Section VI: Pollutant Sources

Point Sources

Point sources are discharges that enter a water body through or from a well defined point of discharge. Point sources can include storm sewers, CSO's, culverts, ditches, waste water treatment plant discharges, concentrated animal feeding operations, etc.

As stated in Section II, the Watershed Diagnostic Study of the Little Calumet-Galien River Watershed noted no correlation between high pollutant loads detected as part of that effort and any permitted point sources along the Little Calumet River for a variety of pollutants.

Most point source discharges require an National Pollutant Discharge Elimination System (NPDES) permit. The most notable exceptions to this are stormwater discharges in rural areas or small communities. There are currently five (5) active NPDES permits and eight (8) inactive NPDES permits in this plan area. This number does not include un-permitted, illegal discharges that are most likely occurring in the watershed.

The Watershed Restoration Action Strategy for the Little Calumet-Galien Watershed states on page 19 that "Illegal discharges of residential waste water (septic tank effluent) to streams and ditches from straight pipe discharges and old inadequate systems are a problem within the watershed."

Municipal operators of a separate storm sewer system in this plan area are currently required by Rule 13 of the Indiana Department of Environmental Management (IDEM) to track down these illicit discharges and eliminate them.

Combined Sewer Overflows within the LCR Watershed

Combined sewers are a system of pipes designed to carry sanitary sewage and stormwater together in the same pipe. Due to the variable nature of storm water flows and the tremendous capacity required in both the pipes and wastewater treatment facilities to deal with those flows, overflow points were constructed to prevent the system from backing up into buildings and homes connected to the sewers. When the volume of flow in the pipe exceeds the system's capacity, the excess flow is directed out the overflow point and into some form of receiving water or ditch. Construction of this type of system was stopped in Indiana in the 1960s. Current design practices require separate sanitary and stormwater collection and treatment systems.

There are currently eight (8) combined sewer overflows within the three watersheds included in this study. Though often regarded as a source of *E.coli*, CSO's are a point source of many different pollutants. Anything flowing through the sanitary sewers can be released out a CSO under the right flow conditions. These pollutants can include *E.coli*, pathogens, solids, debris, and toxic pollutants including chemicals and heavy metals. Figures 6.1 and 6.2 show the locations of these CSO points.

Other Potential Point Sources

Other potential point sources located within the watershed study area include NPDES permit sites, landfills, industrial sites and super fund sites. Underground storage tanks, junk yards and EPA permitted discharges are also potential point sources of pollutants. The locations of these potential point sources along with other potential sources in and around the watershed study area are shown in Figures 6.3 and 6.4. Appendix 17: Potential Point Sources includes a listing of the locations and other associated information for each site in Lake and Porter County.

