**Boise Paper Solutions**
PO Box 500 (99363-0500)
31831 West Highway 12 Wallula, WA 99363
T 509 547 2411
www.bc.com

BOISE

March 24, 2008

Dept of Ecology
Water Resources Program
Olympia WA 98504-7600

Dear Sir/Madam:

Boise White Paper LLC is pleased to submit the application for our aquifer storage project. If you have any questions or concerns, please feel free to contact me.

Sincerely,

Raymond Lam
Environmental Manager-Boise Cascade-Wallula
509-545-3318

WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

# Columbia River Basin
# Water Management Program

# Grant Funding Application Program

## 2008- 2009 Funding Cycle

## Application Form and Instructions

**August 2007**

*If you need this document in an alternate format, please call the Water Resources Program at 360-407-6600. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.*

Form # ECY 070-292

Form # ECY 070-292

# GRANT APPLICATION OVERVIEW

## Introduction

The Columbia River Basin Water Management Program (CRBWMP) is seeking grant applications for its 2008-2009 Grant Funding Cycle. Applications are made through the Department of Ecology (Ecology). This packet contains:

- Information on the grant program.
- Instructions for completing a grant application.
- The application form.
- Information on submitting your application.
- How to get more information.

## Background

In 2006, the legislature passed the Columbia River Water Supply Act (Chapter 90.90 RCW). The Act requires Ecology to develop new water supplies for the Columbia River Basin. The purpose is to provide a reliable supply of water for existing interruptible water rights and for new uses. To accomplish this task, Ecology intends to fund various project types that will conserve water or otherwise make water more available when needed. Part of this new water will remain in the river to enhance flows. This will benefit program participants, existing and new water right users, and aquatic species.

## Eligible Project Types

Eligible project types include:

- Acquisition (purchase of water or water rights)
- Conservation ("pumps and pipes")
- Surface Storage
- Aquifer Storage
- Pump Exchange Projects
- Feasibility Studies
- Operations and Maintenance (annually funded)

## Eligible Applicants

Anyone with a valid water right in the Columbia River basin, within the state of Washington.

## Grant Application Due Dates

- Pre-application materials are due at the Department of Ecology's offices listed below by **5 p.m. November 30, 2007**. Once approved, successful applicants will be invited to submit a complete Application form.
- Final Application materials are due at the Department of Ecology's offices listed below by **5 p.m. March 31, 2008.**

Application materials submitted after the due date will be referred to the next year's cycle.

## Application Submittal

Applications must be submitted directly to the Department of Ecology. Choose one of the following:

**Mailing Address:** Dept. of Ecology
Water Resources Program
PO Box 47600
Olympia, WA 98504-7600

**Hand Delivery:** Dept. of Ecology Headquarters
300 Desmond Drive
Lacey, WA 98503

**Fax:** (360) 407-7162

**Email:** ajos461@ecy.wa.gov

## For More Information

Contact: Alvin Josephy
Voice: (360) 407-6456
Email: ajos461@ecy.wa.gov
Web: http://www.ecy.wa.gov/programs/wr/cwp/crwmp.html

## Availability of Forms:

All forms required for grant application are available:

- At www.ecy.wa.gov/programs/wr/cwp/crwmp.html
- From the Ecology contact listed above.
- Through your local Conservation District, http://www.scc.wa.gov/districts/map/.

## CRBWMP Policy

For policies governing this program, applicants should refer to the Final Programmatic Environmental Impact Statement for the Columbia River Water Management Program (under Chapter 90.90 RCW) (Ecology Publication # 07-11-009), http://www.ecy.wa.gov/programs/wr/cwp/eis.html. Ecology is currently developing regulations and formal policy around the preferred policy options listed in this document. Formal policy will be prepared for the 2009-2010 Grant Funding Cycle.

## Grant Application Timeline

2007-2009 key dates are as follows:

- **October through November 2007:** Pre-application period. Grant application forms available. Interested applicants submit preliminary documents to Ecology.
- **December 2007 through February 2008:** Ecology staff conducts prescreening activities, including assessing existing water rights, site visits, map studies, and consultations with local governments and watershed groups.
- **March 2008:** Application period. Applicants with proposals found to be appropriate for this Program and ready for funding consideration as determined by Ecology are invited at this stage to submit a formal application.
- **April through May 2008:** Formal review of submitted applications by the Technical Advisory Group (TAG). This group will score the project proposal according to previously developed criteria and scoring matrices.
- **June through July 2008:** The Policy Advisory Group (PAG), a statewide group of interested parties and organizations, will review the list of scored projects and make comments.
- **August through December 2008:** Ecology prepares budget proposals for those projects chosen for funding in the current funding cycle.
- **January 2009:** Ecology submits project budget proposals to the Governor and Legislature for funding consideration in the following legislative session.
- **June 2009:** Grant negotiations with successful applicants.
- **July 2009:** Successful applicants receive Notice to Proceed.

# DEFINITIONS

Annual Rate (Qa): The total amount of water used over a year. It is usually measured in terms of acre-feet. (An acre-foot of water, the amount of water required to cover one acre, one foot deep, is 325,851 U.S. gallons.)

Applicant: Individual or organization applying for the grant. Ecology will issue the grant contract in this name.

Beneficial Use: Beneficial use involves the application of a reasonable quantity of water to a non-wasteful use. Uses may include domestic, stock watering, industrial, commercial, agricultural including irrigation, hydroelectric power generation, mining, fish and wildlife maintenance and enhancement, recreational, thermal power production, municipal, and preservation of environmental and aesthetic values.

Columbia River Basin Water Management Program (Program): Included under Chapter 90.90 RCW, the Legislature intends the Program to aid "development of new water supplies that includes storage and conservation in order to meet the economic and community development needs of people and the instream flow needs of fish." Specifically, the Program provides funds to create opportunities for conservation and new storage projects, in the Columbia River basin, that will free water for new uses—both out of the river and instream.

Consumptive use: Water that does not become return flows to the water source, such as what is lost through evaporation, plants use, or is contained within a product or within a production by product.

Curtailment: Existing water rights may have restricted use, based on external factors that can change from time to time. For example, in low water years where there is not enough water available for senior priority water rights, including instream rights adopted for certain watersheds.

Diversionary Right: The right to divert or withdraw water from a public source, recognized through a formal permitting process and documented through the Department of Ecology.

Existing Instream Right: Certain watersheds and tributaries in the State of Washington are subject to instream water rights, adopted primarily in streams that have critical habitat and ecological values for fish and wildlife. These rights have been adopted by, and are quantified in, rules.

Feasibility Study: A report that includes an analysis of the operational, economical, and technical aspects of a proposed project. Results of the study determine whether the solution should be implemented.

FSA: Farm Service Agency

Grant Application: The combined Pre-Application Worksheet and Application Form required to secure funding from the Columbia River Basin Water Management Program. (Only the Application Form is included with this package). The Grant Application will include additional backup information, maps, title documents, aerial photos, letters, and affidavits that will support the application.

Instantaneous Rate (Qi): The use of water, as delivered from a source through a diversion, measured as a rate of flow over some period. It is usually quantified in terms of cubic feet per second.

Non-consumptive use: A type of water use where either there is no diversion from a source body, or where there is no diminishment of the source.

NRCS: National Resource Conservation Service

Return Flows: Waters that, after having been diverted for a beneficial use, escape the control of the water right holder and return to a public waterway or water body. Return flows may include, for example, waters lost through conveyance inefficiencies as well as waters used for a beneficial purpose that are not fully consumed by the purpose of use.

Secondary Use permit: A permit for the use of stored water other than the original intent. An example might include water stored for hydropower that is then used for irrigation. The irrigation, as a secondary use, would require an additional permit.

Storage Right: The right to divert a quantity of water to storage, either surface or aquifer storage.

Water Right Number: The identifying number shown on each water right.

Water Source: The source (stream, river, lake, spring, or other) of the water being put to beneficial use.

## GRANT APPLICATION FORMS

The Application Form is attached to this package following this page.

An Application Form may only be submitted following approval of your Pre-application Worksheet and at the invitation of the Department of Ecology.

The required Pre-application Worksheet, other forms, and further information are available from the contact listed above.

# GRANT APPLICATION INSTRUCTIONS
## Application Form

**Project Name:** Provide a name for your project.

**County:** Name the county or counties in which your project lies.

### 1. APPLICANT INFORMATION

Under Applicant/ Business Name, include the name under which a contract can be written.

### 2. NEW (PROPOSED) WATER USE AND PROJECT BUDGET.

Please be as detailed as possible in this section. Describe your project, its location, and the expected project cost. The project budget should include any required elements broken down by materials and labor.

### 3. DETAILED PROJECT DESCRIPTIONS

You must provide as much detail as practical regarding several aspects of your project. This information allows Ecology and the Technical Advisory Group to evaluate the project for funding.

#### A. Project Costs and Funding Sources

- List the amount of Program grant money you are requesting for this project. **Please note** that the Program may only fund that portion of the project for which an equal portion of the saved or accrued water is placed in trust.
- Using the amount of your funding request, estimate the (Program grant) cost per acre-foot of water resulting from this project.

#### B. Funding Source Information

- While not required, extra consideration will be given to projects that have some funding beyond this Program grant. Please provide the total amount expected from other sources.
- Below the total, list each funding source by name, the amount expected, the status of the funding, and the period that funding will be available.

#### C. Estimated Water Savings

This section asks questions for two general categories. The first is for a conservation project involving work on "pipes and pumps." The second category describes a potential storage project (surface or aquifer). Complete one or both, as appropriate.

- Conservation Project
  - Use the table to define the water savings expected from your proposed project during each month of the year. Enter an estimate of both total monthly quantities (Qa, in acre-feet) as well as instantaneous flows (Qi, in cubic feet per second).
  - Describe how much of the saved water will be placed in trust. The Program grant can only fund that portion of the project for which water is placed in trust. For example, if the Program grant funds 40 percent of the total project cost, at least 40 percent of the saved water must be placed in trust.
  - Please indicate how much of this water savings accrues in a tributary, as opposed to directly in the mainstem Columbia River.

- Storage Project
  - Use the table to define the water savings expected from your proposed project during each month of the year. For each month, include an estimate for both the total monthly quantity (Qa, in acre-feet) as well as the instantaneous flow (Qi, in cubic feet per second). You must also provide engineering or technical backup to support these estimates.
  - Describe how much of the stored water will be allocated permanently to the state for use in the Program. The Program can only fund that portion of the project that the Program receives an equal portion of the water made available by the project.
  - Please describe how much of this stored water will release in a tributary, as opposed to directly to the mainstem Columbia River.
  - If there are constraints on the release of water from this storage (timing, quantity, ownership) please describe them in the box provided.

### D. Consistency with local planning, including Natural Resource Plans

Provide information in the table on area plans that are supportive of the proposed project. If the plan cites the project, please note the reference.

### E. Local support letters and documents (from community organizations involved with Natural Resources)

Provide information on what persons, agencies, or organizations in the community are supportive of the proposed project and list any letters or other documents available showing that support.

### F. Resources committed to long-term support

Describe resources available to ensure long-term maintenance of the project. As performance of the project requires commitment of resources over years, and since this Program has a limited life-span, it is important that you explore these issues during this application process.

- Name the organization responsible for long-term operations of the proposed project.
- Estimate costs, **on a per-year basis**, in the space provided.
- Summarize funding sources for operations and maintenance of project elements.
- Describe measurement devices required to monitor performance of the project in the box provided. It is understood that diversions will be metered as a part of your project.
- Describe the installation, location, and operation of stream gauges related to your proposed project.

