

Walk-To-School Prioritization Analysis *for the schools of* Knox County, Tennessee



Prepared for the
Knox County Dept. of
Engineering &
Public Works



by

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Transportation
Consultants, LLC

The objective of this study is to identify the locations in Knox County having the greatest amount of potential and realized pedestrian activity associated with the walk-to-school trip type. With knowledge about where the greatest pedestrian demand exists, capital planners can focus efforts toward the determination of specific pedestrian infrastructure needs across the county.

The Knox County school walking trip estimates were developed using RPM's non-motorized trip modeling process. The process uses a combination of local and national data to produce walk-to-school trip estimates for all 86 public schools in Knox County. In the model, every student represents one trip made to school, with the potential for this to be a walking trip increasing as the trip length decreases. The student's home address is geo-coded as his/her origin and the student's school is geo-coded as his/her destination. The student data was obtained from Knox County Schools for all 59,276 students in the school system using school year 2013-2014 enrollment data.

With the origin and destination of all travel-to-school trips mapped, a unique trip assignment for all 59,276 trips to school was performed using current open-source mapping. This process results in the travel-to-school distance assuming that the existing street network is used to make the trip.

Interstates and other pedestrian-prohibited roadways were excluded from this analysis. All other streets were idealized as being suitable for pedestrian usage. The result of this process is the shortest theoretical walking distance between

Students who live within...	...have an average (mean) travel-to-school distance of...	...and a median distance of...
Unincorporated Knox County	3.83 miles	3.10 miles
City of Knoxville	2.62 miles	1.84 miles
Town of Farragut	3.32 miles	2.95 miles
Countywide Total	3.32 miles	2.62 miles

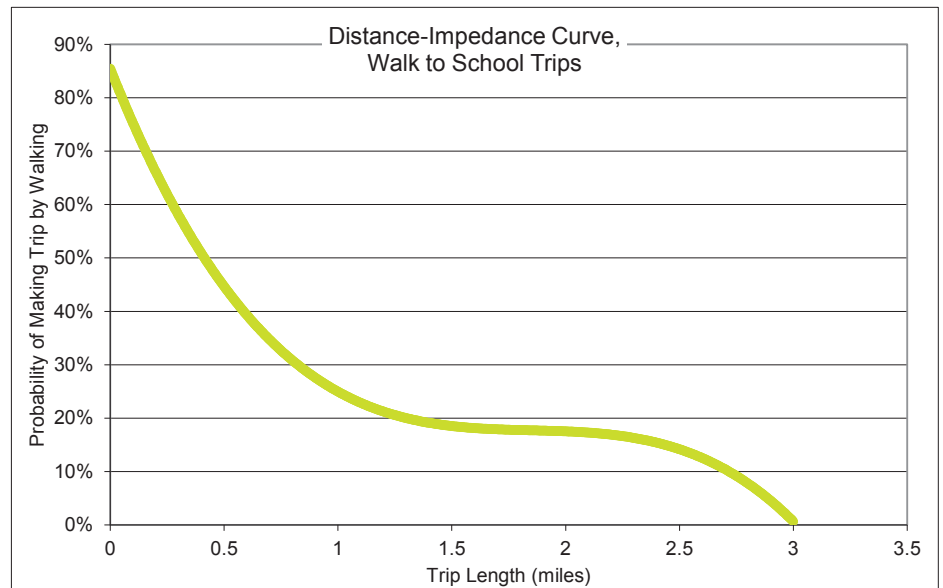
each student and his/her school along the existing street network. In Knox County, these distances were found to range from 0.01 miles to 31.5 miles, with the average (mean) distance being 3.32 miles. And, half of the county's students travel more than 2.62 miles (median distance), and half travel less.

Students residing inside a Parental Responsibility Zone (PRZ) are not eligible for bus transportation services provided by Knox County Schools and as such, may have a higher likelihood of walking to school. Within the district, 37.6% of students reside within one of these zones, comprising 64.4% of the predicted walking trips in the county. This equates to over 22,000 students with the possibility of nearly 5,000 walking trips located in PRZs. It could be concluded that these areas have the potential to induce higher numbers of walk-to-school trips provided the infrastructure was available.

