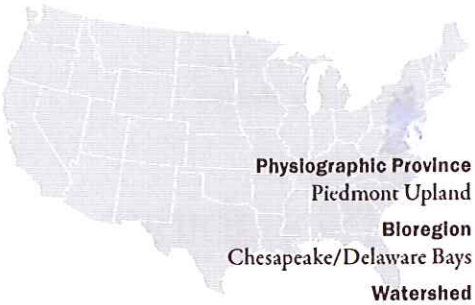

Physiographic Province
Piedmont Upland

Bioregion
Chesapeake/Delaware Bays

Watershed
French Creek

RANCHO DE BOSQUE HOMEOWNERS ASSOCIATION

Rancho de Bosque Natural Wastewater Treatment System

Lamy, New Mexico

An integrated water strategy enables a community in arid New Mexico to maximize use of its limited water supply.

In creating Rancho de Bosque, a 23-lot community located southeast of Santa Fe, NM, developers wanted to ensure that every homeowner could have an attractive, native landscape despite the development's very limited water supply. In addition to establishing covenants requiring the use of native plans and prohibiting hose bibs on house exteriors, the developer also sought a sustainable way to treat and reuse the community's wastewater.

To help achieve this goal, Biohabitats designed an on-site wastewater treatment and reuse system that supplies treated effluent for use as irrigation water. A small diameter collection system conveys wastewater from each home in the community to treatment system consisting of three cells of constructed wetlands, an intermittent sand filter, and a covered storage pond.

During the irrigation season, treated effluent is pumped back to each home's irrigation system through a distribution system that employs the same trench as the collection system. Each home is supplied enough water to irrigate approximately 4,000 square-feet of native landscape.

Rancho de Bosque was the first subdivision in New Mexico permitted for reuse of treated effluent.

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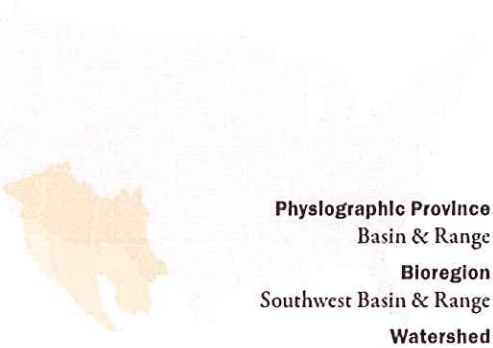

Physiographic Province
Basin & Range

Bioregion
Southwest Basin & Range

Watershed
Galisteo Creek

Return to Agenda

C.
Impact Study

The following narrative responses area intended to address the requirements of the Impact Study.

A. Public Facilities .....

1. Roads and Traffic .....
2. Schools .....
3. Emergency Services *(Police Ambulance and Fire Protection)* .....
4. Utilities .....
5. Sewerage and On-Site Treatment Facilities .....
6. Water Source *(Potable, Irrigation and Fire Projection)* .....
7. Solid Waste .....
8. Effect on Public Water System within Wellhead Protection Area .....

B. Environment .....

1. Vegetation .....
2. Wildlife and Wildlife Habitat .....
3. Avalanche Hazards .....
4. Flood Hazards .....
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6. Effects on Agriculture .....
7. Potential Use of Renewable Resources .....

A. Public facilities:

1. Roads and traffic.*

Response: ***There are two existing roadways within the subject property. Quigley Road is located along the northern edge of the property and will remain unaffected by the proposed development. However, the project proposes to construct a connection to Quigley Road for emergency access. Fox Acres Road which approaches the site from the south will be extended into the property and serve as the primary access to the proposed development. Fox Acres Road and the proposed Quigley Farms Road will be public roadways and have seventy or sixty (70'/60') foot right-of-ways. In addition, Red Tail Lane, Appaloosa Road and Cottontail Road will also be public roadways and have fifty (50') foot right-of-ways. Huckleberry Trail Road will be a private road within a forty (40') side tract. Refer to Section D – Exhibit Drawings, Sheets C-3 – Preliminary Roadway Plan and Sheet C-6 – Preliminary Road Sections for additional information.***

Based on the Traffic Impact Study, the average weekday traffic volumes to/from the proposed development will be 1,278 trips, with peak am trips of 253 and peak pm trips of 207 respectively.

The Owner/Applicant are working with the local jurisdictional agencies to identify any roadway and/or traffic issues. The Blaine County Engineer and Road and Bridge Maintenance Division have been sent a copies of the proposed plans for review and comment.

2. Schools.

Response: ***There are no dedicated sites for public school facilities within the Quigley Farm project boundaries. However, the project does include 6.17+/- acre area that has been designated for a future school site. This is currently identified as the future home for the Sage School. Refer to Section D – Exhibit Drawings, Sheet C-2 – Land Use Site Plan for additional information. It should also be noted that Blaine County School District has been sent a copy of the proposed plans for review and comment.***

3. Police, ambulance and fire protection, including estimated travel time from the nearest twenty four (24) hour county law enforcement, ambulance and rural fire station.*

Response: ***There are no dedicated sites for police/fire services, facilities or sites within the Quigley Farm project boundaries. Again, the Owner/Applicant is actively working with the local jurisdictional agencies to determine any police, ambulance and/or fire protection issues. Wood River Rural Fire has been sent a copy of the proposed plans for review and comment.***

4. Utilities.*

Response: ***Utilities to the proposed project will be provided through a combination of private franchise utilities (i.e. IMG, Idaho Power, Cox, and Qwest) as well as private water/sewerage systems. Refer to Section D – Exhibit Drawings, Sheets C-4 – Preliminary Grading and Drainage Plan, Sheet C-5 – Preliminary Water Plan and Sheet W-1 – Wastewater Infrastructure Plan for additional information. The Blaine County Engineer has been sent a copy of the proposed plans for review and comment.***

5. Sewerage and on site treatment facilities.*

   a. A nutrient-pathogen (N-P) study, as described by the Idaho department of environmental quality (IDEQ) nutrient-pathogen evaluation program for on-site wastewater systems 2002; revised draft January 31, 2006, or subsequent IDEQ's revisions to its N-P program shall be conducted for subdivisions with five (5) or more lots if the buildable area of the individual lots is smaller than five (5) acres and the development relies on on-site systems. An N-P study may also be required for other subdivisions regardless of the number of lots or acreage, when environmental conditions warrant, including, but not limited to, areas of high groundwater, soils with low permeability, or groundwater testing indicating nutrient or pathogen contamination.

   b. Other water quality studies may be required to assess cumulative impact of nutrients and pathogens or other groundwater contaminants posing a health or environmental risk in the watershed.

Response: ***The Applicant/Owner is proposing a private on-site treatment and sewerage system. This will consist of septic tanks for each of the 53 residences, a gravity sewer collection system, a pumping station, a constructed wetlands biological treatment system (CWBTS), a treated effluent re-use system and a pressurized drain field.***

For the dwelling units along, it is assumed that the residential units will generates 90 gallons of solid waste per week. The projected weekly volume is calculated below:

53	x	90 gallons per week	=	4,770
(lots)		gallons/week		Total

Refer to Section D – Exhibit Drawings, Sheet W-1 – Wastewater Infrastructure Plan for additional information. Both the Blaine County Engineer and South Central District Health have been sent a copies of the proposed plans for review and comment.

For additional information, refer to Section E – Appendices, Appendix 10 – Geotechnical Report.

6. Water source adequate for potable water, domestic irrigation and fire protection purposes.*

Response: ***Currently, there is an existing irrigation well located along western edge of the property. This will be utilized for irrigation purposes including domestic irrigation. In addition, a new well and pump house will be constructed to serve the proposed potable water and fire flows. The proposed project will be served by three existing hydrants and eleven new hydrants spaced throughout the proposed development. Refer to Section D – Exhibit Drawings, Sheets C -5 – Preliminary Water Plan for additional information. The Blaine County Engineer and Idaho Department of Water Resources have been sent a copies of the proposed plans for review and comment.***

7. Solid waste removal.

Response: ***The Applicant/Owner will contract with a private franchise hauler for the collection of solid waste.***

8. The effect on public water systems when the proposed subdivision is located within a wellhead protection area.

Response: ***While the proposed project is located within a wellhead protection area, the Applicant/Owner is not anticipating any adverse impacts on the public water system. Again, City of Hailey, the Blaine County Engineer and South Central District Health have been sent a copies of the proposed plans for review and comment.***

B. Environment:

1. Vegetation. A landscaping plan for the property, excluding the conservation tract if no change in use is proposed for the tract, shall be submitted that includes, but is not limited to, the following:

    a. Site mapping, photos and/or aerial imagery of existing vegetation, including, but not limited to, identifying all deciduous trees of five inches (5") in caliper or greater, and coniferous trees of four inches (4") in caliper or greater, within an area proposed for clearing or within twenty five feet (25') of any area to be cleared;

    b. How all disturbed areas will be revegetated and where new landscaping is proposed;

    c. The types of trees and plants proposed in the plan;

d. The water rights and irrigation plans necessary to revegetate or establish landscaping;

e. A minimum two (2) year maintenance plan;

f. Identification and use of low water, site appropriate species.

Response: ***Currently, the vegetative cover on the subject property consists of irrigated agricultural fields at the lower elevations and native vegetation on the hillsides surrounding the proposed project. As part of the proposed development, the Applicant/Owner will require that disturbed areas be revegetated with appropriate landscape materials. To the extent possible, plant materials will be selected based on their appropriateness for the climate and their low water usage. Individual landscape plans for each block/lot area will developed and submitted to the County in order to assess the appropriateness of the plant materials and irrigation methods. As previously mentioned, the Applicant/Owner has existing water rights and an irrigation well that will be used for establish and maintain landscaped areas.***

2. Wildlife and wildlife habitat.*

Response: ***The subject property contains a variety of upland and aquatic wildlife. Based on the Wildlife and Aquatic Resources Assessment, there are small animals and birds as well as large game animals including deer, elk, black bear and mountain lions. There is also grey wolves in the area.***

For additional information, refer to Section E – Appendices, Appendix 9 – Wildlife Report.

3. Avalanche hazard.*

Response: ***Based on the Avalanche Hazard Study, the property contains two hazard areas. Both of these are located north of Quigley Road. No proposed development is located within close proximity of either of these areas. Refer to Section D – Exhibit Drawings, Sheets C -1 – Existing Conditions Plan for additional information.***

For additional information, refer to Section E – Appendices, Appendix 11 – Snow Avalanche Hazard & Mapping Analysis.

4. Flood hazard.*

Response: ***Based on the flood hazard analysis, the property contains a floodplain that extends beyond the banks of Quigley Creek and generally follows the course creek through the property. Aside from a couple of roadway and/or pathway/trail crossings, a majority of floodplain area will be within the area identified for public open space. Any development within the floodplain will comply with federal and state regulations.***

For additional information, refer to Section E – Appendices, Appendix 6 – Flood Hazard Elevation Analysis.

5. **Drainage. Site mapping, photos and/or aerial imagery shall show natural drainage channels, wetlands and/or watercourses, proposed areas of disturbance and non-disturbance. All proposed modification to existing drainages and watercourses shall be identified and labeled in the grading plan required by subsection B8 of this section, including a site specific map showing contours of the drainage and watercourse alteration.**

Response: ***Drainage within the property boundary reflects the topographic condition within the canyon. North of Quigley Road, where the terrain is steep, the property drains north to south. Similarly, on the hillsides south of Fox Acres Road, drainage flows south to north. No development is proposed within these area and the natural drainage will be unaffected. Within the lower elevations of the canyon floor (i.e. approximate 5,430'+/- to 5,360 +/- above sea level), the terrain drains east to west. Quigley Creek flows along the southern edge of the canyon adjacent to Fox Acres Road and serves as the primary drainage feature within the canyon.***

The entirely if the proposed project lies within the canyon floor and generally follows the existing terrains for drainage. Overall, gradients within the proposed development are less than 15% and the public streets are less than 2% slope. Refer to Section D – Exhibit Drawings, Sheet C -4 – Preliminary Grading and Drainage Plan for additional information.

6. **Grading of slopes.***

Response: ***Again, the entirety of the development proposal is being located in the valley floor. Overall, gradients within the proposed development are less than 15% and the public streets are less than 2% slope. Based on the Geotechnical Report, surfaces adjacent to proposed streets, sidewalks and structures are to be sloped away at a minimum of 2% to prevent ponding. Refer to Section D – Exhibit Drawings, Sheet C -4 – Preliminary Grading and Drainage Plan for additional information.***

For additional information, refer to Section E – Appendices, Appendix 10 – Geotechnical Report.

7. **Hydrologic impact to ground and surface water.***

Response: ***The proposed project will be located on alluvium consisting of sand, gravel and clay deposits. The infiltration rates for the native sand and gravel soils are 2" a minute. Based on the Geotechnical Report, seven test pits were excavated. No groundwater was observed in any of the test pits at a depth of 20 feet. The Applicant/Owner does not anticipate any hydrologic impact to the either the ground or surface water as a result of the development.***

For additional information, refer to Section E – Appendices, Appendix 10 – Geotechnical Report.

8. **Soil and erosion.* A grading plan shall show all areas of proposed soil disturbance, how erosion shall be controlled, areas planned for soil removal and areas proposed for on-site soil fill and berms.**

Response: ***Based on the Geotechnical Report, the geology of the areas is characterized as alluvium consisting of sand, gravel and clay deposits by Quigley Creek and Big Wood River. Soils from the seven test pits were characterized as USDA Soil Classification B-2 or C-1. The soil profile consists up to five feet of native, fine sand and silt overlying native silty sand, gravel and cobble up to 21.5 feet below the surface.***

The entirety of the proposed project is being located in the valley floor where slopes are minimal. The Applicant/Owner will employ grading Best Management Practices (BMP's) to minimize soil erosion during construction. Re-vegetation of disturbed soils will be encouraged to occur as soon as possible after construction is completed. Refer to Section D – Exhibit Drawings, Sheets C-1 – Existing Conditions Plan and C -4 – Preliminary Grading and Drainage Plan for additional information.

For additional information, refer to Section E – Appendices, Appendix 10 – Geotechnical Report.

9. **Visual impact.***

Response: ***Again, the development proposal is being located in the valley floor and will not be attempting development on the hillsides. This will preserve the visual impact of the surrounding canyon. Refer to Section D – Exhibit Drawings, Sheets C-1 – Existing Conditions Plan and C -4 – Preliminary Grading and Drainage Plan for additional information.***

10. **Geothermal potential.**

Response: ***The Applicant/Owner has not identified any geothermal potential within the proposed project area.***

11. **Site mapping and photos and/or aerial imagery of natural features, including existing topography, unique geologic features and areas of non-disturbance.**

Response: ***Based on aerial imagery, it is readily apparent that the canyon floor is being used for agricultural purposes. The balance of the areas consisting primarily of steep hillsides are undeveloped and remain undisturbed.***

Refer to Section D – Exhibit Drawings, Sheets C -1 – Existing Conditions Plan for additional information.

12. **Description and date of water rights, if applicable. The plan shall demonstrate compliance with Idaho Code 42-111 that states that the domestic uses of water include the irrigation of up to one-half (1/2) acre of land, if the total use is not in excess of thirteen thousand (13,000) gallons per day.***

Response: ***At the present time, the Applicant/Owner has one licensed and six pending water right claims. These are listed below.***

Right Number	*Source*	*Priority*	*Purpose*	*Amount*
37-2784A	*Quigley Creek*	*1/3/1967*	*Irrigation Storage*	*16 afa*
37-7693	*Quigley Creek*	*12/16/1977*	*Irrigation, Irrigation Storage*	*5.27 cfs 30 afa*
37-8283	*Quigley Creek*	*9/23/1986*	*Stock Water, Rec. & Aesth. Storage*	*0.12 cfs 35 afa*
37-19736	*Quigley Creek*	*10/11/1889*	*Irrigation*	*2.28 cfs*
37-20902	*Ground Water*	*7/21/1966*	*Irrigation, Stock Water*	*2.01 cfs 0.12 cfs*
37-21348	*Ground Water*	*4/15/1985*	*Irrigation*	*0.27 cfs*
37-21349	*Ground Water*	*10/28/1979*	*Irrigation*	*2.01 cfs 56.7 afa*

13. **A noxious weed abatement plan.***

Response: ***At the present time, there is no noxious weed abatement plan in place. However, based on the Wildlife and Aquatic Resources Assessment, there are several noxious weeds identified in the area. This includes Knapweed and Thistle. If required, the proposed project will address the need for weed abatement within the Covenants, Conditions and Restrictions (CC&R's).***

14. **Riparian resources. If the property is located along class 1, 2, 3 or 4 streams as defined in section 9-17-6 of this code and impacts are proposed within the stream setback required in section 10-5-1 of this title, then a riparian area management plan, outlined below, shall be completed and submitted with the subdivision proposal.**

    The riparian area management plan shall include, but not be limited to, the following elements and shall be enforced through subsection 10-8-4A, "Performance Standards For Riparian Areas", of this title:

    a. A map, aerial image, and vegetative and soils analysis that provides enough detail to document the following:

        (1) Stream channels, gravel bars and ordinary high water mark;

        (2) Jurisdictional wetland boundaries;

(3) Site specific 100-year floodplain and floodway, and FIRM map boundaries issued by FEMA;

(4) An inventory of the soils and riparian plant community types present on the property, including a historical account of the site's plant communities.

b. Delineation of areas of riparian plant community to be managed with the riparian setbacks in section 10-5-3 of this title.

c. A mitigation plan outlining how the area of riparian resource will be protected and restored or disturbed areas mitigated. As applicable, the plan shall include, but not be limited to, the following:

(1) Proposed disturbance within the riparian setback area;

(2) Riparian improvement plans;

(3) Planting plan of plants and species commonly found in riparian areas and listed as "wetlands and riparian plants by the Idaho conservation data center";

(4) Erosion control plan.

d. A performance and maintenance plan, with financial guarantees, as described in subsection 10-8-4A of this title.

Response: ***Quigley Creek, which flows through the valley adjacent to Fox Acres Road is the only feature that contains riparian resources. Refer to Section D – Exhibit Drawings, Sheets C -1 – Existing Conditions Plan for general location of Quigley Creek, 100 year floodplain and jurisdictional wetlands. Based on the Riparian Management Strategies, preliminary objectives of the project include:***

- ***Promote Natural Processes***
- ***Enhance Floodplain Function***
- ***Protect and Preserve Wildlife Habitat and Migration Corridors***
- ***Filter Nutrients, Herbicides and other Chemicals from Land Use Applications***
- ***Promote Native Vegetation Plant Communities***

For additional information, refer to Section E – Appendices, Appendix 7 – Preliminary Riparian Management Strategies.

C. Planning considerations:

1. Public easements created or threatened.*

Response: ***The proposed project includes dedication for the public streets as well as easement/tract for the private road and emergency access. In addition, easements will be prepared for public utilities, waterlines, powerlines and non-motorized vehicle access. Additional easements (public or private) will be granted if required through the approval process.***

2. Noise increase and control.

Response: ***The proposed project will implement noise abatement through standard construction procedures for excessive sound mitigation including limiting construction to daylight hours (as allowed per County Ordinance). Noise from site disturbances will be limited to road and utility work and related riparian mitigation work for the stream crossings for roads and driveways. In this instance, plan and profile sheets prior to final plat will be reviewed and approved by the County. Best Management Practices (BMP's) will be followed, including water truck usage when warranted and use of proper survey controls, etc. to control fugitive dust during site preparation and construction. A Construction Management Plan will be developed and required of the successful contractor.***

3. Recreation availability.

Response: ***The proposed project has provided numerous opportunities and access locations for the greater Blaine County residents to enjoy the outdoor scenic beauty and recreation of Quigley Canyon. Per this submittal, the Quigley Farm masterplan is providing non-motorized trails on the south side of the development that start at Fox Acres Road and continue to the east. The Trail splits into a 6'-0" wide pedestrian trail on the north side of the proposed new private road labeled "Huckleberry Trail" and a 10'-0" wide multi-use trail to the south. Both trails run parallel to the road and access greater open space to the east of the property traditional used by the community.***

The development plan will not result in any public access loss to lands, waters or recreational uses but will insure access locations to adjacent public lands in perpetuity.

Quigley Farm will dedicate Block 2 parcel G to the Blaine County Recreation District as a summer and winter trailhead location. Quigley Farm will work with BCRD to provide access to remaining areas of the ranch for non-motorized trails in the summer and for Nordic ski trails in the winter as well as non-motorized connections to the Wood River High School, Community Campus and the Wood River Trail System.

Quigley Farm will dedicate Block 1 Parcel A of approximately 6.9 acres to the Blaine County School District for expansion of recreation/athletic fields.

This development project will have the potential for impacting a recreation trail designation, through the designated pedestrian and multi-use trails to the

south of the property and the connectivity to existing public access points along Fox Acres Road.

Refer to Section D – Exhibit Drawings, Sheets C-2 – Land Use Site Plan for additional information. It should also be noted that Blaine County Recreation District has been sent a copy of the proposed plans for review and comment.

4. **Assessed evaluation changes in subject and adjacent properties.**

Response: ***Due to the further development, the assessed valuation of the subject property will likely increase. This is also likely to cause properties immediately adjacent to the property to have a similar increase in value.***

5. **Area of historical significance.***

Response: ***There are no known areas and/or structures of historical significance.***

6. **Effects on agriculture.***

Response: ***The proposed project will displace some land that is currently being used for agricultural purposes. Through the Planned Unit Development process, the Applicant/Owner is concentrating the proposed development on the western end of the valley in order to protect the existing agricultural property and reduce the cost of infrastructure. Refer to Section D – Exhibit Drawings, Sheets C-2 – Land Use Site Plan for additional information.***

7. **Potential use of renewable resources (solar, geothermal, microhydro and wind).**

Response: ***The proposed project embraces the opportunity to be a leader in renewable resources and innovation of systems thinking for the greater good of the entire community. Utilizing passive design standards as a foundational principle for development the project will look to drive down base loads so that renewable resources can be maximized for a sustainable neighborhood. Solar access for renewables will be maintained for all property owners.***

Return to Agenda

Delineation of the 100-Year Flood Plain on a Reach of Quigley Creek, Blaine County, Idaho

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April 8, 2016

PROFESSIONAL ENGINEER
REGISTERED
9195
4/8/2016
STATE OF IDAHO
CHARLES G. BROCKWAY

A. Overview

This memo describes the methodology and results of a flood plain delineation study on a reach of Quigley Creek near Hailey, Idaho. The study reach extended from the Quigley Pond on the upstream end to the box culvert located near the northwest corner of Wood River High School. The total study reach length was 1.90 miles.

An effective 100-year flood plain for the reach has been established by FEMA. However, this delineation appears to have been performed using relatively sparse topographic data, and a 100-year peak flow that appears to be unjustifiably large. The objectives of the study were 1) to reevaluate the flooding hydrology of the basin and formulate a more accurate 100-year peak flow, and 2) to delineate the 100-year flood plain utilizing HEC-RAS modeling with on-ground survey data and high-density topographic information based on LIDAR.

B. Effective flood plain delineation

The effective flood plain adopted by FEMA for Quigley Creek is partially described in FEMA (2010). FEMA indicates that "detailed methods" were utilized from the corporate limits of Hailey upstream to Quigley Pond but does not thoroughly describe the methods. The current flood plain delineation encompasses two special flood hazard zones as follows: Zone AO with either 1-foot or 2-foot depths from the high school upstream to a point 3,170 feet below the pond, and Zone AE with base flood elevations from this point upstream to the pond. It is not explained in FEMA (2010) why this dual configuration was adopted. Zone AO is defined by FEMA as "Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet." This does not accurately describe the actual flow regime during the 100-year event. Further, since base flood elevations are not defined, the flood plain cannot be properly administered by the local jurisdiction. Finally, a comparison of FEMA's delineation with the most accurate topography available from LIDAR analysis indicates obvious inaccuracies such as flood plain inundation high up on the adjacent hill. A more accurate delineation would be Zone AE with base flood elevations throughout the entire reach.

C. Flood hydrology

In order to delineate a 100-year flood plain, a hydrologic analysis must be performed to estimate the 100-year peak flow from the Quigley Creek basin. Ideally, this estimate would be derived from actual flow measurements, but Quigley Creek is an ungauged stream without any systematic records available. The basin is a 17.3-square-mile catchment located east of Hailey. Observational evidence indicates that spring runoff is generally low and base flow is essentially zero except for springs that are captured by Quigley Pond. However, large flows from the basin can be generated from heavy rain-on-snow or rain-on-frozen ground events, rather than from spring snowmelt as in the Big Wood River or from heavy rain from summer storms.

FEMA recognized this and apparently attempted a joint-probability rainfall-runoff analysis to estimate the 100-year peak flow from the Quigley Creek basin. Using this technique a 100-year peak flow of 500 cfs was estimated. This analysis is partially documented in FEMA (2010), and appears to involve 1) estimating the probability of rainfall at Hailey immediately following a period of subzero weather, and 2) applying the estimated precipitation to a unit hydrograph for the basin, where the unit hydrograph appears to have been derived using the SCS curve number procedure but also somehow based on a very rough estimate of peak flow from the 1963 flood of 800 cfs. FEMA estimated the 1963 flood to be be a 150-year event based on a joint probability analysis of the probability of a rainfall event at Hailey and the probability of frozen ground. No detailed documentation is available of the statistical or computational methodology used, but based on the information provided in FEMA (2010), the multi-step process is likely to have an extremely large uncertainty. Therefore, revises analyses were performed as described below.

Method 1: USGS Procedure

A methodology for estimating streamflow peaks in ungauged basins has been developed by the U. S. Geological Survey (USGS, 2002). This method utilizes empirical relationships between mean annual precipitation, topographic and land-cover characteristics of the basin, and peak flows of various recurrence intervals. The study was specific to basins in Idaho and involved an exhaustive statistical analysis of available streamflow records and basin characteristics. This approach has been implemented in the web-based interface known as Streamstats and is widely utilized by the USGS and engineers to estimate peak flow magnitudes in ungauged basins.

Using this tool, the estimated peak flow frequencies are shown in Table 1.

Table 1. Peak flow estimates using the USGS (2002) procedure for ungauged streams.

Return Interval (yrs)	Peak Flow (cfs)	Std Error (cfs)	Std Error (%)	90% Confidence Interval (cfs)	
1.5	21	58.5	-36.9	10	46
2	29	55.6	-35.7	14	61
2.33	32	54.8	-35.4	15	67
5	50	53.9	-35	24	103
10	66	54.7	-35.3	32	138
25	88	56.7	-36.2	41	187
50	104	58.6	-36.9	48	227
100	124	60.6	-37.7	56	276
200	142	62.9	-38.6	62	322
500	167	66	-39.7	71	391

Method 2: Re-evaluation of meterological data and rainfall-runoff analysis

Review of the meteorological data for Hailey indicated that the 1963 rainfall event assumed by FEMA may not have been a two-day event (Table 2). The 100-year flow from the USGS procedure of 124 cfs (276 cfs if the 90% confidence level is taken) is much lower than the value used by FEMA of 500 cfs and therefore it was necessary to evaluate the likelihood of a 500 cfs flow from Quigley Creek during a 100-year rainfall event. An independent evaluation of the meteorological data for Hailey, Idaho was completed to determine the rainfall recurrence interval (Table 3). The values were then adjusted based on the 1973 Rainfall Atlas values and used to estimate the flood events for Quigley Creek. The flood observed in 1963 was estimated to be a 500-year event based on the available information, not a 150-year event as FEMA estimated.

The precipitation values in Table 3 were then input to the SCS rainfall-runoff model TR-55 using a curve number of 49. The resulting estimated flood discharges by return interval are shown in below (Table 4). A flood of 343 cfs was determined to be more likely for the 100 year event from this synthesized analysis. The flood estimate of 343 cfs is lower than FEMA's value of 500 cfs but significantly higher than the USGS regression values even at the 90% upper confidence limit. It is concluded that FEMA's value of 500 cfs is too large, and a value of 343 cfs is a very conservative estimate of the 100-year flood. The final selected 100-year discharge is 343 cfs, which formed the basis of all HEC-RAS model runs.

Table 2. Summary of meteorological data from Hailey, Idaho for February 1-5, 1963 used as precedent for Quigley Creek 100-yr flood analysis.

	Date	Snowpack Depth (in)	Rainfall (in)	Snowfall (in)	Temperature (F)	
					High	Low
FIS Reported Floodate	1-Feb	8	2.45	1.5	46	29
	2-Feb	8	0.22	2.2	42	25
Supersaturated Snow Melt--> Likely actual Flood date	3-Feb	6	0.59	0	44	27
	4-Feb	5	0.09	0		
	5-Feb	5	0	0	45	31

Table 3. Precipitation recurrence interval for Quigley Creek as determined from historical data for Hailey, Idaho

Gumbel K Formula Statistical Analysis										NOTES
T	100	50	25	10	5	2	150	200	500	
K	3.14	2.59	2.04	1.30	0.72	-0.16				
Pave	1.47	1.47	1.47	1.47	1.47	1.47				
S	0.55	0.55	0.55	0.55	0.55	0.55				
Pt	3.2	2.9	2.6	2.2	1.9	1.4				
Max	0									
n	39									
IDF-Regression	3.4	3.1	2.7	2.2	1.8	1.3	3.7	3.8	4.3	
Adjusted	3.7	3.4	3.1	2.4	2.1	2.0				Based on Atlas2 differences between Hailey and Quigley

Table 4. Flood recurrence discharges for Quigley Creek (TR-55).

	Peak Flow						
Return Period	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
Precipitation Event (in)	2.0	2.1	2.4	3.1	3.4	3.7	4.3
Quigley Creek Discharge (cfs)	0	0.2	16.04	105.4	199.8	343.8	735.9

D. Model development

a. Geometric and topographic data

Surveyed cross-sections were utilized as the basis for HEC-RAS modeling. A total of 25 cross-sections from Benchmark Associates surveys conducted in 2006 and 2007 were used in the model. Topographic conditions do not appear to have changed since that time. The preliminary HEC-RAS model developed at that time was used as a basis for

the present study and was updated and modified as necessary based on LIDAR data provided by Benchmark.

The survey section data is on the NGVD29 datum and the LIDAR data is on the NAVD88 datum. The difference between the two data (NAVD88 minus NGVD29) is 3.64 feet. However, the LIDAR contours appear to reflect a shift of about 0.5 to 1.5 feet higher than 3.64 feet, relative to the actual surveyed ground shots. For this reason, the actual flow depth is larger than it would appear if the BFEs are compared the LIDAR topo. The HEC-RAS model was retained in NGVD29 and the computed water surface was then adjusted upward 3.64 feet for mapping the limits of the flood plain.

The intersection of the water surface and the ground was determined from the actual cross-sections rather than using the LIDAR data due to the apparent discrepancy described above. However, the LIDAR contours were used between cross-sections as a guide to determine the flood plain limits.

From Section 65 downstream, the HEC-RAS model was programmed to create two uniformly-spaced, interpolated sections between surveyed sections to provide better definition of computer water surface elevation.

b. Roughness coefficients

A uniform coefficient of roughness (Manning's n-value) was used throughout the study reach. Based on visual interpretation of the prevailing soil type and vegetation, and consulting the definitive published information by Chow (1959) for a wide variety of channel and overbank conditions, it was determined that a value of 0.040 is reasonable for both the channel and overbanks. In typical river modeling, riparian overbanks areas often have higher n-values than the channel; in this case the overbanks are essentially plowed fields that would have minimal vegetation during the flooding event.

c. Ineffective flow areas and levees

A significant portion of the reach, from Section 56 to Section 63, must be modeled as a split-flow reach due to the high berm between the farmland and the channel against the hill to the south. This berm causes the flow to split at approximately Section 65, such that there is an independent flow on either side of the berm. For this reason, each side has different BFEs and the "levee" option in HEC-RAS was used to isolate one side from the other (the berm is shown as a hatched area on the attached map). The model was run for each side using the downstream Section 56 as a starting point, and a calculated value obtained at upstream Section 63. The flow split between each side was varied until the calculated upstream elevations agreed. It was found that the flow in the right leg (looking downstream) will be 143 cfs and the flow in the left leg will be 200 cfs.

Below Section 55, the flow begins to channelize, and is fully-contained in a flood control channel below Section 53 which conveys flow around the high school.

d. Downstream boundary condition

The starting elevation at the downstream Section 49 was set to confine the flow in the flood channel at the bridge (Section 49 was selected to be far enough downstream so that the choice of starting elevation makes little difference).

E. Model results

The HEC-RAS model computed water surface elevations and channel velocities are shown in Table 5.

Table 5. Selected model output.

Station (ft)	Section No.	Main Channel and Left Split Leg			Right Split Leg		
		W.S. Elev NAVD29 (ft)	Vel Chnl (ft/s)	W.S. Elev NAVD88 (ft)	W.S. Elev NAVD29 (ft)	Vel Chnl (ft/s)	W.S. Elev NAVD88 (ft)
36998	72	5519.72	4.96	5523.36			
36713	71	5514.72	5.65	5518.36			
36414	70	5508.32	6.31	5511.96			
36113	69	5500.98	4.60	5504.62			
35795	68	5492.74	5.76	5496.38			
35492	67	5487.43	3.11	5491.07			
35203	66	5482.37	3.20	5486.01			
34702	65	5472.42	2.67	5476.06	5472.33	1.47	5475.97
34236	64	5465.46	2.20	5469.10	5465.47	2.59	5469.11
33692	63	5458.47	4.12	5462.11	5458.11	1.21	5461.75
33296	62	5449.99	6.17	5453.63	5452.26	3.71	5455.90
32802	61	5441.54	4.09	5445.18	5445.42	3.60	5449.06
32284	60	5433.13	4.87	5436.77	5436.91	3.21	5440.55
31787	59	5425.49	4.30	5429.13	5427.88	3.33	5431.52
31298	58	5415.87	4.82	5419.51	5420.47	3.91	5424.11
30784	57	5407.77	3.30	5411.41	5411.02	4.64	5414.66
30296	56	5402.00	3.54	5405.64	5402.00	1.47	5405.64
29796	55	5391.60	3.87	5395.24			
29287	54	5380.77	4.85	5384.41			
28784	53	5372.13	7.40	5375.77			
28299	52	5364.13	6.52	5367.77			
27791	51	5357.99	5.88	5361.63			
27319	50	5351.65	7.87	5355.29			
26944	49	5340.32	4.74	5343.96			

F. Flood plain delineation and base flood elevations

The computed water surface elevations in Table 5 were mapped using the point of intersection of the ground surface with the water table at each surveyed cross-section. The LIDAR data was used between cross-sections to create a smooth representation of the limits of flood inundation.

From Quigley Pond downstream to Section 68, the model indicates that the flood remains nearly confined in the natural stream channel. Below Section 68 the flood plain becomes wider and inundates a considerable portion of the overbank, reaching a maximum width of 629 feet at Section 63. From Section 63 to Section 55 the flood plain is very uniform with a width varying from 220 to 290 feet. Below Section 55 the flood becomes completely channelized and remains confined within the constructed flood channel which conveys the floodwater safely around the high school.

Base flood elevations (BFEs) were interpolated at 5-foot intervals from the computed data in Table 5, and located on the map accordingly.

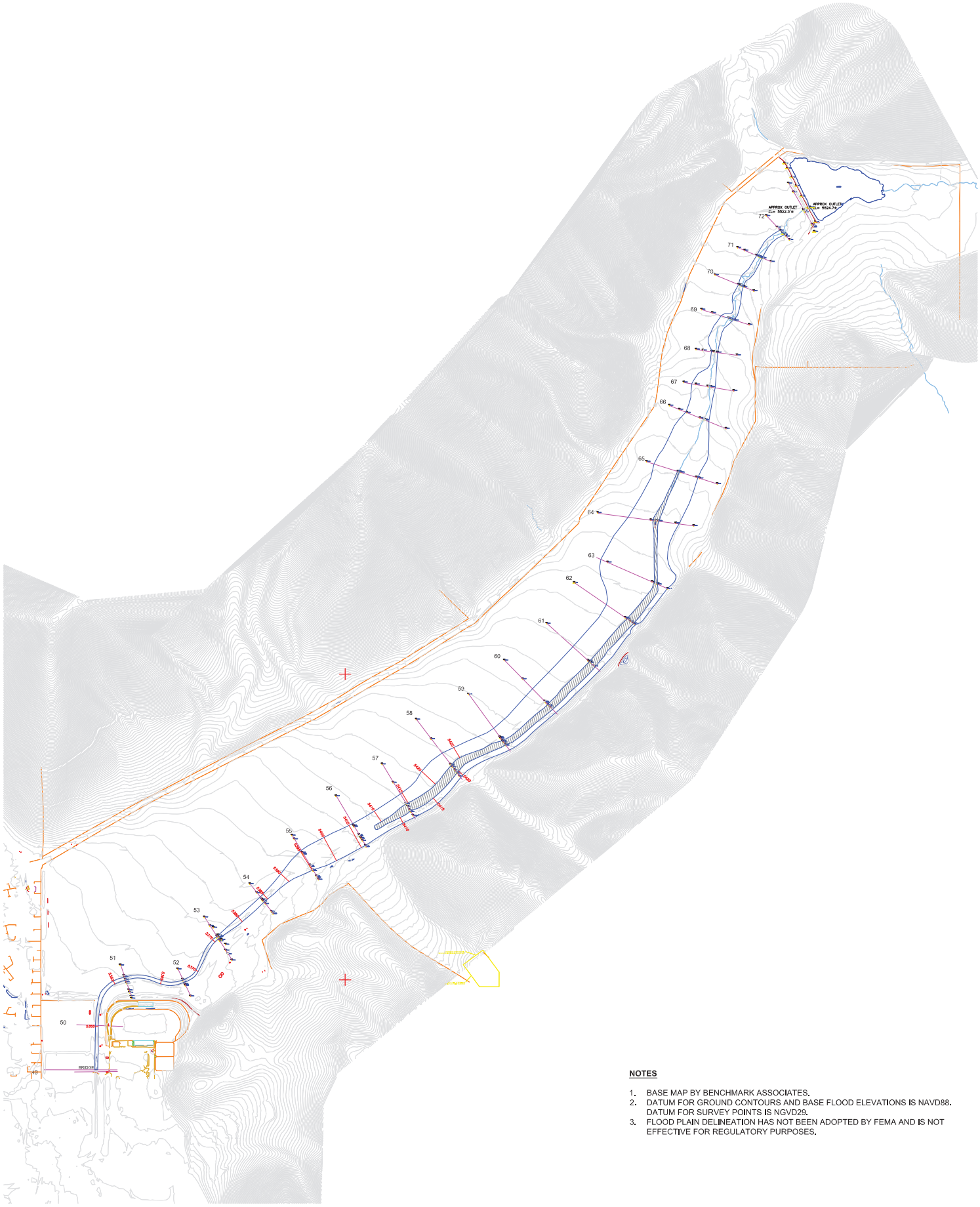
It must be noted that the HEC-RAS modeling, flood plain delineation, and BFEs described herein and shown on the accompanying map have not been adopted by FEMA and are not effective for any regulatory purpose. A Letter of Map Revision (LOMR) must be submitted to FEMA if it is desired to modify the effective flood plain or BFEs.

G. References

Berenbrock, Charles (2002). Estimating the Magnitude of Peak Flows at Selected Recurrence Intervals for Streams in Idaho: U.S. Geological Survey Water Resources-Investigations Report 02-4170, 59 p.

Chow, Ven Te (1959). Open-Channel Hydraulics

Federal Emergency Management Agency (2010). Flood Insurance Study, Blaine County, Idaho and Unincoporated Areas. November 26, 2010.



NOTES

1. BASE MAP BY BENCHMARK ASSOCIATES.
2. DATUM FOR GROUND CONTOURS AND BASE FLOOD ELEVATIONS IS NAVD88. DATUM FOR SURVEY POINTS IS NGVD29.
3. FLOOD PLAIN DELINEATION HAS NOT BEEN ADOPTED BY FEMA AND IS NOT EFFECTIVE FOR REGULATORY PURPOSES.

QUIGLEY CREEK 100-YR FLOODPLAIN DELINEATION

SCALE: 1" = 500'

Brockway Engineering, PLLC
April 8, 2016

Sawtooth Environmental Consulting, LLC
P.O. Box 2707 Ketchum, ID. 83340
208-727-9748

Quigley Farms Development
Preliminary Riparian Management Strategies
January 2016

Location: **Quigley Farm, Section 3 and 10, Township 2 North, Range 18 East, Blaine County, Idaho**

Project: **Quigley Farms Development - Phase 1 SW Neighborhood**

Understanding the importance of riparian habitats and their role in floodplain function, protecting water quality and providing valuable wildlife habitat Quigley Farms Development proposes to protect undisturbed riparian habitat elements and to restore degraded riparian habitat elements within the designated riparian management zone.

Project objectives include:

- Promote natural processes
- Enhance floodplain function
- Protect and preserve wildlife habitat and migration corridors
- Filter nutrients, herbicides and other chemicals from land-use applications
- Promote native vegetation plant communities

Riparian Management Strategies

Preliminary riparian management strategies outlined in this plan are presented to protect water quality, improve floodplain function and enhance riparian and wildlife habitat. As well as help mitigate for the proposed site development and past site alterations, which have altered the natural characteristics of the site.

The designated riparian area will be considered a natural zone, management and maintenance activities will be minimized to the necessary control of noxious weeds, the removal of dead and/or hazardous shrub and trees, and necessary land management applications if required due to unforeseen natural events. No further development will be proposed for the designated riparian management zone.

Preliminary strategies include:

- Protect and preserve an undisturbed vegetation buffer directly adjacent to surface water resources.

- Protect and preserve existing desirable native riparian vegetation [trees, shrubs, grasses and forbs].

- Encourage natural recruitment of native riparian plant species by not mowing and/or maintaining the riparian management zone.

- Control noxious weeds and invasive plant species throughout the riparian management zone on an as needed basis and as required by Idaho law. Control through herbicide and mechanical methods in compliance with all applicable laws, rules, regulations and herbicide manufacturer's instructions.

- Restore native riparian and upland plant communities displaced by past land-use applications. Reclaimed areas within the designated riparian management zone should be addressed by removing all undesirable plant species [weeds], preparing the site and planting with an acceptable riparian seed mix. Hydro-seed application and/or broad cast seeding. Incorporate plantings of native shrub and tree species if deemed appropriate.

- Work to restore Quigley Creek Hydrology and associated surface water flows to the lower reaches of Quigley Creek.

Active riparian management applications will incorporate all applicable Best Management Practices to protect resource values and to ensure compliance with local, state and federal Water Quality Standards.

Quigley Creek Riparian Inventory
and
Wetland Delineation

Quigley Green Subdivision
Hailey, Idaho

Prepared for:
Quigley Green Owners, LLC
P.O. Box 2720
Ketchum, ID 83340

December 6, 2007

Fisher & Associates
Aquatic Resource Management & Enhancement
6640 Highway 200 East
Missoula, MT 59802
(406) 258-6800

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1.0 Introduction

1.1 Purpose

Quigley Green Owners, LLC, asked Fisher & Associates; 6640 Highway 200 East; Missoula, MT, 59802, to conduct an inventory and evaluation of the wetland and riparian areas on the former Quigley Ranch. Locating all wetland and important riparian areas now will insure their function is preserved and protected during future development.

I, Steve Fisher, Aquatic Biologist, was the principle investigator. Coincidentally, I began assisting the previous ranch's owners with stream, pond, and riparian management in 1986. For this present inventory, I visited the property a number of times to inventory wetland conditions, to identify plant species, and to take specific measurements of the channel. I used the data collected during these studies to determine the locations and function of the ranch's wetland and riparian areas. The data I collect will help Quigley Green Owners, LLC, develop the property in the most conscientious manner possible.

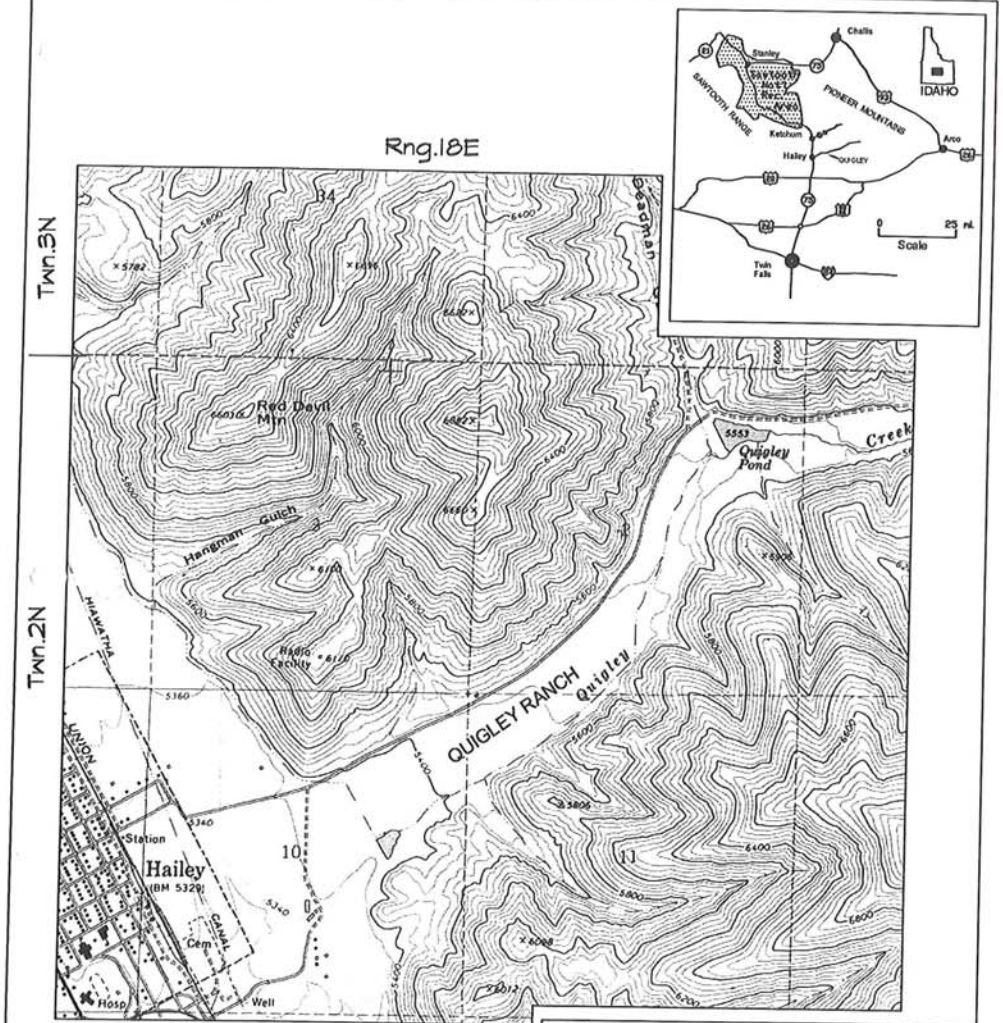
Blaine County and City of Hailey ordinances mandate that an inventory of potential wetlands on-site be conducted to determine if jurisdictional wetland habitats exist prior to the implementation of improvements or alterations to the property. The USCOE (United States Corps of Engineers) has determined that Quigley Creek is not jurisdictional under the CWA (Clean Water Act) because it is an "isolated" drainage (see attached NWW 012200780 in Appendix A). I spoke with Mr. Robert Brochu, at the USCOE Idaho Falls Regulatory Field Office and he confirmed that under present rules, Quigley remains non-jurisdiction. Therefore, I do not plan to submit any of the wetland delineation data to the USCOE for evaluation.

However, flood plains, stream channels, drainages, wetlands, and riparian areas are regulated by the City of Hailey and Blaine County through various ordinances. Also, those aquatic areas contain critical design elements with implications to public safety and quality of life. Early identification and location of these environmentally important areas will insure that their values and functions are protected.

1.2 Site location and description

Quigley Green Owners, LLC, owns the approximate 855 acre property. It lies on the eastern side of Hailey, Idaho, and is proposed to be annexed into the City as part of this development (see page 2's vicinity map). My surveys were confined to the lowest lying areas along the valley bottom because that is were the aquatic resources are found.

Quigley Creek enters the property on its western boundary (see maps on pages 3, 4, and 5). It runs eastward for about 5,200 feet before entering a 5.5 acre irrigation pond. Generally, water is held in the pond and pumped into the ranch's sprinkler irrigation system and none flows into the stream downstream of the pond. The only time water flows in the almost 9,000 feet of stream



0 5 MILE
0 1000 FEET 0 500 1000 METERS
created with TOPO!® ©2001 National Geographic (www.nationalgeographic.com/topo)

Quigley Green Owners, LLC

Vicinity Map

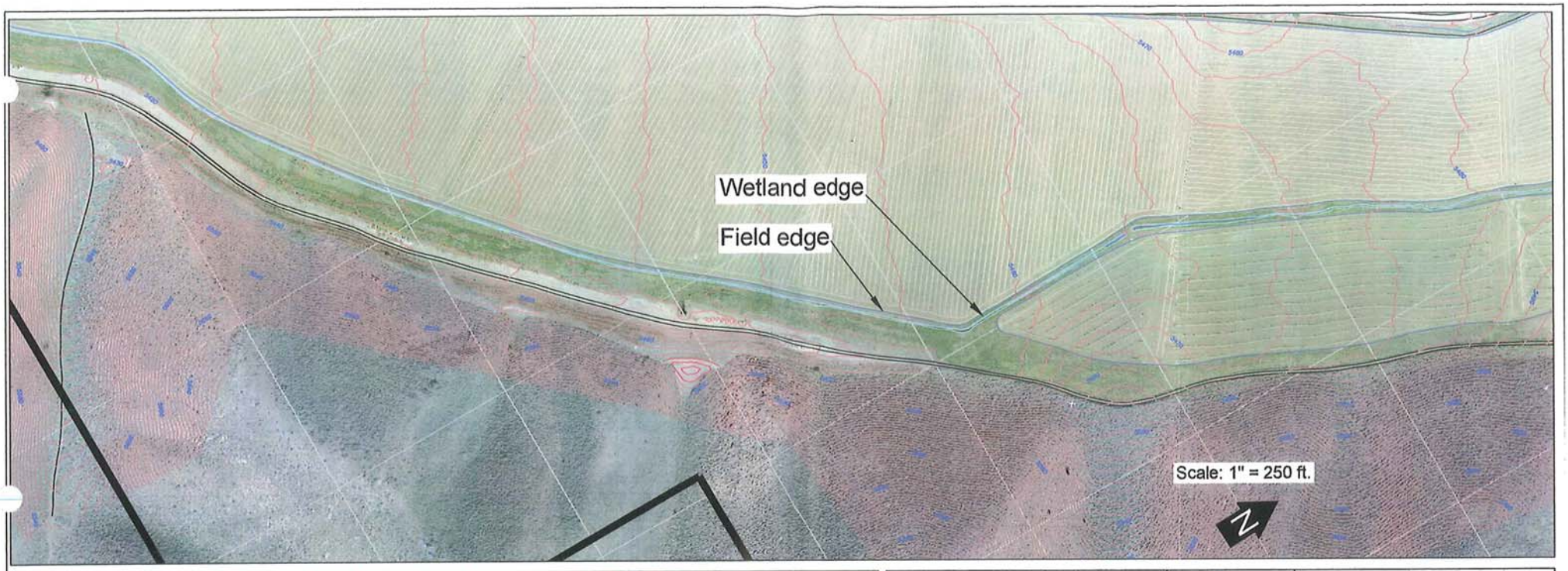
OWNER: QUIGLEY GREEN, LLC
QUIGLEY CREEK DRAINAGE
NEAR HAILEY, IDAHO, BLAINE COUNTY, IDAHO

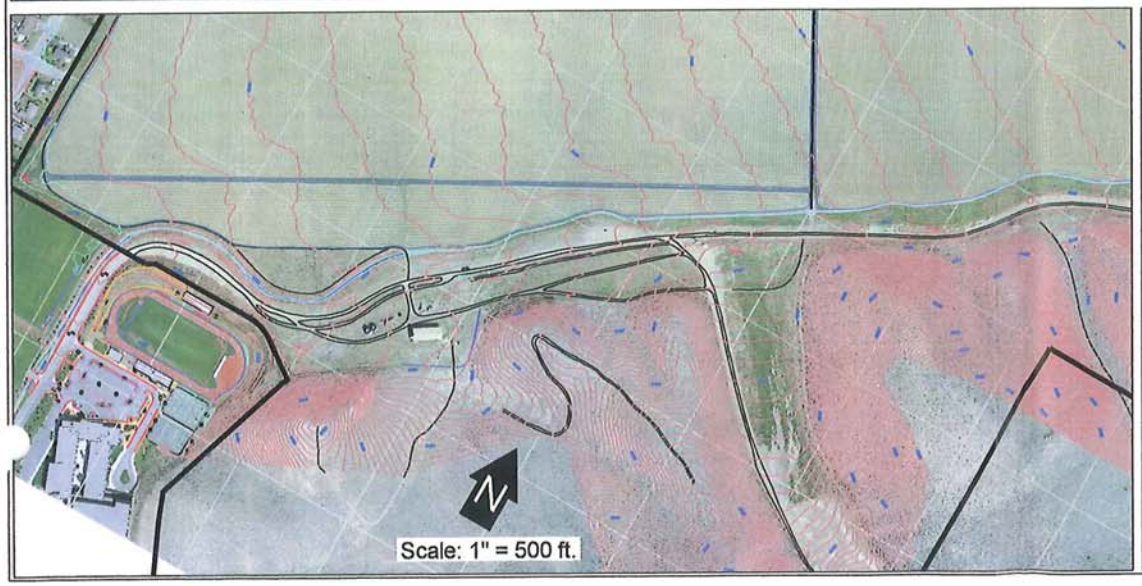
DATE: 9/28/07

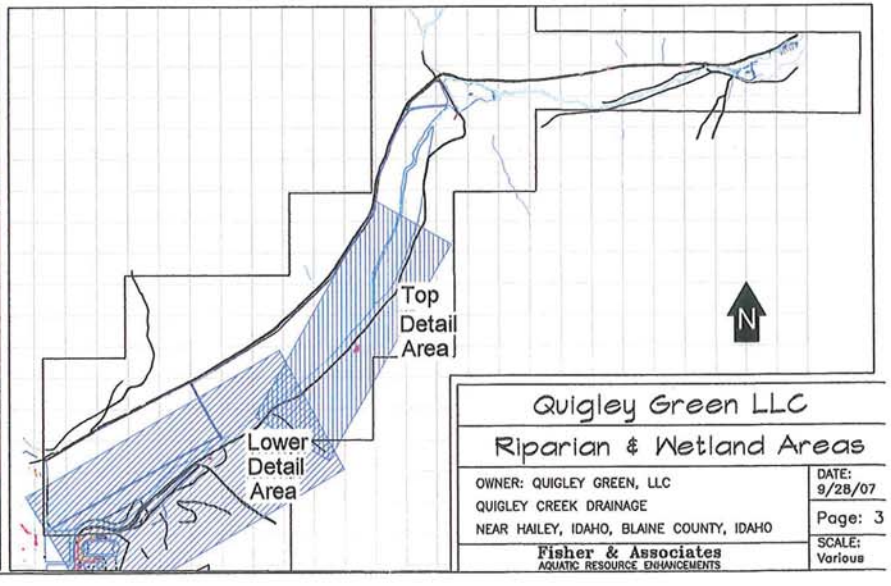
Page: 2

SCALE: 1"=2000ft

Fisher & Associates
AQUATIC RESOURCE ENHANCEMENTS







Quigley Green LLC

Riparian & Wetland Areas

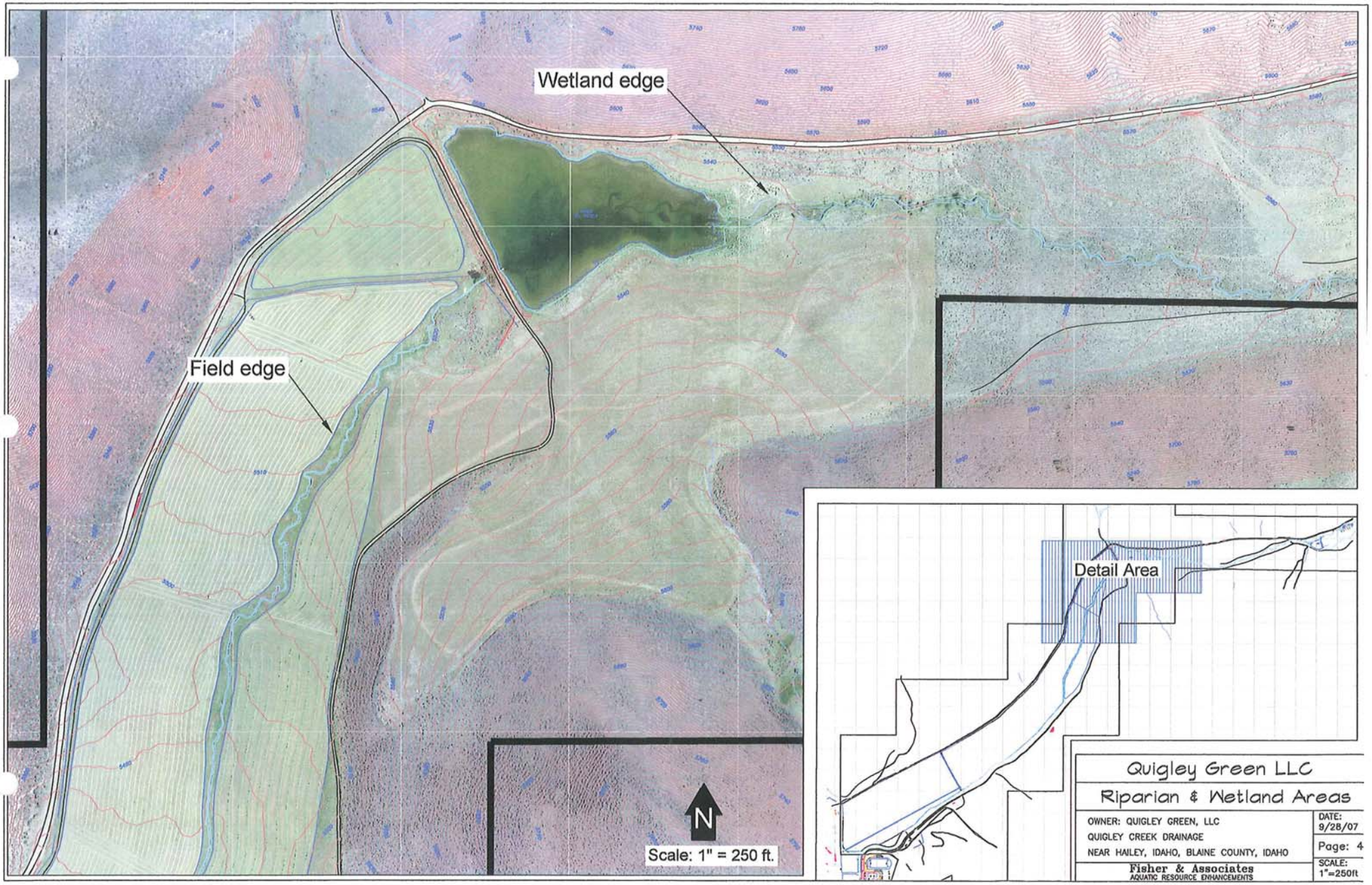
OWNER: QUIGLEY GREEN, LLC
QUIGLEY CREEK DRAINAGE
NEAR HAILEY, IDAHO, BLAINE COUNTY, IDAHO

