City of Reno and Washoe County
TMSA/FSA
Water, Wastewater, and Flood Management Facility Plan

Volume 1

November 2007

Prepared for
City of Reno
Washoe County
Regional Water Planning Commission

Prepared by
ECO:LOGIC Engineering
HDR

ECO:LOGIC Consulting Engineers

HDR

SEAL OF WASHOE COUNTY STATE OF NEVADA

RWPC

RENO

ECO:LOGIC

Consulting Engineers

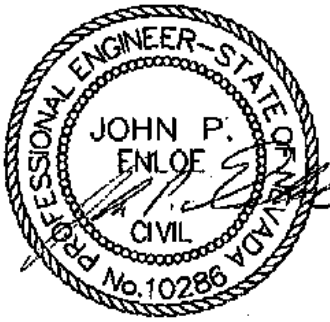
City of Reno and Washoe County TMSA/FSA Water, Wastewater, and Flood Management Facility Plan Volume 1

Prepared for:
City of Reno
Washoe County
Regional Water Planning Commission

Prepared by:
ECO:LOGIC Engineering

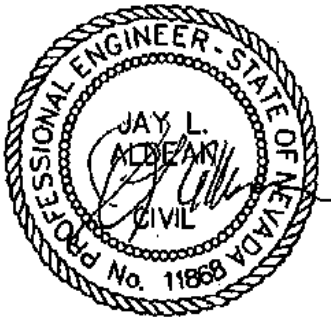
November 2007

Water and Wastewater



EXPIRES 12/31/08
10/10/07

Flood Management and Stormwater



EXPIRES 12/31/08
10/10/07

City of Reno and Washoe County TMSA/FSA Water, Wastewater, and Flood Management Facility Plan

Table of Contents

VOLUME 1

VOLUME 2

Appendices

Section 1
Purpose and Scope

Table of Contents

List of Figures

Section 1 - Purpose and Scope

1.1 INTRODUCTION

On June 28, 2006, the Regional Planning Commission adopted RPC Resolution 06-06, which recommended adoption of proposed amendments to the 2002 Truckee Meadows Regional Plan including amendments related to an Annexation Settlement Agreement (ASA, August 22, 2005) between Washoe County, the City of Reno and the City of Sparks relating to the cities' annexation programs. This was followed by the July 27, 2006 action by the Regional Planning Governing Board to adopt Resolution 06-03 to formally approve these amendments.

One result of this Regional Plan modification is a change to the boundaries of the Truckee Meadows Service Areas (TMSA) and the Spheres of Influence for the Cities of Reno and Sparks. The modification also creates a new classification called Future Service Area (FSA), as well as outlining policies regarding facility plans for public infrastructure.

This facility plan has been prepared to assist the City of Reno and Washoe County in satisfying the requirements of the ASA. The project has received the majority of its funding from the Regional Water Planning Commission's Regional Water Management Fund.

The ASA contains a deadline of July 1, 2007 for local governments to have completed the preparation of facility plans that will identify the infrastructure required to serve future growth. The term used in the ASA to describe the availability of facilities and financing mechanisms in time to serve new development is "Concurrency".

The facility planning process is being performed in parallel with other work by regional entities that is needed to clarify the assumptions to be used for facility planning, such as: 1) What is the meaning of Concurrency; and 2) What is the growth projection to be used for the facility planning process?

1.1.1 Concurrency

There is a Concurrency Management Working Group that includes staff from the three local governments, service providers, and stakeholders. This group has developed a draft document to define the term "Concurrency", the most recent draft of which is dated January 11, 2007, and titled "Concurrency Management Principles". Section 2 of the Concurrency Management Principles contains the most recent information available to describe the facility plan requirements, the key portion of which is quoted below:

> *"Each facility plan must (i) include provisions regarding funding and timelines, (ii) include an assessment of all responsible alternatives to additional capital investment (such as resource conservation, efficient design, and so forth), (iii) identify which facilities are required to address existing deficiencies, (iv) identify*

which facilities are required for new development, and (v) identify which facilities are required to address both existing deficiencies and new development."

1.1.2 Population / Development Forecast

This facility plan has been prepared to cover both the City of Reno (City) and Washoe County (County) portions of the TMSA. Each jurisdiction has provided its own projection of future growth through the year 2030 planning horizon. At the time of preparation of this plan, the only spatially distributed growth forecast model that was available for use and agreed to by both the City and County is the Regional Transportation Commission's (RTC) Traffic Analysis Zone (TAZ) model, which consists of a Geographic Information System (GIS) shapefile containing TAZ boundaries and a spreadsheet with future growth projected over time by TAZ. The City and County have each updated this model with their own projections for their individual jurisdictional areas. This updated model was used as the basis for this water, wastewater and flood control facility planning effort.

The starting point for analysis contained in the RTC TAZ model was the year 2002. The City projected forward from this point in time to 2030, while the County did its own analysis of existing residential units as of July 2006 and projected forward from 2006 to 2030. Some of the traffic analysis zone polygons cross City / County jurisdictional boundaries, and there is nothing in the model to distribute existing development between the City and the County. In order to prevent the double counting of existing units, it was necessary to determine this split and modify the City and County models to include an estimate of existing residential units by jurisdiction.

This was accomplished through the use of a GIS point shapefile provided by the County that contains the number of existing units (all types) by parcel as of July 2006. The TAZ polygons and jurisdictional boundaries were then overlaid on the point file, enabling the determination of a total number of existing units by TAZ and by jurisdiction. This information was then used to adjust the existing development data to 2006 numbers, which also provides a better basis for comparison of existing water commitments issued by water purveyors and wastewater flows received at the region's wastewater treatment plants.

1.1.3 City of Reno Growth Forecast

The City has provided an update to the RTC TAZ model that spatially distributes this forecast within the Reno TMSA. The model also identifies the projected number of dwelling units and acreage of non-residential development within the City of Reno TMSA/FSA boundary. The model has a projection through 2095 that could be used for a longer term, or 100-year growth projection. The 2030 and 2095 projections provide the best available estimate of what the long term need for facilities might be in order to satisfy the Concurrency requirement of the ASA.

1.1.4 Planning Approach for City of Reno TMSA Facility Plan

The following approach was developed in coordination with City staff to project future water demand and wastewater flows:

1. Use City of Reno TAZ forecast of population and development potential at 2030 for the City portion of the planning area in order to generate water demands, wastewater flows, and conceptual level facility plans for backbone infrastructure.

2. Develop planning level cost estimates for this infrastructure. The estimates of demand and flow, and infrastructure cost have been split between development target zones (Transit Oriented Corridors and Regional Centers) and other areas.

3. Update the City of Reno TAZ forecast to include information from University of Nevada, Reno (UNR)'s Small Business Development Center for approved tentative map units when this number exceeds the number of units indicated for the TAZ zone. (Report: Residential Subdivision Activity – September 2006, Greater Reno-Sparks Area)

4. Update City of Reno TAZ forecast to include information from specific large scale development projects where additional facility planning and more detailed information has been provided by project proponents.

5. Provide comparison of potential water demand against potentially available water resources by planning sub-area at 2030 and 2095.

6. Provide estimates of total wastewater flow generation by planning sub-area at 2030 and 2095 and compare against available or planned future treatment capacities. Identify any wastewater treatment or reclaimed water disposal limitations that are particularly significant in this comparison.

7. Review Truckee Meadows Water Authority (TMWA) Resource Plan for significant information regarding available water resources and forecasting methodology that might affect the above analysis.

8. Rely on the TMWA Water Facility Plan for areas within TMWA's service territory, with the exception of a review of fire flow requirements that might trigger new facilities in high density development target areas such as TODs and Centers.

9. Utilize existing facility planning documents for backbone infrastructure requirements to the extent that they are relevant for the current growth assumptions.

10. Utilize development plans from certain master planned projects where more detailed information is available to supplement City Master Plan or Zoning information. Such information was used in Cold Springs, Winnemucca Ranch (Spring Mountain and Sage), and the portion of Sunny Hills that was in the July 2007 TMSA boundary.

1.1.5 Planning Approach for Washoe County TMSA Facility Plan

Similar to the City of Reno, the County has also provided an update to the RTC TAZ model with respect to projected future dwelling units within the County TMSA at 2030, including

consideration of approved projects. Additional data provided included a GIS shapefile containing polygons with TAZ number and approved planned land uses and a point shapefile containing the number of dwelling units by parcel as of July 2006. This planned land use file was used to summarize planned land use acreages by TAZ in order to: 1) develop non-residential water demands and wastewater flows, and 2) develop an average residential lot size by TAZ for the application of residential water demand factors.

The County data was not updated with UNR approved development information because the County had already included such an analysis in the update to the TAZ model.

1.2 CONCEPTUAL LEVEL ANALYSES

The TMSA Facility Plan consists of several components, including projected improvements for water, wastewater and flood control infrastructure improvements. The following sections describe the level of detail provided in this Facility Plan. It should be noted that the infrastructure sizes and locations are conceptual, and are based upon planning level information. It should be anticipated that the recommended sizes and locations of facilities will be further refined as more detailed information and development plans are available.

1.2.1 Water Facility Plans

For this project, a Conceptual Level Water Facility Plan includes the following:

1. Identification of potentially available water resources to serve future growth based on the Water Resource Baseline in the adopted Regional Water Management Plan, or subsequent updates provided by the RWPC.

2. Documentation of land use assumptions.

3. Documentation of existing demands based on information provided by water purveyors, if available.

4. Projection of build-out water demands based on master planned land uses as provided by the City of Reno. Water demand factors are developed based on data for equivalent land uses from the relevant water purveyor in the region.

5. Identification of pressure zones and potential tank sites.

6. Identification of potential wholesale or in-basin water delivery locations, including qualitative descriptions of potential improvements to existing systems based on available information from the relevant water purveyor in the region.

7. Water transmission capacity needed to serve pressure zones in terms of "equivalent water transmission capacity". Equivalent water transmission capacity is defined as the transmission capacity and pipe size required to serve build-out of a region. More detailed planning of the region in the future will likely result in the design of a more distributed

network of smaller diameter pipes following detailed street/lot layouts that provide the same overall capacity.

8. Planning level facility cost estimates for major backbone infrastructure including transmission piping, tanks, wells, treatment, or pump stations, as appropriate, based on recent construction costs in similar conditions. Cost estimates include a 30% contingency, plus an allowance for engineering, permitting, and construction management.

9. Discussion of relevant policies from the adopted Regional Water Management Plan and their effect on water planning within the facility plan study area.

10. Identification of any known constraints affecting the water facilities in the facility plan study area.

1.2.2 Wastewater Facility Plans

For this project, a Conceptual Level Wastewater Facility Plan includes the following:

1. Documentation of land use assumptions.

2. Documentation of existing wastewater flows based on information provided by wastewater treatment providers, if available.

3. Projection of build-out wastewater flows based on master planned land uses as provided by the City of Reno. Wastewater flow factors are developed based on data for equivalent land uses from either the wastewater treatment provider in the region to be planned, or from the 208 Regional Water Quality Management Plan, as appropriate.

4. Identification of gravity wastewater collection areas and potential need for wastewater pump stations.

5. Identification of wastewater treatment plant locations to provide service (new or existing), and capacity needed, with consideration of information contained in 208 Regional Water Management Plan.

6. Discussion of existing effluent disposal methods and limitations and reference to information contained in the 208 Regional Water Quality Management Plan, as appropriate.

7. Wastewater interceptor capacity needed to serve collection areas in terms of "equivalent wastewater collection capacity". Qualitative descriptions of potential improvements to existing systems will be included, based on available information from the relevant wastewater treatment provider in the region. Equivalent wastewater collection capacity is defined as the interceptor capacity and pipe size required to serve build-out of a region

based on average slopes within the collection area. More detailed planning of the region in the future will likely result in the design of a more distributed network of smaller diameter pipes following detailed street/lot layouts that provide the same overall capacity.

8. Planning level facility cost estimates for major backbone infrastructure including gravity interceptor and force main piping, wastewater pump stations, treatment, and effluent disposal, as appropriate, based on recent construction costs in similar conditions. Land costs are not included in the estimates. Cost estimates include a 30% contingency, plus an allowance for engineering, permitting, and construction management.

9. Discussion of relevant policies from the adopted Regional Water Management Plan and their effect on water planning within the facility plan study area.

10. Identification of any known constraints affecting wastewater facilities in the facility plan study area.

1.2.3 Flood Control Facility Plans

For this project, a Conceptual Level Flood Control Facility Plan includes the following:

1. Review of existing available documents and studies of the area, including previous development analyses and plans, previous master plans, and readily available site specific scientific studies.

2. Documentation of the extent of known flooding and high water levels.

3. Field visits to record and photo document general observations of topography and geomorphology, location of existing natural channels, potential for channel migration, playa conditions and potential behavior, civil infrastructure that may need upgrade, replacement or removal, and assistance with interpretation of project specific and other available mapping. Engineering judgment will be exercised on which areas to visit due to the number of facilities.

4. Conceptual level studies as necessary to quantify hydrologic flow potential, estimate extent of flood plains and order of magnitude for required structures, and recommended locations for conveyance and storage facilities.

5. Calculation methods to be used for analysis may vary include stochastic or deterministic modeling as appropriate commensurate with the level of accuracy needed to answer planning level questions. Facilities may not be analyzed to the point that specific sizes are provided, but when needed, sizes that are provided will be based on simple estimation techniques. Any model produced for analysis of a flood control facility plan will be made available to the City for use as a planning tool for future development.

6. Coordination with the Truckee River Flood Project planning effort. Flood facility planning will incorporate elements from the "Local Sponsor Plan" alternative and a discussion on the Army Corps of Engineer's alternative when available.

7. A discussion of flood management strategy and potential alternatives for each area.

8. Planning level facility cost estimates for major backbone infrastructure including channel stabilization, structural channel improvements, flood storage and recharge infrastructure, and other major structural upgrades such as culverts and bridges, as appropriate, based on recent construction costs in similar conditions. Cost estimates include a 30% contingency, plus an allowance for engineering, permitting, and construction management. Facility sites may be identified to the extent of the required amount of land area, but not to the extent of individual parcels. Land costs are not included in the estimates.

1.2.4 Flood Control Planning Philosophies

Generally, flood control and stormwater master planning may be viewed from two distinct points of view, existing development and proposed development. The first (existing development) or what may be deemed as historical flood control master planning, is necessary for problems associated with existing urban infrastructure. When past construction of civil infrastructure occurs without utilizing appropriate drainage solutions, the resulting development typically has numerous flooding/drainage problems. As engineering knowledge in the area of hydrology and hydraulics has improved over time, much of the previously constructed drainage facilities have been shown to be lacking in required conveyance capacity, a stable geomorphic process, and water quality protection.

In addition, consideration of habitat issues during past development was ignored and again it is found that much of the existing infrastructure does not meet the current standard of care. Master plans such as the *Washoe County Flood Control Master Plan*, KJC, 1991, and the Draft *Washoe County Regional Flood Control Master Plan*, WRC, 2005 are examples of this type of planning. These master plans address known flooding problems associated with existing urban development by proposing solutions and the associated project costs. The projects proposed in these plans are intended to be conceptual in nature for budgetary purposes. This planning document updates the most recent regional flood control master plan to reflect problems and solutions for the most recent flooding in 2005.

A second viewpoint of flood control planning is associated with new development. One trend in new land development is to plan new facilities around the existing natural features of the land; including topography (take advantage of land elevation differentials), flood plans, sensitive environmental areas and habitats, etc. Since new drainage facilities are specific to new development it is not typical to plan for those facilities until specific goals for development are defined. Under this scenario, watershed specific plans are developed in conjunction with new developments and specific flood control/drainage features are identified in those watershed

specific plans that meet the needs of the proposed development. New watershed specific master plans fitting this type of planning include named facility plans, such as *North Valleys Flood Control Hydrologic Analysis and Mitigation Options, Volumes 1 and 2,* by Quad Knopf, and *Somersett Development Storm Drainage Master Plan,* by Manhardt which were reviewed for this update.

Finally with respect to new development, there are reasons to develop what may be thought of as guidance planning tools for flood control and drainage for undeveloped areas. Historically, outlying properties have developed in some instances in a haphazard fashion with little or no thought of the ultimate configuration of drainage and flood control facilities. In order to address this problem, there needs to be a level of planning that identifies land features that are in the best interest of the public to protect. Examples would include preservation of natural flood plains to ensure the natural hydrologic and geomorphological function of the flood plain can continue and the natural riparian habitat flourish. Another example might be the preservation of natural stormwater infiltration to continue or even enhance groundwater recharge.

This master plan update includes mapping of natural drainageways to an approximate 100-year frequency storm event. Natural floodplain areas are mapped as well as areas where geomorphic processes are prominent and should be avoided by new structures. These areas are available on a GIS overlay and are easily applied by staff to areas of proposed development as initial guidance for protection of flood control corridors. The delineated floodplain areas are not intended for strict enforcement of no development impact, rather as a point of departure for working with each new permit request. The development code for the City of Reno currently provides for preservation of natural drainageways; but it allows for development to occur accordingly. The intent of the delineation of floodplains is to preserve this procedure.

1.3 HOW TO USE THIS REPORT

Water, wastewater and flood control infrastructure improvements are presented in this TMSA Facility Plan. Reno's portion of the TMSA is subdivided into several planning areas, including Spring Mountain, Sage, Cold Springs, Stead and Lemmon Valley, Truckee Meadows, South Truckee Meadows and Bedell Flat. Section 10, which covers the South Truckee Meadows portion of the TMSA, is incomplete as of this date. Washoe County provides the water and wastewater service to the majority of this area. Washoe County's portion of the TMSA Facility Plan, which includes the water, wastewater and flood control infrastructure improvements for the South Truckee Meadows area of Reno, is scheduled to be complete by September 2007.

~ PERTAINS TO WATER & WASTEWATER

Figures 1-1 and 1-2 show the different Reno planning areas, and which sections of the Facility Plan detailed information can be found regarding the recommended water, wastewater and flood control improvements. Each planning area and its associated figures, represents a portion of the overall TMSA, which may include a portion of Reno's TMSA, a portion of Washoe County's TMSA, or both. As development occurs within the TMSA, more detailed information and project specific plans will be generated. With this additional information, the level of detail of the facility plans will increase based on site specific conditions.

The facility recommendations presented herein are intended to provide the foundation for subsequent detailed planning and design. The City of Reno, Washoe County and the water, wastewater and flood control service providers having jurisdiction are the final authority regarding necessary infrastructure improvements. Preparation of updated facility plans will be necessary based on current information and the specific needs of the development at that time. These future planning efforts will further refine and define the exact facility requirements presented in this plan.

In general, it is anticipated that future planning and design will substantially conform to the TMSA Facility Plan. However, it is reasonable to foresee recommended changes to the TMSA Facility Plan as more detailed information is developed. When considering whether or not a refinement of the recommended facilities conforms with the TMSA Facility Plan and ultimately the Regional Water Management Plan and Truckee Meadows Regional Plan, the basic question to be answered is, "Does the design intent of the proposed facility (capacity, service function, construction phasing of major improvements, general location, design criteria, significant impact to other water related issues, etc.) substantially conform with the Regional Water Management Plan and the design intent of the applicable water, wastewater and flood control facility plans presented in this Plan?"

The Regional Water Management Plan includes Policy 4.1.a: Facility Plans and Infrastructure Studies, for determining whether a proposed revision to the TMSA Facility Plan is of such a kind or size that affects the working of the Regional Water Plan, and is in conformance with the Regional Water Plan. The Regional Water Planning Commission will ultimately determine whether a proposed revision to the TMSA Facility Plan requires a review for conformance with the Regional Water plan, pursuant to Policy 4.1.a below.

> **Policy 4.1.a: Facility Plans and Infrastructure Studies – Conformance with Regional Water Plan**
>
> *Pursuant to NRS 540A.230, facility plans and infrastructure studies of such a kind or size that affect the working of the Regional Water Plan, including water supply and storage, wastewater collection and treatment, stormwater, and flood control shall be reviewed by the RWPC for conformance with the Regional Water Plan.*
>
> **Criteria to implement policy:**
>
> The RWPC shall review facility plans and infrastructure studies of such a kind or size that affect the working of the Regional Water Plan to make a determination that the facility or study conforms to the Policies and Criteria included in the Regional Water Plan;

Proposed facilities and infrastructure shall:

- be consistent or coordinate with existing facility plans or master plans, or demonstrate how they will address any differences with or changes to existing facility plans or master plans, and

- coordinate to avoid unnecessary duplication of facilities

- An evaluation may be provided of the project's impacts on other water-related issues (e.g. a proposed water project must indicate the potential impacts it would have on wastewater treatment).

- Any plan or study that is funded in whole or in part by the Regional Water Management Fund shall be subject to conformance review.

Discussion: The RWPC and local governments provide ongoing planning for the community's water, wastewater, stormwater and flood control needs. Identification and review of potential impacts to existing or planned infrastructure, and needs for new or improved facilities, should provide for integrated planning and management of the region's water resources and cost-effective infrastructure development and improvements.

Facilities are designed and constructed by water purveyors, wastewater treatment providers, and local governments as part of their respective Capital Improvement Programs (CIPs). CIPs are updated annually, at a minimum. When entities update and approve their CIPs, the RWPC shall review them and recommend that pertinent facilities be found in conformance with the Regional Water Plan pursuant to NRS 540A, Washoe County Code (WCC) this policy, and RWPC administrative policies and procedures.

As the RWPC, local governments, wastewater treatment providers, and water purveyors update their respective facility and resource plans, they analyze alternatives for financing and funding proposed facilities, sources or other requirements, and the effects of the funding alternatives on other facilities included in the Regional Water Plan. These plans are then presented to the RWPC for either conformance review or informational purposes, as appropriate under the NRS 540A, this policy, and RWPC administrative policies and procedures. Presentation of these plans to the RWPC provides Commissioners the opportunity to raise questions regarding linkages and comprehensive regional planning for water resources, with the result that overall resource issues can be addressed or additional work can be undertaken, as needed. Lists of such plans that are relevant to regional resource planning are contained at the end of various chapters, and again at the end of this plan. These plans also contain detailed alternatives for financing and funding the respective facilities or sources and should be consulted for such detail.

Facility plans reviewed and found in conformance with the Regional Water Plan are added to a list of projects maintained by the RWPC staff (See Appendix J). Pursuant to the RWPC administrative policies and procedures, the list is submitted as appropriate to the Board of County Commissioners for approval and is included in periodic updates of the Regional Water Plan.

The RWPC recognizes that not all facilities required to implement the Regional Water Plan are listed due to unforeseeable circumstances and/or the frequent necessity to alter facilities once final design and construction proceed. Consequently the RWPC will review facilities that are not in the current edition of the Regional Water Plan if such facilities are of such a kind or size that affect the working of the Regional Water Plan.

ECO:LOGIC

Consulting Engineers

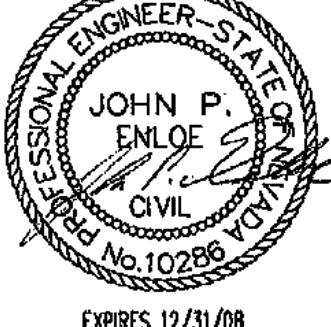
City of Reno and Washoe County TMSA/FSA Water, Wastewater, and Flood Management Facility Plan Volume 1

Prepared for:
City of Reno
Washoe County
Regional Water Planning Commission

Prepared by:
ECO:LOGIC Engineering

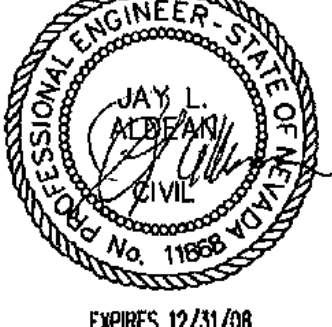
November 2007

Water and Wastewater



EXPIRES 12/31/08
10/10/07

Flood Management and Stormwater



EXPIRES 12/31/08
10/10/07

City of Reno and Washoe County TMSA/FSA Water, Wastewater, and Flood Management Facility Plan

Table of Contents

VOLUME 1

VOLUME 2

Appendices

Table of Contents

List of Figures

Section 1 - Purpose and Scope

1.1 INTRODUCTION

On June 28, 2006, the Regional Planning Commission adopted RPC Resolution 06-06, which recommended adoption of proposed amendments to the 2002 Truckee Meadows Regional Plan including amendments related to an Annexation Settlement Agreement (ASA, August 22, 2005) between Washoe County, the City of Reno and the City of Sparks relating to the cities' annexation programs. This was followed by the July 27, 2006 action by the Regional Planning Governing Board to adopt Resolution 06-03 to formally approve these amendments.

One result of this Regional Plan modification is a change to the boundaries of the Truckee Meadows Service Areas (TMSA) and the Spheres of Influence for the Cities of Reno and Sparks. The modification also creates a new classification called Future Service Area (FSA), as well as outlining policies regarding facility plans for public infrastructure.

This facility plan has been prepared to assist the City of Reno and Washoe County in satisfying the requirements of the ASA. The project has received the majority of its funding from the Regional Water Planning Commission's Regional Water Management Fund.

The ASA contains a deadline of July 1, 2007 for local governments to have completed the preparation of facility plans that will identify the infrastructure required to serve future growth. The term used in the ASA to describe the availability of facilities and financing mechanisms in time to serve new development is "Concurrency".

The facility planning process is being performed in parallel with other work by regional entities that is needed to clarify the assumptions to be used for facility planning, such as: 1) What is the meaning of Concurrency; and 2) What is the growth projection to be used for the facility planning process?

1.1.1 Concurrency

There is a Concurrency Management Working Group that includes staff from the three local governments, service providers, and stakeholders. This group has developed a draft document to define the term "Concurrency", the most recent draft of which is dated January 11, 2007, and titled "Concurrency Management Principles". Section 2 of the Concurrency Management Principles contains the most recent information available to describe the facility plan requirements, the key portion of which is quoted below:

> *"Each facility plan must (i) include provisions regarding funding and timelines, (ii) include an assessment of all responsible alternatives to additional capital investment (such as resource conservation, efficient design, and so forth), (iii) identify which facilities are required to address existing deficiencies, (iv) identify*

which facilities are required for new development, and (v) identify which facilities are required to address both existing deficiencies and new development."

1.1.2 Population / Development Forecast

This facility plan has been prepared to cover both the City of Reno (City) and Washoe County (County) portions of the TMSA. Each jurisdiction has provided its own projection of future growth through the year 2030 planning horizon. At the time of preparation of this plan, the only spatially distributed growth forecast model that was available for use and agreed to by both the City and County is the Regional Transportation Commission's (RTC) Traffic Analysis Zone (TAZ) model, which consists of a Geographic Information System (GIS) shapefile containing TAZ boundaries and a spreadsheet with future growth projected over time by TAZ. The City and County have each updated this model with their own projections for their individual jurisdictional areas. This updated model was used as the basis for this water, wastewater and flood control facility planning effort.

The starting point for analysis contained in the RTC TAZ model was the year 2002. The City projected forward from this point in time to 2030, while the County did its own analysis of existing residential units as of July 2006 and projected forward from 2006 to 2030. Some of the traffic analysis zone polygons cross City / County jurisdictional boundaries, and there is nothing in the model to distribute existing development between the City and the County. In order to prevent the double counting of existing units, it was necessary to determine this split and modify the City and County models to include an estimate of existing residential units by jurisdiction.

This was accomplished through the use of a GIS point shapefile provided by the County that contains the number of existing units (all types) by parcel as of July 2006. The TAZ polygons and jurisdictional boundaries were then overlaid on the point file, enabling the determination of a total number of existing units by TAZ and by jurisdiction. This information was then used to adjust the existing development data to 2006 numbers, which also provides a better basis for comparison of existing water commitments issued by water purveyors and wastewater flows received at the region's wastewater treatment plants.

1.1.3 City of Reno Growth Forecast

The City has provided an update to the RTC TAZ model that spatially distributes this forecast within the Reno TMSA. The model also identifies the projected number of dwelling units and acreage of non-residential development within the City of Reno TMSA/FSA boundary. The model has a projection through 2095 that could be used for a longer term, or 100-year growth projection. The 2030 and 2095 projections provide the best available estimate of what the long term need for facilities might be in order to satisfy the Concurrency requirement of the ASA.

1.1.4 Planning Approach for City of Reno TMSA Facility Plan

The following approach was developed in coordination with City staff to project future water demand and wastewater flows:

1. Use City of Reno TAZ forecast of population and development potential at 2030 for the City portion of the planning area in order to generate water demands, wastewater flows, and conceptual level facility plans for backbone infrastructure.

2. Develop planning level cost estimates for this infrastructure. The estimates of demand and flow, and infrastructure cost have been split between development target zones (Transit Oriented Corridors and Regional Centers) and other areas.

3. Update the City of Reno TAZ forecast to include information from University of Nevada, Reno (UNR)'s Small Business Development Center for approved tentative map units when this number exceeds the number of units indicated for the TAZ zone. (Report: Residential Subdivision Activity – September 2006, Greater Reno-Sparks Area)

4. Update City of Reno TAZ forecast to include information from specific large scale development projects where additional facility planning and more detailed information has been provided by project proponents.

5. Provide comparison of potential water demand against potentially available water resources by planning sub-area at 2030 and 2095.

6. Provide estimates of total wastewater flow generation by planning sub-area at 2030 and 2095 and compare against available or planned future treatment capacities. Identify any wastewater treatment or reclaimed water disposal limitations that are particularly significant in this comparison.

7. Review Truckee Meadows Water Authority (TMWA) Resource Plan for significant information regarding available water resources and forecasting methodology that might affect the above analysis.

8. Rely on the TMWA Water Facility Plan for areas within TMWA's service territory, with the exception of a review of fire flow requirements that might trigger new facilities in high density development target areas such as TODs and Centers.

9. Utilize existing facility planning documents for backbone infrastructure requirements to the extent that they are relevant for the current growth assumptions.

10. Utilize development plans from certain master planned projects where more detailed information is available to supplement City Master Plan or Zoning information. Such information was used in Cold Springs, Winnemucca Ranch (Spring Mountain and Sage), and the portion of Sunny Hills that was in the July 2007 TMSA boundary.

1.1.5 Planning Approach for Washoe County TMSA Facility Plan

Similar to the City of Reno, the County has also provided an update to the RTC TAZ model with respect to projected future dwelling units within the County TMSA at 2030, including

consideration of approved projects. Additional data provided included a GIS shapefile containing polygons with TAZ number and approved planned land uses and a point shapefile containing the number of dwelling units by parcel as of July 2006. This planned land use file was used to summarize planned land use acreages by TAZ in order to: 1) develop non-residential water demands and wastewater flows, and 2) develop an average residential lot size by TAZ for the application of residential water demand factors.

The County data was not updated with UNR approved development information because the County had already included such an analysis in the update to the TAZ model.

1.2 CONCEPTUAL LEVEL ANALYSES

The TMSA Facility Plan consists of several components, including projected improvements for water, wastewater and flood control infrastructure improvements. The following sections describe the level of detail provided in this Facility Plan. It should be noted that the infrastructure sizes and locations are conceptual, and are based upon planning level information. It should be anticipated that the recommended sizes and locations of facilities will be further refined as more detailed information and development plans are available.

1.2.1 Water Facility Plans

For this project, a Conceptual Level Water Facility Plan includes the following:

1. Identification of potentially available water resources to serve future growth based on the Water Resource Baseline in the adopted Regional Water Management Plan, or subsequent updates provided by the RWPC.

2. Documentation of land use assumptions.

3. Documentation of existing demands based on information provided by water purveyors, if available.

4. Projection of build-out water demands based on master planned land uses as provided by the City of Reno. Water demand factors are developed based on data for equivalent land uses from the relevant water purveyor in the region.

5. Identification of pressure zones and potential tank sites.

6. Identification of potential wholesale or in-basin water delivery locations, including qualitative descriptions of potential improvements to existing systems based on available information from the relevant water purveyor in the region.

7. Water transmission capacity needed to serve pressure zones in terms of "equivalent water transmission capacity". Equivalent water transmission capacity is defined as the transmission capacity and pipe size required to serve build-out of a region. More detailed planning of the region in the future will likely result in the design of a more distributed

network of smaller diameter pipes following detailed street/lot layouts that provide the same overall capacity.

8. Planning level facility cost estimates for major backbone infrastructure including transmission piping, tanks, wells, treatment, or pump stations, as appropriate, based on recent construction costs in similar conditions. Cost estimates include a 30% contingency, plus an allowance for engineering, permitting, and construction management.

9. Discussion of relevant policies from the adopted Regional Water Management Plan and their effect on water planning within the facility plan study area.

10. Identification of any known constraints affecting the water facilities in the facility plan study area.

1.2.2 Wastewater Facility Plans

For this project, a Conceptual Level Wastewater Facility Plan includes the following:

1. Documentation of land use assumptions.

2. Documentation of existing wastewater flows based on information provided by wastewater treatment providers, if available.

3. Projection of build-out wastewater flows based on master planned land uses as provided by the City of Reno. Wastewater flow factors are developed based on data for equivalent land uses from either the wastewater treatment provider in the region to be planned, or from the 208 Regional Water Quality Management Plan, as appropriate.

4. Identification of gravity wastewater collection areas and potential need for wastewater pump stations.

5. Identification of wastewater treatment plant locations to provide service (new or existing), and capacity needed, with consideration of information contained in 208 Regional Water Management Plan.

6. Discussion of existing effluent disposal methods and limitations and reference to information contained in the 208 Regional Water Quality Management Plan, as appropriate.

7. Wastewater interceptor capacity needed to serve collection areas in terms of "equivalent wastewater collection capacity". Qualitative descriptions of potential improvements to existing systems will be included, based on available information from the relevant wastewater treatment provider in the region. Equivalent wastewater collection capacity is defined as the interceptor capacity and pipe size required to serve build-out of a region

based on average slopes within the collection area. More detailed planning of the region in the future will likely result in the design of a more distributed network of smaller diameter pipes following detailed street/lot layouts that provide the same overall capacity.

8. Planning level facility cost estimates for major backbone infrastructure including gravity interceptor and force main piping, wastewater pump stations, treatment, and effluent disposal, as appropriate, based on recent construction costs in similar conditions. Land costs are not included in the estimates. Cost estimates include a 30% contingency, plus an allowance for engineering, permitting, and construction management.

9. Discussion of relevant policies from the adopted Regional Water Management Plan and their effect on water planning within the facility plan study area.

10. Identification of any known constraints affecting wastewater facilities in the facility plan study area.

1.2.3 Flood Control Facility Plans

For this project, a Conceptual Level Flood Control Facility Plan includes the following:

1. Review of existing available documents and studies of the area, including previous development analyses and plans, previous master plans, and readily available site specific scientific studies.

2. Documentation of the extent of known flooding and high water levels.

3. Field visits to record and photo document general observations of topography and geomorphology, location of existing natural channels, potential for channel migration, playa conditions and potential behavior, civil infrastructure that may need upgrade, replacement or removal, and assistance with interpretation of project specific and other available mapping. Engineering judgment will be exercised on which areas to visit due to the number of facilities.

4. Conceptual level studies as necessary to quantify hydrologic flow potential, estimate extent of flood plains and order of magnitude for required structures, and recommended locations for conveyance and storage facilities.

5. Calculation methods to be used for analysis may vary include stochastic or deterministic modeling as appropriate commensurate with the level of accuracy needed to answer planning level questions. Facilities may not be analyzed to the point that specific sizes are provided, but when needed, sizes that are provided will be based on simple estimation techniques. Any model produced for analysis of a flood control facility plan will be made available to the City for use as a planning tool for future development.

6. Coordination with the Truckee River Flood Project planning effort. Flood facility planning will incorporate elements from the "Local Sponsor Plan" alternative and a discussion on the Army Corps of Engineer's alternative when available.

7. A discussion of flood management strategy and potential alternatives for each area.

8. Planning level facility cost estimates for major backbone infrastructure including channel stabilization, structural channel improvements, flood storage and recharge infrastructure, and other major structural upgrades such as culverts and bridges, as appropriate, based on recent construction costs in similar conditions. Cost estimates include a 30% contingency, plus an allowance for engineering, permitting, and construction management. Facility sites may be identified to the extent of the required amount of land area, but not to the extent of individual parcels. Land costs are not included in the estimates.

1.2.4 Flood Control Planning Philosophies

Generally, flood control and stormwater master planning may be viewed from two distinct points of view, existing development and proposed development. The first (existing development) or what may be deemed as historical flood control master planning, is necessary for problems associated with existing urban infrastructure. When past construction of civil infrastructure occurs without utilizing appropriate drainage solutions, the resulting development typically has numerous flooding/drainage problems. As engineering knowledge in the area of hydrology and hydraulics has improved over time, much of the previously constructed drainage facilities have been shown to be lacking in required conveyance capacity, a stable geomorphic process, and water quality protection.

In addition, consideration of habitat issues during past development was ignored and again it is found that much of the existing infrastructure does not meet the current standard of care. Master plans such as the *Washoe County Flood Control Master Plan*, KJC, 1991, and the Draft *Washoe County Regional Flood Control Master Plan*, WRC, 2005 are examples of this type of planning. These master plans address known flooding problems associated with existing urban development by proposing solutions and the associated project costs. The projects proposed in these plans are intended to be conceptual in nature for budgetary purposes. This planning document updates the most recent regional flood control master plan to reflect problems and solutions for the most recent flooding in 2005.

A second viewpoint of flood control planning is associated with new development. One trend in new land development is to plan new facilities around the existing natural features of the land; including topography (take advantage of land elevation differentials), flood plans, sensitive environmental areas and habitats, etc. Since new drainage facilities are specific to new development it is not typical to plan for those facilities until specific goals for development are defined. Under this scenario, watershed specific plans are developed in conjunction with new developments and specific flood control/drainage features are identified in those watershed

specific plans that meet the needs of the proposed development. New watershed specific master plans fitting this type of planning include named facility plans, such as *North Valleys Flood Control Hydrologic Analysis and Mitigation Options, Volumes 1 and 2,* by Quad Knopf, and *Somersett Development Storm Drainage Master Plan,* by Manhardt which were reviewed for this update.

Finally with respect to new development, there are reasons to develop what may be thought of as guidance planning tools for flood control and drainage for undeveloped areas. Historically, outlying properties have developed in some instances in a haphazard fashion with little or no thought of the ultimate configuration of drainage and flood control facilities. In order to address this problem, there needs to be a level of planning that identifies land features that are in the best interest of the public to protect. Examples would include preservation of natural flood plains to ensure the natural hydrologic and geomorphological function of the flood plain can continue and the natural riparian habitat flourish. Another example might be the preservation of natural stormwater infiltration to continue or even enhance groundwater recharge.

This master plan update includes mapping of natural drainageways to an approximate 100-year frequency storm event. Natural floodplain areas are mapped as well as areas where geomorphic processes are prominent and should be avoided by new structures. These areas are available on a GIS overlay and are easily applied by staff to areas of proposed development as initial guidance for protection of flood control corridors. The delineated floodplain areas are not intended for strict enforcement of no development impact, rather as a point of departure for working with each new permit request. The development code for the City of Reno currently provides for preservation of natural drainageways; but it allows for development to occur accordingly. The intent of the delineation of floodplains is to preserve this procedure.

1.3 HOW TO USE THIS REPORT

Water, wastewater and flood control infrastructure improvements are presented in this TMSA Facility Plan. Reno's portion of the TMSA is subdivided into several planning areas, including Spring Mountain, Sage, Cold Springs, Stead and Lemmon Valley, Truckee Meadows, South Truckee Meadows and Bedell Flat. Section 10, which covers the South Truckee Meadows portion of the TMSA, is incomplete as of this date. Washoe County provides the water and wastewater service to the majority of this area. Washoe County's portion of the TMSA Facility Plan, which includes the water, wastewater and flood control infrastructure improvements for the South Truckee Meadows area of Reno, is scheduled to be complete by September 2007.

Figures 1-1 and 1-2 show the different Reno planning areas, and which sections of the Facility Plan detailed information can be found regarding the recommended water, wastewater and flood control improvements. Each planning area and its associated figures, represents a portion of the overall TMSA, which may include a portion of Reno's TMSA, a portion of Washoe County's TMSA, or both. As development occurs within the TMSA, more detailed information and project specific plans will be generated. With this additional information, the level of detail of the facility plans will increase based on site specific conditions.

The facility recommendations presented herein are intended to provide the foundation for subsequent detailed planning and design. The City of Reno, Washoe County and the water, wastewater and flood control service providers having jurisdiction are the final authority regarding necessary infrastructure improvements. Preparation of updated facility plans will be necessary based on current information and the specific needs of the development at that time. These future planning efforts will further refine and define the exact facility requirements presented in this plan.

In general, it is anticipated that future planning and design will substantially conform to the TMSA Facility Plan. However, it is reasonable to foresee recommended changes to the TMSA Facility Plan as more detailed information is developed. When considering whether or not a refinement of the recommended facilities conforms with the TMSA Facility Plan and ultimately the Regional Water Management Plan and Truckee Meadows Regional Plan, the basic question to be answered is, "Does the design intent of the proposed facility (capacity, service function, construction phasing of major improvements, general location, design criteria, significant impact to other water related issues, etc.) substantially conform with the Regional Water Management Plan and the design intent of the applicable water, wastewater and flood control facility plans presented in this Plan?"

The Regional Water Management Plan includes Policy 4.1.a: Facility Plans and Infrastructure Studies, for determining whether a proposed revision to the TMSA Facility Plan is of such a kind or size that affects the working of the Regional Water Plan, and is in conformance with the Regional Water Plan. The Regional Water Planning Commission will ultimately determine whether a proposed revision to the TMSA Facility Plan requires a review for conformance with the Regional Water plan, pursuant to Policy 4.1.a below.

Policy 4.1.a: Facility Plans and Infrastructure Studies – Conformance with Regional Water Plan

Pursuant to NRS 540A.230, facility plans and infrastructure studies of such a kind or size that affect the working of the Regional Water Plan, including water supply and storage, wastewater collection and treatment, stormwater, and flood control shall be reviewed by the RWPC for conformance with the Regional Water Plan.

Criteria to implement policy:

The RWPC shall review facility plans and infrastructure studies of such a kind or size that affect the working of the Regional Water Plan to make a determination that the facility or study conforms to the Policies and Criteria included in the Regional Water Plan;

Proposed facilities and infrastructure shall:

- be consistent or coordinate with existing facility plans or master plans, or demonstrate how they will address any differences with or changes to existing facility plans or master plans, and

- coordinate to avoid unnecessary duplication of facilities

- An evaluation may be provided of the project's impacts on other water-related issues (e.g. a proposed water project must indicate the potential impacts it would have on wastewater treatment).

- Any plan or study that is funded in whole or in part by the Regional Water Management Fund shall be subject to conformance review.

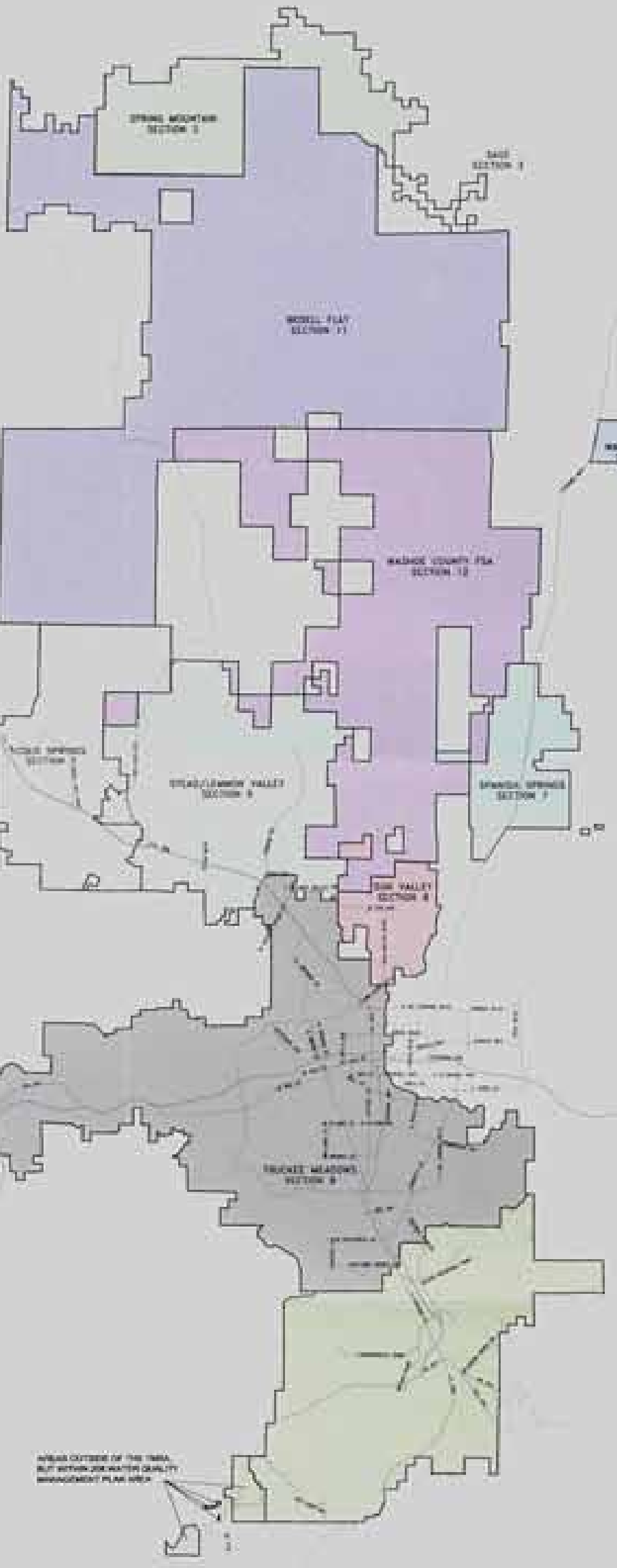
Discussion: The RWPC and local governments provide ongoing planning for the community's water, wastewater, stormwater and flood control needs. Identification and review of potential impacts to existing or planned infrastructure, and needs for new or improved facilities, should provide for integrated planning and management of the region's water resources and cost-effective infrastructure development and improvements.

Facilities are designed and constructed by water purveyors, wastewater treatment providers, and local governments as part of their respective Capital Improvement Programs (CIPs). CIPs are updated annually, at a minimum. When entities update and approve their CIPs, the RWPC shall review them and recommend that pertinent facilities be found in conformance with the Regional Water Plan pursuant to NRS 540A, Washoe County Code (WCC) this policy, and RWPC administrative policies and procedures.

As the RWPC, local governments, wastewater treatment providers, and water purveyors update their respective facility and resource plans, they analyze alternatives for financing and funding proposed facilities, sources or other requirements, and the effects of the funding alternatives on other facilities included in the Regional Water Plan. These plans are then presented to the RWPC for either conformance review or informational purposes, as appropriate under the NRS 540A, this policy, and RWPC administrative policies and procedures. Presentation of these plans to the RWPC provides Commissioners the opportunity to raise questions regarding linkages and comprehensive regional planning for water resources, with the result that overall resource issues can be addressed or additional work can be undertaken, as needed. Lists of such plans that are relevant to regional resource planning are contained at the end of various chapters, and again at the end of this plan. These plans also contain detailed alternatives for financing and funding the respective facilities or sources and should be consulted for such detail.

Facility plans reviewed and found in conformance with the Regional Water Plan are added to a list of projects maintained by the RWPC staff (See Appendix J). Pursuant to the RWPC administrative policies and procedures, the list is submitted as appropriate to the Board of County Commissioners for approval and is included in periodic updates of the Regional Water Plan.

The RWPC recognizes that not all facilities required to implement the Regional Water Plan are listed due to unforeseeable circumstances and/or the frequent necessity to alter facilities once final design and construction proceed. Consequently the RWPC will review facilities that are not in the current edition of the Regional Water Plan if such facilities are of such a kind or size that affect the working of the Regional Water Plan.



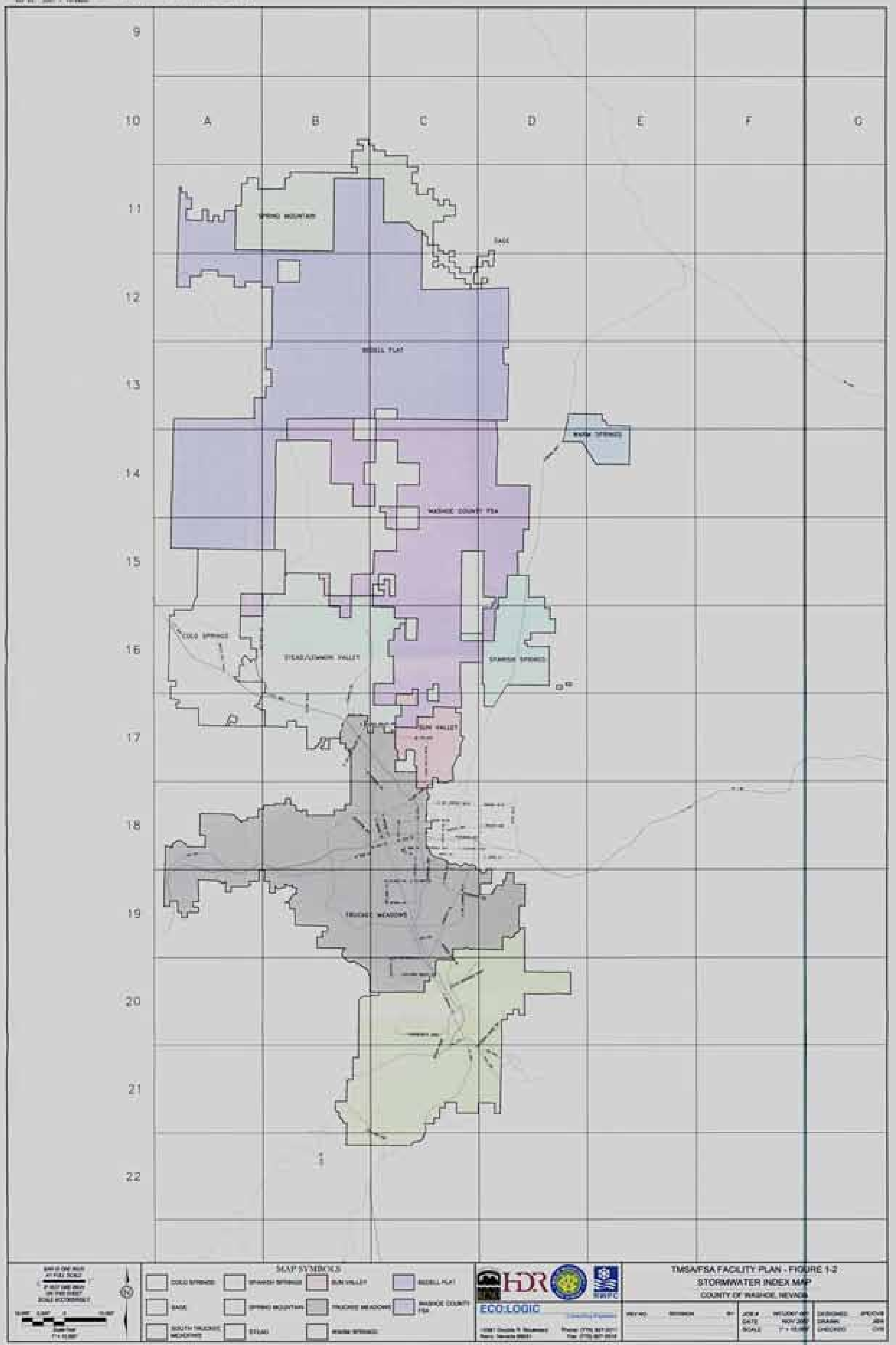
NOTE: FSA AND TMSA BOUNDARIES CURRENT AS OF FEBRUARY AND MAY 2007

MAP SYMBOLS

COLD SPRINGS · SPANISH SPRINGS · SUN VALLEY · MOGUL FLAT
SAGE · SPRING MOUNTAIN · TRUCKEE MEADOWS · WASHOE COUNTY FSA
SOUTH TRUCKEE MEADOWS · ROAD · NORTH SPARKS

HDR · ECO:LOGIC

TMSA/FSA FACILITY PLAN - FIGURE 1-1
TMSA/FSA INDEX MAP
COUNTY OF WASHOE, NEVADA


A
B
C
D
E
F
G
9
10
11
12
13
14
15
16
17
18
19
20
21
22
SPRING MOUNTAIN
BASE
BIDWELL FLAT
WASHOE COUNTY TSA
COLD SPRINGS
STEAD/LEMMON VALLEY
SPANISH SPRINGS
SUN VALLEY
TRUCKEE MEADOWS
MAP SYMBOLS
ECO:LOGIC
HDR
TMSA/FSA FACILITY PLAN - FIGURE 1-2
STORMWATER INDEX MAP
COUNTY OF WASHOE, NEVADA

Section 2
Spring Mountain

Table of Contents

List of Tables

List of Figures – Included at End of Section

Section 2 - Spring Mountain TMSA

2.1 STUDY AREA DESCRIPTION AND DEVELOPMENT CONSTRAINTS

Winnemucca Ranch (AKA Spring Mountain) planned development includes approximately 6,120 acres of property in the Warm Springs and Dry Valley hydrographic basins. The property was added to the Truckee Meadows Service Areas (TMSA) in 2006. The Spring Mountain TMSA is shown on Figure 2-1 (see figures at end of section) and is within the jurisdiction of the City of Reno.

Spring Mountain will be a master planned community with residential, retail, office, civic and recreational land uses. Approximately half of the project acreage is designated for park and open space uses with an extensive community trail system. Water conservation, reclaimed water and low impact development (LID) techniques will be utilized in the project. Spring Mountain is designed to offer healthy living, unprecedented outdoor recreational opportunities, quality design and a small town atmosphere blended with big-city conveniences.

Development statistics are estimated as follows:

- ±23,200 population at buildout;
- ±9,500 standard residential dwelling units;
- ±2,500 age-qualified residential dwelling units;
- ±600,000 square feet of retail floor area;
- ±800,000 square feet of professional office floor area;
- ±600,000 square feet of light industry/office flex floor area.

Areas that are potentially limited or constrained for future development include areas with slopes greater than thirty percent, floodplains, lakes, springs, and drainage ways. These areas are shown on Figure 2-2. Surface runoff within the Dry Creek hydrobasin flows to Dry Creek. Surface runoff within the Warm Springs hydrobasin flows to an unnamed drainage way.

TAZ data was not used for Spring Mountain planning. More detailed land use information provided by the developer's representative was used. For planning purposes, the proposed development was assumed to be built out by 2030.

2.2 CONCLUSIONS AND SUMMARY RECOMMENDATIONS

The water supply for Spring Mountain can potentially be derived from several sources, including both on-site resources and imported resources. Additional study of the long term reliability and yield of the on-site spring resources and the Dry Valley and Black Canyon resources is needed to assess their reliability and municipal water supply yield. Use of reclaimed water and/or imported water, in addition to the on-site resources, will likely be required to help meet projected water

demands. An estimated 1,115-1,674 AF of new residential irrigation demand may be served by reclaimed water.

The water distribution facility recommendations presented in this plan will need to be refined when additional water supply and capacity information for the on-site resources is available. Furthermore, the tanks were located to serve the entire elevation range of the property, in many instances on property administered by the BLM. The tanks may be able to be relocated to on-site locations once development plans are finalized.

A secondary treatment facility is proposed to be constructed for the eastern area, sized for the projected capacity of up to 2.0 MGD. The capacity of this water reclamation facility will be limited to the extent that sufficient infiltration areas can be developed, primarily in the meadow and open space areas, to dispose of the effluent during the non-irrigation season.

A second tertiary reclamation facility is proposed to be constructed in the central area. This plant would serve the growth in both the Central and Western areas, and would also serve as a "polishing plant" for excess effluent generated from the Eastern area. Reclaimed water would be used to the extent practical in the Central and Western areas, and disposed of within areas suitable for infiltration. Excess effluent may be discharged into the Dry Creek drainage.

A summary of the estimated water and wastewater costs for the proposed infrastructure is listed in Table 2.1.

Table 2.1 - Infrastructure Costs (a)

Facility Description	Total Cost ($M)
Water (b)	$64.4
Wastewater	$157.8

(a) 20 Cities ENRCCI = 7,942 May 2007

(b) Imported water and on-site water supply and treatment costs are unknown at this time

2.3 DESCRIPTION OF SERVICE PROVIDERS

There are no current service providers for water, wastewater and stormwater. New systems will be created to provide service for the Spring Mountain TMSA. Stormwater management and flood control are discussed in Section 14.

2.4 STATUS OF INFRASTRUCTURE PLANNING

The Spring Mountain TMSA is a new area of development and little facility planning has been done. The most recent facility plans for water and wastewater that have potential applicability to Spring Mountain are listed in Table 2.2.

Table 2.2 - Recent Facility Plans

Plan Name	Date	Description
Water		
Fish Springs Ranch Facility Plan Reference: ECO:LOGIC	Sept. 2005	Construction of the Fish Springs Water Supply Project to meet future water demands for the Stead, Silver Lake and Lemmon Valley area (North Valleys) within the Truckee Meadows Services Area. The project consists of a new electrical substation off of the Alturas Transmission Line, groundwater production wells, a pump station, a transmission pipeline and terminal water storage tank to convey water from Fish Springs Ranch to the North Valleys. The facilities will be sized to supply 8,000 AF of water per year (AFA).
Wastewater		
Draft Washoe County 208 Water Quality Plan Version 3 Reference: Truckee Meadows Regional Planning Agency	January 2007	Per section 208 of the Clean Water Act this report provides the planning and management of all sources of water pollution and defines the parameters for area-wide wastewater management plans.

2.5 WATER

The projected water demands and required infrastructure are developed in this section.

2.5.1 Assumptions, Planning Criteria and Methodology

Water demand factors used to estimate potential demand are based on TMWA Rule 7 demand factors. It is assumed that this new development will dedicate water resources in accordance with TMWA water rights dedication policies.

In the case of non-residential development, the demand factor used represents an average number for planning purposes only. When TMWA or Washoe County receives a request for water service on a non-residential property, the actual water rights dedication requirement would be based on a project-specific analysis of the number of fixture units and the specific landscaping plan. This level of detail is not available for this analysis.

2.5.2 Existing and Future Water Demand

There is no existing water use beyond the current ranching operation.

Based on the land use analysis, projected water demands for Spring Mountain are listed in Table 2.3. The irrigation demand component is projected assuming that 6,000 gallons per month of water is consumed within a typical house, and the remainder is used for irrigation. The irrigation demand range is based on front yard only irrigation, or the combined front and back yard irrigation. Irrigation demand was also included for irrigating schools and parks assuming 3.5 AFA. Mixed use includes a combination of residential and commercial land uses. Irrigation

demand for the mixed use areas was accounted for as part of the residential demand. Other than the mixed use areas, no other commercial land uses are projected; therefore, no other commercial recycled water irrigation demands were projected. The total demands include both indoor and outdoor water use.

Table 2.3 - Spring Mountain Water Demands

Area	2030 Irrigation Demand Range (AFA) (b)	2030 Total Demands Including Irrigation (AFA) (c)
East	476-727	2,468
Central	279-472	1,636
West	361-475	770
Total	1,116-1,674	4,874

(a) Based on land use analysis.

(b) Based on residential, parks, and school irrigation.

(c) Based on 12,000 dwelling units, 206 acres of mixed residential and commercial use, and 10 acres of commercial use.

2.5.3 Water Resources

The water supply for Spring Mountain can potentially be derived from several sources, including on-site resources and imported resources. The project proponents acquired the rights to 300 AF of groundwater within the Dry Valley Basin. Washoe County also owns the water rights that have been used to irrigate the agricultural lands on the Spring Mountain project site. The long term reliability and yield of the spring resources are currently under investigation by Washoe County. Additional study of the Dry Valley and Black Canyon resources is needed to assess their reliability and municipal water supply yield. For purposes of this analysis, it has been assumed that these water rights can be developed and reliably support 1,700 to 2,200 AF of municipal demand.

Additional water resources potentially available to the area include water rights in the Smoke Creek Basin to the north of Spring Mountain, and the Fish Springs and Intermountain water projects. The developers of Spring Mountain own and/or control water rights in Smoke Creek Basin. More detailed information on these potential water resources can be found in Section 13. The Fish Springs Water Supply Project also crosses the western portion of the project area, and two taps have been provided in the pipeline for future use. The use of Fish Springs water resources in the Spring Mountain area would, if used, require approval by the State Engineer to change to the Place of Use for the water rights. The 300 AF in the Dry Valley basin was acquired from the Intermountain project.

Substantial amounts of reclaimed water could be available from the future wastewater reclamation facilities. This high quality reclaimed water would be suitable for landscape irrigation, including residential areas, and could be used to extend the available potable water supplies. Current landscaping practices account for approximately half of the total water demand

for a typical residential unit. Water demands could be further reduced by implementing water conserving landscaping practices and/or xeriscaping.

Existing and potentially available water resources to serve the Spring Mountain area are presented in Table 2.4.

Table 2.4 - Potentially Available Water Resources

Source Description	Supply (AFA)
On-site Resources	
Springs, Dry Valley Creek, Black Canyon, Dry Valley groundwater	1,700 - 2,200 (a)
Reclaimed Water	(b)
Total	1,700 – 2,200
Potential Imported Resources	
Fish Springs Water Supply Project	8,000 (c)
Intermountain Water Supply Project	2,000 (c)
Lower Smoke Creek	12,000 - 14,000 (d)
Total	22,000 – 24,000

(a) The long term reliability and yield of the resources are currently under investigation. Additional study is ongoing to assess their reliability and municipal water supply yield.

(b) Reclaimed water may be used to supplement water resources for non-potable uses.

(c) Water resources potentially available to Stead, Lemmon Valley, Cold Springs and Winnemucca Ranch.

(d) Refer to Section 13 for additional information on this future potential resource. The long term reliability and yield of the resource is currently under investigation. Additional study is ongoing to assess the reliability and municipal water supply yield.

A comparison of the available resources in the water demand for 2030 is shown in Table 2.5. On-site resources and reclaimed water will satisfy much of the projected demand. Imported water, including either the Fish Springs or Intermountain Water Supply, or water from Smoke Creek, will likely be required to meet a portion of the 2030 projected demand.

Table 2.5 - Water Demand and Resources Comparison

Condition	Potential On-Site Supply (AFA)	Other Potential Supply (AFA)	Spring Mountain Demand (AFA)
2030	1,700 – 2,200	10,000 – 19,000	4,874

2.5.4 Planned Facilities

Backbone distribution system facilities were developed to supply demands for the proposed Spring Mountain development. These facilities appear in Figure 2-3.

On-site water supplies for the Spring Mountain development include groundwater, springs and surface water. The long term reliability and yield of these resources is unclear, and further study is needed to assess their reliability and municipal water supply yield. As such, the potential water supply capacity from these water resources is unknown. For planning purposes, it is assumed that the Spring Mountain development will receive some of its supply from the Fish Springs transmission main, or an alternative importation project.

The Fish Springs transmission main crosses the western portion of Spring Mountain, as shown in Figure 2-3. For sizing transmission mains, a maximum day demand of 9,040 gpm is assumed to be supported by this water supply connection. The water distribution facility recommendations presented in this plan will need to be re-evaluated when additional water supply and capacity information for the on-site resources is available.

From this point of connection, water flows through a 30-inch backbone main east to a storage tank near the Central area. An additional 450,000 gallons is included in this tank volume for operational storage. The proposed pad elevation of 5515 feet is approximate and is based on the hydraulic grade line of the Fish Springs water supply. The actual pad elevation will require a more detailed analysis prior to a final design.

Geographically, the Central and East areas are separated by a pass, with an elevation of 5475 feet. A booster pump station may be required to maintain sufficient distribution system pressures at this high point. The West area is supplied from a 16-inch transmission main that branches from the 30-inch main. No pump stations are required for this area. The recommended water facility infrastructure for the West, Central and East Spring Mountain areas is summarized in Table 2.6.

Table 2.6 - Water Facility Totals

	Total Transmission Main Length (Linear Feet)	Total number of Pump Stations	Number of Tanks / Total Storage Volume (MG)
West Spring Mountain	41,760	0	2 / 1.85
Central Spring Mountain	60,650	2	3 / 3.4
East Spring Mountain	60,150	4	4 / 4.25

Service elevation ranges for the proposed West, Central and East areas is shown in Table 2.7. The tanks were located to serve this entire elevation range of the property, in many instances on property administered by the BLM. The tanks may be relocated to on-site locations once development plans are finalized. Pressure zones for Spring Mountain are presented in Figure 2-3.

Table 2.7 – Service Elevation Ranges

Area	Service Elevation Range (Feet)
West	4,510 – 4,940
Central	5,150 – 5,800
East	4,800 – 5,820

2.5.5 Water Facility Cost Estimates

The recommended water infrastructure costs are summarized in Table 2.8, and are listed in more detail in Appendix B. Costs of the proposed transmission mains, pump stations and storage tanks are included. Individual pressure reducing stations are not included in the cost estimates, as these facilities are generally considered development specific, on-site improvements. In addition, the cost of purchasing water rights is not included.

Table 2.8 - Water Infrastructure Costs (a)

	Facility Cost ($ M)			
Facility	Total	West Area	Central Area	East Area
Supply/Treatment (b)	Insufficient Data			
Transmission	$51.1	$6.6	$15.3	$29.2
Storage	$13.3	$2.6	$4.4	$6.3
Total	$64.4	$9.2	$19.7	$35.5

(a) 20 Cities ENRCCI = 7,942 May 2007

(b) Imported water and on-site water supply and treatment costs are unknown at this time.

2.5.6 Water Planning Limitations

Specific limitations for the water planning in the Spring Mountain area are listed below.

- The potential water supply capacity from the on-site resources is under investigation and anticipated to be 1,700 to 2,200 AFA. The water distribution system facility recommendations will need to be refined when the water supply and capacity information for the on-site resources are more clearly defined.

- Single backbone mains were used to supply water throughout the TMSA. As development occurs, it is likely that an equivalent transmission capacity will be conveyed by a distribution network rather than by a single backbone main.

- Due to numerous pressure zones in the Spring Mountain development, transmission main pressures are proposed to exceed 100 psi in order to reduce facility costs and simplify system operation. In areas where transmission main pressures exceed 100 psi, connections from transmission mains to distribution system mains will require pressure

regulating valves or residences must be equipped with individual pressure regulating valves.

- The tanks were located to serve the entire elevation range of the property, in many instances on property administered by the BLM. The tanks may be able to be relocated to on-site locations once development plans are finalized.

2.6 WASTEWATER

The projected wastewater flows and required infrastructure for conveyance, treatment, and disposal are developed in this section.

2.6.1 Assumptions, Planning Criteria and Methodology

The wastewater flow factor for the Spring Mountain area was based on the 2007 Washoe County 208 Water Quality Management Plan. The flow factor for new development ranges from a low of 110 gallons per capita per day (gpcd) to 130 gpcd. An average of 120 gpcd was used for flow projection. All other wastewater planning assumptions are as stated in Appendix A.

2.6.2 Projected Wastewater Flow

Using the land use data, flow projections for Spring Mountain were developed. The wastewater treatment capacity projection for the three areas is presented in Table 2.9.

Table 2.9 - Spring Mountain Wastewater Projections

Area	2030 Flows (MGD) (a, b)
East	2.0
Central	1.1
West	0.4
Total	3.5

(a) Based on land use analysis.

(b) Based on 12,000 dwelling units, 206 acres of mixed residential and commercial use, and 10 acres of commercial use.

The 208 Plan had a projected 2030 wastewater flow range of 1.7 MGD to 2.4 MGD for Winnemucca Ranch. The 2030 total projected wastewater flow for the Spring Mountain TMSA is 3.5 MGD.

2.6.3 Water Reclamation and Disposal

Water reclamation would beneficially reuse a large portion of the effluent generated by Spring Mountain, and would provide a valuable water resource to help meet non-potable demands. Initial plans are to use reclaimed water to irrigate large portions of the open spaces and meadows throughout the community. The available acreage and amount of water that could be disposed of in these open spaces for each area is listed in Table 2.10.

Table 2.10 – Effluent Disposal

Area	Irrigated Acreage (a)	Potential Reclaimed Water Disposal (AFA) (b)
East	102	355
Central	63	221
West	0	0
Total	165	576

(a) Includes acreage of meadows and open spaces that could be irrigated.

(b) Based on 3.5 AFA per acre.

A review of the project site was conducted to evaluate the feasibility of seasonal storage for the reclaimed water. A good potential reservoir / disposal site exists at the Newcomb Lake playa, which is currently under the ownership of the project proponents. However, this site is several miles away from the development area, and would probably be better suited as an effluent land disposal area. Based on the surrounding topography and proposed land use plan for Spring Mountain, there do not appear to be suitable reservoir sites with sufficient capacity to store the anticipated quantity of effluent that will be generated by the project. Therefore, during the non-irrigation season, the proposed disposal option would be to infiltration areas, with discharge of the excess effluent into Dry Creek drainage. This is discussed further in the following section.

2.6.4 Proposed Wastewater Facilities

Based on the 2030 projected wastewater flows, recommendations for wastewater collection and treatment facilities are developed and shown on Figure 2-4. Wastewater reclamation facilities were planned for each of the three areas. Backbone reclaimed water facilities and disposal facilities are presented on Figure 2-5. More detailed sizing of the collection and reclaimed water facilities will be required as phasing plans and land uses are finalized.

The water reclamation facility construction would be staged to treat the increasing flows as project phases are constructed. Initially, a relatively low technology secondary treatment plant is proposed to be constructed for the Eastern area, sized for the projected capacity of up to 2.0 MGD. An enclosed headworks and odor control facility would be provided. Initially, wastewater would be treated and disposed of in areas with limited public access, such as the meadows and open spaces. As flow increases, the plant would be upgraded to a tertiary reclamation facility, where the filtered and disinfected effluent would also be used for unrestricted irrigation uses such as landscape medians, residential development and other open spaces. The capacity of this water reclamation facility will be limited to the extent that sufficient infiltration areas can be developed, primarily in the meadow and open space areas, to dispose of the effluent during the non-irrigation season. Determination of this infiltration disposal capacity is beyond the scope of this planning effort.

When the disposal capacity of the eastern water reclamation facility is reached, or when development occurs in the Central area, a second tertiary reclamation facility would be

constructed. This plant would serve the growth in the Central and Western areas, and would also serve as a "polishing plant" for excess effluent generated from the Eastern area. Reclaimed water would be used to the extent practical in the Central and Western areas, and disposed of within areas suitable for infiltration. Excess effluent may be discharged into Dry Creek drainage. A pipeline would be constructed between the eastern plant and the central plant so effluent may be disposed of in Dry Creek during the non-irrigation season from all areas.

Table 2.11 - Summary of Wastewater Infrastructure

Interceptors	67,800 feet
Force Mains	41,700 feet
Reclaimed/Disposal Pipe	136,100 feet
Wastewater Lift Stations	2 stations
Reclaimed Water Pump Stations	2 stations
2030 Capacity of East Reclamation facility	2 MGD
2030 Capacity of Central Reclamation facility (a)	1.5 MGD

(a) Central water reclamation facility may have supplemental capacity to treat excess flows from the east water reclamation facility.

2.6.5 Wastewater Facility Cost Estimates

The proposed wastewater facilities and estimated costs are summarized in Table 2.12, and are listed in more detail in Appendix C.

Table 2.12 - Wastewater Infrastructure Costs

Facility Description	Total Cost ($M)
Collection System	$19.9
Treatment	$115.3
Disposal/Reclaimed Water	$22.6
Total	$157.8

(a) 20 Cities ENRCCI = 7,942 May 2007

2.6.6 Wastewater Management Options

The potential exists for a coordinated wastewater treatment and disposal strategy with the planned Sage development, located south of Spring Mountain. The water and wastewater planning criteria for the Sage area is more fully described in Section 3. Because the developments are independent of one another, and the timing of one project may not be appropriate for the other, independent water and wastewater facility plans were developed for each area. However, the proposed land disposal option for Sage may also be a potentially viable option for Spring Mountain. This option, as well as use of the Newcomb Lake playa, are worthy of further consideration once more definitive development plans are available for both proposed projects.

2.6.7 Wastewater Planning Limitations

Specific limitations of the wastewater planning in the Spring Mountain area are listed below.

- Wastewater flow projections are conservative because a mid-range wastewater flow factor is used. The TMWA Rule 7 water demand projections are representative of actual demands. Therefore, the percentage of wastewater flow compared to the total water demand is more than the "typical" fifty percent reported in previous planning studies.

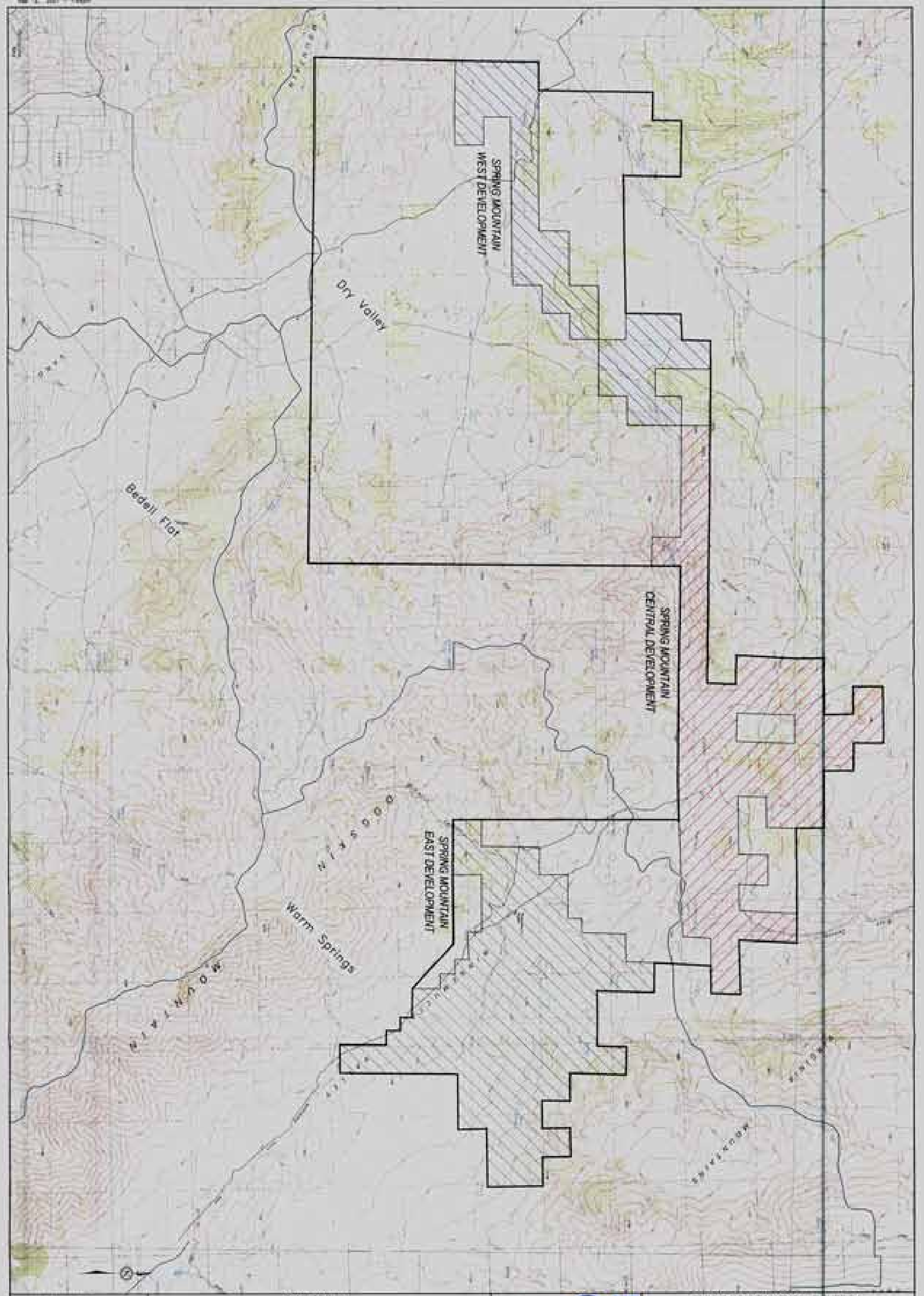
- More detailed sizing of the collection and reclaimed water facilities will be required as phasing plans and land uses are finalized.

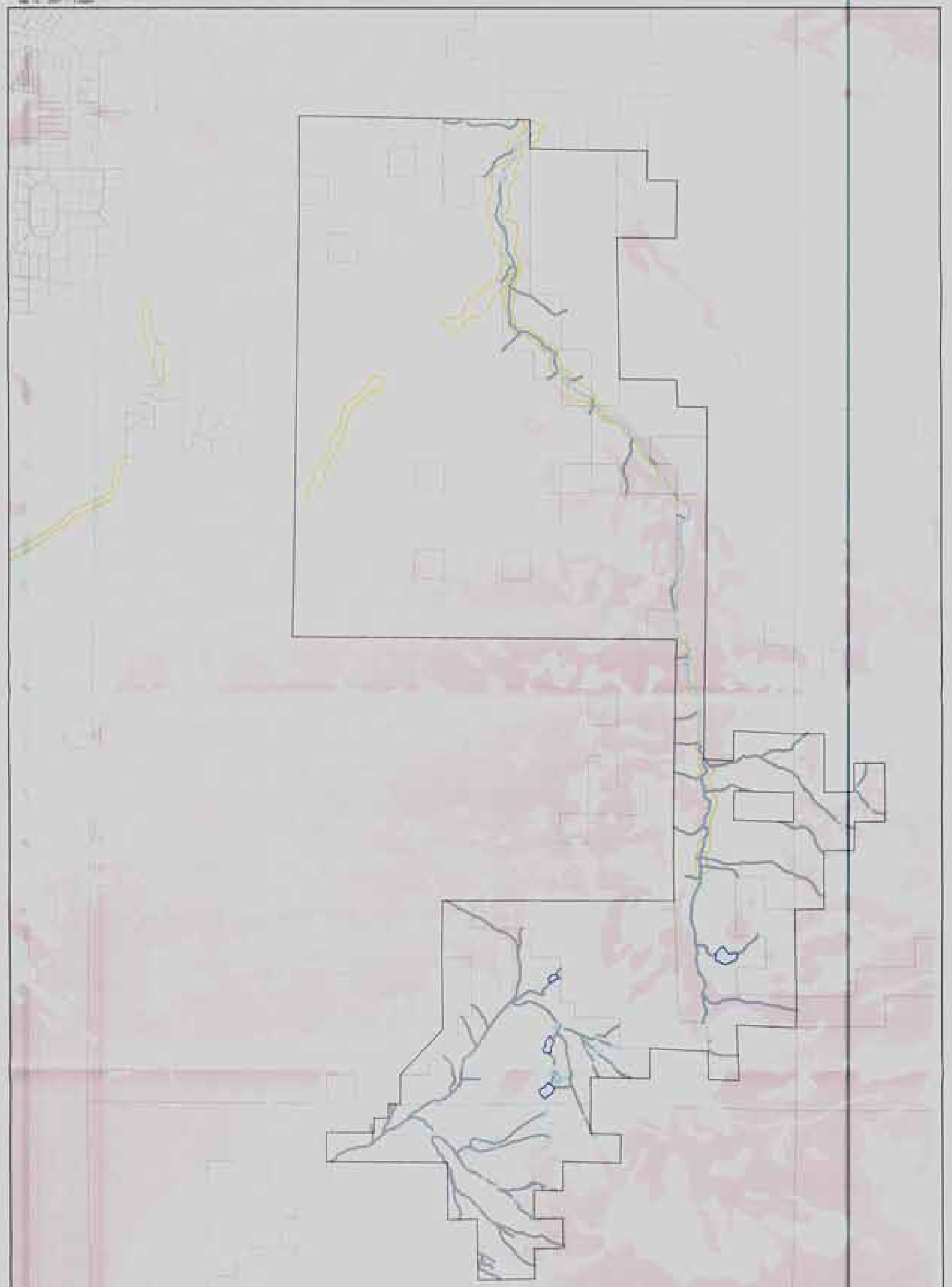
- Effluent disposal planning for the Spring Mountain TMSA is conceptual. Additional evaluation will be required to determine the final effluent treatment and disposal strategy.

2.7 POLICY RECOMMENDATIONS (INCLUSIVE OF WATER, WASTEWATER)

Potentially available water resources have been identified to serve the projected 2030 demands in the Spring Mountain TMSA. However, a combination of imported and on-site water resources may be needed to satisfy the projected buildout demands. Expanded use of reclaimed water, such as front and/or back yard residential landscape watering, should be evaluated on a regional level and implemented where reasonable to extend available water supplies and help fulfill the development potential of the Spring Mountain TMSA.

Current landscaping practices account for approximately half of the total water demand for a typical residential unit. Water demands could be reduced by implementing water conserving landscaping practices and/or xeriscaping. However, water conserving landscape practices should be balanced with the need for disposal of reclaimed water.


SPRING MOUNTAIN WEST DEVELOPMENT
SPRING MOUNTAIN CENTRAL DEVELOPMENT
SPRING MOUNTAIN EAST DEVELOPMENT
Dry Valley
Bedell Flat
Warm Springs
MOUNTAINS
MAP SYMBOLS
CITY OF RENO TMSA
HYDROGRAPHIC BOUNDARY
ECO:LOGIC
SPRING MOUNTAIN TMSA - FIGURE 2-1
STUDY AREA
COUNTY OF WASHOE, NEVADA



MAP SYMBOLS

SLOPE: 30% OR GREATER

WATERSHEDS

FLOODPLAIN

MOUNTAIN BELT

CITY OF RENO TMSA

SPRING

MAJOR DRAINAGEWAY

STREAM

ECO:LOGIC

SPRING MOUNTAIN TMSA - FEGURE 2-2
AREA CONSTRAINTS
COUNTY OF WASHOE, NEVADA

NOTES

[1] PIPE SIZING DOES NOT REFLECT POTENTIAL SUPPLY CAPACITY FROM ON-SITE RESOURCES

[2] TANKS SITED TO SERVE ENTIRE ELEVATION RANGE OF PROPERTY. SOME TANKS MAY BE ABLE TO BE RELOCATED ON-SITE, WHEN DEVELOPMENT PLAN FINALIZED.

[3] INFRASTRUCTURE LOCATIONS AND SIZES ARE CONCEPTUAL AND WILL BE REFINED WHEN MORE DETAILED FACILITY PLANS ARE DEVELOPED.

[4] PRESSURE ZONES APPEAR MATCHED.

TO LEMMON VALLEY

PROPOSED PIPE DIAMETER (IN)

10
12
14
16
18
20
24
30

FACILITY LEGEND

PROPOSED TANK

PROPOSED PUMP STATION

ALTERNATIVE SUPPLY MAIN (30" DIA.)

MAP SYMBOLS

EXISTING MOUNTAIN CENTRAL ZONE BOUNDARY

EXISTING MOUNTAIN WEST ZONE BOUNDARY

EXISTING VALLEY ZONE BOUNDARY

T 9
0.6 MG
4760' PAD

PRIMARY INTERTIE LOCATION

POTENTIAL ALTERNATIVE INTERTIE LOCATION

T 8
1.25 MG
5240' PAD

T 7
1.75 MG
5515' PAD

PS 1
571 GPM

T 6
0.9 MG
5530' PAD

T 5
0.75 MG
5740' PAD

PS 2
665 GPM

T 4
1.5 MG
5575' PAD

PS 3
2485 GPM

PS 4
100 GPM

T 3
0.74 MG
5920' PAD

PS 5
25 GPM

T 2
1.5 MG
5370' PAD

PS 6
4320 GPM

T 1
0.5 MG
5480' PAD

FROM FISH SPRINGS

FISH SPRINGS TRANSMISSION MAIN OR EQUIVALENT SUPPLY

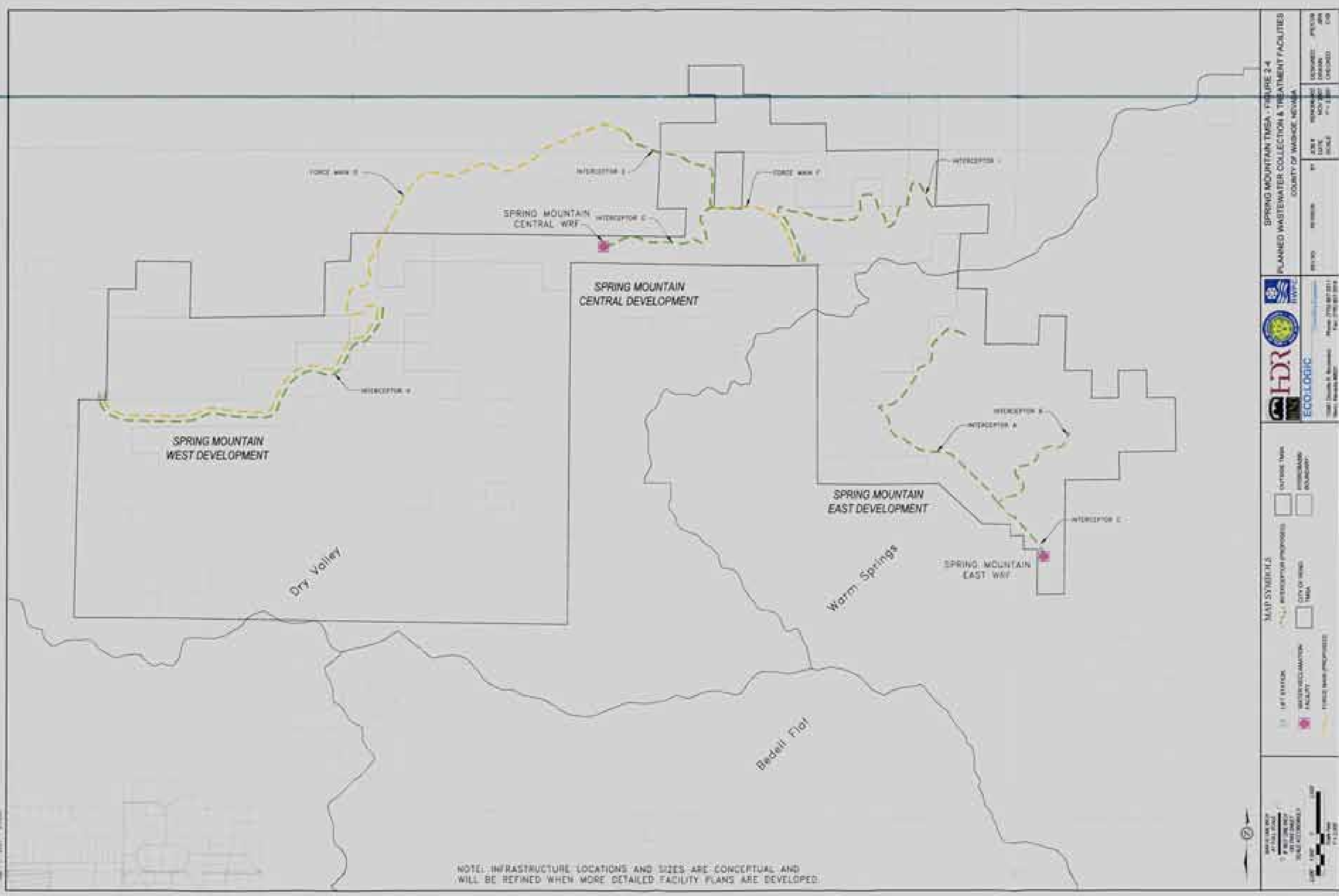
FLOW

SPRING MOUNTAIN TMSA - FIGURE 2-3
PLANNED TMSA WATER FACILITIES
COUNTY OF WASHOE, NEVADA

ECOLOGIC

HDR

SCALE: 1" = 1,000'


SPRING MOUNTAIN TMSA - FIGURE 2-4
PLANNED WASTEWATER COLLECTION & TREATMENT FACILITIES
COUNTY OF WASHOE, NEVADA
FORCE MAIN E
INTERCEPTOR E
FORCE MAIN F
INTERCEPTOR F
SPRING MOUNTAIN CENTRAL WRF
INTERCEPTOR C
SPRING MOUNTAIN CENTRAL DEVELOPMENT
INTERCEPTOR D
SPRING MOUNTAIN WEST DEVELOPMENT
INTERCEPTOR B
INTERCEPTOR A
SPRING MOUNTAIN EAST DEVELOPMENT
INTERCEPTOR C
SPRING MOUNTAIN EAST WRF
Dry Valley
Warm Springs
Bedell Flat
MAP SYMBOLS
NOTE: INFRASTRUCTURE LOCATIONS AND SIZES ARE CONCEPTUAL AND WILL BE REFINED WHEN MORE DETAILED FACILITY PLANS ARE DEVELOPED.

SPRING MOUNTAIN TMSA - FIGURE 2-5
PLANNED RECLAIMED WATER & DISPOSAL FACILITIES
COUNTY OF NYE/CITY OF PAHRUMP, NEVADA

8" PIPELINE

8" PIPELINE

SPRING MOUNTAIN
CENTRAL WRF

SPRING MOUNTAIN
CENTRAL DEVELOPMENT

8" PIPELINE

POTENTIAL RECLAIMED WATER
DISPOSAL TO DRY CREEK

12" PIPELINE

12" PIPELINE

SPRING MOUNTAIN
WEST DEVELOPMENT

SPRING MOUNTAIN
EAST DEVELOPMENT

SPRING MOUNTAIN
EAST WRF

Dry Valley

Worm Springs

Bedell Flat

NOTE: INFRASTRUCTURE LOCATIONS AND SIZES ARE CONCEPTUAL AND WILL BE REFINED WHEN MORE DETAILED FACILITY PLANS ARE DEVELOPED.

HDR

ECOLOGIC

MAP SYMBOLS

Section 3
Sage

Table of Contents

List of Tables

List of Figures – Included at End of Section

Section 3 - Sage TMSA

3.1 STUDY AREA DESCRIPTION AND DEVELOPMENT CONSTRAINTS

The Sage planned development includes approximately 1,080 acres of property in the Warm Springs hydrographic basin. The property was added to the Truckee Meadows Service Areas (TMSA) in 2007. The Sage TMSA is shown on Figure 3-1 (see figures at end of section) and is within the jurisdiction of the City of Reno.

The proposed project will be a master planned community with a mix of residential product types and densities that may include age restricted communities. An extensive open space network is envisioned along with a commercial town center and appropriate public facilities such as an elementary school and safety center as determined by the City of Reno.

Areas that are limited or constrained for future development include areas with slopes greater than thirty percent and drainageways. These areas are shown on Figure 3-2. Surface runoff flows to an unnamed drainageway within the Warm Springs hydrobasin.

TAZ data was not used for Sage planning. More detailed land use information provided by the developer's representative was used. The proposed development was assumed to be built out by 2030.

3.2 CONCLUSIONS AND SUMMARY RECOMMENDATIONS

The water supply for Sage can potentially be derived from several on-site sources. The long term reliability and yield of the surface and groundwater resources are currently under investigation by the project proponent. For purposes of this analysis, it has been assumed that these water rights can be developed and reliably support 764 to 1,460 AF of municipal demand. The use of reclaimed water, in addition to the on-site water resources, will likely provide sufficient resources to meet the projected demands.

The water supply improvements consist primarily of an aquifer storage and recovery system, proposed to be located on BLM property to the south of the proposed development. BLM permitting approvals will be required to develop the water supply improvements, as well as the proposed wastewater treatment and disposal facilities.

Tanks were located to serve the entire elevation range of the property, in several instances on property administered by the BLM. The tanks may be able to be relocated to on-site locations once development plans are finalized.

Current facility planning has not identified a suitable area for wastewater treatment, storage and disposal facilities that could be located within the project site. The treatment facility is proposed to be located on property administered by BLM southeast of the Sage development. Wastewater would be treated and disposed of in areas with limited public access, such as the development

open spaces. Reclaimed water that is not used for irrigation of open spaces is proposed to be disposed of on irrigated fields and stored during the non-irrigation season. Irrigated fields and a seasonal storage reservoir, which uses levies to contain the effluent, are proposed to be located next to the wastewater treatment facility.

A summary of the estimated water and wastewater costs for the proposed infrastructure is listed in Table 3.1.

Table 3.1 - Infrastructure Costs (a)

Facility Description	Total Cost ($M)
Water	$19.6
Wastewater	$63.7

(a) 20 Cities ENRCCI = 7,942 May 2007

3.3 DESCRIPTION OF SERVICE PROVIDERS

There are no current service providers for water, wastewater and stormwater. New systems would be created to provide service for the Sage TMSA. Stormwater management and flood control are discussed in Section 14.

3.4 STATUS OF INFRASTRUCTURE PLANNING

Sage is a new area of development and little planning has been done. The most recent facility plans for water and wastewater that have potential applicability to Sage are listed in Table 3.2.

Table 3.2 - Recent Facility Plans

Plan Name	Date	Description
Water		
2006 Monitoring Report for Lower Warm Springs Creek & Tributaries Reference: Interflow Hydrology, Inc.	March 2007	Describes monitoring activities during the 2006 calendar year for selected surface and groundwater monitoring stations, which have been installed to date.
Wastewater		
Draft Washoe County 208 Water Quality Plan Version 3 Reference: Truckee Meadows Regional Planning Agency	January 2007	Per section 208 of the Clean Water Act this report provides the planning and management of all sources of water pollution and defines the parameters for area-wide wastewater management plans.

3.5 WATER

The projected water demands and required infrastructure are developed in this section.

3.5.1 Assumptions, Planning Criteria and Methodology

Water demand factors used to estimate potential demand are based on TMWA Rule 7 demand factors. It is assumed that this new development will dedicate water resources in accordance with TMWA water rights dedication policies.

In the case of non-residential development, the demand factor used represents an average number for planning purposes only. When TMWA or Washoe County receives a request for water service on a non-residential property, the actual water rights dedication requirement would be based on a project-specific analysis of the number of fixture units and the specific landscaping plan. This level of detail is not available for this analysis.

3.5.2 Existing and Future Water Demand

There is no existing water use beyond the current ranching operation.

Based on the land use analysis, projected water demands for Sage are listed in Table 3.3. The irrigation demands are projected assuming that 6,000 gallons per month of water is consumed within the house and the remainder is used for irrigation. The irrigation demand range is based on either front yard only irrigation or the combined front yard and back yard irrigation. Irrigation demand was also included for the school site assuming 3.5 AFA. Irrigation demand was estimated for commercial uses to be 3.5 AFA using 15% of the gross acreage. The total demands include both indoor and outdoor water use.

Table 3.3 - Sage Water Demands (a)

Condition	2030 Irrigation Demands Range (AFA) (b)	2030 Total Demands Including Irrigation (AFA) (c)
Total	161-307	865

(a) Based on land use analysis.

(b) Based on residential irrigation, and irrigation for a school and commercial land use.

(c) Based on 2,500 dwelling units, 15 acres of commercial land use, and 16.5 acres of public facility.

3.5.3 Water Resources

The water supply for Sage can potentially be derived from several on-site sources. Surface water rights were acquired from Warm Springs Valley Creek, Dewey Springs and Pradere Springs. Currently these rights are allocated for municipal use in Lemmon Valley and would need to be reallocated to the Warm Springs basin. The surface water would be stored and used with an aquifer recharge, storage and recovery system located in the southern part of the development area. Groundwater rights exist for the proven original ranching water supply. Other groundwater rights may be available when proven as a reliable future resource.

The long term reliability and yield of the surface and groundwater resources are currently under investigation by the project proponent. Additional study is needed to assess their reliability and

municipal water supply yield. For purposes of this analysis, it has been assumed that these water rights can be developed and reliably support 764 to 1,460 AF of municipal demand.

Substantial amounts of reclaimed water could be available from the future water reclamation facility. This high quality reclaimed water would be suitable for landscape irrigation, including residential areas, and could be used to extend the available potable water supplies. Landscape irrigation accounts for approximately half of the total water demand for a typical residential unit. Water demands could be further reduced by implementing water conserving landscaping practices and/or xeriscaping.

Existing and potentially available water resources to serve the Sage area are presented in Table 3.4.

Table 3.4 - Potentially Available Water Resources (a)

Source Description	Supply (AFA)
Existing Resources	
Surface Water Rights (Permits 64073-64079)	700
Groundwater	64.6
Reclaimed Water	(b)
Total	764.6
Potential Future Resources	
Groundwater (Permits 64977 and 64978)	696
Total	1,460.6

(a) Potentially available water resources based on information provided by Sage Community Group.

(b) Reclaimed water may be used to supplement water resources for non-potable uses.

A comparison of the available resources in the water demand for 2030 is shown in Table 3.5. Use of reclaimed water in addition to the on-site resources will likely provide sufficient resources to meet projected demands.

Table 3.5 - Water Demand and Resources Comparison

Condition	Supply (AFA)	Sage Demand (AFA)
2030	764 - 1460	865

3.5.4 Planned Facilities

Backbone water supply and distribution system facilities were developed to supply demands and satisfy planning and design criteria for the proposed Sage development. These facilities appear in Figure 3-3.

The water supply for the Sage development is located on BLM property to the south of the proposed development. BLM permitting approvals will be required to develop the water supply improvements, as well as the proposed wastewater treatment and disposal facilities. The planned water supply improvements consist of an aquifer storage and recovery system. Infiltration of surface flows from the unnamed stream will be enhanced to recharge the local aquifer, and will be recovered by a system of wells. Additional groundwater wells may also be provided. Water quality data will be collected in the future to determine the need for potential water treatment improvements. A maximum day demand of 1,659 gpm will need to be supported by the water supply system.

The distribution system consists of two main branches. Four wells have been assumed, with a supply capacity of 500 gpm each. To reduce facilities and their associated costs, transmission main pressures in some regions are proposed to exceed 100 psi. A summary of the recommended water facility infrastructure for the Sage development is summarized in Table 3.6.

Table 3.6 - Water Facility Totals

Total Transmission Main Length	55,440 feet
Total number of Pump Stations	3
Total Tanks/ Total Storage Volume	4 / 2.4 MG

Six pressure zones are planned for the Sage development. Service elevations range from 4430 to 5075 feet. These zones are depicted in Figure 3-3.

3.5.5 Water Facility Cost Estimates

The recommended water infrastructure costs are summarized in Table 3.7 and are listed in more detail in Appendix B. Costs of the proposed wells, transmission mains, pump stations and storage tanks are included. Individual pressure reducing stations are not included in the cost estimates, as these facilities are generally considered development specific, on-site improvements. In addition, the cost of purchasing water rights is not included.

Table 3.7 - Water Infrastructure Costs (a)

Facility Description	Cost ($M)
Supply	$5.8
Transmission	$11.1
Storage	$2.7
Total	$19.6

(a) 20 Cities ENRCCI = 7,942 May 2007

3.5.6 Water Planning Limitations

Specific limitations for the water planning in the Sage area are listed below.

- Single backbone mains were used to supply water throughout the TMSA. As development occurs, it is likely that an equivalent transmission capacity will be conveyed by a distribution network rather than by a single backbone main.

- Due to numerous pressure zones in the Sage development, transmission main pressures are proposed to exceed 100 psi in order to reduce facility costs and simplify system operation. In areas where transmission main pressures exceed 100 psi, connections from transmission mains to distribution system mains will require pressure regulating valves or residences must be equipped with individual pressure regulating valves.

- The tanks were located to serve the entire elevation range of the property, in several instances on property administered by the BLM. The tanks may be able to be relocated to on-site locations once development plans are finalized.

- The long term reliability and yield of the surface and groundwater resources are currently under investigation. Additional study is needed to assess their reliability and municipal water supply yield.

- The improvements required to enhance the infiltration capacity of the ASR site are under investigation. Estimated costs are not included.

3.6 WASTEWATER

The projected wastewater flows and required infrastructure for conveyance, treatment, and disposal are developed in this section.

3.6.1 Assumptions, Planning Criteria, and Methodology

The wastewater flow factor for the Sage area was assumed from the 2007 Washoe County 208 Water Quality Management Plan. The flow factor for new development ranges from a low of 110 gallons per capita per day (gpcd) to 130 gpcd. An average of 120 gpcd was used for flow projection. All other wastewater planning assumptions are as stated in Appendix A.

3.6.2 Projected Wastewater Flow

Using the land use data, flow projections for Sage were developed. The wastewater treatment capacity projection for this TMSA is presented in Table 3.8.

Table 3.8 - Sage Wastewater Projections

Condition	2030 Flows (MGD) (a,b)
Total	0.7

(a) Based on land use analysis.

(b) Based on 2,500 dwelling units, and 15 acres of commercial land use.

3.6.3 Water Reclamation and Disposal

Water reclamation would beneficially reuse a large portion of the effluent generated by Sage, and would provide a valuable water resource to help meet non potable demands. Initial plans are to use reclaimed water to irrigate large portions of the open spaces throughout the community. The available acreage and amount of water that could be reused in these open spaces for each area as listed in Table 3.9. With additional treatment improvements, high quality reclaimed water could also be used, if needed, to help meet non potable irrigation demands for parks, schools, landscape medians and residential areas.

Table 3.9 - Effluent Disposal

Condition	Irrigated Acreage (a)	Potential Reclaimed Water Use (AFA) (b)
2030	215	751

(a) Includes total open space that could be irrigated.

(b) Based on 3.5 AFA per acre.

A review of the project site was conducted to evaluate the feasibility of seasonal storage for the reclaimed water. Based on the surrounding topography and proposed land use plan for Sage, there do not appear to be suitable reservoir sites with sufficient capacity to store the anticipated quantity of effluent. However, a seasonal storage reservoir could potentially be constructed south of the Sage development on BLM property by using levies to contain the effluent. This is discussed further in the following section.

3.6.4 Planned Wastewater Facilities

Based on the projected wastewater flows, recommendations for future wastewater collection and treatment facilities were developed for 2030 as shown on Figure 3-4. Backbone reclaimed water and disposal facilities are shown on Figure 3-5. More detailed sizing of the collection and reclaimed water facilities will be required as phasing plans and land uses are finalized.

Wastewater will be collected throughout the development and conveyed by gravity to a new wastewater treatment facility. Current facility planning has not identified a suitable area for wastewater treatment, storage and disposal facilities that could be located within the project site. The treatment facility is proposed to be located on property administered by BLM southeast of the Sage development. Locating the facility away from the development will provide a buffer for noise and odors. Initially, a relatively low technology secondary treatment plant is proposed to be constructed sized for the projected capacity of up to 0.7 MGD. An enclosed headworks and odor control facility would be provided. Initially, wastewater would be treated and disposed of in areas with limited public access, such as the open spaces. The reclaimed water that is not used for irrigation of the open spaces is proposed to be disposed of on irrigated fields and stored during the non-irrigation season. The irrigated fields and storage ponds are proposed to be located next to the wastewater treatment facility on BLM property.

If additional water resources are needed to meet demands, the water reclamation facility may be upgraded to a tertiary reclamation facility. Filtered and disinfected effluent could be made available for unrestricted irrigation uses such as landscape medians, residential development and other open spaces. Up to 780 AFA of reclaimed water could be available to help meet projected water demands.

Based on the proposed development plan, there are more potential locations to utilize reclaimed water than water available. The total reclaimed water use potential may be up to 1,050 AFA for both residential and open space irrigation. Potentially, Sage could utilize a portion of Spring Mountain's reclaimed water, as discussed below.

Wastewater collection pipe sizing and reclaimed water piping calculations are shown in Appendix C.

Table 3.10 - Summary of New Wastewater Infrastructure

Interceptors	33,400	Feet
Reclaimed Water/Disposal Pipe	33,200	Feet
Reclaimed/Disposal Pump Stations	1	Stations
2030 Treatment Capacity for Reclamation Facility	0.7	MGD
Reclaimed Water Storage Reservoir	430	AF
Reclamation Fields	230	Acres

3.6.5 Wastewater Facility Cost Estimates

The proposed wastewater facilities and estimated costs are summarized in Table 3.11 and are listed in more detail in Appendix C.

Table 3.11 - Wastewater Infrastructure Costs (a)

Facility Description	Total Cost ($M)
Collection System	$6.2
Treatment	$31.1
Disposal/Reclaimed Water	$26.4
Total	$63.7

(a) 20 Cities ENRCCI = 7,942 May 2007

3.6.6 Wastewater Management Options

The potential exists for a coordinated wastewater treatment and disposal strategy with the planned Spring Mountain development, located north of Sage. The water and wastewater planning criteria for this development area is more fully described in Section 2. Because the developments are independent of one another, and the timing of one project may not be

appropriate for the other, independent water and wastewater facility plans were developed for each area. However, the proposed water reclamation and/or land disposal option for Sage may also be a potentially viable option for Spring Mountain.

3.6.7 Wastewater Planning Limitations

Specific limitations of the wastewater planning in the Sage area are listed below.

- Wastewater flow projections are conservative because a mid-range wastewater flow factor is used. The TMWA Rule 7 water demand projections are representative of actual demands. Therefore, the percentage of wastewater flow compared to the total water demand is more than the "typical" fifty percent reported in previous planning studies.

- More detailed sizing of the collection and reclaimed water facilities will be required as phasing plans and land uses are finalized.

- Effluent disposal planning for the Sage TMSA is conceptual. Additional evaluation will be required to determine the final effluent treatment and disposal strategy.

3.7 POLICY RECOMMENDATIONS (INCLUSIVE OF WATER, WASTEWATER)

On-site resources, in addition to the use of reclaimed water will likely provide sufficient resources to meet projected demands. However, expanded use of reclaimed water, such as front and/or back yard residential landscape watering, should be evaluated on a regional level and implemented where reasonable to extend available water supplies and help fulfill the development potential within the Sage TMSA.

Current landscaping practices account for approximately half of the total water demand for a typical residential unit. Water demands could be reduced by implementing water conserving landscaping practices and/or xeriscaping. However, water conserving landscape practices should be balanced with the need for disposal of reclaimed water.

MOUNTAIN

Warm Springs

SAGE COMMUNITY DEVELOPMENT

LOCATION MAP

RENO-SPARKS

SAGE

MAP SYMBOLS

SAGE COMMUNITY DEVELOPMENT

HYDROGRAPH BOUNDARY

CITY OF RENO TMSA

HDR

ECO:LOGIC

SAGE TMSA - FIGURE 3-1

STUDY AREA

COUNTY OF WASHOE, NEVADA

SAGE COMMUNITY DEVELOPMENT

MAP SYMBOLS

SLOPE 30% OR GREATER

INTERMITTENT STREAMS

OUTSIDE TMSA

FLOODPLAIN

CITY OF RENO TMSA

ECO:LOGIC

HDR

RWPC

SAGE TMSA - FIGURE 3.2

AREA CONSTRAINTS

COUNTY OF WASHOE, NEVADA

NOTES

[1] TANKS SIZED TO SERVE CNTIRE ELEVATION RANGE OF PROPERTY. SOME TANKS MAY BE ABLE TO BE RELOCATED ON-SITE WHEN DEVELOPMENT PLAN FINALIZED.

[2] INFRASTRUCTURE LOCATIONS AND SIZES ARE CONCEPTUAL AND WILL BE REFINED WHEN MORE DETAILED FACILITY PLANS ARE DEVELOPED.

[3] PRESSURE ZONES APPEAR MATCHED.

PROPOSED PIPE DIAMETER (in)

8
10
12
14
16
18
20
24
30

FACILITY LEGEND

- W PROPOSED WELL
- PROPOSED TANK
- PS PROPOSED PUMP STATION

PS 1
1660 GPM

T 1
0.5 MG
4325' PAD

T 2
0.9 MG
4291' PAD

PS 2
535 GPM

T 3
0.6 MG
5125' PAD

PS 3
200 GPM

T 4
0.4 MG
5175' PAD

SAGE TMSA - FIGURE 3-3
PLANNED TMSA WATER FACILITIES
COUNTY OF WASHOE, NEVADA

ECOLOGIC

HDR

MAP SYMBOLS

NOTE: INFRASTRUCTURE LOCATIONS AND SIZES ARE CONCEPTUAL AND WILL BE REFINED WHEN MORE DETAILED FACILITY PLANS ARE DEVELOPED.

SAGE WRF

SAGE COMMUNITY DEVELOPMENT

Morris Springs

MAP SYMBOLS

SAGE TMSA - FIGURE 3H

PLANNED WASTEWATER COLLECTION & TREATMENT FACILITIES

COUNTY OF WASHOE, NEVADA

HDR

ECOLOGIC

SAGE TMSA - FIGURE 3-5
PLANNED RECLAIMED WATER FACILITIES
COUNTY OF WASHOE, NEVADA

ECOLOGIC

MAP SYMBOLS

Warm Springs

SAGE COMMUNITY DEVELOPMENT

SAGE WRF

RECLAIMED WATER STORAGE PONDS

NOTE: INFRASTRUCTURE LOCATIONS AND SIZES ARE CONCEPTUAL AND WILL BE REFINED WHEN MORE DETAILED FACILITY PLANS ARE DEVELOPED

Section 4
Warm Springs

Table of Contents

List of Tables

List of Figures – Included at End of Section

Section 4 – Warm Springs TMSA

4.1 STUDY AREA DESCRIPTION AND DEVELOPMENT CONSTRAINTS

The Warm Springs TMSA is in the Warm Springs hydrographic basin. The Warm Springs TMSA is shown on Figure 4-1 (see figures at end of section) and is within the jurisdiction of Washoe County.

Areas that are limited or constrained for future development include areas with slopes greater than thirty percent and drainageways. These areas are shown on Figure 4-2. Surface runoff flows to an unnamed drainageway within the Warm Springs hydrobasin.

As mentioned in Section 1, the land use basis for facility planning was Traffic Analysis Zone (TAZ) data provided by Washoe County, with supplemental information derived from Washoe County planned land uses.

4.2 CONCLUSIONS AND SUMMARY RECOMMENDATIONS

Groundwater will supply the majority of the water resources for the Warm Springs TMSA. The estimated need for additional water resources for the TMSA is approximately 1,502 AFA. This is less than the potentially available water resources of 2,365 AF. Washoe County recognized that the basin was over-appropriated with more groundwater rights than could be sustained on a long term basis. In approving development in the basin, Washoe County has utilized a discount factor of 0.43 for determining the quantity of water rights needed for development projects.

The projected 2030 wastewater flow for Warm Springs is 0.37 MGD. A sequencing batch reactor plant would be constructed with additional tertiary filters, chemical feed facilities and disinfection facilities. The reclaimed water would be disposed of on irrigated fields and stored during the non-irrigation season. The irrigated fields and storage ponds are proposed to be located on BLM property southwest of the plant site.

A summary of the estimated water and wastewater costs for the proposed infrastructure is listed in Table 4.1.

Table 4.1 - Infrastructure Costs (a)

Facility Description	Total Cost ($M)
Water	$11.7
Wastewater	$36.9

(a) 20 Cities ENRCCI = 7,942 May 2007

4.3 DESCRIPTION OF SERVICE PROVIDERS

There are no current service providers for water, wastewater or stormwater facilities. New systems will be created to provide service for the Warm Springs TMSA. Stormwater management and flood control are discussed in Section 14.

4.4 STATUS OF INFRASTRUCTURE PLANNING

Warm Springs is a new area proposed for development and little planning has been done. The most recent facility plans for water and wastewater that have potential applicability to Warm Springs are listed in Table 4.2.

Table 4.2 - Recent Facility Plans

Plan Name	Date	Description
Water		
Washoe County Regional Water Management Plan Reference: RWPC	January 2005	The plan provides the region with an outline of how water will be managed to meet the needs of the citizens and to the future. Major components of the plan are identification of future water supply and wastewater facilities, regional flood control and drainage projects, and development of a water conservation program.
Wastewater		
Draft Washoe County 208 Water Quality Plan Version 3 Reference: Truckee Meadows Regional Planning Agency	January 2007	Per section 208 of the Clean Water Act this report provides the planning and management of all sources of water pollution and defines the parameters for area-wide wastewater management plans.
Warm Springs Ranch Wastewater Treatment Facility Plan Reference: Shaw Engineering	March 2004	Recommended treatment and disposal facilities required to serve future growth in a manner that complies with State and Federal regulations are discussed.
Warm Springs WWTP Preliminary Design Report Reference: ECO:LOGIC Engineering	September 2005	This report establishes the design criteria and treatment processes for the new Warm Springs Wastewater Treatment Plant. The new WWTP will service the planned Warm Springs Ranch development in Washoe County, Nevada.
Addendum to Warm Springs Ranch Wastewater Treatment Plant Facility Plan Reference: ECO:LOGIC Engineering	August 2006	This report updates the 2004 Warm Springs Ranch Wastewater Treatment Plant Facility Plan. It recommends the treatment and disposal facilities required to serve future growth in a manner that complies with State and Federal regulations.

4.5 WATER

The projected water demands and required infrastructure are developed in this section.

4.5.1 Assumptions, Planning Criteria and Methodology

Water demand factors used to estimate potential demand are based on the Washoe County demand factors listed in Appendix A. In the case of non-residential development, the demand factor used represents an average number for planning purposes only. The actual water rights dedication requirement would be based on a project-specific analysis of the number of fixture units and the specific landscaping plan. This level of detail is not available for this analysis.

4.5.2 Existing and Future Water Demand

There is no existing municipal water use beyond domestic and agricultural wells.

Based on the land use analysis, projected water demands for Warm Springs are listed in Table 4.3. The irrigation demands are projected assuming that 6,000 gallons per month of water is consumed within the house and the remainder is used for irrigation. The irrigation demand range is based on either front yard only irrigation or the combined front yard and back yard irrigation. Irrigation demand was not estimated for commercial or industrial use because there is no projection available for the amount of new commercial and industrial acreage that will be built by 2030. The total demand includes both indoor and outdoor water use.

Table 4.3 - Warm Springs Water Demands (a)

Condition	2030 Irrigation Demand Range (AFA) (b)	Warm Springs Demand (AFA) (c, d)	Groundwater Rights Required (AFA) (c, e)
Total	378 - 757	1,502	3,244

(a) Based on TAZ analysis.

(b) Based on residential irrigation.

(c) Based on 1,262 dwelling units, 54 acres of commercial and industrial land use.

(d) Residential demand based on 1.12 AFA per ERU.

(e) Based on water rights dedication rates at 2.5 AFA per ERU based on Washoe County groundwater management plan for the area.

An estimate of water demands associated with domestic wells is listed in Table 4.4. In the TAZ analysis, existing houses were analyzed the same way whether the house has a domestic well, or not. The total demand projected in Table 4.3 includes demands from houses with an existing well.

Table 4.4 - Domestic Well Demands

	Number of Domestic Wells	Domestic Well Conversion Demand (AFA) (a)
County	25	28

(a) Domestic well conversion based on 1.12 AFA per well

4.5.3 Water Resources

Groundwater will supply the majority of the water resources for the Warm Springs TMSA. The groundwater resources of Warm Springs Valley have been managed by Washoe County since 1992, when it developed a Water Budget management approach for the basin. Washoe County recognized that the basin was over-appropriated with more groundwater rights than could be sustained on a long term basis. At the time of the "Water Budget" development, agricultural use of groundwater was occurring at a rate that exceeded the natural replenishment. To address this situation and provide a mechanism for the long term development of the basin, Washoe County adopted a target total demand of 4,000 acre feet (AF) per year for the basin. This quantity was thought to slightly exceed the perennial yield of the basin under natural conditions.

Since 1992, this Water Budget has been used as the basis of land use management decisions. In approving development in the basin, Washoe County has utilized a discount factor of 0.43 for determining the quantity of water rights needed for development projects. For example, a project with a demand of 11.2 AF would need to provide 26 AF of water rights. By implementing the Water Budget approach and the use of the discount factor for water rights, the conversion of agricultural water rights to urban uses will reduce the overall groundwater pumpage in the basin.

The surface water resources of Warm Springs consist of decreed rights and permits primarily from springs and Winnemucca Ranch Creek. Washoe County owns the water rights associated with Winnemucca Ranch and is studying their yield. The State Engineer has issued a permit for an artificial recharge and recovery (ASR) project associated with lower Winnemucca Ranch Creek. To date, the ASR project has not been developed or tested to determine its actual yield. This water will most likely be used for the Spring Mountain TMSA and Sage TMSA.

Substantial amounts of reclaimed water could be available from the future wastewater treatment plant. High quality reclaimed water would be suitable for landscape irrigation, including residential areas, and could be used to extend the available potable water supplies. Landscape irrigation accounts for approximately half of the total water demand for a typical residential unit. Water demands could be further reduced by implementing water conserving landscaping practices and/or xeriscaping.

Existing and potentially available water resources to serve the Warm Springs area are presented in Table 4.5.

Table 4.5 - Potentially Available Water Resources (a)

Source Description	Supply (AFA)
Potential Future Resources	
Groundwater	2,365 (b)
Surface water	0 (c)
Reclaimed Water	(d)
Total	2,365

(a) Potentially available water resources based on information provided by Washoe County.

(b) Available groundwater (discount factor already accounted) for residential, commercial and industrial use.

(c) Surface water may be used by upstream development for the Spring Mountain TMSA and Sage TMSA. Also, no seasonal storage is currently available for intermittent creeks.

(d) Reclaimed water may be used to supplement water resources for non-potable uses.

A comparison of the available resources in the water demand for 2030 is shown in Table 4.6. The total demand estimate includes potential water requirements of 28 AF for domestic wells. The estimated need for additional water resources for the TMSA is approximately 1,502 AFA. This is less than the potentially available water resources of 2,365 AF. Expanded uses for reclaimed water, such as front and back yard residential landscape watering, will be needed to help fulfill the development potential. Future potential water resources are discussed in Section 13.

Table 4.6 - Water Demand and Resources Comparison

Condition	Supply (AFA)	Warm Springs Demand (AFA) (a)	Groundwater Rights Required (AFA) (b)
2030	2,365	1,502	3,244

(a) Residential demand based on 1.12 AFA per ERU.

(b) Based on water rights dedication rates, which is significantly higher than actual water use.

4.5.4 Planned Facilities

Backbone water supply and distribution system facilities were developed to supply demands and satisfy planning and design criteria for the proposed land use. The wells shown have been proposed by others. More wells will be necessary to serve the full demand, but the selection of future well sites was not included as part of this Facility Plan. These facilities appear in Figure 4-3.

A summary of the recommended water facility infrastructure for the Warm Springs TMSA is summarized in Table 4.7.

Table 4.7 - Water Facility Totals

Wells	2
Total Transmission Main Length	17,860 Ft
Total number of Pump Stations	1
Total Tanks/ Total Storage Volume	2/ 2.6 MG

Two pressure zones are planned for the Warm Springs TMSA. Service elevations range from 4280 to 4510 feet. These zones are depicted in Figure 4-3.

4.5.5 Water Facility Cost Estimates

The recommended water infrastructure costs are summarized in Table 4.8 and are listed in more detail in Appendix B. Costs of the proposed wells, transmission mains, pump stations and storage tanks are included. Individual pressure reducing stations are not included in the cost estimates, as these facilities are generally considered development specific, on-site improvements. In addition, the cost of purchasing water rights is not included. Cost analysis project divisions is shown in Figure 4-B1 (Appendix B).

Table 4.8 - Water Infrastructure Costs (a)

Facility Description	Cost ($M)
Supply (b)	$2.8
Transmission	$5.3
Storage	$3.6
Total	$11.7

(a) 20 Cities ENRCCI = 7,942 May 2007

(b) Water rights costs are not included.

4.5.6 Water Planning Limitations

Specific limitations for water planning in the Warm Springs area are listed below.

- Future well locations need to be determined.
- Single backbone mains were used to supply water throughout the TMSA. As development occurs, it is likely that an equivalent transmission capacity will be conveyed by a distribution network rather than by a single backbone main.

4.6 WASTEWATER

The projected wastewater flows and required infrastructure for conveyance, treatment, and disposal are developed in this section.

4.6.1 Assumptions, Planning Criteria, and Methodology

The wastewater flow factor for the Warm Springs area was assumed from the 2007 Washoe County 208 Water Quality Management Plan. The flow factor for Warm Springs ranges from a low of 110 gallons per capita per day (gpcd) to 130 gpcd. An average of 120 gpcd was used for flow projection. All other wastewater planning assumptions are as stated in Appendix A.

4.6.2 Projected Wastewater Flow

Using the TAZ data, flow projections for Warm Springs were developed. The wastewater treatment capacity projection for this TMSA is presented in Table 4.9.

Table 4.9 - Warm Springs Wastewater Projections

Condition	2030 Flows (MGD) (a, b)
Total	0.37

(a) Based on TAZ analysis.

(b) Based on 1,262 dwelling units, 54 acres of commercial and industrial land use.

The potential flow projection for parcels with existing septic systems that could be connected to the municipal sewer system is listed in Table 4.10. In the TAZ analysis, existing houses were analyzed the same way whether the house has a septic system, or not. The flows projected in Table 4.9 include potential flows from houses with a septic system.

Table 4.10 - Septic System Conversion Flow Projections

	Number of Septic Systems	Septic System Conversion Flows (gpd) (a)
County	23	4,600

(a) Septic system conversion based on 200 gpd per septic

The projected 2030 wastewater flow for Warm Springs is 0.37 MGD. The 208 Plan has a projected 2030 wastewater flow of 0.32 MGD to 0.44 MGD.

4.6.3 Water Reclamation and Disposal

No water is currently reclaimed as there is no central treatment. To provide additional water resources to help fulfill the development potential within the County TMSA, and dispose of the effluent that will be produced, water reclamation is recommended. A reclaimed water system could be constructed throughout the Warm Springs area for landscape irrigation where reasonable. A high level of treatment would be required at the treatment plant for unrestricted irrigation. Residential reclaimed water irrigation is only recommended for new development.

Additional water reclamation facilities are discussed in the following section.

4.6.4 Planned Wastewater Facilities

Based on the projected wastewater flows, recommendations for future wastewater collection and treatment facilities were developed for 2030 as shown on Figure 4-4. Backbone reclaimed water and disposal facilities are shown on Figure 4-5. More detailed sizing of the collection and reclaimed water facilities will be required as land uses are finalized.

Wastewater will be collected throughout the development mostly by gravity. Wastewater from the northern portion of the TMSA will be pumped to the new wastewater treatment plant. A sequencing batch reactor plant would be constructed with additional tertiary filters, chemical feed facilities and disinfection facilities. The treatment plant has been planned for the location shown on Figure 4-4. Current land use planning has not identified a suitable area for storage and disposal facilities that could be located within the Warm Springs TMSA. The reclaimed water would be disposed of on irrigated fields and stored during the non-irrigation season. The irrigated fields and storage ponds are proposed to be located on BLM property southwest of the plant site. Other disposal sites should be considered such as the proposed golf course, turf farm and areas around the Air Sailing Gliderport north of the Warm Springs TMSA. Up to 415 AFA of reclaimed water could be available to help meet projected water demands.

Wastewater collection pipe sizing and reclaimed water piping calculations are shown in Appendix C. A summary of the recommended wastewater infrastructure for the Warm Springs TMSA is summarized in Table 4.11.

Table 4.11 - Summary of New Wastewater Infrastructure

Interceptors	15,000	Feet
Wastewater Force Main	3,440	Feet
Wastewater Lift Station	1	Station
2030 Treatment Capacity for Treatment Plant	0.4	MGD
Reclaimed Water/Disposal Pipe	23,000	Feet
Reclaimed/Disposal Pump Stations	1	Station
Reclaimed Water Storage Reservoir	193	AF
Reclamation Fields	125	Acres

4.6.5 Wastewater Facility Cost Estimates

The proposed wastewater facilities and estimated costs are summarized in Table 4.12 and are listed in more detail in Appendix C.

Table 4.12 - Wastewater Infrastructure Costs (a)

Facility Description	Total Cost ($M)
Collection System	$3.2
Treatment	$20.2
Disposal/Reclaimed Water	$13.5
Total	$36.9

(a) 20 Cities ENRCCI = 7,942 May 2007

4.6.6 Wastewater Planning Limitations

Specific limitations of wastewater planning in the Warm Springs area are listed below.

- Wastewater flow projections are conservative because a mid-range wastewater flow factor is used. The County water demand projections are conservatively high. Therefore, the percentage of wastewater flow compared to the total water demand is less than the "typical" fifty percent reported in previous planning studies.

- More detailed sizing of the collection and reclaimed water facilities will be required as land uses are finalized.

- Effluent disposal planning for the Warm Springs TMSA is conceptual. Additional evaluation will be required to determine the final effluent treatment and disposal strategy.

4.7 POLICY RECOMMENDATIONS (INCLUSIVE OF WATER, WASTEWATER)

On-site resources, in addition to the use of reclaimed water will likely provide sufficient resources to meet projected demands. However, expanded use of reclaimed water, such as front and/or back yard residential landscape watering, should be evaluated on a regional level and implemented where reasonable to extend available water supplies and help fulfill the development potential within the Warm Springs TMSA.

Current landscaping practices account for approximately half of the total water demand for a typical residential unit. Water demands could be reduced by implementing water conserving landscaping practices and/or xeriscaping. However, water conserving landscape practices should be balanced with the need for disposal of reclaimed water.

MAP SYMBOLS

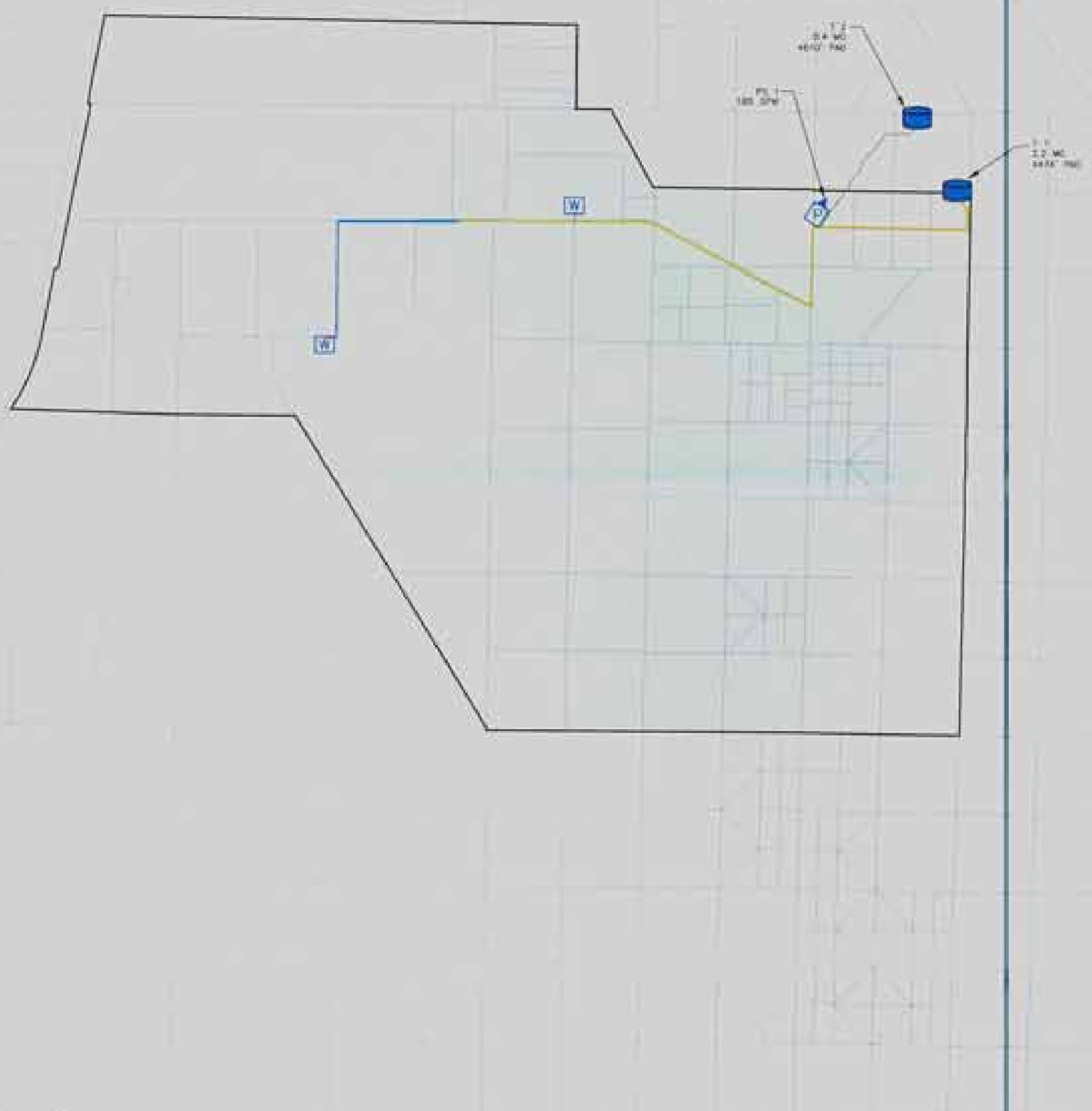
SLOPE 30% OR GREATER

WASHOE COUNTY TMSA

HDR

ECO:LOGIC

WARM SPRINGS TMSA - FIGURE 4-2
AREA CONSTRAINTS
COUNTY OF WASHOE, NEVADA



PROPOSED PIPE DIAMETER (IN)
8
10
12
14
16
18

FACILITY LEGEND

- PROPOSED WELL
- PROPOSED TANK
- PROPOSED PUMP STATION

NOTES:

[1] TANKS SIZED TO SERVE ENTIRE ELEVATION RANGE OF PROPERTY. SOME TANKS MAY BE ABLE TO BE RELOCATED ON-SITE WHEN MORE DETAILED FACILITY PLANS ARE DEVELOPED.

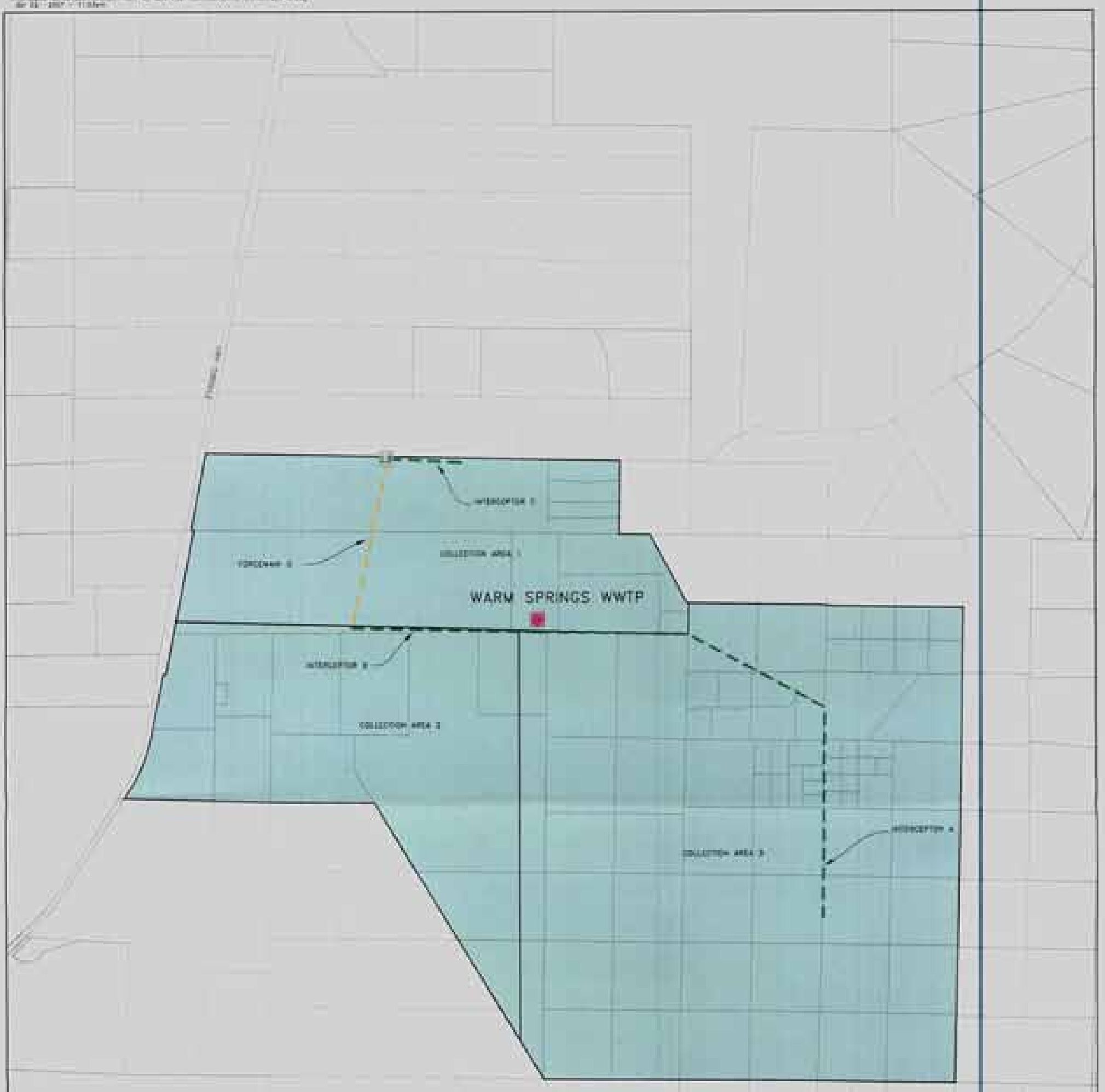
[2] INFRASTRUCTURE LOCATIONS AND SIZES ARE CONCEPTUAL AND WILL BE REFINED WHEN MORE DETAILED FACILITY PLANS ARE DEVELOPED.

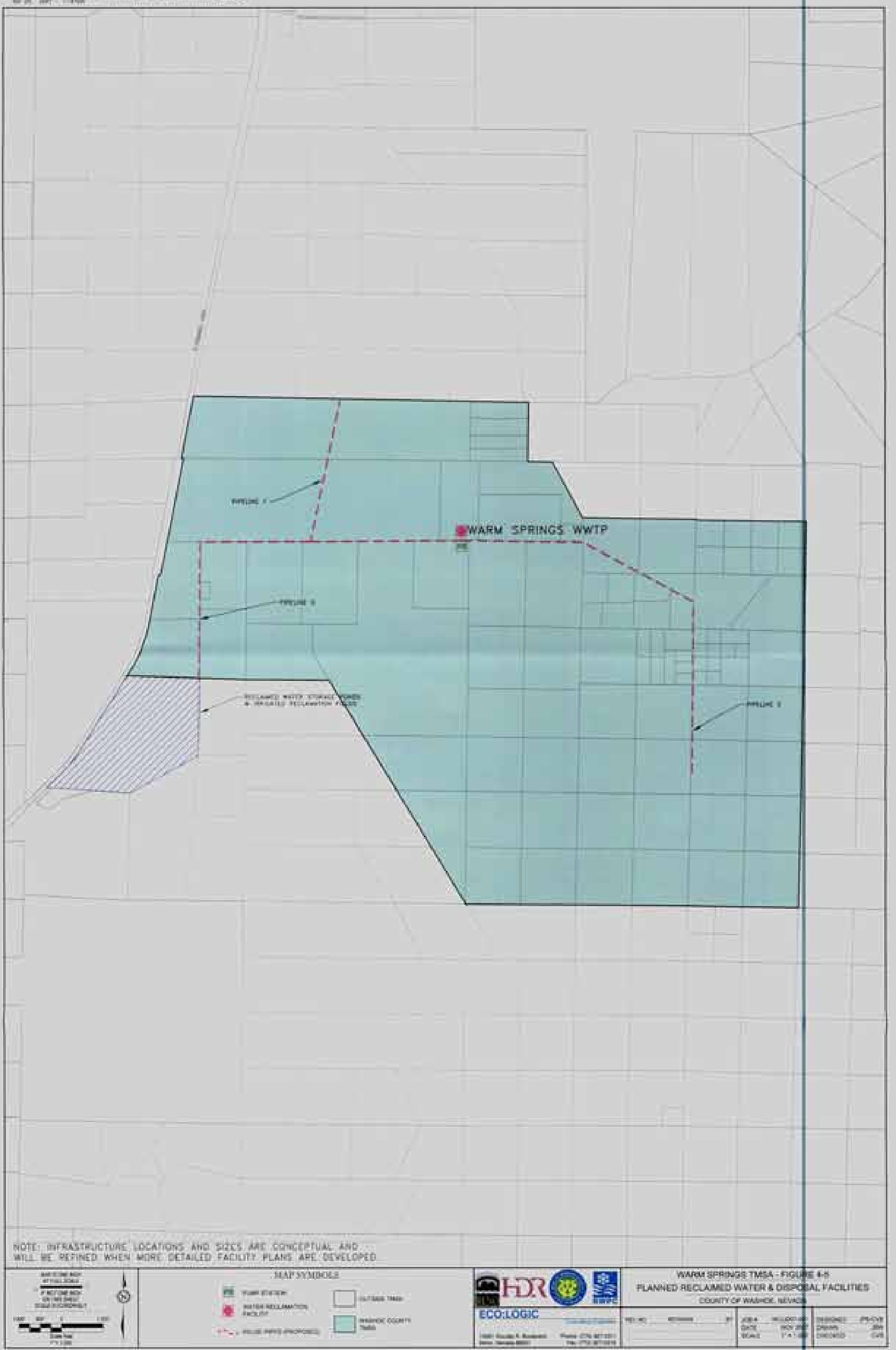
[3] PRESSURE ZONES APPEAR HATCHED.

WARM SPRINGS TMSA - FIGURE 4-3
PLANNED TMSA WATER FACILITIES
COUNTY OF WASHOE, NEVADA

HDR

ECO:LOGIC


WARM SPRINGS WWTP
NOTE: INFRASTRUCTURE LOCATIONS AND SIZES ARE CONCEPTUAL AND WILL BE REFINED WHEN MORE DETAILED FACILITY PLANS ARE DEVELOPED.
MAP SYMBOLS
ECO:LOGIC
WARM SPRINGS TMSA - FIGURE 4-4
PLANNED WASTEWATER COLLECTION & TREATMENT FACILITIES
COUNTY OF WASHOE, NEVADA


WARM SPRINGS WWTP
NOTE: INFRASTRUCTURE LOCATIONS AND SIZES ARE CONCEPTUAL AND WILL BE REFINED WHEN MORE DETAILED FACILITY PLANS ARE DEVELOPED
MAP SYMBOLS
WARM SPRINGS TMSA - FIGURE 4-5
PLANNED RECLAIMED WATER & DISPOSAL FACILITIES
COUNTY OF WASHOE, NEVADA
ECO:LOGIC
HDR

Section 5
Cold Springs

Table of Contents

List of Tables

List of Figures – Included at End of Section

Section 5 - Cold Springs TMSA

5.1 STUDY AREA DESCRIPTION AND DEVELOPMENT CONSTRAINTS

The Cold Springs TMSA is shown on Figure 5-1 (see figures at end of section) and includes areas within the jurisdiction of both the City of Reno and Washoe County. The Cold Springs hydrobasin covers this area. Surface runoff within the basin drains to the White Lake playa. As mentioned in Section 1, the land use basis for facility planning was Traffic Analysis Zone (TAZ) data provided by both the City of Reno and Washoe County, with supplemental information derived from the City's Master Plan and Washoe County planned land uses. These data were modified with more detailed information provided by developer's representatives. TAZ identifications where more current information was incorporated are listed in Table 5.1 and shown in Figure 5-A1 (Appendix A).

Table 5.1 - TAZ Data Modification

TAZ	Modification
400	Modified dwelling units using Wallach IX planning data
412	Modified dwelling units and industrial acreage using Wallach IX planning data
809	Modified dwelling units and industrial acreage using Wallach IX planning data
810	Modified dwelling units and industrial acreage using Wallach IX planning data
850	Modified dwelling units using Wallach IX planning data

Areas that are limited or constrained for future development include White Lake playa, floodplains, and areas with slopes greater than thirty percent. These areas are shown on Figure 5-2.

5.2 CONCLUSIONS AND SUMMARY RECOMMENDATIONS

Insufficient water resources exist to serve the projected 2030 demands in Cold Springs when potential demands for Stead and Lemmon Valley area are taken into consideration. The projected increase in demand is approximately 18,485 AF, compared to the potentially available water resources of 11,909 AF. The demand for potable water supplies for these areas exceeds the currently available supplies, including water from the Fish Springs and Intermountain projects. Future potential water resources are discussed in Section 13.

Expanded use of reclaimed water, such as front and back yard residential landscape watering, should be implemented where reasonable to extend available water supplies and help fulfill the development potential within the Reno and County TMSA. Potentially 3,891 AF of residential irrigation demand in the Cold Springs area may be served by reclaimed water.

The proposed water facilities were not integrated with the existing Utilities Inc. water system. Potential infrastructure savings could be realized with a conjunctive use operation of the two water systems.

The 2030 total projected water reclamation facility capacity for the Cold Springs TMSA is approximately 4.5 MGD, including potential septic system conversion flows. Regional water supply, water reclamation and wastewater disposal should be a coordinated effort for the Cold Springs, Stead and Lemmon Valley TMSA.

A summary of the estimated water and wastewater costs for the proposed infrastructure is listed in Table 5.2.

Table 5.2 - Infrastructure Costs (a)

Facility Description	Total Cost ($M)
Water	$98.1
Wastewater	$103.7

(a) 20 Cities ENRCCI = 7,942 May 2007

5.3 DESCRIPTION OF SERVICE PROVIDERS

The water and wastewater service providers are described in the following sections.

5.3.1 Water

Utilities Inc. provides water service to existing customers within Cold Springs. Existing development in this area is also served by domestic wells. Figure 5-3 depicts the water purveyor service areas, Reno City limits, and locations of existing domestic wells.

5.3.2 Wastewater

Washoe County, through the Cold Springs Water Reclamation Facility (WRF) provides wastewater collection, treatment and disposal for the County's Cold Springs TMSA. Cold Springs WRF is also anticipated to provide service to a significant portion of the City's TMSA, including the north and southwest portions of the TMSA. Some existing development within the County's TMSA is provided wastewater service with individual septic systems. Figure 5-4 depicts the location of the water reclamation facility, the areas anticipated to be served, and the locations of existing septic systems.

5.4 STATUS OF INFRASTRUCTURE PLANNING

The Cold Springs TMSA is poised for development with the implementation of new water supply projects to the Stead area. Development within the area beyond existing commitment levels has been limited due to a lack of additional water supplies. However, Vidler Water Company is constructing the Fish Springs Water Supply Project and the Intermountain Water

Supply project is also under development. Although this water will be supplied initially to the Stead and Lemmon Valley area, with appropriate permitting approvals, this water could be made available to development in Cold Springs with additional transmission facility improvements.

Currently, Washoe County's Cold Springs Water Reclamation Facility is designed to be expanded to a capacity of 1.2 MGD. With the recent addition of new areas to the City of Reno's TMSA within Cold Springs, additional water reclamation facility and disposal capacity will be necessary. Because the Cold Springs area is a closed basin, disposal of the projected future quantities of treated wastewater will be a challenge. Presently, wastewater is disposed of through rapid infiltration basins. The potential disposal capacity of these basins is limited, and is not anticipated to be sufficient to meet the projected wastewater flows. As the need for additional wastewater disposal capacity increases, plans are under consideration to start reclaiming water for proposed landscape irrigation within new developments. Implementation of other disposal options such as discharge to White Lake or export to other basins such as Long Valley Creek is also under investigation. These other disposal options are necessary to manage the overall water resources of the area, taking into consideration water supply, wastewater treatment and disposal, and flood control.

Stormwater management and flood control are also very important considerations for the Cold Springs TMSA. Geographically, the areas lie within a closed basin, so precipitation and runoff stays within the basin. Presently, stormwater runoff is routed to White Lake. Since there is very little percolation from the playa lake, the water persists for several months or seasons until it evaporates. The lake has an established FEMA 100-year flood elevation. Stormwater management and flood control are discussed in Section 14.

The most recent facility plans for water and wastewater are listed in Table 5.3.

Table 5.3 - Recent Facility Plans

Plan Name	Date	Description
Water		
North Valley Water Supply Comparison Reference: ECO:LOGIC	Oct. 2002	Detailed analysis of water supply alternatives that will support the build-out land uses in the Stead, Lemmon Valley, and Cold Springs regions of Washoe County.
Fish Springs Ranch Facility Plan Reference: ECO:LOGIC	Sept. 2005	Construction of the Fish Springs Water Supply Project to meet future water demands for the Stead, Silver Lake and Lemmon Valley area (North Valleys) within the Truckee Meadows Services Area. The project consists of a new electrical substation off of the Alturas Transmission Line, groundwater production wells, a pump station, a transmission pipeline and terminal water storage tank to convey water from Fish Springs Ranch to the North Valleys. The facilities will be sized to supply 8,000 AFA.
Utilities Inc. Water Master Plan Update	April 2004	This master plan addresses the Cold Springs water facilities operated by Utilities Inc.

Wastewater		
North Valley Effluent Disposal Options Reference: ECO:LOGIC	Sept. 2005	Evaluation of effluent disposal strategies in the North Valleys.
Cold Springs Wastewater Facility Plan Reference: Kennedy Jenks	2002	This facility plan addresses the required reclamation facility expansion and wastewater collection and septic system conversion alternatives.
Preliminary Design Report Cold Springs Water Reclamation Facility Expansion Reference: Kennedy Jenks	October 2003	This preliminary design report addresses the design for the expansion of Washoe County's Cold Springs Water Reclamation Facility.
Draft Washoe County 208 Water Quality Plan Version 3 Reference: Truckee Meadows Regional Planning Agency	January 2007	Per section 208 of the Clean Water Act this report provides the planning and management of all sources of water pollution and defines the parameters for area-wide wastewater management plans.

5.5 WATER

The projected water demands and required infrastructure are developed in this section.

5.5.1 Assumptions, Planning Criteria, and Methodology

Water demand factors used to generate demand are based on TMWA design standards for both the Reno and County TMSA. The TMWA Rule 7 demand factors are relevant because new development is assumed to dedicate water resources in accordance with TMWA water rights dedication policies. It should be noted that the water rights dedication policy within the Utilities Inc. service area is different than the TMWA policy.

In the case of non-residential development, the demand factor used represents an average number for planning purposes only. When TMWA or Washoe County receives a request for water service on a non-residential property, the actual water rights dedication requirement would be based on a project-specific analysis of the number of fixture units and the specific landscaping plan. This level of detail is not available for this analysis.

5.5.2 Existing and Future Water Demand

Existing water demands for Reno and the County are listed in Table 5.4, and are based on data provided by Utilities Inc. The demand estimates are approximate and are representative of typical demands that could be expected without the influence of seasonally cool/wet or hot/dry periods that tend to skew the historical record.

Table 5.4 - Existing Water Demands

	Estimated Demand (AFA) (a)
Reno	0
Washoe County	1,417

(a) Data provided from Utilities Inc.

Based on the TAZ analysis, projected water demands for Reno and the County are listed in Table 5.5 and Table 5.6 respectively. The irrigation demand component is projected assuming that 6,000 gallons per month of water is consumed within a typical house, and the remainder is used for irrigation. The irrigation demand range is based on front yard only irrigation, or the combined front and back yard irrigation. Irrigation demand was not estimated for commercial or industrial use because there is no projection available for the amount of new commercial and industrial acreage that will be built by 2030. The total demands include both indoor and outdoor water use. The projected increase in demand is an approximation based upon the difference between the total demand minus the estimated demand reported in Table 5.4.

Table 5.5 - City of Reno Water Demands (a)

Condition	Irrigation Demand Component (AFA)	Total Demand Including Irrigation (AFA)	Projected Increase in Demand (AFA)
2030 (b)	1,668-3,336	6,729	6,729
2095 (c)		8,771	8,771

(a) Based on TAZ analysis, minus estimated demands from Table 5.4.

(b) Based on 7,538 dwelling units and 1,605 acres of commercial and industrial land use.

(c) Based on 10,137 dwelling units and 1,605 acres of commercial and industrial land use.

Table 5.6 - Washoe County Water Demands

Condition	Irrigation Demand Range (AFA)	Total Demand Including Irrigation (AFA)	Projected Increase in Demand (AFA) (a)
2030 (b)	278-555	2,967	1,550

(a) Based on TAZ analysis, minus estimated demands from Table 5.4.

(b) Based on 4,782 dwelling units and 231 acres of commercial and industrial land use.

An estimate of water demands associated with domestic wells is listed in Table 5.7 for Reno and the County. In the TAZ analysis, existing houses were analyzed the same way whether the house has a domestic well, or not. The total demands projected in Tables 5.5 and 5.6 include demands from houses with an existing well.

Table 5.7 - Domestic Well Demands

	Number of Domestic Wells	Domestic Well Conversion Demands (AFA) (a)
Reno	7	8
County	213	239
Total	220	247

(a) Domestic well conversion based on 1.12 AFA per well

5.5.3 Water Resources

Existing water resources available to the Cold Springs area include the Utilities Inc. groundwater supply wells. Utilities Inc. owns water rights in two separate hydrographic basins (Long Valley and Cold Springs Valley).

The Fish Springs Water Supply Project will provide 8,000 AF of new water per year for development. The water will be delivered to the northeast portion of Lemmon Valley, and will be available for use in early 2008 within both the City of Reno and Washoe County TMSA in Stead and Lemmon Valley. Additional water resources from the Intermountain Water Supply Project may also become available in the near future. The project has received permitting approvals from the BLM and Washoe County, and could be implemented within a one-year time frame once all construction related approvals have been obtained. This water could be made available to development in Cold Springs with transmission facility improvements in the Stead area.

Substantial amounts of reclaimed water, up to 5,030 AFA, could also be made available with improvements to the Cold Springs WRF as new development generates additional wastewater flows. High quality reclaimed water is suitable for landscape irrigation, including residential areas, and could be used to extend the available potable water supplies. Landscape irrigation accounts for approximately half of the total water demand for a typical residential unit. Water demands could be further reduced by implementing water conserving landscaping practices and/or xeriscaping.

Existing and potentially available water resources to serve both Reno and Washoe County TMSA in Cold Springs are presented in Table 5.8.

Table 5.8 - Potentially Available Water Resources

Source Description	Supply (AFA)
Existing Resources	
Utilities Inc. Groundwater	1,417
Reclaimed Water	(a)
Total	1,417
Future Resources	
Utilities Inc. Groundwater	987 (b)
Fish Springs Water Supply Project	8,000 (c)
Intermountain Water Supply Project	2,000 (c)
Total	10,987

(a) Reclaimed water may be used to supplement water resources for non-potable uses.

(b) Committed to existing approved uses.

(c) Water resources potentially available to Stead, Lemmon Valley, Cold Springs and Spring Mountain.

A comparison of the existing and future resources, water demand for the existing conditions and the potential 2030 demand is shown in Table 5.9. The total demand estimate includes potential water requirements of 247 AF for domestic wells. The estimated need for additional water resources for the Reno and Washoe County TMSA is approximately 6,729 AFA and 1,550 AFA, respectively, for a total need of 8,279 AF. This compares favorably with the potentially available water resources of 10,987 AF. However, interest has been expressed in use of a portion of the 10,000 AF from the Fish Springs and Intermountain water resources in areas outside of Cold Springs, including the TMSA in Stead, Lemmon Valley and Spring Mountain. The demand for potable water supplies for these areas exceeds the proposed water supply from the Fish Springs and Intermountain projects. Future potential water resources are discussed in Section 13. Expanded uses for reclaimed water, such as front and back yard residential landscape watering, will be needed to help fulfill the development potential within the Reno and County TMSA.

Table 5.9 - Water Demand and Resources Comparison

Condition	Supply (AFA)	City of Reno Demand (AFA)	County Demand (AFA)	Total Demand (AFA)
Existing	1,417	-	1,417	1,417
2030	12,404	6,729	2,967	9,696
Net Increase	10,987 (a)	6,729	1,550	8,279

(a) 10,000 AF of water resources potentially available and shared between Stead, Lemmon Valley, Cold Springs and Spring Mountain TMSA.

5.5.4 Planned Water Facilities

Backbone distribution system facilities were developed to supply 2030 demands resulting from new growth in the Cold Springs area. These facilities appear in Figure 5-5. Although the Stead and Cold Springs areas are being reported separately, they have transmission facilities in common and rely on the same water resources. The currently available water resources are limited and insufficient to meet the projected 2030 Stead, Lemmon Valley and Cold Springs demand. However, the water facilities for the Cold Springs area are sized assuming sufficient water resources become available in the future. If this does not occur, facilities will need to be re-evaluated and potentially decreased in size based upon the available water supply.

The planned water system improvements lie within the Washoe County and Utilities Inc. service territories. The proposed facilities were not integrated with the existing Utilities Inc. water system. Potential infrastructure savings could be realized with a conjunctive use operation of the two water systems. This level of analysis was beyond the scope of this project. The recommended water facility infrastructure is summarized in Table 5.10.

Table 5.10 - Water Facility Totals

Facility	Qty
Total Length of proposed Transmission Mains	±73,000 Linear Feet
Total number of Pump Stations	3 Pump Stations
Total # of Tanks and Storage Volume	4 Tanks totaling 9.6 MG

5.5.5 Water Facility Cost Estimates

The estimated costs of the recommended water infrastructure are summarized in Table 5.11. A portion of the transmission system improvements in Stead are included in the cost estimates, based on a potentially available supply capacity of 3,900 GPM. If additional water resources become available in the future, supply facilities and costs will need to be re-evaluated and potentially increased in size. However, facilities within Cold Springs, including the proposed pump station located at the Stead / Cold Springs boundary, are sized to satisfy the 2030 maximum day demand of 12,500 GPM. These facilities may be oversized, and need to be re-evaluated based upon the available future water supply. (Appendix B provides more detail on cost estimates.) Costs of the proposed transmission mains, pump stations and storage tanks were included. Individual pressure reducing stations are not included in the cost estimates, as these facilities are generally considered development specific, on-site improvements. In addition, the costs of purchasing water rights were not included.

Table 5.11 - Water Infrastructure Costs (a)

Facility Description	Total Cost ($M)	Reno Share of Facility ($M)	County Share of Facility ($M)
Supply (b)	$40.0	Not available	Not available
Transmission (c)	$44.7	$38.8	$5.9
Storage	$13.4	$11.7	$1.7
Total	$98.1	$50.5	$7.6

(a) 20 Cities ENRCCI = 7,942 May 2007

(b) Water rights costs are not included. Supply costs are based upon $40M of the $100M Fish Springs project, and $22M for the Intermountain project with the remainder of the cost allocated to the Stead area. The exact allocation of supply and cost is unknown.

(c) A portion of the costs ($10,730,000) of the transmission mains in Stead supply approximately 31% (3,900 GPM) of the total Cold Springs demand.

The allocation of cost between Reno and the County was proportional to flow (pipes and pump stations) or volume (tanks).

5.5.6 Water Planning Limitations

Specific limitations for water planning in the Cold Springs area are listed below.

- Insufficient water resources are available to serve the projected 2030 demands in the Stead, Lemmon Valley and Cold Springs areas (projected increase in demand of

approximately 18,485 AF, compared to potentially available resources of 11,909 AF). Water supply improvements within the Stead system are sized to provide 3,900 GPM to Cold Springs. However, the water facilities within the Cold Springs area are sized to accommodate the 2030 demands assuming sufficient water resources become available in the future.

- The proposed facilities were not integrated with the existing Utilities Inc. water system. Potential infrastructure savings could be realized with a conjunctive use operation of the two water systems.

- The proposed facilities identified in this plan are for serving new growth and not intended to remediate any existing system deficiencies.

- Single backbone mains were used to supply water throughout the TMSA. As development occurs, it is likely that an equivalent transmission capacity will be conveyed by a distribution network rather than by a single backbone main.

- The allocation of cost between Reno and Washoe County is an approximation. Further analysis will be required to determine the appropriate cost allocation for specific facilities.

5.6 WASTEWATER

The projected wastewater flows and required infrastructure for conveyance, treatment, and disposal are developed in this section.

5.6.1 Assumptions, Planning Criteria, and Methodology

The wastewater flow factor for the Cold Springs area was assumed from the 2007 Washoe County 208 Water Quality Management Plan. The flow factor ranged from a low of 110 gallons per capita per day (gpcd) to 130 gpcd. An average of 120 gpcd was used for flow projection. All other wastewater planning assumptions are as stated in Appendix A for the City and County areas.

5.6.2 Existing and Future Wastewater Flow

The 2006 annual average wastewater flows for Cold Springs WRF are listed in Table 5.12.

Table 5.12 - Existing Wastewater Flows

	2006 Annual Average Flows (MGD) (a)
Cold Springs WRF	0.26

(a) Based on 2006 facility flow records.

Using the TAZ data, flow was projected for the Reno and County TMSA. The water reclamation facility projections for Reno and the County are presented in Tables 5.13 and 5.14, respectively.

Wastewater treatment for the majority of new development within the Reno TMSA is anticipated to be provided by expansion of the Cold Springs WRF or a new treatment facility.

Table 5.13 - City of Reno Wastewater Projections (a)

Condition	Flows (MGD)
2030 (b)	3.10
2095 (c)	3.79

(a) Based on TAZ analysis.

(b) Based on 7,538 dwelling units and 1,605 acres of commercial and industrial land use.

(c) Based on 10,137 dwelling units and 1,605 acres of commercial and industrial land use.

Table 5.14 - Washoe County Wastewater Projections

Condition	Flows (MGD)
2030 (b)	1.43

(a) Based on TAZ analysis.

(b) Based on 4,782 dwelling units and 231 acres of commercial and industrial land use.

The potential flow projection for parcels with existing septic systems that could be connected to the municipal sewer system is listed in Table 5.15. In the TAZ analysis, existing houses were analyzed the same way whether the house has a septic system, or not. The flows projected in Tables 5.13 and 5.14 include potential flows from houses with a septic system.

Table 5.15 - Septic System Conversion Flow Projections

	Number of Septic Systems	Septic System Conversion Flows (MGD) (a)
Reno	5	0.001
County	1,384	0.277
Total	1,389	0.278

(a) Septic system conversion based on 200 gpd per septic

The 2030 total projected water reclamation facility capacity for the Cold Springs TMSA is approximately 4.5 MGD, including potential septic system conversion flows. The 208 Water Quality Plan has a projected 2030 wastewater flow range of 1.6 MGD to 2.2 MGD for Cold Springs. For this analysis, it is assumed that the existing Cold Springs WRF would be expanded to provide the necessary capacity for both the Reno and Washoe County TMSA. Nothing in this document is intended to restrict the City of Reno from developing a new water reclamation facility in Cold Springs, if upon detailed analysis, that option proves to be advantageous.

5.6.3 Water Reclamation and Disposal

The Cold Springs WRF currently disposes all treated effluent to rapid infiltration basins, and does not reclaim water for irrigation purposes. To provide additional water resources to help

fulfill the development potential within the Reno and County TMSA, and to dispose of the large quantity of effluent that will be produced, water reclamation is recommended. A reclaimed water system could be constructed throughout the Cold Springs area for landscape irrigation where it is reasonable. A higher level of treatment would be required at the reclamation facility that would allow for unrestricted irrigation. Reclaimed water is under consideration for water features and landscape irrigation within several planned developments in the area. Residential reclaimed water irrigation would only be for new development due to the high cost of retrofitting existing residential developments.

Additional water reclamation facilities under investigation include an effluent reservoir for non-irrigation season storage in the Silver Knolls vicinity, land disposal in the White Lake playa, and export to other areas such as Long Valley Creek.

5.6.4 Planned Wastewater Facilities

Recommendations for future wastewater collection and treatment facilities were developed for 2030 and are shown on Figure 5-6. Potential sites for a second water reclamation facility are shown. More detailed study would be required to determine the appropriate location. For each sewer collection area, the projected 2030 flows were compared to the capacity of the existing gravity interceptors. The collection areas are shown on Figure 5-C1 for both the City areas and County Area 2, as shown on Figure 1-A1 (Appendix A, C). Existing lift stations and force mains were not analyzed in detail for remaining available capacity. If the existing interceptors or force mains do not have capacity for the 2030 flow, a parallel pipe/facility is recommended. Future detailed design studies should determine whether replacing the existing pipe or installing a parallel main is the appropriate improvement. Facility sizing methods and calculations are included in Appendix C.

The best available information and status of current planning for regional reclaimed water facilities is shown in Figure 5-7. The regional reclaimed water facilities would likely serve the Stead, Lemmon Valley and Cold Springs areas. Additional reclaimed water distribution facilities will be required that have not been evaluated in this facility plan.

Table 5.16 - Summary of Wastewater Infrastructure

Facility	Units
Total Length of New Interceptors	20,400 feet
Total Length of New Force Mains	44,200 feet
Total Length of New Reclaimed/Disposal Pipe	58,400 feet
Total New Waste Water Lift Stations	5 stations
Total New Reclaimed/Disposal Pump Stations	3 stations
2030 Treatment Capacity for Cold Springs	4.5 MGD

5.6.5 Wastewater Facility Cost Estimates

The wastewater infrastructure costs are summarized in Table 5.17, and are listed in more detail in Appendix C. The costs are based on wastewater flow being conveyed and treated at the existing Cold Springs WRF. If expansion at the existing site is not feasible, further study would be required to determine the appropriate location for a second water reclamation facility. These facilities are for serving new growth and not to remediate existing system deficiencies.

Table 5.17 - Wastewater Infrastructure Costs (a)

Facility Description	Total Cost ($M)	Reno Share of Facility ($M)	County Share of Facility ($M)
Collection System	$32.1	$26.9	$5.2
Treatment	$52.3	$42.7	$9.6
Disposal/ Reclaimed Water	$19.3	$14.0	$5.3
Total	$103.7	$83.6	$20.1

(a) 20 Cities ENRCCI = 7,942 May 2007

The allocation of cost between Reno and Washoe County was developed from their respective share of the flow for the collection system and reclamation facilities. The reclaimed water / disposal cost includes a reclaimed water system expansion in Stead and shared regional facilities. A detailed breakdown of regional reclaimed water costs between Stead and Cold Springs is included in Appendix C.

5.6.6 Wastewater Planning Limitations

Specific limitations of the wastewater planning in the Cold Springs area are listed below.

- Wastewater flow projections are conservative because a mid-range wastewater flow factor is used. The TMWA Rule 7 water demand projections are representative of actual demands. Therefore, the percentage of wastewater flow compared to the total water demand is more than the "typical" fifty percent reported in previous planning studies.

- The feasibility of expanding the existing water reclamation facility at its present location is uncertain. Further study would be required to determine the appropriate location for a second water reclamation facility.

- Effluent disposal planning for the Cold Springs TMSA is conceptual. The best available information for regional reclaimed water facilities has been provided; however, additional facilities and costs will be required to provide disposal capacity for the projected 2030 wastewater flows.

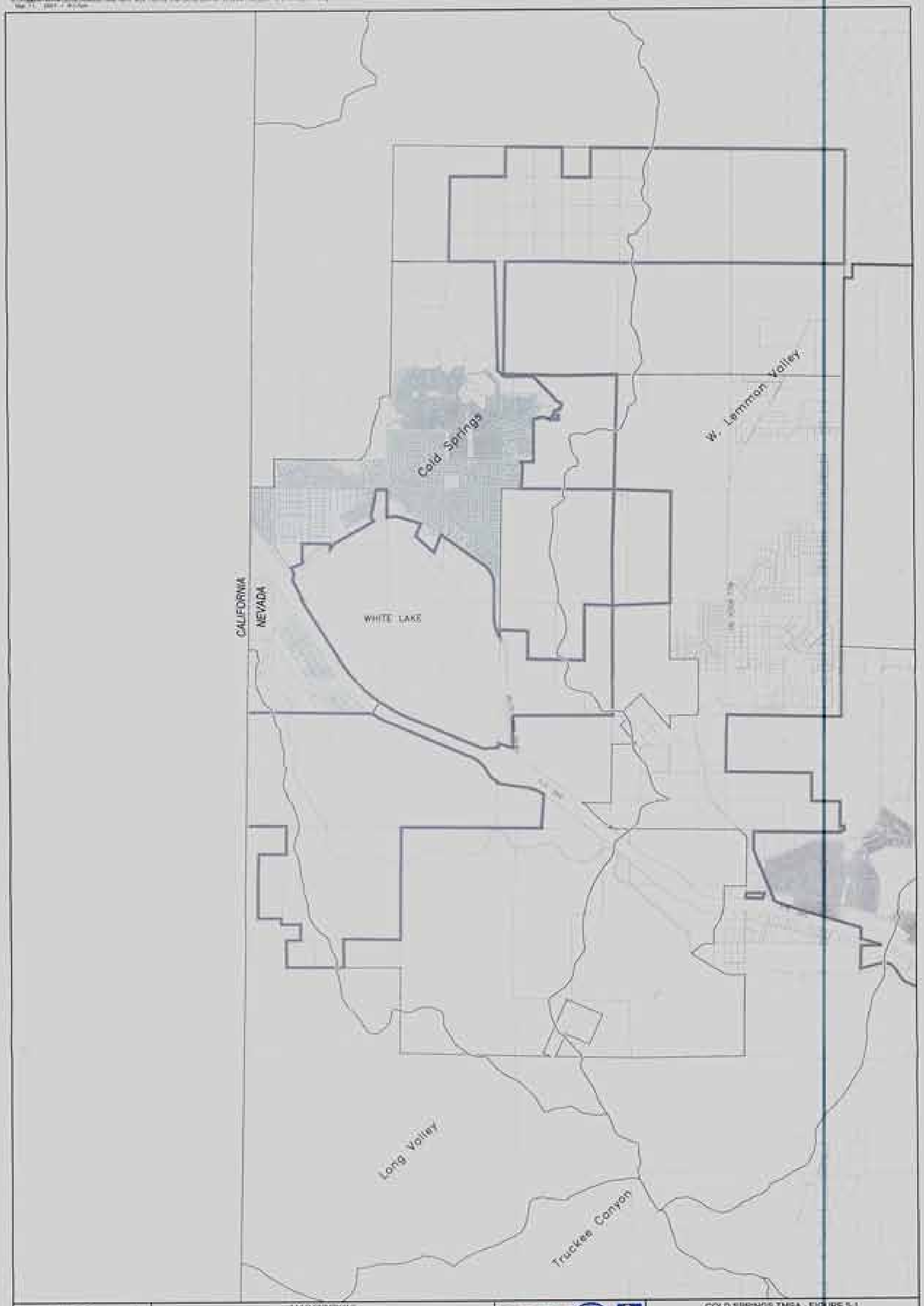
- The allocation of cost between Reno and Washoe County is an approximation. Further analysis will be required to determine the appropriate cost allocation for specific facilities.

5.7 POLICY RECOMMENDATIONS (INCLUSIVE OF WATER, WASTEWATER)

Regional water reclamation and wastewater disposal should be a coordinated effort for the Stead, Lemmon Valley and Cold Springs TMSA.

Potentially available water resources have been identified to serve the projected 2030 demands in the Cold Springs TMSA. However, insufficient water resources are available to also satisfy the needs of Stead and Lemmon Valley, which are relying on the same water resources. Expanded use of reclaimed water, such as front and back yard residential landscape watering, should be implemented where reasonable to extend available water supplies and help fulfill the development potential within the Reno and County TMSA. Water demands could be reduced by implementing water conserving landscape practices and/or xeriscaping. However, water conserving landscape practices should be balanced with the need for disposal of reclaimed water.

The proposed water facilities were not integrated with the existing Utilities Inc. water system. Potential infrastructure savings could be realized with a conjunctive use operation of the two water systems. The merits of a conjunctive use operating strategy with Utilities Inc. should be investigated.



MAP SYMBOLS

HDR

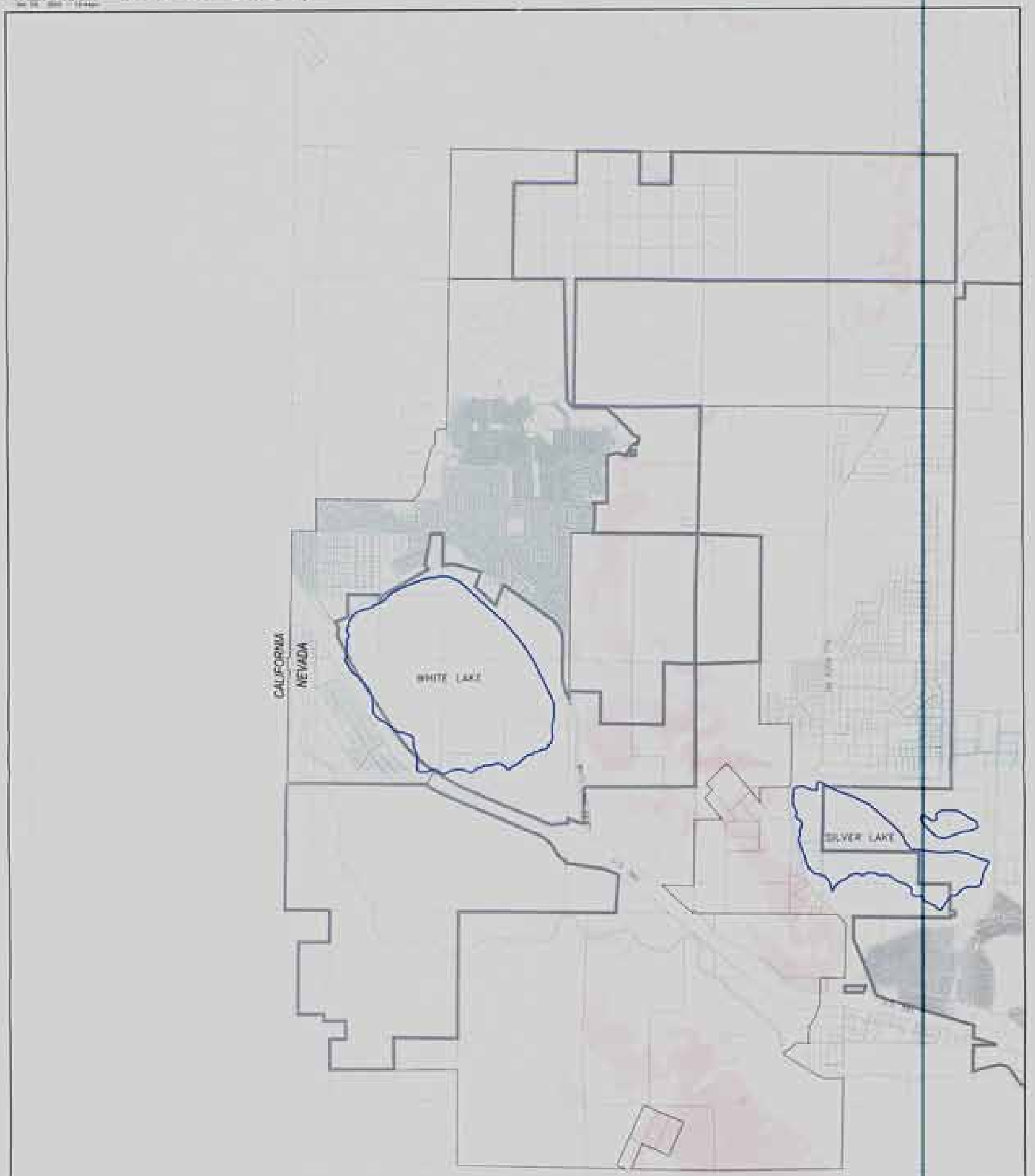
ECO:LOGIC

RWPC

COLD SPRINGS TMSA - FIGURE 5-1

STUDY AREA

COUNTY OF WASHOE, NEVADA

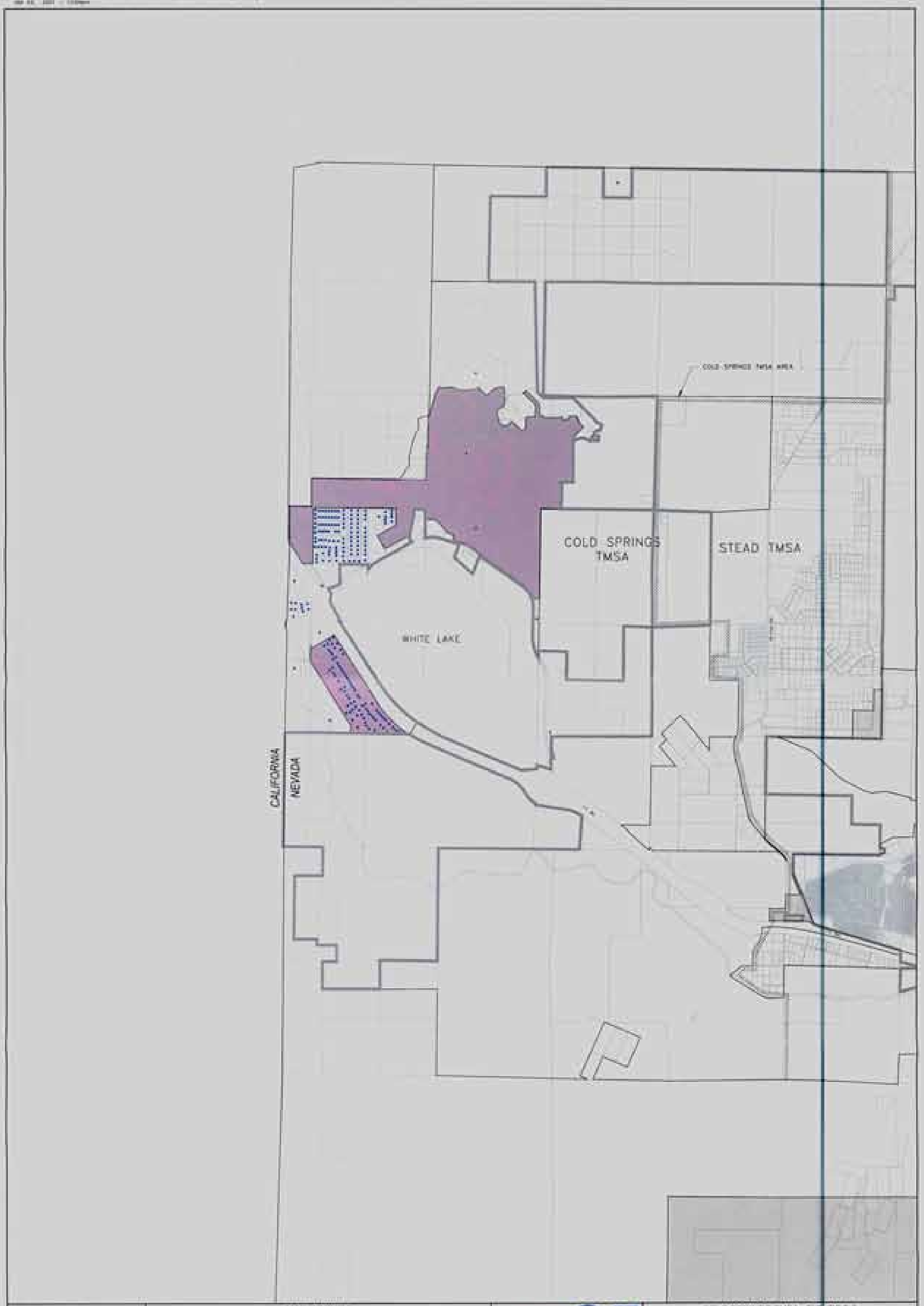


MAP SYMBOLS

- CITY OF RENO TMSA
- WASHOE COUNTY TMSA
- OUTSIDE TMSA
- CITY OF RENO LIMITS

ECO:LOGIC

COLD SPRINGS TMSA - FIGURE 5-2
AREA CONSTRAINTS
COUNTY OF WASHOE, NEVADA



MAP SYMBOLS

COLD SPRINGS TMSA - FIGURE 5-3
WATER PURVEYOR SERVICE AREA
COUNTY OF WASHOE, NEVADA

HDR

ECO:LOGIC

COLD SPRINGS WRF

Cold Springs

W. Lemmon Valley

STEAD TMSA

CALIFORNIA
NEVADA

WHITE LAKE

Long Valley

Ickes Canyon

MAP SYMBOLS

ECO:LOGIC

HDR

RWPL

COLD SPRINGS TMSA - FIGURE 5-4
WASTEWATER SERVICE AREA
COUNTY OF WASHOE, NEVADA

STEAD TMSA

WHITE LAKE

CALIFORNIA

NEVADA

HOTES:

[1] FACILITIES SIZED BASED ON PROJECTED 2030 DEMAND. INSUFFICIENT WATER RESOURCES ARE CURRENTLY AVAILABLE TO MEET THIS DEMAND.

[2] INFRASTRUCTURE LOCATIONS AND SIZES ARE CONCEPTUAL AND WILL BE REFINED WHEN MORE DETAILED FACILITY PLANS ARE DEVELOPED.

PROPOSED PIPE DIAMETER (IN)

10
12
14
16
18
20
24
30
36

FACILITY LEGEND

EXISTING WELL
EXISTING TANK
PROPOSED TANK
PROPOSED PUMP STATION
EXISTING PUMP STATION

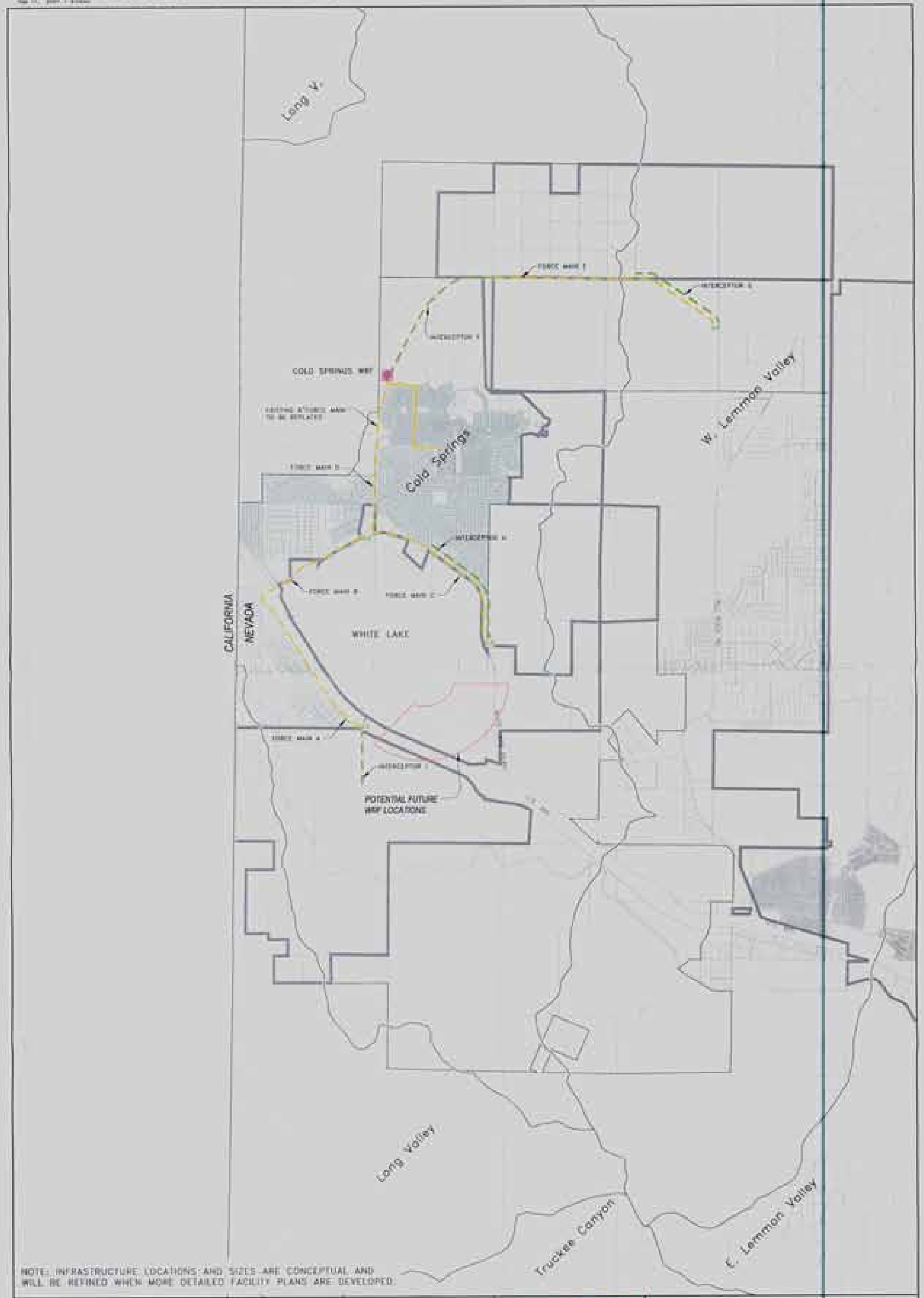
MAP SYMBOLS

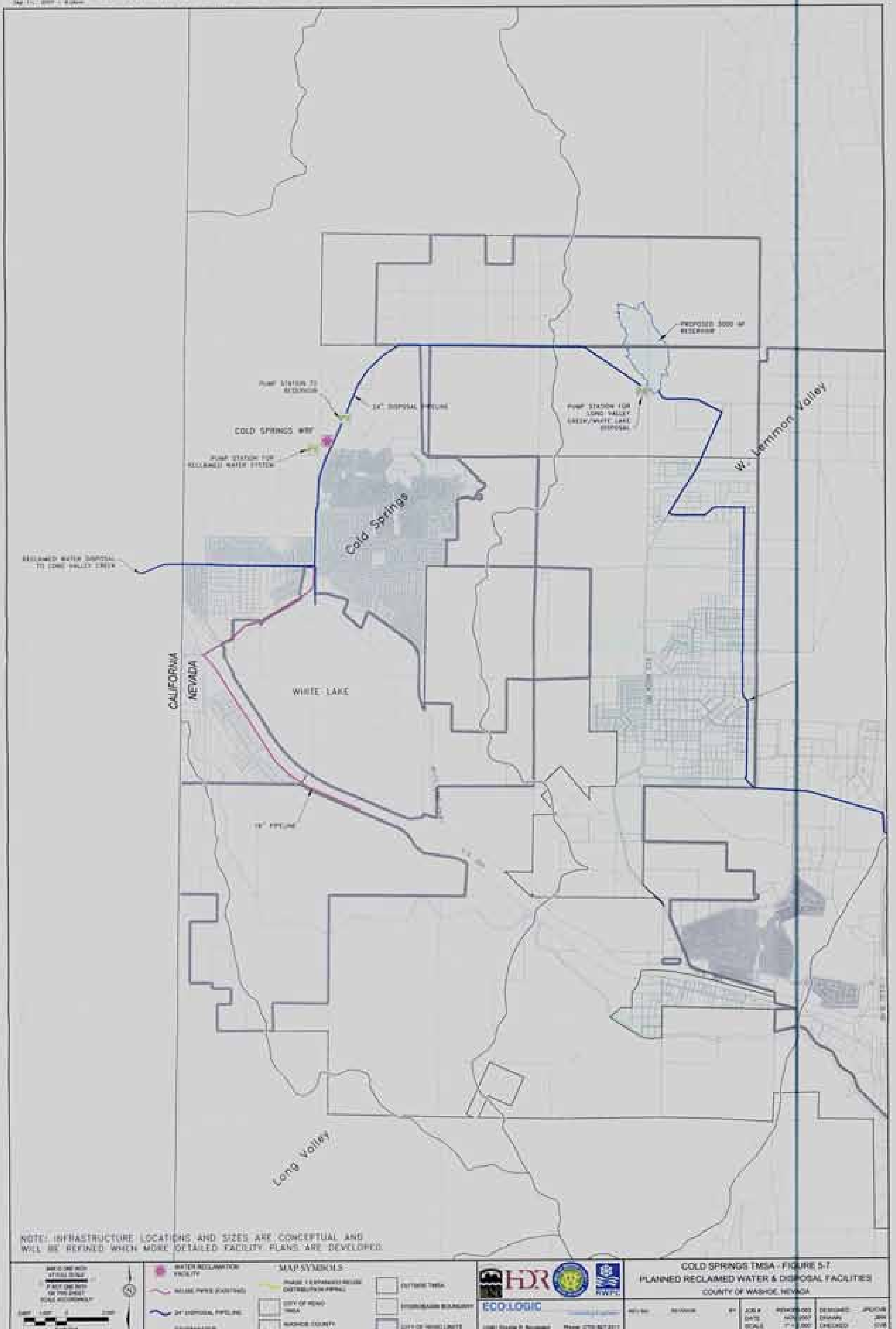
TMSA RETAIL AREA
TMSA SPHERE OF INFLUENCE
WASHOE COUNTY SPHERE OF INFLUENCE
UTILITIES INC. SERVICE AREA

ECO:LOGIC

HDR

COLD SPRINGS TMSA - FIGURE 5-5
PLANNED TMSA WATER FACILITIES
COUNTY OF WASHOE, NEVADA


Long V.
COLD SPRINGS WRF
Cold Springs
W. Lemmon Valley
CALIFORNIA
NEVADA
WHITE LAKE
POTENTIAL FUTURE
WRF LOCATIONS
Long Valley
Truckee Canyon
E. Lemmon Valley
NOTE: INFRASTRUCTURE LOCATIONS AND SIZES ARE CONCEPTUAL AND
WILL BE REFINED WHEN MORE DETAILED FACILITY PLANS ARE DEVELOPED.
MAP SYMBOLS
HDR
ECO:LOGIC
COLD SPRINGS TMSA - FIGURE 5-6
PLANNED WASTEWATER COLLECTION & TREATMENT FACILITIES
COUNTY OF WASHOE, NEVADA


PROPOSED 3000 AF RESERVOIR
PUMP STATION 73 RESERVOIR
24" DISPOSAL PIPELINE
COLD SPRINGS WRF
PUMP STATION FOR RECLAIMED WATER SYSTEM
PUMP STATION FOR LONG VALLEY CREEK/WHITE LAKE DISPOSAL
W. Lemmon Valley
Cold Springs
RECLAIMED WATER DISPOSAL TO LONG VALLEY CREEK
CALIFORNIA
NEVADA
WHITE LAKE
18" PIPELINE
Long Valley
NOTE: INFRASTRUCTURE LOCATIONS AND SIZES ARE CONCEPTUAL AND WILL BE REFINED WHEN MORE DETAILED FACILITY PLANS ARE DEVELOPED.
MAP SYMBOLS
WATER RECLAMATION FACILITY
24" DISPOSAL PIPELINE
CITY OF RENO TMSA
WASHOE COUNTY TMSA
EXTERIOR TMSA
HYDROGRAPHIC BOUNDARY
CITY OF RENO LIMITS
HDR
ECO:LOGIC
COLD SPRINGS TMSA - FIGURE 5-7
PLANNED RECLAIMED WATER & DISPOSAL FACILITIES
COUNTY OF WASHOE, NEVADA

Section 6
Stead / Lemmon Valley

Table of Contents

List of Tables

List of Figures – Included at End of Section

Section 6 - Stead and Lemmon Valley TMSA

6.1 STUDY AREA DESCRIPTION AND DEVELOPMENT CONSTRAINTS

The Stead / Lemmon Valley TMSA is shown on Figure 6-1 (see figures at end of section) and includes areas within the jurisdiction of both the City of Reno and Washoe County. There are two hydrobasins covering this area that are known as West and East Lemmon Valley. Surface runoff within the West Lemmon Valley basin drains to the Silver Lake playa. Surface runoff within the East Lemmon Valley basin drains to the Swan Lake playa. The TMSA is complex from the perspective of whether particular areas are under the jurisdiction of either the City of Reno or Washoe County, who the water and wastewater purveyors are, and who has responsibility for stormwater and floodplain management. Additionally, the Swan Lake Advisory Board has responsibility for planning and management of the Swan Lake playa and surrounding public open space.

The City of Reno portion of the TMSA generally includes the central portion of the TMSA known as Stead and the North Virginia Corridor. Included within this area are the Reno-Stead Regional Airport Center, the North Virginia Transit Oriented Development Corridor (TOD), and a significant amount of existing and proposed future residential, commercial, and industrial development.

As mentioned in Section 1, the land use basis for facility planning was Traffic Analysis Zone (TAZ) data provided by the City of Reno and Washoe County, with supplemental information derived from the City's Master Plan and Washoe County planned land uses. These data were modified with more detailed information provided by the University of Nevada, Reno (UNR) Small Business Development Center and developer's representatives. TAZ identifications where more current information was incorporated are listed in Table 6.1 and shown in Figure 6-A1 (Appendix A).

Table 6.1 - TAZ Data Modification

TAZ	Modification
399	Used water demands from the North Valley Water Supply Comparison report
405	Modified dwelling units from UNR approved unbuilt data
408	Modified dwelling units from UNR approved unbuilt data
631	Modified dwelling units from UNR approved unbuilt data
634	Modified dwelling units from UNR approved unbuilt data
688	Modified dwelling units from UNR approved unbuilt data
806	Modified dwelling units using Wallach IX planning data

Areas that are limited or constrained for future development include the Reno-Stead Airport, Silver Lake playa, Swan Lake playa, floodplains, and areas with slopes greater than thirty percent. These areas are shown on Figure 6-2.

6.2 CONCLUSIONS AND SUMMARY RECOMMENDATIONS

Insufficient water resources exist to serve the projected 2030 demands in Stead and Lemmon Valley, when potential demands for Cold Springs are taken into consideration. The projected increase in demand is approximately 18,485 AF, compared to the potentially available water resources of 11,909 AF. Expanded use of reclaimed water, such as front and back yard residential landscape watering, should be implemented where reasonable to extend available water supplies and help fulfill the development potential within the Reno and County TMSA. Future potential water resources are discussed in Section 13.

In Stead and Lemmon Valley, an estimated 3,467 AF of new residential irrigation demand may be served by reclaimed water.

The 2030 total projected wastewater treatment plant capacity for the Stead and Lemmon Valley TMSA is approximately 7.5 MGD, including potential septic system conversion flows. Regional water supply, water reclamation and wastewater disposal should be a coordinated effort for the Stead, Lemmon Valley and Cold Springs TMSA because of their common effluent disposal constraints.

A summary of the estimated water and wastewater costs for the proposed infrastructure is listed in Table 6.2.

Table 6.2 - Infrastructure Costs (a)

Facility Description	Total Cost ($M)
Water	$171.5
Wastewater	$251.2

(a) 20 Cities ENRCCI = 7,942 May 2007

6.3 DESCRIPTION OF SERVICE PROVIDERS

The water and wastewater service providers are described in the following sections.

6.3.1 Water

The Stead / Lemmon Valley area is served by two main water purveyors, Truckee Meadows Water Authority (TMWA) and Washoe County. Initially, the City of Reno portions of Stead were entirely served by TMWA. Now that the City has expanded its annexation and TMSA, there are portions of the City of Reno that lie within the Washoe County Department of Water

Resources water service area. This complicates matters when describing facilities, service areas, and City/County jurisdictional areas.

Two other small water purveyors include Silver Knolls Mutual Water Company that serves the Silver Knolls area and the Three T Water Company that serves a small county area south of Highway 395. These water systems were not analyzed as part of this report.

TMWA provides water service to existing customers within the majority of Reno's TMSA in Stead. Washoe County is the water purveyor for the remainder of the Stead / Lemmon Valley TMSA, including the portion of Reno's TMSA lying in the northwest portion of the TMSA and the northern portion of the Reno-Stead Airport properties. Figure 6-3 depicts the water purveyor service areas, Reno City limits, and locations of existing domestic wells.

6.3.2 Wastewater

The City of Reno provides wastewater collection, treatment and disposal for Reno's Stead TMSA with wastewater flows being treated at the City's Reno-Stead Water Reclamation Facility (RSWRF). RSWRF is also anticipated to provide service to a significant portion of Washoe County's TMSA within the Lemmon Valley area. Washoe County presently provides wastewater collection, treatment and disposal to existing customers in the Lemmon Valley area at the Lemmon Valley Wastewater Treatment Plant (LVWWTP). Wastewater service for the majority of new development within the County TMSA is anticipated to be provided by expansion of the RSWRF facility. Washoe County's Golden Valley is served by the Cities of Reno's and Sparks' Truckee Meadows Water Reclamation Facility (TMWRF). Figure 6-4 depicts the locations of the RSWRF and LVWWTP, areas anticipated to be served by these facilities, and the locations of existing parcels with septic systems.

6.4 STATUS OF INFRASTRUCTURE PLANNING

The Stead and Lemmon Valley TMSA is poised for development with the implementation of new water supply projects for the area and the expansion of the RSWRF.

Historically, development within the area has been limited due to a lack of available water supplies. The TMWA service capability has been limited by the available capacity of the Stead Main, which supplies water to Stead from the Central Truckee Meadows. Additionally, groundwater resources within the TMWA and Washoe County water systems have been fully allocated.

Vidler Water Company is constructing the Fish Springs Water Supply Project, and TMWA is constructing the North Virginia / Stead Pumping System Improvements. With these two water supply projects, and the Intermountain Water Supply project also under development, over 10,000 AF of new water supplies will be available to support development within the Reno and Washoe County TMSA.

With the implementation of these water supply projects underway, Reno has expanded the capacity of the RSWRF. Present capacity is 2.35 MGD, with improvements to further increase capacity to 3.25 MGD under design. Washoe County currently has no plans to expand the LVWWTP, but it will be maintained in operation for the foreseeable future to serve existing customers in Lemmon Valley. Because the Stead and Lemmon Valley area is a closed basin, disposal of the treated wastewater is a challenge. Presently, treated wastewater is reused for irrigation of parks, a golf course and open spaces, and is supplied to Swan Lake to enhance wetland habitat.

As the need for additional wastewater disposal capacity increases, plans are to provide a small amount of additional reclaimed water to the Swan Lake wetlands, and expand the use of reclaimed water for proposed water features and landscape irrigation within new developments. Implementation of other disposal options, such as rapid infiltration basins or export to other basins such as Bedell Flat and Long Valley Creek, are also under investigation. These other disposal options are necessary to manage the overall water resources of the area, taking into consideration water supply, wastewater treatment and disposal, and flood control.

Stormwater management and flood control are also very important considerations that affect water and wastewater issues in the Stead and Lemmon Valley TMSA. Geographically, the areas lie within a closed basin, so precipitation and runoff stays within the basin. Presently, stormwater runoff is routed to Swan Lake and Silver Lake. Since there is very little percolation from these playa lakes, the water persists for several months or seasons until it evaporates. Each of these lakes has established FEMA 100-year flood elevations. Recent planning work indicates that more severe flooding may occur at Silver Lake than identified by the current flood elevation. Furthermore, additional runoff resulting from development in the Swan Lake watershed will need to be mitigated to prevent an increase in the flood elevation. Stormwater management and flood control are discussed in Section 14.

The most recent facility plans for water and wastewater are listed in Table 6.3.

Table 6.3 - Recent Facility Plans

Plan Name	Date	Description
Water		
North Valley Water Supply Comparison Reference: ECO:LOGIC Engineering	Oct. 2002	Detailed analysis of water supply alternatives that will support the build-out land uses in the Stead, Lemmon Valley, and Cold Springs regions of Washoe County.
North Valley Water Facility Plan Update Reference: ECO:LOGIC Engineering	Jan. 2007	Identification of the backbone water infrastructure that would be required to serve new development once new water resources from the Fish Springs Water Supply Project and Intermountain Water Supply Project become available.
North Virginia Stead Pumping System Improvements Reference: ECO:LOGIC Engineering	Sept. 2005	Evaluate design options and develop the proposed design criteria for the pump station, pipeline and tank to replace the Stead Main and North Virginia pump zone facilities.

Fish Springs Ranch Facility Plan Reference: ECO:LOGIC Engineering	Sept. 2005	Construction of the Fish Springs Water Supply Project to meet future water demands for the Stead, Silver Lake and Lemmon Valley area (North Valleys) within the Truckee Meadows Services Area. The project consists of a new electrical substation off of the Alturas Transmission Line, groundwater production wells, a pump station, a transmission pipeline and terminal water storage tank to convey water from Fish Springs Ranch to the North Valleys. The facilities will be sized to supply 8,000 AFA.
2005-2025 Water Facility Plan Reference: TMWA	Dec. 2004	Describes the necessary water distribution and treated water storage facilities to meet the forecasted demands and resource optimization goals in the 2025 water resource plan.
Wastewater		
North Valley Effluent Disposal Options Reference: ECO:LOGIC Engineering	Sept. 2005	Evaluation of effluent disposal strategies in the North Valleys.
Reno Stead Wastewater Reclamation Facility Expansion Design Report Reference: ECO:LOGIC Engineering	April 2004	Provide the necessary additional capacity, unit process redundancy and other improvements required to reliably treat wastewater generated in the planning area in order to accommodate growth, improve treatment flexibility, and provide process redundancy.
Regional Water Master Plan Amendment-Disposal Options Reference: ECO:LOGIC Engineering	July 2006	This Amendment sets forth the objectives and strategy to address wastewater disposal planning for the Stead / Lemmon Valley area.
Draft Washoe County 208 Water Quality Plan Version 3 Reference: Truckee Meadows Regional Planning Agency	January 2007	Per section 208 of the Clean Water Act this report provides the planning and management of all sources of water pollution and defines the parameters for area-wide wastewater management plans.

6.5 WATER

The projected water demands and required infrastructure are developed in this section.

6.5.1 Assumptions, Planning Criteria, and Methodology

Water demand factors used to generate demand are based on TMWA design standards for both the TMWA and County areas. The TMWA Rule 7 demand factors are also relevant to the County because new development will dedicate water resources in accordance with TMWA water rights dedication policies.

In the case of non-residential development, the demand factor used represents an average number for planning purposes only. When TMWA or Washoe County receives a request for water service on a non-residential property, the actual water rights dedication requirement will be based on a project-specific analysis of the number of fixture units and the specific landscaping plan. This level of detail is not available for this analysis.

6.5.2 Existing and Future Water Demand

Estimated water demands for Reno and the County are listed in Table 6.4, and are based on data provided by the County and TMWA. The demand estimates are approximate and are representative of typical demands that could be expected without the influence of seasonally cool/wet or hot/dry periods that tend to skew the historical record.

Table 6.4 - Existing Water Demands

	Estimated Demand (AFA)
City of Reno	4,035
Washoe County	791

Based on the TAZ analysis, projected water demands for Reno and the County are listed in Table 6.5 and Table 6.6, respectively. The irrigation demand component is projected assuming that 6,000 gallons per month of water is consumed within a typical house, and the remainder is used for irrigation. The irrigation demand range is based on front yard only irrigation, and the combined front and back yard irrigation. Irrigation demand was not estimated for commercial or industrial use because there is no projection available for the amount of new commercial and industrial acreage that will be built by 2030. The total demands include both indoor and outdoor water use. The projected increase in demand is an approximation based upon the difference between the total demand minus the estimated demand reported in Table 6.4.

Table 6.5 - City of Reno Water Demands (a)

Condition	Irrigation Demand Component (AFA)	Total Demand Including Irrigation (AFA)	Projected Increase in Demand (a) (AFA)
2030 (b)	660-1,320	8,280	4,245
2095 (c)		13,417	9,382

(a) Based on TAZ analysis, minus estimated demands from Table 6.4.

(b) Based on 12,728 dwelling units and 2,199 acres of commercial and industrial land use.

(c) Based on 23,085 dwelling units and 2,199 acres of commercial and industrial land use.

The water rights/demands associated with the potential for intensified development within the Reno-Stead Regional Airport Center and North Virginia TOD were compared to the overall demand for the Stead / Lemmon Valley TMSA. Of the 2030 City of Reno water rights requirement, approximately 3,560 AFA or 43 percent is estimated to be within the TOD and Center area. This includes new demands, and potential redevelopment of existing properties.

Table 6.6 - Washoe County Water Demands

Condition	Irrigation Demand Component (AFA) (b)	Total Demand Including Irrigation (AFA) (b)	Projected Increase in Demand (a) (AFA)
2030	1,074- 2,147	5,807	5,016

(a) Based on TAZ analysis, minus estimated demands from Table 6.4.

(b) Based on 13,362 dwelling units and 99 acres of commercial and industrial land use.

An estimate of water demands associated with domestic wells is listed in Table 6.7 for Reno and the County. In the TAZ analysis, existing houses were analyzed the same way whether the house has a domestic well, or not. The flows projected in Tables 6.5 and 6.6 include demands from houses with an existing well.

Table 6.7 - Domestic Well Demands

	Number of Domestic Wells	Domestic Well Demands (AFA) (a)
Reno	184	206
County	1,760	1,971
Total	1,944	2,177

(a) Domestic well conversion based on 1.12 AFA per well

6.5.3 Water Resources

Existing water resources available to the Stead and Lemmon Valley area include Truckee Meadows surface and groundwater delivered by TMWA through the Stead Main, and local groundwater resources. The North Virginia / Stead Pumping System Improvement Project will increase supply capacity to the City of Reno TMSA. As part of this project, TMWA is also providing a new 990 GPM wholesale water supply to Washoe County for its TMSA in the Lemmon Valley and Golden Valley areas. It is anticipated that this water supply project will provide new development with approximately 200 to 400 AFA within the TMWA service area, and 400 to 500 AFA for Washoe County.

The Fish Springs Water Supply Project will provide 8,000 AF of new water per year for development. The water will be delivered to the northeast portion of Lemmon Valley, and will be available for use in early 2008 within both the City of Reno and Washoe County TMSA in Stead and Lemmon Valley. Additional water resources from the Intermountain Water Supply Project may also become available in the near future. The project has received permitting approvals from the BLM and Washoe County, and could be implemented within a one year time frame once all construction related approvals have been obtained.

Substantial amounts of reclaimed water, up to 8,050 AFA, could also become available from RSWRF as new development generates additional wastewater flows. This high quality reclaimed water is suitable for landscape irrigation, including residential areas, and could be used to extend the available potable water supplies. Landscape irrigation accounts for approximately half of the total water demand for a typical residential unit. Water demands could be further reduced by implementing water conserving landscape practices and/or xeriscaping.

Existing and potentially available water resources to serve both the City of Reno and Washoe County TMSA in the Stead and Lemmon Valley area are presented in Table 6.8.

Table 6.8 - Potentially Available Water Resources

Source Description	Supply (AFA)
Existing Resources	
TMWA Truckee Meadows Surface / Non-Stead Groundwater	3,265 (a)
TMWA Stead Groundwater	770
Washoe County Groundwater	1,258
Reclaimed Water	(b)
Total	**5,293**
Future Resources	
TMWA Truckee Meadows Surface / Groundwater	750 (c)
Remaining Groundwater Rights from Golf Course	172
Fish Springs Water Supply Project	8,000 (d)
Intermountain Water Supply Project	2,000 (d)
Total	**10,922**

(a) Approximation of existing utilization of committed water resources.

(b) Reclaimed water may be used to supplement water resources for non-potable uses.

(c) TMWA supply is intended for use only in areas with a return flow to the Truckee River.

(d) Water resources potentially available to Stead, Lemmon Valley, Cold Springs and Spring Mountain.

A comparison of the existing and future resources, water demand for existing conditions and the potential 2030 demand is shown in Table 6.9. The total demand estimate includes potential water requirements of 2,177 AF for domestic wells. The estimated need for additional water resources for the Reno and Washoe County Stead and Lemmon Valley TMSA is approximately 4,245 AFA and 5,960 AFA, respectively, for a total need of 10,205 AF. This compares favorably with the potentially available water resources of 10,922 AF.

Table 6.9 - Water Demand and Resources Comparison

Condition	Supply (AFA)	City of Reno Demand (AFA)	County Demand (AFA)	Total Demand (AFA)
Existing	5,293	4,035	791	4,826
2030	16,215	8,280	6,751	15,031
Net Increase	10,922 (a)	4,245	5,960	10,205

(a) 10,000 AF of water resources potentially available and shared between Stead, Lemmon Valley, Cold Springs and Spring Mountain TMSA.

However, interest has been expressed in use of a portion of the 10,000 AF from the Fish Springs and Intermountain water resources in areas outside of Stead and Lemmon Valley, including the TMSA in Cold Springs and Spring Mountain. Changes to the Place of Use for the water rights would need to be filed and approved by the State Engineer. If approved, the demand for potable water supplies for these areas will exceed the available supplies from the Fish Springs and Intermountain projects. Expanded uses for reclaimed water, such as front and back yard residential landscape watering, will be needed to help fulfill the development potential within the Reno and County TMSA. Future potential water resources are discussed in Section 13.

6.5.4 Planned Water Facilities

Both TMWA and the County have recently prepared water facility plans for their systems in the Stead / Lemmon Valley area that identify the required improvements to accommodate growth and remediate existing system deficiencies in their service territories.

Proposed additional improvements to serve the Reno and County TMSA lie within the Washoe County Department of Water Resources service territory and have been integrated with the County's previous water facility plan. No further planning within TMWA's service territory was conducted. A summary of TMWA's planned facility improvements for the Stead area is presented in Table 6.10 and shown graphically in Figure 6-B3 (Appendix B). The source of this information is TMWA's 2025 Water Facility Plan.

Backbone distribution system facilities are planned that supply a maximum day demand of 18,350 GPM to meet projected growth in the Lemmon Valley, Stead Airport, Silver Knolls, North Virginia Corridor and portions of the Cold Springs regions. These regions, with the exception of Cold Springs, generally comprise the Stead and Lemmon Valley TMSA. These facilities convey the currently available resource while satisfying design criteria. It is important to note that certain transmission facilities for the Stead and Lemmon Valley TMSA have capacity sized to provide water supplies to the Cold Springs TMSA.

A high pressure backbone transmission main is planned that serves all but the highest reaches of the Stead / Lemmon Valley TMSA. The hydraulic grade of the transmission main is 5,311 feet, established by the proposed Intermountain and East Lemmon Tank elevations (see Figure 6-5). Two pump stations are planned that serve higher elevations in the Silver Knolls and Horizon Hills areas. County Area 8 (see Figure 1-A1 in Appendix A) would be served by these facilities.

Maximum pressures in the transmission main are approximately 170 psi. The high pressure backbone main has cost and operational advantages when compared to a conventional pressure transmission main. Results of a planning level cost analysis indicate a capital cost savings with a high pressure main of around $16 million. Lower capital (and O&M) costs are primarily due to fewer required pump stations and storage tanks.

All existing and proposed wells are located on the east side of Silver Lake in the Lemmon Valley region. Well locations are presented in Figure 6-5. The proposed wells will need to be constructed when the imported water capacity approaches its full maximum day allocation. The peaking capacity of several of the existing wells will also need to be increased to meet maximum day demands. However, annual groundwater usage will not increase as additional supplies will be brought into the North Valleys area. A summary of the recommended TMSA facilities is presented in Table 6.10 and illustrated in Figure 6-5. Water system pressure zones are shown in Figure 6-B1 (Appendix B).

Table 6.10 - Water Facility Totals

TMSA Facilities	
Facility	Qty
Total Length of proposed Transmission Mains	187,360 Feet
Total number of Pump Stations	4
Total number of Tanks	8
Total Storage Volume	12.4 MG
Total number of Wells	3 new, 2 retrofitted
TMWA Facilities (per TMWA 2025 WFP) (a)	
Total Length of proposed Transmission Mains	27,200
Well Improvements	1

(a) Planned improvements are from TMWA's Water Facility Plan, as of December 2004.

Fire flows available to the Stead / Lemmon Valley TODs were evaluated. These corridors are along Virginia Street in the Horizon Hills area and Stead Boulevard. With the planned improvements in the Horizon Hills area, there will be 4,000 GPM of available fire flow. According to planning personnel from TMWA, the current available fire flow along Stead Boulevard is approximately 2,000 GPM.

6.5.5 Water Facility Cost Estimates

The estimated costs of the planned water infrastructure for Stead / Lemmon Valley TMSA are summarized in Table 6.11, and are listed in more detail in the Stead section of Appendix B.

Table 6.11 - Water Infrastructure Costs (a)

Facility Description	Total Cost ($M)	Reno Share of Facility ($M)	County Share of Facility ($M)
TMSA Costs (not including TMWA)			
Supply (b)	$90.2	Not available	Not available
Transmission	$56.6	$20.6	$36.0
Storage	$17.4	$5.5	$11.9
Subtotal	$164.2	$26.1	$47.9
TMWA Costs (per TMWA 2025 WFP) (c)			
Transmission	$5.3	$5.3	$0
Other	$2.0	$2.0	$0
Subtotal	$7.3	$7.3	$0
Total	$171.5	$33.4	$39.9

(a) 20 Cities ENRCCI = 7,942 May 2007

(b) Water rights costs are not included. Supply facility costs are based upon $82M of the $100M for Fish Springs and $22M for Intermountain with the remainder of the cost allocated to the Cold Springs Area. Also included is $8.168M for North Virginia capacity (based on 4/06 Feeder Main fees).

(c) Planned improvements costs are from TMWA's Water Facility Plan, as of December 2004.

Project divisions for the cost analysis can be found in Figure 6-B2 (Appendix B). Costs of the proposed transmission mains, pump stations and storage tanks were included. Individual pressure reducing stations are not included in the cost estimates, as these facilities are generally considered development specific, on-site improvements. In addition, the costs of purchasing water rights are not included.

The allocation of cost between Reno and the County was proportioned by flow (pipes and pump stations) or volume (tanks).

6.5.6 Water Planning Limitations

Specific limitations of the water facility plan component for the Stead and Lemmon Valley TMSA are listed below.

- The proposed facilities identified in this plan are for serving new growth and not intended to remediate existing system deficiencies.

- Insufficient water resources have been identified to serve the projected 2030 demands in the Stead, Lemmon Valley and Cold Springs areas (projected increase in demand of approximately 18,485 AF, compared to potentially available resources of 11,909 AF). The transmission mains identified are sized to serve these areas based on the potentially available water resources from Table 6.9. If more resources become available to the area, larger transmission mains will be required to satisfy the forecasted 2030 demand.

- The water demand estimate for the Stead TOD and Center was compared between the TAZ analysis estimate and the TMWA model demand estimate. The TMWA model has a slightly higher demand for this area, and therefore the modeled infrastructure is assumed to be adequate for the area. Site specific infrastructure may need to be upsized for higher demands.

- Single backbone mains were used to supply water throughout the TMSA. As development occurs, it is likely that an equivalent transmission capacity will be conveyed by a distribution network rather than by a single backbone main.

- The allocation of cost between Reno and Washoe County is an approximation. Further analysis will be required to determine the appropriate cost allocation for specific facilities.

- Washoe County and TMWA facilities were not integrated in this analysis. Emergency interties between these systems would provide an economical means of increasing system reliability.

6.6 WASTEWATER

The projected wastewater flows and required infrastructure for conveyance, treatment, and disposal are developed in this section.

6.6.1 Assumptions, Planning Criteria, and Methodology

The wastewater flow factor for the Stead area was assumed from the 2007 Washoe County 208 Water Quality Management Plan. The flow factor ranged from a low of 70 gallons per capita per day (gpcd) to 130 gpcd. An average of 100 gpcd was used for flow projection. All other wastewater planning assumptions are as stated in Appendix A for the City and County areas.

6.6.2 Existing and Future Wastewater Flow

The 2006 annual average wastewater flows for Reno Stead Water Reclamation Facility and Lemmon Valley Wastewater Treatment Plant are listed in Table 6.12 below.

Table 6.12 - Existing Wastewater Flows (a)

	2006 Annual Average Flows (MGD)
Reno Stead WRF	1.4
Lemmon Valley WWTP	0.25
Total	1.65

(a) Based on 2006 plant flow records.

Using the TAZ data, flow was projected for the Reno and County TMSA. The wastewater treatment plant capacity projections for Reno and Washoe County are presented in Tables 6.13

and 6.14, respectively. Wastewater treatment for the majority of new development within the County TMSA is anticipated to be provided by expansion of the RSWRF facility.

Table 6.13 - City of Reno Wastewater Projections

Condition	Flows (MGD)
2030 (a)	4.4
2095 (b)	6.7

(a) Based on 12,728 dwelling units and 2,199 acres of commercial and industrial land use.

(b) Based on 23,085 dwelling units and 2,199 acres of commercial and industrial land use.

The intensification of wastewater flows in the Stead TOD and Center were compared to the overall flows for the Stead area. Of the City wastewater treatment plant flow, 41 percent is estimated to be produced from areas within a TOD or Center.

Table 6.14 - Washoe County Wastewater Projections

Condition	Flows (MGD)
2030 (a)	3.1

(a) Based on 13,362 dwelling units and 99 acres of commercial and industrial land use.

The 208 Plan has a projected 2030 wastewater flow range of 3.3 MGD to 7.1 MGD for Stead. The 2030 total projected wastewater flow for Stead and Lemmon Valley TMSA flowing to RSWRF is 7.2 MGD. Approximately 0.3 MGD of the total Stead and Lemmon Valley TMSA flow would be conveyed to TMWRF.

The potential flow projection for parcels with existing septic systems that could be connected to the municipal sewer system is listed in Table 6.15. In the TAZ analysis, existing houses were analyzed the same way whether the house has a septic system or not. The flows projected in Tables 6.13 and 6.14 include potential flows from houses with septic systems.

Table 6.15 - Septic System Conversion Flow Projections

	Number of Septic Systems	Septic System Conversion Flows (MGD) (a)
Reno	136	0.027
County	2,358	0.472
Total	2,494	0.499

(a) Septic system conversion based on 200 gpd per septic

6.6.3 Water Reclamation and Disposal

Water reclamation and disposal are discussed for RSWRF in this Section; see Section 9 for a discussion of TMWRF water reclamation and disposal. Current plans to increase water reclamation and disposal capacity at the RSWRF include providing additional supplies to the

Swan Lake wetlands, up to 2.35 MGD, and expanding the use of reclaimed water. Reclaimed water is proposed for water features and landscape irrigation within several new developments located within both the Reno and Washoe County TMSA. Within Reno, current plans for expansion of the reclaimed water system are proposed along Stead Boulevard and will connect to the existing distribution system near Silver Lake Road and Silver Sky Parkway. Within Washoe County, expansion of the reclaimed water system is proposed to serve the planned developments east of Lemmon Drive. Potentially 3,467 AF of new residential irrigation demand may be served by reclaimed water. Residential reclaimed water irrigation would only be for new development due to the high cost of retrofitting existing residential developments.

Wastewater disposal capacity beyond 2.35 MGD will require implementation of additional water reclamation facilities and disposal options. Additional water reclamation facilities under investigation include an effluent reservoir for non-irrigation season storage in the Silver Knolls vicinity, and potential new uses at the Golden Valley Community Park and the North Valleys High School. Supplemental disposal options include rapid infiltration basins and export to other areas including Bedell Flat and Long Valley Creek.

6.6.4 Planned Wastewater Facilities

Recommendations for future wastewater collection and treatment facilities were developed for 2030 and are shown on Figure 6-6. For each sewer collection area, the projected 2030 flows were compared to the capacity of the existing gravity interceptors. The collection areas are shown on Figure 6-C1 for both the City areas and County Areas 3, 4, 7, and 8, as shown on Figure 1-A1 (Appendix A, C). The County areas are connected into the City RSWRF collection system except for Golden Valley. Existing lift stations and force mains were not analyzed in detail for remaining available capacity. If the existing interceptors or force mains do not have capacity for the 2030 flow, a parallel pipe/facility is recommended. Future detailed design studies should determine whether replacing the existing pipe or installing a parallel main is the appropriate improvement. Facility sizing methods and calculations are included in Appendix A.

The best available information and status of current planning for regional reclaimed water facilities is shown in Figure 6-7. Regional reclaimed water facilities will likely serve the Stead, Lemmon Valley and Cold Springs TMSA due to their common effluent disposal constraints. Additional reclaimed water distribution facilities will be required that have not been evaluated in this facility plan.

A summary of recommended wastewater collection, treatment, and reclaimed water / disposal infrastructure is summarized in Table 6.16.

Table 6.16 - Summary of Recommended Wastewater Infrastructure

Facility		Units
Interceptors/ Parallel Interceptors	111,200	Feet
Force Mains	46,600	Feet
Reclaimed Water/Disposal Pipe	75,500	Feet
Wastewater Lift Stations	6	Stations
Reclaimed Water/Disposal Pump Stations	1	Station
2030 Treatment Capacity for Reno Stead WRF	7.2	MGD
2030 Treatment Capacity for Lemmon Valley WWTP	0.3	MGD
2030 Treatment Capacity for Truckee Meadows WRF	0.3	MGD
Reclaimed Water Storage Reservoir	3,000	AF

6.6.5 Wastewater Facility Cost Estimates

Wastewater infrastructure costs are summarized in Table 6.17, and are listed in more detail in Appendix C. These facilities are intended to serve new growth, and not to remediate existing system deficiencies.

Table 6.17 - Wastewater Infrastructure Costs (a)

Facility Description	Total Cost ($M)	Reno Share of Facility ($M)	County Share of Facility ($M)
Collection System	$61.4	$44.5	$16.9
Treatment (b)	$150.3	$65.1	$85.2
Disposal/Reclaimed Water	$39.5	$17.1	$22.4
Total	$251.2	$126.7	$124.5

(a) 20 Cities ENRCCI = 7,942 May 2007

(b) Treatment costs for RSWRF improvements. Does not include TMWRF improvements from Golden Valley flow (See Section 9).

The allocation of cost between Reno and Washoe County was developed from their respective share of the flow for the collection system and treatment facilities. The reclaimed water / disposal cost includes a reclaimed water system expansion in Stead and shared regional facilities. A detailed breakdown of regional reclaimed water costs between Stead and Cold Springs is located in Appendix C.

6.6.6 Wastewater Planning Limitations

Specific limitations of the wastewater planning in the Stead and Lemmon Valley area are listed below.

- Wastewater flow projections are conservative because a mid-range wastewater flow factor is used. The TMWA Rule 7 water demand projections are representative of actual

demands. Therefore, the percentage of wastewater flow compared to the total water demand is more than the "typical" fifty percent reported in previous planning studies.

- The 2004 expansion of the Norton Interceptor was designed for a d/D ratio of 0.7. Analysis of the projected flow and capacity of the Norton Interceptor used this design standard instead of the d/D ratio of 0.5 that was used for the remainder of the City pipes. The projected flow in the Norton Interceptor exceeds the projected capacity at a d/D ratio of 0.7. The potential need to expand the capacity of the pipe should be studied as development progresses.

- Effluent disposal planning for the Stead and Lemmon Valley TMSA is conceptual. The best available information for regional reclaimed water facilities has been provided; however, additional facilities and costs will be required to provide disposal capacity for the projected 2030 wastewater flows.

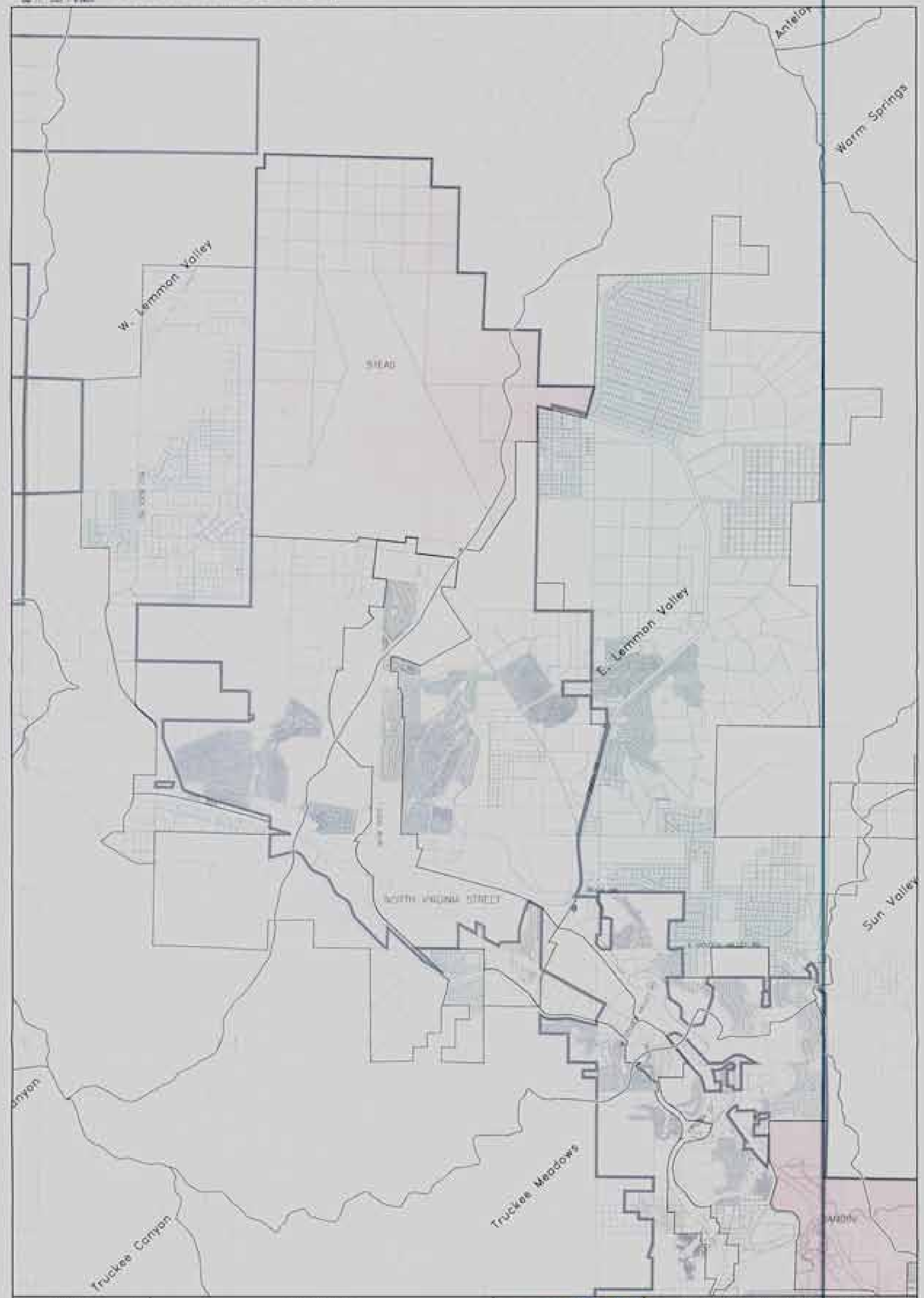
- The effluent disposal strategy will likely consist of a combination of continued disposal to Swan Lake, expanded water reclamation, land disposal to the White Lake playa and discharge to Long Valley Creek.

- The allocation of cost between Reno and Washoe County is an approximation. Further analysis will be required to determine the appropriate cost allocation for specific facilities.

6.7 POLICY RECOMMENDATIONS (INCLUSIVE OF WATER, WASTEWATER)

Potentially available water resources have been identified to serve the projected 2030 demands in the Stead and Lemmon Valley TMSA. However, insufficient water resources are available to satisfy the needs of Cold Springs, which is relying on the same water resources. Expanded use of reclaimed water, such as front and back yard residential landscape watering, should be implemented where reasonable to extend available water supplies and help fulfill the development potential within the Reno and County TMSA. Water demands could be reduced by implementing water conserving landscaping practices and/or xeriscaping. However, water conserving landscape practices should be balanced with the need for disposal of reclaimed water.

Regional water supply, water reclamation and wastewater disposal should be a coordinated effort for the Stead, Lemmon Valley and Cold Springs TMSA because of their common effluent disposal constraints.


Antelope
Warm Springs
W. Lemmon Valley
E. Lemmon Valley
Sun Valley
Truckee Canyon
Truckee Meadows
NORTH VIRGINIA STREET
MAP SYMBOLS
HDR
ECO:LOGIC
STEAD/LEMMON VALLEY TMSA - FIGURE 6-1
STUDY AREA
COUNTY OF WASHOE, NEVADA

RENO-STEAD AIRPORT

SWAN LAKE

SILVER LAKE

MAP SYMBOLS

ECO:LOGIC

STEAD/LEMMON VALLEY TMSA - FIGURE 6-2
AREA CONSTRAINTS
COUNTY OF WASHOE, NEVADA

COLD SPRINGS TMSA

TRUCKEE MEADOWS TMSA

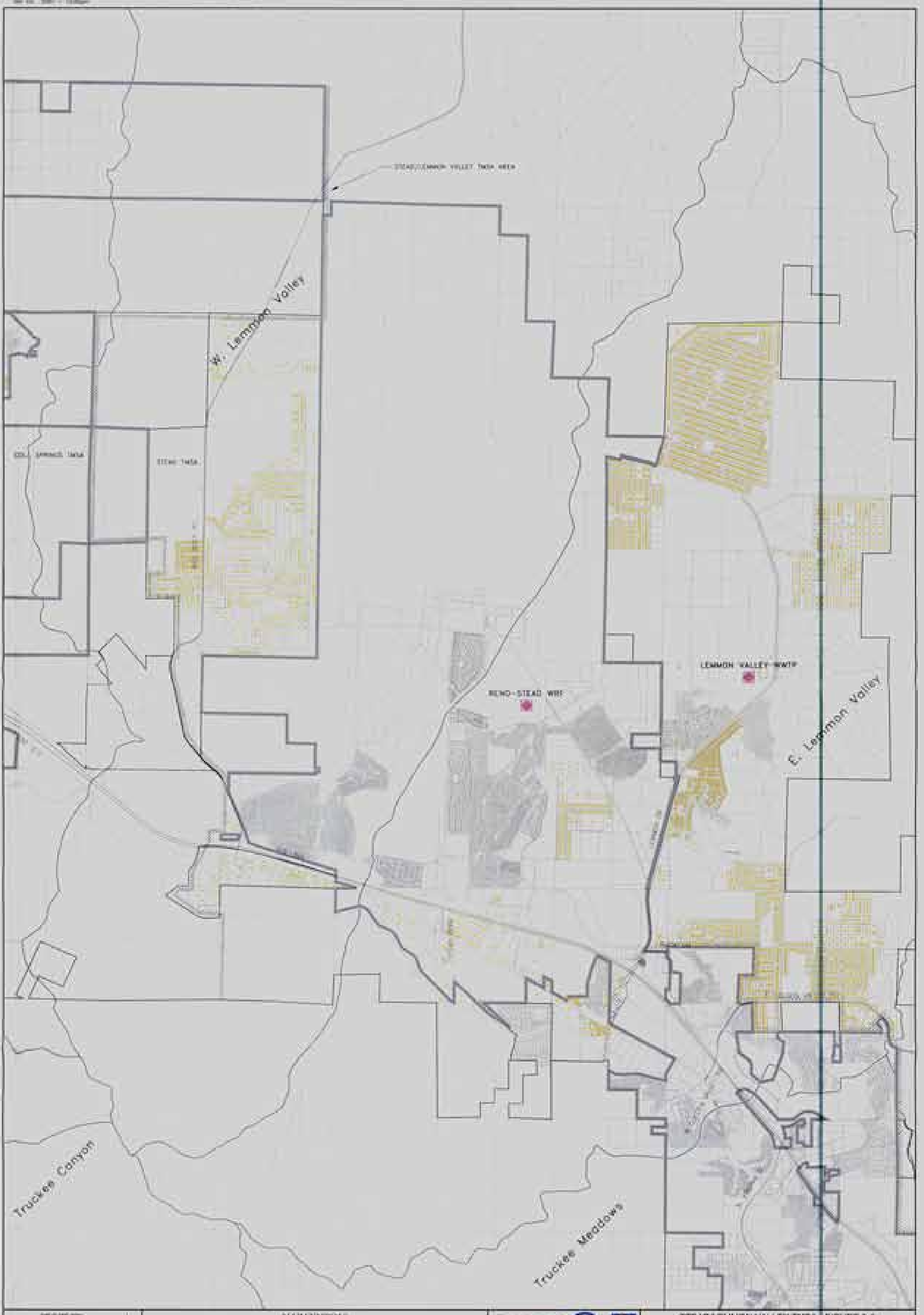
MAP SYMBOLS

- DOMESTIC WELL
- TMSA (RECTAN. AREA)
- TMSA (SPHERE OF INFLUENCE)
- WASHOE COUNTY WATER SPHERE OF INFLUENCE
- CITY-OWN WATER WHOLESALE AREAS
- PRIVATE WATER PURVEYOR
- CITY OF RENO LIMITS

HDR

ECO:LOGIC

STEAD/LEMMON VALLEY TMSA - FIGURE 6-3
WATER PURVEYOR SERVICE AREA
COUNTY OF WASHOE, NEVADA



MAP SYMBOLS

STEAD/LEMMON VALLEY TMSA : FIGURE 6-4
WASTEWATER SERVICE AREA
COUNTY OF WASHOE, NEVADA

ECO:LOGIC

HDR

TMWPC

STEAD/LEMMON VALLEY TMSA

TO COLD SPRINGS

PS 2
1925 GPM

COLD SPRINGS TMSA

SILVER KNOLLS REGION

AIRPORT REGION

LEMMON REGION

W. VERDI REGION

TRUCKEE MEADOWS TMSA

NOTES:

[1] INFRASTRUCTURE LOCATIONS AND SIZES ARE CONCEPTUAL AND WILL BE REFINED WHEN MORE DETAILED FACILITY PLANS ARE DEVELOPED.

[2] TMWA FACILITIES SHOWN IN FIGURE 6-8S

PROPOSED PIPE DIAMETER (IN)

10
12
14
16
18
20
24
30

FACILITY LEGEND

- PROPOSED WELL
- EXISTING WELL
- EXISTING TANK
- PROPOSED TANK
- PROPOSED PUMP STATION

MAP SYMBOLS

- TMWA RETAIL AREA
- TMWA SPHERE OF INFLUENCE
- WASHOE COUNTY WATER SPHERE OF INFLUENCE
- OTHER WATER WHOLESALE AREAS

HDR ECO:LOGIC

STEAD/LEMMON VALLEY TMSA - FIGURE 6-5
PLANNED TMSA WATER FACILITIES
COUNTY OF WASHOE, NEVADA

NOTES:
1. INFRASTRUCTURE LOCATIONS AND SIZES ARE CONCEPTUAL AND WILL BE REFINED WHEN MORE DETAILED FACILITY PLANS ARE DEVELOPED.
2. EXISTING PIPES BASED ON DATA PROVIDED BY CITY OF RENO (JULY 2006) AND WASHOE COUNTY (APRIL 2007).

Antelope Valley

Warm Springs

W. Lemmon Valley

INTERCEPTOR A

FORCE MAIN G

INTERCEPTOR B

INTERCEPTOR A

FORCE MAIN F

INTERCEPTOR I

INTERCEPTOR F

FORCE MAIN E

LEMMON VALLEY WWTP

RENO-STEAD WRF

FORCE MAIN

INTERCEPTOR C

INTERCEPTOR J

INTERCEPTOR H

E. Lemmon Valley

INTERCEPTOR E

INTERCEPTOR D

Spanish Springs

Sun Valley

INTERCEPTOR G

INTERCEPTOR K

E. Lemmon Valley

Truckee Canyon

Truckee Meadows

MAP SYMBOLOGY

WATER RECLAMATION FACILITY

FORCE MAIN (EXISTING)

FORCE MAIN (PROPOSED)

PARALLEL INTERCEPTOR (PROPOSED)

INTERCEPTOR (EXISTING)

INTERCEPTOR (PROPOSED)

CITY OF RENO LIMITS

CITY OF RENO TMSA

WASHOE COUNTY TMSA

OUTSIDE TMSA

ECO:LOGIC

HDR

RWPC

STEAD/LEMMON VALLEY TMSA - FIGURE 6-6

PLANNED WASTEWATER COLLECTION & TREATMENT FACILITIES

COUNTY OF WASHOE, NEVADA

CALIFORNIA

NEVADA

WHITE LAKE

Cold Springs

W. Lemmon Valley

E. Lemmon Valley

MAP SYMBOLS

CITY OF RENO TMSA

WASHOE COUNTY TMSA

OUTSIDE TMSA

HYDROGRAPHIC BOUNDARY

CITY OF RENO LIMITS

ECO:LOGIC

HDR

STEAD/LEMMON VALLEY TMSA - FIGURE 6-7

PLANNED RECLAIMED WATER & DISPOSAL FACILITIES

COUNTY OF WASHOE, NEVADA

Section 7
Spanish Springs

Table of Contents

List of Tables

List of Figures – Included at End of Section

Section 7 - Spanish Springs TMSA

7.1 STUDY AREA DESCRIPTION AND DEVELOPMENT CONSTRAINTS

The Spanish Springs TMSA is shown on Figure 7-1 (see figures at end of section) and includes area within the jurisdiction of Washoe County and the City of Sparks. This section addresses the Washoe County portions of the area. The Spanish Springs Valley is a north-trending basin in west-central Nevada, about five miles northeast of Reno. The Spanish Springs Valley is bounded by the Pah Rah Range on the east and Hungry Ridge on the west. The Orr Ditch, an agricultural irrigation canal, and the North Truckee Drain, an agricultural return flow canal, enter and exit the valley on the south. The Spanish Springs hydrobasin covers this area. Irrigation return flow is collected in the North Truckee Drain and returned to the Truckee River in the City of Sparks. There are no natural perennial streams within the study area.

As mentioned in Section 1, the land use basis for facility planning was Traffic Analysis Zone (TAZ) data provided by Washoe County, with supplemental information derived from Washoe County planned land uses.

Areas that are limited or constrained for future development include floodplains, and areas with slopes greater than thirty percent. These areas are shown on Figure 7-2.

7.2 CONCLUSIONS AND SUMMARY RECOMMENDATIONS

Coordination of stakeholders within the basin is key to the success of a long-term groundwater management strategy. Because the available water rights are out of balance with available groundwater resources, stakeholders in this basin must work together to ensure a comprehensive sustainable management plan for the basin is implemented. The estimated need for additional water resources is approximately 3,362 AFA. This additional water would most likely be provided through the TMWA wholesale service to Washoe County.

The projected 2030 wastewater flow from the Spanish Springs TMSA for TMWRF is 3.0 MGD, not including flow from the City of Sparks, City of Reno, or Sun Valley. As an alternative to conveying wastewater to TMWRF for treatment, building a Spanish Springs Valley Water Reclamation Facility has been considered in past planning studies. A summary of the estimated water and wastewater costs for the proposed infrastructure is listed in Table 7.1.

Table 7.1 - Infrastructure Costs (a)

Facility Description	Total Cost ($M)
Water	$39.5
Wastewater (b)	$78.2

(a) 20 Cities ENRCCI = 7,942 May 2007

(b) Costs do not address long term reuse and disposal requirements.

7.3 DESCRIPTION OF SERVICE PROVIDERS

The water and wastewater service providers are described in the following sections.

7.3.1 Water

Washoe County provides water service to existing customers within Spanish Springs. The Washoe County public water system consists of the Desert Springs, Spring Creek, and Spring Creek East regions. Until recently these regions were separate public water systems. Some existing development in this area is also served by domestic wells. The Sky Ranch Water Services Corp. (580 service connections in the Sky Ranch and Bridle Path subdivisions north of La Posada Road) operated by Utilities Inc. provides water service to a portion of Spanish Springs. Only the Washoe County water system was analyzed as part of this report. Figure 7-3 depicts the water purveyor service areas and locations of existing domestic wells.

7.3.2 Wastewater

Washoe County provides wastewater collection for the Spanish Springs TMSA. The Washoe County collection system connects to the City of Sparks collection system that conveys wastewater to the Truckee Meadows Water Reclamation Facility (TMWRF). The Cities of Reno and Sparks provide wastewater treatment and disposal for the Spanish Springs TMSA with wastewater flow being treated at the regional TMWRF. TMWRF also provides service to City of Sparks, City of Reno and portions of the Washoe County TMSA.

Some existing development within the County's TMSA is provided wastewater service with individual septic systems. The County is in the process of connecting existing septic systems to the collection system. The conversion is planned to occur in nine phases over a period of 20 years to be completed in 2026.

A Spanish Springs Valley Water Reclamation Facility had been discussed as an alternative to sending flow to TMWRF. The negotiated 2005 wastewater conveyance agreement between Washoe County and the City of Sparks states that the preferred option is to continue wastewater conveyance to TMWRF rather than the construction of a satellite wastewater treatment plant in the Spanish Springs Valley. Up to 8,495 Washoe County equivalent residential units will be served by the City of Sparks for collection and treatment capacity per the existing agreement. The agreement is based on equivalent residential units and not flow. Figure 7-4 depicts the areas anticipated to be served, and the locations of existing septic systems.

7.4 STATUS OF INFRASTRUCTURE PLANNING

The most recent facility plans for water and wastewater are listed in Table 7.2. Stormwater management and flood control are discussed in Section 14.

Table 7.2 - Recent Facility Plans

Plan Name	Date	Description
Water		
Spanish Springs Water Facility Plan Reference: ECO:LOGIC Engineering	June 2007	The purpose of this report is to provide an update to the 2004 Spanish Springs Water Facility Plan. The components that have been updated as a part of this report include water demand forecasts, and the facility improvements necessary to support the anticipated development found in the Spanish Springs Area Plan.
Spanish Springs Water Facility Plan Reference: ECO:LOGIC Engineering	May 2004	The purpose of this Water Facility Plan is to assist Washoe County and the development community in determining the types of facilities that are needed to support the development anticipated by the Spanish Springs Area Plan, as modified in 1999 by the Spanish Springs Specific Plan amendment. It provides planning level cost estimates of facilities and identifies trigger points for when these facilities must be constructed.
Spanish Springs Valley Groundwater Budget Analysis Reference: ECO:LOGIC Engineering	March 2004	This report describes the effect on water resources that will happen from transitioning from agricultural to urban residential use.
Washoe County Regional Water Management Plan Reference: RWPC	January 2005	The plan provides the region with an outline of how water will be managed to meet the needs of the citizens and to the future. Major components of the plan are identification of future water supply and wastewater facilities, regional flood control and drainage projects, and development of a water conservation program.
Wastewater		
Spanish Springs Valley Wastewater Reclamation Facility Plan Reference: Stantec Consulting Inc. and Kennedy/Jenks Consultants	November 2004	The purpose of this report is to recommend the most appropriate sanitary servicing alternative for the Spanish Springs Valley. The two planning alternatives considered are construction of a new water reclamation facility in Spanish Springs Valley and continued servicing via the Truckee Meadows Water Reclamation Facility.
Draft Washoe County 208 Water Quality Plan Version 3 Reference: Truckee Meadows Regional Planning Agency	January 2007	Per section 208 of the Clean Water Act this report provides the planning and management of all sources of water pollution and defines the parameters for area-wide wastewater management plans.

7.5 WATER

The projected water demands and required infrastructure are developed in this section.

7.5.1 Assumptions, Planning Criteria, and Methodology

Water demand factors used to estimate potential demand are based on the Washoe County demand factors listed in Appendix A. In the case of non-residential development, the demand factor used represents an average number for planning purposes only. The actual water rights

dedication requirement would be based on a project-specific analysis of the number of fixture units and the specific landscaping plan. This level of detail is not available for this analysis.

7.5.2 Existing and Future Water Demand

Existing water demands for the County are listed in Table 7.3, and are based on data provided by Washoe County. The demand estimates are approximate and are representative of typical demands that could be expected without the influence of seasonally cool/wet or hot/dry periods that tend to skew the historical record.

Table 7.3 - Existing Water Demands

	Estimated Demand (AFA) (a)
Washoe County	2,930

(a) Data provided from Washoe County.

Based on the TAZ analysis, projected water demands for the County are listed in Table 7.4. The irrigation demand component is projected assuming that 6,000 gallons per month of water is consumed within a typical house, and the remainder is used for irrigation. The irrigation demand range is based on front yard only irrigation, or the combined front and back yard irrigation. Irrigation demand was not estimated for commercial or industrial use because there is no projection available for the amount of new commercial and industrial acreage that will be built by 2030. The total demands include both indoor and outdoor water use. The projected increase in demand is an approximation based upon the difference between the total demand minus the estimated demand reported in Table 7.3.

Table 7.4 - Washoe County Water Demands

Condition	Irrigation Demand Range (AFA)	Total Demand Including Irrigation (AFA)	Projected Increase in Demand (AFA) (a)
2030 (b)	867 - 1,734	6,292	3,362

(a) Based on TAZ analysis, minus estimated demands from Table 7.3.

(b) Based on 9,005 dwelling units and 586 acres of commercial and industrial land use.

An estimate of water demands associated with domestic wells is listed in Table 7.5 for the County. In the TAZ analysis, existing houses were analyzed the same way whether the house has a domestic well, or not. The total demands projected in Table 7.4 include demands from houses with an existing well.

Table 7.5 - Domestic Well Demands

	Number of Domestic Wells	Domestic Well Conversion Demands (AFA) (a)
County	21	24

(a) Domestic well conversion based on 1.12 AFA per well

7.5.3 Water Resources

Existing water resources available to the Spanish Springs area include Orr Ditch surface water rights, TMWA wholesale water supply and groundwater.

As identified in the March 2004 report, "Spanish Springs Valley Groundwater Budget Analysis" the evaluation identifies a long-term reduction of available groundwater resources that will happen from transitioning from agricultural to urban residential use. Coordination of stakeholders within the basin is key to the success of a long-term groundwater management strategy. Because the available water rights are out of balance with available groundwater resources, stakeholders in this basin must work together to ensure a comprehensive sustainable management plan for the basin is implemented. This is a shared responsibility between the stakeholders, including Washoe County, the Truckee Meadows Water Authority, the Sky Ranch Water Company (Utilities Inc.), the City of Sparks, domestic well owners, the Red Hawk Golf Course, the Granite, Sha Neva and Donovan quarry owners, and other entities that hold water rights. Although Washoe County holds 3,378 AF of permitted groundwater rights, the County is working to implement a voluntary groundwater management strategy, which limits their pumping to approximately 1,800 AFA.

High quality reclaimed water is also available for landscape irrigation, including residential areas, and could be used to extend the available potable water supplies. Landscape irrigation accounts for approximately half of the total water demand for a typical residential unit. Water demands could be further reduced by implementing water conserving landscaping practices and/or xeriscaping. Existing and potentially available water resources to serve Spanish Springs are presented in Table 7.6.

Table 7.6 - Potentially Available Water Resources

Source Description	Supply (AFA)
Existing Resources	
Orr Ditch Surface Water Rights	280
TMWA Wholesale Surface Water	1,903.33
Washoe Permitted County Groundwater	3,378 (a)
Reclaimed Water	(b)
Total	5,561
Future Resources	
TMWA Wholesale Surface Water (c)	2,309
Total	6,292 (a)

(a) Washoe County has a permitted groundwater supply of 3,378 AFA, but will pump approximately 1,800 AFA to help manage future overdraft issues. Groundwater management needs be a coordinated effort between all groundwater users.

(b) Reclaimed water may be used to supplement water resources for non-potable uses.

(c) TMWA wholesale connection with the County system physically may convey 4,200 GPM. The water rights would also be in demand from Reno, Sparks and other County areas.

A comparison of the existing and future resources, water demand for the existing conditions and the potential 2030 demand is shown in Table 7.7. The total demand estimate includes potential water requirements of 24 AFA for domestic wells. The estimated need for additional water resources is approximately 3,362 AFA. This additional water would most likely be provided through the TMWA wholesale service to Washoe County. Expanded uses for reclaimed water, such as front and back yard residential landscape watering, could also be used to help fulfill the development potential within the County TMSA.

Table 7.7 - Water Demand and Resources Comparison

Condition	Supply (AFA)	County Demand (AFA)
Existing	2,930 (a)	2,930
2030	6,292	6,292
Net Increase	3,362	3,362

(a) Existing supply set equal to existing demand. Washoe County has a permitted groundwater supply of 3,378 AFA, but will pump approximately 1,800 AFA to help manage future overdraft issues.

7.5.4 Planned Water Facilities

Backbone distribution system facilities were developed to supply 2030 demands resulting from new growth in the Spanish Springs area. These facilities are based on the Spanish Springs Water System Facility Plan and are presented in Figure 7-5. Planned pressure zones range from 4465 to 5000 feet.

The proposed facilities were not integrated with the existing Utilities Inc. water system. Potential infrastructure savings could be realized with a conjunctive use operation of the two water systems. This level of analysis was beyond the scope of this project. The recommended water facility infrastructure is summarized in Table 7.8.

Table 7.8 - Water Facility Totals

Facility	Qty
Total Length of proposed Transmission Mains	59,460 Feet
Total number of Pump Stations	1
Total # of Tanks and Storage Volume	1/ 0.3 MG

7.5.5 Water Facility Cost Estimates

The estimated costs of the recommended water infrastructure are summarized in Table 7.9 (Appendix B provides more detail on cost estimates). Costs of the proposed transmission mains, pump stations and storage tanks were included. Individual pressure reducing stations are not included in the cost estimates, as these facilities are generally considered development specific, on-site improvements. In addition, the costs of purchasing water rights were not included.

Table 7.9 - Water Infrastructure Costs (a)

Facility Description	Total Cost ($M)
Supply (b, c, d)	$32.4
Transmission	$6.7
Storage	$0.4
Total	$39.5

(a) 20 Cities ENRCCI = 7,942 May 2007

(b) Water rights costs are not included.

(c) Supply costs were developed by multiplying the estimated Spanish Springs TMSA 2030 increase in MDD by TMWA's Rule 5 *Supply and Treatment* Facility charge ($3,236 per maximum day GPM).

(d) Feeder main costs were developed by multiplying the estimated Spanish Springs TMSA 2030 increase in MDD by TMWA's Rule 5 Feeder Main Charge (currently $2,337 per maximum day GPM).

7.5.6 Water Planning Limitations

Specific limitations for water planning in the Spanish Springs area are listed below.

- The proposed facilities identified in this plan are for serving new growth and not intended to remediate any existing system deficiencies.
- Single backbone mains were used to supply water throughout the TMSA. As development occurs, it is likely that an equivalent transmission capacity will be conveyed by a distribution network rather than by a single backbone main.

7.6 WASTEWATER

The projected wastewater flow and required infrastructure for conveyance, treatment, and disposal are developed in this section.

7.6.1 Assumptions, Planning Criteria, and Methodology

The wastewater flow factor for the Truckee Meadows planning area was assumed from the 2007 Washoe County 208 Water Quality Management Plan. The Truckee Meadows flow factor ranged from a low of 108 gallons per capita per day (gpcd) to 149 gpcd. An average of 128.5 gpcd was used for flow projection. All other wastewater planning assumptions are as stated in Appendix A.

7.6.2 Existing and Future Wastewater Flow

The 2006 annual average wastewater flow for Truckee Meadows Water Reclamation Facility from Spanish Springs is listed in Table 7.10.

Table 7.10 - Existing Wastewater Flow

	2006 Annual Average Flow (MGD) (a)
TMWRF	0.41

(a) Based on 3,164 equivalent residential units (ERUs) connected to Spanish Springs Interceptor at 128.5 gpd per ERU.

Using the TAZ data, flow was projected for the County TMSA. The water reclamation facility projections for the County are presented in Table 7.11. Wastewater treatment for new development within the Washoe County TMSA is anticipated to be provided by expansion of the TMWRF.

Table 7.11 - Washoe County Wastewater Projections

Condition	Flow (MGD)
2030 (a, b)	3.0

(a) Based on TAZ analysis.

(b) Based on 9,005 dwelling units and 586 acres of commercial and industrial land use.

The potential flow projection for parcels with existing septic systems that could be connected to the municipal sewer system is listed in Table 7.12. In the TAZ analysis, existing houses were analyzed the same way whether the house has a septic system, or not. The flow projected in Table 7.11 includes potential flow from houses with a septic system.

Table 7.12 - Septic System Conversion Flow Projections

	Number of Septic Systems	Septic System Conversion Flow (MGD) (a)
County	1,967	0.393

(a) Septic system conversion based on 200 gpd per septic.

The projected 2030 wastewater flow from Washoe County's portion of the Spanish Springs TMSA for TMWRF is 3.0 MGD. This does not include flow from the City of Sparks, City of Reno, or Sun Valley. The 208 Plan has a projected 2030 wastewater flow of 43.6 MGD to 70.1 MGD for the entire TMWRF service area.

7.6.3 Water Reclamation and Disposal

For a discussion of effluent disposal from TMWRF, see Section 9.1. Reclaimed water facilities in Spanish Springs are discussed in Section 7.6.4.

7.6.4 Planned Wastewater Facilities

Up to 8,495 Washoe County equivalent residential units will be conveyed to the City of Sparks for collection and treatment capacity per the existing agreement. The agreement is based on equivalent residential units and not flow. Additional equivalent residential units beyond the existing agreement will need additional conveyance and treatment capacity. Sparks' interceptor capacity was not analyzed outside of the Washoe County Spanish Springs TMSA.

Within Washoe County's Spanish Springs TMSA, recommendations for wastewater collection and facilities were developed for 2030 as shown on Figure 7-6. For each sewer collection area, the projected 2030 flow was compared to the capacity of the existing gravity interceptors. The collection areas are shown on Figure 7-C1 (Appendix C). Existing lift stations and force mains were not analyzed in detail for remaining available capacity. If the existing interceptors do not have capacity for the 2030 flow, a parallel pipe is recommended. Future detailed design studies should determine whether replacing the existing pipe or installing a parallel main is the appropriate improvement. Facility sizing methods and calculations are included in Appendix C. The recommended wastewater facility infrastructure is summarized in Table 7.13.

The best available information and status of current planning for regional reclaimed water facilities is shown in Figure 7-7. Additional reclaimed water distribution facilities will be required that have not been evaluated in this facility plan. The recommended wastewater facility infrastructure is summarized in Table 7.13.

Table 7.13 - Summary of Wastewater Infrastructure

Facility	Units
Total Length of Interceptors	36,720
2030 Treatment Capacity for Spanish Springs	3.0

7.6.5 Wastewater Facility Cost Estimates

The wastewater infrastructure costs are summarized in Table 7.14, and are listed in more detail in Appendix C. The costs are based on wastewater flow being conveyed and treated at the existing TMWRF. These facilities are for serving new growth and not to remediate existing system deficiencies. No costs have been included for buying capacity from City of Sparks for the Spanish Springs interceptor that conveys wastewater from the Spanish Springs area to TMWRF.

Table 7.14 - Wastewater Infrastructure Costs (a)

Facility Description	Total Cost ($M)
Collection System (b)	$38.3
Treatment (c)	$39.9
Total	$78.2

(a) 20 Cities ENRCCI = 7,942 May 2007

(b) Includes connection charge for Sparks' treatment and interceptor capacity for available 5,331 ERUs (5,331*128.5=0.69 MGD) under current agreement at $5,618 per ERU. Does not include any capacity improvements required for the Spanish Springs Interceptor within the City of Sparks beyond the existing agreement.

(c) Based on the expansion of TMWRF by 1.9 MGD at $15 million per MGD of expansion plus contingencies.

7.6.6 Wastewater Management Options

As an alternative to conveying wastewater to TMWRF for treatment, building a Spanish Springs Valley Water Reclamation Facility has been considered in past planning studies. The proposed treatment facility would involve the construction of a membrane bioreactor process with odor control. Effluent would be disposed of in new rapid infiltration basins (RIB) on the Martin Marietta site. The RIBs could also be used for reclaimed water disposal from the main TMWRF reclaimed water system. A reclaimed water pipeline has already been constructed from TMWRF to Boneyard Flat. Solids would be disposed of in the existing interceptor system and treated by TMWRF.

7.6.7 Wastewater Planning Limitations

Specific limitations of the wastewater planning in the Spanish Springs area are listed below.

- The Spanish Springs interceptor capacity was not analyzed outside of the Spanish Springs TMSA. More capacity will be required in the Sparks' Spanish Springs interceptor. An agreement between Washoe County and the City of Sparks would need to be developed.

- The potential benefits of building a new treatment facility versus sending flow to TMWRF were not analyzed as part of this Facility Plan.

7.7 POLICY RECOMMENDATIONS (INCLUSIVE OF WATER, WASTEWATER)

Coordination of stakeholders within the basin is key to the success of a long-term groundwater management strategy. Because the available water rights are out of balance with available groundwater resources, stakeholders in this basin must work together to ensure a comprehensive sustainable management plan for the basin is implemented.

Warm Springs

E. Lemmon Valley

Spanish Springs

Sun Valley

NOTE: TMSA BOUNDARY CURRENT AS OF MAY 2007.

MAP SYMBOLS

WASHOE COUNTY TMSA

WASHOE COUNTY BOUNDARY

HDR

ECO:LOGIC

RWPC

SPANISH SPRINGS TMSA - FIGURE 7-1

STUDY AREA

COUNTY OF WASHOE, NEVADA

MAP SYMBOLS

FLOODPLAIN

SLOPE 15% OR GREATER

WASHOE COUNTY TMSA

ECO:LOGIC

HDR

SWPC

SPANISH SPRINGS TMSA - FIGURE 7.2

AREA CONSTRAINTS

COUNTY OF WASHOE, NEVADA

SUN VALLEY TMSA

SPARKS TMSA

MAP SYMBOLS

ECOLOGIC

SPANISH SPRINGS TMSA - FIGURE 7-3
WATER PURVEYOR SERVICE AREA
COUNTY OF WASHOE, NEVADA

Warm Springs

E. Lemmon Valley

Sun Valley

SUN VALLEY TMSA

SPARKS TMSA

Spanish Springs

Truckee Meadows

MAP SYMBOLS

ECO:LOGIC

HDR

SPANISH SPRINGS TMSA - FIGURE 7-4
WASTEWATER SERVICE AREA
COUNTY OF WASHOE, NEVADA

SUN VALLEY TMSA

SPARKS TMSA

PROPOSED PIPE DIAMETER (IN)

- 8
- 10
- 12
- 14
- 16
- 18
- 20
- 24
- 30

FACILITY LEGEND

- W PROPOSED WELL
- W EXISTING WELL
- EXISTING TANK
- PROPOSED TANK
- P PROPOSED PUMP STATION
- I PROPOSED INTERTIE
- I EXISTING INTERTIE

NOTE: PRESSURE ZONES APPEAR HATCHED.

SPANISH SPRINGS TMSA - FIGURE 7-5
PLANNED TMSA WATER FACILITIES
COUNTY OF WASHOE, NEVADA

HDR | RWPC

ECO:LOGIC Consulting Engineers

Warm Springs

E. Lemmon Valley

Spanish Springs

Sun Valley

Truckee Meadows

NOTE: INFRASTRUCTURE LOCATIONS AND SIZES ARE CONCEPTUAL AND WILL BE REFINED WHEN MORE DETAILED FACILITY PLANS ARE DEVELOPED.

MAP SYMBOLS

HDR

RWPC

ECO:LOGIC

SPANISH SPRINGS TMSA - FIGURE 7-6
PLANNED WASTEWATER COLLECTION & TREATMENT FACILITIES
COUNTY OF WASHOE, NEVADA

Spanish Springs

Sun Valley

PIPE DIAMETER (IN)

8
10
12
14
16
18
20
24
30

FACILITY LEGEND

TANK

PUMP STATION

MAP SYMBOLS

WASHOE COUNTY TMSA

HYDROBASIN BOUNDARY

HDR

ECO:LOGIC

SPANISH SPRINGS TMSA - FIGURE 7-7
EXISTING RECLAIMED WATER & DISPOSAL FACILITIES
COUNTY OF WASHOE, NEVADA

Section 8
Sun Valley

Table of Contents

List of Tables

List of Figures – Included at End of Section

Section 8 - Sun Valley TMSA

8.1 STUDY AREA DESCRIPTION AND DEVELOPMENT CONSTRAINTS

The Sun Valley TMSA is shown on Figure 8-1 (see figures at end of section) and includes areas within the jurisdiction of Washoe County and the City of Reno. The portion of the Sun Valley TMSA within the City of Reno limits is very small in comparison to the Washoe County area. Therefore, only Washoe County is discussed for the remainder of this report. The Sun Valley hydrobasin covers the majority of this area. Surface runoff within the Sun Valley TMSA drains to the Truckee River via unnamed drainageways.

As mentioned in Section 1, the land use basis for facility planning was Traffic Analysis Zone (TAZ) data provided by Washoe County, with supplemental information derived from Washoe County planned land uses.

Areas that are limited or constrained for future development include areas with slopes greater than thirty percent. These areas are shown on Figure 8-2.

8.2 CONCLUSIONS AND SUMMARY RECOMMENDATIONS

The majority of the Sun Valley planning area is within the Sun Valley General Improvement District (SVGID) service area. SVGID's Water and Wastewater Master Plan are comprehensive documents; therefore, no further detailed planning was necessary for this Facility Plan within SVGID's service territory except for the northern most area. The Sun Valley TMSA is split by many jurisdictional boundaries. It is assumed that SVGID will provide water and wastewater service within the Sun Valley hydrobasin. Coordinated planning for water and wastewater facilities is required for areas immediately outside of the hydrobasin boundary that could be served by SVGID or others.

The estimated need for additional water resources is approximately 2,607 AFA, which is equal to the potentially available water resources.

The projected 2030 wastewater flow for Sun Valley to TMWRF is 2.0 MGD.

A summary of the estimated water and wastewater costs for the proposed infrastructure is listed in Table 8.1.

Table 8.1 - Infrastructure Costs (a)

Facility Description	Total Cost ($M)
Water	$5.9
Wastewater (b)	$22.2

(a) 20 Cities ENRCCI = 7,942 May 2007

(b) Costs do not address long term reuse and disposal requirements.

8.3 DESCRIPTION OF SERVICE PROVIDERS

The water and wastewater service providers are described in the following sections. The majority of the Sun Valley TMSA is served by SVGID. It is assumed that the SVGID boundary may be expanded to serve within the hydrobasin as growth occurs.

8.3.1 Water

SVGID provides water service to existing customers within SVGID boundaries. Truckee Meadows Water Authority (TMWA) provides wholesale water to SVGID, and serves existing customers outside of the SVGID boundary. Existing development in this area is also served by domestic wells. Figure 8-3 depicts the water purveyor service areas, Reno city limits, and locations of existing domestic wells.

8.3.2 Wastewater

SVGID provides wastewater collection for the majority of Sun Valley TMSA within SVGID boundaries. The remainder of the wastewater collection for existing development outside SVGID boundaries is provided by Washoe County. Wastewater collection outside of SVGID boundaries, but within the Sun Valley TMSA for new development will be determined as growth occurs. The Cities of Reno and Sparks provide wastewater treatment and disposal for the Sun Valley TMSA with wastewater flow being treated at the regional Truckee Meadows Water Reclamation Facility (TMWRF). TMWRF also provides service to City of Sparks, City of Reno and portions of the Washoe County TMSA. Some existing development within the County's Sun Valley TMSA is provided wastewater service with individual septic systems. Figure 8-4 depicts the areas anticipated to be served, and the locations of existing septic systems.

8.4 STATUS OF INFRASTRUCTURE PLANNING

The most recent facility plans for water and wastewater are listed in Table 8.2. Stormwater management and flood control are discussed in Section 14.

Table 8.2 - Recent Facility Plans

Plan Name	Date	Description
Water		
Water Master Plan Update Reference: Shaw Engineering	July 2003	This plan provides a description of the water infrastructure required to serve Sun Valley.
Sun Valley West Basin Water System Improvements Reference: Shaw Engineering	November 2004	This plan provides a description of the water infrastructure required to serve Sun Valley area of west Seventh Street growth area.
Washoe County Regional Water Management Plan Reference: RWPC	January 2005	The plan provides the region with an outline of how water will be managed to meet the needs of the citizens and in the future. Major components of the plan are identification of future water supply and wastewater facilities, regional flood control and drainage projects, and development of a water conservation program.

2005-2025 Water Facility Plan Reference: TMWA	December 2004	Describes the necessary water distribution and treated water storage facilities to meet the forecasted demands and resource optimization goals in the 2025 water resource plan.
Wastewater		
Sun Valley Wastewater System Master Plan Reference: Shaw Engineering	April 2004	This plan provides a description of the wastewater of the structure required to serve Sun Valley.
Draft Washoe County 208 Water Quality Plan Version 3 Reference: Truckee Meadows Regional Planning Agency	January 2007	Per section 208 of the Clean Water Act this report provides the planning and management of all sources of water pollution and defines the parameters for area-wide wastewater management plans.

8.5 WATER

The projected water demands and required infrastructure are developed in this section.

8.5.1 Assumptions, Planning Criteria, and Methodology

Water demand factors used to generate demand are based on TMWA design standards for the TMSA. The TMWA Rule 7 demand factors are relevant because new development is assumed to dedicate water resources in accordance with TMWA water rights dedication policies.

In the case of non-residential development, the demand factor used represents an average number for planning purposes only. When TMWA or SVGID receives a request for water service on a non-residential property, the actual water rights dedication requirement would be based on a project-specific analysis of the number of fixture units and the specific landscaping plan. This level of detail is not available for this analysis.

8.5.2 Existing and Future Water Demand

Existing water demands for the Sun Valley TMSA are listed in Table 8.3, and are based on data provided by SVGID. The demand estimates are approximate and are representative of typical demands that could be expected without the influence of seasonally cool/wet or hot/dry periods that tend to skew the historical record.

Table 8.3 - Existing Water Demands

	Estimated Demand (AFA) (a)
SVGID	2,375

(a) Data provided by SVGID.

Based on the TAZ analysis, projected water demands for the Sun Valley TMSA are listed in Table 8.4. The irrigation demand component is projected assuming that 6,000 gallons per month of water is consumed within a typical house, and the remainder is used for irrigation. The irrigation demand range is based on front yard only irrigation, or the combined front and back

yard irrigation. Irrigation demand was not estimated for commercial or industrial use because there is no projection available for the amount of new commercial and industrial acreage that will be built by 2030. The total demands include both indoor and outdoor water use. The projected increase in demand is an approximation based upon the difference between the total demand minus the estimated demand reported in Table 8.3.

Table 8.4 - Sun Valley TMSA Water Demands

Condition	Irrigation Demand Range (AFA)	Total Demand Including Irrigation (AFA)	Projected Increase in Demand (AFA) (a)
2030 (b)	355 - 710	4,982	2,607

(a) Based on TAZ analysis, minus estimated demands from Table 8.3.

(b) Based on 9,486 dwelling units and 125 acres of commercial and industrial land use.

An estimate of water demands associated with domestic wells is listed in Table 8.5 for the Sun Valley TMSA. In the TAZ analysis, existing houses were analyzed the same way whether the house has a domestic well, or not. The total demands projected in Table 8.4 include demands from houses with an existing well.

Table 8.5 - Domestic Well Demands

	Number of Domestic Wells	Domestic Well Conversion Demands (AFA) (a)
County	77	86

(a) Domestic well conversion based on 1.12 AFA per well

8.5.3 Water Resources

Existing water resources available to the Sun Valley area include TMWA water supply through one existing and one future wholesale point.

High quality reclaimed water is suitable for landscape irrigation, including residential areas, and could be used to extend the available potable water supplies. Landscape irrigation accounts for approximately half of the total water demand for a typical residential unit. Water demands could be further reduced by implementing water conserving landscape practices and/or xeriscaping.

Existing and potentially available water resources to serve Sun Valley are presented in Table 8.6.

Table 8.6 - Potentially Available Water Resources

Source Description	Supply (AFA)
Existing Resources	
TMWA Wholesale Water	2,375
Total	2,375
Future Resources	
Reclaimed Water	(a)
TMWA Wholesale Water (b)	4,982
Total	4,982

(a) Reclaimed water may be used to supplement water resources for non-potable uses.

(b) TMWA wholesale connection with the County system physically may convey 3,515 GPM. The water rights would also be in demand from Reno, Sparks and other County areas.

A comparison of the existing and future resources, water demand for the existing conditions and the potential 2030 demand is shown in Table 8.7. The estimated need for additional water resources is approximately 2,607 AFA, which is equal to the potentially available water resources. The total demand estimate includes potential water requirements of 86 AFA for domestic wells. Expanded uses for reclaimed water, such as front and back yard residential landscape watering, may be used to help fulfill the development potential within the Sun Valley TMSA.

Table 8.7 - Water Demand and Resources Comparison

Condition	Supply (AFA)	Sun Valley Demand (AFA)
Existing	2,375	2,375
2030	4,982	4,982
Net Increase	2,607	2,607

8.5.4 Planned Water Facilities

The majority of the Sun Valley planning area is within the SVGID service area. Existing and planned infrastructure improvements from the Water Master Plan Update and Sun Valley West Basin Water System Improvements reports are shown in Appendix B. SVGID's Water Master Plan is a comprehensive document; therefore, no further detailed planning was necessary for this Facility Plan within SVGID's service territory except for the northern most area. Backbone distribution system facilities were developed to supply 2030 demands resulting from new growth in the portion of the Sun Valley TMSA located to the north of the main part of Sun Valley. This area has the County designation of general rural (one dwelling unit per 40 acres). The infrastructure would need to be resized if the zoning changed. No infrastructure was analyzed within the existing SVGID system to support this area. These facilities appear in Figure 8-5. The recommended water facility infrastructure is summarized in Table 8.8. Proposed pressure zones range from 5250 to 5720 feet elevation and are presented in Figure 8-B1 (Appendix B).

Table 8.8 - Water Facility Totals (a)

Facility	Qty
Total Length of proposed Transmission Mains	11,200
Total number of Pump Stations	2
Total # of Tanks and Storage Volume	2/ 0.65 MG

(a) To serve northern most area of SVGID current service area. See SVGID Water Master Plan Update for other areas.

A portion of the Sun Valley TMSA is currently served directly by TMWA. TMWA's 2025 Water Facility Plan (WFP) identifies the required improvements to accommodate growth and remediate existing system deficiencies within its service territory. The WFP Executive Summary and cost tables can be found in Appendix B. A brief discussion of the proposed major water system facilities and estimated costs can be found in the Executive Summary. Greater facility detail is presented in the cost tables and Executive Summary including specific facility information, such as estimated in-service date, estimated cost and cost allocation to existing and new development. It is assumed that the information contained within TMWA's WFP is current, even though some planning changes and facility improvements may have occurred. TMWA's 2025 Water Facility Plan is a comprehensive document; therefore, no further detailed planning was necessary for this facility plan within TMWA's retail service territory.

8.5.5 Water Facility Cost Estimates

The estimated costs of the recommended water infrastructure are summarized in Table 8.9. (Appendix B provides more detail on cost estimates.) Costs of the proposed transmission mains, pump stations and storage tanks were included. Individual pressure reducing stations are not included in the cost estimates, as these facilities are generally considered development specific, on-site improvements. In addition, the costs of purchasing water rights were not included. Cost analysis project divisions are shown on Figures 8-B2 (Appendix B).

Table 8.9 - Water Infrastructure Costs (a)

Facility Description	Total Cost ($M)
Sun Valley TMSA	
Supply	(b)
Northern SVGID area (c)	
Transmission	$3.0
Storage	$0.9
Subtotal	$3.9
Water Master Plan Costs (d)	$2.0
Total	$5.9

(a) 20 Cities ENRCCI = 7,942 May 2007

(b) SVGID has an existing wholesale contract with TMWA. If the annual volume changes, additional fees will be assessed.

(c) To serve northern most area of SVGID current service area. See SVGID Water Master Plan Update for other areas.

(d) Capital improvement costs for serving new growth only from Water Master Plan Update, July 2003

8.5.6 Water Planning Limitations

Specific limitations for water planning in the Sun Valley area are listed below.

- Potentially the northernmost portion of the Sun Valley TMSA may be served from the Washoe County system to the west. When this area develops, further analysis should be conducted. No improvements were analyzed within the existing SVGID system to support this area.
- The proposed facilities identified in this plan are for serving new growth and not intended to remediate any existing system deficiencies.
- Single backbone mains were used to supply water throughout the TMSA. As development occurs, it is likely that an equivalent transmission capacity will be conveyed by a distribution network rather than by a single backbone main.
- Costs of TMWA's overall system improvements appear in their WFP Executive Summary found in Appendix B. Costs of facility improvements specific to the Sun Valley area were not extracted from the TMWA WFP.

8.6 WASTEWATER

The projected wastewater flow and required infrastructure for conveyance, treatment, and disposal are developed in this section.

8.6.1 Assumptions, Planning Criteria, and Methodology

The wastewater flow and facilities are based on the design criteria from the Wastewater Master Plan as shown in Table 8.10.

Table 8.10 - Wastewater Design Criteria

Treatment Plant Flow		
Residential flow rate	205	gpd/ERU
Commercial/Industrial flow rate	800	gpad
Interceptor Criteria		
Residential flow rate	205	gpd/ERU
Commercial and Industrial flow rate	800	gpad
Peaking factor	2.25	
Depth of Flow	<0.75 pipe diameter	
Manning Roughness Coefficient	n= 0.014 (a)	

(a) Roughness value varies for SVGID pipes, but this average value was used.

8.6.2 Existing and Future Wastewater Flow

The 2006 annual average wastewater flow for Truckee Meadows Water Reclamation Facility from Sun Valley is listed in Table 8.11.

Table 8.11 - Existing Wastewater Flow

	2006 Annual Average Flow (MGD) (a)
TMWRF	1.2

(a) Based on 2006 TMWRF flow records.

Using the TAZ data, flow was projected for the Sun Valley TMSA. The water reclamation facility projections for Sun Valley are presented in Table 8.12. Wastewater treatment for the new development within the Sun Valley TMSA is anticipated to be provided by expansion of the TMWRF facility.

Table 8.12 - Sun Valley Wastewater Projections

Condition	Flow (MGD)
2030 (a, b)	2.0

(a) Based on TAZ analysis.

(b) Based on 9,486 dwelling units and 125 acres of commercial and industrial land use.

The potential flow projection for parcels with existing septic systems that could be connected to the municipal sewer system is listed in Table 8.13. In the TAZ analysis, existing houses were analyzed the same way whether the house has a septic system, or not. The flow projected in Table 8.12 includes potential flow from houses with a septic system.

Table 8.13 - Septic System Conversion Flow Projections

	Number of Septic Systems	Septic System Conversion Flow (MGD) (a)
County	82	0.016

(a) Septic system conversion based on 200 gpd per septic.

The projected 2030 wastewater flow for Sun Valley to TMWRF is 2.0 MGD. The 208 Plan has a projected 2030 wastewater flow of 43.6 MGD to 70.1 MGD for the entire TMWRF service area.

8.6.3 Water Reclamation and Disposal

For a discussion of effluent disposal from TMWRF see Section 9. There are no reclaimed water facilities currently in the Sun Valley TMSA.

8.6.4 Planned Wastewater Facilities

SVGID has an allotted maximum month average day capacity of 1,900,000 GPD for collection and treatment capacity. Of this amount, Washoe County is entitled to 479,000 GPD maximum month average day capacity. The additional flow beyond the existing agreement will need additional conveyance and treatment capacity. The interceptors were analyzed only to the connection with the City of Sparks collection system. The City of Sparks facilities are analyzed in a separate report.

Based on the projected wastewater flow and previous master plan, recommendations for wastewater collection and treatment facilities were developed for 2030 as shown on Figure 8-6. Backbone reclaimed water facilities are shown on Figure 8-7. The projected 2030 flow was compared to the capacity of the existing gravity interceptors. If the existing interceptors or force mains do not have capacity for the 2030 flow, a parallel pipe/facility is recommended. Future detailed design studies should determine whether replacing the existing pipe or installing a parallel main is the appropriate improvement. Facility sizing methods and calculations are included in Appendix C. The recommended wastewater facility infrastructure is summarized in Table 8.14.

Table 8.14 - Summary of Wastewater Infrastructure

Facility	Units
Total Length of New/ Parallel Interceptors	31,270
Total Length of New Force Mains	2,430
Total New Lift Stations	2
2030 Treatment Capacity for Sun Valley	2.0

8.6.5 Wastewater Facility Cost Estimates

The wastewater infrastructure costs are summarized in Table 8.15, and are listed in more detail in Appendix C. The costs are based on wastewater flow being conveyed and treated at the existing TMWRF. These facilities are for serving new growth and not to remediate existing system deficiencies. No costs have been included for buying capacity from Washoe County or City of Sparks for the interceptor that conveys wastewater from Sun Valley TMSA to TMWRF.

Table 8.15 - Wastewater Infrastructure Costs (a)

Facility Description	Total Cost ($M)
Collection System (b)	$6.3
Treatment (c)	$15.9
Total	$22.2

(a) 20 Cities ENRCCI = 7,942 May 2007.

(b) Does not include any capacity improvements required for the portion of the interceptor within the City of Sparks.

(c) Based on the expansion of TMWRF by 0.8 MGD at $15 million per MGD of expansion plus contingencies.

The allocation of cost between SVGID and Washoe County would be developed from their respective share of the flow for the collection system.

8.6.6 Wastewater Planning Limitations

Specific limitations of the wastewater planning in the Sun Valley area are listed below.

- The interceptor capacity was not analyzed within the City of Sparks. More capacity will be required in the Spanish Springs interceptor. An amended agreement between SVGID and the City of Sparks would need to be developed.

8.7 POLICY RECOMMENDATIONS (INCLUSIVE OF WATER, WASTEWATER)

The Sun Valley TMSA is split by many jurisdictional boundaries. It is assumed that SVGID will provide water and wastewater service within the Sun Valley hydrobasin. Coordinated planning for water and wastewater facilities is required for areas immediately outside of the hydrobasin boundary that could be served by SVGID or others.

E. Lemmon Valley

Spanish Springs

Sun Valley

Truckee Meadows

NOTE: TMSA BOUNDARY CURRENT AS OF MAY 2007

MAP SYMBOLS

SUN VALLEY TMSA

HYDROGRAPH BOUNDARY

CITY OF RENO LIMITS

ECO:LOGIC

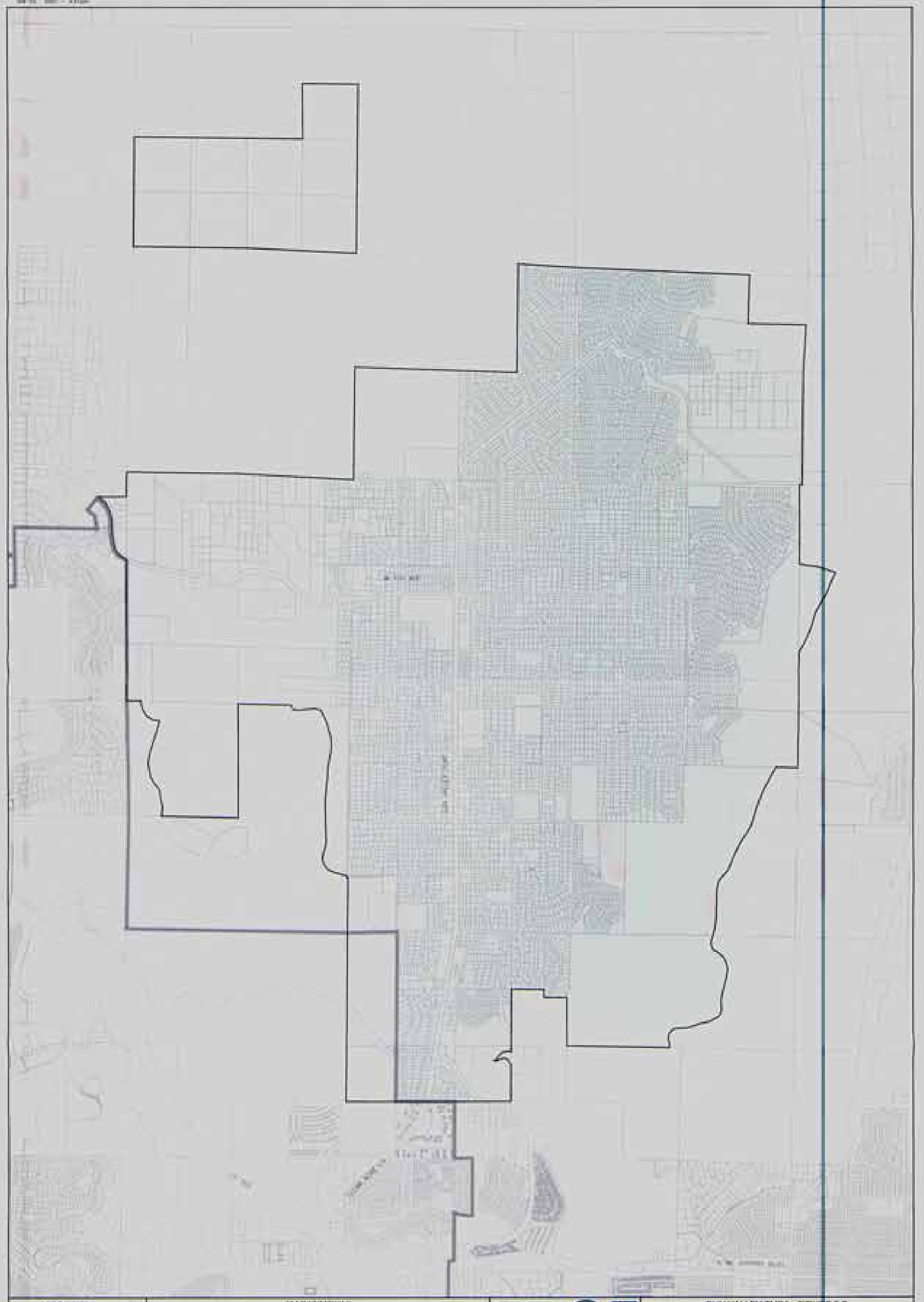
HDR

SWPC

SUN VALLEY TMSA - FIGURE 8-1

STUDY AREA

COUNTY OF WASHOE, NEVADA



MAP SYMBOLS

SLOPE 15% OR GREATER

CITY OF RENO LIMITS

SUN VALLEY TMSA

HDR

ECO:LOGIC

SUN VALLEY TMSA - FIGURE 8-2
AREA CONSTRAINTS
COUNTY OF WASHOE, NEVADA

SUN VALLEY TMSA AREA

TRUCKEE MEADOWS TMSA

SPARKS TMSA

MAP SYMBOLS

DOMESTIC WELL

TMWA RETAIL AREA

OTHER WHOLESALE AREAS

WASHOE COUNTY WATER SPHERE OF INFLUENCE

TMWA SPHERE OF INFLUENCE

CITY OF SPARKS LIMITS

WASHOE COUNTY WATER WHOLESALE AREAS

HDR

ECO:LOGIC

SUN VALLEY TMSA - FIGURE 8-3
WATER PURVEYOR SERVICE AREA
COUNTY OF WASHOE, NEVADA

MODIFIED FROM WASHOE COUNTY COMPREHENSIVE REGIONAL WATER MANAGEMENT PLAN THAT SHOWED THIS AREA GOING TO RSWWF

SUN VALLEY TMSA AREA

Sun Valley

SPARKS TMSA

TRUCKEE MEADOWS TMSA

MAP SYMBOLS

TRUCKEE MEADOWS WWF COLLECTION AREA

HYDROGRAPH BOUNDARY

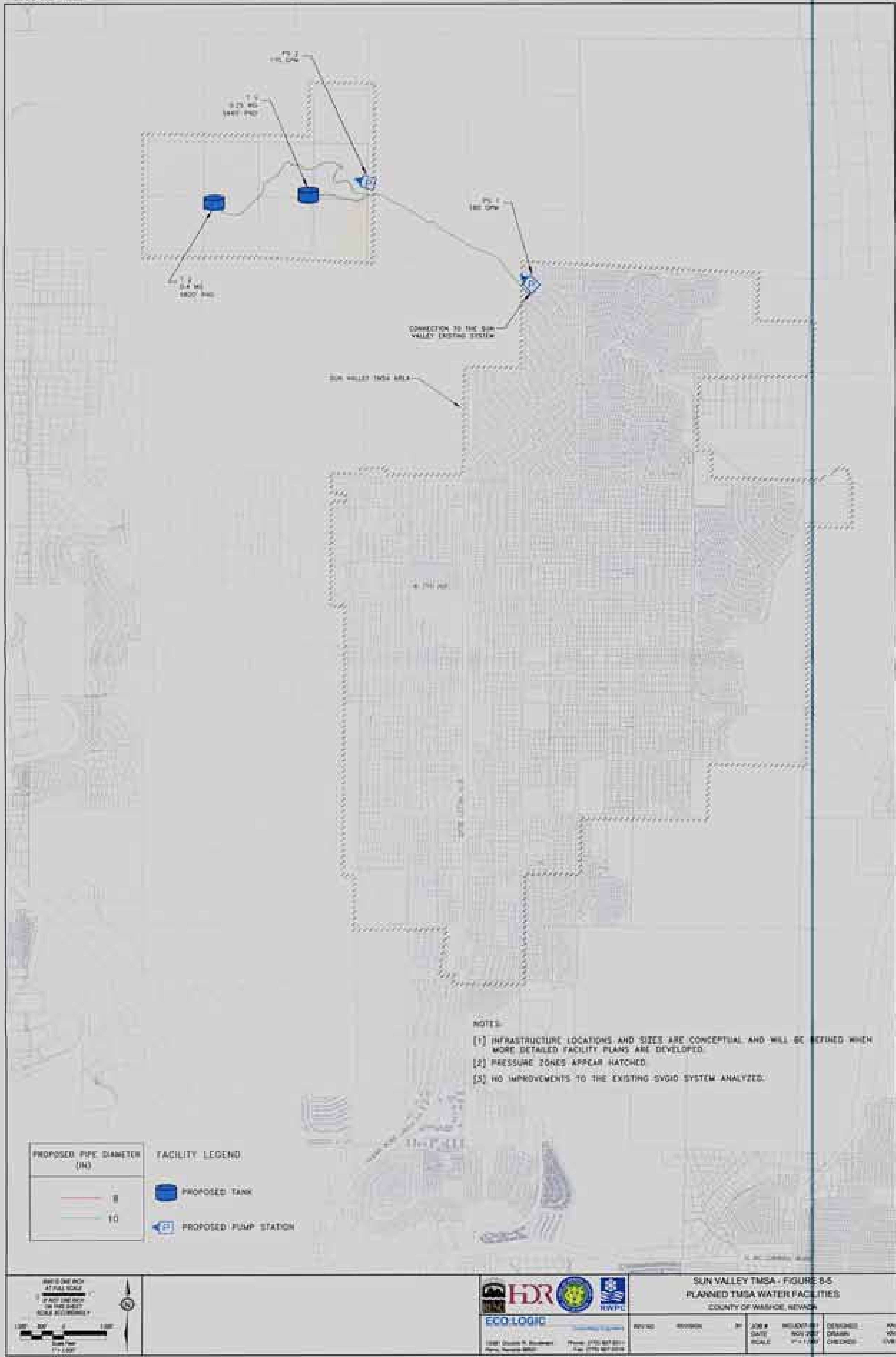
CITY OF RENO LIMITS

HDR

RWPC

ECO:LOGIC

SUN VALLEY TMSA - FIGURE 8-4
WASTEWATER SERVICE AREA
COUNTY OF WASHOE, NEVADA



T 2
0.4 MG
CONNECTION TO THE SUN VALLEY EXISTING SYSTEM
SUN VALLEY TMSA AREA
NOTES:
[1] INFRASTRUCTURE LOCATIONS AND SIZES ARE CONCEPTUAL AND WILL BE REFINED WHEN MORE DETAILED FACILITY PLANS ARE DEVELOPED.
[2] PRESSURE ZONES APPEAR HATCHED.
[3] NO IMPROVEMENTS TO THE EXISTING SVGID SYSTEM ANALYZED.
PROPOSED PIPE DIAMETER (IN)
8
10
FACILITY LEGEND
PROPOSED TANK
PROPOSED PUMP STATION
HDR
RWPC
ECO:LOGIC
SUN VALLEY TMSA - FIGURE 8-5
PLANNED TMSA WATER FACILITIES
COUNTY OF WASHOE, NEVADA
DESIGNED
DRAWN
CHECKED

LEMMON VALLEY WWTP

E. Lemmon Valley

Spanish Springs

Sun Valley

SUN VALLEY COLLECTION AREA

Truckee Meadows

TRUCKEE MEADOWS WRF

NOTE: INFRASTRUCTURE LOCATIONS AND SIZES ARE CONCEPTUAL AND WILL BE REFINED WHEN MORE DETAILED FACILITY PLANS ARE DEVELOPED.

MAP SYMBOLS

LIFT STATION

INTERCEPTOR (PROPOSED)

FORCE MAIN (PROPOSED)

PARALLEL INTERCEPTOR (PROPOSED)

INTERCEPTOR (EXISTING)

BASIN SERVICE AREA

HYDRAULIBASIN BOUNDARY

WASHOE COUNTY TMSA

CITY OF RENO LIMITS

HDR

ECO:LOGIC

SWPC

SUN VALLEY TMSA - FIGURE 8-8

PLANNED WASTEWATER COLLECTION & TREATMENT FACILITIES

COUNTY OF WASHOE, NEVADA

Section 9
Truckee Meadows

Table of Contents

List of Tables

List of Figures – Included at End of Section

Section 9 - Truckee Meadows TMSA

9.1 STUDY AREA DESCRIPTION AND DEVELOPMENT CONSTRAINTS

The Truckee Meadows TMSA is shown on Figure 9-1 (see figures at end of section) and includes areas within the jurisdiction of both the City of Reno and Washoe County. The Reno portion of the TMSA generally follows the Truckee Meadows Water Reclamation Facility (TMWRF) service area boundary. Several hydrobasins cover the Truckee Meadows area including Truckee Canyon, Truckee Meadows, and a portion of East Lemmon Valley. Surface runoff drains to various drainageways that end up in the Truckee River. The Truckee Meadows TMSA is complex from the perspective of whether particular areas are under the jurisdiction of either the City of Reno or Washoe County, who the water and wastewater purveyors are, and who has responsibility for stormwater and floodplain management.

The Truckee Meadows portion of the TMSA includes several regional centers and transit oriented development corridors (TODs) as shown on Figure 9-1. Regional centers consist of Dandini, University of Nevada, Reno (UNR), Downtown Reno, Renown, Reno-Tahoe International Airport, and the Convention Center. TODs consist of West 4th Street, East 4th Street, North Virginia Street, Mill Street, and South Virginia Street.

As mentioned in Section 1, the land use basis for facility planning was Traffic Analysis Zone (TAZ) data provided by both the City of Reno and Washoe County, with supplemental information derived from the City's Master Plan and Washoe County planned land uses. These data were modified with more detailed information provided by the UNR Small Business Development Center and developer's representatives. TAZ identifications, where more current information was incorporated, are listed in Table 9.1 and shown in Figure 9-A1 (Appendix A).

Table 9.1 - TAZ Data Modification

TAZ	Modification
102	Modified dwelling units from UNR approved unbuilt data
106	Modified dwelling units from UNR approved unbuilt data
115	Modified dwelling units from UNR approved unbuilt data
128	Modified dwelling units from UNR approved unbuilt data
143	Modified dwelling units from UNR approved unbuilt data
275	Modified dwelling units from UNR approved unbuilt data
312	Modified dwelling units from UNR approved unbuilt data
387	Modified dwelling units from UNR approved unbuilt data
391	Modified dwelling units from UNR approved unbuilt data
397	Modified dwelling units from UNR approved unbuilt data
415	Modified dwelling units and commercial acreage using Verdi plan data
416	Modified dwelling units and commercial acreage using Verdi plan data
421	Modified dwelling units from UNR approved unbuilt data
432	Modified dwelling units from UNR approved unbuilt data

435	Modified dwelling units and commercial acreage using Verdi plan data
481	Modified dwelling units from UNR approved unbuilt data
655	Modified dwelling units from UNR approved unbuilt data
690	Modified dwelling units from UNR approved unbuilt data
691	Modified dwelling units from UNR approved unbuilt data
695	Modified dwelling units from UNR approved unbuilt data
703	Modified dwelling units from UNR approved unbuilt data
704	Modified dwelling units from UNR approved unbuilt data
705	Modified dwelling units from UNR approved unbuilt data
781	Modified dwelling units and commercial acreage using Verdi plan data
782	Modified dwelling units and commercial acreage using Verdi plan data
783	Modified dwelling units and commercial acreage using Verdi plan data
784	Modified dwelling units and commercial acreage using Verdi plan data
785	Modified dwelling units and commercial acreage using Verdi plan data
786	Modified dwelling units and commercial acreage using Verdi plan data
787	Modified dwelling units and commercial acreage using Verdi plan data
788	Modified dwelling units and commercial acreage using Verdi plan data
789	Modified dwelling units and commercial acreage using Verdi plan data
790	Modified dwelling units and commercial acreage using Verdi plan data
815	Modified dwelling units from UNR approved unbuilt data

Areas that are limited or constrained for future development include the Reno-Tahoe International Airport, drainageways, waterbodies, and areas with slopes greater than thirty percent. These areas are shown on Figure 9-2.

9.2 CONCLUSIONS AND SUMMARY RECOMMENDATIONS

The estimated need for additional water resources for the Reno and Washoe County TMSA is approximately 17,021 AFA. This compares favorably with the potentially available water resources of 22,363 AF. However, additional demands will also be placed on these available water resources from other planning areas including Sparks, Spanish Springs and the South Truckee Meadows.

TMWA's 2025 Water Facility Plan is a comprehensive document; therefore, no further detailed planning was necessary within TMWA's retail service territory, other than for Verdi. Further planning was done for portions of Caughlin Ranch within the TMWA sphere of influence and Hidden Valley within the County water system.

The projected 2030 wastewater flow for the Truckee Meadows Water Reclamation Facility (TMWRF) is 41.2 MGD, not including flow from the City of Sparks, Sun Valley, Golden Valley or Spanish Springs. Reuse and discharge of reclaimed water from the various water reclamation facilities in the region is constrained by a number of factors. A thorough planning and facilities study of regionally integrated reclaimed water systems and management strategies is required to develop a plan to meet the disposal capacity requirements for the projected 2030 wastewater

flow. Regionally integrated reclaimed water systems and management strategies may realize economic and financially prudent alternatives that cannot be realized with separate, independent systems.

A summary of the estimated water and wastewater costs for the proposed infrastructure is listed in Table 9.2

Table 9.2 - Infrastructure Costs

Facility Description	Total Cost (a) ($M)
Water	$150.3
Wastewater (b)	$223.9

(a) 20 Cities ENRCCI = 7,942 May 2007.

(b) Costs do not address long term reuse and disposal requirements.

9.3 DESCRIPTION OF SERVICE PROVIDERS

The water and wastewater service providers are described in the following sections.

9.3.1 Water

TMWA provides water service to existing customers within the majority of Reno's TMSA in Truckee Meadows. Washoe County is the water purveyor for the remainder of the Truckee Meadows TMSA. Three small water purveyors exist in the Verdi area including the Boomtown water system, Verdi Meadows Utility Company and Verdi Mutual Water Company. The Boomtown water system serves the hotel/casino, service station, truck stop and RV park. Verdi Meadows Utility Company serves the River Oaks Subdivision. The Panther Valley Water Users Association serves water to the Panther Valley area and was not analyzed as part of this report. Figure 9-3 depicts the water purveyor service areas, Reno City limits, and locations of existing domestic wells.

The City of Reno has recently annexed approximately 2,700 acres in Verdi (2001). Maximum density and density distribution within the annexation area have been defined as part of a settlement agreement between the City of Reno and Washoe County. Preliminary water facility plans have been developed by TMWA and Capital Engineering that identify the required backbone facilities to deliver water from TMWA's system to the Verdi area. The TMWA supply will be the primary source of water to the Verdi area. Local groundwater will supplement the TMWA supply for peak demands.

9.3.2 Wastewater

The City of Reno provides wastewater collection, treatment and disposal for the Truckee Meadows TMSA with wastewater flow being treated at the regional TMWRF. TMWRF also provides service to Sparks and portions of the Washoe County TMSA. Two wastewater plants in the Verdi area will be decommissioned after being connected to the Lawton Verdi interceptor

that conveys wastewater to TMWRF. These plants include the Boomtown Wastewater Treatment Facility and Gold Ranch Casino. The Verdi Meadows Utility Company (River Oak) plant was connected to the Lawton Verdi interceptor in 2007.

Figure 9-4 depicts the locations of the wastewater treatment facilities, areas anticipated to be served by these facilities, and the locations of existing parcels with septic systems.

9.4 STATUS OF INFRASTRUCTURE PLANNING

The most recent facility plans for water and wastewater are listed in Table 9.3. Stormwater management and flood control are discussed in Section 14.

Table 9.3 - Recent Facility Plans

Plan Name	Date	Description
Water		
Preliminary Boomtown/Verdi Area Water Facility Plan (Draft) Reference: Capital Engineering	June 2004	Outlines the required water facility infrastructure to connect the Boomtown and Verdi areas to TMWA's service area.
Mortensen Et. Al. Development Standards Handbook Reference: Summit Engineering Corporation	March 2004	Identifies development standards for properties within the Verdi Settlement agreement.
Memo Titled "Backbone Water Facility Improvements to Supply 3560 GPM to Verdi/Verdi Area Reference: TMWA	June 2006	Summary of the backbone facilities required to deliver 3560 GPM of maximum day supply to the Verdi area.
2005-2025 Water Facility Plan Reference: TMWA	Dec. 2004	Describes the necessary water distribution and treated water storage facilities to meet the forecasted demands and resource optimization goals in the 2025 water resource plan.
Washoe County Regional Water Management Plan Reference: RWPC	Jan. 2005	The plan provides the region with an outline of how water will be managed to meet the needs of the citizens and to the future. Major components of the plan are identification of future water supply and wastewater facilities, regional flood control and drainage projects, and development of a water conservation program.
Preliminary Design Report Hidden Valley Water System Reference: ECO:LOGIC Engineering and CH2MHILL	Nov. 2004	Re-evaluates the need for a water treatment plant and expands upon the previous evaluation of TMWA wholesale water supplies.
Hidden Valley Water System Facility Plan Reference: Stantec Consulting	March 2004	Evaluates water supply and treatment alternatives for the Hidden Valley water supply wells, examines site selection for a new water storage tank, provides hydraulic analysis of the distribution system regarding minimum required pressures and fire flows and examines maintenance of the distribution system.

Wastewater		
Lawton Verdi Wastewater Facility Plan Reference: Stantec	July 2002	Evaluates various wastewater conveyance systems for existing and planned development in the Lawton Verdi area.
Draft Washoe County 208 Water Quality Management Plan Version 3 Reference: Truckee Meadows Regional Planning Agency	January 2007	Per section 208 of the Clean Water Act this report provides the planning and management of all sources of water pollution and defines the parameters for area-wide wastewater management plans.
2002 Truckee Meadows Regional Plan Reference: Truckee Meadows Regional Planning Agency	February 2003	A plan for the Truckee Meadows as it relates to land use planning, infrastructure provision, resource management and plan implementation.

9.5 WATER

The projected water demands and required infrastructure are developed in this section.

9.5.1 Assumptions, Planning Criteria and Methodology

Water demand factors used to estimate demands are based on TMWA design standards for both the TMWA and County areas. In the case of non-residential development, the demand factor used represents an average number for planning purposes only. When TMWA or Washoe County receives a request for water service on a non-residential property, the actual water rights dedication requirement will be based on a project-specific analysis of the number of fixture units and the specific landscaping plan. This level of detail is not available for this analysis.

9.5.2 Existing and Future Water Demand

Estimated water demands for Reno and the County are listed in Table 9.4, and are based on data provided by the County and TMWA. The current estimated weather normalized retail water demand in the Truckee Meadows is 78,120 AFA, with approximately 50,788 AF of the demand attributed to customers in the Reno and Washoe County portions of the Truckee Meadows planning area. It was not possible to accurately differentiate the existing demand between Reno and Washoe County. These estimates are based upon the actual demand experienced in 2006 and adjusted upward by approximately 8 percent to offset the cool wet spring conditions that reduced the observed demand by about 8 percent from the highest demand in the past 5 years.

Table 9.4 - Existing Water Demands

	Estimated Demand (AFA) (a)
City of Reno / Washoe County	50,788

(a) Based on 2006 adjusted demand data.

Based on the TAZ analysis, projected water demands for Reno and the County are listed in Table 9.5. The irrigation demand component is projected assuming that 6,000 gallons per month of water is consumed within a typical house, and the remainder is used for irrigation. The irrigation

demand range is based on front yard only irrigation, or the combined front and rear yard irrigation. Irrigation demand was not estimated for commercial or industrial use because there is no projection available for the amount of new commercial and industrial acreage that will be built by 2030. The total demands include both indoor and outdoor water use. The projected increase in demand is an approximation based upon the difference between the 2006, 2030 and 2095 TAZ projections.

Table 9.5 - City of Reno and Washoe County Water Demands

Condition	Irrigation Demand Component (AFA)	Total Demand Including Irrigation (AFA)	Projected Increase in Demand (a) (AFA)
2030 City of Reno and Washoe County (b, c)	3,162-6,323	67,809	17,021
City of Reno 2095 (d)		93,656	42,868

(a) Based on TAZ analysis.

(b) Based on 125,050 dwelling units and 5,318 acres of commercial/industrial zone in City of Reno.

(c) Based on 6,835 dwelling units and 45 acres of commercial/industrial zone in Washoe County.

(d) Based on 221,088 dwelling units and 5,318 acres of commercial/industrial zone in City of Reno.

Of the 2030 City of Reno water rights requirement, approximately 28 percent is estimated to be within the TOD and Center area. This includes new demands and potential redevelopment of existing properties.

An estimate of water demands associated with domestic wells is listed in Table 9.6, for Reno and the County. In the TAZ analysis, existing houses were analyzed the same way whether the house has a domestic well, or not. The flow projected in Table 9.5 includes demands from houses with an existing well.

Table 9.6 - Domestic Well Demands

	Number of Domestic Wells	Domestic Well Demands (AFA) (a)
Reno	416	466
County	966	1,082
Total	1,382	1,548

(a) Domestic well conversion based on 1.12 AFA per well

9.5.3 Water Resources

Substantial amounts of reclaimed water are potentially available from TMWRF as new development generates additional wastewater flow. However, there is a limit to the amount of reclaimed water that can be utilized without requiring a return flow water right for the Truckee

River. Refer to Section 9.6.3 for further discussion on reclaimed water constraints. This high quality reclaimed water is suitable for landscape irrigation, including residential areas, and could be used to extend the available potable water supplies. Landscape irrigation accounts for approximately half of the total water demand for a typical residential unit. Water demands could be further reduced by implementing water conserving landscape practices and/or xeriscaping.

Existing and potentially available water resources to serve both the City of Reno and Washoe County TMSA in the Truckee Meadows area are presented in Table 9.7. Refer to Appendix B for more detailed information on available water resources.

Table 9.7 - Potentially Available Water Resources

Source Description	Supply (AFA)
Existing Resources	
TMWA Water Resources (a)	102,000
Verdi Area Surface and Groundwater Rights (b)	550
Reclaimed Water	(c)
Total	102,550
Future Resources	
TMWA Water Resources (d)	120,353
Verdi Area Surface and Groundwater Rights	4,560
Total	124,913

(a) Existing commitment level for the entire water system associated with TMWA's decreed municipal rights, storage rights, groundwater rights and main stem Truckee River irrigation rights.

(b) Estimate of existing water resource utilization for M&I purposes within the Verdi area.

(c) Reclaimed water may be used to supplement water resources for non-potable uses.

(d) Future commitment level based on implementation of TROA.

A comparison of the existing and future resources, water demand for the existing conditions and the potential 2030 demand is shown in Table 9.8. The total demand estimate includes potential water requirements of 1,548 AF for domestic wells. The estimated need for additional water resources for the Reno and Washoe County TMSA is approximately 17,021 AFA. This compares favorably with the potentially available water resources of 22,363 AF. However, additional demands will also be placed on these available water resources from other planning areas including Sparks, Spanish Springs and the South Truckee Meadows. Future potential water resources are discussed in Section 13.

Table 9.8 - Water Demand and Resources Comparison

Condition	Supply (AFA)	Total Demand (AFA)
Existing	102,550	50,788
2030	124,913	67,809
Net Increase	22,363 (a)	17,021

(a) Increase in water supply available to serve new demands in Reno, Sparks and Washoe County

9.5.4 Planned Water Facilities

The majority of the Truckee Meadows area is currently served by TMWA. TMWA's 2025 Water Facility Plan (WFP) identifies the required improvements to accommodate growth and remediate existing system deficiencies within its service territory. The WFP Executive Summary and cost tables can be found in Appendix B. A brief discussion of the proposed major water system facilities and their estimated costs are included in the Executive Summary. Greater facility detail is presented in the WFP cost tables that accompany the Executive Summary including specific facility information, such as estimated in-service date, estimated cost and cost allocation to existing and new development. It is assumed that the information contained within TMWA's WFP is current, even though some planning changes and facility improvements may have occurred. TMWA's 2025 Water Facility Plan is a comprehensive document; therefore, no further detailed planning was necessary for this Facility Plan within TMWA's retail service territory.

Estimated available fire flows to the Truckee Meadows TODs and Regional Centers are shown in Table 9.9.

Table 9.9 - Estimated Available Fire Flow for TODs and Regional Centers

Area		Description	Available Fire Flow (GPM)(a)	Remarks
Stead		Regional Center	TBD	Undeveloped
North Virginia Street	Upper	TOD Corridor	2,000	Along Stead Blvd. North of the intersection of US 395 and Stead Blvd.
	Middle		0	No fire hydrants available along N. Virginia from Stead Blvd. to Lemmon Dr.
	Lower		4,000	Along N. Virginia St. South of the intersection of US 395 and Lemmon Dr.
South Virginia Street	Upper	TOD Corridor	4,000	Along S. Virginia St. in between Downtown Reno and Convention Center.
	Middle		3,000	Along S. Virginia St. near the Convention Center. Flow can be increased with minor system improvements.

Dandini	Regional Center	3,000	Recent TMWA improvements have increased flows to 3,000 GPM.
UNR	Regional Center	3,000	Recent TMWA improvements have increased flows to 3,000 GPM.
Downtown Reno	Downtown Center	4,000 - 5,000	
Renown Medical	Regional Center	4,000	
East Fourth Street	TOD Corridor	4,000	
West Fourth Street	TOD Corridor	2,000 - 3,000	Mains are limited in this area.
Mill Street	TOD Corridor	4,000	
Convention Center	Regional Center	4,000	
Reno-Tahoe International Airport	Regional Center	4,000	

(a) Available fire flows are approximate and depend on the specific location and piping in the immediate vicinity.

Verdi, Hidden Valley and a portion of Caughlin Ranch are planned for additional development within the expanded Truckee Meadows TMSA. Details of the water facilities for these areas are presented below.

Verdi Facilities

Backbone water facilities have been previously planned by TMWA that will convey 3,560 GPM to the Verdi area. Local groundwater wells are anticipated to produce 800 GPM. These facilities are anticipated to be sufficient to meet the TMWA and Washoe County buildout maximum day demand projections of 4,355 GPM. TMWA's proposed facilities include improvements internal to their system west to Mogul, as well as the extension of facilities from Mogul to the Boomtown water system. These improvements are shown in Figure 9-5.

In this Facility Plan, a combination of developer specific estimated demands and demands calculated based on TAZ methodology yields a total estimated demand of 5,270 GPM. Based on this demand estimate, a potential supply deficit of approximately 740 GPM may result. If development in the Verdi area is realized to the extent predicted in this analysis, the following water supply alternatives should be considered. Ultimately, the best alternative will depend on the timing and extent of the actual development in the Verdi area.

- Additional TMWA Supply – The proposed backbone facilities would need to be oversized to the Verdi area. In general, these facilities would need to be increased to the next standard pipe size (i.e. from 18" to 20"). However, most of TMWA's proposed internal system improvements have been constructed or are currently under design;

therefore, the practicality of this alternative is limited. The estimated cost to oversize the backbone facilities identified in TMWA's 2006 report, from the intersection of Leroy Street and Mae Anne Avenue, is on the order of 1.5 million dollars.

- Verdi Surface Water Treatment Plant – Verdi has the potential to add supply capacity via a surface water treatment plant to treat Truckee River and/or local spring water resources. This is particularly advantageous from a water supply reliability perspective. The estimated cost for a surface water treatment plant to supply 740 GPM is on the order of 3 million dollars.

- Additional Verdi Groundwater supply – Additional groundwater supply capacity could be investigated, including the potential to increase peak production capacity using aquifer storage and recovery.

The recommended water facility infrastructure for the Verdi area is summarized in Table 9.10 and presented in Figure 9-5. Additional facilities are planned to convey water from the Boomtown area to the Gold Ranch vicinity. Planned service elevation ranges for the Verdi area are 4860 to 5615 feet. Proposed pressure zones are presented in Figure 9-B1 (Appendix B).

Table 9.10 - Verdi Area Water Facility Totals

Facility	Qty
Total Length of proposed Transmission Mains	80,300 Feet
Total number of Pump Stations	7
Total Storage Volume	6.9 MG
TMWA Facilities (See Appendix B, TMWA 2025 WFP Information)	

No infrastructure was planned for areas with existing wells such as Belli Ranch. Water demands were included in the total water demand estimate to account for the potential conversion of domestic wells to the municipal system in the future.

Hidden Valley Facilities

The recommended water facility infrastructure for the Hidden Valley area is summarized in Table 9.11 and presented in Figure 9-6. Planned service elevation ranges for the Hidden Valley area are 4,450 to 5,290 feet. No infrastructure was analyzed within the existing County system to support this area. Proposed pressure zones are presented in Figure 9-6.

Table 9.11 - Hidden Valley Area Water Facility Totals

Facility	Qty
Total Length of proposed Transmission Mains	15,700 Feet
Total number of Pump Stations	3
Number of Tanks/ Total Storage Volume	3/ 0.85 MG

Caughlin Ranch Facilities

The recommended water facility infrastructure for the Caughlin Ranch area is summarized in Table 9.12 and presented in Figure 9-7. Planned service elevation ranges for the Caughlin Ranch area are 4890 to 6280 feet. No infrastructure was analyzed within the existing TMWA system to support this area. Proposed pressure zones are presented in Figure 9-7.

Table 9.12 - Caughlin Ranch Water Facility Totals

Facility	Qty
Total Length of proposed Transmission Mains	7,440 Feet
Total number of Pump Stations	3
Number of Tanks/ Total Storage Volume	3/ 0.66 MG

9.5.5 Water Facility Cost Estimates

The estimated costs of the planned water infrastructure for the Truckee Meadows TMSA are summarized in Table 9.13, and are listed in more detail in Appendix B. Costs of the proposed Verdi, Hidden Valley and Caughlin Ranch transmission mains, pump stations and storage tanks are summarized in Table 9.14. Individual pressure reducing stations are not included in the cost estimates, as these facilities are generally considered development specific, on-site improvements. In addition, the cost of purchasing water rights is not included. Cost analysis project divisions for Verdi are shown in Figure 9-B2 (Appendix B). Cost analysis project divisions for Hidden Valley are shown in Figure 9-B3 (Appendix B).

TMWA has identified facility "charge areas" for system mains and pumping and distribution improvements in their system (see Appendix B). TMWA has developed a Supply and Treatment Facility Charge and a Storage Facility Charge. These are defined as the unit cost in dollars per GPM of maximum day demand, representing the cost to construct and finance supply/treatment improvements as well as storage improvements as identified in TMWA's Water Facility Plan.

The costs for the 2030 Truckee Meadows TMSA facilities were estimated by multiplying the new development portion of the 2030 maximum day demand (13,500 GPM, not including Verdi), by the Supply and Treatment Facility Charge (currently $3,236 per GPM) and the Storage Facility Charge (currently $1,240 per GPM). These cost values are shown in Table 9.13. TMWA's rate schedule showing their current water system facility charges is included in Appendix B.

Table 9.13 - TMWA Truckee Meadows Planning Area Water Infrastructure Costs (a)

Facility Description	Total Cost ($M)	New Development Allocation ($M)	Existing Customer Allocation ($M)
Supply (b)(c)	$43.69	$43.69	$0
Storage (d)	$16.74	$16.74	$0
Mains, Pumping and Distribution Improvements	$32.0	$22.7	$9.3
Total	$92.43	$83.13	$9.3

(a) Planned improvement costs are from TMWA's Water Facility Plan as of December 2004.

(b) Water rights costs are not included.

(c) Supply costs were developed by multiplying the estimated TM TMSA 2030 MDD by TMWA's Rule 5 *Supply and Treatment* Facility charge ($3,236 per maximum day GPM).

(d) Storage costs were developed by multiplying the estimated TM TMSA 2030 MDD by TMWA's Rule 5 Storage Facility Charge (currently $1,240 per maximum day GPM).

Table 9.14 – Verdi, Hidden Valley and Caughlin Ranch Water Infrastructure Costs (a)

Facility Description	Total Cost ($M)	Reno Share of Facility ($M)	County Share of Facility ($M)
Verdi			
Supply (b)(c)	$11.5	$8.6	$2.9
Transmission	$28.4	$22.2	$6.2
Storage	$9.4	$7.4	$2
Subtotal	$49.3	$38.2	$11.1
Hidden Valley			
Supply (b)(c)	$0.7	$0	$0.7
Transmission	$2.7	$0	$2.7
Storage	$1.2	$0	$1.2
Subtotal	$4.6	$0	$4.6
Caughlin Ranch			
Supply (b)(c)	$0.4	$0	$0.4
Transmission	$2.7	$0	$2.7
Storage	$0.9	$0	$0.9
Subtotal	$4.0	$0	$4.0
Total	$57.9	$38.2	$19.7

(a) 20 Cities ENRCCI = 7,942 May 2007.

(b) Water rights costs are not included.

(c) Supply costs were developed by multiplying the estimated increase required for the 2030 MDD by TMWA's Rule 5 *Supply and Treatment* Facility charge ($3,236 per maximum day GPM).

9.5.6 Water Planning Limitations

Specific limitations of the water facility plan component for the Truckee Meadows TMSA planning area are listed below.

- Costs of TMWA's overall system improvements appear in their WFP Executive Summary found in Appendix B. Costs of facility improvements specific to the Reno portion of the Truckee Meadows area were not extracted from the TMWA WFP.

- Single backbone mains were used to supply water throughout the new development areas. As development occurs, it is likely that an equivalent transmission capacity will be conveyed by a distribution network rather than by a single backbone main.

- In Verdi, the allocation of cost between Reno and Washoe County is an approximation. Further analysis will be required in the future to determine the appropriate cost allocation for specific facilities.

9.6 WASTEWATER

The projected wastewater flows and required infrastructure for conveyance, treatment, and disposal are developed in this section.

9.6.1 Assumptions, Planning Criteria and Methodology

The wastewater flow factor for the Truckee Meadows planning area was assumed from the 2007 Washoe County 208 Water Quality Management Plan. The Truckee Meadows flow factor ranged from a low of 108 gallons per capita per day (gpcd) to 149 gpcd. An average of 128.5 gpcd was used for flow projection. All other wastewater planning assumptions are as stated in Appendix A for the City and County areas.

9.6.2 Existing and Future Wastewater Flow

The 2006 annual average wastewater flows for Truckee Meadows Water Reclamation Facility, not including flows from Sparks, Sun Valley Golden Valley or Spanish Springs, is listed in Table 9.15.

Table 9.15 - Existing Wastewater Flows

	2006 Annual Average Flows (MGD) (a)
Truckee Meadows WRF (b)	20.7

(a) Based on 2006 plant flow records.

(b) No flow is included from Sparks, Sun Valley, Golden Valley or Spanish Springs. Total 2006 TMWRF flow is 29.3 MGD.

Using the TAZ data, flow was projected for the Reno and County portion of the Truckee Meadows TMSA planning area. The TMWRF capacity projections for Reno and Washoe County are presented in Tables 9.16 and 9.17, respectively.

Table 9.16 - City of Reno Wastewater Projections

Condition	Flows (MGD)
2030 Truckee Meadows WRF (a)	39.3
2095 Truckee Meadows WRF (b)	66.5

(a) Based on 125,050 dwelling units and 5,318 acres of commercial and industrial land use.

(b) Based on 221,088 dwelling units and 5,318 acres of commercial and industrial land use.

The intensification of wastewater flows in all TODs and Centers was compared to the overall flows. Of the 2030 City water reclamation facility flow, 41 percent is estimated to be produced from areas within a TOD or Center.

Table 9.17 - Washoe County Wastewater Projections

Condition	Flow (MGD)
2030 Truckee Meadows WRF (a)	1.9

(a) Based on 6,835 dwelling units and 45 acres of commercial/industrial zone.

The potential flow projection for parcels with existing septic systems that could be connected to the municipal sewer system is listed in Table 9.18. In the TAZ analysis, existing houses were analyzed the same whether the house has a septic system, or not. The flows projected in Tables 9.16 and 9.17 include potential flows from houses with septic systems.

Table 9.18 - Septic System Conversion Flow Projections

	Number of Septic Systems	Septic System Conversion Flow (MGD)
Reno	1,709	0.342
County	2,576	0.515
Total	4,285	0.857

(a) Septic system conversion based on 200 gpd per septic system.

The projected 2030 wastewater flow for TMWRF is 41.2 MGD, not including flow from the City of Sparks, Sun Valley, Golden Valley or Spanish Springs. The 208 Plan has a projected 2030 wastewater flow of 43.6 MGD to 70.1 MGD for the entire TMWRF service area.

9.6.3 Water Reclamation and Disposal

The City of Sparks and the City of Reno each own and operate utilities that distribute reclaimed water from TMWRF. The existing reclaimed water facilities are shown in Figure 9-9. The wastewater treatment and reclamation systems will need to be expanded to dispose of the projected effluent in 2030. Potential reclaimed water expansion areas are identified in the Washoe County Comprehensive Regional Water Management Plan and the 208 Water Quality Management Plan. These plans represent the region's current status of reclaimed water facility planning; therefore, no further detailed planning was conducted for this Facility Plan.

Reuse and discharge of reclaimed water from the various water reclamation facilities in the region may eventually be constrained by a number of factors, including:

- Water quality standards, TMDLs and discharge permit limitations to the Truckee River.
- Possible constraints on use of water originating from outside the Truckee River watershed.
- The need for additional water rights in locations where a return flow to the Truckee River is required.
- Regulatory constraints on discharges to groundwater aquifers.
- The sub-regional imbalance of reclaimed water supply, storage and demand.
- Sites available for use of reclaimed water may not be sufficient to consume all of the available supply of reclaimed water.
- A shift in the application of regulatory policy may increase or restrict the locations where application of reclaimed water is allowed.

A thorough planning and facilities study of regionally integrated reclaimed water systems and management strategies may realize economic and financially prudent alternatives that cannot be realized with separate, independent systems. A detailed evaluation of water reclamation facilities and management strategies was beyond the scope of this Facility Plan.

9.6.4 Planned Wastewater Facilities

Planned wastewater facilities are developed for the Truckee Meadows area.

Truckee Meadows

Recommendations for future wastewater collection and treatment facilities were developed for 2030 and are shown on Figure 9-8 for Truckee Meadows. For each sewer collection area, the projected 2030 flow was compared to the capacity of the existing gravity interceptors. The collection areas are shown on Figure 9-C1 for both the City areas and County Areas 10, 11, 12, 13, 14, 15, portion of 16, and 17 as shown on Figure 1-A1 (Appendix A, C). Existing lift stations and force mains were not analyzed for remaining available capacity. If the existing City of Reno interceptors or force mains do not have capacity for the 2030 flow, a parallel pipe/facility is recommended. Future detailed design studies should determine whether replacing

the existing pipe or installing a parallel main is the appropriate solution. Facility sizing methods and calculations are included in Appendix A.

The County areas are connected into the City TMWRF collection system. Most of these pipes would not be defined as interceptors due to their size, but are included to show how the County areas are or may be sewered.

No infrastructure was planned for areas with existing septic systems such as Belli Ranch. Wastewater flows were included in the total flow estimate to account for the potential conversion of septic systems to the municipal system in the future.

A summary of recommended wastewater collection and treatment infrastructure for the Truckee Meadows portion of the TMSA is summarized in Table 9.19.

Table 9.19 - Truckee Meadows Recommended Wastewater Infrastructure

Facility		Units
Interceptors	11,000	Feet
Parallel Interceptors	130,470	Feet
2030 Treatment Capacity for TMWRF (not including City of Sparks, Sun Valley, Golden Valley or Spanish Springs flow)	41.2	MGD

9.6.5 Wastewater Facility Cost Estimates

Wastewater infrastructure costs are summarized for the Truckee Meadows portion of the TMSA in Table 9.20, and are listed in more detail in Appendix C. These facilities are intended to serve new growth, and not to remediate existing system deficiencies.

Table 9.20 - Truckee Meadows Wastewater Infrastructure Costs (a)

Facility Description	Total Cost ($M)	Reno Share of Facility ($M)	County Share of Facility ($M)
Collection System	$51.1	$48.4	$2.7
City of Reno Planned Capacity Improvements (b)	$93.0	Not Available	Not Available
Truckee Meadows WRF Treatment (c)	$79.8	$76.2	$3.6
Total	$223.9	$124.6	$6.3

(a) 20 Cities ENRCCI = 7,942 May 2007.

(b) 5-year projected CIP improvements to increase capacity and not fix existing problems.

(c) Cost based on expansion of plant from 46 MGD (current capacity) to 49.8 MGD.

The allocation of cost between Reno and Washoe County was developed from their respective share of the flow for the collection system and treatment facilities.

9.6.6 Wastewater Planning Limitations

Specific limitations of wastewater planning in the Truckee Meadows area are listed below.

- Wastewater flow projections are conservative because a mid-range wastewater flow factor is used. The TMWA Rule 7 water demand projections are representative of actual demands. Therefore, the percentage of wastewater flow compared to the total water demand is more than the "typical" fifty percent reported in previous planning studies. The flow projection methodology for 2095 further exacerbates this discrepancy.

- The interceptors analyzed in this Facility Plan represent approximately ten percent of Reno's collection system pipelines. Substantial improvements to smaller existing trunk sewers and collection pipelines are also required. The projected need for overall sewer collection system improvement and rehabilitation is more on the order of $20 million per year. Evaluation of these potential improvements is beyond the scope of this Facility Plan.

- The existing interceptor capacity was analyzed using an average capacity for a pipe segment. There will be sections of pipe reach with less capacity that may require upsizing even if the pipe reach as a whole has enough capacity. More detailed analysis of the sewer collection system is required to determine specific improvements by pipe section.

- Effluent disposal planning for the Truckee Meadows TMSA planning area is conceptual. The existing information for regional reclaimed water facilities has been provided; however, a thorough planning and facilities study of regionally integrated reclaimed water systems and management strategies is required to develop a plan to meet the disposal capacity requirements for the projected 2030 wastewater flow.

- The allocation of cost between Reno and Washoe County is an approximation. Further analysis will be required in the future to determine the appropriate cost allocation for specific facilities.

9.7 POLICY RECOMMENDATIONS (INCLUSIVE OF WATER, WASTEWATER)

Reuse and discharge of reclaimed water from the various water reclamation facilities in the region is constrained by a number of factors. Regionally integrated reclaimed water systems and management strategies may realize economic and financially prudent alternatives that cannot be realized with separate, independent systems.

CALIFORNIA
NEVADA
Truckee Canyon
Truckee Meadows
Long Valley
N. Lemmon Valley
E. Lemmon Valley
Sun Valley
Spanish Springs

MAP SYMBOLS

DOWNTOWN CENTER (POLICY 1.2.5)
REGIONAL CENTER (POLICY 1.2.5)
TOD CORRIDOR (POLICY 1.2.10)
CITY OF RENO TMSA
WASHOE COUNTY TMSA
OUTSIDE TMSA
CITY OF RENO LIMITS
WASHOE COUNTY BOUNDARY

HDR
ECO:LOGIC
RWPC

TRUCKEE MEADOWS TMSA - FIGURE 9-1
STUDY AREA
COUNTY OF WASHOE, NEVADA

CALIFORNIA

NEVADA

MAP SYMBOLS

SLOPE 15% OR GREATER

WATERBODY

FLOODPLAIN

AIRPORT

CITY OF RENO TMSA

WASHOE COUNTY TMSA

OUTSIDE TMSA

CITY OF RENO LIMITS

WASHOE COUNTY BOUNDARY

ECO:LOGIC

TRUCKEE MEADOWS TMSA - FIGURE 9-2

AREA CONSTRAINTS

COUNTY OF WASHOE, NEVADA

CALIFORNIA

NEVADA

STEAD TMSA

MAP SYMBOLS

TRUCKEE MEADOWS TMSA - FIGURE 9-3

WATER PURVEYOR SERVICE AREA

COUNTY OF WASHOE, NEVADA

HDR

ECO:LOGIC

CALIFORNIA
NEVADA

Truckee Canyon

Verdi

Boca

Hirschdale

Prosser Creek Reservoir

Boca Reservoir

Truckee River

Long Valley

E. Lemmon Valley

Truckee Meadows

Sun Valley

SPARKS TMSA

S. TRUCKEE MEADOWS TMSA

SOUTH TRUCKEE MEADOWS WRF

TRUCKEE MEADOWS WRF

MAP SYMBOLS

SEPTIC SYSTEM (TMWRF COLLECTION)

SEPTIC SYSTEM (SWRF COLLECTION)

WATER RECLAMATION FACILITY

TRUCKEE MEADOWS WRF COLLECTION AREA

SOUTH TRUCKEE MEADOWS WRF COLLECTION AREA

TO BE DECOMMISSIONED AFTER CONNECTION TO LAKEVIEW INTERCEPTOR

CITY OF RENO LIMITS

HYDROLOGIC BOUNDARY

WASHOE COUNTY BOUNDARY

HDR

ECO:LOGIC

TRUCKEE MEADOWS TMSA - FIGURE 9-4
WASTEWATER SERVICE AREA
COUNTY OF WASHOE, NEVADA

NOTES:

[1] INFRASTRUCTURE LOCATIONS AND SIZES ARE CONCEPTUAL AND WILL BE REFINED WHEN MORE DETAILED FACILITY PLANS ARE DEVELOPED.

[2] FOR DETAILED TMWA SYSTEM IMPROVEMENTS SEE BOOMTOWN/VERDI AREA BACKBONE WATER FACILITY REPORT (2006).

PROPOSED PIPE DIAMETER (IN)

20
24
20
18
16
14
12
10

FACILITY LEGEND

EXISTING WELL
EXISTING TANK
PROPOSED TANK
PROPOSED PUMP STATION
PROPOSED WATER TREATMENT PLANT LOCATION

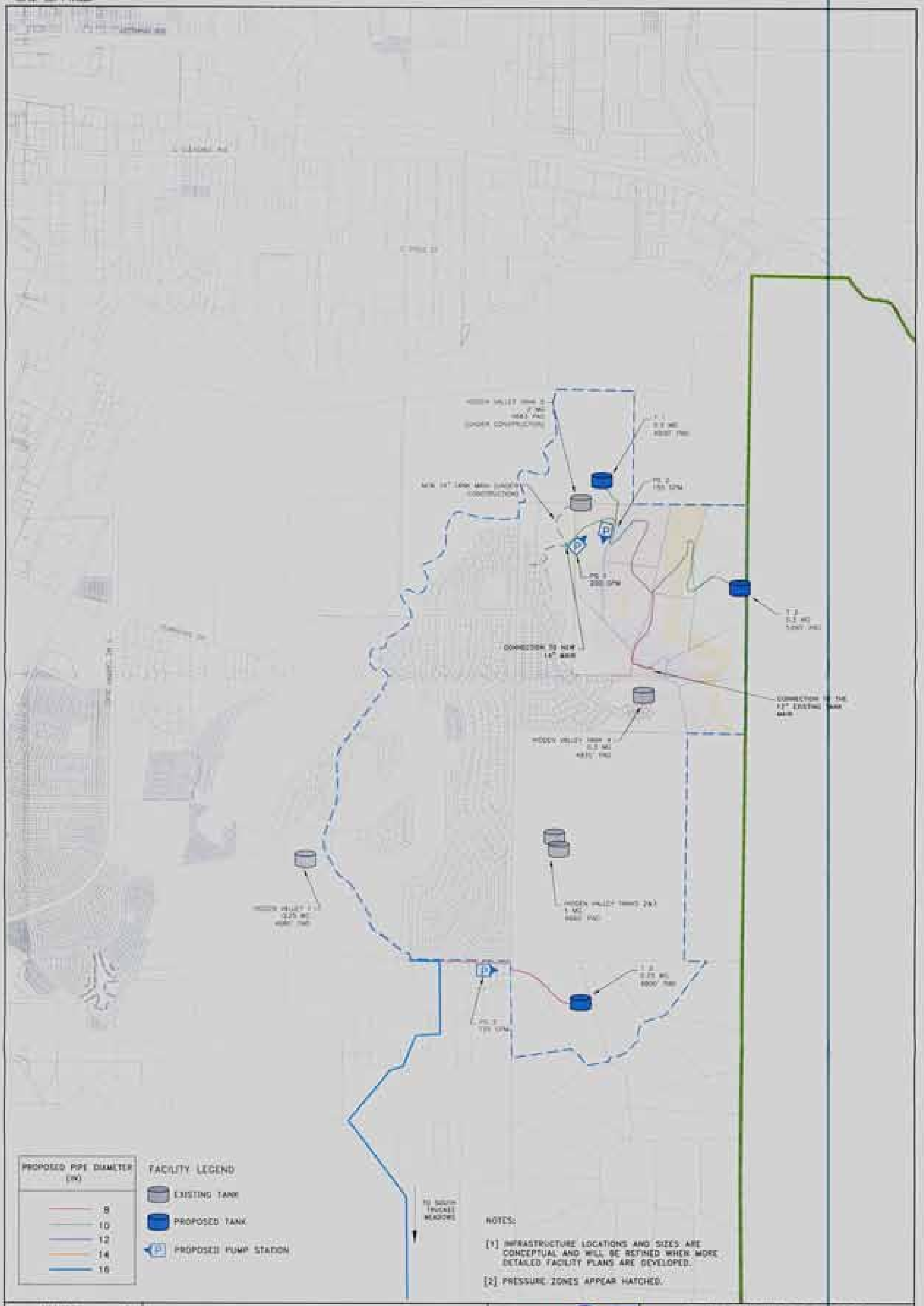
MAP SYMBOLS

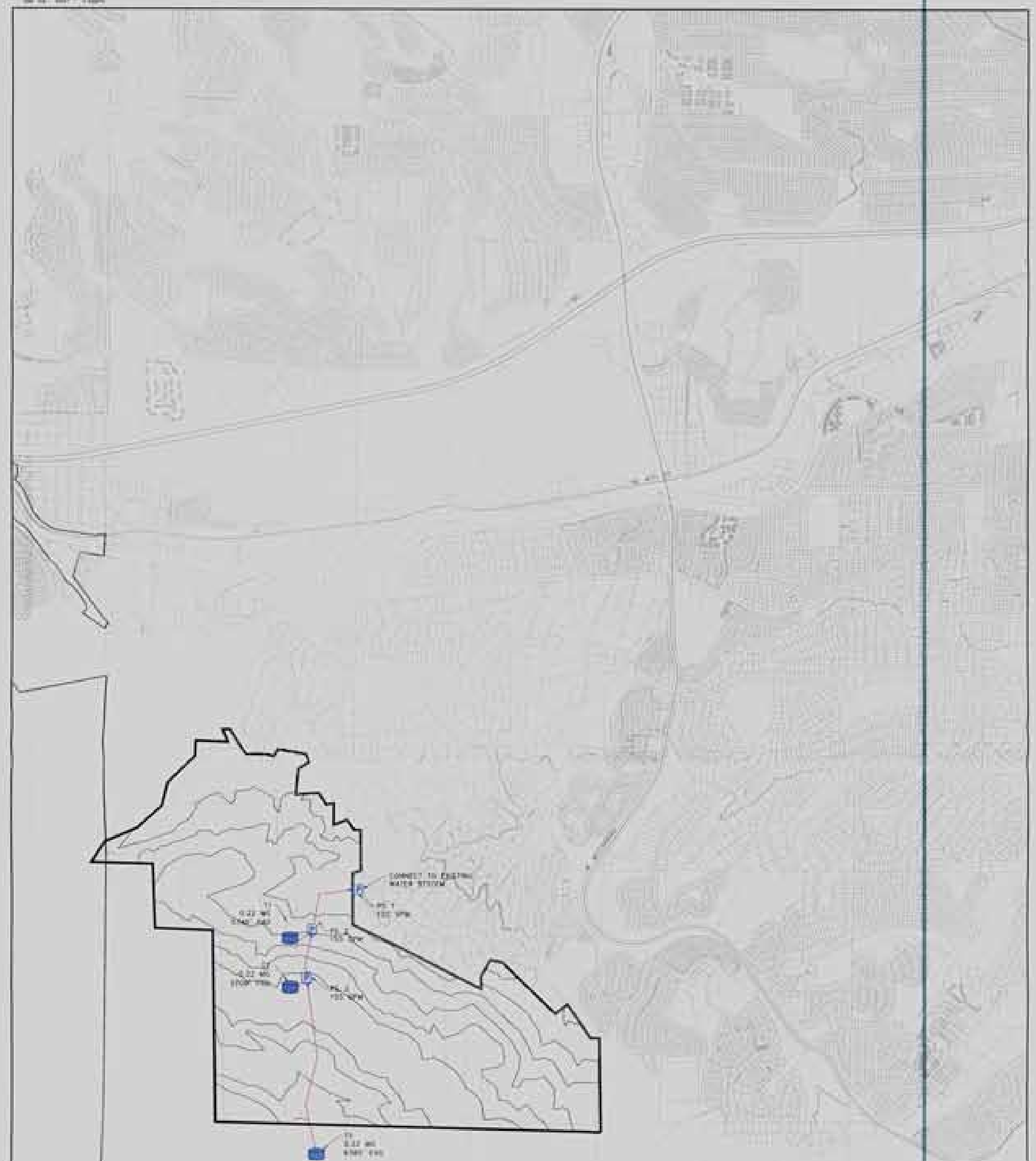
TMWA SERVICE AREA
TMWA RETAIL
TMWA WHOLESALE
OTHER PURVEYORS
WASHOE COUNTY WATER SERVICE AREA
WASHOE COUNTY BOUNDARY

CALIFORNIA
NEVADA

ECO:LOGIC

TRUCKEE MEADOWS TMSA - FIGURE 9-5
PLANNED VERDI WATER FACILITIES
COUNTY OF WASHOE, NEVADA


PROPOSED PIPE DIAMETER (IN)
8
10
12
14
16
FACILITY LEGEND
EXISTING TANK
PROPOSED TANK
PROPOSED PUMP STATION
NOTES:
[1] INFRASTRUCTURE LOCATIONS AND SIZES ARE CONCEPTUAL AND WILL BE REFINED WHEN MORE DETAILED FACILITY PLANS ARE DEVELOPED.
[2] PRESSURE ZONES APPEAR HATCHED.
MAP SYMBOLS
HIDDEN VALLEY PLANNING LIMIT
WASHOE COUNTY BOUNDARY
TRUCKEE MEADOWS TMSA - FIGURE 9-6
PLANNED HIDDEN VALLEY WATER FACILITIES
COUNTY OF WASHOE, NEVADA
ECO:LOGIC
HDR
SWPC



NOTES:

[1] INFRASTRUCTURE LOCATIONS AND SIZES ARE CONCEPTUAL AND WILL BE REFINED WHEN MORE DETAILED FACILITY PLANS ARE DEVELOPED.

[2] PRESSURE ZONES APPEAR HORIZONTAL

[3] WC IMPROVEMENTS TO THE EXISTING TMWA SYSTEM ANALYZED.

MAP SYMBOLS

- CAUGHLIN RANCH PLANNING LIMITS
- PROPOSED TANK
- 8" PIPELINE
- PUMP STATION

ECO:LOGIC

HDR

TRUCKEE MEADOWS TMSA - FIGURE 9-7
CAUGHLIN RANCH WATER FACILITIES
COUNTY OF WASHOE, NEVADA

NOTES:
1. INFRASTRUCTURE LOCATIONS AND SIZES ARE CONCEPTUAL AND WILL BE REFINED WHEN MORE DETAILED FACILITY PLANS ARE DEVELOPED.
2. EXISTING PIPES BASED ON DATA PROVIDED BY CITY OF RENO (JULY 2006) AND WASHOE COUNTY (APRIL 2007).

Truckee Meadows

Verdi

Truckee River

Lemmon Valley

Spanish Springs

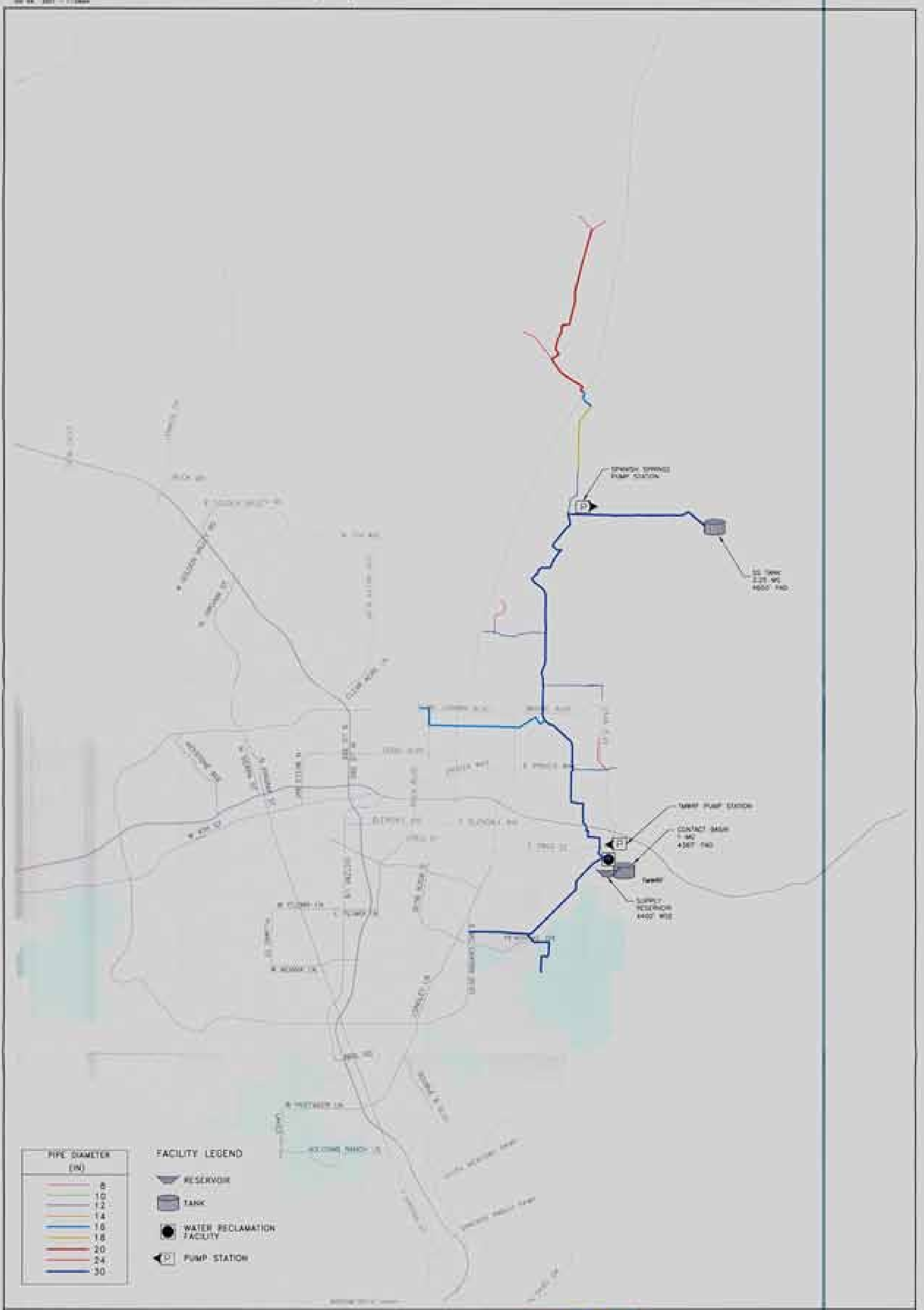
Sun Valley

MAP SYMBOLS

- WATER RECLAMATION FACILITY
- FORCE MAIN (EXISTING)
- INTERCEPTOR (EXISTING)
- INTERCEPTOR (PROPOSED)
- PARALLEL INTERCEPTOR (PROPOSED)
- LIFT STATION
- CITY OF RENO TMSA
- WASHOE COUNTY TMSA
- OUTSIDE TMSA
- CITY OF RENO LIMITS
- WASHOE COUNTY BOUNDARY

HDR | ECO:LOGIC | RWPC

TRUCKEE MEADOWS TMSA - FIGURE 5-5
PLANNED WASTEWATER COLLECTION & TREATMENT FACILITIES
COUNTY OF WASHOE, NEVADA


PIPE DIAMETER (IN)
8
10
12
14
16
18
20
24
30
FACILITY LEGEND
RESERVOIR
TANK
WATER RECLAMATION FACILITY
PUMP STATION
MAP SYMBOLS
CITY OF RENO TMSA
WASHOE COUNTY TMSA
TRUCKEE MEADOWS TMSA - FIGURE 9-9
EXISTING RECLAIMED WATER & DISPOSAL FACILITIES
COUNTY OF WASHOE, NEVADA
HDR
ECO:LOGIC

Section 10
South Truckee Meadows

Table of Contents

List of Tables

List of Figures (Included at End of Section)

Section 10 – South Truckee Meadows TMSA

10.1 STUDY AREA DESCRIPTION AND DEVELOPMENT CONSTRAINTS

The South Truckee Meadows TMSA is shown on Figure 10-1 (see figures at end of section) and includes areas within the jurisdiction of both the City of Reno and Washoe County. Several hydrobasins cover the South Truckee Meadows area including Pleasant Valley and Truckee Meadows. Surface runoff drains to various drainageways that end up in the Truckee River. The South Truckee Meadows TMSA is complex from the perspective of whether particular areas are under the jurisdiction of the City of Reno or Washoe County, who the water and wastewater purveyors are, and who has responsibility for stormwater and floodplain management.

The South Truckee Meadows portion of the TMSA includes a regional center and a transit oriented development corridor (TOD) consisting of Redfield and South Virginia Street as shown on Figure 10-1.

As mentioned in Section 1, the land use basis for facility planning was Traffic Analysis Zone (TAZ) data provided by both the City of Reno and Washoe County, with supplemental information derived from the City's Master Plan and Washoe County planned land uses. These data were modified with more detailed information provided by the University of Nevada, Reno (UNR) Small Business Development Center and developer's representatives. TAZ identifications where more current information was incorporated are listed in Table 10.1 and shown in Figure 10-A1 (Appendix A).

Table 10.1 - TAZ Data Modification

TAZ	Modification
444	Modified dwelling units from UNR approved unbuilt data
448	Modified dwelling units from UNR approved unbuilt data
475	Modified dwelling units and commercial acreage with Sunny Hills data
483	Modified dwelling units from UNR approved unbuilt data
533	Modified dwelling units from UNR approved unbuilt data
553	Modified dwelling units from UNR approved unbuilt data
554	Modified dwelling units and commercial acreage with Sunny Hills data
558	Modified dwelling units from UNR approved unbuilt data
560	Modified dwelling units from UNR approved unbuilt data
568	Modified dwelling units from UNR approved unbuilt data
570	Modified dwelling units from UNR approved unbuilt data
571	Modified dwelling units from UNR approved unbuilt data
572	Modified dwelling units from UNR approved unbuilt data

Areas that are limited or constrained for future development include waterbodies, and areas with slopes greater than thirty percent. These areas are shown on Figure 10-2.

10.2 CONCLUSIONS AND SUMMARY RECOMMENDATIONS

The estimated need for additional water resources for the Reno and Washoe County TMSA is approximately 12,137 AFA. This is more than the potentially available water resources of 10,546 AF.

Both the County and TMWA have recently prepared water facility plans for their systems in South Truckee Meadows that identify the required improvements to accommodate growth and remediate existing system deficiencies in their service territories. Proposed additional improvements to serve new growth in the Reno and County TMSA lie within the Washoe County Department of Water Resources service territory and have been integrated with the County's previous water facility plan. Extending the finished water pipeline to the upper Mount Rose fan area is recommended to offset winter groundwater pumping and help alleviate localized groundwater level declines. The recommended pipeline is in lieu of the upper water treatment plant that was proposed in the South Truckee Meadows Facility Plan.

The projected 2030 wastewater flow for South Truckee Meadows Water Reclamation Facility (STMWRF) is 10.8 MGD. Washoe County operates a utility that distributes reclaimed water from STMWRF as the only method of disposal of effluent. The wastewater treatment and reclamation systems will need to be expanded to dispose of the projected effluent in 2030. A thorough planning and facilities study of regionally integrated reclaimed water systems and management strategies is required to develop a plan to meet the disposal capacity requirements for the projected 2030 wastewater flow. Regionally integrated reclaimed water systems and management strategies may realize economic and financially prudent alternatives that cannot be realized with separate, independent systems.

A summary of the estimated water and wastewater costs for the proposed infrastructure is listed in Table 10.2

Table 10.2 - Infrastructure Costs

Facility Description	Total Cost (a) ($M)
Water	$154.0
Wastewater (b)	$192.3

(a) 20 Cities ENRCCI = 7,942 May 2007

(b) Costs do not address long term reuse and disposal requirements.

10.3 DESCRIPTION OF SERVICE PROVIDERS

The water and wastewater service providers are described in the following sections.

10.4 WATER

Three utilities provide the majority of the potable water service within the planning area to eight independent water systems, including the Washoe County Department of Water Resources, the South Truckee Meadows General Improvement District (STMGID) and Truckee Meadows Water Authority (TMWA). A number of individual domestic wells are also located in the planning area, serving primarily parcels to the north of Zolezzi Lane and Pleasant Valley areas.

The Washoe County Department of Water Resources owns and operates 6 water systems in the South Truckee Meadows area, consisting of the Thomas Creek, ArrowCreek, Sunrise, Mount Rose, St. James and the Double Diamond commercial / industrial systems. The systems are supplied predominately by groundwater wells serving multiple pressure zones. The Double Diamond system is also supplied with wholesale water from TMWA. Each of the systems is provided with gravity storage, and several have emergency connections with neighboring systems to increase reliability.

In addition to the Washoe County water systems, the County operates the STMGID water system under contract with the STMGID Local Managing Board. The STMGID system serves customers on either side of Highway 395, and includes a growing commercial corridor along the Mt. Rose Highway.

TMWA supplies water to the northern most portion of the study area, including areas along the commercial South Virginia Street corridor to the north of Zolezzi Lane, and wholesale service to the existing Double Diamond residential development. Essentially all of the water supplied to the South Truckee Meadows by TMWA is delivered through the Longley pump station and South Hills pump zone.

The Steamboat Springs Water Works, Inc. system provides water service to a small area in Pleasant Valley and was not analyzed as part of this report. Figure 10-3 depicts the water purveyor service areas, Reno City limits, and locations of existing domestic wells.

10.5 WASTEWATER

Washoe County provides wastewater collection, treatment and disposal for the South Truckee Meadows TMSA with wastewater flow being treated at the regional STMWRF. STMWRF also provides service to portions of the Reno TMSA. Figure 10-4 depicts the locations of the water reclamation facility, areas anticipated to be served by these facilities, and the locations of existing parcels with septic systems.

10.6 STATUS OF INFRASTRUCTURE PLANNING

The most recent facility plans for water and wastewater are listed in Table 10.3. Stormwater management and flood control are discussed in Section 14.

Table 10.3 - Recent Facility Plans

Plan Name	Date	Description
Water		
South Truckee Meadows Facility Plan Reference: ECO:LOGIC Engineering	July 2002	This report presents a facility plan for water, wastewater and stormwater for the South Truckee Meadows area.
2005-2025 Water Facility Plan Reference: TMWA	December 2004	Describes the necessary water distribution and treated water storage facilities to meet the forecasted demands and resource optimization goals in the 2025 water resource plan.
Washoe County Regional Water Management Plan Reference: RWPC	January 2005	The plan provides the region with an outline of how water will be managed to meet the needs of the citizens and to the future. Major components of the plan are identification of future water supply and wastewater facilities, regional flood control and drainage projects, and development of a water conservation program.
Steamboat and Tributary Municipal Water Supply Yield Analysis Reference: ECO:LOGIC Engineering	October 2006	This report is an update to the water resources component of Washoe County's 2002 South Truckee Meadows Facility Plan. The Facility Plan is an integrated water supply analysis, which makes the best use of the available water resources to meet a year round municipal demand.
South Truckee Meadows Water Treatment Facility Standards for Design Engineering Report Reference: Carollo Engineers	November 2006	This is an engineering report that fulfills the requirements of NAC section 445A.530 for the construction of a water treatment plant.
Wastewater		
Draft Washoe County 208 Water Quality Management Plan Version 3 Reference: Truckee Meadows Regional Planning Agency	January 2007	Per section 208 of the Clean Water Act this report provides the planning and management of all sources of water pollution and defines the parameters for area-wide wastewater management plans.
2002 Truckee Meadows Regional Plan Reference: Truckee Meadows Regional Planning Agency	February 2003	A plan for the Truckee Meadows as it relates to land use planning, infrastructure provision, resource management and plan implementation.
South Truckee Meadows Facility Plan Reference: ECO:LOGIC Engineering	July 2002	This report presents a facility plan for water, wastewater and stormwater for the South Truckee Meadows area.

10.7 WATER

The projected water demands and required infrastructure are developed in this section.

10.7.1 Assumptions, Planning Criteria and Methodology

Water demand factors used to estimate demands are based on TMWA design standards for the TMWA wholesale areas and Washoe County factors for the County systems as listed in Appendix A. In the case of non-residential development, the demand factor used represents an average number for planning purposes only. When TMWA or Washoe County receives a

request for water service on a non-residential property, the actual water rights dedication requirement will be based on a project-specific analysis of the number of fixture units and the specific landscaping plan. This level of detail is not available for this analysis.

10.7.2 Existing and Future Water Demand

Estimated water demands for Reno and the County are listed in Table 10.4, and are based on data provided by the County and TMWA. The current estimated weather normalized retail water demand in the Truckee Meadows is 78,120 AFA, with approximately 6,939 AF of the demand attributed to customers in the Reno and Washoe County portions of the South Truckee Meadows planning area. It was not possible to accurately differentiate the existing demand between Reno and Washoe County. These estimates are based upon the actual demand experienced in 2006 and adjusted upward by approximately 8 percent to offset the cool wet spring conditions that reduced the observed demand by about 8 percent from the highest demand in the past 5 years.

Table 10.4 - Existing Water Demands

	Estimated Demand (AFA) (a)
City of Reno / Washoe County	6,939

(a) Based on 2006 adjusted demand data.

Based on the TAZ analysis, projected water demands for Reno and the County are listed in Table 10.5. The irrigation demand component is projected assuming that 6,000 gallons per month of water is consumed within a typical house, and the remainder is used for irrigation. The irrigation demand range is based on front yard only irrigation, or the combined front and rear yard irrigation. Irrigation demand was not estimated for commercial or industrial use because there is no projection available for the amount of new commercial and industrial acreage that will be built by 2030. The total demands include both indoor and outdoor water use. The projected increase in demand is an approximation based upon the difference between the 2006, 2030 and 2095 TAZ projections.

Table 10.5 - City of Reno and Washoe County Water Demands

Condition	Irrigation Demand Component (AFA)	Total Demand Including Irrigation (AFA)	Projected Increase in Demand (a) (AFA)
2030 City of Reno and Washoe County (b, c)	3,102 – 6,203	19,076	12,137
City of Reno 2095 (d)		24,110	17,171

(a) Based on TAZ analysis.

(b) Based on 23,886 dwelling units and 1,097 acres of commercial/industrial zone in City of Reno.

(c) Based on 13,799 dwelling units and 151 acres of commercial/industrial zone in Washoe County.

(d) Based on 37,348 dwelling units and 1,097 acres of commercial/industrial zone in City of Reno.

Of the 2030 City of Reno water rights requirement, approximately 16 percent is estimated to be within the TOD and Center area. This includes new demands, and potential redevelopment of existing properties.

An estimate of water demands associated with domestic wells is listed in Table 10.6, for Reno and the County. In the TAZ analysis, existing houses were analyzed the same way whether the house has a domestic well, or not. The flow projected in Table 10.5 includes demands from houses with an existing well.

Table 10.6 - Domestic Well Demands

	Number of Domestic Wells	Domestic Well Demands (AFA) (a)
Reno	74	83
County	1,353	1,515
Total	1,427	1,598

(a) Domestic well conversion based on 1.12 AFA per well

10.7.3 Water Resources

The water supply for the South Truckee Meadows area supplied by STMGID and Washoe County is planned to grow primarily through the conversion of agricultural surface water rights to municipal use. These water rights would be provided by a wholesale supply from TMWA and through facilities owned by Washoe County, including the Longley Lane Water Treatment Plant and a planned surface water treatment plant which will utilize water from Steamboat Ditch, groundwater requiring treatment, and from the local stream resources in the South Truckee Meadows (Galena, Whites, Thomas, Browns and Steamboat Creeks).

Substantial amounts of reclaimed water are available from STMWRF as new development generates additional wastewater flow. This high quality reclaimed water is suitable for landscape irrigation, including residential areas, and could be used to extend the available potable water supplies. Landscape irrigation accounts for approximately half of the total water demand for a typical residential unit. Water demands could be further reduced by implementing water conserving landscaping practices and/or xeriscaping.

Existing and potentially available water resources to serve both the City of Reno and Washoe County TMSA in the South Truckee Meadows area are presented in Table 10.7. Refer to Appendix B for more detailed information on available water resources.

Table 10.7 - Potentially Available Water Resources

Source Description	Supply (AFA)
Existing Resources	
Groundwater	7,180
Wholesale from TMWA	2,166
Reclaimed Water	(a)
Total	9,346
Future Resources	
Groundwater	9,575
Surface water	4,679
Wholesale from TMWA	3,472
Total	17,726

(a) Reclaimed water may be used to supplement water resources for non-potable uses.

A comparison of the existing and future resources, water demand for the existing conditions and the potential 2030 demand is shown in Table 10.8. The total demand estimate includes potential water requirements of 1,598 AF for domestic wells. The estimated need for additional water resources for the Reno and Washoe County TMSA is approximately 12,137 AFA. This is more than the potentially available water resources of 10,546 AF. Expanded uses for reclaimed water, such as front and back yard residential landscape watering, will be needed to help fulfill the development potential within the Reno and County TMSA. Future potential water resources are discussed in Section 13.

Table 10.8 - Water Demand and Resources Comparison

Condition	Supply (AFA)	Total Demand (AFA)
Existing	7,180	6,939
2030	17,726	19,076
Net Increase	10,546 (a)	12,137

(a) Increase in water supply available to serve new demands in Reno and Washoe County. Available supply includes existing banked water rights.

10.7.4 Planned Water Facilities

Both the County and TMWA have recently prepared water facility plans for their systems in South Truckee Meadows that identify the required improvements to accommodate growth and remediate existing system deficiencies in their service territories.

Proposed additional improvements to serve new growth in the Reno and County TMSA lie within the Washoe County Department of Water Resources service territory and have been integrated with the County's previous water facility plan. A 6 MGD surface water treatment

plant, which will utilize groundwater requiring treatment and water from the local stream resources in the South Truckee Meadows (Galena, Whites, Thomas, Browns and Steamboat Creeks), is planned to begin construction in 2007. New finished water pipelines will supply the Double Diamond, Damonte Ranch and lower Mount Rose fan systems. Extending the finished water pipeline to the upper Mount Rose fan area is recommended to offset winter groundwater pumping and help alleviate localized groundwater level declines. The recommended pipeline is in lieu of the upper water treatment plant that was proposed in the South Truckee Meadows Facility Plan. The recommended water facility infrastructure for these newly planned areas of South Truckee Meadows is summarized in Table 10.9 and shown in Figure 10-5. Planned pressure zones are shown in Figure 10-B1 (Appendix B).

Table 10.9 – South Truckee Meadows Water Facility Totals

Facility	Qty
Total Length of proposed Transmission Mains	234,000 ft
Total number of Pump Stations	9
Number of Tanks/ Total Storage Volume	9/ 11.0 MG
TMWA Facilities (per TMWA 2025 WFP) (a)	
Total Length of proposed Transmission Mains	8,050

(a) Planned improvements are from TMWA's Water Facility Plan, as of December 2004.

A portion of the South Truckee Meadows area is currently served by TMWA. TMWA's 2025 Water Facility Plan (WFP) identifies the required improvements to accommodate growth and remediate existing system deficiencies within its service territory. The WFP Executive Summary and WFP cost tables can be found in Appendix B.

Estimated available fire flows to the South Truckee Meadows TOD and Regional Center are presented in Table 10.10.

Table 10.10 - Estimated Available Fire for TODs and Regional Centers

Area	Description	Available Fire Flow (gpm) (a)	Remarks
South Virginia Street	TOD Corridor	3,000 gpm	Plan area boundary to the TMWA service area boundary.
		4,000 gpm	North of Damonte Ranch Parkway to the TMWA service area boundary.
		3,000 gpm	South of Damonte Ranch Parkway and north of Geiger Grade.
Redfield	Regional Center	3,000 gpm	Existing Redfield campus.
		4,000 gpm	Summit Sierra and just south of the shopping mall.

(a) Available fire flows are approximate and depend on the specific location and piping in the immediate vicinity.

10.7.5 Water Facility Cost Estimates

The estimated costs of the planned water infrastructure for the South Truckee Meadows TMSA are summarized in Table 10.11 and are listed in more detail in Appendix B. Individual pressure reducing stations are not included in the cost estimates, as these facilities are generally considered development specific, on-site improvements. In addition, the costs of purchasing water rights are not included. Cost analysis project divisions for non-TMWA areas are shown in Figure 10-B2 (Appendix B).

Table 10.11- South Truckee Meadows Planning Area Water Infrastructure Costs

Facility Description	**Total Cost ($M)**	**Reno Share of Facility ($M)**	**County Share of Facility ($M)**
TMSA Costs (not including TMWA) (a, b)			
Supply (c, d)	STMWTP construction cost and new well costs included in County CIP costs below.		
Storage	$15.3	$2.5	$12.8
Mains, Pumping and Distribution Improvements	$55.7	$12.4	$43.3
Subtotal	$71.0	$14.9	$47.8
Capital Improvement Programs (e)			
Washoe County CIP			
Supply	$50.5		
Storage	$0.9		
Transmission	$20.2		
STMGID CIP	$4.0		
Subtotal	$75.6		
TMWA (per TMWA 2025 WFP) (e)			
Supply (c, g)	$4.2		
Storage (h)	$1.6		
Mains, Pumping and Distribution Improvements	$1.6		
Subtotal	$7.4		
Total	$154.0		

(a) 20 Cities ENRCCI = 7,942 May 2007

(b) Insufficient data to determine amount of cost that should be allocated to the City or the County.

(c) Water rights costs are not included.

(d) Washoe County has an existing wholesale contract with TMWA. If the annual volume changes, additional fees will be assessed.

(e) Planned improvement costs from Washoe County Department of Resources Capital Improvement Program Fiscal Years 2008-2012. Does not include costs for facilities included in the TMSA recommended facilities.

(f) Planned improvement costs are from TMWA's Water Facility Plan as of December 2004.

(g) Supply costs were developed by multiplying the estimated STM TMSA 2030 MDD (1,287 gpm) by TMWA's Rule 5 *Supply and Treatment* Facility charge ($3,236 per maximum day gpm).

(h) Storage costs were developed by multiplying the estimated STM TMSA 2030 MDD (1,287 gpm) by TMWA's Rule 5 Storage Facility Charge (currently $1,240 per maximum day gpm).

10.7.6 Water Planning Limitations

Specific limitations of the water facility plan component for the South Truckee Meadows TMSA planning area are listed below.

- Single backbone mains were used to supply water throughout the new development areas. As development occurs, it is likely that an equivalent transmission capacity will be conveyed by a distribution network rather than by a single backbone main.

- The allocation of cost between Reno and Washoe County is an approximation. Further analysis will be required in the future to determine the appropriate cost allocation for specific facilities.

- The proposed Sunny Hills development is located in both Washoe and Storey Counties. Facilities presented were sized only for the Washoe County portion of the development and do not accommodate Storey County demands. If development in Storey County is realized, and the water is supplied from Washoe County's system, the facilities will need to be resized to accommodate these demands.

- No infrastructure was planned for areas with existing domestic wells, such as the Pleasant Valley / Steamboat Springs area. Water demands were included in the total water demand estimate to account for the potential conversion of domestic wells to the municipal system in the future.

10.8 WASTEWATER

The projected wastewater flow and required infrastructure for conveyance, treatment, and disposal are developed in this section.

10.8.1 Assumptions, Planning Criteria and Methodology

The wastewater flow factor for the South Truckee Meadows planning area was assumed from the 2007 Washoe County 208 Water Quality Management Plan. The South Truckee Meadows flow factor ranged from a low of 110 gallons per capita per day (gpcd) to 130 gpcd. An average of 120 gpcd was used for flow projection. All other wastewater planning assumptions are as stated in Appendix A for the City and County areas.

10.8.2 Existing and Future Wastewater Flow

The 2006 annual average wastewater flow for South Truckee Meadows Water Reclamation Facility is listed in Table 10.13.

Table 10.13 - Existing Wastewater Flow

	2006 Annual Average Flow (MGD) (a)
South Truckee Meadows WRF	2.6

(a) Based on 2006 plant flow records.

Using the TAZ data, flow was projected for the Reno and County portion of the South Truckee Meadows TMSA planning area. The STMWRF capacity projections for Reno and Washoe County are presented in Tables 10.14 and 10.15, respectively.

Table 10.14 - City of Reno Wastewater Projections (a)

Condition	Flow (MGD)
2030 South Truckee Meadows WRF (b)	7.1
2095 South Truckee Meadows WRF (c)	10.7

(a) Based on TAZ analysis.

(b) Based on 23,686 dwelling units and 1,097 acres of commercial/industrial zone.

(c) Based on 37,348 dwelling units and 1,097 acres of commercial/industrial zone.

The intensification of wastewater flow in all TODs and Centers was compared to the overall flow. Of the 2030 City water reclamation facility flow, 20 percent is estimated to be produced from areas within a TOD or Center.

Table 10.15 - Washoe County Wastewater Projections

Condition	Flows (MGD)
2030 South Truckee Meadows WRF (a)	3.7

(a) Based on 13,799 dwelling units and 151 acres of commercial/industrial zone.

The potential flow projection for parcels with existing septic systems that could be connected to the municipal sewer system is listed in Table 10.16. In the TAZ analysis, existing houses were analyzed the same way whether or not the house has a septic system. The flows projected in Tables 10.14 and 10.15 include potential flows from houses with septic systems.

Table 10.16 - Septic System Conversion Flow Projections

	Number of Septic Systems	Septic System Conversion Flows (MGD)
Reno	90	0.018
County	3,717	0.743
Total	3,807	0.761

(a) Septic system conversion based on 200 gpd per septic system

The projected 2030 wastewater flow for STMWRF is 10.8 MGD. The 208 Plan has a projected 2030 wastewater flow of 6.5 MGD to 8.9 MGD for the entire STMWRF service area.

10.8.3 Water Reclamation and Disposal

Washoe County operates a utility that distributes reclaimed water from STMWRF as the only method of disposal of effluent. Treated effluent is stored in the Huffaker reservoir before distribution to the reclaimed water system. The reservoir will be partially lined in 2009. Potentially the reservoir may also be expanded from 4,000 AF to 6,000 AF by raising the dam 22 feet. Expanding the reservoir capacity may allow for other reclaimed water systems to be connected to the South Truckee Meadows system. The existing reclaimed water facilities are shown in Figure 10-7.

The wastewater treatment and reclamation systems will need to be expanded to dispose of the projected effluent. Potential reclaimed water expansion areas are identified in the Washoe County Comprehensive Regional Water Management Plan and the 208 Water Quality Management Plan. These plans represent the region's current status of reclaimed water facility planning; therefore, no further detailed planning was conducted for this Facility Plan. For a discussion of regional reclaimed water issues see Section 9.

10.8.4 Planned Wastewater Facilities

Recommendations for future wastewater collection and treatment facilities were developed for 2030 and are shown on Figure 10-6 for South Truckee Meadows. For each sewer collection area, the projected 2030 flows were compared to the capacity of the existing gravity interceptors. The collection areas are shown on Figure 10-C1 for both the City areas and County Areas 16 (partial), 18, 19, and 20, as shown on Figure 1-A1 (Appendix A, C). Existing lift stations and force mains were not analyzed for remaining available capacity. If the existing interceptors do not have capacity for the 2030 flow, a parallel pipe/facility is recommended. Future detailed design studies should determine whether replacing the existing pipe or installing a parallel main is the appropriate solution. Facility sizing methods and calculations are included in Appendix A.

No infrastructure was planned for areas with existing septic systems, such as the Pleasant Valley / Steamboat Springs area. Wastewater flows were included in the total flow estimate to account for the potential conversion of septic systems to the municipal system in the future.

STMWRF is being expanded from an existing permitted capacity of 4.1 MGD to 6 MGD. Some unit processes at the site, such as the secondary clarifiers, filters, and contact basins are rated for 6 MGD already. The expansion will bring all unit process capacity to 6 MGD and improve the headworks and solids handling. Further expansion of the plant will be required to treat all of the projected 2030 TMSA flow.

A summary of recommended wastewater collection and treatment infrastructure for the South Truckee Meadows portion of the TMSA is summarized in Table 10.17.

Table 10.17 - South Truckee Meadows Recommended New Wastewater Infrastructure

Facility		Units
Interceptors	40,200	Feet
Parallel Interceptors	23,050	Feet
Lift Stations	2	Stations
2030 Treatment Capacity for STMWRF	10.8	MGD

10.8.5 Wastewater Facility Cost Estimates

Wastewater infrastructure costs are summarized for the South Truckee Meadows portion of the TMSA in Table 10.18 and are listed in more detail in Appendix C. These facilities are intended to serve new growth, and not to remediate existing system deficiencies.

Table 10.18 - South Truckee Meadows Wastewater Infrastructure Costs (a)

Facility Description	Total Cost ($M)	Reno Share of Facility ($M)	County Share of Facility ($M)
Collection System	$20.0	$8.1	$11.9
Washoe County Planned Capacity Improvements (b)	$26.5	Not Available	Not Available
South Truckee Meadows WRF Treatment (c)	$145.8	Not Available	Not Available
Total	$192.3		

(a) 20 Cities ENRCCI = 7,942 May 2007

(b) 5-year projected CIP improvements to increase capacity and not fix existing problems for wastewater collection and reclaimed water systems. Does not include costs for facilities included in the TMSA recommended facilities.

(c) Expansion from designed WRF expansion capacity of 6 MGD to 10.8 MGD. Also includes $45M for current expansion to 6 MGD

The allocation of cost between Reno and Washoe County was developed from their respective share of the flow for the collection system and treatment facilities.

10.8.6 Wastewater Planning Limitations

Specific limitations of the wastewater planning in the South Truckee Meadows area are listed below.

- The existing interceptor capacity was analyzed using an average capacity for a pipe segment. There will be sections of pipe reach with less capacity that may require upsizing even if the pipe reach as a whole has enough capacity. More detailed analysis of the sewer collection system is required to determine specific improvements by pipe section.

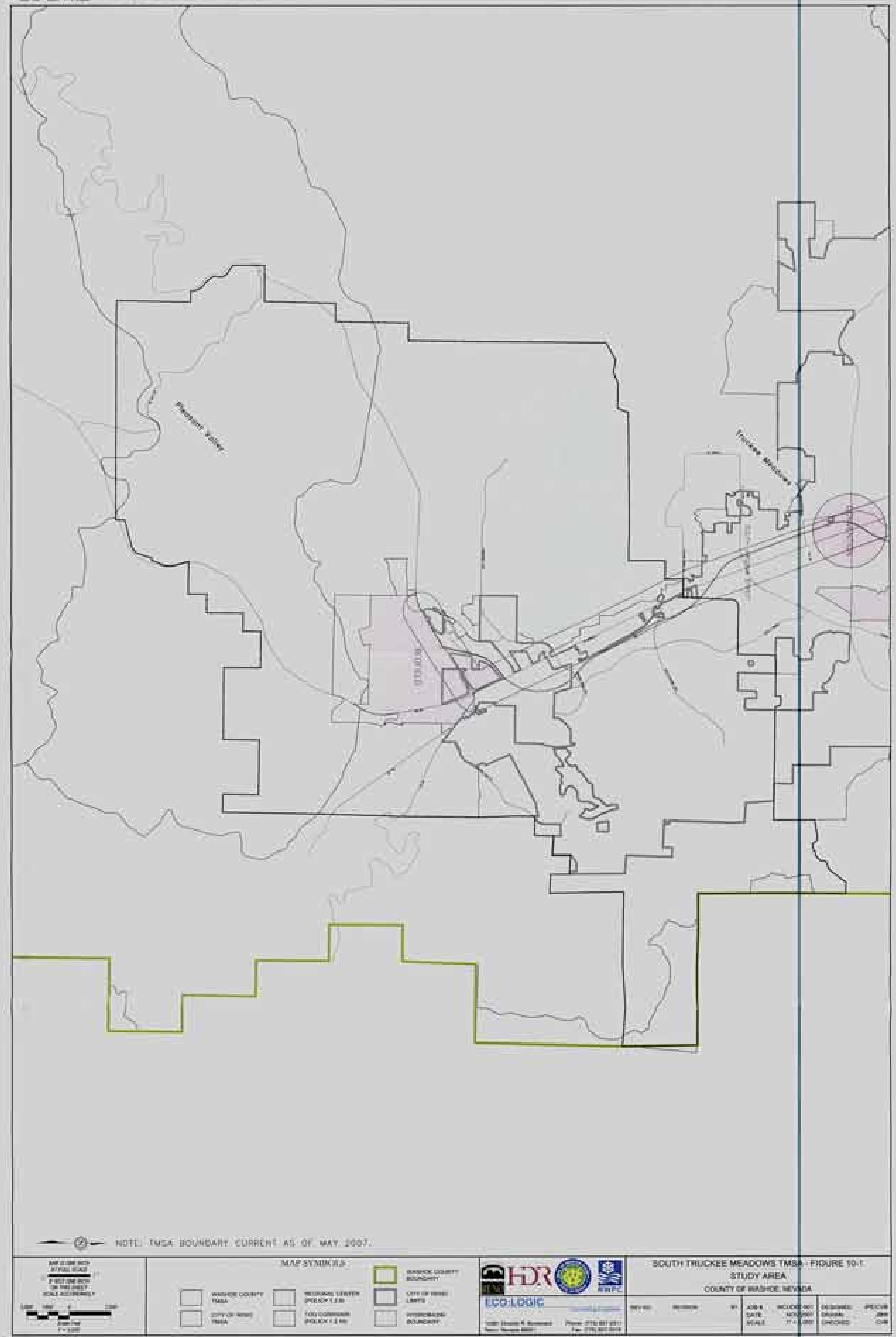
- Effluent disposal planning for the South Truckee Meadows TMSA planning area is conceptual. The existing information for regional reclaimed water facilities has been provided; however, a thorough planning and facilities study of regionally integrated reclaimed water systems and management strategies is required to develop a plan to meet the disposal capacity requirements for the projected 2030 wastewater flows.

- The allocation of cost between Reno and Washoe County is an approximation. Further analysis will be required in the future to determine the appropriate cost allocation for specific facilities.

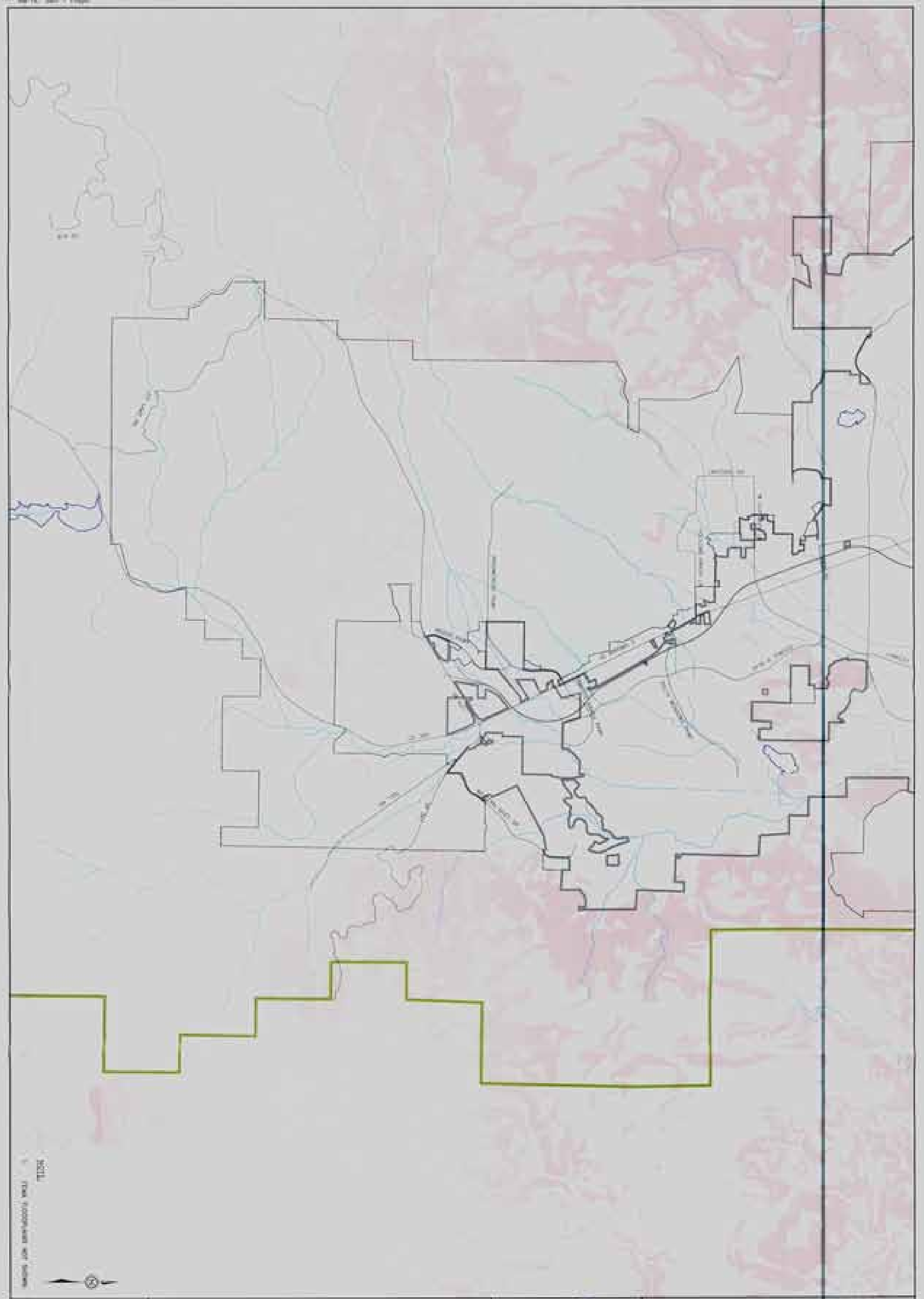
- The proposed Sunny Hills development is located in both Washoe and Storey Counties. Facilities presented were sized only for the Washoe County portion of the development and do not accommodate Storey County flows. If development in Storey County is realized, facilities will need to be resized to accommodate these flows.

10.9 POLICY RECOMMENDATIONS (INCLUSIVE OF WATER, WASTEWATER)

Reuse and discharge of reclaimed water from the various water reclamation facilities in the region is constrained by a number of factors. Regionally integrated reclaimed water systems and management strategies may realize economic and financially prudent alternatives that cannot be realized with separate, independent systems.



Pleasant Valley
Truckee Meadows
NOTE: TMSA BOUNDARY CURRENT AS OF MAY 2007.
MAP SYMBOLS
WASHOE COUNTY BOUNDARY
WASHOE COUNTY TMSA
REGIONAL CENTER (POLICY 1.2.8)
CITY OF RENO LIMITS
CITY OF RENO TMSA
HYDROBASIN BOUNDARY
HDR
RWPC
ECO:LOGIC
SOUTH TRUCKEE MEADOWS TMSA - FIGURE 10-1
STUDY AREA
COUNTY OF WASHOE, NEVADA


MAP SYMBOLS
SLOPE 30% OR GREATER
WATERBODY
WASHOE COUNTY TMSA
CITY OF RENO TMSA
OUTSIDE TMSA
WASHOE COUNTY BOUNDARY
CITY OF RENO LIMITS
STREAMS
HDR
ECO:LOGIC
SOUTH TRUCKEE MEADOWS TMSA - FIGURE 10-2
AREA CONSTRAINTS
COUNTY OF WASHOE, NEVADA

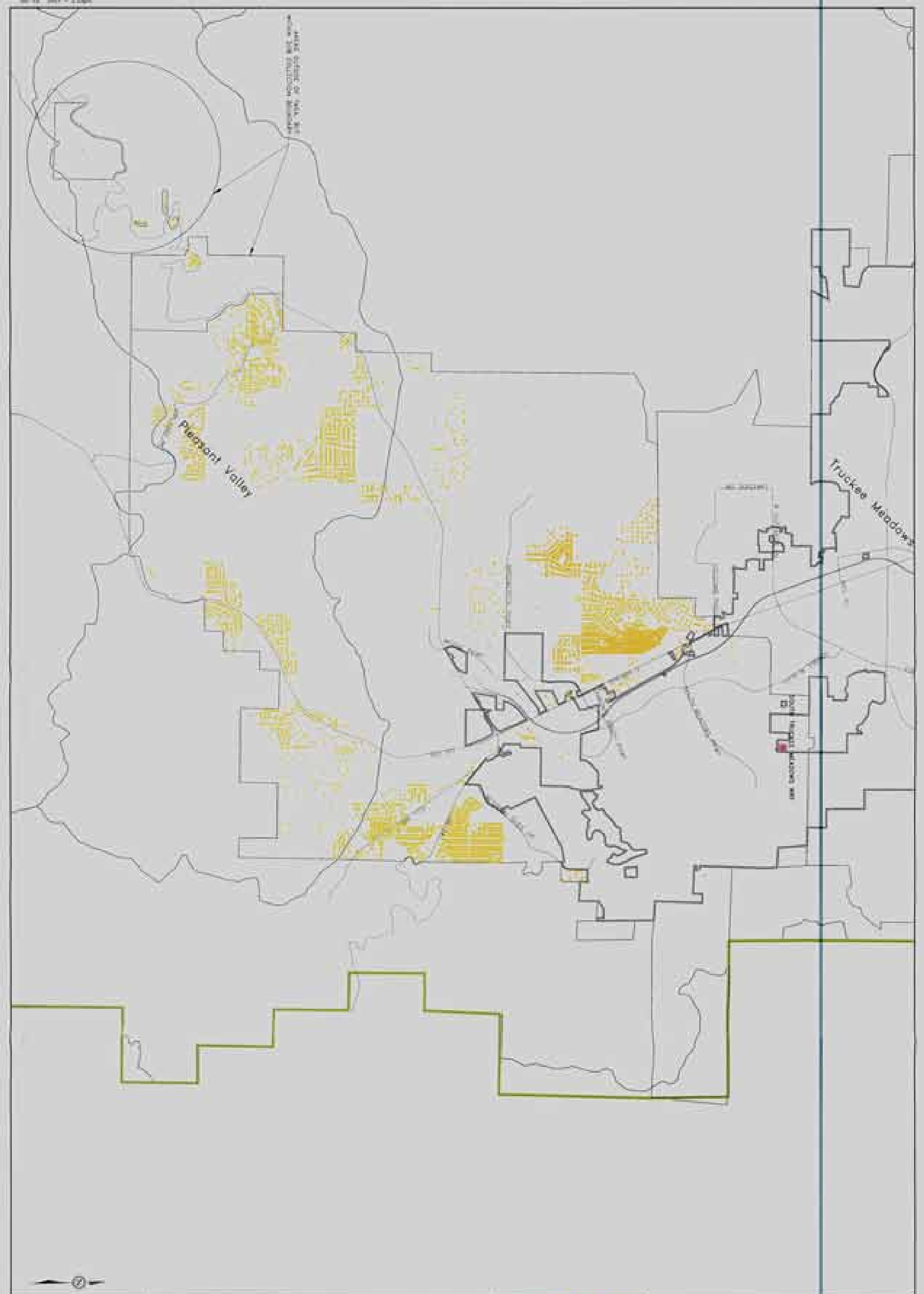
TRUCKEE MEADOWS TMSA

MAP SYMBOLS

SOUTH TRUCKEE MEADOWS TMSA - FIGURE 10-3
WATER PURVEYOR SERVICE AREA
COUNTY OF WASHOE, NEVADA

HDR

ECO:LOGIC



MAP SYMBOLS

SPPTA SYSTEM

WATER RECLAMATION FACILITY

SOUTH TRUCKEE MEADOWS WRF COLLECTION AREA

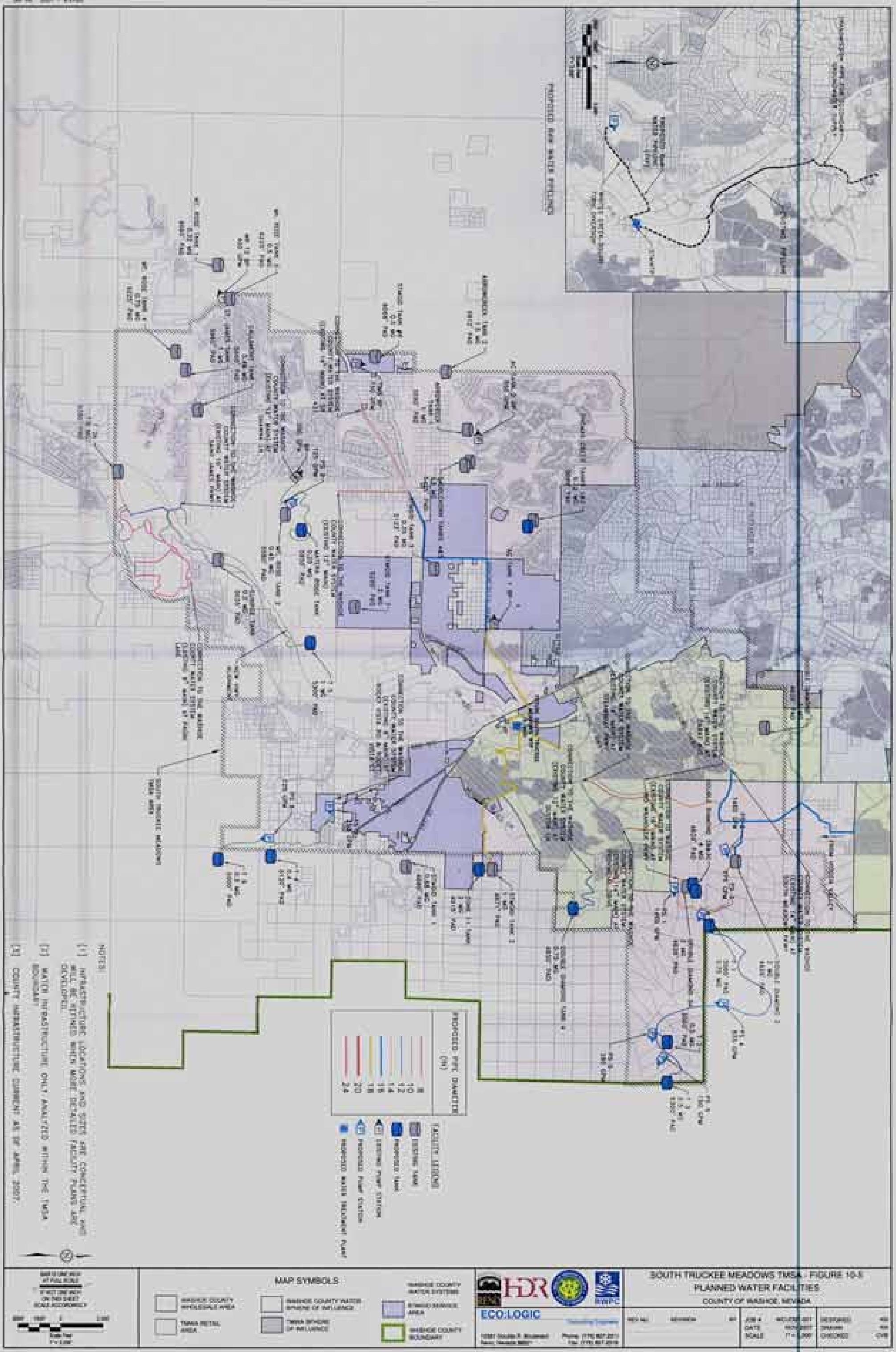
CITY OF RENO LIMITS

WASHOE COUNTY BOUNDARY

HDR

ECO:LOGIC

SOUTH TRUCKEE MEADOWS TMSA - FIGURE 10-4
WASTEWATER SERVICE AREA
COUNTY OF WASHOE, NEVADA


PROPOSED WATER FACILITIES
MAP SYMBOLS
WASHOE COUNTY WHOLESALE AREA
TMWA RETAIL AREA
WASHOE COUNTY WATER SPHERE OF INFLUENCE
TMWA SPHERE OF INFLUENCE
WASHOE COUNTY WATER SYSTEMS
STMGID SERVICE AREA
WASHOE COUNTY BOUNDARY
FACILITY LEGEND
PROPOSED WATER TREATMENT PLANT
PROPOSED PUMP STATION
EXISTING PUMP STATION
PROPOSED TANK
EXISTING TANK
PROPOSED PIPE DIAMETER (IN)
24
20
18
16
14
12
10
8
NOTES:
(1) INFRASTRUCTURE LOCATIONS AND SIZES ARE CONCEPTUAL AND WILL BE REFINED WITH MORE DETAILED FACILITY PLANS AND DESIGNS.
(2) WATER INFRASTRUCTURE ONLY ANALYZED WITHIN THE TMSA BOUNDARY.
(3) COUNTY INFRASTRUCTURE CURRENTLY IN APRIL 2021.
HDR
ECO:LOGIC
SOUTH TRUCKEE MEADOWS TMSA - FIGURE 10-5
PLANNED WATER FACILITIES
COUNTY OF WASHOE, NEVADA

NOTE:
1. INFRASTRUCTURE LOCATIONS AND SIZES ARE CONCEPTUAL AND WILL BE REFINED WHEN MORE DETAILED FACILITY PLANS ARE DEVELOPED.
2. EXISTING PIPES BASED ON DATA PROVIDED BY THE CITY OF RENO (JULY 2006) AND WASHOE COUNTY (APRIL 2007).

SOUTH TRUCKEE MEADOWS WRF

Truckee Meadows

Pleasant Valley

SOUTH TRUCKEE MEADOWS/TMSA - FIGURE 10-4
PLANNED WASTEWATER COLLECTION & TREATMENT FACILITIES
CITY OF RENO/WASHOE COUNTY

HDR
ECO:LOGIC

Truckee Meadows

Pleasant Valley

PIPE DIAMETER (IN)

8
10
12
12 (P)
14
16
18
20
24
30

FACILITY LEGEND

EXISTING RESERVOIR

EXISTING TANK

EXISTING WATER RECLAMATION FACILITY

EXISTING PUMP STATION

PROPOSED PUMP STATION

MAP SYMBOLS

CITY OF RENO TMSA

WASHOE COUNTY TMSA

HYDROGRAPH BOUNDARY

HDR

RWPC

ECO:LOGIC

SOUTH TRUCKEE MEADOWS TMSA - FIGURE 10-7
RECLAIMED WATER & DISPOSAL FACILITIES
COUNTY OF WASHOE, NEVADA

Section 11
Bedell Flat

Table of Contents

List of Tables

List of Figures – Included at End of Section

Section 11 – Bedell Flat FSA

11.1 BACKGROUND

A reconnaissance level analysis of several water resource related issues has been performed to assist the County with identifying lands that need to be reserved for water resource purposes. Planning within the FSA is based on an assumed land use pattern provided by the County. The proposed amendment to the 2002 Regional Plan implements the Annexation Settlement Agreement (ASA), and calls for local governments to collaborate with Federal officials on a proposal for conversion of federal lands to private use within the FSA.

Information is presented to provide input to the planning process that may lead to recommendations for transfer or sale of appropriate public lands. Land areas should be considered for either: a) transfer to local government ownership for future public facilities, or b) retained in federal or local public ownership for protection or management of hydrologic resources. The following water resource related issues are presented in this Section:

1. Projection of water demands
2. Projection of wastewater treatment plant capacity and possible sites to serve future development
3. Analysis of recharge sites and locations for storage and/or disposal of effluent
4. Floodplain management and channel migration

The Bedell Flat FSA includes approximately 70,200 acres in several hydrographic basins including Bedell Flat, Red Rock, Dry Valley, Cold Springs, Warm Springs, and Long Valley. Bedell Flat is within the City of Reno FSA and consists mostly of federal lands. The land would not be developable until 2028 per the FSA development projections. The Bedell Flat area is shown on Figure 11-1 (see figures at end of section). Areas that are limited or constrained for future development include areas with slopes greater than thirty percent and drainageways. These areas are shown on Figure 11-2. Approximately 22 percent of the area is projected to be in a future Transit Oriented Development Corridor (TOD) or Center.

11.2 WATER

The projected water demands are developed in this section.

11.2.1 Assumptions, Planning Criteria and Methodology

Water demand factors used to estimate potential demand are based on TMWA Rule 7 demand factors. It is assumed that this new development will dedicate water resources in accordance with TMWA water rights dedication policies.

In the case of non-residential development, the demand factor used represents an average number for planning purposes only. When TMWA or Washoe County receives a request for water service on a non-residential property, the actual water rights dedication requirement would be based on a project-specific analysis of the number of fixture units and the specific landscaping plan. This level of detail is not available for this analysis.

11.2.2 Future Water Demand

Based on the land use analysis, projected water demands for Bedell Flat are listed in Table 11.1. The irrigation demands are projected assuming that 6,000 gallons per month is consumed within the dwelling and the remainder is used for irrigation. The irrigation demand range is based on either front yard only irrigation or the combined front yard and back yard irrigation. Irrigation demands for commercial and industrial land use were estimated assuming fifteen percent of the total acreage is irrigated at an application rate of 3.5 AFA. The total projected demand includes both indoor and outdoor water use.

Table 11.1 - Bedell Flat Projected Water Demands

Irrigation Demand Component (AFA)	Total Demand Including Irrigation (AFA) (a)
4,700-6,775	21,355

(a) Based on 52,518 dwelling units at an average of 0.3 AF per unit, and 5,000 acres of commercial and industrial land use.

11.2.3 Water Facilities

Existing and proposed water supply facilities are presented in Figure 11-3. The Vidler Water Supply Project crosses the Bedell Flat FSA. The planned Intermountain Water Supply Project and several of their water supply wells are also located within the FSA. However, the demand for potable water supplies for Cold Springs, Stead and Lemmon Valley will significantly exceed the available water supply from the Fish Springs and Intermountain projects. Imported water, for instance, from the Smoke Creek basin, will likely be required to meet projected demands.

11.3 WASTEWATER

Projected wastewater flows, possible treatment plant sites, potential recharge sites and locations for storage and/or disposal of effluent are developed in this section.

11.3.1 Assumptions, Planning Criteria and Methodology

The wastewater flow factor for the Bedell Flat area was assumed from the 2007 Washoe County 208 Water Quality Management Plan. The flow factor for new development ranges from a low of 110 gallons per capita per day (gpcd) to 130 gpcd. An average of 120 gpcd was used for flow projection. All other wastewater planning assumptions are as stated in Appendix A.

11.3.2 Projected Wastewater Flow

Using the land use data, flow projections for Bedell Flat FSA were developed. The wastewater treatment capacity projection for this planning area is presented in Table 11.2.

Table 11.2 - Bedell Flat Wastewater Projections

Projected Wastewater Treatment Capacity (MGD) (a)
10.1

(a) Based on 52,518 dwelling units, and 5,000 acres of commercial land use.

11.3.3 Wastewater Treatment Locations

Potential wastewater treatment facility locations are shown on Figure 11-4. Potential sites for two treatment facilities are located in the two hydrobasins that appear most favorable for development. As land use master plans are developed for the area, the proposed treatment plant locations and alternative sites should be evaluated in detail.

11.3.4 Water Reclamation

Water reclamation would beneficially reuse a large portion of the effluent generated by Bedell Flat, and would provide a valuable water resource to help meet non-potable demands. Non-potable irrigation demands include parks, schools, landscape medians and residential areas. A review of the area was conducted to evaluate the feasibility of seasonal storage for the reclaimed water. Three potential effluent reservoir sites were identified. The reservoir sites are shown on Figure 11-4, potential reservoir volumes are listed in Table 11.3.

Table 11.3 - Potential Effluent Reservoir Sites

Reservoir	Surface Area (acres)	Dam Height (feet)	Approximate Volume (AF)
1	357	145	15,800
2	664	200	38,600
3	350	145	14,700

Effluent that is not reused potentially may be disposed of in rapid infiltration basins (RIBs). Thirteen soil borings were completed around portions of the Bedell Flat valley to evaluate the near surface geology and determine if highly permeable materials exist that would be favorable for operation of RIBs. The BLM permit required that all borings be located on existing dirt roads.

The borings were up to 33 feet deep, and during drilling, split spoon samples were collected every five feet. The results indicated that sandy surface soils present in many areas are underlain

at shallow depth by dense to very dense, semi-consolidated, poorly-sorted sand having variable silt content. Thin gravelly-sand interbeds locally exist. Similar materials are present in many areas throughout the North Valleys and they would be expected to have relatively low, in-place permeability. Well-sorted, coarse-grained, unconsolidated alluvial materials favorable for RIB operation were not encountered.

In some boreholes, the sand was coarser-grained, better sorted and contained less silt and very fine sand. Seven samples from two of the more favorable borings were submitted to a laboratory for grain size analysis. The site is located near the proposed reservoir site, on the south side of the valley near the end of Bird Springs Road. The results indicate that the materials may be marginally suitable for RIB use; however, additional drilling, and both in-situ and laboratory testing would be required to delineate the extent of the coarser materials and further evaluate the sites.

11.4 FLOODPLAIN MANAGEMENT AND CHANNEL MIGRATION

The natural drainage/conveyance areas within Bedell Flat are undeveloped and pose no threat to life and property. As development occurs, floodplain planning must alleviate the impact of flooding to ensure protection of life and property. This Facility Plan encourages the preservation of natural drainageways. These drainageways have several important functions: conveyance of flood flows, conveyance of watershed sediment loading, groundwater recharge, environmental and wildlife habitat, and aesthetic quality. These areas are shown in Figure 11-2.

Development of future roads and facilities within Bedell Flat will result in improvements within and across major drainageways. Open channels tend to have more conveyance capability than an enclosed facility. Moreover, open channels can convey debris more effectively provided that road crossings are designed properly. It is recommended that when enclosing major drainageways, the City should ensure that the design storm event for all such enclosures be a significant storm event, such as the 100-year storm event. Appropriate freeboard, debris conveyance capabilities and areas for natural channel migration should be provided.

Refer to Section 14 for further information on flood control management.

Dry Valley

Red Rock

Bedell Flat

Long V.

Warm Springs

Antelope Valley

Cold Springs

W. Lemmon Valley

E. Lemmon Valley

Spanish Springs

CALIFORNIA
NEVADA

MAP SYMBOLS

CITY OF RENO FSA

CITY OF RENO LIMITS

OUTSIDE FSA

HYDROGRAPHIC BOUNDARY

HDR

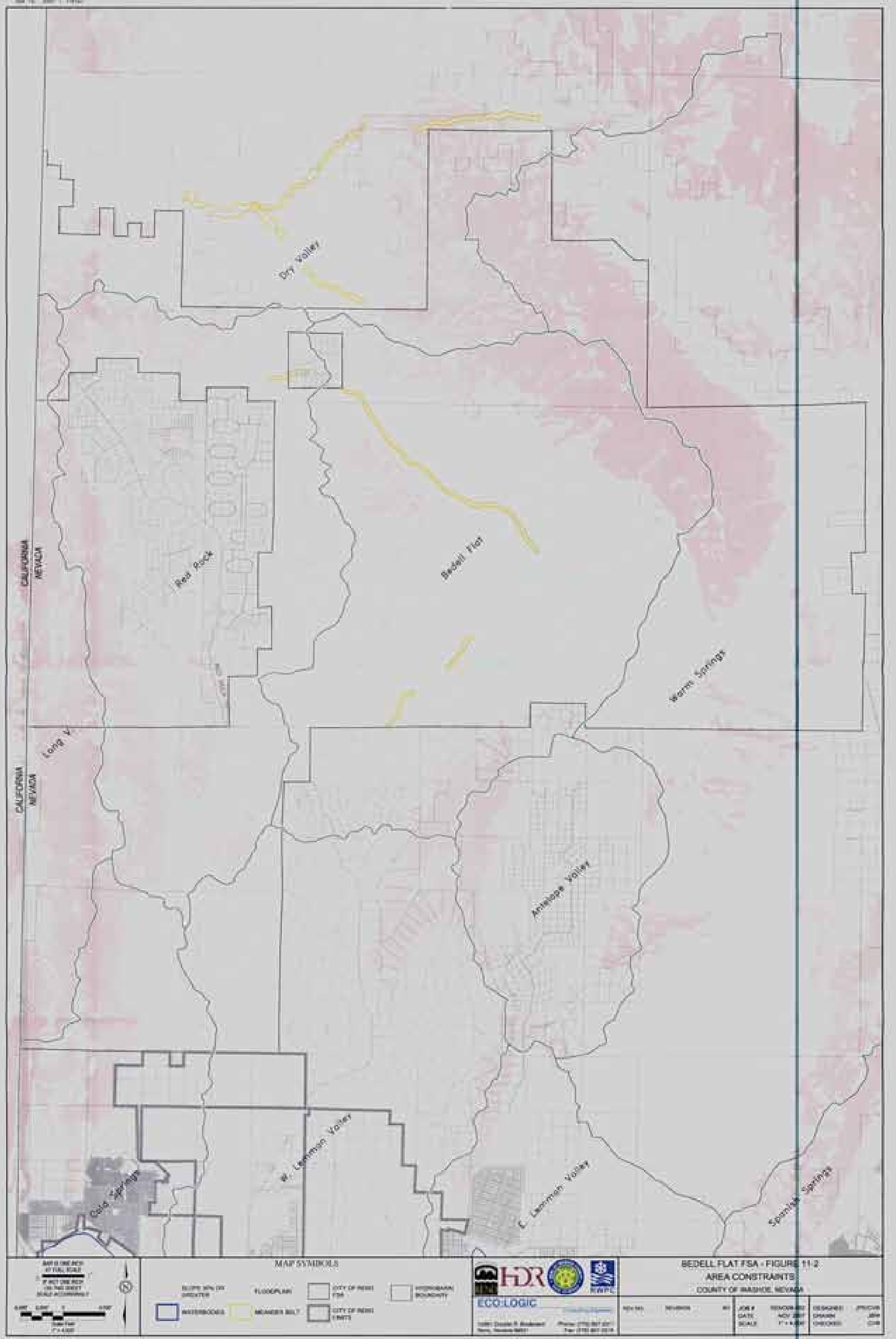
RWPC

ECO:LOGIC

BEDELL FLAT FSA - FIGURE 11-1

STUDY AREA

COUNTY OF WASHOE, NEVADA


Dry Valley
Red Rock
Bedell Flat
Warm Springs
Long V
Antelope Valley
Cold Springs
Leonnon Valley
Leonnon Valley
Spanish Springs
CALIFORNIA
NEVADA
CALIFORNIA
NEVADA
MAP SYMBOLS
FLOODPLAIN
WATERBODIES
MEADERS BELT
HYDROGRAPHIC BOUNDARY
ECO:LOGIC
HDR
BEDELL FLAT FSA - FIGURE 11-2
AREA CONSTRAINTS
COUNTY OF WASHOE, NEVADA

DV-2
DV-1
DV-3
DV-4
DV-5
Dry Valley
BV-1 WELL
BV-2 WELL
FISH SPRINGS/INTERMOUNTAIN
WATER TRANSMISSION PIPELINE
RIGHT OF WAY
CALIFORNIA
NEVADA
Red Rock
Bedell Flat
Long V.
Antelope Valley
Warm Springs
Cold Springs
W. Lemmon Valley
E. Lemmon Valley
Spanish Springs

MAP SYMBOLS

ECO:LOGIC

HDR

BEDELL FLAT FSA - FIGURE 11-3
PLANNED WATER SUPPLY FACILITIES
COUNTY OF WASHOE, NEVADA

Dry Valley

CALIFORNIA
NEVADA

Red Rock

Bedell Flat

Long V.

Warm Springs

Antelope Valley

W. Lemmon Valley

E. Lemmon Valley

Spanish Springs

Cold Springs

MAP SYMBOLS

HDR

ECO:LOGIC

BEDELL FLAT FSA - FIGURE 11-4
PLANNED WASTEWATER TREATMENT & DISPOSAL FACILITIES
COUNTY OF WASHOE, NEVADA

Table of Contents

List of Tables

List of Figures – Included at End of Section

Section 12 – Washoe County FSA

12.1 BACKGROUND

A reconnaissance level analysis of several water resource related issues has been performed to assist the County with identifying lands that need to be reserved for water resource purposes. Planning within the FSA is based on an assumed land use pattern provided by the County. The proposed amendment to the 2002 Regional Plan implements the Annexation Settlement Agreement (ASA), and calls for local governments to collaborate with Federal officials on a proposal for conversion of federal lands to private use within the FSA.

Information is presented to provide input to the planning process that may lead to recommendations for transfer or sale of appropriate public lands. Land areas should be considered for either: a) transfer to local government ownership for future public facilities, or b) retained in federal or local public ownership for protection or management of hydrologic resources. The following water resource related issues are presented in this Section:

1. Projection of water demands
2. Projection of wastewater treatment plant capacity and possible sites to serve future development
3. Analysis of locations for storage and/or disposal of effluent
4. Floodplain management and channel migration

The Washoe County FSA includes approximately 44,600 acres in several hydrographic basins including Bedell Flat, Antelope Valley, Warm Springs, Spanish Springs, Lemmon Valley, and a portion of Sun Valley. The Washoe County FSA consists mostly of federal lands. The land would not be developable until 2028 per the FSA development projections. The Washoe County FSA area is shown on Figure 12-1 (see figures at end of section). Areas that are limited or constrained for future development include areas with slopes greater than thirty percent and drainageways. These areas are shown on Figure 12-2.

12.2 WATER

The projected water demands are developed in this section.

12.2.1 Assumptions, Planning Criteria and Methodology

Water demand factors used to estimate potential demand are based on an average demand factor of 0.4 AFA per ERU. It is assumed that this future development will dedicate water resources in accordance with TMWA water rights dedication policies.

In the case of non-residential development, the demand factor used represents an average number for planning purposes only. When TMWA or Washoe County receives a request for water

service on a non-residential property, the actual water rights dedication requirement would be based on a project-specific analysis of the number of fixture units and the specific landscaping plan. This level of detail is not available for this analysis.

12.2.2 Future Water Demand

Based on the land use analysis, projected water demands for Washoe County FSA are listed in Table 12.1. The irrigation demands are projected assuming that 6,000 gallons per month is consumed within the dwelling and the remainder is used for irrigation. The irrigation demand range is based on either front yard only irrigation or the combined front yard and back yard irrigation. Irrigation demands for commercial and industrial land use were estimated assuming fifteen percent of the total commercial and industrial acreage is irrigated at an application rate of 3.5 AFA. The total projected demand includes both indoor and outdoor water use.

Table 12.1 - Washoe County FSA Projected Water Demands

Irrigation Demand Component (AFA)	Total Demand Including Irrigation (AFA) (a)
1,410 - 2,820	10,270

(a) Based on 18,340 dwelling units at an average of 0.4 AF per unit, and 2,616 acres of commercial and industrial land use.

12.2.3 Water Facilities

Existing and proposed water supply facilities are presented in Figure 12-3. The Vidler Water Supply Project crosses the Washoe County FSA. Part of the planned Intermountain Water Supply Project is also located within the FSA. However, the projected demand for potable water supplies for Cold Springs, Stead and Lemmon Valley exceeds the available water supply from the Fish Springs and Intermountain projects. Use of reclaimed water and additional imported water will likely be required to meet projected demands. Additional imported water, such as from the Smoke Creek basin, may be available for future uses. Information on future potential water resources is discussed in Section 13.

12.3 WASTEWATER

Projected wastewater flows, possible treatment plant sites, and locations for storage and/or disposal of effluent are developed in this section.

12.3.1 Assumptions, Planning Criteria and Methodology

The wastewater flow factor for the Washoe County FSA was assumed from the 2007 Washoe County 208 Water Quality Management Plan. The flow factor for new development ranges from a low of 110 gallons per capita per day (gpcd) to 130 gpcd. An average of 120 gpcd was used for flow projection. All other wastewater planning assumptions are as stated in Appendix A.

12.3.2 Projected Wastewater Flow

Using the land use data, flow projections for the Washoe County FSA were developed. The wastewater treatment capacity projection by hydrobasin for the County FSA is presented in Table 12.2.

Table 12.2 - Washoe County FSA Wastewater Projections (a)

Hydrobasin	Dwelling Units (ERUs)	Commercial Land Use (acres)	Projected Wastewater Treatment Capacity (MGD)
Bedell Flat	946	135	0.4
Antelope Valley	2,053	293	0.8
Warm Springs	9,231	1,317	3.4
Lemmon Valley	4,076	581	1.5
Spanish Springs	1,644	235	0.6
Sun Valley	388	55	0.1
Total	**18,338**	**2,616**	**6.8**

(a) Wastewater flow projections are conservative. Therefore, the percentage of wastewater flow compared to the total water demand is more than the "typical" fifty percent reported in various planning studies.

12.3.3 Wastewater Treatment Locations

Because the Washoe County FSA is distributed among several hydrobasins, it is likely that many of these areas will sewer to existing wastewater treatment plants, or be consolidated with other proposed treatment facilities. Potential treatment facilities for wastewater from each hydrobasin are identified in Table 12.3.

Table 12.3 - Washoe County FSA Treatment Locations

Hydrobasin	Potential Wastewater Treatment Facility
Bedell Flat	May be combined with a proposed City of Reno WRF in Bedell Flat or pumped to Antelope Valley.
Antelope Valley	May be served by a proposed County WRF in the Warm Springs hydrobasin, or pumped to Lemmon Valley
Warm Springs	Proposed new County WRF.
Lemmon Valley	RSWRF or LVWWTP
Spanish Springs	May be served by TMWRF or a new Spanish Springs Valley WRF.
Sun Valley	May be served by TMWRF.

A potential Warm Springs hydrobasin wastewater treatment facility location is shown on Figure 12-4. The potential site for a treatment facility is located in the hydrobasin that appears most

favorable for development. As land use master plans are developed for the area, the proposed treatment plant location and alternative sites should be evaluated in detail.

12.3.4 Water Reclamation and Disposal

Water reclamation would beneficially reuse a large portion of the effluent generated within the Washoe County FSA, and would provide a valuable water resource to help meet non-potable demands. Non-potable irrigation demands include parks, schools, landscape medians and residential areas. A review of the area was conducted to evaluate the feasibility of seasonal storage for the reclaimed water. Potential storage reservoir sites are shown on Figure 12-4. Potential reservoir volumes are listed in Table 12.4.

Table 12.4 - Potential Effluent Reservoir Sites

Reservoir	Surface Area (acres)	Dam Height (feet)	Crest Length (feet)	Approximate Volume (AF)
1	110	100	1,030	2,900
2 (a)	150	100	1,580	4,100
3 (a)	270	75	700	6,300

(a) Would require relocating a gas transmission main.

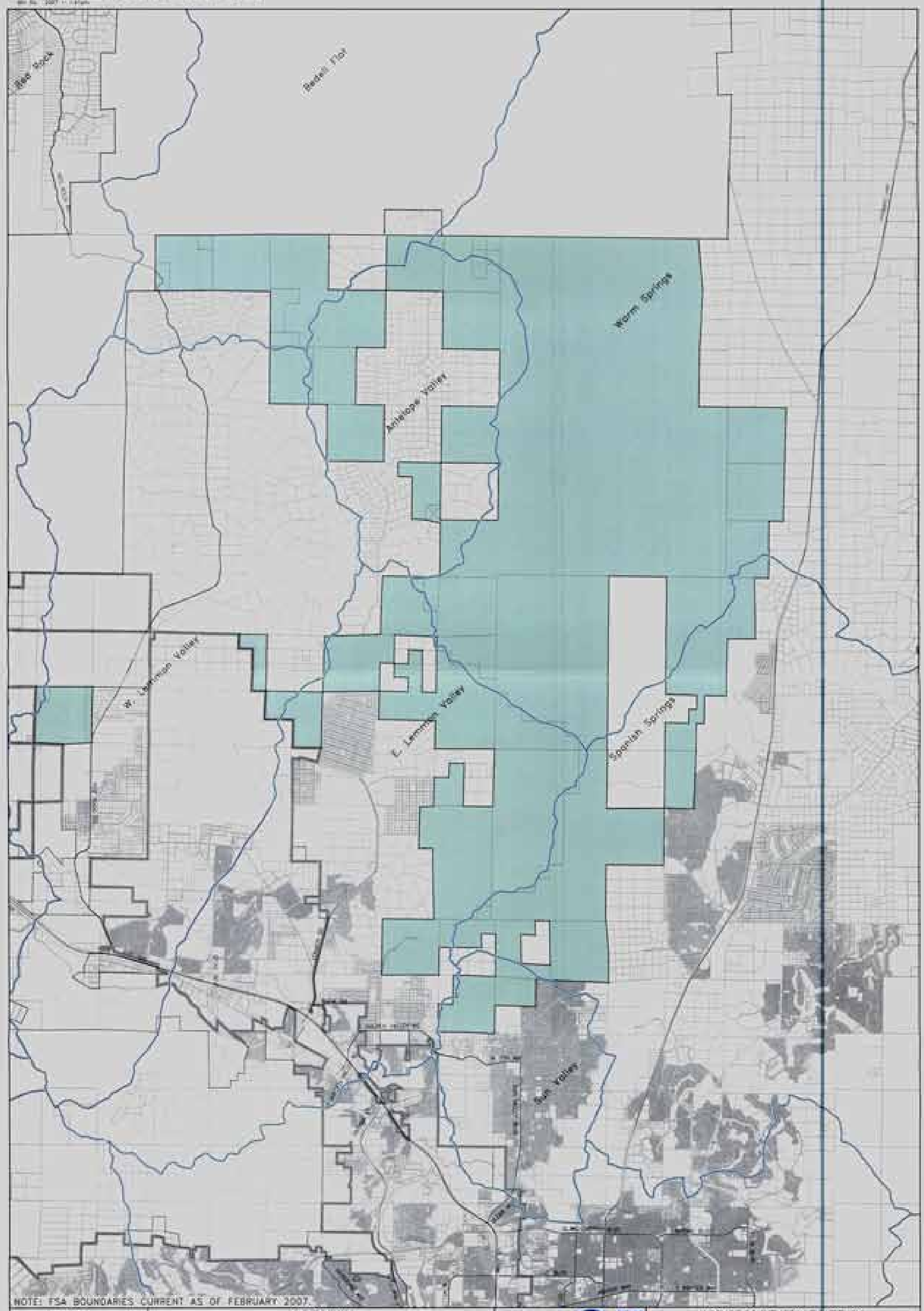
Based on a review of geologic maps and initial site reconnaissance, no likely rapid infiltration areas were identified as the soil conditions do not appear to be suitable.

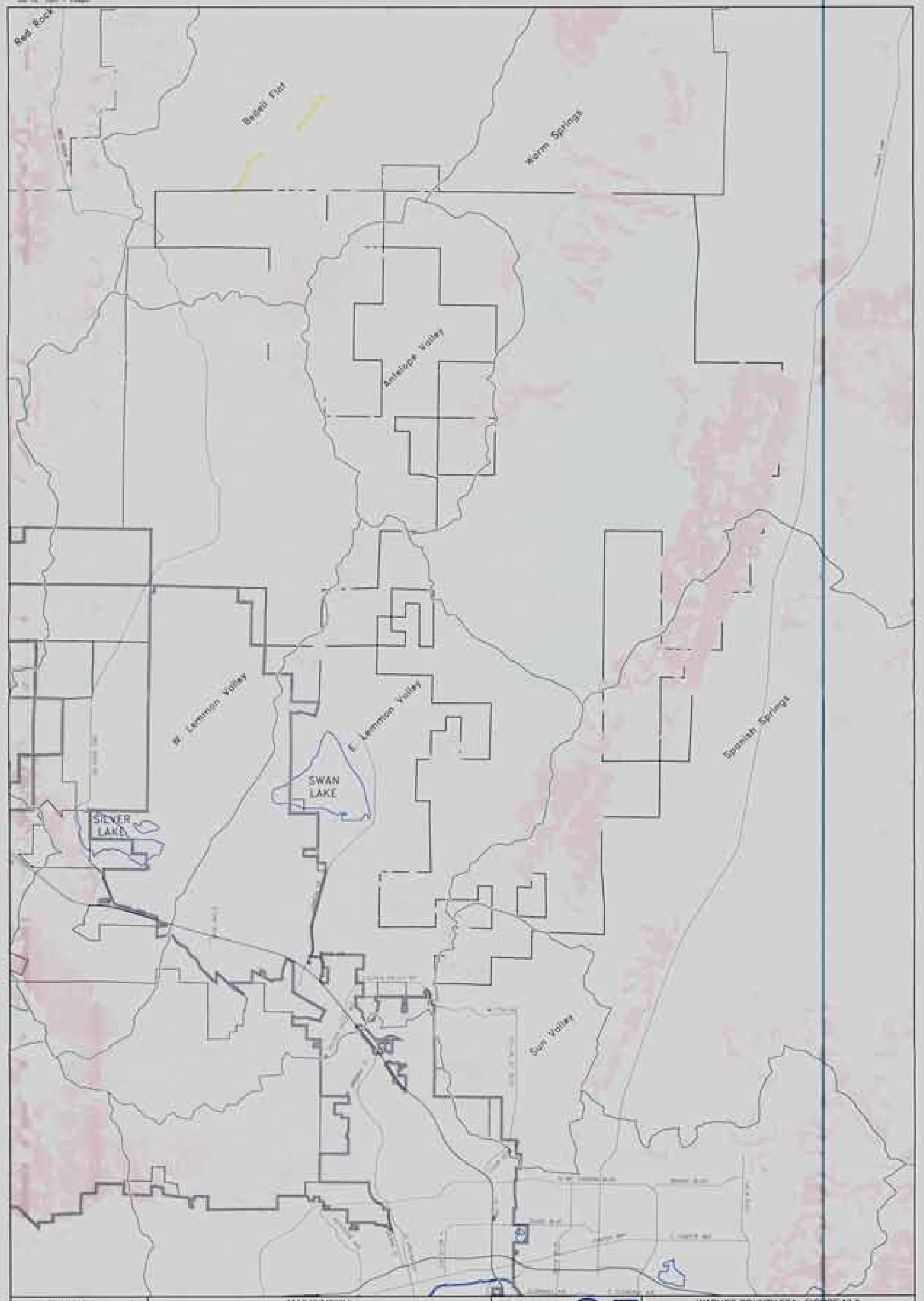
12.4 FLOODPLAIN MANAGEMENT AND CHANNEL MIGRATION

As development occurs, floodplain planning must alleviate the impact of flooding to ensure protection of life and property. This Facility Plan encourages the preservation of natural drainageways. These drainageways have several important functions: conveyance of flood flows, conveyance of watershed sediment loading, groundwater recharge, environmental and wildlife habitat, and aesthetic quality. These areas are shown in Figure 12-2.

Development of future roads and facilities within Washoe County FSA will result in improvements within and across major drainageways. Open channels tend to have more conveyance capability than an enclosed facility. Moreover, open channels can convey debris more effectively provided that road crossings are designed properly. It is recommended that when enclosing major drainageways, the County should ensure that the design storm event for all such enclosures be a significant storm event, such as the 100-year storm event. Appropriate freeboard, debris conveyance capabilities and areas for natural channel migration should be provided.

Refer to Section 15 for further information on flood control management.


Red Rock
Pleasant Valley
Antelope Valley
Warm Springs
W. Lemmon Valley
E. Lemmon Valley
Spanish Springs
Sun Valley
NOTE: FSA BOUNDARIES CURRENT AS OF FEBRUARY 2007.
MAP SYMBOLS
WASHOE COUNTY FSA
CITY OF RENO LIMITS
WASHOE COUNTY FSA - FIGURE 12-1
STUDY AREA
COUNTY OF WASHOE, NEVADA
ECO:LOGIC


Red Rock
Bailey Flat
Kerns Springs
Antelope Valley
E. Lemmon Valley
E. Lemmon Valley
SWAN LAKE
SILVER LAKE
Spanish Springs
Sun Valley
MAP SYMBOLS
WASHOE COUNTY FSA - FIGURE 12-2
AREA CONSTRAINTS
COUNTY OF WASHOE, NEVADA
HDR
ECOLOGIC

BV-1 WELL

BV-2 WELL

FISH SPRINGS/INTERMOUNTAIN WATER TRANSMISSION PIPELINE RIGHT OF WAY

Bedell Flat

Antelope Valley

Warm Springs

W. Lemmon Valley

E. Lemmon Valley

Spanish Springs

Sun Valley

MAP SYMBOLS

WASHOE COUNTY FSA

CITY OR HOA LIMITS

ECO:LOGIC

HDR

SWPE

BEDELL FLAT FSA - FIGURE 12-3

PLANNED WATER SUPPLY FACILITIES

COUNTY OF WASHOE, NEVADA

Bedell Flat

Warm Springs

Antelope Valley

RESERVOIR 1

PROPOSED WASHOE COUNTY FSA WWF

RESERVOIR 2

RESERVOIR 3

W. Lemmon Valley

E. Lemmon Valley

LEMMON VALLEY WWTF

Spanish Springs

Sun Valley

MAP SYMBOLS

WASHOE COUNTY FSA

CITY OF RENO LIMITS

HDR

ECO:LOGIC

RWPC

WASHOE COUNTY FSA - FIGURE 12-4
POTENTIAL WASTEWATER TREATMENT LOCATIONS
COUNTY OF WASHOE, NEVADA

Table of Contents

Figure List (Included at End of Section)

Section 13 – Future Planning

This section addresses future planning needs for the development of the Reno and Washoe County TMSA/FSA. Topics of planning discussed include future water resources, wastewater management and floodplain management.

13.1 FUTURE WATER RESOURCES

A combination of imported and onsite water resources will be needed to satisfy the projected 2030 demands. In addition to the potentially available resources discussed in each planning area, several importation projects have been proposed to bring additional water to the TMSA area. These projects are listed in Table 13.1 and shown on Figure 13-1.

Table 13.1 – Future Potential Water Resources

Project Name	Basin of Origin	Groundwater Quantity (AF)	State Engineer Action	Project Status	Approximate Distance
Red Rock Valley Ranch, LLC (a)	Red Rock Valley	1,300	Ruling Pending	State and federal approvals required	10-15 miles to North Valleys
Aqua Trac, LLP (a)	Granite Springs	38,000	Denied	State and federal approvals required	80-100 miles to Fernley, Truckee Meadows
Intermountain (a)	Dry Valley	2,000 -3,000	Approved	EIS approved, additional State and federal construction permits required	20 miles to North Valleys
Sonterra (a)	San Emidio & Hualapai Flat	7,200	Pre-hearing	State and federal approvals required	100+ miles to Fernley/other
High Rock & Juniper Hills Partners, LLC (a)	Hualapai Flat	10,000-14,000 ground and surface water	Pre-hearing	State and federal approvals required	100+ miles to Fernley/other
Lower Smoke Creek (b)	Basin 21	12,000-14,000	Pre-hearing	State and federal approvals required	70+ miles to Winnemucca Ranch, North Valleys

(a) Data provided from TMWA.

(b) Data provided from Jackrabbit Properties LLC and Bright-Holland Co.

Brief descriptions of these projects are provided below.

Red Rock Valley Ranch, LLC

The Red Rock Valley water importation project is proposed to bring water from the Red Rock groundwater basin to the north end of West Lemmon Valley. The project is awaiting a ruling

from its June 2007 hearing with the State Engineer. The proposed pipeline alignment is shown on Figure 13-1.

Aqua Trac, LLP

On September 17, 2007 the State Engineer signed Order 5782, in which all Aqua Trac applications to appropriate the underground waters of Granite Springs hydrographic basin were denied based on: (1) insufficient water in the basins to support the application; (2) lack of identification of an amount of water to be used by a specific user; (3) no contracts in place with a water purveyor or other entity to put the water to beneficial use; and (4) no actual project identified to be constructed to use the water. It is not known what Aqua Trac's next steps will be nor the status of its BLM application. The proposed pipeline alignment is shown on Figure 13-1.

Intermountain

The Intermountain pipeline alignment is shown on Figure 12-3. The project would import groundwater from Dry Valley and Bedell Flat to the North Valleys. The project has received approval through the BLM EIS permitting process. Additional permitting approvals are required prior to initiating construction.

Sonterra

The Northern Nevada Pipeline is being proposed by the Granite Investment Group, LLC. They are proposing to build a pipeline and associated facilities to convey water from the Gerlach area to Fernley, and possibly later toward Dayton for municipal purposes.

The water is currently permitted for, and has been historically used for irrigation on two farms: Empire Farms, and Orient Farms, located in two separate, designated hydrographic basins. This proposal intends to convert all of this water from irrigation to municipal use. The project proponents are anticipating delivering approximately 28,000 AF annually.

Currently, the project proponent indicated that the proposed withdrawal amount is greater than the USGS projection of basin recharge; and subsequently, prepared a hydrologic assessment of basin recharge that refutes the USGS estimates. The basins are over-allocated, meaning that total water rights exceed basin recharge. In cases where water rights exceed recharge, basins are designated for administration by the State Engineer, who has the authority to limit the use of water. The subject basins have thus been designated.

The 36-inch to 48-inch diameter pipeline would be approximately 100 miles long, and would require approximately 1,100 feet of lift. Three pump stations are envisioned. Several alternatives for water storage have been identified, including new storage tanks in Fernley or storage in existing tanks.

Power in the well fields and at the initial pump station would be supplied either with existing Sierra Pacific Power Co. power lines, or with an existing geothermal power plant located at

Empire Farms. Power from the intermediate pump stations would likely be brought to the sites with new power lines from the Fernley area.

Based on test results, project proponents expect the water to be of drinking water quality, requiring no treatment.

High Rock & Juniper Hills Partners, LLC

The project would bring water from Hualapai Flat to the Fernley area. No pipeline route has been established.

Lower Smoke Creek

The Lower Smoke Creek project is shown on Figure 13-1. Basin 21 is located just north of Pyramid Lake in Washoe County. This water is held primarily by one owner through various entities, including Bright-Holland Co., a Nevada corporation and Jackrabbit Properties LLC, a Nevada limited liability company (collectively "Jackrabbit").

Some recent history within the basin is that Jackrabbit executed an option to sell with Granite Fox Power, LLC also known as Sempra. Sempra optioned the water rights owned by Jackrabbit and Bright Holland. The option agreement encompassed approximately 28,000 AF of groundwater and surface water combined. It was Sempra's intent to use the water for a $2 billion coal fired power plant within Basin 21. Basin 21 has a yield substantiated by the USGS of 16,000 AF. In addition, several test wells were constructed and pumping tests completed which confirmed the long term sustainability of the water resource. With this existing information, including USGS gauges in place since 1986, the abovementioned water rights will support approximately 12,000 to 14,000 AF of municipal water annually, subject to State Engineer approvals.

Subsequently, Sempra decided not to proceed with the power plant project and as a result, released its options to purchase the water. Jackrabbit, in turn, executed a water development agreement with LSC Development, which intends to develop a water importation project rather than a power plant project. The first phase of the water project is intended to capture the water on the Lower Smoke Creek segment and pipe the water to Winnemucca Ranch and other proposed developments consistent with the relevant water resource plans.

13.2 WASTEWATER MANAGEMENT

Reuse and discharge of reclaimed water from the various water reclamation facilities in the region may eventually be constrained by a number of factors, including:

- Water quality standards, TMDLs and discharge permit limitations to the Truckee River.
- Possible constraints on use of water originating from outside the Truckee River watershed.

- The need for additional water rights in locations where a return flow to the Truckee River is required.
- Regulatory constraints on discharges to groundwater aquifers.
- The sub-regional imbalance of reclaimed water supply, storage and demand.
- Sites available for use of reclaimed water may not be sufficient to consume all of the available supply of reclaimed water.
- A shift in the application of regulatory policy may increase or restrict the locations where application of reclaimed water is allowed.

As a result of these constraints, additional planning efforts need to be undertaken to evaluate the technical challenges and regulatory considerations associated with disposal of effluent and potential new uses for reclaimed water. Three of these future planning needs are described below.

13.2.1 Regionalization of Reclaimed Water Use

A thorough planning and facilities study of regionally integrated reclaimed water systems and management strategies is recommended. Regionally integrated reclaimed water systems may realize economic and financially prudent alternatives that cannot be realized with separate, independent systems.

13.2.2 Treated Effluent Aquifer Storage and Recovery

Water purveyors and wastewater service providers should work in a coordinated manner to investigate, test, permit and implement a treated effluent aquifer storage and recovery (ASR) program within the region. ASR may be beneficial for effluent disposal and water supply. The region lacks large aboveground storage areas for treated effluent. Being able to store treated effluent underground maximizes the amount of water that may be reused. For example, in Spanish Springs storing treated effluent could help balance the water supply by providing a new resource. Further work is needed to address potential public health concerns, determine the level of wastewater treatment required and the associated cost impacts, and to gain public acceptance.

13.2.3 Indirect Potable Reuse

Together with studying of a treated effluent ASR program, the water purveyors and wastewater service providers should also undertake a long term program to evaluate the merits of indirect potable reuse as a supplemental water supply / water management alternative that is protective of public health and the environment. Treated effluent ASR and indirect potable reuse programs must be closely coordinated with NDEP since current regulations in Nevada do not allow these practices. Neighboring arid states, including California and Arizona, are implementing similar water management programs. Additional planning is necessary to determine if ASR and indirect potable reuse is technically and politically feasible in Nevada.

13.3 FLOODPLAIN MANAGEMENT

13.3.1 Watershed Protection

The area of watershed protection throughout the Truckee Meadows should be identified for future study. It is recommended that future project work should include a comprehensive study all Truckee Meadows urban watersheds specifically for planning best management practices (BMP) retrofit.

13.3.2 Floodplain Storage within the Truckee River Watershed

The Truckee River Flood Project includes a locally preferred plan alternative that includes a significant detention/storage facility proposed for the Huffaker Narrows area in South Truckee Meadows. In addition, storage volume is also preserved within the critical flood pool (Zone 1) by ordinance on a volume per volume (1 to 1) basis. Floodplain storage is not currently addressed outside of the Critical Zone 1 boundary; however, it may be necessary to do so for the benefit of the Truckee River Flood Project. Development of a hydrologic model of the entire Truckee Meadows is recommended prior to development of a higher standard for floodplain storage.

13.3.3 Floodplain Management

The nature of floodplain planning involves alleviating the impact of flooding on people and communities to ensure protection of life and property. Projects proposed for the urban areas of Washoe County are designed to accomplish this goal. Natural drainage/conveyance areas are undeveloped and pose no threat to life and property, but can as development occurs. This Facility Plan encourages the preservation of natural drainageways. These drainageways have several important functions: conveyance of flood flows, conveyance of watershed sediment loading, groundwater recharge, environmental and wildlife habitat, and aesthetic quality.

It is important to note that flood control facility plans in this plan for undeveloped areas are conceptual. If development occurs responsibly, the floodplain function will be preserved and there will be no impact to property upstream or downstream of the proposed development. Each development should provide for source control of stormwater, both in quantity and quality. It is recognized that stormwater source control is the most beneficial means for effective land development. Regional facilities may accomplish many of the same benefits but may fall short of simulating all of the existing natural processes.

However, sometimes regional facilities make sense and should be considered. It is recommended that for these times, or if more than one developer wants to construct a regional facility, there should be a mechanism established to accomplish this goal. The mechanism needs to outline a framework for how the project can be completed. It should be established in code, recognize the project, provide for funding, collection of funds, design and construction and make responsible an agency to oversee project completion.

Hydrologic studies conducted within the Truckee Meadows have historically followed numerous and inconsistent methods. This makes flood control planning and drainage very difficult at best to coordinate across governmental boundary lines as well as across subdivision boundary lines. Washoe County with input from the Cities of Sparks and Reno developed the Draft Washoe County Hydrologic Criteria and Drainage Design Manual in 1996 to address this problem. Currently this manual is only available in draft form and has not been adopted by any of the participating local governments. It is recommended to finalize this document and that it be officially adopted by all participating local governments.

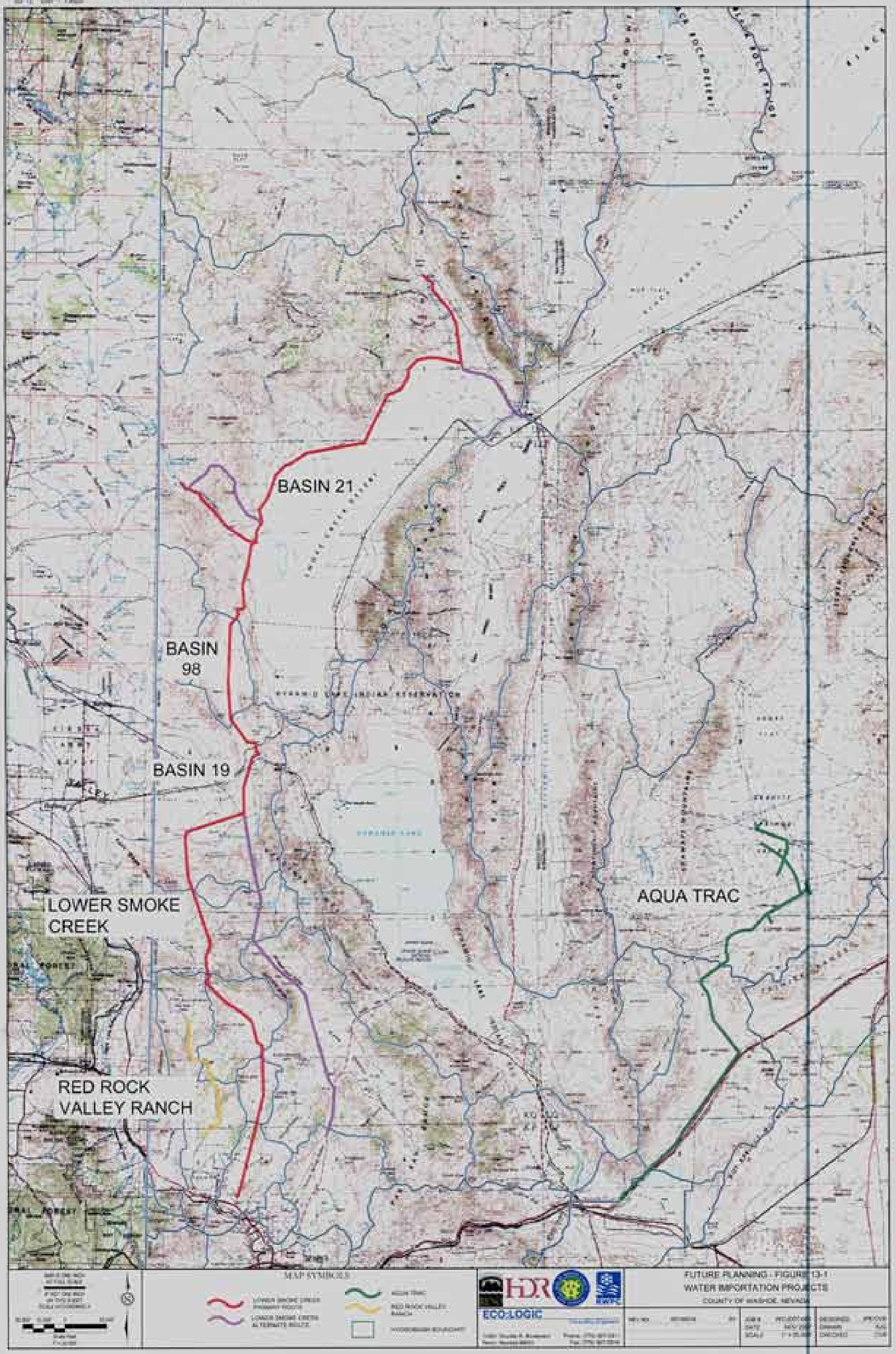

BASIN 21
BASIN
98
BASIN 19
LOWER SMOKE
CREEK
RED ROCK
VALLEY RANCH
AQUA TRAC
MAP SYMBOLS
ECO:LOGIC
HDR
FUTURE PLANNING - FIGURE 13-1
WATER IMPORTATION PROJECTS
COUNTY OF WASHOE, NEVADA

Table of Contents

List of Tables

List of Figures – Included at End of Section

Section 14 - Stormwater

Drainage and flood control guidelines are established generally for two goals. The first is to allow a systematic and uniform approach to land development, and the second is to provide a framework for upgrades to existing facilities.

In general, drainage and flood management strategy incorporates solutions that accept stormwater from upstream and control release of stormwater in such a manor so as not to impact the lower watershed. The ultimate goal of development for drainage is to intercept water that naturally drains to the site from upstream and to release it to the downstream property in a manner that minimizes any departures from the existing conditions. Typically planners interpret this goal to mean that concentration of sheet flow drainage runoff is minimized, and no increase in flow rates are experienced downstream of the development.

Recently development guidelines from other jurisdictions have incorporated the concept of "no increase in volume of runoff" allowed from a proposed development in addition to the "no increase in peak discharge" that is usually required. This concept of "no increase in volume" is not universally accepted or applied throughout the country; however acceptance of this concept is gaining momentum. In short, the additional volume of stormwater generated on site should be retained on site and disposed of through ground interception, transpiration or some other method that prevents discharge to the network of streams. Detention facilities are used generally to control runoff flow rates while retention facilities function to control stormwater volume. Using these guideline concepts, the impact of new development is minimized.

The development model being proposed herein allows the network of streams and channels to remain in a natural state so a majority of the natural processes can continue. Floodplains are delineated for undeveloped major drainage channels with watersheds of 100 acres or more. Floodplains are not shown in developed or populated areas, nor are they intended to supplant the FEMA regulatory flood zones. Each municipal jurisdiction is the designated authority to regulate urban interaction of civil infrastructure and the FEMA flood zone and is the keeper of that information. Since FEMA flood zones are not consistently available for the more rural watersheds, it is important to provide a tool for city/county planners to assist developers to protect the floodplains during development. The floodplains delineated on the maps are intended to serve as a preliminary notification to the planners of the presence of a potential floodplain conflict.

Developed areas within the Truckee Meadows continue to have flooding and drainage problems. Many of these problems are a result of inadequate planning for facilities, or application of drainage design criteria that have since become outdated. The basis for the existing flood control master plan is the Draft Regional Flood Control Master Plan developed by WRC Engineers in 2005, (WRC plan). The WRC plan was an update of the Washoe County Flood Control Master Plan, dated 1991 by Kennedy Jenks Chilton Consultants. The content of the WRC plan was not reviewed for accuracy or adequacy, merely a transfer of information was performed into the

geodatabase that will be made available in connection with this master plan update. The information from the WRC plan was provided to HDR electronically. The transfer of information from the WRC plan into this master plan update included, in some cases, an observation to determine if the particular project had been constructed and then only to remove it from the master plan project list if the conclusion was that the project, as described, had been constructed. The resulting geodatabase became the basis for the maps showing all of the CIPs included in this master plan update. Other projects, in addition to those in the WRC plan, have been included by HDR that are located geographically within the study areas of this master plan update; some of which became evident during the flood event of 2005 and others were known problems that were not mentioned in the WRC plan. No additional investigation was performed for projects that lie outside of the study areas of this master plan update. Costs for all facilities are included in Table 14.1.

14.1 FLOOD CONTROL PLANNING PROCESS

Flood master planning effort consists of a series of tasks that have been described in various publications and is further detailed in the most recent WRC plan. The following numbered items identify a brief summary of the planning process referenced in the WRC plan as modified in this plan update:

1. Define the master plan objectives. Foremost among possible objectives for flood control includes protection against flooding, life, property and protection of the environment. Inherent in this goal is the frequency of storm or level of flood protection, i.e. catastrophic flood damage, 100-year flood damage, or some lesser storm flooding. Drainage system channels, dams and other drainage/flood related infrastructure would all be designed to the agreed to level of service and methodology by the community to maintain a consistent design among all proposed developments and hopefully existing ones as well. Additional engineering complexity is involved in the Truckee Meadows when considering the playas (closed basins); unique strategies must be applied to these areas.

   It is now becoming critical to include environmental considerations in stormwater master planning to maintain the natural geomorphic function and habitat. Finally, other non-flood considerations must be incorporated into the overall plan objective which may include groundwater infiltration for conjunctive water use, wastewater disposal and detention/retention facilities for use in potable water storage and delivery.

2. Based on the goals stated in step 1, gather and assemble available relevant information on the existing drainage facilities, previous master plans, land use plans, zoning maps, flood hazard area delineations, etc.

3. Identify existing and potential drainage problems with respect to the goals established in step 1.

4. Identify structural stormwater improvements and/or mitigation concepts to remedy problems identified in step 3.

5. Incorporate a stakeholder's process to solicit opinions of those most heavily impacted and to garner their support for the project. Stakeholder's typically include the public, but may also include impacted organizations and regulatory agencies as well.

6. Narrow all options into a few of the most appropriate alternatives and proceed with an analysis of these alternatives. Appropriateness may be determined by a combination of popular opinion and engineering judgement.

7. Continue with the stakeholder's process to select a "preferred alternative" to be included in the master plan.

A short form variation of the above process may be followed which eliminates the stakeholder's process. Items 5 through 7 are replaced with a short analysis based on engineering judgment of workable alternatives adequate for master planning purposes. The short form was followed in this plan update due to the limited amount of time for performing this update. The short form is also typically followed by private land development companies when planning their improvements, unless the development requires an EIR.

14.2 WATERSHED SPECIFIC MASTER PLANS

Watershed specific plans were reviewed for this update. Overall the Draft *Washoe County Regional Flood Control Master Plan* (WRC Plan) dated July 2005 by WRC is the basis for this master plan update. WRC reviewed the following watershed specific master plans: Drainage Master Plan for Stead NV, Spanish Springs Valley Flood Control Master Plan, Washoe County, NV; Drainage Master Plan for Sun Valley, Washoe County, NV; ReTrac Drainage Report, Reno, NV; Storm Drain Master Plan East Washoe Valley Washoe County, NV; City of Sparks, NV Drainage Master Plan; Kiley Ranch Flood Control Master Plan, Spanish Springs Valley, NV. Projects that are proposed in any of these plans were taken at face value during this master plan update. HDR does not imply that any of the projects proposed within these plans are recommended by HDR; however it is recognized that the projects proposed do address a particular flooding or drainage problem and that some sort of solution is required at the location shown for each project, and the listing in this master plan update is appropriate for planning purposes.

Projects appropriate for inclusion into the regional master plan were included in the master plan by WRC; those projects are also made a part of this update. In addition, individual watershed specific master plans reviewed for this master plan update are discussed below:

North Valleys Flood Control Hydrologic Analysis and Mitigation Options

The Silver Lake and Swan (Lemmon) Lake playas are studied in this report. The focus of the report includes analysis of existing and future buildout conditions[1] for both watersheds. Both watersheds are subject to flooding under the future conditions. Existing conditions in Silver Lake are reported as being above (approx 3') the existing FEMA regulatory 100-year base flood elevation. The existing 100-year regulatory base flood elevation (BFE) for Silver Lake was developed using hydrologic criteria that is no longer utilized for development in Washoe County; but the problem remains that many homes adjacent to the low point in the Silver Lake area were built according to the original BFE and so now are subject to an increase potential to flood. In the Swan Lake watershed, the existing computed water surface elevation is below the existing FEMA 100-year BFE for Swan Lake and no homes are currently threatened.

Due to the potential for property damage to adjacent properties to the lakes in both basins, under future conditions, the referenced report discusses some mitigation options. In addition to the playa flooding potential, another goal of the study was to determine the potential for storing wastewater effluent in either or both of these playa lakes. Mitigation options analyzed include combinations of the following solutions:

1. Removal of material from the playa lake bottoms,
2. Construction of levees to contain the current or projected increase in stormwater volume,
3. Use spreading basins or areas of enhanced infiltration,
4. Expand the lake holding capacity or develop additional storage areas within the watershed,
5. Inject excess stormwater into the Vadose Zone,
6. Incorporate Low Impact Development practices into the required building code for these areas,
7. Provide for evacuation of selected properties on the fringe areas of each playa lake,
8. Provide for draining excess water from Silver Lake to Swan Lake,
9. Pump excess stormwater from Swan Lake to a site in Hungry Valley, and
10. Construct an infiltration facility located on Stead Airport Property.

The recommendations from this report separated existing and future conditions in both watersheds. Under existing conditions for Silver Lake, the recommendation is to update the BFE

[1] Buildout conditions according to projected land use were assumed for the future developed hydrology study in the report.

and apply for a LOMR from FEMA. This will correct previous studies that lowered the BFE in the first place and establish a proper framework for future improvements. The cost associated with this effort is minimal when compared to other construction mitigation options analyzed in the report. If the recommendation of a LOMR is rejected, then costs for other project options ranged from 53 to 163 million dollars. It was suggested that an amount of $55 million should be a benchmark for planning purposes to protect against existing flooding, and that number may be as high as $88 million if property needs to be required. This number is included in the project summary and cost amounts in this master plan as CIP B16-7. For future conditions, it was recommended to construct an infiltration facility on airport property as well as individual retention sites within the Swan Lake watershed.

Another concept could be considered and is explained in **Section 15** under the heading of **Flood Volume in Closed Playas;** it is suggested that future development be allowed to discharge only the predevelopment runoff rate and volume. This concept would certainly go along with a general rule of thumb that no development can impact surrounding properties as a direct result of the new development. Following this suggestion would void the necessity of providing for future construction for flood prevention with respect to lake levels in these watersheds. Under this scenario, the total costs for improvements to these watersheds would be minimal; however the burden would be significant to the land developers.

The final solution to this problem could be very different from the report recommendations so the amount of $88 million was included for planning purposes; this will at least allow for fixing the existing conditions and enable construction of a least cost alternative for the future conditions. It is recognized that the cost of flood control is exceptionally high in these watersheds and that the use of any number must be taken as a very preliminary amount. It is also important to note that the project shown on the map (# B16-7) in this master plan update is not intended to show a particular project layout, merely a place holder that links the solution for these two lakes as a joint solution that will include several projects to be performed at the same time. Finally this amount of money is programmed in this master plan update to signal that for future development to occur within these watersheds, a significant amount of attention will be required to avoid "adverse impacts" to the homes, and infrastructure within each watershed, AND that if impact fees for this area are developed from the project list for this service area, an appropriate amount is determined.

Somersett Development Storm Drainage Master Plan

The Somersett development including Somersett Wash and Mogul Wash are studied in this report by Manhard Consulting, dated 2004. Focus of the report includes analysis of existing and proposed future conditions. In both conditions, runoff from the south slopes of Peavine Mountain collects in the two washes and reports to the Mogul area, then under Interstate 80, and into the Truckee River. As part of the Somersett community, a total of 11 detention ponds were proposed and are in various stages of construction. According to the Somersett Development Storm Drainage Master Plan, these ponds will detain site runoff so that build-out peak flow is less than pre-construction peak flow. Additionally, "green belts" through the community were

preserved to collect and convey runoff. While the reduction in peak flow will help reduce downstream flooding concerns in Mogul, the area is still very susceptible to localized flooding under events larger than a 5-year or 10-year storm.

According to an earlier 1998 Somersett Drainage Master Plan by WRC Nevada: "...the drainage structures in the Mogul area have sufficient capacity for the 5-year event. Flow rates in excess of the 5-year event may result in some localized overtopping of roadways as well as some of the channel crossings and at the Interstate 80 frontage road and underpass. In a 100-year event, flows will exceed channel and culvert capacities in the Mogul area and cause flooding of private properties."

Field observations from site visits do indicate that this statement is accurate especially where Mogul Wash crosses under Silva Ranch Rd and W. 4th St, although a lack of photographical and specific anecdotal information persists.

Drainage Master Plan for Stead, Nevada

Stantec Consulting prepared this master plan for flood control facilities for the Stead area of Washoe County. A complete hydrology model was developed for the project area and six projects were proposed. All of the six projects have been constructed.

14.3 MISCELLANEOUS FACILITIES

The following section discusses projects and miscellaneous issues in addition to the projects identified in Table 14.1.

Irrigation Ditch and Stream Interactions

During the New Years Flood of 2005, the interaction between the irrigation ditches and streams that predominate on the city's west side (but also exist throughout the city) became more pronounced. The irrigation ditches have been a significant part of the city for more than 100 years, but few stories exist of flooding problems associated with these ditches. As mentioned in 2005, the irrigation ditches intercepted flow at several locations. Prior to construction of the ditches, stormflows followed the historical watershed flow path. After the ditch construction and stormwater intercepted by the ditches exceeded the conveyance capacity of the ditch, overflow occurred at unpredictable locations. The previous master plans did identify some structures to alleviate the potential for flood damage but no mention was made on the overall problem.

For this plan update, each of the ditch crossings have been observed and a short section is included in this update; however, there is a deeper issue at hand and that is of liability. Because the ditches are privately owned, are the ditch companies responsible when drainage water enters

their systems then overtops and floods other properties? Is the city responsible if natural drainage/creeks cross these ditches and is channeled into the ditch rather than the historical watershed? Most of the structures at the ditch crossings are manually operated. Who is responsible for failure to operate and are the operations at the various sites even recorded in writing so that the procedure can be followed by future operators? Finally, in most instances development has occurred downstream of the ditch crossings; what happens if stormwater is turned back into the historical watershed?

These and other discussion points preclude the recommendation to upgrade these systems to full 100-year protection, unless of course the downstream system is fully improved to where the outfall discharges into the Steamboat Creek or Truckee River. These systems could be in the tens of millions of dollars in construction cost each and unlikely that they will ever be constructed. It is recommended in this update that the City develop a public policy or general guideline that could be followed for enhancement of each of the reported ditch crossings and bring the stakeholders into the process as appropriate.

NDOT Road Crossings at City Owned Drainage Facilities

The following culvert crossings have potential to result in flooding at various areas within the city/county. These areas are noted in this master plan for discussion and informational purposes and have not been included in the proposed project list for this plan update. The following system crossings are listed for future planning discussions with NDOT staff.

Evans Creek

Under the intersection of Hwy 395 and Neil Road, the conveyance for Evans Creek is through a pair of 11'x4' box culverts which are 1,600 ft long. The capacity of this system has been found to be between 900 and 1200 cfs. A detailed study of the 100-yr storm determined that flow rates in Evans Creek could be in the magnitude of 2,200 cfs. Historically, flow has broken out of the creek in numerous places between Lakeside Dr and Hwy 395, therefore reducing the amount of flow that the box has to convey. However, CIPs to fix these break-outs have been recommended. As the recommended CIPs are constructed, flow rates reaching the 2 – 11'x4' boxes will increase and could exceed capacity.

A detention basin has been proposed on Evans Creek in the Balardini Ranch area above Lakeridge. If this facility is constructed, many if not all of the concerns about the capacity of this box should vanish. Through proper design, the discharge of flows out of the basin could be reduced to allow for the accumulation of runoff below the basin, and combined still be less than the studied box capacity.

Thomas Creek North Split

The north branch (sometimes referenced as West Branch) of Thomas Creek passes under South Virginia and Hwy 395 just south of the "Pink Scolari's." The open channel approaches the intersection from the southwest (near the furniture stores) and enters the culvert system through a structure containing 2 - 30" RCP, and 1 - 24" RCP. Only 1 - 30"

RCP exits inside the clover leaf/detention basin on the NE side of the intersection, and neither field observation, research at NDOT, or research at the City of Reno, has revealed the discharge location of the other 2 culverts. During field inspections, approximately 1/3 of the flow entering through the 3 culvert structure re-appeared inside the clover leaf and again at Huffaker Hills Park. During the 2005 event, water overtopped South Virginia by the intake structure, and the detention pond inside the Northbound onramp cloverleaf filled up and overtopped South Virginia and the on ramp.

A detention basin has been proposed on Thomas Creek near the Arrowcreek Subdivision. Additionally, a flow split structure has been proposed where Thomas Creek splits into two branches east of Dixon Lane. If these facilities are constructed, flooding concerns in the vicinity of the Pink Scolari's will be reduced. However, the lack of information about the discharge location of the two culverts makes it extremely difficult to perform an accurate evaluation of the capacity of this reach and system modifications may still be prudent.

Thomas Creek East Split

Due to the problematic nature of Thomas Creek West Split, CIPs mentioned in the previous section are intended to divert flow away from Thomas Creek West Split into the East Split. Currently an 11'x3.5' box culvert carries flow under South Virginia St., then the main channel passes through a detention basin and under Hwy 395 through a 12'x6' box. Overflow from the detention area drains into 2-12'x5' box culverts located approximately 200 yards north of the basin. Preliminary estimates indicate that this configuration has capacity for additional flow if the channel between the split and South Virginia St. and the box culvert under South Virginia (both are previously mentioned CIPs) are upsized.

A detention basin near the Arrowcreek development has been discussed for a number of years and is included in the WRC plan and this plan update. If constructed, this detention basin will have a significant impact on flow rates, and corresponding sizes, of the culvert under South Virginia. Additionally, depending on the flow the East Split will experience, the existing capacity under Hwy 395 may need to be increased.

Galena High Wash

Under Wedge Parkway, where Wedge Parkway crosses the Mt Rose Highway, there are 2 - 7'x3' boxes. Sixty feet upstream of these boxes is a pair of 36" CMPs. Due to the channel configuration (culverts are perpendicular to flow), the capacity of these culverts is not adequate. The channel continues east to where a single 36" CMP conveys some water north across the highway. About 100' east of this culvert, a pair of drop inlets exist. It is assumed that these were placed to catch excess flow that cannot be conveyed by the CMPs. Any flow not captured by the CMP and the DI's continues down the historical path, which leads flow to pond between the south abutment and the jersey barrier for the north-bound clover leaf on ramp of Hwy 395. During the 2005 event, this area impounded water and eventually flow spilled over the barrier and onto the on-ramp. Once the on ramp was filled, the other jersey barrier was overtopped and the flow continued down it's historical path which lead to water overtoping Hwy 395 south of the Geiger Grade interchange. The approximate runoff using

the USGS peak flow regression equation indicates that the wash will receive 200-650 cfs during a 100-year storm event. The single 36" CMP at the bottom should have capacity for 40 cfs, and the pair of 36" CMPs above Wedge Pkwy are assumed to handle 15 cfs each (the culvert's outlet location is unknown therefore obtaining slope and length are not possible) when the channel is flowing full, and the pair of drainage inlets have an assumed capacity of 10 cfs total - bringing the total capacity to approximately 80 cfs.

Lemmon Drive Wash

The wash enters a 6'x7' box culvert on the south of Hwy 395, west of Lemmon Dr. At some location along the 1,800 ft length of the culvert, the size and material change to a 72" CMP. The approximate runoff using the USGS peak flow regression equation indicates that the wash will receive approximately 350-500 cfs. The box appears to have capacity for approximately 300 cfs, and the pipe only has capacity for approximately 200 cfs. Once the runoff exceeds the capacity of the culvert system, water will pond into the street and flow north along Lemmon Valley Drive. North of Buck Drive, some flow will leave the street and flow west/north (to Swan Lake via Military Drive) the remainder continues east/north (to Swan Lake via Lemmon Valley Drive).

Stead Wash

The Stead Wash flows under North Virginia Street heading in a northerly direction to Hwy 395 and eventually towards Stead. Upstream of Hwy 395, this channel is fed by a single 24" CMP coming from the west, and a pair of 36" CMPs under North Virginia. Just before crossing Hwy 395, the combined channel is directed through a recently constructed 60" RCP beneath a mini storage road. Downstream from this culvert, is a 36" RCP under Hwy 395. The approximate runoff using the USGS regression peak flow equation indicates that the wash will receive 300-400 cfs. The culvert under Hwy 395 appears to have capacity for approximately 20 cfs.

14.4 PLANNED FACILITIES AND PROBABLE COSTS

This master plan update includes a combination of projects still awaiting construction as proposed in the WRC plan and new projects proposed specifically for this plan update. Project information for projects proposed by HDR is provided in Appendix D, which includes written description of each project as well as opinions of probable costs for each project. Each project is referenced by the CIP ID No and is labeled accordingly on each map. The "CIP ID" number indicates the sheet number (see map index on each sheet) followed by the project number. For projects that were originally proposed in a previous master plan study (i.e. the 2005 WRC draft Master Plan), the "Prev ID" column includes the reference number used in that study for the specific project. The "Last Modified By" column references the name of the party responsible that either originally added the project or most recently proposed changes to a previously listed project.

The map index on each sheet depicts a shaded indicator map position in relation to the service area boundary. The maps are oriented from north to south by service area beginning with Spring Mountain, which is the furthest north, to the South Truckee Meadows which is furthest south. Each map figure number contains the number of this section (14) appended with the map index grid cell number.

The maps include a label indicating the location of each proposed project included in this update. Table 14.1 includes a summary of general data for each project including costs. The projects are subtotaled by service area and by the municipal organization that apparently benefits the most by the group of projects. In other words a project may be physically located in Washoe County, but the majority of the benefits of that project generally apply to residents in the City, then the project is grouped in the table as a city project. Final cost allocation to each jurisdiction may differ as each project is analyzed more closely. Costs for projects originally proposed in 1990 were not reworked; an inflationary factor was applied to bring those costs to present day. The inflation amount is shown in the table.

Finally the maps also show the delineation of floodplains for the undeveloped service areas. Utilization of the floodplain information and how the floodplains were developed is explained elsewhere in this plan update and in the beginning of this section.

Table 14.1 Stormwater Project Information and Costs

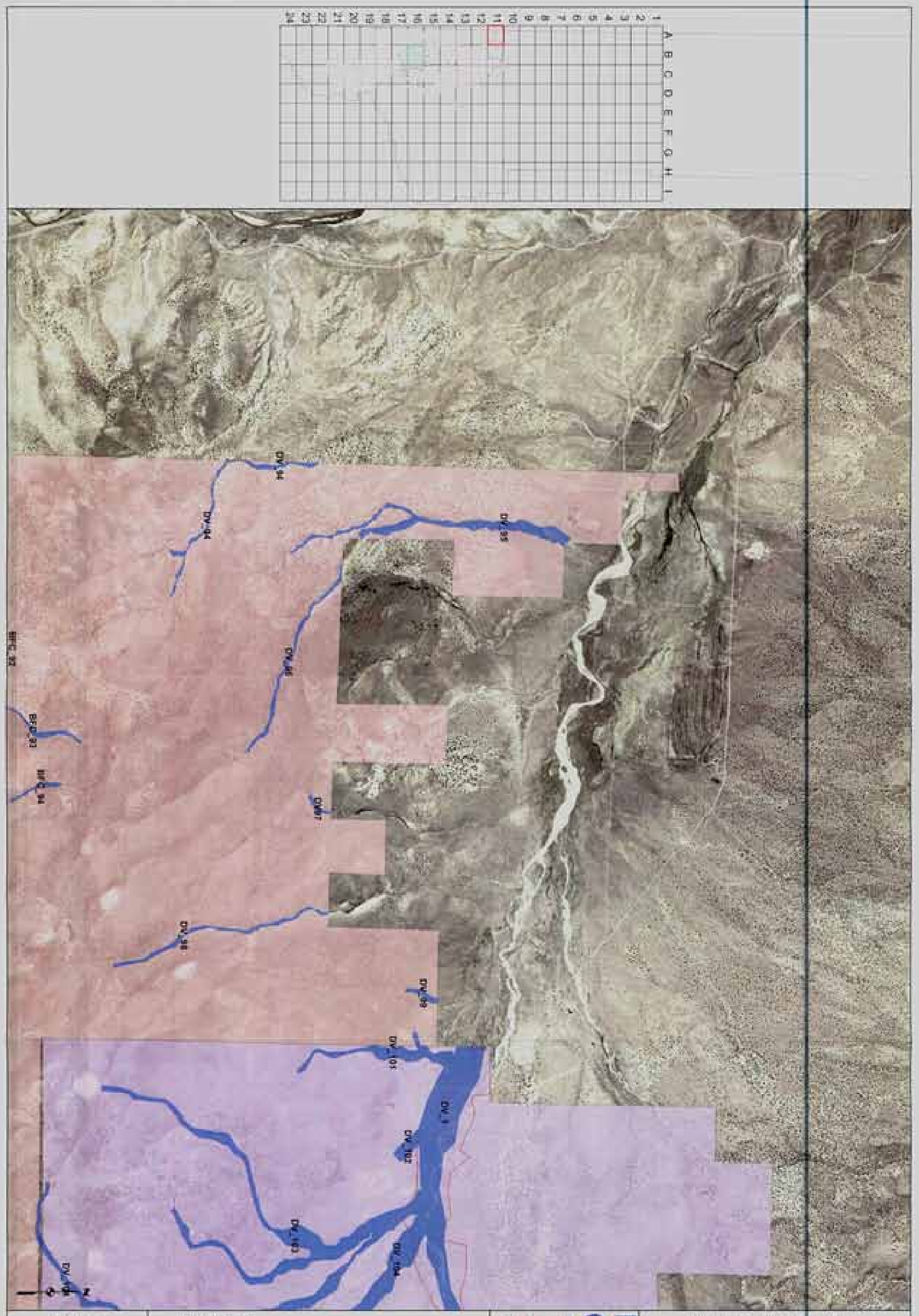
CIP ID No	Prev ID No	Watershed	Location	Type Facility	Size	1998 Costs (K)	Infl @ 52% (K)	2007 Costs (K)	Q (cfs)	Last Modified By	Date Modified	Physical Location	Observations
C20-2		Thomas Creek W split	Lake Ditch E of Dixon Ct.	Structure				250		HDR	10/2007	Reno	
C20-3		Thomas Creek E split	S Virginia St near Wilson	Culvert				2,860		HDR	10/2007	Reno	
C20-4	C6-3	Thomas Creek	Dixon Lane - South Virginia Street	Channel		900	470	1,370	500	WRC	7/2005	Reno	Not Constructed (natural channel)
C20-5	C6-4	Thomas Creek	Sierra Manor	Culvert	3'	150	80	230	500	WRC	7/2005	Reno	"Constructed circular CMP (3' verified by HDR). May need to be enlarged, size dependent on size of detention basin
C20-6		Thomas Creek E split	btwn Solit and Sierra Manor Dr					5,340		HDR	10/2007	Reno	
C20-7		Thomas Creek	E of S end of Dixon Ln	Irrigation Ditch Bypass Structure				220		HDR	10/2007	Reno	
C20-8	C6-2	Thomas Creek	South of Zolezzi Lane	Detention basin		5,600	2,940	8,590	250	WRC	7/2005	Reno	Smaller detention basin constructed for a development, located south of Ventana is not sufficient for watershed flows. This basin shown by WRC south of Zolezzi Lane
C21-1	C6-6	Whites Creek	THOMAS CK PKWY	Debris basin and spilling structure				2,860	100	HDR	10/2007	Reno	Original recommendation was for a detention basin, 2007 cost of 12,820k. Current recommendation is for a combination flow spilling structure (# C21-1a) and debris basin (# C21-1b).
C21-2		Galena Wash	Btwn Wedge Pkwy and 36inch CMP	Channel				1,570		HDR	10/2007	Reno	
C21-3		Galena Wash	Btwn Galena High and Wedge Pkwy	Channel				1,650		HDR	10/2007	Reno	
C21-4		Steamboat Creek	Tivana Dr	Culvert				3,100		HDR	10/2007	Reno	
C21-5		Steamboat Creek	Rhodes Rd	Culvert				3,100		HDR	10/2007	Reno	
D20-1	D6-4	Virginia Foothill Wash	Mira Loma Road - Steamboat Creek	Channel	70', D3'	1,460	770	2,250	700	WRC	7/2005	Reno	
D20-2	D6-3	Virginia Foothill Wash	Mira Loma Road	Culvert		130	70	200	500	WRC	7/2005	Reno	
D20-3	D6-2b		RANCHO VERDE DR.	Culvert		1,400	730	2,130		WRC	7/2005	Reno	Not Constructed
D20-4	D6-1	Virginia Foothill Wash	Debris Basin Site	Debris basin		820	430	1,250	500	WRC	7/2005	Reno	Not Constructed
			Subtotal COR - South Truckee Meadows					**$ 37,000**					
B16-7			Swan Lake/Silver Lake flooding solution	System				88,000	5,500	Quad Knopf	3/2007	Washoe County	Swan Lake to Silver Lake Culvert - added by Quad Knopf, refer to Chapter 14, Section entitled North Valleys Flood Control Hydrologic Analyses and Mitigation Options
B16-1	B2-18	Black Springs Wash	Thoit Drive - Military Road	Channel		810	430	1,240	500	HDR	10/2007	Washoe County	
B16-2	B2-17	Black Springs Wash	Thoit Drive	Culvert		130	70	200	500	HDR	10/2007	Washoe County	
B16-3	B2-16	Black Springs Wash	Wise Ave - Thoit Drive	Channel		420	220	640	500	HDR	10/2007	Washoe County	
B16-4	B2-15	Black Springs Wash	Wise Ave	Culvert		150	80	230	500	HDR	10/2007	Washoe County	
B16-5	B2-14	Black Springs Wash	Leather Lane - Wise Ave	Channel		130	70	200	500	HDR	10/2007	Washoe County	
B17-1	A2-3	Anderson Wash	US 395	Culvert	4'	1,280	670	1,950	1,700	HDR	10/2007	Reno	4' CMP Under abandoned dead-end rd, omitted by WRC, appears to be undersized
B17-2	B2-3	Paymaster Wash	US 395 - Silver Lake Road	Channel		530	280	810	700	HDR	10/2007	Washoe County	Omitted by WRC, channel appears to be undersized
B17-3	B2-4	Paymaster Wash	Silver Lake Road	Culvert	2-12'x3'	260	150	430	700	HDR	10/2007	Washoe County	Box Culverts, omitted by WRC, appears to be undersized
B17-4	B2-2	Paymaster Wash	US 395	Culvert		810	430	1,240	700	HDR	10/2007	Washoe County	36" existing, 60" culvert upstream, 36" needs to be upsized; omitted by WRC, retained by HDR
B17-5	B2-13	Black Springs Wash	Leather Lane	Culvert		170	90	260	500	WRC	7/2005	Washoe County	
B17-6	B2-12	Black Springs Wash	Casalia Drive - Leather Lane	Channel		270	150	420	500	WRC	7/2005	Washoe County	
B17-7	B2-11	Black Springs Wash	Casalia Drive	Culvert		260	140	400	500	WRC	7/2005	Washoe County	
B17-8	B2-10	Black Springs Wash	Silver Lake Road	Culvert	2'	130	70	200	500	HDR	10/2007	Washoe County	"Constructed 2 - 2' Steel pipes (36" CMP existing, project omitted by WRC, requires enlargement, retained by HDR
B17-9	B2-9	Black Springs Wash	US 395	Culvert	8'x6'	710	370	1,080	500	HDR	10/2007	Washoe County	"Constructed box culvert under US 395; omitted by WRC, appears to be undersized
B17-10	B2-8	Black Springs Wash	Old 395	Culvert	4'	160	90	250	500	HDR	10/2007	Washoe County	"Constructed 4' Cmc. Steel pipe (36" CMP existing, project omitted by WRC, requires enlargement, retained by HDR
			Subtotal COR - Stead/Lemmon Valley					**$ 97,550**					
B17-11	B2-22	Lemmon Valley Wash	US 395	Culvert		770	410	1,180	1,300	WRC	7/2005	Washoe County	"Constructed under the Lemon Dr. Underpass; Modified by HDR
B18-1		Brock N Wash	BLOCK N WASH DAM SITE	Detention Basin				7,940		HDR	10/2007	Washoe County	New Location
B19-1			Aspen Glen Dr. and White Fir St or Ambrose Pk	Structure				260		HDR	10/2007	Reno	Intake restriction Structure or excess flow discharge
B19-2	B4-5	Alum Creek	500' U/S McCarran - Mayberry Drive	Channel	T50', B25', D5	910	480	1,390	1,300	HDR	10/2007	Reno	Ditch or natural channel
B19-3		Alum Creek	Last Chance Ditch W of W Mc Carran	Ditch modification	N/A			360		HDR	10/2007	Washoe County	
B19-4		Rosewood Wash	Last Chance Ditch btwn Barnes and Bellford	Structure				170		HDR	10/2007	Washoe County	
B19-5		Rosewood Wash	Corey Dr and Reinna Cir.	Discharge Structure				90		HDR	10/2007	Washoe County	
B19-6	B5-2	Evans Creek	EVANS CREEK DAM SITE	Detention basin		2,940	3,090	9,030	150	WRC	7/2005	Reno	Weir footing, approx. 1.5' drop
C18-1		Dandini Wash	E of Valley Rd, N of Manogue	Structure				170		HDR	10/2007	Washoe County	
C19-1		Rosewood Wash	Lakeside Dr	Culvert	3-10'x3'			164		HDR	10/2007	Washoe County	
C19-2		Rosewood Wash	Hillcrest Dr to Lakeside Dr	Channel				2,240		HDR	10/2007	Washoe County	
C19-3		Rosewood Wash	Hillcrest Dr	Culvert	3-15'x8'			290		HDR	10/2007	Washoe County	
C19-4		Rosewood Wash	Plumb Ln to Hillcrest Dr	Channel				3,490		HDR	10/2007	Washoe County	
C19-5		Rosewood Wash	Plumb and Watt	Culvert	2-12'x8'			640		HDR	10/2007	Washoe County	
C19-6		Rosewood Wash	Plumas to Watt St	Channel				3,910		HDR	10/2007	Washoe County	
C19-7		Rosewood Wash	Plumas	Culvert	2-12'x8'			610		HDR	10/2007	Washoe County	
C19-8		Rosewood Wash	Plumb to Plumas	Channel				2,030		HDR	10/2007	Washoe County	
C19-9		Rosewood Wash	Plumb Ln	Culvert	2-10'x8'			830		HDR	10/2007	Washoe County	
C19-10	C4-2	Rosewood Wash	Arlington Avenue	Culvert		110	60	170	400	WRC	7/2005	Washoe County	Not constructed

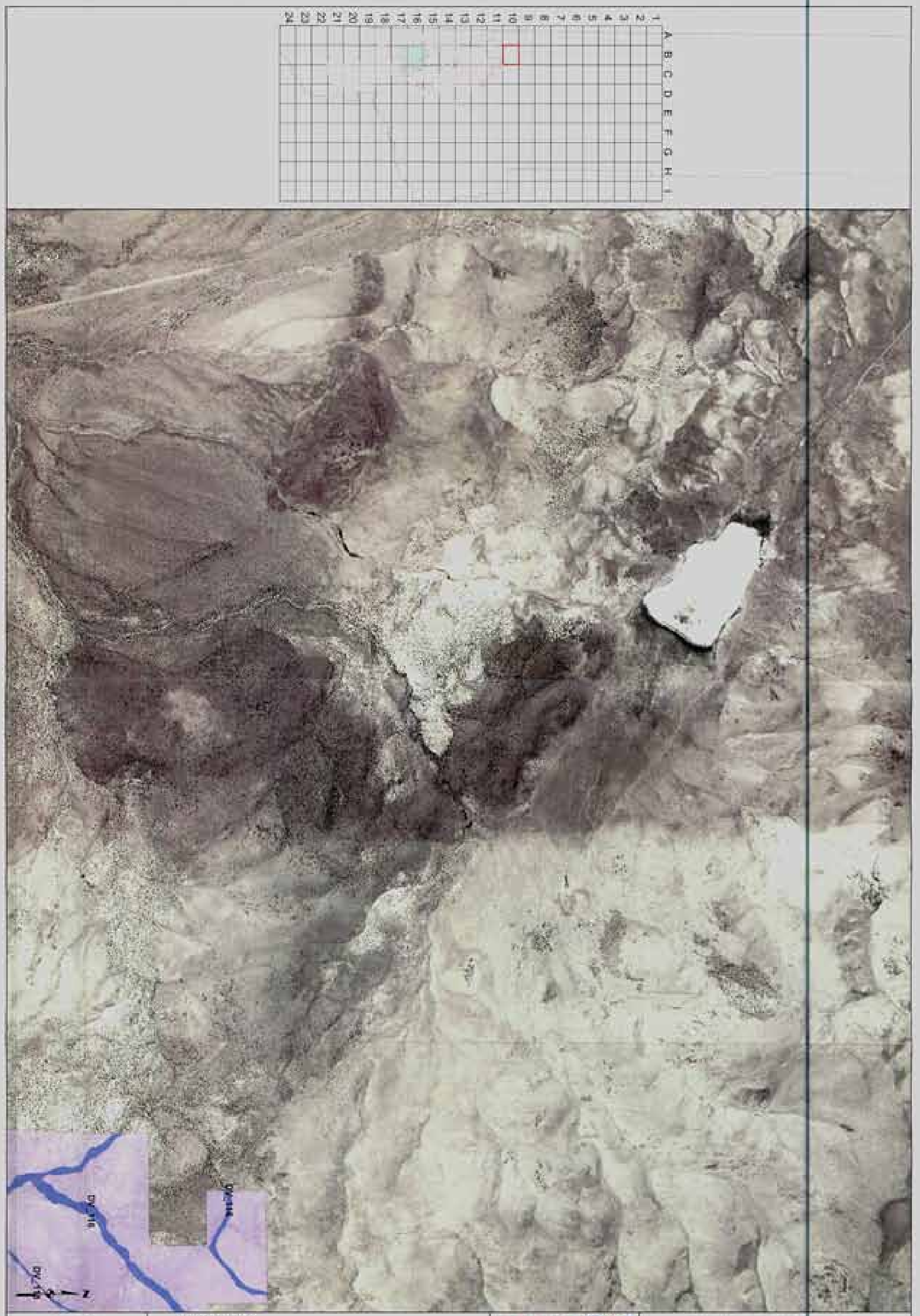
Table 14.1 Stormwater Project Information and Costs

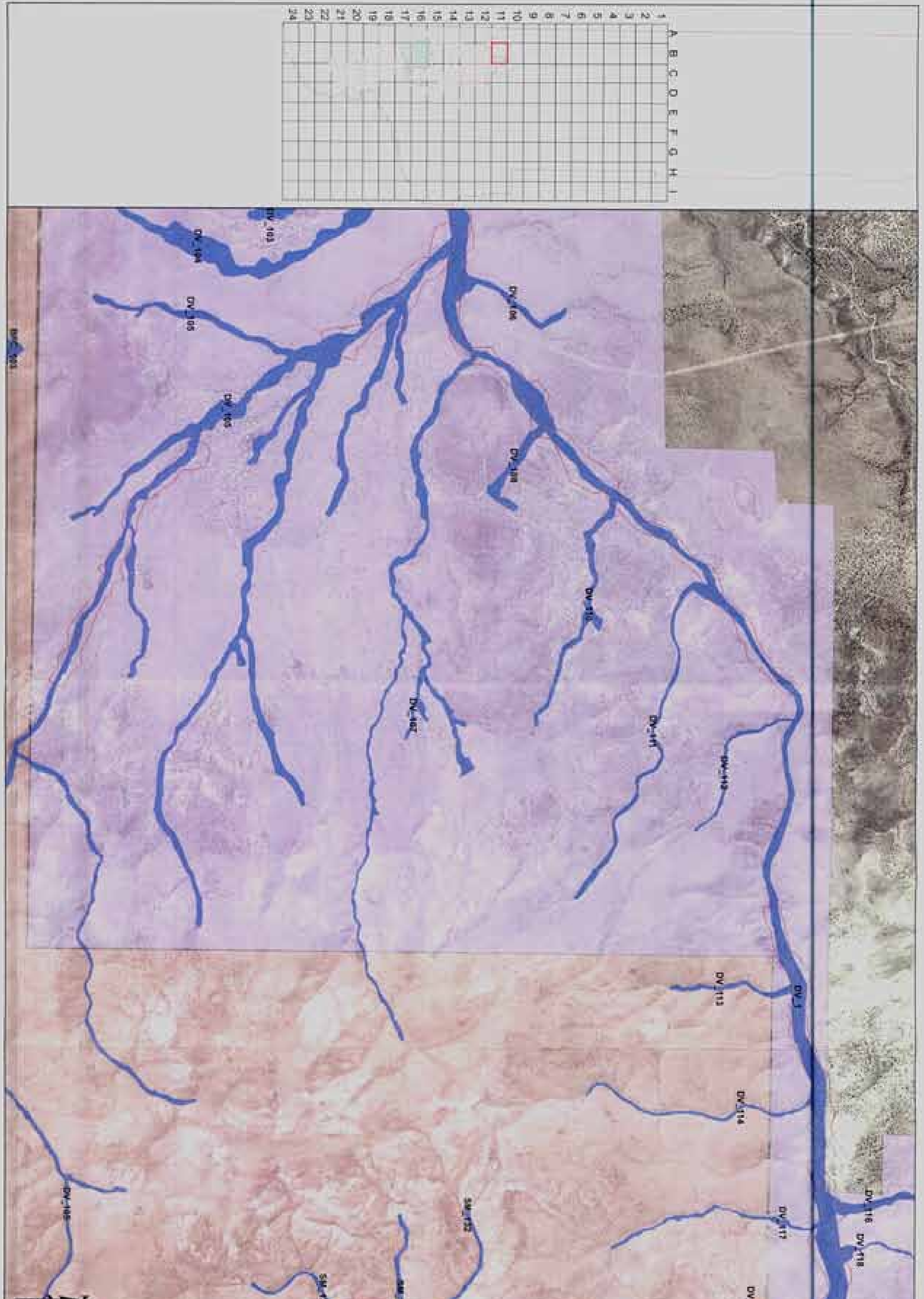
CIP ID No	Prev ID No	Watershed	Location	Type Facility	Size	1990 Costs (K)	Infl @ 52% (K)	2007 Costs (K)	Q (cfs)	Last Modified By	Date Modified	Physical Location	Observations
C19-11	B4-6	Rosewood Wash	1002' U/S Arlington - Arlington Avenue	Channel		400	210	610	400	HDR	10/2007	Washoe County	Verified as constructed by WRC. The ditch or natural channel appears to be undersized
C19-12		Dant Wash	Eastshore Dr	Culvert	3-10'x4'			390		HDR	10/2007	Washoe County	
C19-13		Dant Wash	Brinkby Ave. to Eastshore Dr.	Channel				2,890		HDR	10/2007	Washoe County	
C19-14		Dant Wash	Glenda Wy. Lakeside Dr. Brinkby Ave	Culvert	2-7'x4'			4,990		HDR	10/2007	Washoe County	
C19-15	C5-10		MOANA PRIVATE DRIVEWAY	Culvert	8'x3' box	20	20	40		WRC	1/2005	Washoe County	*Constructed 3' CMP just u/s of Moana Ln xing; Modified by HDR
C19-16		Dant Wash	Pheasant Ln to Moana Ln	Channel				21,230		HDR	10/2007	Washoe County	
C19-17		Dant Wash	Lake Ditch S of Moana Ln	Structure				170		HDR	10/2007	Washoe County	
C19-18	B5-1	Dant Wash	Pheasant Lane	Culvert	6'x3'	130	70	200	350	HDR	10/2007	Washoe County	1 Box Culvert
C19-19		Dant Wash	Dant Blvd to Pheasant Ln	Channel				2,990		HDR	10/2007	Washoe County	
C19-20		Dant Wash	Last chance Ditch E of DANT BLVD	Structure				170		HDR	10/2007	Washoe County	
C19-21		Manzanita Park Wash	Manzanita Park	Detention Basin				1,900		HDR	10/2007	Washoe County	Enlarge Current Basin
C19-22		Boynton Slough	E McCarran	Culvert	7-12'x10'			2,260		HDR	10/2007	Washoe County	
C19-23		Boynton Slough	Longley Ln	Culvert	7-12'x10'			3,320		HDR	10/2007	Washoe County	
C19-24		Boynton Slough	Airport Runway 34R	Culvert	5-12'x10'			2,190		HDR	10/2007	Washoe County	
C19-25		Boynton Slough	Peckham Ln	Culvert	4-12'x10'			900		HDR	10/2007	Washoe County	
C19-26		Evans Creek	Delucchi Ln	Modify head gates				190		HDR	10/2007	Washoe County	
C19-27		Evans Creek	S Virginia to Delucchi	Channel				1,250		HDR	10/2007	Washoe County	Also remove Cochran ditch crossing
C19-28		Evans Creek	Green Ranch Circle and Lakeside Dr	Structure				210		HDR	10/2007	Washoe County	
C20-1	C5-11	Dry Creek	DRY CREEK DAM SITE	Channel		6,510	3,420	9,990	350	WRC	7/2005	Washoe County	Not constructed
				Subtotal COR - Truckee Meadows				**$ 89,684**					
				TOTAL CITY OF RENO				**$ 224,234**					
A15-1			Village Parkway @ Mud Springs Dr	Culvert				$ 1,680	2,000	HDR	10/2007	Washoe County	
A16-1			NINE MILE CT	Debris basin				8,800		HDR	10/2007	Washoe County	No estimate is provided for this project
A16-3			Cold Springs Drive	Channel				260		HDR	10/2007	Washoe County	
A16-4			Little Valley Drive	Culvert				220		HDR	10/2007	Washoe County	
A16-5			Cold Springs Drive	Culvert				220		HDR	10/2007	Washoe County	
A16-6			Cold Springs Drive To Village Parkway	Channel				2,940		HDR	10/2007	Washoe County	
A16-7			Village Parkway	Culvert				790	1,000	HDR	10/2007	Washoe County	
				Subtotal WC - Cold Springs				**$ 14,910**					
C20-18	C6-9	Whites Creek	Zolezzi Lane	Culvert	6'x4' - verified by HDR	240	130	334	400	WRC	7/2005	Washoe County	*Constructed concrete box culvert. Additional capacity needed; ditch termination need improvement - HDR
C21-6	C6-14	Bailey Creek	Toll Road - Steamboat Creek	Channel		680	460	1,332	1,000	WRC	7/2005	Washoe County	*Not Constructed (natural Channel)
C21-7	C6-13	Bailey Creek	Toll Road	Culvert	12'x4	240	130	370	1,000	HDR	10/2007	Washoe County	*Constructed concrete box culvert, verified by WRC, appears to be undersized
C21-8	BF-4		JONES CR @ MT MEADOW LN	Culvert	Existing 3' RCP	350	190	515	573	WRC	7/2005	Washoe County	Recommended 2 12'x4' RCBs - modified by HDR
C21-9	C7-1	Jones Creek	Callahan Ranch Road	Culvert	Ex 3' RCP and 5'x3' CMAP	410	220	630	575	WRC	7/2005	Washoe County	Recommended 2 12'x4' RCBs - by HDR
C21-10	C7-3	Galena Creek	GALENA CK GALENA NARROWS	Detention basin		4,970	2,360	6,793	100	WRC	7/2005	Washoe County	Not Constructed
D21-1	C6-12	Bailey Creek	Kivett Lane - Toll Road	Channel	T25; B11'; D4'	3,100	1,620	4,720	1,000	WRC	7/2005	Washoe County	*Constructed trapz. Channel
D21-2	D7-13	Geiger Fork Bailey Creek	Kivett Lane - Bailey Creek	Channel		280	150	407	200	WRC	7/2005	Washoe County	<NUll>
D21-3	D7-12	Geiger Fork Bailey Creek	Kivett Lane	Culvert	18"	100	60	136	200	WRC	7/2005	Washoe County	*Constructed parallel CMP's
D21-4	D7-11	Geiger Fork Bailey Creek	Prison Drive - Kivett Lane	Channel		180	100	268	200	WRC	7/2005	Washoe County	Not Constructed
D21-5	D7-10	Geiger Fork Bailey Creek	Prison Drive	Culvert		100	60	136	200	WRC	7/2005	Washoe County	*Not Constructed
D21-6	D7-9	Geiger Fork Bailey Creek	SR 341 - Prison Drive	Channel		710	370	1,058	200	WRC	7/2005	Washoe County	Not Constructed
D21-7	D7-8	Geiger Fork Bailey Creek	SR 341	Culvert	4'x4'	100	60	160	200	WRC	7/2005	Washoe County	*Constructed concrete box culvert
D21-9	Yld Dflw label	Geiger Fork Bailey Creek	Prison Dr	Bridge/Culvert	T29'; B29'; D4 to 5.5'	100	60	160	200	WRC	7/2005	Washoe County	Bridge/culvert proposed by WRC, but no cost given; HDR used a similar project for costs
D21-10	D7-7	Bailey Creek	Temple Hill Road - Kivett Lane	Channel	T25; B10'; D5'	670	350	1,020	350	HDR	10/2007	Washoe County	*Constructed trapz. Natural channel, verified by WRC, appears to be undersized
D21-11	D7-4	Bailey Creek	Toll Road - Temple Hill Road	Channel	T25; B10'; D4'	620	330	950	200	HDR	10/2007	Washoe County	*Constructed native trapz. Channel, verified by WRC, appears to be undersized.
D21-12	D7-6	Bailey Creek	Temple Hill Road	Culvert	10'	40	30	70	200	HDR	10/2007	Washoe County	*Constructed circular CMP, verified by WRC, appears to be undersized.
D21-13	D7-5	Bailey Creek	Private Driveway	Culvert	8'	40	30	70	100	HDR	10/2007	Washoe County	*Constructed circular CMP, verified by WRC, appears to be undersized.
D21-14	D7-3	Bailey Creek	Toll Road	Culvert	8'x4.5'	40	30	70	100	HDR	10/2007	Washoe County	*Constructed 2 concrete box culverts, verified by WRC, appears to be undersized.
D21-15	D7-2	Bailey Creek	Dam Site - Toll Road	Channel	T25; B10'; D5'	310	270	780	100	HDR	10/2007	Washoe County	*Constructed trapz natural channel, verified by WRC, appears to be undersized.
D21-16	D7-1	Bailey Creek	Dam Site	Detention basin		9,700	5,080	14,938	100	WRC	7/2005	Washoe County	Not Constructed - natural channel
				Subtotal WC - South Truckee Meadows				**$ 34,479**					

Table 14.1 Stormwater Project Information and Costs

CIP ID No	Prev ID No	Watershed	Location	Type Facility	Size	1990 Costs (K)	Infl @ 52% (K)	2007 Costs (K)	Q (cfs)	Last Modified By	Date Modified	Physical Location	Observations
D16-1			KINGLET DR	Detention basin				1,010		HDR	10/2007	Washoe County	DETENTION BASIN ENLARGEMENT, ARMORING AND CHANNEL MODIFICATION; MODIFICATIONS RECOMMENDED BY HDR
D16-2			NIGHTINGALE WAY	Detention basin				1,200		HDR	10/2007	Washoe County	DETENTION BASIN ENLARGEMENT, ARMORING AND CHANNEL MODIFICATION; MODIFICATIONS RECOMMENDED BY HDR
D16-3			SPANISH SPRINGS HIGH SCHOOL	Detention basin				1,110		HDR	10/2007	Washoe County	DIVERSION BERM AND DETENTION BASIN ENLARGEMENT, ARMORING AND CHANNEL MODIFICATION; MODIFICATIONS RECOMMENDED BY HDR
D16-4			SPANISH SPRINGS VILLAGE	Culvert				2,980	250	HDR	10/2007	Washoe County	CULVERTS (9) AND CHANNEL ANALYSIS AND MODIFICATIONS - RECOMMENDED BY HDR
			Subtotal WC - Spanish Springs					**$ 6,900**					
B15-1			ANTELOPE VALLEY WASH	Debris basin				8,720		HDR	10/2007	Washoe County	
B16-6	B1-27	Chokpdee Wash	Lemmon Drive	Culvert		770	410	1,180	2,400	HDR	10/2007	Washoe County	Not Constructed; WRC plan shows final costs of 370K, this appears to be a typo as the full 1990 costs were inflated to present day
C16-1	B2-42	Arkansas St Wash	Lemmon Drive	Culvert		300	160	434	1,000	WRC	7/2005	Washoe County	Not constructed
			Subtotal WC - Stead/Lemmon Valley					**$ 10,334**					
C17-1		Sun Valley Wash	Middle Fork Dr	Culvert	2.5' CMP			240	100			Washoe County	(recommended 1 - 7' x 3' RCB - HDR)
C17-2		Sun Valley Wash	Amargosa Dr	Culvert	2.5' CMP			240	100			Washoe County	(recommended 1 - 7' x 3' RCB - HDR)
C17-3			Sun Valley Dr	Channel	4' bottom, 3:1 slope, 7' deep			240	150			Washoe County	Gas pipe being seen
C17-4		Sun Valley Wash	Sun Valley Dr	Culvert	2.5' CMP			280	100			Washoe County	(recommended 1 - 7' x 3' RCB - HDR)
C17-5		Sun Valley Wash	Smoky Canyon Dr	Culvert	2.5' CMP			240	100			Washoe County	(recommended 1 - 7' x 3' RCB - HDR)
C17-7	C3-1	Sun Valley Wash	Amagosa Drive - Sun Valley Gravel Pit	Channel System	3' deep, 3:1 side slope, 4' bottom width	1,900	990	2,890	100	HDR	10/2007	Washoe County	
C17-10		Sun Valley Wash	9th Ave	Culvert	2.5' CMP			240	100			Washoe County	(recommended 1 - 7' x 3' RCB - HDR)
C17-15		Sun Valley Wash	8th and W of Leon	Culvert	2.5' CMP			370	100			Washoe County	Recommended 2-4'x 3' RCB by HDR
C17-16			8 th St and Leon	Channel	see notes			400	150			Washoe County	Channel size: 3' deep, 3:1 side slope, 4' bottom natural vegetated channel
C17-31	C3-2	Sun Valley Wash	Pit Ln and Side Hill Dr (Not 6th Ave)		1.5' RCP	800	430	1,250	180	HDR	10/2007	Washoe County	Recommended 3- 4' x 2' RCB by HDR
C17-68	C3-4	Sun Valley Wash	Leon Street - First Avenue	Channel System		900	450	1,310	1,300	WRC	7/2005	Washoe County	Existing natural channel is undersized
C17-72	C3-5	Sun Valley Wash	First Avenue	Culvert	2.5' CMP existing size	290	160	450	1,200	WRC	7/2005	Washoe County	3 12x4 RCBs - recommended by HDR
C17-74	C3-7	Sun Valley Wash	Franes Lane	Culvert	Existing size 2 3x5' CMAP	310	170	480	850	HDR	10/2007	Washoe County	Recommended 3-12' x 4' RCB's by HDR; Flow by HDR
C17-78	C3-9	Sun Valley Wash	Rampon Avenue	Culvert	3 (2-5.5' CMP, 5K)	530	280	810	1,000	WRC	7/2005	Washoe County	2 - circular steel pipes (recommend 2 12x6 RCBs - HDR); Flow modified by HDR
C17-80	C3-8	Sun Valley Wash	Franes Lane - Rampon Avenue	Channel		510	270	780	1,200	HDR	10/2007	Washoe County	Verified as constructed by WRC; Naturally vegetated channel appears to be undersized
			Subtotal WC - Sun Valley					**$ 10,220**					
A18-1	A4-1	Dog Valley Creek	900' U/S Bridge Street - Bridge Street	Channel	T50', B30', D5'	730	380	1,110	6,200	HDR	10/2007	Washoe County	*Constructed Trapz natural channel widened veg; omitted by WRC, appears to be undersized
A18-2	A4-2	Dog Valley Creek	Bridge Street	Bridge	Span 30'	400	210	610	6,200	HDR	10/2007	Washoe County	*Constructed One lane wide bridge; omitted by WRC; appears to be undersized
A18-3	A4-3	Dog Valley Creek	Bridge Street - Truckee River	Channel		370	200	570	6,200	HDR	10/2007	Washoe County	*Constructed Trapz. Channel, wide shallow natural channel, omitted by WRC, appears to be undersized
A18-4	A4-5	North Flat Wash	Old Hwy 40 - Truckee River	Channel	T20', B10', D10'	310	170	480	900	HDR	10/2007	Washoe County	*Constructed Trapz. Natural channel, observed by WRC, omitted to be undersized
C20-9	C5-7b		LAKESIDE DR	Culvert	7'x6'			200		WRC	7/2005	Washoe County	*Constructed 12'x7' concrete box culvert - cost modified by HDR
C20-10		Dry Creek	Panorama Drive	Culvert	Existing - 2 7'x' CMPs			880	2,000	HDR	10/2007	Washoe County	Recommended 4 12'x8' RCBs - by HDR
C20-11	C5-7	Dry Creek	Frost Lane	Culvert	2.5'	180	100	258	350	WRC	7/2005	Washoe County	*Constructed: 2 - 5' CMP - Modified by HDR
C20-12		Dry Creek	Derringer Drive	Culvert	Existing - 2 10'x9' RCB			890	1,670	HDR	10/2007	Washoe County	Recommended - 4 12'x8' RCBs - by HDR
C20-13	C5-8	Dry Creek	Lakeside Drive	Culvert	12'x9'	360	190	529	1,000	WRC	7/2005	Washoe County	Reinforced Concrete Box - 750 CFS - modified by HDR
C20-14		Dry Creek	Timothy Drive	Culvert	Existing - 2 7'x6' RCBs			570	1,280	HDR	10/2007	Washoe County	3 10'x8' RCBs - Recommended by HDR
C20-15	C6-1	Dry Creek	Holcomb Lane	Culvert	6'x5	310	170	480	1,100	WRC	7/2005	Washoe County	*Constructed concrete Box culvert - verified by HDR
C20-16								400		HDR	10/2007	Washoe County	
D19-1	D5-1	North Holden Valley Wash	Dam Site	Detention basin		3,060	1,600	4,558	50	WRC	7/2005	Washoe County	Debris basins already constructed - may be undersized - Modified by HDR
D19-2	D5-2	South Holden Valley Wash	Dam Site	Detention basin		1,100	580	1,627	50	WRC	7/2005	Washoe County	Detention basin exists near park entrance - likely undersized - modified by HDR
			Subtotal WC - Truckee Meadows					**$ 13,060**					
			TOTAL WASHOE COUNTY					**$ 89,903**					
			GRAND TOTAL (City of Reno & Washoe County)					**$ 314,137**					


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
A B C D E F G H I
DV-34
DV-33
DV-32
DV-31
DV-30
DV-29
DV-28
DV-27
DV-26
DV-25
DV-24
DV-23
DV-22
DV-21
DV-20
DV-19
DV-18
DV-17
DV-16
DV-15
DV-14
DV-13
DV-12
DV-11
DV-10
DV-9
DV-8
DV-7
DV-6
DV-5
DV-4
DV-3
DV-2
DV-1
MAP SYMBOLS
TMSA/FSA BOUNDARIES
HDR
ECO:LOGIC
SPRING MOUNTAIN TMSA - FIGURE 14-A11


A B C D E F G H I
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
MAP SYMBOLS
TMSA/FSA BOUNDARIES
HDR
ECO:LOGIC
SPRING MOUNTAIN TMSA - FIGURE 14-1(1)

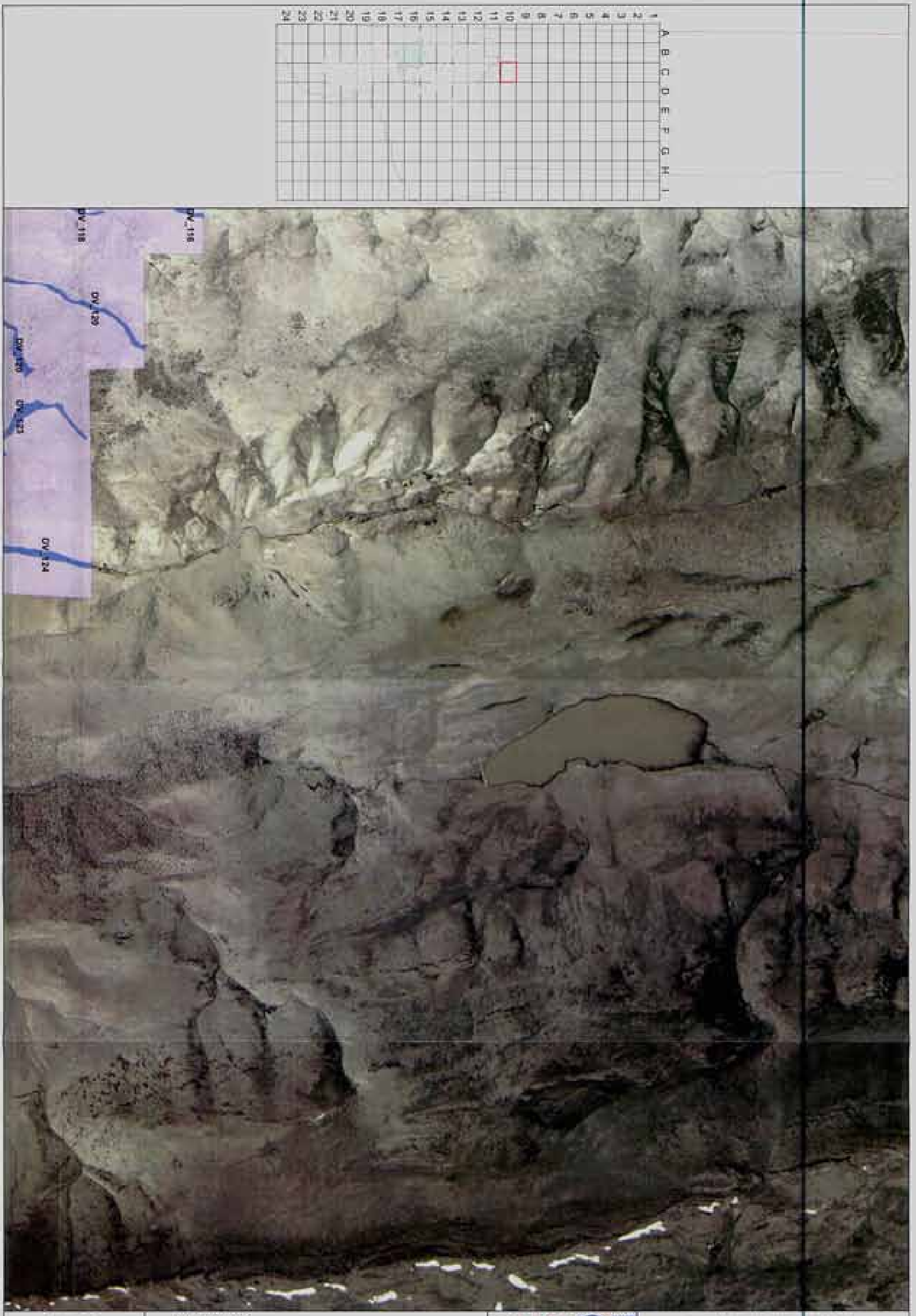


MAP SYMBOLS

TMSA/FSA BOUNDARIES

ECO:LOGIC

SPRING MOUNTAIN TMSA - FIGURE 14-B11



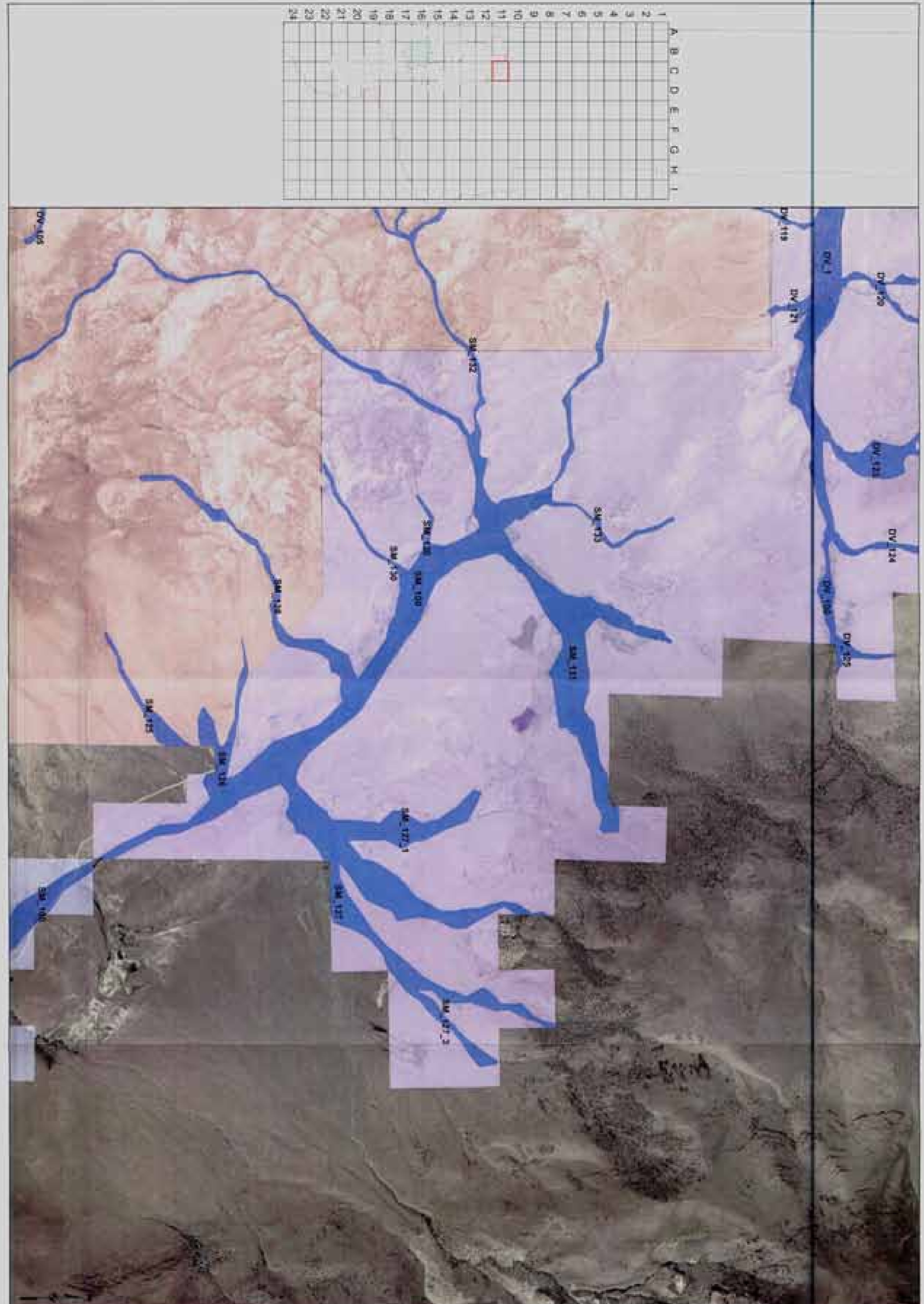
MAP SYMBOLS

TMSA/FRA BOUNDARIES

HDR

ECO LOGIC

SPRING MOUNTAIN TMSA - FIGURE 14-C10

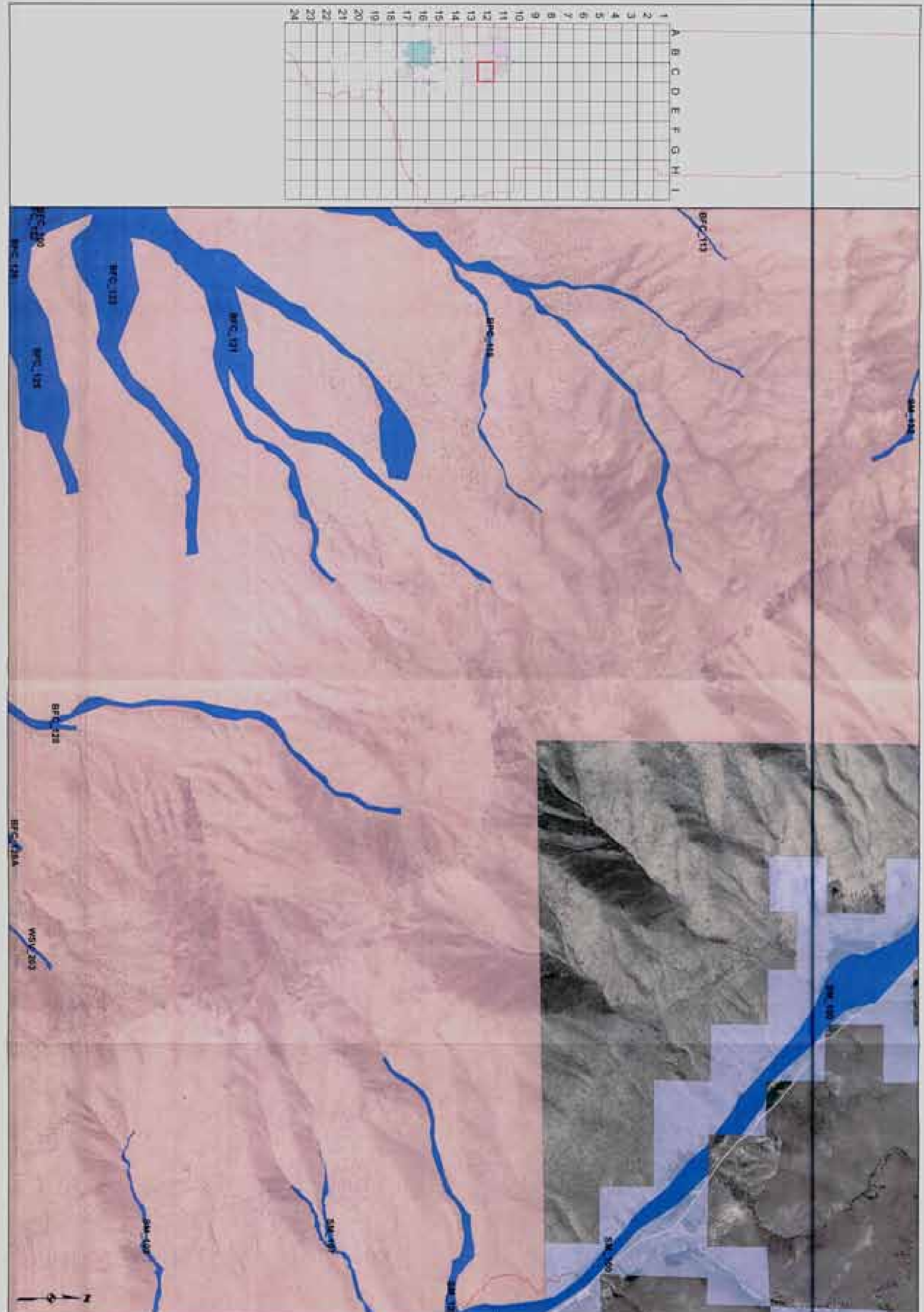


MAP SYMBOLS

TMSA/FSA BOUNDARIES

ECO LOGIC

SPRING MOUNTAIN TMSA / FIGURE 14 C11

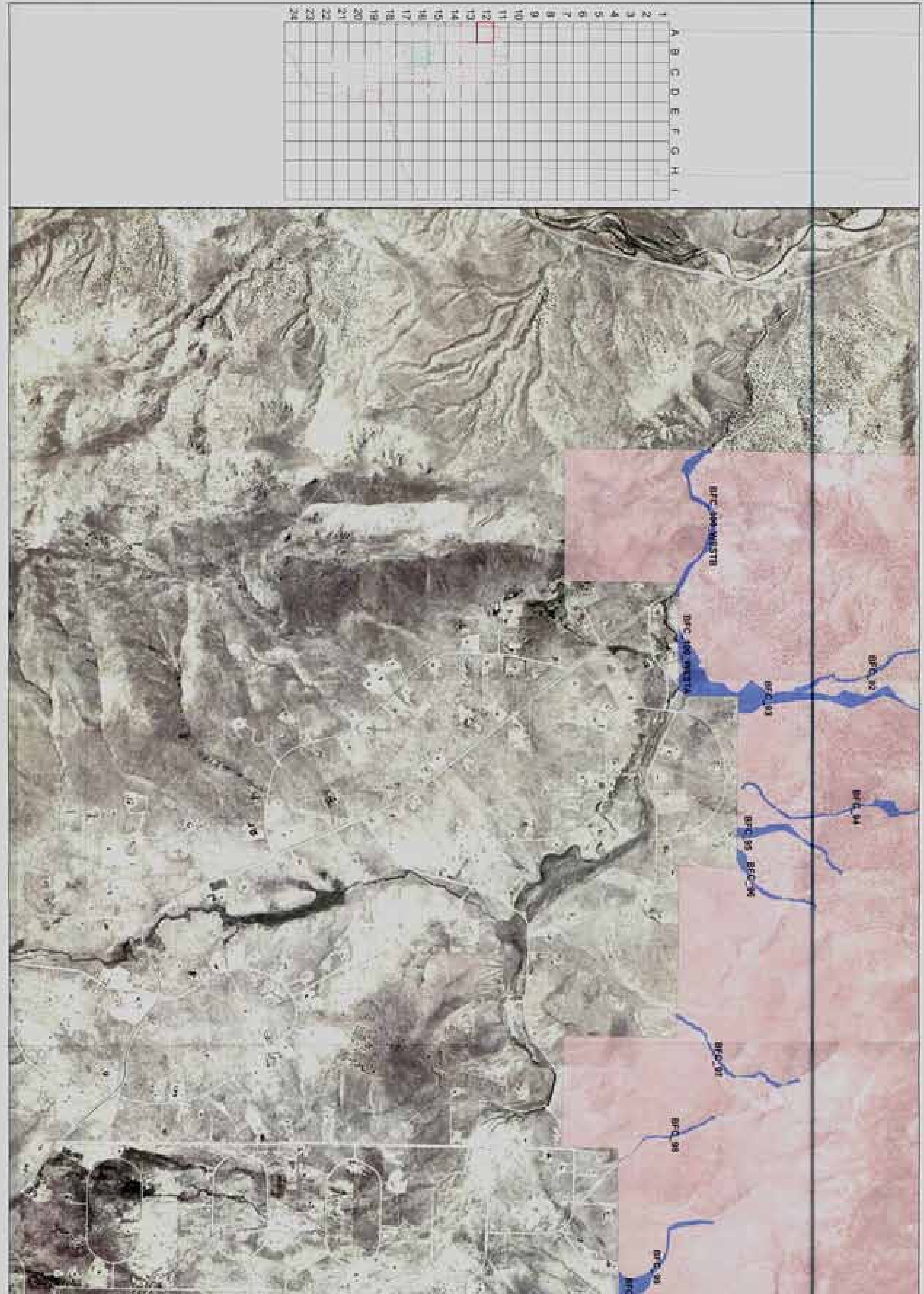


MAP SYMBOLS

TMSA/FSA BOUNDARIES

ECO LOGIC

SAGE TMSA - FIGURE 14-C12



MAP SYMBOLS

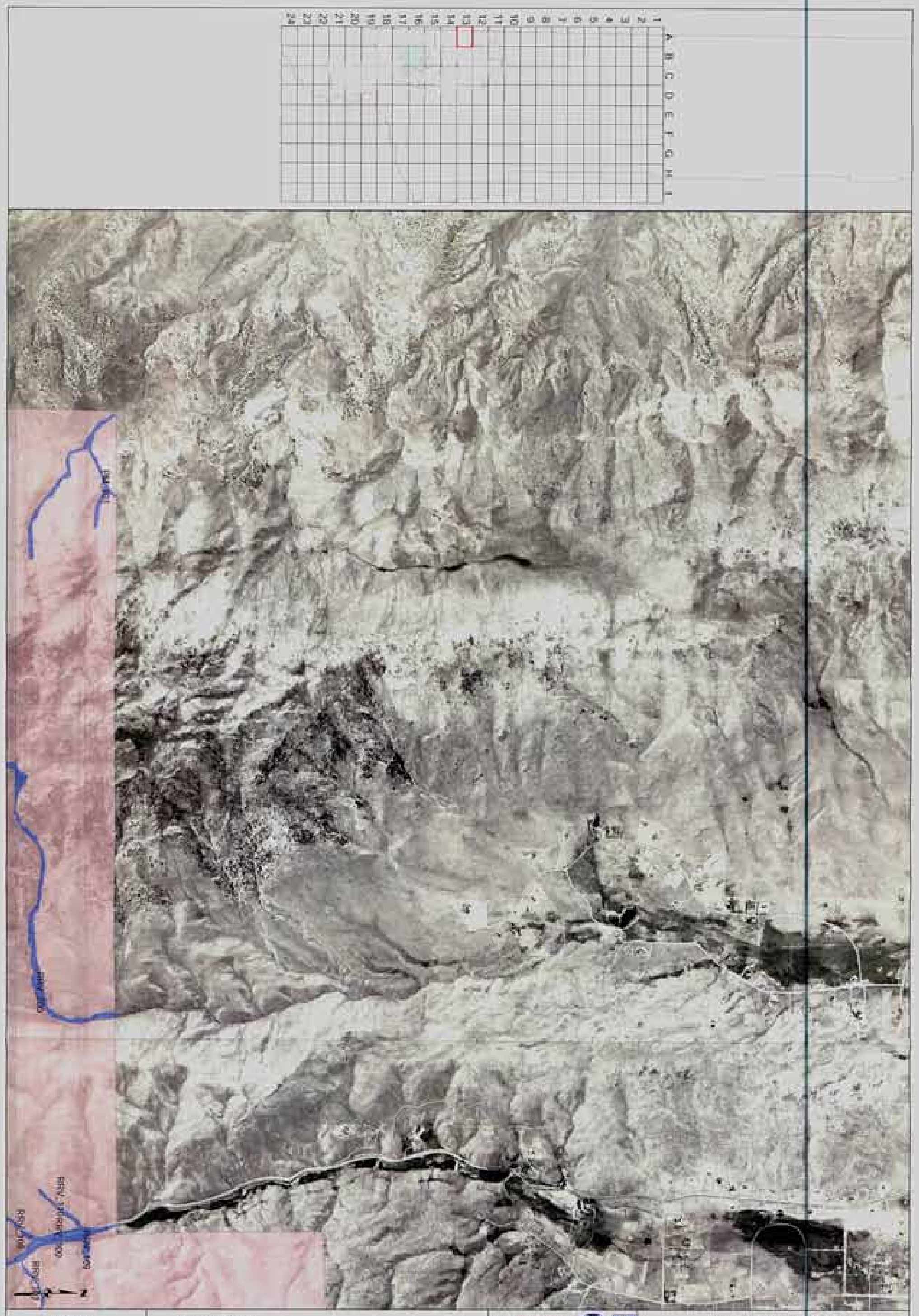
TMSA/FSA BOUNDARIES

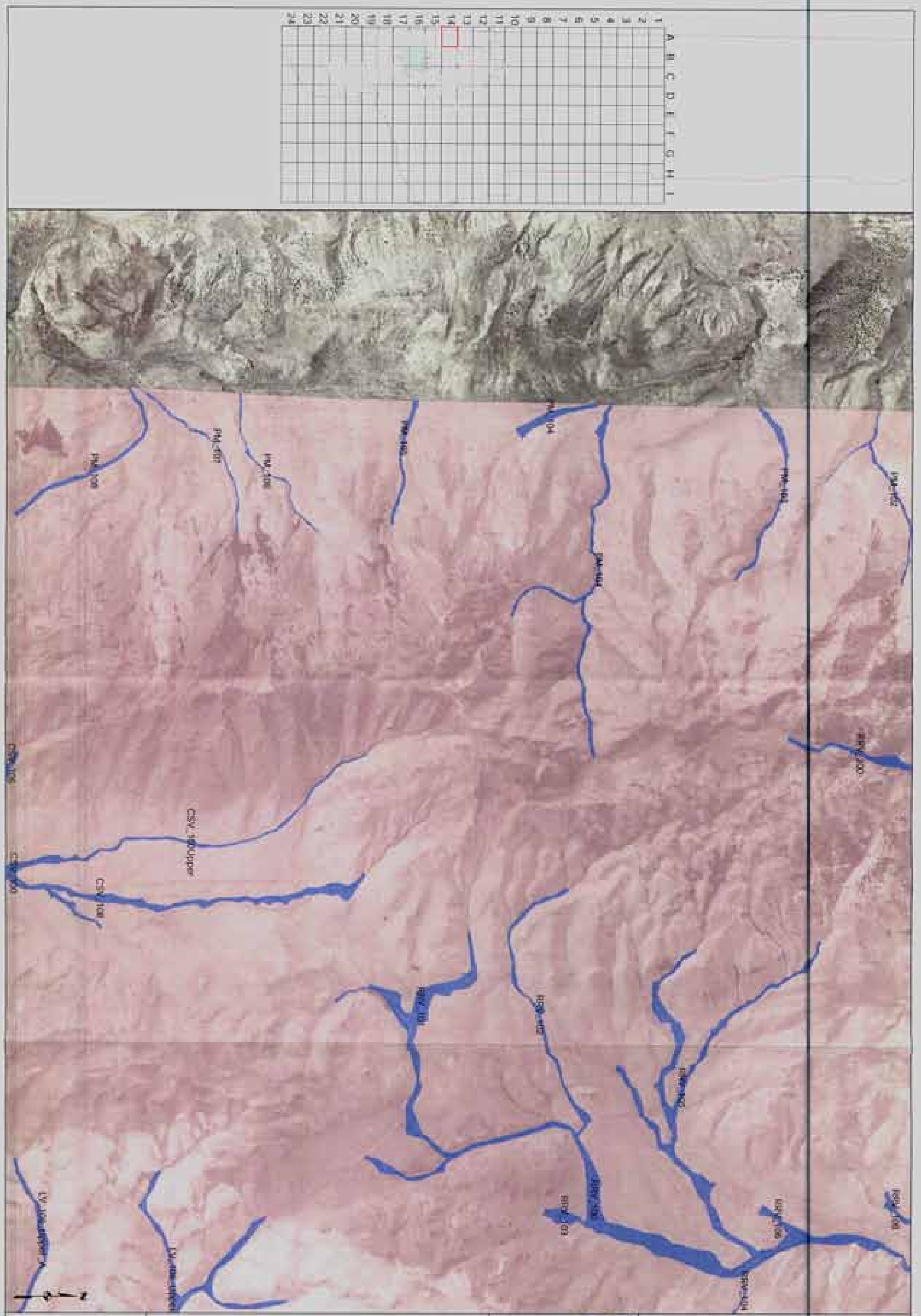
HDR

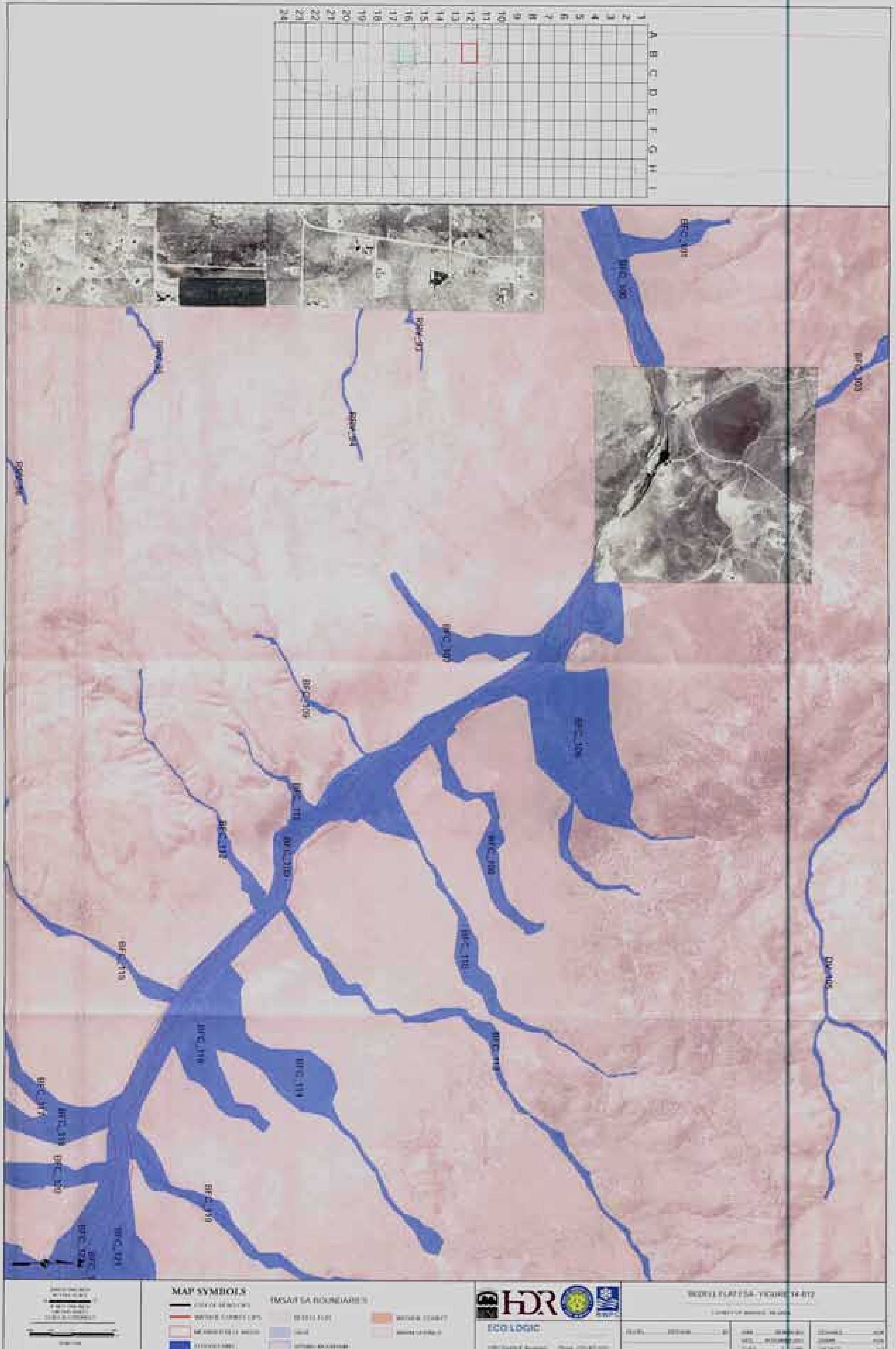
ECO:LOGIC

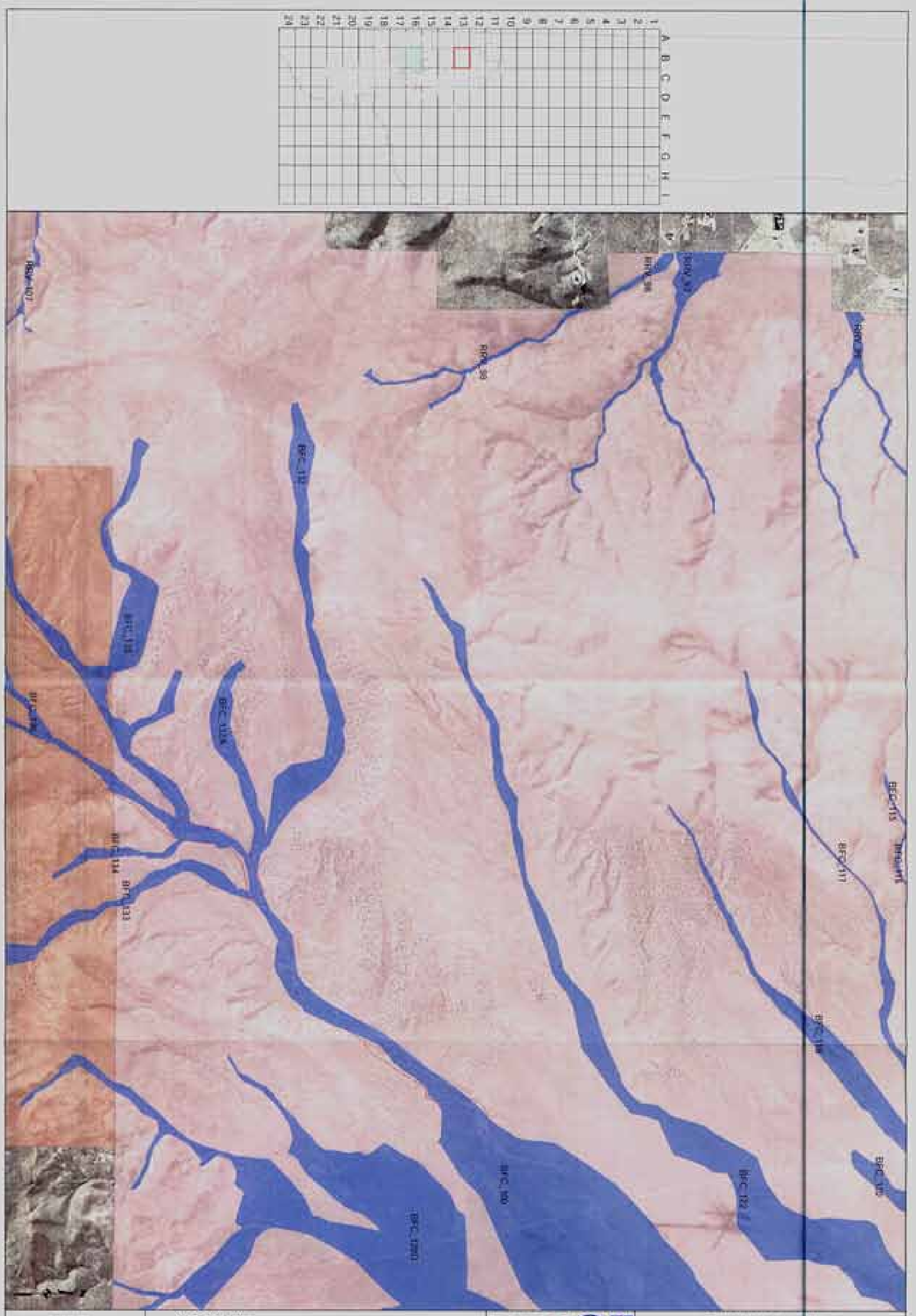
BEDELL FLAT FSA - FIGURE 14-A12

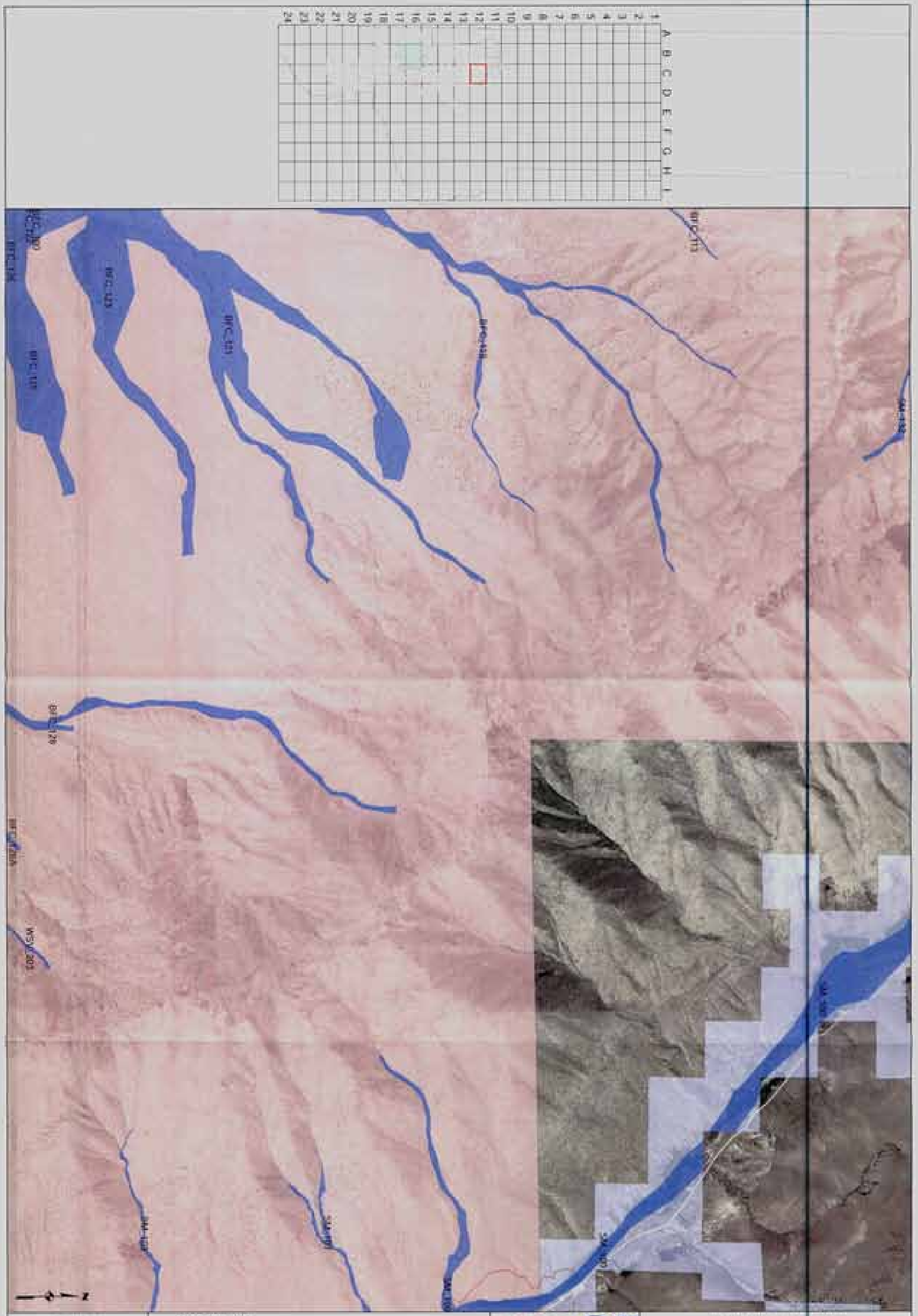
COUNTY OF WASHOE, NEVADA

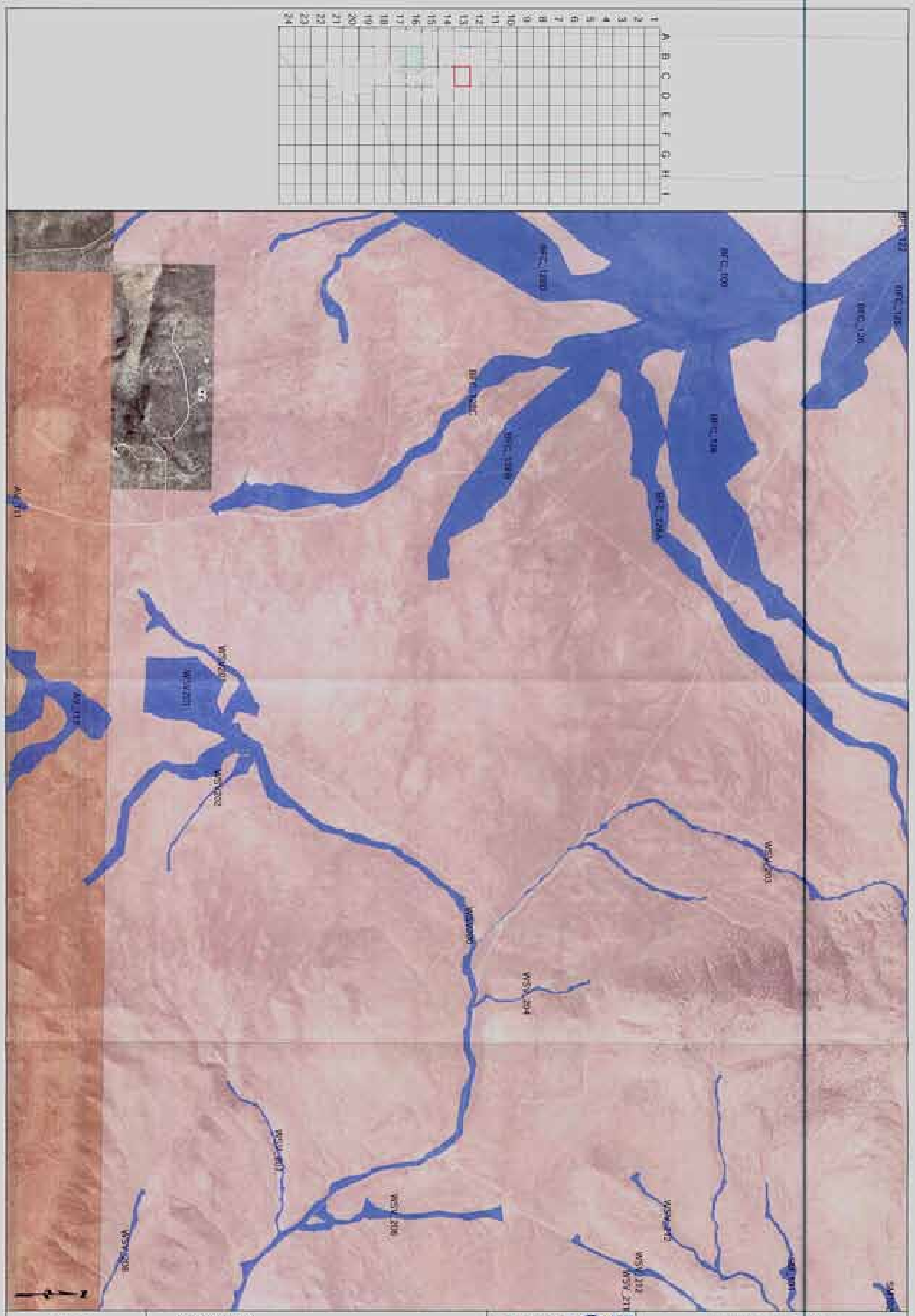

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
A B C D E F G H I
MAP SYMBOLS
IMPAIRMENT BOUNDARIES
HDR
ECOLOGIC

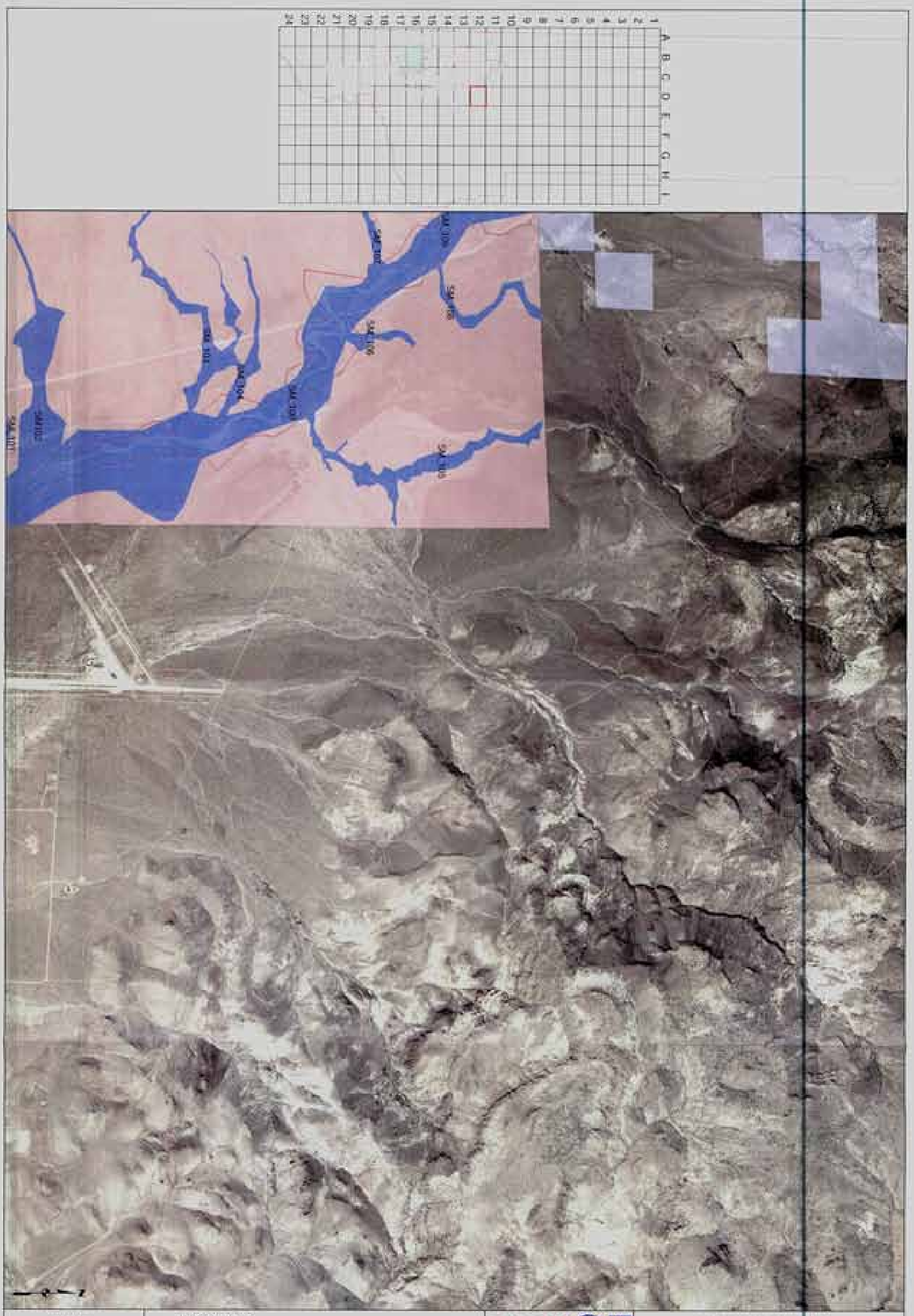

MAP SYMBOLS
ECO LOGIC
HDR

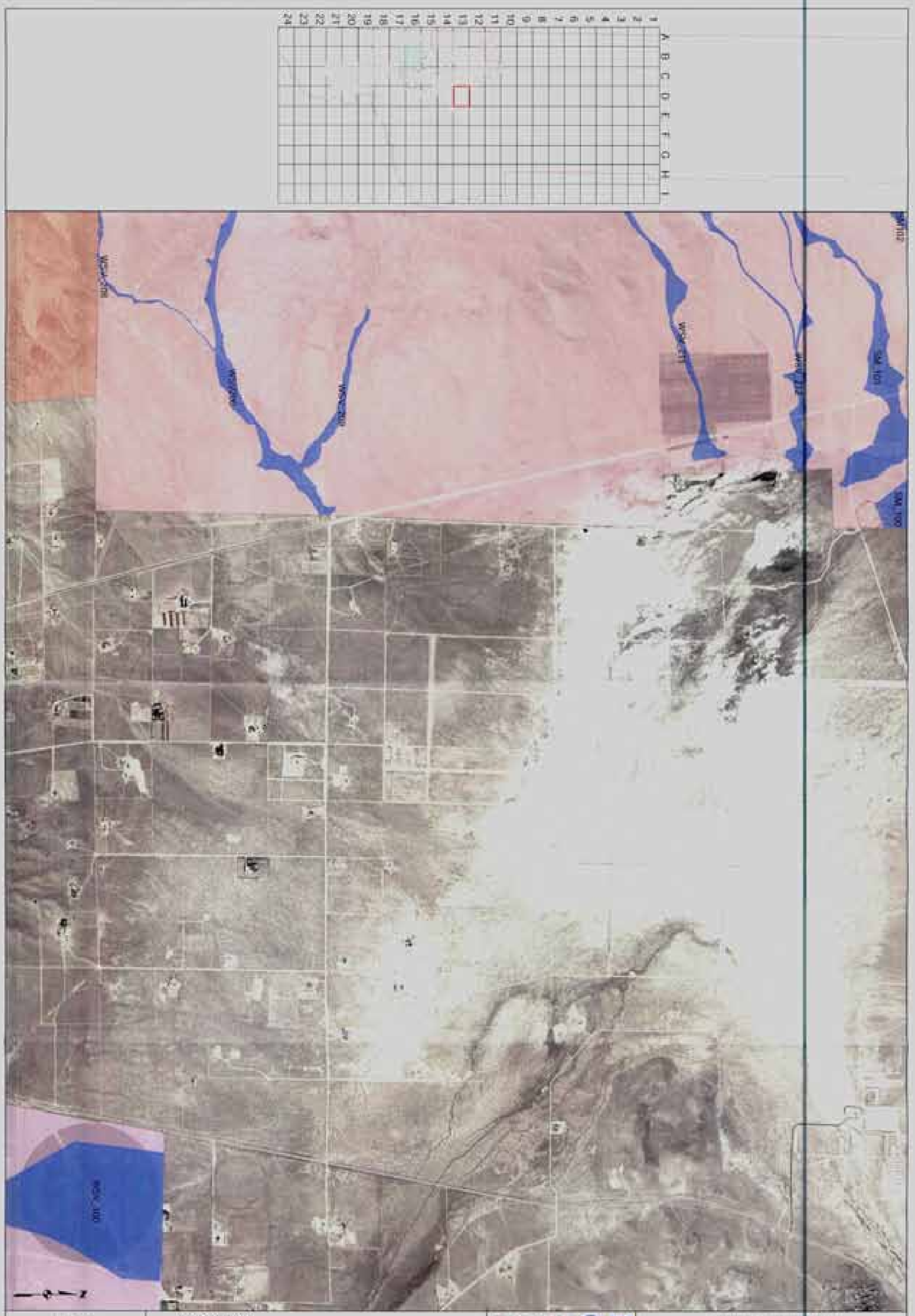

BFC_107
BFC_112
BFC_115
MAP SYMBOLS
ECO LOGIC


A B C D E F G H I
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
BEC 113
BEC 114
BEC 115
BEC 116
BEC 117
BEC 118
BEC 119
BEC 120
BEC 121
BEC 122
BEC 123
BEC 124
BEC 125
BEC 126
BEC 127
BEC 128
BEC 129
BEC 130
BEC 131
BEC 132
BEC 133
MAP SYMBOLS
IMSAT SA BOUNDARIES
HDR
ECO LOGIC

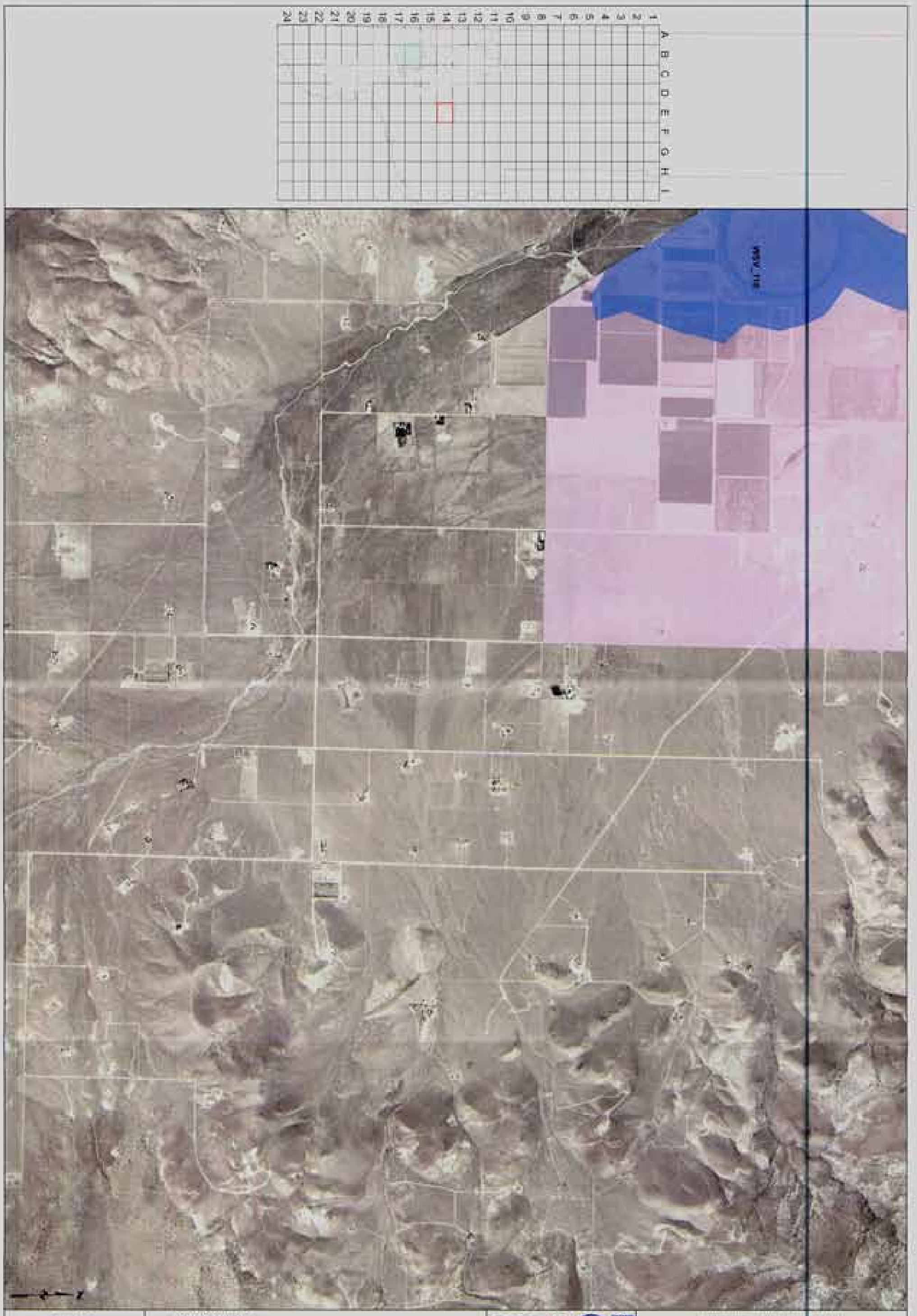

A B C D E F G H I
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
MAP SYMBOLS
HDR
ECOLOGIC

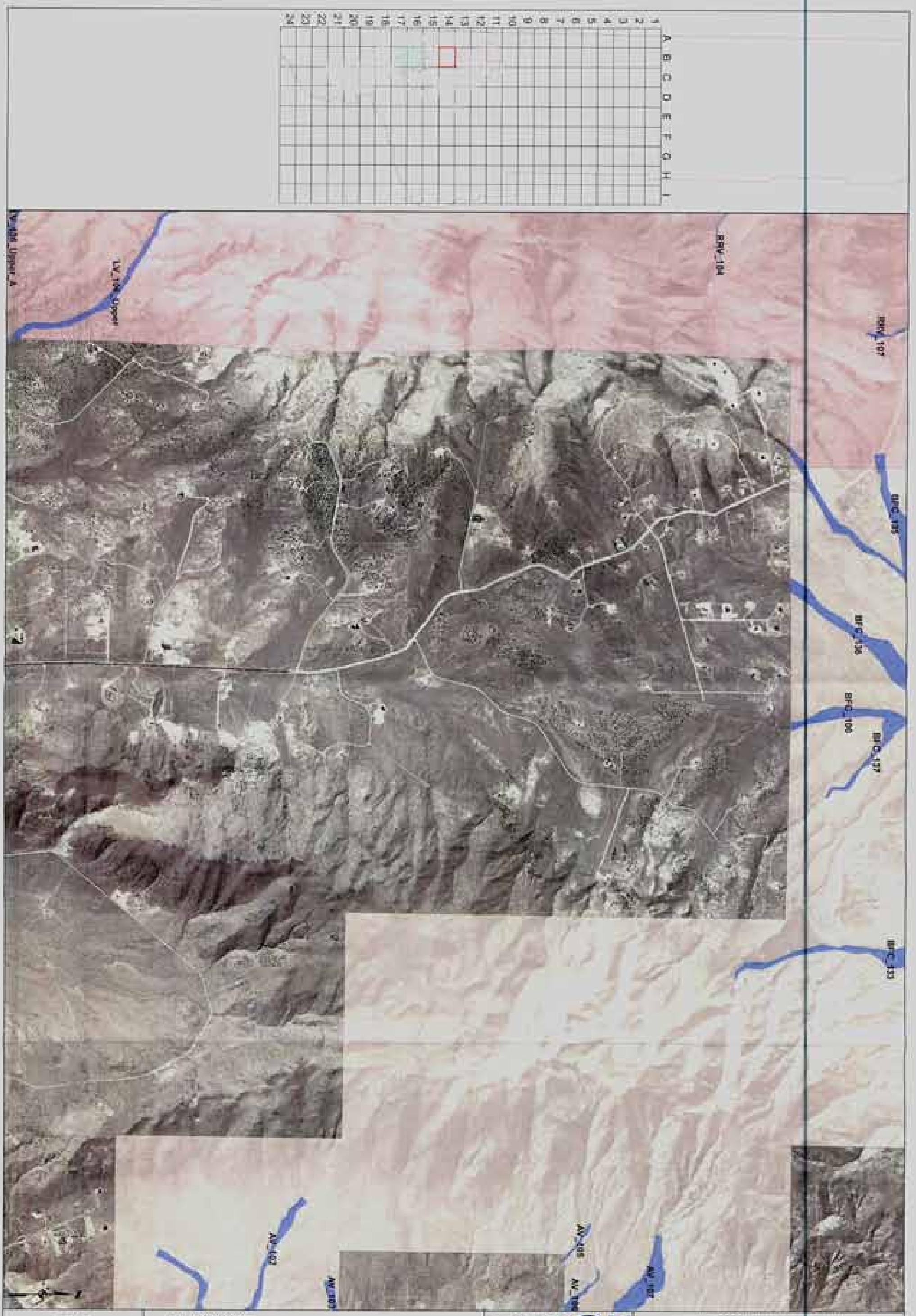

A B C D E F G H I
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
MAP SYMBOLS
IMGAPSA BOUNDARIES
ECOLOGIC
HDR

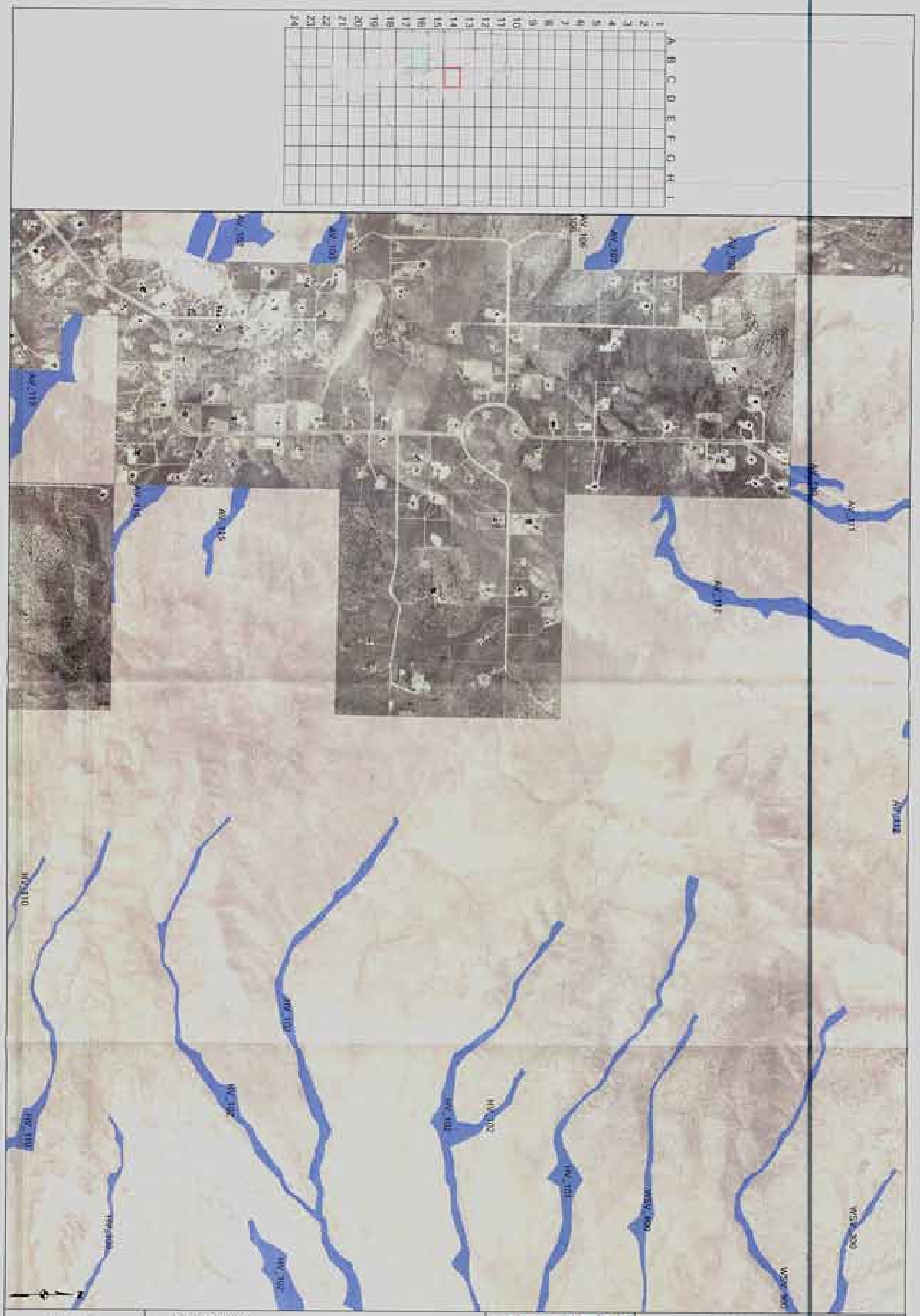

MAP SYMBOLS
IMSA'S A BOUNDARIES
ECOLOGIC
HDR

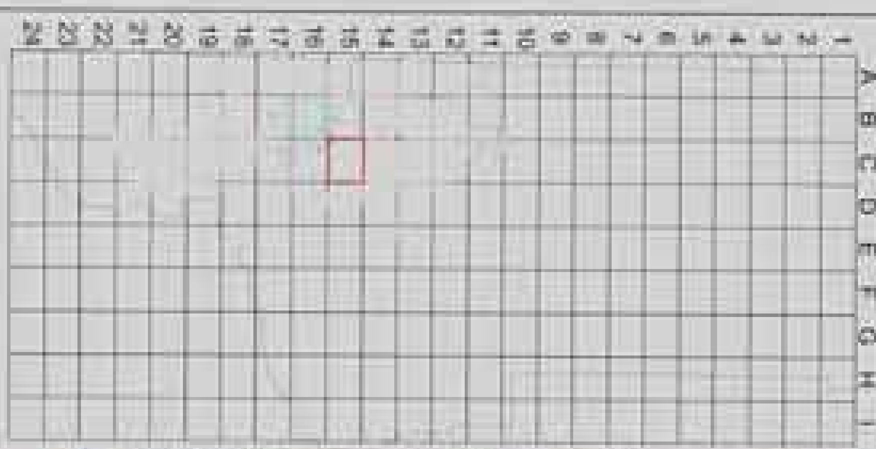

A B C D E F G H I
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
MAP SYMBOLS
IMSAVSA BOUNDARIES
HDR
ECOLOGIC

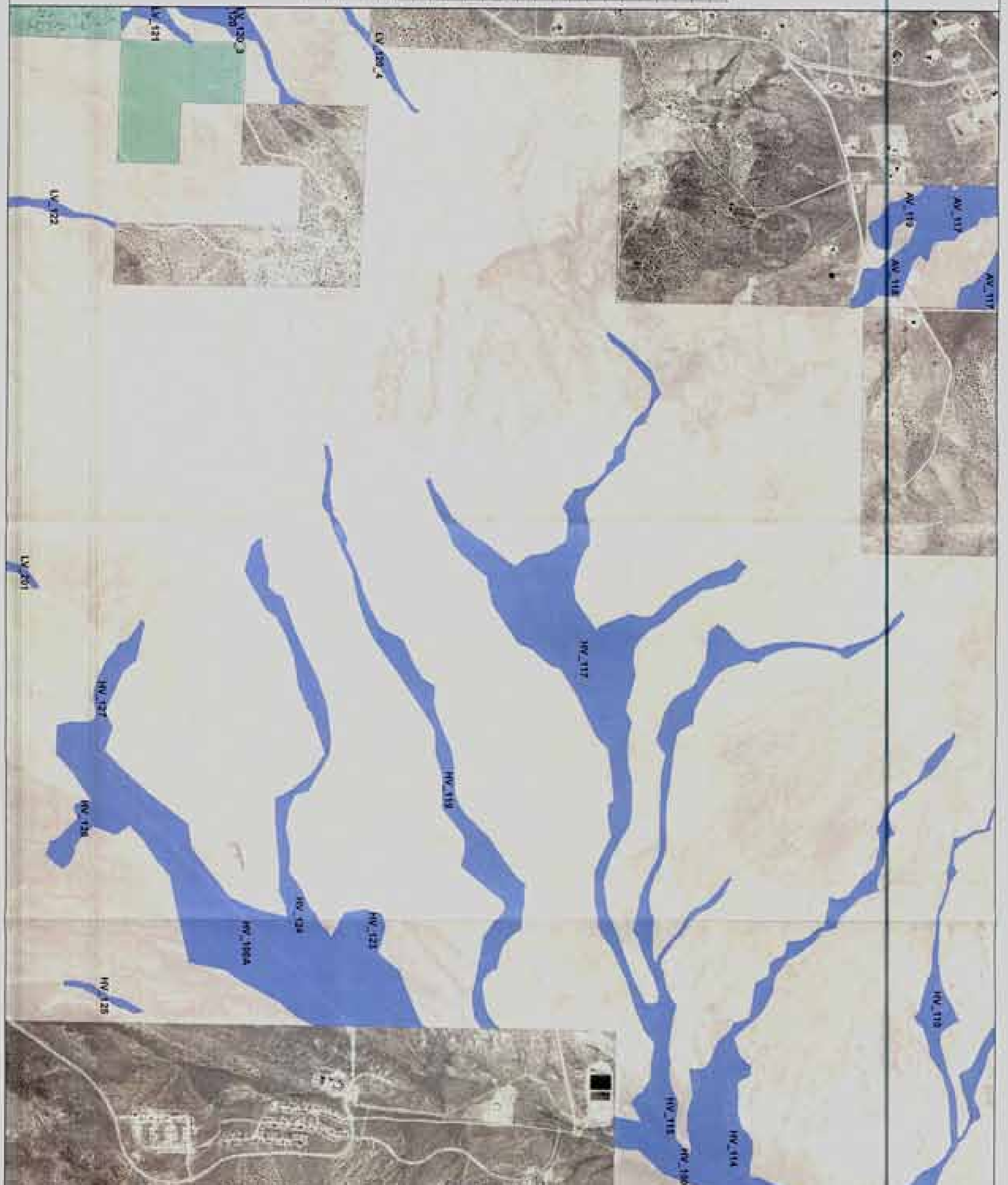

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
A B C D E F G H I
MAP SYMBOLS
TMSA/FSA BOUNDARIES
HDR
ECOLOGIC


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
A B C D E F G H I
MAP SYMBOLS
TMSA/FSA BOUNDARIES
HDR
ECOLOGIC


A B C D E F G H I
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
MAP SYMBOLS
TMSA/FSA BOUNDARIES
HDR
ECO LOGIC
WASHOE COUNTY FSA FIGURE 14-B14


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
A B C D E F G H I
MAP SYMBOLS
MSAS SA BOUNDARIES
ECOLOGIC
HDR





MAP SYMBOLS

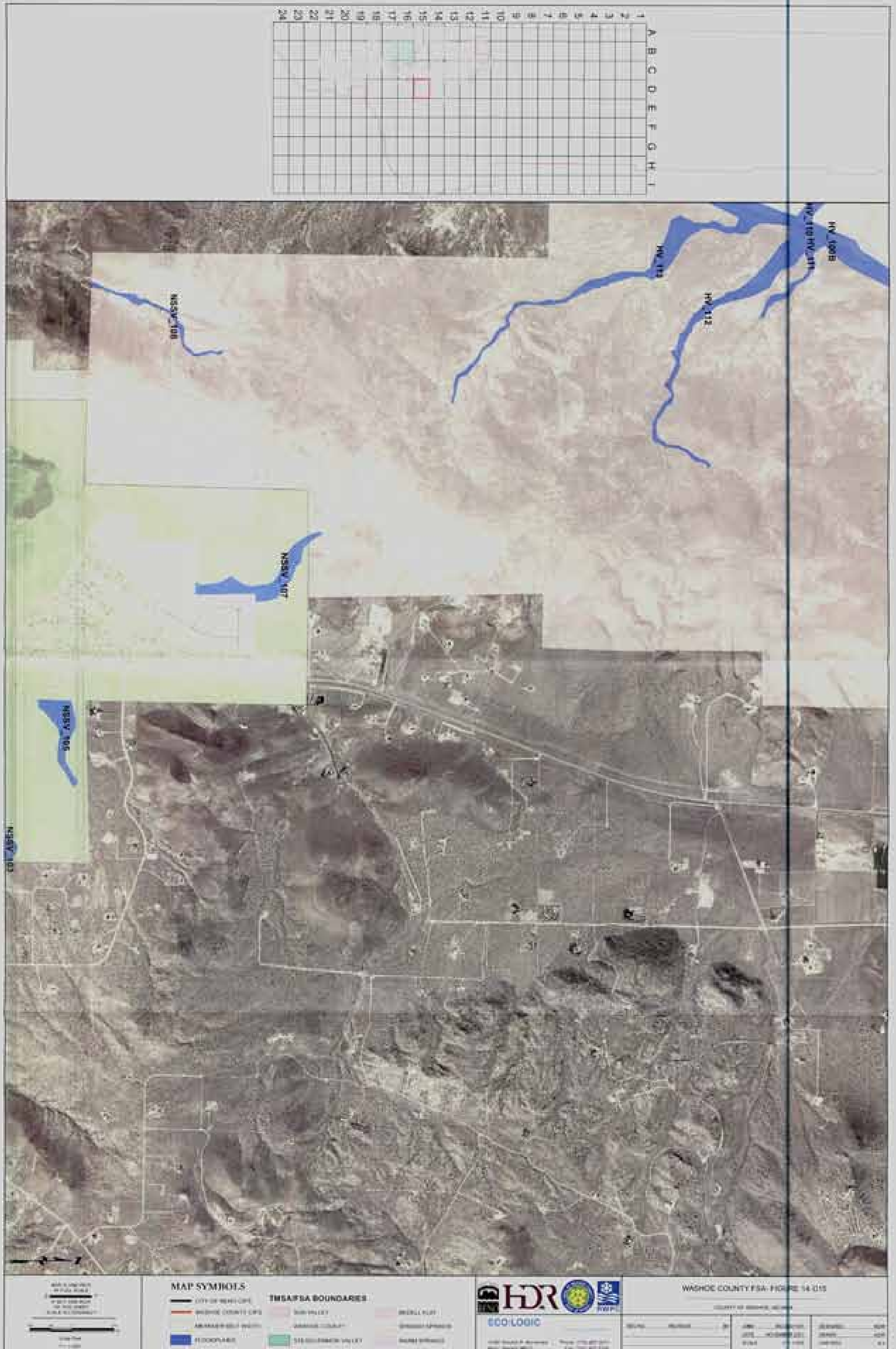
TMSA/FSA BOUNDARIES

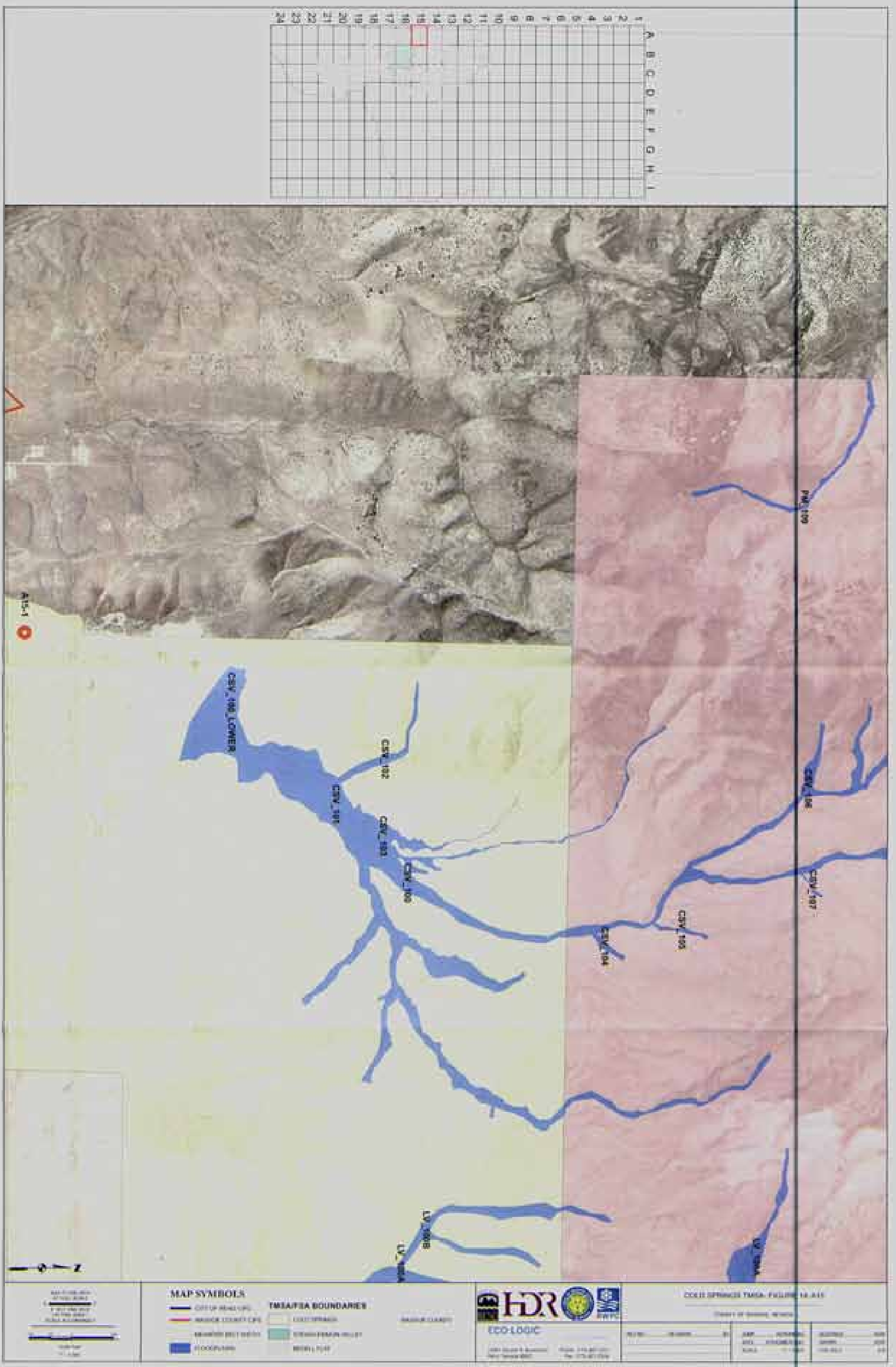
ECO:LOGIC

WASHOE COUNTY FSA: FIGURE 14-C15

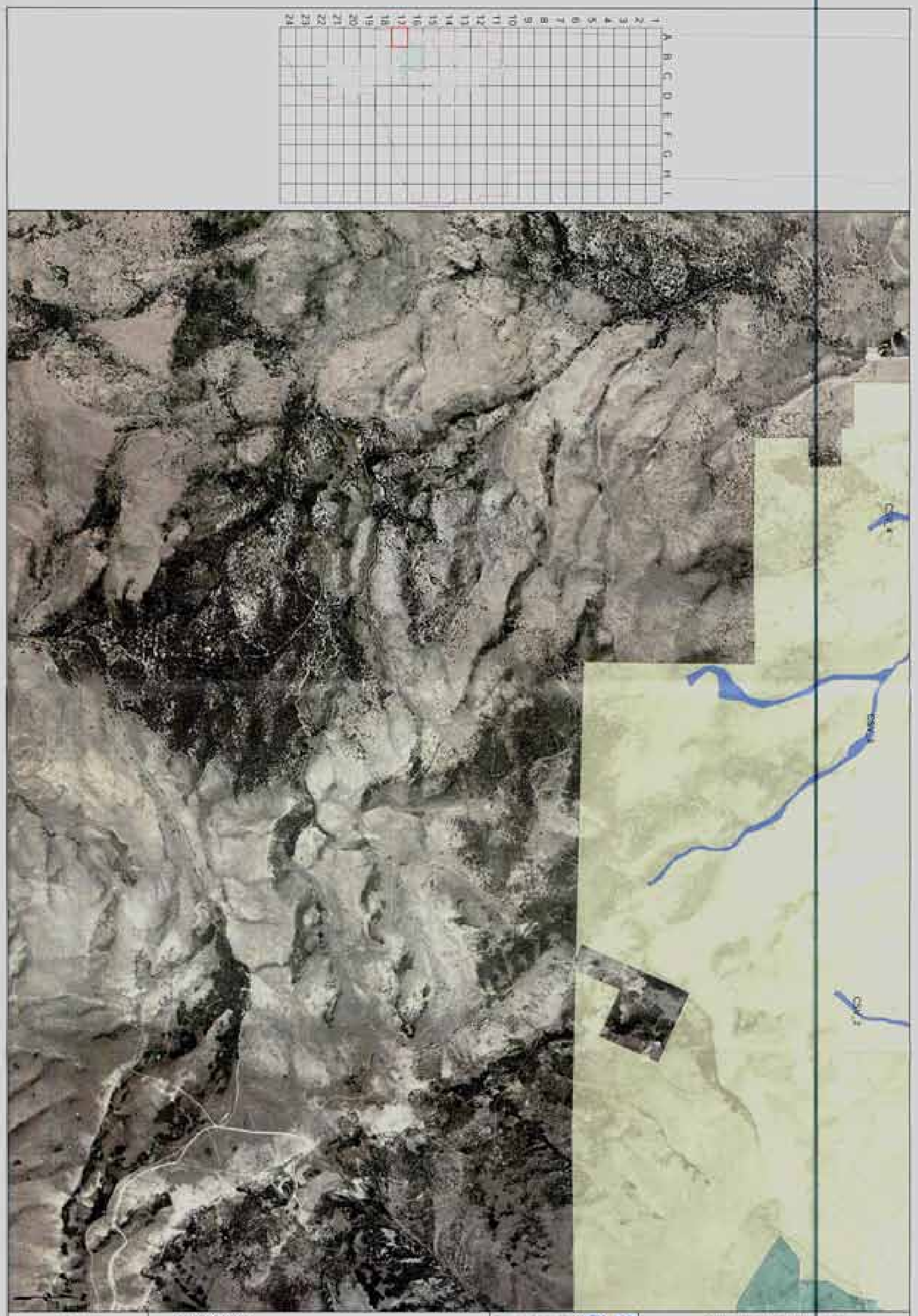

A B C D E F G H I
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
C9-1
LV_306
LV_122
LV_123
LV_100
LV_206B
LV_201
LV_206A
LV_206
LV_203
LV_202
MAP SYMBOLS
TMSA/FSA BOUNDARIES
ECO LOGIC
HDR


A B C D E F G H I
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
MAP SYMBOLS
IMPLAVIA BOUNDARIES
HDR
ECO:LOGIC
WASHOE COUNTY, CA: FIGURE 16-014


A
B
C
D
E
F
G
H
I
NSSV_106
HV_113
HV_112
HV_110 HV_111
HV_108B
NSSV_107
NSSV_105
MAP SYMBOLS
TMSA/FSA BOUNDARIES
HDR
ECO:LOGIC
RWPC
WASHOE COUNTY FSA- FIGURE 14-D15

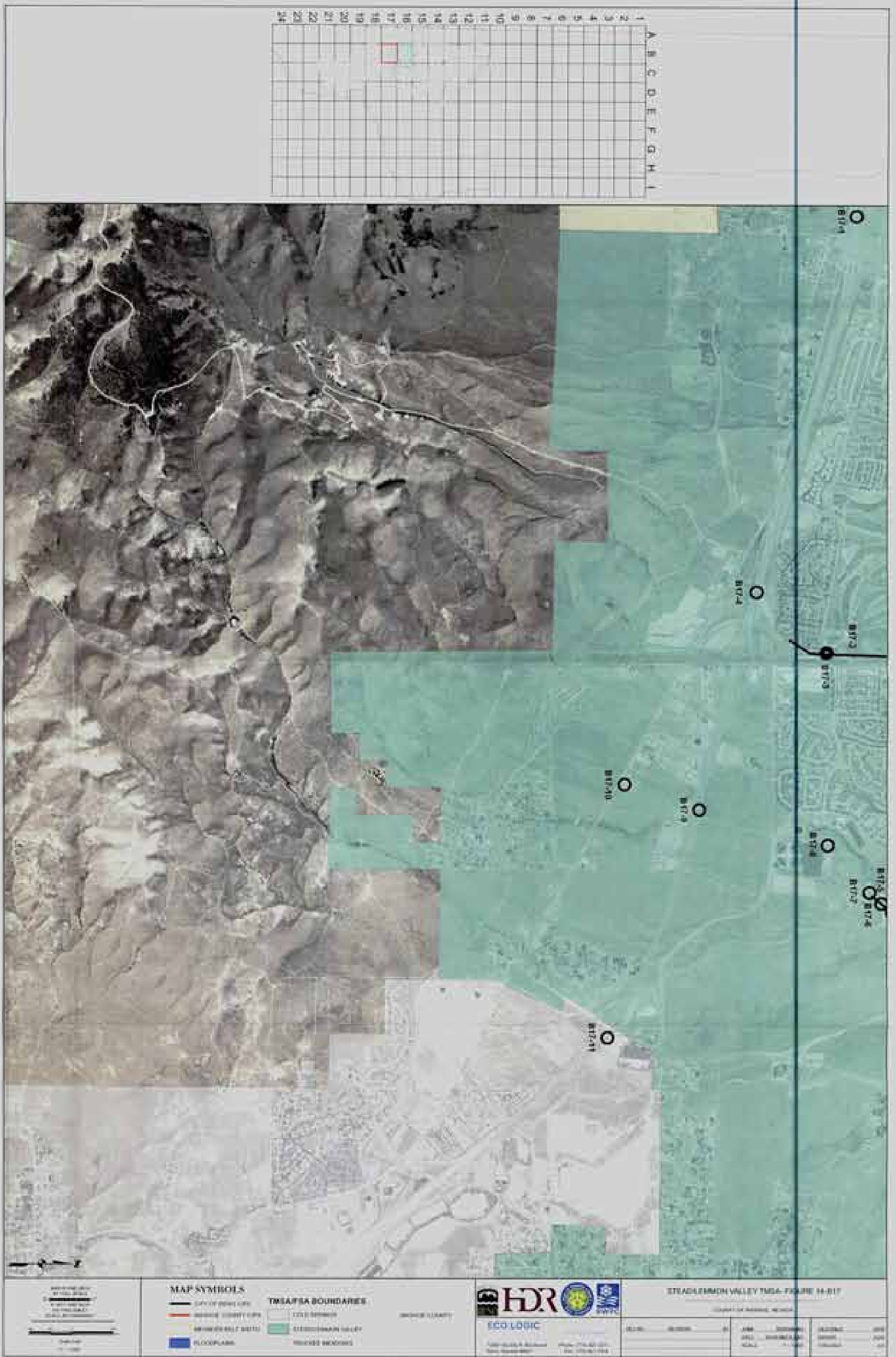

MAP SYMBOLS
TMSA/FSA BOUNDARIES
HDR
ECO-LOGIC

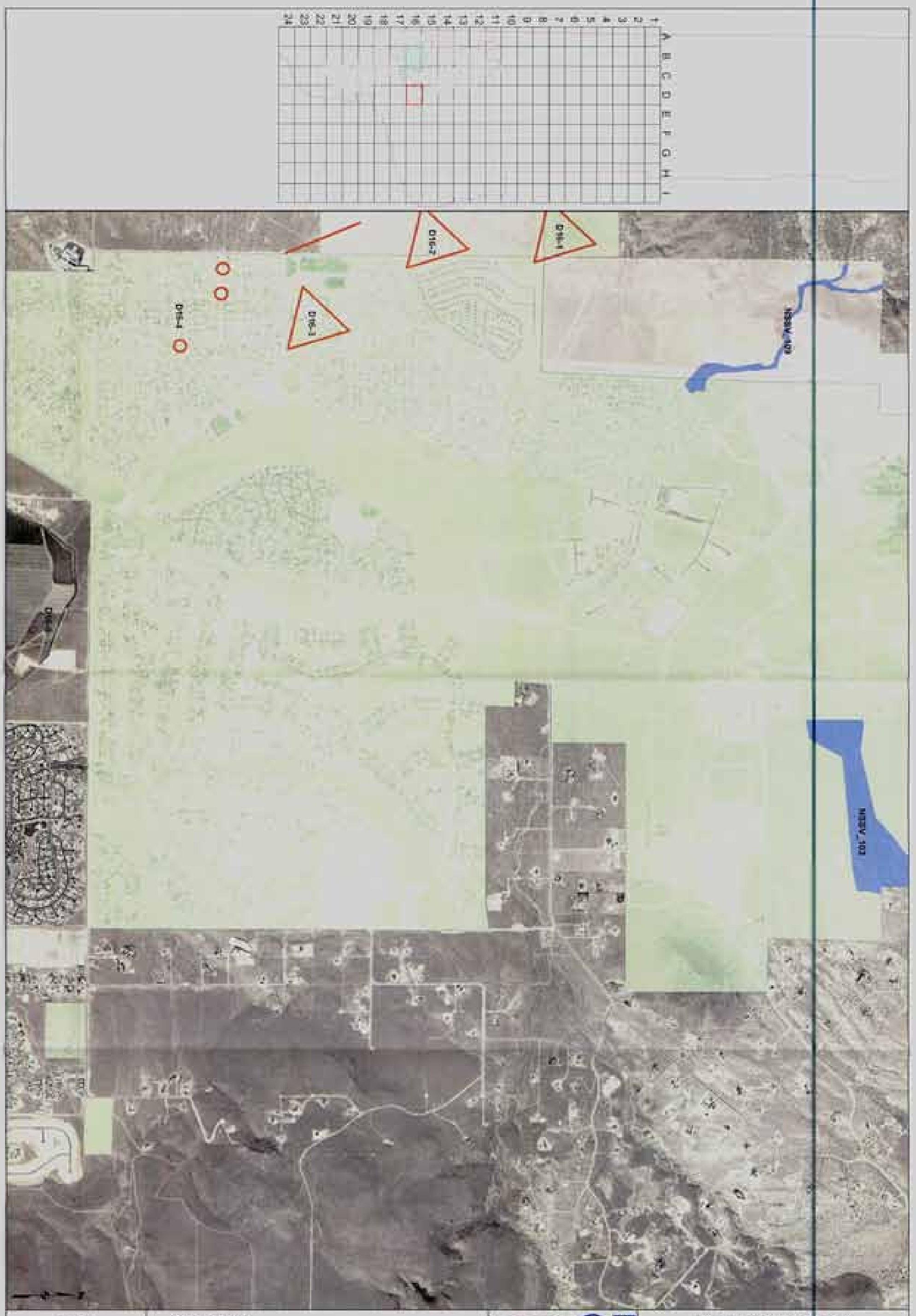

A B C D E F G H I
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
A-16-1
A-16-2
A-16-3
A-16-4
A-16-5
A-16-6
A-16-7
CSV_1
CSV_2
CSV_3
CSV_4
CSV_5
CSV_6
100 Year Lake Boundary with 10% Development
LK_101
LK_102
LK_103
LK_104
MAP SYMBOLS
TMSA/FSA BOUNDARIES
FLOODPLAINS
HDR
ECO-LOGIC


MAP SYMBOLS
HDR
ECO LOGIC

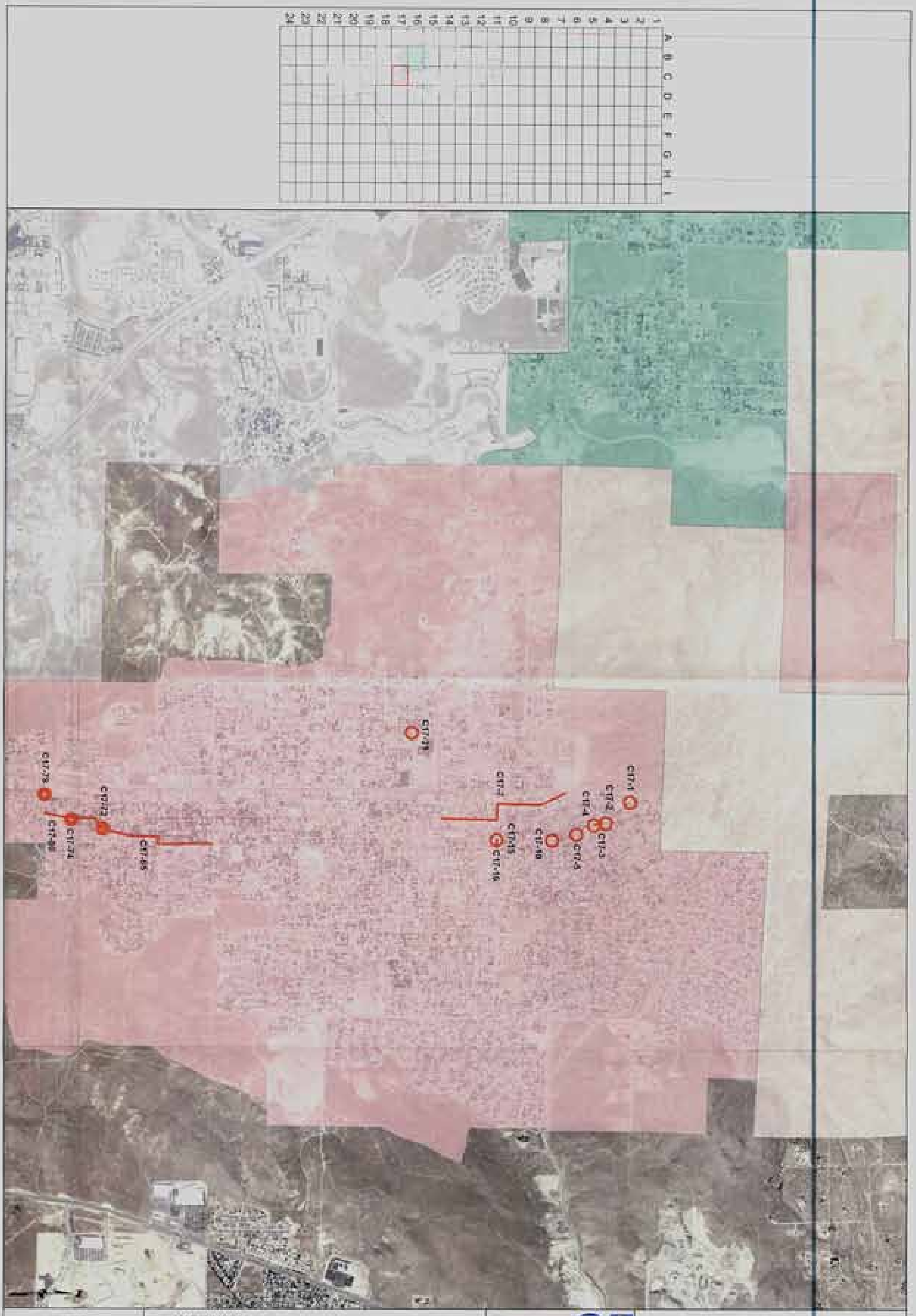
A B C D E F G H I
LV_106A
LV_106
LV_106B
LV_107
B15-1
LV_120_2
LV_120_4
MAP SYMBOLS
TMSA/FSA BOUNDARIES
ECO-LOGIC
COLD SPRINGS TMSA: FIGURE 14-B15

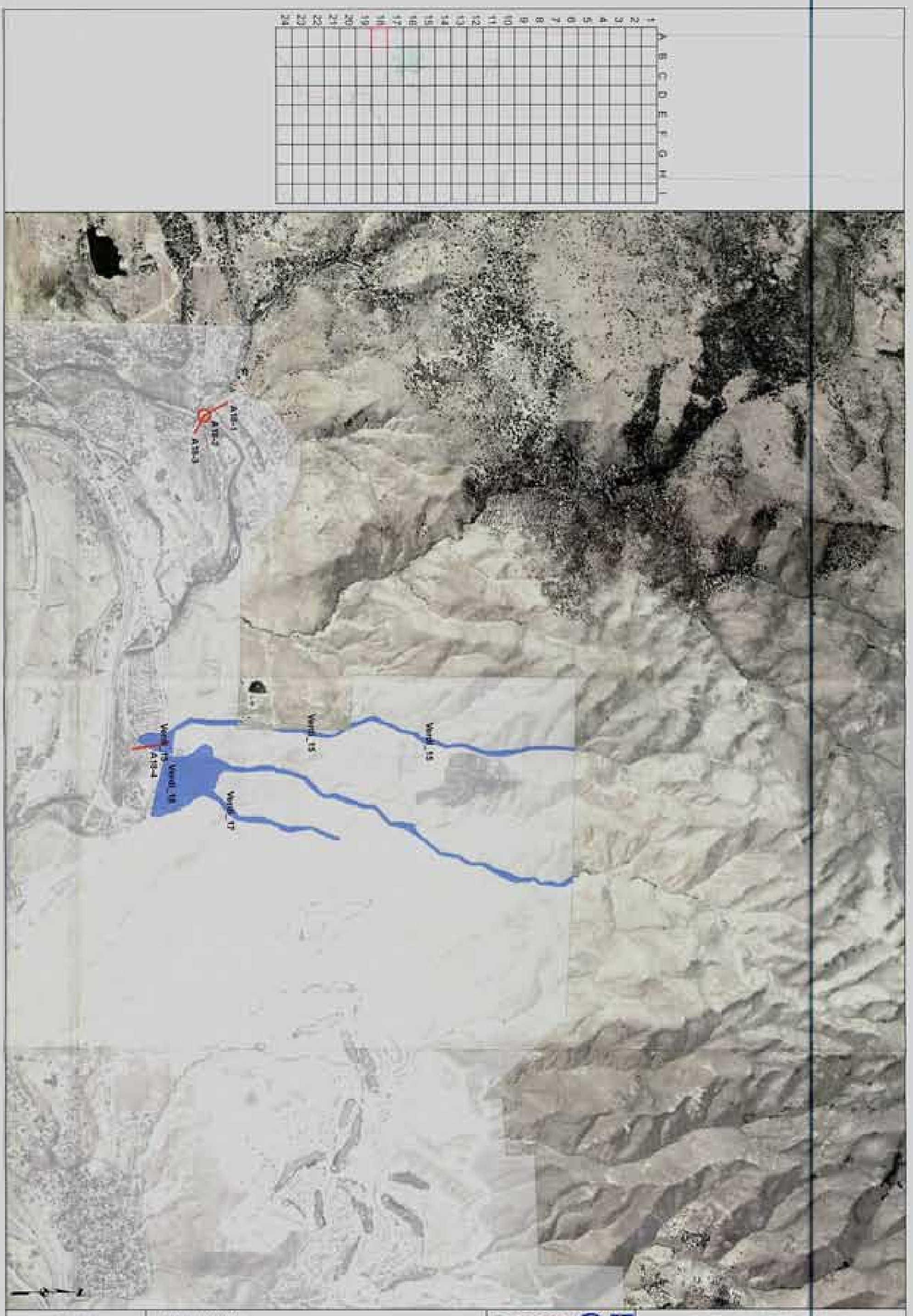

B16-2
B16-4
LV_107
MAP SYMBOLS
TMSA/FSA BOUNDARIES
COLD SPRINGS
FLOODPLAIN
TRUCKEE MEADOWS
HDR
ECO:LOGIC
RWPC
STEAD/LEMMON VALLEY TMSA- FIGURE 14-B16


MAP SYMBOLS
TMSA/FSA BOUNDARIES
FLOODPLAINS
ECO LOGIC
STEAD/LEMMON VALLEY TMSA- FIGURE 10-D17


A B C D E F G H I
DIG-2
DIG-3
DIG-1
DIG-4
SPANISH SPRINGS TMSA- FIGURE 14-D16
MAP SYMBOLS
TMSA/FSA BOUNDARIES
ECO LOGIC
HDR


MAP SYMBOLS
TMSA/FSA BOUNDARIES
ECO:LOGIC
SPANISH SPRINGS TMSA- FIGURE 14.D1T


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
A B C D E F G H I
CIT-1
CIT-2
CIT-3
CIT-4
CIT-5
CIT-6
CIT-7
CIT-8
CIT-9
CIT-10
CIT-11
CIT-12
CIT-13
CIT-14
CIT-15
CIT-16
MAP SYMBOLS
TMSA/FSA BOUNDARIES
SUN VALLEY
ECO LOGIC
HDR

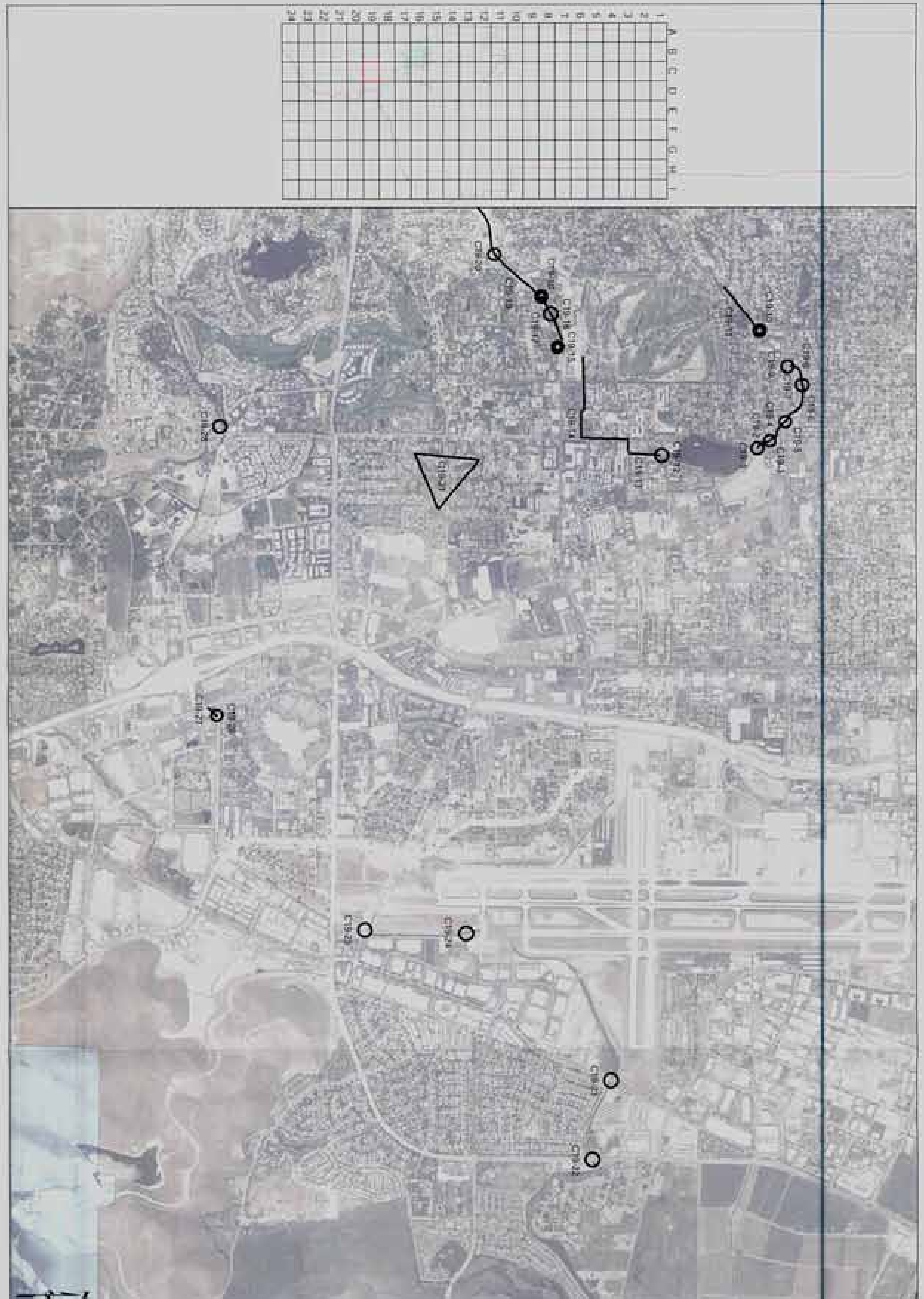

MAP SYMBOLS
TMSA/FSA BOUNDARIES
FLOODPLAIN
ECOLOGIC
HDR
TRUCKEE MEADOWS TMSA - FY2016 14-419


MAP SYMBOLS
HDR
ECOLOGIC


MAP SYMBOLS
HDR
ECOLOGIE


MAP SYMBOLS
IMSAFSA BOUNDARIES
ECO LOGIC
HDR


MAP SYMBOLS
HDR
ECOLOGIC



MAP SYMBOLS

TMSA/FSA BOUNDARIES

HDR

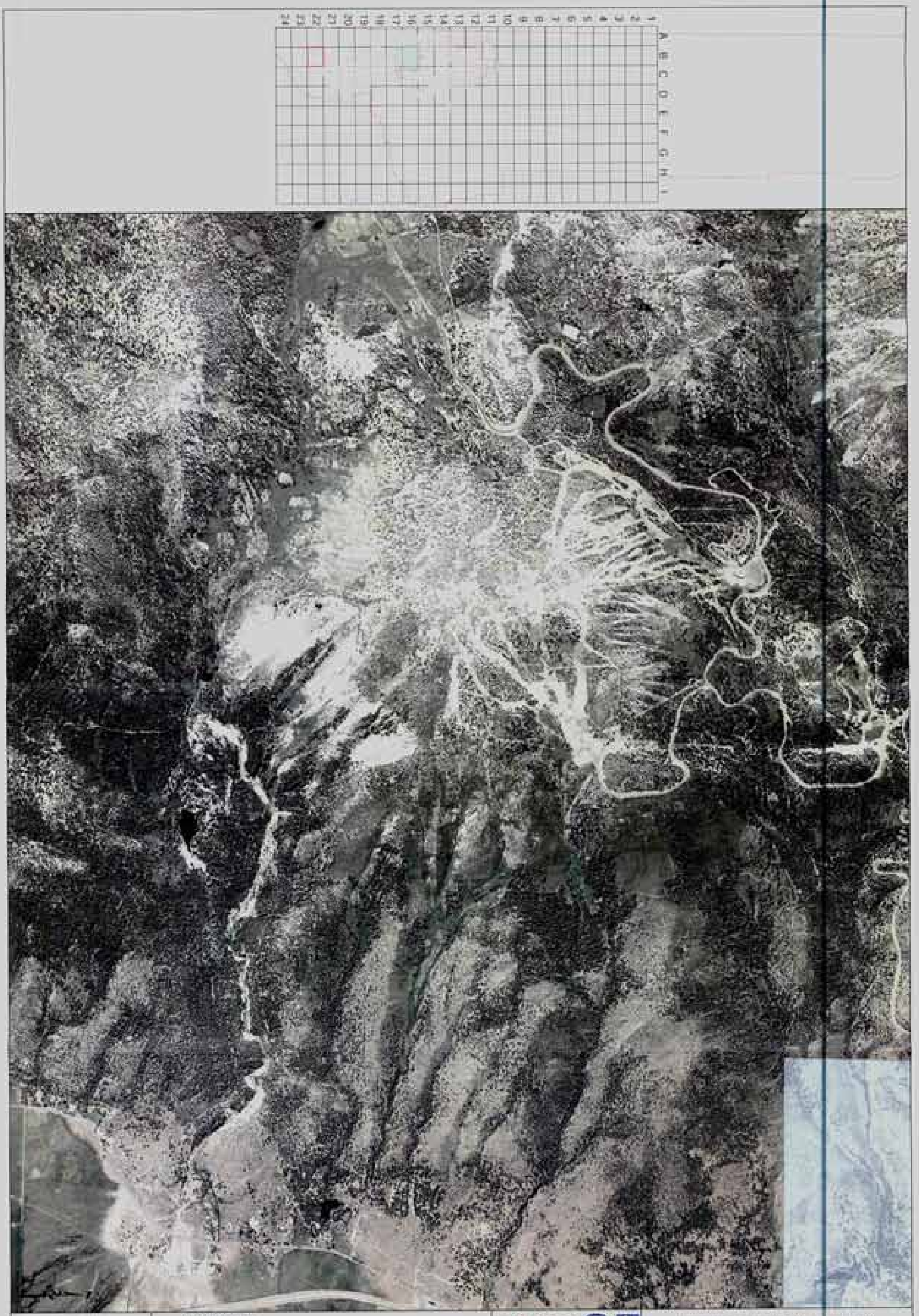
ECO:LOGIC

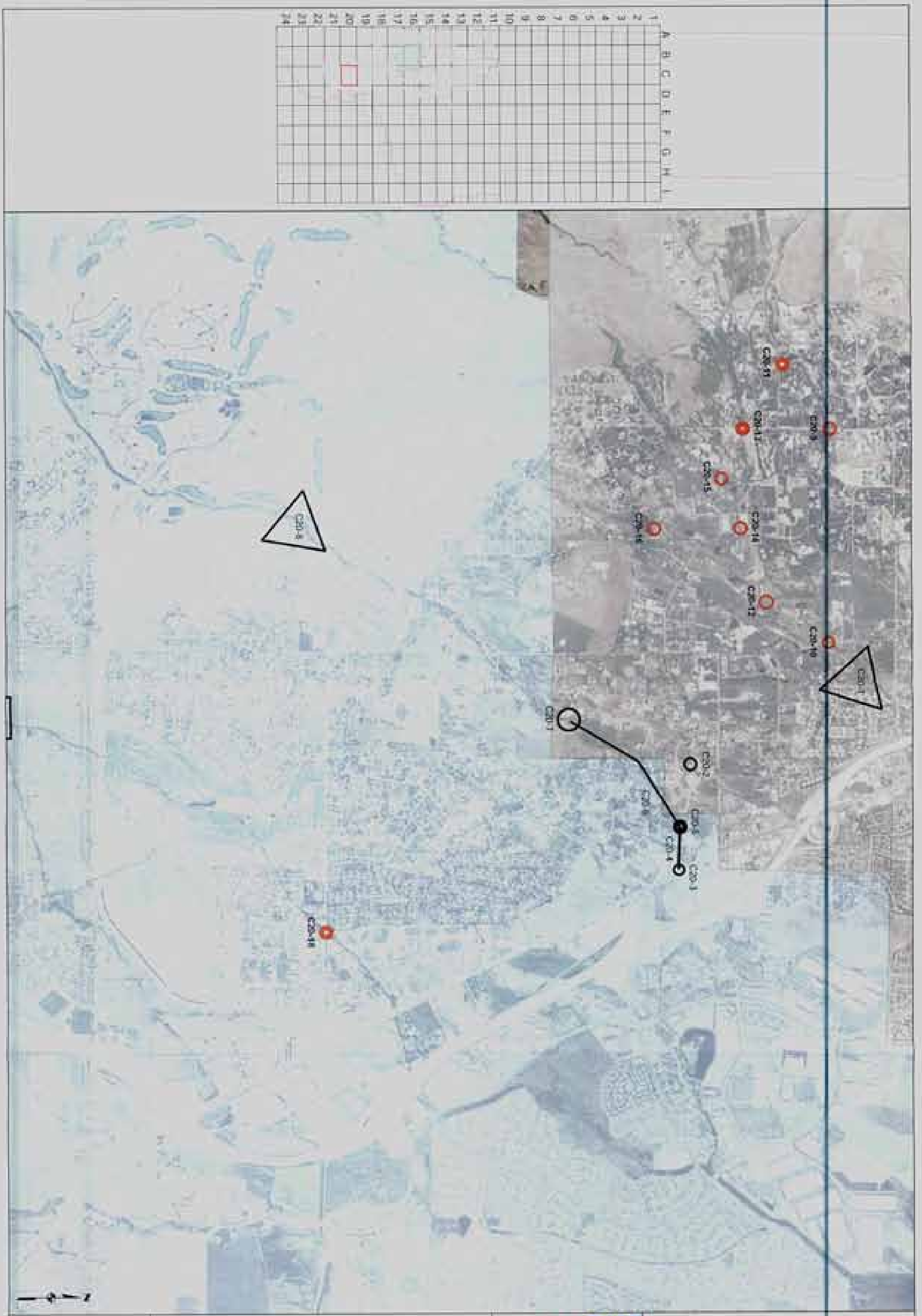
TRUCKEE MEADOWS TMSA : FIGURE 14 C19

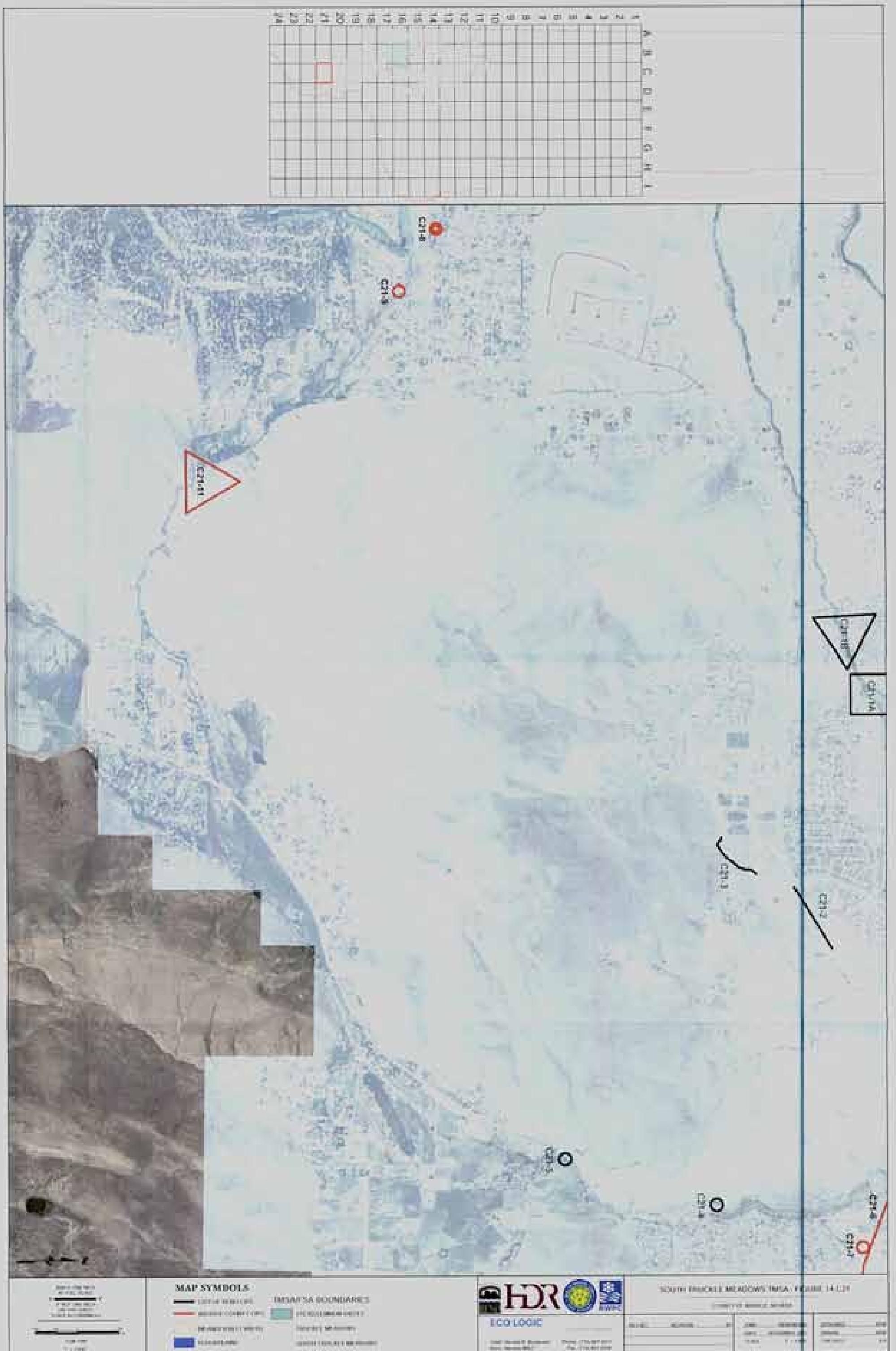

MAP SYMBOLS
ECOLOGIC
HDR


MAP SYMBOLS
TMSA/FSA BOUNDARIES
SOUTH TRUCKEE MEADOWS TMSA - FIGURE 14-B2
ECOLOGIC
HDR

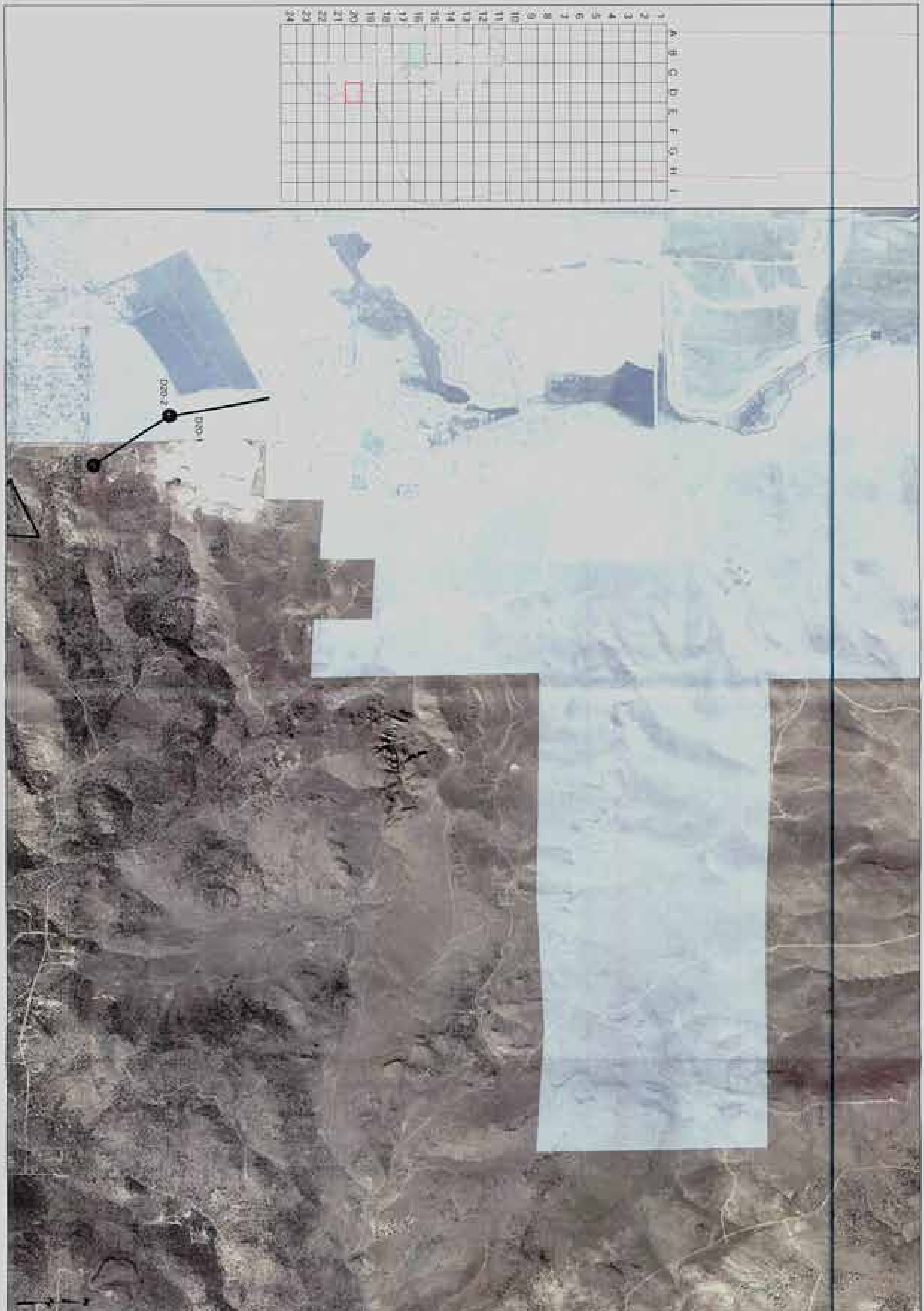

MAP SYMBOLS
TMSAVSA BOUNDARIES
ECO LOGIC
HDR


MAP SYMBOLS
MSAP SA BOUNDARIES
ECO LOGIC
HDR


A B C D E F G H I
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
C20-11
C20-12
C20-9
C20-15
C20-16
C20-13
C20-10
C20-14
C20-8
C20-7
C20-6
C20-5
C20-4
C20-3
C20-2
C20-1
C20-17
MAP SYMBOLS
IMSA'S'X BOUNDARIES
HDR
ECO LOGIC
SOUTH BRIDGE MEADOWS IMSA - FIGURE 19-C20


CH14
CH13
CH11
CH12
CH10
CH9
CH8
CH7
CH6
CH5
CH4
CH3
CH2
CH1
MAP SYMBOLS
IMVAFSA BOUNDARIES
HDR
ECO LOGIC
SOUTH RISDALE MEADOWS IMSA / FIGURE 14-CH


MAP SYMBOLS
HDR
ECO LOGIC



MAP SYMBOLS

TMSA/FSA BOUNDARIES

ECO LOGIC

SOUTH TRUCKEE MEADOWS TMSA - FIGURE 14 D20

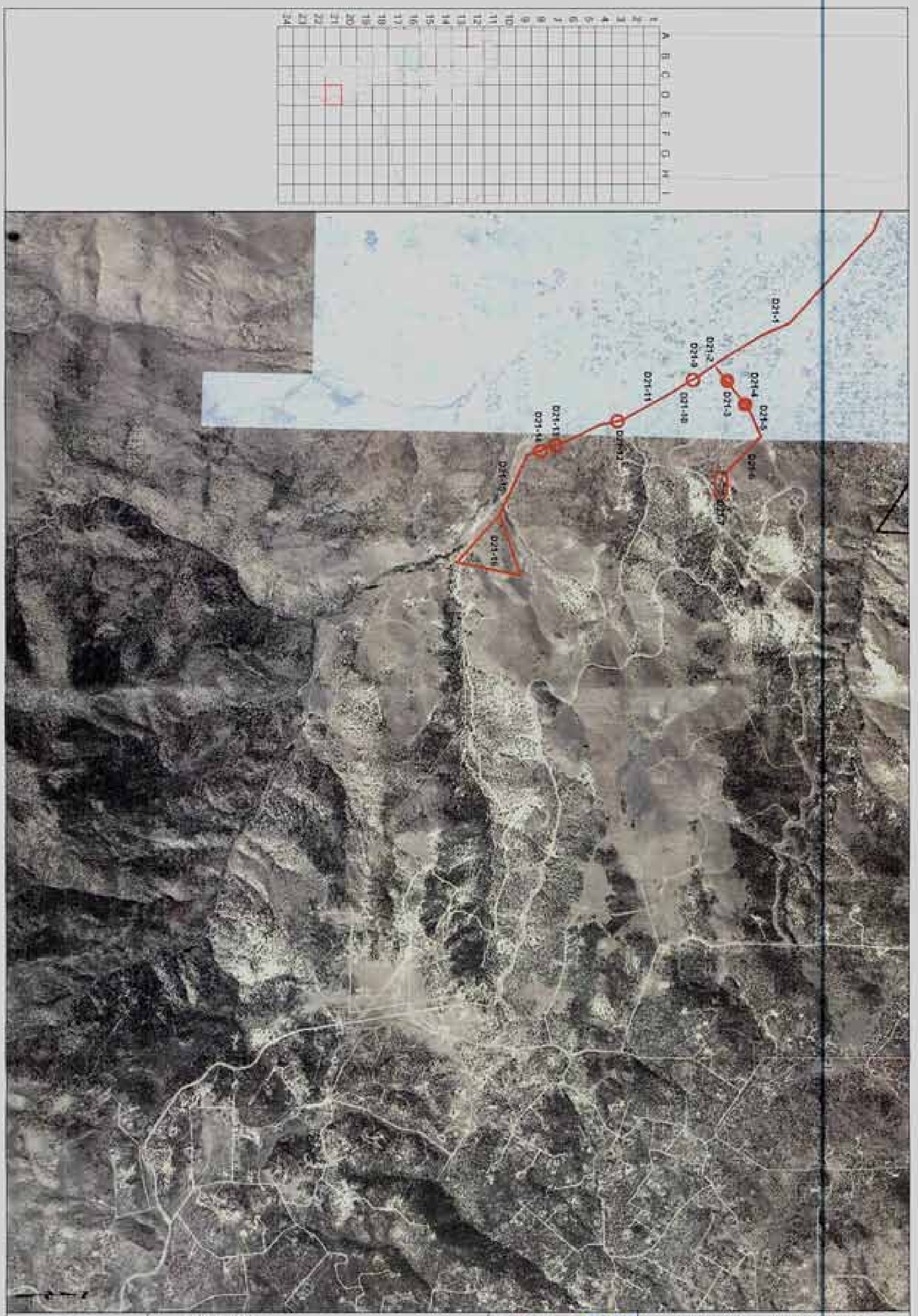

A B C D E F G H I
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
D21-1
D21-2
D21-6
D21-11
D21-10
D21-3
D21-4
D21-5
D21-15
D21-14
D21-13
D21-12
D21-7
D21-8
MAP SYMBOLS
IMPAIR SA BOUNDARIES
HDR
ECO LOGIC
SOUTH ENGLE MEADOWS TMDA

Table of Contents

List of Tables

Section 15 - Conclusions and Policy Recommendations

Conclusions from each of the planning areas regarding the recommended water and wastewater infrastructure improvements are reiterated in this section, including a summary of the estimated water demand and supply, wastewater projections and costs. Relevant policies from the Regional Water Management Plan are presented, together with a discussion of proposed policy issues for future consideration. It is anticipated that any Regional Water Management Plan (RWMP) policy revisions will be undertaken as part of the current RWMP update.

15.1 INFRASTRUCTURE REQUIREMENTS

Following is a summary of the recommended water and wastewater infrastructure improvements. Flood control and stormwater improvements are summarized in Section 14.

15.1.1 Spring Mountain TMSA

The water supply for Spring Mountain can potentially be derived from several sources, including on site resources and imported resources. Additional study of the long term reliability and yield of the onsite spring resources and the Dry Valley and Black Canyon resources is needed to assess their reliability and municipal water supply yield. Use of reclaimed water and/or imported water, in addition to the onsite resources, will likely be required to help meet projected water demands. An estimated 1,115-1,674 AF of new residential irrigation demand could potentially be served by reclaimed water.

A secondary treatment water reclamation facility is proposed to be constructed for the Eastern area, sized for the projected capacity of up to 2.0 MGD. The capacity of this water reclamation facility will be limited to the extent that sufficient infiltration areas can be developed, primarily in the meadow and open space areas, to dispose of the effluent during the non-irrigation season. A second tertiary reclamation facility is proposed to be constructed in the Central area. This plant would serve the growth in both the Central and Western areas, and would also serve as a "polishing plant" for excess effluent generated from the Eastern area. Reclaimed water would be used to the extent practical in the Central and Western areas, and disposed of within areas suitable for infiltration. Excess effluent may be discharged into the Dry Creek drainage.

15.1.2 Sage TMSA

The water supply for Sage can potentially be derived from several on-site sources. The long term reliability and yield of the surface and groundwater resources are currently under investigation by the project proponent. For purposes of this analysis, it has been assumed that these water rights can be developed and reliably support 764 to 1,460 AF of municipal demand. The use of reclaimed water, in addition to the on-site water resources, will likely provide sufficient resources to meet the projected demands.

Current facility planning has not identified a suitable area for wastewater treatment, storage and disposal facilities that could be located within the project site. The treatment facility is proposed to be located on property administered by BLM southeast of the Sage development. Wastewater would be treated and disposed of in areas with limited public access, such as the development open spaces. Reclaimed water that is not used for irrigation of open spaces is proposed to be disposed of on irrigated fields during the irrigation season and stored during the non-irrigation season. Irrigated fields and a seasonal storage reservoir, which uses levies to contain the effluent, are proposed to be located next to the wastewater treatment facility.

15.1.3 Warm Springs TMSA

Groundwater will supply the majority of the water resources for the Warm Springs TMSA. The estimated need for additional water resources for the TMSA is approximately 1,502 AFA. This is less than the potentially available water resources of 2,365 AF. Washoe County recognized that the basin was over-appropriated with more groundwater rights than could be sustained on a long term basis. In approving development in the basin, Washoe County has utilized a discount factor of 0.43 for determining the quantity of water rights needed for development projects.

The projected 2030 wastewater flow for Warm Springs is 0.37 MGD. A sequencing batch reactor plant is proposed to be constructed with additional tertiary filters, chemical feed facilities and disinfection facilities. The reclaimed water would be disposed of on irrigated fields and stored during the non-irrigation season. The irrigated fields and storage ponds are proposed to be located on BLM property southwest of the plant site.

15.1.4 Cold Springs, Stead and Lemmon Valley TMSA

Regional water supply, water reclamation and wastewater disposal should be a coordinated effort for the Cold Springs, Stead and Lemmon Valley TMSA because of their common water supply and effluent disposal constraints.

Insufficient water resources exist to serve the projected 2030 demands in Stead and Lemmon Valley, when potential demands for Cold Springs are taken into consideration. The projected increase in demand is approximately 18,485 AF, compared to the potentially available water resources of 11,909 AF. The demand for potable water supplies for these areas will exceed the available supplies, including water from the Fish Springs and Intermountain projects. The demand for additional water can potentially be supplied from the future potential water resources discussed in Section 13, and from reclaimed water.

The 2030 total projected wastewater treatment plant capacity for the Stead and Lemmon Valley TMSA is approximately 7.5 MGD, including potential septic tank conversion flows. The 2030 total projected water reclamation facility capacity for Cold Springs is approximately 4.5 MGD. The wastewater treatment and reclamation systems will need to be expanded to dispose of the projected effluent in 2030. The Reno Stead WRF and Cold Springs WRF should be included in a thorough planning and facilities study of regionally integrated reclaimed water systems and

effluent management strategies to develop a plan to meet the disposal capacity requirements for the projected 2030 wastewater flow.

Expanded use of reclaimed water, such as front and back yard residential landscape watering, should be implemented where reasonable to extend available water supplies and help fulfill the development potential within the Reno and County TMSA. In Stead, Lemmon Valley and Cold Springs, up to 7,358 AF of new residential irrigation demand could potentially be served by reclaimed water.

15.1.5 Spanish Springs

As identified in the March 2004 report, "Spanish Springs Valley Groundwater Budget Analysis", the evaluation identifies a long-term reduction of available groundwater resources that will result from transitioning from agricultural to urban residential use. Coordination of stakeholders within the basin is key to the success of a long-term groundwater management strategy. Because the available water rights are out of balance with available groundwater resources, stakeholders in this basin must work together to ensure that a comprehensive sustainable management plan for the basin is implemented. The estimated need for additional water resources is approximately 3,362 AFA. This additional water would most likely be provided through the TMWA wholesale service to Washoe County.

The projected 2030 wastewater flow from the Spanish Springs TMSA for TMWRF is 3.0 MGD, not including flow from the City of Sparks, City of Reno, or Sun Valley. As an alternative to conveying wastewater to TMWRF for treatment, building a Spanish Springs Valley Water Reclamation Facility has been considered in past planning studies. This option may be reconsidered in the future as conditions warrant.

15.1.6 Sun Valley

The majority of the Sun Valley planning area is within the Sun Valley General Improvement District (SVGID) service area. SVGID's Water and Wastewater Master Plan are comprehensive documents; therefore, no further detailed planning was necessary for this Facility Plan within SVGID's service territory except for the northern most area. The Sun Valley TMSA is split by many jurisdictional boundaries. It is assumed that SVGID will provide water and wastewater service within the Sun Valley hydrobasin. Coordinated planning for water and wastewater facilities is required for areas immediately outside of the hydrobasin boundary that could be served by SVGID or others.

The estimated need for additional water resources is approximately 2,607 AFA, which is equal to the potentially available water resources. The water supply is anticipated to be provided by TMWA.

The projected 2030 wastewater flow from Sun Valley to TMWRF is 2.0 MGD.

15.1.7 Truckee Meadows TMSA

The estimated need for additional water resources for the Reno and Washoe County portion of the TMSA is approximately 17,021 AFA. This compares favorably with the potentially available water resources of 22,363 AF. However, additional demands will also be placed on these available water resources from other areas including Sparks, Sun Valley, Spanish Springs and the South Truckee Meadows.

TMWA's 2025 Water Facility Plan is a comprehensive document; therefore, no further detailed planning was necessary within TMWA's retail service territory, other than for Verdi. Further planning was done for portions of Caughlin Ranch within the TMWA sphere of influence and Hidden Valley within the County water system.

The projected 2030 wastewater flow for the Truckee Meadows Water Reclamation Facility is 41.2 MGD, not including flow from the City of Sparks, Sun Valley, Golden Valley or Spanish Springs. Reuse and discharge of reclaimed water from the various water reclamation facilities in the region is constrained by a number of factors. A thorough planning and facilities study of regionally integrated reclaimed water systems and effluent management strategies is required to develop a plan to meet the disposal capacity requirements for the projected 2030 wastewater flows.

15.1.8 South Truckee Meadows TMSA

The estimated need for additional water resources for the Reno and Washoe County TMSA is approximately 12,137 AFA. This is more than the potentially available water resources of 10,546 AF.

Both the County and TMWA have recently prepared water facility plans for their systems in South Truckee Meadows that identify the required improvements to accommodate growth and remediate existing system deficiencies in their service territories. Proposed additional improvements to serve new growth in the Reno and County TMSA lie within the Washoe County Department of Water Resources service territory and have been integrated with the County's previous water facility plan. Extending the finished water pipeline from the planned South Truckee Meadows Water Reclamation Facility (STMWRF) to the upper Mount Rose fan area is recommended to offset winter groundwater pumping and help alleviate localized groundwater level declines. The recommend pipeline is in lieu of the upper water treatment plant that was proposed in the 2002 South Truckee Meadows Facility Plan.

The projected 2030 wastewater flow for STMWRF is 10.8 MGD. Washoe County also operates a utility that distributes reclaimed water from STMWRF as the only method of disposal of effluent. The wastewater treatment and reclamation systems will need to be expanded to dispose of the projected effluent in 2030. STMWRF should be an integral part of a thorough planning and facilities study of regionally integrated reclaimed water systems and effluent management

strategies to develop a plan to meet the disposal capacity requirements for the projected 2030 wastewater flow.

15.1.9 Reno Bedell Flat FSA

The Bedell Flat FSA includes approximately 70,200 acres in several hydrographic basins including Bedell Flat, Red Rock, Dry Valley, Cold Springs, Warm Springs, and Long Valley. Bedell Flat consists mostly of federal lands. The land would not be developable until 2028 per the FSA development projections. Areas that are limited or constrained for future development include areas with slopes greater than thirty percent and drainageways. Using the land use data, the total projected water demand for Bedell Flat is 21,355 AFA, based on 52,518 dwelling units and 5,000 acres of commercial and industrial development. The wastewater treatment capacity projection for this area is 10.1 MGD.

15.1.10 Washoe County FSA

The Washoe County FSA includes approximately 44,600 acres in several hydrographic basins including Bedell Flat, Antelope Valley, Warm Springs, Spanish Springs, Lemmon Valley, and a portion of Sun Valley. The Washoe County FSA consists mostly of federal lands. The land would not be developable until 2028 per the FSA development projections. Areas that are limited or constrained for future development include areas with slopes greater than thirty percent and drainageways. Using the land use data, the total projected water demand for the Washoe County FSA is 10,270 AFA, based on 18,340 dwelling units and 2,616 acres of commercial and industrial development. The wastewater treatment capacity projection for this area is 6.8 MGD.

15.2 WATER RESOURCES AND DEMANDS

The Washoe County and Reno FSAs include approximately 76,400 acres of potentially developable land, with future potential water requirements of 31,625. A proposed amendment to the 2002 Regional Plan implements the Annexation Settlement Agreement calls for local governments to collaborate with Federal officials on a proposal for conversion of federal lands to private use within the FSA. The land would not be developable until 2028 per the FSA development projections. Therefore, planned development within the TMSA is anticipated to occur prior to significant development in the FSA.

A summary of water resources and projected 2030 demands by area are listed in Table 15.1.

Table 15.1 – TMSA Water Resources and Demands (a)

TMSA Area	Supply Net Increase (AFA)	2030 Demand Net Increase (AFA)	Supply/ Deficit (AFA)
Spring Mountain (b)	1,700-2,200	4,874	(2,674-3,174)
Sage	764-1,460	865	(101)-595
Warm Springs	2,365	1,502	863
Stead, Lemmon Valley and Cold Springs (b), (c)	11,909	18,485	(6,576)
Truckee Meadows TMSA (c)	22,363	17,021	5,342
Sun Valley TMSA (c)	2,607	2,607	0
Spanish Springs TMSA (c)	3,362	3,362	0
Sparks TMSA (c), (d)	Not included		Not included
South Truckee Meadows TMSA (c)	10,546	12,137	(1,591)
Bedell Flat	-	21,355	(21,355)
Washoe County FSA	-	10,270	(10,270)

(a) Reclaimed water is not included as part of the supply.

(b) 10,000 AF of water resources are potentially available and shared between Stead, Lemmon Valley, Cold Springs and Spring Mountain TMSA based on the Vidler and Intermountain water supply projects. A combination of imported and onsite water resources will be needed to satisfy the projected 2030 demands.

(c) 22,363 AF of potentially available water resources are identified for the Truckee Meadows TMSA. A portion of this supply will also be needed to serve the projected demands within the Stead, Sun Valley, Spanish Springs, Sparks and South Truckee Meadows TMSA. Based on current policies, water resources are not reserved for development in one planning area versus another.

(d) Information on the Sparks TMSA is provided in an independent document.

15.3 WATER RESOURCES AND LAND USE POLICIES

In several of the planning areas, a potential water supply deficit exists based on the projected development and the potentially available water resources. This is an acceptable practice, as recognized by the Regional Water Planning Commission in the following Policies and Criteria:

Policy 1.3.d: Water Resources and Land Use

Policy Statement: Proposed projects or land use changes or changes to the Truckee Meadows Service Areas that create or exacerbate a potential water supply deficiency are allowable. Long-range land use plans generally include more zoning and land use opportunities than will be developed within a specific planning horizon (20 years for example). Under the current regulations in the region, land use or zoning designations do not guarantee an allocation of future water resources. This applies to both surface and groundwater, including groundwater for domestic wells. Land use designations that create a potential water supply deficiency within the Truckee Meadows Service Areas

are consistent with current long-range land use planning practices. This allows for flexibility in actual development and avoids the perception of land shortages. While a potential water supply deficiency is allowable based on approved land uses, water supply commitments may only be approved pursuant to Policy 1.3.f.

Criteria to implement policy:

Local governments shall consider the following criteria in reviewing proposed projects or in reviewing changes to land use or proposing changes to the Truckee Meadows Service Areas:

- the potential resource requirement;
- the availability of uncommitted water resources in the hydrobasin, as identified in the Water Resource Budget[1];
- whether or not a potential water supply deficiency is created and its timing, magnitude and regional water resource impacts;
- existing water resource investigations that have been performed in accordance with Policy 1.2.b; or
- timing and availability of potential new water resources developed in accordance with Policy 1.3.c and / or potential mitigation measures.

Discussion: Water resource options will be identified to help meet the potential water resource requirements associated with fulfilling the reasonable development potential of properties identified under Regional Plan Policies 1.2.1 and 1.2.2, as presented in the preliminary 2003 Water Resource Baseline[1] and subsequent Water Resource Budgets. The RWPC recognizes that proposed projects, master plan, zoning or land use changes may create a situation where there are insufficient water resources identified to supply the build-out of all approved land uses within the Truckee Meadows Service Areas.

Policy 1.3.f: Water Resource Commitments

Policy Statement: Subject to existing state and local regulatory review, new commitments may not be issued against a water resource or combination of resources above and beyond the sustainable yield[2].

[1] The RWPC 2003 Water Resource Baseline and subsequent Water Resource Budget are subject to continuing review and update by the RWPC.

[2] In some hydrographic basins, the sustainable yield number is known with a fair amount of certainty, while in others there is less information available. It is recognized that sustainable yield may be determined and revised from time to time utilizing new reports and information developed by recognized agencies and sources. The Water Resource Baseline includes information about the level of confidence in sustainable yield numbers.

Where the combination of available water resources is inadequate to meet existing commitments or allow the issuance of new commitments, the RWPC may recommend the development of a management plan to address the over allocation.

Criteria to implement policy:

When determining whether there are additional commitments available under the sustainable yield, the local government or water purveyor shall evaluate the commitment request in terms of a specific water resource, or combination of resources. The local government or water purveyor shall consider a total of:

- existing commitments
- the potential water resources that can be used by existing parcels and lots that are entitled to construct domestic wells (whether or not such domestic wells currently exist)
- the proposed commitment

The following criteria will be applied to requests for will-serve commitments and creation of new parcels that would be served by domestic wells:

1. The responsible water purveyor shall make a case-by-case determination at the time of request for a "will serve" letter to ensure that no new water commitments are issued beyond the sustainable yield.
2. For parcel maps and subdivisions supplied by domestic wells, the local government will ensure that the approval would not result in a commitment of resources beyond the sustainable yield.
3. In specific basins, resources have been regulated by the State Engineer (such as groundwater in Basin 92) or by water purveyors through the development of an approved management plan or discount factor. In addition, certain orders have been issued by the State Engineer on specific resources detailing and limiting the amount of the resource available for municipal use while protecting the basin of origin. These resources shall be considered available sustainable yield and shall be managed in a manner consistent with such State Engineer regulation, management plan or discount factor.
4. The Water Resource Budget will be used as the basis for evaluating the availability of resources to serve the proposed commitment.

Discussion: While a potential water supply deficit is allowable based upon Policy 1.3.d, it represents a hypothetical (or potential future) demand on water resources. A commitment represents an obligation of a water purveyor to provide water to an approved project and therefore should be allowed up to the sustainable yield of the available resources or combination of resources. Properties with existing domestic wells and properties entitled to construct domestic wells constitute a form of

commitment of water resources made by a local government when the parcels or lots are created; however, there is no guarantee that well drilling will be successful.

15.4 FUTURE POTENTIAL WATER RESOURCES

A combination of imported and onsite water resources will be needed to satisfy the projected 2030 demands. In addition to the potentially available resources discussed for each planning area, several importation projects have been proposed to bring additional water to the TMSA. These potential future water resources are listed in Table 15.2.

Table 15.2 – Future Potential Water Resources

Project Name	Basin of Origin	Groundwater Quantity (AF)
Red Rock Valley Ranch, LLC (a)	Red Rock Valley	1,300
Aqua Trac, LLP (a)	Granite Springs	38,000
Intermountain (a)	Dry Valley	2,000 -3,000
Sonterra (a)	San Emidio & Hualapai Flat	7,200
High Rock & Juniper Hills Partners, LLC (a)	Hualapai Flat	10,000-14,000 ground and surface water
Lower Smoke Creek (b)	Basin 21	12,000- 14,000

(a) Data provided from TMWA.

(b) Data provided from Jackrabbit Properties LLC and Bright-Holland Co.

15.5 WASTEWATER TREATMENT REQUIREMENTS

Based on the TAZ land use assumptions and documentation of existing wastewater flows, a projection of build-out wastewater flows for each planning area has been developed. Recommended wastewater treatment capacity needs are developed for existing and proposed wastewater treatment facilities, together with general locations for new or expanded facilities. Recommended effluent disposal methods and limitations are also presented.

A summary of the wastewater treatment capacity required for each planning area is listed in Table 15.3.

Table 15.3 – TMSA Wastewater Flow Projections

Wastewater Service Area	2030 Capacity (MGD)
Combined Spring Mountain WRFs	3.5
Sage WRF	0.7
Future Warm Springs WWTP	0.4
Reno Stead WRF (including Lemmon Valley WWTP)	7.2
Cold Springs WRF	4.5
TMWRF (not including Sparks flow)	46.5
Truckee Meadows TMSA	41.5 (a)
Sun Valley TMSA	2.0
Spanish Springs TMSA	3.0
Sparks TMSA (b)	Not included
STMWRF	10.8
Bedell Flat	10.1
Washoe County FSA	6.8

(a) Includes 0.3 MGD from Stead/ Lemmon Valley TMSA for Golden Valley.

(b) Information on the Sparks TMSA is provided in an independent document.

15.6 INFRASTRUCTURE COSTS

Based on the water and wastewater infrastructure cost estimates developed in this Facility Plan, a summary of the projected costs for each planning area is presented in Table 15.4. The total 2030 water and wastewater facility estimated cost is approximately $1.8 billion. It should be noted that several significant cost components are not included in Table 15.4, such as the cost of implementation of future water importation projects to meet projected water demands, water rights, and long term reclaimed water and effluent management requirements. Insufficient information is available to estimate those costs at this time.

Stormwater and flood management costs are presented in Section 14.

Table 15.4 – Reno and Washoe County TMSA Water and Wastewater Facility Costs (a)

Area	Water ($M)	Wastewater ($M)	Total ($M)
Spring Mountain (b)	$64.4	$157.8	$222.2
Sage	$19.6	$63.7	$83.3
Warm Springs	$11.7	$36.9	$48.6
Cold Springs (c)	$98.1	$103.7	$201.8
Stead / Lemmon Valley (d)	$171.5	$251.2	$422.7
Spanish Springs (e)	$39.5	$78.2	$117.7
Sun Valley (e)	$5.9	$22.2	$28.1
Truckee Meadows (e)	$150.3	$223.9	$374.2
South Truckee Meadows	$154.0	$192.3	$346.3
Total	$715.0	$1,129.9	$1,844.9

(a) 20 Cities ENRCCI = 7,942 May 2007

(b) Imported water and on-site water supply and treatment costs are unknown at this time

(c) Water supply costs are unknown at this time. Cold Springs will likely receive an undetermined allocation of capacity from the $100M Fish Springs project, and the $22M Intermountain project. A $40M water supply cost is allocated to Cold Springs.

(d) Water supply facility costs are based upon $100M for Fish Springs, $22M for Intermountain and $8.168M for North Virginia capacity, less $40M allocated to Cold Springs

(e) Wastewater costs do not address long term reuse and disposal requirements

15.7 ADDITIONAL POLICY ISSUES FOR CONSIDERATION

Based on results of the analyses performed for the various TMSA areas, several recurring themes were identified. The following discussion presents several recommended policy issues and/or clarifications to existing City and County Code for Regional Water Planning Commission consideration. It is anticipated that proposed Regional Water Management Plan policy revisions will be undertaken as part of the current RWMP update.

TAZ Data – The land use basis for this Facility Plan is the Regional Transportation Commission Traffic Analysis Zone (TAZ) data provided by the City of Reno and Washoe County. Supplemental information has been incorporated from the City's Master Plan and Washoe County's planned land uses. TAZ data is not ideal for water and wastewater infrastructure planning. The TAZ boundaries do not take into account jurisdictional boundaries between Reno, Sparks, and Washoe County, nor do they account for different water purveyors, wastewater treatment areas, and hydrographic basin boundaries. For this data to be most useful for water and wastewater facility planning in the future, the RWPC and service providers must provide input on the format and content of the Regional Transportation Commission's TAZ projections.

Effluent Reuse - Potentially available water resources have been identified to serve the projected 2030 demands. A combination of imported and onsite water resources will generally be needed to satisfy the projected build out demands. Expanded use of reclaimed water, such as

front and/or back yard residential landscape watering, should be evaluated on a regional level and implemented where reasonable to extend available water supplies and help fulfill the development potential of the TMSA.

Effluent Reuse – Discharge of reclaimed water from the various water reclamation facilities in the region is constrained by a number of factors. Furthermore, some planning areas will generate more reclaimed water than can be fully utilized within that planning area. Regionally integrated reclaimed water systems and management strategies may realize economic and financially prudent alternatives that cannot be realized with separate, independent systems. Better coordination of rates, charges and ordinances should also be investigated to encourage expanded use of reclaimed water.

Effluent Reuse – The existing Policy 2.1.a: Effluent Reuse - Efficient Use of Water Resources and Water Rights, "encourages" the use of reclaimed wastewater for irrigation, recharge or other permitted uses, and "shall be pursued" to the extent that such use is an efficient use of water resources and water rights. To the extent that the respective criteria are satisfied, Reno and Washoe County should consider adopting ordinances that empower local governments, effluent providers, or water purveyors to require the use of reclaimed water, including the necessary facility improvements.

Effluent Reuse – Water purveyors and wastewater service providers should work in a coordinated manner to investigate, test, permit and implement a treated effluent aquifer storage and recovery (ASR) program within the region. Together with permitting and implementation of a treated effluent ASR program, the water purveyors and wastewater service providers should also undertake a long term program to evaluate the merits of indirect potable reuse as a supplemental water supply / water management alternative that is protective of public health and the environment. Treated effluent ASR and indirect potable reuse programs must be closely coordinated with NDEP since current regulations in Nevada do not allow this practice. Neighboring arid states, including California and Arizona, are implementing similar water management programs.

Water Conservation - Current landscaping practices account for approximately half of the total water demand for a typical residential unit. Water demands could be reduced by implementing water conserving landscaping practices and/or xeriscaping. However, water conserving landscape practices should be balanced with the need for disposal of reclaimed water.

Conformance Reviews – The facility recommendations presented herein are intended to provide the foundation for subsequent detailed planning and design. These future planning efforts will further refine and define the facility requirements presented in this Plan. When considering whether or not a refinement of the recommended facilities conforms with the TMSA Facility Plan and ultimately the Regional Water Management Plan and Truckee Meadows Regional Plan, the basic question to be answered is, "Does the design intent of the proposed facility (capacity, service function, construction phasing of major improvements, general location, design criteria, significant impact to other water related issues, etc.) substantially conform with the Regional

Water Management Plan and the design intent of the applicable water, wastewater and flood control facility plans presented in this Plan?"

The Regional Water Management Plan includes Policy 4.1.a: Facility Plans and Infrastructure Studies, for determining whether a proposed revision to the TMSA Facility Plan is of such a kind or size that affects the working of the Regional Water Plan, and is in conformance with the Regional Water Plan. The Regional Water Planning Commission should include specific criteria within Policy 4.1.a. to determine whether a proposed revision to the TMSA Facility Plan requires a review for conformance with the Regional Water Plan.

Floodplain Storage Outside of the Truckee River Watershed - Watersheds outside the Truckee River Watershed fall into two categories; areas that drain to terminal desert lakes, and those that drain into other watersheds such as the Long Valley Creek. Floodplain storage within the Truckee River watershed is critical to the proper function of the Truckee River Flood Project. However, floodplain storage is also important for groundwater recharge, riparian habitat and geomorphological processes. Floodplain storage is currently not being regulated outside of the Critical Zone 1 in the Truckee Meadows. It is recommended to establish a policy that encourages preservation of natural floodplain storage with all new development.

Watershed Protection - Watershed protection is mandatory for the preservation of water supply, water quality, the environment and recreation. The Regional Water Planning Commission has produced guidance documents aimed at protection of water quality in stormwater, but to date they are not required by ordinance. It is recommended that the following documents be adopted by ordinance by all participating local governments: Low Impact Development Manual and the Structural Controls Design Manual.

Currently the State of Nevada administers the National Pollutant Discharge Elimination System (NPDES) permit program for construction sites and a companion document, Construction Site Best Management Practices is available for guidance. It is recommended that this document also be adopted by ordinance.

Flood Volume in Closed Playas - Section 18.12.1703.g of the City of Reno code covers standards for closed lakes. This section states that no rise in water surface will be allowed. However, depending on the interpretation and methods accepted by the City to demonstrate compliance with this section, an increase in volume from a development may or may not be tolerated. The code would be much stronger if the requirement were stated that no property within a closed basin may discharge an increase in flow or volume of stormwater runoff when compared to the predevelopment state for a minimum condition of a 24-hour, 100-year storm event; as an alternative, a regional detention facility designed to handle multiple properties would be appropriate. Under this requirement there would be no need to consider the possibility that future development would increase the lake level as each individual development would be required to provide "onsite" retention, or participate in a regional facility to protect the existing water surface level.

Washoe County code Section 110.420.20.f.2 provides for the possibility of requiring detention of the 100-year excess runoff based upon the capacity of the downstream facilities. This code is effective for control of downstream drainage system capacity but does not address volume considerations. This code segment even if enforced strictly for all closed playa watersheds, will result in an overall rise of terminal lake level. The code should be revised to include a potential requirement for retention of excess stormwater as well.

Sediment Transport - Section 18.12.1703.b of the City of Reno code covers standards for alluvial fans. This section imposes a limitation on sediment flow through a subdivision that creates a health and/or safety hazard. This requirement could be strengthened to limit sediment flow on an alluvial fan within a development as well as downstream to predevelopment conditions. This would force development within alluvial fans to control sediment by controlling both maximum flow discharged downstream from a development, as well as hold the volume of discharge to the predevelopment condition. If just the flow rate is held to predevelopment conditions, the additional volume generated in the development would still generate an increase in sediment flows.

One of the most significant deterrents to enforcement of the existing code, as well as any future code restrictions, is the methodology used to demonstrate compliance. Sediment transport methodologies are approximate and will be difficult to apply and enforce. As a suggestion, criteria known to be successful in other similar environments might be studied for adoption in the Truckee Meadows. The methodology should be developed, approved and shared among the area professionals prior to modifying the code.

Natural Floodplain Storage - Section 18.12.1801 of the City of Reno code provides for retaining natural floodplain storage. The concept is good but there are loopholes that effect enforcement with this issue. If a stream has been altered in the past, then the storage appears to be human-caused rather than natural, and this section would then not apply. Acceptable language would include in the definition of natural floodplain storage, human-caused open areas, including ranches and farms.

The issue of no net loss in floodplain storage is currently enforced in the Truckee Meadows area identified as Critical Flood Zone 1; however, under the referenced code section it may be applied to more streams if amended. Washoe County and the City of Reno have accepted a critical flood zone where development may only be accomplished through mitigation if additional fill is being proposed. The flood zone boundaries are not coincident and it is recommended that they should be.

Finally with respect to the critical flood zone is the issue of enforcement. It is very likely that many small projects are undertaken within the critical flood zone boundary that may escape notice. The detriment of numerous small projects cumulatively is the same as for one large project. No development permits are required for landscaping and most jurisdictions exempt small projects from grading permits, which leaves as the only recourse for enforcement of the development codes with respect to floodplain mitigation, filing a criminal complaint.

Enforcement in this manner is time consuming and troublesome. A better mechanism would be through some type of permit, which can be enforced easily especially when complaints are received telling of someone breaking the rules.

It is recommended that the City of Reno as well as Washoe County specifically do not exempt the requirement for obtaining a grading permit for any grading performed within the critical flood zone areas even if it is for minor grading. A special category of the grading permit could be developed to allow citizens a relatively easy method to obtain a "small" grading permit and would likewise allow agencies an easily enforceable method to stop an individual from taking advantage of the current system by conducting illegal grading within the critical flood in small increments. The grading permit also allows for monitoring of activity over a long term. The "small" grading permit could be developed in a manner that would streamline the process for an individual that just wanted to move some soil on their property, while preventing a gradual loss of floodplain storage.

Section 18.12.1802 of the City of Reno code references a map entitled, "Potential Wetlands, Stream Environments and Regionally Significant Hydrologic Resources Map", depicting the locations of corridors that would qualify under this article, but it is not kept current. Most of the information is available as GIS data. It is recommended that this map be converted to a GIS overlay and included with other sensitive resources and then be made available to the public.

Enclosure of a Major Drainageway - Section 18.12.1904.e allows for the exception of enclosing a major drainageway. This situation is sometimes unavoidable to allow for maximization of the personal use of private property. One of the typical problems incurred when enclosing a major drainageway is that open channels tend to have more conveyance capability than an enclosed facility. This usually comes in the form of channel freeboard. Moreover, open channels can convey debris more effectively provided that road crossings are designed properly. It is recommended that language be included in the code for enclosing major drainageways to ensure that the design storm event for all such enclosures be a significant storm event, such as the 100-year storm event, and to include freeboard and when appropriate debris conveyance capabilities.

No Adverse Impact to Natural Major Drainageways - Chapter II, Section 1.4 of the City of Reno Public Works Design Manual provides for no adverse impact to natural drainageways. The issue of no adverse impact could also be discussed in light of stormwater volume. It could be argued under this statute that any increase to discharge from the property or increase in volume of runoff could potentially have a negative impact to a downstream channel. In light of that, clarification should be provided for this section to either include stormwater volume, or exclude it.