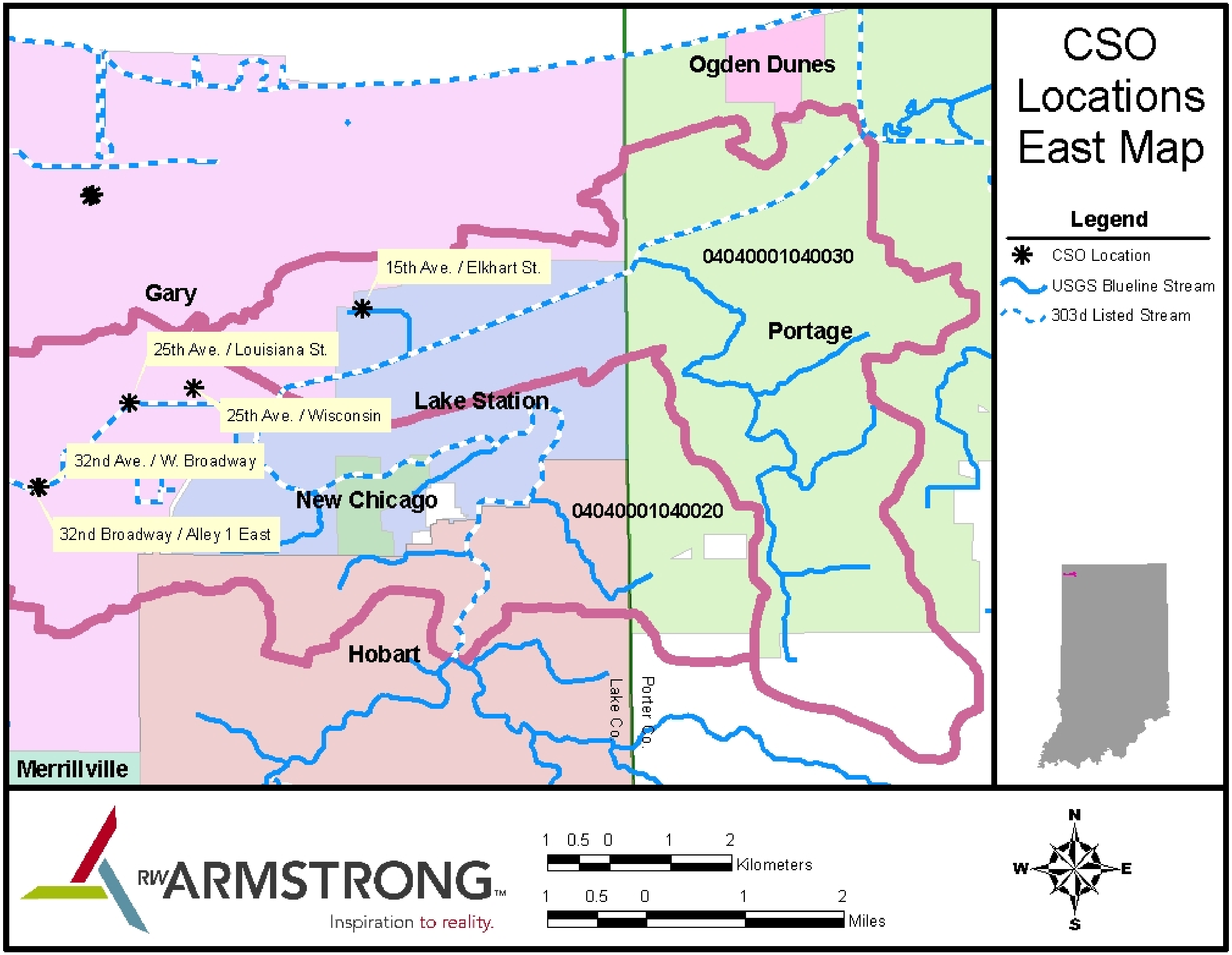

Figure 6.1: Combined Sewer Outfall locations for the eastern portion of the watershed study area.