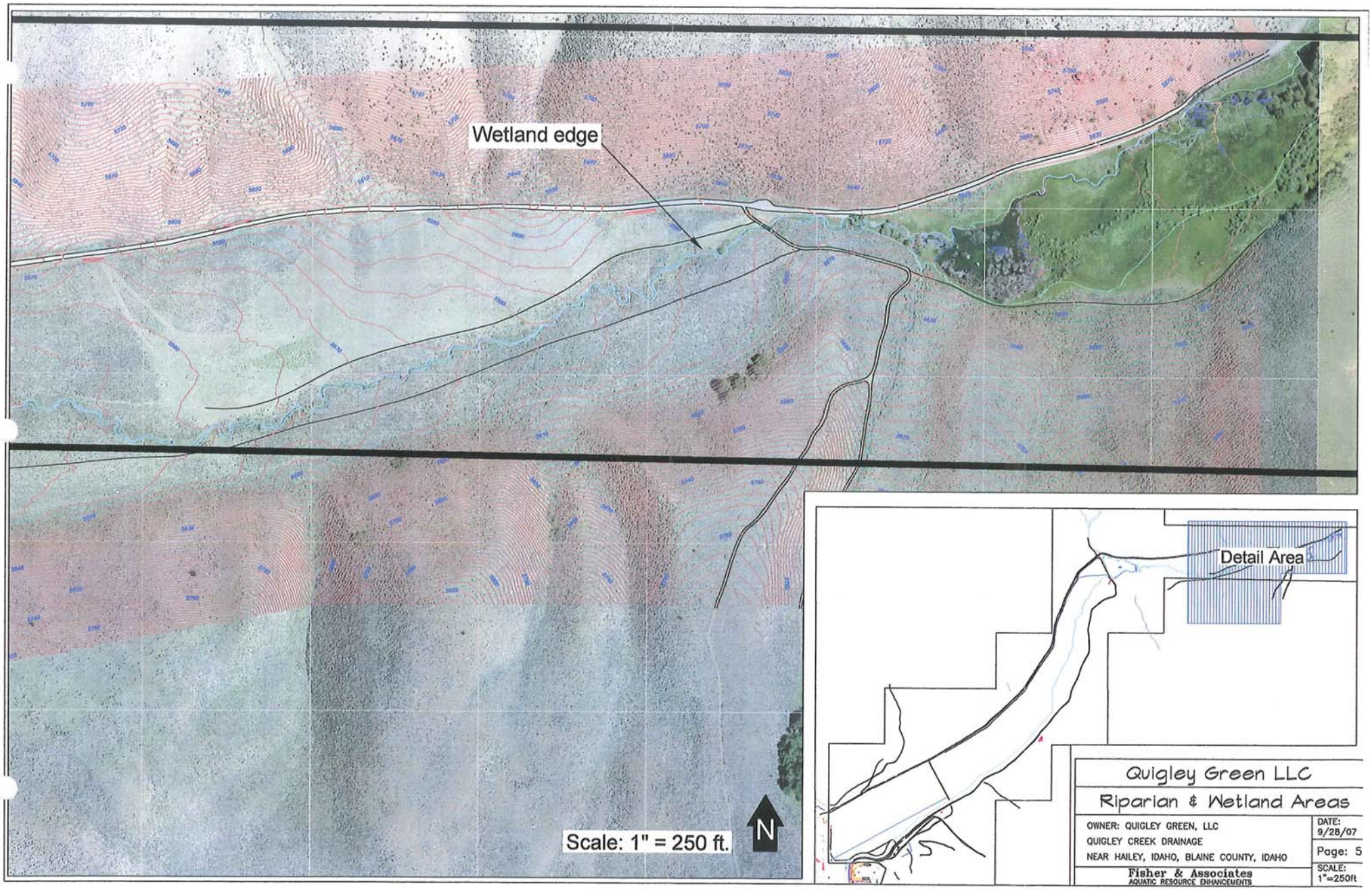
Fisher & Associates
AQUATIC RESOURCE ENHANCEMENTS

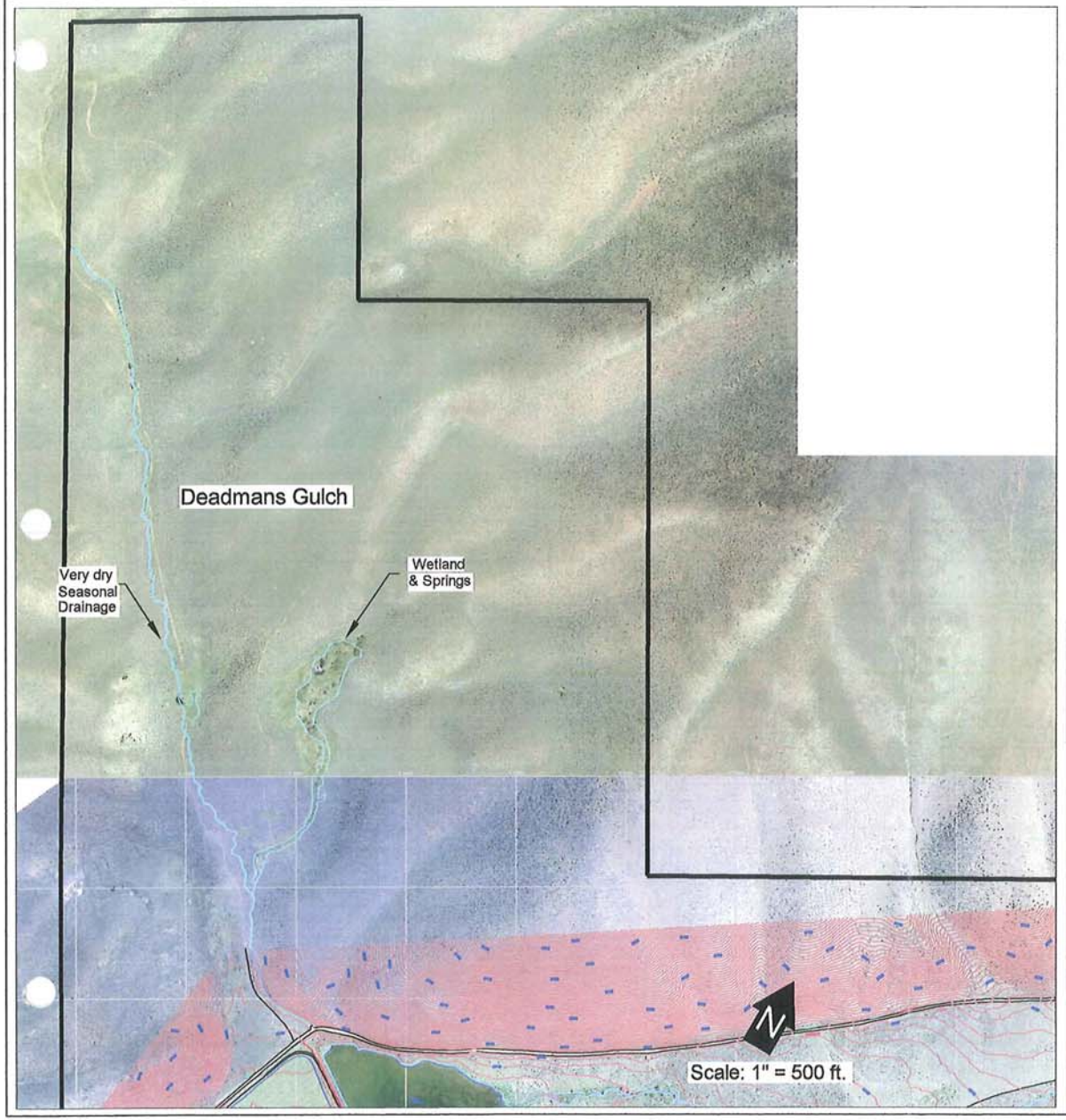
DATE: 9/28/07

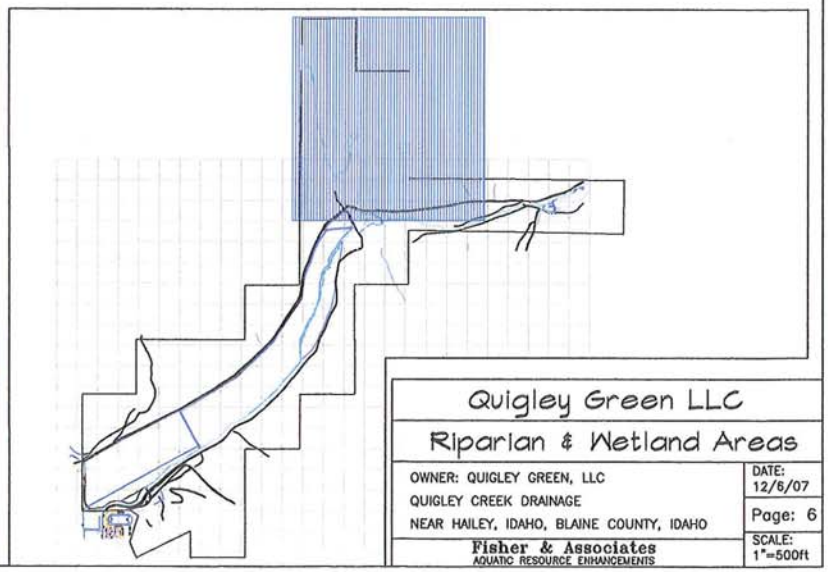
Page: 3

SCALE: Various


Wetland edge
Field edge
Detail Area
N
Scale: 1" = 250 ft.
Quigley Green LLC
Riparian & Wetland Areas
OWNER: QUIGLEY GREEN, LLC
QUIGLEY CREEK DRAINAGE
NEAR HAILEY, IDAHO, BLAINE COUNTY, IDAHO
Fisher & Associates
AQUATIC RESOURCE ENHANCEMENTS
DATE: 9/28/07
Page: 4
SCALE: 1"=250ft


Wetland edge
Scale: 1" = 250 ft.
N
Detail Area
Quigley Green LLC
Riparian & Wetland Areas
OWNER: QUIGLEY GREEN, LLC
QUIGLEY CREEK DRAINAGE
NEAR HAILEY, IDAHO, BLAINE COUNTY, IDAHO
Fisher & Associates
AQUATIC RESOURCE ENHANCEMENTS
DATE: 9/28/07
Page: 5
SCALE: 1"=250ft





Quigley Green LLC

Riparian & Wetland Areas

OWNER: QUIGLEY GREEN, LLC
QUIGLEY CREEK DRAINAGE
NEAR HAILEY, IDAHO, BLAINE COUNTY, IDAHO

Fisher & Associates
AQUATIC RESOURCE ENHANCEMENTS

DATE: 12/6/07

Page: 6

SCALE: 1"=500ft

channel downstream of the pond is during the winter when the irrigation system is not running. During the growing season that channel is normally dry. Also, Deadman Gulch, a minor drainage, enters the Ranch in the northeast corner.

1.3 Regulatory requirements

If development proposes to alter any of the natural Quigley Creek channel, including the pond's banks, permits will be required to do so from IDWR (Idaho Department of Water Resources) and the City of Hailey, if annexed, or Blaine County, if not. Water quality certification for any work involving flowing water will be required from IDEQ (Idaho Department of Environmental Quality), also. Review by the USCOE will not be required, as described previously.

2.0 Methods

2.1 Investigation Methods

The property is very open and can be viewed well from a County road running along the northern boundary. As I drove along it during my initial investigations, I saw the stream system and pond are the main landscape features. The surrounding agricultural fields and native open spaces rise very quickly to irrigated and dryland uplands. When I walked along the stream channel and pond bank during my detailed physical inspections, I found that all wetlands and riparian areas were closely associated with the Quigley Creek channel (Photo 1) and the immediate pond edge (Photo 2). I also walked along the drainage in Deadman's Gulch and investigated a rather large spring located in a side canyon in that drainage.

After walking the entire stream channel and examining the recent aerial photo of the ranch, I realized that the creek exhibits four distinct zones, not counting Deadman's Gulch. In each zone the effects of historical agriculture and or other human activities have impacted the physical nature of the stream. This makes each zone very different from the others. We, therefore, decided to inventory each in a separate fashion.

The four zones are:

1) The channel sparsely vegetated 5,500 foot length of creek from the western boundary downstream (Photo 1).
2) The pond itself and a 650 foot section of well vegetated inlet channel (Photos 2 and 3).
3) The section of somewhat natural channel downstream of the pond about 3,300 feet long (Photo 4).
4) The furthest downstream 5,600 feet of the creek channel that has been re-located to the south side of the valley (Photo 5).

3.0 Results and findings

3.1 Stream Reaches

3.1.1 Quigley Creek Upstream of Pond -

I walked along the entire length of this stream segment from the pond east to the property line. Along the way I noted that about 650 feet upstream of the pond, the presence of riparian shrubs and trees diminished drastically. I decided to treat the sparsely vegetated upper section separate from the pond and its 650 long well vegetated inlet channel (see next section).

I did not place wetland flags along this reach because here the creek is tightly confined to its channel and the wetland/riparian zone is usually no more than 6 feet wide. I did find some small areas where the gradient was flatter and the wetland/riparian plant zone may expand to 15 feet but they are the exception. As I walked, I found that I could follow my progress very well on the present aerial photo and I decided that placing the Riparian Area line on the orthophoto would be sufficient and would provide enough precision to guide future resource management.

About 3,900 feet upstream of the pond lies another pond and wetland area. It is obviously formed by a dike of bedrock that constricts the Quigley Canyon at this point. Exposed rock outcrops can be seen on the hills adjacent to the ponds. This natural grade control is the reason the channel immediately downstream is so incised. The higher elevation of these ponds provides enough power to the outflowing water so that it has scoured and incised the channel. This incision persists until the large pond downstream checks the grade and the channel becomes flatter once again.

3.1.2 Pond and Inlet Channel -

I walked around the pond perimeter, noted all of the wetland and riparian plant species, and looked for spring inlets or other sources of water other than Quigley Creek. I found none. I did notice that the pond level was one or two feet below full pool and, where the bank sloped gradually, wetland plant species extended outward from the pond for a good distance. In areas where bank relief was very steep, wetland plants and saturated soils were found only very close to the water's edge.

As I walked I placed wetland flags at the wetland and upland interface. I adhered to the traditional methodology for identifying wetlands vs uplands. I considered an area to be a wetland if its present condition tested positive for:

1) A preponderance of wetland plants thriving at the site.
2) A permanent source of water persisting throughout the growing season.
3) Soils that displayed hydric characteristics due to permanent saturation.

I continued placing wetland flags along the bank up to the first fence line to the east. Coincidentally, the prevalence and type of riparian vegetation changed markedly at this point and I decided to inventory the upstream portion, as described in the previous section above, less formally.

3.1.3 Quigley Creek Downstream of the Pond (Natural Channel) -

I walked along Quigley Creek's channel downstream from the pond to the southwest property corner. The creek, when it flows, runs in a natural meandering channel for about 3,400 feet downstream of the pond. However, even though a natural grass buffer up to 40 feet wide separates the active channel from the tilled fields, agricultural activities have cleared almost all riparian shrubs and trees.

I found wetland characteristics only in the bed of the dry channel and not many there, either. In fact, if Quigley Creek were a jurisdictional "water of the United States" under USCOE guidelines, the wetland line would have to be determined by the position of the MHW (mean high water) mark in the channel because that is the only evidence of seasonal hydrology. As it is, I decided to again depend on the aerial photo to position a line separating wetland and/or riparian areas from uplands.

The site map on page two also shows a "field edge" line between the creek and the tilled fields. On the creek side of that line native forbs and grasses and introduced naturalized grasses are allowed to grow and are never cut. A few very small shrubs were found growing here also but they were scarce.

3.1.4 Quigley Creek Downstream of the Pond (Altered Channel) -

The downstream 5,600 feet of creek has been re-located to the south side of the valley to facilitate agriculture. The channel's banks are covered with riparian grasses planted after the channel was moved and, while the channel is stable and not eroding, it looks very un-natural and supports no riparian shrubbery or trees for over a mile. The channel enters a flood control channel near the downstream southwest property line. From there Quigley Creek either percolates into the ground or is disbursed into the storm drain system. It does not reach the Big Wood River, ever.

3.1.5 Deadman's Gulch

Deadman's Gulch lies on the northern boundary of the property. Upon first inspection, it appears to be very dry. However, a seasonal channel runs along the valley bottom and some past channeling can be found that probably channeled the seasonal water into the large pond.

Desiccated clumps of willows are scattered along the channel. In the largest willow accumulations some wetland grasses and sedges can be found but, for the most part, the main channel is very dry and it is obvious that surface water is present here only in the early spring and

persists only during very wet years.

A side canyon about 1,000 feet into Deadman's Gulch contains a large spring. Even during the very dry late summer of 2007 the ground in amongst the willow thickets was saturated. Water from the springs accumulates in the draw's lower portions. That water flows towards the drainage in the main gulch, almost reaching it before percolating back into the ground.

3.2 Vegetation

I found most of the natural stands of native vegetation, with the exception of the grasses, in the reach of creek channel immediately upstream of the pond. The area does not appear to have ever been cleared and I suspect the mix of vegetation there presents a fairly natural plant community.

Table 1 shows the species I found by common name. Each species' scientific name and wetland indicator status (see notes below table) is also included.

Table 1 - Plant species found on Quigley Ranch -

Redtop	*Agrostis alba*	FACW
Nebraska sedge	*Carex nebrascensis*	OBL
Water Sedge	*Carex aquatilis*	OBL
Other sedges	*Carex* spp.	OBL - FACW - FAC+
Rushes	*Juncus* spp.	OBL - FACW - FAC+
Northwest cinquefoil	*Potentilla gracilis*	FAC
Cheat grass	*Bromus tectorum*	NI
Canada rye	*Elymus canadensis*	FAC
Smooth brome	*Bromus inermis*	NI
Idaho fescue	*Festuca idahoensis*	FACU
Orchard grass	*Dactylis glomerata*	NI
Basin wild rye	*Elymus cinereus*	NI - FACU
Slender wheat grass	*Agropyron trachycaulum*	FAC-
Dock	*Rumex* sp.	FACW
Nightshade	*Solanum* sp.	FACU
Cattail (broadleaf)	*Typha latifolia*	OBL
Spotted knapweed	*Centaurea maculosa*	NI
Willow	*Salix* spp.	OBL - FACW

Dogwood	*Cornus stolonifera*	FACW
Wood's rose	*Rosa woodsii*	FACU
Silver sage	*Artemisia cana*	FAC-
Other sage	*Artemisia* spp.	NI
Rabbit brush	*Chrysothmnus nauseosus*	NI
Golden currant	*Ribes aureum*	FAC+
Cottonwood	*Populus trichocarpa*	FAC
Canary reedgrass	*Phalaris arundinacea*	FAC W
Butterweed groundsel	*Senecio serra*	FAC U
Fireweed	*Epilobium angustifolium*	FAC U+
Alder	*Alnus incana*	FAC W

FACW	Facultative Wetland	Usually occurs in wetlands (estimated probability 67%-99%), but occasionally found in non-wetlands.
FAC	Facultative	Equally likely to occur in wetlands or non-wetlands (estimated probability 34%-66%).
FACU	Facultative Upland	Usually occurs in non-wetlands (estimated probability 67%-99%), but occasionally found on wetlands (estimated probability 1%-33%).
UPL	Obligate Upland	Occurs in wetlands in another region, but occurs almost always (estimated probability 99%) under natural conditions in non-wetlands in the regions specified. If a species does not occur in wetlands in any region, it is not on the National List.
NI	No indicator	Insufficient information was available to determine an indicator status.

4. 0 Discussion and Conclusion

The reach of stream immediately upstream of the pond contains more plants than any other reach of the stream. In fact, all other reaches are positively bare by comparison. To understand why this is so requires some careful comparison of the four reaches.

A lack of riparian tress in the channel downstream of the pond can be easily explained by blaming farmers of the past for removing them. However, that may not be the whole story. For instance, when one looks at the upper most reach of stream, very few riparian trees or shrubs are seen. That reach seems to be very natural and unaffected by man's activities. So, why no shrubs?

I suspect that the presence of the thick stands of riparian vegetation in the channel above the pond

is due to channel morphology rather than the absence of the detrimental activities of man. The channel in both the naturally sparse upper reach and the suspected man impacted reach below the pond are cut deeply into their beds – much deeper than the well vegetated reach immediately above the pond. Also their grade, or slope, is a bit steeper than the heavily vegetated reach.

The presence of vegetation has obviously been affected by the historical agricultural activities. However, I also believe that channel slope and channel incision play a major role. Those two channel characteristics must be given careful consideration when designing a Wetland and Riparian Area Restoration and Management Plan for the future development.

APPENDIX

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
201 NORTH THIRD AVENUE
WALLA WALLA, WASHINGTON 99362-1876

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SPECK & AANESTAD

Reply To
Attention Of:

May 3, 2001

Operations Division

SUBJECT: NWW No. 012200780

Mr. Jim Lewis
Blaine County School District No. 61
118 West Bullion
Hailey, Idaho 83333

Honorable Brad Siemer
Mayor of Hailey
115 South Main Street, Suite H
Hailey, Idaho 83333

Dear Mr. Lewis and Mayor Siemer:

This responds to an inquiry from Mr. Jim Speck, attorney for Blaine County School District No. 61, concerning how the recent U.S. Supreme Court opinion in Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers, No. 99-1178 (SWANCC decision) affects your proposed work in Quigley Creek.

Quigley Creek is considered an isolated water because it does not have a surface tributary connection to interstate waters. The SWANCC decision reduced our jurisdiction under Section 404 of the Clean Water Act in isolated waters, such as Quigley Creek, and currently the Corps of Engineers has not determined the full impact of the Court's decision on our Regulatory program. We are waiting for guidance on how to implement this decision. Until we receive this guidance, the issue remains unclear whether we still have regulatory jurisdiction over Quigley Creek.

To avoid delays in processing your application, you may request that we complete processing of your application under the assumption that we will continue to have jurisdiction over Quigley Creek. On the other hand, if you believe that your project is no longer regulated by the Corps of Engineers and you want to construct your project without a Department of the Army permit, you may request that your application be withdrawn. We want to advise you, though, that if you proceed without our permit and, at a later date, we determine that your project involved the discharge of fill material into a jurisdictional water of the United States we may require after-the-fact permit processing for your project. This could require the addition of mitigation to minimize impacts to waters of the United States resulting from your project.

We are sending a copy of this letter to Mr. Jim Speck, Speck and Aanestad PC, P.O. Box 987, Ketchum, Idaho 83340. [Please advise us of your decision on these options by May 17, 2001, or we will continue processing your application.] If you have any questions or need further information, please write or call me at 208-345-2286.

Sincerely,

Barbara Benge

for Robert K. Flowers
Regulatory Project Manager

PHOTOS

Photo 1 - Sparsely vegetation (at least in terms of riparian shrubs) section immediately downstream of eastern property line.

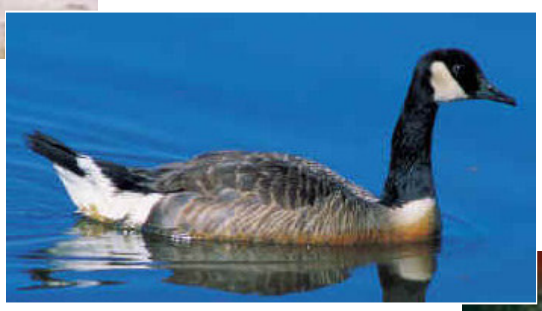
Photo 2 - Pond edge during summer draw-down.

Photo 3 - Healthy well vegetated spot in the 650 of channel just upstream of the pond.

Photo 4 - Typical channel below pond.

Photo 5 - Portion of the lower 5,600 feet of channel. In this area the channel has been trained into a flood control channel before exiting the property.

Wildlife and Aquatic Resources Assessment and Recommendations for Quigley Canyon Ranch



Prepared by:

Lake to Forest Investments LLC

"Providing Practical Environmental Solutions"

September 2007

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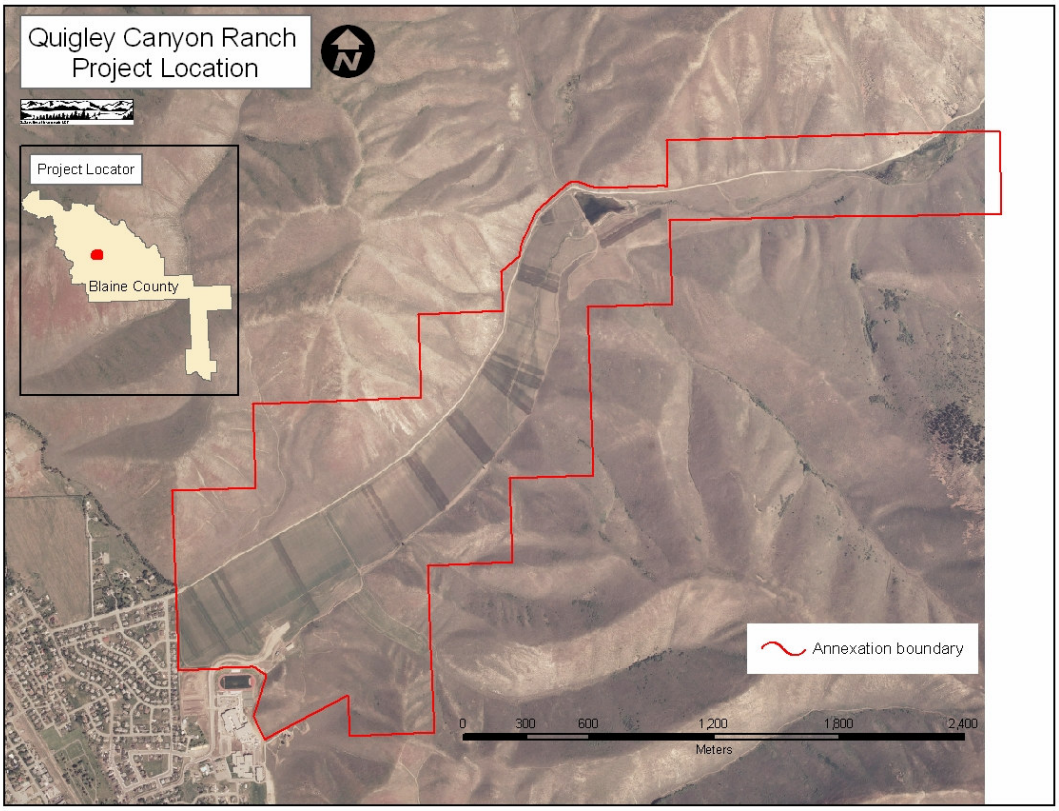
INTRODUCTION

By their very nature, golf courses provide open spaces and potential opportunities to provide wildlife habitat in areas that are increasingly becoming urbanized. At the same time, they can also infringe on the critical habitats of native species that are currently in place and functioning. It is with this in mind that we investigate the impact on local wildlife and aquatic resources and recommend measures to alleviate potential problems associated with the development.

The Wood River Valley is a community where open space is becoming more and more limited. Development is continually increasing near the community and city planners are faced to answer questions concerning where growth should occur. Should growth be clustered around the major population centers of Sun Valley/Ketchum, Hailey, and Bellevue? Should landowners have the choice whether or not they can subdivide their land at higher densities than they are currently zoned for? These are all difficult questions city planning officials must answer. However, when taking wildlife and aquatic resources into consideration, it is simple to discern where development should occur. If development is to occur, it will be better to concentrate population centers around a central area leaving larger tracts of land void of development for wildlife and aquatic resources.

* * It is important to note that this assessment is not extensive in nature and is based upon preliminary information and observations collected on site. The information contained in this assessment is an overview of the resources observed or known to be on site and some of the potential problems that may occur with the proposed development. Additional input from the Idaho Department of Fish and Game (IDFG), Bureau of Land Management (BLM), and any of the other cooperators is essential.

PROJECT LOCATION



MAJOR THREATS TO QUIGLEY CANYON

- **Fire**

Large wildfires threatened the Wood River Valley in the summer of 2007. The Castle Rock fire was ignited by lightning and quickly spread to its final size of 48,500 acres. A large fire-fighting effort saved residents their homes, but left the rest of the area charred. In this event, there was ample time to evacuate, plan, and extinguish the flames of the fire. However, it would not be out of the ordinary to see wildfires in the proposed development area that will burn hot and flashy. Residents of the development should maintain defensible space around their homes that can withstand a wildland fire. It is the duty of the homeowner to maintain their home in a fire prone system and being fire wise should be encouraged.

- **Noxious and Invasive Weeds**

Noxious and invasive weeds are problematic as their spread continues to increase across many western lands. They affect the production of agricultural areas as well as degrade wildlife habitat. Although it is not always obvious, the interface between urban areas and the uplands is a prime location for invasive weed expansion. Therefore, it is crucial that

the development take careful measures to ensure invasive weeds do not establish and/or expand in the area.

Major noxious weeds observed were:

- Diffuse knapweed (*Centaurea diffusa)* is fairly widespread in areas that have been disturbed including roads and past seedings on the property. It has not encroached up into the shrublands. At the current extent, it would require a major undertaking to try and combat the Diffuse knapweed infestation.

- Scotch thistle (*Onopordum acanthium)* is present in small isolated patches. It is mainly located along a past irrigation canal on the southern road of the property. Scotch thistle has not expanded into the uplands and is fairly easy to control either by limiting seed production or chemical application in the spring.

- Spotted knapweed (*Centaurea maculosa)* was only observed in one location above Quigley pond. It is likely to occur in other areas, but should be dealt with immediately due to its known spread potential.

- The probability of other noxious weeds to occur on the property is high. However, much of the weed problems are in the lowlands and have not crept up into the foothills surrounding the agricultural ground.

To keep this area free of any new invasive weeds, it will be imperative that the development require its contractors to clean their equipment before they enter the site. It is also wise to have them clean their equipment when leaving the site to prevent the spread of noxious weeds to other sites.

- **Inappropriate Grazing**

Grazing of the upland hillsides appears to be minimal. If any grazing does occur, it should be seasonally limited to avoid interactions with wildlife.

WILDLIFE RESOURCES ON THE PROPERTY

Wildlife Resources exist in large numbers on and near the projected development sites. There are numbers of small animals and birds as well as large game animals including deer, elk, black bear, and mountain lions. There are also grey wolves in the area. The following is an overview of the species noted or known to inhabit the property:

BIG GAME:

Mule deer (*Odocoileus hemionus*) were observed in Quigley Canyon during a site visit in August of 2007. A more detailed plan concerning all big game species will be outlined in a separate report.

Rocky Mountain Elk (*Cervus elaphus*) were not observed on the property during any site visits, but elk feces were in August of 2007. Elk frequent the areas later in the seasons during their annual migrations.

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Reports have shown that antelope (*Antilocapra americana*) occasionally visit the area.

Moose (*Alces alces*) have been sighted in upper Quigley creek and in surrounding drainages. It is expected that an increase in forage plants along the reconstructed stream and surrounding foothills will attract more.

It is a certainty that mountain lions (*Felis concolor*) will follow the deer and elk as they move to the surrounding winter ranges. Potential exists for lion/human conflicts as well as conflicts with lions and domestic pets.

Black bears (*Ursus americanus*) also could be found occasionally in the area. Property garbage containers and education of the residents on how to live in harmony with bears is advised.

UPLAND GAME:

- Grey (Hungarian) Partridge- (*Perdix perdix*)
- Mourning Dove- (*Zenaida macroura*)_
- Cottontail Rabbit- (*Sylvilagus bachmani*)
- Blue Grouse- (*Dendragapus obscurus*)
- Ruffed Grouse (*Bonasa umbellus*)

Upland game is currently found mainly on the upper end of the valley. Mourning doves are found throughout the property and are quite numerous. Grey partridge inhabit the upper reaches of the property in the sagebrush (*Artemisia tridentata*)/bitterbrush (*Purshia tridentata*) steep and hilly terrain. Cottontail rabbits are found in the lowland areas as well as on the hillsides with sagebrush habitat. Ruffed grouse are found along the riparian areas of the upper valley. Hunters have reported that Blue Grouse are numerous on the north facing slopes that have Douglas fir trees.

WATERFOWL:

- Canada Goose- (*Branta canadensis*)
- Mallard- (*Anas platyrhynchos*)
- American Widgeon- (*Anas Americana*)

Waterfowl are numerous on the upper stretches of the property where it borders the agricultural fields. There is excellent habitat along Quigley creek for nesting and rearing of young in the numerous beaver ponds. Both mallards and widgeons were seen in the upper pond (Quigley Pond) as well as in the beaver ponds upstream in September of 2007.

Canadian geese are not currently numerous but they can be expected to nest nearby and rear their young on the lawn areas of the property. Caution will have to be taken to ensure that any standing water/ponds have adequate flow through them to keep the water fresh. Goslings are very susceptible to organophosphate poisoning from fertilizers used on the lawns of golf courses getting into the water. It will be essential to try and keep fertilizers on site and avoid over fertilization.

The Fish and Game Department estimates that geese will probably be one of the most difficult wildlife species to deal with. They estimate substantial numbers of geese will be using the property in the fall and winter. Another problem is that geese tend to stay close to protected golf courses during hunting seasons. They normally return year after year and steps may have to taken to trap and transfer the geese if they become too numerous.

Research suggests that limited hunting and hazing by trained dogs are somewhat successful techniques in keeping the numbers in check.

NONGAME BIRDS:

There are numerous types of nongame birds on the property. With the recovery of the riparian area associated with the reconstruction of Quigley creek and the 3 new ponds, there should be increased habitat for birds. It is expected that many non-game species of birds will return to the lower valley as suitable habitat develops. Some of these expected to frequent the area include but are not limited to:

- Brewer's Blackbird- (*Euphagus cyanocephalus*)
- Red Winged Blackbird- (*Agelaius phoeniceus*)
- Robin- (*Turdus migratorius*)
- English Sparrow- (*Passer domesticus*)
- Starling- (*Sturnus domesticus*)
- Western Meadow Lark- (*Sturnella neglecta*)
- Belted Kingfisher- (*Megaceryle alryon*)
- Western Tanager- (*Piranga ludoviciana*)
- Black headed Grosbeak- (*Pheucticus melanocephalus*)
- Sage Thrasher-(*Oreoscoptes montanus*)
- Rock Wren-(*Salpinctes obsoletus*)
- Lewis's Woodpecker- (*Melanerpes lewis*)
- Clark's Nutcracker- (*Nucifraga columbiana*)
- Hummingbirds- (numerous varieties)
- Mountain Bluebird (*Sialia currucoides*)

There are numerous other small bird species that inhabit the upper rangelands and sagebrush areas. Over 200 species are known to exist in the region. Extensive sampling would need to be conducted in order to definitively say what species inhabit the area.

NONGAME MAMMALS AND FURBEARERS:

- American Beaver- (*Castor canadensis*)
- Common Muskrat- (*Ondatra zibethicus*)
- North American River Otter- (*Lutra Canadensis*)
- Mink- (*Mustela vision*)
- Short Tailed Weasel- (*Mustela erminea*)
- Long Tailed Weasel- (*Mustela frenata*)
- Red Fox- (*Vulpes vulpes*)
- Coyote- (*Canis latrans*)
- Badger- (*Taxidea taxus*)
- Black Tailed Jack Rabbit- (*Lepus californicus*)
- Paiute Ground Squirrel- (*Spermophilis mollis*)

Beaver are numerous in the upper reaches of Quigley creek and have created a large swampy area with their dams. Beaver will become a problem for the golf course as well as any houses in the vicinity of the stream or ponds. It is recommended that all trees within 100 meters of the reservoir or Quigley creek should be wrapped in 1 inch chicken wire to a height of three feet to restrict beavers.

Muskrats also inhabit the upper area, especially in the beaver ponds. They can and will be a nuisance animal due to their propensity to dig burrows in dams and ponds.

It is a certainty that Red foxes, and coyotes will be living and hunting in close proximity to the development and have been known to prey on small dogs and cats. Because of this it is suggested that foxes and coyotes not be allowed to den in the vicinity of the development.

The remainder of the non-game mammals found on the property should pose very little problems for the development and its residences.

RAPTORS:

- Red Tailed Hawks- (*Buteo jamaicensis*)
- Kestrel Falcon(sparrow Hawk)- (*Falco sparverius*)
- Northern Harrier(Marsh Hawk)- (*Circus cyaneus*)

All of these species of raptors will hunt over the entire property. Their main prey will be lizards, snakes, ground squirrels, mice, voles, and rabbits.

There are currently no occupied hawk nests on the property

Kestrel Falcons are common and will be nesting on the property but should cause no problems.

Northern Harriers inhabit the lower flatter reaches of the development and can be expected to be seen regularly. Their main food source is mice and voles. They nest in very tall grass along the edges of waterways so they should not pose a problem for the development.

NONGAME REPTILES:

- Garter Snake- (*Thamnophis ordinoides*)
- Gopher Snake (bull snake)- (*Pituopis melanoleucus*)
- Western Diamond Back Rattler- (*Crotalus viridus*)
- Numerous lizards

Various reptiles are found on the property and the surrounding areas.
Snakes, such as garter and bull snakes will be found primarily in the riparian zones and along the edges of ponds. Western diamondback rattlesnakes will be found on the upland slopes.

Although dangerous due to their venom, rattlesnakes are usually only aggressive when provoked. Snake safety should include informing residents about interaction with pets, especially dogs, and the need to avoid interactions and snake train dogs.

SENSITIVE AND ENDANGERED SPECIES:

The definition of a Listed Species as per (50 CFR 17.11 and 17.12) follow:

- Listed Endangered (LE). Taxa in danger of extinction throughout all or a significant portion of their range.
- Listed Threatened (LT). Taxa likely to be classified as Endangered within the foreseeable future throughout all or a significant portion of their range.

Proposed and Candidate Species as per (Federal Register 69(86): 24876-24904; May 4, 2004) follows:

- Proposed Endangered (PE). Taxa proposed to be listed as Endangered (formal rulemaking in progress).
- Proposed Threatened (PT). Taxa proposed to be listed as Threatened (formal rulemaking in progress).
- Candidate (C) species. Taxa for which the U. S. Fish and Wildlife Service has on file sufficient information on biological vulnerability and threats to support proposals to list them as endangered or threatened. Issuance of proposed rules for these species is precluded by higher priority listing actions.

The repository for information within the state of Idaho pertaining to threatened and endangered species is held by the Department of Fish and game in a department called the Conservation Data Center (CDC). As of September of 2007, there are 5 listed, threatened, or candidate vertebrate species within Blaine County. Those species follow:

- Yellow-billed Cuckoo (*Coccyzus americanus*) (C)
- Canada lynx (*Lynx Canadensis*) (LT)
- Steelhead (*Oncorhynchus mykiss*) (LT)
- Chinook Salmon (*Oncorhyncus tshawytscha*) (LT)
- Bull trout (*Salvelinus confluentus*) (LT)

Federally

- Grey Wolf "Timber wolf" – (*Canis lupus*)
- Bald Eagle- (*Haliaeetus leucocephalus*) (formally listed)

Fish and Game reports, to date, that there are no wolves located on the property or on adjacent lands. However, with numbers of wintering big game, in the area, it would not be unusual to have wolves visit. Wolves have been sighted in Elk Management Zones 48, 49 and 50 so it is likely they will show up from time to time.

Bald eagles are known to be in the area, but have not established any permanent residencies in Quigley canyon.

Fish and Game and the Conservation Data Center (CDC) reports that there are no rare or federally listed plant within the development and surrounding areas. Quigley creek is also not a bull trout, Chinook salmon, or steelhead stream.

The yellow-billed cuckoo inhabits streamside forests. The cause of its decline is the mostly associated with habitat loss of streamside forests. It is unlikely that any cuckoos inhabit the property as the creek does not have adequate habitat. With the increase in riparian vegetation, the golf course may actually provide more habitat for the bird.

The lynx is a solitary animal that is rarely seen. Their diet consists of mainly snowshoe hares. Lynx also eat squirrels, other small mammals and some birds, including grouse. Sometimes they consume larger animals that have died from other causes. On average, a lynx kills every other night, eating 150-200 hares a year. It is possible that lynx could pass through the property, but is unlikely at best given the current agricultural use, lack of ample food source, and low amounts of cover available.

CURRENT WATER USE ON THE PROPERTY

Water coming down the Quigley creek drainage is currently being used to irrigate malt barley crops in the area proposed for the golf course and development (personal communication with Kevin Lakey in 2004, water master Idaho Department of Water Resources). The IDWR however, does not have record as to the amount of water that is used for irrigation. According to the water master, there is a substantial stream in the spring and early summer that dumps into the reservoir at the top of the valley. According to the water master there is no gauge or record of water amounts because of the fact that Quigley creek becomes intermittent and is not considered a perennial stream. This water is generated predominately through snowmelt in the spring and tapers off throughout the summer. Lakey estimated that maximum flows expected during high water years would be between 20 and 30 CFS. A detailed water budget should be conducted to analyze the current water consumption and future needs for the golf course.

CURRENT AQUATIC RESOURCES ON THE PROPERTY

FISH:

- Brook Trout (Salvelinus fontinalis)

Above the development area there are resident non-native populations of Brook trout. According to the Idaho Department of Fish and Game, there are no other game fish species in the watershed.

Other nongame species of fish likely to be present would include sculpin *(Cottus spp)* as well as red-side shiners (*Richardsonius balteatus)*. Detailed sampling by electrofishing would produce more species. However, with the flow of water basically ending at Quigley pond, fish are not likely to be impacted upstream. Quigley creek is not a bull trout stream.

AMPHIBIANS:

- Spotted Frog-(Rana pretiosa)
- Western Toad- (Bufo boreas)
- Long-toed Salamander-Ambystoma macrodactylum
- Leopard Frog-Rana pipiens

Various amphibians are found on the property and the surrounding areas.
The amphibian species will be associated with the riparian zone along the creek and the edges of ponds. Numerous aquatic amphibians may find their way into the area once suitable habitat is created along the development.

FUTURE AQUATIC RESOURCES ON THE PROPERTY

Watering of the golf course is going to come from surface water as well as from groundwater wells. Currently, the development is looking into watering the course with reclaimed gray water from the city of Hailey as well. If snowmelt runoff water is needed less for irrigation of the golf course than the current amount for crops, a change in the amount of surface water available will increase. This excess water could be used solely, or in conjunction with supplemental water from wells to reconstruct approximately 1.5 miles of Quigley creek. The opportunity to construct ponds throughout the development also exists with opportunities for fishing and wildlife viewing at these sites.

Trout are the most desired and popular species to catch by anglers. They also have strict requirements in order to survive. They must have clean, cool water that is well oxygenated, and provides enough food for survival. It will be difficult to achieve these needs year long due to the limited flows currently during the summer months. However, it is quite feasible to have a put and take fishery where catchable rainbow trout (*Oncorhynchus mykiss*) are planted each spring and taken throughout the season if desired. This will provide angling opportunities for the youth and general public of the area. If more water is available should the gray water idea materialize, it may be possible to achieve the needs of trout. A detailed water budget and analysis from a reputable stream restoration firm will be able to decipher the feasibility.

Reconstructing the creek is going to be labor and cost intensive in order to do it correctly. It would be easier to simply create a series of ponds and connect them with water, but in order to create a functional stream that provides adequate habitat for wildlife and aquatic resources, the task becomes more difficult. However, with the right amount of forethought, this stream corridor will not only enhance the beauty of the golf course, but will also enhance habitat. We recommend that a qualified firm that is experienced in stream reconstruction/restoration be hired to design/and or design/build the stream portion of the project. They should be well versed in stream geomorphology, stream typing, vegetation recruitment and succession, and overall restoration processes. Lake to Forest Investments can provide a list of reputable contractors for the design and/or build of the project should there be a need.

RECOMMENDATIONS

The Quigley Canyon Ranch Development should take an active approach to optimize the site's ability to support a diversity of wildlife and aquatic species. We recommend the following measures be taken to ensure this happens:

1. Limited to no development (residential, fencing, grazing, landscaping, etc.) should be allowed on south facing slopes above the valley as this will encroach on big game winter range. The big game report will address this issue.

2. A feasibility study and detailed water budget should be conducted to determine whether or not there will be enough water to reconstruct 1.5 miles of Quigley Creek.

3. Homeowners should be encouraged to be proactive regarding fire risk. Vegetation should be fire resistant in nature and far enough from homes that it will not ignite structures on fire.

4. The open space in the development plans seem to be adequate and will help provide a buffer for big game winter range from the development.

5. According to the design plans, homes will be clustered near the lower end of the valley. This design will help to keep more of the traffic near town lessening the impact on wildlife.

6. Yearlong trails/paths should be placed close to development and away from the uplands as possible to create a larger buffer from wintering habitat. These trails/paths should also avoid the reconstructed stream when possible to alleviate problems with nesting songbirds. Trails that will be closed during the winter may utilize the uplands as it is not as critical a time period for the wildlife.

7. We recommend that designated open space be restored using native forbs, grasses, and shrubs to re-establish some measure of native wildlife habitat.

8. All or most tees and greens should be elevated to some extent to avoid inundation should there be a flood event in an extremely high water year. Quigley canyon is narrow and can potentially have extreme runoff should there be a large snow event and a subsequent warming period.

9. Use of the slow-release, less soluble and least mobile chemical fertilizers, pesticides, and herbicides available is encouraged. These products should be used at the smallest rates of active ingredient to accomplish the desired result. They should also contain low amounts of organophosphate as goslings are susceptible to poisoning from fertilizers. Any accumulation will be partially

mitigated by maintaining an adequate flow through the system to keep the water fresh.

10. The development proposal includes a series of ponds. Potential negative impacts to native fish populations and water quality are minimal because the pond will have no connectivity to perennial or intermittent streams. As long as adequate flow is maintained, the ponds and streams should remain attractive and free of nuisance levels of algae and other nutrient dependent plants.

11. Livestock grazing should be prohibited on slopes of more than 5% to prevent damage to native shrub-steppe habitats and soils. Restricting grazing will ensure the availability of forage for wintering wildlife and eliminate the need for fences, which can constitute movement barriers for wildlife.

12. Big game and other wildlife depredations on ornamental plants and gardens are anticipated. All responsibility for controlling wildlife depredation will belong with the property owner. Any actions taken to alleviate depredation will be those prescribed by the IDFG. We encourage the use of mature, native plant materials for landscaping to lessen the likelihood and potential severity of big game depredation. We encourage developers and residents to use the IDFG listing of approved plants that are native and from a list that are non-palatable to ungulates. This will help landowners and the development from incurring depredation damage

13. All hay and other livestock feed should be stored and fed in a manner that does not attract big game or other wildlife species. Attracting wildlife from native habitats exacerbates existing winter habitat problems in the Big Wood River Valley.

14. All pet food should be stored and fed in a manner that does not attract "nuisance" wildlife (e.g. skunks, raccoons, magpies, red fox, etc.). All responsibility for controlling nuisance wildlife will belong with the property owner. Any actions taken to alleviate nuisance wildlife problems will be those prescribed by the IDFG.

15. We recommend the feeding of game species or predatory wildlife be prohibited. Artificial feeding of wildlife tends to attract and concentrate animals away from native habitat, can facilitate the spread of disease, and has the potential to create conflict between neighboring homeowners due to the likelihood wildlife will use adjacent properties where they may be considered a nuisance.

16. This property maintains a healthy and functioning riparian zone where water is not limiting. Riparian habitats provide important seasonal and year-round habitat for migratory birds, songbirds, raptors, small and large mammals, reptiles, and amphibians. In addition, riparian zones serve as movement and migration corridors for wildlife and link diverse habitats. Riparian zones also

help dissipate floodwaters, filter and trap sediments, and are vital for properly functioning riverine systems. We recommend that no livestock use or removal of vegetation be allowed within the riparian setback. Any action within this area should be to create or enhance the riparian.

17. All pets should be kept in-doors, kenneled, or leashed at all times. Pets running at large dramatically increase the negative effects of housing developments on wildlife.

18. Fencing should be kept to a minimum. No fencing would be our preferred option. If fences are necessary, they should be a post and rail design with a maximum top rail height of 42" and a minimum bottom rail height of 18". This design will facilitate wildlife passage through the area.

19. Require residential trash to be kept inside the house, garage or appropriate enclosures until the morning of trash collection. It is strongly encouraged that all trash containers have attached lids.

20. Educational materials should be provided to all residents outlining the wildlife resources found on the property. This information should include warnings about disturbance of wildlife and the problems caused by recreational feeding.

21. Construction fencing/siltation barriers should be utilized during the construction phase where needed to protect habitat and stream areas.

CONCLUSION

Golf courses have to address environmental concerns related to their impacts upon the land. Impacts include: water consumption, chemical use and its effect on local water sources, wildlife species disturbance, and native habitat alteration. By addressing these concerns, there is the opportunity to benefit wildlife and aquatic resources, while still providing a golf experience in a natural setting that functions effectively for both wildlife and people. It is in our opinion that the Quigley Creek Ranch Development impacts can be mitigated and that the development will be beneficial and provide opportunities for recreation, while still maintaining open space and maintaining and in some cases creating habitat for wildlife. By adhering to the recommendations set out by IDFG, BLM, and the recommendations outlined within this assessment, the wildlife and aquatic resources of Quigley Canyon will persist.

Appendix A. Audubon Cooperative Sanctuary Program (ACSP) for Golf

Audubon Cooperative Sanctuary Program (ACSP) for Golf

Since 1991, Audubon International has been the leading environmental organization to provide comprehensive environmental education and conservation assistance to golf course superintendents and industry professionals. Through collaborative efforts begun in 1991 with the United States Golf Association (USGA), membership in the Audubon Cooperative Sanctuary Program for Golf Courses has steadily grown to include more than 2,300 courses in all fifty states, Canada, and increasingly, around the world.

Opportunities and Issues

By their very nature, golf courses provide significant open spaces and opportunities to provide needed wildlife habitat in increasingly urbanized communities across North America. At the same time, golf courses are called to address environmental concerns related to the potential and actual impacts of water consumption and chemical use on local water sources, wildlife species, and native habitats.

The ACSP for Golf Courses seeks to address golf's environmental concerns while maximizing golf course opportunities to provide open space benefits. This highly-regarded education and assistance program promotes participation in comprehensive environmental management, enhancement and protection of existing wildlife habitats, and recognition for those who are engaged in environmentally-responsible projects.

A flexible program to fit a diversity of needs.

Of the estimated 16,000 golf courses in the United States, no two are alike. The ACSP is designed to help a golf course take stock of environmental resources and any potential problems, and then develop a plan that fits its unique setting, goals, staff, budget, and available time. The program has been tailored to a variety of different types of golf course properties, including: private clubs, public and municipal golf courses, PGA sites, 9-hole facilities, resort courses, and golf residential communities.

Audubon International provides information to help golf courses with:

- Environmental Planning,
- Wildlife and Habitat Management,
- Chemical Use Reduction and Safety,
- Water Conservation,
- Water Quality Management, and
- Outreach and Education.

By completing projects in each of these components of the program, the golf course member receives national recognition as a Certified Audubon Cooperative Sanctuary.

Good for the environment; good for golf.
The ACSP presents a win-win opportunity for the game of golf and the environment. Here are just a few of the many benefits our members frequently report:

- Enhances the natural beauty of the golf course.
- Reduces water use and the need for expensive chemical applications.
- Promotes the course's positive, pro-active environmental achievements.
- Educates golf course employees about habitat management, Best Management Practices, and public outreach strategies designed especially for golf courses.
- Provides on-going technical information, support, and guidance for implementing environmental projects.
- Results in financial savings on course maintenance.
- Connects superintendents and course personnel with local resource people and organizations that can support the golf course's environmental management programs.
- Improves job satisfaction.

Audubon International believes that by working cooperatively with course maintenance staff, club personnel, golfers, and industry associations, we can help golf courses integrate sound environmental management practices and make a valuable contribution to conservation. Together, we are enhancing the game of golf while improving the quality of the environment through stewardship action.

All information taken from Audubon website:
http://www.audubonintl.org/programs/acss/golf.htm

Appendix B. Quigley Creek Reconstruction and Pond Creation Plan

Quigley creek has not run for decades due to agricultural practices. It is therefore going to be a challenge to reconstruct this stream to a semblance of what it once was as well as meeting the goals of a functioning stream. The main goals should be: 1) create wildlife habitat along the stream for wildlife and aquatic resources 2) create a stream that has self maintaining structure and function that will require little to no maintenance over time 3) Maintain a functioning riparian corridor that is attractive to wildlife, aesthetically pleasing to the golf course, and functionally intact with vegetation should there be a flood event.

Specific recommendations follow:

1. A minimum flow should be determined that will keep the system in a desirable condition. This will help keep temperatures lower, oxygenate the water, and reduce algae growth. Quigley creek alone may not be sufficient to provide this amount of water especially later in summer months. We recommend that using gray water from the city be investigated further as it will free up surface water for the stream reconstruction. This water will contain higher levels of nutrients than that of well or surface water and may be beneficial in irrigation.

2. All ponds created should have inlet and outlet gates so they can be drained at will.

3. The use of insecticides should be kept to a minimum. If problems occur with insects, biological control methods should be sought first.

It is in our opinion that the goals can be met as long as there is the commitment to achieving them. This commitment entails spending the money to do the job correctly. A qualified firm should be selected to undertake the project.

Selection criteria of the restoration firm should include:

1. Knowledge of stream geomorphology (sinuosity, slope, width/depth ratio, entrenchment ratio, stream power, substrate lining materials, etc.) The firm should be well versed in stream classification such as that by Rosgen or Montgomery and Buffington.

2. Experience in restoration using native plants. In order to create habitat for wildlife and aquatic resources, vegetation must be established. This vegetation should lead to a composition of mature-native plants in a timely manner.

3. Ability to complete the job in a timely manner. Does this firm have the tools necessary at their disposal or the experience in using subcontractors (i.e. heavy equipment, green houses, manpower)

4. Cost is important, but should be considered only after all other factors. Hiring the right people to do the job is critical to the success.

There are many stream restoration companies who specialize in creating habitat who would be able to do the job. Some example of these types of companies might include:

- Bitterroot Restoration Inc. http://www.bitterrootrestoration.com
- Interfluve Inc. http://www.interfluve.com
- Intermountain Aquatics Inc. http://www.intermountainaquatics.com
- Spring Creek Aquatic Concepts http://aquahabitat.com
- The American Water Resources Co. http://www.americanwaterresources.com
- GeoEngineers http://www.geoengineers.com/

We suggest visiting their websites and determining if they are the type of company you are looking for or if they know of someone who may fit your needs.

Appendix C. Vegetation and landscaping management

When homeowners landscape their yards, it is encouraged to plant species that are not palatable to ungulates. This will decrease the threat of depredation in the area and make the golf course less attractive for ungulates in the winter months. Species that are resistant to herbivory are listed later in this appendix.

