CITY OF RAPID CITY

RAPID CITY, SOUTH DAKOTA 57701

Public Works Department

Engineering Services Division

300 Sixth Street

Telephone: (605) 394-4154 FAX: (605) 355-3083

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July 8, 2009

Mayor Hanks and City Council Members
City of Rapid City
300 Sixth Street
Rapid City, SD 57701

Dear Mayor Hanks and City Council Members:

The City of Rapid City selected Stanley Consultants, Inc. to review City practices and to outline suggestions for mitigating current potential source water contamination and eliminating future source water contamination risks. Studies completed by the USGS, SD DENR and SDSM&T were reviewed as were policies, laws and practices of other cities with similar issues.

In protecting Rapid City's source water, two approaches were considered:

- Mitigating current potential source water threats through policy change and regulation.
- Reducing the number of on-site wastewater systems, commonly referred to as septic systems, by extending public sanitary sewer.

The prolonged sustainability and high quality of Rapid City's water supply is necessary for our community's health, businesses, growth and overall future viability. Please find attached executive summary for the report, a Power Point presentation and a final of the copy is available for review. **Staff is therefore requesting Council approval of the Source Water Protection Report by Stanley Consultants, Inc. and authorization of the staff to proceed with implementing the recommendations contained within the report.**

Sincerely,

Louie Arguello

Louie Arguello
Engineering Project Administrator
(605) 394-4154

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Executive Summary

The City of Rapid City, South Dakota has experienced periods of moderate to significant population growth over the past few decades. The abundant quantity and generally excellent quality of domestic drinking water is a significant element in the quality of life enjoyed by residents of Rapid City. Water quality data collected over the last fifteen years from Rapid City's municipal wells, however, show that the levels of nitrate concentrations are steadily increasing. The South Dakota Department of Environment and Natural Resources (DENR) completed a Source Water Assessment for the Rapid City Public Water Supply System in 2003 and documented contaminant sources which included, among other things, on-site wastewater disposal systems commonly known as septic tanks.

The City's municipal wells draw from both the Madison and Minnelusa aquifers. Several other aquifers are interconnected to the Madison and the Minnelusa and therefore, influence the water quality of the others. Other aquifers include the Inyan Kara, the Minnekahta, and the Deadwood. Water from one aquifer flows to another through fractures, pores, breccia, and caves in the limestone making the Madison and the Minnelusa vulnerable to pollution from contaminant sources at the ground surface. Currently, Rapid City has documented approximately 3,200 existing on-site systems within the City limits and the surrounding one-mile buffer area. In addition, there are believed to be up to 9,000 more systems upgradient of the major aquifer recharge area in the central Black Hills.

While the current nitrate levels in the City's municipal water supply remain below the EPA drinking water limit (10 mg/l), proactive measures should be taken to ensure the quality and sustainability of the City's drinking water supply into the future. Ignoring this threat to the City's source water can lead to enormously expensive future water treatment costs and even the potential loss of the City's current source of water altogether.

The purpose of this report is to recommend a proactive approach to the problem of increasing nitrate levels in the aquifers. This report recommends the City begin a program to remove

existing on-site systems and extend sanitary sewer infrastructure to connect these homes to the City's sanitary sewer system. Such a program would involve installing roughly 75 miles of sanitary sewer and related infrastructure within the current City limits and surrounding one-mile buffer area at an approximate cost of $60 million. A number of potential project areas have been identified in this report. Due to the large number of existing on-site systems, the recommendation calls for a phased approach to on-site system removal using a combination of congressional grant monies and City funding sources. Completion of all identified project areas would result in the removal of approximately 92% of existing on-site systems within the City and the surrounding one-mile buffer area. A discussion on funding sources and cost recovery methods for construction of sewer extension projects is also included in the report.

The report also recommends the City develop an Aquifer Protection Overlay zoning ordinance and revise the current subdivision ordinance to aid in breaking the continuous cycle of new subdivisions being developed with on-site systems that will ultimately require the costly extension of municipal sanitary sewer infrastructure. Specific recommended revisions include prohibiting new on-site systems within sensitive aquifer recharge areas and requiring, at a minimum, installation of dry sewer with new developments utilizing on-site systems in non-sensitive areas.

Finally, the report also recommends the City continue to encourage Pennington County to develop and implement standards for inspection and maintenance of existing on-site systems within the County that are equivalent to the City's program. A dialogue should also be started between the City and Meade and Pennington Counties regarding the establishment of growth management areas and joint zoning regulations that effectively manage urban growth and avoid the practices that have led to the current situation of large concentrations of on-site systems threatening the City's drinking water supply.

SOURCE WATER PROTECTION REPORT

City of Rapid City
South Dakota

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Public Works Committee: July 14, 2009
Legal & Finance Committee: July 15, 2009

BACKGROUND

- Rapid City historically has drawn a majority of its drinking water from the Minnelusa and Madison Aquifers.
- Research by USGS, SDSM&T, & SDDENR indicate:
  - Rising nitrate levels in City drinking water supply over last 15 years
  - Aquifers are interconnected via fractures, pores, caves, & breccia
  - Water moves quickly through aquifer system and generally flows easterly from central Black Hills towards Rapid City's wells
- Aquifer system is highly susceptible and vulnerable to pollution from contaminants at the ground surface

