OREGON WATER RESOURCE DEPARTMENT
WATER CONSERVATON, REUSE AND STORAGE
GRANT PROGRAM

I. Grant Information

Study Name: *Fessler Nursery Aquifer Storage and Recovery Feasibility Study*

Type of Grant Requested: ☐ Water Conservation ☐ Reuse ☐ Above Ground Storage
☒ Storage Other Than Above-Ground [Including Aquifer Storage and Recovery (ASR)]
Note: A Water Conservation and Reuse study may be submitted as a joint application. All other applications must only include one application type.

Program Funding Dollars Requested: $ 11,405.00 Total cost of planning study: $ 22,810.00
Note: Request may not exceed $500,000

II. Applicant Information

Applicant Name: *Fessler Nursery*	Co- Applicant Name:
Contact: *Dale Fessler*	Contact:
Address *12666 Monitor-McKee Rd*	Address:
Woodburn, OR 97071	
Phone *503.984.1775*	Phone:
Fax:	Fax:
Email: *dale@fesslernursery.com*	Email:

Fiscal Officer Name: *Malla R. Kupillas*	Principle Contact: *Malla R. Kupillas*
Organization: *Pacific Hydro-Geology Inc.*	Organization: *Pacific Hydro-Geology Inc.*
Address: *18487 S. Valley Vista Rd.*	Address: *18487 S. Valley Vista Rd.*
Mulino, Oregon 97042	*Mulino, Oregon 97042*
Phone: *503.632.5016 ext. 11*	Phone: *503.632.5016 ext. 11*
Fax: *503.632.5983*	Fax: *503.632.5983*
Email: *phg@bctonline.com*	Email: *phg@bctonline.com*

Certification:

I certify that this application is a true and accurate representation of the proposed work for a project planning study and that I am authorized to sign as the Applicant or Co-Applicant. By the following signature, the Applicant certifies that they are aware of the requirements of an Oregon Water Resources Department grant and are prepared to conduct the planning study if awarded.

Applicant Signature: Dale Fessler Date: *12/14/2011*

Print Name: *Dale Fessler* Title: *Owner*

III. Planning Study Summary

Please give a brief summary of the planning study using no more than 150 words.

Fessler Nursery is determining the feasibility of using Aquifer Storage and Recovery (ASR) as an alternate source of water for nursery use. The objectives of the feasibility study will be to determine whether: the source water meets drinking water standards; the source water is chemically compatible with the basalt aquifer; the basalt aquifer has the capacity to store the volume of water to be injected; and the source can sustainably provide the water. The source is an alluvial aquifer that is also used for drinking water. Water will be pumped from existing, permited alluvial wells and injected into a basalt well completed for the feasiblity study. The study will consist of water quality testing, water compatibility analysis, a pumping test, pumping test analysis, and water level monitoring.

IV. Grant Specifics

Section A. Common Criteria

Instructions: Answer all questions in this section by typing the answer below the question. It is anticipated that completed applications will result in additional pages.

1. Describe how the planning study will be performed. Include:
   a. A description of the planning schedule/timeline, which includes identifying all key tasks. (Section VI provides an opportunity for a "graphical" representation of the schedule.)

      See Section VI for a chart that provides a "graphical" representation of the schedule discussed below.

      The study for the grant will begin in June 2012 with collection of the monthly water level measurements in the injection, source, and observations wells. These water levels will be collected on a monthly basis for the duration of the grant.

      During the first week of September 2012, a 24-hour pumping test will be completed using the injection well as the pumped well. During the pumping test, water levels will be monitored with pressure transducers at the injection well and one of the basalt observation wells. The pumping test also marks the beginning of water level monitoring with pressure transducers in the injection and observation well until June of 2013. Periodic hand water level measurements will be collected at the other basalt observation wells during the pumping test.

      A full suite of water quality samples will also be collected during the pumping test to document the water quality in the injection and source wells prior to beginning injection under the existing UIC registration or under the ASR Limited License.

      Injection of water from the source wells will begin in November and continue until March or April, 2013. The exact time injection stops will be weather dependent. If water from the alluvial wells is not needed for maintaining nursery stock, then injection will continue through April. If March and April are hot and/or dry, then injection will stop in March.

      Recovery of the injected water will start in March or April when injection stops, and water quality sampling from the basalt-injection well will start as soon as injection stops. The water will be tested for common ions and arsenic once a month, with the last sample under the grant to be collected in June 2013.

      All work proposed above can be completed within the time frame of the grant, and follows the time line for collecting data to evaluate the feasibility of an ASR project in a new location. A chart is provided in Section 6 that shows the schedule for the project under the grant.

   b. When the planning study could begin.

      The planning study can begin as soon as the grant money is available because the feasibility study is on-going.

2. Provide a description of the relevant professional qualifications and/or experience of the person(s) that will play key roles in performing the planning study. If the personnel have not been decided upon, include a description of the professional qualifications and/or experience of the person(s) you anticipate will play key roles in performing the planning study.

   Ms. Kupillas will be the project lead for the grant. Additional personal who may assist with the project are Greg Kupillas, and Doann Hamilton. Malia has a broad and extensive background covering environmental services, water resources development and management, and natural

resources protection, with over 22 year of experience as a hydrogeologist. She is a Registered Geologist and Certified Water Rights Examiner in Oregon and a Licensed Geologist in Washington with a Hydrogeologist certification. She has gained considerable experience with ground-water sampling, water level monitoring, and aquifer pump testing and analysis. All of this experience qualifies her for this project. Ms. Kupillas has been working on the Mt. Angel area ASR projects since 2004, investigating how to develop water sources that meet drinking water standards with minimal to no additional water treatment.

Malia Kupillas will complete the water quality sampling, water level monitoring, pumping test analysis, and PHREEQC modeling. She will also handle all of the fiscal coordinating between the project and the grant funding. The administrative costs are already built into the hourly billing rate. Thus, there are no additional adminstrative costs in the budget.

