Smart Growth Implications for Water Quality

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Regions are growing…

- The US Census estimates that our population will grow by 50 million people by 2020.

Where and how will these people live?

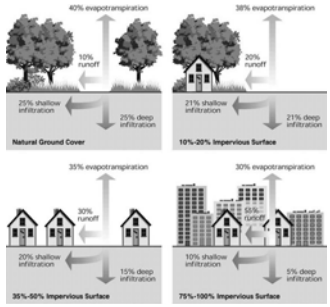
Development patterns

- 80% of residential development occurs on urban fringe or beyond
- 94% of that development on 1 acre or more

USDA Economic Research Service

Water Quality Impact from Development

- Impact of Trends
  - 1 acre parking lot has 16 times greater runoff
  - Water quality, impairment due to urban runoff:
    - Estuaries: 32 percent
    - Rivers: 13 percent
    - Lakes: 18 percent
    - Ocean shorelines: 56 percent



Which is better for Watershed Water Quality?

OR

Low Density

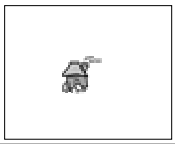
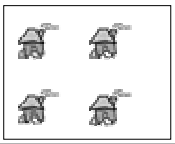
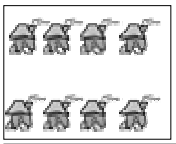
Higher Density

Water Quality and Land Use

Regardless of development densities, in order to ensure adequate water quality:

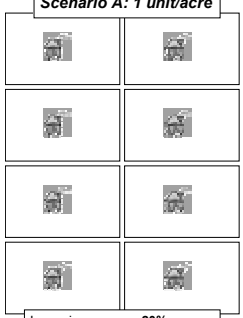
- Preserve large, continuous areas of open space;
- Preserve sensitive ecological areas
- Minimize overall land disturbance and impervious surface associated with development

EPA Research on Smart Growth & Water

Scenario A: 1 unit/acre	*Scenario B: 4 units/acre*	*Scenario C: 8 units/acre*
		
Impervious cover = 20% Runoff/acre = 18,700 ft^3/yr Runoff/unit = 18,700 ft^3/yr	Impervious cover = 38% Runoff/acre = 24,800 ft^3/yr Runoff/unit = 6,200 ft3/yr	Impervious cover = 65% Runoff/acre = 39,600 ft^3/yr Runoff/unit = 4,950 ft3/yr

Accommodating the same number of houses (8) at varying densities

Scenario A: 1 unit/acre



Impervious cover = **20%**
Total runoff = **149,600 ft^3/yr**
Runoff/house = **18,700 ft^3/yr**

Scenario B: 4 units/acre

Impervious cover = **38%**
Total runoff = **49,600 ft^3/yr**
Runoff/house = **6,200 ft^3/yr**

Scenario C: 8 units/acre

Impervious cover = **65%**
Total runoff = **39,600 ft^3/yr**
Runoff/house = **4,950 ft^3/yr**

And at the watershed level…

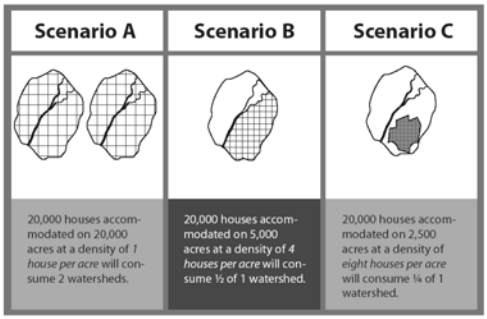
Accommodating 10,000 units on a 10,000 acre watershed at different densities

Scenario A	Scenario B	Scenario C
		
10,000 houses built on 10,000 acres produce: 10,000 acres x 1 house x 18,700 ft^3/yr of runoff = **187 million ft^3/yr of stormwater runoff** **Site: 20% impervious cover** **Watershed: 20% impervious cover**	10,000 houses built on 2,500 acres produce: 2,500 acres x 4 houses x 6,200 ft^3/yr of runoff = **62 million ft^3/yr of stormwater runoff** **Site: 38% impervious cover** **Watershed: 9.5% impervious cover**	10,000 houses built on 1,250 acres produce: 1,250 acres x 8 houses x 4,950 ft^3/yr of runoff = **49.5 million ft^3/yr of stormwater runoff** **Site: 65% impervious cover** **Watershed: 8.1% impervious cover**

The lower density scenario creates more run-off and consumes 2/3 more land that the higher density scenario.

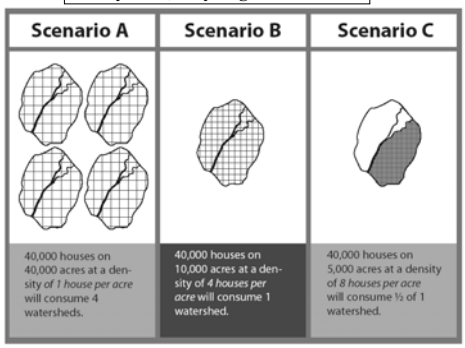
In 20 years, they have doubled their populations…

So by 2020, they might look like...