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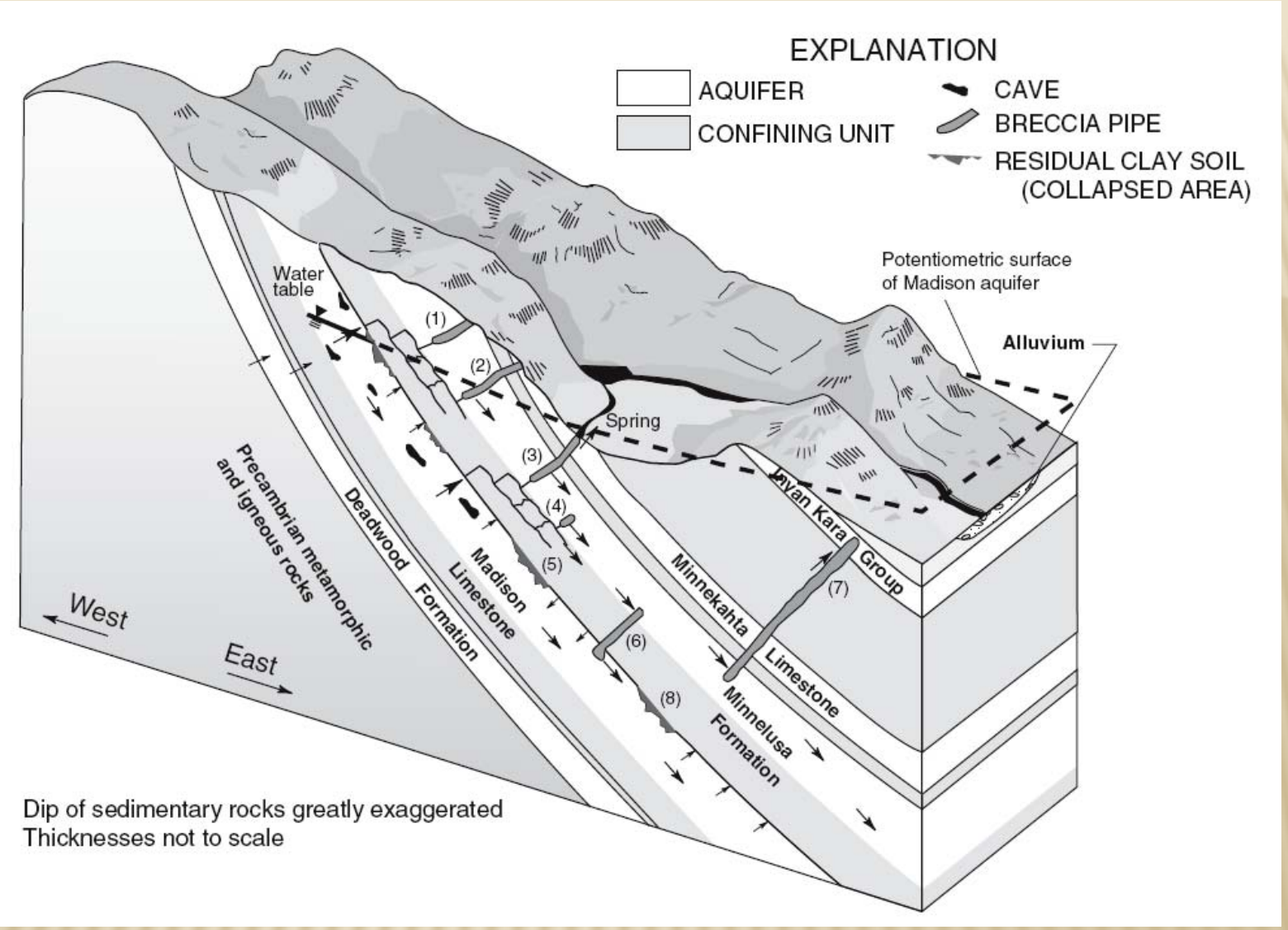

Schematic of Hydrogeologic Setting of Black Hills Area (Long & Putnam, 2002)

