



Wellhead Protection  
A Pennsylvania Perspective  
Options for Municipalities in  
Carbon County, Pennsylvania



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## Presentation Sponsors

- Carbon County Groundwater Guardians  
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- C-SAW Program - Consortium for Scientific Assistance to Watersheds Program  
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## Center for Environmental Quality

Non-profit/ equal opportunity employer, is operated and managed, within the Environmental Engineering and Earth Sciences

Outreach Programs

- Environmental and Professional Education and Training
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Website: <http://www.water-research.net>

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## Why Be Concerned about Groundwater Quality / Quantity ?

- In Carbon County - 45 % of residents serviced by private wells.
- Private Wells are not regulated by the PADEP or EPA
- Groundwater helps to maintain and sustain recreational areas and habitats, i.e., streams, lakes, wetlands, and most surfacewater features.
- Over withdrawal or groundwater mining can impact existing and future uses.
- Improper planning can result in groundwater contamination, which can cause a financial burden on individuals, business, and other entities in the County.

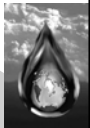
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County	# of homes served by private water systems			Avg. Change in homes served by private water systems per year	% of all homes served by public water	% of all homes served by private water system
	1980	1990	2000			
Bradford	13,443	16,865	20,287	+342	37	63
Carbon	6,594	12,235	17,876	+564	55	45
Lackawanna	9,952	12,745	15,538	+279	86	14
Luzerne	19,994	24,662	29,330	+467	82	18
Monroe	21,129	37,246	53,363	+1612	32	68
Pike	9,441	16,875	24,309	+743	45	55
Sullivan	2,147	4,727	7,307	+258	13	87
Susquehanna	9,423	15,212	21,001	+579	25	75
Tioga	9,126	11,888	14,650	+276	35	65
Wayne	9,913	19,097	28,281	+918	33	67
Wyoming	7,236	8,657	10,078	+142	27	73
Region	118,398	180,209	242,020	+562	43	57

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## Keys to Groundwater Resource Management and Planning

- Local or County regulations related to land-use, zoning, and wellhead protection.
- Well Siting, Drilling, and Construction Standards
- Groundwater Availability Analysis for Proposed Subdivisions or Proposed Expansions of Unregulated Water Systems.
- Community Education and Outreach
- Developing a Well Ordinance as part of the Act 537 Plan



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## Groundwater and Surfacewater Withdrawals (Who does what?)

- Depending on the size of a project or proposed use, the use of water for consumption or withdrawal may be regulated and permitted by the local PADEP and River Basin Commissions with feedback from the other state and federal organizations. Local agencies can not allocate water.
- PADEP and River Basin Commissions are not a local or county planning agency – they are state/federal permitting agencies.
- PADEP Permits and Regulates – Public Water Systems
- River Basin Commissions are typically involved with consumptive use or withdrawals starting at 20,000 gallons per day or the equivalent of 76 edus (equivalent dwelling units- 262.5 gpd/house).
- PADEP and River Basin Commissions do not contact local planning.

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## PADEP Regulates Monitors, and, Oversees the following:



1. Public Water System – has 15 service connections and services at least 25 individuals for 6 months during the year (This could be as few as 7- 3 bedroom homes).
2. Bottle Water Operations, Bulk Water Haulers, and Water Vending Machines

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## PADEP Permits / Regulates Public Systems

In Carbon County, Public Systems service only 55 % of the population.



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## Why Private Well Owners Need Some Help !



A USGS survey found that 70% of private wells were contaminated. This contamination could result in acute or chronic health concerns.



Over 45 % of Carbon County citizens use private wells.



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## Problem in Pennsylvania Is the Lack of State and Federal Regulations and Local Support / Education

- Currently No Federal Or Pennsylvania State Regulations Related to Private Water Well Construction.
  - Pennsylvania one of 2 states that has no private water well construction standards, via regulation.
  - PA does not really have a comprehensive certification program for drilling contractors and operators.
  - Local agencies do not have, require, or promote well ordinances, water availability analysis, water conservation, or water reuse.

