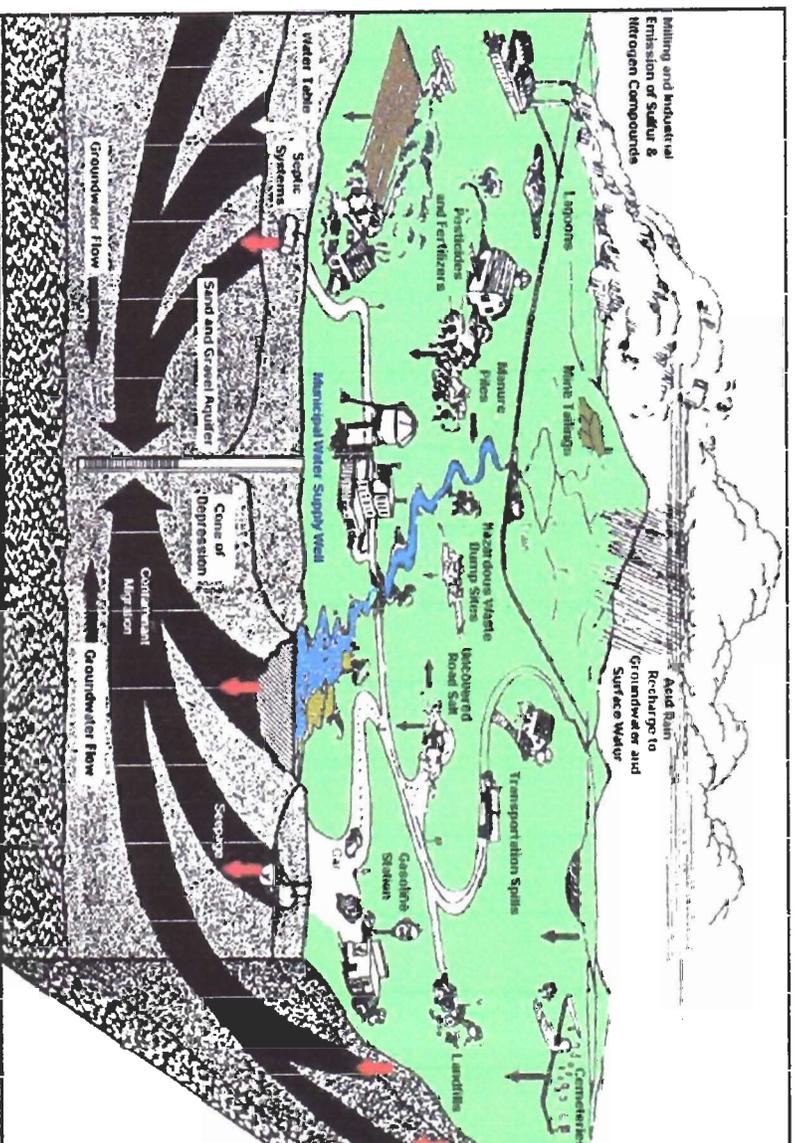


Wellhead Protection Planning for Pahrump Valley



Presented by:
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Approach for Pahrump is Different

Most WHPPs are for a single utility with a few sources.

For Pahrump, the WHPP will be for the entire valley.

WHY?

Pahrump has 40 Public Water Supply Systems

Rather than do 40 WHPPs, it makes more sense to do 1 that covers the entire community