### G. Proponents readiness to proceed

- Describe the status of reports, permits, and other documentation necessary to proceed with the project. This includes any studies, including feasibility studies, that are complete or in progress. In addition, explain the status of engineering and design work (in terms of the stage of completion of plans and specifications) and the status of any required permitting for the proposed project.
- Explain the ownership of the land to be used for the project. Please provide any title reports or appropriate documentation as an attachment to this document.
- A box is provided for the applicant to describe the status of the range of project design deliverables, including studies, design, and permit submittals.

## 4. SIGNATURES

Provide appropriate signatures as indicated on the worksheet.

OFFICE USE ONLY: CR 01 07 01

☐ Draft/Worksheet

☐ Submission/ Final Date Rcvd: ____/____/____

WASHINGTON STATE DEPARTMENT OF ECOLOGY

# COLUMBIA RIVER WATER MANAGEMENT PROGRAM GRANT APPLICATION

**Project Name: Boise White Paper, LLC, Wallula Aquifer Storage Project**

**County: Walla Walla**

IF MORE SPACE IS NEEDED, ATTACH ADDITIONAL SHEETS

## 1. APPLICANT INFORMATION

| APPLICANT/BUSINESS NAME | PHONE NO. | FAX NO. |
|---|---|---|
| Raymond Lam/Boise White Paper LLC | (509) 545-3318 | (509) 545-3338 |
| ADDRESS<br>31831 W Hwy 12 | | |
| CITY<br>Wallula | STATE<br>WA | ZIP CODE<br>99363 |

## 2. NEW (PROPOSED) WATER USE AND PROJECT BUDGET

| |
|---|
| PROJECT NAME<br>Aquifer Storage |
| PROJECT LOCATION<br>Boise White Paper Wallula |
| STREAM REACH MILE/ LOCATION<br>Mile 316 /Columbia River |

PROJECT DESCRIPTION (TYPE) The project would entail the installation of an aquifer storage system to provide cold water during the summer which would reduce the overall water used by the facility (which uses ambient river water in the summer). The project would pump cold water down into the aquifer during the winter months and withdraw it during the summer months. The main thrust of the project is the ability to shut down electrically powered chillers by using the cold water, and greatly reduce water consumption for the non contact cooling water used on the evaporators. Thus the primary goal of the project is not additional water needs, but the cooling ability of this cold water source. This could have many implications for many industries outside of Boise.

The aim would be to supply 3 MGPD of this cooled water, which would displace an estimated 5 MGPD of facility water use.

This project will reduce summer water use, cool the effluent at end of pipe, reduce electricity from the chillers being shut down, supply a source of water for consumptive uses downstream not currently available and eliminate a major source of refrigerant use in the facility.

An important consideration of this project is that the effected on the effluent returned to the Columbia Rive. The program could either significantly lower than the facilities current discharge temperature by an estimated 4 degrees Celsius, or reduce the non consumptive

water flow by 5 MGPD during the late spring, summer and early fall months.
The project could eventually also pump hot water into the aquifer in the summer and draw it back into the facility in the winter, displacing some fuel consumption used to heat process water.

FEASIBILITY STUDY BUDGET $200,000

OPERATIONS AND MAINTENANCE BUDGET
(INDICATE DURATION OF AGREEMENT PROPOSED) $150,000 over the course of 10 -20 years

| | MATERIALS | LABOR |
|---|---|---|
| ESTIMATED CONSTRUCTION COST | $2,435,000 | $1,350,000 |
| DESIGN FEES | $500,000 | |
| PROFESSIONAL FEES | | $200,000 |
| SOFT COSTS (ALL PERMITS, LOCAL FEES, AND SO ON) | $5000 | $10,000 |
| OTHER CONTINGENCIES | | |

## 3. DETAILED PROJECT DESCRIPTIONS

(PROVIDE EXPLANATIONS AS REQUESTED. ESTIMATE PROJECT AMOUNTS (COSTS, WATER QUANTITIES, AND SO ON) AS CLOSELY AS POSSIBLE.

**A. PROJECT COSTS AND FUNDING SOURCES**

TOTAL PROJECT AMOUNT REQUESTED FROM THIS PROGRAM
(DOLLAR TOTAL AND PERCENT OF PROJECT BUDGET)
$4,500,000 - 95%

TOTAL EXPECTED COST (PROGRAM GRANT) PER ACRE FOOT OF WATER GAINED FOR THE PROGRAM FROM THIS PROJECT.
$272

**B. FUNDING SOURCE INFORMATION**

TOTAL PROJECT AMOUNT EXPECTED TO BE PROVIDED BY SOURCES OTHER THAN THIS PROGRAM (DOLLAR TOTAL AND PERCENT OF PROJECT BUDGET)
$225,000 or 5%

IDENTIFY SOURCES AND TYPE OF FUNDING OTHER THAN THROUGH THIS PROGRAM GRANT. INCLUDE EXPECTED DATES OF PARTICIPATION. INCLUDE AS AN ATTACHMENT; LETTERS OF COMMITMENT, OFFER LETTERS, APPLICATION APPROVALS, AND SO ON.

SOURCE AND TYPE OF FUNDING: Boise White Paper LLC Corporate

AMOUNT: $225,000

STATUS: Awaiting grant approval

DATES OF PARTICIPATION: Capital allocation cycle right after the grant is approved

SOURCE AND TYPE OF FUNDING: ______

AMOUNT: ______

STATUS: ______

DATES OF PARTICIPATION: ______

SOURCE AND TYPE OF FUNDING: ______

AMOUNT: ______

STATUS: ______

DATES OF PARTICIPATION: ______

SOURCE AND TYPE OF FUNDING: ______

AMOUNT: ______

STATUS: ______

DATES OF PARTICIPATION: ______

SOURCE AND TYPE OF FUNDING: ______

AMOUNT: ______

STATUS: ______

DATES OF PARTICIPATION: ______

SOURCE AND TYPE OF FUNDING: ______

AMOUNT: ______

STATUS: ______

DATES OF PARTICIPATION: ______

**C. ESTIMATED TOTAL WATER SAVINGS**

**CONSERVATION PROJECT**: ESTIMATE THE WATER TO BE CONSERVED THROUGH THIS PROJECT. PROVIDE ENGINEERING OR TECHNICAL ANALYSIS TO SUPPORT THIS ESTIMATE.

| MONTH | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Qa (ACRE-FEET) | | | | | | 414 | 414 | 414 | 414 | | | | |
| Qi (CFS) | | | | | | | | | | | | | |

HOW MUCH WATER IS THE APPLICANT PREPARED TO PLACE IN TRUST? 1657 AF
(NOTE: THE MINIMUM TRUST QUANTITY IS PROPORTIONATE TO FUNDING UNDER THIS PROGRAM.)

HOW MUCH OF THE TRUST WATER QUANTITY ACCRUES IN A TRIBUTARY? (AMOUNT) 1657 AF

TRIBUTARY NAME Columbia River

HOW MUCH OF THE TRUST WATER QUANTITY ACCRUES TO THE COLUMBIA RIVER? (AMOUNT) 1657 AF

**STORAGE PROJECT**: ESTIMATE THE WATER TO BE STORED UNDER THIS PROJECT. PROVIDE ENGINEERING OR TECHNICAL ANALYSIS TO SUPPORT THIS ESTIMATE. ESTIMATED ACRE-FEET= 1657 AF

ESTIMATE THE TOTAL QUANTITIES AND TIMING WATER WILL BE DIVERTED INTO STORAGE BELOW.

| MONTH | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Qa (ACRE-FEET) | 350 | 200 | 207 | | | | | | | 100 | 350 | 350 | |
| Qi (CFS) | | | | | | | | | | | | | |

HOW MUCH STORED WATER IS THE APPLICANT PREPARED TO ASSIGN FOR STATE USE FOR THE COLUMBIA RIVER PROGRAM? 1657 AF

NOTE: THE MINIMUM QUANTITY ASSIGNED IS PROPORTIONATE TO FUNDING UNDER THIS PROGRAM.

HOW MUCH OF THE STORED WATER QUANTITY WILL BE RELEASED IN A TRIBUTARY? 1657 AF

TRIBUTARY NAME Columbia River

HOW MUCH OF THE STORED WATER QUANTITY WILL BE RELEASED TO THE COLUMBIA RIVER? 1657 AF

FOR THE PORTION OF STORED WATER ASSIGNED TO THE STATE, DESCRIBE ANY CONSTRAINTS (HYDRAULIC, DEMAND, ETC.) ON THE RELEASE OF THE WATER FOR STATE USE. Released during the late spring, summer and early fall months only.
Will not be used when facility is shut down for maintenance.

| D. TO WHAT EXTENT IS THE PROJECT CONSISTENT WITH, SUPPORTIVE TO, OR CITED IN LOCAL NATURAL RESOURCE PLANS? | | | |
|---|---|---|---|
| CITATION PROVIDED ✓ | PLAN TYPE | PLAN TITLE | PAGE NUMBER OR OTHER CITATION |
| ☒ | WATERSHED PLAN | Snake River Region and Salmon Recovery and Walla Walla Watershed Planning Detailed Implementaion Plan | 2-7 |
| ☒ | CONSERVATION DISTRICT | Snake River Region and Salmon Recovery and Walla Walla Watershed Planning Detailed Implementaion Plan | 2-7 |
| ☒ | LEAD ENTITY STRATEGY | Salmon Recovery Funding program | |
| ☒ | NPCC SUBBASIN PLAN | Walla Walla Subbasin Plan 2004 | 3 |
| ☒ | SALMON RECOVERY PLAN | Snake River Region and Salmon Recovery and Walla Walla Watershed Planning Detailed Implementaion Plan | 2-7 |
| ☒ | OTHER RECOVERY PLAN | Columbia River Basin Water Management Program | |
| ☒ | COMPREHENSIVE WATER SYSTEM PLAN | | |
| ☐ | GMA COMPREHENSIVE PLAN | | |
| ☒ | OTHER PUBLISHED PLAN | Columbia River Basin Water supply-House Bill 2860-Section 1 | |
| ☐ | OTHER PUBLISHED PLAN | | |

| E. ATTACH LETTERS OF SUPPORT FROM LOCAL COMMUNITY ENTITIES INVOLVED IN NATURAL RESOURCES. Provide entity type and title, and attach letters to application. | | |
|---|---|---|
| LETTER PROVIDED ✓ | PLANNING ENTITY TYPE | PLANNING ENTITY TITLE |
| ☐ | TRIBE | Confederated Tribes of the Umatilla Indian Reservation |
| ☐ | COUNTY | Walla Walla |
| ☐ | WATERSHED PLANNING UNIT | Walla Walla |
| ☐ | CONSERVATION DISTRICT | Walla Walla Watershed Planning |
| ☐ | IRRIGATION DISTRICT | South Columbia Irrigation district |
| ☐ | SALMON RECOVERY LEAD ENTITY | Fish and Wildlife |
| ☐ | OTHER PLANNING ENTITY | |

**F. RESOURCES CURRENTLY COMMITTED TO ENSURE LONG-TERM PERFORMANCE OF THE PROPOSED PROJECT (OPERATION AND MAINTENANCE).**

WHO IS RESPONSIBLE FOR LONG-TERM OPERATION AND MAINTENANCE OF THE PROJECT? Boise Cascade Wallula

HAVE OPERATION AND MAINTENANCE COSTS BEEN IDENTIFIED? ☐ YES. ☒ NO. IF YES, PROVIDE REFERENCE.

HOW WILL ONGOING OPERATION AND MAINTENANCE COSTS BE FUNDED?

