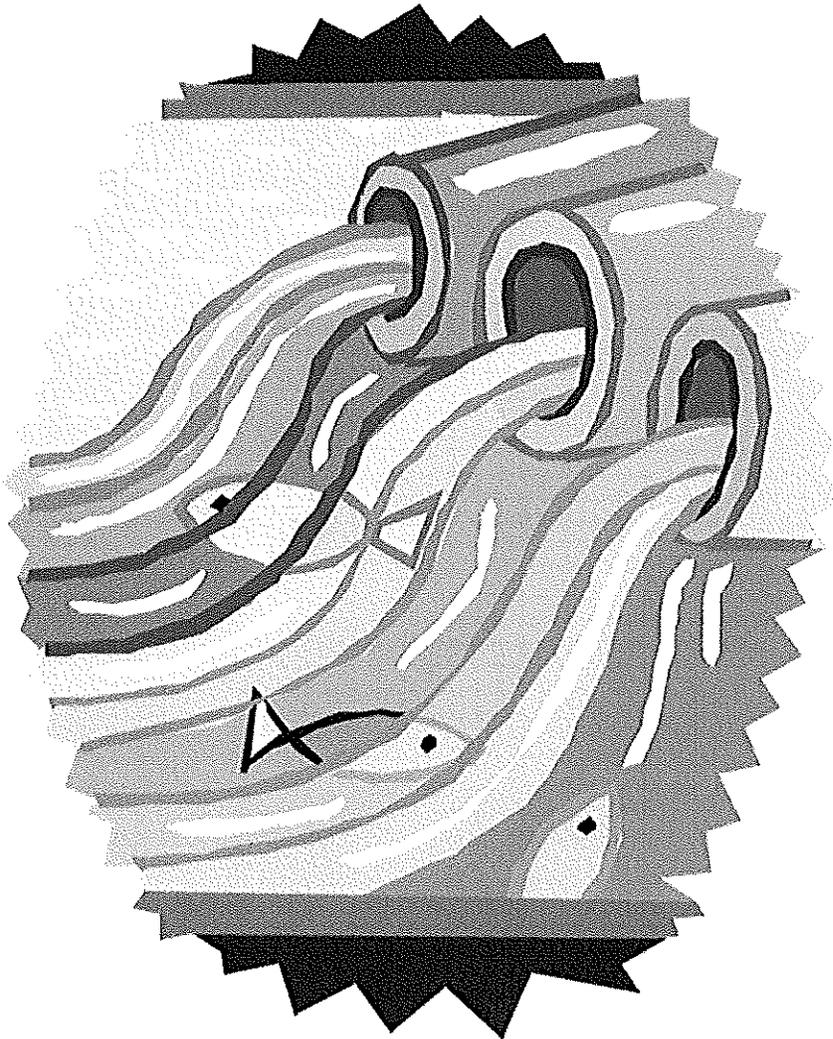


This booklet belongs to: \_\_\_\_\_

# Honey Brook Township Storm Water Activity Book



An activity booklet designed to teach children about water resources and storm water pollution.

Assembled June 16, 2016 by Honey Brook Township; adapted from the Utah State University Storm Water Activity Book and from the MS4 Partners: College, Ferguson, Harris, & Patton Townships; Penn State; and State College Borough (<http://www.ms4partners.org/index.html>).

# What is Stormwater?

When rain falls or snow melts, where does the water go? Some is soaked into the ground, some sits in puddles, and some disappears. Water that flows over the land surface and downhill to the nearest stream or ditch is called stormwater runoff.



When storm drains are free of debris, water can easily drain from roadways. When storm drains are clogged, this causes the potential of flooding on roadway surfaces, which can also cause contamination. **Never put anything down a storm drain.**

Solve the hidden message. Use the clues below.