Community Systems -14

Serve the same people year round

Utilities and Mobile Home Parks

Non-Transient Non-Community – 3

Serve the same people but not year round

Churches, Senior Center, RV Parks

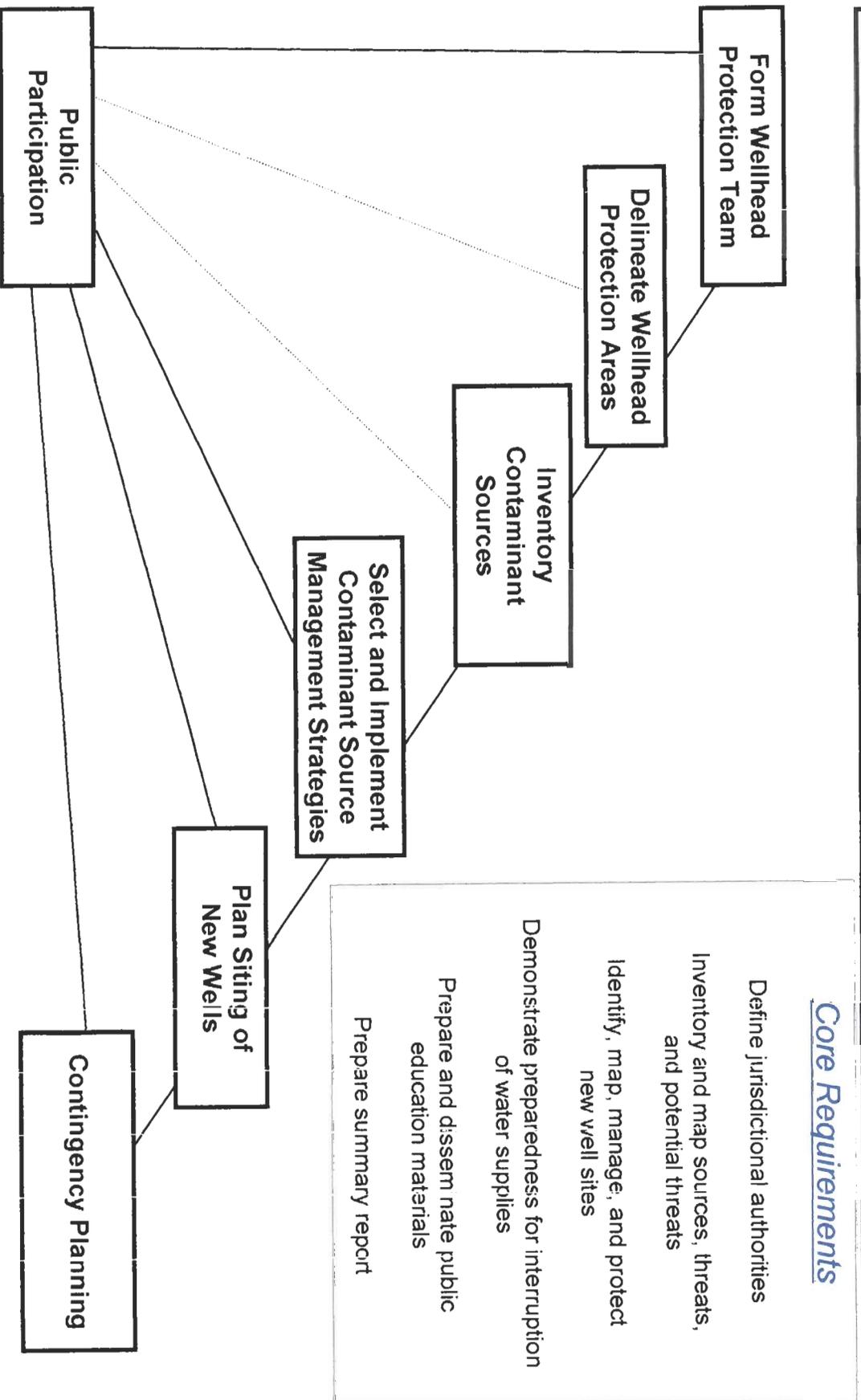
Transient Non-Community – 23

Do not consistently serve the same people

**Bars, Restaurants, Lodges, Brothels,
RV Parks, Markets**

SUMMARY OF STATE OF NEVADA WELLHEAD PROTECTION PROGRAM GUIDANCE

Seven Required Elements in Developing a Wellhead Protection Program



Element 1 – Form Wellhead Protection Team

Define Jurisdictional Authorities

System Operators, Nye Co., Town Board, RPC, SNCCD, Clark County?

Define Goals

- Water supply protection
- Cooperative recharge area management
- Guide WHPP development
- Select management strategies

Select Management Options

- Evaluate risks
- Define new operations
- Evaluate new well proposals

Long-term implementation

Monitor – Evaluate - Modify

<p><i>Core Requirements</i></p> <p>Form intergovernmental PWS/Public team</p> <p>Conduct meetings</p> <p>Prepare mailing list w/addresses and contact numbers</p> <p>Name lead contact person</p>