ARE MEASUREMENT DEVICES OTHER THAN DIVERSION SOURCE METERS NECESSARY TO MONITOR COMPLIANCE WITH THE PROJECT INTENT OR PLAN? IF YES, DESCRIBE IN THE BOX BELOW. ☒ YES ☐ NO

Temperature probes into aquifer storage and out of aquifer storage

DOES A WATER MEASUREMENT DEVICE EXIST ON THE SOURCE AND DOWNSTREAM OF THE PROPOSED PROJECT? ☒ YES ☐ NO

IF NO, WILL A WATER MEASUREMENT DEVICE BE INSTALLED AS PART OF THIS PROJECT? ☐ YES ☐ NO

IF YES, DESCRIBE LOCATION AND OPERATING ENTITY Magnetic flowmeter on final effluent from facility to Columbia River

IF YES, PROVIDE RIVER MILE Mile 316

WHAT IS THE NEAREST STREAM GAGE DOWNSTREAM OF THE PROPOSED PROJECT? SOURCE NAME Columbia River at McNary Dam

RIVER MILE : 292.5

## G. PROPONENT'S READINESS TO PROCEED:

DESCRIBE STATUS OF FEASIBILITY REPORTS, ENGINEERING DESIGN, AND PERMITS. PROVIDE DOCUMENTATION FOR THESE DELIVERABLES AND DESCRIBE THE PROJECT EFFORT TIMELINE AS APPROPRIATE. (SUBMIT TWO (2) COPIES OF ALL REQUIRED DOCUMENTS)

A very preliminary report has been done to estimate the cost in 2004. This was done by Golder Associates

An aquifer storage permit would be required.

DOES PROJECT PROPONENT OWN THE LAND FOR THE PROPOSED PROJECT? IF NOT, DOES THE PROPONENT HAVE DOCUMENTED ACCESS TO THE RIGHT OF WAY OR OWNS AN EASEMENT TO THE PROPERTY PROPOSED (PLEASE ATTACH APPROPRIATE DOCUMENTATION INCLUDING TITLE REPORTAS APPLICABLE)

Yes, Boise Cascade Wallula owns the land

DESIGN/ ENGINEERING STATUS:

| | | |
|---|---|---|
| PRE-PLANNING (Pre – permitting) | ☒ | Status: Very preliminary done |
| PRE-DESIGN (DESIGN REPORTS) (10%) | ☐ | Status: Not done |
| SCHEMATIC DESIGN (30%) | ☐ | Status: Not done |
| DESIGN DEVELOPMENT (75%) | ☐ | Status: Not done |
| CONSTRUCTION DOCUMENTS (95%) | ☐ | Status: Not done |
| BID DOCUMENTS (Ready for bid) | ☐ | Status: Not done |

PERMIT STATUS

| | | |
|---|---|---|
| SEPA | ☐ | Status: Not done |
| 401 | ☐ | Status: Not applicable |
| FISH AND WILDLIFE CONSULTATION | ☐ | Status: Not applicable |
| STORAGE AND /OR SECONDARY USE PERMIT | ☐ | Status: Not done |
| OTHER ( ______ ) | ☐ | Status: ______ |
| OTHER ( ______ ) | ☐ | Status: ______ |
| OTHER ( ______ ) | ☐ | Status: ______ |

## 4. SIGNATURES

*I certify that the information above is true and accurate to the best of my knowledge. I understand that in order to process my application, I am hereby granting staff from the Department of Ecology access to the above site(s) for inspection and monitoring purposes. If assisted in the preparation of the above application, I understand that all responsibility for the accuracy of the information rests with me. I also understand that I may rescind this application at any time prior to signing the Agreement with no other obligations or requirements.*

[signature] Boise White Paper LLC — 03/24/2008
**(Applicant/ Grant Recipient)** — **(Date)**

[signature] for Boise White Paper LLC — 03/24/2008
**(Water Right Holder)** — **(Date)**

[signature] for Boise White Paper LLC — 03/24/2008
**(Land Owner(s) of Existing Place of Use)** — **(Date)**

**For More Information**

| | |
|---|---|
| **Contact:** | Alvin Josephy |
| **Voice:** | (360) 407-6456 |
| **Email:** | ajos461@ecy.wa.gov |
| **Web:** | http://www.ecy.wa.gov/programs/wr/cwp/crwmp.html |

*If you need this document in an alternate format, please call the Water Resources Program at 360-407-6600. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.*

BARR

Barr Engineering Company
4700 West 77th Street • Minneapolis, MN 55435-4803
Phone: 952-832-2600 • Fax: 952-832-2601

Minneapolis, MN • Hibbing, MN • Duluth, MN • Ann Arbor, MI • Jefferson City, MO

November 4, 2002

Mr. David Tobin
Boise Paper
31831 W. Highway 12
Wallula, WA 99363

**Re: Preliminary Evaluation of Aquifer Storage and Recovery**

Dear Mr. Tobin:

This letter presents the results of our evaluation of the feasibility of implementing aquifer storage and recovery (ASR) at Boise Paper's Wallula Mill. Barr Engineering Company (Barr) developed a transient groundwater flow model for this evaluation after reviewing the information in our files on the hydrogeology in the vicinity of the Wallula Mill and obtaining some additional information from Boise staff. As you instructed, we focused our evaluation on the hydraulic issues – i.e., we used existing data and information to see if the requisite volumes of water could be injected and stored in the surficial aquifer in the vicinity of the Mill.

Our evaluation indicates that the surficial aquifer in the vicinity of the Mill will likely be suitable for implementing ASR for the quantities of water you seek. The surficial aquifer in the vicinity of the Mill is a very transmissive sand and gravel – our modeling indicates that at it would be possible to inject into and recover large volumes of water from this aquifer and use ASR to provide additional groundwater reserves for the Mill. The highly transmissive nature of this aquifer has a minor drawback, however. Some of the injected water could migrate to the Columbia River before it is time to pump it back out. We believe that there are several options for mitigating this problem, including injecting more water than you believe you will need.

## Summary of Groundwater Model Development

A single-layer groundwater flow model of the greater Wallula, Washington area was constructed in order to investigate the feasibility of operating an ASR system in the surficial sand and gravel aquifer at the Boise Paper mill. The groundwater modeling computer code MODFLOW-SURFACT (HydroGeologic, 1996), which is a modified version of the USGS's three-dimensional, finite-difference groundwater flow model, MODFLOW (McDonald and Harbaugh, 1988), was used for this groundwater model. The single-layer model was constructed using available hydrologic and geologic information (e.g. Barr, 1992; Barr, 1997; Pacific Groundwater Group, 1995; U.S. Department of

BARR

Barr Engineering Company
4700 West 77th Street • Minneapolis, MN 55435-4803
Phone: 952-832-2600 • Fax: 952-832-2601

Minneapolis, MN • Hibbing, MN • Duluth, MN • Ann Arbor, MI • Jefferson City, MO

November 4, 2002

Mr. David Tobin
Boise Paper
31831 W. Highway 12
Wallula, WA 99363

**Re: Preliminary Evaluation of Aquifer Storage and Recovery**

Dear Mr. Tobin:

This letter presents the results of our evaluation of the feasibility of implementing aquifer storage and recovery (ASR) at Boise Paper's Wallula Mill. Barr Engineering Company (Barr) developed a transient groundwater flow model for this evaluation after reviewing the information in our files on the hydrogeology in the vicinity of the Wallula Mill and obtaining some additional information from Boise staff. As you instructed, we focused our evaluation on the hydraulic issues – i.e., we used existing data and information to see if the requisite volumes of water could be injected and stored in the surficial aquifer in the vicinity of the Mill.

Our evaluation indicates that the surficial aquifer in the vicinity of the Mill will likely be suitable for implementing ASR for the quantities of water you seek. The surficial aquifer in the vicinity of the Mill is a very transmissive sand and gravel – our modeling indicates that at it would be possible to inject into and recover large volumes of water from this aquifer and use ASR to provide additional groundwater reserves for the Mill. The highly transmissive nature of this aquifer has a minor drawback, however. Some of the injected water could migrate to the Columbia River before it is time to pump it back out. We believe that there are several options for mitigating this problem, including injecting more water than you believe you will need.

## Summary of Groundwater Model Development

A single-layer groundwater flow model of the greater Wallula, Washington area was constructed in order to investigate the feasibility of operating an ASR system in the surficial sand and gravel aquifer at the Boise Paper mill. The groundwater modeling computer code MODFLOW-SURFACT (HydroGeologic, 1996), which is a modified version of the USGS's three-dimensional, finite-difference groundwater flow model, MODFLOW (McDonald and Harbaugh, 1988), was used for this groundwater model. The single-layer model was constructed using available hydrologic and geologic information (e.g. Barr, 1992; Barr, 1997; Pacific Groundwater Group, 1995; U.S. Department of

Energy, 1987) and covered an area bounded by the Columbia River on the west, the Snake River on the north, the Walla Walla River on the south and extending east to the upper reaches of the Touchet River. Figure 1 shows the area covered by the model.

Based on pumping test results from the area (Robinson and Noble, Inc., 1978), an initial hydraulic conductivity value of 900 ft/day was used in the vicinity of the Mill. An initial specific yield of 0.3 was used based on the results from Barr (1992).

## Calibration of the Groundwater Model

The groundwater model was calibrated to available groundwater level data from observation and production wells at the site. Two versions of the groundwater flow model were used during the calibration process. A steady-state version of the model was constructed to simulate flow conditions observed during the winter of 1992. The steady-state model provided initial conditions for a transient model, which was used to simulate a 32-day pumping test that was conducted at the site in March and April of 1992 (Barr, 1992). Twenty water level measurements from the winter of 1992 were used as head targets for the steady-state model. Calibration of the transient model was performed using a combination of water-level targets and drawdown targets based on groundwater levels measured during the 1992 pumping test. A total of 93 head and drawdown targets were used in the transient model calibration.

The two models (steady-state and transient) were calibrated in an iterative process. Both models were initially run using "best-guess" values for the parameters of the surficial aquifer. The simulated results from both models were compared to the applicable calibration targets. Based on the resulting "goodness-of-fit" between observed and simulated values, parameters were modified in the steady-state model, which was then rerun. The same parameter values were then put into the transient model, which was rerun using the new initial conditions from the updated steady-state model. Model results from both the steady-state and transient models were again compared to the calibration targets and the iterative process continued. Calibration iterations progressed until there was an acceptable match between observed water levels or drawdowns and model results in both the steady-state and transient models. Parameters that were varied during the calibration process included horizontal and vertical hydraulic conductivity and aquifer storativity.

The final, calibrated hydraulic conductivity value used for the sand and gravel aquifer surrounding the Mill was 899 ft/day. Further upgradient of the site (i.e. to the east), the final, calibrated hydraulic conductivity used for the sand and gravel aquifer was 164 ft/day. The final, calibrated specific yield value was 0.3.

## Injection Simulations

Boise staff requested we evaluate the injection of 5 million gallons per day (MGD) over a period of 90 days. We also evaluated higher injection rates. Two different injection configuration scenarios were simulated using the calibrated transient groundwater flow model. The first scenario had one

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Figure 3 shows the water table across the site without any injection. In the area of the fiber farm, the water table is very near the base of the sand and gravel aquifer. Figures 4 and 5 show the water table after 90 days of injection for two different simulations using one injection well. In the first simulation (Figure 4), water was injected at a rate of 5 MGD and in the second simulation (Figure 5) water was injected at a rate of 7.5 MGD. For injection rates greater than 7.5 MGD, the water table rose above the ground surface, resulting in flooding. Ground surface elevation in the area of the fiber farm slopes from 165m in the east to 125m in the west.

Figures 6 through 8 show the results of injecting water in three wells after a period of 90 days. Results from injecting at a rate of 1.66 MGD in each well for a combined total injection rate of 5 MGD are shown on Figure 6. Figure 7 shows the water table after injecting at a rate of 5 MGD in each of the three wells (combined total injection rate of 15 MGD) and Figure 8 shows the water table after injecting at a rate of 7.5 MGD in each well (combined total injection rate of 22.5 MGD). Injection rates greater than 7.5 MGD in each well resulted in flooding.