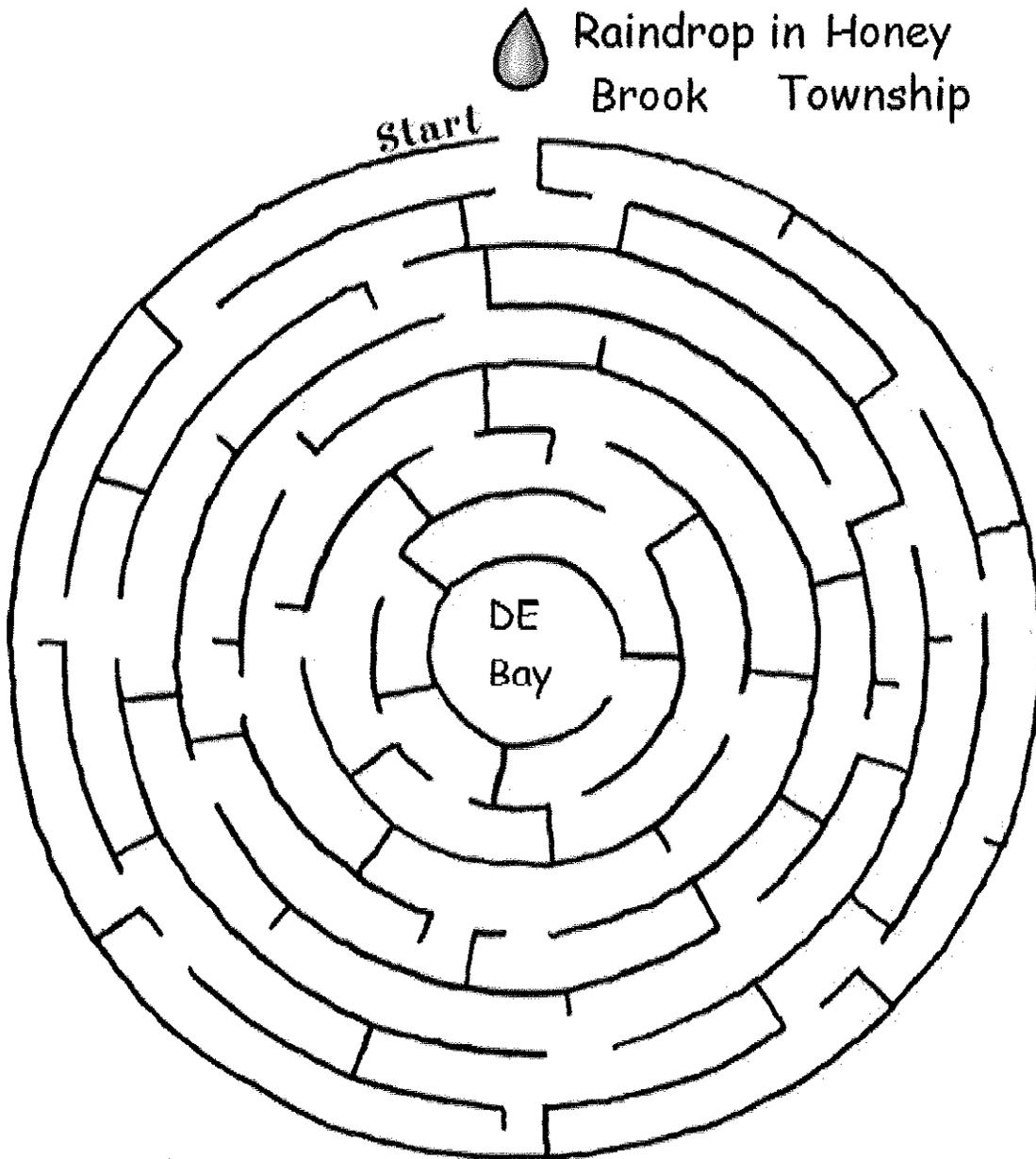
- ⊕ = A
- ⊗ = B
- ⊕ = C
- ⊗ = D
- ⊕ = E
- ⊕ = F
- ⊕ = G
- ⊙ = H
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- ⬡ = L
- ⊙ = M
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- ⊙ = O
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- ⊙ = R
- ⊗ = S
- ⊠ = T
- △ = U
- △ = V
- ◇ = W
- ◆ = X
- ◇\* = Y
- ⊕\* = Z

\_ \_ \_ \_ \_      \_ \_ \_ \_ \_  
 ⊙ ⊙ ⊠ + ◇      ⊗ ⊙ ⊙ ⊙ ⬠  
  
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 ⬠ ⊠ ⊙ ◇ ⊠      ⊕ ⊗      ⊠ ⊙ +  
  
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 ⊠ ⊙ +      ⊗ ⊙ ⊕ ⊠ ⊗ ◇\* ◇ △ ⊠ +

Activity Challenge: What secret messages can you make using the above code letters? What about using your own symbols?

## Water Maze

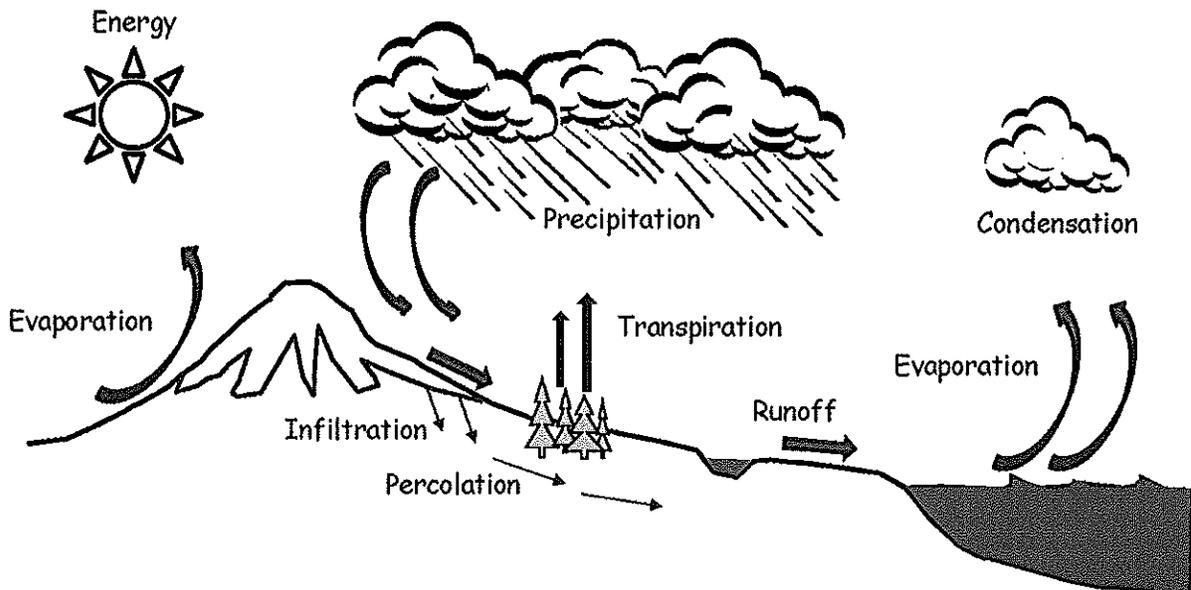
A drop of water that begins in Honey Brook Township can move through one of four watersheds to either the Delaware or Chesapeake Bay—and eventually to the Atlantic Ocean! Lead this water droplet through the maze from where it landed at the Honey Brook Elementary Center to the Delaware Bay in Wilmington.



Did you know that a cistern is a tank for storing rainwater and that rain barrels are a type of cistern? Many older homes and farms in the area have had or do have cisterns.

Activity Challenge: Create your own maze with multiple exits. Is there any shape that works best?

## The Water Cycle



**Energy:** Solar radiation causing heat.

**Evaporation:** When water is heated by the sun, it causes the water to turn into vapor and rise into the air.

**Transpiration:** Water that plants give off as vapor.

**Condensation:** When water vapor cools, it turns into tiny drops of water. These combine to make clouds.

**Precipitation:** The water in the clouds falls to the earth as rain or snow.

**Runoff:** The water falling to the ground through precipitation runs back into the lakes, rivers and oceans over the surface of the ground.

**Infiltration:** When water enters the soil surface.

**Percolation:** After water is infiltrated into the ground and then moves through the soils.

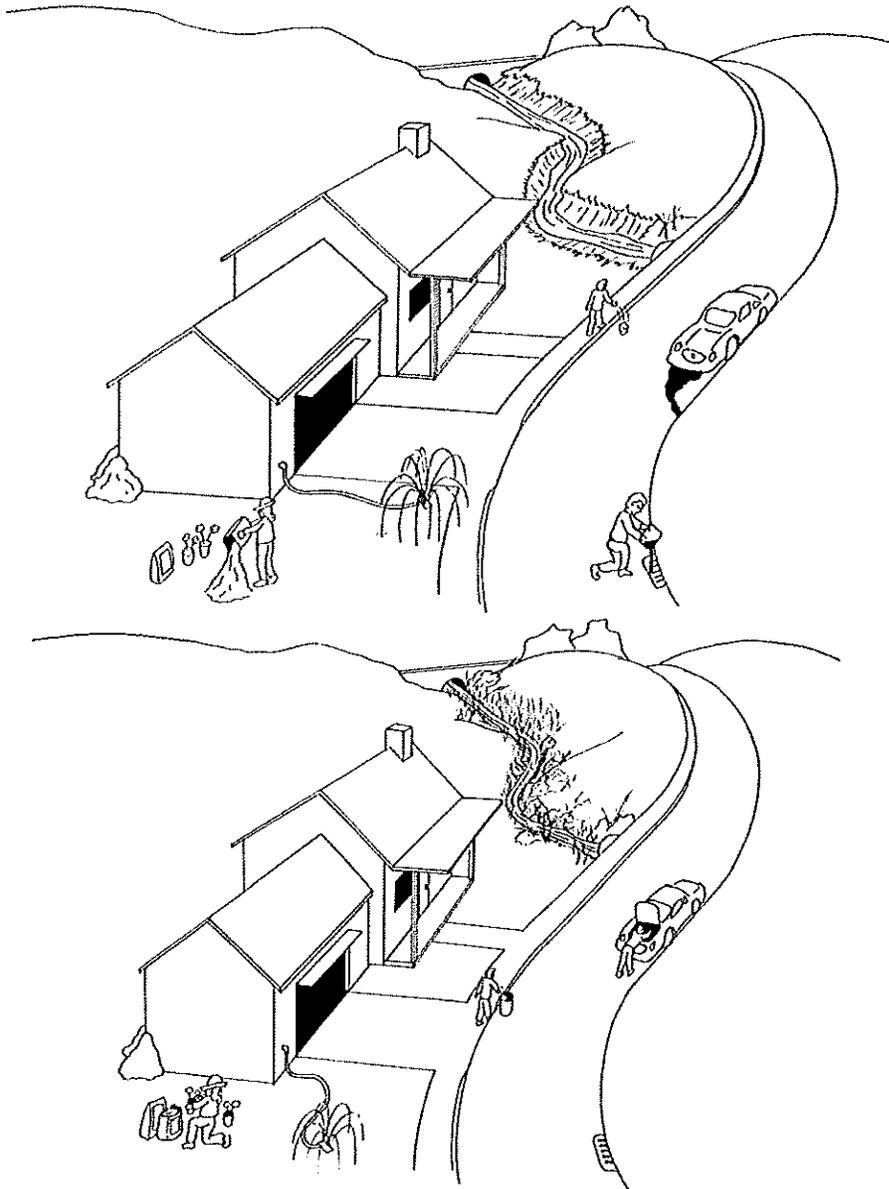
**Hydrology:** The study of how water moves through the environment. The water cycle can also be called the hydrologic cycle.

**Impervious Surfaces:** Are mainly artificial surfaces like roofs, roads, sidewalks, and parking lots that are impenetrable to water, which makes water runoff.

Did you know that the water you drink is as old as the earth itself? Dinosaurs may have swum in the water from your kitchen sink. The earth's water supply is about the same as it was millions of years ago. That's because every molecule of water is recycled over and over through the water cycle. More than 99% of the earth's water is salt water in the ocean or trapped in the ice caps or deep underground. That leaves only 1% of the earth's water available for us to use. Let's make sure we protect that water and keep it clean.

## Stormwater Pollution Picture Search

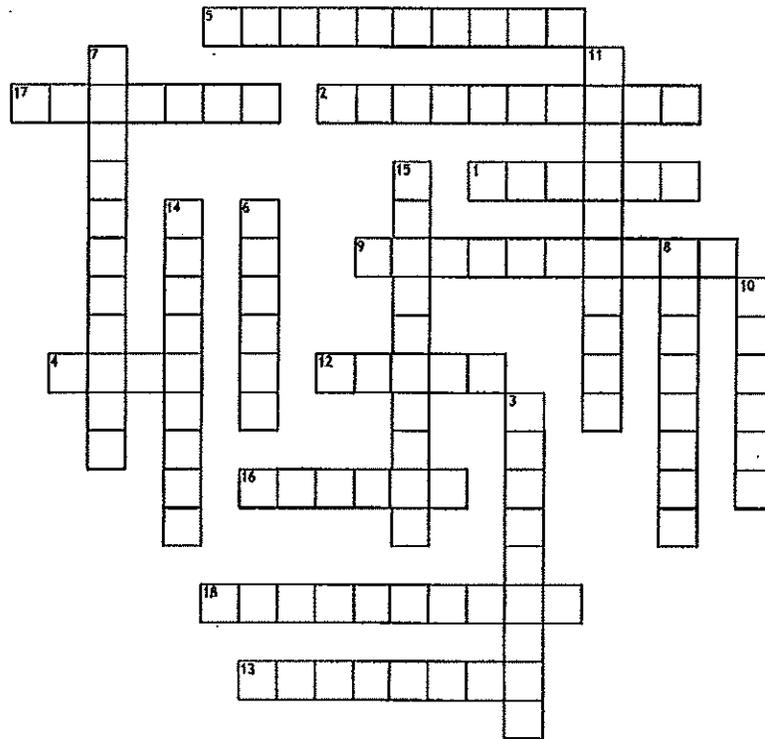
Towns and other highly-populated areas have more stormwater runoff than in the countryside because they have more paved areas where the water can't soak into the ground. Impervious surface like roads and parking lots can contribute lots of pollutants to our streams. Compare the two pictures below. Circle all the differences between them that you can find that could result in polluted runoff. You should find 6 things.



Activity Challenge: What do these differences have to do with protecting our water from stormwater runoff?

Everything we do is interconnected and can affect something else. Complete the crossword puzzle below. Hint: many of the words can be found in this activity booklet.

## Stormwater Crossword Puzzle



### Across

1. A rain \_\_\_\_\_ stores water runoff from a home
2. A city at the mouth of the Brandywine watershed
4. A form of precipitation
5. A name of two local municipalities
9. A Christina River tributary
12. A Honey Brook Township mountain
13. A town in the Conestoga Creek watershed
16. A Creek that is part of the Chesapeake Bay watershed
17. Another name for marshy land
18. Precipitation is part of this

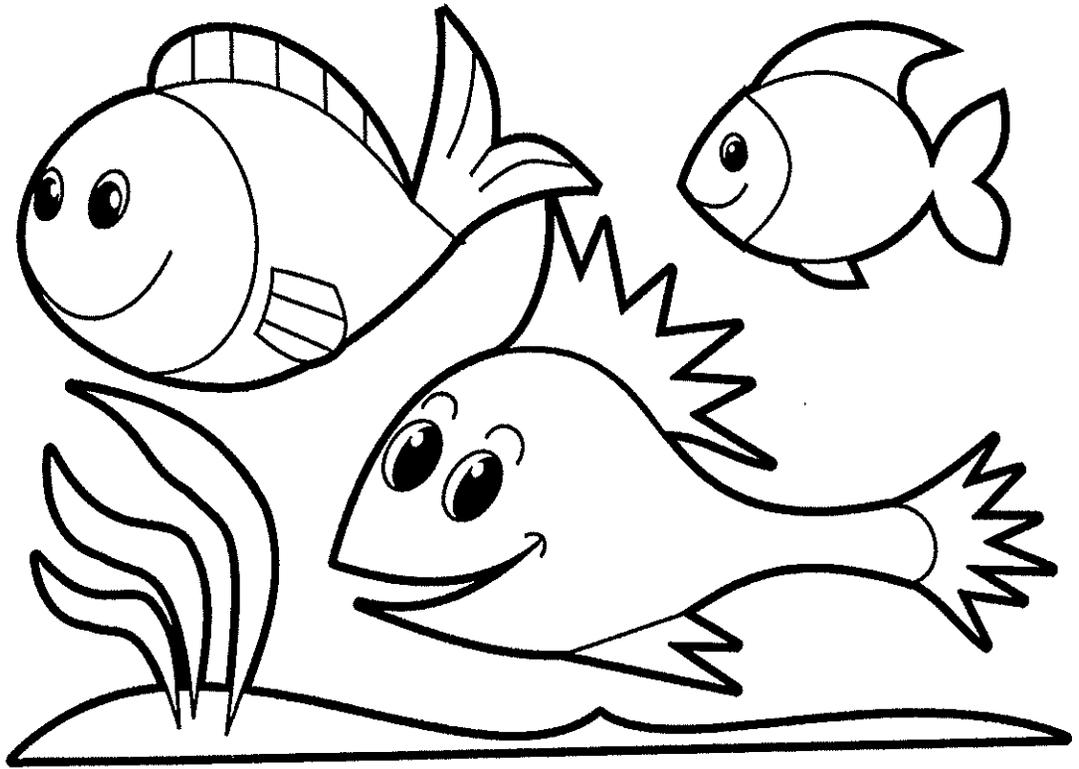
### Down

3. A practice that helps the environment
6. Where water comes out of the ground
7. Where you can fish in Honey Brook Township
8. Pollution not from a single source or "point"
10. Where the community gets its drinking water
11. What this activity booklet is about
14. The kind of stream the Brandywine is
15. Too much of this pollutes water

Activity Challenge: Create your own crossword using other stormwater words used in this booklet.

## Color the Fish

The Brandywine River begins in Honey Brook Township and runs through Chester County, supporting many fishing activities. As the “headwaters of the Brandywine,” Honey Brook Township plays an important role in the health of the Brandywine watershed.



Activity Challenge: Draw your own picture of what you think is needed for a healthy watershed.

## Word Search

Pollution in our streams and groundwater can come from many sources (including "non-point" sources) and not just from big spills. See if you can find the pollutants listed below.



**Agriculture**

**Animals**

**Cars**

**Chromium**

**Copper**

**Dirt**

**Driveway**

**Fertilizer**

**Garbage**

**Gasoline**

**Grass Clippings**

**Grease**

**Lead**

**Motor Oil**

**Mud**

**Nitrate**

**Pesticides**

**Phosphorous**

**Salt**

**Sediment**

**Sewage**

**Tar**

**Trash**

**Wastewater**

**Wildlife**

Remember: Polluted water that goes down the drains in your house goes to a wastewater plant or septic system for treatment.

Activity Challenge: Make your own word search with words you think are important.

## Stormwater Scramble

See if you can unscramble the following words. If you get stuck, look at the hints for suggestions. Another hint is that most of these words can be found somewhere in this activity book. Good Luck!

### Hints

- |                                 |                                       |
|---------------------------------|---------------------------------------|
| 1. OUAETRRNGDW _____            | Where we get our drinking water       |
| 2. TAHDERWSE _____              | Drainage area of streams & creeks     |
| 3. DPNO _____                   | Stored water on the ground surface    |
| 4. USTAELSANBI _____            | Something that preserves resources    |
| 5. TINRCSE _____                | Used for storing water                |
| 6. GEERN OROF _____             | An urban stormwater practice          |
| 7. NAIR DRGENA _____            | Stormwater practice for homes         |
| 8. ASEWTRETAW ANPLT _____       | Where polluted water should go        |
| 9. ORUFFN _____                 | Water flowing over the ground         |
| 10. VIMRSUIPOE _____            | Surface preventing water infiltration |
| 11. NDREIBYWNA RCEKE _____      | Basin that Honey Brook is in          |
| 12. HSTAEWDEAR _____            | Starting point of the Brandywine      |
| 13. HENYOY RBOOK WOITSPNH _____ | Municipality the HBEC is in           |
| 14. YNEDWNRIAB _____            | Two main branches of this are here    |
| 15. ATSHRICIN _____             | River the Brandywine Creek drains to  |
| 16. BTUYIARTR _____             | Contributes to larger rivers          |
| 17. LTINIAMCPIUY _____          | Local governmental body               |
| 18. MRSTEOWART BIANIS _____     | A man-made solution for runoff        |

Activity Challenge: Create scrambled words you've learned about protecting our water for your friends

# Final Stream Facts

**Perennial Stream** – a stream that flows year round, like the East and West Branches of the Brandywine.

**Intermittent Stream** – a stream that flows part of the year or seasonally. Some tributaries to the Brandywine are intermittent.

**Ephemeral Stream** – a stream that only flows in direct response to precipitation.

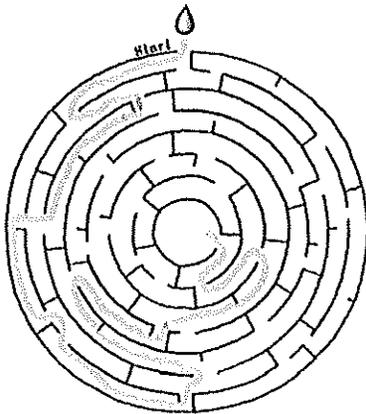
Many of the small drainage-ways without any bed or banks in the watershed are some of the most important streams needing protection in the watershed because they are highly infiltrative. Help protect our streams no matter what size they are!

## Answer Key

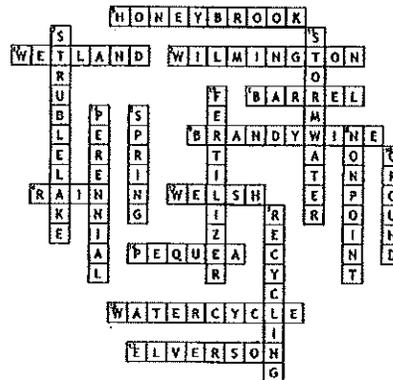
Hidden Message: Honey Brook Township is known as the headwaters of the Brandywine.

\*Pollution Picture Search: 1) creek without vegetation, 2) car leaking fluid, 3) man dumping down a drain, 4) woman using excess nutrients, 5) watering impervious areas like sidewalks, and 6) throwing trash onto the street.

\*Maze:



Crossword Puzzle:



Word Search:

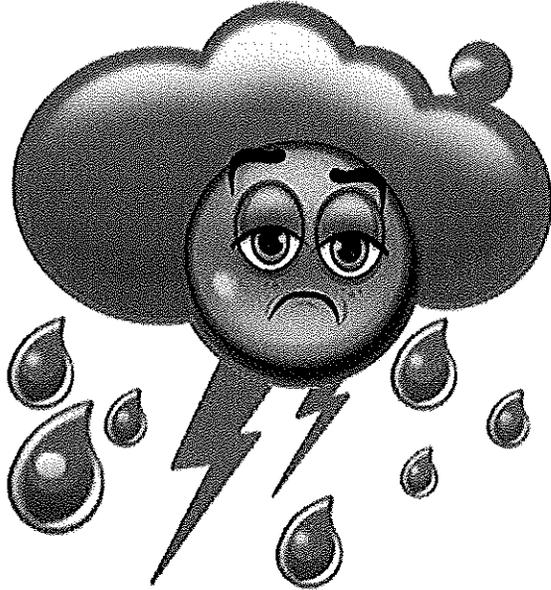


Word Scramble:

1. OUAETRNRGDW Groundwater
2. TAIDERWSE Watershed
3. DPNO Pond
4. USTAELSANBI Sustainable
5. TRNRCSE Cistern
6. GEERN OROF Green Roof
7. NAR DRGENA Rain Garden
8. ASEWTREYAW ANPLT Wastewater Plant
9. ORUFN Runoff
10. VNRSUPOE Impervious
11. NDREBYWNA RCEKE Brandywine Creek
12. HSTAEWDEAR Headwaters
13. HENYOY BROOK WOTSPNH Honey Brook Township
14. YNDRWNRUAB Brandywine
15. ATSHRIBN Christina
16. BTUAIARTR Tributary
17. LTNIAHCPRIY Municipality
18. NRSTEWART BIAHS Stormwater Basin

\*Pollution Picture Search and Maze adapted from the Utah State University Storm water Activity Book.

## TURN STORMY'S FROWN UPSIDE DOWN



Stormy the Raincloud doesn't like getting blamed for polluted runoff, so do your part to keep Stormy happy. Share what you've learned with your friends and family!

This booklet is brought to you by the Supervisors of Honey Brook Township, under an initiative of the MS4\* program.



\*The acronym MS4 is short for "Municipal Separate Storm Sewer System." Honey Brook Township has an MS4 storm water permit that helps protect the environment.