Element 2 – Delineate WHPAs and Recharge Areas

Delineate WHPAs

Select methods criteria & thresholds

Apply methods

EPA model runs for water supply wells
Hydrologic evaluation for springs

Prepare summary

Rationale for methods selected
Thresholds selected

Prepare maps

Aquifer system contributing to supplies
Recharge areas
WHPAs

Core Requirements

Reference/Information review

Pump test data

Analyze and evaluate
aquifer characteristics,
and degree of confinement

Outline methods, criteria,
thresholds, and rationale for
WHPAs

Map recharge areas

Prepare, display, and distribute
WHPA maps

Element 2 – Delineate WHPAs and Recharge Areas

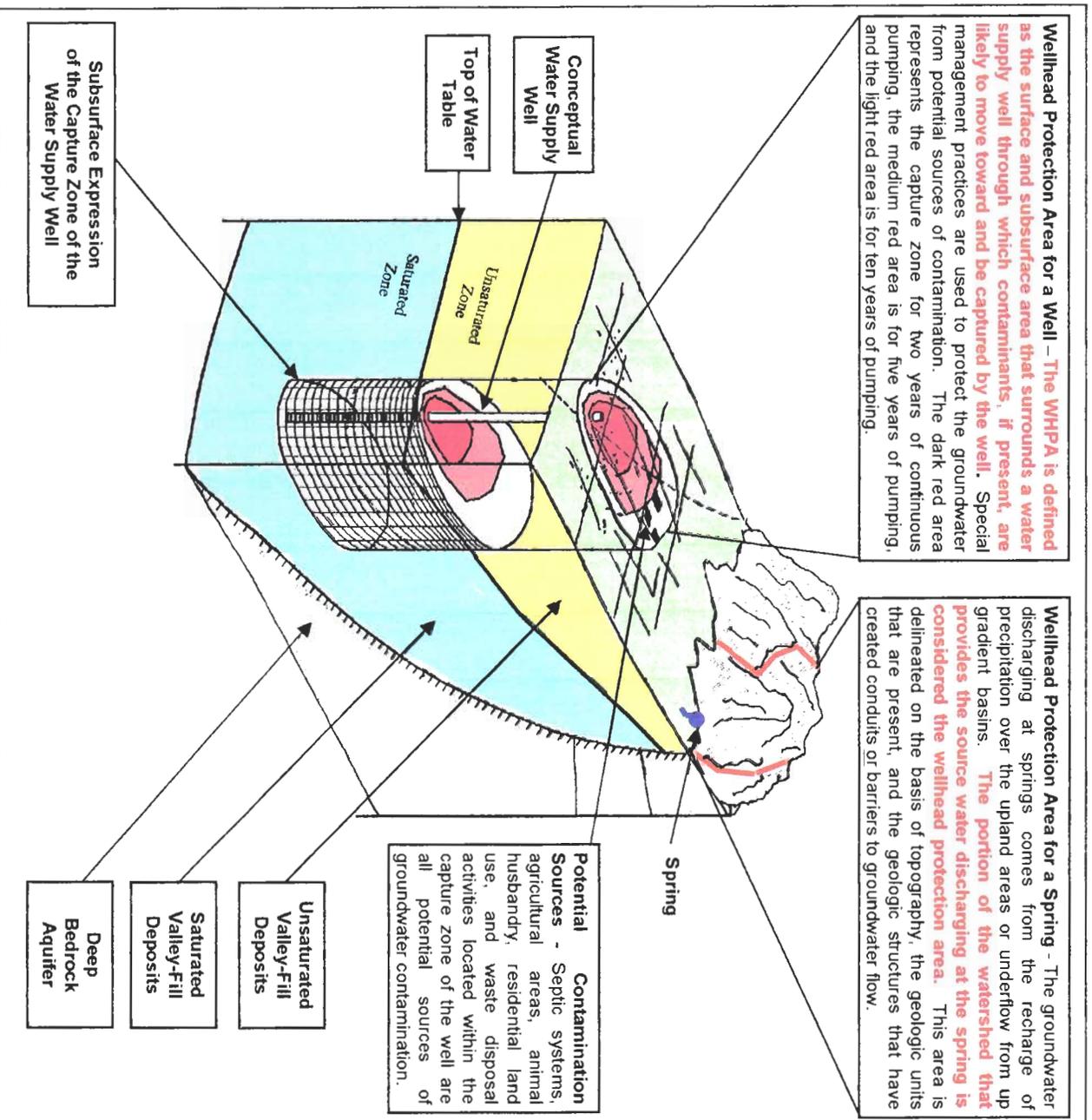
What is a Wellhead Protection Area?

What is a Groundwater Vulnerability Assessment?

What is a Capture Zone?

What about Springs ?

How is the Recharge Area defined?



What is a Wellhead Protection Area?

“A wellhead protection area is the area on the ground surface which must be managed in order to protect the groundwater below.”

State of Nevada
 Wellhead Protection Guide
 Second Revision
 August, 2000.

What is a Vulnerability Assessment?

Vulnerability Assessments are done by the Bureau of Health Protection Services to determine the threat imposed to surface and groundwater supplies from **potential** contaminant sources.

A VA comprises a records search; compilation of historic water quality analyses, system operating characteristics, and well construction details; the surveying of potential sources of contamination; computer modeling of well capture zones; and the ranking of risks associated with each water supply source (well or spring).

