Case Description

Lancaster County, Pennsylvania is known for its rolling farmland and its historic urban core. The towns in the county have agreed to engage in some regional planning initiatives including an Urban Growth Boundary (UGB).   Inside the boundary are areas where the regional government wishes to encourage high density development, while development outside the boundary is restricted for agriculture, recreation etc.

The project intends to extend the UGB in one town that is best suited for new, **infill** development just **outside** of the UGB.   The new development must occur within a **quarter mile** outside of the existing UGB boundary and in the area immediately around Lancaster City – the urban core. The motivation is to extend the UGB in an area that already features high density development.

Solution

The Map for the Inside and Outside Buffer area of UGB
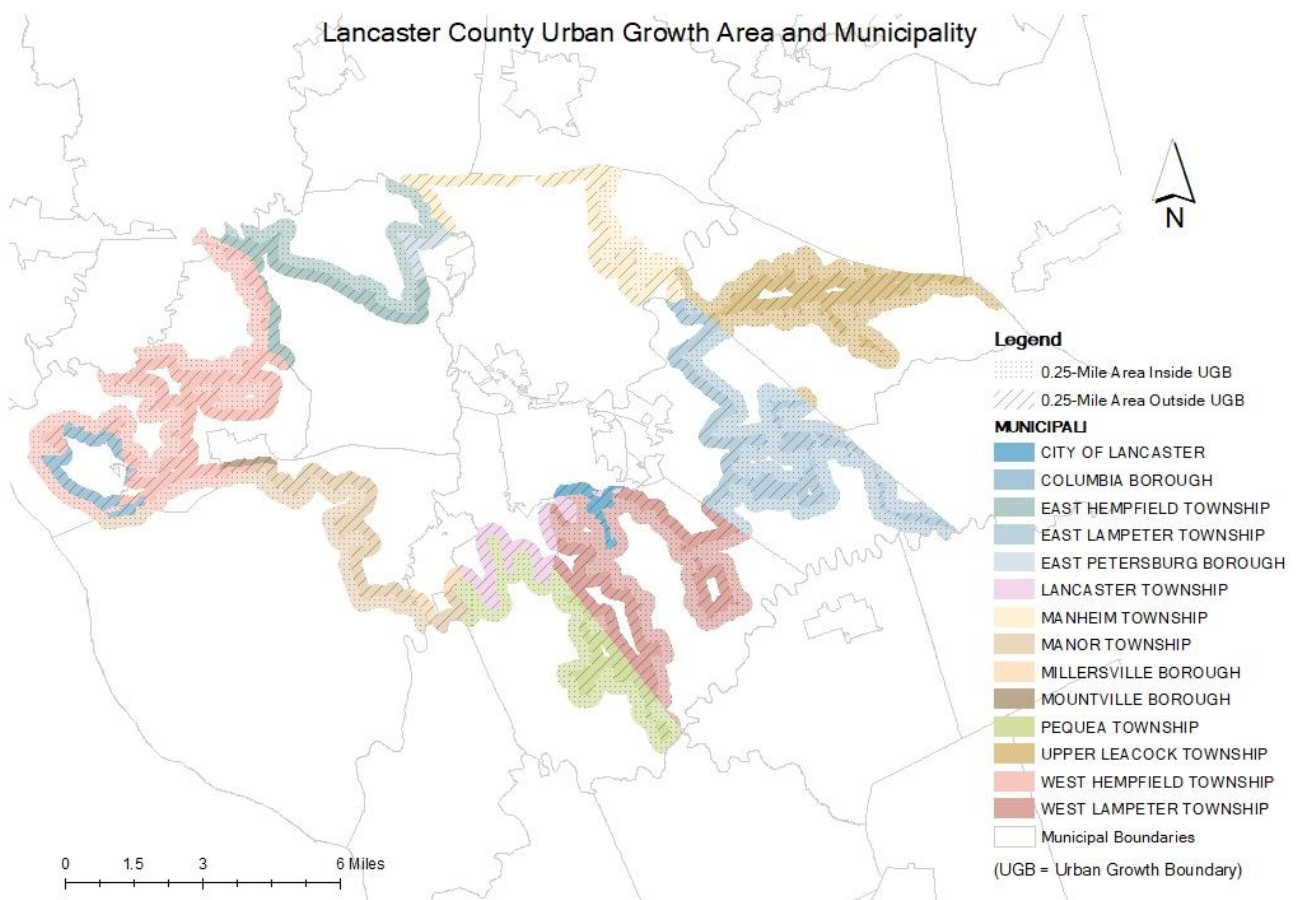

Fig. 1. The map for the inside and outside area of Lancaster county urban growth boundary (UGB), and the townships of the urban growth area.