With the travel distances for each student known, the probability of the trip to school being made by walking can be estimated. These estimates are made based on national data collected as part of the National House-

Total number of students in Knox County	59,276
Total potential number of daily walk-to-school trips	7,434
Number of students within a Parental Responsibility Zone (PRZ)	22,322 (~ 37.6%)
Potential walk trips originating in a PRZ	4,789 (~ 64.4%)

hold Travel Survey (NHTS) performed regularly by the Federal Highway Administration (FHWA). This survey effort samples the travel behavior of over 1 million households across the country and compiles the response data into trip-making information that is transferrable to communities across the country. For this effort, data from the NHTS was used to specifically quantify the relationship between three independent variables: trips made to school, trips made by walking, and the distance of the trip. With this, a distance-impedance curve was established specifically for trips made by walking to school.

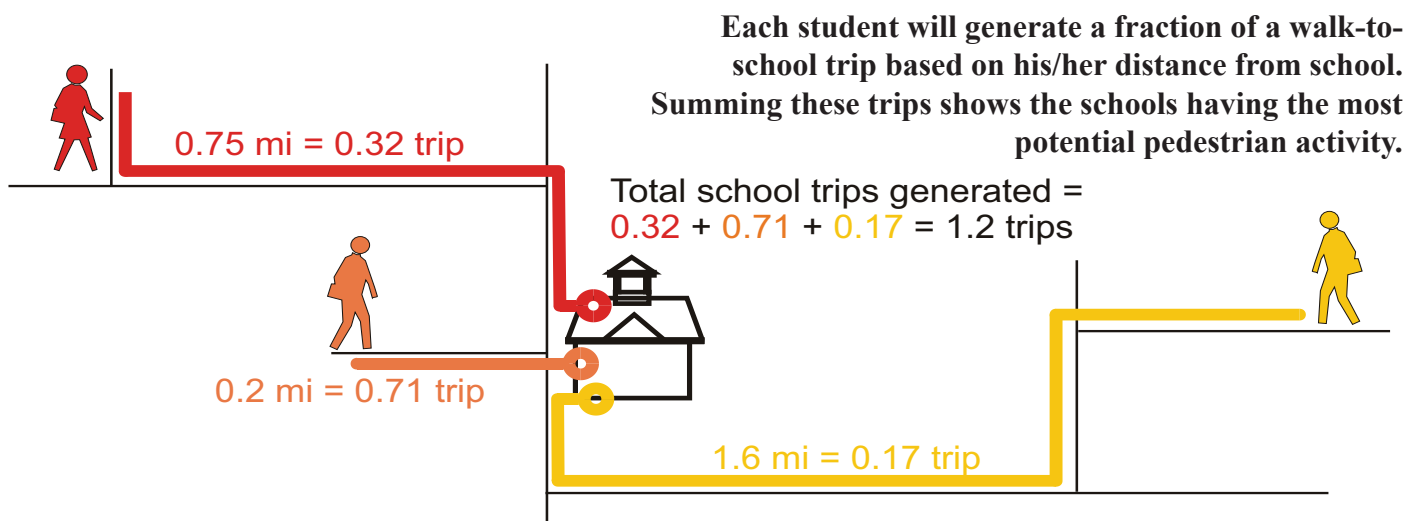


As would be expected, the curve shows that the shorter the trip to school, the more likely the trip will be made

An inverse relationship exists between trip distance and walking mode choice. Walking estimates are based on data which quantifies this relationship. Source: RPM analysis of data from the National Household Travel Survey (NHTS).

by walking. The value of the curve, however, is that this distance-mode probability can be uniquely quantified for any walk-to-school distance. For example, the survey data show that no matter how close a student lives to school, the maximum probability that the trip will be made by walking is approximately 85%. Also, the data show that at about 2.5 miles, the probability of making the trip by walking decreases sharply with trips 3 miles or greater having no real likelihood as walking trips.

Knowing the distance for each trip to school in Knox County along with the quantified relationship between distance and walking probability, the probability of a walking trip was attributed to each student in the county. This estimate results in the basis by which the locations most in need of improved pedestrian infrastructure have been identified.



The resulting walking trip estimates have been used to determine the school zones having the most potential walk activity. This table lists the top 25 walking schools in Knox County. Again, this list assumes that pedestrian facilities do not preclude the ability to walk to school. Because real-world facilities often do present a challenge to making a walk trip (having to cross a busy roadway, for example), this list should be considered to be a list of potential walking activity, and can provide capital planners a place to start to develop improved pedestrian infrastructure in order to efficiently meet walking demands and/or encourage more pedestrian activity.