If Malia needs additional assistance, then Greg Kupillas and/or Doann Hamiliton will help with the project. Greg has a broad background in environmental services and water resources development and management encompassing over 22 years of experience working in both the private and public sectors. Mr. Kupillas is a Registered Geologist and Certified Water Rights Examiner in Oregon, and a Licensed Geologist in Washington with a hydrogeologist certification. Mr. Kupillas has gained extensive experience involving the evaluation and protection of groundwater resources through his participation in a wide variety of projects including both large and small environmental remedial investigations, regional aquifer studies, and local ground water characterizations. He has conducted and supervised a wide variety of field activities associated with environmental site assessments, remediation projects, and groundwater and surface water investigations, and served as project manager for numerous environmental remediation projects and groundwater investigations.

Doann Hamilton has a broad background in environmental services with over 18 years of experience working in the field measuring water levels, collecting water quality samples, and running pumping tests. Ms. Hamilton is a Registered Geologist in Oregon and Washington.

3. What local, state or federal project permitting requirements/issues do you anticipate in order for the planning study to be conducted?

   There should be no permitting issues.

   - *Fessler Nursery has existing water rights for the source wells, and received a UIC registration from DEQ that would allow injection of water for the beginning of the feasibility study.*
   - *The ASR Limited License Application has been submitted for review and comments, and the response to those comments should be submitted by Februray 2012. This will allow the Limited License to be issued before the 2013 injection season begins in November 2013.*
   - *Appropriate land use review by Marion County has been completed and the "Land Use" form for the ASR Limited License has been signed by the county and submitted to OWRD. There have been no zoning changes or changes to the land use laws that could effect a land use review if a new one is requested by OWRD.*

4. Are permits/governmental approvals required for the planning study? If yes, indicate whether you have obtained the necessary permits/governmental approval. If you have not obtained the necessary permits/governmental approval, describe the steps you have taken to obtain them.

   Yes, two permits are required and a third is needed to use water injected for ASR.

- *Water rights are needed to pump water from the alluvial wells during the injection season. The alluvial wells have nursery rights which allow pumping during the injection season. Thus, this condition is met.*
- *A UIC registration with DEQ is required before feasibility testing can begin, and has been attained. Thus, this condition is met. An ASR Limited License is needed only if the injected water is going to be used for nursery use. An ASR Limited License has been submitted for review and comments, and the revisions will be submitted by February 2013. The ASR Limited License should be issued during the time frame for the grant. However, feasibility testing can be completed under the UIC registration if the ASR Limited License has not been issued.*

5. Describe your goal (which must be based on evaluating the feasibility of developing a water conservation, reuse or storage project) and how this study helps to achieve the goal.

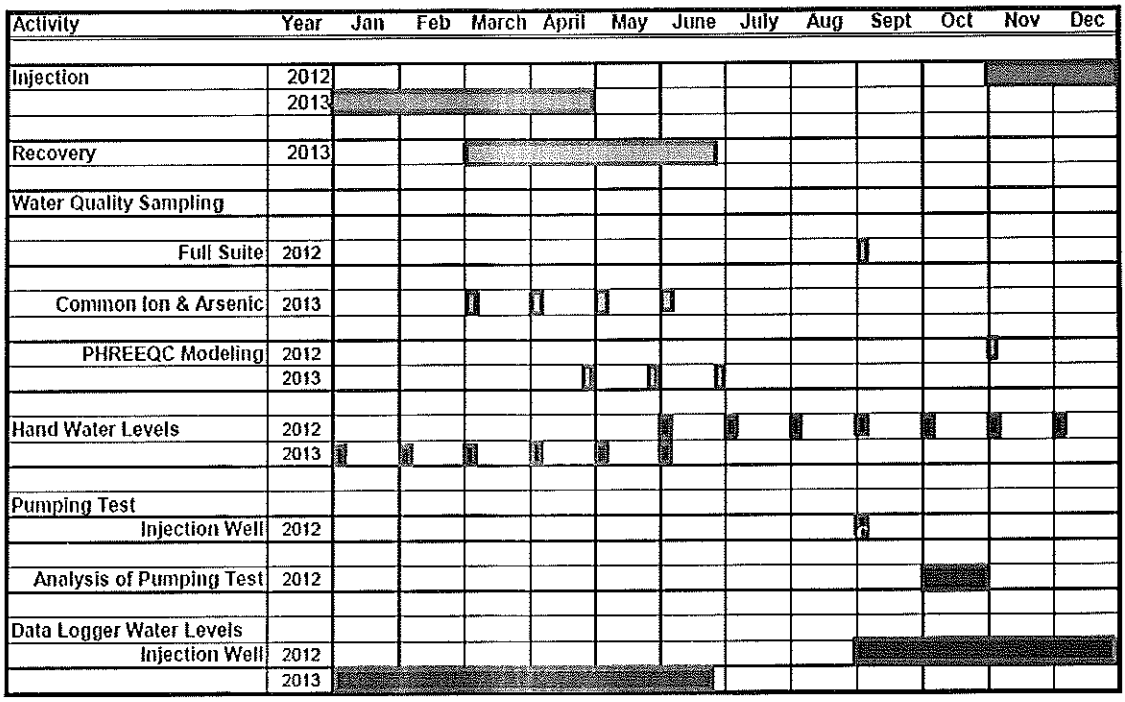
   The goal of this study is to show ASR is feasible in this area. The feasability of this ASR project is based on the source water meeting drinking water standards, and the source water not reacting in a negative way with the basalt substrate and water in the basalts. The basalt aquifer must have the storage capcity to store the volume of water requested, and the alluvial aquifer must be able to provide the volume of water sustainably. The feasibility goal will be met when the following has been accomplished.

   - *It has been determined that the water from the alluvial aquifer (source) meets drinking water standards.*
   - *It has been determined that the injection of ground water from the alluvium into the basalts does not cause adverse reactions. Some examples of adverse reactions are precipitation of minerals that would cause the basalt aquifer to clog. Another adverse reaction would be dissolution of arsenic that would degrade the quality of water in the basalt aquier.*
   - *It has been shown that up to 40 acre feet of water can be pumped from the alluvial wells during the injection season.*
   - *It has been shown that up to 40 acre feet of water can be injected into and stored in the basalt aquifer.*
   - *It has been shown that long term water levels in the alluvial aquifer remain stable after injection begins.*

6. Describe the technical aspects of the planning study and why your approaches are appropriate for accomplishing the goal of the planning study.

