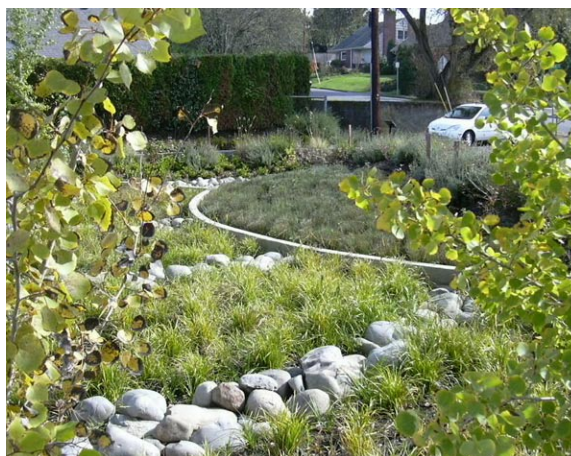


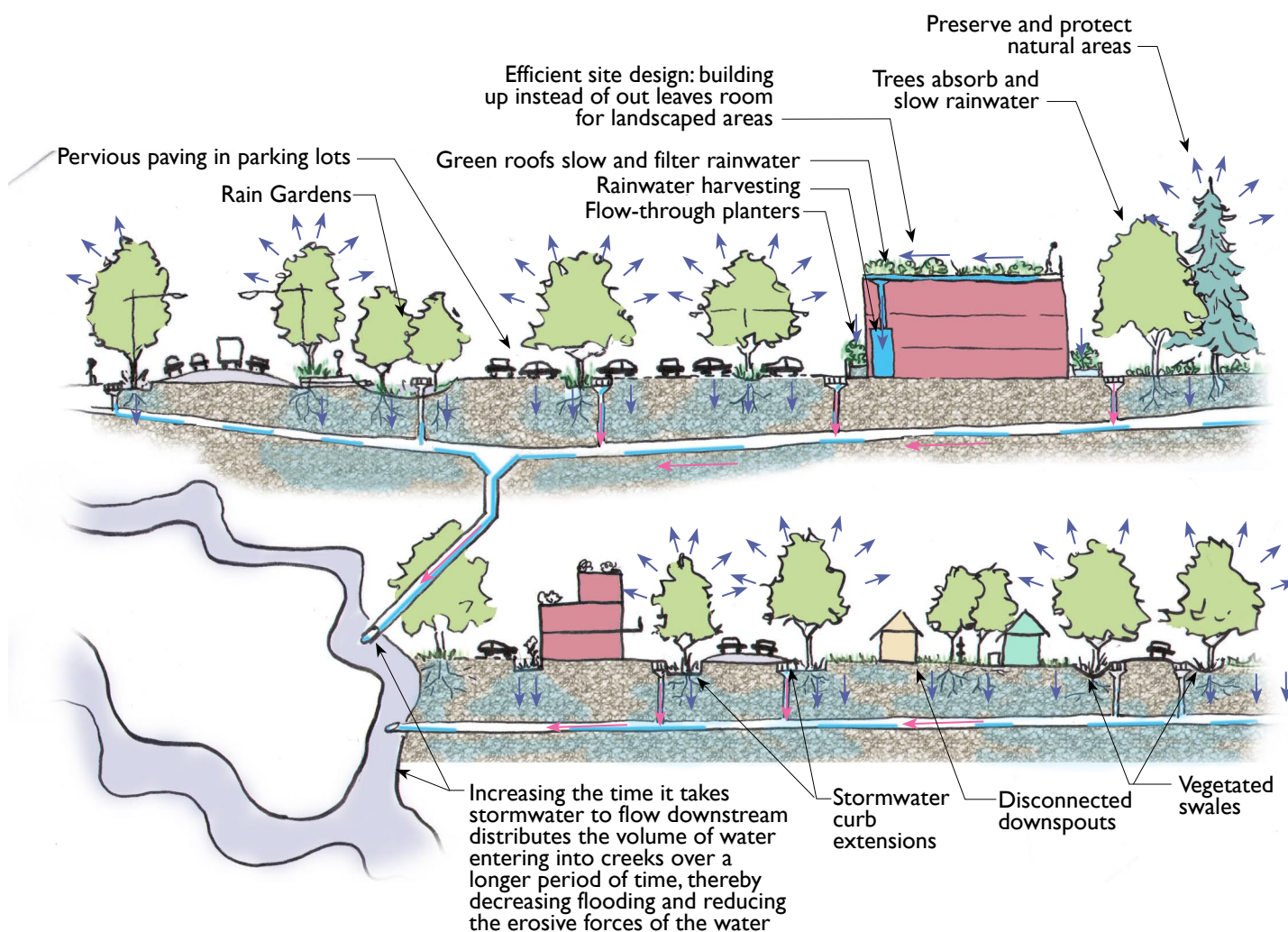
BALANCED DEVELOPMENT: A Greener Approach

Infrastructure can be designed to minimize its impact on natural drainage systems. Our infrastructure can help maintain the balance of natural drainage systems by capturing, slowing, and absorbing stormwater, as well as filtering the pollutants that urban development introduces.



SOURCE: KEVIN ROBERT PERRY - CITY OF PORTLAND

Figure 1-7: Infrastructure can help protect creeks and streams by capturing, slowing, and absorbing stormwater and filtering pollutants.





SOURCE: KEVIN ROBERT PERRY - CITY OF PORTLAND

Figure 1-8: Stormwater facilities filter sediments and other pollutants in runoff, which results in improved water quality.



SOURCE: NEVUE NGAN ASSOCIATES

Figure 1-9: Stormwater facilities slow the flow of stormwater runoff through the interaction of the water with plants and soil.



SOURCE: KEVIN ROBERT PERRY - CITY OF PORTLAND

Figure 1-10: Stormwater facilities collect and absorb stormwater to reduce the overall volume of runoff.

The Three Stormwater Management Goals

Sustainable stormwater design should achieve the following three goals to the greatest extent possible:

Water Quality Goal

Stormwater facilities should filter and **remove** excess sediments and other pollutants from runoff. By allowing water to interact with plants and soil, water quality improvements are achieved through a variety of natural physical and chemical processes. Even if soils are not conducive to infiltration, or if there is a high water table, water quality is still enhanced through pollutant settling, absorption into the soil, and uptake by plants.

Flow Reduction Goal

Stormwater facilities should **slow** the velocity of runoff by detaining stormwater in the landscape. Flow rate reduction can often be achieved by integrating design strategies (such as pervious paving, planter boxes, swales, and rain gardens) that provide stormwater detention. By detaining and delaying runoff, peak flow rates are attenuated and downstream creeks are protected from erosive flows. Conveying runoff through a system of naturalized surface features mimics the natural hydrological cycle and minimizes the need for underground drainage infrastructure.

Volume Reduction Goal

Whenever possible, facilities should collect and **absorb** stormwater to reduce the overall volume of runoff. Retention facilities offer long-term stormwater collection and storage for reuse or groundwater recharge. Plants contribute to retention capacity by intercepting rainfall, taking up water from the soil, and assisting infiltration by maintaining soil porosity. Volume reduction does not require stormwater facilities to be extremely deep. In fact, it is usually best to employ a highly integrated and interconnected system of shallow stormwater facilities.