Overall Rank	School Name	Enrollment	Total Predicted Walk Trips
1*	CEDAR BLUFF ELEMENTARY	1,293	213
2	LONSDALE ELEMENTARY	400	190
3*	BLUE GRASS ELEMENTARY	707	174
4	BELLE MORRIS ELEMENTARY	507	170
5	NORWOOD ELEMENTARY	613	169
6	BEAUMONT MAGNET	560	163
7	CHRISTENBERRY ELEMENTARY	548	162
8	FULTON HIGH SCHOOL	955	159
9	WEST HILLS ELEMENTARY	830	158
10	SARAH MOORE GREENE MAGNET	699	157
11	ROCKY HILL ELEMENTARY	722	151
12	AUSTIN EAST HIGH SCHOOL	563	147
13*	POWELL ELEMENTARY	913	143
14	DOGWOOD ELEMENTARY	770	137
15*	POWELL HIGH SCHOOL	1,373	135
16	FARRAGUT HIGH SCHOOL	1,671	134
17*	BRICKEY-MCCLOUD ELEMENTARY	975	132
18*	KARNS ELEMENTARY SCHOOL	1,251	131
19*	HALLS HIGH SCHOOL	1,276	130
20	INSKIP ELEMENTARY	482	128
21*	AMHERST ELEMENTARY	799	125
22	BEARDEN HIGH SCHOOL	1,914	122
23	WEST HIGH SCHOOL	1,234	121
24*	HALLS MIDDLE SCHOOL	1,146	120
25	GREEN MAGNET ACADEMY	336	119

*** Designates schools located in unincorporated Knox County.**

Focusing on the schools located within unincorporated Knox County (outside of Knoxville or Town of Farragut Limits), the highest walking schools are ranked as follows:

County Rank	Overall Rank	School Name	Enrollment	Total Predicted Walk Trips
1	1	CEDAR BLUFF ELEMENTARY	1,293	213
2	3	BLUE GRASS ELEMENTARY	707	174
3	13	POWELL ELEMENTARY	913	143
4	15	POWELL HIGH SCHOOL	1,373	135
5	17	BRICKEY-MCCLOUD ELEMENTARY	975	132
6	18	KARNS ELEMENTARY SCHOOL	1,251	131
7	19	HALLS HIGH SCHOOL	1,276	130
8	21	AMHERST ELEMENTARY	799	125
9	24	HALLS MIDDLE SCHOOL	1,146	120
10	26	HALLS ELEMENTARY	785	116
11	27	ADRIAN BURNETT ELEM	633	112
12	28	A.L. LOTTS ELEMENTARY	849	111
13	34	CEDAR BLUFF MIDDLE SCHOOL	609	100
14	39	WEST VALLEY MIDDLE SCHOOL	1,153	94
15	40	GIBBS ELEMENTARY	797	91
16	46	POWELL MIDDLE SCHOOL	957	85
17	51	BALL CAMP ELEMENTARY	583	75
18	52	KARNS MIDDLE SCHOOL	1,385	75
19	57	HARDIN VALLEY ELEMENTARY	985	60
20	58	CARTER ELEMENTARY	579	59
21	60	RITTA ELEMENTARY	653	57
22	61	GIBBS HIGH SCHOOL	1,089	57
23	63	EAST KNOX COUNTY ELEMENTARY	523	49
24	64	BONNY KATE ELEMENTARY	363	43
25	65	MOUNT OLIVE ELEMENTARY	257	42
26	66	CARTER HIGH SCHOOL	928	41
27	68	HARDIN VALLEY ACADEMY	1,902	40
28	69	KARNS HIGH SCHOOL	1,200	36
29	70	SOUTH DOYLE HIGH SCHOOL	1,159	36
30	71	NEW HOPEWELL ELEMENTARY	248	36
31	72	CARTER MIDDLE SCHOOL	820	32
32	74	COPPER RIDGE ELEMENTARY	556	30
33	77	GAP CREEK ELEMENTARY	107	23
34	78	SUNNYVIEW PRIMARY	306	20
35	79	CORRYTON ELEMENTARY	199	19