It is also useful to examine the flow of groundwater across the site under the different injection scenarios. Volumetric flow rates were calculated across the fiber farm along the line shown in Figure 2 after 90 days of injection. These flows are summarized in Table 1.

**Table 1.** Flow of groundwater under fiber farm for different injection scenarios. Total injection rate is the sum of the injection rates for the simulations with three wells. All rates are in MGD unless otherwise noted.

| Injection Scenario | Total Injection Rate | Flow Across Site after 90 days | Time for Mound to Dissipate (Days) |
|---|---|---|---|
| No Injection | 0 | 1.5 | - |
| 1 Injection Well | 5 | 4.8 | 139 |
| | 7.5 | 6.4 | >185 |
| 3 Injection Wells | 5 | 4.6 | 139 |
| | 15 | 10.7 | >185 |
| | 22.5 | 15.3 | >185 |

Under all injection scenarios, the mound of injected water is still expanding after 90 days of injection. Residence time of the groundwater mound is defined as the length of time over which the water table in the vicinity of the injection well(s) is elevated above pre-injection levels after injection

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Under all injection scenarios, the mound of injected water is still expanding after 90 days of injection. Residence time of the groundwater mound is defined as the length of time over which the water table in the vicinity of the injection well(s) is elevated above pre-injection levels after injection has stopped. For all of the injection scenarios, the residence time of the groundwater mound varied from approximately 140 days to over 185 days (Table 1). This suggests that a significant volume of water can be injected and stored in the aquifer for a period of several months. Our evaluation also suggests that the volume of water that can be injected into the aquifer is sensitive to the number and configuration of injection wells

## Summary and Conclusions

Results of this evaluation indicate the following:

- The surficial sand and gravel aquifer in the vicinity of the Wallula Mill has a high transmissivity and high specific yield (storage). It should be possible to inject and store a significant volume of water in the aquifer over a period of several months.

- It appears that the volume of water that could be injected over a three-month period without causing flooding of the land surface is sensitive to the number and configuration of the injection wells. Optimization of the number and configuration of injection wells would be part of the next step in the process, if Boise Paper wishes to pursue ASR further.

- The residence time of the groundwater mound produced by injecting water for a 90-day period is on the order of several months. In other words, it will take several months for the mound to dissipate as groundwater flows toward the River and pre-injection water levels are once again approached in the aquifer.

If you have any questions please call Ray Wuolo at 952-832-2696 or John Greer at 952-832-2691.

Sincerely,

/s/ Ray W. Wuolo /s/ John Greer

Ray Wuolo, P.E.
Vice President

John Greer, P.G.
Sr. Hydrogeologist

Figures
cc: Ray Lam
Dennis Cox
Dennis Ross
Mike Goodwin

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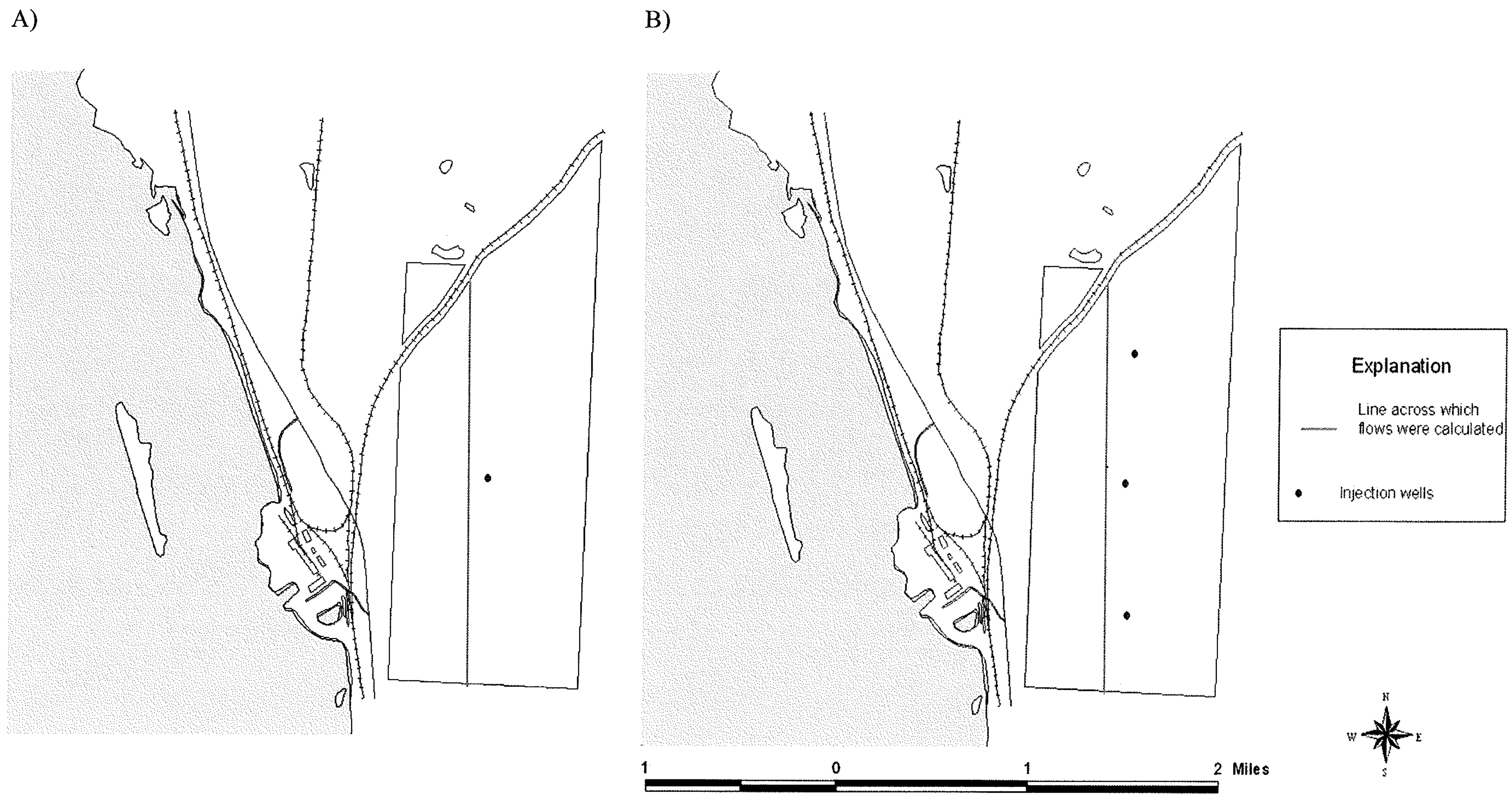



Figure 2. Location of injecting wells for simulations using one well (A) and three wells (B). Also shown is the line across which flows were calculated.

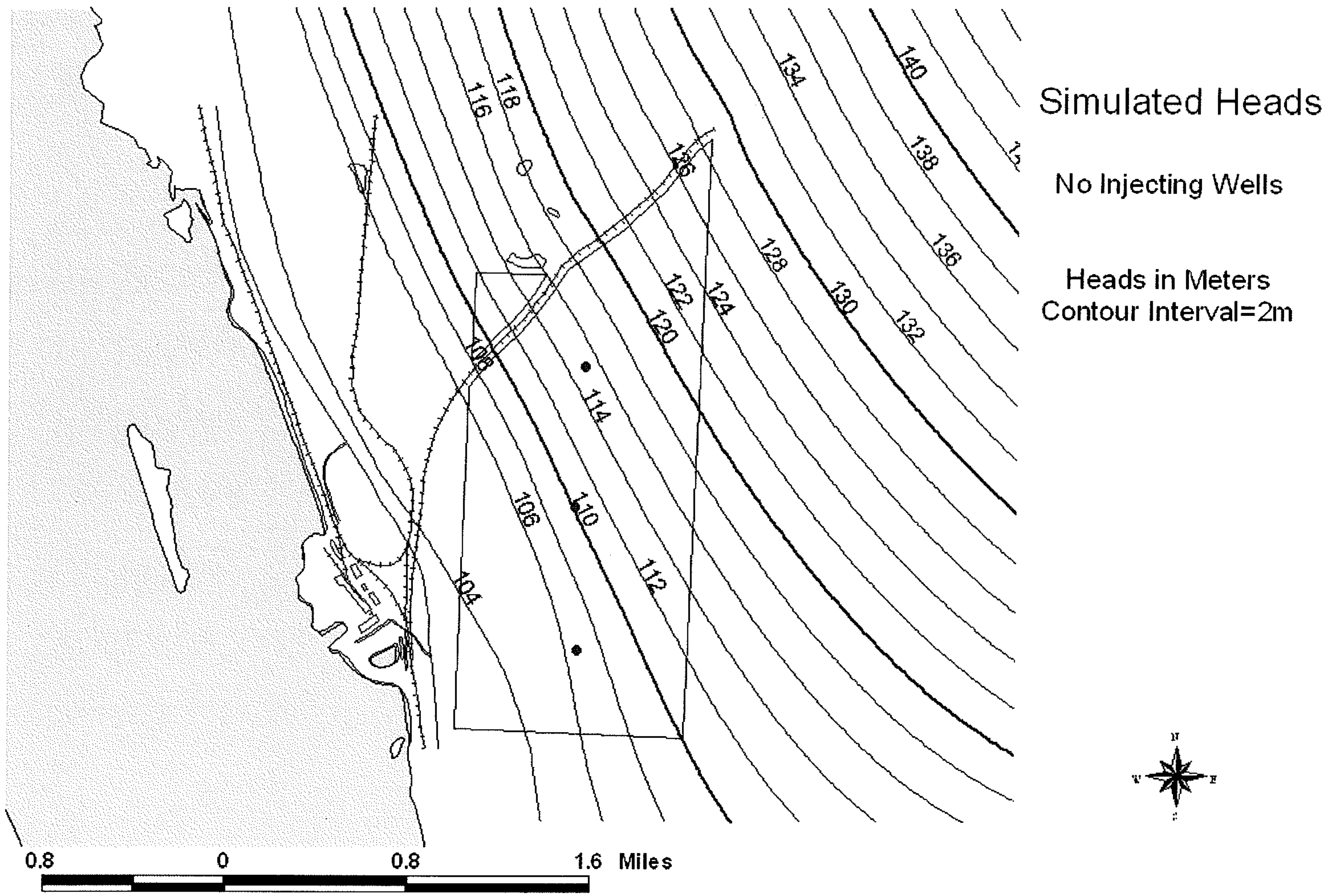



Figure 3. Simulated heads without any injection.