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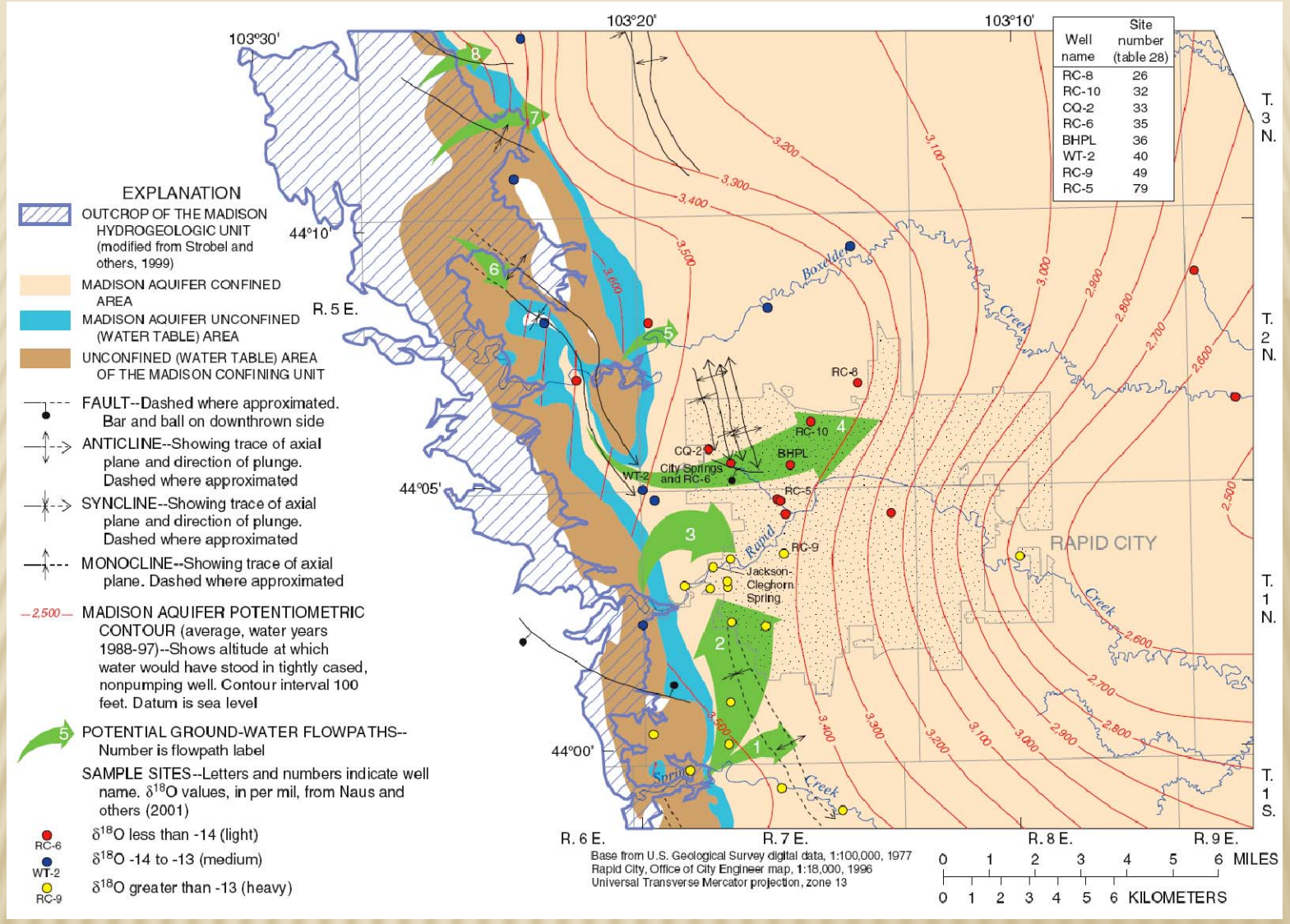

Groundwater Flow Paths in Madison Aquifer (Long & Putnam, 2002)

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PROBLEM

- Steadily rising nitrate levels in City water supply
- Approximately 3,200 existing on-site wastewater disposal systems within City and one-mile buffer
- Additional 9,000 systems in central Black Hills

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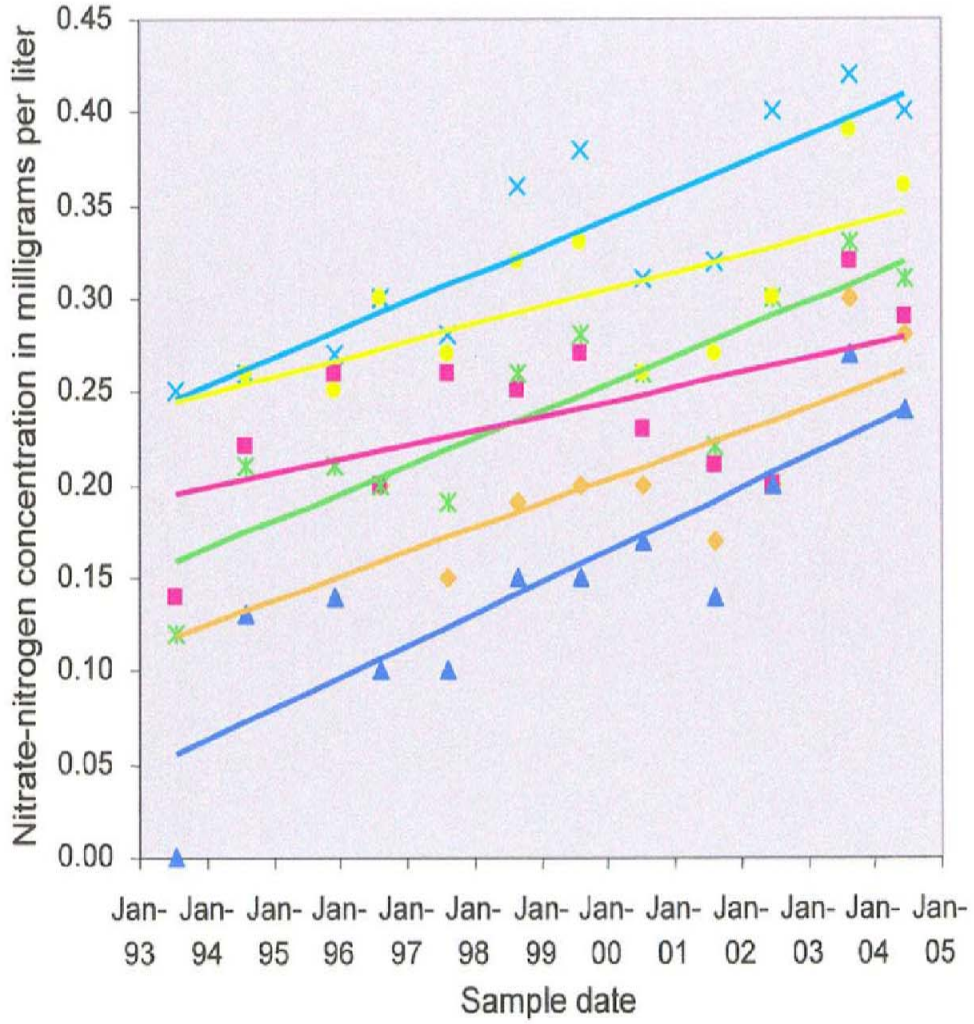

Nitrate Concentrations in City Wells in Madison Aquifer (Rahn, 2006)