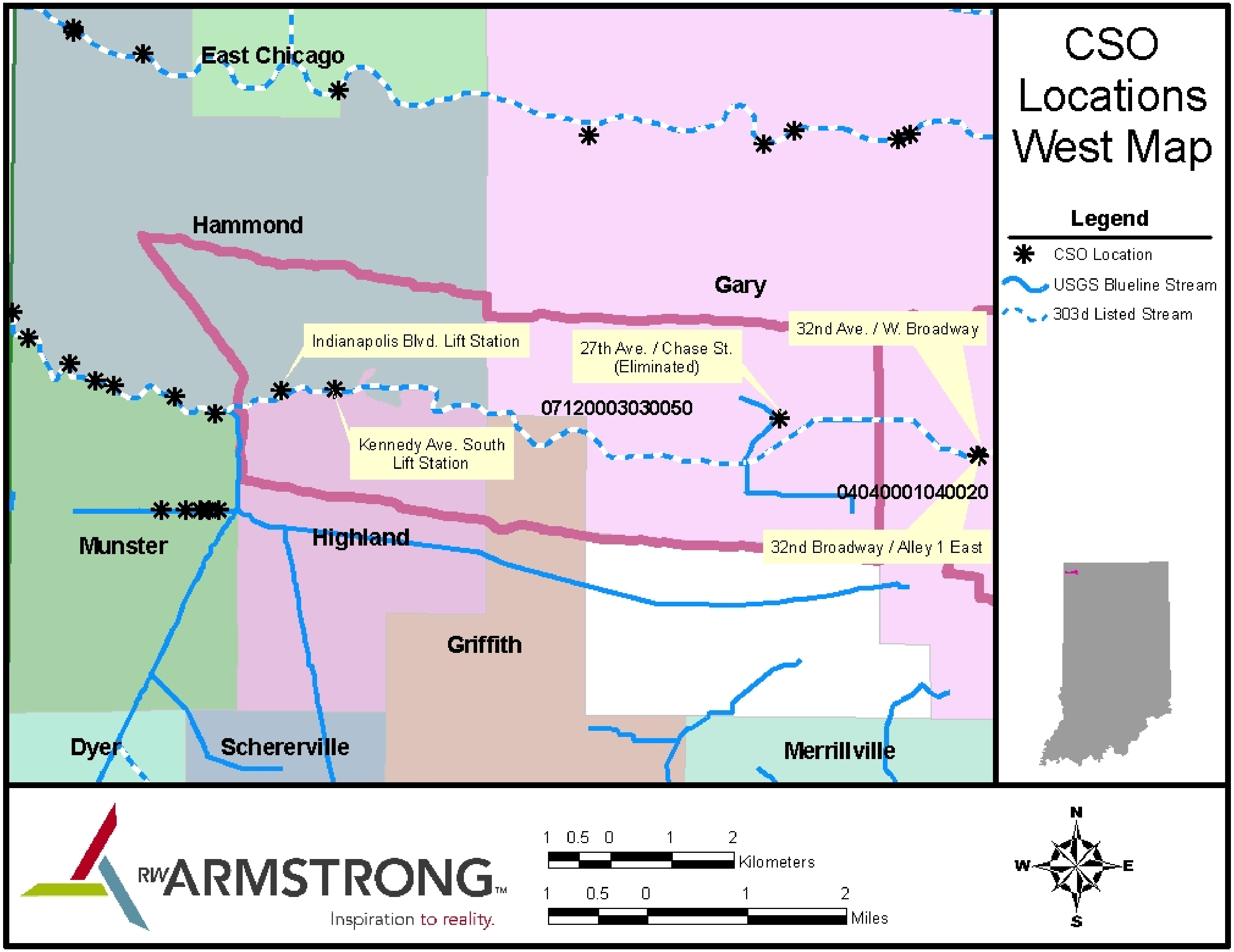

Figure 6.2: Combined Sewer Outfall locations for the western portion of the watershed study area.