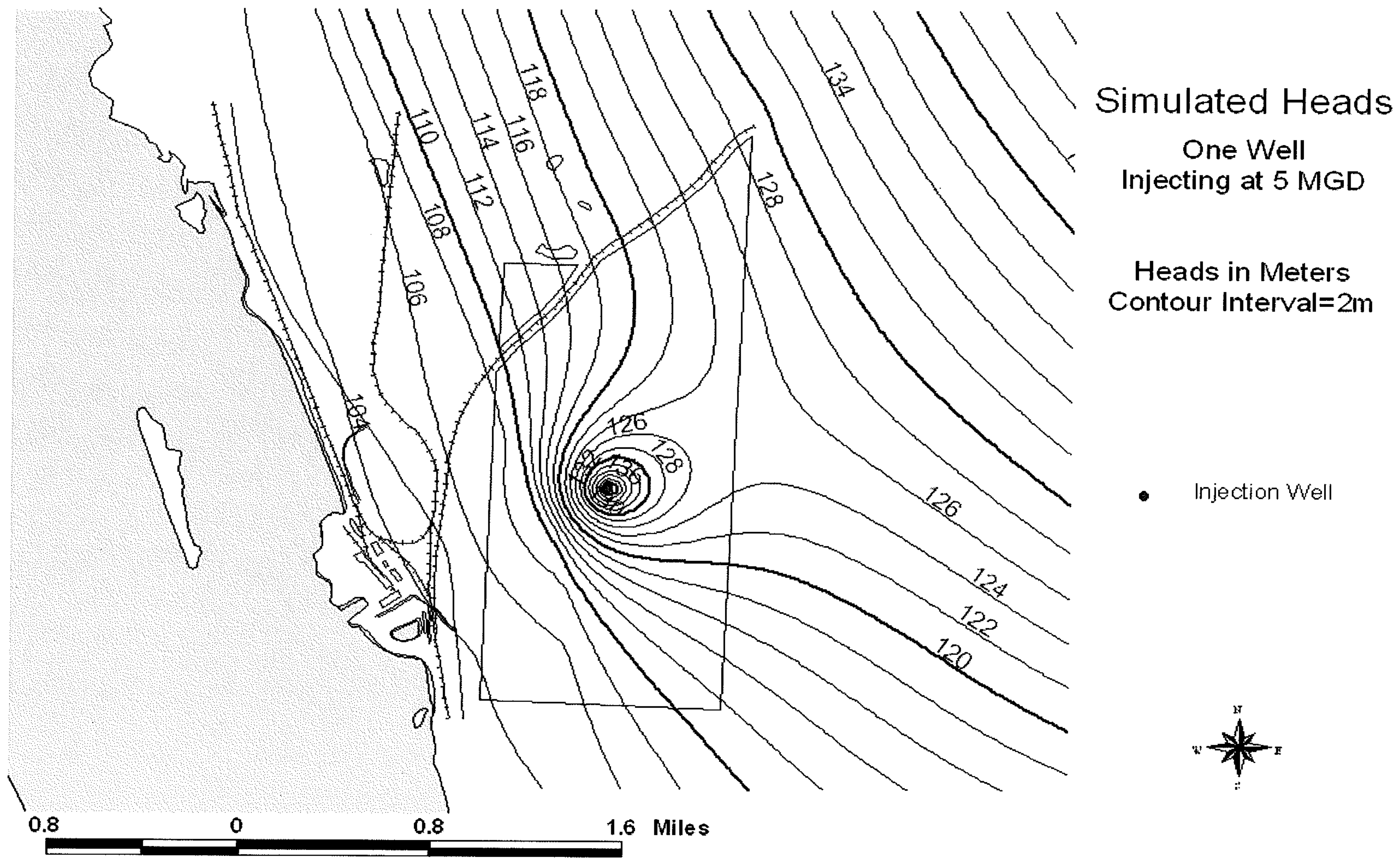



Figure 4. Simulated heads with one well injecting 5 MGD for 90 days.

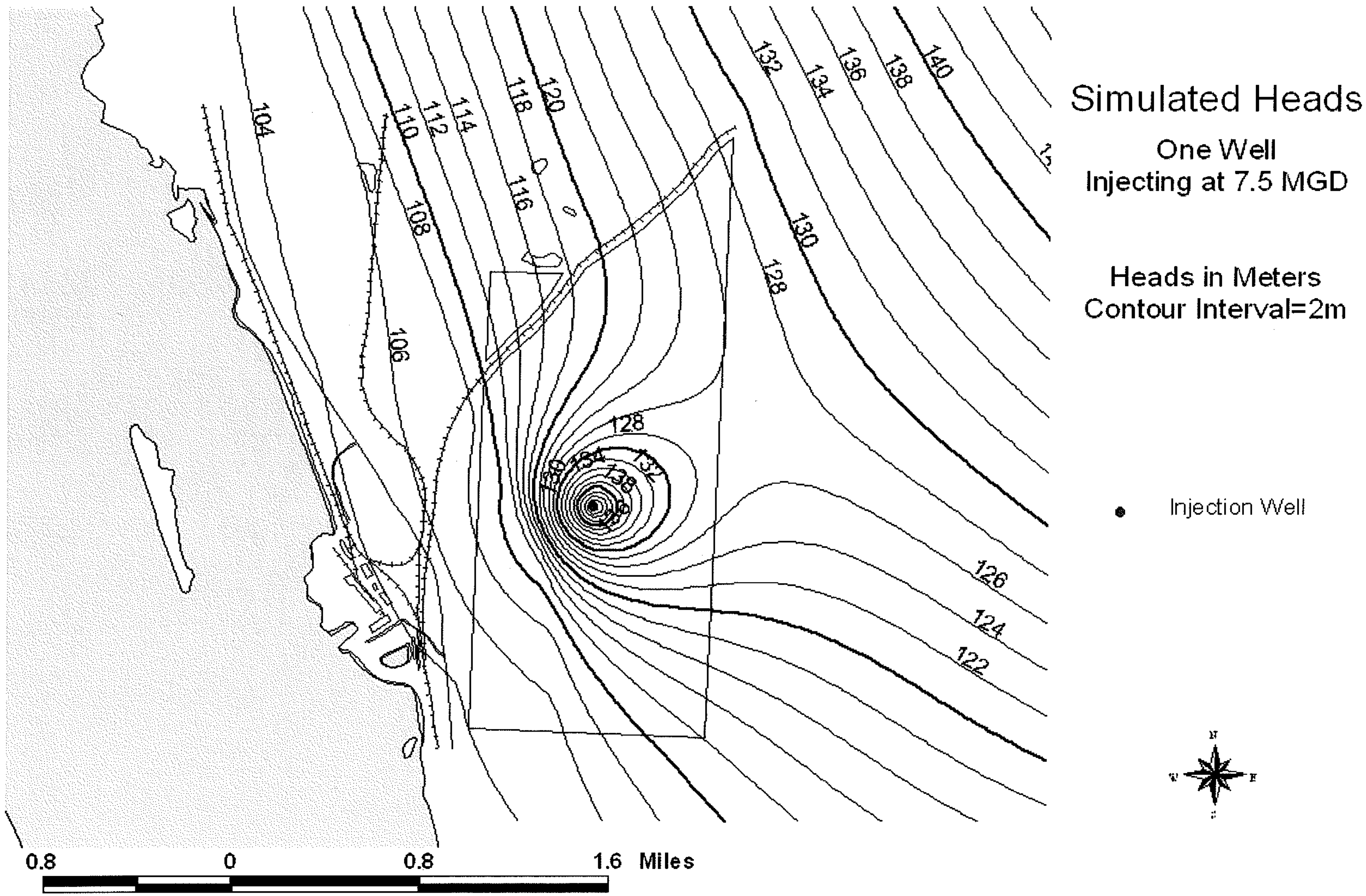



Figure 5. Simulated heads with one well injecting 7.5 MGD for 90 days.

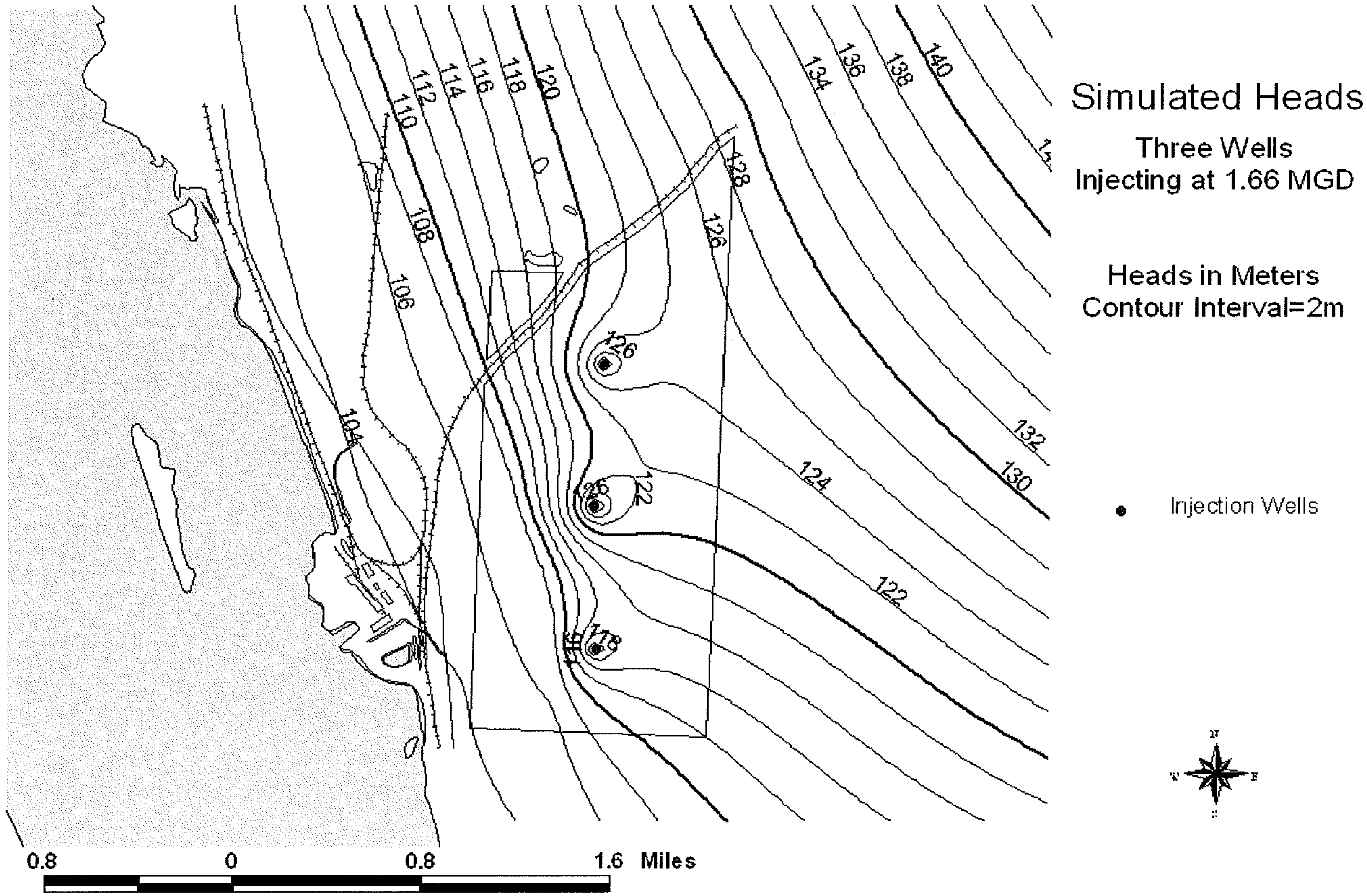



Figure 6. Simulated heads with three wells injecting a total of 5 MGD for 90 days.

