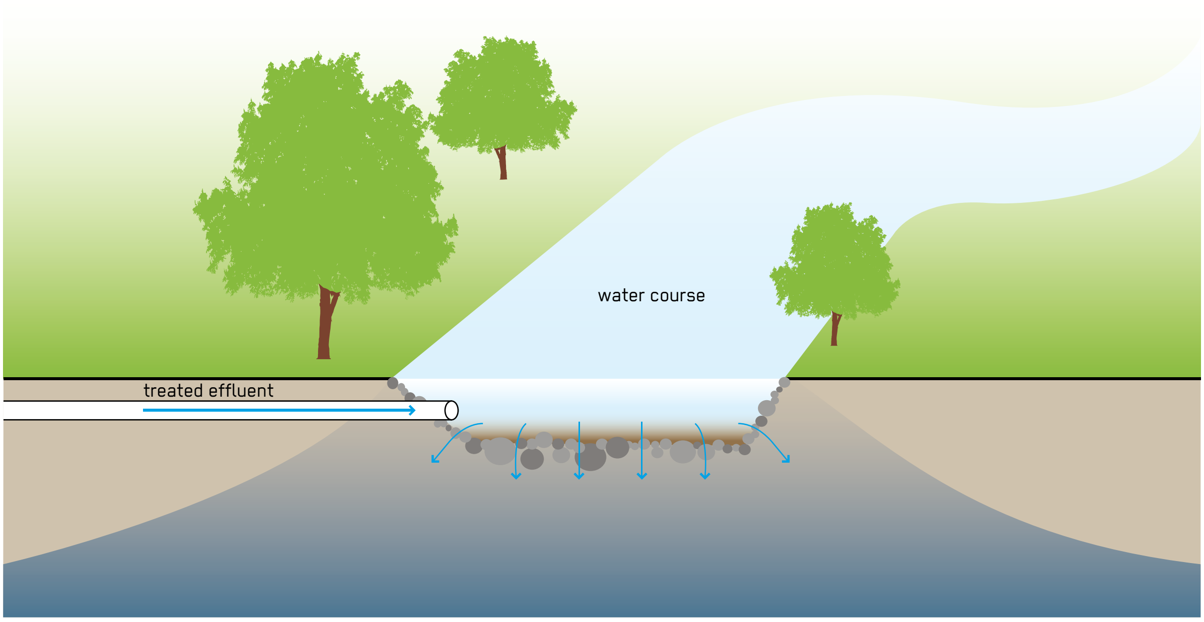
Water Disposal and Groundwater Recharge

Phase of Emergency	Application Level / Scale	Management Level	Objectives / Key Features
Acute Response * Stabilisation ** Recovery	** Household ** Neighbourhood ** City	** Household ** Shared ** Public	Safe disposal, Groundwater recharge
Space Required	**Technical Complexity**	**Inputs**	**Outputs**
* Little	** Medium	Effluent, Stormwater	



Treated effluent and/or stormwater can be directly discharged into receiving water bodies (such as rivers, lakes, etc.) or into the ground to recharge aquifers, depending on their quality.

The uses of the surface water body, whether for industry, recreation, spawning habitat, etc., and its size determine the quality and quantity of treated wastewater that can be introduced without deleterious effects. Alternatively, water can be discharged into aquifers. Groundwater Recharge is increasing in popularity as groundwater resources deplete and as saltwater intrusion becomes a greater threat to coastal communities. Although the soil is known to act as a filter for a variety of contaminants, Groundwater Recharge should not be viewed as a treatment method.

Design Considerations: It is necessary to ensure that the assimilation capacity of the receiving water body is not exceeded, i.e. that the receiving body can accept the quantity of nutrients without being overloaded. Parameters such as turbidity, temperature, suspended solids, biochemical oxygen demand, nitrogen and phosphorus content (among others) should be carefully controlled and monitored before releasing any water into a natural water body. Local authorities should be consulted to determine the discharge limits for the relevant parameters as they can widely vary. For especially sensitive areas, a post-treatment technology (e.g. chlorination **(POST)**) may be required to meet microbiological limits. The quality of water extracted from a recharged aquifer is a function of the quality of the wastewater introduced, the method of recharge, the characteristics of the aquifer, the residence time, the amount of blending with other waters, the direction of groundwater flow and the history of the system. Careful analysis of these factors should precede any recharge project.

Materials: Groundwater Recharge does not require materials. Preceding technologies to add the water to the receiving water body, like Leach Fields **(D.9)** or Soak Pits **(D.10)**, require materials. Equipment for regular monitoring and evaluation of the groundwater quality might be needed.

Applicability: The adequacy of discharge into a water body or aquifer will depend entirely on the local environmental conditions and legal regulations. Generally, discharge to a water body is only appropriate when there is a safe distance between the discharge point and the next closest point of use. Similarly, Groundwater Recharge is most appropriate for areas that are at risk of saltwater intrusion or aquifers that have a long retention time. Depending on the volume, the point of discharge and/or the quality of the water, a permit may be required. This technology should be implemented downstream of any settlement, as treated wastewater may still contain pathogens.

Operation and Maintenance: Regular monitoring and sampling is important to ensure compliance with regulations and to ensure public health requirements. Depending on the recharge method, some mechanical maintenance may be required.

Health and Safety: For Groundwater Recharge, cations (e.g. Mg^{2+}, K^{+}, NH_4^{+}) and organic matter will generally be retained within a solid matrix, while other contaminants (such as nitrates) will remain in the water. There are numerous models for the remediation potential of contaminants and microorganisms, but predicting downstream or extracted water quality for a large suite of parameters is rarely feasible. Therefore, potable and non-potable water sources should be clearly identified, the most important parameters modelled and a risk assessment completed.

Costs: There are no direct costs associated with this technology. There can be indirect costs depending on the recharge method, for example, construction of an outlet pipe or construction of a Soak Pit **(D.10)**. Regular monitoring of groundwater requires the installation of monitoring wells.

Social Considerations: The domestic or recreational use of water bodies at the location of recharge should be prohibited, as there are still some health risks if this water is used for consumption. This would require an information campaign at this location, for example using warning signs.

Strengths and Weaknesses:

(+) Contributes to a "drought-resistant" water supply by replenishing groundwater
(+) May increase productivity of water bodies by contributing to maintenance of constant levels

(−) Discharge of nutrients and micro-pollutants may affect natural water bodies and/or drinking water
(−) Introduction of pollutants may have long-term impacts
(−) May negatively affect soil and groundwater properties

→ **References and further reading material for this technology can be found on page 196**