RESIDENTIAL DENSITY & WATER DEMAND

2017 Rocky Mountain Land Use Institute Conference
Mitch Horrie, Denver Water
Denver Water Retail Service Area

- Serve 1.4 million people
- About 335 sq. miles
- 25 master meter distributors
- Mountain snowpack supply:
  - 50% Co River Basin
  - 50% S. Platte Basin
Denver Water Multifamily Customer Characteristics

Multifamily Units by Density

- Zero to 15 Units/Acre
- 15 to 30 Units/Acre
- 30 to 50 Units/Acre
- 50 to 100 Units/Acre
- >100 Units/Acre
Residential Product Types

Large Single Family
- > 10,000 ft²

Typical Single Family
- > 5,000 ft²
- <10,000 ft²

Small Single Family
- <5,000 ft²
Product Types Contd.

**Townhomes, Rowhouses, Patio Homes, Zero Lot Lines, Small Multifamily**

Attached single family dwellings. No “stacked” development

**Three Story Walkup**

**Mid-Range Multifamily**

At least 3 Stories

Some surface parking. Can have parking structures.

**High Density Multifamily**

> 9 stories
Parking structure
What if there’s no pervious area?

Thousands of Gallons

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Indoor Use
Outdoor Use
Outdoor Water Use

Outdoor Water Use by Product Type

- Large SF: 250 gallons per unit per day
- Typical SF: 100 gallons per unit per day
- Small SF: 75 gallons per unit per day
- Small MF: 50 gallons per unit per day
- 3 Story Walkup: 25 gallons per unit per day
- Mid-Range MF: 10 gallons per unit per day
- High Density MF: 5 gallons per unit per day

Low Density vs. High Density
A large lot single family unit used about 4 times as much water as a unit in a high density development.
It’s not just density

- 74 units on 1.5 acres
- 40% of annual water use is seasonal
- About 60 gallons per pervious ft\(^2\)
- About 57 GPUD seasonal use
- 350 pervious ft\(^2\) per unit

- 72 units on 1.5 acres
- 2% of annual water use is seasonal
- About 6 gallons per pervious ft\(^2\)
- About 3 GPUD seasonal use
- 170 pervious ft\(^2\) per unit
Land Use and Water Tool

Two Tools:
1. Population and Product Type Model
2. Density Comparison Model

Land Area (Acres)

Scenario 1
   - Residential Density 1
   - Water Demand 1

Scenario 2
   - Residential Density 2
   - Water Demand 2

Scenario 3
   - Residential Density 3
   - Water Demand 3

Annual Demand Comparison

- Big Houses: 22 (4, 11)
- Tiny Houses: 15

Population Comparison

- Big Houses: 80
- Tiny Houses: 400

DENVER WATER