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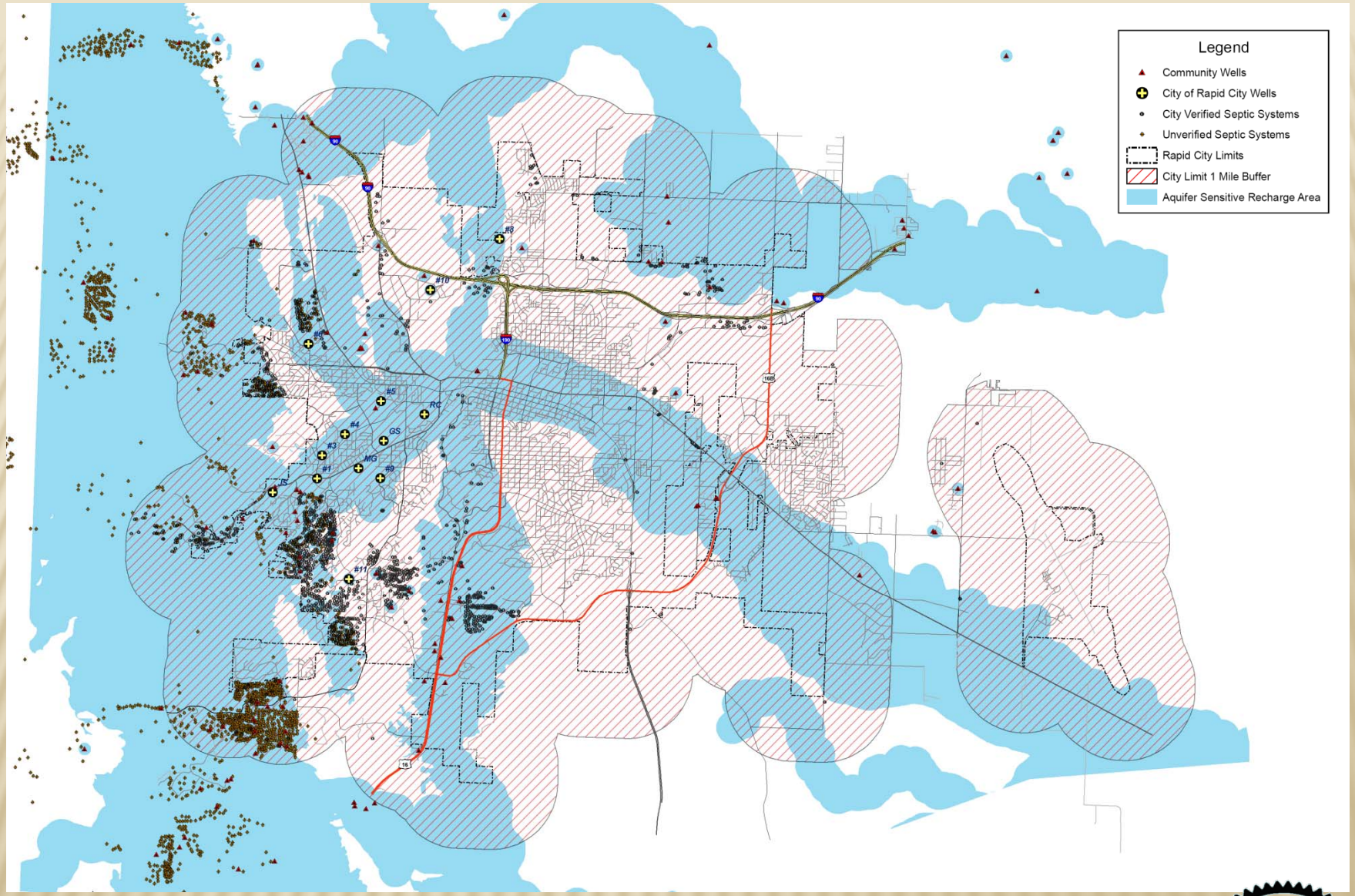

Map of Existing On-Site Wastewater Disposal Systems

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RECOMMENDATIONS

- Recommend City begin program to extend City sanitary sewer and remove existing on-site systems
  - Fifteen potential project areas identified in Report
  - Represents 92% of existing systems within City & one-mile buffer
  - Approximately 75 miles of sanitary sewer & related infrastructure
  - Approximately $60 million in construction (2009 dollars)

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Project Area Name	Project Area	Septic Tanks	Acreage	Sewer Length (ft)	Estimated Construction Cost (2009$)	Aquifer Sensitivity	In Aquifer Flow Path to Water Supply	Tanks Removed per 1000 ft of sewer	Cost per Tank Removed ($)	Within City Limits as of Report Date
Countryside	A	682	838	76,000	11,670,000	Y	Y	9	17,111	N
Wildwood/Carriage Hills	B	199	452	32,000	4,940,000	Y	Y	6	24,824	Y
Enchanted Hills	C	153	204	14,000	4,800,000	Y	N	11	31,373	Y
Springbrook Acres	D	166	231	23,000	3,080,000	N	Y	7	18,554	Y
Wonderland	E	298	488	43,000	7,470,000	Y	Y	7	25,067	Y
Cleghorn Canyon	F	78	99	9,800	1,400,000	Y	Y	8	17,949	N
Red Rock Canyon	G	38	165	8,400	870,000	Y	Y	5	22,895	N
Dark Canyon	H	95	419	21,000	2,180,000	Y	Y	5	22,947	N
Westberry Trail	I	116	335	23,000	2,520,000	Y	Y	5	21,724	N
Berry Pines/Pinedale/South Canyon	J	96	293	16,500	1,950,000	Y	Y	6	20,313	Y
Kingswood	K	46	104	12,300	1,170,000	Y	Y	4	25,435	Y
Sunnyside	L	356	289	29,500	5,550,000	Y	Y	12	15,590	N
North Valley Drive	M	109	84	9,600	1,730,000	Y	N	11	15,872	N
Green Valley	N	269	428	35,300	4,880,000	Y	N	8	18,141	N
Valley Heights / Valley View	O	198	205	39,000	4,280,000	N	N	5	21,616	N

