

Watersheds 101 – Outline

INTRODUCTION

- This is an INTRODUCTION to “**Watersheds**” so we will overview some highlights, but not discuss details or technical topics.
- We will cover 8 topics :
 1. What is a “watershed”?
 2. What is the “**Watersheds**” Plan?
 3. What’s IN the “**Watersheds**” Plan?
 4. What tools are available to assist with implementing “**Watersheds**”?
 5. How can “**Watersheds**” assist with land use and development planning and decision-making?
 6. How can “**Watersheds**” assist with water and wastewater planning and decision-making?
 7. How can “**Watersheds**” assist in applying for grants?
 8. What is YOUR role in implementing “**Watersheds**”?

1. WHAT IS A WATERSHED?

- A watershed is an area of land that drains to a common water body.
- It is bounded and surrounded by a continuous ridge line.
- Rain that falls within the area encircled by that ridge line, will flow downhill to a common stream, lake or pond.
- All of that area is the watershed of that waterbody.

- Everyone lives in a watershed
- Every inch of land surface is in a watershed
- Watersheds are generally named for the major stream that they drain to

- Watersheds are 3-dimensional
- They include
 - ridge that forms the boundary
 - land area within that boundary
 - network of streams that drain to the major stream
 - ground water that is recharged by rainfall infiltrating through the ground; and that ultimately flows through the ground until it reaches a stream
- Watersheds need water to work
- That water comes from precipitation - rainfall and snow.
- Chester county gets about 46 inches of precipitation in a normal year
- The rain can either
 - infiltrate into the ground and be taken up by roots of plants (transpired)
 - evaporated from the surface of the ground or plants or from shallow soils
 - infiltrate deeper into the ground until it reaches the ground water table
 - run off across the surface of the ground and into a curb or storm sewer and ultimately into a stream

First Order Streams

- Streams come in many different sizes.
- Stream size - or stream order - can be classified based on how many smaller streams came together to form it
- First order streams are the smallest streams - they are the first streams to form where ground water seeps out onto the ground year round
- When 2 first order streams come together (or “confluence”), they form a second order stream
- When 2 second order streams come together (or confluence) they form a third order stream, etc.
- Over 50% of all of the streams in Chester County are first order streams
- These first order streams are the most fragile and vulnerable to pollutants and water use; and they are the streams that we recommend be mapped, recognized and protected by municipalities.

Watershed Size and Nomenclature

- There is no universally accepted definition of the SIZE of a watershed.
- Different terms are applied differently by different people to refer to the relative size of a watershed
- Within the **Watersheds** Plan, we have used the following convention of terms:
 - **Basins** - can be subdivided into **watersheds**
 - **Watersheds** - can be subdivided into **subbasins**
 - **Subbasins** (or subwatersheds) which can be subdivided into **drainage areas**
- Refer to Figure 2-3, pg 29

Chester County Has 21 Watersheds

- Chester County includes portions of 21 watersheds.
- Nearly ALL of the County’s streams originate within Chester County and flow downstream to neighboring Counties in 3 states
- **Watersheds** Plan is intended to be IMPLEMENTED by Chester County
- But to develop the Plan, we had to STUDY larger portions of the 21 watersheds that extended into other states and other counties
- In total, our studies and planning covered
 - 21 watersheds
 - 78 subbasins
 - 160 municipalities
 - 8 counties
 - In 3 states
- **Watersheds** Plan addresses these 21 watersheds, emphasizing needs and guidance for Chester County.

2. WHAT IS THE “WATERSHEDS” PLAN?

- **Watersheds** was officially adopted by Chester County Commissioners in September 2002 as the water resources component of **Landscapes**, Chester County’s Comprehensive Land Use Policy Plan
- It was developed by CCWRA with assistance from CCPC, CCCD, CCHD, USGS, and the Water Resources Task Force.
- It is intended to be a REFERENCE and guidance document, not a book to read and absorb cover to cover
- It was developed to be a HANDBOOK for community-based stewardship of the water resources of Chester County
- It provides GUIDANCE on how we can accommodate planned growth within our communities while maintaining the integrity of our watershed resources
- It was also developed to serve as a Rivers Conservation Plan for all watersheds within Chester County - this allows the communities within these watersheds to be eligible for additional state funding and grants by having a watershed conservation plan in place to help guide projects.

What is an “Integrated Water Resources Plan” ?