   The feasibility study consists of injecting water from a source well beginning in November 2012 and ending in March or April of 2013. Then, the injected water will be pumped from the basalt aquifer when the injection ends. The feasibility study also consists of water quality sampling, water level monitoring, a pumping test, analysis of the pumping test data, and analysis of the water quality data using the PHREEQC computer model developed by USGS, which are discussed in more detail below. Chart 1, shown below, provides the schedule for the work to be completed under the grant.

Chart 1. Fessler ASR Schedule for Grant



Water Quality Sampling

Water quality sampling events are divided into two types based on the parameters that will be analyzed. The first type is the comprehensive sampling where all the parameters listed on Table 1 will be analyzed except those parameters that have been granted a waiver. The samples for this event will be collected from the basalt injection well and the combined flow from the source wells. This sampling event determines if the source water meets drinking water standards, which is one of the goals of the feasibility study.

The second type of sampling event focuses on common ions and arsenic. The samples for this event will only be collected from the basalt injection well. This water quality data will be used to monitor changes in chemistry as the injected water is pumped out. The changes in chemistry will be evaluated each month, with the exception of the June 2013 data, using the PHREEQC computer model developed by USGS. The mixing and inverse models will be run to evaluate possible chemical reactions that could be occurring between the native water, injected water, and the basalt substrate. The results from the modeling may show whether or not there are no short term reactions occurring and ASR is feasible. The results from this sampling meet the goal of determining if any adverse chemical reactions are occurring with the injected water and the basalt aquifer.

Water Level Monitoring

Water levels will be monitored in the basalt injection well, three basalt observations wells, two alluvial source wells, and one alluvial observation well that are shown on Figure 1. The purpose for the water level data is to monitor long term changes in the alluvial and basalt aquifers in response to the ASR project, and help in evaluating how much injected water is lost to the system and not recoverable. These data will be used to meet the goal of testing aquifer sustainability and the ability of the basalt aquifer to store up to 40 acre feet of water.

Pumping Test

The purpose of the pumping test is to obtain site specific aquifer parameters for the basalt aquifer. These data are needed to evaluate how far the injected water may travel and evaluate how much water may be lost from the aquifer system that cannot be recovered. These data will be used to meet the goal of testing aquifer sustainability and the ability of the basalt aquifer to store up to 40 acre feet of water.

7. Describe the level of involvement; interest and/or commitment of different entities associated with the planning study (attach letters of support). Describe how these entities will benefit or be impacted by the planning study.

Fessler Nursery is the entity who will be providing the matching funds for this grant, and the results from the study will help with their feasibility study. Therefore, they will receive the greatest benefit and the results from the study will have the greatest impact on their project. A letter of support from Fessler Nursery is attached.

Kraemer Farms and Dickman Farms have been involved in their own ASR feasibility studies in the Mt. Angel area. However, the high cost of monitoring has slowed the progress of their projects. Marion Soil Water Conservation District provided a grant to Dickman Farms to help with some of the costs, because ASR has the potential to be the most cost effective way, with the least impact to the environment, to store water in the winter for irrigation use in the summer. Therefore, Kraemer Farms and Dickman Farms are very interested in in this planning study. The results of the study will help them with their feasibility studies, and they are in support of the study. Letters of support from Dickman Farms and Kraemer Farms are attached.

Woodburn Nursery and Azaleas is providing access to three of their basalt wells for water level monitoring during this feasibility study, and is very interested in the results from this feasibility study for their own future ASR Limited License application. Water levels have been declining in their basalt wells, which has them worried about the long term sustainability of the basalt aquifer they are dependent on for their nursery operations. If Fessler Nursery's feasibility study is successful, then Woodburn Nursery and Azaleas will be applying for their own ASR Limited License. The water level data and PHREEQC modeling will be directly applicable to their ASR Limited License application, because they will use water from the same alluvial aquifer and inject into the same basalt water-bearing zone. Thus, they are directly involved in this study by allowing access to their wells, and will directly benefit from the results. A letter of support from Woodburn Nursery and Azaleas (Tom Fessler) is attached.

Section B. Unique Criteria

Instructions: Answer the set of questions below that applies to the type of planning study that this grant will fund.

☒ **Storage Other Than Above-Ground [Including Aquifer Storage and Recovery (ASR)]**

Please answer the following three questions BEFORE proceeding:

Will the project divert greater than 500 acre-feet of surface water annually?	☐ Yes	☒ No
Will the project impound surface water on a perennial stream?	☐ Yes	☒ No
Will the project divert water from a stream that supports sensitive, threatened or endangered species?	☐ Yes	☒ No

If you answered "Yes" to any one of these questions, by signature on this application, you are committing to include the following required elements in your planning study.

Describe how you intend to address the required elements in your planning study:

a) **Analyses of by-pass, optimum peak, flushing and other ecological flows of the affected stream and the impact of the storage project on those flows.**
Not Applicable

b) **Comparative analyses of alternative means of supplying water, including but not limited to the costs and benefits of water conservation and efficiency alternatives and the extent to which long-term water supply needs may be met using those alternatives.**
Not Applicable

c) **Analyses of environmental harm or impacts from the proposed storage project.**
Not Applicable

d) **Evaluation of the need for and feasibility of using stored water to augment in-stream flows to conserve, maintain and enhance aquatic life, fish life and any other ecological values.**
Not Applicable

Is the proposed storage project for municipal use?

☐ Yes ☒ No

If you answered "Yes," then describe how you intend to address the following required element in your planning study:

e) **For a proposed storage project that is for municipal use, analysis of local and regional water demand and the proposed storage project's relationship to existing and planned water supply projects.**
Not Applicable

Proceed in answering the following questions:

1. Water Conservation or Reuse projects that may result from this planning study are requested to be included in the Water Resources Department's "Inventory of Potential Conservation Opportunities". Though you may have already submitted this information earlier in the year through a separate survey, we ask that all applicants complete the information on the form provided at the end of this application.
☐ I have filled out the application or ☐ I have not filled out the application. **Not Applicable**

2. Describe the water supply need(s) that the project associated with the planning study is intended to meet. Applicant should reference supporting documentation that would be available upon request.