**Great Opportunity for Grass-root Efforts !**

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## Protect Your Water Source Things a Citizen or Community Can Do

- Periodically Inspect
- Drain Surface Water Away
- **Install Sanitary Seal and Proper Well Construction**
- Annual Testing
- Maintain Records
- Start a Community Based Groundwater Education Program
- Carbon County Groundwater Guardians
- Proper Abandonment
- Chemical Storage, Disposal and Use
- Groundwater or Water Availability Analysis as part of Planning
- Proper Well Location
- Septic System Maintenance
- Recycle used Oil and Participate in Hazardous Chemical Disposal Programs
- Well Ordinance

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## Protect Your Water Source Things Local Agency Can Do

- Zoning and Planning Process that Includes a Groundwater Availability Analysis.
- Developing a Well Water Ordinance and Link the Well Water Ordinance to Act 537 Planning
- Developing Well Construction Standards
- Start or Support a Community Based Groundwater Education Program (Carbon County Groundwater Guardians, County Conservation District, and other partners)

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## Importance of Groundwater Analysis and Planning

- Protect the health, security, and well-being of the current residences and water users.
- Protect the environmental and recreational activities that rely on surfacewater – Groundwater and Surfacewater are linked.
- Protect long-term economic growth by properly managing are resources.
- Evaluate projects to make sure that proposed densities or demands do not exceed the natural recharge capacity of the

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As the area is converted from a natural woodland, grassland, or forest into developed lands, the amount of groundwater recharge decreases.

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Source: Dr. Dale Bruns, Wilkes University

Because of increased impervious areas, over-pumping of groundwater sources, stream base flows will decrease.

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Source: Mr. Paul DeBarry, PE, Borton-Lawson Engineering

## Why Conduct a Groundwater Availability Analysis ?

- A preliminary desktop assessment could help to identify potential impacts on existing uses or other regulated facilities during the planning process and existing problems within the community.
- Desktop assessments can be used to develop site-specific criteria for well construction for unregulated projects and long-term sustainability.
- For larger projects, a preliminary analysis may compile enough information to show that a more comprehensive site-specific analysis would provide sufficient data to show if the withdrawal is sustainable.
- Helps to provide a proactive means of managing groundwater and water resources and helps to ensure the long-term reliability, quality, and sustainability of the system.
- The groundwater system helps to sustain the water cycle during droughts.

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## When Should a Groundwater or Water Availability Analysis

- As part of planning and local approvals for new subdivisions or expansion of unregulated water systems, the applicant would conduct a groundwater availability analysis.
- For the Carbon County area, the analysis should be requested when the proposed density is greater than 1 edu per 2 acres or when the project is proposing the use of a central wastewater disposal system with a stream discharge and not a land-based wastewater disposal system.
- Groundwater availability analysis and hydrological description should be conducted by a licensed professional geologist.
- The initial desktop assessment should include a view of published and readily available data.
- Where the desktop evaluation indicates the potential for over-pumping of the aquifer, insufficient yield, or poor water quality, the local regulations could require a more comprehensive hydrological analysis that could include the installation of test wells and conducting a short-term pumping test.

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## Additional Options for Local Agency

- Developing Water Well Ordinance that provides construction standards and an initial water quality and yield analysis.
- Developing Well Construction and Placement standards – beyond a minimum isolation distance from land-based wastewater systems, what about hazardous chemicals, manure storage, stormwater facilities, floodplains, etc.

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## Why an Ordinance?

Primary reasons for the ordinances included:

- Improper Well Construction
- Incidents of Well Contamination
  - Improper Siting
  - Interconnection with Contaminated Site
  - Induce Contamination – Lack of Grouting
  - No Testing Requirements to ensure potability
- Overuse of the Groundwater Aquifer.



Online Directory of State Water Well Ordinances  
<http://www.epa.gov/R5water/ordcom/>

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## Well Construction Specs Jackson Township, Monroe County, PA

- Casing must be 18 inch above grade
- Must use a sanitary well seal
- 19# casing must be at least 40 feet in length and 10 feet into bedrock (does not say the bedrock should be firm)
- All casing must be threaded and coupled or if welded, a certified welder must weld it.
- Annulus must be grouted with neat cement grout, Promix cement grout, or concrete grout to within approximately 5 feet of the top of the casing.
- Well must be disinfected – this does not mean long-term disinfection treatment, but shock disinfected.