Table for Four Variables

	Building_MeanQSqt			Density			DLY_VMT_Sum			ParkingLots_MeanSqt		
Municipality	Inside	Outside	Difference	Inside	Outside	Difference	Inside	Outside	Difference	Inside	Outside	Difference
CITY OF LANCASTER	0	1570.429	-1570.429	NaN	0.052284	NaN	0	22725	-22725	0	11341.04	-11341.04
COLUMBIA BOROUGH	3574.969	2495.55	1079.419	0.000782	1.918763	-1.917981	2563	373400	-370837	0	30142.71	-30142.71
EAST HEMPFIELD TOWNSHIP	3083.036	5385.06	-2302.024	1.232249	1.518667	-0.286418	243091	480358	-237267	103400.2	70258.26	33141.894
EAST LAMPETER TOWNSHIP	3162.846	3487.247	-324.4012	5.209652	0.089199	5.1204529	259217	377311	-118094	73375.8	52047.33	21328.467
EAST PETERSBURG BOROUGH	0	2089.668	-2089.668	NaN	0.206777	NaN	55459	77155	-21696	65111.01	15669.98	49441.031
LANCASTER TOWNSHIP	0	1926.247	-1926.247	NaN	0.4745	NaN	15942	53954	-38012	0	17791.94	-17791.94
MANHEIM TOWNSHIP	2804.822	2706.524	98.298198	0.010397	0.428467	-0.41807	409475	314456	95019	78875.93	23207.79	55668.14
MANOR TOWNSHIP	2438.255	2726.543	-288.2887	0.45769	0.640751	-0.18306	80963	67169	13794	42705.99	8157.451	34548.541
MILLERSVILLE BOROUGH	NaN	3378.543	NaN	NaN	0.098012	NaN	NaN	17268	NaN	NaN	20682.08	NaN
MOUNTVILLE BOROUGH	NaN	3125.07	NaN	NaN	0.138755	NaN	NaN	11529	NaN	NaN	80746.6	NaN
PEQUEA TOWNSHIP	1689.323	1866.565	-177.2421	2.966854	0.910388	2.0564653	129299	101010	28289	27671.99	28881.01	-1209.019
UPPER LEACOCK TOWNSHIP	2643.988	3927.652	-1283.664	1.658488	0.180301	1.4781877	151713	208370	-56657	79237.72	54628.45	24609.265
WEST HEMPFIELD TOWNSHIP	2015.863	2091.063	-75.20032	0.384224	1.422122	-1.037898	660694	682454	-21760	56220.79	47151.03	9069.7612
WEST LAMPETER TOWNSHIP	3554.116	2355.427	1198.6893	1.213339	2.07798	-0.864641	176261	201605	-25344	30724.3	24471.43	6252.8768
(For the difference columns, negative data means the Inside is lower than outside,vice versa)												

Table 1. Provided the value of inside and outside area around UGB, and also provided the differences of two area for each town. The variables include the mean building area, building density, the sum of vehicle mile traveled, and the mean area of parking lots.

Grass Shrub Area in Acres of Developable Land

MUNICIPALITY	GRASS SHRUB LAND IN PROPOSED UGB EXTENSION (ACRE)	COUNT
CITY OF LANCASTER	88.57864211	358464
COLUMBIA BOROUGH	271.6019781	1099131
EAST HEMPFIELD TOWNSHIP	843.6185059	3413993
EAST LAMPETER TOWNSHIP	1392.78538	5636386
EAST PETERSBURG BOROUGH	170.0430995	688138
LANCASTER TOWNSHIP	552.4467129	2235666
MANHEIM TOWNSHIP	1283.401886	5193728
MANOR TOWNSHIP	552.4467129	4394283
MILLERSVILLE BOROUGH	73.99172174	299433
MOUNTVILLE BOROUGH	42.88773524	173560
PEQUEA TOWNSHIP	552.363191	2235328
UPPER LEACOCK TOWNSHIP	847.3888508	3429251
WEST HEMPFIELD TOWNSHIP	1627.167001	6584892
WEST LAMPETER TOWNSHIP	1286.262881	5205306

Table 2. Grass shrub in acres for the outside area of UGB of each township.

This step used raster calculator to get the number of grass shrub cells for the town by *("township" == value of the town) & ("landcover == value of grass shrub)*. Then, used the zonal statistic in table to find the area.