   The ASR Limited License application is requesting to inject and store 40 acre feet of water per year. This is the volume of water anticipated by Fessler Nursery to meet their irrigation needs during the summer.

3. Explain how the project associated with the planning study will meet the water supply need(s), and indicate what percentage of that need will be met. (For example: If your water supply need is 20,000 acre-feet of additional water and the project will supply 10,000 additional acre-feet, 50% of your need will be met).

   Fessler Nursery estimates that they need 40 acre feet of water for their nursery operation during the summer. One of the objectives of this feasibility study is to determine if up to 40 acre feet of water can be injected and stored in the basalt aquifer. Thus, this project has the potential to meet 100% of the need if it is successful.

4. Present convincing argument that there are no other reasonably achievable alternatives that would be able to meet the water supply need(s). Applicant may reference supporting documentation that would be available upon request.

   At this time, farmers in the Mt. Angle area have implemented best management practices to conserve water in an effort to stabalize water levels in the basalt aquifer. However, those efforts have not been successful, and all of the 5-year renewable water rights have been cancelled. Thus, conservation is not sufficient to stabilize the aquifer while continuing to meet the irrigation needs of the area. Therefore, Fessler Nursery, Dickman Farms,and Kraemer Farms have been exploring the feasibility of using ASR in the Mt. Angel area to provide additional water needed for irrigation.

   These farmers are also members of the East Valley Water District (EVWD) that has been involved for over ten years in efforts to build a storage reservoir project. No one knows when an above-ground storage reservoir is actually going to be built, and the high environmental impacts associated with a storage reservoir may delay that potential source for water for another ten years or more. In addition, the great distance between Fesser Nursery and the current proposed reservoir site makes it even more unlikely that water from an EVWD reservoir would reach Fessler Nursery.

   Dickman Farms and Kraemer Farms, along with another farmer have also explored the possibility of capturing water that discharges from drain tiles during the winter, and using that water for ASR. The preliminary testing indicated that the water generally meets drinking water standards. However, the main limitation to using this source of water for ASR was the turbidity of the water during high storm events when the bulk of the water is available. This source of water also carries with it a more negative public perception, and would require extensive water quality testing to show that pesticides are not a problem.

   At this time, it seems that a small-scale ASR project has the greatest chance to meet the water supply needs of Fessler Nursery, and the potential to make the basalt aquifer more sustainable. This is based on the fact that conservation efforts alone have not been enough to stabalize the aquifer and no one knows if or when the East Valley Water District will be successful in building an above-ground storage reservoir.

5. Provide data and information on the associated project and the project's sources of water supply:
   a. The location of the associated project. (Include the basin, county, township, range and section.)
   The project is located in the Pudding River Basin, Tributary to the Willamette River, Marion County, Towndhip5 South, Range1 West, Sections 33 and 34.

   b. The name(s) and river mile(s) of the source water and what they are tributary to, if applicable.
   The source water will be an alluvial aquifer, which does not have a river mile. The nearest water body is Zollner Creek, which is a tributary to the Pudding River, which discharges into the Willamette River.

   c. Water availability to meet project storage. (Typically, the Department evaluates new storage projects using a 50 percent water availability analysis.)
   Water is available for the proposed injection time frame using a 50 percent water availability analysis.

   d. Proposed purposes and uses of stored water.
   The stored water will be used for nursery uses.

   e. Environmental flow needs and water quality requirements of source water.
   The source water is ground water, which does not have any environmental flow needs or water quality requirements.

   f. Water quality, storage capacity, and geologic aspects of the associated aquifer(s) and/or recharge zones.
   The water quality, storage capacity, and geologic aspects of the associated aquifers are described below.

   Water Quality
   Initial water quality testing from the alluvial and basalt aquifer show they both meet drinking water standards. The initial PHREEQC modeling indicates there should be no adverse reaction from injecting the source water into the basalts.

   Storage Capacity
   Water levels have dropped at least 50 feet in the basalt aquifer, which means there should be adequate storage capacity for 40 acre feet per year.

   Geologic Aspects
   The source wells are completed in an alluvial aquifer, with the capacity to provide the 40 acre feet of water per year. The basalt aquifer has an estimated pumping capacity of 200 gpm. The estimated injection rate necessary to store 40 acre feet of water during the injection period is 60 gpm. Therefore, the basalt aquifer should be able to receive the injected water at the required rate from the source wells.

6. Provide a review of the local, state, and/or federal permitting requirements and issues posed by the implementation of the project associated with the planning study.

Listed below is a review of the local, state, and federal permitting requirements and issues posed by the implementation of this feasibility study.

Local:

The land use for ASR has been approved by Marion County.

State:

There are two state permitting requirements. The first permitting requirement is registering the project with the Department of Environmental Quality's Underground Injection Control (UIC) program. The project has been registered and assigned UIC number 14351. The UIC number is needed for injection, but does not allow the injected water to be used for the desired application. Thus, work proposed under this grant application can be completed under the UIC registration.

The second permitting requirement is an ASR Limited License. An ASR Limited License has been submitted for review and returned with comments. The application will be re-submitted shortly after this grant application has been submitted, and the limited license should be issued before injection can begin in November 2013.

Federal:

There are no Federal permitting requirements.

V. Match Funding Information

Applicants must demonstrate a minimum dollar-for-dollar match based on the total funding request. The match may include a) secured resources, b) previously expended resources, and/or c) pending resources. For secured funding, you must attach a letter of support from the match funding source that specially mentions the dollar amount shown in the "Amount/Dollar Value" column. For pending resources, documentation showing a request for the matching funds must accompany the application. For resources that have been previously expended, the expenditure must have occurred on or after July 1, 2011. Resources expended prior to July 1, 2011 are not eligible for match purposes.

The Type of matching funds may include:	The Status of matching funds may include:
• The value of in-kind labor, equipment rental and materials essential to the planning study provided by the applicant or partner*.	• Secured funding commitments from other sources.
• Cash is direct expenditures made in support of the planning study by the applicant.	• Associated and documented expenditures for the planning study from non-program sources incurred on or after July 1, 2011.
	• Pending commitments of funding from other sources. In such instances, Department funding will not be released prior to securing a commitment of the funds from other sources. Pending commitments of the funding must be secured within 12 months from the date of the award.