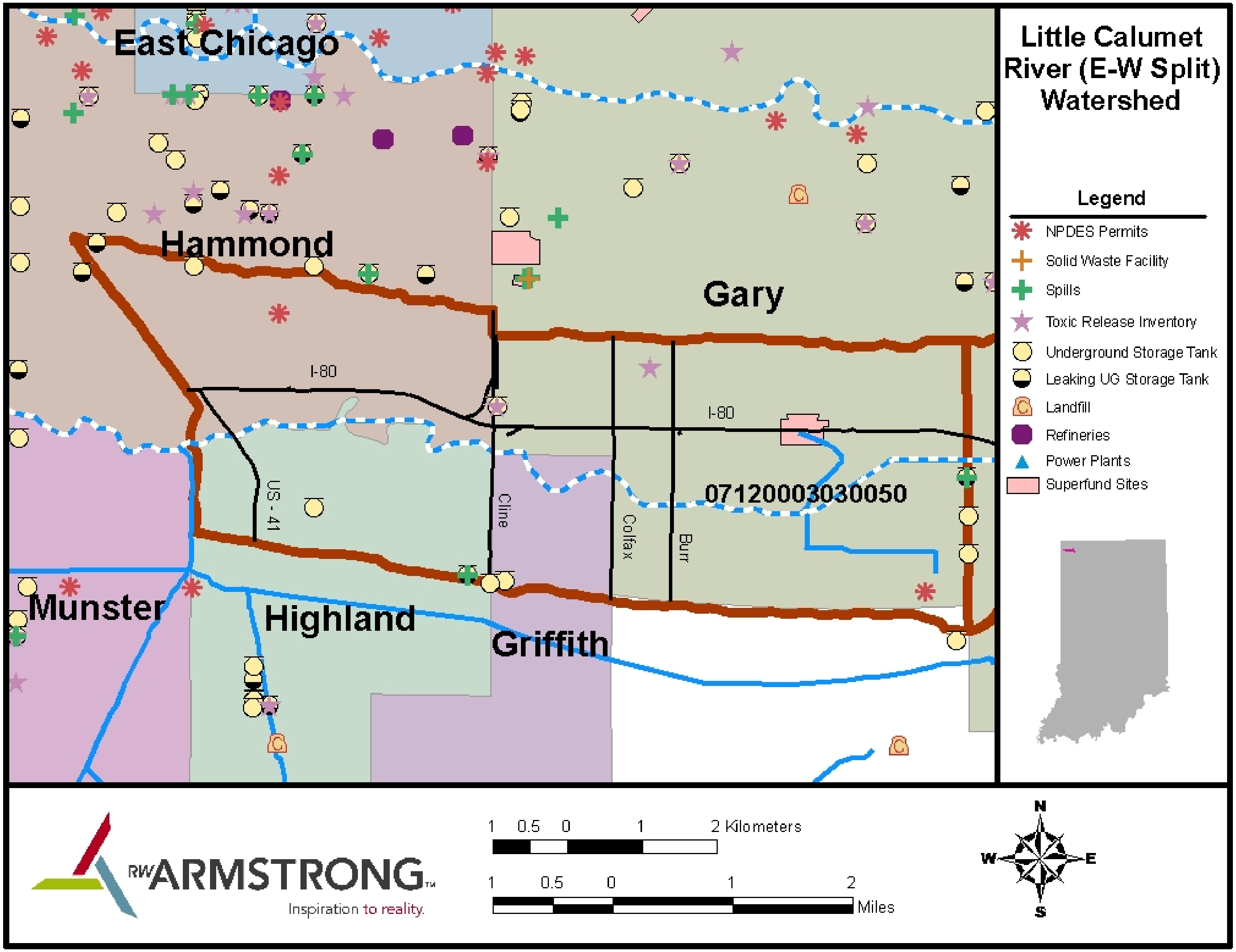

Figure 6.3: Potential point sources for the western portion of the watershed study area.

