APPENDIX B

Proposed Water Resources Monitoring and Management Plan for Future Pumping in Clover Valley, Nevada as it Relates to the LCLA Groundwater Development and Utility Rights-of-Way Project

PROPOSED
WATER RESOURCES MONITORING
AND MANAGEMENT PLAN

FOR FUTURE PUMPING IN CLOVER VALLEY, NEVADA
AS IT RELATES TO THE
LCLA GROUNDWATER DEVELOPMENT AND UTILITY RIGHTS-OF-WAY PROJECT

The purpose of this Monitoring and Management Plan (**Plan**) is to describe monitoring and management activities of water resources and related potential impacts due to development of groundwater resources in southern Clover Valley associated with the proposed LCLA Groundwater Development and Rights-of-Way Project (**Project**). This Plan applies to proposed groundwater extraction rates of up to 14,480 acre-feet per year (af/yr) in southern Clover Valley. The groundwater would be extracted from this valley by Lincoln County Water District and conveyed via pipelines to the LCLA in southern Lincoln County, Nevada, and also be subject to water right appropriations from the Nevada State Engineer and conformance with Nevada State law concerning adverse impacts to public resources.

This Plan consists of four principal components:

1) *Monitoring Requirements*, related to production wells, monitor wells, elevation control, spring flow, water quality, precipitation stations, quality of data, and reporting as proposed in Attachment A: including location of existing supply and monitor wells, groundwater extraction rates, groundwater level measurements, flow from springs, water quality, precipitation data, and wetland/riparian conditions;

2) *Management Requirements*, related to the creation and role of the Technical Review Panel (TRP), establishment of action criteria, and details of the decision-making process;

3) *Mitigation Measures*, related to potential mitigation measures that could be implemented if "unreasonable adverse impacts" occur as a result of groundwater extraction associated with the LCLA Project; and

4) *Modification of Plan*, related to procedures that could be followed to modify the Plan if future changing conditions or mitigations warrant modifications.

MONITORING REQUIREMENTS

The EIS for the Project contains information about water resources data in Clover Valley and surrounding areas. This information includes location of existing supply and monitor wells, groundwater level measurements, flow from springs, water quality,

precipitation data, and wetland/riparian conditions. This information, as well as data available from other local, state, and federal agencies, shall be compiled into a central database that would be expanded as new data are collected.

The term "as is feasible" as used in this Plan shall relate to mechanical failures or other events/reasons outside the control of LCWD that do not permit data collection.

Proposed Production Wells

- Discharge rates and groundwater levels will be measured in production wells on a continuous or frequent basis, as is feasible, using permanent recording devices. Water levels will be measured during pumping and non-pumping periods.

- All monitoring data will be entered into a project database recommended by the TRP.

Proposed Monitor Wells

- A network of monitor wells will be proposed to measure groundwater levels over time. Monitor wells would be located in Clover Valley (**Attachment A**). These proposed monitoring networks will be subject to concurrence from the TRP.

- Groundwater levels will be measured, as feasible, using permanent recording devices in selected monitor wells. For those monitor wells without continuous monitoring instruments, water levels will be measured initially on a quarterly basis to establish seasonal variations, followed by semi-annual or annual measurements after such seasonal trends have been established.

- The TRP may recommend that new monitor well(s) be installed in key areas where there are no existing wells available for monitoring. These new wells could be located and constructed in a cost-effective manner, while meeting the objectives of early-warning detection of impacts, if any, from proposed groundwater extraction. Consideration shall be given to completing nested wells that monitor individual aquifers at a single location.

- Initiation of groundwater level monitoring will commence as soon as possible after the wells are installed, recognizing the desire to obtain baseline data prior to groundwater extraction.

- Locations and monitoring frequency of the monitor well network will be reviewed by the TRP on an annual basis, and may be reduced or expanded in scope upon its recommendation.

- All groundwater level monitoring data will be entered into the project database on a regular basis, reflecting the monitoring interval chosen.

Elevation Control

- Ground surface and measuring point elevations shall be established using survey-grade GPS instrumentation at production, monitor, and private wells used as part of this Plan. Elevations for surface water and spring monitoring locations shall also be established. The common datum would allow a comparative base for all elevation associated data; including the possibility of the occurrence of subsidence due to groundwater extraction.

- All elevation measurements will be added to the project database that contains project data.