*"Partner" means a non-governmental or governmental person or entity that has committed funding, expertise, materials, labor, or other assistance to a proposed planning study. OAR 690-600-0010.

Match Funding Source (if in-kind, briefly describe the nature of the contribution)	Type (✓ One)	Status (✓ One)	Amount/ Dollar Value	Date Match Funds Available *(Month/Year)*
Fessler Nursery	☒ cash ☐ in kind	☒ secured ☐ expended ☐ pending	*11,405.00*	*6/2012*
	☐ cash ☐ ins kind	☐ secured ☐ expended ☐ pending		
	☐ cash ☐ in kind	☐ secured ☐ expended ☐ pending		
	☐ cash ☐ in kind	☐ secured ☐ expended ☐ pending		
	☐ cash ☐ in kind	☐ secured ☐ expended ☐ pending		
	☐ cash ☐ in kind	☐ secured ☐ expended ☐ pending		
	☐ cash ☐ in kind	☐ secured ☐ expended ☐ pending		
	☐ cash ☐ in kind	☐ secured ☐ expended ☐ pending		
	☐ cash ☐ in kind	☐ secured ☐ expended ☐ pending		
	☐ cash ☐ in kind	☐ secured ☐ expended ☐ pending		

VI. Project Planning Study Schedule

Estimated Project Duration: June 2012 to June 2013

Place an "X" in the appropriate column to indicate when each element (key task) of the project will take place.

	2012		2013			
Project Planning Study Element (Key Tasks)	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Water Level Measurements	X	X	X	X		
Initial Water Quality Sampling	X					
Pumping Test	X					
Common Ion Water Quality Testing				X		
PHREEQC MODELING		X		X		

VII. Project Planning Study Budget

Section A

Please provide an estimated line item budget for the project planning study. An example would include: labor, materials, equipment, contractual services and administrative costs.

Line Items *Note: Administrative costs may not exceed 10% of the total funding requested by the Department.*	**Unit * Number** *(e.g. # of hours)*	**Unit Cost** *(e.g. hourly rate)*	**In-Kind Match**	**Cash Match Funds**	**OWRD Grant Funds**	**Total Cost**
Water Quality Sampling (Full Suite, Labor)	*3.00*	*85.00*		*127.50*	*127.50*	*255.00*
Water Quality Full Suite (Lab fee)	*1*	*3,300.00*		*1,650.00*	*1,650.00*	*3,300.00*
Water Quality Sampling for IOC & Arsenic (Labor)	*10*	*85.00*		425.00	425.00	850.00
Water Quality for IOC etc. (Lab fee)	*4*	*350.00*		700.00	700.00	1,400.00
Pumping Test (Labor)	*20.00*	*85.00*		*850.00*	*850.00*	*1,700.00*
Water Level Monitoring (Labor)	*80.0*	*85.00*		*3,400.0*	*3,400.00*	*6,800.00*
Water Level Monitoring Data Logger (Equipment)	*10.0*	*400.00*		*2,000.00*	*2,000.00*	*4,000.00*
Pumping Test Analysis (Labor)	*20.00*	*85.00*		*850.00*	*850.00*	*1,700.00*
PHREEQC Modeling (Labor)	*32.00*	*85.00*		*1,360.00*	*1,360.00*	*2,720.00*
Administrative Costs	*1*	*85.00*		*42.50*	*42.50*	*85.00*
Total for Section A				*11,405.00*	*11,405.00*	*22,810.00*
Percentage for Section A				*50%*	*50%*	*100%*

** Note: The "Unit" should be per "hour" or "day" – not per "project" or "contract."*

Section B

If Grant amount requested is $50,000 or greater, you MUST complete Section B. Elements (key tasks) in Section B should be the same as the elements (key tasks) in Section VI (Project Planning Study Schedule).

Project Planning Study Element (Key Tasks)	**In-Kind Match**	**Cash Match Funds**	**OWRD Grant Funds**	**Total Cost**
Total for Section B				

Totals in Section B must match the totals in Section A

Request to be added to the Oregon Water Resources Department's

Inventory of Potential Conservation Opportunities

The purpose of this inventory is to catalogue potential conservation projects that water users themselves have identified but not yet pursued because of financial, institutional, or other barriers. For the purpose of this application, water storage other than above-ground are included as conservation opportunities and are most likely capital conservation projects.

As a water provider or user, you know your water demands and water conservation opportunities better than anyone. We would appreciate your assistance with this important data collection effort by completing this survey. Your participation will help provide the building blocks we need to begin to identify and achieve potential future water supplies. Please answer the questions as completely as possible, to the best of your ability. We appreciate your help with this important effort.

This inventory of already-identified, potential conservation projects includes both capital and programmatic projects. Capital projects are defined as one-time, large investments resulting in water savings. Examples include reclaimed water plants, reservoir covering, transmission line upgrades reducing leaks, or industrial engineering modifications to re-use process water. Programmatic projects are defined as ongoing investments resulting in water savings. Examples include facilitating upgrades to more efficient water using devices (e.g., distributing free showerheads, toilet rebates) and distribution system leak detection programs. The conservation inventory is primarily intended to include "planned" projects rather than projects that are currently being implemented. However, currently active programmatic projects may be listed if they will continue or expand in future years. The inventory of projects submitted will be compiled by county or basin.