The ranking for just the schools inside of Knoxville and Farragut is as follows:

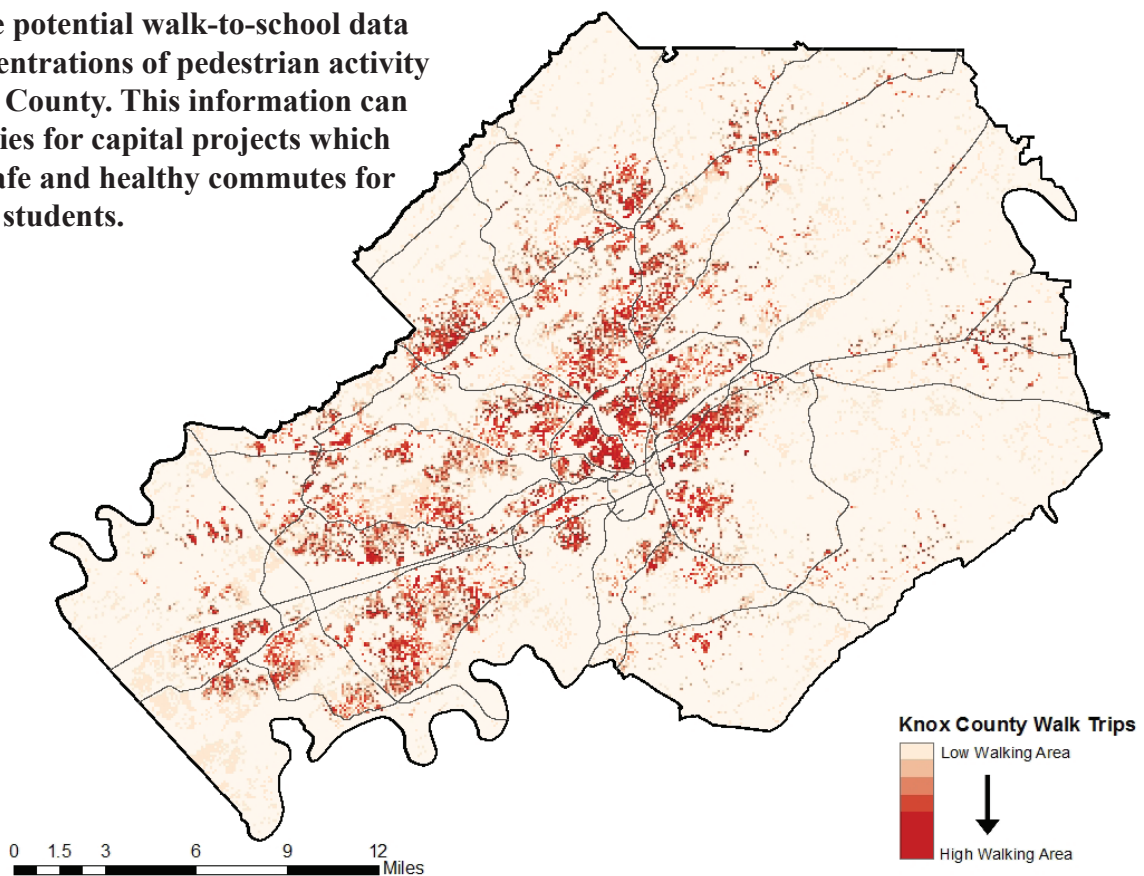
City Rank	Overall Rank	School Name	Enrollment	Total Predicted Walk Trips
1	2	LONSDALE ELEMENTARY	400	190
2	4	BELLE MORRIS ELEMENTARY	507	170
3	5	NORWOOD ELEMENTARY	613	169
4	6	BEAUMONT MAGNET	560	163
5	7	CHRISTENBERRY ELEMENTARY	548	162
6	8	FULTON HIGH SCHOOL	955	159
7	9	WEST HILLS ELEMENTARY	830	158
8	10	SARAH MOORE GREENE MAGNET	699	157
9	11	ROCKY HILL ELEMENTARY	722	151
10	12	AUSTIN EAST HIGH SCHOOL	563	147
11	14	DOGWOOD ELEMENTARY	770	137
12	16	FARRAGUT HIGH SCHOOL	1,671	134
13	20	INSKIP ELEMENTARY	482	128
14	22	BEARDEN HIGH SCHOOL	1,914	122
15	23	WEST HIGH SCHOOL	1,234	121
16	25	GREEN MAGNET ACADEMY	336	119
17	29	CENTRAL HIGH SCHOOL	1,168	109
18	30	FOUNTAIN CITY ELEMENTARY	386	102
19	31	BEARDEN MIDDLE SCHOOL	1,166	101
20	32	WEST HAVEN ELEMENTARY	366	100
21	33	SOUTH DOYLE MIDDLE SCHOOL	1,084	100
22	35	PLEASANT RIDGE ELEMENTARY	408	100
23	36	MAYNARD ELEMENTARY	201	96
24	37	WHITTLE SPRINGS MIDDLE SCHOOL	533	95
25	38	FARRAGUT PRIMARY	1,011	95
26	41	SEQUOYAH ELEMENTARY	450	91
27	42	NORTHWEST MIDDLE SCHOOL	821	90
28	43	FARRAGUT MIDDLE SCHOOL	1,369	90
29	44	GRESHAM MIDDLE SCHOOL	767	90
30	45	FARRAGUT INTERMEDIATE	1,057	89
31	47	WEST VIEW ELEMENTARY	240	84
32	48	SHANNONDALE ELEMENTARY	410	83
33	49	MOORELAND HEIGHTS ELEMENTARY	396	82
34	50	STERCHI ELEMENTARY	393	81
35	53	BEARDEN ELEMENTARY	381	72
36	54	POND GAP ELEMENTARY	316	71
37	55	SPRING HILL ELEMENTARY	407	70