A concerted effort between BLM, Forest Service, the city of Hailey, and the local Cooperative Weed Management Area (CWMA) should be made to spray noxious weeds in the area. As these weeds proliferate they will reduce valuable forage for wintering ungulates. Grant programs area available from groups such as the Rocky Mountain Elk Foundation and Mule Deer Foundations. There are also federal grants that can be applied for as well. For specific grants available, contact your local weed superintendent or we can provide a longer list of possible granting agencies.

Plants Susceptible to Ungulate Damage

Botanical Name	Common Name
Flowers	
Allium spp.	Flowering Onion
Tulipa spp	Tulip
Vines	
Clematis spp.	Clematis
Hedera helix	English Ivy
Parthenocissus quinquifolia	Virginia Creeper
Thjua orientalis	Oriental Arborvitae
Shrubs	
Acer spp.	Maple
Alnus spp.	Alder
Amerlanchier spp.	Serviceberry
Juniperus spp.	Juniper
Physocarpus malcaceous	Ninebark
Prunus spp.	Cherry, Plum
Ribes spp.	Currant
Rosa (x)spp.	Hybrid Rose
Rubus spp.	Raspberry
Salix spp.	Willow
Sorbus aucauparia	European Mountain Ash
Taxus spp.	Yew

Trees

Abies spp.	Fir
Acer spp.	Maple
Cercis canadensis	Eastern Redbud
Malus spp.	Apple
Pinus contorta	Lodgepole Pine
Pinus ponderosa	Ponderosa Pine
Populus spp.	Aspen, Cottonwood
Prunus spp.	Cherry, Plum
Pyrus spp.	Pear
Quercus spp.	Oak
Thuja spp.	Cedar
Thuja occidentalis	American Arborvitae

Ungulate Resistant Landscaping Plants

Botanical name	Common Name
Ground Cover	
Ajuga retans	Carpet Bugle
Convallaria majali	Lily-of-the-valley
Lamium spp.	Dead nettle
Pachysndra terminalis	Pachysandra
Vinca major	Large periwinkle
Vinca minor	Periwinkle
Flowers	
Achillea spp.	Yarrow
Aquilegia spp.	Columbine
Astilbe spp.	Astilbe
Coreopsis spp.	Tickseed
Dianthus spp.	Pinks
Dicentra spp.	Bleeding Heart
Echinacea spp.	Purple Coneflower
Epimedium spp.	Epimedium
Geranium spp.	Geranium
Helleborus spp.	Hellebore
Helianthus spp.	Sunflower
Iveris spp.	Candytuft
Iris spp.	Iris
Lavendual spp.	Lavender
Liantris spicata	Spike Gay-feather

Lupinus spp.	Lupines
Lychnis coronaria	Rose Campion
Naccissus spp.	Daffodil
Pulmonaria spp.	Lungwort
Rudveechia spp.	Coneflower
Solidago spp.	Goldenrod
Veronica officinalis	Speedwell
Yucca	Yucca

Vines

Celastrus spp.	Bittersweet
Hedera helix baltica	Baltic Ivy
Lonicera spp.	Honeysuckle

Shrubs

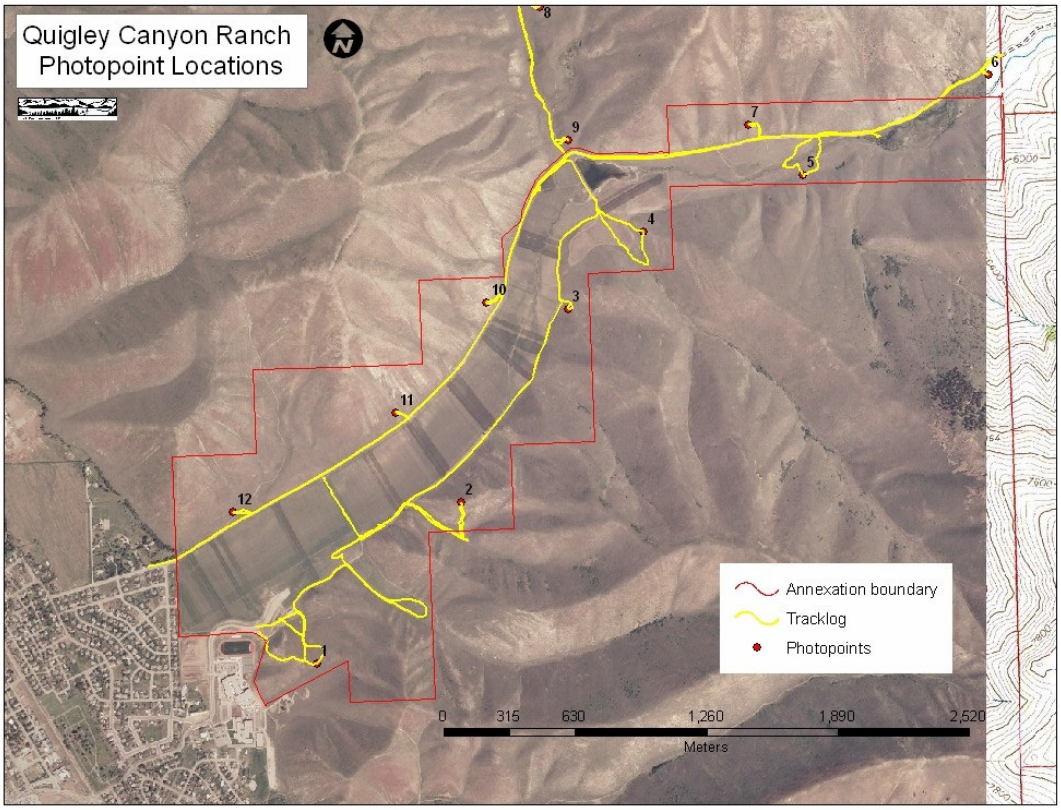
Amorpha canescens	Lead Plant
Berbis spp.	Bayberry
Caragana spp.	Caragana
Ceanothus velutinus	Snowbrush Ceanothus
Cornus sericea	Red Osier Dogwood
Coirnus stolonifera	Osier Dogwood
Eleagnum sommutata	Silverberry
Kolkwitzia amabilis	Beautybush
Lonicera spp.	Honeysuckle
Rosa spp. (some)	Rose
Rhus spp.	Sumac
Rhamnus cathartica	Common Buckthorn
Sheperdia argentea	Buffaloberry
Spiraea spp.	Spiraea
Syringa vulgaris	Late Lilac
Vibrunum spp.	Common Lilac
Yucca filamentosa	Viburnum
	Adams Needle

Trees

Betula papyrifera	Paper Birch
Betula pendula	European White Birch
Crataegus spp.	Hawthorn
Gleditsia tricanthos	Honey Locust
Picea abies	Norway Spruce
Picea pungens	Colorado Blue Spruce
Pinus nigra	Austrian Pine
Pinus mugho	Mugo Pine
Pinus sylvestris	Scotch Pine

Appendix D. Photopoints

All photopoints were chosen due to their views of Quigley Canyon and the surrounding foothills and vegetation. At each point, 8 pictures were taken starting from the north and taking one picture every 45 degrees in a clockwise direction. These photos were taken on August 7th of 2007 using a Canon Powershot digital camera. The photos are label by their cardinal directions starting with North, Northeast, East, Southeast, South, Southwest, West, and finishing with Northwest. The locations of the photopoints are shown below.



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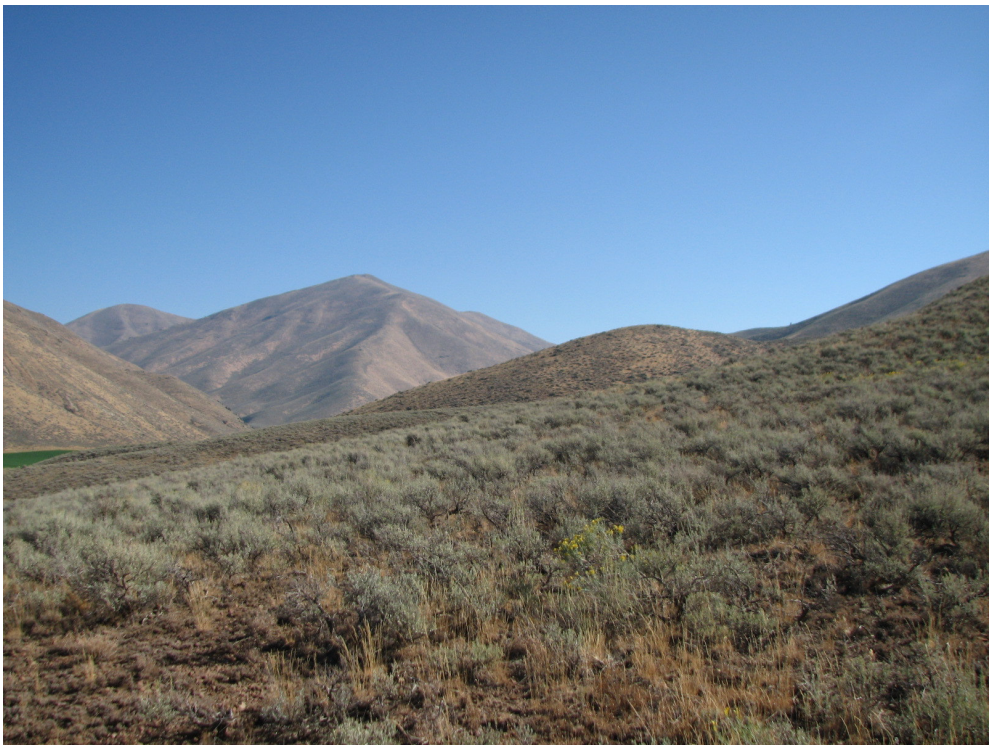

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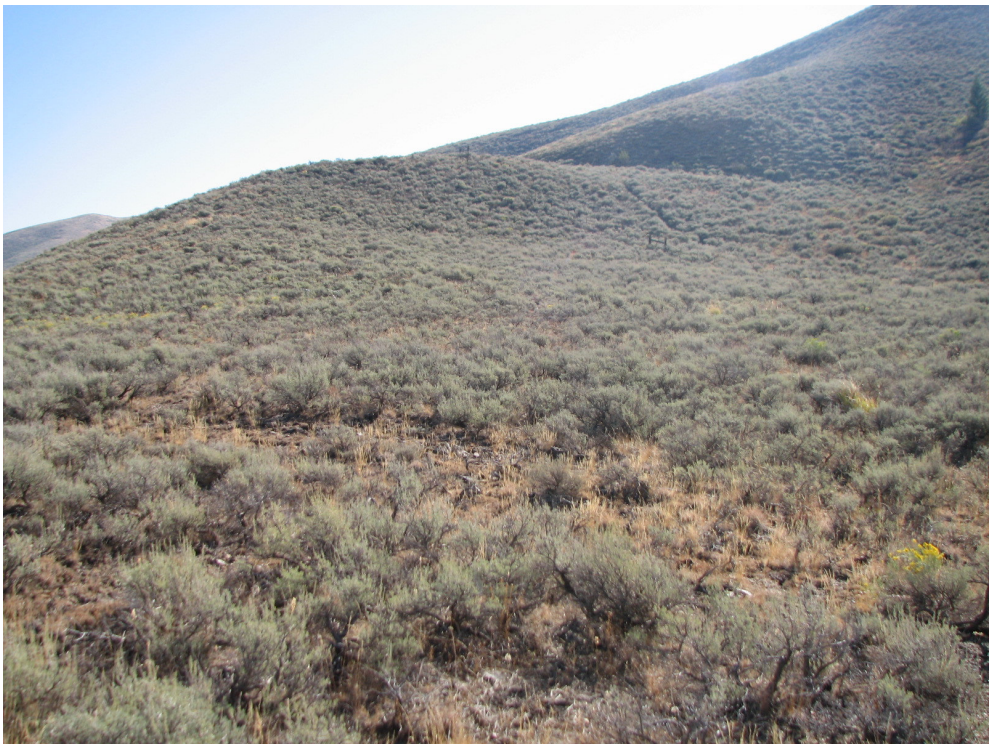
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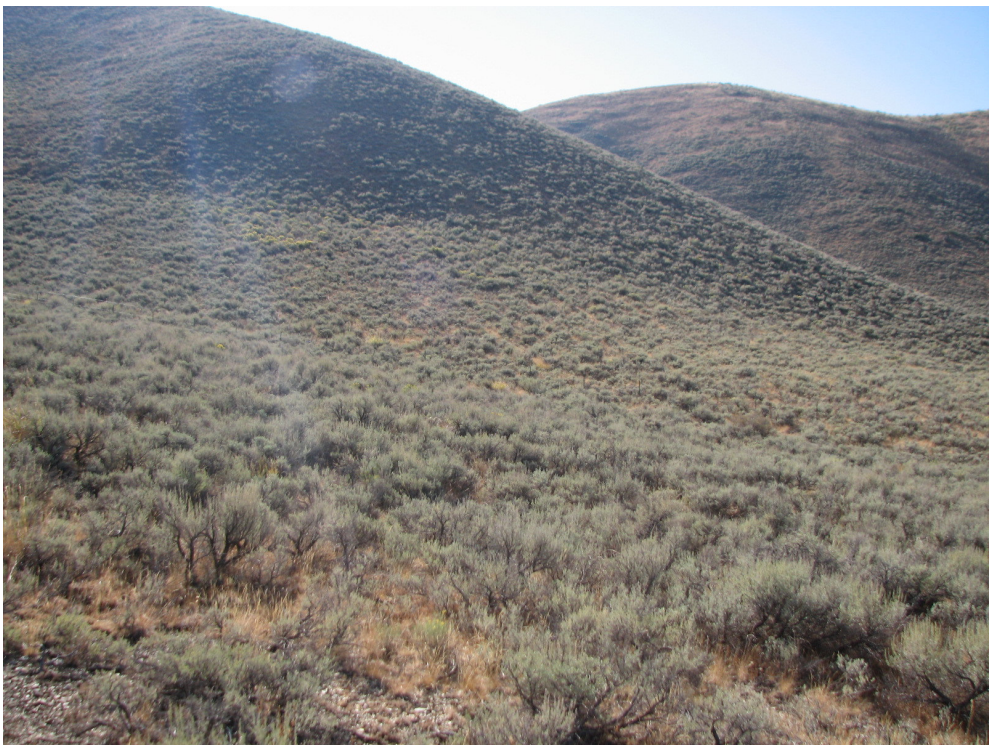
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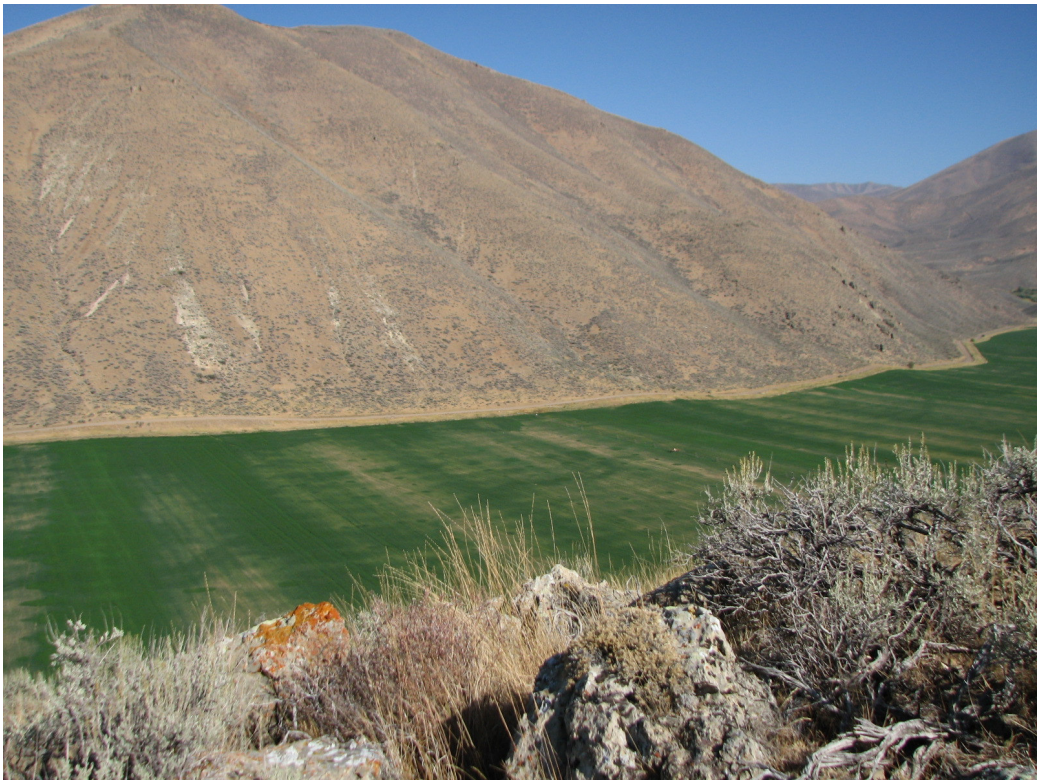

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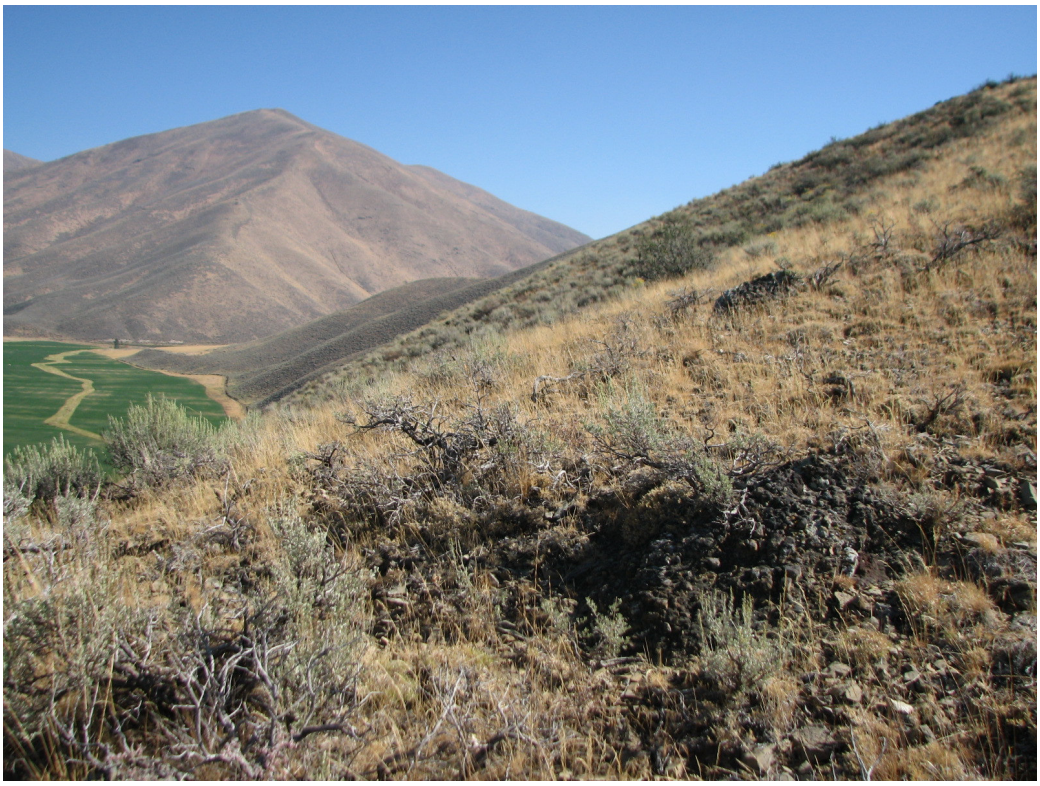

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Photopoint #3

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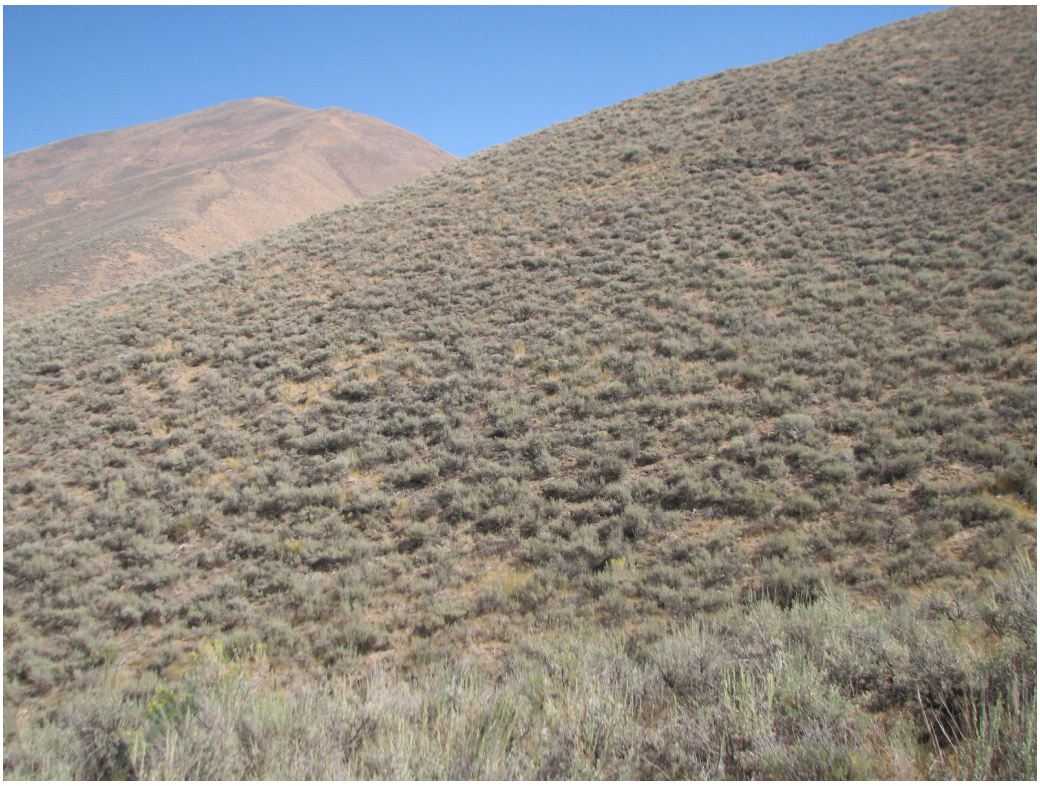

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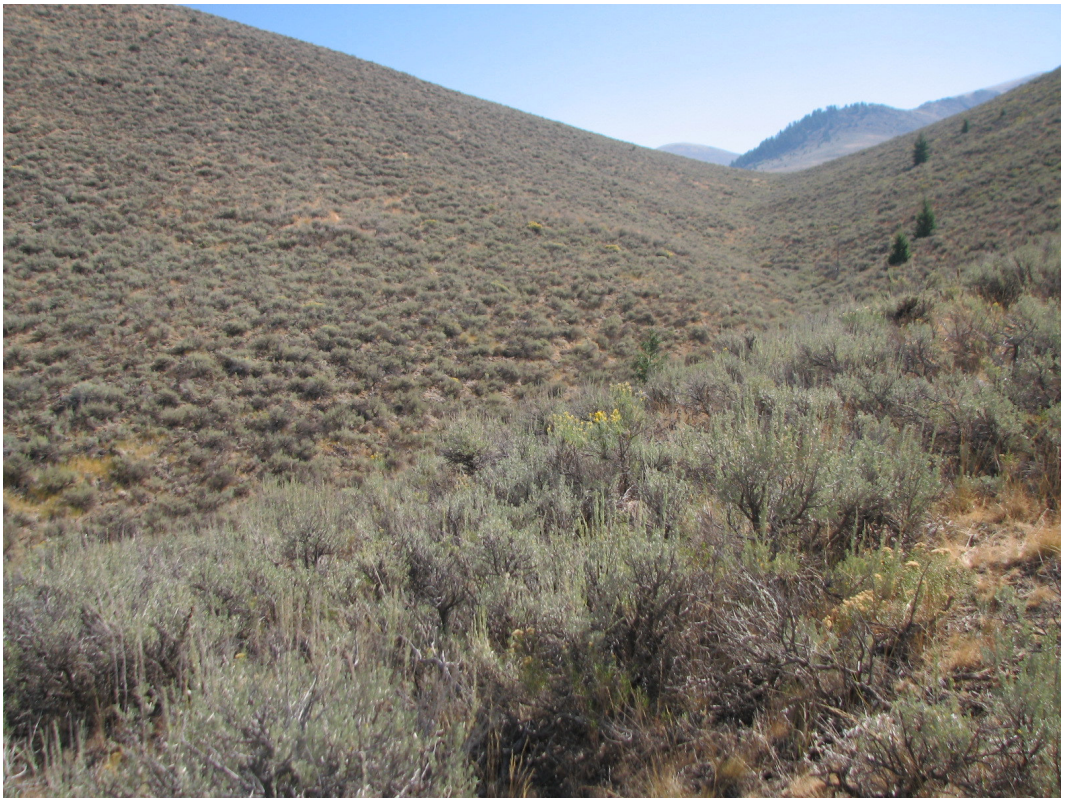
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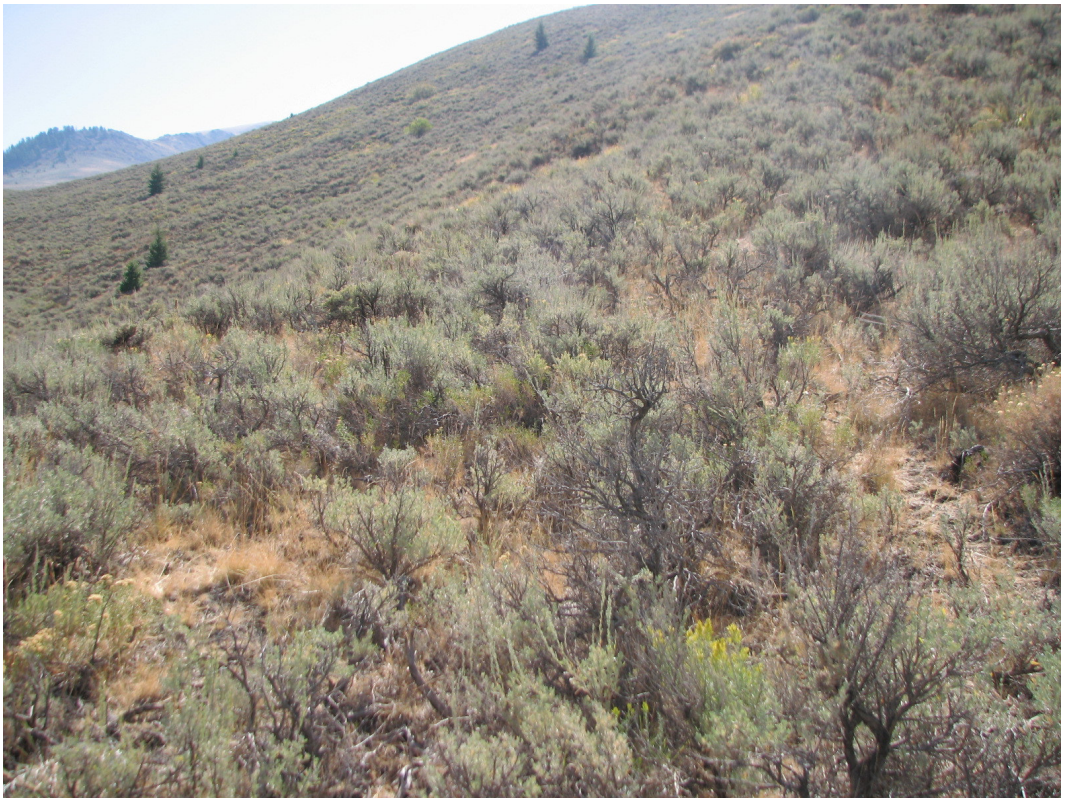
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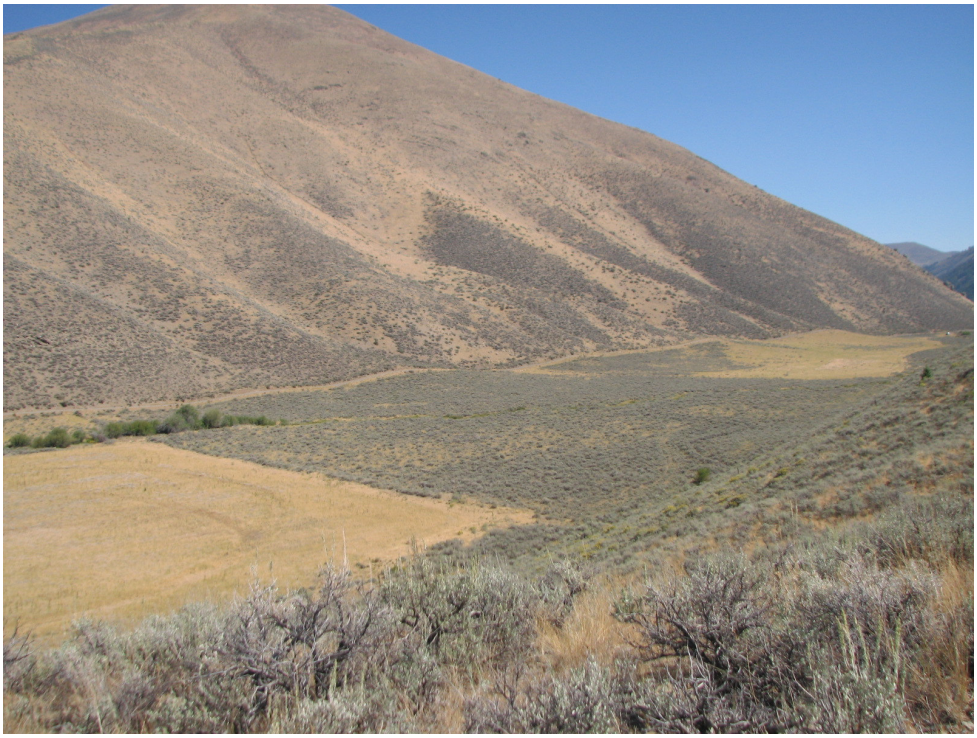

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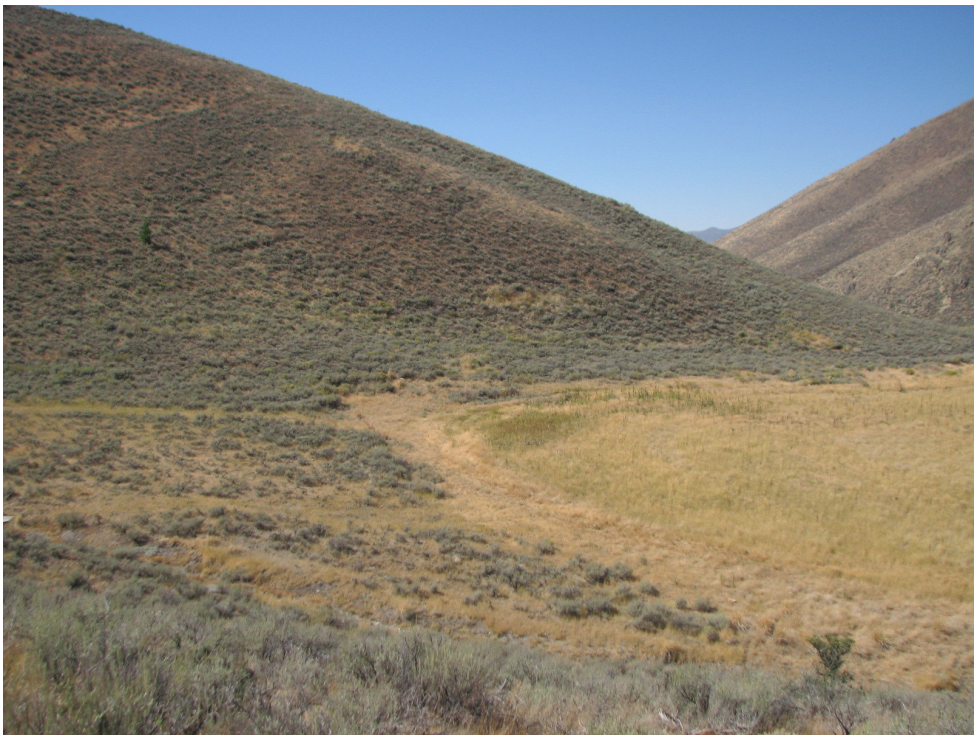
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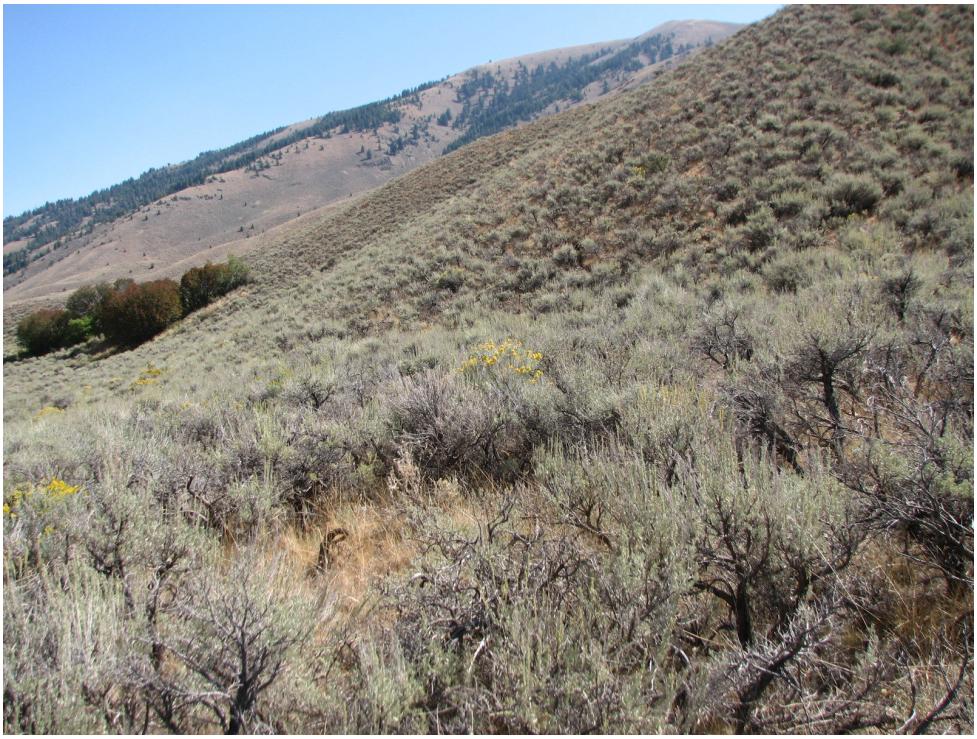
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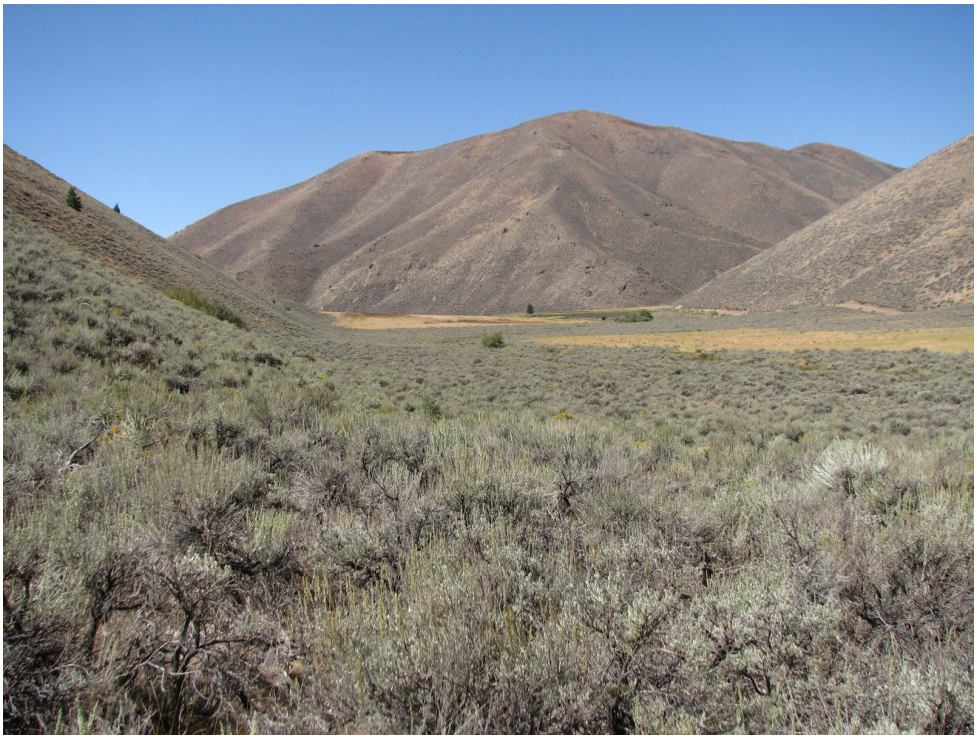
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Photopoint #6

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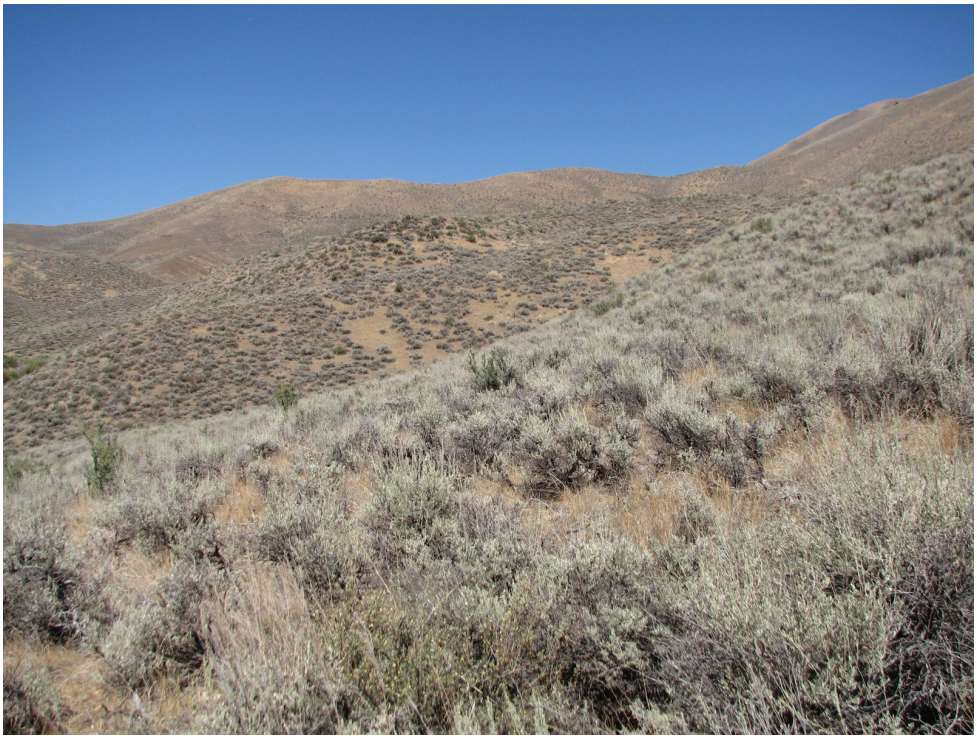

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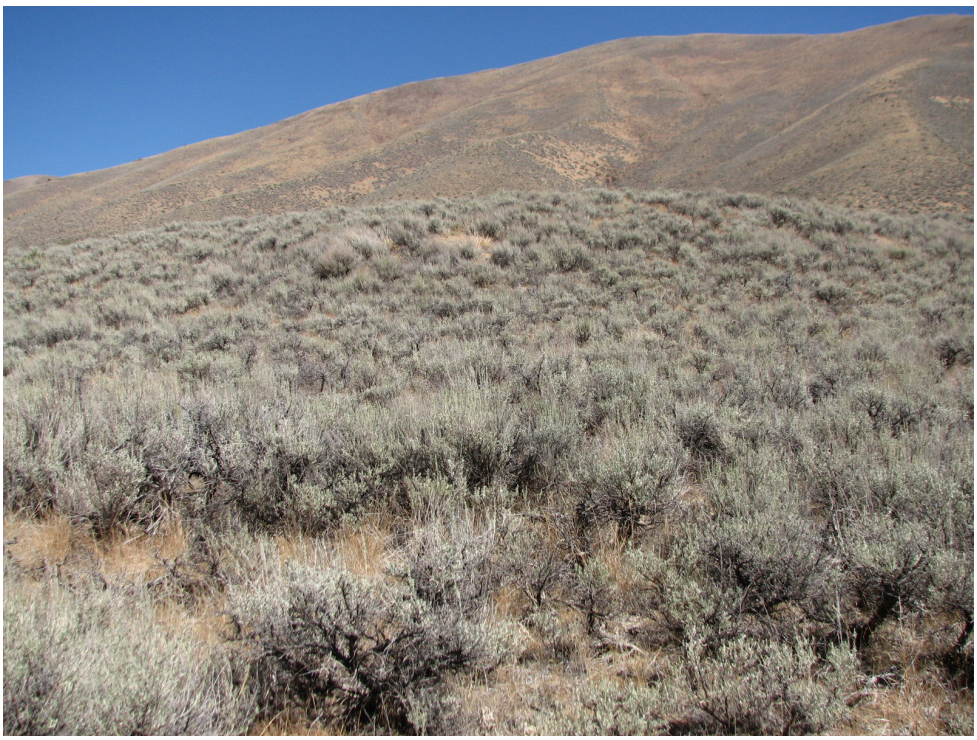

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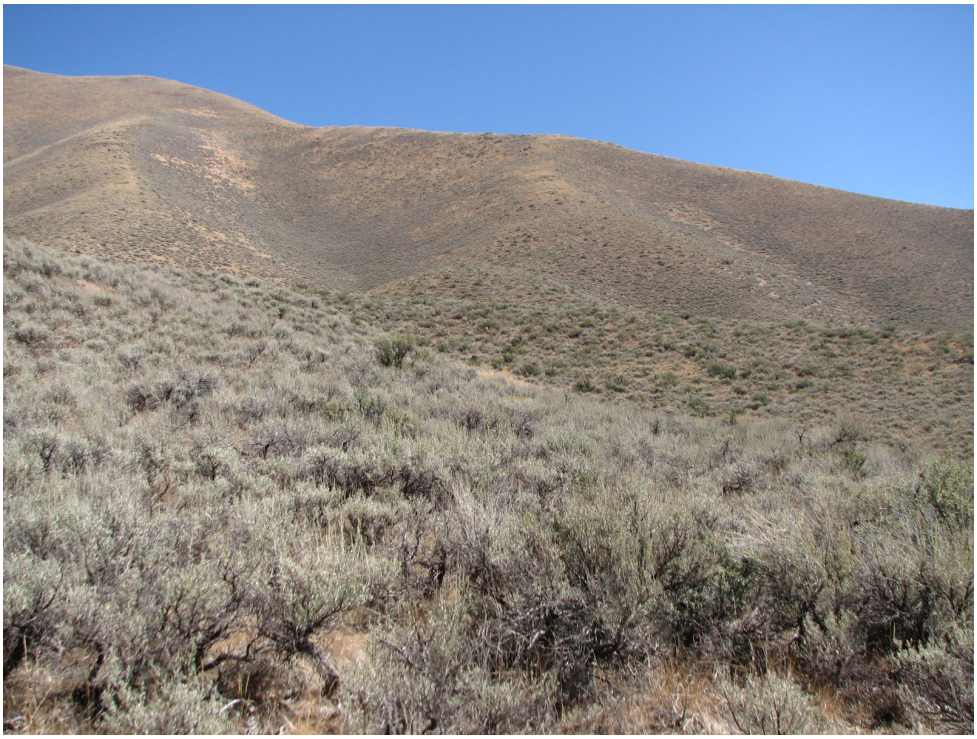
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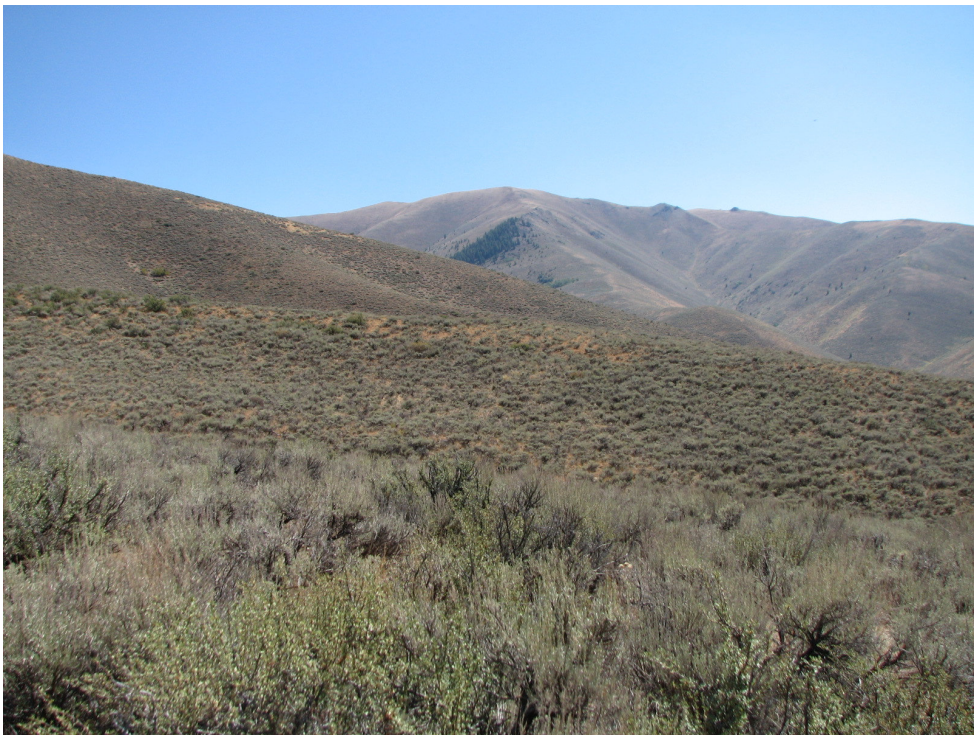
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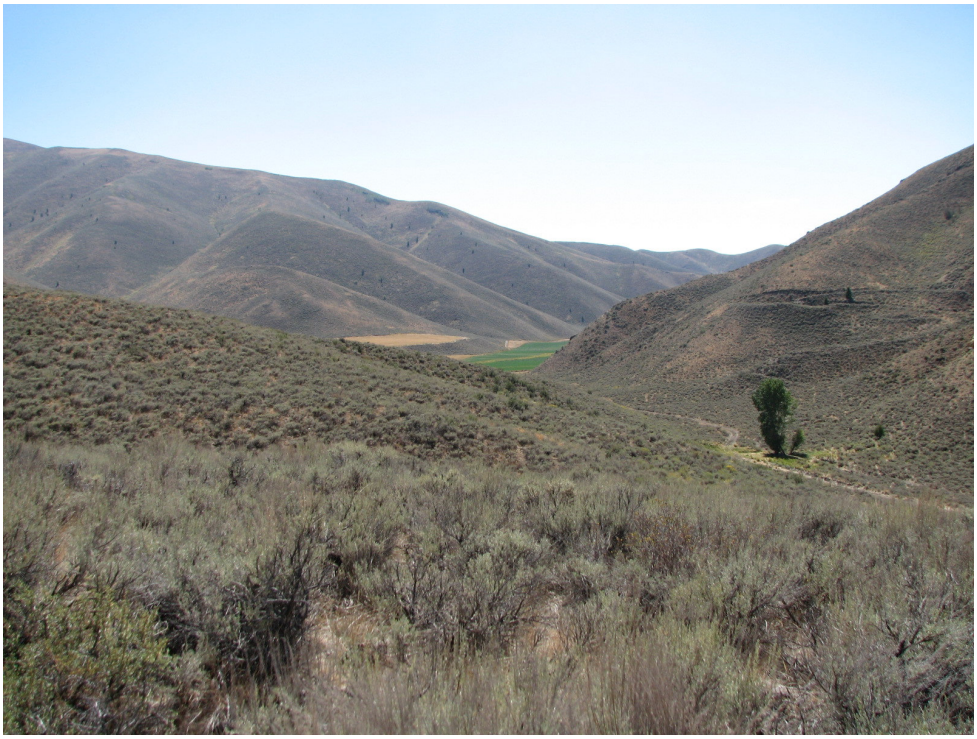

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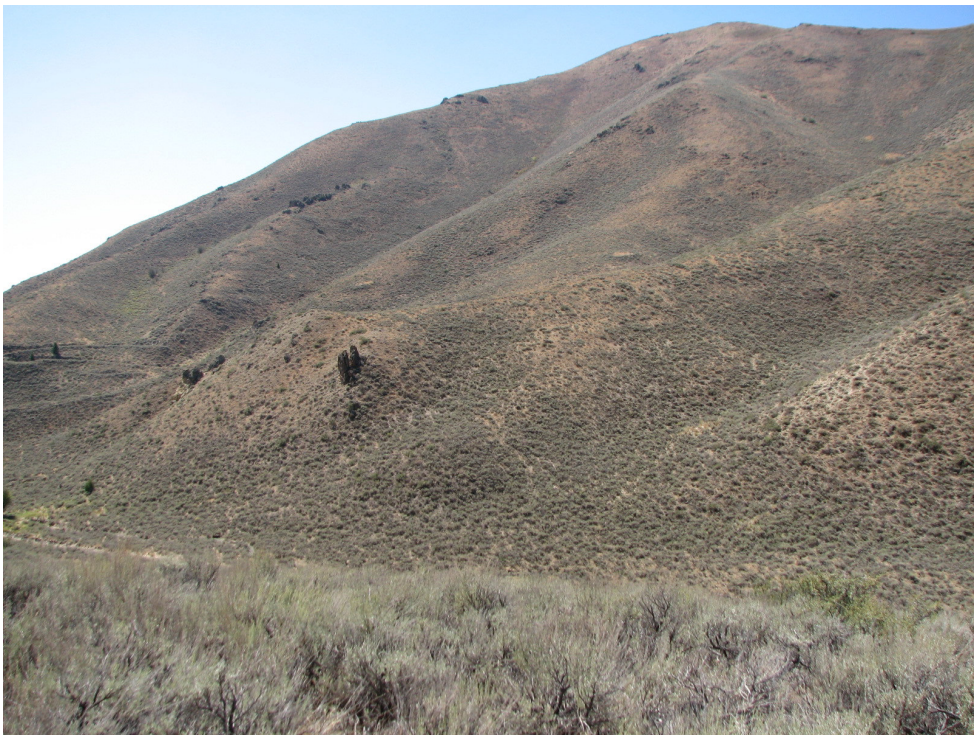

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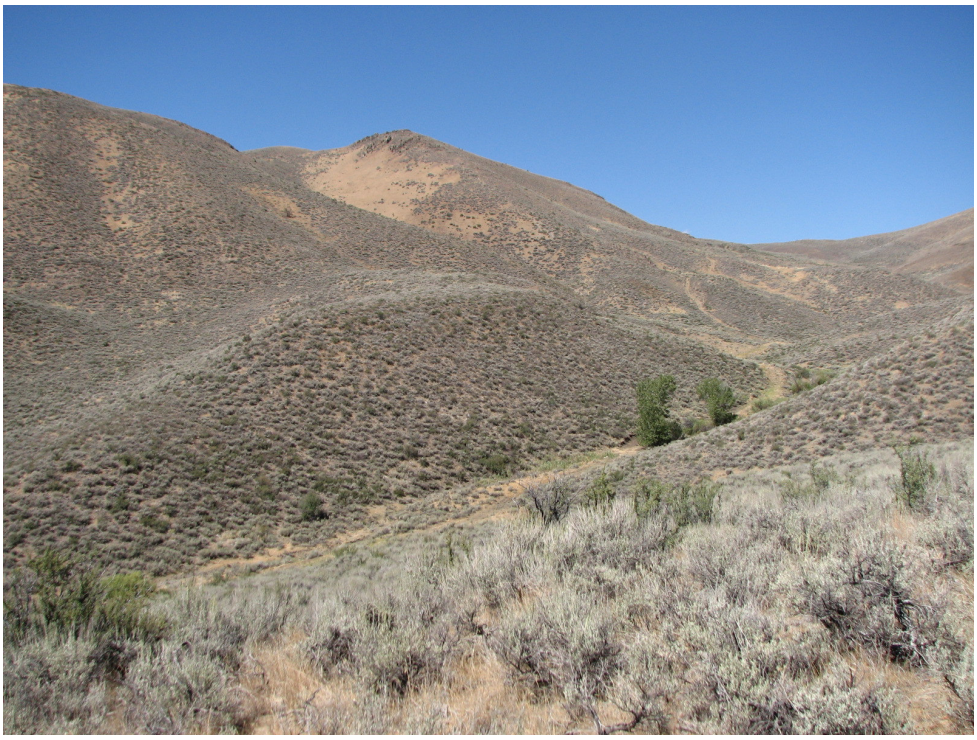

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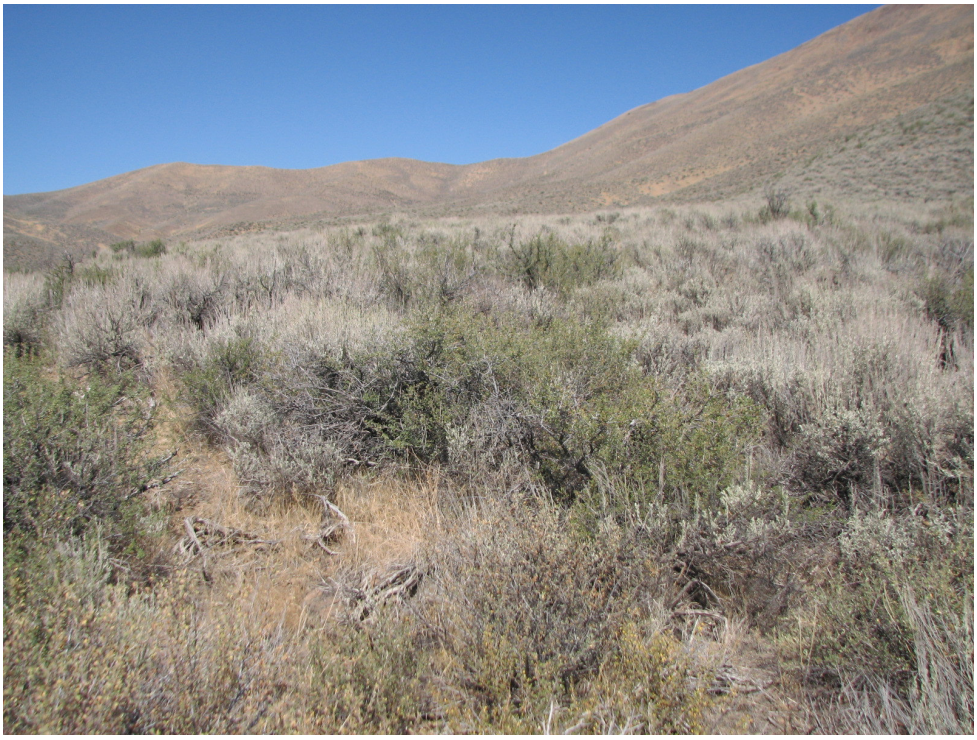

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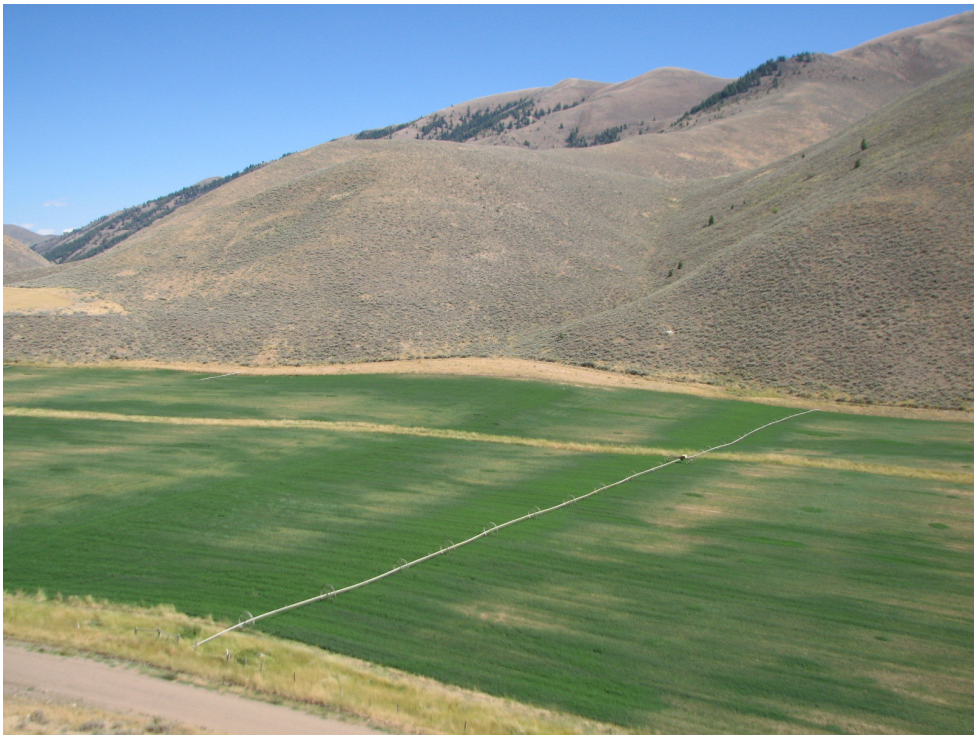