The Best Qualified Town

The best qualified town for receiving new development permit is Manor Town. The density of building and the sum of daily vehicle miles traveled are the most decisive variables. For the two variables, Manor town has the least differences of inside and outside areas, which means the overall developments for both sides are almost at the same level, so conducting new developments would face less problem of inequality in previous developments or social factors. Since the building density of Manor town is relatively lower than other towns, there would be more space for new constructions. The new development would also increase people's travel frequency and distance in the town. In terms of location, Manor town locates next to the river, so the benefits of water transportation are another positive factor to the new developments.

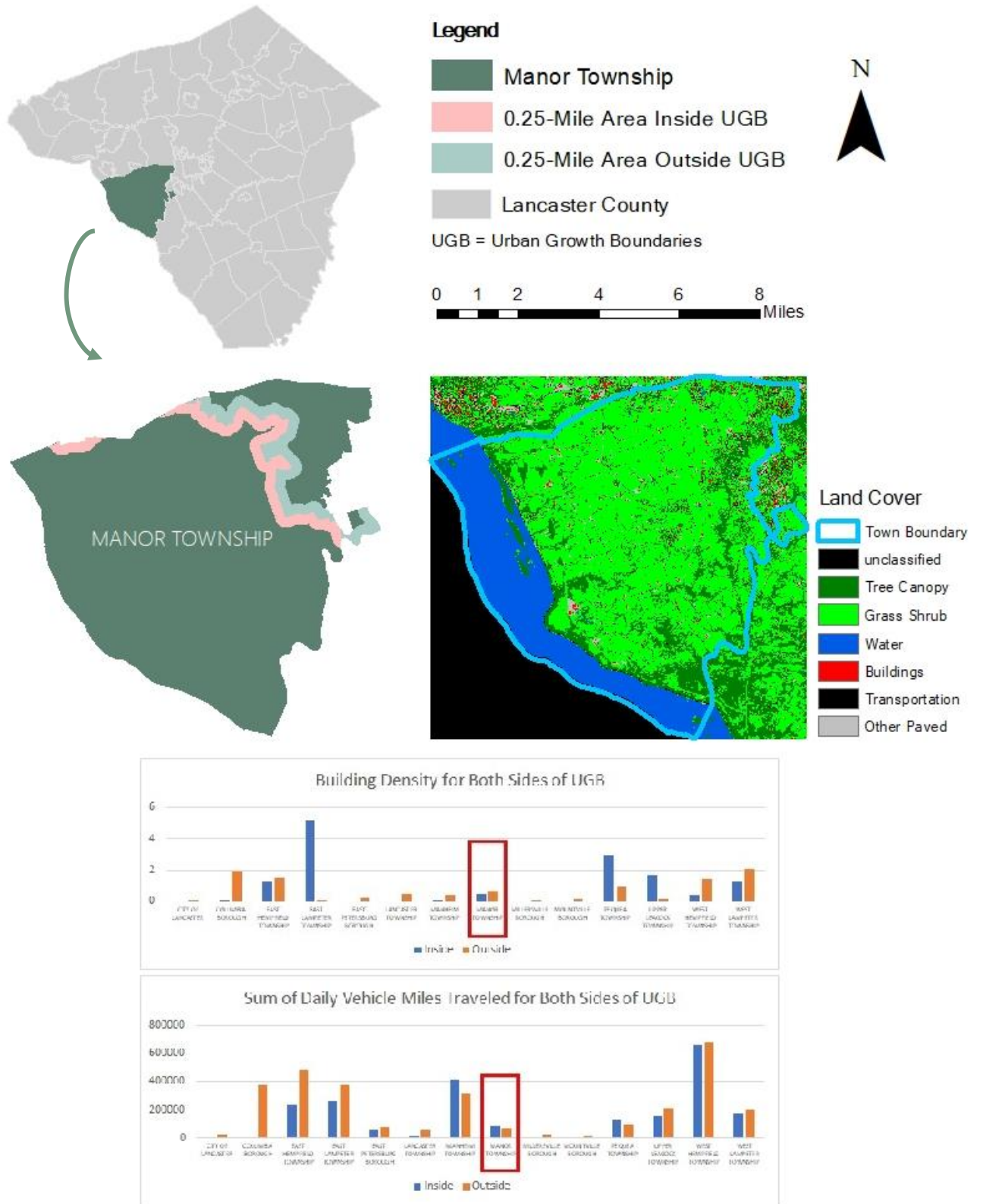# Manor Town: The Best Qualified town for New Development Permits

Fig. 2. The map set of the location and shape of Manor Town and its landcover pattern. The two variables of Manor town, the building density and the daily vehicle mile, are labeled in the bar graphs.