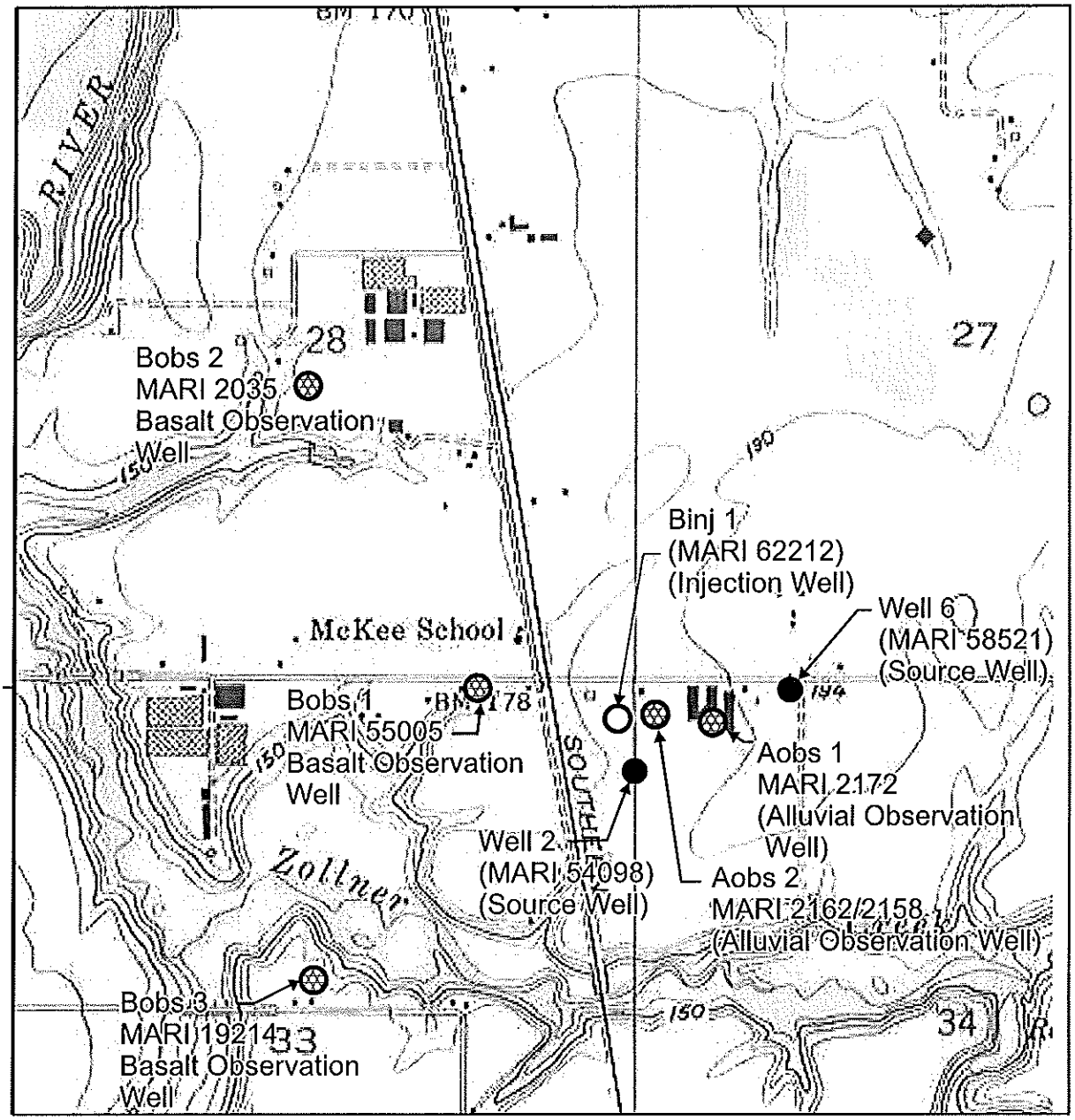
Examples are provided below.

	Example Capital Conservation Project	Example Programmatic Conservation Project
Project Description Provide brief sentence	Line 3 miles of unlined ditch.	Toilet rebate program for residential customers
Estimated Future Savings Provide brief sentence, including information regarding savings seasonality.	20 acre feet of water per year	If we spend our full budget each year, we estimate 50,000 gallons of water save per year
Seasonality Indicate what part of the year savings are generated (e.g. year-round; summer only; etc.).	Peak (irrigation) season savings.	Savings should occur throughout the year.
Estimated Future Costs Provide brief sentence.	$500,000 total project costs.	$40,000 a year.
Implementation Schedule Provide brief sentence.	Not set. Have conducted cost and savings estimate, but still seeking funding.	We started the program in 2005 and plan to implement until 2015.
Project Funded? Designate either "yes", "no", or provide brief sentence if necessary	No. Pursuing grant funding.	Yes. IN our CIP through the next 5 years.

To add a project to the inventory of potential conservation opportunities, please provide the following information for each conservation project. **Not Applicable**

This is a ☐ Capital Conservation Project ☐ Programmatic Conservation Project	
Project #/Name	**Not Applicable**
Project Description	
Estimated Future Savings	
Seasonality	
Estimated Future Costs	
Implementation Schedule	
What are the barriers to implementation, e.g. funding?	
This is a ☐ Capital Conservation Project ☐ Programmatic Conservation Project	
Project #/Name	
Project Description	
Estimated Future Savings	
Seasonality	
Estimated Future Costs	
Implementation Schedule	
What are the barriers to implementation, e.g. funding?	

- Include this form with your application -



Scale: 1:15840

0 — 1 Mile

Contour Interval 10 Feet

N

Source: USGS 7.5 Minute Topographic Survey Maps From National Geopgraphic TOPO (R) CD

SiteLoc Map.cdr

Figure 1. ASR Site and Well Locations

Fessler Nursery ASR Project
T.5S. R.1W Sec. 33 and Sec. 34

Pacific Hydro-Geology Inc.