Project Area Data

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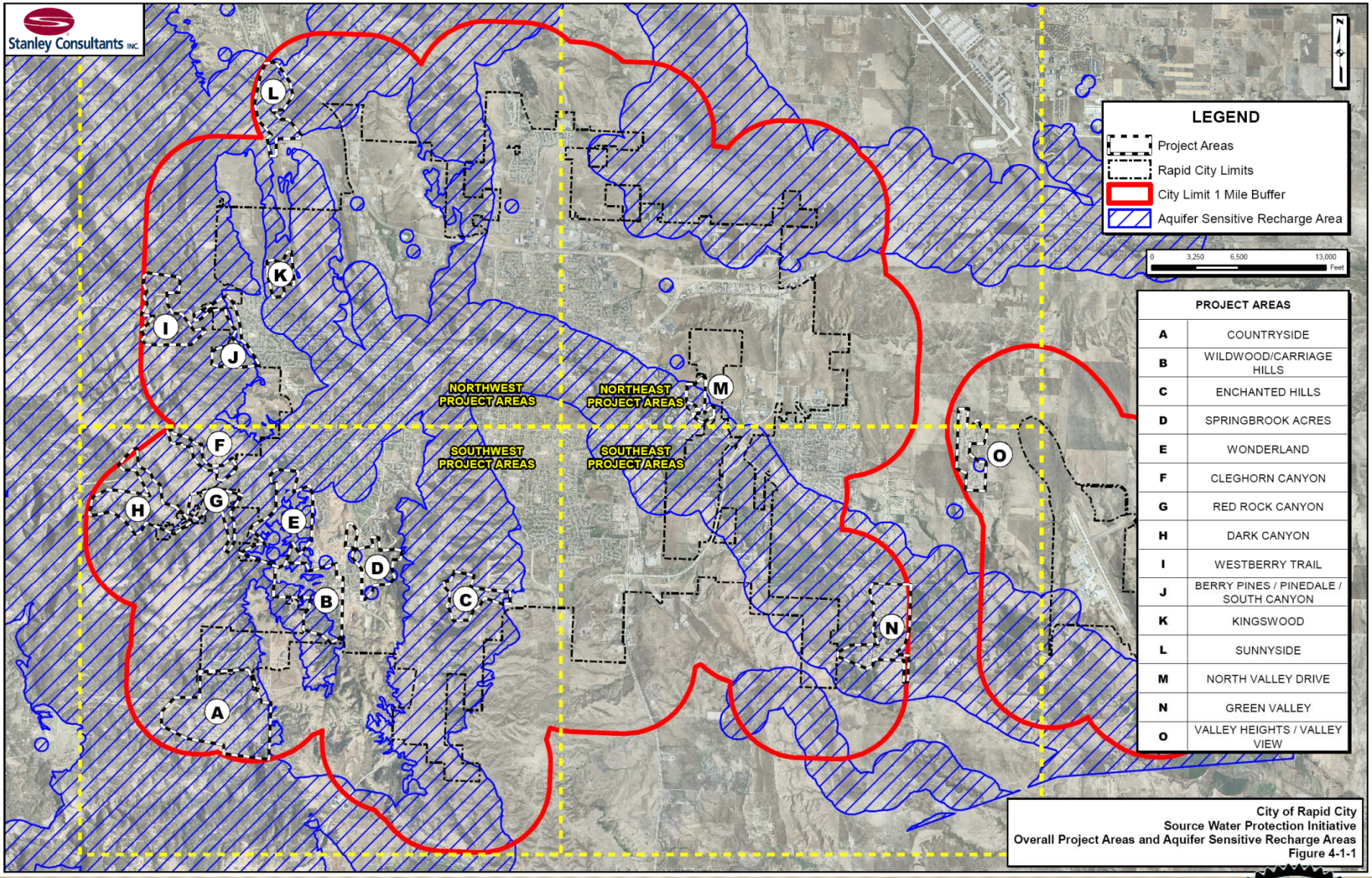