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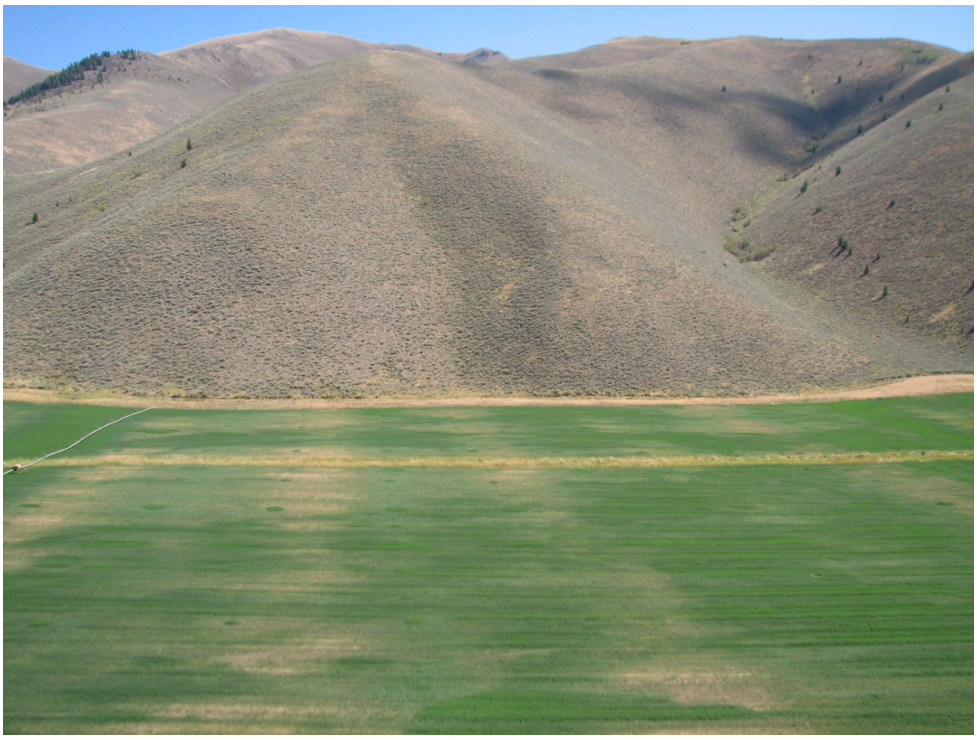

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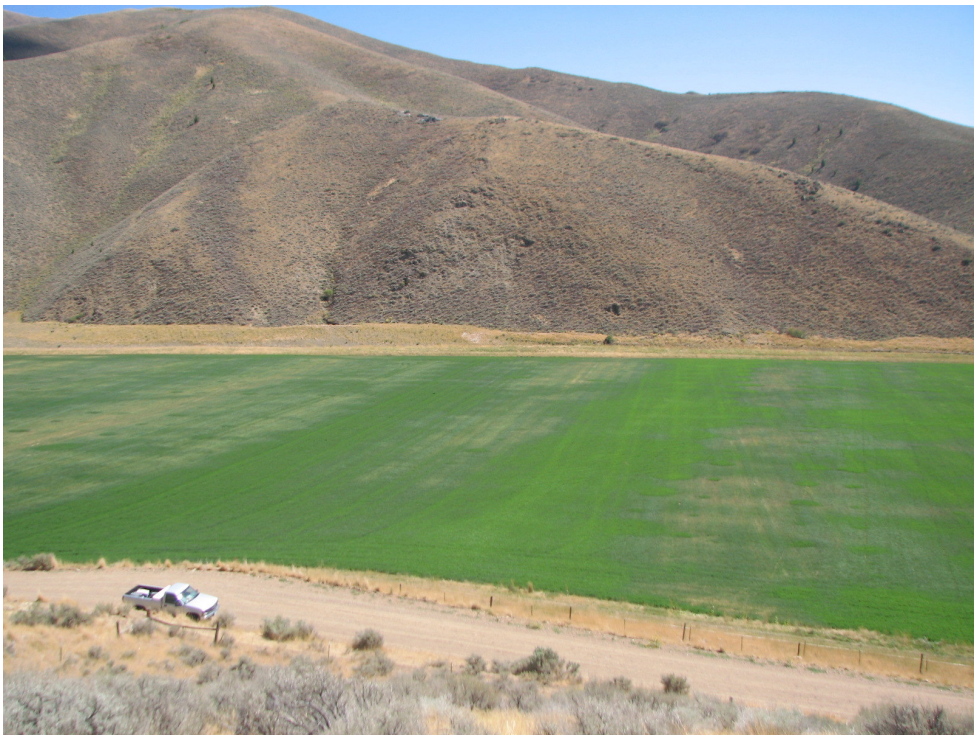
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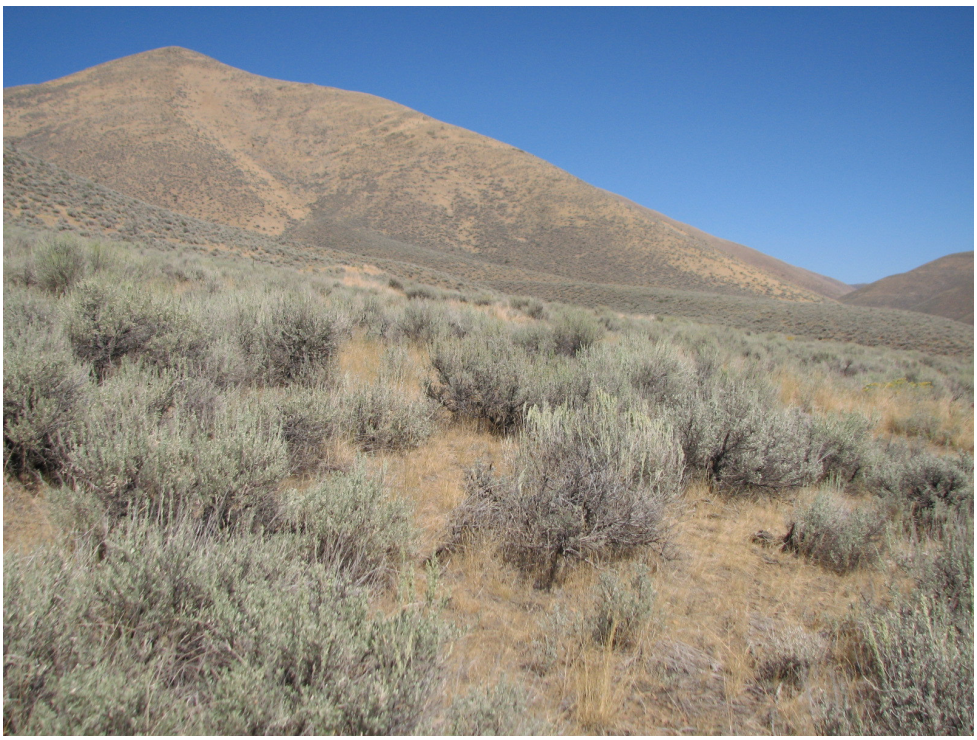

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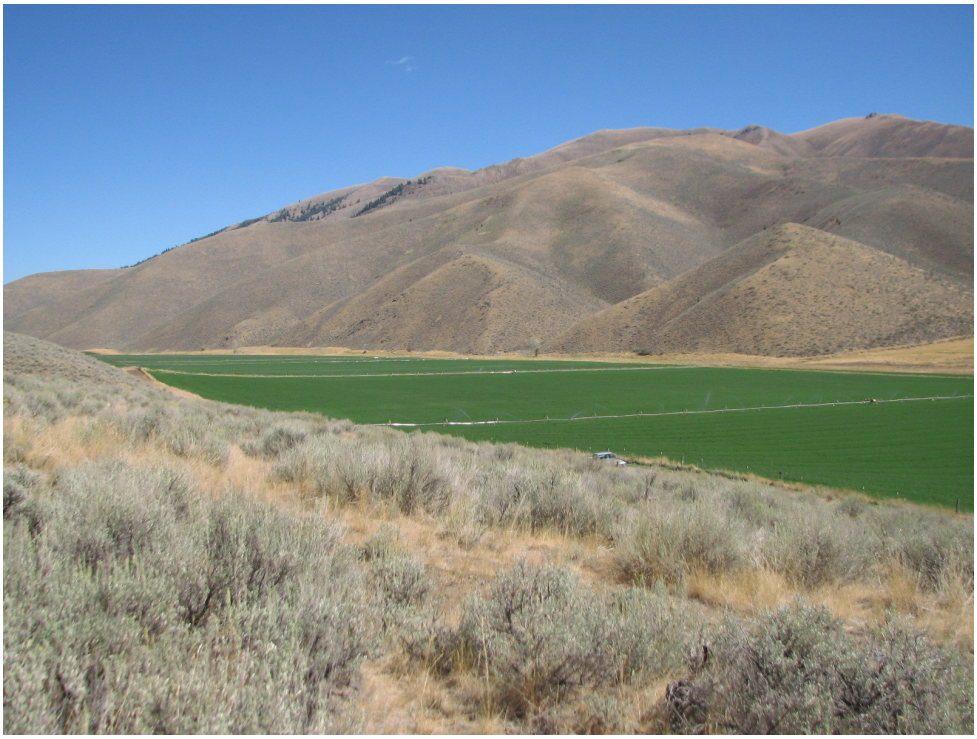
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Wildlife Assessment and Conservation Plan

Quigley Farm Development
Blaine County, Idaho

for

Quigley Initiative, LLC

c/o Hennessy Company

May 18, 2016

GeoEngineers
Earth Science + Technology

Wildlife Assessment and Conservation Plan

Quigley Farm Development
Blaine County, Idaho

for
Quigley Initiative, LLC
c/o Hennessy Company

May 18, 2016

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Wildlife Assessment and Conservation Plan

Quigley Farm Development
Blaine County, Idaho

File No. 22398-001-00

May 18, 2016

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INTRODUCTION

Background / Location

GeoEngineers, Inc. (GeoEngineers) was contracted by Quigley Initiative, LLC to complete a wildlife assessment and conservation plan for the proposed Quigley Farm Development located directly east of the City of Hailey in Blaine County, Idaho (Figure 1, Vicinity Map). The proposed Quigley Farm development (Figure 2, Proposed Site Layout Map) will consist of developed road access, utility development (water, sewer and power), single and multi-family residences, mixed use commercial, public open space and recreation areas, a school and hospitality site (inn). This report was completed in accordance with the Blaine County Code (BCC) 10-4-1 Procedure for Approval and Plat Contents.

The project site is located within an approximate 205 acre parcel (Parcel No. RP02N18010333E) within Sections 10 and 3 of Township 2 North, Range 18 East of the Boise Meridian (1967 Hailey, Idaho U.S. Geological Society (USGS) topographical map) (Figure 3, Topographic / National Wetlands Inventory Map). However, the proposed development consists of approximately 61 acres that is located within the southern portion of the larger 205 acre parcel and is considered the "project site" under this assessment report.

Existing Conditions

The project site is currently developed with agriculture fields and small storage buildings for farm equipment/implements and hay. The northern half and southeast corner of the larger parcel consist of undeveloped mountain slopes that are dominated by sagebrush (*Artemisia tridentata*) and rabbitbrush (*Ericameria nauseosa*). Quigley Drive (gravel road) is situated on the north end of the agricultural field and Fox Acres Road (gravel road) borders the agricultural field to the south. The project site is bordered to east by additional agricultural fields and to the west and southwest by residential homes and the Wood River High School complex, respectfully. Figure 4, Surrounding Area Map, contains an aerial photograph of the project site and surrounding vicinity.

The United States Department of Fish and Wildlife (USFWS) National Wetlands Inventory (NWI) online mapper depicts Quigley Creek and a ponded wetland on the project site (Figure 3). Although a channel was identified in the approximate location of the mapped creek, it was dry during the site visit. The mapped wetland was not identified during the field investigation; observations of this area did not reveal hydrophytic vegetation or evidence of wetland hydrology.

PURPOSE AND METHODS

The purpose of this assessment is to document and evaluate the project site and adjacent areas, in accordance with Blaine County Code (BCC) 10-4-1, for habitat that may be affected by the proposed Quigley Farms development and the effect it may have on local wildlife and plant species. The presence of habitat and use of the property by plants and animals was evaluated through a review of available literature as well as an assessment of on-site habitat during the field reconnaissance as discussed below.

Previous Report Review / Agency Contact

Prior to conducting the field reconnaissance, GeoEngineers performed a review of available background data and maps that may occur on or in the vicinity of the site. Background data that was reviewed included the following.

- 2007 Wildlife and Aquatic Resources Assessment and Recommendations for Quigley Canyon Ranch Report (Lake to Forest investments LLC 2007)
- 2011 Draft Quigley Canyon Ranch Quigley Canyon Subdivision Conservation Plan (Kuck and Lonn 2011)
- USFWS threatened and endangered species that might be in the project area (USDI/USFWS 2016)
- Blaine County Internet Map Services regarding wetlands, streams and habitats that may be mapped on the project site
- Idaho Department of Fish and Game (IDFG) regarding species that may occur in Blaine County, Idaho
- IDFG Jerome, Idaho Field Office regarding big game migration routes and wintering habitat
- USFWS NWI online mapper

Field Investigation

Habitat was evaluated during the site visit completed by GeoEngineers on the evening of April 18 and the morning of April 19, 2016. Vegetation conditions, existing development and adjacent off-site features were observed and documented during the site visit. Evidence of plant and wildlife species within the general project area was evaluated during the field visit. Visual evidence of wildlife species was limited to, observations of small mammals, birds, animal tracks and scat. Photographs of the site were collected during the April 18 and 19, 2016 site visit and are provided in Appendix A, Site Photographs. Site observations were recorded and are described below in the results section.

RESULTS

Previous Report Review / Agency Contact

Previous Reports

The 2007 and 2011 reports previously prepared for the project site were reviewed and a list of plant and animal species potentially found on site was developed from these reports. The 2007 report was completed for a larger geographic area that included the project site and includes information on potential impacts to local wildlife and aquatic resources (Lake to Forest investments LLC 2007). The report discusses threats (fire, noxious weeds, inappropriate grazing) to Quigley Canyon and documented potential wildlife in the area of the project site and also provided recommended measures to alleviate potential problems associated with the development (Lake to Forest investments LLC 2007). The 2011 report was also completed for a larger geographic area that included the project site and consisted of a conservation plan that discussed the presence of Class I and II lands on the subject property (Kuck and Lonn 2011). This report also provided recommended measures to alleviate impacts to the Class I and II lands (Kuck and Lonn 2011). Many of the recommended measures to mitigate potential impacts are still relevant from these reports have been included in the Impact Minimizations Measures section below.

Agency Contact

GeoEngineers contacted Mike McDonald, Environmental Staff Biologist with the IDFG Jerome, Idaho field Office. According to Mr. McDonald, the Quigley valley supports wintering big game consisting of mule deer (*Odocoileus hemionus*) and elk (*Cervus Canadensis*). Numbers of these species fluctuate based on winter

weather and habitat conditions; however, Quigley Canyon is the northern most location in the valley that supports high concentrations of wintering mule deer (McDonald personal communication 2016). Figure 5 and Figure 6, Elk Winter Range Map, depict the wintering range of mule deer and elk and the occurrence points of these species in the vicinity of the project site.

In addition, IDFG also maps big game migration corridors and one of these corridors does extend through the western portion of the proposed development (Figure 5, Mule Deer Winter Range/Migration Map). The migration corridors are used by big game moving back and forth from higher elevations, in the summer and fall, to lower elevations in the winter (McDonald personal communication 2016). To mitigate for potential impacts from the migration corridor being within the development site, IDFG suggests the development should designate open space and develop management strategies to accommodate continued deer migration (McDonald personal communication 2016).

Species Potentially Found On Site

A list of plant and animal species that may be present on the project site was developed based on the previous documentation, information from USFWS, IDFG and Blaine County.

Fish

The topographic / NWI map information (Figure 3) depicts Quigley Creek as being located within the project boundary. This creek (drainage) was identified along the south edge of the agricultural field on the project site; however, it was not flowing at the time of the site visit. Furthermore, according to the 2007 Lake to Forest Investments' report, the segment of stream downstream Quigley Pond to the southwest corner of the project site is considered to be non-fishbearing. No other streams were identified within the project site. Based on previous documentation and visual observations, it is GeoEngineers opinion that fish populations downstream of Quigley Pond are not a concern to the proposed development at this time and will not be discussed further in this report.

Wildlife

The agriculture fields within the area of the project site likely provide habitat for small wildlife species including resident and migratory birds, reptiles and small to medium sized mammals such as rodents, shrews and coyotes. However, the surrounding habitat (steep sagebrush steppe mountain slopes) likely provides habitat for larger species such as elk (*Cervus elaphus*), mule deer (*Odocoileus hemionus*), antelope (*Antilocapra Americana*), black bears (*Ursus americanus*) and moose (*Alces americanus*) and gray wolf (*Canis lupus*).

The potential for the presence of species listed under the federal Endangered Species Act (ESA) and/or listed by IDFG as being a state rare or sensitive species is described below. Fish are not included as part of this report because the site does not contain perennial waterbodies. Table B-1 of Appendix B, Species Lists, summarizes federal- and state-listed terrestrial species data obtained for the project site. Critical habitat for listed species was not identified or mapped by the USFWS or IDFG within the project site. Under this section, the following definitions are used when discussing suitable and critical habitat:

- **Suitable Habitat**: habitat that contains features or characteristics that are needed for plants and/or wildlife to exist in that area. Typically, suitable habitat is capable of supporting viable plant and/or animal populations.

- **Critical Habitat**: a specific geographic area(s) that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection (USFWS 2015). Critical habitat may include an area that is not currently occupied by the species but that is considered critical for its recovery.

In addition to those species listed in Appendix B, the 2007 and 2011 reports also identified the following species as potentially being present at the project site: skunks, raccoons, red fox, Grey partridge, mourning doves, blue grouse, cottontail rabbits, ruffed grouse, American widgeon, badger, black tailed jack rabbit, western diamond back rattlesnake, Brewer's blackbird, Western meadow lark, rock wren, Lewis's woodpecker, mountain bluebird, beavers, common muskrat, North American river otter, minks, short tailed weasel, and long tailed weasel. Although beaver and river otters are discussed in the earlier reports, it is unlikely they are at the project site due to lack of suitable habitat (i.e. no streams, water or trees).

Federal and State Listed Species

Threatened, Endangered, and Sensitive animal species are identified by both federal and state agencies (Figure 7, Federal and State Occurrence Species Data Map). At the federal level, the U.S. Fish and Wildlife Service (USFWS) lists threatened and endangered species and designated critical habitats by County. State threatened, endangered and sensitive species lists are maintained by IDFG. Federal and state listed species identified in Table B-1 within Appendix B that have the potential to occur within the project site are described below.

Federally Listed Animal Species: Table B-1 in Appendix B lists federally-listed species that occur within Blaine County. However based on species needs for habitat characteristics, none of the federally listed species have the potential to be at the project site.

State Listed Animal Species: Table B-1 in Appendix B lists Idaho State-listed species that occur within Blaine County. However, based on species needs for habitat characteristics only 33 out of 161 species have the potential to be in the vicinity of the project site.

Summary of Species Potentially Found On Site

Based on Table B-1 in Appendix B and the species in the previous reports there is a potential for 61 species to be found in the vicinity of the project site. These species are listed below. The species bolded are considered rare and sensitive by the State.

- **Prairie rattlesnake (*Crotalus viridis*)**
- **Longnose Leopard lizard (*Gambelia wislizenii*)**
- **Night snake (*Hypsiglena torquata*)**
- **Stiped whipsnake (*Masticophis taeniatus*)**
- **Gopher Snake (*Pituophis catenifer*)**
- **Western terrestrial garter snake (*Thamnophis elegans*)**
- **Common garter snake (*Thamnophis sirtalis*)**
- **Short-eared owl (*Asio flammeus*)**
- **Western burrowing owl (*Athene cunicularia hypugaea*)**
- **Red-tailed hawk (*Buteo jamaicensis*)**
- **Swainson's Hawk (*Buteo swainsoni*)**

American goldfinch (*carduelis tristi*

- **Killdeer (*Charadrius vociferous*)**
- **Common nighthawk (*Chordeiles minor*)**
- **Northern Harrier (*Circus cyaneus*)**
- **Northern flicker (*Colaptes auratus*)**
- **Common raven (*Corvus corax*)**
- **Horned lark (*Eremophila alpestris*)**
- **American kestrel (*Falco sparverius*)**
- **Barn swallow (*Hirundo rustica*)**
- **Song sparrow (*Melospiza melodia*)**
- **Brown-headed cowbird (*Molothrus ater*)**
- **Long-billed curlew (*Numenius americanus*)**
- **Savannah sparrow (*Passerculus sandwichensis*)**
- **Cliff swallow (*Petrochelidon pyrrhonota*)**
- **Rufous hummingbird (*Selasphorus rufus*)**
- **Western meadowlark (*Sturnella neglecta*)**
- **American robin (*Turdus migratorius*)**
- **Eastern kingbird (*Tyrannus tyrannus*)**
- **Townsend's big-eared bat (*Corynorhinus townsendii*)**
- **Big brown bat (*Eptesicus fuscus*)**
- **Western small-footed myotis (*Myotis ciliolabrum*)**
- **Least chipmunk (*Neotamias minimus***
- Mule deer (*Odocoileus hemionus*)
- Elk (*Cervus canadensis*)
- Skunks (*Mephitis mephitis*)
- Raccoons (*Procyon lotor*)
- Red fox (*Vulpes vulpes*)
- Antelope (*Antilocapra americana*)
- Moose (*Alces alces*)
- Mountain lions (*Puma concolor*)
- Black bears (*Ursus americanus*)
- Grey partridge (*Perdix perdix*)
- Mourning doves (*Zenaida macroura*)
- Blue grouse (*Dendragapus obscurus*)
- Cottontail rabbits (*Sylvilagus nuttallii*)
- Ruffed grouse (*Bonasa umbellus*)
- American wigeon (*Anas americana*)
- Coyote (*Canis latrans*)
- Badger (*Taxidea taxus*)
- Black tailed jack rabbit (*Lepus californicus*)
- Western diamond back rattler (*Crotalus atrox*)
- Brewer's blackbird (*Euphagus cyanocephalus*)
- Western meadow lark (*Sturnella neglecta*)
- Rock wren (*Salpinctes obseoletus*)
- Lewis's woodpecker (*Malanerpes lewis*)
- Mountain bluebird (*Sialia currucoides*)
- Common muskrat (*Ondatra zibethicus*)

- Minks (*Mustela vison*)
- Short tailed weasel (*Mustela erminea*), and
- Long tailed weasel (*Mustela frenata*)

The species listed above, have the potential to be found on the project site. The species are typically found in disturbed agricultural fields and/or in open canyon/valley bottom areas. Although the species may be found on-site, they will likely not be significantly impacted due to the species utilizing varied habitats that are prevalent throughout the greater vicinity of the project site.

Plants

Due to the conditions of the project site where development will occur (agricultural field), the site provides little habitat for native plant species. However, to the north and south of the agricultural areas are shrub/steppe habitat with native vegetation on mountain slopes. Appendix A contains site photographs of existing conditions. The potential for the presence of species listed under the federal Endangered Species Act (ESA) and/or listed by IDFG as being rare or sensitive is described below. Table B-2 within Appendix B describes these species potentially found on site.

In addition to those plant species within Table B-2 in Appendix B, the 2007 and 2011 reports also identified Sagebrush and bitterbrush as within the project site. These species are likely in the greater area of the parcel; these species are not found on the proposed project site.

Federal and State Listed Species

Threatened, Endangered, and Sensitive plant species are identified by both federal and state agencies. At the federal level, the U.S. Fish and Wildlife Service (USFWS) lists threatened and endangered species. State threatened, endangered and sensitive species lists are maintained by IDFG. Federal and state listed species identified in Table B-2 within Appendix B are described below.

Federally Listed Plant Species: According to USFWS, there are no federally threatened or endangered plant species that have the potential to be on the project site.

State Listed Plant Species: There are five plant species that are listed in the IDFG rare and sensitive species list for Blaine County. Out of these five species only one (Bugleg goldenweed [*Pyrrocoma insecticruris*]) has the potential to be found on the greater parcel area but is not expected to be located within the proposed project site.

Summary of Species Potentially Found On Site

Based on Table B-2 in Appendix B and the species in the previous reports there is a low likelihood of state or federally listed species to be on the project site where development will occur. Vegetation in the development site is highly disturbed and consists of maintained herbaceous species and tilled fields.

Field Investigation

The subject site is relatively flat with a slight incline to the north. The northern portion of the larger parcel has steep mountain slopes to the north and south. The site was traversed on foot with the focus to document potential habitat for plant and animal species. Visual observations of actual species other than magpies (*Pica pica*), meadowlarks (*Sturnella neglecta*), field mice (*Mus musculus*), and red tailed hawks

(*Buteo jamaicensis*) did not occur. However, evidence of mule deer and elk was observed in the form of scat and multiple tracks were identified on or adjacent to the project site during the field visit.

Elk and deer habitat consists of a mix of habitat types that includes woodland cover, shrub lands and large open areas. Woodland habitat provides cover and escape from human disturbance and predators as well as travel corridors between different habitat types (USDA-NRCS, 1999). Shrub lands and large open herbaceous areas provide food to elk and deer that typically eat a wide seasonal variety of grasses, forbs and shrubs (USDA-NRCS, 1999; USDA-NRCS 2005). Other important habitat characteristics that are important to deer, elk and other animal species include the availability of water, security cover (thick vegetation or logs and snags to hide behind), interspersion of habitat components and habitat connectivity (USDA-NRCS, 1999; USDA-NRCS 2005).

As previously mentioned, the field investigation was completed on in the evening of April 18 and the morning of April 19, 2016. Observations on habitat features as well as evidence of animal use were recorded and are described below.

Human Disturbance

The project site is located in an area actively used for agricultural purposes. At the time of the site visit the field had been prepared and planted. Residential homes were observed along western boundary and the Wood River High School was located along the southern property boundary near the toe of the mountain slope. Quigley Road, borders the agricultural field to the north and Fox Acres Road borders the site to the south. A gravel parking area is located near the northwest corner of the project site (west central portion of the larger parcel). This parking lot is heavily used by locals for access to mountain trails. This human activity may act as a disturbance to deer, elk or other wildlife that may use the property or surrounding area.

Vegetation and Habitat Interspersion

As mentioned above, the project site is located on a parcel that is approximately 205 acres in size and the project site within the larger parcel consist of approximately 61 acres. The project site largely consists of maintained herbaceous vegetation such as grasses and actively tilled agricultural fields. To the north and south, however, is steep mountain shrub/steppe habitat. The dominant plant species in this habitat includes sagebrush (*Artemisia species*) and bitterbrush (*Purshia tridentata*).

Habitat interspersion within the project site is extremely limited. There are no forested areas with the project site or adjacent properties.

Food and Water Availability

A source of water was not identified on the project area; however, Quigley Creek, which was dry during the field visit, is located in the south end of the project site and Quigley Pond is approximately 1 mile upstream to the northeast. Elk and deer typically feed on herbaceous and shrub vegetation. There is no shrub vegetation where development will occur (within the agricultural field), however, shrub/steppe habitat is located north and south of the agricultural fields.

Security Cover

Security cover consists of thick shrubs, logs and large trees where animals can hide from predators or other disturbances. The project site appears to consist of little security cover due to the lack of features to hide

behind. Large woody debris, such as logs were not identified within the project site or adjacent areas. Although the shrub vegetation that was identified adjacent to the project site and would act as some cover/camouflage for larger species, it is not large enough to totally obscure the view of elk and deer species.

Habitat Connectivity

Based on a review of aerial photographs and site observations, the site is connected to several hundred acres of Pioneer Mountains to the north and south. In addition, the areas north and south of the development area (agricultural fields) are mapped as migratory corridors for elk and deer (McDonald personal communication 2016). However, the there is no micro habitat pockets within the project site that could be used by larger species.

ENVIRONMENT EFFECTS

Based on site observations and information gathered from the USFWS and IDFG, there are no sensitive ecosystem or biological communities on the project site according to Blaine County Internet Map Services or IDFG occurrence data. Therefore, it is GeoEngineers opinion that significant impacts to the ecosystem or biological communities would not be expected as a result of the proposed development.

Based on preferred and suitable habitat characteristics for federal, state and locally listed wildlife and plant species identified above, approximately 61 wildlife species and no sensitive plant species were identified as potentially occurring within the project site. These 61 wildlife species are typically associated with habitat that is found within the project site, (i.e. agricultural fields and open habitats within valley bottoms).

Short-Term Impacts

Noise associated with construction activities may result in short-term avoidance of the project area by wildlife species and may temporarily disrupt feeding and result in short-term avoidance by birds and small mammals. Increased noise levels during construction may temporally disrupt foraging, nesting, calling and flight behavior of birds within the immediate vicinity of the project area. However, these potential construction impacts to wildlife would be temporary, highly localized and would cease once construction is complete.

Long-Term Impacts

Long-term impacts could result in loss of forage for larger ungulate species with the reduction of agricultural crops and future operational activities within the project site could have direct and indirect effects on some smaller species. The project would likely cause direct effects such as a loss of grassland habitat because of the development and increase in noise and human presence. There might also be indirect effects such as changing predator/prey relationships. For example, if the project causes prey species like squirrels to avoid the project site, then predator species like owls, hawks, etc., might avoid the project site. These changes could potentially impact wildlife species that may be currently be present within the project site.

During the operational phase of the project, it is expected that there would be increased noise levels associated with additional automobiles and trucks traveling through the project site on a daily basis. In addition to noise, development of new structures within currently undeveloped areas would increase lights and human presence within the area. These operational effects would likely cause wildlife species to avoid

the area. Avoidance has the potential for causing permanent loss or displacement of species. However, because the site is situated adjacent to existing development (single family homes and roadways), it is unlikely that the project would have a significant impact on living resources in the area.

Cumulative Impacts

The project site is located in an area that is situated adjacent to single family residential areas, roadways and a high school. Cumulative effects are likely to include the future development of adjacent/surrounding properties with rural and agricultural uses. This additional development would increase human use and further displace local wildlife species. However, as mentioned above, the project site is located in an area that has previously been developed with agricultural lands. Wildlife displacement impacts that could occur from additional development but would most likely be considered insignificant.

IMPACT MINIMIZATION MEASURES

Mitigation actions include means and measures that reduce, eliminate and/or offset project effects. Mitigation measures can be applied to reduce or eliminate adverse effects from the project. This section of the report presents minimization measures for the project to reduce potential impacts from the proposed project and includes typical minimization measures that could occur during the construction and operation phases of the project. These measures are intended to prevent or reduce potential environmental impacts and/or avoid or reduce future long-term effects.

General Conservation Measures Related to Construction Activities

- The construction contractor will be required to prepare a stormwater pollution prevention plan (SWPPP) to protect adjacent properties from erosion ad runoff during construction.
- All construction-related debris will be cleaned up on a daily basis. Proper conservation measures will be taken to ensure that debris will not contaminate surface waters.
- Waste materials including concrete, riprap, miscellaneous garbage and/or other debris removed from the project site, will be transported off site for disposal in accordance with applicable regulations.
- Project work will be conducted in compliance with all appropriate regulations and restrictions.
- Excavation will be limited to those areas necessary for access to the work areas and construction activities. Construction limits will be marked in the field, and equipment will not be allowed outside the work area.
- Adequate materials will be maintained on-site to respond to weather conditions and modify the construction plan as needed to accommodate unanticipated events.
- Routine inspections of erosion control measures will be conducted daily during construction to ensure the effectiveness of the measures and to determine the need for maintenance or additional control measures.
- Grading and construction will be phased to reduce the time that soil is exposed, to the extent possible.
- Silt fences will be constructed around the project site.
- Disturbance will be limited to the smallest area feasible for each phase of the project and element under construction and will stay within the limits of construction as identified on the site plans.

- Use only construction equipment that is in good working order especially noise muffling systems.
- Stage work efficiently to minimize construction days.
- Restrict all construction activities from 6:00 am to 7:00 pm, weekdays only.
- Type, orientation and design the proposed structures to minimize glare leaving the site.
- Nighttime lighting will be minimal to the extent necessary for safety and security.

On-Going Site-Specific Recommendations for the Project Site

Site recommendations from the 2007 and 2011 reports (Lake to Forest investments LLC; Kuck and Lonn 2011) were reviewed and evaluated with the current project description. Based on the new design of the project, we have either slightly revised or taken the recommendations listed in the 2007 and 2011 reports that still apply to the project, and listed them below.

- Limited development should occur on south facing slopes, especially further up the valley, as this will encroach on big game winter range.
- Homeowners should be encouraged to be proactive regarding fire risk. The HOA should encourage planting fire resistant materials and recommend Class A roofs.
- The open space in the development plans seem to be adequate and will help provide a buffer for big game winter range from the development.
- According to the design plans, homes will be clustered near the lower end of the valley. The design will help to keep more traffic near town lessening the impact on wildlife.
- Yearlong trails/paths should be placed close to development and away from the uplands as much as possible to create a larger buffer from wintering habitat. These trails/paths should also avoid the reconstructed stream when possible to alleviate problems with nesting songbirds. Trails that will be closed during the winter may utilize the uplands as it is not as critical a time period for the wildlife.
- We recommend that designated open space be restored using native forbs, grasses, and shrubs to re-establish some measure of native wildlife habitat. Careful attention needs to be given to seed mixtures on disturbed soils to establish vegetation that is resistant to noxious weed invasion.
- Use of the slow-release, less soluble and least mobile chemical fertilizers, pesticides, and herbicides available is encouraged. These products should be used at the smallest rates of active ingredient to accomplish the desired result. They should also contain low amounts of organophosphate as goslings are susceptible to poisoning from fertilizers. Any accumulation will be partially mitigated by maintaining an adequate flow through the system to keep the water fresh.
- Livestock grazing should be prohibited on slopes of more than 5 percent to prevent damage to native shrub/steppe habitats and soils. Restricting grazing will promote the availability of forage for wintering wildlife and eliminate the need for fences, which can constitute movement barriers for wildlife.
- Big game and other wildlife depredations on ornamental plants and gardens are anticipated. All responsibility for controlling wildlife depredation will be with the property owner. Any actions taken to alleviate depredation will be those prescribed by the IDFG. We encourage the use of mature, native plant materials for landscaping to lessen the likelihood and potential severity of big game depredation. We encourage developers and residents to use the IDFG listing of approved plants that are native and

from a list that are non-palatable to ungulates. This will help landowners and the development from incurring depredation damage.

- All hay and other livestock feed should be stored and fed in a manner that does not attract big game or other wildlife species. Attracting wildlife from native habitats exacerbates existing winter habitat problems in the Big Wood river Valley.
- All pet food should be stored and fed in a manner that does not attract "nuisance" wildlife (e.g. skunks, raccoons, magpies, red fox, etc.). All responsibility for controlling nuisance wildlife will belong with the property owner. Any actions taken to alleviate nuisance wildlife problems will be those prescribed by the IDFG.
- We recommend the feeding of game species or predatory wildlife be prohibited. Artificial feeding of wildlife tends to attract and concentrate animals away from native habitat, can facilitate the spread of disease, and has the potential to create conflict between neighboring homeowners due to the likelihood wildlife will use adjacent properties where they may be considered a nuisance.
- All pets should be kept in-doors, kenneled, or leashed at all times. Pets running at large dramatically increase the negative effects of housing developments on wildlife.
- Fencing should be kept to a minimum. If fences are necessary, they should be a post and rail design with a maximum top rail height of 42 inches and a minimum bottom rail height of 18 inches. This design will facilitate wildlife passage through the area.
- Require residential trash to be kept inside the house, garage or appropriate enclosures until the morning of trash collection. It is encouraged that all trash containers have attached lids.
- Educational materials should be provided to all residents outlining the wildlife resources found on the property. This information should include warnings about disturbance of wildlife and the problems caused by recreational feeding.
- No structures will be built on lands classified as winter range within Quigley Canyon to prevent the destruction and/or alteration of natural vegetation on winter ranges.
- All winter habitats within Quigley Canyon Ranch will be posted and closed to motorized and non-motorized access from December 1 through March 31.
- BLM property north of the property and no structures are permitted outside the allowed fenced areas. Further said areas will be posted and closed to motorized and non-motorized access from December 1 through March 31.
- A Plat Note will state that each residential property within the subdivision will be responsible for the protection of their property against wildlife damage and will not be eligible for compensation from the State of Idaho for damages caused by wildlife.

SUMMARY

This letter and associated figures serve to formally describe and characterize on-site habitat in regards to potential wildlife that could occur within and adjacent to the project site. Approximately 61 wildlife species were identified as potentially utilizing habitat within the development site and no federally or state listed plant species were identified as potentially being on site. Habitat within the development area includes migration corridors for big game species such as elk and deer.

Since the existing habitat within the project site is highly disturbed with agricultural uses, roads and active human use, potential wildlife use of the project site is expected to be limited. Based on the information gathered from the IDFG, USFWS and Blaine County, it is GeoEngineers opinion that if impact minimization measures are conducted, there should be little to no impact to the species listed above. Additionally, elk and deer migration and wintering habitat is unlikely to be impacted due to the reduction/consolidation of the proposed development from previous site plans. Although the development has been consolidated, open space still remains a large part of the overall objective of the development. By consolidating various building areas and leaving sufficient open space between these areas, wildlife corridors are maintained to a degree. The project designers have made significant efforts to reduce the overall footprint of the design while incorporating open space and keeping the areas further up the Quigley valley undeveloped.

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FIGURES

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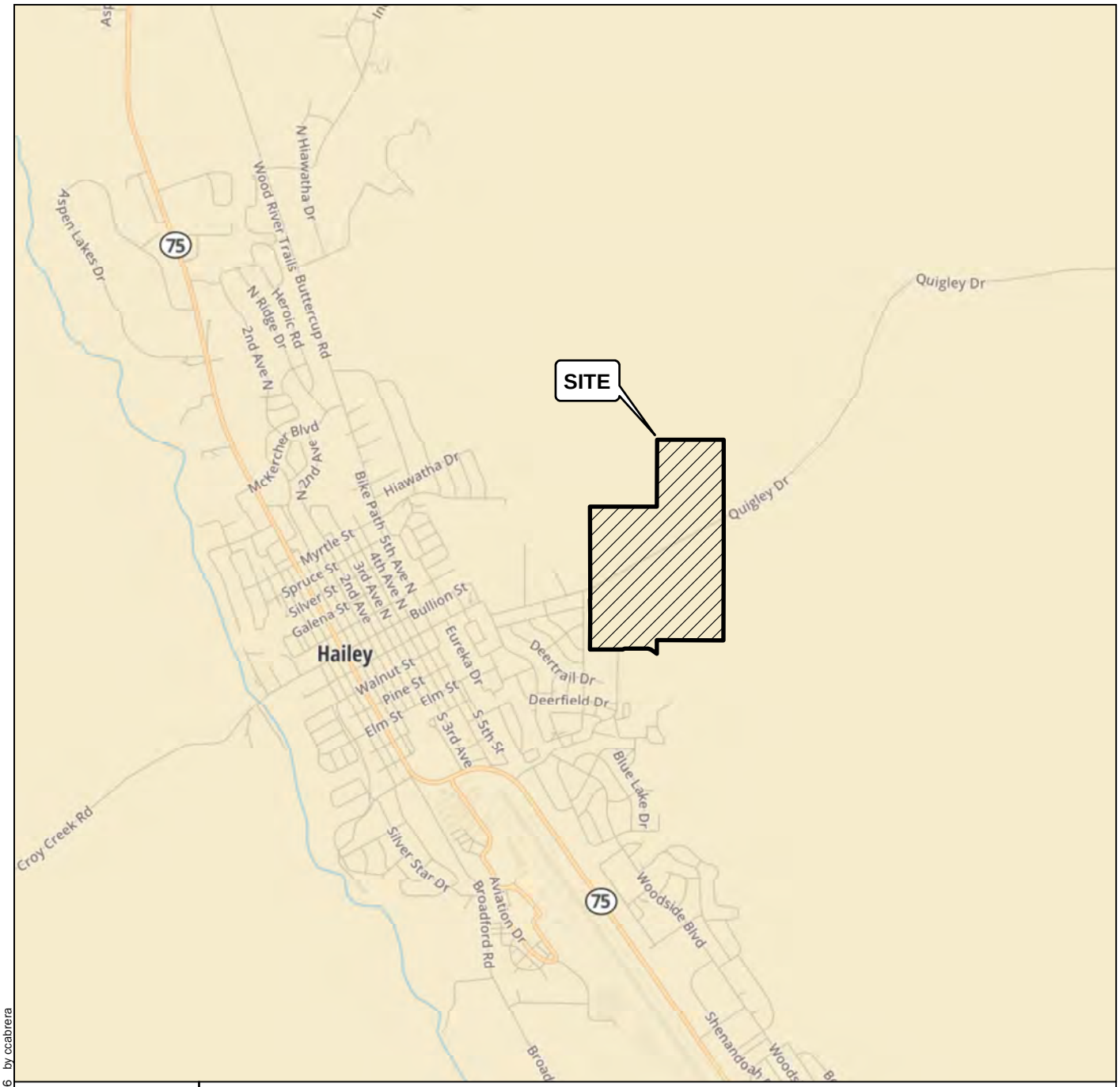

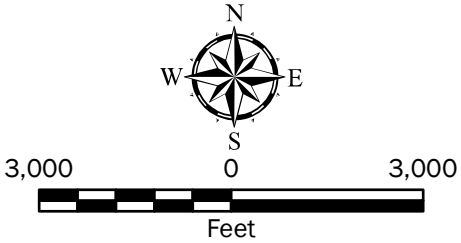

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Mapbox Open Street Map, 2016

Projection: NAD 1983 StatePlane Idaho Central FIPS 1102 Feet

Vicinity Map

Quigley Initiative Wildlife Assessment
Hailey, Idaho

GeoEngineers

Figure 1

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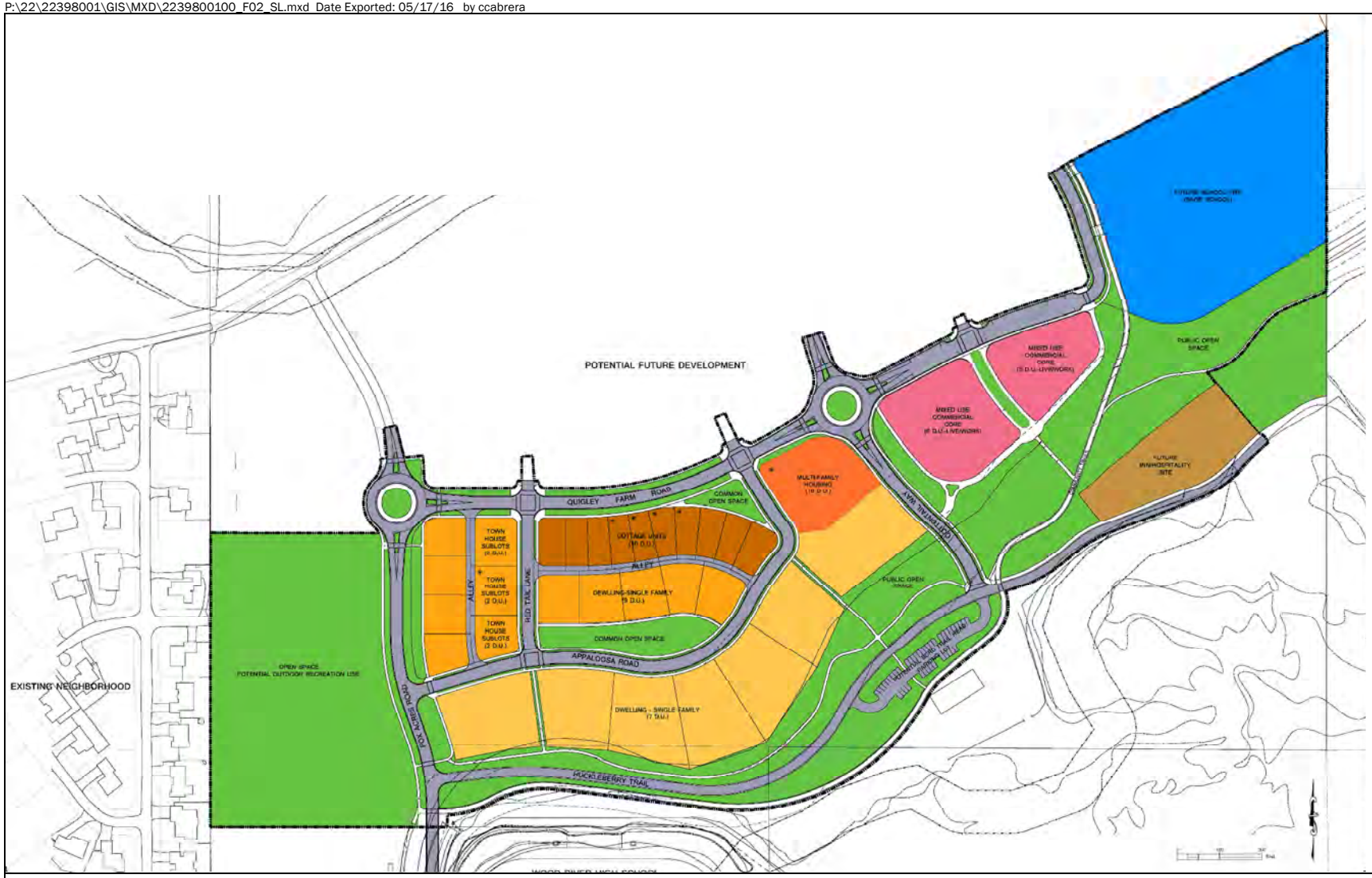

Notes:
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2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Land Use Site Plan from Benchmark Associates, C-2, 02/19/16.

Projection: NAD 1983 StatePlane Oregon North FIPS 3601 Feet

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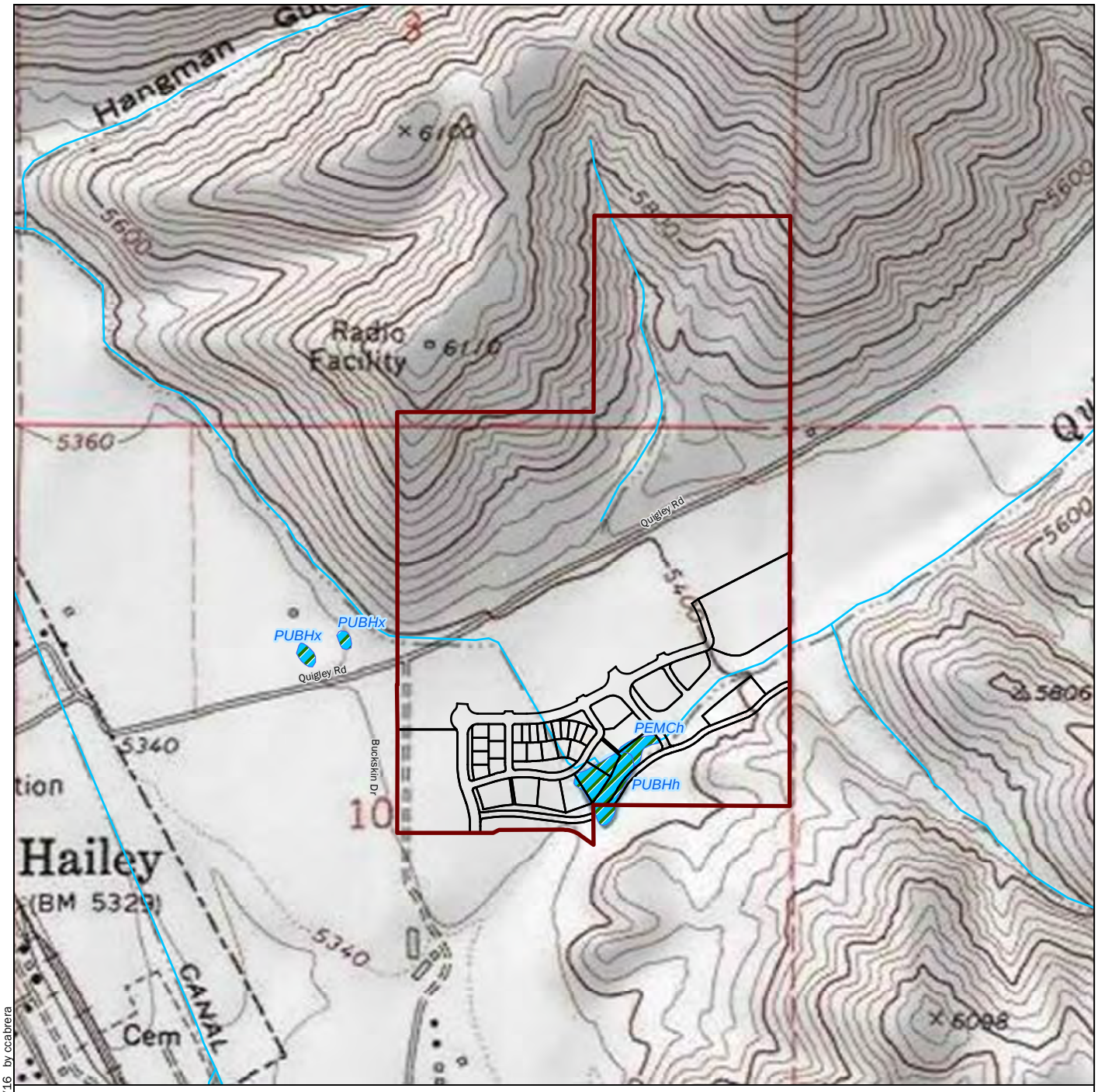
Proposed Site Layout

Quigley Initiative Wildlife Assessment
Hailey, Idaho

GeoEngineers

Figure 2



Legend

- Parcel Boundary
- Development Area
- Mapped Waterway
- Mapped Wetland

Wetland Classification
PUBHx: Palustrine, Unconsolidated Bottom, Permanently Flooded, Excavation
PUBHh: Palustrine, Unconsolidated Bottom, Permanently Flooded, Dike/Impounded
PEMCh: Palustrine, Emergent, Seasonally Flooded, Dike/Impounded

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Data Source: Topo base from ArcGIS Data Online.
NWI Wetlands from US Fish and Wildlife. NHD data from USGS.

Projection: NAD 1983 StatePlane Idaho Central FIPS 1102 Feet

Topographic/National Wetlands Inventory Map

Quigley Initiative Wildlife Assessment
Hailey, Idaho

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Figure 3

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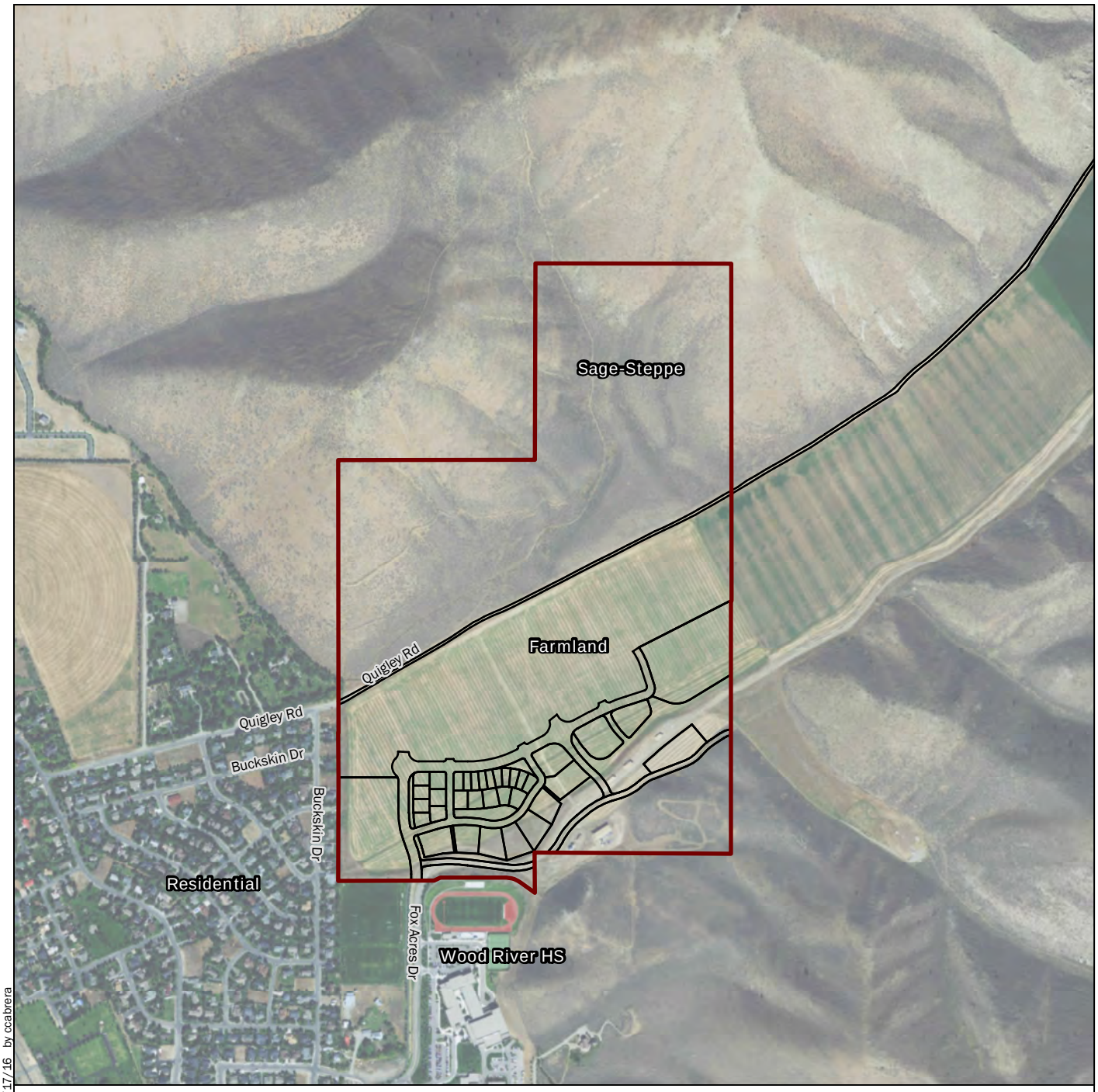

Legend

Parcel Boundary

Development Area

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Notes:

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Data Source: 2013 Aerial from ArcGIS Data Online.