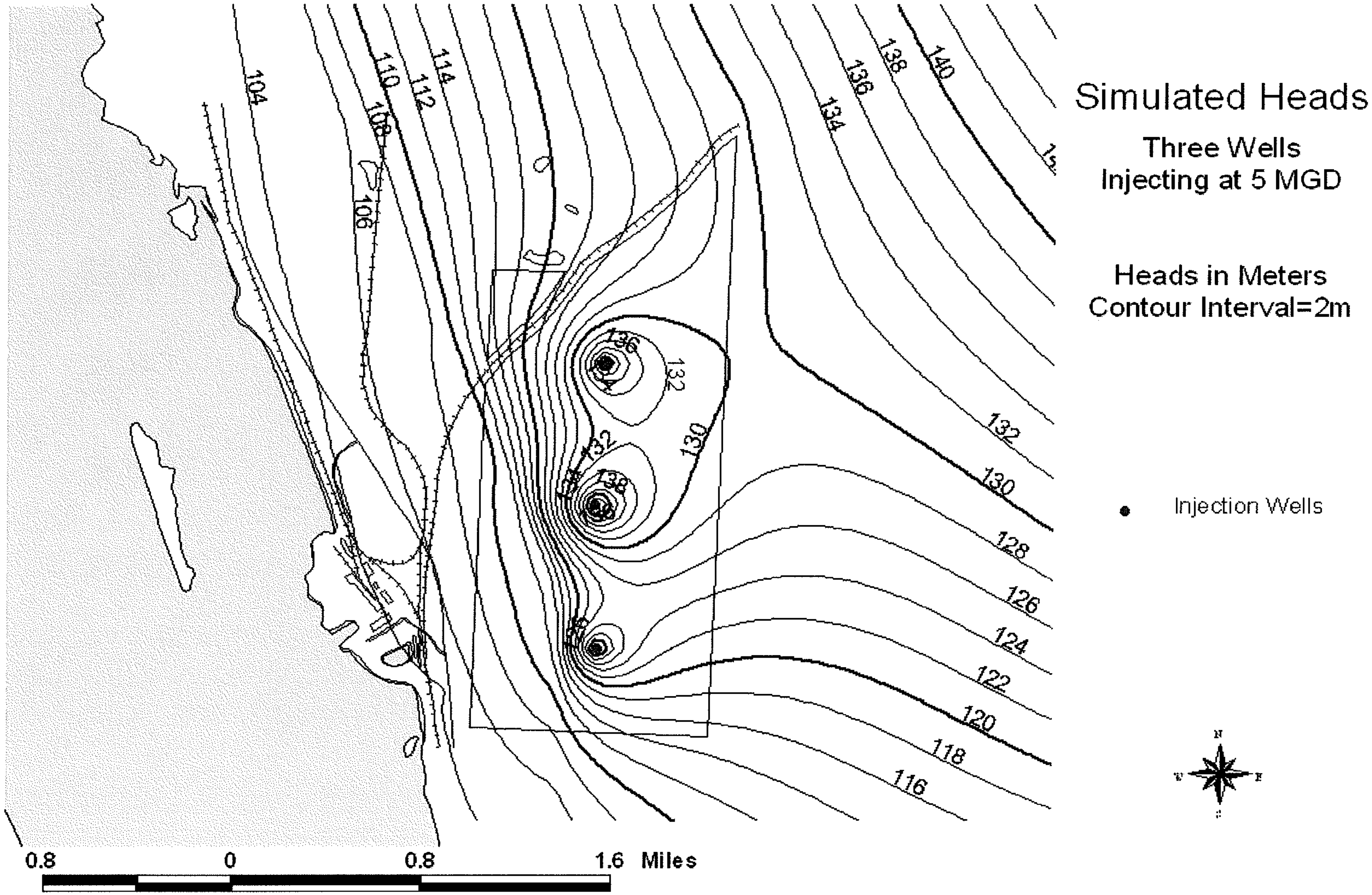



Figure 7. Simulated heads with three wells injecting 5 MGD each for 90 days.

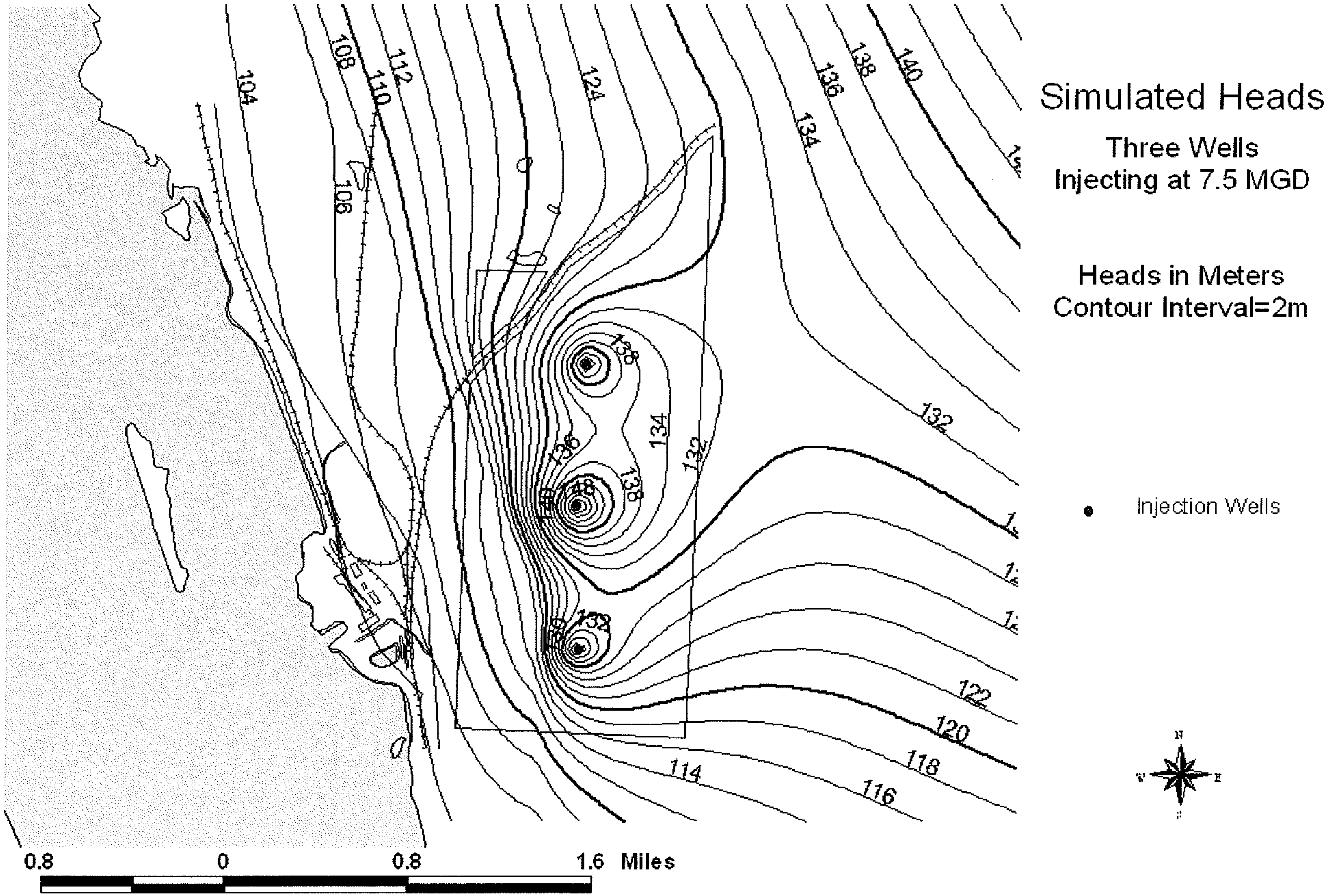
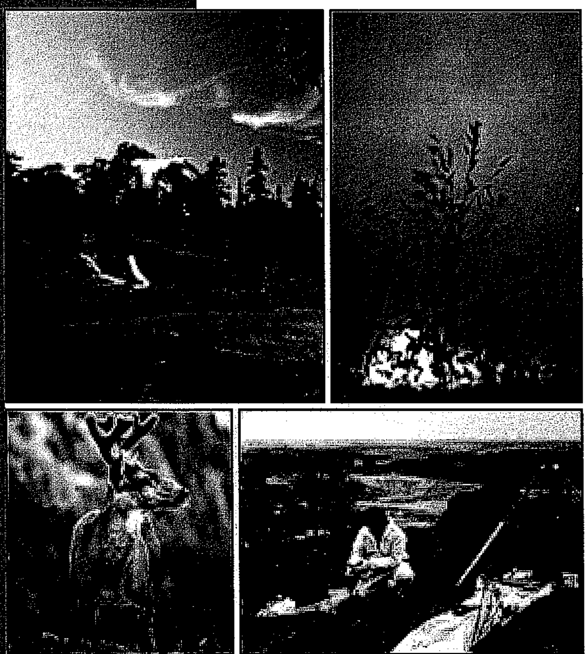



Figure 8. Simulated heads with three wells injecting 7.5 MGD for 90 days.

*Proposal to:*

Boise Cascade Corporation

Wallulla Facility



# Aquifer Storage and Recovery Cooling System Development Project Phase 1: Physical, Permitting and Cost Feasibility Assessments

Golder Associates

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## Introduction

The Boise Cascade Corporation utilizes surface water from the Columbia River for cooling at the Wallulla Mill facility. The Columbia River adjacent to the mill experiences a dramatic swing in seasonal temperatures that leads to inefficient cooling during the summer months when the river temperatures are high. Boise Cascade is interested in developing an aquifer storage and recovery (ASR) project at the Wallulla Mill in order to store cold, treated, Columbia River water during the winter months in a gravel aquifer beneath the facility. Boise Cascade would then recover the cold water during the summer months for more efficient cooling of the facility.

The goal of this project is to determine whether a 3 MGD ASR system can be permitted and developed in the shallow alluvial aquifer system in a cost effective manner. Barr Engineering Company developed a groundwater flow model for the gravel aquifer as the first step in evaluating the feasibility of ASR. In a letter describing that model, Barr concluded that stored water would be lost to the Columbia River. As a result of that conclusion, Washington State Department of Ecology staff provided a negative assessment of the permitting feasibility of the project. Based on a subsequent technical review of Barr's approach, we believe their conclusion is incorrect.

In November 2003, a technical review of the Barr Engineering Company's letter titled *Preliminary Evaluation of Aquifer Storage and Recovery* dated November 4, 2002 was completed. That review concluded that (based on available information) the surface gravel aquifer in the vicinity of the Wallulla facility appears capable of storing a significant volume of water. There does not appear to be a significant risk that stored water would be lost to the river with a properly designed and operated project. Based on our experience, we believe that Ecology will be inclined to facilitate permitting, if the conjunctive use benefits are fully explained.

The project described below presents a scope of work designed to complete an evaluation of the physical, economic, and permitting feasibility of developing the ASR cooling system.

## roject Approach

Boise Cascade has several cooling alternatives available, and the ASR cooling option requires further definition before it can be compared to the other alternatives. The three major elements of the project that will be defined by the work proposed as part of this project are:

- **Physical Feasibility**. Actual aquifer transmissivity, depth, saturated thickness, and hydraulic gradient has not been defined. These characteristics will be used to develop a conceptual ASR system that can then be evaluated for permitting feasibility and cost.
- **System Layout**. The aquifer and well characteristics will determine the location and number of wells and associated infrastructure required, and design/installation/ construction costs.
- **Cost Benefit**. Golder will use the schematic ASR system layout to develop a preliminary system development cost, and provide those costs to Boise staff. Boise will be able to use to use this estimate to confirm whether the ASR cooling system is the most cost efficient cooling alternative, as expected.
- **Permitting**. A portion of the total project development costs will be satisfying the permitting requirements as described in WAC 153-357. Once the physical parameters, layout, and hydraulic evaluation have been completed, Boise Cascade will be able to present a detailed project description to Ecology to obtain pre-application assurance that project development costs will be manageable and permitting success can be assured.

A flow-chart representing the process for completing the entire ASR development project is included as Figure 1.