City Rank	Overall Rank	School Name	Enrollment	Total Predicted Walk Trips
38	56	VINE MIDDLE MAGNET	312	66
39	59	NORTHSHORE ELEMENTARY SCHOOL	869	58
40	62	SOUTH KNOXVILLE ELEMENTARY	159	52
41	67	SAM E. HILL FAMILY / COMMUNITY CENTER	182	40
42	73	HOLSTON MIDDLE SCHOOL	883	32
43	75	CHILHOWEE INTERMEDIATE	267	28
44	76	FAIR GARDEN FAM/COMM CTR	149	25
45	80	L & N STEM ACADEMY	468	7
46	81	RICHARD YOAKLEY ALT	95	2
47	82	PAUL L. KELLEY VOLUNTEER ACADEMY	128	1
48	83	RIDGEDALE ALTERNATIVE	90	1
49	84	FT SANDERS ED DEV CTR	61	1
50	85	KNOX COUNTY ADULT HIGH SCHOOL	236	0
51	86	KNOX ADAPTIVE EDUCATION CENTER	79	0

To aid in the analysis of these walking trip estimates with respect to capital planning for new pedestrian facilities, these estimates have been mapped. Mapping the trip data allows locations of particularly high or concentrated levels of walking to be highlighted. These highlighted locations make natural places to begin planning for new or improved pedestrian accommodations.

As a beginning point for local discussions of planning improved walk-to-school accommodations, detailed maps of the walk activity in following school zones have been created: Cedar Bluff Elementary, Lonsdale Elementary, Blue Grass Elementary, Belle Morris Elementary, Norwood Elementary, Powell Elementary, Powell High School, and Brickey-McCloud Elementary. These schools represent the top five walking schools within all of Knox County and the top five walking schools which are located within unincorporated Knox County (Cedar Bluff and Blue Grass Elementaries make both lists).

Mapping the potential walk-to-school data reveals concentrations of pedestrian activity across Knox County. This information can drive priorities for capital projects which encourage safe and healthy commutes for the county's students.




Using this knowledge about where the greatest pedestrian demand and/or potential exists should provide a focused starting point for pedestrian project planning. The GIS data provided as part of this effort will allow technical staffs to evaluate a number of potential approaches in prioritizing walk-to-school needs. This will provide Knox County with one more tool that will help meet the critical objective of keeping its students both safe and healthy.