Projection: NAD 1983 StatePlane Idaho Central FIPS 1102 Feet

Surrounding Areas Map

Quigley Initiative Wildlife Assessment
Hailey, Idaho

GeoEngineers

Figure 4

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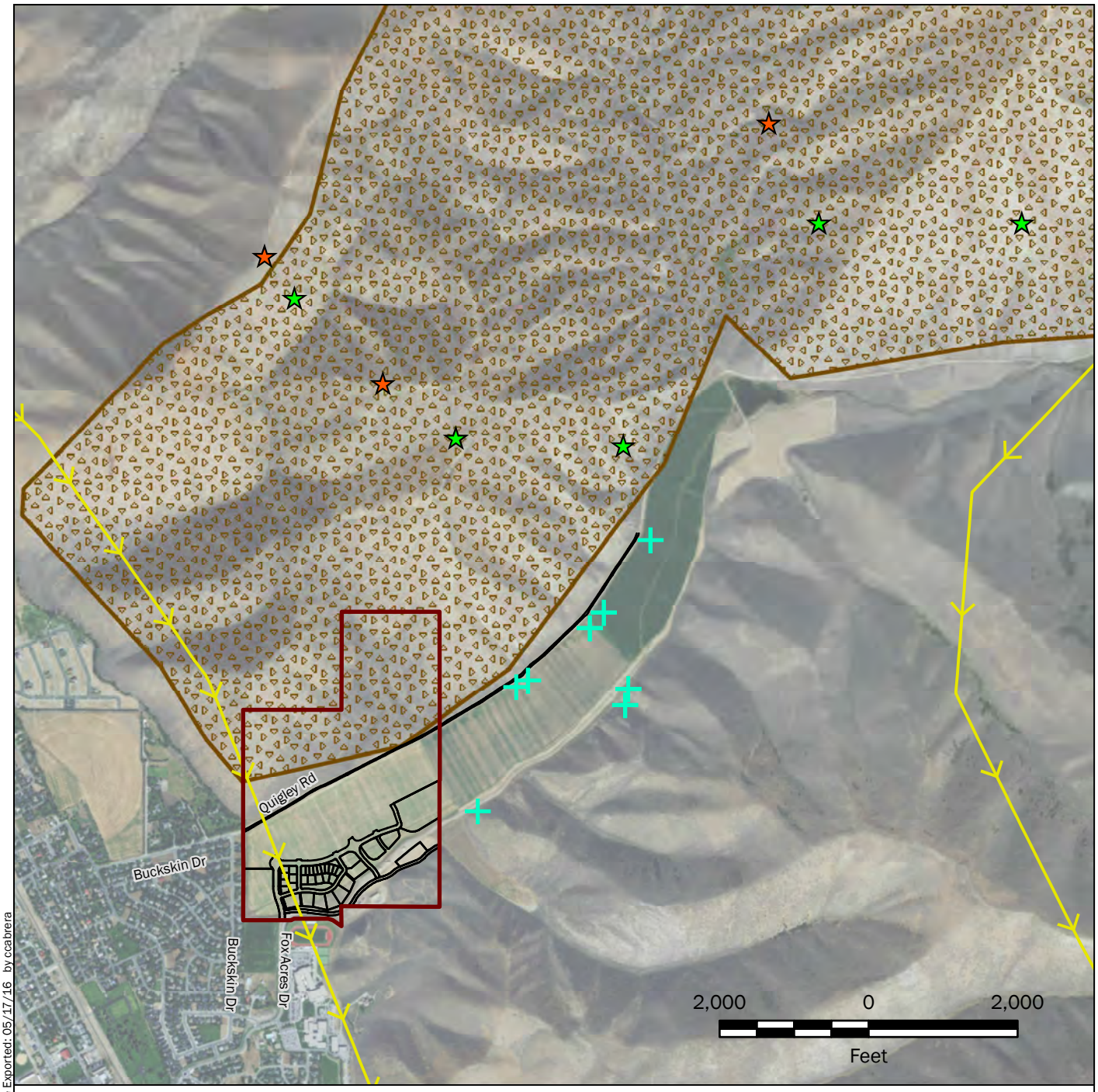

Legend

- Parcel Boundary
- Development Area
- Mule Deer Winter Habitat
- Blaine County Deer Migration Arrows
- Quigley Deer Migration Points
- Deer from Unit 49 Elk Survey 2008
- Deer from Unit 49 Elk Survey 2004

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Data Source: 2013 aerial imagery from ArcGIS Data Online.
Mule Deer winter habitat and survey locations from Idaho Fish and Wildlife Information System, https://fishandgame.idaho.gov.
Projection: NAD 1983 StatePlane Idaho Central FIPS 1102 Feet

Mule Deer Wintering Range

Quigley Initiative Wildlife Assessment
Hailey, Idaho

GeoEngineers

Figure 5

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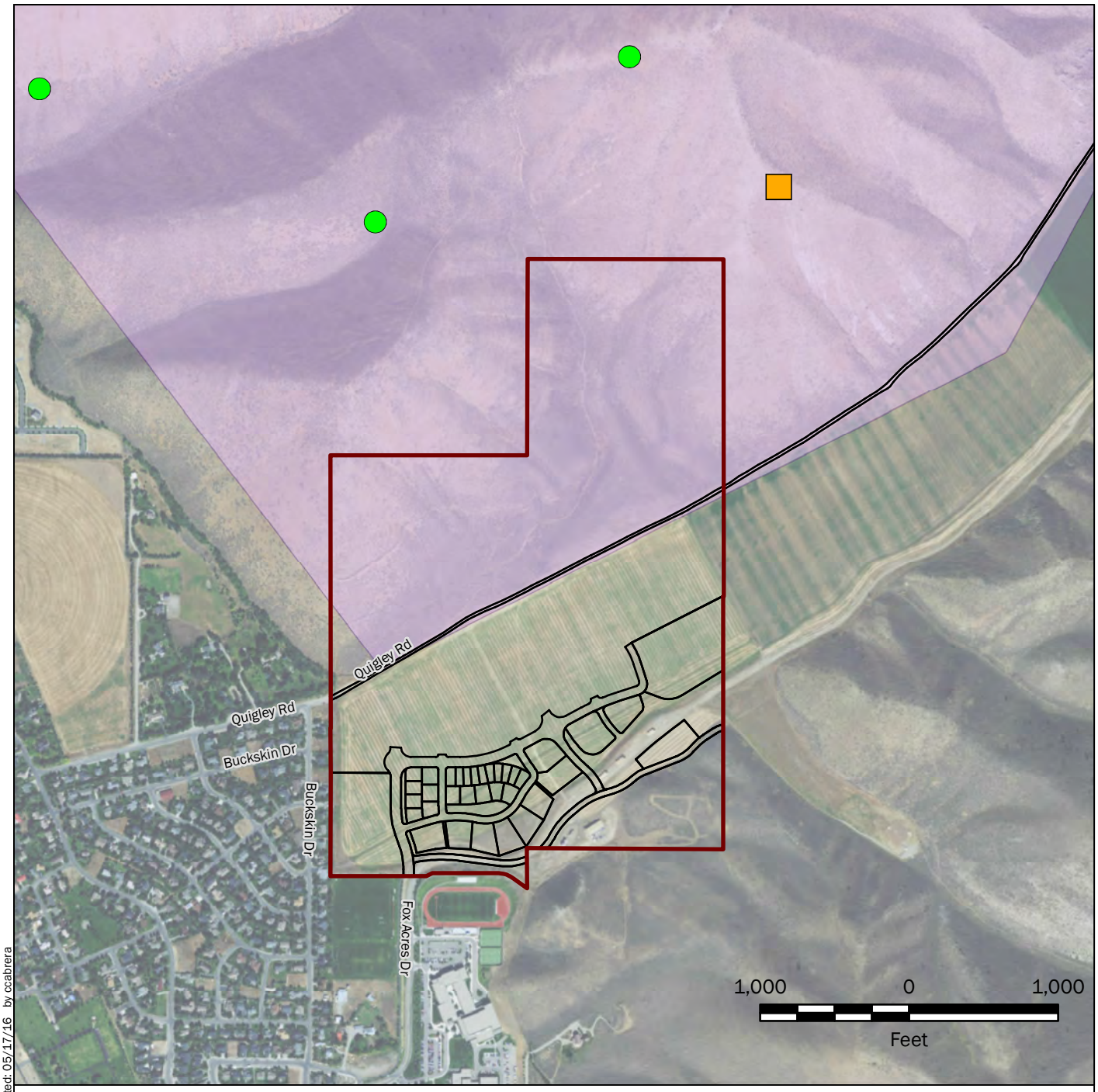

Legend

- Parcel Boundary
- Development Area
- Blaine County Elk Winter Range 2006
- Elk Unit 49 Waypoints (2013)

Elk Unit 49 Waypoints (1996, 1998, 2001, 2004, 2008)

- Group Size 1-10

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Notes:

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Data Source: 2013 aerial imagery from ArcGIS Data Online.
Mule Deer winter habitat and survey locations from Idaho Fish and Wildlife Information System, https://fishandgame.idaho.gov.

Projection: NAD 1983 StatePlane Idaho Central FIPS 1102 Feet

Elk Wintering Range

Quigley Initiative Wildlife Assessment
Hailey, Idaho

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Figure 6

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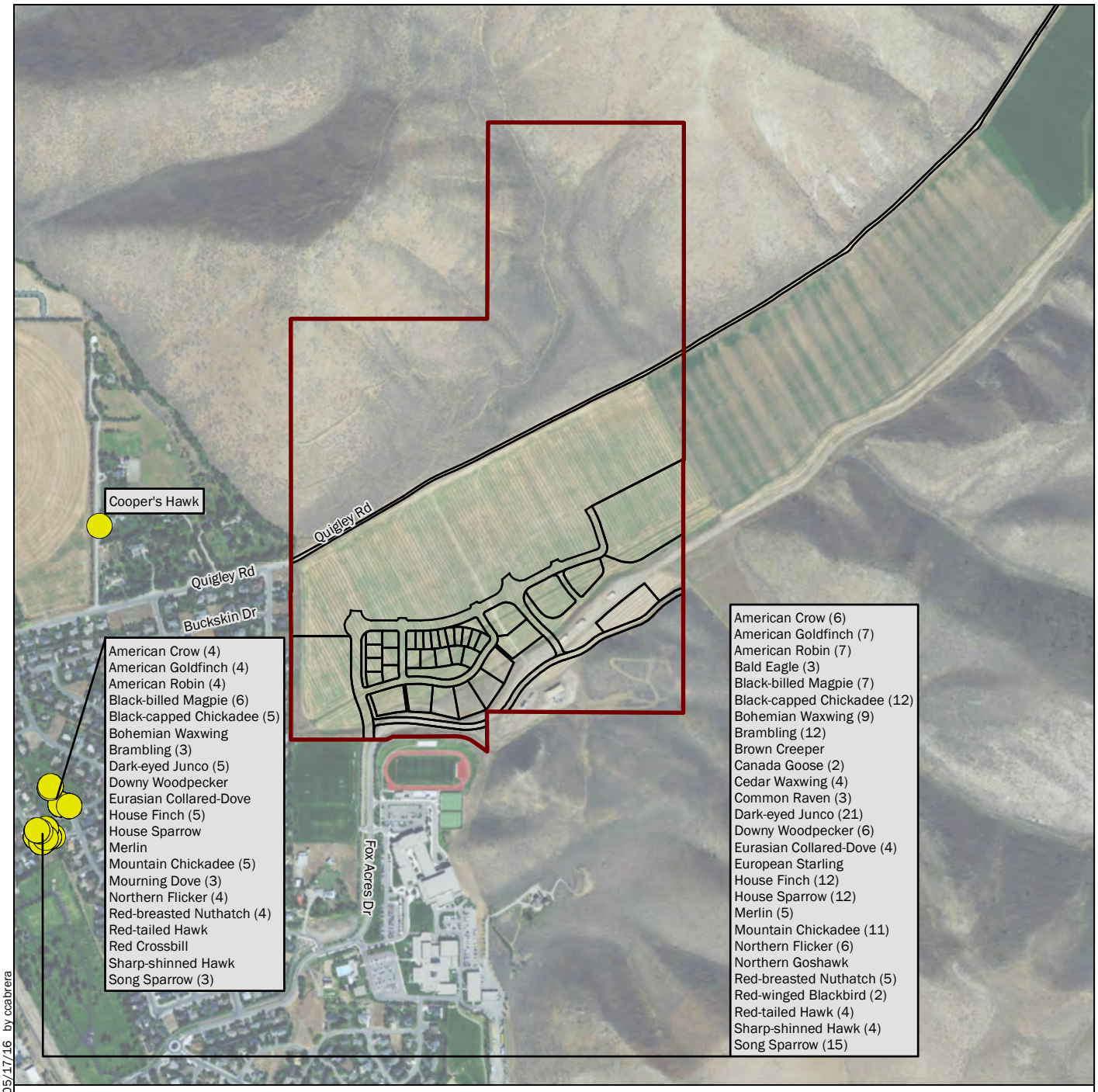

Legend

- Parcel Boundary
- Development Area
- Species Diversity Locations

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Feet

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Notes:
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Data Source: species diversity data from Idaho Fish and Wildlife Information System, https://fishandgame.idaho.gov.

Projection: NAD 1983 StatePlane Idaho Central FIPS 1102 Feet

Fish and Game Species Data

Quigley Initiative Wildlife Assessment
Hailey, Idaho

GeoEngineers

Figure 7

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APPENDICES

GeoEngineers

APPENDIX A
Site Photographs

Photograph 1. Looking westerly from the southwest corner of the property.

Photograph 2. Looking northerly from the southwest corner of the property. The agricultural field is where development will occur.

Site Photographs	
Quigley Initiative Wildlife Assessment Blaine County, Idaho	
GeoEngineers	Figure A-1

22398-001-00 Date Exported: 05/03/16

Photograph 3. Looking easterly along Fox Acres Road from the southwest corner

Photograph 4. Quigley Creek (flows east west on the property) is located in the ditch at the bottom of the photograph. Photograph looks northerly from the south edge of the agricultural field

Site Photographs	
Quigley Initiative Wildlife Assessment Blaine County, Idaho	
GeoEngineers	Figure A-2

22398-001-00 Date Exported: 05/03/16

Photograph 5. From the south edge of the agricultural field, looking south at the mountain slopes. Vegetation on the Canyon floor seems to be mostly maintained herbaceous vegetation and vegetation on the slopes consist of shrub/steppe habitat

Photograph 6. Deer or elk scat was identified on the south end of the property during the site visit

Site Photographs	
Quigley Initiative Wildlife Assessment Blaine County, Idaho	
GeoEngineers	Figure A-3

Photograph 7. Looking southwest from the southeast corner of the agricultural field where development will take place

Photograph 8. Looking southeast at the agricultural fields and irrigation system, from the southeast corner of the agricultural field where development will occur

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Site Photographs

Quigley Initiative Wildlife Assessment
Blaine County, Idaho

GeoEngineers

Figure A-4

Photograph 9. Looking westerly from the northeast corner of the agricultural field at the shrub/steppe vegetation north of Quigley Road

Photograph 10. Looking west down Quigley Road from the northeast corner of the agricultural field where development will occur.

Site Photographs	
Quigley Initiative Wildlife Assessment Blaine County, Idaho	
GeoEngineers	Figure A-5

22398-001-00 Date Exported: 05/03/16

Photograph 11. Looking southerly from Quigley Road across the agricultural field where development on the project site will occur

Photograph 12. Looking southwest towards the school and single family residences in Hailey, Idaho
Photograph was taken from Quigley Road

Site Photographs	
Quigley Initiative Wildlife Assessment Blaine County, Idaho	
GeoEngineers	Figure A-6

22398-001-00 Date Exported: 05/03/16

Photograph 13. Parking area with trails in the northwest corner of the development area.

Photograph 14. Looking southerly from the northwest corner of the agricultural field along Quigley Road

Site Photographs	
Quigley Initiative Wildlife Assessment Blaine County, Idaho	
GeoEngineers	Figure A-7

22398-001-00 Date Exported: 05/03/16

APPENDIX B
Species Lists

APPENDIX B. SPECIES LISTS

TABLE B-1. FEDERAL- AND STATE-LISTED SPECIES POTENTIALLY PRESENT IN BLAINE COUNTY

	Common Name	Scientific Name	State Status[1]	Federal Status[1]	Preferred Habitat	Potential to Occur On Site	
						Development Site	Greater Parcel Area
Reptiles	Long-toed salamander	Ambystoma macrodactylum	S5—Secure	none	Found in sagebrush communities		X
	Inland tailed frog	Ascaphus montanus	S3—Vulnerable	none	Clear, cold swift moving streams		
	Western Toad	Bufo boreas	S4—Apparently secure	none	Found in agricultural areas; however also require streams, ponds, or reservoirs.		
	Rubber boa	Charina bottae	S5—Secure	none	Found in sagebrush and grassy areas not far from water		X
	Racer	Coluber constrictor	S5- secure	none	Found in shrublands and canyons		X
	Prairie rattlesnake	Crotalus viridis	S5- secure	none	Found in most habitats	X	X
	Western skink	Eumeces skiltonianus	S5- secure	none	Partial to open wooded foothills usually associated with rocks.		
	Longnose Leopard lizard	Gambelia wislizenii	S5- secure	none	Desert and semi-desert with scattered shrubs or low plants	X	X
	Night snake	Hypsiglena torquata	S3- Vulnerable	none	Inhabits arid and semi-arid flats, canyons and hillsides and includes sagebrush communities.	X	X
	Striped whipsnake	Masticophis taeniatus	S4 – apparently secure	none	Shrublands and grasslands, canyons and sagebrush	X	X
	Gopher Snake	Pituophis catenifer	S5- secure	none	Found in most habitats	X	X
	Boreal Chorus Frog	Pseudacris maculata	S4 – apparently secure	none	Non-flowing bodies of water and wetlands.		
	Pacific Chorus Frog	Pseudacris regilla	S5- secure	none	Found in a variety of habitats near water		
	Columbia spotted frog	Rana luteiventris	S3S4	none	Highly aquatic and found adjacent to permanent water		
	Northern leopard frog	Rana pipiens	S2	none	Springs, streams, marshes, ponds, etc.		

	Common Name	Scientific Name	State Status[1]	Federal Status[1]	Preferred Habitat	Potential to Occur On Site	
						Development Site	Greater Parcel Area
	Sagebrush lizard	Sceloporus graciosus	S5- secure	none	Sagebrush vegetation communities		X
	Great basin spadefoot	Spea intermontana	S4 – apparently secure	none	Sagebrush flats and semi-desert shrublands		X
	Western terrestrial garter snake	Thamnophis elegans	S5- secure	none	Found in most habitats	X	X
	Common garter snake	Thamnophis sirtalis	S5- secure	none	Found in most habitats	X	X
Birds	Northern Goshawk	Accipiter gentilis	S4 – apparently secure	none	Found in mature woodlands		
Birds	Spotted Sandpiper	*Actitis macularius*	S5B – secure breeding	none	Breed in freshwater habitats and during migration found near water.		
Birds	Clark's Grebe	*Aechmophorus clarkii*	S2B – imperiled breeding	none	Saltwater bays in winter; freshwater wetlands to breed.		
Birds	Boreal owl	Aegolius funereus	S2 - Imperiled	none	Found in mature boreal and sub-alpine forests		
Birds	Red-Winged blackbird	Agelaius phoeniceus	S5B – secure breeding S3N – vulnerable non-breeding	none	Found in cattail marsh, wooded swamps, wet meadows		
Birds	Sage sparrow	Amphispiza belli	S4B – apparently secure breeding	none	Open shrub lands and grasslands including sagebrush stands		X
Birds	Black-throated sparrow	Amphispiza bilineata	S2B – imperiled breeding	none	Open shrub lands and grasslands including sagebrush stands		X
Birds	Northern pintail	Anas acuta	S5B – secure breeding S2N – imperiled non-breeding	none	Shallow ponds during breeding and wetlands and/or flooded fields during winter.		
Birds	Black-chinned hummingbird	Archilochus alexandri	S5B – secure breeding	none	Found in steppe habitat, however within steppe habitat found in wetlands.		
Birds	Great Egret	Ardea alba	S1B – critically imperiled breeding	none	Inhabit freshwater wetlands		
Birds	Great blue Heron	Ardea herodias	S5B – secure breeding S5N – secure non-breeding	none	Forage habitat associated with waters and nesting habitat found in mature forests		
Birds	Short-eared Owl	Asio flammeus	S4 – apparently secure	none	Found in most habitats	X	X
Birds	Western burrowing owl	Athene cunicularia hypugaea	S3 - vulnerable S4 – apparently secure	none	Flat open terrain with short grasses; includes shrub/steppe	X	X
Birds	Lesser scaup	Aythya affinis	S3- Vulnerable	none	Associated with water		
Birds	Cedar waxwing	*Bombycilla cedrorum*	S5B – secure breeding S3N – vulnerable non-breeding	none	Lowland woodlands with shrubs and small trees.		
Birds	American Bittern	*Botaurus lentiginosus*	S4B – apparently secure breeding	none	Associated with water		
Birds	Barrow's goldeneye	*Bucephala islandica*	S3B – vulnerable breeding S3N – vulnerable non-breeding	none	Associated with water		
Birds	Red-tailed hawk	*Buteo jamaicensis*	S5B – secure breeding S5N – secure non-breeding	none	Found in most habitats	X	X
Birds	Ferruginous Hawk	*Buteo regalis*	S3B – vulnerable breeding	none	Dry open county including shrub/steppe.		X

Common Name	Scientific Name	State Status[1]	Federal Status[1]	Preferred Habitat	Potential to Occur On Site	
					Development Site	Greater Parcel Area
Swainson's Hawk	*Buteo swainsoni*	S3B – vulnerable breeding	none	Open farmland, sagebrush desert and prairies.	X	X
Lark Bunting	*Calamospiza melanocorys*	S1?B – critically imperiled breeding/ inexact rank	none	Associated with sagebrush habitat		X
Baird's sandpiper	*Calidris bairdii*	S2N – Imperiled non-breeding	none	Dry upland tundra and along sandy shores and mudflats.		
Western sandpiper	*Calidris mauri*	S2N – Imperiled non-breeding	none	Mostly coastal but migrate across land and stop at inland wetlands.		
American goldfinch	*Carduelis tristis*	S5- secure	none	Brushy and weedy habitats and at the edges of fields	X	
Turkey vulture	*Cathartes aura*	S4B – apparently secure breeding	none	Found above open country, in rocky areas.		X
Willet	*Catoptrophorus semipalmatus*	S4B – apparently secure breeding	None	Associated with coastal areas and wetlands and ponds.		
Greater sage-grouse	*Centrocercus urophasianus*	S2 - Imperiled	C	Found in shrub steppe habitats		X
Belted kingfisher	*Ceryle alcyon*	S5- secure	None	Associated with water environments		
Killdeer	*Charadrius vociferus*	S5B – secure breeding S3N – vulnerable non-breeding	None	Found in a variety of open habitats	X	X
Black tern	*Chlidonias niger*	S1B – Critically imperiled breeding	None	Associated with water environments		
Common nighthawk	*Chordeiles minor*	S5B – secure breeding	None	Variety of open habitats including shrub steppe.	X	X
Northern Harrier	*Circus cyaneus*	S5B – secure breeding S5N – secure non-breeding	None	Variety of open habitats including shrub steppe.	X	X
Yellow-billed cuckoo	*Coccyzus americanus*	S2B – imperiled breeding	C	Forested stream riparian areas with cottonwoods and willows.		
Black-billed Cuckoo	*Coccyzus erythropthalmus*	S1B – critically imperiled breeding	None	Woodlands and thickets and need extensive tracts of woods.		
Northern flicker	*Colaptes auratus*	S5- secure	None	While they breed in woodlands they can be found in open areas including sagebrush and grasslands.	X	X
Western wood-pewee	*Contopus sordidulus*	S5B – secure breeding	None	Open coniferous forests, wooded streams and forest edges		
Common Raven	*Corvus corax*	S5- secure	None	Found in a variety of habitats including open sagebrush country	X	X
Trumpeter swan	*Cygnus buccinators*	S1B – Critically imperiled breeding S2N – imperiled non-breeding	None	Associated with water environments		
Yellow warbler	*Dendroica petechial*	S5B – secure breeding	None	Brushy habitats on forest edges.		
Gray catbird	*Dumetella carolinensis*	S5B – secure breeding	none	Dense undergrowth dominated by saplings and shrubs.		
Snowy egret	*Egretta thula*	S2B – imperiled breeding	None	Associated with water environments		
Least flycatcher	*Empidonax minimus*	SNA – A status rank is not applicable	None	Deciduous or mixed woods		
Willow flycatcher	*Empidonax traillii*	S5B – secure breeding	None	Brushy areas near wetlands		
Horned lark	*Eremophila alpestris*	S5 - secure	None	Short grass or scattered shrubs	X	X
Merlin	*Falco columbarius*	S2B – imperiled breeding S2N – imperiled non-breeding	None	Rugged terrain that provides trees for nests and open areas for hunting.		
Peregrine falcon	*Falco peregrinus anatum*	S2B – imperiled breeding	none	Open areas along the coast or other water bodies. Nest on cliffs.		
American Kestrel	*Falco sparverius*	S5B – secure breeding S5N – secure non-breeding	None	Wide variety of open habitats including agricultural areas and sagebrush.	X	X

Common Name	Scientific Name	State Status[1]	Federal Status[1]	Preferred Habitat	Potential to Occur On Site	
					Development Site	Greater Parcel Area
Common loon	*Gavia immer*	S1B – critically imperiled breeding S2N – imperiled non-breeding	None	Associated with water environments		
Common yellowthroat	*Geothlypis trichas*	S5B – secure breeding	none	Associated with water environments		
Sandhill crane	*Grus canadensis*	S3B – vulnerable breeding	none	Associated with water environments		
Bald eagle	*Haliaeetus leucoccephalus*	S3B – vulnerable breeding S4N – apparently secure non-breeding	none	Generally coastal areas or near large lakes and rivers with shores that have large trees.		
Black-necked stilt	*Himantopus mexicanus*	S3B – vulnerable breeding	None	Associated with water environments		
Barn swallow	*Hirundo rustica*	S5B – secure breeding	None	Open areas with suitable sites for nesting.	X	X
Bullock's oriole	*Icterus bullockii*	S5B – secure breeding	None	Associated with forested habitats.		
Herring gull	*Larus argentatus*	S2N – imperiled non-breeding	None	Associated with water environments		
California gull	*Larus californicus*	S2B – imperiled breeding S3N – vulnerable non-breeding	None	Associated with water environments		
Ring-billed gull	*Larus delawarensis*	S2 – imperiled S3B – vulnerable breeding S3N – vulnerable non-breeding	None	Associated with water environments		
Franklin's gull	*Larus pipixcan*	S2B – imperiled breeding	None	Associated with water environments, although wintering habitat does include agricultural fields.		
Long-billed dowitcher	*Limnodromus scolopaceus*	S2N – imperiled non-breeding	None	Associated with water environments		
Marbled godwit	*Limosa fedoa*	S2N – imperiled non-breeding	None	Associated with grassy areas that are near or associated with water environments		
Hooded merganser	*Lophodytes cucullatus*	S2B – imperiled breeding S3N – vulnerable non-breeding	None	Associated with water environments		
Song sparrow	*Melospiza melodia*	S5B – secure breeding S5N – secure non-breeding	None	Found in a variety of habitats.	X	X
Northern mockingbird	*Mimus polyglottos*	S1B – critically imperiled breeding	None	Shrublands with open ground and can be found in sagebrush habitat.		X
Brown-headed cowbird	*Molothrus ater*	S5B – secure breeding	None	Found in a variety of open areas.	X	X
Clark's nutcracker	*Nucifraga columbiana*	S5- secure	None	Associated with forested habitat.		
Long-billed curlew	*Numenius americanus*	S2B – imperiled breeding	None	Dry grasslands and shrub savannahs, and agricultural fields	X	X
Black-crowned night-heron	*Nycticorax nycticorax*	S2B – imperiled breeding	None	Associated with water environments		
MacGillivray's warbler	*Oporonis tolmiei*	S5B – secure breeding	none	Dense thickets in riparian areas clear-cuts within forests		
Sage thrasher	*Oreoscoptes montanus*	S5B – secure breeding	none	Open shrub steppe habitat		X
Flammulated owl	*Otus flammeolus*	S3B – vulnerable breeding	none	Associated with forested habitat.		
Osprey	*Pandion haliaetus*	S5B – secure breeding	None	Near wetlands and estuaries. Rare along rivers in shrub steppe zone.		
Savannah sparrow	*Passerculus sandwichensis*	S5B – secure breeding	None	A variety of open habitats	X	X
Lazuli Bunting	*Passerina amoena*	S5B – secure breeding	None	Shrubby areas in forested zones.		

Common Name	Scientific Name	State Status[1]	Federal Status[1]	Preferred Habitat	Potential to Occur On Site	
					Development Site	Greater Parcel Area
American White Pelican	*Pelecanus erythrorhynchos*	S1B – critically imperiled breeding	None	Associated with water environments		
Cliff Swallow	*Petrochelidon pyrrhonota*	S5B – secure breeding	None	Farmland, wetlands, prairies, residential areas, road cuts and over water.	X	X
Double-crested cormorant	*Phalacrocorax auritus*	S2B – imperiled breeding	None	Associated with water environments		
Wilson's phalarope	*Phalaropus tricolor*	S3B – vulnerable breeding	None	Associated with water environments		
Black-headed grosbeak	*Pheucticus melanocephalus*	S5B – secure breeding	None	Associated with forested areas and riparian areas.		
Black-billed magpie	*Pica hudsonia*	S5- secure	None	Found in open country with large shrubs or trees for nesting		X
Three-toed woodpecker	*Picoides dorsalis*	S2 - Imperiled	None	Mature boreal conifer forests		
Downy woodpecker	*Picoides pubescens*	S5- secure	None	Associated with forested areas.		
Hairy woodpecker	*Picoides villosus*	S5- secure	None	Associated with forested areas.		
White-faced ibis	*Plegedis chihi*	S2B – imperiled breeding	None	Associated with water environments		
Black-bellied plover	*Pluvialis squatarola*	S2N – imperiled non-breeding	None	Associated with water environments		
Red-necked grebe	*Podiceps grisegena*	S2B – imperiled breeding	None	Associated with water environments		
Eared grebe	*Podiceps nigricollis*	S4B – apparently secure breeding	None	Associated with water environments		
Pied-billed grebe	*Podilymbus podiceps*	S4B – apparently secure breeding S3N – vulnerable non-breeding	none	Associated with water environments		
Black-capped chickadee	*Poecile atricapilla*	S5- secure	None	Forests, open woods, parks and disturbed areas.		
Sora	*Porzana carolina*	S5B – secure breeding	None	Associated with water environments		
Virgina Rail	*Rallus limicola*	S5B – secure breeding	None	Associated with water environments		
American Avocet	*Recurvirostra Americana*	S5B – secure breeding	None	Associated with water environments		
Northern waterthrush	*Seiurus noveboracensis*	S3? – vulnerable/inexact numeric rank	none	Forested areas adjacent to ponds or lakes.		
Rufous hummingbird	*Selasphorus rufus*	S5B – secure breeding	None	Shrubby and open areas, forest openings, yards, and parks.	X	X
Red-breasted nuthatch	*Sitta canadensis*	S5- secure	None	Mature, wet coniferous forests with closed canopies		
Brewer's sparrow	*Spizella breweri*	S3B – vulnerable breeding	None	Shrub steppe zone		X
Caspian tern	*Sterna caspia*	S2B – imperiled breeding	None	Associated with water environments		
Forster's tern	*Sterna forsteri*	S1B – critically impaired breeding	None	Associated with water environments		
Common tern	*Sterna hirundo*	S1B – critically impaired breeding	None	Associated with water environments		
Western meadowlark	*Sturnella neglecta*	S5B – secure breeding S3N – vulnerable non-breeding	None	Grasslands, shrub steppe and agricultural fields.	X	X
Lesser yellowlegs	*Tringa flavipes*	S2N – imperiled non-breeding	None	Breed in open boreal woods and often use large clearings or burned areas near ponds.		
Greater yellowlegs	*Tringa melanoleuca*	S2N – imperiled non-breeding	None	Boreal forests and fresh and saltwater wetland habitats.		
Solitary sandpiper	*Tringa solitaria*	SNA – A status rank is not applicable	None	Associated with water environments		
American robin	*Turdus migratorius*	S5B – secure breeding S3N – vulnerable non-breeding	None	Found in most habitats	X	X

	Common Name	Scientific Name	State Status[1]	Federal Status[1]	Preferred Habitat	Potential to Occur On Site	
						Development Site	Greater Parcel Area
	Columbian sharp-tailed grouse	*Tympanuchus phasianellus columbianus*	S1 – critically imperiled	none	Grass and shrub savanna.		X
	Eastern kingbird	*Tyrannus tyrannus*	S4B – apparently secure breeding	None	Open shrub steppe and agricultural areas.	X	X
	Orange-crowned warbler	*Vermivora celata*	S5B – secure breeding	None	Shrubby thickets and deciduous woodlands		
	Warbling vireo	*Vireo gilvus*	S5B – secure breeding	None	Open deciduous or shrubby mixed woodlands.		
	Red-eyed vireo	*Vireo olivaceus*	S5B – secure breeding	None	Deciduous woodlands.		
	Solitary vireo	*Vireo solitaries*	SNA – A status rank is not applicable	None	Associated with forested habitats		
	Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	S5B – secure breeding	None	Associated with wetland habitat.		
Mammals	Pygmy Rabbit	*Brachylagus idahoensis*	S2 - Imperiled	none	Sagebrush habitat		X
	Gray wolf	*Canis lupus*	S3- Vulnerable	XN	Most habitats where there is suitable food.		X
	Townsend's big-eared bat	*Corynorhinus townsendii*	S3- Vulnerable	none	Found in a variety of habitats.	X	X
	Big brown bat	*Eptesicus fuscus*	S4? – apparently secure/ inexact rank	none	Found in a variety of habitats.	X	X
	Northern flying squirrel	*Glaucomys sabrinus*	S4 – apparently secure	none	Coniferous and mixed forests.		
	North American wolverine	*Gulo gulo luscus*	S2 - Imperiled	C	Coniferous, mixed, and deciduous woodlands, bogs ad open mountain as well as tundra habitats.		
	Lynx	*Lynx canadensis*	S1 – critically imperiled	LT	Boreal forests and their main prey species, the snowshoe hare depends largely on patches of successional growth in older multi-layered stands.		
	Fisher	*Martes pennanti*	S1 – critically imperiled	none	Upland and lowland forests		
	Western small-footed myotis	*Myotis ciliolabrum*	S4? – apparently secure/ inexact rank	None	Rock outcrops on open grasslands to canyons in the foothills to lower mountains with yellow pine woodlands.	X	X
	Long-eared myotis	*Myotis evotis*	S3?- Vulnerable/inexact rank	None	Found in a wide variety of habitats but most common are mixed coniferous forests		
	Little brown myotis	*Myotis lucifugus*	S5- secure	None	Forested lands near water		
	Long-legged myotis	*Myotis Volans*	S3?- Vulnerable/inexact rank	None	Found in forested regions		
	Least chipmunk	*Neotamias minimus*	S5 - secure	None	Variety of habitats including sagebrush.	X	X
	Yellow pine chipmunk	*Neotamis amoenus*	S5- secure	None	Brushy areas interspersed with herbaceous vegetation and open conifer stands.		
	American Pika	*Ochotona princeps*	S5- secure	None	Talus and talus like formations adjoining a meadow		
	Golden-mantled ground squirrel	*Spermophilus lateralis*	S5- secure	None	Mountain slopes and foothills, rocky sagebrush country and campgrounds.		X
	Piute ground Squirrel	*Spermophilus mollis*	S2 - Imperiled	None	High desert including sagebrush habitat		X
	Red squirrel	*Tamiasciurus hudsonicus*	S5- secure	none	Coniferous and mixed forests		
	Kit fox	*Vulpes macrotis*	S1 – critically imperiled	none	Arid and semi-arid regions encompassing desert scrub, chaparral, halophytic, and grassland communities.		X

	Common Name	Scientific Name	State Status[1]	Federal Status[1]	Preferred Habitat	Potential to Occur On Site	
						Development Site	Greater Parcel Area
Invertebrates	A Mayfly	*Ameletus sparsatus*	S2 - Imperiled	none	Associated with freshwater		
	A Mayfly	*Centroptilum selanderorum*	S1 – critically imperiled	none	Cleared vegetation, slow moving waters		
	A mayfly	*Parameletus columbiae*	SNR – not ranked yet	none	Associated with freshwater		
	A Grasshopper	*Argiacris militaris*	S2 - Imperiled	none	Rocky areas with scant vegetation and above 8,000 feet		
	A stonefly	*Bolshecapnia milami*	S1 – critically imperiled	none	Associated with freshwater		
	A stonefly	*Isoperla bifurcata*	S1 – critically imperiled	none	Identified in Blaine County but, listed as extirpated/possibly extirpated		
	A stonefly	*Pictetiella expansa*	S2 - Imperiled	none	Associated with freshwater		
	A spring stonefly	*Malenka tina*	S2 - Imperiled	none	Associated with freshwater		
	Idaho Dunes Tiger Beetle	*Cicindela arenicola*	S2 - Imperiled	none	Restricted to inland sand dune systems		
	Green River pebblesnail	*Fluminicola coloradoensis*	S2 - Imperiled	none	Associated with freshwater		
	Columbia pebblesnail	*Fluminicola fuscus*	S1 – critically imperiled	none	Associated with freshwater		
	Rustic pondsnail	*Stagnicola hinkleyi*	S1 – critically imperiled	none	Associated with freshwater		
	Desert valvata	*Valvata utahensis*	S1 – critically imperiled	none	Associated with freshwater		

Notes:

1. State and federal status comes from the 2012 IDFG rare and sensitive species list by county.

C = Candidate, SNA = a conservation status rank is not applicable because the species is not a suitable target for conservation activities, LT = Listed Threatened, XN = Experimental population, non-essential: a population of a listed species designated by rule that is separate geographically from other populations of the same species.

Fish species are not listed in this table because no streams or other fish bearing waterbodies were identified during the field investigation.

The above list of species is from IDFG 2012 distribution of rare and sensitive species by County (IDFG 2012) and the USFWS species list for the project site (USDI-USFWS 2016).

Site visit conducted in the evening of April 18 and the morning of April 19, 2016 to observe habitat conditions.

TABLE B-2. BLAINE COUNTY FEDERAL- AND STATE-LISTED PLANTS

Common Name	Scientific Name	State Status[1]	Federal Status[1]	Preferred Habitat	Potential to Occur On Site	
					Development Site	Greater Parcel Area
Picabo Milkvetch	*Astragalus oniciformis*	S3 -Vulnerable	None	Sandy soils in the north-central portion of the eastern Snake River Plain		
Obscure phacelia	*Phacelia inconspicua*	S1- Critically Imperiled	None	Restricted to northeast to east facing aspects. Aspects range from 45 to 95 degrees. Grows in small gaps within shrubby vegetation.		
Marsh's Bluegrass	*Poa abbreviate ssp. marshii*	S1- Critically Imperiled	None	Soil pockets in alpine scree and talus		
Bugleg goldenweed	*Pyrrocoma insecticruris*	S3 -Vulnerable	None	Mountain meadows, sagebrush/grass, 5,000–6,000 feet elevation		X
False Mountain willow	*Salix pseudomonticola*	S1- Critically Imperiled	None	Wet meadows, stream banks, lake edges, etc.		

Notes:

1. State and federal status comes from the 2012 IDFG rare and sensitive species list by county.

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SNOW AVALANCHE HAZARD & MAPPING ANALYSIS

QUIGLEY CANYON RANCH, BLAINE COUNTY, IDAHO

Prepared for:

Mr. John Gaeddert
Mr. Noah Nemmers

Prepared by:

Arthur I. Mears, P.E., Inc.
Gunnison, Colorado

December, 2007

1. Objectives and Limitations

This report has the following **objectives**:

a. Revise and update mapping of design-magnitude[1] avalanche hazard areas for the proposed Quigley Canyon Ranch development; The revisions reflect improved topographic maps and updated analytical methods;
b. Delineation of "red" (high-hazard)[2] and "blue" (moderate-hazard)[3] zones within the avalanche-path boundaries mapped; and;
c. Discussion of land uses, risks and general practices for reducing avalanches hazards within and near the defined hazard zones.

This report also has the following **limitations**, which must be understood by all those relying on the results, conclusions, and recommendations:

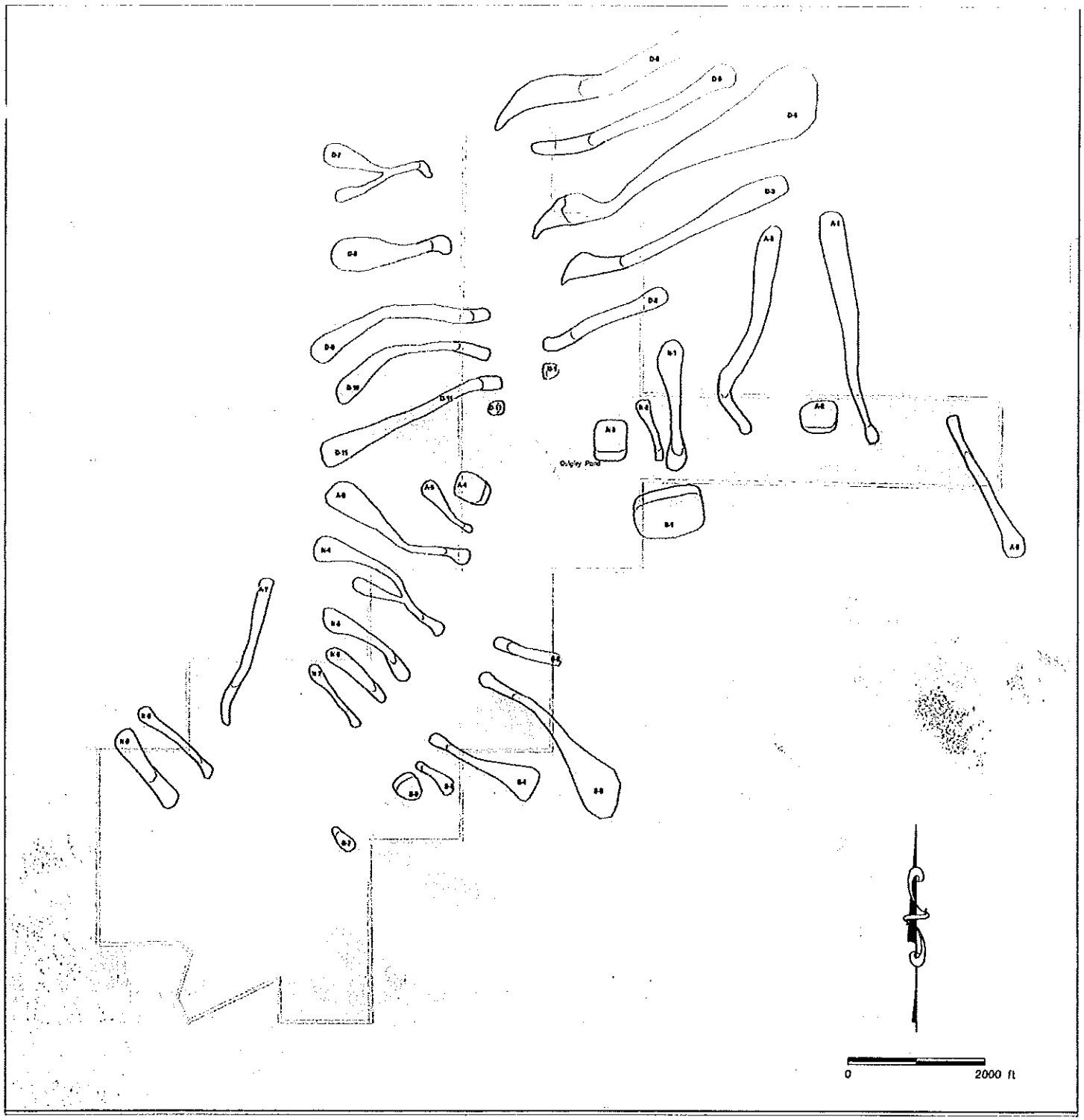
a. Avalanches larger than the design-magnitude event are possible, will travel farther, and possess greater impact forces; the probability of such events is small enough that it is generally considered within acceptable limits of risk in this location at this time for the type of land use proposed.
b. The study is site specific, thus it applies only to the areas previously identified where development was planned; and
c. Site specific mitigation of structures including buildings, roads, and parking areas are beyond the scope of this study.

---

[1] The *Design-Magnitude Avalanche* is defined in Blaine County as an avalanche with a return period of 100 years (a 1% annual probability). Due to lack of historic records and a short observation period, the 100-year event is a "nearest order of magnitude" estimate of the true return period, which probably is between 30 and 300 years.

[2] The *Blue Zone* is defined as an area where avalanches have a return period ranging from 30 to 100 years (3% to 1% annual probability) *and* where avalanches produce impact pressures of less than 600 lbs/ft^2 on a flat surface normal to flow.

[3] The *Red Zone* is an area where avalanches have a return period of 30 years or less *or* produce impact pressures of 600 lbs/ft^2 *or* greater on a flat surface normal to flow.



QUIGLEY CANYON RANCH

Design-magnitude snow avalanche mapping

This map is accompanied by the report "*SNOW AVALANCHE HAZARD & MAPPING ANALYSIS QUIGLEY CANYON RANCH, BLAINE COUNTY, IDAHO*" by A.I. Mears, dated December, 2007. This map should not be distributed without the report which forms an essential part of the study.

Figure 1

6. Avalanche Hazard Mitigation Recommendations

Some areas of the proposed development at Quigley Canyon Ranch are likely to be exposed to avalanche hazards of varying degrees. The most reliable form of mitigation is complete avoidance of the mapped hazard zones. Since the hazard boundaries are approximate and avalanches larger than the design magnitude event are possible, risks can be further reduced by placing structures away from hazard zone boundaries. All private or public buildings should avoid the red zone.

Development within the Blue zone is possible if structures are designed for the design magnitude loads and the developer and future owners and occupants accept the small risk that an avalanche larger than the design event is possible. Also, in any size avalanche, humans, animals, and property outside of the structure are not protected. Mitigation for structures within the Blue zone must be site and structure-specific and address the orientation of walls and roofs, as well as the dynamic response of the structure, the loading sequence and interaction between structural components, and variations in impact loading with height. Potential impacts of deflected avalanche flows must also be addressed.

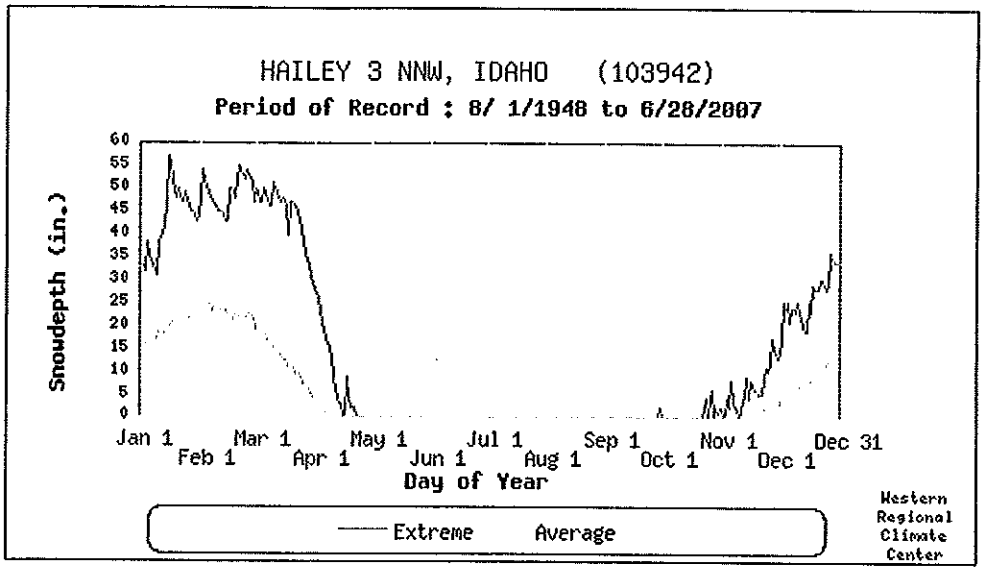
Earthen barriers may provide an alternative mitigation technique for some avalanche paths. The heights, lengths and orientation of earthen barriers must be designed specifically for the avalanche path and structures that it would protect.

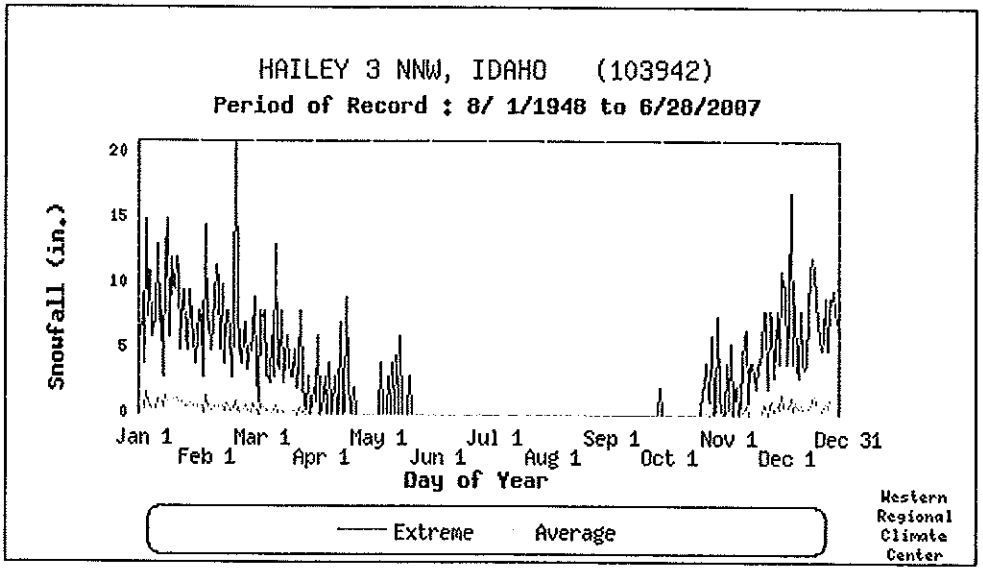
Public parking areas should avoid avalanche red zones. No Parking signs should be placed on roads where they cross avalanche hazard areas.

Risks associated with avalanches can be further reduced if residents are informed and educated about avalanche safety. It is prudent for anyone living in avalanche terrain to attend a Level 1 Avalanche Class certified by the American Avalanche Association. Residents should also be familiar with the local avalanche warning and advisory system. Residents should be trained and equipped for self rescue.

Appendix

Climate Data





Avalanche Path Geometry Summary

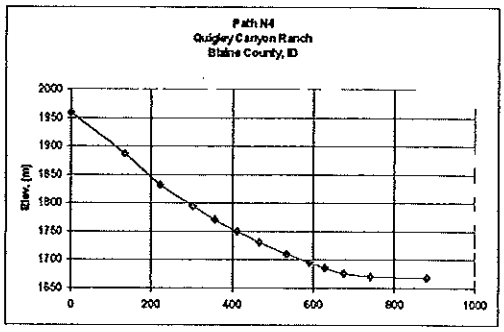
Quigley Canyon Ranches

Blaine County, Idaho

	Overall Path			Starting Zone						
Path Name	Length (ft)	Height (ft)	slope (deg)	Zone L (ft)	percent of path	slope (deg)	Aspect	Wind factor	d_0 (m)	Volume (m^3)
N-1	1902	670	19	238	13	29	S	1.0	0.87	6,600
N-2	897	350	21	169	19	28	S	1.0	0.88	2,800
N-3	597	270	24	153	26	32	S	1.0	0.85	5,700
N-4	2390	930	21	478	20	32	E-SE	1.2	1.02	15,500
N-5	1546	605	22	280	18	32	E	1.2	1.02	9,400
N-6	1074	510	25	210	20	30	SE	1.2	1.04	4,300
N-7	1087	430	22	216	20	31	SE	1.2	1.03	3,900
N-8	1395	510	20	256	18	30	SE	1.2	1.04	5,500
N-9	1370	500	20	301	22	31	SE	1.2	1.03	9,800
S-1	726	365	27	225	30	33	N-NW	1.1	0.92	16,900
S-2	1032	525	27	228	22	30	W-NW	1.0	0.87	3,400
S-3	2690	925	19	484	18	36	W-NW	1.0	0.81	23,600
S-4	1645	670	22	334	20	30	W-NW	1.0	0.87	13,000
S-5	658	360	29	142	22	30	NW	1.0	0.87	1,700
S-6	418	260	32	84	20	38	NW	1.0	0.79	1,500
S-7	433	220	27	87	20	31	NW	1.0	0.86	1,300
A-1	2200	260	25	440	20	32	S	1.0	0.85	12,700
A-2	470	250	28	94	20	33	S	1.0	0.84	3,600
A-3	3227	1400	23	450	15	30	S	1.0	0.87	10,300
A-4	576	310	30	115	20	36	E-SE	1.2	0.97	3,600
A-5	984	510	27	196	19	31	E-SE	1.2	1.03	4,400
A-6	2326	1080	25	465	20	31	E-SE	1.2	1.03	18,100
A-7	2200	950	23	396	18	31	S	1.0	0.86	6,100
A-8	2200	780	20	390	18	30	N-NW	1.0	0.87	9,500
D-1	228	130	29	46	20	36	W	1.0	0.81	600
D-2	4750	1930	22	880	19	29	S-SW	1.0	0.87	17,900
D-3	3520	1490	23	500	14	29	W-SW	1.0	0.87	12,700
D-4	4500	1930	23	720	16	30	W-SW	1.0	0.87	52,500
D-5	3220	1260	21	511	16	29	W-SW	1.0	0.87	13,500
D-6	4900	1920	21	490	11	30	W-SW	1.0	0.87	23,700
D-7	1620	570	19	324	20	28	E	1.2	1.06	11,000
D-8	1780	490	15	350	10	32	E	1.2	1.02	14,600
D-9	2800	860	17	505	18	31	E-NE	1.2	1.03	16,200
D-10	2550	885	19	468	18	30	E-NE	1.2	1.04	12,700
D-11	2890	1090	20	417	15	29	E-NE	1.2	1.05	15,500
D-12	234	130	29	47	20	33	E	1.2	1.01	700

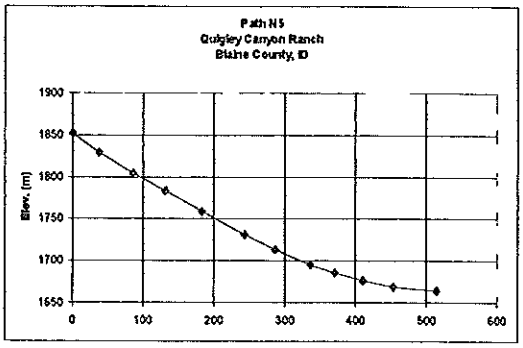
Quigley Canyon Ranch
Blaine County, Idaho
N4

delta-x	delta-z	x(ft)	z(ft)	w(ft)	x(m)	y(m)	z(m)	w(m)	phi (deg)	avg (deg)
	0	0	6425	365	0	0	1958	111		
	235	440	6190	270	134	0	1887	82	28	28.1
	180	730	6010	165	223	0	1832	50	32	29.6
	120	995	5890	135	303	0	1795	41	24	28.3
	80	1173	5810	110	358	0	1771	34	24	27.7
	70	1349	5740	105	411	0	1750	32	22	26.9
	60	1527	5680	80	465	0	1731	27	19	26.0
	70	1752	5610	85	534	0	1710	29	17	24.9
	50	1937	5560	100	590	0	1695	30	15	24.1
	30	2064	5530	105	629	0	1686	32	13	23.4
	30	2217	5500	130	676	0	1676	40	11	22.6
	20	2430	5460	160	741	0	1670	49	5	21.3
	8	2890	5472	180	881	0	1668	55	1	18.3



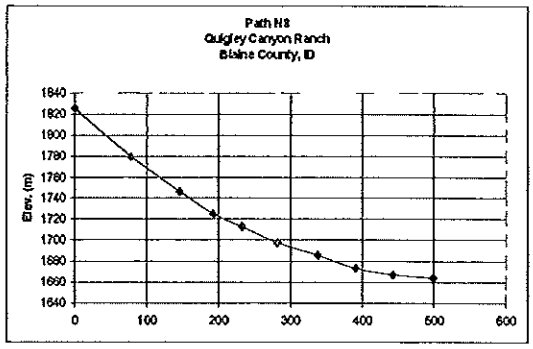
Quigley Canyon Ranch
Blaine County, Idaho
N5

delta-x	delta-z	x(ft)	z(ft)	w(ft)	x(m)	y(m)	z(m)	w(m)	phi (deg)	avg (deg)
	0	0	6075	285	0	0	1852	87		
	75	127	6000	325	39	0	1829	99	31	30.6
	80	280	5920	285	85	0	1804	87	28	29.0
	70	432	5850	220	132	0	1783	67	25	27.5
	80	603	5770	170	184	0	1759	52	25	26.8
	90	796	5680	140	243	0	1731	43	25	26.4
	60	939	5620	120	286	0	1713	37	23	25.9
	60	1102	5560	120	336	0	1695	37	20	25.0
	30	1215	5530	120	370	0	1686	37	15	24.2
	30	1348	5500	150	411	0	1676	46	13	23.1
	25	1487	5475	185	453	0	1669	56	10	22.0
	15	1689	5460	200	515	0	1664	61	4	20.0



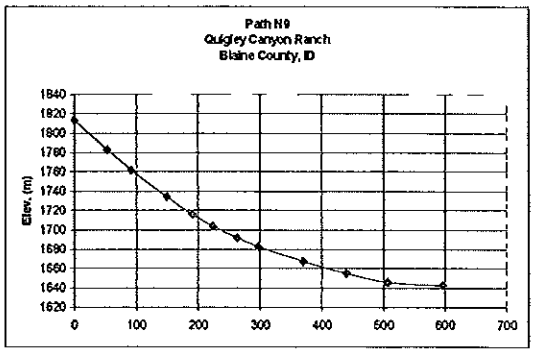
Quigley Canyon Ranch
Blaine County, Idaho
N8

delta-x	delta-z	x(ft)	z(ft)	w(ft)	x(m)	y(m)	z(m)	w(m)	phi (deg)	avg (deg)
	0	0	5990	220	0	0	1826	67		
	150	257	5840	165	78	0	1780	50	30	30.3
	110	478	5730	125	146	0	1747	38	26	28.6
	70	633	5660	130	193	0	1725	40	24	27.5
	40	765	5620	130	233	0	1713	40	17	25.8
	50	924	5570	120	282	0	1698	37	17	24.4
	40	1108	5530	110	338	0	1686	34	12	22.5
	40	1283	5490	110	391	0	1673	34	13	21.3
	20	1450	5470	115	442	0	1667	35	7	19.7
	10	1638	5460	120	499	0	1664	37	3	17.9