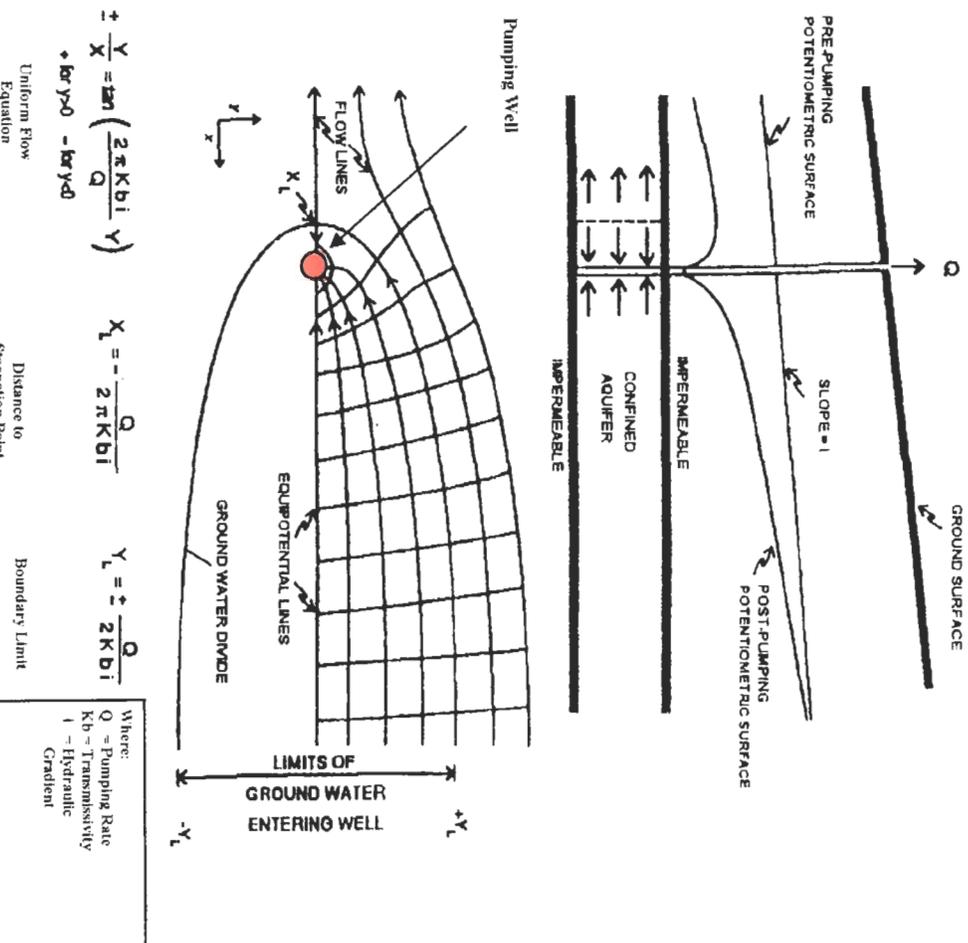
VAs have been completed for almost all well and spring sources in the State of Nevada and contain useful information for locating new water supply sources. VAs have been done for the water supply systems in Pahrump.

What is a Capture Zone?

Mathematical Basis for Defining a Capture Zone

While most people know about the cone of depression around a pumping well, the concept of a capture zone is not as widely understood. In an area where the water table is flat (there is no gradient), then the draw down of the water table in the vicinity of a pumping well will be shaped like a cone, hence the term cone of depression.

In natural conditions, however, the water table is seldom flat, rather it slopes steeply in the mountainous areas, less steeply under the alluvial fan area, and even less steeply under the lowland areas. When the water table slopes, the effects of a pumping well can be represented mathematically as the intersection of a plane with a cone. The result is a parabola as shown in this figure.