Overall Project Areas

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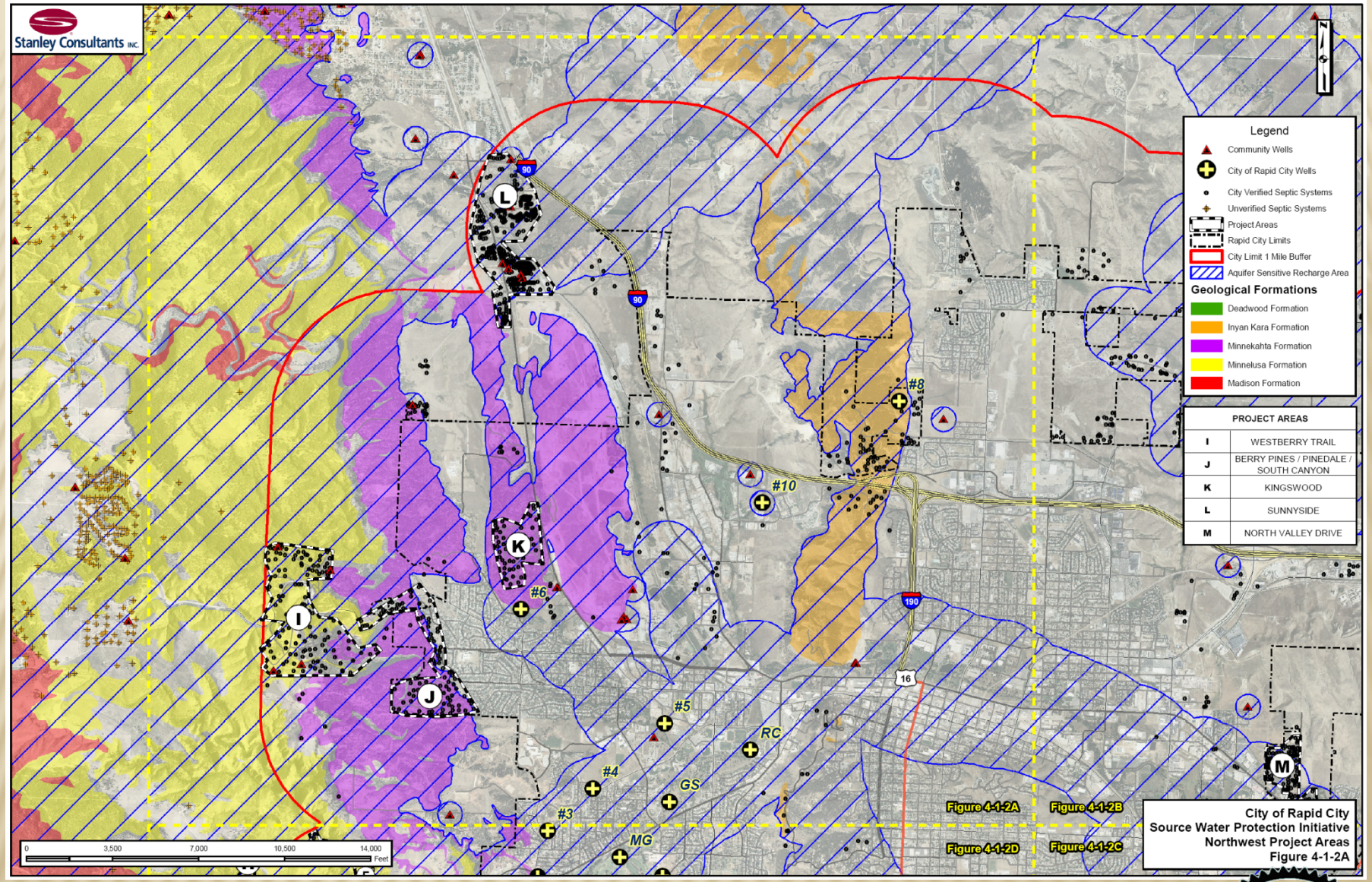

Northwest Project Areas

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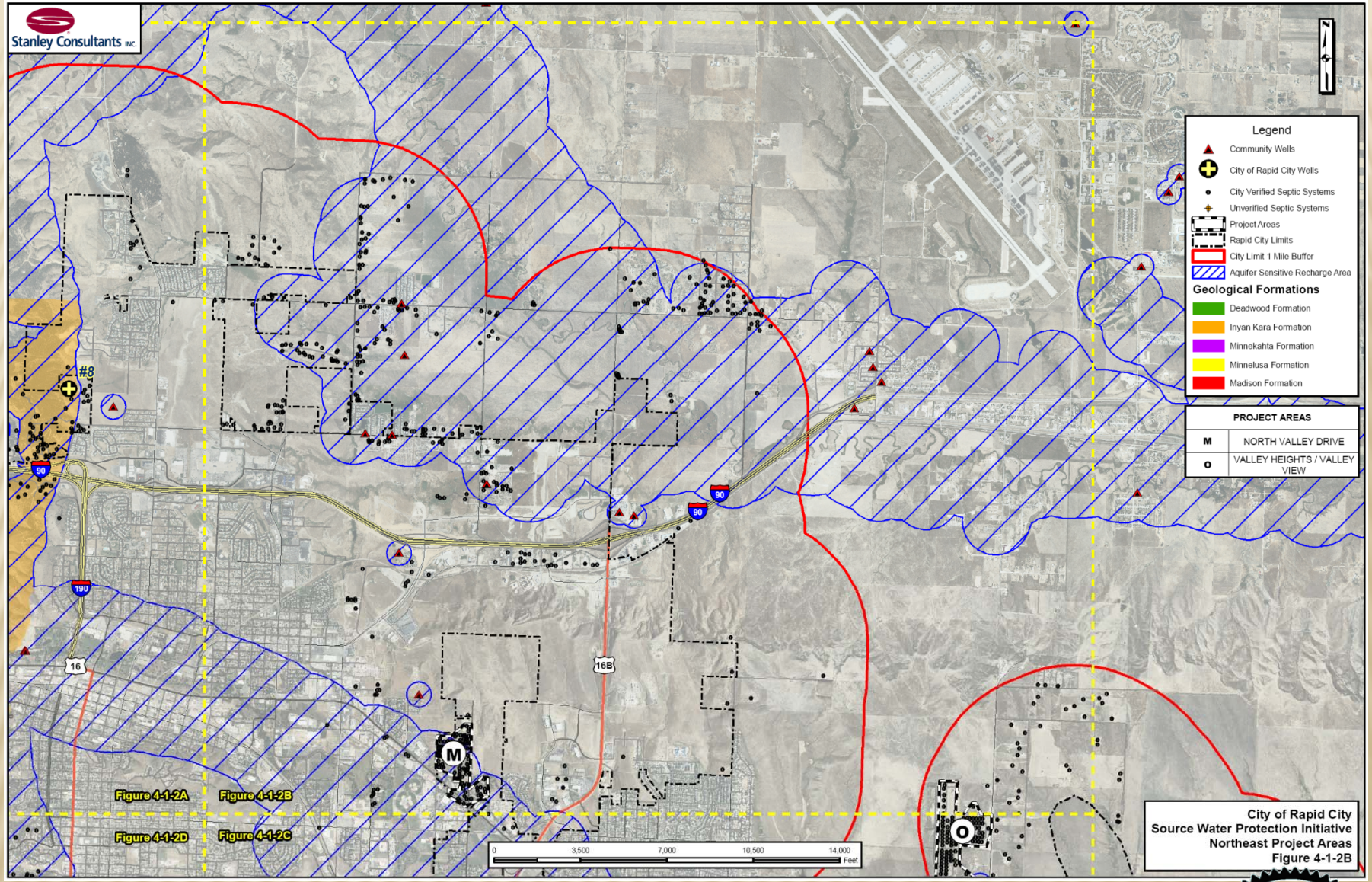