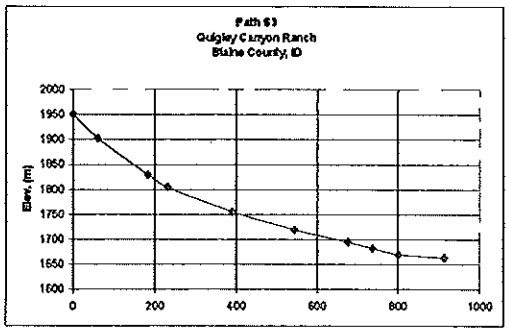
Quigley Canyon Ranch
Blaine County, Idaho
N9

delta-x	delta-z	x(ft)	z(ft)	w(ft)	x(m)	y(m)	z(m)	w(m)	phi (deg)	avg (deg)
	0	0	5950	280	0	0	1814	85		
	100	175	5850	310	53	0	1783	94	30	29.7
	70	301	5780	295	92	0	1762	90	29	29.5
	90	488	5690	234	149	0	1734	71	26	28.0
	60	624	5630	208	190	0	1716	63	24	27.2
	40	738	5590	200	225	0	1704	61	19	26.0
	40	864	5550	200	263	0	1692	61	18	24.8
	30	975	5520	200	297	0	1682	61	15	23.8
	50	1213	5470	200	370	0	1667	61	12	21.6
	40	1444	5430	220	440	0	1655	67	10	19.8
	30	1660	5400	240	506	0	1646	73	8	18.3
	10	1957	5390	260	596	0	1643	79	2	16.0



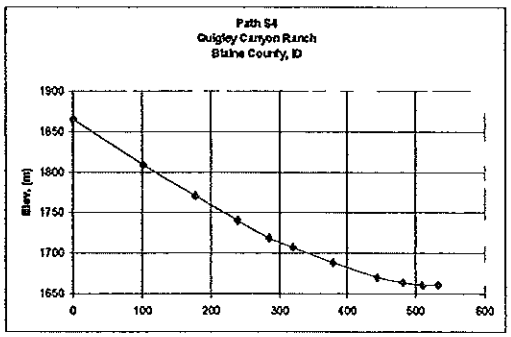
Quigley Canyon Ranch
Blaine County, Idaho

delta-x	delta-z	x(ft)	z(ft)	w(ft)	x(m)	y(m)	z(m)	w(m)	phi (deg)	avg (deg)
0	0	0	6400	750	0	0	1951	229		
200	160	200	6240	450	61	0	1902	137	39	38.7
600	240	600	6000	190	183	0	1829	58	31	33.7
760	80	760	5920	170	232	0	1804	52	27	32.3
1280	160	1280	5760	170	390	0	1756	52	17	26.6
1780	120	1780	5640	180	543	0	1719	55	13	23.1
2220	80	2220	5560	185	677	0	1695	56	10	20.7
2420	40	2420	5520	190	738	0	1682	58	11	20.0
2630	40	2630	5480	195	802	0	1670	59	11	19.3
3000	20	3000	5460	200	914	0	1664	61	3	17.4



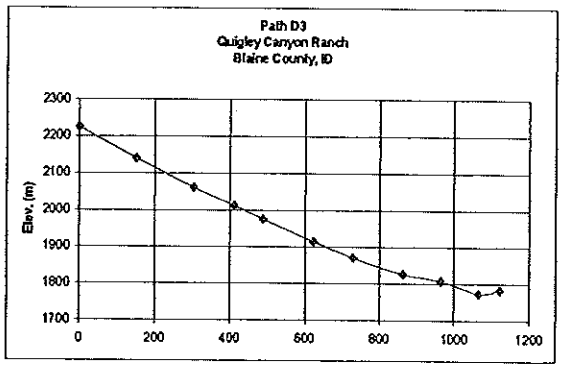
Quigley Canyon Ranch
Blaine County, Idaho

delta-x	delta-z	x(ft)	z(ft)	w(ft)	x(m)	y(m)	z(m)	w(m)	phi (deg)	avg (deg)
	0	0	6120	467	0	0	1865	142		
	185	333	5935	385	101	0	1809	117	29	29.1
	125	582	5810	245	177	0	1771	75	27	28.0
	100	782	5710	170	238	0	1740	52	27	27.7
	70	934	5640	150	285	0	1719	46	25	27.2
	40	1049	5600	130	320	0	1707	40	19	26.4
	60	1246	5540	130	380	0	1689	40	17	25.0
	60	1457	5480	120	444	0	1670	37	16	23.7
	20	1581	5460	160	482	0	1664	49	9	22.7
	10	1676	5450	170	511	0	1661	52	6	21.8
	0	1750	5450	180	533	0	1661	55	0	21.0

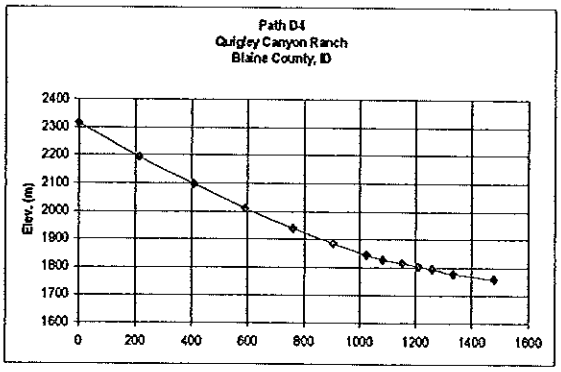


Quigley Canyon Ranch
Blaine County, Idaho
D3

delta-x	delta-z	x(ft)	z(ft)	w(ft)	x(m)	y(m)	z(m)	w(m)	phi (deg)	avg (deg)
0	0	0	7300	285	0	0	2225	87		
495	280	495	7020	350	151	0	2140	107	29	29.5
500	260	995	6760	285	303	0	2060	87	27	28.5
357	160	1352	6600	215	412	0	2012	66	24	27.4
252	120	1604	6480	190	489	0	1975	58	25	27.1
438	200	2042	6280	180	622	0	1914	55	25	26.5
352	140	2394	6140	210	730	0	1871	64	22	25.9
438	150	2832	5990	250	863	0	1826	76	19	24.8
333	60	3165	5930	300	965	0	1807	91	10	23.4
331	110	3496	5820	270	1066	0	1774	82	18	22.9
188	-30	3684	5850	240	1123	0	1783	73	-9	21.5

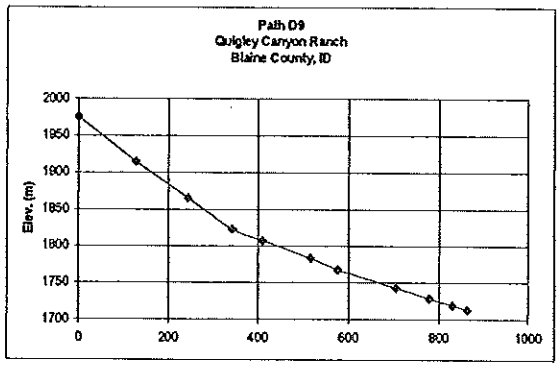


delta-x	delta-z	x(ft)	z(ft)	w(ft)	x(m)	y(m)	z(m)	w(m)	phi (deg)	avg (deg)
0	0	0	7600	650	0	0	2316	198		
698	400	698	7200	600	213	0	2195	183	30	29.8
642	320	1340	6880	300	408	0	2097	91	26	28.3
595	280	1935	6600	250	590	0	2012	76	25	27.3
554	240	2489	6360	230	759	0	1939	70	23	26.5
480	170	2969	6190	220	905	0	1887	67	20	25.4
391	140	3360	6050	200	1024	0	1844	61	20	24.8
193	50	3553	6000	180	1083	0	1829	55	15	24.2
228	40	3781	5960	175	1152	0	1817	53	10	23.4
191	40	3972	5920	170	1211	0	1804	52	12	22.9
155	30	4127	5890	160	1258	0	1795	49	11	22.5
247	60	4374	5830	160	1333	0	1777	49	14	22.0
476	60	4850	5770	140	1478	0	1759	43	7	20.7



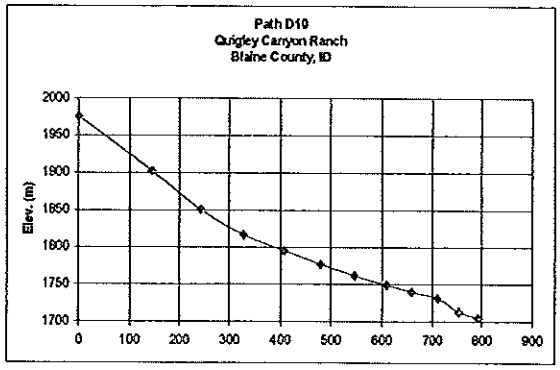
Quigley Canyon Ranch
Blaine County, Idaho
D9

delta-x	delta-z	x(ft)	z(ft)	w(ft)	x(m)	y(m)	z(m)	w(m)	phi (deg)	avg (deg)
0	0	0	6480	300	0	0	1975	91		
416	200	416	6280	300	127	0	1914	91	26	25.7
384	160	800	6120	220	244	0	1865	67	23	24.2
327	140	1127	5980	175	344	0	1823	53	23	23.9
218	50	1345	5930	180	410	0	1807	55	13	22.2
348	80	1693	5850	190	516	0	1783	58	13	20.4
201	50	1894	5800	190	577	0	1768	58	14	19.8
421	80	2315	5720	190	706	0	1743	58	11	18.2
240	50	2555	5670	192	779	0	1728	59	12	17.6
175	30	2730	5640	200	832	0	1719	61	10	17.1
107	20	2837	5620	210	865	0	1713	64	11	16.9



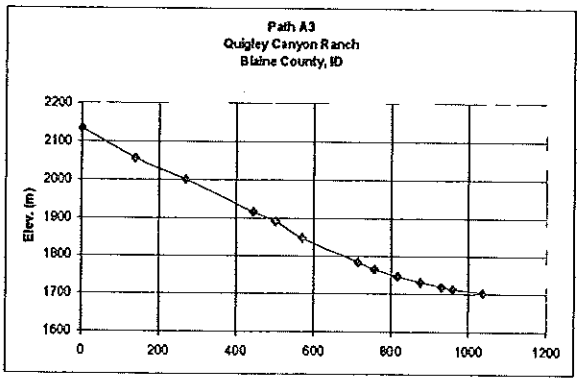
Quigley Canyon Ranch
Blaine County, Idaho
D10

delta-x	delta-z	x(ft)	z(ft)	w(ft)	x(m)	y(m)	z(m)	w(m)	phi (deg)	avg (deg)
0	0	0	6480	280	0	0	1975	85		
473	240	473	6240	280	144	0	1902	85	27	26.9
322	170	795	6070	210	242	0	1850	64	28	27.3
282	110	1077	5960	160	328	0	1817	49	21	25.8
260	70	1337	5890	120	408	0	1795	37	15	23.8
237	60	1574	5830	120	480	0	1777	37	14	22.4
219	50	1793	5780	120	547	0	1762	37	13	21.3
207	40	2000	5740	145	610	0	1750	44	11	20.3
166	30	2166	5710	165	660	0	1740	50	10	19.6
167	30	2333	5680	170	711	0	1731	52	10	18.9
142	60	2475	5620	175	754	0	1713	53	23	19.2
125	25	2600	5595	180	792	0	1705	55	11	18.8



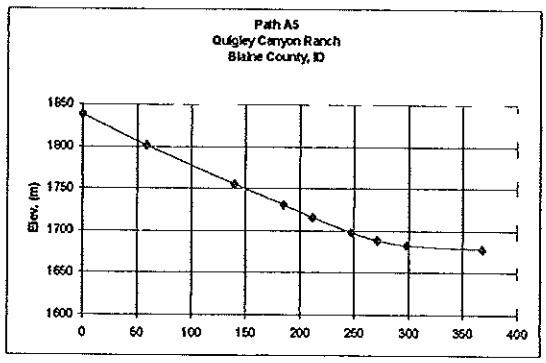
Quigley Canyon Ranch
Blaine County, Idaho
A3

delta-x	delta-z	x(ft)	z(ft)	w(ft)	x(m)	y(m)	z(m)	w(m)	phi (deg)	avg (deg)
0	0	0	7000	280	0	0	2134	85		
450	260	450	6740	320	137	0	2054	98	30	30.0
432	180	882	6560	270	269	0	1999	82	23	26.5
574	280	1456	6280	210	444	0	1914	64	26	26.3
189	80	1645	6200	210	501	0	1890	64	23	25.9
225	140	1870	6060	210	570	0	1847	64	32	26.7
476	210	2346	5850	180	715	0	1783	55	24	26.1
140	60	2486	5790	160	758	0	1765	49	23	26.0
195	60	2681	5730	140	817	0	1747	43	17	25.3
194	50	2875	5680	120	876	0	1731	37	14	24.7
175	40	3050	5640	110	930	0	1719	34	13	24.0
99	20	3149	5620	120	960	0	1713	37	11	23.7
251	30	3400	5590	150	1036	0	1704	46	7	22.5



Quigley Canyon Ranch
Blaine County, Idaho
A5

delta-x	delta-z	x(ft)	z(ft)	w(ft)	x(m)	y(m)	z(m)	w(m)	phi (deg)	avg (deg)
0	0	0	6030	220	0	0	1838	67		
193	120	193	5910	230	59	0	1801	70	32	31.9
265	150	458	5760	122	140	0	1756	37	30	30.6
148	80	606	5680	100	185	0	1731	30	28	30.0
88	50	694	5630	90	212	0	1716	27	30	30.0
119	60	813	5570	80	248	0	1698	24	27	29.5
78	30	891	5540	90	272	0	1689	27	21	28.8
88	20	979	5520	100	298	0	1682	30	13	27.5
229	15	1208	5505	110	368	0	1678	34	4	23.5



Traffic Impact Study

Quigley Development

Prepared for
Hennessy Company

Submitted by

LOCHNER

April 2016

PROFESSIONAL ENGINEER
REGISTERED
13139
4/19/16
STATE OF IDAHO
LEWIS E. VENARD

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I. INTRODUCTION AND SUMMARY

A. Purpose of the Report and Study Objectives

The purpose of this report is to assess the effects of the proposed Quigley Development on the surrounding transportation network and to determine the provisions needed for safe and efficient site access and accommodate traffic flow in the area. The scope of this study is in accordance with Idaho Transportation Department (ITD), "*Requirements for Transportation Impact Studies*", Board Policy B-12-06.

Existing traffic volumes and two horizon years have been analyzed for this study. In 2020, the Quigley Development is scheduled to be completed. Additionally, traffic in the horizon year of 2025 was analyzed to evaluate anticipated conditions five years after completion of the development.

B. Executive Summary

Location and Study Area
The Quigley Canyon Development is located on approximately 205 acres on the eastern edge of Hailey, Idaho. The project will use Fox Acres Road as a primary access to the proposed development. The following off-site intersections along Fox Acres Road have been analyzed as part of this study:

- Main Street (SH-75)
- Creekside Drive
- Woodside Blvd.
- Eastridge Drive
- Foxmoor Drive
- Wood River High School Driveways (South, Middle, and North)

The traffic distribution was assumed to be using Fox Acres Road and distributed to intersecting streets in the same proportions as existing traffic.

Development Description
The proposed Quigley development includes 51 detached homes and cottages, athletic fields, mixed-use retail/commercial and non-profit offices, a trailhead, lodging, and a school. The total area of the development is approximately 205 acres.

Principal Findings
The results of this traffic analysis indicate Fox Acres Road would provide sufficient access to the development. The project will not have any significant impacts to the intersections in the study area. As traffic volumes increase in the study area, the anticipated Level of service (LOS) will deteriorate to an "E" or "F" at some of the intersections along Fox Acres Road during peak hours in 2025. The largest increases in delay will occur at the minor legs of the SH-75 and Creekside intersections.

Study Area Improvements
A roundabout was recently constructed at the Woodside and Fox Acres intersection. To accommodate additional traffic generated by the Quigley Development, a second westbound right turn lane could be added to Fox Acres Road at SH-75, and an acceptance lane (two-way left turn lane) can be added for the turning movement at Creekside. All of these improvements can be constructed inside existing right-of-way. In order to achieve acceptable level of service for all

intersections throughout the analysis period, regardless of the development, will require improvements at over-capacity intersections.

Conclusions
The combination of the background traffic growth and traffic from the proposed Quigley Development will result in a peak hour LOS of "E" or worse for the Creekside and SH-75 intersections with Fox Acres Road by the year 2025. The most significant impact to traffic will be at the Fox Acres leg of the SH-75 intersection. Deteriorating conditions will occur with growth of the background traffic alone. With the development, conditions are worsened.

The improvements listed in this study will provide additional capacity to significantly improve traffic flow. The additional capacity will provide an improved LOS with development traffic compared to no improvements with background traffic.

II. PROPOSED DEVELOPMENT

A. Off-Site Development
There is no proposed off-site development related to this project.

B. Description of On-Site Development

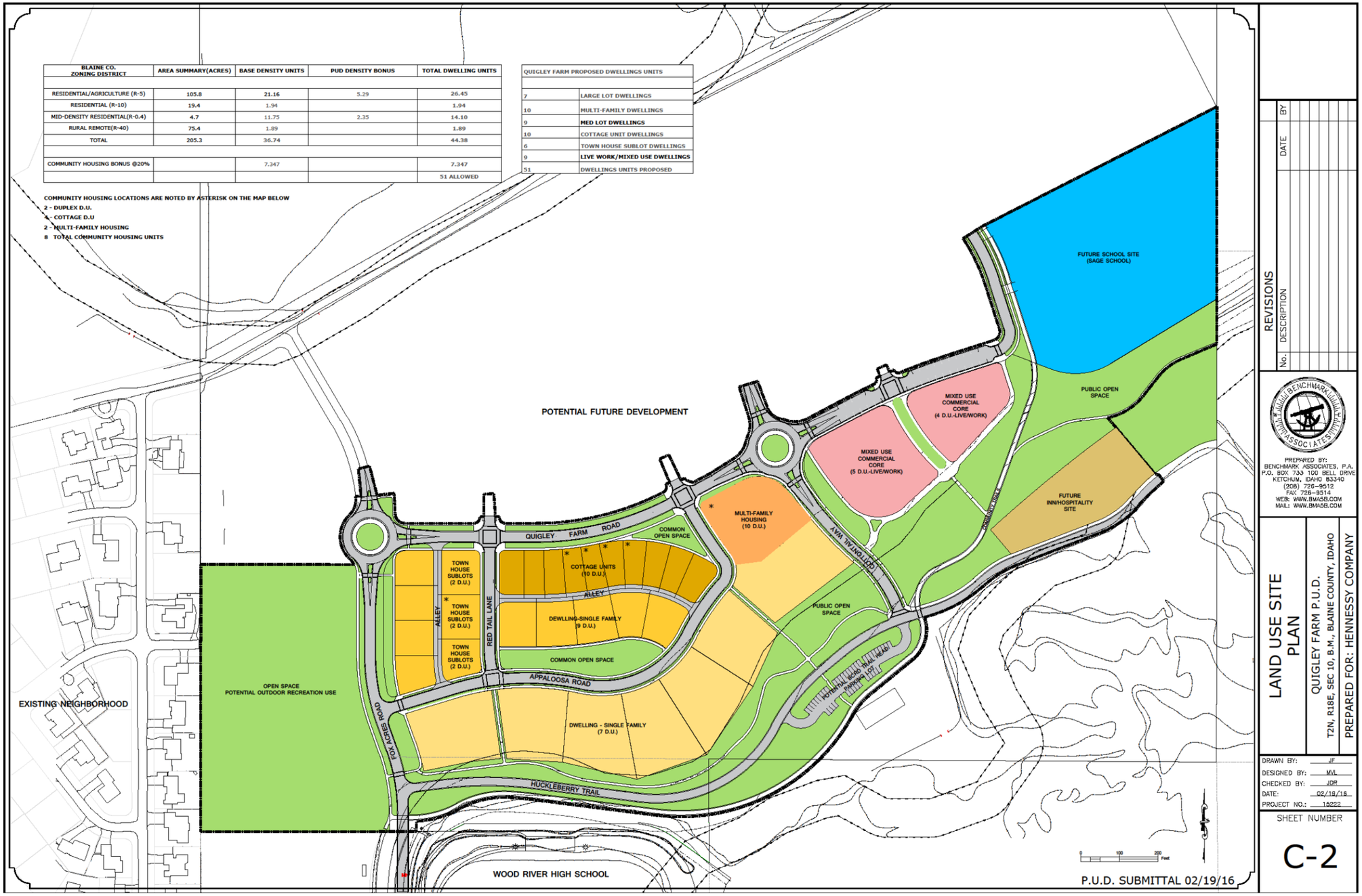
Land Use and Density
The Quigley development is located on approximately 205 acres of land. It includes the following proposed improvements:
Residential - 43 individual home building lots ranging from 1/8th to 3/4 acres in size and 8 cottages
Lodging – Bed & Breakfast with 20 rooms
School – Private school with 120 students and 20 employees
Athletic Fields – approximately 7 acres
Trailhead – new trailhead
Mixed Use – 7,500 sf of retail/commercial and 4,000 sf of non-profit offices

Location
The Quigley development is located east of Hailey in Blaine County, Idaho. The proposed development begins at the entrance to Quigley Canyon and extends approximately 1/2 mile east up Quigley Canyon. See Figure 1 for a location map of the proposed development.

Site Plan
See Figure 2 for a site plan of the proposed development.

Figure 1 – Location Map

Figure 2 – Development Plan



BLAINE CO. ZONING DISTRICT	AREA SUMMARY(ACRES)	BASE DENSITY UNITS	PUD DENSITY BONUS	TOTAL DWELLING UNITS
RESIDENTIAL/AGRICULTURE (R-5)	105.8	21.16	5.29	26.45
RESIDENTIAL (R-10)	19.4	1.94		1.94
MID-DENSITY RESIDENTIAL(R-0.4)	4.7	11.75	2.35	14.10
RURAL REMOTE(R-40)	75.4	1.89		1.89
TOTAL	205.3	36.74		44.38
COMMUNITY HOUSING BONUS @20%		7.347		7.347
				51 ALLOWED

QUIGLEY FARM PROPOSED DWELLINGS UNITS	
7	LARGE LOT DWELLINGS
10	MULTI-FAMILY DWELLINGS
9	MED LOT DWELLINGS
10	COTTAGE UNIT DWELLINGS
6	TOWN HOUSE SUBLOT DWELLINGS
9	LIVE WORK/MIXED USE DWELLINGS
51	DWELLINGS UNITS PROPOSED

COMMUNITY HOUSING LOCATIONS ARE NOTED BY ASTERISK ON THE MAP BELOW
2 - DUPLEX D.U.
4 - COTTAGE D.U
2 - MULTI-FAMILY HOUSING
8 TOTAL COMMUNITY HOUSING UNITS

III. AREA CONDITIONS

A. Study Area

The proposed project will use Fox Acres Road as a primary access to the proposed development. A secondary access will be constructed on Quigley Drive for emergency access only. The study area includes all of the intersections along Fox Acres Road between SH-75 and the Quigley development. These intersections are located at the following locations (see Figure 3):

- Main Street (SH-75)
- Creekside Drive
- Woodside Blvd.
- Eastridge Drive
- Foxmoor Drive
- Wood River High School Driveways (South, Middle, and North)

B. Study Area Land Use

Existing Land Use

The land uses surrounding the project site are single-family residential and Wood River High School. The commercial core of the City of Hailey is approximately 2.0 miles from the project site.

Anticipated Future Development

The City of Hailey is growing and there is little undeveloped area left in the vicinity of Quigley Canyon. There are a few vacant parcels north and west of Quigley Canyon. These are planned to be developed for residential use.

C. Site Accessibility/Study Area Roadway System

Fox Acres Road

Fox Acres Road is a collector, providing east/west access from State Highway 75 to residential neighborhoods and Wood River High School (WRHS). The speed limit for the entire length is 20 mph, and the school zone from west of Foxmoor to north of the WRHS south entrance is posted at 15 mph. Fox Acres Road is primarily a two-lane roadway with approximately 32 feet of pavement. At the SH-75 and Foxmoor Drive intersections, the pavement widens to approximately 40 feet to accommodate a left-turn lane in the median. The land uses adjacent to Fox Acres Road are low density residential and the Wood River High School.

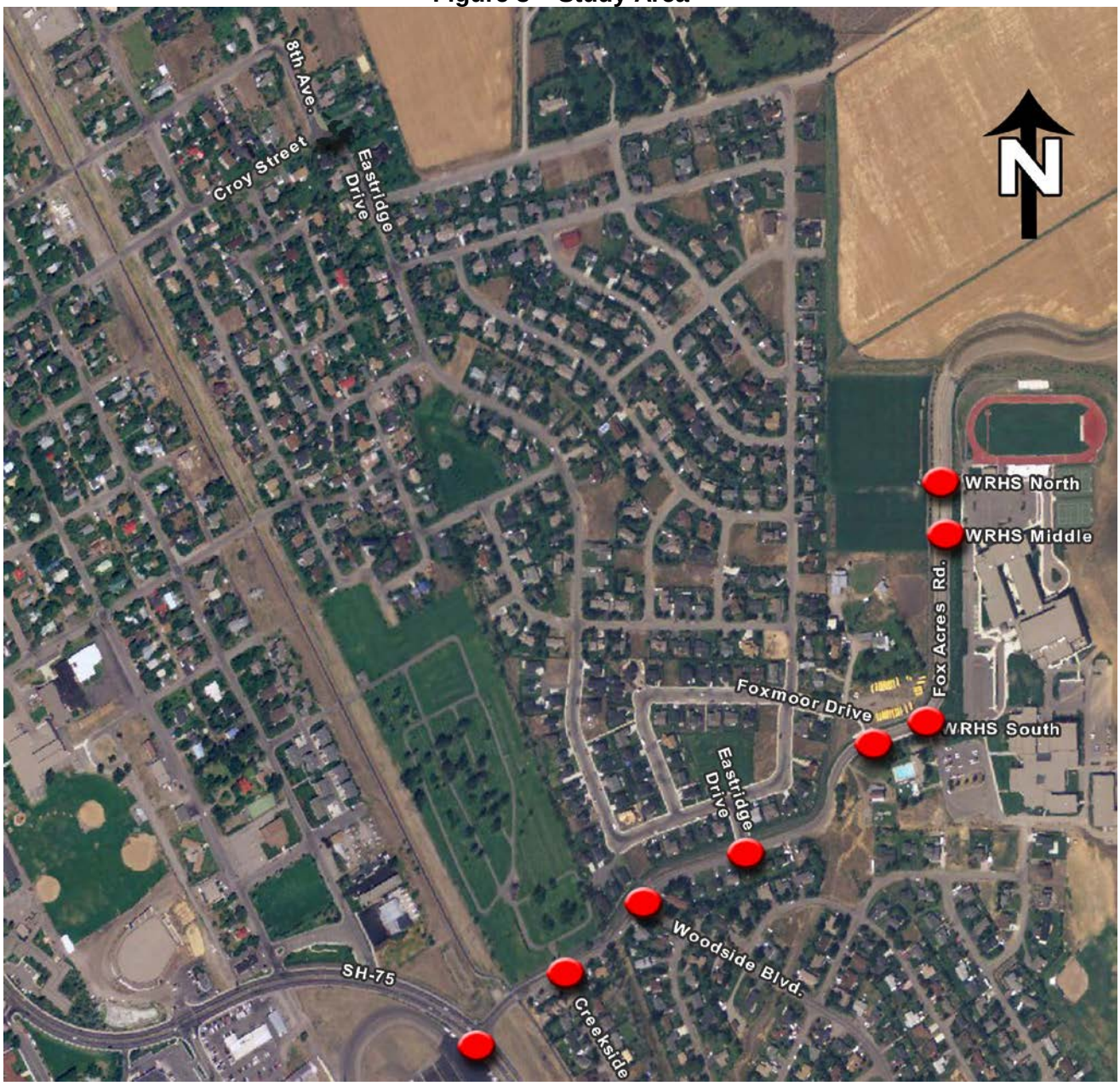
State Highway 75

State Highway 75 is a major arterial providing regional north/south access throughout the Wood River Valley. At the intersection of State Highway 75/Fox Acres Road, State Highway 75 is a five-lane arterial with two northbound lanes, two southbound lanes and one southbound left turn lane. The intersection of State Highway 75/Fox Acres Road is controlled by an ITD traffic signal.

Creekside Drive

Creekside Drive is a two-lane local roadway. It provides north/south residential access to Fox Acres Road. The pavement width is approximately 30 feet and the speed limit is 20 mph. The intersection of Creekside Drive and Fox Acres Road is stop controlled for Creekside Drive.

Figure 3 – Study Area



Woodside Boulevard

Woodside Blvd is a two-lane collector in the City of Hailey. Woodside Blvd provides north/south access through residential neighborhoods with a speed limit of 25 mph. Woodside Blvd. is bordered by single-family residential land uses in the vicinity of the project area. The pavement width is approximately 32 feet. The intersection of Woodside Blvd and Fox Acres Road is a roundabout.

Eastridge Drive

Eastridge Drive is a two-lane local roadway that provides north/south access from Fox Acres Road to Croy Street and 8th Avenue. Eastridge Drive has a pavement width of approximately 30 feet and a speed limit of 20 mph. Eastridge Dive is bordered by low-density residential developments. Eastridge Drive is stop controlled at the intersection with Fox Acres Road.

Foxmoor Drive
Foxmoor Dive is a two-lane local roadway. It provides access from the Foxmoor and Deerfield Subdivisions to Fox Acres Road. Foxmoor Drive has a pavement width of approximately 30 feet and a speed limit of 20 mph. It is bordered by low-density residential development. The intersection of Foxmoor Drive and Fox Acres Road is stop controlled for Foxmoor Drive.

Wood River High School/Blaine County Aquatic Center
Wood River High School and the Blaine County Aquatic Center are located at the east end of Fox Acres Road. They share a driveway on the south end of the campus. There are two additional driveways on the north end of the campus near the stadium. All three of the driveways are stop controlled where they intersect with Fox Acres Road

Existing Traffic volumes
AM and PM peak hour traffic data was collected for the intersections on Fox Acres Road. Volumes were collected for each turning movement during the hours of 7:00 am to 9:00 am and 4:00 pm to 6:00 pm on Tuesday, November 17, 2015, except PM peak volumes for the High School entrances were collected between 3:00 pm and 5:00 pm. The AM peak hour generally occurred from 7:30 am to 8:30 am. The PM peak hour varied by intersection. For most of the intersections, the PM peak hour began at roughly 5:00. The High School driveways' PM peek began at 3:15. For a conservative analysis approach, the PM peak hour for all of the intersections was assumed to occur at the same time. Existing traffic count data is included in the Appendix A.

Public transportation service
The Peak Bus, operated by South Valley Commuter Service, runs between Bellevue and Sun Valley. Buses run at approximately 30 minute headways during AM and PM peak hours and 2-3 hour headways during non-peak hours from 6:00 am to 8:00 pm. The route runs north-south along Woodside Blvd. and east-west along Fox Acres Road between SH-75 and Woodside Blvd. There are stops located on Fox Acres Road between Creekside Dr. and Woodside Blvd.

Pedestrian/Bicycle Facilities
A 10 foot wide mixed use path runs along the north side of Fox Acres Road from where the Wood River Trail crosses near the SH-75 intersection to where the road currently ends. Additional segments of sidewalk provide connectivity to the bus stops, Woodside Blvd., Foxmoor Dr., and the High School entrances.

IV. PROJECTED TRAFFIC

A. Site Traffic

Trip generation for the Quigley Canyon Development was estimated using data published in *Trip Generation, Ninth Edition, Institute of Transportation Engineers* (ITE), 2012. Land Use Code 210, *Single-Family Detached Housing* was utilized to calculate trip generation for residences. Code 310, *Hotel* was used for lodging. Code 411, *City Park*, was used for the athletic fields. Code 534, *Private School (K-8)*, was used for the school. Code 710, *General Office Building*, was used for the mixed-use, non-profit offices. Finally, Code 826, *Specialty Retail Center*, was used for the mixed-use retail. See Appendix A for ITE trip generation rates used in this study. Table 2 includes trip generation data for each type of land use including AM peak, PM peak, average weekday, and directional distribution volumes.

The proposed Quigley Canyon Development will be constructed in one phase, which is scheduled to be completed in 2020. Table 3 includes trip generation data for the development including AM peak, PM peak, average weekday, and directional distribution volumes.

Table 2 – Development Category Traffic Volumes

Traffic Generator	Houses	Lodging (rooms)	School (students)	Athletic Fields (acres)	Trailhead	Retail	Office	Total Traffic
Quantity	51	20	120	7	1	7500	4000	-
AM Peak Hour Traffic	39	11	108	32	16	52	6	264
In	10	6	59	18	12	25	5	135
Out	29	5	49	14	4	27	1	129
PM Peak Hour Traffic	51	12	72	25	16	38	6	220
In	32	6	34	14	4	21	1	112
Out	19	6	38	11	12	17	5	108
Average Weekday Traffic	488	148	180	56	164	332	44	1412

Table 3 – Development Traffic Volumes

Traffic Generators							Weekday Peak Hour Traffic						Average Weekday Traffic
							AM			PM			
					Mixed Use (sf)		In	Out	Total	In	Out	Total	
Houses	Lodging (rooms)	School (students)	Athletic Fields (acres)	Trailhead	Retail	Office	In	Out	Total	In	Out	Total	
51	20	120	7	1	7500	4000	135	129	264	112	108	220	1412

B. Background Traffic Forecast

Background traffic in the study area was divided into two categories: regional traffic traveling through the study area on SH-75, and traffic using Fox Acres Road. These two categories were used to project future background traffic based on existing growth patterns.

To develop future volumes for through movements on SH-75, a growth rate was calculated from ITD automatic traffic recorder data. Comparison of traffic volumes between 1996 and 2008 resulted in an average growth rate of 1.2% per year. This rate was used to forecast future background traffic volumes for each horizon year.

The predominant existing traffic generators on Fox Acres Road are residential neighborhoods and Wood River High School. With the limited amount of developable land near the study area, background residential traffic should not increase dramatically in the future. The high school will draw additional traffic as attendance increases. Between 1990 and 2000 the portion of Blaine County residents under 18 years old has remained the same at approximately 25%. This indicates that attendance at the high school will increase at the same rate as the population. The population in Blaine County has been increasing by approximately 3.5% annually. This rate was used for future traffic projections of background traffic on Fox Acres Road.

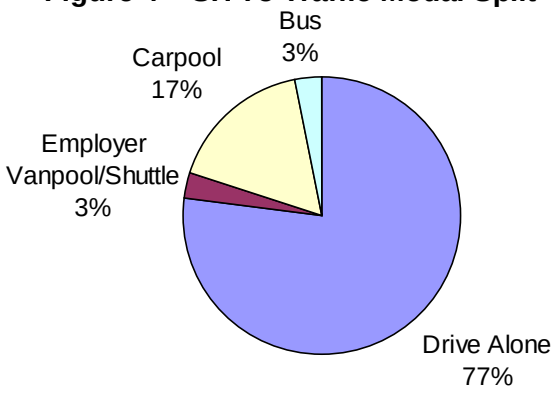
C. Trip Distribution

All of the generated traffic was distributed to the Fox Acres Road access. The proposed development is not anticipated to change the current distribution of traffic flow through the study area. In developing forecast volumes for each intersection, the future volumes were dispersed using the observed existing lane distribution. See the Appendix A for traffic volumes and lane distributions for each intersection and study horizon year.

D. Modal Split/Travel Demand Management (TDM)

ITD conducted a survey of commuters using the SH-75 corridor for the *Timmerman to Ketchum Environmental Analyses.* The results of this survey included the following modal split for the SH-75 corridor:

Figure 4 – SH-75 Traffic Modal Split



The Quigley development trip generation traffic volumes were not reduced to account for mode split. A conservative approach was taken considering the distance of the closest bus stop to the development and the uncertainty of vehicle trips on the local network for carpooling.

V. TRAFFIC ANALYSIS

A. Analysis Methodology

The study area intersections for the Quigley Development were analyzed using the methodologies presented in *Highway Capacity Manual 2010* edition. It provides a systematic and consistent basis for assessing the capacity and level of service of transportation facilities. Synchro v8 software was used to apply this methodology. Traffic models were developed and analyzed for AM and PM peak hours during existing conditions, Horizon Year (2020) with the project, Horizon Year (2020) without the project, Horizon Year (2025) with the project, and Horizon Year (2025) without the project.

Two Measures of Effectiveness (MOE's) were used to quantify intersection traffic conditions for the various scenarios. These MOE's were Level of Service (LOS) and intersection delay (seconds/vehicle). LOS is a simplistic approach to describe the effectiveness of a transportation facility by grouping levels of performance to a letter "grade". The three types of controlled intersections within the study area, signalized, roundabout, and two-way stop controlled, each require a separate methodology for analysis. For two-way stop controlled intersections, LOS is calculated by approaching lane groups only. Table 4 shows the average vehicle delay criteria used by the HCM 2010 to determine LOS for signalized intersections. Table 5 shows average vehicle delay for unsignalized intersections.

Average delay per vehicle calculated for intersections is also known as control delay. It is measured by comparing the travel time in seconds per vehicle of a movement that is controlled versus an uncontrolled condition. Comparison of delay between alternatives shows slight differences and quantifies excessive delays significantly higher than LOS E. Legs of an intersection that are free-flowing do not experience control delay and will not have values for "Delay" or "LOS" on Tables 6 and 7.

Table 4 – Signalized Intersection LOS Criteria

LOS	Average Delay (seconds/veh.)
A	≤ 10
B	> 10 to 20
C	> 20 to 35
D	> 35 to 55
E	> 55 to 80
F	> 80
Source: *Highway Capacity Manual* (Transportation Research Board, 2010)	

Table 5 – Unsignalized Intersection LOS Criteria

LOS	Average Delay (seconds/veh.)
A	≤ 10
B	> 10 to 15
C	> 15 to 25
D	> 25 to 35
E	> 35 to 50
F	> 50
Source: *Highway Capacity Manual* (Transportation Research Board, 2010)	

B. Analysis Results

A summary of the MOE's for the intersections within the study area for each of the horizon years analyzed and existing conditions is included in Tables 6 and 7. As can be seen from these tables, all of the study area intersections and movements currently operate at a LOS "C" or better under the existing traffic conditions. With addition of the Quigley development to the background traffic in horizon year 2020, the LOS at the SR-75 & Fox Acres intersection deteriorates to LOS "E." The other study area intersections all remain at LOS "D" or better.

During horizon year 2025, five years following completion of the Quigley development, the SH-75, Creekside, and Woodside intersections will have at least one approach that will deteriorate to an LOS of "E " or worse during peak hours. The highest delay would occur for the WB right movement at the SH-75 intersection. During the AM peak, there is not enough green time available to serve the high number of right turns.

Table 6 – AM Peak Traffic Analysis Results

Intersection	Approach	Traffic Control	2015		2020				2025			
			Existing		W/ Dev.		W/out Dev.		W/ Dev.		W/out Dev.	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
SR-75/ Fox Acres	SB	Signal	B	13.7	B	16.9	B	15.9	C	26.5	B	19.2
	NB	Signal	C	24.9	C	30.2	C	27.2	D	42.5	C	30.6
	WB	Signal	E	79.6	F	187.0	F	97.7	F	286.9	F	222.7
	Intersection		C	34.6	E	66.1	D	40.6	F	108.9	F	80.3
Creekside/ Fox Acres	NB	Stop	C	18.1	D	27.7	C	22.4	E	38.0	D	29.1
	EB	Free	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	WB	Free	A	8	A	8.4	A	8.2	A	8.6	A	8.4
	Intersection		N/A	0.8	N/A	1.1	N/A	1	N/A	1.6	N/A	1.3
Woodside/ Fox Acres	NE	Roundabout	A	7.0	A	9.5	A	8	B	10.9	A	9.1
	SW	Roundabout	A	8.7	B	14.6	B	10.7	C	19.4	B	13.5
	WB	Roundabout	B	12	C	22.2	C	16.5	E	39.3	D	25.2
	Intersection		A	9.5	C	15.7	B	12.2	C	24.0	C	16.8
Eastridge/ Fox Acres	SB	Stop	B	11.3	C	15.3	B	12.3	C	17.7	B	13.6
	EB	Free	A	7.7	A	8.1	A	7.8	A	8.3	A	8
	WB	Free	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Intersection		N/A	2.4	N/A	2.5	N/A	2.5	N/A	2.9	N/A	2.7
Foxmoor/ Fox Acres	SB	Stop	B	13.6	C	21.6	C	15.4	D	27.3	C	17.8
	EB	Free	A	7.7	A	8.2	A	7.8	A	8.3	A	7.9
	WB	Free	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Intersection		N/A	2.6	N/A	3.9	N/A	3	N/A	4.9	N/A	3.5
WRHS S/ Fox Acres	NB	Stop	B	12.9	C	19.7	B	14.5	D	24.6	C	16.8
	EB	Free	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	WB	Free	A	8.4	A	9.2	A	8.7	A	9.6	A	9
	Intersection		N/A	3.9	N/A	4.4	N/A	4.3	N/A	5.6	N/A	5
WRHS Mid/ Fox Acres	SB	Free	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	NB	Free	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	WB	Stop	A	9.2	B	10.6	A	9.3	B	10.7	A	9.4
	Intersection		N/A	1.1	N/A	0.4	N/A	1.1	N/A	0.4	N/A	1.1
WRHS N/ Fox Acres	SB	Free	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	NB	Free	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	WB	Stop	A	9.0	B	10.3	A	9	B	10.3	A	9
	Intersection		N/A	2.5	N/A	0.5	N/A	2.5	N/A	0.6	N/A	2.6

Table 7 – PM Peak Traffic Analysis Results

Intersection	Approach	Traffic Control	2015		2020				2025			
			Existing		W/ Dev.		W/out Dev.		W/ Dev.		W/out Dev.	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
SR-75/ Fox Acres	SB	Signal	A	5.9	B	11.7	A	7.9	B	17.9	B	10.4
	NB	Signal	B	11.5	B	17.3	B	14.3	B	19.2	B	17.1
	WB	Signal	D	37.5	D	41.9	D	38	D	45.7	D	41.1
	Intersection		B	10.8	B	17.3	B	13.2	C	22.5	B	16.1
Creekside/ Fox Acres	NB	Stop	C	16.1	C	22.1	C	18.8	D	26.9	C	22.5
	EB	Free	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	WB	Free	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Intersection		N/A	0.4	N/A	0.4	N/A	0.4	N/A	0.5	N/A	0.5
Woodside/ Fox Acres	NB	Roundabout	A	9.9	C	16.3	B	12.3	C	22.9	C	16
	SB	Roundabout	A	6.1	A	8.2	A	6.9	A	9.3	A	7.7
	WB	Roundabout	A	6.4	A	8.4	A	7.2	A	9.6	A	8.2
	Intersection		A	8.3	B	12.6	A	10	C	16.6	B	12.4
Eastridge/ Fox Acres	SB	Stop	A	9.7	B	11.1	B	10	B	11.6	B	10.3
	EB	Free	A	7.6	A	8.0	A	7.7	A	8	A	7.8
	WB	Free	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Intersection		N/A	2.2	N/A	1.9	N/A	2.3	N/A	2	N/A	2.3
Foxmoor/ Fox Acres	SB	Stop	B	11.0	B	13.6	B	11.6	B	14.5	B	12.1
	EB	Free	A	7.6	A	8	A	7.7	A	8.1	A	7.8
	WB	Free	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Intersection		N/A	1.5	N/A	1.7	N/A	1.6	N/A	1.9	N/A	1.6
WRHS S/ Fox Acres	NB	Stop	B	11.9	C	16.1	B	12.9	C	18.5	B	14.2
	EB	Free	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	WB	Free	A	7.6	A	8	A	7.7	A	8.1	A	7.8
	Intersection		N/A	4.5	N/A	4.4	N/A	4.9	N/A	5.3	N/A	5.4
WRHS Mid/ Fox Acres	SB	Free	A	7.3	A	7.5	A	7.3	A	7.5	A	7.3
	NB	Free	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	WB	Stop	A	9.6	B	11.1	A	9.8	B	11.4	A	9.9
	Intersection		N/A	5.0	N/A	2.5	N/A	5.1	N/A	2.8	N/A	5.2
WRHS N/ Fox Acres	SB	Free	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	NB	Free	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	WB	Stop	A	9.1	B	10.4	A	9.2	B	10.4	A	9.3
	Intersection		N/A	7.3	N/A	2.1	N/A	7.4	N/A	2.4	N/A	7.4

C. Traffic Safety

Current traffic conditions on Fox Acres Road operate acceptably, at an LOS of “C” or better. As volumes increase, improvements should be constructed to continually provide a safe facility. As delay increases, drivers tend to become frustrated and attempt to enter free-flowing traffic with smaller gaps than they normally would, potentially causing accidents.

VI. IMPROVEMENT ANALYSIS

A. Study Area Improvements

The analysis results shown in Section V indicate that as traffic volumes increase in the study area, the anticipated LOS will deteriorate at some of the intersections during peak hours in 2025. The largest increases in delay will occur at the minor legs of the SH-75 and Creekside intersections. To accommodate additional traffic generated by the Quigley development, capacity improvements could be constructed at those intersections. The following capacity and safety improvements were added to the study traffic model and analyzed for the 2020 and 2025 horizon years:

- Second westbound right turn lane on Fox Acres Road at the SR-75 intersection.
- Northbound to westbound acceptance lane (TWLTL) at the Creekside intersection.

These improvements can be constructed inside existing right-of-way. The widening for the additional right turn lane at the SH-75 intersection could be constructed to the south to avoid the existing curb, gutter, and signal equipment on the north corner. The existing right-of-way for Fox Acres Road and Woodside Blvd. is 80 feet wide, ample room for a two-way left turn lane west of the Creekside intersection.

B. Improvement Analysis Results

The improvements listed above would reduce delay in the study area. Table 8 includes a summary of the MOE's from the analysis of the study intersections with these enhancements. The improvements provide additional capacity to significantly improve the LOS and reduce delay. Analysis of the study area indicates that additional traffic from the Quigley development and the improvements listed above provide an improved LOS compared to the scenario of no development on the existing transportation network.

Table 8 – AM/PM Improvement Traffic Analysis Results

Intersection	Approach	Traffic Control	2020 AM		2020 PM		2025 AM		2025 PM	
			W/ Dev.		W/ Dev.		W/ Dev.		W/ Dev.	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
SR-75/ Fox Acres	SB	Signal	B	14.1	A	6.0	B	15.4	A	7.6
	NB	Signal	C	20.3	B	11.1	C	28.4	B	12.7
	WB	Signal	D	35.0	C	34.1	E	56.4	C	34.0
	Intersection		C	22.3	B	11.2	C	33.1	B	12.8
Creekside/ Fox Acres	NB	Stop	C	17.3	C	15.7	C	19.6	C	17.3
	EB	Free	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	WB	Free	A	8.4	N/A	N/A	A	8.6	N/A	N/A
	Intersection		N/A	0.7	N/A	0.3	N/A	0.8	N/A	0.3
Woodside/ Fox Acres	NE	Roundabout	A	9.5	C	16.3	B	10.9	C	22.9
	SW	Roundabout	B	14.6	A	8.3	C	19.4	A	9.3
	WB	Roundabout	C	22.2	A	8.4	E	39.3	A	9.6
	Intersection		C	15.7	B	12.6	C	24.0	C	16.6
Eastridge/ Fox Acres	SB	Stop	C	15.3	B	11.1	C	17.7	B	11.6
	EB	Free	A	8.1	A	8.0	A	8.3	A	8
	WB	Free	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Intersection		N/A	2.5	N/A	1.9	N/A	2.9	N/A	2
Foxmoor/ Fox Acres	SB	Stop	C	21.6	B	13.6	D	27.3	B	14.5
	EB	Free	A	8.2	A	8	A	8.3	A	8.1
	WB	Free	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Intersection		N/A	3.9	N/A	1.7	N/A	4.9	N/A	1.9
WRHS S/ Fox Acres	NB	Stop	C	19.7	C	16.1	D	24.6	C	18.5
	EB	Free	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	WB	Free	A	9.2	A	8	B	9.6	A	8.1
	Intersection		N/A	4.4	N/A	4.4	N/A	5.6	N/A	5.3
WRHS Mid/ Fox Acres	SB	Free	N/A	N/A	A	7.5	N/A	N/A	A	7.5
	NB	Free	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	WB	Stop	B	10.6	B	11.1	B	10.7	B	11.4
	Intersection		N/A	0.4	N/A	2.5	N/A	0.4	N/A	2.8
WRHS N/ Fox Acres	SB	Free	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	NB	Free	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	WB	Stop	B	10.3	B	10.4	B	10.3	B	10.4
	Intersection		N/A	0.5	N/A	2.1	N/A	0.6	N/A	2.4

C. Planned Improvements

The ITD *Timmerman to Ketchum* Project includes improvements to SH-75 that would improve traffic flow in the study area. Through-traffic flow on SR-75 will be improved with a consistent five lane typical section. The Country Side Road intersection will be widened to improve access to SH-75. This improvement to Country Side Road will draw traffic that is currently accessing SH-75 via Fox Acres Road. These improvements proposed by ITD were not accounted for in this study as the project is delayed. They should provide benefits to all of the traffic scenarios analyzed.

VII. CONCLUSIONS/RECOMENDATIONS

A. Site Accessibility

The Quigley development is proposing to utilize Fox Acres Road as the primary access to the project. Fox Acres Road and the connection to State Highway 75 are appropriate facilities for this development. The project will also construct a connection to Quigley Drive for emergency access.

B. Traffic Impacts

The combination of the background traffic growth and traffic from the proposed Quigley development will result in a peak hour LOS of “E” or worse for two intersections by the year 2025. The most significant impacts to traffic will be at the minor legs of the SH-75 and Creekside intersections. As the gaps in traffic are reduced with an increase in congestion, cars are less able to access Fox Acres Road and SH-75.

C. Need for Improvements

The planned improvements by ITD on SH-75 will reduce traffic volumes on Fox Acres Road and improve flow on SH-75. The improvements listed in Section VI will provide additional capacity in the study area to significantly improve traffic flow. Comparing the traffic analysis results on Table 8 with the results on Tables 6 and 7 reveals that if the listed improvements were constructed, the study area would experience a similar LOS to conditions without the development. The proposed improvements would provide a better LOS for the minor approaches at the Creekside and SH-75 intersections.