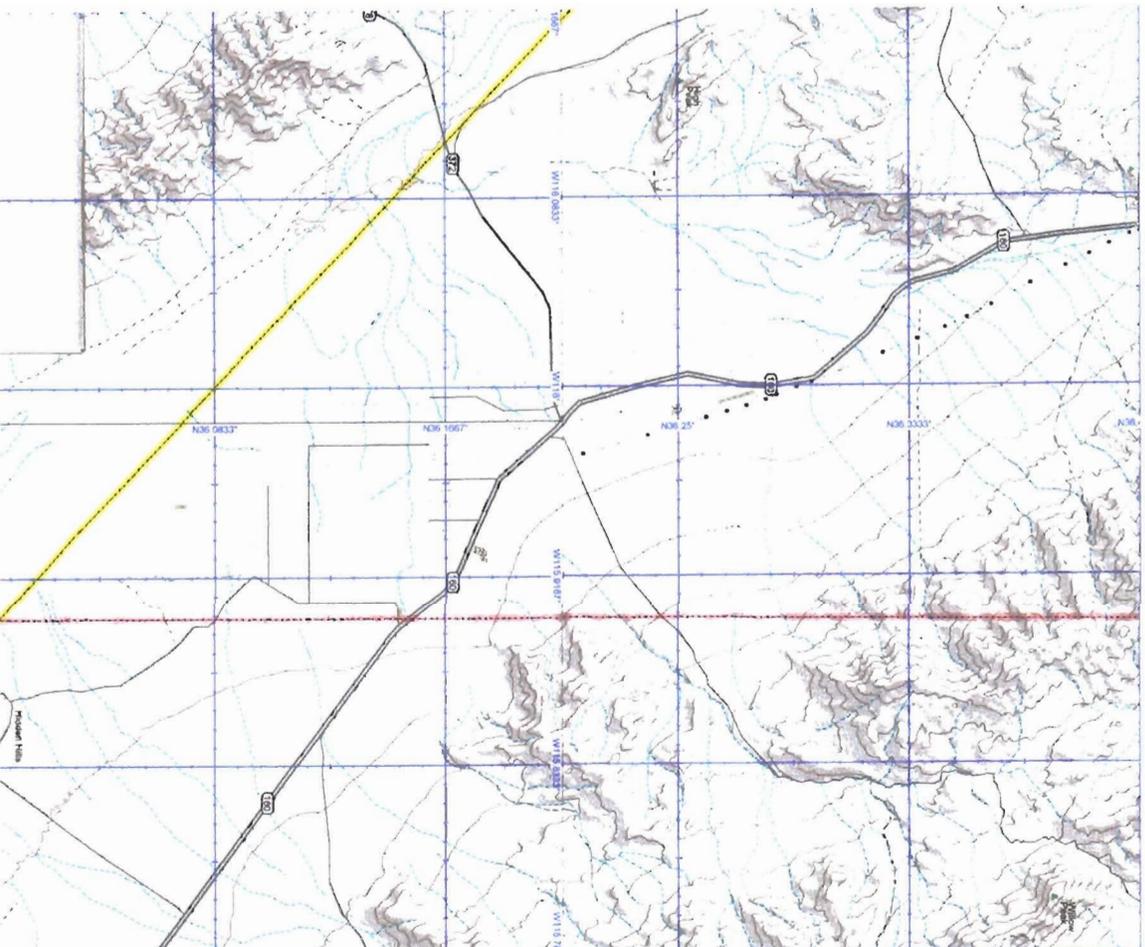


This parabola shaped depression in the groundwater is called the capture zone for a well. The capture zone varies in width and length depending upon the volume of pumping, the duration of pumping, and the hydrologic parameters.

Modified from Bureau of Water Quality Planning

Guidance (1995)

How are Recharge Areas Defined?

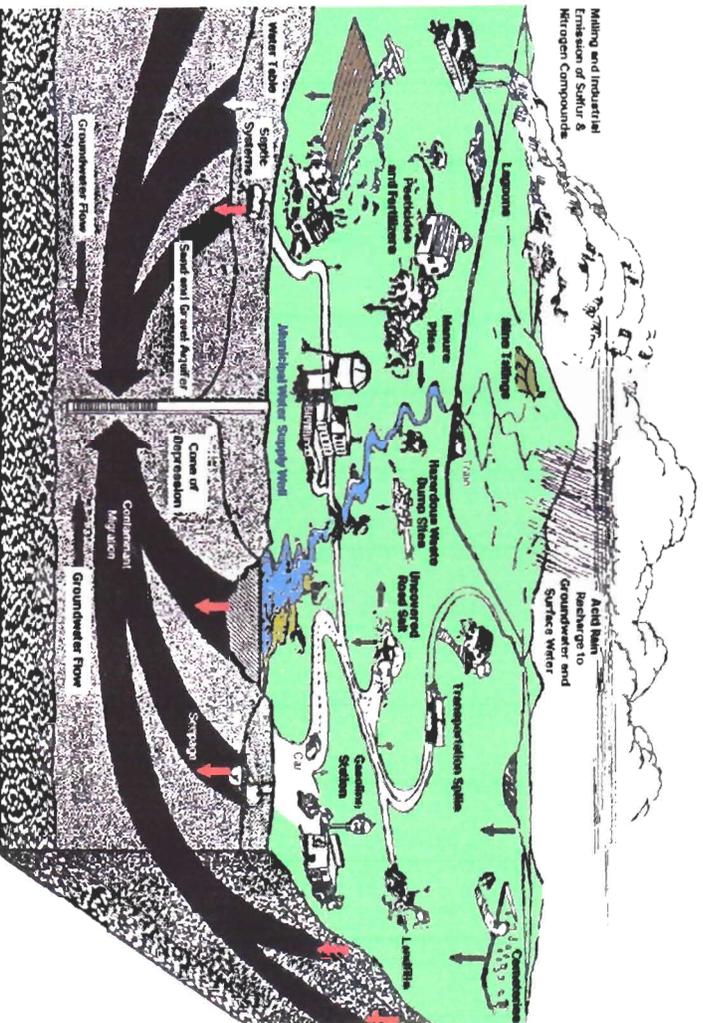


Recharge from precipitation is based on elevation/recharge distribution of Spring Mountains

No recharge from subsurface flow.

Areas of secondary recharge (agricultural fields, septics) are also identified and considered.

Element 3 – Inventory Contaminant Sources



Contaminant Source Inventory

Identifies and surveys potential sources of contamination within the Wellhead Protection Area for each well and spring.

Core Requirements

Records review

Field survey

Tabulate and summarize sources

Existing and potential source map

Map of master plan and land use designations

Schedule update and assign responsibilities

For Each Potential Source

Survey with GPS

Assign relative risk

Map at 1:24,000 with capture zone

Document and schedule updates

Activities That May Contaminate Drinking Water

Residential Uses: (*viruses, bacteria, nitrates, chemical compounds*)

- Failing septic systems, chemical septic system cleaners
- Improper storage and application of fertilizers, pesticides and lawn care chemicals
- Disposal of household cleaners, automotive products, poisons, waste oil, paint thinners, gasoline, pet waste into septic systems, backyard pits and storm drains
- Driveway runoff of oils, gasoline, heavy metals, de-icing chemicals
- Leaking underground heating oil tanks

Schools and Institutions: (*chemical compounds, solvents, nitrates*)

- Disposal of oil, paints, chemicals into floor drains, sinks or directly to the ground
- Contaminated runoff from parking areas
- Improper fertilization of recreation fields
- Equipment wash waste water

Municipal Uses: (*sodium chloride, heavy metals, petroleum*)

