



Innovative Environmental Solutions

For Cleaner Water and a Greener Future



Effective management and conservation of water is one of the world's most challenging issues of the 21st century. Parjana has developed sustainable, EGRP[®]-based solutions for a wide variety of applications that can:

- Improve soil health and potentially increase plant available water content
- Reduce stormwater treatment costs
- Mitigate runoff pollution
- Increase rates of groundwater runoff
- Promote Water Neutrality
- Operate alongside other green technology or within green-gray hybrid systems

These benefits are delivered to our customers without compromising any aspect of groundwater or surface water quality at project installation sites.

Major anthropogenic sources of water pollution include partially-treated and untreated sewage, runoff from construction sites, motor oil and other automotive fluids, and pesticides and fertilizers used in agriculture and lawn care. An overabundance of certain chemical constituents introduced by these sources into natural surface waters can lead to an imbalance in nutrient cycling such as eutrophication, during which natural cycles become overwhelmed by excessive amounts of nitrates, phosphates, and/or organic waste. Elevated nitrate and phosphate levels in drinking water can also lead to health problems in humans and livestock.

The United States Environmental Protection Agency (EPA) has established maximum contaminant levels for drinking water, which Parjana and third parties conducting independent testing refer to while assessing groundwater and surface water quality at Parjana's EGRP[®] installation sites. Constituents measured to assess water quality vary from project to project, but typically include nitrate, phosphate, and chloride concentrations, as well as total dissolved solids.

Parjana Technical Summary on Water Quality

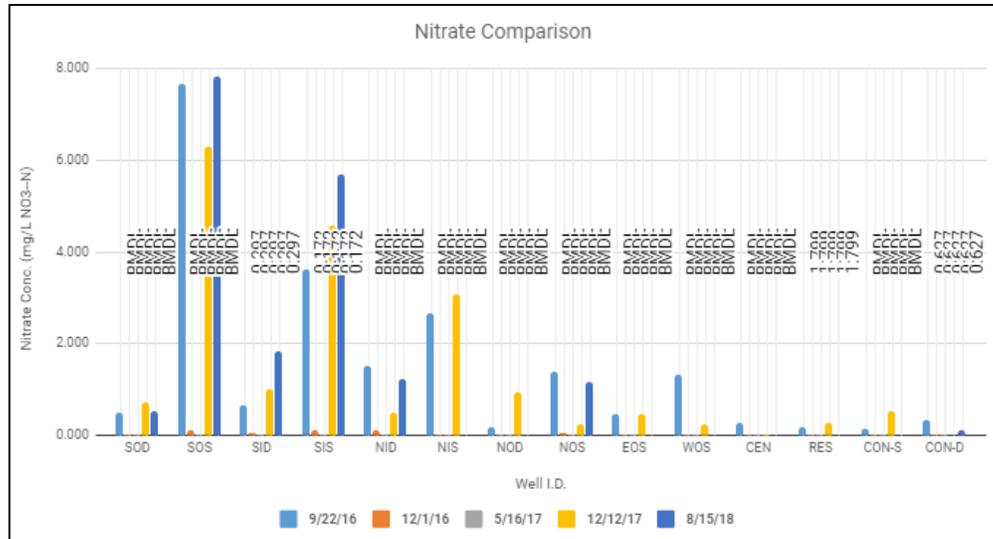


Figure 1. Nitrate concentrations obtained from wells proximal to Parjana's Lawrence Technological University installation on five different dates.

One of Parjana’s longest running groundwater quality sampling campaigns in collaboration with Lawrence Technological University (LTU) is located at a parking lot on their campus. Here, the EGRP® system was installed in December 2015, and since then, water quality data has been collected and analyzed periodically. Data confirm that groundwater obtained from wells surrounding the LTU project site demonstrate nitrate concentrations well below the EPA’s maximum acceptable level of 10 mg/L (Figure 1). Phosphate measurements are also being obtained and then compared to natural background levels of total phosphorus, which should generally be less than 0.05 mg/L.

Another key study conducted at Parjana’s Belle Isle installation site performed by Environmental Consulting & Technology, Inc. (ECT) quantitatively confirmed that, in terms of total phosphorus, chloride, total dissolved solids, and *E. coli*, the EGRP® system has not posed any negative effects to water quality onsite (Figure 2).

Parameter	Units	MDEQ Part 201, Non-residential Drinking Water Criteria	Lake St. Clair Regional Monitoring Project – Median Dry weather (23 sites/16 events) Surface Water	Lake St. Clair Regional Monitoring Project median wet weather (13 sites/10 events) Surface Water	P-2 (Test)	P-4 (Control)
Total Phosphorus	mg/L	240	0.059	0.14	0.082	0.23
Chloride	mg/L	250	130	111	670	1,400
Total Dissolved Solids	mg/L	500	534	420	<40	<40
<i>E. coli</i>	cfu/100 mL		93	1,333	21	12

Table 1: Groundwater Quality Results – Belle Isle, Michigan

ECT noted that the Chloride concentrations recorded in the groundwater at all sampled piezometers was significantly higher than typical groundwater readings of 35-125 mg/L. For purposes of this study, it was noted that the Chloride levels were high on both the Control and Test Sites. The intent of this study was not to determine the cause of this high Chloride, but to document the fact that the Test Site levels did not indicate the EGRP®s adversely affected the levels when compared to the Control Site.

Figure 2. Excerpt from ECT's report on groundwater quality at Parjana's Belle Isle installation.

As demonstrated in Figure 2, total phosphorus, total dissolved solids, and *E. coli* measurements onsite clearly meet the MDEQ Drinking Water Criteria (which mimic criteria outlined by the EPA), whereas chloride concentrations exceed the acceptable level of 250 mg/L. Because this chloride anomaly is present at both test (EGRP®) and control (non- EGRP®) sites, ECT concluded that Parjana's system did not adversely impact groundwater quality. In fact, it can be noted that chloride concentrations are significantly lower at the test site than at the control site.

While numerous studies have indicated that EGRP®-based solutions are ecologically friendly and do not accelerate the downward migration of potential surface water contaminants into the groundwater supply, Parjana continues to partner with researchers in industry and academia to gather quantitative data demonstrating that water quality standards remain high at sites where EGRP® have been installed. This report will be updated periodically as more data from ongoing and new sampling campaigns become available.