Monitoring Springs and Riparian Areas

- Selected springs and associated riparian areas located in Clover Valley will be monitored on a quarterly basis (**Attachment A**). Monitoring will consist of measuring flow rate and photo-documenting general site conditions. Flow can be estimated for low flow conditions or where flow is diffuse on the ground surface. Monitoring frequency may be reduced later as recommended by the TRP to semi-annually or annually.

- Initiation of monitoring for springs and riparian areas shall commence as soon as possible, recognizing the desire to obtain baseline data prior to groundwater extraction. Monitoring data will be recorded using a standard format to be used for each monitoring event.

Water Quality

- Groundwater quality samples will be collected from selected production, monitor, and private wells and analyzed by a laboratory for major ions, trace elements, and/or isotopes. Wells to be sampled, schedule of sample collection, and list of parameters are included in **Attachment A.**

- Frequency, sampling location, and water quality parameters will be reviewed by the TRP on an annual basis, and reduced or expanded in scope upon its recommendation to the TRP.

Precipitation Stations

- A precipitation station will be established in the southern portion of Clover Valley. Existing precipitation stations may be used where possible. The purpose of collecting precipitation data is to support conclusions regarding changes in groundwater levels with corresponding changes in precipitation, if it occurs.

- All precipitation data will be entered into the project database.

Quality of Data

- The TRP shall ensure that the entity or entities that collect water resources data follow standard protocols of data collection, recording and analysis (e.g., USGS and EPA), unless otherwise agreed to by the Parties.

- The water quality sampling program will include standard field and laboratory quality control procedures.

Reporting

- All data collected under or as described in this Plan, will be fully and cooperatively shared among interested parties, and made available to the public after appropriate QA/QC evaluation procedures have confirmed its accuracy.

- The TRP will have timely access to all data gathered related to the LCLA GDP.

- All water resources information collected for the Project will be downloaded to a project database and updated periodically on a website or other public access forum that is accessible to interested parties and the public.

- In addition to updating the water resources project database on a regular basis, an annual summary report shall be prepared by the TRP that summarizes all information collected during the previous calendar year, including an analysis of any trends. These reports will be used for annual assessment of potential impacts to water resources resulting from groundwater extraction in Clover Valley.

MANAGEMENT REQUIREMENTS

Technical Review Panel (TRP)

A committee will be established to provide the technical scientific expertise necessary to impartially develop, evaluate and analyze data.

- The TRP will be established with membership created from representatives from cooperating agencies that may include the BLM, LCWD, USGS and Nevada State Engineer. A representative of the Nevada State Engineer's Office would be invited to participate. The TRP would not be limited to the above mentioned agency representatives, however additional agencies may participate in the TRP should their representatives have the appropriate technical expertise and the participating agency have reason to be a member of this review panel.

- The TRP will meet initially to establish and execute the monitoring plan and, thereafter, at intervals deemed appropriate to review and analyze data.

- The TRP will meet within the first quarter after one year's worth of data has been collected.

- Roles and responsibilities of the TRP will be determined by the TRP under advisement of the Nevada State Engineer's Office.

Suggested purposes and functions of the TRP would be to:

1. Review proposed project monitoring plans and recommend implementation as appropriate.
2. Review historic groundwater level trends, spring and creek flows to determine historic hydrologic trends. Where possible identify wet and dry regimes, climate effects on groundwater recharge rates and base flows in surface waters. Where possible identify critical lows for detrimental impacts on habitat and resource sustainability.
3. Develop/refine standards and quality control procedures for data collection, management, and analysis.
4. Evaluate monitoring plans and data to determine whether data gaps exist, make appropriate recommendations.
5. Evaluate all monitoring data to determine if any action criteria have been exceeded, indicating a possible unreasonable adverse impact; report findings.

Action Criteria

- Specific quantitative criteria (action criteria) will be developed by the TRP and recommended to the Nevada State Engineer for possible use to "trigger" management actions. The specific action criteria will be developed by the TRP at one of it's first meetings, either the organizational meeting or the first meeting after one year's worth of data collection has been completed.

- Action criteria will be developed by the TRP and recommended to the Nevada State Engineer to provide early warning of unreasonable adverse impacts to public resources and prior water rights of other appropriators. These criteria would be based on changes in groundwater levels, flow of springs, water quality, and/or changes in wetland/riparian habitat that can be attributed to groundwater extraction by the Project(s).