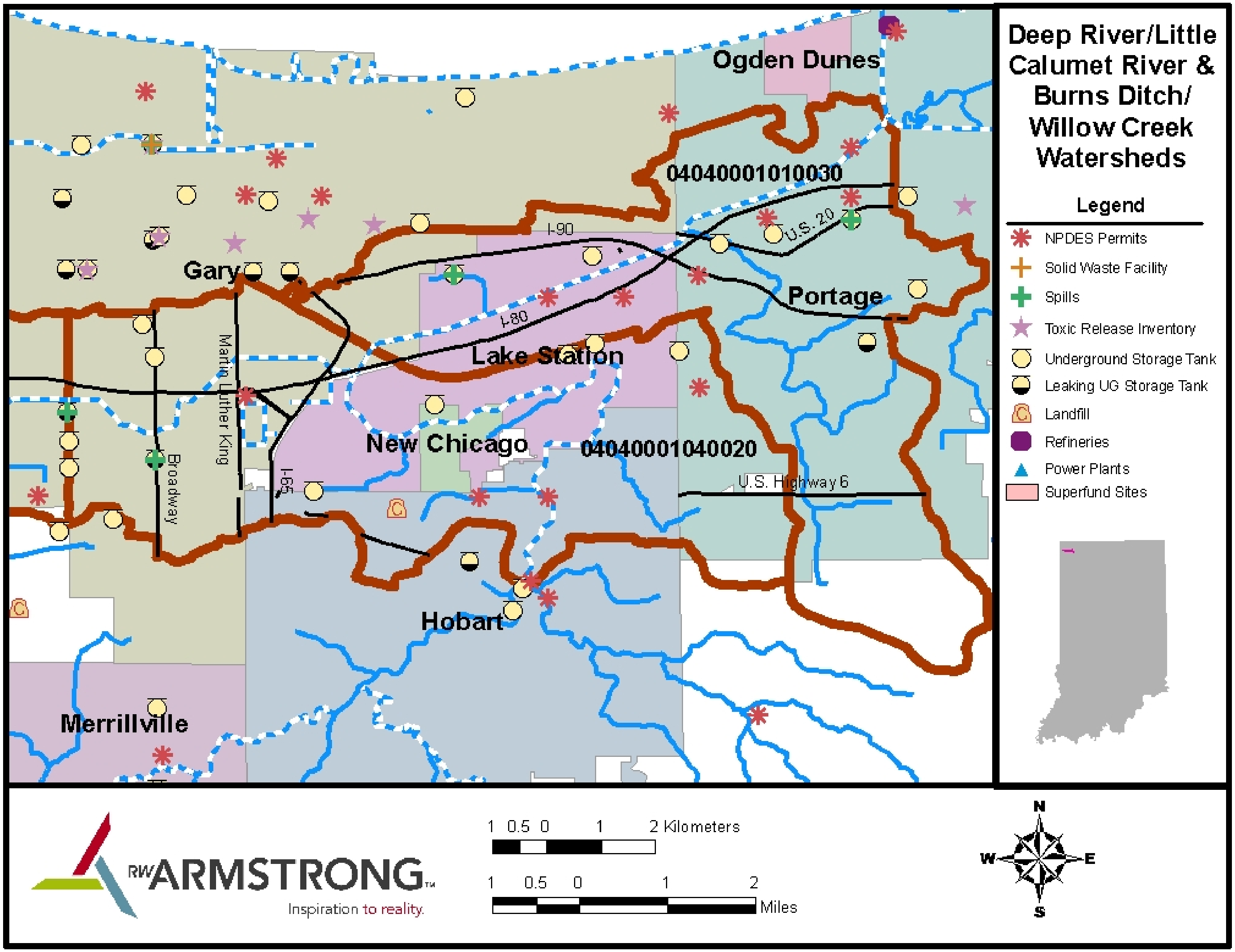

Figure 6.4: Potential point sources for the eastern portion of the watershed study area.

Non-Point Sources

Non-point source pollution refers to pollutants that enter the waterbody through stormwater runoff, contaminated ground water, snowmelt, or atmospheric deposition. These sources tend to be more diffuse in nature and occur at random time intervals depending on weather patterns.

Non-point sources can, in some instances, provide larger pollutant loads than the point sources to the same water body. Sources of pollutants in this category tend to be related to land useage and are more dispersed throughout the watershed. These sources can include roadways, parking areas, failing septic systems, animal wastes, fertilizers, detergents, etc.

With regard to *E.coli* pollution, the Little Calumet and Portage Burns Waterway TMDL for *E.coli* Bacteria discussed in Section II states:

"Based on the modeling and data analyzed, the allowable TMDLs for the Little Calumet – Portage Burns Waterway will require a reduction of over 90 percent in non-point source loads."

Onsite Wastewater Disposal

Because the TMDL states that a 90 percent reduction in non-point source *E.coli* bacteria is needed to meet current water quality standards, an attempt has been made to map existing septic systems within the three watersheds. Both the Lake and Porter County Health Departments were contacted and neither had adequate records to produce a map of active and abandoned septic systems. Once that was determined, a new strategy was developed and the City of Gary's Health Department was contacted. The new strategy was to attempt to map un-sewered areas because the City of Gary had already produced such a map under their Integrated Storm Water Drainage Plan for the Little Calumet River Watershed Study (2003-2004).

While the map attempts to locate un-sewered areas, not all communities were forthcoming with information needed to complete the map shown in Figure 6.5. Even in the areas shown as sewered, there may be enough active and/or abandoned septic systems to be a significant source of *E.coli* and other non-point source pollutants.