TECHNICAL APPENDIX

APPENDIX A – EXISTING TRAFFIC & FORECAST VOLUMES

APPENDIX B – EXISTING ANALYSIS RESULTS

APPENDIX C – 2020 ANALYSIS RESULTS

APPENDIX D – 2025 ANALYSIS RESULTS

APPENDIX E – IMPROVEMENT ANALYSIS RESULTS

APPENDIX A – EXISTING TRAFFIC & FORECAST VOLUMES

SR-75 & Fox Acres

AM Peak Hour

				Build Traffic Volumes				No-Build Traffic Volumes			
Movement	Existing 2015 Traffic	Existing 2015 Peds	Lane Dist.	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds
NBL			0.0%								
NBT	970	0	90.6%	1028	0	1086	0	1028	0	1086	0
NBR	101		9.4%	127		133		107		113	
SBL	220		36.4%	276		290		233		246	
SBT	384	0	63.6%	407	0	430	0	407	0	430	0
SBR			0.0%								
EBL											
EBT		0			0		0		0		0
EBR											
WBL	59		11.6%	72		91		63		82	
WBT		0	0.0%								
WBR	451		88.4%	549		698		478		627	

PM Peak Hour

				Build Traffic Volumes				No-Build Traffic Volumes			
Movement	Existing 2015 Traffic	Existing 2015 Peds	Lane Dist.	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds
NBL			0.0%								
NBT	384	0	86.5%	407	0	430	0	407	0	430	0
NBR	60		13.5%	73		76		64		67	
SBL	424		29.2%	509		534		449		475	
SBT	1026	0	70.8%	1088	0	1149	0	1088	0	1149	0
SBR			0.0%								
EBL											
EBT		0			0		0		0		0
EBR											
WBL	46		18.0%	65		73		55		64	
WBT		0	0.0%		0		0		0		0
WBR	210		82.0%	298		336		253		290	

SR-75 Growth Rate (%/Yr) = 1.2

Creekside & Fox Acres

AM Peak Hour

				Build Traffic Volumes				No-Build Traffic Volumes			
Movement	Existing 2015 Traffic	Existing 2015 Peds	Lane Dist.	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds
NBL	34		87.2%	40		46		40		46	
NBT		0	0.0%		0		0		0		0
NBR	5		12.8%	7		8		6		7	
SBL											
SBT		0			0		0		0		0
SBR											
EBL			0.0%								
EBT	317	1	98.8%	436	1	491	1	372	1	428	1
EBR	4		1.2%	5		5		5		5	
WBL	2		0.4%	2		3		2		3	
WBT	491	0	99.6%	657	0	743	0	577	0	663	0
WBR			0.0%								

PM Peak Hour

				Build Traffic Volumes				No-Build Traffic Volumes			
Movement	Existing 2015 Traffic	Existing 2015 Peds	Lane Dist.	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds
NBL	16		100.0%	19		22		19		22	
NBT		0	0.0%		0		0		0		0
NBR	1		5.9%	1		1		1		1	
SBL											
SBT		0			0		0		0		0
SBR											
EBL	0		0.0%								
EBT	467	0	91.7%	617	0	699	0	549	0	630	0
EBR	42		8.3%	49		57		49		57	
WBL	0		0.0%	0		0		0		0	
WBT	246	0	100.0%	344	0	387	0	289	0	332	0
WBR			0.0%								

Growth Rate (%/Yr.) = 3.5

Woodside & Fox Acres

AM Peak Hour

				Build Traffic Volumes				No-Build Traffic Volumes			
Movement	Existing 2015 Traffic	Existing 2015 Peds	Lane Dist.	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds
NBL	291		74.4%	342		393		342		393	
NBT		0	0.0%		0		0		0		0
NBR	100		25.6%	143		161		118		135	
SBL											
SBT					0		0		0		0
SBR											
EBL			0.0%								
EBT	250	0	77.9%	359	0	402	0	294	0	338	0
EBR	71		22.1%	83		96		83		96	
WBL	47		19.3%	75		83		55		63	
WBT	197	0	80.7%	312	0	346	0	231	0	266	0
WBR			0.0%								

PM Peak Hour

				Build Traffic Volumes				No-Build Traffic Volumes			
Movement	Existing 2015 Traffic	Existing 2015 Peds	Lane Dist.	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds
NBL	118		70.2%	139		159		139		159	
NBT		0	0.0%		0		0		0		0
NBR	50		29.8%	76		84		59		68	
SBL											
SBT					0		0		0		0
SBR											
EBL			0.0%								
EBT	207	0	44.6%	312	0	348	0	243	0	279	0
EBR	257		55.4%	302		347		302		347	
WBL	72		35.0%	114		126		85		97	
WBT	134	0	65.0%	213	0	236	0	157	0	181	0
WBR			0.0%								

Growth Rate (%/Yr.) = 3.5

Eastridge & Fox Acres

AM Peak Hour

Movement	Existing 2015 Traffic	Existing 2015 Peds	Lane Dist.	Build Traffic Volumes 2020 Traffic	2020 Peds	2025 Traffic	2025 Peds	No-Build Traffic Volumes 2020 Traffic	2020 Peds	2025 Traffic	2025 Peds
NBL											
NBT		0			0		0		0		0
NBR											
SBL	21		21.2%	31		35		25		28	
SBT		0	0.0%		0		0		0		0
SBR	78		78.8%	92		105		92		105	
EBL	37		11.1%	43		50		43		50	
EBT	295	0	88.9%	437	0	489	0	347	0	398	0
EBR			0.0%								
WBL			0.0%								
WBT	166	10	98.8%	295	12	324	14	195	12	224	14
WBR	2		1.2%	4		4		2		3	

PM Peak Hour

Movement	Existing 2015 Traffic	Existing 2015 Peds	Lane Dist.	Build Traffic Volumes 2020 Traffic	2020 Peds	2025 Traffic	2025 Peds	No-Build Traffic Volumes 2020 Traffic	2020 Peds	2025 Traffic	2025 Peds
NBL											
NBT		0			0		0		0		0
NBR											
SBL	4		6.1%	7		8		5		5	
SBT		1	0.0%		1		1		1		1
SBR	62		93.9%	73		84		73		84	
EBL	44	0	18.4%	52	0	59	0	52	0	59	0
EBT	195		81.6%	314		348		229		263	
EBR			0.0%								
WBL			0.0%								
WBT	130	7	97.7%	237	8	260	9	153	8	176	9
WBR	3		2.3%	6		6		4		4	

Growth Rate (%/Yr.) = 3.5

Foxmoor & Fox Acres

AM Peak Hour

				Build Traffic Volumes				No-Build Traffic Volumes			
Movement	Existing 2015 Traffic	Existing 2015 Peds	Lane Dist.	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds
NBL											
NBT		0			0		0		0		0
NBR											
SBL	124		98.4%	184		205		146		167	
SBT		0	0.0%		0		0		0		0
SBR	2		1.6%	2		3		2		3	
EBL	2		0.6%	2		3		2		3	
EBT	319	0	99.4%	472	0	528	0	375	0	431	0
EBR			0.0%								
WBL			0.0%								
WBT	164	0	78.1%	294	0	322	0	193	0	221	0
WBR	46		21.9%	82		90		54		62	

PM Peak Hour

				Build Traffic Volumes				No-Build Traffic Volumes			
Movement	Existing 2015 Traffic	Existing 2015 Peds	Lane Dist.	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds
NBL											
NBT		0					0				0
NBR											
SBL	55		96.5%	89		99		65		74	
SBT		1	0.0%		1		1		1		1
SBR	2		3.5%	2		3		2		3	
EBL	1		0.5%	1		1		1		1	
EBT	195	2	99.5%	317	2	351	3	229	2	263	3
EBR			0.0%								
WBL			0.0%								
WBT	134	4	80.2%	244	5	268	5	157	5	181	5
WBR	33		19.8%	60		66		39		45	

Growth Rate (%/Yr.) = 3.5

WRHS South Driveway & Fox Acres

AM Peak Hour

				Build Traffic Volumes				No-Build Traffic Volumes			
Movement	Existing 2015 Traffic	Existing 2015 Peds	Lane Dist.	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds
NBL	191		99.5%	224		258		224		258	
NBT		0	0.0%		0		0		0		0
NBR	1		0.5%	1		1		1		1	
SBL											
SBT											
SBR											
EBL			0.0%								
EBT	78	0	17.7%	227	0	240	0	92	0	105	0
EBR	363		82.3%	427		490		427		490	
WBL	8		33.3%	9		11		9		11	
WBT	16		66.7%	148	0	151		19	0	22	
WBR			0.0%								

PM Peak Hour

				Build Traffic Volumes				No-Build Traffic Volumes			
Movement	Existing 2015 Traffic	Existing 2015 Peds	Lane Dist.	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds
NBL	182		99.5%	214		246		214		246	
NBT		1	0.0%		1		1		1		1
NBR	1		0.5%	1		1		1		1	
SBL											
SBT											
SBR											
EBL			0.0%								
EBT	18	25	10.2%	133	29	136	34	21	29	24	34
EBR	158		89.8%	186		213		186		213	
WBL	3		2.4%	4		4		4		4	
WBT	123		97.6%	253		274		145		166	
WBR			0.0%								

Growth Rate (%/Yr.) = 3.5

WRHS Middle Driveway & Fox Acres

AM Peak Hour

				Build Traffic Volumes				No-Build Traffic Volumes			
Movement	Existing 2015 Traffic	Existing 2015 Peds	Lane Dist.	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds
NBL			0.0%								
NBT	32	2	37.6%	173	2	178	3	38	2	43	3
NBR	53		62.4%	62		72		62		72	
SBL			0.0%	0		0		0		0	
SBT	13	4	100.0%	145	5	148	5	15	5	18	5
SBR			0.0%								
EBL											
EBT											
EBR											
WBL	12		92.3%	14		16		14		16	
WBT		0	0.0%		0		0		0		0
WBR	1		7.7%	1		1		1		1	

PM Peak Hour

				Build Traffic Volumes				No-Build Traffic Volumes			
Movement	Existing 2015 Traffic	Existing 2015 Peds	Lane Dist.	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds
NBL			0.0%								
NBT	13	1	68.4%	127	1	130	1	15	1	18	1
NBR	6		31.6%	7		8		7		8	
SBL	1		2.0%	1		1		1		1	
SBT	50	0	98.0%	167	0	177	0	59	0	68	0
SBR			0.0%								
EBL											
EBT											
EBR											
WBL	76		100.0%	89		103		89		103	
WBT		0	0.0%		0		0		0		0
WBR	0		0.0%	0		0		0		0	

Growth Rate (%/Yr.) = 3.5

WRHS North Driveway & Fox Acres

AM Peak Hour

				Build Traffic Volumes				No-Build Traffic Volumes			
Movement	Existing 2015 Traffic	Existing 2015 Peds	Lane Dist.	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds
NBL			0.0%								
NBT		0	0.0%	135	0	135	0		0		0
NBR	33		100.0%	39		45		39		45	
SBL											
SBT				129		129					
SBR											
EBL											
EBT											
EBR											
WBL	13		100.0%	15		18		15		18	
WBT		0	0.0%		0		0		0		0
WBR			0.0%								

PM Peak Hour

				Build Traffic Volumes				No-Build Traffic Volumes			
Movement	Existing 2015 Traffic	Existing 2015 Peds	Lane Dist.	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds	2020 Traffic	2020 Peds	2025 Traffic	2025 Peds
NBL			0.0%								
NBT		0	0.0%	112	0	112	0		0		0
NBR	13		100.0%	15		18		15		18	
SBL											
SBT				108		108					
SBR											
EBL											
EBT											
EBR											
WBL	52		100.0%	61		70		61		70	
WBT		0	0.0%		0		0		0		0
WBR			0.0%								

Growth Rate (%/Yr.) = 3.5

APPENDIX B – EXISTING ANALYSIS RESULTS

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	220	384	970	101	59	451
Number	1	6	2	12	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	190.0	186.3	186.3
Lanes	1	2	2	0	1	1
Cap, veh/h	335	2273	1586	165	550	491
Arrive On Green	0.09	0.61	0.48	0.48	0.31	0.31
Sat Flow, veh/h	1774	3725	3319	346	1774	1583
Grp Volume(v), veh/h	250	436	618	599	67	512
Grp Sat Flow(s),veh/h/ln	1774	1863	1863	1802	1774	1583
Q Serve(g_s), s	6.7	5.2	25.9	26.0	2.7	31.0
Cycle Q Clear(g_c), s	6.7	5.2	25.9	26.0	2.7	31.0
Prop In Lane	1.00			0.19	1.00	1.00
Lane Grp Cap(c), veh/h	335	2273	890	861	550	491
V/C Ratio(X)	0.75	0.19	0.69	0.70	0.12	1.04
Avail Cap(c_a), veh/h	455	2273	890	861	550	491
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.8	8.6	20.4	20.4	24.7	34.5
Incr Delay (d2), s/veh	4.5	0.2	4.4	4.6	0.1	52.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	6.4	1.9	11.7	11.4	1.2	19.3
Lane Grp Delay (d), s/veh	22.3	8.8	24.8	25.0	24.8	86.8
Lane Grp LOS	C	A	C	C	C	F
Approach Vol, veh/h		686	1217		579	
Approach Delay, s/veh		13.7	24.9		79.6	
Approach LOS		B	C		E	

Timer			
Assigned Phs	1	6	2
Phs Duration (G+Y+Rc), s	13.2	65.0	51.8
Change Period (Y+Rc), s	4.0	4.0	4.0
Max Green Setting (Gmax), s	16.0	61.0	41.0
Max Q Clear Time (g_c+I1), s	8.7	7.2	28.0
Green Ext Time (p_c), s	0.5	8.8	5.9

Intersection Summary	
HCM 2010 Ctrl Delay	34.6
HCM 2010 LOS	C

Notes

Intersection	
Intersection Delay, s/veh	0.8

Movement	NBL	NBR	NET	NER	SWL	SWT
Vol, veh/h	34	5	317	4	2	491
Conflicting Peds, #/hr	0	0	0	1	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	39	6	360	5	2	558

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	926	363	0	0	365	0
Stage 1	363	-	-	-	-	-
Stage 2	563	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	298	682	-	-	1194	-
Stage 1	704	-	-	-	-	-
Stage 2	570	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	297	682	-	-	1194	-
Mov Capacity-2 Maneuver	297	-	-	-	-	-
Stage 1	704	-	-	-	-	-
Stage 2	568	-	-	-	-	-

Approach	NB	NE	SW
HCM Control Delay, s	18	0	0

Minor Lane / Major Mvmt	NET	NER	NBLn1	SWL	SWT
Capacity (veh/h)	-	-	320	1194	-
HCM Lane V/C Ratio	-	-	0.138	0.002	-
HCM Control Delay (s)	-	-	18.1	8.021	0
HCM Lane LOS			C	A	A
HCM 95th %tile Q(veh)	-	-	0.476	0.006	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	9.5
Intersection LOS	A

Approach	WB	NE	SW
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	445	365	277
Demand Flow Rate, veh/h	454	373	282
Vehicles Circulating, veh/h	290	54	338
Vehicles Exiting, veh/h	137	566	406
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	15	7
Ped Cap Adj	1.000	0.998	0.999
Approach Delay, s/veh	12.0	7.0	8.7
Approach LOS	B	A	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	454	373	282
Cap Entry Lane, veh/h	845	1071	806
Entry HV Adj Factor	0.980	0.979	0.981
Flow Entry, veh/h	445	365	277
Cap Entry, veh/h	829	1046	789
V/C Ratio	0.537	0.349	0.350
Control Delay, s/veh	12.0	7.0	8.7
LOS	B	A	A
95th %tile Queue, veh	3	2	2

Intersection	
Intersection Delay, s/veh	2.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	37	295	166	2	21	78
Conflicting Peds, #/hr	10	0	0	10	10	10
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	42	335	189	2	24	89

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	201	0	-	0	619	210
Stage 1	-	-	-	-	200	-
Stage 2	-	-	-	-	419	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1371	-	-	-	452	830
Stage 1	-	-	-	-	834	-
Stage 2	-	-	-	-	664	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1360	-	-	-	428	816
Mov Capacity-2 Maneuver	-	-	-	-	428	-
Stage 1	-	-	-	-	827	-
Stage 2	-	-	-	-	633	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	11

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1360	-	-	-	684
HCM Lane V/C Ratio	0.031	-	-	-	0.164
HCM Control Delay (s)	7.731	0	-	-	11.3
HCM Lane LOS	A	A			B
HCM 95th %tile Q(veh)	0.096	-	-	-	0.586

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	2.6

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	2	319	164	46	124	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	362	186	52	141	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	239	0	-	0	580	213
Stage 1	-	-	-	-	213	-
Stage 2	-	-	-	-	367	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1328	-	-	-	477	827
Stage 1	-	-	-	-	823	-
Stage 2	-	-	-	-	701	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1328	-	-	-	476	827
Mov Capacity-2 Maneuver	-	-	-	-	559	-
Stage 1	-	-	-	-	823	-
Stage 2	-	-	-	-	700	-

Approach	EB	WB	SE
HCM Control Delay, s	0	0	14

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	1328	-	-	-	562
HCM Lane V/C Ratio	0.002	-	-	-	0.255
HCM Control Delay (s)	7.715	-	-	-	13.6
HCM Lane LOS	A				B
HCM 95th %tile Q(veh)	0.005	-	-	-	1.006

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	3.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	78	363	8	16	191	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	89	412	9	18	217	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	501	0	331	295
Stage 1	-	-	-	-	295	-
Stage 2	-	-	-	-	36	-
Follow-up Headway	-	-	2.218	-	3.518	3.318
Pot Capacity-1 Maneuver	-	-	1063	-	664	744
Stage 1	-	-	-	-	755	-
Stage 2	-	-	-	-	986	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	1063	-	658	744
Mov Capacity-2 Maneuver	-	-	-	-	669	-
Stage 1	-	-	-	-	755	-
Stage 2	-	-	-	-	978	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3	13

Minor Lane / Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	669	744	-	-	1063	-
HCM Lane V/C Ratio	0.324	0.002	-	-	0.009	-
HCM Control Delay (s)	12.9	9.8	-	-	8.416	-
HCM Lane LOS	B	A			A	
HCM 95th %tile Q(veh)	1.406	0.005	-	-	0.026	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	1.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	12	1	32	53	0	13
Conflicting Peds, #/hr	0	0	0	2	4	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	14	1	36	60	0	15

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	81	70	0	0	97	0
Stage 1	66	-	-	-	-	-
Stage 2	15	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	921	993	-	-	1496	-
Stage 1	957	-	-	-	-	-
Stage 2	1008	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	919	990	-	-	1491	-
Mov Capacity-2 Maneuver	863	-	-	-	-	-
Stage 1	957	-	-	-	-	-
Stage 2	1006	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	872	1491	-
HCM Lane V/C Ratio	-	-	0.017	-	-
HCM Control Delay (s)	-	-	9.2	0	-
HCM Lane LOS			A	A	
HCM 95th %tile Q(veh)	-	-	0.052	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	2.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	13	0	0	33	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	15	0	0	38	0	0

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	19	19	0	0	38	0
Stage 1	19	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	998	1059	-	-	1572	-
Stage 1	1004	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	998	1059	-	-	1572	-
Mov Capacity-2 Maneuver	916	-	-	-	-	-
Stage 1	1004	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	916	1572	-
HCM Lane V/C Ratio	-	-	0.016	-	-
HCM Control Delay (s)	-	-	9	0	-
HCM Lane LOS			A	A	
HCM 95th %tile Q(veh)	-	-	0.049	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	424	1026	384	60	46	210
Number	1	6	2	12	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	190.0	186.3	186.3
Lanes	1	2	2	0	1	1
Cap, veh/h	748	2693	1669	259	323	289
Arrive On Green	0.15	0.72	0.53	0.53	0.18	0.18
Sat Flow, veh/h	1774	3725	3151	488	1774	1583
Grp Volume(v), veh/h	482	1166	257	247	52	239
Grp Sat Flow(s),veh/h/ln	1774	1863	1863	1777	1774	1583
Q Serve(g_s), s	9.5	10.6	6.3	6.4	2.1	12.3
Cycle Q Clear(g_c), s	9.5	10.6	6.3	6.4	2.1	12.3
Prop In Lane	1.00			0.27	1.00	1.00
Lane Grp Cap(c), veh/h	748	2693	986	941	323	289
V/C Ratio(X)	0.64	0.43	0.26	0.26	0.16	0.83
Avail Cap(c_a), veh/h	826	2693	986	941	652	582
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	6.2	4.7	10.8	10.8	29.1	33.2
Incr Delay (d2), s/veh	1.5	0.5	0.6	0.7	0.2	6.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	3.0	3.1	2.5	2.4	0.9	5.3
Lane Grp Delay (d), s/veh	7.7	5.2	11.5	11.5	29.3	39.3
Lane Grp LOS	A	A	B	B	C	D
Approach Vol, veh/h		1648	504		291	
Approach Delay, s/veh		5.9	11.5		37.5	
Approach LOS		A	B		D	

Timer			
Assigned Phs	1	6	2
Phs Duration (G+Y+Rc), s	16.3	65.0	48.7
Change Period (Y+Rc), s	4.0	4.0	4.0
Max Green Setting (Gmax), s	16.0	61.0	41.0
Max Q Clear Time (g_c+I1), s	11.5	12.6	8.4
Green Ext Time (p_c), s	0.9	9.5	9.0

Intersection Summary	
HCM 2010 Ctrl Delay	10.8
HCM 2010 LOS	B

Notes

Intersection	
Intersection Delay, s/veh	0.4

Movement	NBL	NBR	NET	NER	SWL	SWT
Vol, veh/h	16	1	467	42	0	246
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	18	1	531	48	0	280

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	835	555	0	0	578	0
Stage 1	555	-	-	-	-	-
Stage 2	280	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	338	531	-	-	996	-
Stage 1	575	-	-	-	-	-
Stage 2	767	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	338	531	-	-	996	-
Mov Capacity-2 Maneuver	338	-	-	-	-	-
Stage 1	575	-	-	-	-	-
Stage 2	767	-	-	-	-	-

Approach	NB	NE	SW
HCM Control Delay, s	16	0	0

Minor Lane / Major Mvmt	NET	NER	NBLn1	SWL	SWT
Capacity (veh/h)	-	-	345	996	-
HCM Lane V/C Ratio	-	-	0.056	-	-
HCM Control Delay (s)	-	-	16.1	0	-
HCM Lane LOS			C	A	
HCM 95th %tile Q(veh)	-	-	0.177	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	8.3
Intersection LOS	A

Approach	WB	NE	SW
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	191	527	234
Demand Flow Rate, veh/h	195	538	239
Vehicles Circulating, veh/h	240	84	137
Vehicles Exiting, veh/h	382	292	298
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	15	7
Ped Cap Adj	1.000	0.998	0.999
Approach Delay, s/veh	6.4	9.9	6.1
Approach LOS	A	A	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	195	538	239
Cap Entry Lane, veh/h	889	1039	985
Entry HV Adj Factor	0.979	0.980	0.979
Flow Entry, veh/h	191	527	234
Cap Entry, veh/h	871	1016	964
V/C Ratio	0.219	0.519	0.243
Control Delay, s/veh	6.4	9.9	6.1
LOS	A	A	A
95th %tile Queue, veh	1	3	1

Intersection	
Intersection Delay, s/veh	2.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	44	195	130	3	4	62
Conflicting Peds, #/hr	7	0	0	7	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	50	222	148	3	5	70

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	152	0	-	0	472	157
Stage 1	-	-	-	-	150	-
Stage 2	-	-	-	-	322	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1429	-	-	-	551	889
Stage 1	-	-	-	-	878	-
Stage 2	-	-	-	-	735	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1421	-	-	-	528	883
Mov Capacity-2 Maneuver	-	-	-	-	528	-
Stage 1	-	-	-	-	877	-
Stage 2	-	-	-	-	705	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	10

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1421	-	-	-	848
HCM Lane V/C Ratio	0.035	-	-	-	0.088
HCM Control Delay (s)	7.626	0	-	-	9.7
HCM Lane LOS	A	A			A
HCM 95th %tile Q(veh)	0.109	-	-	-	0.29

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	1	195	134	33	55	2
Conflicting Peds, #/hr	2	0	0	4	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	222	152	38	62	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	191	0	-	0	396	174
Stage 1	-	-	-	-	172	-
Stage 2	-	-	-	-	224	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1383	-	-	-	609	869
Stage 1	-	-	-	-	858	-
Stage 2	-	-	-	-	813	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1381	-	-	-	608	867
Mov Capacity-2 Maneuver	-	-	-	-	657	-
Stage 1	-	-	-	-	857	-
Stage 2	-	-	-	-	812	-

Approach	EB	WB	SE
HCM Control Delay, s	0	0	11

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	1381	-	-	-	663
HCM Lane V/C Ratio	0.001	-	-	-	0.098
HCM Control Delay (s)	7.609	-	-	-	11
HCM Lane LOS	A				B
HCM 95th %tile Q(veh)	0.002	-	-	-	0.323

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	4.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	18	158	3	123	182	1
Conflicting Peds, #/hr	0	25	0	0	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	20	180	3	140	207	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	201	0	258	111
Stage 1	-	-	-	-	111	-
Stage 2	-	-	-	-	147	-
Follow-up Headway	-	-	2.218	-	3.518	3.318
Pot Capacity-1 Maneuver	-	-	1371	-	731	942
Stage 1	-	-	-	-	914	-
Stage 2	-	-	-	-	880	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	1371	-	714	941
Mov Capacity-2 Maneuver	-	-	-	-	729	-
Stage 1	-	-	-	-	913	-
Stage 2	-	-	-	-	860	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	12

Minor Lane / Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	729	941	-	-	1371	-
HCM Lane V/C Ratio	0.284	0.001	-	-	0.002	-
HCM Control Delay (s)	11.9	8.8	-	-	7.632	-
HCM Lane LOS	B	A			A	
HCM 95th %tile Q(veh)	1.167	0.004	-	-	0.007	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	76	0	13	6	1	50
Conflicting Peds, #/hr	0	0	0	1	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	86	0	15	7	1	57

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	77	18	0	0	22	0
Stage 1	18	-	-	-	-	-
Stage 2	59	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	926	1061	-	-	1593	-
Stage 1	1005	-	-	-	-	-
Stage 2	964	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	925	1061	-	-	1593	-
Mov Capacity-2 Maneuver	868	-	-	-	-	-
Stage 1	1005	-	-	-	-	-
Stage 2	963	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	868	1593	-
HCM Lane V/C Ratio	-	-	0.099	0.001	-
HCM Control Delay (s)	-	-	9.6	7.262	-
HCM Lane LOS			A	A	
HCM 95th %tile Q(veh)	-	-	0.33	0.002	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	7.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	52	0	0	13	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	59	0	0	15	0	0

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	7	7	0	0	15	0
Stage 1	7	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	1014	1075	-	-	1603	-
Stage 1	1016	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	1014	1075	-	-	1603	-
Mov Capacity-2 Maneuver	927	-	-	-	-	-
Stage 1	1016	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	927	1603	-
HCM Lane V/C Ratio	-	-	0.064	-	-
HCM Control Delay (s)	-	-	9.1	0	-
HCM Lane LOS			A	A	
HCM 95th %tile Q(veh)	-	-	0.204	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

APPENDIX C – 2020 ANALYSIS RESULTS

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	276	407	1028	127	72	549
Number	1	6	2	12	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	190.0	186.3	186.3
Lanes	1	2	2	0	1	1
Cap, veh/h	361	2235	1365	168	507	452
Arrive On Green	0.12	0.60	0.42	0.42	0.29	0.29
Sat Flow, veh/h	1774	3725	3255	400	1774	1583
Grp Volume(v), veh/h	314	462	667	645	82	624
Grp Sat Flow(s),veh/h/ln	1774	1863	1863	1792	1774	1583
Q Serve(g_s), s	6.5	4.0	22.7	22.8	2.4	20.0
Cycle Q Clear(g_c), s	6.5	4.0	22.7	22.8	2.4	20.0
Prop In Lane	1.00			0.22	1.00	1.00
Lane Grp Cap(c), veh/h	361	2235	781	752	507	452
V/C Ratio(X)	0.87	0.21	0.85	0.86	0.16	1.38
Avail Cap(c_a), veh/h	395	2235	781	752	507	452
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.4	6.4	18.4	18.4	18.7	25.0
Incr Delay (d2), s/veh	17.5	0.2	11.5	12.1	0.1	184.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	7.0	1.4	11.6	11.3	1.0	30.7
Lane Grp Delay (d), s/veh	31.9	6.6	29.8	30.6	18.9	209.1
Lane Grp LOS	C	A	C	C	B	F
Approach Vol, veh/h		776	1312		706	
Approach Delay, s/veh		16.9	30.2		187.0	
Approach LOS		B	C		F	

Timer			
Assigned Phs	1	6	2
Phs Duration (G+Y+Rc), s	12.6	46.0	33.4
Change Period (Y+Rc), s	4.0	4.0	4.0
Max Green Setting (Gmax), s	10.0	42.0	28.0
Max Q Clear Time (g_c+I1), s	8.5	6.0	24.8
Green Ext Time (p_c), s	0.2	10.6	2.3

Intersection Summary	
HCM 2010 Ctrl Delay	66.1
HCM 2010 LOS	E

Notes

Intersection	
Intersection Delay, s/veh	1.1

Movement	NBL	NBR	NET	NER	SWL	SWT
Vol, veh/h	40	7	436	5	2	657
Conflicting Peds, #/hr	0	0	0	1	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	45	8	495	6	2	747

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1249	498	0	0	501	0
Stage 1	498	-	-	-	-	-
Stage 2	751	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	191	572	-	-	1063	-
Stage 1	611	-	-	-	-	-
Stage 2	466	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	190	572	-	-	1063	-
Mov Capacity-2 Maneuver	190	-	-	-	-	-
Stage 1	611	-	-	-	-	-
Stage 2	464	-	-	-	-	-

Approach	NB	NE	SW
HCM Control Delay, s	28	0	0

Minor Lane / Major Mvmt	NET	NER	NBLn1	SWL	SWT
Capacity (veh/h)	-	-	211	1063	-
HCM Lane V/C Ratio	-	-	0.253	0.002	-
HCM Control Delay (s)	-	-	27.7	8.394	0
HCM Lane LOS			D	A	A
HCM 95th %tile Q(veh)	-	-	0.969	0.006	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	15.7
Intersection LOS	C

Approach	WB	NE	SW
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	552	502	440
Demand Flow Rate, veh/h	563	512	449
Vehicles Circulating, veh/h	416	87	397
Vehicles Exiting, veh/h	183	759	582
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	15	7
Ped Cap Adj	1.000	0.998	0.999
Approach Delay, s/veh	22.2	9.5	14.6
Approach LOS	C	A	B

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	563	512	449
Cap Entry Lane, veh/h	745	1036	760
Entry HV Adj Factor	0.980	0.980	0.980
Flow Entry, veh/h	552	502	440
Cap Entry, veh/h	731	1013	744
V/C Ratio	0.755	0.495	0.592
Control Delay, s/veh	22.2	9.5	14.6
LOS	C	A	B
95th %tile Queue, veh	7	3	4

Intersection	
Intersection Delay, s/veh	2.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	43	437	295	4	31	92
Conflicting Peds, #/hr	12	0	0	12	12	12
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	49	497	335	5	35	105

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	352	0	-	0	944	362
Stage 1	-	-	-	-	350	-
Stage 2	-	-	-	-	594	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1207	-	-	-	291	683
Stage 1	-	-	-	-	713	-
Stage 2	-	-	-	-	552	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1195	-	-	-	269	669
Mov Capacity-2 Maneuver	-	-	-	-	269	-
Stage 1	-	-	-	-	706	-
Stage 2	-	-	-	-	515	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	15

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1195	-	-	-	487
HCM Lane V/C Ratio	0.041	-	-	-	0.287
HCM Control Delay (s)	8.141	0	-	-	15.3
HCM Lane LOS	A	A			C
HCM 95th %tile Q(veh)	0.128	-	-	-	1.176

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	3.9

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	2	472	294	82	184	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	536	334	93	209	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	427	0	-	0	922	381
Stage 1	-	-	-	-	381	-
Stage 2	-	-	-	-	541	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1132	-	-	-	300	666
Stage 1	-	-	-	-	691	-
Stage 2	-	-	-	-	583	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1132	-	-	-	299	666
Mov Capacity-2 Maneuver	-	-	-	-	423	-
Stage 1	-	-	-	-	691	-
Stage 2	-	-	-	-	582	-

Approach	EB	WB	SE
HCM Control Delay, s	0	0	22

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	1132	-	-	-	425
HCM Lane V/C Ratio	0.002	-	-	-	0.497
HCM Control Delay (s)	8.187	-	-	-	21.6
HCM Lane LOS	A				C
HCM 95th %tile Q(veh)	0.006	-	-	-	2.696

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	4.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	227	427	9	148	224	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	258	485	10	168	255	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	743	0	690	501
Stage 1	-	-	-	-	501	-
Stage 2	-	-	-	-	189	-
Follow-up Headway	-	-	2.218	-	3.518	3.318
Pot Capacity-1 Maneuver	-	-	864	-	411	570
Stage 1	-	-	-	-	609	-
Stage 2	-	-	-	-	843	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	864	-	406	570
Mov Capacity-2 Maneuver	-	-	-	-	496	-
Stage 1	-	-	-	-	609	-
Stage 2	-	-	-	-	833	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	20

Minor Lane / Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	496	570	-	-	864	-
HCM Lane V/C Ratio	0.513	0.002	-	-	0.012	-
HCM Control Delay (s)	19.7	11.3	-	-	9.217	-
HCM Lane LOS	C	B			A	
HCM 95th %tile Q(veh)	2.887	0.006	-	-	0.036	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	14	1	173	62	0	145
Conflicting Peds, #/hr	0	0	0	3	5	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	1	197	70	0	165

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	397	237	0	0	267	0
Stage 1	232	-	-	-	-	-
Stage 2	165	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	608	802	-	-	1297	-
Stage 1	807	-	-	-	-	-
Stage 2	864	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	606	799	-	-	1292	-
Mov Capacity-2 Maneuver	656	-	-	-	-	-
Stage 1	807	-	-	-	-	-
Stage 2	862	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	664	1292	-
HCM Lane V/C Ratio	-	-	0.026	-	-
HCM Control Delay (s)	-	-	10.6	0	-
HCM Lane LOS			B	A	
HCM 95th %tile Q(veh)	-	-	0.079	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	15	0	135	39	0	129
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	17	0	153	44	0	147

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	323	176	0	0	198	0
Stage 1	176	-	-	-	-	-
Stage 2	147	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	671	867	-	-	1375	-
Stage 1	855	-	-	-	-	-
Stage 2	880	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	671	867	-	-	1375	-
Mov Capacity-2 Maneuver	702	-	-	-	-	-
Stage 1	855	-	-	-	-	-
Stage 2	880	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	702	1375	-
HCM Lane V/C Ratio	-	-	0.024	-	-
HCM Control Delay (s)	-	-	10.3	0	-
HCM Lane LOS			B	A	
HCM 95th %tile Q(veh)	-	-	0.075	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	233	407	1028	107	63	478
Number	1	6	2	12	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	190.0	186.3	186.3
Lanes	1	2	2	0	1	1
Cap, veh/h	323	2273	1569	164	550	491
Arrive On Green	0.10	0.61	0.47	0.47	0.31	0.31
Sat Flow, veh/h	1774	3725	3318	346	1774	1583
Grp Volume(v), veh/h	265	462	655	635	72	543
Grp Sat Flow(s),veh/h/ln	1774	1863	1863	1802	1774	1583
Q Serve(g_s), s	7.2	5.5	28.6	28.7	2.9	31.0
Cycle Q Clear(g_c), s	7.2	5.5	28.6	28.7	2.9	31.0
Prop In Lane	1.00			0.19	1.00	1.00
Lane Grp Cap(c), veh/h	323	2273	881	852	550	491
V/C Ratio(X)	0.82	0.20	0.74	0.75	0.13	1.11
Avail Cap(c_a), veh/h	435	2273	881	852	550	491
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.3	8.7	21.4	21.5	24.8	34.5
Incr Delay (d2), s/veh	8.8	0.2	5.6	5.9	0.1	72.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	7.3	2.1	13.0	12.7	1.3	22.1
Lane Grp Delay (d), s/veh	28.1	8.9	27.1	27.3	24.9	107.4
Lane Grp LOS	C	A	C	C	C	F
Approach Vol, veh/h		727	1290		615	
Approach Delay, s/veh		15.9	27.2		97.7	
Approach LOS		B	C		F	

Timer			
Assigned Phs	1	6	2
Phs Duration (G+Y+Rc), s	13.7	65.0	51.3
Change Period (Y+Rc), s	4.0	4.0	4.0
Max Green Setting (Gmax), s	16.0	61.0	41.0
Max Q Clear Time (g_c+I1), s	9.2	7.5	30.7
Green Ext Time (p_c), s	0.5	9.8	5.5

Intersection Summary	
HCM 2010 Ctrl Delay	40.6
HCM 2010 LOS	D

Notes

Intersection	
Intersection Delay, s/veh	1

Movement	NBL	NBR	NET	NER	SWL	SWT
Vol, veh/h	40	6	372	5	2	577
Conflicting Peds, #/hr	0	0	0	1	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	45	7	423	6	2	656

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1086	426	0	0	428	0
Stage 1	426	-	-	-	-	-
Stage 2	660	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	239	628	-	-	1131	-
Stage 1	659	-	-	-	-	-
Stage 2	514	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	238	628	-	-	1131	-
Mov Capacity-2 Maneuver	238	-	-	-	-	-
Stage 1	659	-	-	-	-	-
Stage 2	512	-	-	-	-	-

Approach	NB	NE	SW
HCM Control Delay, s	22	0	0

Minor Lane / Major Mvmt	NET	NER	NBLn1	SWL	SWT
Capacity (veh/h)	-	-	259	1131	-
HCM Lane V/C Ratio	-	-	0.202	0.002	-
HCM Control Delay (s)	-	-	22.4	8.189	0
HCM Lane LOS			C	A	A
HCM 95th %tile Q(veh)	-	-	0.738	0.006	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	12.2
Intersection LOS	B

Approach	WB	NE	SW
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	523	428	326
Demand Flow Rate, veh/h	534	437	332
Vehicles Circulating, veh/h	341	64	397
Vehicles Exiting, veh/h	160	665	478
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	15	7
Ped Cap Adj	1.000	0.998	0.999
Approach Delay, s/veh	16.5	8.0	10.7
Approach LOS	C	A	B

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	534	437	332
Cap Entry Lane, veh/h	803	1060	760
Entry HV Adj Factor	0.979	0.980	0.981
Flow Entry, veh/h	523	428	326
Cap Entry, veh/h	787	1037	745
V/C Ratio	0.665	0.413	0.437
Control Delay, s/veh	16.5	8.0	10.7
LOS	C	A	B
95th %tile Queue, veh	5	2	2

Intersection	
Intersection Delay, s/veh	2.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	43	347	195	2	25	92
Conflicting Peds, #/hr	12	0	0	12	12	12
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	49	394	222	2	28	105

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	236	0	-	0	727	247
Stage 1	-	-	-	-	235	-
Stage 2	-	-	-	-	492	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1331	-	-	-	391	792
Stage 1	-	-	-	-	804	-
Stage 2	-	-	-	-	615	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1318	-	-	-	365	776
Mov Capacity-2 Maneuver	-	-	-	-	365	-
Stage 1	-	-	-	-	796	-
Stage 2	-	-	-	-	580	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	12

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1318	-	-	-	626
HCM Lane V/C Ratio	0.037	-	-	-	0.212
HCM Control Delay (s)	7.837	0	-	-	12.3
HCM Lane LOS	A	A			B
HCM 95th %tile Q(veh)	0.115	-	-	-	0.799

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	3

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	2	375	193	54	146	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	426	219	61	166	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	281	0	-	0	681	250
Stage 1	-	-	-	-	250	-
Stage 2	-	-	-	-	431	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1282	-	-	-	416	789
Stage 1	-	-	-	-	792	-
Stage 2	-	-	-	-	655	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1282	-	-	-	415	789
Mov Capacity-2 Maneuver	-	-	-	-	512	-
Stage 1	-	-	-	-	792	-
Stage 2	-	-	-	-	654	-

Approach	EB	WB	SE
HCM Control Delay, s	0	0	15

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	1282	-	-	-	514
HCM Lane V/C Ratio	0.002	-	-	-	0.327
HCM Control Delay (s)	7.813	-	-	-	15.4
HCM Lane LOS	A				C
HCM 95th %tile Q(veh)	0.005	-	-	-	1.413

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	4.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	92	427	9	19	224	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	105	485	10	22	255	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	590	0	389	347
Stage 1	-	-	-	-	347	-
Stage 2	-	-	-	-	42	-
Follow-up Headway	-	-	2.218	-	3.518	3.318
Pot Capacity-1 Maneuver	-	-	985	-	615	696
Stage 1	-	-	-	-	716	-
Stage 2	-	-	-	-	980	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	985	-	609	696
Mov Capacity-2 Maneuver	-	-	-	-	631	-
Stage 1	-	-	-	-	716	-
Stage 2	-	-	-	-	970	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3	14

Minor Lane / Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	631	696	-	-	985	-
HCM Lane V/C Ratio	0.403	0.002	-	-	0.01	-
HCM Control Delay (s)	14.5	10.2	-	-	8.693	-
HCM Lane LOS	B	B			A	
HCM 95th %tile Q(veh)	1.948	0.005	-	-	0.031	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	1.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	14	1	38	62	0	15
Conflicting Peds, #/hr	0	0	0	3	5	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	1	43	70	0	17

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	95	83	0	0	114	0
Stage 1	78	-	-	-	-	-
Stage 2	17	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	905	976	-	-	1475	-
Stage 1	945	-	-	-	-	-
Stage 2	1006	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	903	972	-	-	1469	-
Mov Capacity-2 Maneuver	851	-	-	-	-	-
Stage 1	945	-	-	-	-	-
Stage 2	1003	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	858	1469	-
HCM Lane V/C Ratio	-	-	0.02	-	-
HCM Control Delay (s)	-	-	9.3	0	-
HCM Lane LOS			A	A	
HCM 95th %tile Q(veh)	-	-	0.061	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	2.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	15	0	0	39	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	17	0	0	44	0	0

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	22	22	0	0	44	0
Stage 1	22	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	995	1055	-	-	1564	-
Stage 1	1001	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	995	1055	-	-	1564	-
Mov Capacity-2 Maneuver	914	-	-	-	-	-
Stage 1	1001	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	914	1564	-
HCM Lane V/C Ratio	-	-	0.019	-	-
HCM Control Delay (s)	-	-	9	0	-
HCM Lane LOS			A	A	
HCM 95th %tile Q(veh)	-	-	0.057	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	509	1088	407	73	65	298
Number	1	6	2	12	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	190.0	186.3	186.3
Lanes	1	2	2	0	1	1
Cap, veh/h	692	2493	1385	247	431	385
Arrive On Green	0.18	0.67	0.45	0.45	0.24	0.24
Sat Flow, veh/h	1774	3725	3079	550	1774	1583
Grp Volume(v), veh/h	578	1236	278	267	74	339
Grp Sat Flow(s),veh/h/ln	1774	1863	1863	1766	1774	1583
Q Serve(g_s), s	15.5	15.0	8.8	8.9	3.0	18.8
Cycle Q Clear(g_c), s	15.5	15.0	8.8	8.9	3.0	18.8
Prop In Lane	1.00			0.31	1.00	1.00
Lane Grp Cap(c), veh/h	692	2493	838	794	431	385
V/C Ratio(X)	0.84	0.50	0.33	0.34	0.17	0.88
Avail Cap(c_a), veh/h	692	2493	838	794	603	538
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	10.4	7.5	16.2	16.3	27.2	33.2
Incr Delay (d2), s/veh	8.7	0.7	1.1	1.1	0.2	11.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	6.7	5.2	3.9	3.7	1.3	8.6
Lane Grp Delay (d), s/veh	19.2	8.2	17.3	17.4	27.4	45.1
Lane Grp LOS	B	A	B	B	C	D
Approach Vol, veh/h		1814	545		413	
Approach Delay, s/veh		11.7	17.3		41.9	
Approach LOS		B	B		D	

Timer			
Assigned Phs	1	6	2
Phs Duration (G+Y+Rc), s	20.0	65.0	45.0
Change Period (Y+Rc), s	4.0	4.0	4.0
Max Green Setting (Gmax), s	16.0	61.0	41.0
Max Q Clear Time (g_c+I1), s	17.5	17.0	10.9
Green Ext Time (p_c), s	0.0	10.5	9.7

Intersection Summary	
HCM 2010 Ctrl Delay	17.3
HCM 2010 LOS	B

Notes

Intersection	
Intersection Delay, s/veh	0.4

Movement	NBL	NBR	NET	NER	SWL	SWT
Vol, veh/h	19	1	617	49	0	344
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	22	1	701	56	0	391

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1120	729	0	0	757	0
Stage 1	729	-	-	-	-	-
Stage 2	391	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	228	423	-	-	854	-
Stage 1	477	-	-	-	-	-
Stage 2	683	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	228	423	-	-	854	-
Mov Capacity-2 Maneuver	228	-	-	-	-	-
Stage 1	477	-	-	-	-	-
Stage 2	683	-	-	-	-	-

Approach	NB	NE	SW
HCM Control Delay, s	22	0	0

Minor Lane / Major Mvmt	NET	NER	NBLn1	SWL	SWT
Capacity (veh/h)	-	-	233	854	-
HCM Lane V/C Ratio	-	-	0.098	-	-
HCM Control Delay (s)	-	-	22.1	0	-
HCM Lane LOS			C	A	
HCM 95th %tile Q(veh)	-	-	0.32	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	12.6
Intersection LOS	B

Approach	WB	NE	SW
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	244	698	372
Demand Flow Rate, veh/h	249	712	380
Vehicles Circulating, veh/h	362	133	161
Vehicles Exiting, veh/h	483	408	450
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	15	7
Ped Cap Adj	1.000	0.998	0.999
Approach Delay, s/veh	8.4	16.3	8.3
Approach LOS	A	C	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	249	712	380
Cap Entry Lane, veh/h	787	989	962
Entry HV Adj Factor	0.980	0.980	0.979
Flow Entry, veh/h	244	698	372
Cap Entry, veh/h	771	968	941
V/C Ratio	0.316	0.721	0.395
Control Delay, s/veh	8.4	16.3	8.3
LOS	A	C	A
95th %tile Queue, veh	1	7	2

Intersection	
Intersection Delay, s/veh	1.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	52	314	237	6	7	73
Conflicting Peds, #/hr	8	0	0	8	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	59	357	269	7	8	83

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	277	0	-	0	749	282
Stage 1	-	-	-	-	274	-
Stage 2	-	-	-	-	475	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1286	-	-	-	379	757
Stage 1	-	-	-	-	772	-
Stage 2	-	-	-	-	626	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1277	-	-	-	356	751
Mov Capacity-2 Maneuver	-	-	-	-	356	-
Stage 1	-	-	-	-	771	-
Stage 2	-	-	-	-	589	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	11

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1277	-	-	-	685
HCM Lane V/C Ratio	0.046	-	-	-	0.133
HCM Control Delay (s)	7.956	0	-	-	11.1
HCM Lane LOS	A	A			B
HCM 95th %tile Q(veh)	0.145	-	-	-	0.456

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	1.7

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	1	317	244	60	89	2
Conflicting Peds, #/hr	2	0	0	5	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	360	277	68	101	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	346	0	-	0	675	314
Stage 1	-	-	-	-	312	-
Stage 2	-	-	-	-	363	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1213	-	-	-	419	726
Stage 1	-	-	-	-	742	-
Stage 2	-	-	-	-	704	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1211	-	-	-	418	724
Mov Capacity-2 Maneuver	-	-	-	-	520	-
Stage 1	-	-	-	-	741	-
Stage 2	-	-	-	-	703	-

Approach	EB	WB	SE
HCM Control Delay, s	0	0	14

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	1211	-	-	-	523
HCM Lane V/C Ratio	0.001	-	-	-	0.198
HCM Control Delay (s)	7.976	-	-	-	13.6
HCM Lane LOS	A				B
HCM 95th %tile Q(veh)	0.003	-	-	-	0.729

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	4.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	133	186	4	253	214	1
Conflicting Peds, #/hr	0	29	0	0	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	151	211	5	288	243	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	364	0	555	258
Stage 1	-	-	-	-	258	-
Stage 2	-	-	-	-	297	-
Follow-up Headway	-	-	2.218	-	3.518	3.318
Pot Capacity-1 Maneuver	-	-	1195	-	493	781
Stage 1	-	-	-	-	785	-
Stage 2	-	-	-	-	754	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	1195	-	479	780
Mov Capacity-2 Maneuver	-	-	-	-	564	-
Stage 1	-	-	-	-	784	-
Stage 2	-	-	-	-	733	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	16

Minor Lane / Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	564	780	-	-	1195	-
HCM Lane V/C Ratio	0.431	0.001	-	-	0.004	-
HCM Control Delay (s)	16.1	9.6	-	-	8.024	-
HCM Lane LOS	C	A			A	
HCM 95th %tile Q(veh)	2.158	0.004	-	-	0.011	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	2.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	89	0	127	7	1	167
Conflicting Peds, #/hr	0	0	0	1	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	101	0	144	8	1	190

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	340	148	0	0	152	0
Stage 1	148	-	-	-	-	-
Stage 2	192	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	656	899	-	-	1429	-
Stage 1	880	-	-	-	-	-
Stage 2	841	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	655	899	-	-	1429	-
Mov Capacity-2 Maneuver	691	-	-	-	-	-
Stage 1	880	-	-	-	-	-
Stage 2	840	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	691	1429	-
HCM Lane V/C Ratio	-	-	0.146	0.001	-
HCM Control Delay (s)	-	-	11.1	7.521	-
HCM Lane LOS			B	A	
HCM 95th %tile Q(veh)	-	-	0.511	0.002	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	2.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	61	0	112	15	0	108
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	69	0	127	17	0	123

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	259	136	0	0	144	0
Stage 1	136	-	-	-	-	-
Stage 2	123	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	730	913	-	-	1438	-
Stage 1	890	-	-	-	-	-
Stage 2	902	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	730	913	-	-	1438	-
Mov Capacity-2 Maneuver	742	-	-	-	-	-
Stage 1	890	-	-	-	-	-
Stage 2	902	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	742	1438	-
HCM Lane V/C Ratio	-	-	0.093	-	-
HCM Control Delay (s)	-	-	10.4	0	-
HCM Lane LOS			B	A	
HCM 95th %tile Q(veh)	-	-	0.308	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	449	1088	407	64	55	253
Number	1	6	2	12	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	190.0	186.3	186.3
Lanes	1	2	2	0	1	1
Cap, veh/h	715	2593	1539	242	377	337
Arrive On Green	0.16	0.70	0.49	0.49	0.21	0.21
Sat Flow, veh/h	1774	3725	3144	494	1774	1583
Grp Volume(v), veh/h	510	1236	273	262	62	288
Grp Sat Flow(s),veh/h/ln	1774	1863	1863	1776	1774	1583
Q Serve(g_s), s	11.6	13.2	7.7	7.8	2.5	15.3
Cycle Q Clear(g_c), s	11.6	13.2	7.7	7.8	2.5	15.3
Prop In Lane	1.00			0.28	1.00	1.00
Lane Grp Cap(c), veh/h	715	2593	912	869	377	337
V/C Ratio(X)	0.71	0.48	0.30	0.30	0.16	0.86
Avail Cap(c_a), veh/h	753	2593	912	869	628	560
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	7.9	6.1	13.4	13.4	28.1	33.2
Incr Delay (d2), s/veh	3.0	0.6	0.8	0.9	0.2	6.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	4.1	4.2	3.2	3.1	1.1	6.6
Lane Grp Delay (d), s/veh	10.9	6.7	14.2	14.3	28.4	40.0
Lane Grp LOS	B	A	B	B	C	D
Approach Vol, veh/h		1746	535		350	
Approach Delay, s/veh		7.9	14.3		38.0	
Approach LOS		A	B		D	

Timer			
Assigned Phs	1	6	2
Phs Duration (G+Y+Rc), s	18.1	65.0	46.9
Change Period (Y+Rc), s	4.0	4.0	4.0
Max Green Setting (Gmax), s	16.0	61.0	41.0
Max Q Clear Time (g_c+I1), s	13.6	15.2	9.8
Green Ext Time (p_c), s	0.6	10.4	9.7

Intersection Summary	
HCM 2010 Ctrl Delay	13.2
HCM 2010 LOS	B

Notes

Intersection	
Intersection Delay, s/veh	0.4

Movement	NBL	NBR	NET	NER	SWL	SWT
Vol, veh/h	19	1	549	49	0	289
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	22	1	624	56	0	328

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	980	652	0	0	680	0
Stage 1	652	-	-	-	-	-
Stage 2	328	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	277	468	-	-	912	-
Stage 1	518	-	-	-	-	-
Stage 2	730	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	277	468	-	-	912	-
Mov Capacity-2 Maneuver	277	-	-	-	-	-
Stage 1	518	-	-	-	-	-
Stage 2	730	-	-	-	-	-

Approach	NB	NE	SW
HCM Control Delay, s	19	0	0

Minor Lane / Major Mvmt	NET	NER	NBLn1	SWL	SWT
Capacity (veh/h)	-	-	283	912	-
HCM Lane V/C Ratio	-	-	0.08	-	-
HCM Control Delay (s)	-	-	18.8	0	-
HCM Lane LOS			C	A	
HCM 95th %tile Q(veh)	-	-	0.26	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	10.0
Intersection LOS	A

Approach	WB	NE	SW
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	225	619	275
Demand Flow Rate, veh/h	229	632	281
Vehicles Circulating, veh/h	282	99	161
Vehicles Exiting, veh/h	449	343	350
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	15	7
Ped Cap Adj	1.000	0.998	0.999
Approach Delay, s/veh	7.2	12.3	6.9
Approach LOS	A	B	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	229	632	281
Cap Entry Lane, veh/h	852	1023	962
Entry HV Adj Factor	0.983	0.980	0.980
Flow Entry, veh/h	225	619	275
Cap Entry, veh/h	837	1001	942
V/C Ratio	0.269	0.619	0.292
Control Delay, s/veh	7.2	12.3	6.9
LOS	A	B	A
95th %tile Queue, veh	1	4	1

Intersection	
Intersection Delay, s/veh	2.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	52	229	153	4	5	73
Conflicting Peds, #/hr	8	0	0	8	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	59	260	174	5	6	83

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	179	0	-	0	555	185
Stage 1	-	-	-	-	177	-
Stage 2	-	-	-	-	378	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1397	-	-	-	493	857
Stage 1	-	-	-	-	854	-
Stage 2	-	-	-	-	693	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1388	-	-	-	468	851
Mov Capacity-2 Maneuver	-	-	-	-	468	-
Stage 1	-	-	-	-	853	-
Stage 2	-	-	-	-	658	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	10

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1388	-	-	-	809
HCM Lane V/C Ratio	0.043	-	-	-	0.11
HCM Control Delay (s)	7.709	0	-	-	10
HCM Lane LOS	A	A			B
HCM 95th %tile Q(veh)	0.133	-	-	-	0.368

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	1.6

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	1	229	157	39	65	2
Conflicting Peds, #/hr	2	0	0	5	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	260	178	44	74	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	224	0	-	0	465	204
Stage 1	-	-	-	-	202	-
Stage 2	-	-	-	-	263	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1345	-	-	-	556	837
Stage 1	-	-	-	-	832	-
Stage 2	-	-	-	-	781	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1343	-	-	-	555	835
Mov Capacity-2 Maneuver	-	-	-	-	620	-
Stage 1	-	-	-	-	831	-
Stage 2	-	-	-	-	780	-

Approach	EB	WB	SE
HCM Control Delay, s	0	0	12

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	1343	-	-	-	625
HCM Lane V/C Ratio	0.001	-	-	-	0.122
HCM Control Delay (s)	7.683	-	-	-	11.6
HCM Lane LOS	A				B
HCM 95th %tile Q(veh)	0.003	-	-	-	0.414

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	4.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	21	186	4	145	214	1
Conflicting Peds, #/hr	0	29	0	0	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	24	211	5	165	243	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	236	0	305	131
Stage 1	-	-	-	-	131	-
Stage 2	-	-	-	-	174	-
Follow-up Headway	-	-	2.218	-	3.518	3.318
Pot Capacity-1 Maneuver	-	-	1331	-	687	919
Stage 1	-	-	-	-	895	-
Stage 2	-	-	-	-	856	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	1331	-	667	918
Mov Capacity-2 Maneuver	-	-	-	-	696	-
Stage 1	-	-	-	-	894	-
Stage 2	-	-	-	-	832	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	13

Minor Lane / Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	696	918	-	-	1331	-
HCM Lane V/C Ratio	0.349	0.001	-	-	0.003	-
HCM Control Delay (s)	12.9	8.9	-	-	7.714	-
HCM Lane LOS	B	A			A	
HCM 95th %tile Q(veh)	1.568	0.004	-	-	0.01	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	5.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	89	0	15	7	1	59
Conflicting Peds, #/hr	0	0	0	1	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	101	0	17	8	1	67

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	90	21	0	0	25	0
Stage 1	21	-	-	-	-	-
Stage 2	69	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	910	1056	-	-	1589	-
Stage 1	1002	-	-	-	-	-
Stage 2	954	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	909	1056	-	-	1589	-
Mov Capacity-2 Maneuver	857	-	-	-	-	-
Stage 1	1002	-	-	-	-	-
Stage 2	953	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	857	1589	-
HCM Lane V/C Ratio	-	-	0.118	0.001	-
HCM Control Delay (s)	-	-	9.8	7.267	-
HCM Lane LOS			A	A	
HCM 95th %tile Q(veh)	-	-	0.4	0.002	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	7.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	61	0	0	15	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	69	0	0	17	0	0

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	9	9	0	0	17	0
Stage 1	9	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	1011	1073	-	-	1600	-
Stage 1	1014	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	1011	1073	-	-	1600	-
Mov Capacity-2 Maneuver	926	-	-	-	-	-
Stage 1	1014	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	926	1600	-
HCM Lane V/C Ratio	-	-	0.075	-	-
HCM Control Delay (s)	-	-	9.2	0	-
HCM Lane LOS			A	A	
HCM 95th %tile Q(veh)	-	-	0.242	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

APPENDIX D – 2025 ANALYSIS RESULTS

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	290	430	1086	133	91	698
Number	1	6	2	12	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	190.0	186.3	186.3
Lanes	1	2	2	0	1	1
Cap, veh/h	361	2273	1373	167	550	491
Arrive On Green	0.15	0.61	0.42	0.42	0.31	0.31
Sat Flow, veh/h	1774	3725	3258	397	1774	1583
Grp Volume(v), veh/h	330	489	703	682	103	793
Grp Sat Flow(s),veh/h/ln	1774	1863	1863	1793	1774	1583
Q Serve(g_s), s	12.7	5.9	35.1	35.5	4.3	31.0
Cycle Q Clear(g_c), s	12.7	5.9	35.1	35.5	4.3	31.0
Prop In Lane	1.00			0.22	1.00	1.00
Lane Grp Cap(c), veh/h	361	2273	785	756	550	491
V/C Ratio(X)	0.91	0.22	0.90	0.90	0.19	1.62
Avail Cap(c_a), veh/h	382	2273	785	756	550	491
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.3	8.8	26.9	27.0	25.3	34.5
Incr Delay (d2), s/veh	25.1	0.2	15.0	16.1	0.2	286.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	10.6	2.2	17.9	17.6	1.9	51.2
Lane Grp Delay (d), s/veh	52.4	9.0	41.9	43.1	25.4	320.8
Lane Grp LOS	D	A	D	D	C	F
Approach Vol, veh/h		819	1385		896	
Approach Delay, s/veh		26.5	42.5		286.9	
Approach LOS		C	D		F	

Timer			
Assigned Phs	1	6	2
Phs Duration (G+Y+Rc), s	18.9	65.0	46.1
Change Period (Y+Rc), s	4.0	4.0	4.0
Max Green Setting (Gmax), s	16.0	61.0	41.0
Max Q Clear Time (g_c+I1), s	14.7	7.9	37.5
Green Ext Time (p_c), s	0.2	11.1	2.5

Intersection Summary	
HCM 2010 Ctrl Delay	108.9
HCM 2010 LOS	F

Notes

Intersection	
Intersection Delay, s/veh	1.6

Movement	NBL	NBR	NET	NER	SWL	SWT
Vol, veh/h	46	8	491	5	3	743
Conflicting Peds, #/hr	0	0	0	1	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	52	9	558	6	3	844

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1412	561	0	0	564	0
Stage 1	561	-	-	-	-	-
Stage 2	851	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	152	527	-	-	1008	-
Stage 1	571	-	-	-	-	-
Stage 2	419	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	151	527	-	-	1008	-
Mov Capacity-2 Maneuver	151	-	-	-	-	-
Stage 1	571	-	-	-	-	-
Stage 2	416	-	-	-	-	-

Approach	NB	NE	SW
HCM Control Delay, s	38	0	0

Minor Lane / Major Mvmt	NET	NER	NBLn1	SWL	SWT
Capacity (veh/h)	-	-	169	1008	-
HCM Lane V/C Ratio	-	-	0.363	0.003	-
HCM Control Delay (s)	-	-	38	8.584	0
HCM Lane LOS			E	A	A
HCM 95th %tile Q(veh)	-	-	1.535	0.01	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	24.0
Intersection LOS	C

Approach	WB	NE	SW
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	630	566	487
Demand Flow Rate, veh/h	643	577	497
Vehicles Circulating, veh/h	466	96	456
Vehicles Exiting, veh/h	207	857	653
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	15	7
Ped Cap Adj	1.000	0.998	0.999
Approach Delay, s/veh	39.3	10.9	19.4
Approach LOS	E	B	C

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	643	577	497
Cap Entry Lane, veh/h	709	1027	716
Entry HV Adj Factor	0.980	0.981	0.980
Flow Entry, veh/h	630	566	487
Cap Entry, veh/h	695	1005	701
V/C Ratio	0.907	0.563	0.695
Control Delay, s/veh	39.3	10.9	19.4
LOS	E	B	C
95th %tile Queue, veh	12	4	6

Intersection	
Intersection Delay, s/veh	2.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	50	489	324	4	35	105
Conflicting Peds, #/hr	14	0	0	14	14	14
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	57	556	368	5	40	119

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	387	0	-	0	1053	398
Stage 1	-	-	-	-	384	-
Stage 2	-	-	-	-	669	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1171	-	-	-	251	652
Stage 1	-	-	-	-	688	-
Stage 2	-	-	-	-	509	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1157	-	-	-	228	637
Mov Capacity-2 Maneuver	-	-	-	-	228	-
Stage 1	-	-	-	-	680	-
Stage 2	-	-	-	-	467	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	18

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1157	-	-	-	440
HCM Lane V/C Ratio	0.049	-	-	-	0.362
HCM Control Delay (s)	8.272	0	-	-	17.7
HCM Lane LOS	A	A			C
HCM 95th %tile Q(veh)	0.155	-	-	-	1.624

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	4.9

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	3	528	322	90	205	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	600	366	102	233	3

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	468	0	-	0	1024	417
Stage 1	-	-	-	-	417	-
Stage 2	-	-	-	-	607	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1094	-	-	-	261	636
Stage 1	-	-	-	-	665	-
Stage 2	-	-	-	-	544	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1094	-	-	-	260	636
Mov Capacity-2 Maneuver	-	-	-	-	389	-
Stage 1	-	-	-	-	665	-
Stage 2	-	-	-	-	543	-

Approach	EB	WB	SE
HCM Control Delay, s	0	0	27

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	1094	-	-	-	391
HCM Lane V/C Ratio	0.003	-	-	-	0.605
HCM Control Delay (s)	8.301	-	-	-	27.3
HCM Lane LOS	A				D
HCM 95th %tile Q(veh)	0.009	-	-	-	3.828

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	5.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	240	490	11	151	258	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	273	557	12	172	293	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	830	0	748	551
Stage 1	-	-	-	-	551	-
Stage 2	-	-	-	-	197	-
Follow-up Headway	-	-	2.218	-	3.518	3.318
Pot Capacity-1 Maneuver	-	-	802	-	380	534
Stage 1	-	-	-	-	577	-
Stage 2	-	-	-	-	836	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	802	-	374	534
Mov Capacity-2 Maneuver	-	-	-	-	469	-
Stage 1	-	-	-	-	577	-
Stage 2	-	-	-	-	822	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1	25