- The remainder of the title indicates the planning approach used for **Watersheds** – “Integrated Water Resources Management Plan”
- “Integrated Resources Planning” is a concept used for some time in the electric utility industry.
- In 1998, DRBC began applying the concept to water resources
- In 2000, PA legislature coined the name “integrated water resources management planning” within legislation
- IWRP and IRP for water are considered synonymous
- The Point is – IWRP is necessary to fully address all water issues and appropriately incorporate water planning with land use planning.
- IWRP includes consideration of
 - water quality
 - ground water
 - stormwater
 - wastewater
 - human behavior
 - water quantity
 - streams
 - water supply
 - land use impacts
 - cultural/ historic resources
- **Watersheds** is the first and only county-wide IWRP in PA, possibly in the U.S.
- **Watersheds** has 7 goals.
 - Engage and educate individuals, communities and governments in watershed stewardship
 - Enhance water-based recreational and cultural resources
 - Preserve natural resources
 - Improve water quality
 - Reduce stormwater runoff and flooding
 - Protect watershed water balances

- Integrate utility and municipal planning to meet future water supply and wastewater needs
- These are the 7 “commandments” of integrating water resources into land use planning
- These serve as the final “litmus test” for whether ANY proposed project or land or water related activity ; has the project appropriately addressed each of these to the best extent practicable?

How does *Watersheds* relate to state laws?

- PA Act 67/68
 - addresses the requirements for water supply planning as a component of County comprehensive plan
 - provides guidance to municipalities on how to prepare their water supply planning components, in a manner consistent with intent of Act 67/68
- PA Act 167 Stormwater Management Planning
 - stormwater management strategies address all aspects of Act 167 plans except release rates from stormwater ponds; and even that is addressed to some extent
- NPDES Phase II Stormwater Regulations
 - the 6 MCMs required to be addressed by municipalities are incorporated into **Watersheds**
- State Water Planning Act of 2002
 - we hope **Watersheds** will serve (in some aspects) as a model for the new State-wide water plan

How does *Watersheds* relate to regulatory agencies?

- PADEP, PA-PUC, SRBC, DRBC
 - These agencies have been aware of (and most have been involved in) development of **Watersheds**, and have received multiple copies of the Plan for their use.
 - PADEP has considered and incorporated several of the stormwater management strategies from **Watersheds** into their stormwater management policies.
 - Our intention is to use **Watersheds** as we use **Landscapes** to respond to these agencies about proposed projects and whether or not they are consistent or inconsistent with County planning and policies. Success will be on a case-by-case basis.
- PADCNR – very supportive implementation of **Watersheds**; and is looking to **Watersheds** to be setting the leadership and overall guidance for applicants for DCNR grants from Chester County.

How does *Watersheds* relate to other local initiatives?

- Voluntary; not mandatory
- Will NOT involve new Memorandums of Understanding for municipalities
- Intended to serve as guidance and over-arching umbrella to support and assist efforts of municipalities and non-governmental organizations

3. WHAT'S IN "WATERSHEDS" PLAN?

- **Watersheds** includes several components
 - 1-page summary, presented as Letter to Reader
 - Table of Contents
 - 10 Parts or Chapters
 - Glossary of Terms and Acronyms
 - Numerous maps and tables that present useful information

- Let's walk through the document..... But we'll start from the BACK and work our way through to the front.

Covers

- Covers, layout and artwork throughout the document are credited to the CCPC Graphics Department Staff
- Inside front cover -
 - Mission statement of the Plan
 - Disclaimer, because it addresses some very technical topics, but does have limitations
 - Acknowledgements to our many funding partners including the Chester County Commissioners and grants from PA DCNR, PA DEP, and partnership with BVA and William Penn Foundation

Glossary of Terms and Acronyms

- This provides one composite collection of several terms and acronyms that are commonly used to discuss water resources and that are used within the document

Part 10

- The reason the **Watersheds** Plan was prepared is that there are many beautiful streams in Chester County, but each of them has numerous challenges
 - resources that need to be protected (Exceptional Value streams, threatened and endangered species, sources of public water supplies, etc.)
 - problems that need to be corrected (flooding, pollution, etc.).
- Part 10 presents a snapshot of the key management needs that were identified for each watershed
 - Resources to be protected
 - Growth and Land Use pressures
 - Water availability and use for water supply
 - Stormwater runoff problems (flooding, etc)
 - Water quality or pollution problems
 - Regional prioritizations - if the watershed or any of its subbasins ranked as high priorities across the County
- If you are working with any watershed in the County, this is a first good place to start to get acquainted with the key things that need to be done in that watershed
- Also pictures for each watershed.