- If and when any action criterion is reached, the following management actions will be triggered:

    (1) LCWD will notify the appropriate agency and the parties will confer within 30 days;

(2) If the parties agree that the action criterion exceedance is not attributable to ground-water withdrawals under the subject ground-water permits, then further management actions will not be required at that time;
(3) If either or both parties conclude that the action criterion exceedance is attributable to ground-water withdrawals under the subject ground-water permits, then the TRP will meet to determine the cause;

- Any member of the TRP may propose a change to any action criterion. Any such change shall be presented in writing to other members of the TRP, and accompanied by data and scientific analyses to support the proposed change. If the supporting analyses are found to be technically sound, then the TRP may recommend to the Nevada State Engineer that the action criterion be adjusted, as appropriate.

Decision-Making Process

- If the TRP determines that an action criterion is exceeded and attributed to groundwater extraction by the Project(s), the TRP can recommend a course-of-action (i.e., management activity or mitigation measure). If within the TRP, there are: (1) different interpretations regarding relationship of an adverse impact to the Project's groundwater extraction; or (2) different opinions on the course-of-action, the Parties may jointly agree to conduct additional data collection and/or data review and analysis directed at resolving the different interpretations or opinions, if possible. If that is not successful, the Parties could refer the issue to their respective managers and the Nevada State Engineer. Nothing herein limits or changes the Nevada State Engineer's authority, and any Party can petition the State Engineer to consider the issue.

- In the event that any of the Parties disagree as to whether the Proponents' proposed or ongoing groundwater extraction will result in unreasonable adverse impacts, any Party may petition the Nevada State Engineer to request that it determine whether there is or is not adverse impact(s) that require implementation of management or mitigation measures.

MITIGATION MEASURES

- The Project could mitigate unreasonable adverse impacts either as agreed upon by the Parties or after the Nevada State Engineer determines whether there are unreasonable adverse impacts due to Project groundwater extraction. The Parties shall take necessary steps to ensure that mitigation actions are feasible and reasonable.

- The mitigation portion of the plan shall include a bond or escrow account established by LCWD to fund any possible mitigation actions.

- Mitigation measures may include one or more of the following:

1. Geographic redistribution of groundwater extraction;
2. Reduction or cessation of groundwater extraction from one or more wells;
3. Restoration/modification of existing habitat;
4. Establishment of new habitat;
5. Augmentation of water resources with groundwater extracted for the Project;
6. Purchase other water rights in the area, if available;
7. Other measures as agreed to by the Parties and/or required by the Nevada State Engineer.

MODIFICATION OF THE PLAN

- The Parties may modify this Plan by mutual agreement. The Parties also acknowledge that the Nevada State Engineer has authority to modify this Plan. In addition, the Parties may individually or jointly petition the Nevada State Engineer to modify this Plan in the event that mutual agreement cannot be reached. Any such petition shall only be filed after 90 days written notice to the remaining Party members. Any Party member, including the Proponents, may submit written comments to the Nevada State Engineer regarding the merits of any such petition for modification.

Attachment A

MONITORING PLAN FOR GROUNDWATER DEVELOPMENT IN CLOVER VALLEY, LINCOLN, COUNTY, NEVADA

July, 2007

1.0 INTRODUCTION

LCWD intends to explore and develop groundwater resources in Clover Valley (Basin 204). Initially, two exploration wells will be constructed in Clover Valley as shown on Figure 1 (attached). These locations are likely to be Clover Well Site (CWS) -E and CWS-G as shown on Figure 1, however the exact well sites may change based on additional ongoing studies. Monitor wells will be constructed at the selected well sites and used initially as part of this monitoring effort. These monitor wells will be called Clover Monitor Well (CMW) - 1 and CMW-2 and will be located at well sites CWS-E and CWS-G. If the well sites change pending the ongoing studies, there will still be two monitor wells constructed.

The wells to be drilled at well sites CWS-E and CWS-G will be for exploratory purposes originally to determine what type of aquifer system may occur at depth in Clover Valley. These wells will be converted to monitor wells and used for multiple purposes including determining depth to water, groundwater elevations, water quality sampling, and aquifer testing. The well sites have been chosen based on several criteria that include but are not limited to: existing geologic data including surficial geologic maps and interpretation/extrapolation of map units at depth, geologic cross-sections, existing hydrologic data, and proximity to existing roads and pipeline locations. Field investigations are ongoing to determine the best potential well sites within which to drill and exploratory borehole and complete a monitor well.