The TMDL report sites an Ohio Department of Environmental Quality 2001 study that estimated each failing septic system could generate a daily load of around 1.516 x 10^8 cfu/day. It then states that the non-point source load in the Black Oak area of the City of Gary would indicate 200 to 300 failing septic systems if 100 percent of the loading reached the river. It goes on to say that this scenario is unlikely and other non-point sources must exist in and around the Black Oak area to account for the loading observed in that area of the river.

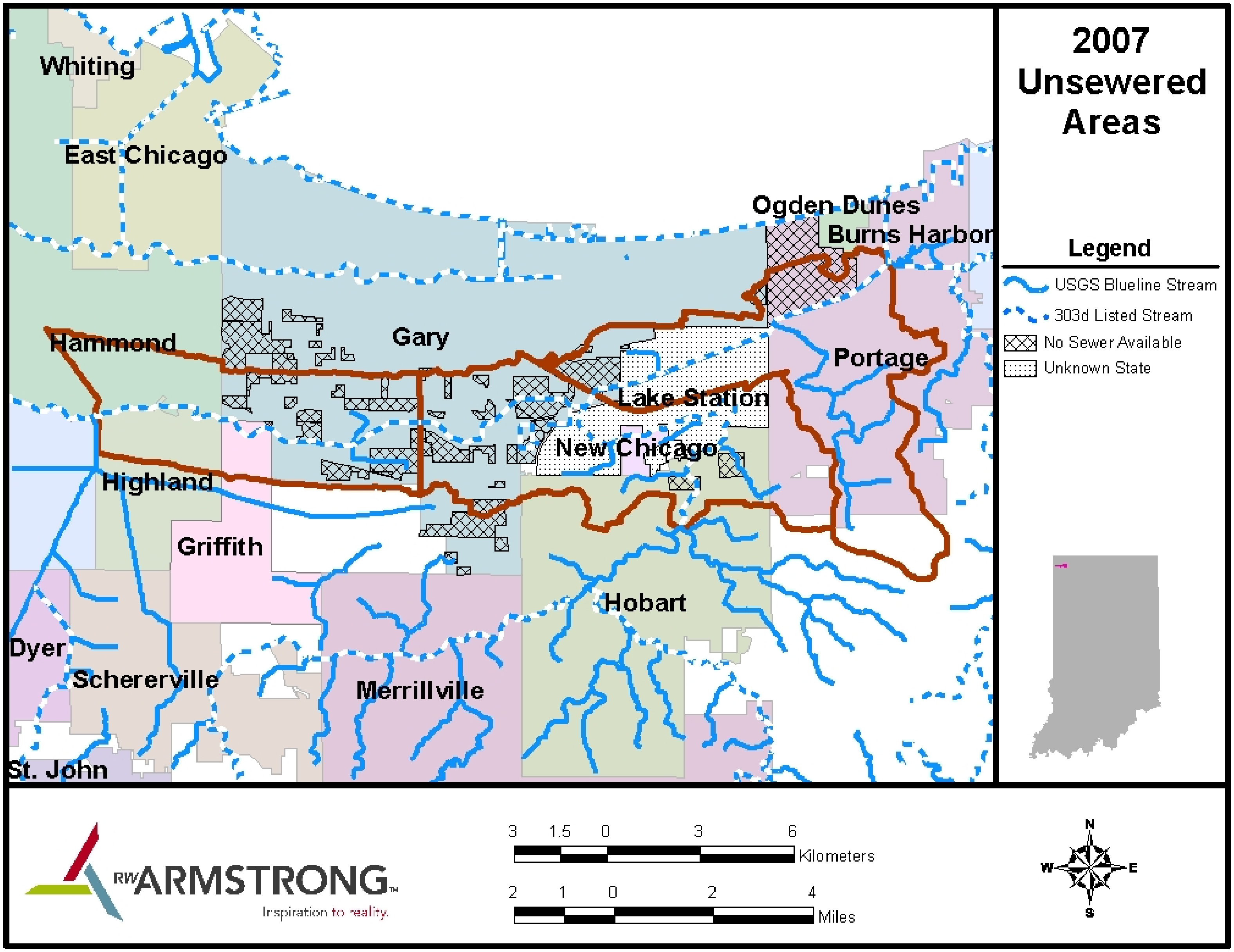

Figure 6.5: Un-sewered areas in the watershed study area according to information received from local sanitary districts.