Part 9

- The point of having the **Watersheds** Plan is to influence change and encourage improvement of the conditions of our water resources and preserve the natural resources of our watersheds.
- Part 9 presents several characteristics that we can track to help document whether conditions are improvement or deteriorating across the county.
- These serve as “indicators” of change, with hope that over time we will see positive change
- The **Watersheds** indicators have been incorporated within the **Landscapes** Indicators and will be tracked and reported as part of the *Landscapes Index*, which is published every 2 years.
- The primary indicator (and perhaps overall quantitative goal) of **Watersheds** is to reduce the percentage of streams assessed by PADEP that are designated as “impaired” (or polluted) toward zero.

Part 8

- For each of the 7 goals of **Watersheds**, there is a set of objectives for achieving the goal.
- For each objective, there is a set of strategies - specific things that can be done to achieve the goals and objectives
- there are 227 strategies listed in Part 8. This is the section to refer to if you want to know what to do to address a certain type of problem or need.
- For example, if a proposed subdivision plan is presented for review and comments, and you notice that it is located near a major waterbody, yet no recreational elements were included, you can refer to material presented on page 174, under goal for “Enhance Water-Based Recreational and Cultural Resources” for ideas on what might be suitable.
- Other Key topics of interest - strategies for
 - stormwater management
 - water supply planning and decision-making
 - forested riparian buffers
 - etc.

Part 7

- EVERYONE has a role in watershed stewardship.
- EVERYONE in the room has a role in watershed stewardship
- Only by individually accepting and undertaking our individual roles can we collectively restore and preserve our water resources
- This part presents listings of roles for all types of people - government agencies to developers to residential property owners
- In the front of this section is an extensive discussion of municipal roles, as they are the primary audience for **Watersheds** Plan.

Part 6

- This section is one of the most important

- It presents a process and the information to assist municipalities in making INFORMED decisions regarding water and wastewater service to new developments or areas with problems.
- The key message of this Part is - “THERE ARE OPTIONS”
- The dialog box on Pg 112 summarizes the steps of this process
- The maps on pgs 116-117 show
 - where public water and wastewater should be located, based on the planned growth areas identified in **Landscapes**
 - AND where existing public water and wastewater service areas are located
- These maps compare the vision of growth management to infrastructure.
- Pg 117 - presents a map of best available information of what water utility has the rights to serve which areas of Chester County.
- Table 6-3 presents water demand estimates for every municipality in Chester County for 1998 and 2020. This is a very KEY piece of information for municipalities to have to begin the water supply planning components of their Comprehensive Plans (all data need to be verified and updated by the municipality).

Part 5

- We saw in Part 10 how each watershed has its own specific needs.
- In part 5, we compared all of the 21 watersheds to each other to determine which was in the greatest need of protection or restoration of its resources.
- We also compared all of the 78 subbasins that comprise the 21 watersheds and ranked them to see which were in greatest need.
- Table 5-1 presents how each watershed ranked within each of the 4 categories; Figure 5-1 and 5-2 highlights the overall highest priority watersheds
- Table 5-2 presents all of the subbasins that ranked “high” in each of the 4 categories; Figure 5-4 shows the one subbasin that was determined to be of greatest overall concern
- While these rankings are useful and interesting, the primary element of Part 5 is Table 5-3 - the Priority Management Objectives for each watershed.
- This is a companion to Part 10, and was developed based on the inventory of management needs in Part 10.
- This is the key list for land use planning strategies and for watershed restoration projects and grant applications.

Part 4

- Part 4 presents each of the 7 goals of **Watersheds**, and their supporting objectives and some discussion of the rationale for each.
- This section provides the backup information to help justify or clarify recommended approaches.