There are several private well owners in Clover Valley, as well as wells managed by the BLM. These well owners will be contacted by LCWD and their permission will be requested to access and monitor their wells for both water levels and groundwater quality. Potential private wells are identified on both Table 1 and Figure 1.

2.0 GROUNDWATER-LEVEL MONITORING

LCWD will measure groundwater levels in Clover Valley monitor wells per this monitoring and mitigation plan. Continuous water level monitoring, as feasible, will be conducted at monitor wells to be drilled at sites CWS-E and CWS-G (Figure 1) for a period of at least 1 year prior to groundwater production.

Accordingly, LCWD will install pressure transducers and data loggers in all Clover wells constructed as part of this project. In addition, the intent is to install a transducer/data logger in existing private wells; however, this is subject to LCWD receiving permission to do so. Figure 1 identifies the existing private wells that may be used for monitoring purposes.

In addition, LCWD will also install one barometric pressure transducer in the monitor well constructed at site CWS-E.

Table 1: Proposed Lincoln County-Vidler Water Company Test/Monitor Wells in Clover Valley					
Well ID	**Anticipated Date Completed**	**Casting Diameter (inches)**	**Anticipated Screen Interval (feet below surface)**	**Groundwater Medium**	**Depth to Groundwater (feet below surface)**
CMW 1	Fall, 2008	8	3,000-3,500	Fractured rock	1,000
CMW-2	Fall, 2008	8	3,000-3,500	Fractured rock	1,000
Proposed Private Wells to be Monitored in Clover Valley					
Well ID	**Well Owner**	**Water Right #**	**Well Log**	**Well Location**	
1	Barclay Well	44731	65466	SW ¼, NE ¼, Sec. 31, T5S, R70E	
2	Mathew Brothers	28632	20392	SE ¼, NW ¼, Sec. 11, T5S, R69E	
3	Hershel Hafen	22872	9761	Sec. 14, T5S, R69E	
4	Cannon	__	65459/65460	SE ¼, NW ¼, Sec. 16, T5S, R69E	

The data loggers will be set to record every 60 minutes. The frequency of data recording may be revised upon mutual agreement between LCWD and interested parties or as determined after review of the data. The data loggers will initially be downloaded at least monthly during confirmatory manual measurement to assess potential drift in the transducer data. An appropriate frequency of supplemental manual measurement and data logger downloading will be established after an initial 6-month period of data collection.

3.0 GROUNDWATER QUALITY SAMPLING

LCWD will sample groundwater in Clover Valley wells consistent with this monitoring and mitigation plan. Water quality samples will be analyzed for major ions, trace elements and isotopes at all production and monitor wells used as part of this plan. The frequency of sampling and analysis is semi-annually for one and one-half years, and then every five years thereafter. The samples will be collected, analyzed, and reported using standard methods.

Accordingly, LCWD will collect samples for the stated water quality parameters from the monitor wells constructed at the following well sites: CWS-E and CWS-G.

The groundwater samples will be analyzed for the parameters listed in Table 2. In addition, field parameters will also be measured and recorded at the time of sample collection. These field parameters include temperature, pH, conductivity, and oxidation-reduction potential.

Table 2: Water Quality Parameters
General mineral and selected metals:
Calcium (EPA 200.7)
Sodium (EPA 273.1)
Potassium (EPA 258.1)
Chloride (EPA 300.0)
Sulfate (EPA 300.0)
Carbonate alkalinity (SM2320B)
Alkalinity (SM2320B)
Silica (EPA 200.7)
Iron (EPA 200.7)
Manganese (EPA 200.7)
Magnesium (EPA 200.7)
Arsenic
Isotopes:
Deuterium
Oxygen 16/18
Carbon 13/14
Field parameters:
Temperature
pH
Electrical conductivity
Oxidation-Reduction potential

4.0 SPRINGS and STREAM FLOWS

Three springs, Big Spring, Sheep Spring, and East Spring, are proposed to be monitored before any pumping begins and during the pumping (see Figure 1). A weir and continuous data logger/transducer will be installed at each spring location to record and collect springflow data. LCWD will also sample these springs for water quality data. Water quality samples will be analyzed for major ions, trace elements, and isotopes as shown in Table 2.

These springs were chosen to be monitored due to their location within the basin. Big Spring is north of the proposed well field and flows into Clover Creek, which eventually flows to Meadow Valley Wash. Both Sheep Spring and East Spring discharge in the southern part of Clover Valley and are located south of the proposed well field.