- Improper storage and application of deicing chemicals
- Street sweeping
- Public works garages, auto maintenance, equipment wash waste water
- Uncapped/unlined landfills, open dumps
- Leaking sewer lines/oil lines
- Improper storage/application of pesticides and fertilizers
- Contaminated runoff from roads, parking lots

Commercial, Industrial Uses: (*heavy metals, petroleum, sodium chloride*)

- Improper storage, disposal and management of hazardous materials/waste
- Abandoned or leaking underground storage tanks
- Spills and releases that go unattended
- Floor drains which discharge directly to the ground
- Exposed bodies of water from mining, sand and gravel operations
- Waste storage lagoons
- Transportation spills and releases

Agriculture Uses: (*nitrates, bacteria, viruses*)

- Improper use/storage of pesticides, herbicides, animal manure, fertilizers
- Improper irrigation methods
- Animal burial
- Storage lagoons
- Concentrated animal feedlot operations
- Contaminated runoff and equipment wash waste water

Many common activities use compounds that can result in potential threats to water supply sources.

Areas where these types of activities are conducted should be avoided when selecting new locations for supply wells.

A water supply well must be at least 100 ft from any source but this distance is inadequate for good wellhead protection.

Potential Contamination Sources

CLASS	SOURCE	CATEGORY					RISK RANKING
		A	B	C	D	E	
Agricultural	Animal burial areas		X	X	X		High
	Animal feedlots		X	X	X		Moderate to High
	Chemical application (e.g. pesticides, fungicides, & fertilizers)		X	X	X		High
	Chemical mixing & storage areas (including rural airports)		X	X	X		High
	Irrigated fields		X	X			Moderate
Industrial	Irrigation ditches				X		High
	Manure spreading & pits		X	X	X		Moderate
	Unsealed irrigation wells		X	X	X		High
	Chemical manufacturers, warehouse/distribution activities		X	X	X		High
	Electroplaters & fabricators		X	X	X		High
	Electrical products & manufacturing		X	X	X		High
	Machine & metalworking shops		X	X	X		High
	Manufacturing sites		X	X	X		High
	Petroleum products production, storage & distribution centers		X	X	X		High
	Dry cleaning establishments		X	X	X		High
Commercial	Furniture & wood stripper & refinishers		X	X	X		High
	Jewelry & metal plating				X		Low
	Laundromats				X		High
	Paint shops				X		High
	Photography establishments & printers				X		High
Automotive	Auto repair shops		X	X	X		High
	Car washes		X	X	X		Moderate
	Gas stations		X	X	X		High
	Road decking operations: storage & application areas (e.g. road salt)		X	X	X		Moderate
	Road maintenance depots		X	X	X		High
Residential	Household hazardous products		X	X	X		Moderate
	Private wells		X	X	X		Moderate
	Septic systems, cesspools		X	X	X		Moderate to High
	Educational institutions (labs, lawns, & chemical storage areas)		X	X	X		Low
	Medical institutions (medical, dental, vet offices)		X	X	X		High
Storage	Research laboratories		X	X	X		High
	Aboveground storage tanks		X	X	X		High
	Underground storage tanks		X	X	X		High
	Public storage		X	X	X		Low
	Radioactive materials storage					X	High
Municipal Waste	Dumps and landfills (historic/active)		X	X	X	X	High
	Municipal incinerators		X	X	X		Moderate
	Recycling & reduction facilities		X	X	X		High
	Scrap & junkyards		X	X	X		High
	Septage Lagoons, wastewater treatment plants		X	X	X		High
	Sewer Transfer Stations		X	X	X		High
	Airports		X	X	X		High
	Asphalt plants		X	X	X		High
	Boat Yards		X	X	X		High
	Cemeteries		X	X	X		Moderate
Miscellaneous	Construction areas		X	X	X		Moderate
	Dry wells		X	X	X		High
	Fuel storage systems		X	X	X		High
	Golf courses, parks & nurseries (chemical application)		X	X	X		High
	Mining (surface & underground)		X	X	X		High
	Pipelines (oil, gas, coal slurry)		X	X	X		High
	Railroad tracks, yards & maintenance		X	X	X		High
	Surface water impoundments, streams/ditches		X	X	X		High
	Stormwater drains & retention basins		X	X	X		High
	Unplugged abandoned well		X	X	X		High
Well - operating		X	X	X		High - Low	

The Contaminant Survey identifies any of the potential contaminant sources in the table on the left.

If sources are located in or near the capture zone for a water supply source, the sites are surveyed and mapped.

Relative risk rankings are made on the basis of the number and types of sources, their distance to the water supply source, and the risk associated with that class of contamination.

In selecting new locations for water supply sources, these types of potential contaminant sources should be avoided.