Part 3

- Part 3 presents a snapshot of the existing conditions within the watersheds. Lets walk through this section just to see the variety of topics addressed and some of the useful graphics and maps presented.
 - Community values
 - Population and Growth
 - Land Use
 - Impervious Cover
 - Ground Water Quality
 - Stream Water Quality
 - Figure 3-5, table 3-3.
 - Cultural and Historic Resources
 - Biological Diversity
 - Stormwater and Flooding - Fig 3-10
 - Stormwater and Pollutant Runoff
 - First Order Streams - Fig 3-11 and Table 3-4
 - Watershed water budgets
 - Ground Water Balances and Availability (Figure 3-13 and 3-14)
 - Water Withdrawals and Discharges
 - Water Supply and Wastewater Estimates

Part 2

- Part 2 was included to help the Reader understand some of the key concepts of what a watershed is and how it works.
- What is a watershed?
- How do streams work?
- What is ground water?
- What are riparian buffers and why are they important?
- How does land use impact streams and ground water?
- How can we do things different to avoid degrading our streams and ground water?
- Figure 2-7 is an important figure of **Watersheds** - this summarizes some of the science behind our recommendations for riparian buffers at a glance and documents why riparian buffers are so important and why we recommend widths of up to 100 feet
- Figure 2-6 presents our recommendations for riparian buffers. Based on the scientific literature.

Part 1

- ... and that brings us back to the start - to Part 1.
- Here we present the summary of why and how we developed the Plan
- Table 1-1 is a handy table of statistics about each watershed.
- Figures 1-2 and 1-3 are the “center-fold” of **Watersheds**. In these 2 maps is the picture of why **Watersheds** was needed, and what problems exist that need to be addressed; and what resources and water uses exist that need to be protected.

- These 2 figures are the cornerstones of **Watersheds**.
- These 2 figures should be dog-eared, smudged and wrinkled in your copy of the Plan within a couple months.
- These 2 figures are what the 7 goals of **Watersheds** are all about.
- Figures 1-1 and 1-4 are included to help the Reader get oriented; to find what watershed they and their municipality are located within.
- Page 26 (top para) succinctly describes what **Watersheds** is intended to accomplish
- So now you see what mean that **Watersheds** is a “handbook” or guidance document.

Acknowledgements

- And you can see why our listing of “Acknowledgements” on pgs 11-14 is so long - it took a lot of people and public input to create this.

4. WHAT TOOLS AND REFERENCE MATERIALS ARE AVAILABLE?

- Several documents and reference materials have been published by CCWRA and CCPC that will assist municipalities in implementing **Watersheds**, including:
 - *Chester County, PA Water Resources Compendium*
 - Section 13 - Guidance for Municipalities
 - CCWRA Website <www.chesco.org/water>
 - *Watershed Action Plans*
 - General overview of maps and tables and info included
 - Table of Priority Recommended Management Actions and Costs
 - CCPC “*Toolbox for Change*”
 - 4 Municipal Ordinance Tools being developed (including stormwater management, conservation design, riparian buffers, and others)
 - Streams Designations Map
 - Impaired Streams Map
 - First Order Streams map

5. HOW CAN WATERSHEDS ASSIST MUNICIPALITIES?

Municipal Roles

- Review / revise ordinances to reduce generation of stormwater and other impacts
- Review / revise ordinances and comprehensive plans to incorporate other **Watersheds** goals and strategies
- Encourage conservation development designs
- Manage municipal-owned lands and facilities consistent with **Watersheds**
- Participate in multi-municipal IWRPs
- Expand public education and participation in watershed stewardship

Four priorities for municipal implementation:

- **Watersheds** identifies 4 priority areas for municipal implementation:
 - Providing and enhancing water-based recreation and cultural resources
 - Reducing stormwater and flooding impacts
 - Establishing networks of forested riparian buffers
 - Preparing integrated water resources plans for meeting future water / wastewater needs.
 - A fifth is somewhat included in these, but worth special mention:
 - Improve water quality
- These 5 items SHOULD BE primary items considered when developing municipal plans, ordinances and subdivision reviews.
- These (except #1 and #4) should also apply to plans and practices for agricultural operations.