Northeast Project Areas

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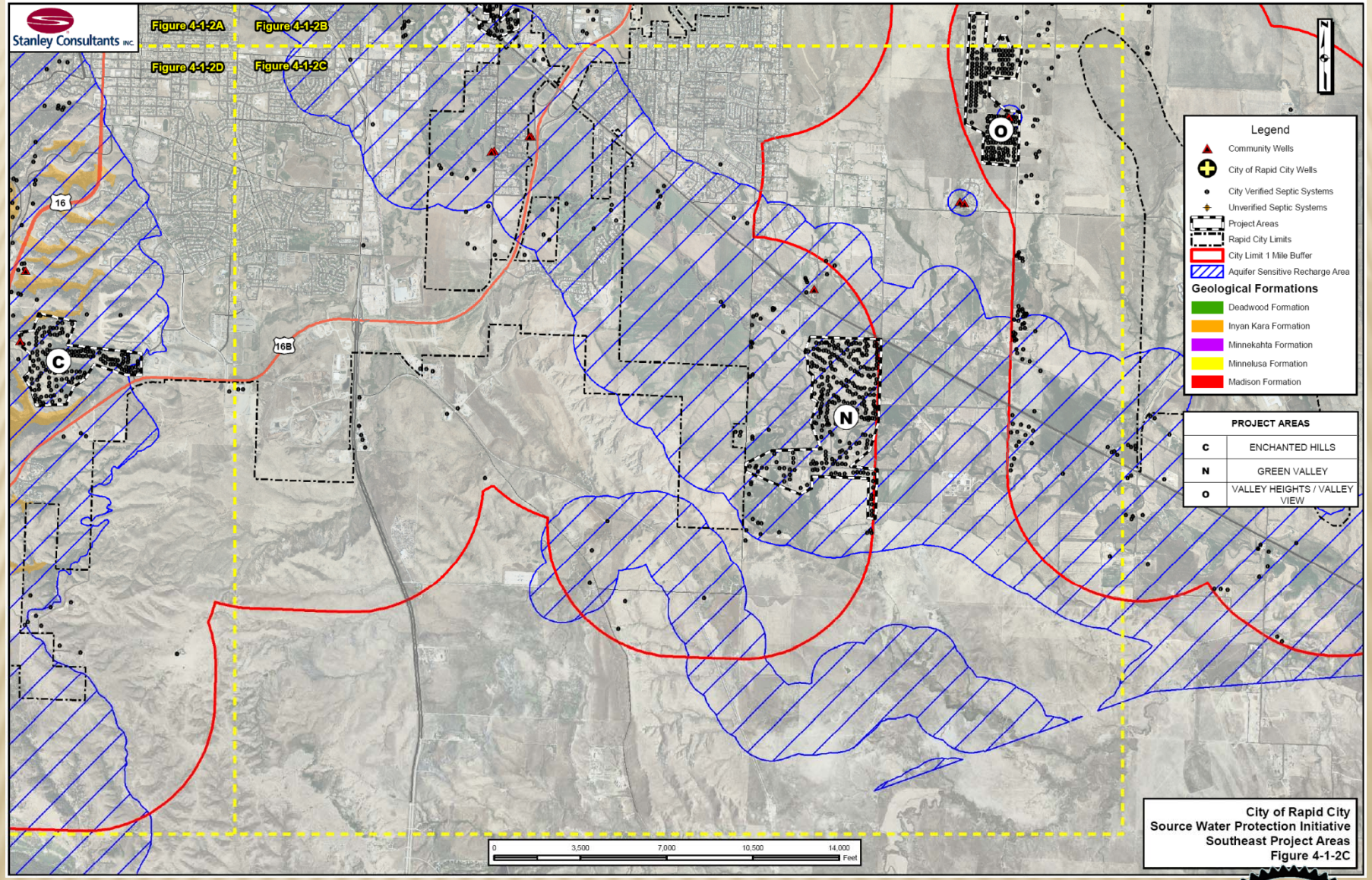