Urban/Residential

Runoff from urban areas can be the most significant source of non-point source pollution in a watershed. Impervious surfaces can increase the volume of runoff, the rate of run off, and the temperature of runoff.

The additional flow can cause erosion and sedimentation in receiving channels. Impervious areas also allow detergents, auto fluids, deicing chemicals, household wastes, pesticides, fertilizers, animal wastes, and other pollutants to reach receiving waters with little or no filtering, often due to curb and guttered roadways. Atmospheric deposition on impervious surfaces is often washed away with the first rain or snowmelt.

Agriculture/Managed Lands

These lands include areas such as golf courses, agricultural land, and parks where fertilizers, pesticides, animal wastes, and other chemicals may be washed off the land and into receiving waters. Land disturbance in these areas can also lead to pollutant loading in the river.

Land Disturbing Activities

Any type of land-disturbing activity such as clearing, tilling, excavation, filling, grading, or even vegetation degradation can result in increased pollutant loading. Increased erosion by wind and water ultimately reaches waterways.

Natural Areas

While natural areas tend to be a sink for many pollutants, especially nutrients, they can be a significant source of *E.coli* depending on local animal types and populations. The TMDL report for this watershed sites potential bacteria contributions from geese, ducks, deer, beavers, and raccoons. It is interesting to note that the estimated daily bacteria production for each goose, duck, deer, and beaver exceeds the bacteria loading rate of a failing septic system. The bacteria production of each raccoon is slightly below (approximately 18%) the loading produced by each failing septic system.

<u>Pollutant Specific Sources</u>

E.coli Sources

<u>Combined Sewer Overflows</u> are the dominant source of *E.coli* bacteria. Previous testing of CSO discharges discussed earlier in this plan found discharges as high as 5,300,000 cfu/100mL. The locations of these discharges are shown in Figures 6.1 and 6.2. Because each CSO community is required to develop a Long Term Control Plan (LRCP) to eliminate these discharges, they were not considered in

the development of the TMDL discussed previously and do not need to be included in the goals of this plan, at this time.

Animal Life in this watershed, according to the TMDL, could contribute to the *E.coli* impairment in these waters. The TMDL report for this watershed sites potential *E.coli* contributions from geese, ducks, deer, beavers, and raccoons. Population estimates for wildlife in the natural areas in these watersheds would be needed to quantify this contribution. Previously presented land use maps indicate areas where wildlife is most likely concentrated, but wildlife is certainly not limited to these areas. In addition to wildlife, pets and livestock in the watershed are also sources of *E.coli*. The LCRBDC has found horse farms in the flood plains of the river, though most live stock along the Little Calumet River is located east of this study area. Pet waste in the high density and medium density urban areas could also contribute to the problem.

Failing Septic Systems are another source of *E.coli* pollution in this watershed. The quantity and location of septic systems within these watersheds is unknown. The un-sewered areas map, Figure 6.5, does not necessarily indicate that there are no septic systems in the sewered areas. Estimated bacteria release from failing septic systems is unlikely to be the sole source of *E.coli* impairment in this watershed based on estimated bacteria release from these systems.

Contaminated Sediments are also sited in the TMDL as a likely source of *E.coli* pollution. Years of CSO discharges and other sources may have contaminated sediments in and around the channels causing residual *E.coli* contamination during higher flows when these sedimets are agitated. Contaminated sediments may also be contained within storm sewers leading to the channels.