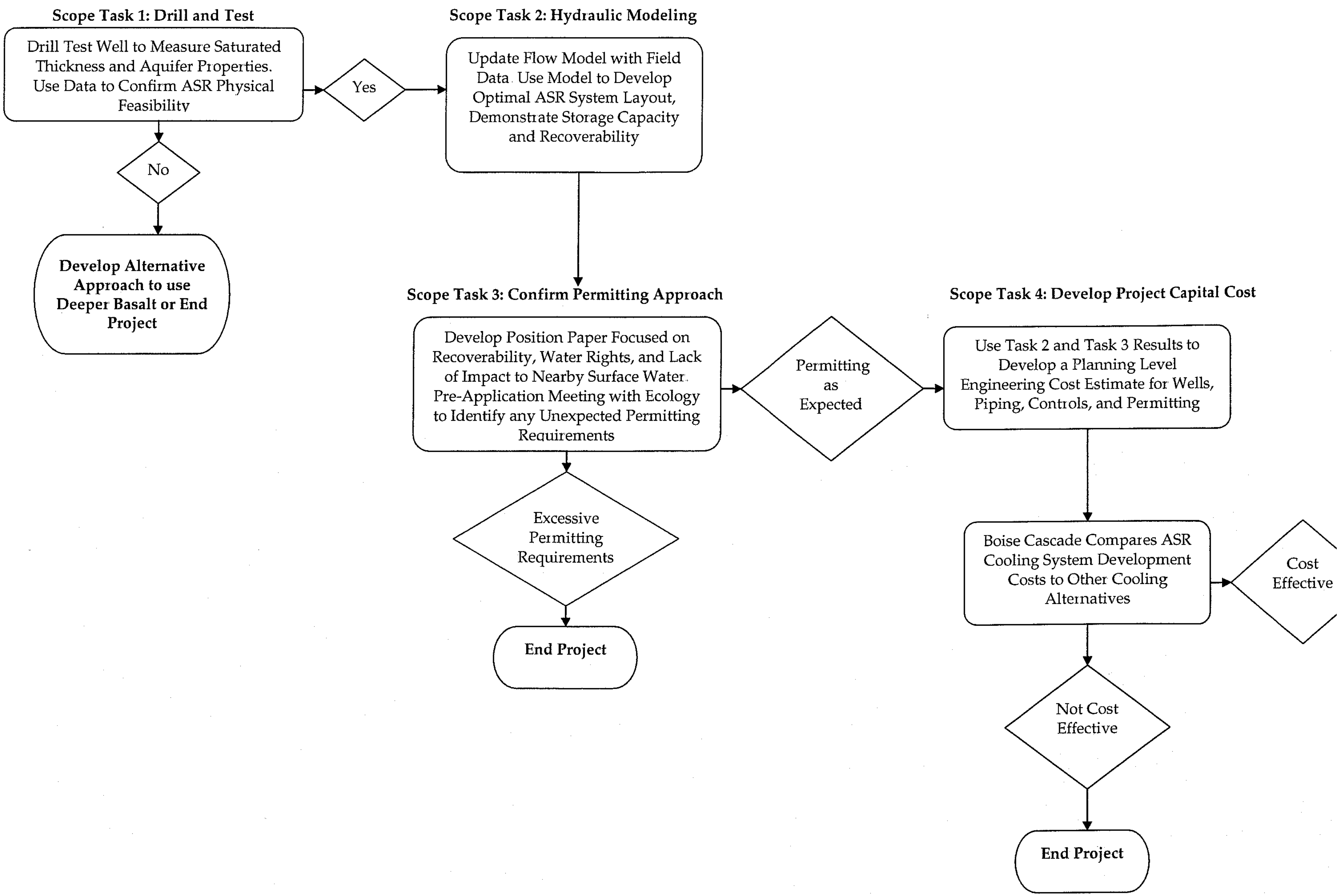
Three project milestones will be used to re-assess the practicality of the remaining tasks:

1. When drilling is complete, the observed conditions encountered in the field will be used to determine whether well construction and aquifer testing remain logical next steps. If low permeability materials or only one or two feet of saturated aquifer are encountered, Golder will direct the subcontractor to delay well construction until the conditions and options are discussed with Boise Cascade staff.
2. The aquifer test will be used to determine whether sufficient permeability exists to support recharge and recovery operations. A preliminary (field) evaluation of permeability will be made at the completion of the first 24 hours of pumping. If initial results do not suggest sufficient permeability is present, the test will be aborted to reduce project costs.
3. The test data (aquifer characteristics and well performance) will be used re-assess ASR cooling system feasibility, water chemistry and temperature in the technical memorandum that will follow the aquifer test. This memorandum will include a recommendation for proceeding with the next phases of the project: ASR system layout, permitting, and cost development.

The effort and cost associated with this scope of work will apply directly to the overall cost of developing an ASR system. The drilling, testing, and the hydraulic analysis are elements that would be required by Ecology as part of the ASR permitting effort, if an application were filed in advance of this work.

There are advantages to completing this work in advance of an ASR permit application. First, Boise Cascade has the ability to assess the feasibility of the project at intermediate steps prior to engaging regulators. Second, when these results are provided to Ecology in advance of the pre-application meeting, the degree of uncertainty is substantially reduced and the remainder of the permitting task can be easily defined and is likely to be less extensive. Finally, this approach will allow a well defined overall project cost estimate to be developed prior to committing funds to the permitting process.

## Figure 1 - Proposed Boise Cascade ASR Project Development Process



## :ope of Work

The following scope of work describes the first task in developing the ASR project. The data collected though this scope of work will be utilized to update the groundwater flow model with site-specific information, and prepare a conceptual level system design. These products will support the permitting process, and allow a project cost to be developed.

## ısk 1 - Drilling and :sting

A production well will be drilled at the facility and an aquifer test completed to define aquifer conditions. We anticipate that the information derived from this task will include:

- Total thickness of gravel aquifer in vicinity of likely ASR system location
- Total saturated thickness of gravel aquifer
- Aquifer hydraulic conductivity (K)
- The storage coefficient and hydraulic gradient will also be assessed, provided nearby observation wells are available for water level monitoring
- Well performance criteria that can be utilized in ASR system design

In addition, the facility will obtain a production well intended for use as an ASR system recovery well at the end of this task.

There are several types of test wells that could be drilled to produce the information described above. We recommend that the test well installed be designed to have a function in the future ASR system. Although the system layout would likely be refined after the site-specific data is collected, Golder would use existing information to site the well in a location seems likely to allow the recovery of stored water.

Barr Engineering reported the saturated thickness of the aquifer as "limited". A review of nearby well logs indicates that the alluvial aquifer thickness in the vicinity of the mill will likely be between 35 and 55 feet. As a result, the following well is proposed for this task:

1. Air rotary drilling to 60-feet below land surface
2. 30 feet of 20-inch stainless steel production screen and filter pack
3. Casing and seal to 20 feet

For cost estimating purposes, the aquifer is assumed to be 60 feet thick, composed of gravel with sand and cobbles, and saturated over the bottom 40 feet. The well will be drilled until basalt is encountered, so the actual drilled depth, casing length, screen length, and drilling subcontractor costs will vary as a function of actual conditions encountered beneath the site. If less than 10 feet of saturated thickness is encountered, Golder will recommend that the well be advanced and designed to incorporate a pumping chamber below the base of the screened interval. The reduced length of stainless steel screen would offset this cost.

If the well is constructed, a 3' x 3' cement pad will be constructed at the surface, and the well will be fitted with a watertight locking cap/cover. It is assumed that all other production infrastructure (wellhouse, power drop, piping and controls) will be installed at a later date, if the ASR project advances to construction.

A temporary generator powered submersible test pump will be installed to conduct a 48-hour constant rate aquifer test targeting a rate between 500 and 1000 gallons per minute (gpm). The actual test rate will be a function of well depth, lift, and aquifer performance. It is assumed that the water can be easily managed onsite by discharging to an onsite lagoon, storm system, spreading area, or other conveyance system and no Golder permitting will be required to manage the discharge. The water developed during testing should not be discharged to the surface near the well as re-infiltration of test water could create conditions that indicate aquifer transmissivity is higher than actually exists).

Golder staff will identify nearby Boise Cascade wells available for water level monitoring during the test, and install up to 3 water level transducer/dataloggers, and one barometric pressure transducer/datalogger. If no nearby river stage monitoring is available, an additional transducer assembly will be installed in the river near the facility.

A technical memorandum documenting the well location, construction, test results, and a re-assessment of ASR feasibility based on these results will be produced at the end of this task.

Individual Task 1 elements include:

**ısk 1a - Well Site lection**

Golder staff will meet onsite with Boise Paper staff to evaluate the best location for the test well installation. Factors to consider in selecting the optimal location will include:

- Location downgradient from likely recharge well location(s)
- Distance downgradient from likely recharge well location(s)
- Location where drill cuttings and water can be easily managed
- Location proximal to well development and aquifer test water discharge point
- Location that minimizes future conveyance distance

**ısk 1b - Drilling, Well stallation, and ːvelopment**

This cost estimate assumes that Golder will solicit bids from three qualified drilling subcontractors and provide them to Boise Cascade with a recommendation. This scope of work assumes that Boise Cascade will contract drilling services directly. A preliminary cost estimate provided by a qualified drilling subcontractor with experience constructing large diameter wells for ASR and municipal supply systems indicates that the production well drilling costs will be approximately $60,000. The drilling subcontractor provided an allowance for up to 500 feet of temporary discharge piping in their cost estimate. Work to be completed as part of this task will include:

- Prepare scope, solicit and review bids, and develop selection recommendation
- Permitting for drilling program
- Mobilization
- Drilling oversight
- Well design
- Well construction oversight
- Well development
- Finalize drilling log

The cost estimate for this task is based on an assumed 4 9-hour days of drilling and logging, including one round trip travel from Portland. Well construction and development is assumed to require an additional 3 9-hour days including one round trip travel.

**ask 1c - Aquifer Testing**

After the well has been constructed and developed, an aquifer test will be completed to measure site-specific aquifer parameters that will influence ASR system design and performance. Work completed as part of this task includes:

- Subcontractor installs test pump and conveyance piping
- Golder establishes a baseline monitoring network, to include nearby wells, barometric pressure, and river stage monitoring locations. Up to four datalogger/transducer assemblies will be installed.
- A 48-hour (maximum) constant-rate aquifer testing and recovery monitoring will be completed
- One groundwater sample will be collected near the end of the pumping period and submitted to a certified laboratory for geochemical analysis

The groundwater analytical results will be used at a later date (as required by the permitting process) to evaluate the geochemical compatibility of the source and the native (receiving) waters. The end of the aquifer test is the most cost efficient time to collect a representative water quality sample.

The aquifer test setup costs for this task are based on the assumption that adequate sufficient site infrastructure and permits currently exist that the water developed during testing can be disposed without additional conveyance piping (beyond the 500 feet currently allocated), detention structures, or permits. A preliminary cost estimate provided by a qualified drilling subcontractor with experience conducting aquifer tests in large diameter wells for ASR and municipal supply systems indicates that the cost to set and operate a temporary test pump and discharge piping is approximately $14,000.

**ask 1d - Data Analysis ıd Technical [emorandum**

The data collected as part of Task 1c will be entered into a database format, corrected for antecedent trends, barometric pressure fluctuations (if any) and river stage changes (if any). The data will then be used to assess aquifer transmissivity, boundary conditions, specific capacity of the well, and storage coefficient if observation well data is available.

The Task 1c and 1d results will be captured in a brief technical memorandum that will include:

- Drilling geologic log
- Well construction diagram
- Map of well location and observation network
- Aquifer test hydrographs and analysis
- Re-evaluation of ASR feasibility and recommendations for any revisions to Tasks 2, 3, and 4.

**ask 2 - Hydraulic valuation**

If the data resulting from the drilling and testing task are consistent with current site understanding, and no conditions that limit ASR feasibility are discovered, the results of the testing will be used to update the existing MODFLOW numerical model with site specific information. For the purpose of this proposal, it is assumed that a nearby fully penetrating observation well will be available for monitoring to facilitate model calibration.

The model will be updated with site-specific transmissivity estimates, aquifer thickness, saturated thickness, boundary conditions (e.g. the river to the west if appropriate, or thinning to the east), any new information regarding the hydraulic gradient and the presence/absence of confining conditions. The work included in Task 2 will include:

- Obtain the current model files from Barr Engineering
- Evaluate model construction and functional operation
- Update model with site specific information and revise as appropriate
- Conduct limited sensitivity analysis to evaluate variability of output results
- Obtain ASR system operation criteria from Boise Cascade staff
- Complete model runs to optimize a conceptual ASR system design

To be considered optimal, the conceptual design of the ASR system will be the layout that requires the fewest number of recharge and recovery wells necessary to meet summer plant cooling demand. In addition, wells that are conservatively sited at locations that will ensure that the water can be effectively stored and recovered while minimizing conveyance costs to the extent practical will be selected.