Southeast Project Areas

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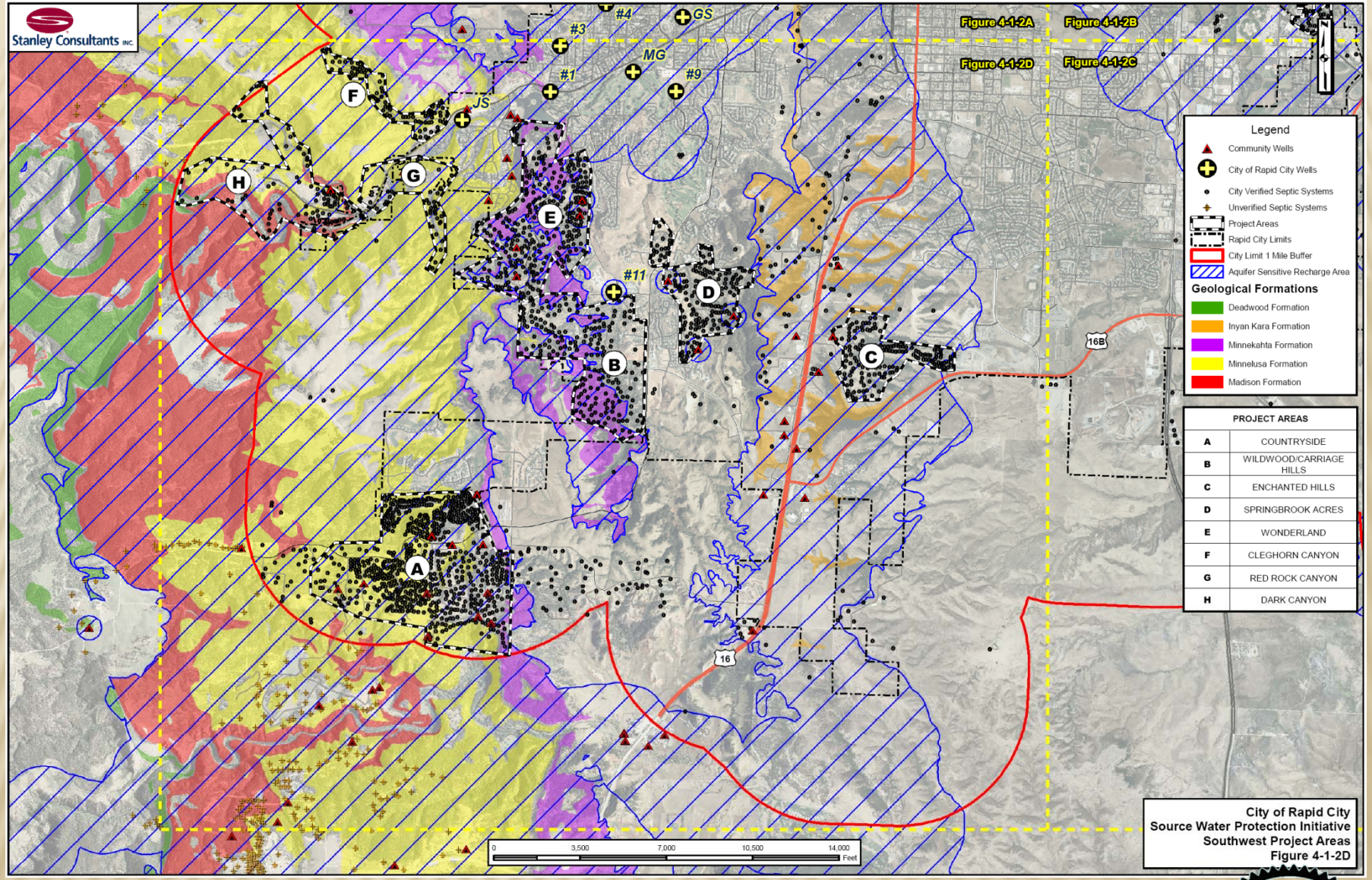

Southwest Project Areas

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RECOMMENDATIONS

- Recommend City develop Aquifer Protection Overlay Ordinance & revise current Subdivision Ordinance
  - Prohibit new on-site systems within sensitive aquifer recharge areas
  - Require all new subdivisions to install sanitary sewer with development
    1. Connect to City system if within 500 feet
    2. Connect to City system if within sensitive aquifer recharge areas
    3. Allow dry sewer with interim on-site systems and covenant agreements if not within 500 feet and only if subdivision located within non-sensitive aquifer recharge areas
- Recommend City encourage Pennington County to adopt ordinance language equivalent to City's for inspection & maintenance of existing on-site systems

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RECOMMENDATIONS

- Recommend City begin dialogue with Pennington & Meade Counties on establishment of growth management areas and joint zoning regulations
  - Promote smart, sustainable urban growth; avoid leapfrogging
  - Avoid undue scattering or concentration of population
  - Provide efficient delivery of municipal services as City expands

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FUNDING SOURCES FOR SEWER EXTENSIONS

Within the City Limits	Within the Three-Mile Platting Jurisdiction
• .16 Utility Facilities Fund • Water Reclamation Enterprise Fund • Water Enterprise Fund • Infrastructure Development Partnership Fund • Tax Increment Financing • Clean Water State Revolving Fund • Consolidated Water Facilities Construction Program • State Water Resources Management System • Federal Grant Funding	• Clean Water State Revolving Fund • USDA Rural Development • Small Community Grant • Community Development Block Grant • Consolidated Water Facilities Construction Program • State Water Resources Management System • Federal Grant Funding

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FEDERAL FUNDING RELATIONSHIPS

Funding Received

$890,000 Federal Grant

$735,000 City match required

FY 2010 Funding Requests

$2,000,000

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COST RECOVERY FOR SEWER EXTENSIONS

Within the City Limits	Within the Three-Mile Platting Jurisdiction
• Assessments • Construction Fee • Sewer Utility Fee • Water Utility Fee • Rate Surcharge	• Construction Fee • Increased Sewer Utility Fee (150%) • Rate Surcharge

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QUESTIONS OR COMMENTS

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