

## Back Creek Watershed Critical Area Resource Plan (CARP)

### Critical Water Planning Area Elements

Below is the list of seven critical elements necessary for the development of a Critical Area Resource Plan (CARP) in the context of the Pennsylvania State Water Plan. The seven critical elements are listed along with the items necessary for each critical element, and an explanation as to how these elements will be achieved for the Back Creek Watershed.

**Agencies involved: USGS, Mountain Watershed Association (MWA), Mackin Engineering, Somerset County Conservation District (SCCD), and Fayette County Conservation District (FCCD).**

#### **(i) An identification of existing and future reasonable and beneficial uses.**

**Attainment:** Need to determine what the different water uses in the basin. This information will be compiled along with the official use for the different surface-water bodies available at website: [www.pacode.com/secure/data/025/chapter93/s93.9v.html](http://www.pacode.com/secure/data/025/chapter93/s93.9v.html). The information on water use is available from the work that USGS and PADEP conducted to draft the report "Verification of Water-Analysis Screening Tool Results for Indian Creek watershed, Fayette and Westmoreland Counties, Pennsylvania". This report was compiled by USGS for the State Water Plan in 2009.

#### **Items that need to be addressed under (i):**

##### ***Withdrawal Uses***

*This section addresses existing withdrawal uses. The water use identification and quantification should include the following:*

- *Service areas and franchise areas of public water suppliers and amount of water use in these areas, including an assessment of per capita use and bulk sales or purchases through interconnections*
- *Self-supplied water users, by category and the amount of water use*
- *Water use by type of source (i.e., ground water and surface water)*
- *Service areas of sewage collection systems and quantity of discharge from those systems*
- *Areas served by on-lot wastewater disposal, and quantities*
- *Consumptive uses (water not returned, e.g., evaporation, transpiration, product incorporation or export)*
- *Interwatershed transfers - imports to and exports from the watershed(s), including through water supply and wastewater systems*
- *Existing water conservation programs and their effects*
- *Compliance with permit limits and conditions on withdrawals.*

##### ***Non-withdrawal Uses***

*For streams and other surface waters within the watershed(s), identify non-withdrawal or instream uses, including existing and designated stream uses, and where possible assess the flows and base flows needed to protect those uses based upon established standards. Such uses may include:*

- *Protection of aquatic resources*
- *Recreational uses, such as swimming, boating or fishing*
- *Hydropower*
- *Navigation or commercial boating*

**Tasks for (i)**

- **Compile and review existing water use information for Back Creek (USGS). - DONE.**
- **Compile and review additional water use information, including service boundaries, permit information, and interbasin transfers (USGS). -DONE.**
- **Summarize instream uses (MWA, FCCD, SCCD). - STATUS UNCERTAIN.**
- **IFIM study (MWA, FCCD, SCCD, USGS). -FIELD WORK COMPLETE; TEXT BEING DRAFTED.**
- **Benthic macroinvertebrate assessment (MWA, FCCD, SCCD). -FIELD WORK COMPLETE; TEXT BEING DRAFTED.**

- **(ii) A water availability evaluation, including a quantitative assessment of the available water resources and their relationship to the existing and future reasonable and beneficial uses.**

**Attainment:** A water availability evaluation was conducted for the Indian Creek watershed as part of the State Water Plan. The USGS Water-Analysis Screening Tool (WAST) was used in coordination with PaDEP's state water use database to determine if the Indian Creek Basin was stressed relative to water availability. The results showed that the most stressed area within the Indian Creek watershed was the Back Creek subbasin. Water quality, discharges, and basin characteristics in the basin will also be evaluated. There are no parts of Back Creek on the 303(d) list. Future water use, land-use changes, and population growth will be evaluated with respect to water availability.

**Items that need to be addressed under (ii):**

*The assessment of existing and future available water resources should include an evaluation of the following:*

- *All natural water sources (streams and aquifers) within the watershed(s), including: yield, flows, location, extent, ground water maps, watershed boundaries, etc.*
- *All sources originating outside the watershed(s) (water supply or wastewater)*
- *Existing hydrologic data for the watershed(s). Such information would include:*
  - *Geology and water producing capabilities of the geologic units and their potential use for water supply.*