Land Development Review / Decision-Making:

- See handout – “**Watersheds** Checklist”
- CCPC and CCWRA will be using this checklist internally for reviews.
- The checklist may be useful to municipal representatives
- Some of the key questions included in the checklist are:
 - Determine what watershed(s) it's in
 - What problems already exist in that watershed? (Figure 1-2; Part 10)
 - What resources exist that need to be protected? (Figure 1-3; Part 10)
 - What are the priority management objectives for that watershed(s)? (Table 5-3)
 - Will this exacerbate problems or degrade resources or existing uses?
 - Has it incorporated the 7 Goals to the greatest reasonable extent possible? (see guidance questions on checklist)

Municipal Comprehensive Plans

- Similar approach; checklist may assist as a guide
- Some key questions include:
 - What watershed(s)?
 - What resources to be protected (EV/HQ streams; carbonate aquifers; PNDI habitat; sources of public water supplies)?
 - What problems to be corrected (ground water / streams water quality; flooding)?
 - Any downstream water supply intakes; or downgradient public water supply wells?
 - Geology? (carbonate; serpentine; diabase)
 - Areas designated for future public water / wastewater service?
 - Sources of water used for water supply in municipality?
 - Projections of future water demand?
 - What alternatives of water sources are available to consider for meeting future demand?
 - “10 principles of comprehensive stormwater management” included?
 - Forested riparian buffers included?
 - Water-based recreation and cultural resources addressed?

- **Address the 7 Goals as robustly as possible**

6. HOW CAN WATERSHEDS ASSIST WITH WATER / WASTEWATER PLANNING?

- Lets take a closer look at Part 6.
- Water pipes do not create sprawl all by themselves. But they are often the LAST piece of the puzzle.
- Schools, hot real estate market, roads, wastewater capability, and water supply are needed, and all of these exist everywhere in Chester County.
- There are always options for meeting water and wastewater needs.
- **Watersheds** encourages
 - informed decision-making
 - sound planning basis
 - objective evaluation of all reasonable alternatives

Six Step Process for Water Supply Planning (pg. 112):

- Identify planning area and partners involved
- Develop projections of growth in population and employment
- Estimate current and future water demand
- Identify potential alternatives for meeting additional demand
- Identify constraints
- Evaluate, select and plan for implementation of alternative(s) that best meets the collective needs and interests of the municipalities, utilities and other stakeholders

Included in *Watersheds*:

- Guidance for the 6 step process
- Suggested planning partners (Figure 6-1)
- Recommended public service planning areas (per **Landscapes**)
- Maps of existing public service
- Inventory of available alternatives (ground water, streams, reservoirs, existing utility systems, conservation/reuse, etc.)
- Hierarchy for evaluating alternatives (e.g. when to use ground water and when to use surface waters)
- Techniques for protecting rural pipeline corridors
- Source Water Protection strategies
- Population and Employment Projections (table 6-2)
- Water Supply Demand and Projections (table 6-3)
- Ground Water Availability Data (table 6-4)
- Total Water Availability Data (table 6-5)

7. HOW CAN WATERSHEDS ASSIST WITH GRANT APPLICATIONS?

- With the completion of **Watersheds**, municipalities and others are eligible for funding under additional PA DCNR Keystone Programs
- Municipal implementation of **Watersheds** is eligible for funding under Chester County Planning Commissions Vision Partnership Program
 - ordinances
 - comprehensive plan updates
 - special projects - multi-municipal integrated water resources plans
 - etc.
- **Watersheds** was funded by
 - PA DCNR Keystone Rivers Conservation Program
 - PA DEP 319 Nonpoint Source (close enough to Growing Greener)
 - William Penn Foundation
 - Chester County Commissioners
- Thus, if you are applying to these entities for funding, your proposed project **SHOULD BE CONSISTENT** with **Watersheds**
- Specifically, include in your application:
 - which goals, objectives AND STRATEGIES (Part 8) is your project implementing?
 - which priority management objectives will your project address for your watershed (Table 5-3)?
 - which problems (shown on Figure 1-2 and listed in Part 10) are you restoring?
 - which resources and water uses (shown on Figure 1-3 and listed in Part 10) are you preserving or enhancing?
 - Which recommended priority actions it is implementing (from listing in Watershed Action Plan)?
- CCWRA will provide letters of “consistency”
 - provide us with your request, draft letter, and short summary of technical scope 10 days in advance of when you need it returned to you.
- PA DCNR and PA DEP will be looking for consistency with **Watersheds**
- CCPC - VPP will REQUIRE consistency with **Watersheds**

8. WHAT IS YOUR ROLE?

- To wrap up, lets re-visit what YOUR ROLE is for the implementation of **Watersheds**, given everything we’ve discussed here in the workshop
- Pages 151-170.
 - Residential / homeowner roles
 - Management of government owned / operated lands and facilities
 - Governance of land planning and development