- Contaminant Categories:
 A = V.O.C.
 B = S.O.C.
 C = I.O. C.
 D = MICROBIOLOGICAL
 E = RADIONUCLIDES

Table 6 – Contaminant Source Management Tools

Regulatory Options	Suggested Management Approach	Applicability to City of Ely WHPA
Sanitary Ordinances Zoning Ordinances Source Prohibitions Land Use Planning Master Planning Special Use Permits Subdivision of Land Parceling of Land	Local governments may use these regulatory options as management tools to protect their communities' underground drinking water resources. These tools will be most effective if they become part of WHPA.	State regulations govern sanitary services. Subdivision and parceling ordinances are already adequate to protect WHPAs. A land use plan is in place and is consistent with WHPA. Source prohibitions within Zone 1 of WHPAs are appropriate.
Non-Regulatory Options Land Acquisition	Suggested Management Approach The community or utility can acquire land within a WHPA through donation, purchase or trade development rights, and/or conservation easements restricting use of land.	Applicability to City of Ely WHPA The City of Ely and White Pine County do not have the financial wherewithal to acquire land specifically for WHPA protections.
Groundwater Monitoring	A groundwater monitoring program consists of regular sampling of wells for contaminants. It helps the community to measure the effectiveness of its source controls and compliance with drinking water standards.	Groundwater monitoring should be conducted at one or more locations within the 17 th Street and Ave. M WHPAs and up gradient of Murry Springs if financial assistance can be obtained.
Local Business Owner Education	Encourage local business owners to take advantage of the Business Environmental Program offered by Nevada Small Business Development Center (NSBDC).	Local business owner education is appropriate to the implementation of the WHPA
Household Hazardous Waste Collection	A good management tool to reduce the amount of hazardous waste going to the landfill or septic systems. Coordinate with local government to implement a Household Hazardous Waste Collection Day. Funding is available through NDEP's Solid Waste Program. This option helps to educate the public about the types of household products which are toxic or hazardous. It encourages public involvement. Educate the citizens in your community by distributing NDEP's flyer about Safer Alternatives to Hazardous Household Products.	This management tool is appropriate if funding can be obtained.
Wellhead Protection Sign	Place signs on perimeters of WHPAs. A sign would reduce the risk of an accident. It serves as notification in case of an accidental spill of contaminant. Signs help to educate the public.	Signs have been placed in the Murry Springs watershed. Signing of Ave. M and 17 th Street WHPAs should be considered if funding is available.
Public Education	Public education is a key aspect of any WHPA. Public education efforts are important in building public support for regulatory changes and local funding. NDEP has prepared a flyer listing the available sources for getting ground water protection related public education materials. Use this source to educate the public about WHPA. The Nevada Rural Water Association (NWRWA) conducts free workshops to educate small communities. Encourage citizens in your community to participate in NWRWA's workshops.	Public education through the public school system is appropriate and a set of educational materials has been obtained from the U.S. Geological Survey for use by the White Pine County School system.

Element 4

Select and Implement Contaminant Source Management Strategies

Core Requirements

Develop and document regulatory and non-regulatory strategies to implement for WHPA protection

Non industrial zoning for WHPAs is strongly encouraged

Compile documentation related to management options

Designate team member responsible for source management and strategy revision and a tentative revision schedule.

Element 5 – Plan Siting of New Wells

SITING CONSIDERATIONS

New wells must be more than 100 ft from any source of contamination.

WHPAs should be delineated all proposed wells.

WHPA team should evaluate proposals for new wells.

Add all new wells to the WHPP

Modify Contingency Plan
Implement/Modify Management Practices

Avoid water table aquifer if possible

Do not draw from multiple aquifers if possible

Core Requirements

Map new well sites and their WHPAs

Document rationale for selection

Develop tentative schedule for well use.

The documentation is done in the Source Development Plan

Source development plan is major part of the required contingency planning.

Plan defines when new wells will be needed, and what steps must be taken to develop a new well as a public water supply source.

The plan lays out the approach that will be used to identify a new source, secure water rights for that source, define the WHPA, obtain permits and rights-of-way, and secure funding to pay for it all.

Table 8 - Source Development Plan Elements for New Water Supply Wells

Element	Considerations	Status
Estimate Projected Supply Needs	Current capacity is adequate in terms of production, storage, and treatment.	Projected demand can be met with existing sources through 2010 if no comminoration occurs.
Identify Underdeveloped Water Sources	Spring development is costly especially if Surface Water Rule must be met. Suitable sites exist for future water supply well.	Suitable areas identified for additional water supply wells to augment or replace Murry Springs.
Examine Steps Required to Obtain Water Rights	City of Ely has adequate water rights to provide for future expansion of system.	Change in point of diversion filed with NDWR after final well site selection.
Define WH/PAs for New Well Sites	Site-specific data will not be available but existing data for region as a whole is considered adequate.	Deferred to final well location selection. Adequate information already exists for delineation of preliminary WH/PA. Final definition based on results of well tests.
Identify Potential Contaminant Sources	Contaminant inventory was completed in 2001.	New sources will be monitored through NDEP, BHPS, and WH/P Team.
Select Management Strategies and Options	Groundwater monitoring, signs at Murry Springs, and public education are in place. Source prohibitions have been identified for WH/PAs to be implemented as an overlay district pending required approvals.	Signs needed marking WH/PAs at two wells (\$5K). Groundwater monitoring sites selected, funding needed for 2-3 wells (\$30K to \$50K). Public education program to continue. Municipal and County commission approvals needed prior to implementing overlay district prohibitions.
Perform Compliance Studies	Obtain permits and access and file environmental documentation. Can cost \$5K to \$50K depending on location and NEPA requirements. Sample water and test for chemical constituents to demonstrate compliance with Safe Drinking Water Act. Costs can approach \$5K per source for sampling, analyses, reporting, and contractor fees. Conduct aquifer test of new source well.	Permitting, rights-of-way and NEPA documentation initiated after funds secured. Sampling is typically done following well completion and development or during drilling of a pilot borehole. Will include Safe Drinking Water Act parameters for chemistry. Aquifer test needed for final WH/PA delineation; to be done at time of well completion.
Evaluate Financial Needs and Procure Funding	10-year planning horizon. Priority needs are 2-3 monitoring wells and signs. Second priority is development of new groundwater source or sources over five to 10-year timeframe. (\$200K+).	Potential funding sources identified for monitoring wells and grant proposals will be prepared. Funding sources for new supply wells will be sought.

