

Understanding Streams

Natural Streams

What is a Stream?




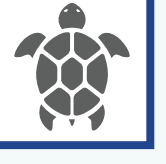
Streams collect rainfall and snow melt from the upper reaches of a watershed and transport it to our rivers and lakes. Natural streams have the following characteristics:

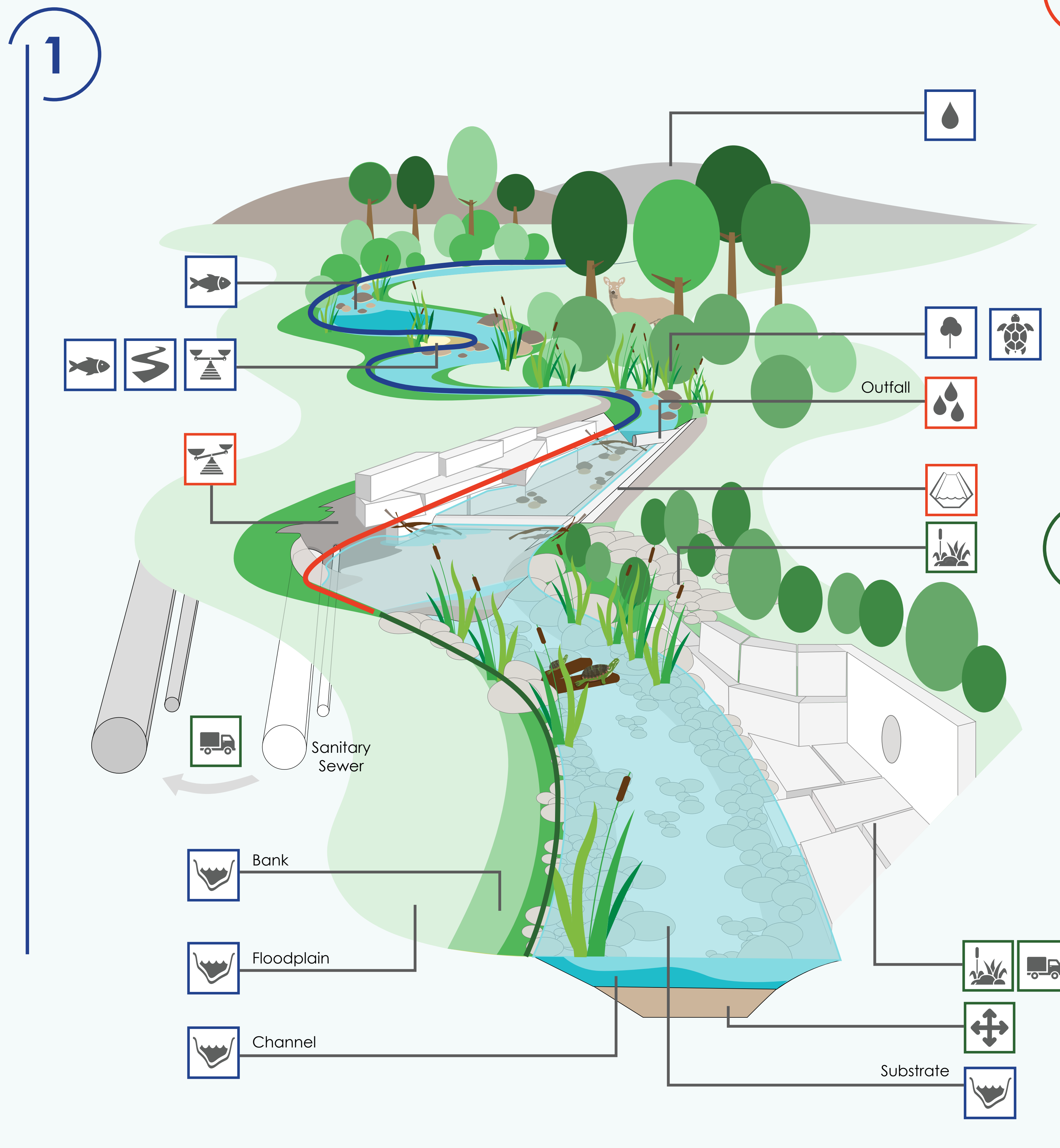
-  **Physical Form**
Streams are made up of a variety of physical forms including banks, channels, floodplains, and substrate
-  **Diverse Stream Features**
Stream riffles, pools, and point bars provide a variety of fish habitat necessary for fish reproduction, growth, feeding, and shelter
-  **Trees and Vegetation**
Trees and vegetation provide bank stability, fish cover, wildlife habitat, and shade to cool water

How do Streams Function?

Streams are naturally dynamic and change over time. A stream's natural function of moving water and sediment operates in balance and creates diverse forms and habitats.

A healthy stream...





-  Receives water from a pervious watershed that slows and infiltrates rain and snow melt
-  Varies in width, depth, length & slope creating a variety of stream features including boulders, shallow riffles, deep pools and point bars
-  Is subject to a balanced process of erosion and laying of sediment until a stable form is developed and maintained
-  Supports diverse plant and aquatic habitats that stabilize stream banks, create cover for fish and provide shade to lower water temperature



2 Land Use and Land Management Changes

Land Use and Land Management Changes and Climate Change




Historical land use and land management changes, as well as Climate Change, in a watershed introduces stressors that destabilize stream form and function causing erosion, risk to infrastructure and degraded natural features. Stressors include:

-  A higher quantity of water enters the stream as a result of historically altered land uses and land management changes that obstruct the infiltration of rain and snow melt
-  Historical floodplain encroachment, channelization and erosion controls have straightened, hardened or altered the stream's form and counter-acted natural processes and increased the speed that water moves through the stream
-  Climate Change increases the frequency and intensity of precipitation events, including large storms, which increases erosion
-  Greater volume and speed of water tips the balance of a healthy stream and erosion widens and deepens the channel putting City infrastructure at risk of exposure and potential damage or failure

3 Restoration

Methods of Infrastructure Protection

Methods for mitigation aim to work with natural processes and changes in stream form and function to protect infrastructure, enhance stream function and habitat, and minimize excessive erosion. Strategies include:

-  Where possible, move water and sewer infrastructure further from the stream and recess stormwater outfalls into stream banks
-  Where possible, realign and/or raise stream beds
-  Vegetation and stone based restoration to stabilize stream banks and slow the speed of water entering and flowing through the stream

Master Plan Development

To select the right mitigation method, a plan is developed for each location using the following approach:

- 1** Identify: determine problems and causes
- 2** Evaluate: changes in stream form and function and its impact on water and sewer infrastructure
- 3** Develop: design improved stream form to protect infrastructure and improve stream function