12/2011

Table 1. ASR Chemical Component Check List

Inorganic	MCL (ppm)	Source (ppm)	Injection (ppm)
Antimony (Sb)	0.006	Initial Test	Initial Test
Arsenic (As)	0.05	Initial Test	MDR
Asbestos	7.00E+06	Waived[2]	Waived[2]
Barium (Ba)	2	Initial Test	Initial Test
Berylium (Be)	0.004	Initial Test	Initial Test
Cadmium (Cd)	0.005	Initial Test	Initial Test
Chromium (Cr)	0.1	Initial Test	Initial Test
Cyanide	0.2	Initial Test	Initial Test
Fluoride (F)	4	Initial Test	Initial Test
Mercury (hg)	0.002	Initial Test	Initial Test
Nitrate (NO3)	10	Initial Test	Initial Test
Nitrite (NO2)	1	Initial Test	Initial Test
Selenium (Se)	0.05	Initial Test	Initial Test
Titanium (Tl)	0.002	Initial Test	Initial Test
Common ions			
Calcium (Ca)		Initial Test	MDR
Magnesium (Mg)		Initial Test	MDR
Alkalinity		Initial Test	MDR
Iron Total (Fe)		Initial Test	MDR
Manganese (Mn)		Initial Test	MDR
Sodium (Na)		Initial Test	MDR
Potassium (K)		Initial Test	MDR
Chloride (Cl)		Initial Test	MDR
Sulfate (SO4)		Initial Test	MDR
Silica (SiO_2)		Initial Test	MDR
TDS[3]		Every Time	Every Time
pH[3]		Every Time	Every Time
Redox[3] (mv)		Every Time	Every Time
Temp[3]		Every Time	Every Time
Dissolved Oxygen[3]		Every Time	Every Time
Turbidity[3]		Every Time	Every Time
Pesticides			
Alachlor	0.002	Annually[4]	Annually[4]
Atrazine	0.003	Annually[4]	Annually[4]
Azinphos-methyl[1]		Annually[4]	Annually[4]
Carbofuran	0.04	Annually[4]	Annually[4]
Chlordane	0.002	Annually[4]	Annually[4]
Chlorobenzilate	0.1	Annually[4]	Annually[4]
Chlorpyrifos (Lorsban)[1]		Annually[4]	Annually[4]
Chlorpyrifos-methyl (Reldan)[1]		Annually[4]	Annually[4]
Cyanazine (Bladex)[1]		Annually[4]	Annually[4]
2,4-D[4]	0.07	Annually[4]	Annually[4]
Dalapon[4]	0.2	Annually[4]	Annually[4]
DBCP[1]	0.0002	Annually[4]	Annually[4]
Dieldrin[1]		Annually[4]	Annually[4]
Dinoseb[4]	0.007	Annually[4]	Annually[4]
Diquat[4]	0.02	Annually[4]	Annually[4]
Diuron[1]		Annually[4]	Annually[4]
EDB[1]	0.00005	Annually[4]	Annually[4]
Endothall[4]	0.1	Annually[4]	Annually[4]
Endrin	0.002	Annually[4]	Annually[4]

Pesticides con'd	MCL (ppm)	Source (ppm)	Injection (ppm)
Glyphosate[4]	0.7	Annually[4]	Annually[4]
Heptachlor	0.0004	Annually[4]	Annually[4]
Heptachlor epoxide	0.0002	Annually[4]	Annually[4]
Hexachlorobenzene	0.001	Annually[4]	Annually[4]
Hexachlorocyclopentadiene	0.05	Annually[4]	Annually[4]
Lindane	0.0002	Annually[4]	Annually[4]
Methoxychlor	0.04	Annually[4]	Annually[4]
Metolachlor (Dual)[1][4]		Annually[4]	Annually[4]
Oxamyl (Vydate)	0.2	Annually[4]	Annually[4]
Picloram[4]	0.5	Annually[4]	Annually[4]
Simazine	0.004	Annually[4]	Annually[4]
2,4,5-TP (Silvex)[4]	0.05	Annually[4]	Annually[4]
Toxaphene	0.003	Annually[4]	Annually[4]
Organics			
Benzene	0.005	Annually[4]	Annually[4]
Benzo-A-Pyrene	0.0002	Annually[4]	Annually[4]
o-dichlorobenzene	0.6	Annually[4]	Annually[4]
p-dichlorobenzene	0.075	Annually[4]	Annually[4]
1,2-Dichlorethane	0.005	Annually[4]	Annually[4]
1,1-Dichloroethene	0.007	Annually[4]	Annually[4]
cis-1,2 dichloroethen	0.07	Annually[4]	Annually[4]
trans-1,2 dichlorethen	0.1	Annually[4]	Annually[4]
dichloromethane	0.005	Annually[4]	Annually[4]
1,2-DCP	0.005	Annually[4]	Annually[4]
di(2-ethylhex)adipate	0.4	Annually[4]	Annually[4]
di(2-ethylhex)phathlate	0.006	Annually[4]	Annually[4]
Dioxin	3.00E-08	Annually[4]	Annually[4]
Ethylbenzene	0.7	Annually[4]	Annually[4]
Pentachlorophenol	0.001	Annually[4]	Annually[4]
PCBs	0.0005	Annually[4]	Annually[4]
Styrene	0.1	Annually[4]	Annually[4]
Tetrachloroethyene (PCE)	0.005	Annually[4]	Annually[4]
Toluene	1	Annually[4]	Annually[4]
1,2,4-trichlorobenzene	0.07	Annually[4]	Annually[4]
1,1,1-TCA	0.2	Annually[4]	Annually[4]
1,1,2-TCA	0.005	Annually[4]	Annually[4]
TCE	0.005	Annually[4]	Annually[4]
Vinyl Chloride	0.002	Annually[4]	Annually[4]
Xylenes (total)	10	Annually[4]	Annually[4]
Radionuclides			
Gross Alph	15 pci/L	Waived[5]	Waived[5]
Ra-226/228*	5 pci/L	Waived[5]	Waived[5]
Beta/Phot	4 mrems	Waived[5]	Waived[5]
U	30ug/L	Waived[5]	Waived[5]
Disinfection Byproducts			
TTHMs		Waived[2]	Waived[2]
HAA5		Waived[2]	Waived[2]
Total Chlorine[4]			
Biological			
Coliform Bacteria		Annually[4]	Annually[4]

(1) Added by DEQ

(2) Waived if residual chlorine is < 0.5 mg/L

(3) Measured in the field

(4) Measured annually for 1st 3 years, then waiver may be granted

(5) Waived (Date by DEQ and DHS)

MDR = Monthly During Recovery

Fessler Nursery Company

12666 Monitor-McKee Road N.E.
Woodburn, Oregon 97071
Phone (503) 634-2448 • FAX (503) 634-2866

December 14, 2011

Oregon Water Resources Department
Bill Fujii
725 Summer St. NE, Suite A
Salem, Oregon 97301-1271

RE: 2011-2013 Grant Program

Dear Mr. Fujii:

This letter is in support of the Oregon Water Resources Water Conservation, Reuse and Storage Grant Program application being submitted by Malia Kupillas, Pacific Hydro-Geology Inc. for Fessler Nursery.