- *Streamflow data and statistics for the watershed(s) or nearby gaged watersheds of similar characteristics including estimates of mean daily flow, 1 in 25 year annual average baseflow and Q<sub>7-10</sub>.*
- *Precipitation*
- *Storage in on-stream and off-stream reservoirs, including consideration of passby flow or conservation release requirements*
- *Permit limits and conditions*
- *System capacity limits*
- *Sewage treatment systems within the watershed(s). Types of information that may be useful to consider:*
  - *For wastewater discharges: locations; monthly average and peak flow volumes; permitted capacity; system capacity; effluent limits; pollutant loads; service area; inflow and infiltration (I/I) estimates; ground water recharge and land application sites; and Act 537 Plans.*
  - *For septic systems: community septic systems; areas with on-lot septic systems; areas with failing septic systems; estimated discharges and nutrient loads.*
- *Important natural resources and habitat existing in the watershed(s).*
- *Land uses and/or land cover within the watershed(s) - types and area of land in each; forest and impervious cover should be estimated for the watershed(s).*
- *Estimates of stormwater runoff, evapotranspiration and infiltration.*
- *Areas of impaired water quality and the sources of impairments with the goal of assessing how these impaired areas affect water availability.*

#### Tasks for (ii)

- **Review WAST tool results (withdrawals, discharges, sources of water) and add additional pour points as needed (USGS). - DONE.**
- **Identify water quality impairments in the watershed (USGS). - ONGOING; DATA COMPILED; IMPAIRMENTS NOT IDENTIFIED.**
- **Compile characteristics of basin, including land use, human population, geology, and soils (USGS & MACKIN). - ONGOING; NEARLY FINAL.**
- **Summarize hydrologic data (streamflows, precipitation, aquifers) (USGS). - ONGOING; NEARLY FINAL.**
- **Summarize wastewater streams in basin (WWTP, septic) (USGS). - ONGOING; NEARLY FINAL.**
- **Summarize important natural resources in basin (MWA, FCCD, SCCD). - STATUS UNCERTAIN.**
- **Determine how future development (changes in human population and associated land-use changes) may impact water use (USGS, MACKIN). -NO PROGRESS.**

**(iii) An identification of the quantity of water available for new or increased uses of water in the foreseeable future and an identification of quantities required for future water uses associated with planned projects or developments.**

**Attainment:** Identify alternative water sources, if any, in Back Creek, anticipated future water use, and increases to existing permits. This will be done through discussions with municipal and water authority officials, review of existing permit applications, and review of future land use maps developed as part of this project. These changes to water use will be input to the USGS WAST as scenarios to determine how increased water usage would affect WAST results previously run on existing water use.

**Items that need to be addressed under (iii):**

***Planning Period***

*At a minimum, it is recommended that a 15-year planning period be evaluated. If possible, determine future water demands for 5-year time intervals.*

***Population, employment and development***

*Future scenarios should be based on best available population and employment projections; county and local land use plans and ordinances, and land development proposals. Full zoning build-out scenarios result in over-projection of growth and are not encouraged.*

*The Critical Area Resource Plan should delineate where (geographically) land development would likely occur in the watershed(s) based upon local comprehensive planning and zoning and proposed land development projects. Based upon these delineations, distribution of future water use in the watershed(s) should be estimated.*

***Future Withdrawal Uses***

*This section discusses the projection of future withdrawal uses. The water use assessment should include an evaluation of the following:*

- *Future service areas and franchise areas of public water suppliers and amount of water use in these areas, including an assessment of per capita use and bulk sales or purchases through interconnections*
- *Future self-supplied water users, by category (e.g., residential, industrial, commercial, institutional, agricultural livestock and irrigation, non-agricultural irrigation, thermoelectric power, and mining), and the amount of water use*
- *Future water use by type of source (i.e., ground water and surface water)*
- *Future service areas of sewage collection systems and quantity of discharge from those systems*
- *Future areas to be served by on-lot wastewater disposal, and quantities*
- *Future consumptive uses*
- *Future interwatershed transfers - imports to and exports from the watershed(s), including through water supply and wastewater systems*
- *Potential future water conservation programs and their effects*

***Future Non-withdrawal uses***

*For streams and other surface waters within the watershed(s), identify future non-withdrawal or instream uses, including existing and designated stream uses, and where possible assess the flows and base flows needed to protect those uses based upon established standards. Such uses may include:*

- *Protection of aquatic resources*
- *Recreational uses, such as swimming, boating or fishing*
- *Hydropower*
- *Navigation or commercial boating*

#### **Tasks for (iii)**

- **Run WAST tool for future scenarios (out to 15 years) to determine water availability. Input any changes to human population and try to determine what impact developing the mountain top would have on stream recharge. Account for any permit changes (USGS). - NO PROGRESS.**
- **Identify any potential new sources of water that could occur in the future (MWA, FCCD). -ONGOING; NEARLY FINAL.**
- **Determine how new future uses could impact stream biota (USGS, MWA, FCCD, SCCD). - NO PROGRESS.**
- **Evaluate feasibility of implementing water conservation programs in the basin and assess what impact they would have on water quantity (MWA, FCCD, SCCD, USGS). - NO PROGRESS.**

**(iv) An assessment of water quality issues that have a direct and substantial effect on water resource availability.**

**Attainment:** Recent or historical water quality assessments available electronically for surface water and groundwater in the Back Creek basin will be compiled. Possible sources include USGS (NWIS), EPA (LEGACY STORET and MODERNIZED STORET), DEP, and PAFBC. These data will be assessed for any significant water-quality concerns that would affect water quantity. A surface water and groundwater water quality sampling will also be performed during low-flow periods. An evaluation of any resource extraction in the basin will be completed.