Minor Lane / Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	469	534	-	-	802	-
HCM Lane V/C Ratio	0.625	0.002	-	-	0.016	-
HCM Control Delay (s)	24.6	11.8	-	-	9.56	-
HCM Lane LOS	C	B			A	
HCM 95th %tile Q(veh)	4.2	0.006	-	-	0.047	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	16	1	178	72	0	148
Conflicting Peds, #/hr	0	0	0	3	5	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	18	1	202	82	0	168

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	411	248	0	0	284	0
Stage 1	243	-	-	-	-	-
Stage 2	168	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	597	791	-	-	1278	-
Stage 1	797	-	-	-	-	-
Stage 2	862	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	596	788	-	-	1273	-
Mov Capacity-2 Maneuver	648	-	-	-	-	-
Stage 1	797	-	-	-	-	-
Stage 2	860	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	655	1273	-
HCM Lane V/C Ratio	-	-	0.029	-	-
HCM Control Delay (s)	-	-	10.7	0	-
HCM Lane LOS			B	A	
HCM 95th %tile Q(veh)	-	-	0.091	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	18	0	135	45	0	129
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	20	0	153	51	0	147

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	326	179	0	0	205	0
Stage 1	179	-	-	-	-	-
Stage 2	147	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	668	864	-	-	1366	-
Stage 1	852	-	-	-	-	-
Stage 2	880	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	668	864	-	-	1366	-
Mov Capacity-2 Maneuver	700	-	-	-	-	-
Stage 1	852	-	-	-	-	-
Stage 2	880	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	700	1366	-
HCM Lane V/C Ratio	-	-	0.029	-	-
HCM Control Delay (s)	-	-	10.3	0	-
HCM Lane LOS			B	A	
HCM 95th %tile Q(veh)	-	-	0.09	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	246	430	1086	113	82	627
Number	1	6	2	12	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	190.0	186.3	186.3
Lanes	1	2	2	0	1	1
Cap, veh/h	317	2273	1543	160	550	491
Arrive On Green	0.11	0.61	0.46	0.46	0.31	0.31
Sat Flow, veh/h	1774	3725	3321	344	1774	1583
Grp Volume(v), veh/h	280	489	690	672	93	712
Grp Sat Flow(s),veh/h/ln	1774	1863	1863	1802	1774	1583
Q Serve(g_s), s	8.0	5.9	31.5	31.8	3.8	31.0
Cycle Q Clear(g_c), s	8.0	5.9	31.5	31.8	3.8	31.0
Prop In Lane	1.00			0.19	1.00	1.00
Lane Grp Cap(c), veh/h	317	2273	865	837	550	491
V/C Ratio(X)	0.88	0.22	0.80	0.80	0.17	1.45
Avail Cap(c_a), veh/h	414	2273	865	837	550	491
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.1	8.8	22.8	22.8	25.1	34.5
Incr Delay (d2), s/veh	16.1	0.2	7.6	8.0	0.1	214.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	8.3	2.2	14.9	14.5	1.7	41.3
Lane Grp Delay (d), s/veh	37.2	9.0	30.4	30.8	25.3	248.5
Lane Grp LOS	D	A	C	C	C	F
Approach Vol, veh/h		769	1362		805	
Approach Delay, s/veh		19.2	30.6		222.7	
Approach LOS		B	C		F	

Timer			
Assigned Phs	1	6	2
Phs Duration (G+Y+Rc), s	14.5	65.0	50.5
Change Period (Y+Rc), s	4.0	4.0	4.0
Max Green Setting (Gmax), s	16.0	61.0	41.0
Max Q Clear Time (g_c+I1), s	10.0	7.9	33.8
Green Ext Time (p_c), s	0.5	10.8	4.5

Intersection Summary	
HCM 2010 Ctrl Delay	80.3
HCM 2010 LOS	F

Notes

Intersection	
Intersection Delay, s/veh	1.3

Movement	NBL	NBR	NET	NER	SWL	SWT
Vol, veh/h	46	7	428	5	3	663
Conflicting Peds, #/hr	0	0	0	1	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	52	8	486	6	3	753

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1249	489	0	0	492	0
Stage 1	489	-	-	-	-	-
Stage 2	760	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	191	579	-	-	1071	-
Stage 1	616	-	-	-	-	-
Stage 2	462	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	190	579	-	-	1071	-
Mov Capacity-2 Maneuver	190	-	-	-	-	-
Stage 1	616	-	-	-	-	-
Stage 2	459	-	-	-	-	-

Approach	NB	NE	SW
HCM Control Delay, s	29	0	0

Minor Lane / Major Mvmt	NET	NER	NBLn1	SWL	SWT
Capacity (veh/h)	-	-	209	1071	-
HCM Lane V/C Ratio	-	-	0.288	0.003	-
HCM Control Delay (s)	-	-	29.1	8.372	0
HCM Lane LOS			D	A	A
HCM 95th %tile Q(veh)	-	-	1.144	0.01	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	16.8
Intersection LOS	C

Approach	WB	NE	SW
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	600	493	374
Demand Flow Rate, veh/h	612	503	381
Vehicles Circulating, veh/h	392	73	456
Vehicles Exiting, veh/h	184	764	548
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	15	7
Ped Cap Adj	1.000	0.998	0.999
Approach Delay, s/veh	25.2	9.1	13.5
Approach LOS	D	A	B

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	612	503	381
Cap Entry Lane, veh/h	764	1050	716
Entry HV Adj Factor	0.980	0.981	0.982
Flow Entry, veh/h	600	493	374
Cap Entry, veh/h	749	1028	702
V/C Ratio	0.802	0.480	0.533
Control Delay, s/veh	25.2	9.1	13.5
LOS	D	A	B
95th %tile Queue, veh	8	3	3

Intersection	
Intersection Delay, s/veh	2.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	50	398	224	3	28	105
Conflicting Peds, #/hr	14	0	0	14	14	14
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	57	452	255	3	32	119

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	272	0	-	0	836	284
Stage 1	-	-	-	-	270	-
Stage 2	-	-	-	-	566	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1291	-	-	-	337	755
Stage 1	-	-	-	-	775	-
Stage 2	-	-	-	-	568	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1276	-	-	-	309	737
Mov Capacity-2 Maneuver	-	-	-	-	309	-
Stage 1	-	-	-	-	766	-
Stage 2	-	-	-	-	528	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	14

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1276	-	-	-	571
HCM Lane V/C Ratio	0.045	-	-	-	0.265
HCM Control Delay (s)	7.953	0	-	-	13.6
HCM Lane LOS	A	A			B
HCM 95th %tile Q(veh)	0.14	-	-	-	1.059

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	3.5

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	3	431	221	62	167	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	490	251	70	190	3

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	322	0	-	0	783	286
Stage 1	-	-	-	-	286	-
Stage 2	-	-	-	-	497	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1238	-	-	-	362	753
Stage 1	-	-	-	-	763	-
Stage 2	-	-	-	-	611	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1238	-	-	-	361	753
Mov Capacity-2 Maneuver	-	-	-	-	470	-
Stage 1	-	-	-	-	763	-
Stage 2	-	-	-	-	610	-

Approach	EB	WB	SE
HCM Control Delay, s	0	0	18

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	1238	-	-	-	473
HCM Lane V/C Ratio	0.003	-	-	-	0.408
HCM Control Delay (s)	7.916	-	-	-	17.8
HCM Lane LOS	A				C
HCM 95th %tile Q(veh)	0.008	-	-	-	1.961

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	105	490	11	22	258	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	119	557	12	25	293	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	676	0	448	398
Stage 1	-	-	-	-	398	-
Stage 2	-	-	-	-	50	-
Follow-up Headway	-	-	2.218	-	3.518	3.318
Pot Capacity-1 Maneuver	-	-	915	-	568	652
Stage 1	-	-	-	-	678	-
Stage 2	-	-	-	-	972	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	915	-	560	652
Mov Capacity-2 Maneuver	-	-	-	-	594	-
Stage 1	-	-	-	-	678	-
Stage 2	-	-	-	-	958	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3	17

Minor Lane / Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	594	652	-	-	915	-
HCM Lane V/C Ratio	0.494	0.002	-	-	0.014	-
HCM Control Delay (s)	16.8	10.5	-	-	8.989	-
HCM Lane LOS	C	B			A	
HCM 95th %tile Q(veh)	2.726	0.005	-	-	0.042	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	1.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	16	1	43	72	0	18
Conflicting Peds, #/hr	0	0	0	3	5	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	18	1	49	82	0	20

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	110	95	0	0	131	0
Stage 1	90	-	-	-	-	-
Stage 2	20	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	887	962	-	-	1454	-
Stage 1	934	-	-	-	-	-
Stage 2	1003	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	885	958	-	-	1448	-
Mov Capacity-2 Maneuver	839	-	-	-	-	-
Stage 1	934	-	-	-	-	-
Stage 2	1000	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	845	1448	-
HCM Lane V/C Ratio	-	-	0.023	-	-
HCM Control Delay (s)	-	-	9.4	0	-
HCM Lane LOS			A	A	
HCM 95th %tile Q(veh)	-	-	0.07	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	2.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	18	0	0	45	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	20	0	0	51	0	0

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	26	26	0	0	51	0
Stage 1	26	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	989	1050	-	-	1555	-
Stage 1	997	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	989	1050	-	-	1555	-
Mov Capacity-2 Maneuver	910	-	-	-	-	-
Stage 1	997	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	910	1555	-
HCM Lane V/C Ratio	-	-	0.022	-	-
HCM Control Delay (s)	-	-	9	0	-
HCM Lane LOS			A	A	
HCM 95th %tile Q(veh)	-	-	0.069	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	534	1149	430	76	73	336
Number	1	6	2	12	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	190.0	186.3	186.3
Lanes	1	2	2	0	1	1
Cap, veh/h	652	2412	1344	235	475	424
Arrive On Green	0.17	0.65	0.44	0.44	0.27	0.27
Sat Flow, veh/h	1774	3725	3090	541	1774	1583
Grp Volume(v), veh/h	607	1306	294	281	83	382
Grp Sat Flow(s),veh/h/ln	1774	1863	1863	1767	1774	1583
Q Serve(g_s), s	16.0	17.9	10.0	10.1	3.4	21.9
Cycle Q Clear(g_c), s	16.0	17.9	10.0	10.1	3.4	21.9
Prop In Lane	1.00			0.31	1.00	1.00
Lane Grp Cap(c), veh/h	652	2412	811	769	475	424
V/C Ratio(X)	0.93	0.54	0.36	0.37	0.17	0.90
Avail Cap(c_a), veh/h	652	2412	811	769	584	521
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.8	9.0	17.8	17.9	26.5	33.3
Incr Delay (d2), s/veh	20.2	0.9	1.3	1.3	0.2	16.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	9.7	6.6	4.4	4.3	1.5	10.5
Lane Grp Delay (d), s/veh	35.0	9.9	19.1	19.2	26.7	49.8
Lane Grp LOS	D	A	B	B	C	D
Approach Vol, veh/h		1913	575		465	
Approach Delay, s/veh		17.9	19.2		45.7	
Approach LOS		B	B		D	

Timer			
Assigned Phs	1	6	2
Phs Duration (G+Y+Rc), s	20.0	65.0	45.0
Change Period (Y+Rc), s	4.0	4.0	4.0
Max Green Setting (Gmax), s	16.0	61.0	41.0
Max Q Clear Time (g_c+I1), s	18.0	19.9	12.1
Green Ext Time (p_c), s	0.0	11.4	10.4

Intersection Summary	
HCM 2010 Ctrl Delay	22.5
HCM 2010 LOS	C

Notes

Intersection	
Intersection Delay, s/veh	0.5

Movement	NBL	NBR	NET	NER	SWL	SWT
Vol, veh/h	22	1	699	57	0	387
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	25	1	794	65	0	440

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1267	827	0	0	859	0
Stage 1	827	-	-	-	-	-
Stage 2	440	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	186	371	-	-	782	-
Stage 1	430	-	-	-	-	-
Stage 2	649	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	186	371	-	-	782	-
Mov Capacity-2 Maneuver	186	-	-	-	-	-
Stage 1	430	-	-	-	-	-
Stage 2	649	-	-	-	-	-

Approach	NB	NE	SW
HCM Control Delay, s	27	0	0

Minor Lane / Major Mvmt	NET	NER	NBLn1	SWL	SWT
Capacity (veh/h)	-	-	190	782	-
HCM Lane V/C Ratio	-	-	0.138	-	-
HCM Control Delay (s)	-	-	26.9	0	-
HCM Lane LOS			D	A	
HCM 95th %tile Q(veh)	-	-	0.468	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	16.6
Intersection LOS	C

Approach	WB	NE	SW
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	276	789	411
Demand Flow Rate, veh/h	282	805	419
Vehicles Circulating, veh/h	403	146	185
Vehicles Exiting, veh/h	548	458	500
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	15	7
Ped Cap Adj	1.000	0.998	0.999
Approach Delay, s/veh	9.6	22.9	9.3
Approach LOS	A	C	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	282	805	419
Cap Entry Lane, veh/h	755	976	939
Entry HV Adj Factor	0.979	0.980	0.980
Flow Entry, veh/h	276	789	411
Cap Entry, veh/h	739	955	919
V/C Ratio	0.373	0.826	0.447
Control Delay, s/veh	9.6	22.9	9.3
LOS	A	C	A
95th %tile Queue, veh	2	10	2

Intersection	
Intersection Delay, s/veh	2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	59	348	260	6	8	84
Conflicting Peds, #/hr	9	0	0	9	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	67	395	295	7	9	95

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	303	0	-	0	830	309
Stage 1	-	-	-	-	300	-
Stage 2	-	-	-	-	530	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1258	-	-	-	340	731
Stage 1	-	-	-	-	752	-
Stage 2	-	-	-	-	590	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1249	-	-	-	316	725
Mov Capacity-2 Maneuver	-	-	-	-	316	-
Stage 1	-	-	-	-	751	-
Stage 2	-	-	-	-	549	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	12

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1249	-	-	-	652
HCM Lane V/C Ratio	0.054	-	-	-	0.16
HCM Control Delay (s)	8.046	0	-	-	11.6
HCM Lane LOS	A	A			B
HCM 95th %tile Q(veh)	0.17	-	-	-	0.568

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	1.9

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	1	351	268	66	99	3
Conflicting Peds, #/hr	3	0	0	5	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	399	305	75	112	3

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	381	0	-	0	744	346
Stage 1	-	-	-	-	343	-
Stage 2	-	-	-	-	401	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1177	-	-	-	382	697
Stage 1	-	-	-	-	719	-
Stage 2	-	-	-	-	676	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1174	-	-	-	381	695
Mov Capacity-2 Maneuver	-	-	-	-	491	-
Stage 1	-	-	-	-	718	-
Stage 2	-	-	-	-	675	-

Approach	EB	WB	SE
HCM Control Delay, s	0	0	14

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	1174	-	-	-	495
HCM Lane V/C Ratio	0.001	-	-	-	0.234
HCM Control Delay (s)	8.069	-	-	-	14.5
HCM Lane LOS	A				B
HCM 95th %tile Q(veh)	0.003	-	-	-	0.9

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	5.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	136	213	4	274	246	1
Conflicting Peds, #/hr	0	34	0	0	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	155	242	5	311	280	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	398	0	597	277
Stage 1	-	-	-	-	277	-
Stage 2	-	-	-	-	320	-
Follow-up Headway	-	-	2.218	-	3.518	3.318
Pot Capacity-1 Maneuver	-	-	1161	-	466	762
Stage 1	-	-	-	-	770	-
Stage 2	-	-	-	-	736	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	1161	-	450	761
Mov Capacity-2 Maneuver	-	-	-	-	542	-
Stage 1	-	-	-	-	769	-
Stage 2	-	-	-	-	712	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	18

Minor Lane / Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	542	761	-	-	1161	-
HCM Lane V/C Ratio	0.516	0.001	-	-	0.004	-
HCM Control Delay (s)	18.5	9.7	-	-	8.113	-
HCM Lane LOS	C	A			A	
HCM 95th %tile Q(veh)	2.933	0.004	-	-	0.012	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	2.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	103	0	130	8	1	177
Conflicting Peds, #/hr	0	0	0	1	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	117	0	148	9	1	201

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	355	152	0	0	157	0
Stage 1	152	-	-	-	-	-
Stage 2	203	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	643	894	-	-	1423	-
Stage 1	876	-	-	-	-	-
Stage 2	831	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	642	894	-	-	1423	-
Mov Capacity-2 Maneuver	681	-	-	-	-	-
Stage 1	876	-	-	-	-	-
Stage 2	830	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	681	1423	-
HCM Lane V/C Ratio	-	-	0.172	0.001	-
HCM Control Delay (s)	-	-	11.4	7.532	-
HCM Lane LOS			B	A	
HCM 95th %tile Q(veh)	-	-	0.617	0.002	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	2.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	70	0	112	18	0	108
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	80	0	127	20	0	123

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	261	138	0	0	148	0
Stage 1	138	-	-	-	-	-
Stage 2	123	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	728	910	-	-	1434	-
Stage 1	889	-	-	-	-	-
Stage 2	902	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	728	910	-	-	1434	-
Mov Capacity-2 Maneuver	741	-	-	-	-	-
Stage 1	889	-	-	-	-	-
Stage 2	902	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	741	1434	-
HCM Lane V/C Ratio	-	-	0.107	-	-
HCM Control Delay (s)	-	-	10.4	0	-
HCM Lane LOS			B	A	
HCM 95th %tile Q(veh)	-	-	0.359	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	475	1149	430	67	64	290
Number	1	6	2	12	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	190.0	186.3	186.3
Lanes	1	2	2	0	1	1
Cap, veh/h	688	2510	1432	222	422	377
Arrive On Green	0.18	0.67	0.45	0.45	0.24	0.24
Sat Flow, veh/h	1774	3725	3152	488	1774	1583
Grp Volume(v), veh/h	540	1306	288	277	73	330
Grp Sat Flow(s),veh/h/ln	1774	1863	1863	1777	1774	1583
Q Serve(g_s), s	13.8	15.9	9.0	9.1	3.0	18.2
Cycle Q Clear(g_c), s	13.8	15.9	9.0	9.1	3.0	18.2
Prop In Lane	1.00			0.27	1.00	1.00
Lane Grp Cap(c), veh/h	688	2510	846	807	422	377
V/C Ratio(X)	0.78	0.52	0.34	0.34	0.17	0.88
Avail Cap(c_a), veh/h	691	2510	846	807	607	542
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	9.8	7.4	15.9	16.0	27.4	33.2
Incr Delay (d2), s/veh	5.9	0.8	1.1	1.2	0.2	10.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	5.3	5.5	3.9	3.8	1.3	8.3
Lane Grp Delay (d), s/veh	15.7	8.2	17.0	17.1	27.6	44.1
Lane Grp LOS	B	A	B	B	C	D
Approach Vol, veh/h		1846	565		403	
Approach Delay, s/veh		10.4	17.1		41.1	
Approach LOS		B	B		D	

Timer			
Assigned Phs	1	6	2
Phs Duration (G+Y+Rc), s	19.9	65.0	45.1
Change Period (Y+Rc), s	4.0	4.0	4.0
Max Green Setting (Gmax), s	16.0	61.0	41.0
Max Q Clear Time (g_c+I1), s	15.8	17.9	11.1
Green Ext Time (p_c), s	0.1	11.4	10.4

Intersection Summary	
HCM 2010 Ctrl Delay	16.1
HCM 2010 LOS	B

Notes

Intersection	
Intersection Delay, s/veh	0.5

Movement	NBL	NBR	NET	NER	SWL	SWT
Vol, veh/h	22	1	630	57	0	332
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	25	1	716	65	0	377

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1125	748	0	0	781	0
Stage 1	748	-	-	-	-	-
Stage 2	377	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	227	412	-	-	837	-
Stage 1	468	-	-	-	-	-
Stage 2	694	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	227	412	-	-	837	-
Mov Capacity-2 Maneuver	227	-	-	-	-	-
Stage 1	468	-	-	-	-	-
Stage 2	694	-	-	-	-	-

Approach	NB	NE	SW
HCM Control Delay, s	22	0	0

Minor Lane / Major Mvmt	NET	NER	NBLn1	SWL	SWT
Capacity (veh/h)	-	-	232	837	-
HCM Lane V/C Ratio	-	-	0.113	-	-
HCM Control Delay (s)	-	-	22.5	0	-
HCM Lane LOS			C	A	
HCM 95th %tile Q(veh)	-	-	0.375	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	12.4
Intersection LOS	B

Approach	WB	NE	SW
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	258	711	316
Demand Flow Rate, veh/h	264	725	322
Vehicles Circulating, veh/h	323	112	185
Vehicles Exiting, veh/h	514	395	402
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	15	7
Ped Cap Adj	1.000	0.998	0.999
Approach Delay, s/veh	8.2	16.0	7.7
Approach LOS	A	C	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	264	725	322
Cap Entry Lane, veh/h	818	1010	939
Entry HV Adj Factor	0.977	0.980	0.981
Flow Entry, veh/h	258	711	316
Cap Entry, veh/h	799	988	920
V/C Ratio	0.323	0.719	0.343
Control Delay, s/veh	8.2	16.0	7.7
LOS	A	C	A
95th %tile Queue, veh	1	6	2

Intersection	
Intersection Delay, s/veh	2.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	59	263	176	4	5	84
Conflicting Peds, #/hr	9	0	0	9	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	67	299	200	5	6	95

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	206	0	-	0	636	212
Stage 1	-	-	-	-	203	-
Stage 2	-	-	-	-	433	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1365	-	-	-	442	828
Stage 1	-	-	-	-	831	-
Stage 2	-	-	-	-	654	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1355	-	-	-	415	821
Mov Capacity-2 Maneuver	-	-	-	-	415	-
Stage 1	-	-	-	-	830	-
Stage 2	-	-	-	-	615	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	10

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1355	-	-	-	778
HCM Lane V/C Ratio	0.049	-	-	-	0.13
HCM Control Delay (s)	7.795	0	-	-	10.3
HCM Lane LOS	A	A			B
HCM 95th %tile Q(veh)	0.156	-	-	-	0.446

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	1.6

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	1	263	181	45	74	3
Conflicting Peds, #/hr	3	0	0	5	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	299	206	51	84	3

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	258	0	-	0	533	235
Stage 1	-	-	-	-	232	-
Stage 2	-	-	-	-	301	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1307	-	-	-	507	804
Stage 1	-	-	-	-	807	-
Stage 2	-	-	-	-	751	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1304	-	-	-	506	801
Mov Capacity-2 Maneuver	-	-	-	-	585	-
Stage 1	-	-	-	-	806	-
Stage 2	-	-	-	-	750	-

Approach	EB	WB	SE
HCM Control Delay, s	0	0	12

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	1304	-	-	-	591
HCM Lane V/C Ratio	0.001	-	-	-	0.148
HCM Control Delay (s)	7.763	-	-	-	12.1
HCM Lane LOS	A				B
HCM 95th %tile Q(veh)	0.003	-	-	-	0.517

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	5.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	24	213	4	166	246	1
Conflicting Peds, #/hr	0	34	0	0	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	242	5	189	280	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	270	0	347	149
Stage 1	-	-	-	-	149	-
Stage 2	-	-	-	-	198	-
Follow-up Headway	-	-	2.218	-	3.518	3.318
Pot Capacity-1 Maneuver	-	-	1293	-	650	898
Stage 1	-	-	-	-	879	-
Stage 2	-	-	-	-	835	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	1293	-	629	897
Mov Capacity-2 Maneuver	-	-	-	-	669	-
Stage 1	-	-	-	-	878	-
Stage 2	-	-	-	-	808	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	14

Minor Lane / Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	669	897	-	-	1293	-
HCM Lane V/C Ratio	0.418	0.001	-	-	0.004	-
HCM Control Delay (s)	14.2	9	-	-	7.794	-
HCM Lane LOS	B	A			A	
HCM 95th %tile Q(veh)	2.066	0.004	-	-	0.011	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	5.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	103	0	18	8	1	68
Conflicting Peds, #/hr	0	0	0	1	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	117	0	20	9	1	77

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	105	25	0	0	30	0
Stage 1	25	-	-	-	-	-
Stage 2	80	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	893	1051	-	-	1583	-
Stage 1	998	-	-	-	-	-
Stage 2	943	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	892	1051	-	-	1583	-
Mov Capacity-2 Maneuver	845	-	-	-	-	-
Stage 1	998	-	-	-	-	-
Stage 2	942	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	845	1583	-
HCM Lane V/C Ratio	-	-	0.139	0.001	-
HCM Control Delay (s)	-	-	9.9	7.276	-
HCM Lane LOS			A	A	
HCM 95th %tile Q(veh)	-	-	0.48	0.002	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	7.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	70	0	0	18	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	80	0	0	20	0	0

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	10	10	0	0	20	0
Stage 1	10	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	1010	1071	-	-	1596	-
Stage 1	1013	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	1010	1071	-	-	1596	-
Mov Capacity-2 Maneuver	925	-	-	-	-	-
Stage 1	1013	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	925	1596	-
HCM Lane V/C Ratio	-	-	0.086	-	-
HCM Control Delay (s)	-	-	9.3	0	-
HCM Lane LOS			A	A	
HCM 95th %tile Q(veh)	-	-	0.282	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

APPENDIX E – IMPROVEMENT ANALYSIS RESULTS

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	276	407	1028	127	72	549
Number	1	6	2	12	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	190.0	186.3	186.3
Lanes	1	2	2	0	1	2
Cap, veh/h	371	2499	1697	209	428	764
Arrive On Green	0.11	0.67	0.52	0.52	0.24	0.24
Sat Flow, veh/h	1774	3725	3255	400	1774	3167
Grp Volume(v), veh/h	314	462	667	645	82	624
Grp Sat Flow(s),veh/h/ln	1774	1863	1863	1792	1774	1583
Q Serve(g_s), s	6.9	4.2	24.3	24.5	3.3	16.9
Cycle Q Clear(g_c), s	6.9	4.2	24.3	24.5	3.3	16.9
Prop In Lane	1.00			0.22	1.00	1.00
Lane Grp Cap(c), veh/h	371	2499	971	934	428	764
V/C Ratio(X)	0.85	0.18	0.69	0.69	0.19	0.82
Avail Cap(c_a), veh/h	496	2499	971	934	605	1079
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.4	5.6	16.2	16.3	27.4	32.6
Incr Delay (d2), s/veh	9.8	0.2	4.0	4.2	0.2	3.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	8.1	1.5	11.1	10.8	1.5	7.0
Lane Grp Delay (d), s/veh	26.2	5.8	20.2	20.4	27.7	36.0
Lane Grp LOS	C	A	C	C	C	D
Approach Vol, veh/h		776	1312		706	
Approach Delay, s/veh		14.1	20.3		35.0	
Approach LOS		B	C		D	

Timer			
Assigned Phs	1	6	2
Phs Duration (G+Y+Rc), s	13.6	65.0	51.4
Change Period (Y+Rc), s	4.0	4.0	4.0
Max Green Setting (Gmax), s	16.0	61.0	41.0
Max Q Clear Time (g_c+I1), s	8.9	6.2	26.5
Green Ext Time (p_c), s	0.7	11.3	7.4

Intersection Summary	
HCM 2010 Ctrl Delay	22.3
HCM 2010 LOS	C

Notes

Intersection	
Intersection Delay, s/veh	0.7

Movement	NBL	NBR	NET	NER	SWL	SWT
Vol, veh/h	40	7	436	5	2	657
Conflicting Peds, #/hr	0	0	0	1	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	45	8	495	6	2	747

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1249	498	0	0	501	0
Stage 1	498	-	-	-	-	-
Stage 2	751	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	191	572	-	-	1063	-
Stage 1	611	-	-	-	-	-
Stage 2	466	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	190	572	-	-	1063	-
Mov Capacity-2 Maneuver	325	-	-	-	-	-
Stage 1	611	-	-	-	-	-
Stage 2	464	-	-	-	-	-

Approach	NB	NE	SW
HCM Control Delay, s	17	0	0

Minor Lane / Major Mvmt	NET	NER	NBLn1	SWL	SWT
Capacity (veh/h)	-	-	347	1063	-
HCM Lane V/C Ratio	-	-	0.154	0.002	-
HCM Control Delay (s)	-	-	17.3	8.394	0
HCM Lane LOS			C	A	A
HCM 95th %tile Q(veh)	-	-	0.538	0.006	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	15.7
Intersection LOS	C

Approach	WB	NE	SW
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	552	502	440
Demand Flow Rate, veh/h	563	512	449
Vehicles Circulating, veh/h	416	87	397
Vehicles Exiting, veh/h	183	759	582
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	15	7
Ped Cap Adj	1.000	0.998	0.999
Approach Delay, s/veh	22.2	9.5	14.6
Approach LOS	C	A	B

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	563	512	449
Cap Entry Lane, veh/h	745	1036	760
Entry HV Adj Factor	0.980	0.980	0.980
Flow Entry, veh/h	552	502	440
Cap Entry, veh/h	731	1013	744
V/C Ratio	0.755	0.495	0.592
Control Delay, s/veh	22.2	9.5	14.6
LOS	C	A	B
95th %tile Queue, veh	7	3	4

Intersection	
Intersection Delay, s/veh	2.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	43	437	295	4	31	92
Conflicting Peds, #/hr	12	0	0	12	12	12
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	49	497	335	5	35	105

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	352	0	-	0	944	362
Stage 1	-	-	-	-	350	-
Stage 2	-	-	-	-	594	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1207	-	-	-	291	683
Stage 1	-	-	-	-	713	-
Stage 2	-	-	-	-	552	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1195	-	-	-	269	669
Mov Capacity-2 Maneuver	-	-	-	-	269	-
Stage 1	-	-	-	-	706	-
Stage 2	-	-	-	-	515	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	15

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1195	-	-	-	487
HCM Lane V/C Ratio	0.041	-	-	-	0.287
HCM Control Delay (s)	8.141	0	-	-	15.3
HCM Lane LOS	A	A			C
HCM 95th %tile Q(veh)	0.128	-	-	-	1.176

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	3.9

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	2	472	294	82	184	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	536	334	93	209	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	427	0	-	0	922	381
Stage 1	-	-	-	-	381	-
Stage 2	-	-	-	-	541	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1132	-	-	-	300	666
Stage 1	-	-	-	-	691	-
Stage 2	-	-	-	-	583	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1132	-	-	-	299	666
Mov Capacity-2 Maneuver	-	-	-	-	423	-
Stage 1	-	-	-	-	691	-
Stage 2	-	-	-	-	582	-

Approach	EB	WB	SE
HCM Control Delay, s	0	0	22

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	1132	-	-	-	425
HCM Lane V/C Ratio	0.002	-	-	-	0.497
HCM Control Delay (s)	8.187	-	-	-	21.6
HCM Lane LOS	A				C
HCM 95th %tile Q(veh)	0.006	-	-	-	2.696

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	4.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	227	427	9	148	224	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	258	485	10	168	255	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	743	0	690	501
Stage 1	-	-	-	-	501	-
Stage 2	-	-	-	-	189	-
Follow-up Headway	-	-	2.218	-	3.518	3.318
Pot Capacity-1 Maneuver	-	-	864	-	411	570
Stage 1	-	-	-	-	609	-
Stage 2	-	-	-	-	843	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	864	-	406	570
Mov Capacity-2 Maneuver	-	-	-	-	496	-
Stage 1	-	-	-	-	609	-
Stage 2	-	-	-	-	833	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	20

Minor Lane / Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	496	570	-	-	864	-
HCM Lane V/C Ratio	0.513	0.002	-	-	0.012	-
HCM Control Delay (s)	19.7	11.3	-	-	9.217	-
HCM Lane LOS	C	B			A	
HCM 95th %tile Q(veh)	2.887	0.006	-	-	0.036	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	14	1	173	62	0	145
Conflicting Peds, #/hr	0	0	0	3	5	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	1	197	70	0	165

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	397	237	0	0	267	0
Stage 1	232	-	-	-	-	-
Stage 2	165	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	608	802	-	-	1297	-
Stage 1	807	-	-	-	-	-
Stage 2	864	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	606	799	-	-	1292	-
Mov Capacity-2 Maneuver	656	-	-	-	-	-
Stage 1	807	-	-	-	-	-
Stage 2	862	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	664	1292	-
HCM Lane V/C Ratio	-	-	0.026	-	-
HCM Control Delay (s)	-	-	10.6	0	-
HCM Lane LOS			B	A	
HCM 95th %tile Q(veh)	-	-	0.079	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	15	0	135	39	0	129
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	17	0	153	44	0	147

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	323	176	0	0	198	0
Stage 1	176	-	-	-	-	-
Stage 2	147	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	671	867	-	-	1375	-
Stage 1	855	-	-	-	-	-
Stage 2	880	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	671	867	-	-	1375	-
Mov Capacity-2 Maneuver	702	-	-	-	-	-
Stage 1	855	-	-	-	-	-
Stage 2	880	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	702	1375	-
HCM Lane V/C Ratio	-	-	0.024	-	-
HCM Control Delay (s)	-	-	10.3	0	-
HCM Lane LOS			B	A	
HCM 95th %tile Q(veh)	-	-	0.075	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	509	1088	407	73	65	298
Number	1	6	2	12	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	190.0	186.3	186.3
Lanes	1	2	2	0	1	2
Cap, veh/h	773	2797	1645	294	268	478
Arrive On Green	0.17	0.75	0.53	0.53	0.15	0.15
Sat Flow, veh/h	1774	3725	3079	550	1774	3167
Grp Volume(v), veh/h	578	1236	278	267	74	339
Grp Sat Flow(s),veh/h/ln	1774	1863	1863	1766	1774	1583
Q Serve(g_s), s	10.8	10.1	6.6	6.7	3.0	8.3
Cycle Q Clear(g_c), s	10.8	10.1	6.6	6.7	3.0	8.3
Prop In Lane	1.00			0.31	1.00	1.00
Lane Grp Cap(c), veh/h	773	2797	995	943	268	478
V/C Ratio(X)	0.75	0.44	0.28	0.28	0.28	0.71
Avail Cap(c_a), veh/h	825	2797	995	943	677	1208
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	6.0	3.8	10.4	10.4	30.6	32.8
Incr Delay (d2), s/veh	3.6	0.5	0.7	0.7	0.6	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	3.3	2.6	2.6	2.5	1.4	3.4
Lane Grp Delay (d), s/veh	9.5	4.3	11.1	11.1	31.1	34.8
Lane Grp LOS	A	A	B	B	C	C
Approach Vol, veh/h		1814	545		413	
Approach Delay, s/veh		6.0	11.1		34.1	
Approach LOS		A	B		C	

Timer			
Assigned Phs	1	6	2
Phs Duration (G+Y+Rc), s	17.6	65.0	47.4
Change Period (Y+Rc), s	4.0	4.0	4.0
Max Green Setting (Gmax), s	16.0	61.0	41.0
Max Q Clear Time (g_c+I1), s	12.8	12.1	8.7
Green Ext Time (p_c), s	0.8	10.6	9.9

Intersection Summary	
HCM 2010 Ctrl Delay	11.2
HCM 2010 LOS	B

Notes

Intersection	
Intersection Delay, s/veh	0.3

Movement	NBL	NBR	NET	NER	SWL	SWT
Vol, veh/h	19	1	617	49	0	344
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	22	1	701	56	0	391

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1120	729	0	0	757	0
Stage 1	729	-	-	-	-	-
Stage 2	391	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	228	423	-	-	854	-
Stage 1	477	-	-	-	-	-
Stage 2	683	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	228	423	-	-	854	-
Mov Capacity-2 Maneuver	355	-	-	-	-	-
Stage 1	477	-	-	-	-	-
Stage 2	683	-	-	-	-	-

Approach	NB	NE	SW
HCM Control Delay, s	16	0	0

Minor Lane / Major Mvmt	NET	NER	NBLn1	SWL	SWT
Capacity (veh/h)	-	-	358	854	-
HCM Lane V/C Ratio	-	-	0.063	-	-
HCM Control Delay (s)	-	-	15.7	0	-
HCM Lane LOS			C	A	
HCM 95th %tile Q(veh)	-	-	0.202	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	12.6
Intersection LOS	B

Approach	WB	NE	SW
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	244	698	372
Demand Flow Rate, veh/h	249	712	380
Vehicles Circulating, veh/h	362	133	161
Vehicles Exiting, veh/h	483	408	450
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	15	7
Ped Cap Adj	1.000	0.998	0.999
Approach Delay, s/veh	8.4	16.3	8.3
Approach LOS	A	C	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	249	712	380
Cap Entry Lane, veh/h	787	989	962
Entry HV Adj Factor	0.980	0.980	0.979
Flow Entry, veh/h	244	698	372
Cap Entry, veh/h	771	968	941
V/C Ratio	0.316	0.721	0.395
Control Delay, s/veh	8.4	16.3	8.3
LOS	A	C	A
95th %tile Queue, veh	1	7	2

Intersection	
Intersection Delay, s/veh	1.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	52	314	237	6	7	73
Conflicting Peds, #/hr	8	0	0	8	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	59	357	269	7	8	83

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	277	0	-	0	749	282
Stage 1	-	-	-	-	274	-
Stage 2	-	-	-	-	475	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1286	-	-	-	379	757
Stage 1	-	-	-	-	772	-
Stage 2	-	-	-	-	626	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1277	-	-	-	356	751
Mov Capacity-2 Maneuver	-	-	-	-	356	-
Stage 1	-	-	-	-	771	-
Stage 2	-	-	-	-	589	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	11

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1277	-	-	-	685
HCM Lane V/C Ratio	0.046	-	-	-	0.133
HCM Control Delay (s)	7.956	0	-	-	11.1
HCM Lane LOS	A	A			B
HCM 95th %tile Q(veh)	0.145	-	-	-	0.456

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	1.7

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	1	317	244	60	89	2
Conflicting Peds, #/hr	2	0	0	5	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	360	277	68	101	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	346	0	-	0	675	314
Stage 1	-	-	-	-	312	-
Stage 2	-	-	-	-	363	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1213	-	-	-	419	726
Stage 1	-	-	-	-	742	-
Stage 2	-	-	-	-	704	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1211	-	-	-	418	724
Mov Capacity-2 Maneuver	-	-	-	-	520	-
Stage 1	-	-	-	-	741	-
Stage 2	-	-	-	-	703	-

Approach	EB	WB	SE
HCM Control Delay, s	0	0	14

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	1211	-	-	-	523
HCM Lane V/C Ratio	0.001	-	-	-	0.198
HCM Control Delay (s)	7.976	-	-	-	13.6
HCM Lane LOS	A				B
HCM 95th %tile Q(veh)	0.003	-	-	-	0.729

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	4.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	133	186	4	253	214	1
Conflicting Peds, #/hr	0	29	0	0	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	151	211	5	288	243	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	364	0	555	258
Stage 1	-	-	-	-	258	-
Stage 2	-	-	-	-	297	-
Follow-up Headway	-	-	2.218	-	3.518	3.318
Pot Capacity-1 Maneuver	-	-	1195	-	493	781
Stage 1	-	-	-	-	785	-
Stage 2	-	-	-	-	754	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	1195	-	479	780
Mov Capacity-2 Maneuver	-	-	-	-	564	-
Stage 1	-	-	-	-	784	-
Stage 2	-	-	-	-	733	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	16

Minor Lane / Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	564	780	-	-	1195	-
HCM Lane V/C Ratio	0.431	0.001	-	-	0.004	-
HCM Control Delay (s)	16.1	9.6	-	-	8.024	-
HCM Lane LOS	C	A			A	
HCM 95th %tile Q(veh)	2.158	0.004	-	-	0.011	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	2.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	89	0	127	7	1	167
Conflicting Peds, #/hr	0	0	0	1	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	101	0	144	8	1	190

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	340	148	0	0	152	0
Stage 1	148	-	-	-	-	-
Stage 2	192	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	656	899	-	-	1429	-
Stage 1	880	-	-	-	-	-
Stage 2	841	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	655	899	-	-	1429	-
Mov Capacity-2 Maneuver	691	-	-	-	-	-
Stage 1	880	-	-	-	-	-
Stage 2	840	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	691	1429	-
HCM Lane V/C Ratio	-	-	0.146	0.001	-
HCM Control Delay (s)	-	-	11.1	7.521	-
HCM Lane LOS			B	A	
HCM 95th %tile Q(veh)	-	-	0.511	0.002	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	2.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	61	0	112	15	0	108
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	69	0	127	17	0	123

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	259	136	0	0	144	0
Stage 1	136	-	-	-	-	-
Stage 2	123	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	730	913	-	-	1438	-
Stage 1	890	-	-	-	-	-
Stage 2	902	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	730	913	-	-	1438	-
Mov Capacity-2 Maneuver	742	-	-	-	-	-
Stage 1	890	-	-	-	-	-
Stage 2	902	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	742	1438	-
HCM Lane V/C Ratio	-	-	0.093	-	-
HCM Control Delay (s)	-	-	10.4	0	-
HCM Lane LOS			B	A	
HCM 95th %tile Q(veh)	-	-	0.308	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	290	430	1086	133	91	698
Number	1	6	2	12	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	190.0	186.3	186.3
Lanes	1	2	2	0	1	2
Cap, veh/h	379	2350	1430	174	437	779
Arrive On Green	0.13	0.63	0.44	0.44	0.25	0.25
Sat Flow, veh/h	1774	3725	3258	397	1774	3167
Grp Volume(v), veh/h	330	489	703	682	103	793
Grp Sat Flow(s),veh/h/ln	1774	1863	1863	1793	1774	1583
Q Serve(g_s), s	6.3	3.6	22.1	22.4	3.0	16.0
Cycle Q Clear(g_c), s	6.3	3.6	22.1	22.4	3.0	16.0
Prop In Lane	1.00			0.22	1.00	1.00
Lane Grp Cap(c), veh/h	379	2350	817	787	437	779
V/C Ratio(X)	0.87	0.21	0.86	0.87	0.24	1.02
Avail Cap(c_a), veh/h	420	2350	817	787	437	779
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.9	5.1	16.4	16.5	19.6	24.5
Incr Delay (d2), s/veh	16.5	0.2	11.5	12.3	0.3	36.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	6.6	1.0	10.6	10.5	1.3	9.9
Lane Grp Delay (d), s/veh	30.4	5.3	27.9	28.8	19.9	61.1
Lane Grp LOS	C	A	C	C	B	F
Approach Vol, veh/h		819	1385		896	
Approach Delay, s/veh		15.4	28.4		56.4	
Approach LOS		B	C		E	

Timer			
Assigned Phs	1	6	2
Phs Duration (G+Y+Rc), s	12.5	45.0	32.5
Change Period (Y+Rc), s	4.0	4.0	4.0
Max Green Setting (Gmax), s	10.0	41.0	27.0
Max Q Clear Time (g_c+I1), s	8.3	5.6	24.4
Green Ext Time (p_c), s	0.2	10.4	1.9

Intersection Summary	
HCM 2010 Ctrl Delay	33.1
HCM 2010 LOS	C

Notes

Intersection	
Intersection Delay, s/veh	0.8

Movement	NBL	NBR	NET	NER	SWL	SWT
Vol, veh/h	46	8	491	5	3	743
Conflicting Peds, #/hr	0	0	0	1	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	52	9	558	6	3	844

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1412	561	0	0	564	0
Stage 1	561	-	-	-	-	-
Stage 2	851	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	152	527	-	-	1008	-
Stage 1	571	-	-	-	-	-
Stage 2	419	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	151	527	-	-	1008	-
Mov Capacity-2 Maneuver	286	-	-	-	-	-
Stage 1	571	-	-	-	-	-
Stage 2	416	-	-	-	-	-

Approach	NB	NE	SW
HCM Control Delay, s	20	0	0

Minor Lane / Major Mvmt	NET	NER	NBLn1	SWL	SWT
Capacity (veh/h)	-	-	307	1008	-
HCM Lane V/C Ratio	-	-	0.2	0.003	-
HCM Control Delay (s)	-	-	19.6	8.584	0
HCM Lane LOS			C	A	A
HCM 95th %tile Q(veh)	-	-	0.732	0.01	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	24.0
Intersection LOS	C

Approach	WB	NE	SW
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	630	566	487
Demand Flow Rate, veh/h	643	577	497
Vehicles Circulating, veh/h	466	96	456
Vehicles Exiting, veh/h	207	857	653
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	15	7
Ped Cap Adj	1.000	0.998	0.999
Approach Delay, s/veh	39.3	10.9	19.4
Approach LOS	E	B	C

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	643	577	497
Cap Entry Lane, veh/h	709	1027	716
Entry HV Adj Factor	0.980	0.981	0.980
Flow Entry, veh/h	630	566	487
Cap Entry, veh/h	695	1005	701
V/C Ratio	0.907	0.563	0.695
Control Delay, s/veh	39.3	10.9	19.4
LOS	E	B	C
95th %tile Queue, veh	12	4	6

Intersection	
Intersection Delay, s/veh	2.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	50	489	324	4	35	105
Conflicting Peds, #/hr	14	0	0	14	14	14
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	57	556	368	5	40	119

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	387	0	-	0	1053	398
Stage 1	-	-	-	-	384	-
Stage 2	-	-	-	-	669	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1171	-	-	-	251	652
Stage 1	-	-	-	-	688	-
Stage 2	-	-	-	-	509	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1157	-	-	-	228	637
Mov Capacity-2 Maneuver	-	-	-	-	228	-
Stage 1	-	-	-	-	680	-
Stage 2	-	-	-	-	467	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	18

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1157	-	-	-	440
HCM Lane V/C Ratio	0.049	-	-	-	0.362
HCM Control Delay (s)	8.272	0	-	-	17.7
HCM Lane LOS	A	A			C
HCM 95th %tile Q(veh)	0.155	-	-	-	1.624

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	4.9

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	3	528	322	90	205	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	600	366	102	233	3

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	468	0	-	0	1024	417
Stage 1	-	-	-	-	417	-
Stage 2	-	-	-	-	607	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1094	-	-	-	261	636
Stage 1	-	-	-	-	665	-
Stage 2	-	-	-	-	544	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1094	-	-	-	260	636
Mov Capacity-2 Maneuver	-	-	-	-	389	-
Stage 1	-	-	-	-	665	-
Stage 2	-	-	-	-	543	-

Approach	EB	WB	SE
HCM Control Delay, s	0	0	27

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	1094	-	-	-	391
HCM Lane V/C Ratio	0.003	-	-	-	0.605
HCM Control Delay (s)	8.301	-	-	-	27.3
HCM Lane LOS	A				D
HCM 95th %tile Q(veh)	0.009	-	-	-	3.828

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	5.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	240	490	11	151	258	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	273	557	12	172	293	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	830	0	748	551
Stage 1	-	-	-	-	551	-
Stage 2	-	-	-	-	197	-
Follow-up Headway	-	-	2.218	-	3.518	3.318
Pot Capacity-1 Maneuver	-	-	802	-	380	534
Stage 1	-	-	-	-	577	-
Stage 2	-	-	-	-	836	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	802	-	374	534
Mov Capacity-2 Maneuver	-	-	-	-	469	-
Stage 1	-	-	-	-	577	-
Stage 2	-	-	-	-	822	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1	25

Minor Lane / Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	469	534	-	-	802	-
HCM Lane V/C Ratio	0.625	0.002	-	-	0.016	-
HCM Control Delay (s)	24.6	11.8	-	-	9.56	-
HCM Lane LOS	C	B			A	
HCM 95th %tile Q(veh)	4.2	0.006	-	-	0.047	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	16	1	178	72	0	148
Conflicting Peds, #/hr	0	0	0	3	5	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	18	1	202	82	0	168

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	411	248	0	0	284	0
Stage 1	243	-	-	-	-	-
Stage 2	168	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	597	791	-	-	1278	-
Stage 1	797	-	-	-	-	-
Stage 2	862	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	596	788	-	-	1273	-
Mov Capacity-2 Maneuver	648	-	-	-	-	-
Stage 1	797	-	-	-	-	-
Stage 2	860	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	655	1273	-
HCM Lane V/C Ratio	-	-	0.029	-	-
HCM Control Delay (s)	-	-	10.7	0	-
HCM Lane LOS			B	A	
HCM 95th %tile Q(veh)	-	-	0.091	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	18	0	135	45	0	129
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	20	0	153	51	0	147

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	326	179	0	0	205	0
Stage 1	179	-	-	-	-	-
Stage 2	147	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	668	864	-	-	1366	-
Stage 1	852	-	-	-	-	-
Stage 2	880	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	668	864	-	-	1366	-
Mov Capacity-2 Maneuver	700	-	-	-	-	-
Stage 1	852	-	-	-	-	-
Stage 2	880	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	700	1366	-
HCM Lane V/C Ratio	-	-	0.029	-	-
HCM Control Delay (s)	-	-	10.3	0	-
HCM Lane LOS			B	A	
HCM 95th %tile Q(veh)	-	-	0.09	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Volume (veh/h)	534	1149	430	76	73	336
Number	1	6	2	12	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	190.0	186.3	186.3
Lanes	1	2	2	0	1	2
Cap, veh/h	753	2748	1576	276	294	524
Arrive On Green	0.18	0.74	0.51	0.51	0.17	0.17
Sat Flow, veh/h	1774	3725	3090	541	1774	3167
Grp Volume(v), veh/h	607	1306	294	281	83	382
Grp Sat Flow(s),veh/h/ln	1774	1863	1863	1767	1774	1583
Q Serve(g_s), s	12.3	11.7	7.6	7.7	3.4	9.5
Cycle Q Clear(g_c), s	12.3	11.7	7.6	7.7	3.4	9.5
Prop In Lane	1.00			0.31	1.00	1.00
Lane Grp Cap(c), veh/h	753	2748	950	901	294	524
V/C Ratio(X)	0.81	0.48	0.31	0.31	0.28	0.73
Avail Cap(c_a), veh/h	779	2748	950	901	665	1187
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	7.2	4.4	11.8	11.8	30.2	32.7
Incr Delay (d2), s/veh	6.1	0.6	0.8	0.9	0.5	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	4.3	3.1	3.1	3.0	1.5	3.9
Lane Grp Delay (d), s/veh	13.3	5.0	12.6	12.7	30.7	34.7
Lane Grp LOS	B	A	B	B	C	C
Approach Vol, veh/h		1913	575		465	
Approach Delay, s/veh		7.6	12.7		34.0	
Approach LOS		A	B		C	

Timer			
Assigned Phs	1	6	2
Phs Duration (G+Y+Rc), s	18.8	65.0	46.2
Change Period (Y+Rc), s	4.0	4.0	4.0
Max Green Setting (Gmax), s	16.0	61.0	41.0
Max Q Clear Time (g_c+I1), s	14.3	13.7	9.7
Green Ext Time (p_c), s	0.5	11.6	10.7

Intersection Summary	
HCM 2010 Ctrl Delay	12.8
HCM 2010 LOS	B

Notes

Intersection	
Intersection Delay, s/veh	0.3

Movement	NBL	NBR	NET	NER	SWL	SWT
Vol, veh/h	22	1	699	57	0	387
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	25	1	794	65	0	440

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1267	827	0	0	859	0
Stage 1	827	-	-	-	-	-
Stage 2	440	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	186	371	-	-	782	-
Stage 1	430	-	-	-	-	-
Stage 2	649	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	186	371	-	-	782	-
Mov Capacity-2 Maneuver	316	-	-	-	-	-
Stage 1	430	-	-	-	-	-
Stage 2	649	-	-	-	-	-

Approach	NB	NE	SW
HCM Control Delay, s	17	0	0

Minor Lane / Major Mvmt	NET	NER	NBLn1	SWL	SWT
Capacity (veh/h)	-	-	318	782	-
HCM Lane V/C Ratio	-	-	0.082	-	-
HCM Control Delay (s)	-	-	17.3	0	-
HCM Lane LOS			C	A	
HCM 95th %tile Q(veh)	-	-	0.267	0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	16.6
Intersection LOS	C

Approach	WB	NE	SW
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	276	789	411
Demand Flow Rate, veh/h	282	805	419
Vehicles Circulating, veh/h	403	146	185
Vehicles Exiting, veh/h	548	458	500
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	15	7
Ped Cap Adj	1.000	0.998	0.999
Approach Delay, s/veh	9.6	22.9	9.3
Approach LOS	A	C	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	282	805	419
Cap Entry Lane, veh/h	755	976	939
Entry HV Adj Factor	0.979	0.980	0.980
Flow Entry, veh/h	276	789	411
Cap Entry, veh/h	739	955	919
V/C Ratio	0.373	0.826	0.447
Control Delay, s/veh	9.6	22.9	9.3
LOS	A	C	A
95th %tile Queue, veh	2	10	2

Intersection	
Intersection Delay, s/veh	2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	59	348	260	6	8	84
Conflicting Peds, #/hr	9	0	0	9	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	67	395	295	7	9	95

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	303	0	-	0	830	309
Stage 1	-	-	-	-	300	-
Stage 2	-	-	-	-	530	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1258	-	-	-	340	731
Stage 1	-	-	-	-	752	-
Stage 2	-	-	-	-	590	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1249	-	-	-	316	725
Mov Capacity-2 Maneuver	-	-	-	-	316	-
Stage 1	-	-	-	-	751	-
Stage 2	-	-	-	-	549	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	12

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1249	-	-	-	652
HCM Lane V/C Ratio	0.054	-	-	-	0.16
HCM Control Delay (s)	8.046	0	-	-	11.6
HCM Lane LOS	A	A			B
HCM 95th %tile Q(veh)	0.17	-	-	-	0.568

Notes

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Intersection	
Intersection Delay, s/veh	1.9

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	1	351	268	66	99	3
Conflicting Peds, #/hr	3	0	0	5	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	399	305	75	112	3

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	381	0	-	0	744	346
Stage 1	-	-	-	-	343	-
Stage 2	-	-	-	-	401	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1177	-	-	-	382	697
Stage 1	-	-	-	-	719	-
Stage 2	-	-	-	-	676	-
Time blocked-Platoon, %		-	-	-		
Mov Capacity-1 Maneuver	1174	-	-	-	381	695
Mov Capacity-2 Maneuver	-	-	-	-	491	-
Stage 1	-	-	-	-	718	-
Stage 2	-	-	-	-	675	-

Approach	EB	WB	SE
HCM Control Delay, s	0	0	14

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	1174	-	-	-	495
HCM Lane V/C Ratio	0.001	-	-	-	0.234
HCM Control Delay (s)	8.069	-	-	-	14.5
HCM Lane LOS	A				B
HCM 95th %tile Q(veh)	0.003	-	-	-	0.9

Notes

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Intersection	
Intersection Delay, s/veh	5.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	136	213	4	274	246	1
Conflicting Peds, #/hr	0	34	0	0	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	155	242	5	311	280	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	398	0	597	277
Stage 1	-	-	-	-	277	-
Stage 2	-	-	-	-	320	-
Follow-up Headway	-	-	2.218	-	3.518	3.318
Pot Capacity-1 Maneuver	-	-	1161	-	466	762
Stage 1	-	-	-	-	770	-
Stage 2	-	-	-	-	736	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	1161	-	450	761
Mov Capacity-2 Maneuver	-	-	-	-	542	-
Stage 1	-	-	-	-	769	-
Stage 2	-	-	-	-	712	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	18

Minor Lane / Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	542	761	-	-	1161	-
HCM Lane V/C Ratio	0.516	0.001	-	-	0.004	-
HCM Control Delay (s)	18.5	9.7	-	-	8.113	-
HCM Lane LOS	C	A			A	
HCM 95th %tile Q(veh)	2.933	0.004	-	-	0.012	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	2.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	103	0	130	8	1	177
Conflicting Peds, #/hr	0	0	0	1	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	117	0	148	9	1	201

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	355	152	0	0	157	0
Stage 1	152	-	-	-	-	-
Stage 2	203	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	643	894	-	-	1423	-
Stage 1	876	-	-	-	-	-
Stage 2	831	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	642	894	-	-	1423	-
Mov Capacity-2 Maneuver	681	-	-	-	-	-
Stage 1	876	-	-	-	-	-
Stage 2	830	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	681	1423	-
HCM Lane V/C Ratio	-	-	0.172	0.001	-
HCM Control Delay (s)	-	-	11.4	7.532	-
HCM Lane LOS			B	A	
HCM 95th %tile Q(veh)	-	-	0.617	0.002	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	2.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	70	0	112	18	0	108
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	80	0	127	20	0	123

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	261	138	0	0	148	0
Stage 1	138	-	-	-	-	-
Stage 2	123	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	728	910	-	-	1434	-
Stage 1	889	-	-	-	-	-
Stage 2	902	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	728	910	-	-	1434	-
Mov Capacity-2 Maneuver	741	-	-	-	-	-
Stage 1	889	-	-	-	-	-
Stage 2	902	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10	0	0

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	741	1434	-
HCM Lane V/C Ratio	-	-	0.107	-	-
HCM Control Delay (s)	-	-	10.4	0	-
HCM Lane LOS			B	A	
HCM 95th %tile Q(veh)	-	-	0.359	0	-

Notes

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