Impervious Areas are sited by the TMDL as likely sources of *E.coli*. Although impervious areas do not produce *E.coli* themselves, they are a conduit for *E.coli* bacteria from other sources to reach the river before they can die off. Runoff carrying *E.coli* from pet wastes, failing septic systems, etc. can be quickly routed to the creeks/rivers in this area via curb and gutter and storm sewer systems. Impervious areas also contribute to thermal pollution by raising the temperature of run off and may be responsible for making the flows more conducive to bacteria survival. Likely locations of impervious areas can be seen on the land use maps (Figure 4.34 to Figure 4.38).

Nitrogen and Phosphorus Sources

Combined Sewer Overflows were shown to be major sources of nitrogen and phosphorus in previously discussed studies on the Little Calumet River. The locations of these discharges are shown in Figures 6.1 and 6.2. Because each CSO community is required to develop a Long Term Control Plan (LRCP) to eliminate these discharges, they do not need to be included in the goals of this plan.

Excessive Fertilizer Application is sited by the Watershed Diagnostic Study of the Little Calumet-Galien River Watershed as a source of nitrogen and phosphorus in this watershed. Managed lands such as golf courses and urban areas are significant sources of excess fertilizer applications. A main source though would be the agricultural land which makes up approximately 12% of this watershed study area.

Animal Life in this watershed, according to the Watershed Diagnostic Study of the Little Calumet-Galien River Watershed, is also a source of nitrogen and phosphorus. Pets and livestock in this watershed are an additional source of nitrogen and phosphorus. The LCRBDC has found horse farms in the flood plains of the river, though most live stock along the Little Calumet River is located east of this study area. Pet waste in the high density and medium density urban areas could also contribute to the problem. Wildlife contributions are most likely limited to bird droppings deposited directly into the waters or on impervious surfaces that carry to flows to the channels without any break in impervious surface connections.

Failing Septic Systems are another source of nitrogen and phosphorus pollution in this watershed according to the Watershed Diagnostic Study of the Little Calumet-Galien River Watershed. The quantity and location of septic systems within these watersheds is unknown. The un-sewered areas map (Figure 6.5) does not necessarily indicate that there are no septic systems in the sewered areas.

Total Suspended Solids

Impervious Areas are a major source of Total Suspended Solids (TSS) in this watershed. Soil erosion and sedimentation are naturally occurring processes in all streams and rivers. However, as impervious areas increase so do runoff volumes and velocities. These increased volumes and velocities often directly relate to additional channel erosion in drainage ditches, streams, and rivers. This erosion in drainage ditches is a constant problem in this watershed due to highly erodible soils, the high ground water table, and almost flat slopes within the ditches themselves. Impervious areas also collect wind deposited sediments as well as deicing salt/sand mixtures that can then be carried directly to waterways, if there is no break in the connection of impervious areas.

Construction Practices within this highly urbanized area are also a source of total suspended solids via soil erosion by wind and water. The large amount of construction work in this watershed due to development, redevelopment, and replacement of aging infrastructure presents ample opportunity for soil erosion if careful planning and execution of preventive measures is not performed. The rural land that that is currently located on the east side of the watershed study area in un-incorporated Porter County will be a source of population growth in the next 20 years. The population and development trends outlined in Section III estimate that this part of Porter County is expected to grow at a rate of 741 people per square mile. Figure 3.12 shows the population change data through the year

2030 for the watershed study area. Those areas that have the greatest changes in number of people are the areas that will be critical to control the construction practices. While many standards are in place for dealing with erosion through storm water runoff, little is done to prevent wind erosion.

Agriculture can also contribute to total suspended solids when care is not taken to prevent soil loss. With current agricultural practices within the watershed study area including land being plowed right up to the edge of ditches; runoff from the land goes straight to the water with no time for any pollutants to settle. While agriculture is not the dominant land use in this watershed, its 4,100 plus acres make up almost 12% of the watershed area. Agriculture still occurs right up to the river between the levee system in places though this is being phased out. Some of these fields have as recently as 2007 been planted with rows perpendicular to the river allowing water carrying sediments and nutrients to flow directly to the river between crop rows.