#### **Items that need to be addressed under (iv):**

*Water quantity and water quality are interrelated. The Critical Area Resource Plan should consider the inter-relationship of water quality and water availability for current and future water uses. Contaminated water may be difficult and costly to remediate and may reduce or preclude the resource's potential use as a water source; AMD is an example. Impacts to source water for public water suppliers must be considered. Protecting existing and designated uses includes insuring that there is sufficient stream flow to protect the physical, chemical and biological characteristics of the stream. Total Maximum Daily Loads (TMDLs) have been developed or will be developed for many watersheds in Pennsylvania. Existing or potential future TMDLs must be fully considered in the assessment of water quality issues.*

*The CARP should evaluate existing and proposed wastewater disposal and non-point sources of pollution and their effects on water resources.*

*Under Section 303(d) of the Clean Water Act all states are required to assess the use impairment status of their surface waters and report the results to EPA on a biennial basis. Results of these assessments will be evaluated as part of CARP development to ensure that documented impairments of surface water uses outlined in Pennsylvania's Water Quality Standards are considered.*

**Tasks for (iv)**

- **Water quality assessment of surface water and groundwater in the basin. Collect samples during low-flow period. (USGS, MWA, FCCD, SCCD). - DONE.**
- **Compile any existing water quality (surface water and groundwater) data for the basin (USGS). - DONE.**
- **Determine potential future impacts of resource extraction on potable water and water for instream uses (MWA, FCCD, SCCD). - STATUS UNCERTAIN.**
- **Incorporate IFIM results (SCCD). - STATUS UNCERTAIN.**

**(v) A consideration of storm water and floodplain management within the critical water planning area and their impacts on water quality and quantity.**

**Attainment:** The 100-year FEMA floodplain maps will be overlaid atop land use maps developed by Mackin to indicate where additional development can not occur. The municipalities with flood prone areas will be identified by reviewing the 100-year floodplain maps and discussions with the appropriate municipalities. Municipalities will be contacted to determine whether flooding is an issue or if there are flood-prone areas that required them to enact floodplain regulations in order to comply with Pennsylvania's Floodplain management Act (Act 166 of 1978). Potential impacts from runoff from storm events will be assessed.

**Items that need to be addressed under (v):**

*The assessment should evaluate:*

- *Existing and future conditions in the watershed(s) as they pertain to stormwater runoff and flooding, including the protection of downstream water supplies from debris or other pollutant runoff from floodplains;*
- *Impacts of existing and future land development and impervious surfaces on runoff volumes and rates and ground water infiltration;*
- *Impacts to source waters for public water supplies;*
- *Existing local, state and federal stormwater management and floodplain regulations including, but not limited to: local ordinances, Act 167, and NPDES Phase II and other federal Clean Water Act non-point source regulations; and*
- *Enforcement of existing stormwater and floodplain ordinances;*

**Tasks for (v)**

- **Compile FEMA maps for 100-year floodplain and overlay on existing land use (USGS, MACKIN). - MAPS ACQUIRED BUT NOT FINALIZED FOR REPORT.**
- **Determine if future population changes would increase impervious area and thus increase peak stream discharges (USGS, MACKIN). - ONGOING; LAND USE CHANGES ARE BEING DETERMINED.**
- **Determine if stormflow impacts water supply; if so, attempt to quantify impacts (USGS, FCCD, SCCD). - NO PROGRESS.**
- **Compile existing local, state and federal stormwater management and floodplain regulations and ordinances (MACKIN, FCCD, SCCD). - CLOSE TO COMPLETION.**

**(vi) Identification of existing and potential adverse impacts on uses or conflicts among users or areas of the critical water planning area and identification of alternatives for avoiding or resolving such conflicts.**

**Attainment:** Any conflicting water uses in the basin will be identified. Results from the WAST and IFIM study for Back Creek will be used to identify conflicting interests and/or if the aquatic community is stressed relative to the quantity of water in the creek. Other impacts may be aquifer dewatering and the negative effect this could have on ground-water availability for homeowner wells. Aquifer dewatering could be especially important if development occurs in a critical recharge zone, such as would be the case if the upper parts of Back Creek are developed and recharge is diminished. Any sediment build up in reservoirs (if they exist in this subbasin) would have an adverse impact on the recreational use (if recreational use of the water bodies is common in this subbasin).