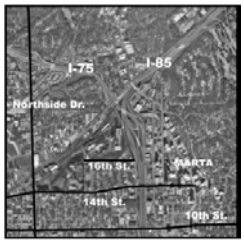
In another 20 years, they have doubled their populations, again…

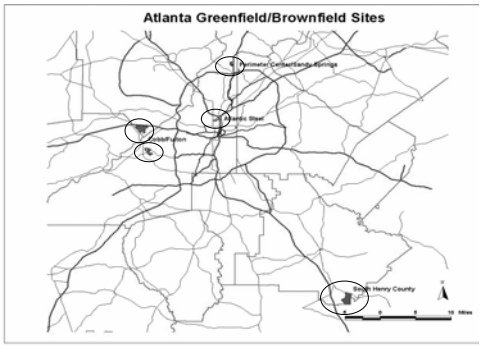
So by 2040, they might look like...



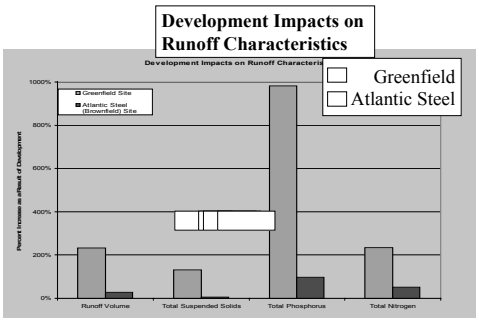
Atlantic Station

- Atlantic Station site near downtown. If you wanted infill, this is where you would want it.
- But terrible access: No road, no transit. Better access necessary to development.





Atlantic Station Water Analysis



Working Together: Density and Site-Design Strategies

- Complementary approaches for reducing total environmental impact
- Smart growth site design techniques prevent pollution
- Site-design strategies-- treats and stores remaining stormwater and pollutants on site

Result? Maximum benefit for communities addressing growth and water quality concerns

For example…

- Emeryville, CA is redeveloping many industrial sites to increase densities and to treat runoff.
- Portland, OR created "Green Streets," design guidelines for managing the nexus between roads and water

These site level approaches enhance the community's sense of place

And in Salishan, Washington...

- Currently a public housing project with 855 units
- Redesigned as a mixed use development with 1200 units, including market rate housing, local retail, senior housing facility, daycare

- Narrower streets, some streets replaced with walkways
- Site plan will restore 65 % of the land to forest and pervious landscape
- Remaining streets bordered by rain gardens

Should We Treat This Strip Mall Like a Forest?

Redeveloping a dead mall

- **Abandoned mall in Mizner Park, FL**
- **29 acres**
- **100% IC**
- **Value: $26.8 M**
- **Redeveloped into:**
  - **272 apartments**
  - **103K sq ft office**
  - **156K sq ft retail**
  - **decreased IC by 15%**
- **Value: $68 M**

Some successful community strategies

- ***Protecting Water Resources with Higher Density Development***
- ***Protecting Water Resources with Smart Growth*** catalogue 75 policies that simultaneously address growth and water quality

Using Smart Growth Strategies as a BMP

"Getting to Smart Growth" Volumes 1 and 2 catalogue 200 specific policies for implementing the 10 SG principles.

Available at: www.epa.gov/smartgrowth

Thank You

- My information
  - Lynn Richards: 202-566-2858
  - Richards.lynn@epa.gov
- Resources
  - EPA OWOW's smart growth water training: http://www.epa.gov/watertrain/smartgrowth/
  - Smart Growth Network: www.smartgrowth.org
  - International City/County Management Association (ICMA) www.icma.org
  - Local Government Commission www.water.lgc.org

Dispersed, large-lot development costs more to serve

Assuming same water use:

- 1/4 acre lot near plant = $143/year
- 1 acre lot near plant = $272/year
- 1 acre lot far from plant = $388/year

Source: Journal of the American Planning Association, 2002

Cost of water distribution

- About 80% of drinking-water system assets go to distribution
- Cost depends on:
  - Lot size
  - Distance from treatment plant

Lot size (lawns)

- Homes on 1/5 acre use 50% less water than those on ½ acre
- Outdoor water use (avg.):
  - National: 50-70%
  - Gainesville, FL: 11%
  - Utah: 60%
  - Las Vegas: 75%
- System capacity determined by peak demand: summer watering

Leaks

- Leakage determined by length and condition of pipes, pressure, connection
- 6 - 25% of treated water is lost to leaks
- 9.2 trillion gallons ($13 billion) lost to leaks each year nationally

Sources: Environmental Health Perspective, US Geological Survey, Kansas Water Office