

# Potential Pollution from Gas Station Runoff

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## Introduction

When putting gas in your car, drips from the nozzle can accumulate at the base of pumps at gas stations. Rainstorms will cause the gas to move along with the runoff. This runoff will lead to a water source that could potentially pollute the water and cause ecological damage. The distance from the gas station to the water body will show which gas stations have the highest potential to cause pollution.

While there has been no formal study that shows how much gas is lost in liquid form when fueling a vehicle (as droplets falling from the nozzle or dripping down from the fill spout on the vehicle), an estimation has been done. In a paper written by Raymond Sierra from Stanford University, he finds that approximately one liter of gasoline is wasted or lost as liquid runoff per every 15,000 gallons pumped. While that may not seem like a lot, when it is considered that “in 2013, about 134.51 billion gallons<sup>1</sup> (or 3.20 billion barrels) of gasoline were consumed<sup>2</sup> in the United States, a daily average of about 368.51 million gallons.” (Department of Energy). Using Mr. Sierra’s estimation, this means that roughly 24,567 liters are lost as runoff per day. The following report shows the potential for runoff from gas stations in Arcata to reach and pollute local waterways.

## Methods

Acquiring the necessary data, stream and gas station location, was the first step. Once this data was imported to ArcMap and geo-referenced we added a basemap to show the layout of Arcata. We then created a new shapefile for the locations of all the local gas stations in the area. A buffer was created at 75 meters around all of the streams. We then created buffers around all the gas stations at 75, 150, and 300 meters. These are our high, medium, and low risk parameters respectively. The intersect tool was then used to find where the buffer zones for the gas station and the buffer zone for the streams intersect. The final step was making the map attractive to the viewer.

## Results

We found that there are ten gas stations throughout Arcata. Eight of them are within range of streams with at least a low risk of polluting the water body. Of the eight stations, three of them have a medium pollution risk factor and two have a high risk of polluting a local waterway.



Figure 1. Analysis area within Humboldt County

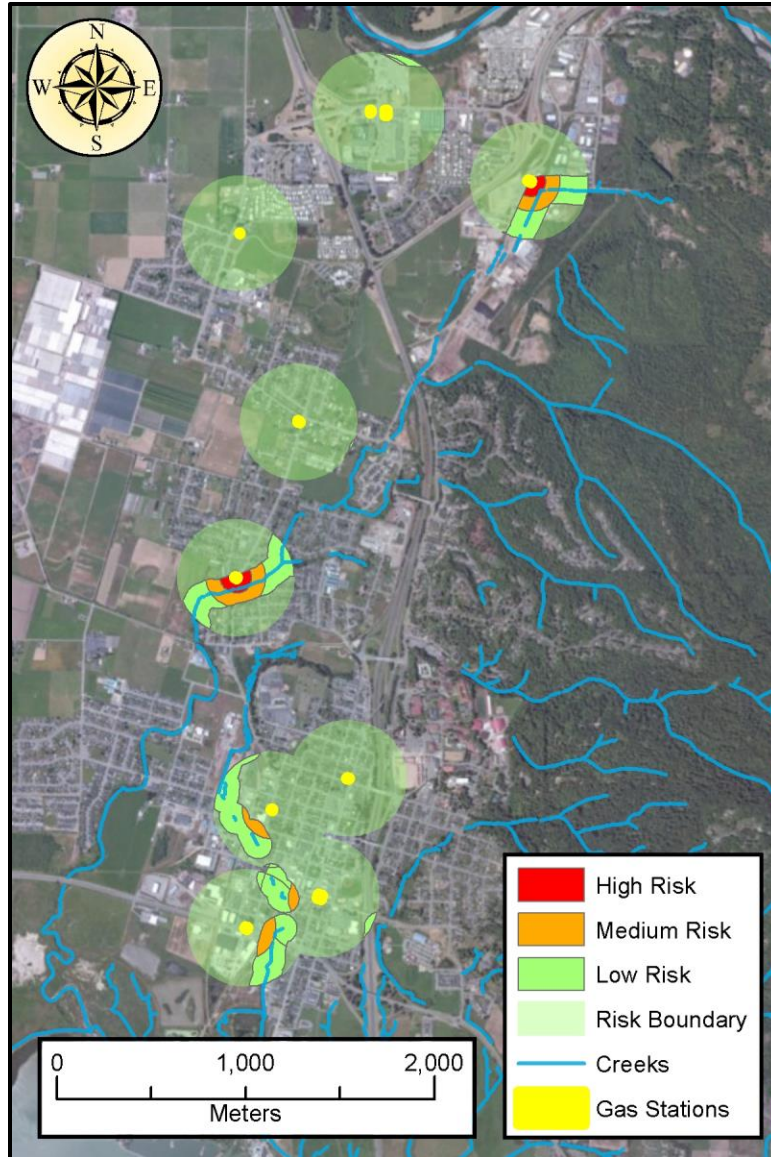


Figure 2. Potential risk of gas pollution due to run off.

## Conclusion

There are two gas stations with a high risk for pollution nearby water resources. These are the Renner Petroleum gas station at 5000 W End Road and a 76 gas station at 2205 Alliance Road. Both of these stations sit extremely close to the riparian areas surrounding the waterways. The sites should be monitored for inadvertent gas runoff because of the increased potential for polluting the water. The riparian areas nearby should also be inspected for contamination. It may prove beneficial to do additional research on the effects of topography on the potential for waterway contamination by gas runoff not only for these two sites, but also for all areas with the potential for pollution by gas runoff.

## Sources

Data was acquired from Humboldt County's GIS data website and the City of Arcata's GIS portal. ESRI also provided the base map on which the data was layered onto.

Sierra, Raymond. "Drops at the Pump." Stanford University, 24 Oct. 2010. Web. 04 Dec. 2014. <<http://large.stanford.edu/courses/2010/ph240/sierra1/>>.

U.S. Energy Information Administration - EIA - Independent Statistics and Analysis." How Much Gasoline Does the United States Consume? U.S. Department of Energy, 13 May 2014. Web. 04 Dec. 2014. <http://www.eia.gov/tools/faqs/faq.cfm?id=23&t=10>

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