A conceptual well and system layout drawing will be developed and submitted to Boise Cascade staff for approval prior to proceeding with Tasks 3 or 4. For the purposes of scope development and cost estimating, it has been assumed that the previous modeling effort utilized Groundwater Vistas versions 3.0 or 4.0 as the platform for operating the MODFLOW model. Other MODFLOW interface tools could result in the need to reassess the time required to revise and operate the model.

**ısk 3 - Develop Capital ›st Estimate**

The results of Task 2 and Task 3 will be used to complete the conceptual design of the system, including site improvements, piping, and system P&ID. The completed conceptual design will be used to develop an estimate of the cost to design and construct an operational ASR system, obtain the permits necessary for its testing and operation, and for consulting services associated with the first year of pilot test operations.

This cost estimate will allow Boise Cascade to evaluate the total capital construction and outside services costs associated with developing the ASR cooling system, and allow for an internal comparison with alternative cooling methods. Golder will provide engineering budget-level cost estimates for:

- Wells
- Pumping systems
- Piping and controls

- Wellhouses
- Electrical System
- Permitting (assumed)
- Pilot Testing (year 1, assumed)

The permitting estimate will be based on Golder's experience with developing ASR programs throughout Oregon and Washington, and extensive familiarity with the regulatory framework. Washington ASR regulations allow for additional data and evaluations to be requested by permit reviewers, and as a result, the level of effort cannot be predicted with certainty. The permitting cost estimate could be revised at the conclusion of Task 4. A memorandum describing the costing approaches, assumptions, and alternatives will be prepared and submitted to Boise Cascade along with the schematic layout drawing.

**ısk 4 - Permitting ıssessment**

Permitting feasibility is a primary concern for Boise Cascade staff. Based on the Barr Engineering modeling memorandum, an early ecology review did not provide positive feedback. Golder believes that there are four reasons that are likely behind the lack of enthusiasm from Ecology staff:

1. Barr incorrectly concluded that stored water would be lost to the river. Without putting the project in the context of the benefits, Ecology misinterpreted this conclusion as implying an unacceptable degree of hydraulic interference with the nearby river.
2. Ecology was unaware that water withdrawn from the aquifer during the summer months would be added directly to the river after passing through the plants cooling system. This would result in no net decrease in surface water supplies resulting from hydraulic interference between the recovery wells and the river.
3. Water added to the river would likely be cooler than water currently returned to the river in the summer months, thereby generating a temperature benefit.
4. The total volume of water required for cooling during the summer months will decrease due to improved cooling system efficiency. As a result, the project could have a net positive impact on surface water supplies.

It is Golder's belief that Ecology would view the project favorably with the intrinsic mitigation components clearly described. Golder recommends the following work is completed as part of this task:

1. Golder will develop a project description. This document would contain some of the elements that will be required in the ASR permitting process. The document described for this scope of work would contain:
   - A description of the water rights that will be the basis for the project, and project rates and volumes
   - A description of the hydrogeologic setting, a hydrogeologic cross section, and a map showing the location of nearby wells
   - A description of the drilling, testing, and groundwater flow modeling results

- A conceptual project layout showing the location of recharge and recovery wells (if necessary)
- A description of the impacts (or lack thereof) to surface water supplies and nearby groundwater users

2. The project description will be submitted to Ecology for review prior to meeting, which is intended to result in a single productive meeting rather than a series of information exchanges.
3. Golder will meet with Ecology staff to discuss the permitting feasibility of the project. The purpose of the meeting is to define permitting requirements and obtain Ecology's perspective on the feasibility of the ASR project. This task will identify any data or study requests that would alter the permitting and testing costs developed in Task 3.
4. A summary memorandum describing the meeting results and any changes to the expected permitting process will be provided.

**timated Fee**

The cost estimate associated with the four tasks described above is provided below. The costs provided in Table 1 assumes that subcontractors will contract directly with Boise Cascade, and those estimates are not included below.

| Table 1<br>Boise Cascade Wallulla:<br>ASR Feasibility Study<br>Consulting Services Cost Estimate<br>Per Diem Budget by Task | | | | | |
|---|---|---|---|---|---|
| | **Description** | **Labor Hours** | **Labor** | **Expenses** | **Total** |
| Task 1 | Drilling and Testing Program | 407 | $41,100 | $6,200 | $47,300 |
| Task 2 | Hydraulic Feasibility Assessment | 176 | $19,300 | $1,000 | $20,300 |
| Task 3 | Develop Capital Cost Estimate | 198 | $22,400 | $900 | $23,300 |
| Task 4 | Permitting Feasibility Estimate | 48 | $6,200 | $700 | $6,900 |
| | **PROJECT TOTAL** | **829** | **$89,000** | **$7,300** | **$97,800** |

The estimated costs are developed on the basis of a fixed per diem schedule with the following labor categories:

| Title | Hourly Rate | % Total Hours |
|---|---|---|
| Principal, Senior Consultant, Contracting/ Regional Business Manager | $150 | 3.7% |
| Project Manager/Senior Hydrogeologist, Senior Engineer | $135 | 39.7% |
| Project Hydrogeologist and Project Engineer | $95 | 27.7% |
| Field Hydrogeologist | $80 | 24.8% |
| Office/Administrative | $50 | 4.1% |

Assuming that the preliminary drilling subcontractor estimate is valid for cost budgeting purposes, Boise Cascade's total cost for both engineering services and drilling/testing subcontractors for this task would be approximately **$172,000**.

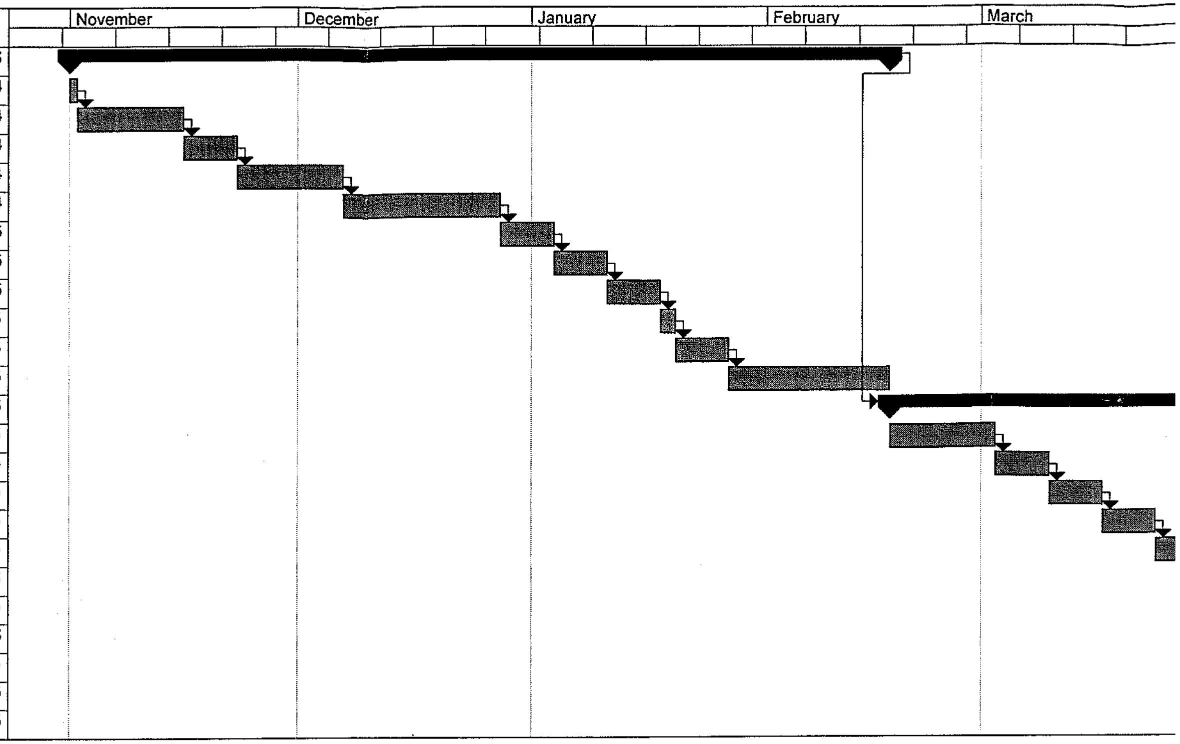
**'roject Schedule**

A draft project schedule is attached as Figure 2. Assuming a start date of November 1, 2004, and no fatal flaws stopping the project are identified at milestones, and drilling equipment is continuously available, this task would be completed May 2005.

Golder Associates

## Figure 2
## Boise Cascade ASR Feasibility Project
## Proposed Schedule

| ID | Task Name | Duration | Start | Finish |
|---|---|---|---|---|
| 1 | **Task 1: Drilling and Testing Program** | **78 days** | **Mon 11/1/04** | **Wed 2/16/05** |
| 2 | Notice to Procede | 1 day | Mon 11/1/04 | Mon 11/1/04 |
| 3 | Contracting | 10 days | Tue 11/2/04 | Mon 11/15/04 |
| 4 | Site Selection | 5 days | Tue 11/16/04 | Mon 11/22/04 |
| 5 | Solicit Bids | 10 days | Tue 11/23/04 | Mon 12/6/04 |
| 6 | Selection, Subconbtracting, Mobilization | 15 days | Tue 12/7/04 | Mon 12/27/04 |
| 7 | Drilling | 5 days | Tue 12/28/04 | Mon 1/3/05 |
| 8 | Construction | 5 days | Tue 1/4/05 | Mon 1/10/05 |
| 9 | Development | 5 days | Tue 1/11/05 | Mon 1/17/05 |
| 10 | Develop Obs Network | 2 days | Tue 1/18/05 | Wed 1/19/05 |
| 11 | Aquifer Test | 5 days | Thu 1/20/05 | Wed 1/26/05 |
| 12 | Data Analysis and Reporting | 15 days | Thu 1/27/05 | Wed 2/16/05 |
| 13 | **Task 2: Hydraulic Evaluation** | **35 days** | **Thu 2/17/05** | **Wed 4/6/05** |
| 14 | Obtain Exisitng Model | 10 days | Thu 2/17/05 | Wed 3/2/05 |
| 15 | Evalaute Exisitng Model | 5 days | Thu 3/3/05 | Wed 3/9/05 |
| 16 | Update/Revise with Task 1 Results | 5 days | Thu 3/10/05 | Wed 3/16/05 |
| 17 | Sensitivity Analysis | 5 days | Thu 3/17/05 | Wed 3/23/05 |
| 18 | Model Runs for System Design/Operation | 10 days | Thu 3/24/05 | Wed 4/6/05 |
| 19 | **Task 3: Develop Capital Cost Estimate** | **15 days** | **Thu 4/7/05** | **Wed 4/27/05** |
| 20 | Cost Estimating | 15 days | Thu 4/7/05 | Wed 4/27/05 |
| 21 | **Task 4: Permitting Evaluation** | **11 days** | **Thu 4/28/05** | **Thu 5/12/05** |
| 22 | Develop Project Description | 5 days | Thu 4/28/05 | Wed 5/4/05 |
| 23 | Meet with Ecology | 1 day | Thu 5/5/05 | Thu 5/5/05 |
| 24 | Summary Memorandum | 5 days | Fri 5/6/05 | Thu 5/12/05 |




Project: BC Schedule
Date: Fri 10/1/04

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline