Outline

➢ Who we are/what we do

➢ Development Tracking

➢ Projections and Spatial Allocations

➢ Scenario Planning

➢ Application to Regional Services

➢ Conclusions
Who We Are/What We Do

Created in 1989 to foster coordination among the three local governments: Reno, Sparks, Washoe County

Support comprehensive and innovative approaches for economic development and community planning

Facilitating land-use, infrastructure provision, and resource management throughout the region

Collaborative information and data warehouse, coordinating regional data collection and delivering advanced geospatial analytics
Truckee Meadows Region

- Northeast of Lake Tahoe
- Situated in a ‘bowl’ between two mountain ranges
- The TMSA is the developed area that the Truckee Meadows Regional Planning Agency focuses on
DEVELOPMENT TRACKING

Parcel-level Data
Tracking Current and Future Land Use

Tracking residential development present and future potential

- Washoe County Parcels
- Tentative Maps (TMs)
- Existing Dwelling Units
- Planned Unit Developments (PUDs)
- Final Maps

TMRPA Land Use Fabric

Monthly Process for Updating Land Use Fabric

- WC Parcels
- Vacancy status
- Update DU and LU Class
- Update Final Maps
- PUDs
- TMs
- TMRPA LU Fabric

Tracking employees by business location

- Bank of America
- 15 local employees
Parcel Data

- Identify existing land use and zoning designation
  - Is it already developed?
- Identify vacant parcels
  - Unconstrained areas are buildable (remove slopes, public land, water bodies, flood)
- Estimate capacity of that land
  - Future housing units based on zoning and development approvals
  - Future employment based on existing employment mix and zoning
PROJECTIONS AND SPATIAL ALLOCATIONS
Washoe County Consensus Forecast

➢ Assessment of forecasted population and employment growth; performed every 2 years by TMRPA to inform planning efforts across the region.

➢ Sources
- Nevada State Demographer
- Truckee Meadows Water Authority
- Woods and Poole
- IHS – Global Insight
Spatial Allocation of Predicted Growth

- Translate time series projections to spatial allocation of housing units and employment

- Rule-based allocation model that uses an overall suitability score
  - Parcel-based
  - Dual-mode suitability model
    - Population
    - Employment
  - Written in Python

- Model results can be aggregated to any geography
  - Traffic analysis zones
  - Wastewater treatment facility service areas
  - Etc.
SCENARIO PLANNING

Truckee Meadows Housing Study
Population Growth

Historical (1990–2014)
- 181,000 new people
- 7,500 new people per year

Forecast (2015–2035)
- 128,000 new people
- 6,400 new people per year

Convert estimated population to necessary housing units:
- Divide by US Census Person Per Household multipliers (roughly 2.5 people per unit)
- Account for vacancy rate of around 11% (US Census)

Equates to roughly 50,600 new housing units needed by 2035
Develop Scenarios

Classic Scenario (1)
- Based on spatial pattern of recent home building, since 2000
- More development on the fringe of the community
- Allowed for very limited redevelopment
- Housing Type mix based on historic development percentages

McCarran Scenario (2)
- Change in spatial pattern with more emphasis on core of our region
- 25% of new homes modeled within the McCarran Ring
- Increased redevelopment on currently built parcels
- Housing Type mix varied to increase higher density types

Employment projections held constant in both scenarios
# Current Housing Types

<table>
<thead>
<tr>
<th>Housing Type</th>
<th>Example Housing Types</th>
<th>Existing Housing Stock in the Region</th>
<th>Examples in the Truckee Meadows</th>
</tr>
</thead>
</table>
| Low Density Single Family | Single family detached unit on a lot of 20,000 square feet and larger | 9% of Total Housing Stock  
15,000 housing units | ![Image](image1.png) ![Image](image2.png) |
| Moderate Density Single Family | Single family detached unit on a lot between 6,000 and 20,000 square feet | 45% of Total Housing Stock  
80,000 housing units | ![Image](image3.png) ![Image](image4.png) |
| High Density Single Family/Low Density Multi-Family | Single-family detached unit on a 4,500 square foot lot  
Townhouse on a 4,000 square foot lot  
Tri-Plex with 3,000 square feet per unit | 18% of Total Housing Stock  
31,000 housing units | ![Image](image5.png) ![Image](image6.png) |
| Moderate Density Multi-Family | Two or three story garden or walk-up apartment building with about 15 to 30 dwelling units per acre | 19% of Total Housing Stock  
34,000 housing units | ![Image](image7.png) ![Image](image8.png) |
| High Density Multi-Family | Multi-story apartment or condominium building with more than 30 dwelling units per acre | 9% of Total Housing Stock  
15,000 housing units | ![Image](image9.png) ![Image](image10.png) |
Housing Type Mix

Forecasted growth of 50,600 new dwelling units in TMSA 2015-2035

Classic Scenario (1)
- Low Density Single Family: 5,554 (11%)
- Moderate Density Single Family: 10,144 (20%)
- High Density Single Family/Low Density Multi-Family: 6,483 (13%)
- Moderate Density Multi-Family: 2,603 (5%)

McCarran Scenario (2)
- Low Density Single Family: 3,468 (7%)
- Moderate Density Single Family: 21,239 (42%)
- High Density Single Family/Low Density Multi-Family: 11,486 (23%)
- Moderate Density Multi-Family: 10,492 (20%)
- High Density Multi-Family: 3,937 (8%)
Classic Scenario (1): New Dwelling Units by 2035

Scenario 1A 2035
Predicted Units
- 1
- 2 - 5
- 6 - 25
- 26 - 50
- 51 - 100
- > 100
McCarran
Scenario (2): New Dwelling Units by 2035
Scenario Differences (2020 - 2035)

Difference in Units Predicted by Scenario

Baseline (Classic - 2035)
- 0 - 5
- 6 - 25
- 26 - 75
- 76 - 150
- 151 - 349

Compact (McCarran - 2035)
- 0 - 5
- 6 - 25
- 26 - 75
- 76 - 150
- 151 - 502
- No Differences
APPLICATION TO REGIONAL SERVICES

Wastewater
Wastewater Reclamation Facility (WRF) Boundaries

- 5 WRF boundaries within our region
- Wastewater estimates by parcel are aggregated up to these boundaries
- Ability to estimate future impacts to facilities based on projected growth

Wastewater Reclamation Facility Areas
- Cold Springs Service Area
- Lemmon Valley Service Area
- Reno-Stead Service Area
- STMWRF Service Area
- TMWRF Service Area
# TMWA Indoor Water Use Coefficients

*Indoor usage only*

*Winter months from December - March*

*Weighted Average gives more weight to hydrobasins that have more units or meters in them*

<table>
<thead>
<tr>
<th>Hydro-basin</th>
<th>GMWS</th>
<th>GMWS Meters</th>
<th>MMW (per customer)</th>
<th>MMW (per unit)*</th>
<th>Multi-Family Units</th>
<th>RMWS</th>
<th>Single-Family Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>83</td>
<td>170.4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>51.5</td>
<td>213</td>
</tr>
<tr>
<td>85</td>
<td>265.8</td>
<td>206</td>
<td>325.1</td>
<td>32.5</td>
<td>944</td>
<td>64.4</td>
<td>17407</td>
</tr>
<tr>
<td>86</td>
<td>201.9</td>
<td>19</td>
<td>193.5</td>
<td>19.4</td>
<td>234</td>
<td>19.4</td>
<td>6079</td>
</tr>
<tr>
<td>87</td>
<td>481.5</td>
<td>5646</td>
<td>356.5</td>
<td>35.7</td>
<td>49501</td>
<td>55.4</td>
<td>78137</td>
</tr>
<tr>
<td>088E</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>8</td>
<td>36.0</td>
<td>2093</td>
</tr>
<tr>
<td>088W</td>
<td>116.2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>8</td>
<td>30.5</td>
<td>2093</td>
</tr>
<tr>
<td>89</td>
<td>101.6</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>33</td>
<td>24.0</td>
<td>1898</td>
</tr>
<tr>
<td>92</td>
<td>397.5</td>
<td>270</td>
<td>415.8</td>
<td>41.6</td>
<td>1231</td>
<td>55.3</td>
<td>11710</td>
</tr>
<tr>
<td>Average</td>
<td>247.8</td>
<td>-</td>
<td>322.7</td>
<td>32.3</td>
<td>-</td>
<td>45.3</td>
<td>-</td>
</tr>
<tr>
<td>Weighted Average</td>
<td>469.67</td>
<td>-</td>
<td>35.7</td>
<td>-</td>
<td>54.0</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*Assumes an average of 10 units per service*

- Water use coefficients are derived from billing records from 2009-2015
- Indoor usage only
- Winter months from December - March
- Weighted Average gives more weight to hydrobasins that have more units or meters in them
## Methods – Wastewater Generation Calculations

### Residential

<table>
<thead>
<tr>
<th>Dwelling Unit Type</th>
<th>Dwelling Units (Dus)</th>
<th>(DUs×Coefficient ×Gallons)÷365 days</th>
<th>Total Wastewater Generation (GPD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Family (weighted)</td>
<td>1</td>
<td>(1×53.992×1000) ÷365 =</td>
<td>148</td>
</tr>
<tr>
<td>Multi-Family (weighted)</td>
<td>1</td>
<td>(1×35.661×1000) ÷365 =</td>
<td>98</td>
</tr>
</tbody>
</table>

### Non-Residential (GMWS)

<table>
<thead>
<tr>
<th>Unit</th>
<th>(Units×Coefficient ×Gallons)÷365 days</th>
<th>Total Wastewater Generation (GPD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Employee</td>
<td>(1employee×0.075 ×0.49) (469.67×1000) ÷365 =</td>
<td>47 Gallons Per Employee</td>
</tr>
</tbody>
</table>

### Non-Residential (employee-weighted)

<table>
<thead>
<tr>
<th>Unit</th>
<th>(Units×Coefficient ×Gallons)÷365 days</th>
<th>Total Wastewater Generation (GPD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Employee</td>
<td>(1employee×0.075 ×0.49) (469.67×1000) ÷365 =</td>
<td>47 Gallons Per Employee</td>
</tr>
</tbody>
</table>

### Weighted Average Factors

<table>
<thead>
<tr>
<th>Factor Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Businesses Per Employee</td>
<td>0.0750</td>
</tr>
<tr>
<td>Meters Per Business</td>
<td>0.4862</td>
</tr>
<tr>
<td>Businesses Per Employee</td>
<td>0.06055</td>
</tr>
<tr>
<td>Meters Per Business</td>
<td>0.3578</td>
</tr>
</tbody>
</table>

- We chose a weighted-average approach to reflect the impact that more dwelling units and/or employees have on the overall average of water demand or wastewater generation.
- Our initial calculations indicate that the weighted approaches had produced results more in line with observed flows.
## Regional Wastewater Generation – Validation with Observed (2015)

<table>
<thead>
<tr>
<th>Water Reclamation Facility (method)</th>
<th>Total Wastewater Generation - Employee Factors Weighted (GPD)</th>
<th>Average Day Annual Flow (GPD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMWRF</td>
<td>26,787,640</td>
<td>26,330,000</td>
</tr>
<tr>
<td>STMWRF</td>
<td>3,339,401</td>
<td>3,000,000</td>
</tr>
<tr>
<td>RSWRF</td>
<td>1,459,302</td>
<td>1,400,000</td>
</tr>
<tr>
<td>CSWRF</td>
<td>325,080</td>
<td>297,000</td>
</tr>
<tr>
<td>LVWRF</td>
<td>182,921</td>
<td>260,000</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>32,094,344</strong></td>
<td><strong>31,287,000</strong></td>
</tr>
</tbody>
</table>

**Comparison**

| Percentage of ADAF | 102.58% |
## Comparison – Classic Scenario (1A) vs. McCarran Scenario (2A)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>TMWRF 1</th>
<th>TMWRF 2</th>
<th>STMWRF 1</th>
<th>STMWRF 2</th>
<th>RSWRF 1</th>
<th>RSWRF 2</th>
<th>LVWRF 1</th>
<th>LVWRF 2</th>
<th>CSWRF 1</th>
<th>CSWRF 2</th>
<th>TOTAL 1</th>
<th>TOTAL 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>1,676,938</td>
<td>1,727,897</td>
<td>803,689</td>
<td>385,541</td>
<td>279,546</td>
<td>258,876</td>
<td>75,878</td>
<td>42,728</td>
<td>35,123</td>
<td>35,123</td>
<td>2,871,174</td>
<td>2,450,165</td>
</tr>
<tr>
<td>2025</td>
<td>3,193,791</td>
<td>3,303,387</td>
<td>1,326,118</td>
<td>814,603</td>
<td>591,609</td>
<td>483,545</td>
<td>228,011</td>
<td>202,810</td>
<td>75,303</td>
<td>64,677</td>
<td>5,414,831</td>
<td>4,869,021</td>
</tr>
<tr>
<td>2030</td>
<td>4,851,328</td>
<td>4,998,543</td>
<td>1,361,689</td>
<td>1,266,568</td>
<td>938,902</td>
<td>807,347</td>
<td>423,068</td>
<td>399,827</td>
<td>193,845</td>
<td>140,464</td>
<td>7,768,332</td>
<td>7,612,749</td>
</tr>
<tr>
<td>2035</td>
<td>6,232,927</td>
<td>6,455,611</td>
<td>1,798,665</td>
<td>1,637,415</td>
<td>1,135,789</td>
<td>1,020,746</td>
<td>499,504</td>
<td>505,412</td>
<td>462,476</td>
<td>229,209</td>
<td>10,129,362</td>
<td>9,848,394</td>
</tr>
</tbody>
</table>

**Modeled Wastewater Generation:**

- **TMWRF**
  - Scenario 1A
  - Scenario 2A

- **CSWRF**
  - Scenario 1A
  - Scenario 2A
Comprehensive Approach

Examined wastewater infrastructure at 3 levels:

- Reclamation facility
- Trunk/Interceptors
- Collection pipes
Regional Service Costs

- Collaborative effort with service providers
  - Transportation
  - School District
  - Water Service
  - Wastewater Service

- Ten percent (10%) reduction in capital costs in the McCarran Scenario (2)
CONCLUSIONS
TMRPA Value Add Using GIS

- TMRPA has used GIS analysis to go beyond its statutory requirements as a regulatory agency
- Development of a regional data warehouse assures all relevant data is centralized and accessible by local and regional entities
- The ability to manage existing and future land use development data at the parcel level in a GIS enables sophisticated simulation of different futures
- Scenario planning allows us to assess how variation in future development patterns will trigger different community impacts – which leads to informed policy discussion
Housing Study Takeaways

- Local governments and service providers all face pressing fiscal challenges to provide services and infrastructure
- Location of housing is very important: servicing land in more compact development scenario is less expensive
- Capital costs for infrastructure in the McCarran Scenario is $780 million less than Classic Scenario
- Over $100 million potential savings in wastewater service alone
- Learn more at www.tmrpa.org
Questions?