A gaging station will also be installed along a reach of Clover Creek in between Big Spring and Meadow Valley Wash. This gaging station will be used to measure streamflows within the creek on a continuous and peak-stage basis. This effort will be coordinated with the US Geological Survey. The exact location of the gaging station will be determined with a site visit however, the general area for this gage location is shown on Figure 1.

5.0 ANNUAL REPORTING

An annual report will be produced and submitted to the TRP before March 31 of the following year. The report will summarize the monitoring and sampling activities and results of the previous year. This report will be provided to the Nevada State Engineer and other interested parties, as requested.

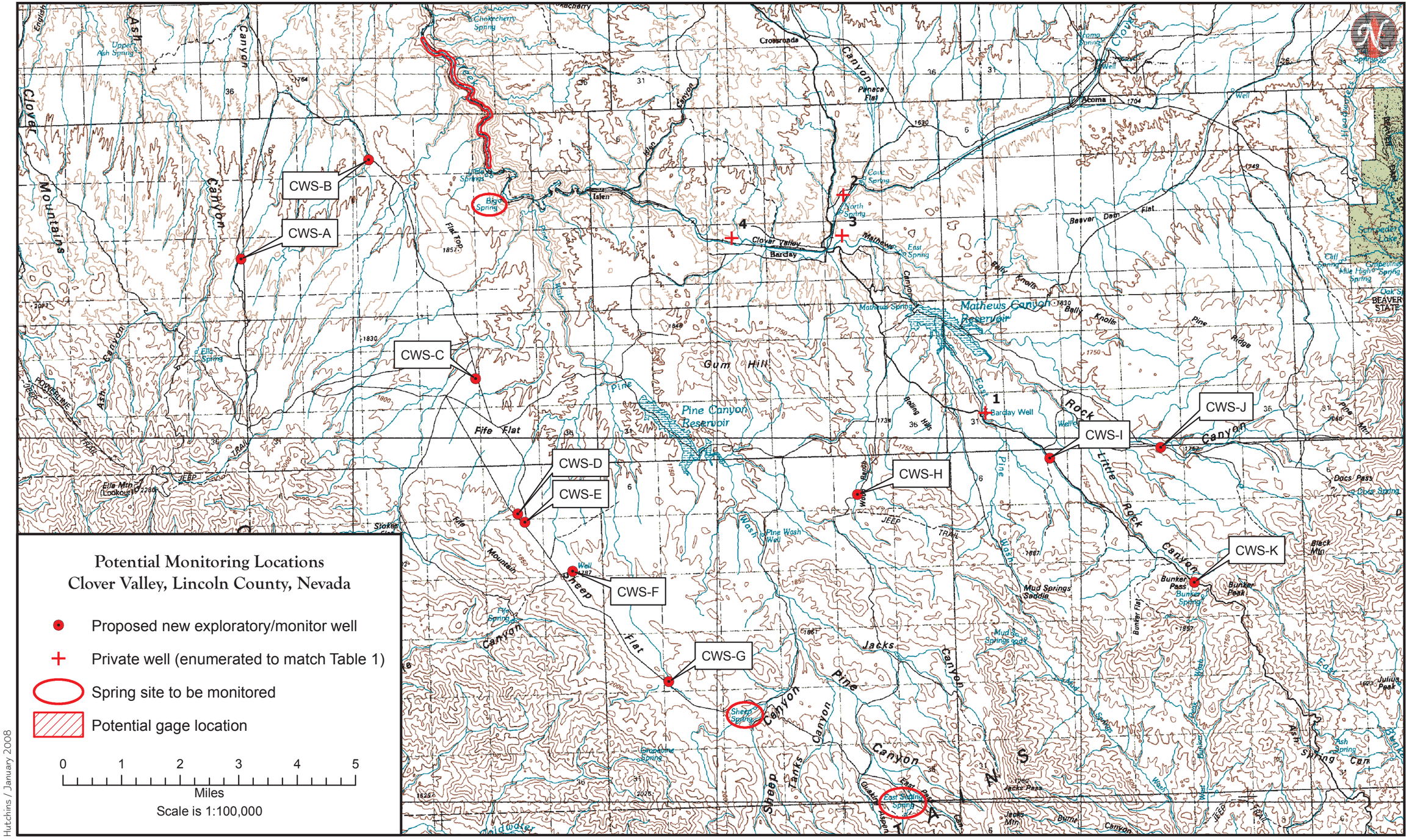

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Figure 1
Preliminary - Subject to Revision