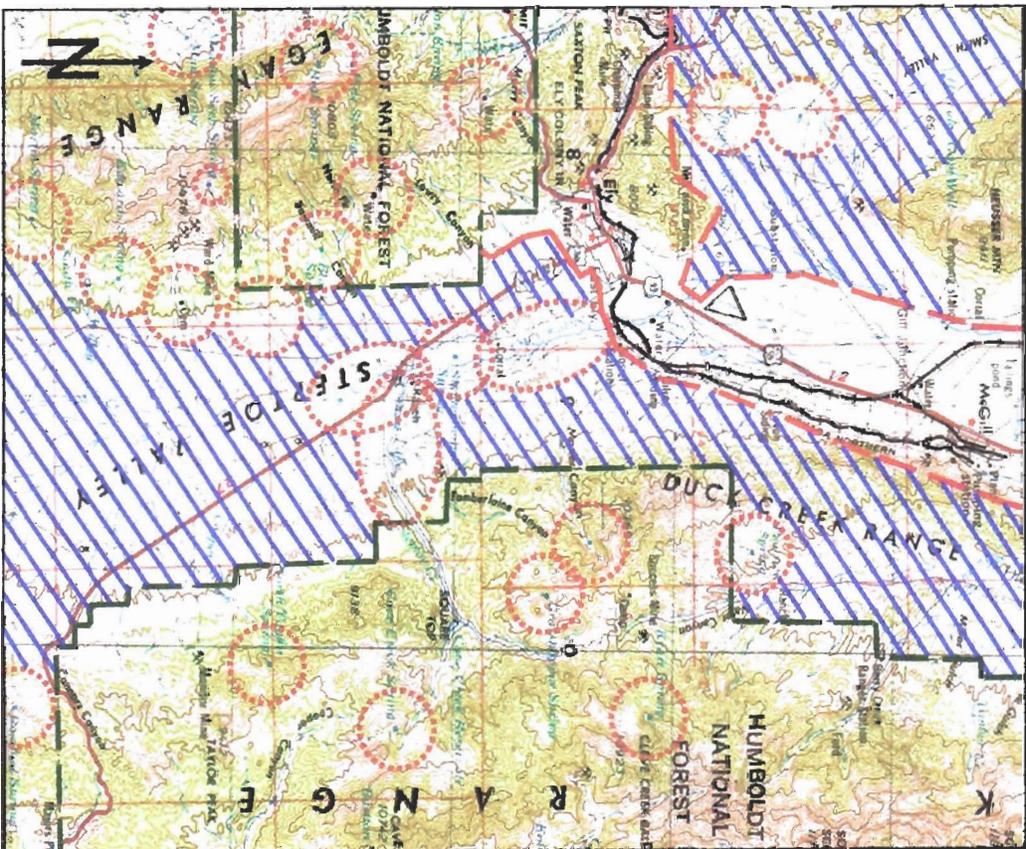


Figure 14. Suitable Locations for Water Supply Wells and Exclusion Zones (Scale 1:250,000)

 suitable areas based upon setbacks from Exclusionary Zones

Note: The areas delineated as suitable are based upon the inventoried confinement sources and the setback distances described in the text. The Forest Service and were not considered, nor were engineering factors, costs, or hydrogeologic criteria. Prior to the actual selection of final well sites, additional studies should be done to consider these additional factors and to insure that no new confinement sources are present. This map is not suitable for the selection of final well sites. Rather, the map serves as a guide for areas that should be excluded from further consideration for the location of public water supply wells.

Element 6 – Contingency Plans

Incident

Emergency Response

Source Control

Water Rationing

Supply Decontamination

Source Development

Core Requirements

Identify safe alternative sources

Plan source development

Plans for emergency response, rationing, and decontamination

Implementation schedules

Update schedules and responsibilities

Element 7 – Public Participation

Town Board
Citizens Advisory Councils
Utilities
Elem. & Jr. High Schools

Core Requirements
Propose activities
Implementation schedule
Develop school program

Suggested Activities:

Customer mailings

Business flyers

Presentations at Town Board Meetings

Get the signs up



**For Wellhead Protection
the guys from the State
are here to help us**