Alternative C

1.) 7 sites w/ grab samples for a full suite of water chemistry and physical parameters:
    - pH, temperature, dissolved oxygen,
    - nitrate+nitrite, organic nitrogen (TKN), ammonia nitrogen,
    - total and dissolved phosphorus,
    - turbidity, conductivity, and discharge (flow).
    - Fecal coliform as *E.coli*
    - Stormflow and baseflow samples collected once at each site.
2.) 40 long-term *E.coli* samplers
    - Samplers stay in via stakes for one month
    - Media removed and rinsed
    - Sub-sample of wash water cultured on Petri dish and enumerated
3.) 5 Macroinvertebrate Sites
    - Will require Hester Dendy artificial substrate samplers due to lack of riffle habitat
    - NOTE: species diversity is affected by available habitat, therefore potential knowledge gained related to insect community health (re: surrogate for long-term water quality conditions) is some what limited since Hester Dendy samplers are only left in place a few weeks.

The creation and aim of alternative "A" was to respond to public concerns presented at the first public meeting. Alternative "C" was added based on a suggestion by steering committee members that believed some Macroinvertebrate data would be beneficial.

After much discussion, the Steering Committee selected Alternative "B" with the intent to provide two rounds of long-term *E.coli* samplers. The first round of grab samples and long-term *E.coli* samplers was planned to take place during high flows. The second round was planned for summer when only base flow is likely to be present in the river.

Macroinvertebrate data was to be gathered by the Hoosier River Watch program, though the data may not be as useful as professionally gathered data.

The seven (7) sampling sites are shown in Figure 4.32 with their exact locations and sample streams noted in Table 4.1.

A Quality Assurance Project Plan (QAPP) was submitted to the Indiana Department of Environmental Management (IDEM). The sampling plan was modified through this process to include 42 grab sample sites in lieu of the 90 long term samplers. The approved QAPP is included in Appendix 13: Quality Assurance Project Plan. The sampling sites are described in Appendix 14: Sampling Sites.

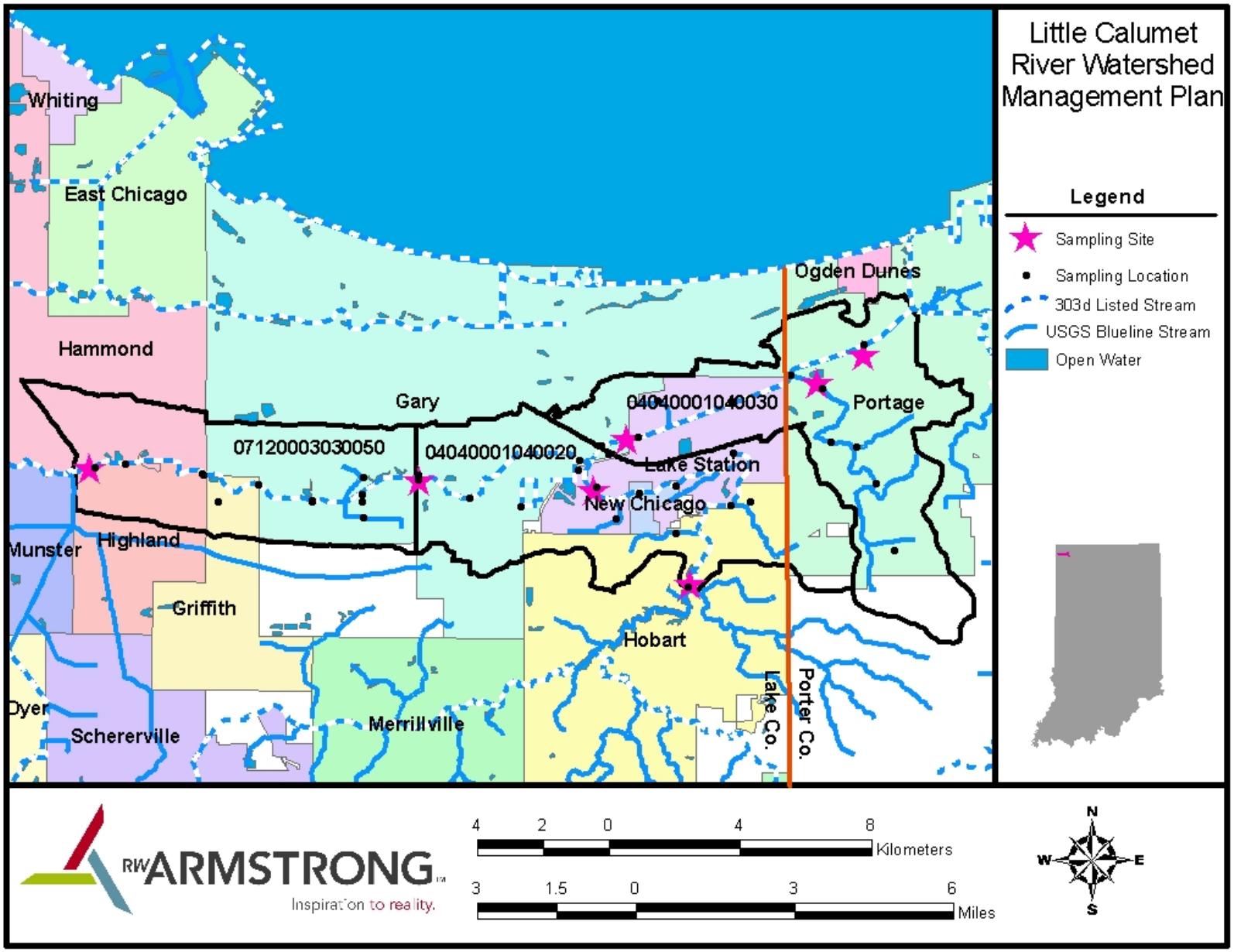

Figure 4.32: Sampling sites proposed and accepted by IDEM for a full suite of nutrient testing parameters.

Sampling Sites	Stream Name	Location	Latitude	Longitude
Site 1	Little Calumet	Indianapolis Blvd.	41.34.06	87.28.28
Site 2	Little Calumet	Grant Street	41.33.56	87.21.20
Site 3	Deep River	Upstream	41.32.14	87.15.18
Site 4	Deep River	Downstream	41.33.47	87.17.27
Site 5	Burns Ditch	Clay Street	41.34.37	87.16.45
Site 6	Willow Creek	Hwy 20	41.35.33	87.12.36
Site 7	Burns Ditch	Downstream	41.36.10	87.11.35

Table 4.1: Little Calumet River Watershed Management Plan sampling site locations.

Sampling Site Contributing Areas

The watershed area that is the focus of this study was divided into five (5) subwatersheds that were delineated by the site to which they drained. Figure 4.33 shows the five subwatersheds that the study area was broken into. The land use was summarized for each of the five (5) subwatersheds in the study area and can be found in Figures 4.34 to 4.38.

Pollutant Load Determination Based on Land Use

Expected pollutant loading rates were calculated based on the current land use summarized for each delineated subwatershed. The two sampling sites that do not have an associated watershed were used as baseline comparison points.

The watershed was separated into five subwatersheds, each contributing to a different sampling site, Sites 2, 4, 5, 6, and 7. Within each specific sampling sites watershed the land use areas were tabulated and the pollutant loads determined using the United States Environmental Protection Agency (U.S. EPA) Region V Watershed Treatment Model (WTM) Version 3.1. The WTM was created in an excel format by the Office of Wetlands, Oceans and Watersheds and can be found and downloaded via the internet on the EPA website.

The drawback to the model used is that it only calculates the Total Nitrogen, Total Phosphorus, Total Suspended Solids and Fecal Coliform. This does not cover the same parameters tested for as part of the water quality testing completed for this plan. The determination of fecal coliform does not allow a direct comparison to the data collected. It is estimated that the *E.coli* bacteria concentrations are about 80% of the fecal coliform concentrations according to the TMDL prepared for the Little Calumet River.

The results of the WTM are shown in Table 4.2

Summary of Calculated Pollutant Loads					
		TN lb/year	TP lb/year	TSS lb/year	Bacteria billion/year
Sampling Site #2	Total	77634.72505	9626.678867	2215445.901	2881371.093
	Storm	67185.44355	9005.798767	2126249.801	2881371.093
	Non-Storm	10449.2815	620.8801	89196.1	0
Sampling Site #4	Total	49914.49127	6346.572785	1452197.602	1756754.933
	Storm	42668.37327	5838.227985	1403691.302	1756754.933
	Non-Storm	7246.118	508.3448	48506.3	0
Sampling Site #5	Total	46380.93083	5817.501848	1301459.691	1720582.641
	Storm	40444.85283	5441.529848	1254902.291	1720582.641
	Non-Storm	5936.078	375.972	46557.4	0
Sampling Site #6	Total	40357.62145	5327.227418	1200551.513	1310087.86
	Storm	33281.55695	4753.587418	1162953.263	1310087.86
	Non-Storm	7076.0645	573.64	37598.25	0
Sampling Site #7	Total	37165.85372	4686.047654	1139354.857	1175854.182
	Storm	29899.67322	4177.695454	1090435.657	1175854.182
	Non-Storm	7266.1805	508.3522	48919.2	0
TOTAL	Total	251453.6223	31804.02857	7309009.565	8844650.709
	Storm	213479.8998	29216.83947	7038232.315	8844650.709
	Non-Storm	37973.7225	2587.1891	270777.25	0

Table 4.2: Calculated pollutant loadings based on land use in subwatersheds using WTM.

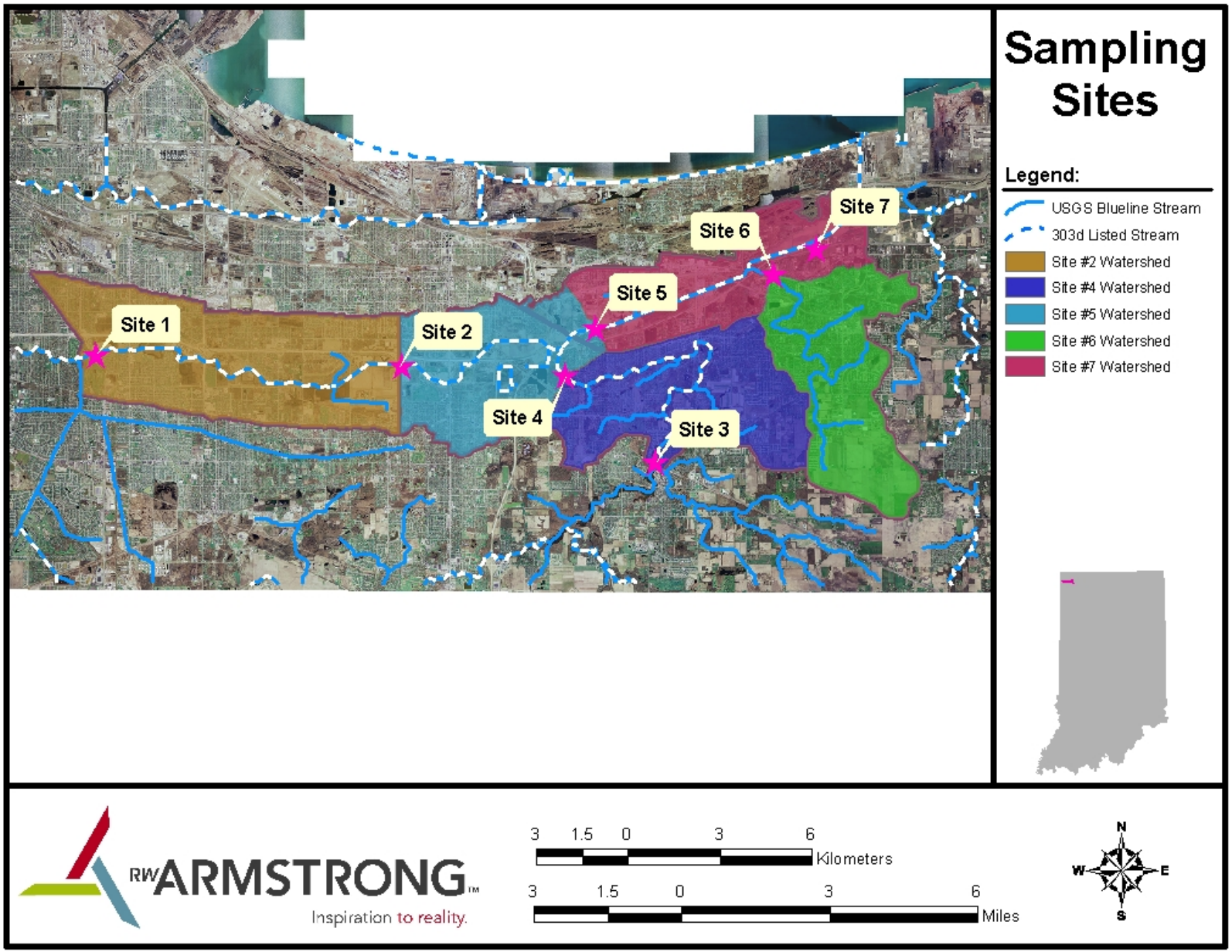

Figure 4.33: Delineation of sampling site watersheds.

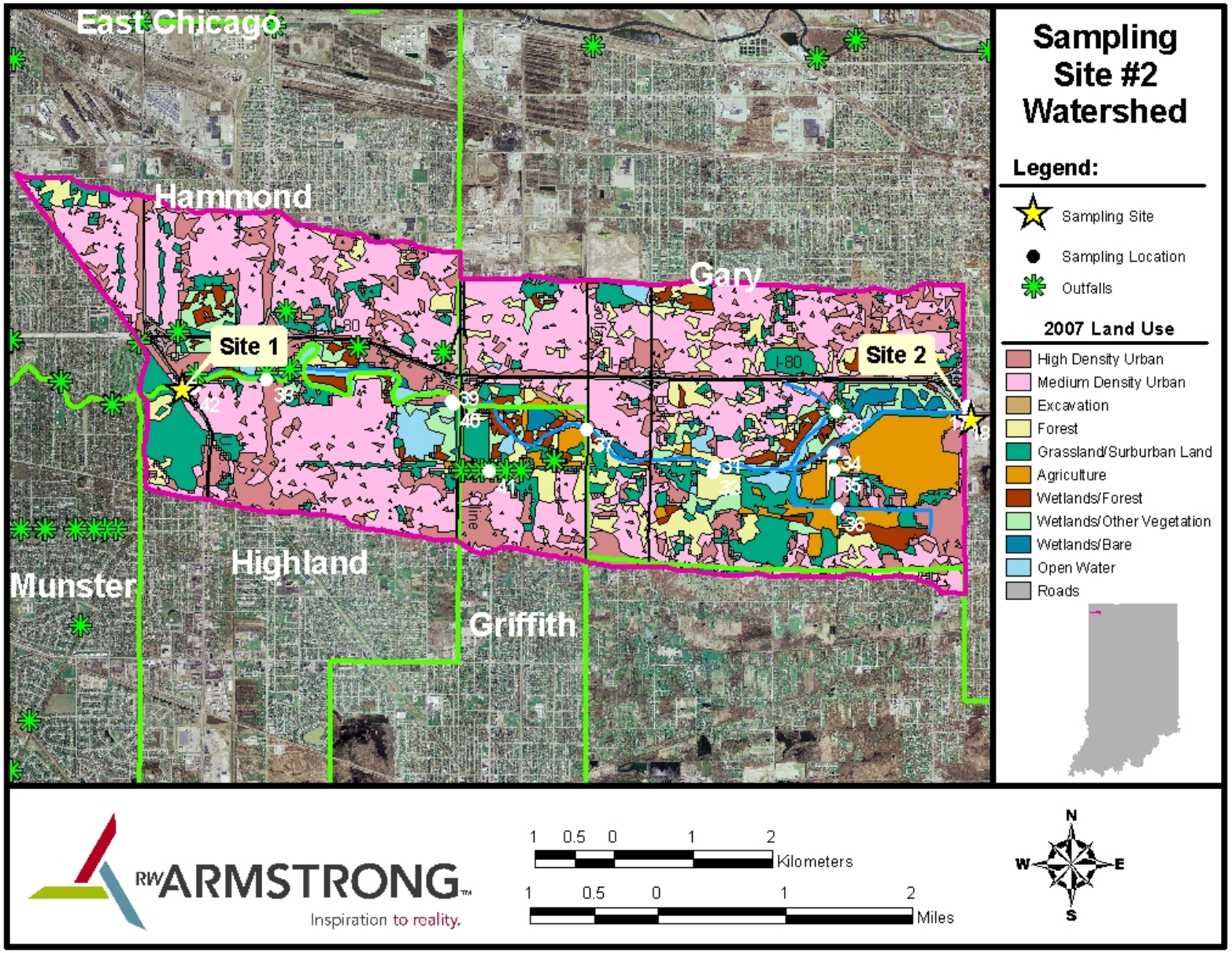

Figure 4.34: Sampling Site 2 subwatershed land use map.

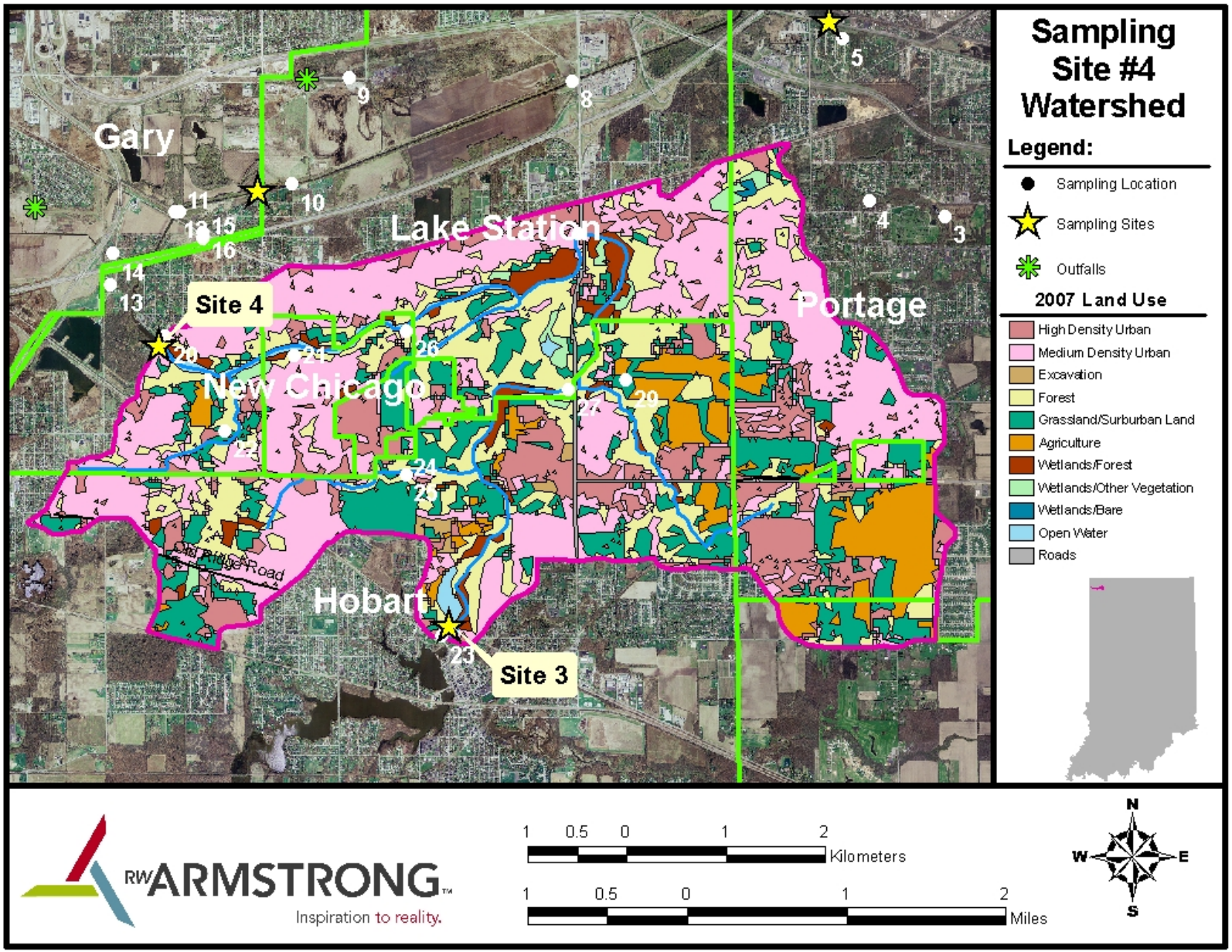

Figure 4.35: Sampling Site 4 subwatershed land use map.

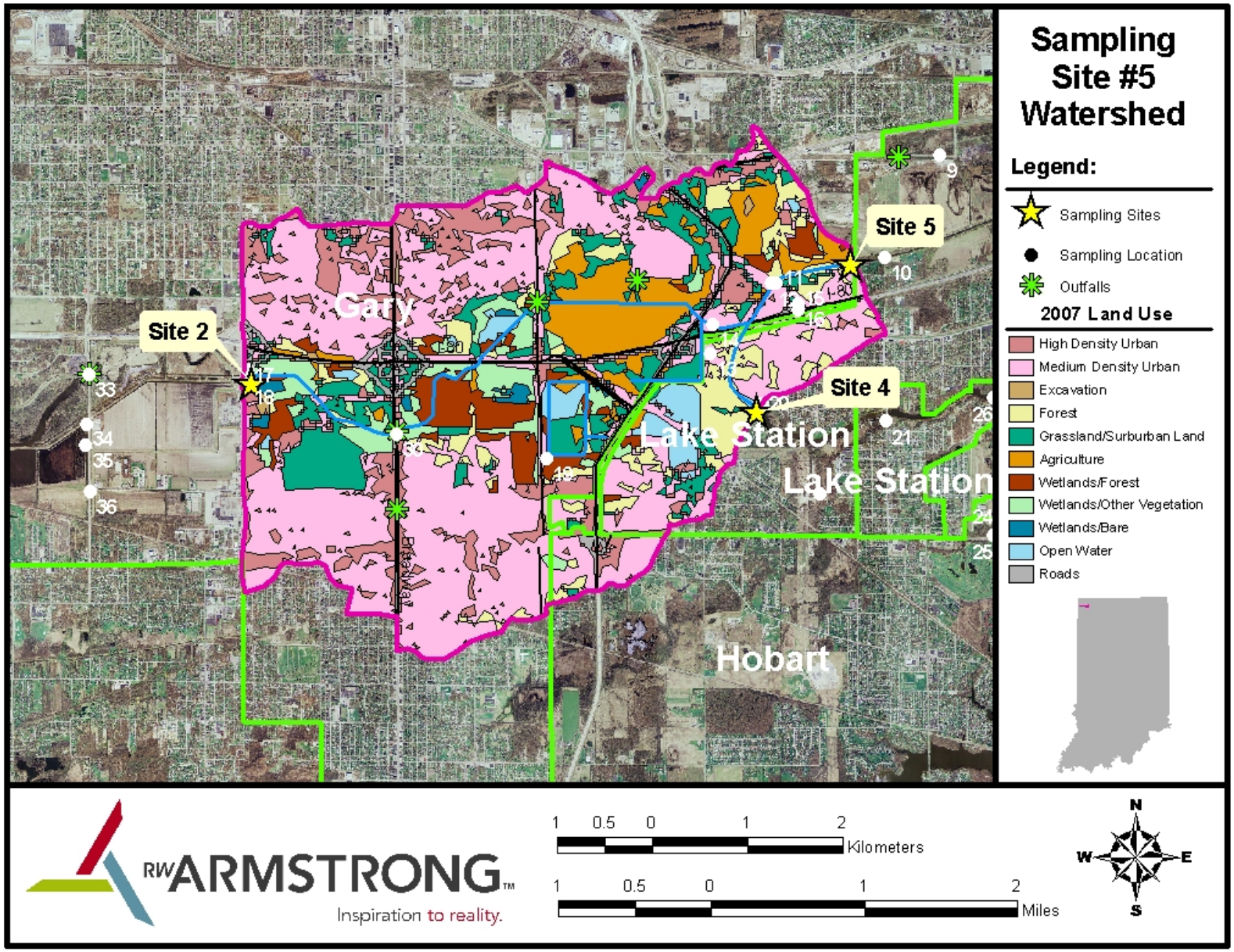

Figure 4.36: Sample Site 5 subwatershed land use map.

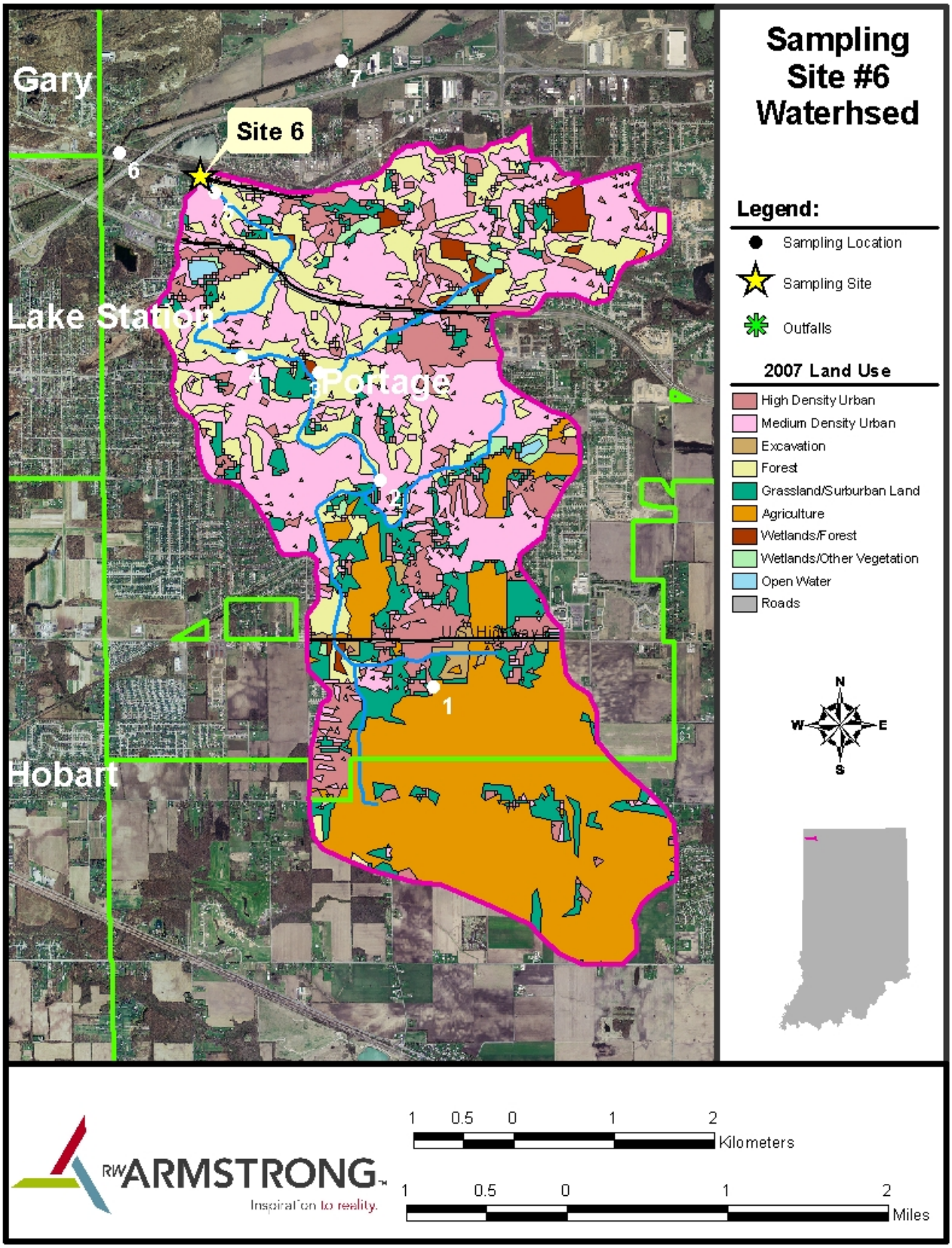

Figure 4.37: Sample Site 6 subwatershed land use map.

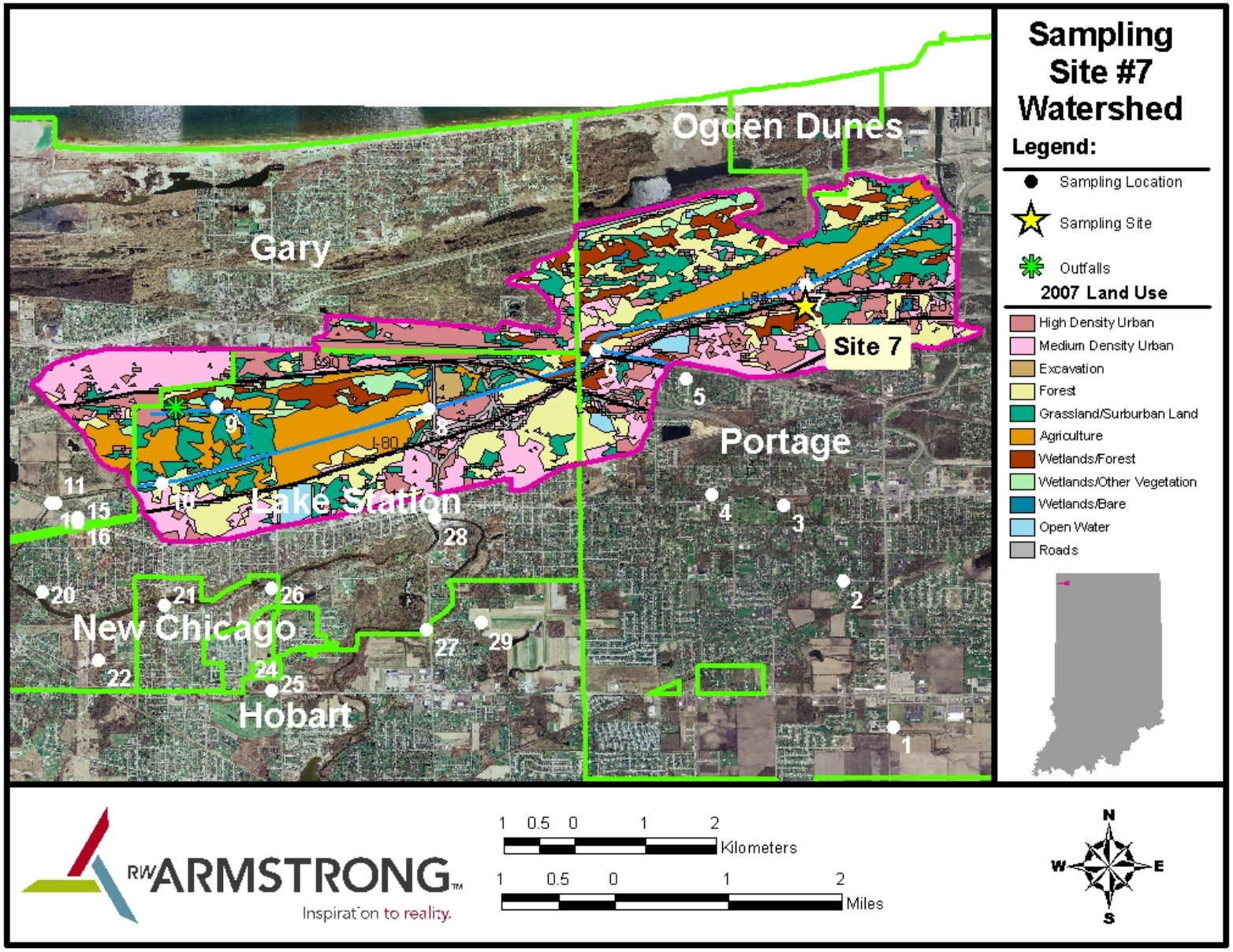

Figure 4.38: Sample Site 7 subwatershed land use map.