

**Learning Objectives:**

- a. *Demonstrate critical analysis skills and capabilities expected of practicing water resources engineers, including to identify, evaluate, and recommend alternatives.*
- b. *Coherently and concisely present engineering designs in written format.*
- c. *Recognize, describe, and adapt engineering designs to physical, economic, environmental, social, political, and other constraints that limit water resources engineering and management.*
- d. *Complete water resources designs in a timely fashion*
- e. *Work individually to solve a water resources problem*
- f. *Apply public-domain water resources models to solve current water problems*
- j. *Recommend aquifer storage and recovery sites within Cache County.*

As part of its Water Master Planning Effort, Cache County has hired your engineering firm to evaluate the feasibility of aquifer storage and recovery (ASR) in Cache Valley. Your firm has been assigned one potential site and the County would like you to:

1. Identify the annual volume of surface water available for recharge and the new infrastructure and/or operations required to deliver water to and recharge water at the site,
2. Estimate capital and operating costs for the project converted to present-value unit costs per acre-foot of water (i) recharged and (ii) recovered,
3. File a new/change water rights application(s) to undertake ASR at the site, and
4. Discuss how uncertainties affect your estimates of the available surface water and project costs.

Submit your work for the site as a draft wiki page on the [USU College of Engineering Wiki](#) by November 29. Use the work for your and the other sites to:

5. Recommend a preferred ASR site(s) and include this recommendation in your Final wiki due on December 11.

A copy of the recent report "Cache Valley Principal Aquifer Storage and Recovery Site Assessment: Phase I" by The Utah Geological Survey is available [here](#).

Your group is responsible to find all the other data you may need.

## Group and Self Rating Form

Submit this form (one per student) with both the draft and final wikis you submit.

Criteria	Group Member	Rating (1=low; 5=high)	Explanation (if needed)
<b>1. Attendance</b> Responds to emails, made meetings, answers phone calls, etc.	Self		
<b>2. Preparation</b> Prepared, offers suggestions for how to proceed with work.	Self		
<b>3. Attitude/Cooperation</b> Enthusiastic, didn't balk at assignments or assigned tasks, minimal complaining.	Self		
<b>4. Participation</b> Participates, asks those that are quiet to be involved, does not monopolize the situation, provided leadership.	Self		
<b>5. Work Distribution</b> Volunteered for tasks, shares knowledge, doesn't offer to do it for others, does fair share.	Self		

**Additional comments, feedback, or concern(s) [use back if needed]:**

Category (Possible Score)	No Evidence	Does not Meet Standard	Nearly Meets Standard	Meets Standard	Exceeds Standard	Self-Score	Instructor Score
<b>Title (2)</b>	Absent 0	Evidence of one. 0	Evidence of two. 1	Evidence of three. 1	Title, author names, and contact info for authors. Neatly finished with no errors. 2		
<b>Introduction (10)</b>	Absent, no evidence 0	There is no clear introduction, main topic, or outline of content. 1 - 5	The introduction is either: 1. Too sketchy. Gives an inadequate overview, Or: 2. Too detailed, info later repeated 6 - 7	The introduction overviews the group project and previews the wiki page(s) structure 8	The introduction overviews the project, work done, and organization of the wiki page(s). An effective summary. Gives enough detail to interest the reader. 9 - 10		
<b>Organization and Development (10)</b>	No evidence of structure.	Little evidence of structure or organization. 2 - 5	Organization of ideas not fully developed. Two or more pages, sections, or sub-sections missing or out of order. 6 - 7	Sub-pages, sections, sub-sections, and/or lists present, but their use not perfected. 8	Logical sequencing of ideas. Uses sub-pages, sections, sub-sections, and/or lists to order, present, and develop ideas. In each section, one or more paragraphs develop each idea. 9 - 10		
<b>Engineering Design (33)</b>	The writer has no clue what they are talking about. 0 - 42%	One, possibly two design points addressed. 45 - 58%	Sketchy: left out required design points. Did not work on this as much as you should have, and it shows. 61 - 79%	All the necessary points are covered, but discussion lacks adequate detail. 82 - 88%	Provides what was explicitly asked for. The function of each piece is demonstrated to the reader in adequate, but not overwhelming, detail. 91 - 100%		
	1. Identify source(s) of recharge and quantify available volume(s) [6]						
	2. Describe methods of transport of water source to site and recharge [5]						
	3. File water rights application(s) [7]						
	4. Costs of transport and recharge [6]						
	5. Characterize groundwater at recharge site [5]						
	6. Describe uncertainties and sensitivity of cost estimates [4]						

Category (Possible Score)	No Evidence	Does not Meet Standard	Nearly Meets Standard	Meets Standard	Exceeds Standard	Self-Score	Instructor Score
<b>Word Usage and Format (15)</b>	Not applicable	Many, distracting errors in grammar, spelling, sentence structure, word usage, significant figures, tables, and figures. Unacceptable at the graduate level. <u>1 - 8</u>	With some grammatical errors. Figures are too small and/or under-labeled, although they are usually of acceptable quality and focus. Incoherent tables. Inconsistent fonts and headings. Could be improved by being more meticulous. <u>9 - 11</u>	Almost no errors in punctuation, capitalization, spelling, sentence structure, word usage, significant figures, and presentation of figures and tables. No broken hyperlinks. <u>12 - 13</u>	Punctuation, capitalization, spelling, sentence structure, word usage, and significant figures all correct. Clear, consistent fonts and headings. Good wiki processing skills. Figures and tables presented in correct format. No broken or empty hyperlinks. <u>14 - 15</u>		
<b>Conclusions (10)</b>	Absent <u>0</u>	Incomplete and/or not focused. <u>4 - 6</u>	The conclusion does not adequately restate the main findings. <u>7</u>	The conclusion restates the main findings. <u>8</u>	Effectively restates the main findings and benefit to the reader. <u>9 - 10</u>		
<b>Hyperlinks and References (5)</b>	Absent <u>0</u>	With many errors or only 1 hyperlink provided. <u>1 - 2</u>	With some errors and only 2 hyperlinks provided. <u>3</u>	With few errors, at least 3 hyperlinks to content outside the USU domain <u>4</u>	All citations and references listed in ASCE format with no errors. Include at least 4 hyperlinks to content or work outside the USU domain. <u>5</u>		
<b>Group Participation (10)</b>	Not applicable.	Wiki page(s) appear to be the work of only one group member. <u>1 - 3</u>	One or more group members disproportionately author content <u>4 - 7</u>	All group members author content. <u>8</u>	All group members significantly contribute to author content as reflected by use logs on History page(s). <u>9 - 10</u>		
<b>TOTAL (100)</b>							