# PROJECT DESCRIPTION –
## Passive Groundwater Treatment for Nitrogen, Phosphorus & Perchlorate Removal

**Nitrate Nitrogen < 0.1 -0.6 mg/l**
**Total Phosphorus < 0.1 mg/l**
**Total Perchlorate < 0.2 ug/l**

**Project:** Permeable Reactive Barrier (PRB)
Passive Groundwater Treatment
Nitrogen Removal

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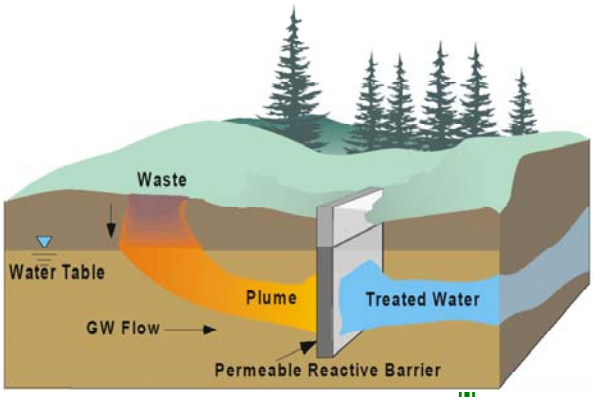
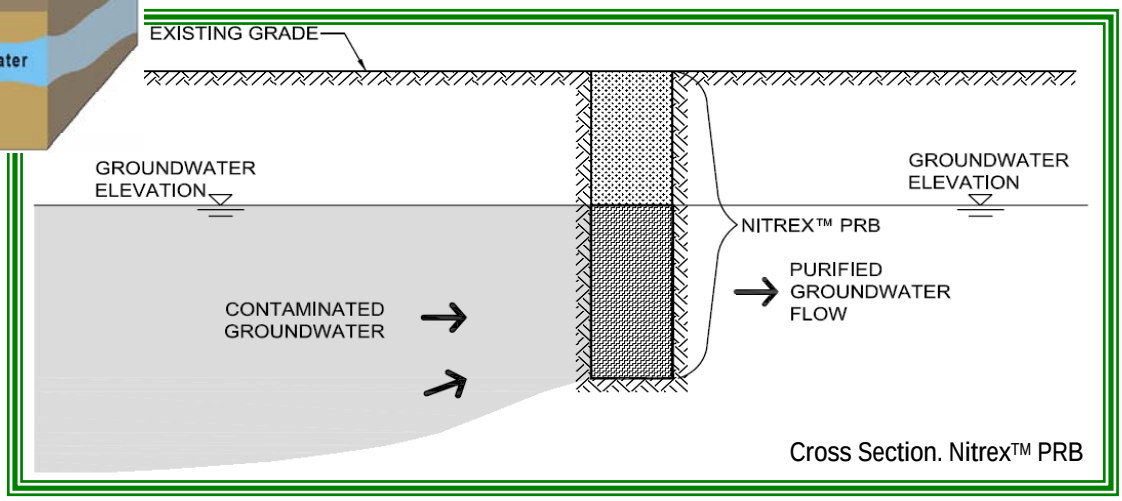
**Site 1 – Nitrogen Removal – Cape Cod, Massachusetts**

As part of a Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET) funded demonstrated project, the Woods Hole Marine Biological Lab (MBL) retained Lombardo Associates, Inc. (LAI) for installation of the patented Nitrex™ groundwater nitrogen removal technology at two locations on Cape Cod, MA in the Waquoit Bay watershed.

**Performance.**

| Site | Influent Nitrate – N (mg/l) | Effluent Nitrate – N (mg/l) |
|---|---|---|
| Waquoit Bay, MA | 1.74 | 0.007 |
| Childs River, MA | 7.19 | 0.568 |




**Site 2 – Nitrogen Removal – Southern New England**

Two Nitrex™ PRBs were installed in a Rhode Island coastal watershed. Upstream and downstream concentrations of nitrate, ammonia, and dissolved organic nitrogen in the groundwater were monitored over two annual cycles. The dissolved inorganic nitrogen (DIN) levels are presented below.

| | Influent DIN (mg/l) | Effluent DIN (mg/l) |
|---|---|---|
| Coastal Site #1 | 3.9 | 0.2 |
| Coastal Site #2 | 3.7 | 0.1 |

DIN = Dissolved Inorganic Nitrogen = Ammonium + Nitrate + Nitrite

**Site 3 – Perchlorate and Nitrogen Removal – Ontario, Canada**

| Ontario, Canada Site | Nitrate - N (mg/l) | Perchlorate (ug/l) |
|---|---|---|
| Influent | 50 | 50 |
| Effluent | <0.1 | <0.2 |

**Site 4 – Phosphorus Removal –Massachusetts Site**

| Massachusetts Site | Influent Phosphorus (mg/l) | Effluent Phosphorus (mg/l) |
|---|---|---|
| Site #1 | 1.7 | 0.1 |

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