Fessler Nursery is a family owned greenhouse nursery, run and operated by the second generation of Fesslers. We operate about 570,000 square feet of greenhouse space that produces florist azaleas, and spring bedding plants. We rely on irrigation to meet the water needs of our nursery plants.

Our nursery is located just north of the Mt. Angel Ground Water Limited Area where 5-year renewable permits have been cancelled, and are current members of the East Valley Water District. We have concerns about declining water levels in the area. Therefore, we have installed 10 tanks to collect rainwater from our greenhouses at a cost of around $25,000. Systems have been installed to recycle irrigation waste water through a system of tiles in the greenhouses at a cost of $30,000. For our spring basket crops we have installed a drip irrigation system at a cost of about $30,000.

Because our business is so dependent on water for our plants, we have started working on an Aquifer Storage and Recover project. This grant would allow us to complete the feasibility study for our project.

Our participation in this program will be through matching funds. The secured financial amount will be $11,405.00.

Sincerely,

Dale Fessler

Dale Fessler,
President

DICKMAN FARMS, INC.

December 8, 2011

Mr. Bill Fujii
Oregon Water Resources Department
725 Summer St. NE, Suite A
Salem, Oregon 97301-1271

RE: 2011-2013 Grant Program

Dear Mr. Fujii:

This letter is in support of the Oregon Water Resources Water Conservation, Reuse and Storage Grant Program application being submitted by Malia Kupillas, Pacific Hydro-Geology Inc. for Fessler Nursery.

Our farm is a family-owned business, currently operated by the third and fourth generations of the Dickman family. We operate about 1,000 acres of owned and rented land, primarily north and east of Mt. Angel. Our peak summer employment is about 20 people. We produce vegetables and seed crops, and rely on irrigation to meet the water needs of our crops during the summer. We are also members and supporters of the East Valley Water District.

Our farm is located in the Mt. Angel Ground Water Limited Area, and we had a 5-year renewable water cancelled because water levels have continued to decline in the basalt aquifer in spite of our efforts to conserve water using current best management practices. We have also started a pilot ASR project that would obtain water from Zollner Creek and store the water in basalts that are the same or similar to the basalts involved in the Fessler Nursery project. Our pilot project and feasibility study would benefit greatly from the data collected under the grant proposed for Fessler Nursery. Therefore, we are in support of this grant application, because we would also benefit from the results that would show ASR is feasible in the Mt Angel area's basalts.

Sincerely,

Mark Dickman

15829 Mt. Angel-Scotts Mills Hwy NE • Silverton, OR 97381-9734 • Fax (503) 845-6471 • (503) 845-6472

Kraemer Farms, LLC
13318 Dominic Rd
Mt. Angel, OR 97362

Phone: 503-845-2489
Fax: 503-845-6474
Email: kraemert6@aol.com

December 8, 2011

Oregon Water Resources Department
Bill Fujii
725 Summer St. NE, Suite A
Salem, OR 97301-1271

RE: 2011-2013 Grant Program

Dear Mr. Fujii:

This letter is in support of the grant application for Fessler Nursery under the Oregon Water Resources Water Conservation, Reuse and Storage Grant Program.

Our farm is a family-owned business, currently operated by the third and fourth generations of Kraemers. We operate about 2,500 acres of owned and rented land, primarily north and east of Mt. Angel. Our peak summer employment is over 250 people. We produce berries, wine, grapes, vegetables, and seed crops. We rely on irrigation to meet the water needs of our crops during the summer. We are also members and supporters of the East Valley Water District.

Kraemer Farms is located in the Mt. Angel Ground Water Limited Area, and we had two 5-year renewable water rights cancelled, because water levels continued to decline in the basalt aquifer, in spite of our efforts to conserve water using current best management practices. We have also started a pilot ASR project that would obtain water from Butte Creek and store the water in basalts that are the same or similar to the basalts involved in the Fessler Nursery project. Our pilot project and feasibility study would benefit greatly from the data collected under the grant proposed for Fessler Nursery. Therefore, we are in support of the grant application, because we would also benefit from the results that would show ASR is feasible in the Mt. Angel area's basalts.

Sincerely,

Ray Stafford

Ray Stafford
Kraemer Farms

WOODBURN NURSERY & AZALEAS

December 8, 2011

Oregon Water Resources Department
Bill Fujii
725 Summer St. NE, Suite A
Salem, Oregon 97301-1271

RE: 2011-2013 Grant Program

Dear Mr. Fujii:

This letter is in support of the grant application for Fessler Nursery under the Oregon Water Resources Water Conservation, Reuse and Storage Grant Program.

I am interested in this grant because our nursery is located adjacent and north of Fessler Nursery, which is just north of the Mt. Angel groundwater limited area. Long-term water level measurements in our wells have been showing a decline. Thus, we are very concerned about the long-term sustainability of the basalts that our wells obtain water from. We are also concerned because we are close to the decline area where water rights have been regulated by the State in an effort to stabilize water levels in the Mt. Angel basalt aquifer.

In response to our concerns, we have been exploring the feasibility of completing an ASR project for our basalt wells similar to the one proposed by Fessler Nursery. In fact, three of our wells that will be a part of our ASR study are currently being monitored for water levels as a part of Fessler Nursery's ASR program and will be monitored under this grant. Therefore, the money from this grant will also help provide us with the water level data needed for our feasibility study. In addition, the data and results obtained under this grant would be directly applicable to our ASR feasibility study. Thus, we are in support of this grant application, because we would also benefit from the results that would show ASR is feasible in the Mt Angel area's basalts. If Fessler Nursery's ASR project is proven feasible from this grant, then we would be ready to begin our feasibility study the following year.

Sincerely,

Tom Fessler

Tom Fessler
Woodburn Nursery & Azaleas Inc.

Sales & Delivery Address: 13009 McKee School Rd. Woodburn, OR 97071-9006 Office: 503-634-2231, Fax 503-634-2238
Website: www.woodburnnursery.com