**Items that need to be addressed under (vi):**

*Potential adverse impacts or conflicts among users or among areas within the CWPA will be identified as part of the CWPA designation process and during the development of the Critical Area Resource Plan. Conflicts may also be identified through the alternative solutions analyses, because multiple objectives may conflict.*

*Resolving such conflicts will require negotiation, collaboration and consensus building of key stakeholders. There are many methods and tools available to support these efforts. Examples include: ranking alternatives by weighing criteria, decision tree analysis and cost/benefit analysis. The process must provide opportunity for all stakeholders to express their views.*

**Tasks for (vi)**

- **Stakeholders meetings to determine what are the conflicts and possible remedies (ALL AGENCIES). - NO PROGRESS.**
- **Evaluate possible future diminished recharge area and impact on streamflow and aquifer dewatering (USGS). - NO PROGRESS.**
- **Evaluate IFIM results; possible stressed aquatic community? (MWA, FCCD, SCCD). - STATUS UNCERTAIN.**

**(vii) An identification of practicable supply-side and demand-side alternatives for assuring an adequate supply of water to satisfy existing and future reasonable and beneficial uses.**

**Attainment:** Identify or develop plans for alternative water supplies in the future for Back Creek basin in conjunction with municipal and water-use facility officials. These possible alternative withdrawals can be input to the WAST tool to get an idea how future changes will affect water quantity.

**Items that need to be addressed under (vii):**

*The evaluation should consider the environmental, economic/cost, regulatory, land use planning, engineering and social implications of the alternatives.*

*In addition to other alternatives being evaluated, the following alternatives may be considered:*

- *No action alternative*
- *Expanding water conservation beyond existing mandated programs (i.e. aggressive leak detection and repair program for utilities and users, conservation rate structures, toilet rebate program)*
- *Potential uses for reclaimed water and greywater*
- *Alternative sources of ground water and surface water and conjunctive use of surface water and ground water*
- *Modifying existing or planned stream intake and discharge locations to minimize impacts on stream flows.*
- *Stormwater infiltration*
- *Implementation of land uses and development practices that incorporate sound water resources management, including incentives for low-impact development designs and forested riparian buffer networks;*
- *Additional water treatment and remediation to increase available sources*
- *Development of additional storage*
- *Importation of water*
- *Implementation of sound storm water management practices and programs, including:*



- *Revising existing or developing new stormwater and best management practices requirements;*
- *Revising existing local regulations that require unnecessary impervious cover;*
- *Developing performance-based design and stormwater control standards that allow consideration of site-specific factors such as soil, slope, cover and geology in developing stormwater plans;*
- *Supporting implementation of agricultural BMPs to reduce stormwater impacts and encourage retention of agricultural operations; and*
- *Identifying opportunities for protecting or restoring floodplains to their natural flood carrying capacities.*

#### **Tasks for (vii)**

- **Compile list of alternatives for water supply to alleviate water-use conflicts (MWA, FCCD, SCCD). -ONGOING.**
- **Review any future changes to permits or possible new permits to determine how this may influence conflicts – suggest alternatives if necessary (MWA, FCCD, SCCD). - ONGOING.**
- **Assess how the alternative water supplies would affect water quantity (USGS). -NO PROGRESS.**

#### **Primary Task (ALL AGENCIES)**

##### **CARP Document**

Above is a summarization of the seven critical elements necessary for the development of the Critical Area Resource Plan (CARP) for Laurel Hill Creek Watershed located in Somerset County, PA. The final step in CARP development is the compilation of all the existing information into the final planning document.

The outline for the Back Creek CARP was drafted using the Upper Wissahickon Management Plan as a template.

Link to Upper Wissahickon Watershed Management Plan:

<http://planning.montcopa.org/planning/cwp/view.a,1607,q,58675.asp>

One of the last chapters of the CARP will be a section on recommendations. Below is the outline for this chapter. This chapter does not necessarily fit within the context of the seven critical elements for a CARP, but the chapter is a necessary component of a typical water-resource management plan.

*Chapter 8 - Recommendations*

*Source water protection*

*Surface water*

*Riparian zone*

*Agricultural/Stormflow BMPs*

*Groundwater*

*Wellhead protection area*

*Recharge areas*

*Education/outreach*

*Home BMPs*

**Other Tasks (NO PROGRESS ON ANY ITEMS BELOW)**

- **Steering committee meetings**
- **Township meetings**
- **Public meeting(s)**
- **Submit draft to local steering committee; address comments**
- **Submit draft to regional steering committee; address comments**
- **Submit draft to each municipality and township; address comments**
- **Submit draft to statewide steering committee; address comments**