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## Well Construction Specs Paradise Township, Monroe County, PA

- Casing must be 24 inch above grade or the 100-year flood level of record
- Must use a sanitary well seal
- 19# casing must be at least 50 feet in length and 10 feet into bedrock (does not say the bedrock should be firm)
- Annulus must be grouted with bentonite grout.
- Well must be disinfected – this does not mean long-term disinfection treatment, but shock disinfected.

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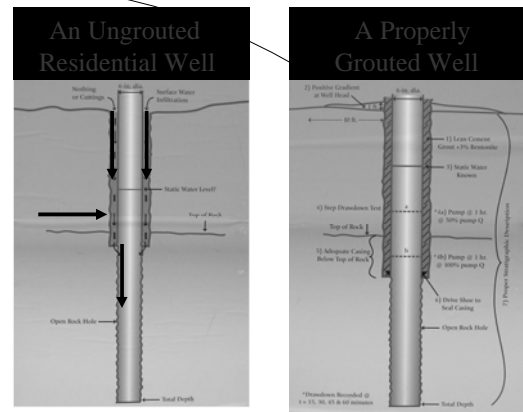
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## Well Construction Specs Ryan Township, Schuylkill County, PA

- Casing must be 12 inch above grade
- Casing wall thickness must be at least 0.1875 inch (13#)
- Must use a sanitary well seal
- Casing must be at least 40 feet in length and 10 feet into bedrock (does not say the bedrock should be firm)
- Annulus must be grouted within 24 hours with bentonite grout or Neat cement grout (No disturbance – 2 hours bentonite and 48-hours cement).
- Well must be disinfected – this does not mean long-term disinfection treatment, but shock disinfected.

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## Well Construction Options for Private Wells

Standard Well Cap



Allows entry for insects and small animals

Sanitary Well Cap



Sealed to prevent contamination

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## Why Care About Well Construction ?

- Poor construction can affect drinking water quality for well user and regional well users
- Poor construction can contribute, promote, and facilitate pollution and contamination of the groundwater aquifer
- Proper construction can prolong the life and yield of the well

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## A Properly Constructed (Sanitary) Residential Water Well Has:

- casing that extends at least 15 feet into firm bedrock or 40 feet below ground, whichever is greater
- casing of adequate wall thickness (meet PADEP Requirements Community Water Supplies- recommend 19#)
- a driveshoe on the bottom of the casing
- annular space should be grouted and casing should have a sanitary well cap.
- casing at least 12 inches above grade and 3 feet above flood elevation.

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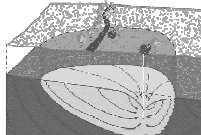
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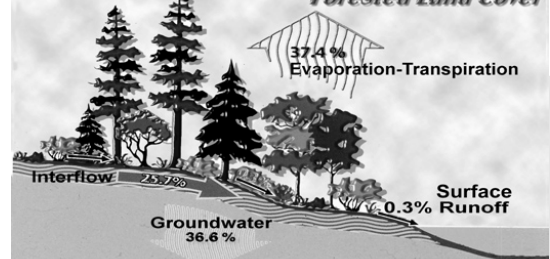
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## Hydrology Under Natural Conditions

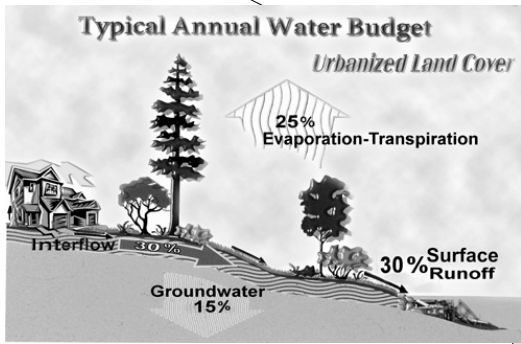
### Typical Annual Water Budget

#### Forested Land Cover



Courtesy May, U of W

## Developed Conditions



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Courtesy May, U of W

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