Legend

 Cedar Bluff School Zone

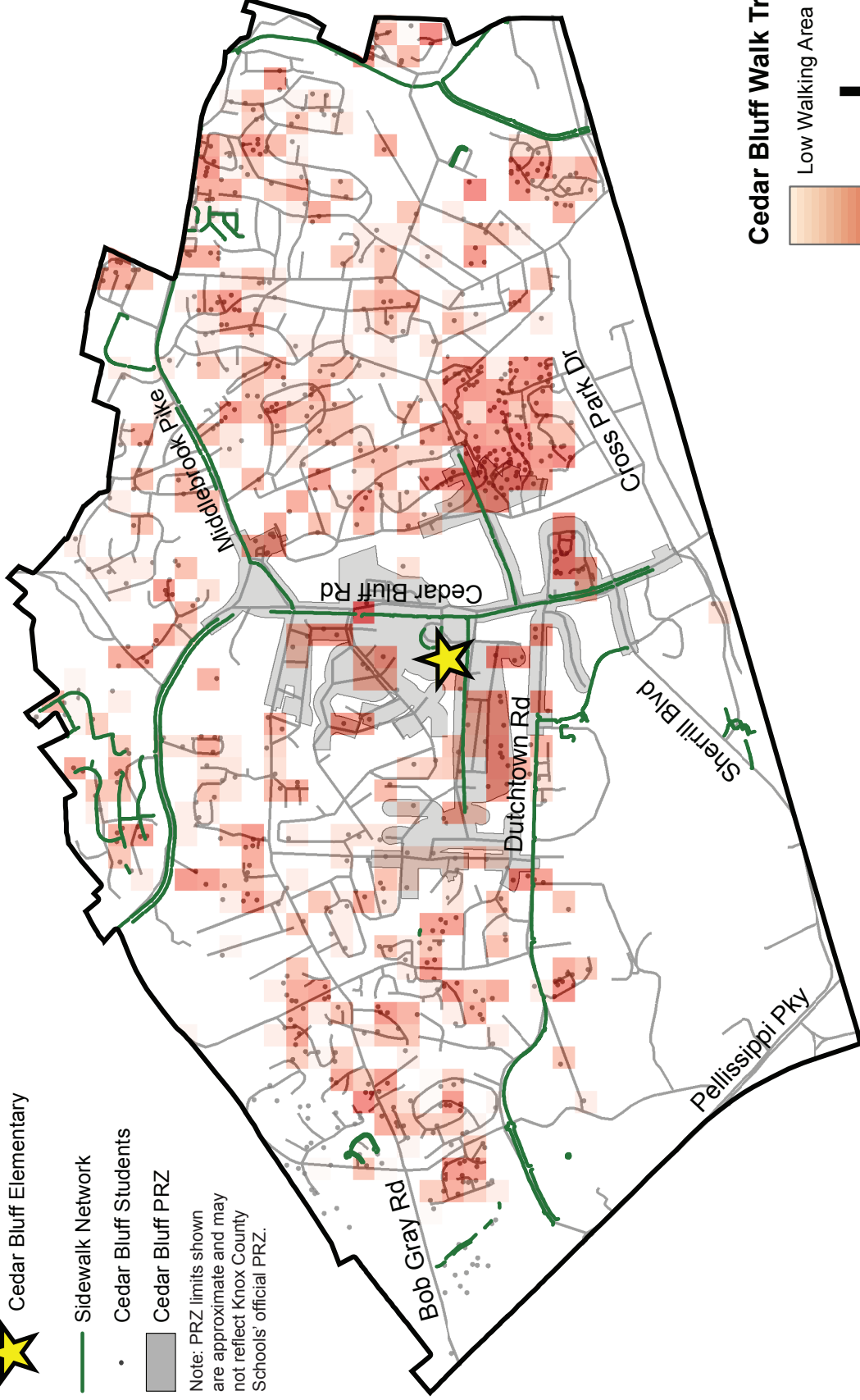
 Cedar Bluff Elementary

 Sidewalk Network

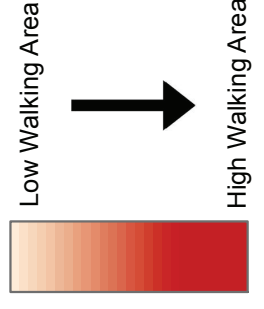
 Cedar Bluff Students

 Cedar Bluff PRZ

Note: PRZ limits shown are approximate and may not reflect Knox County Schools' official PRZ.








Cedar Bluff Walk Trips



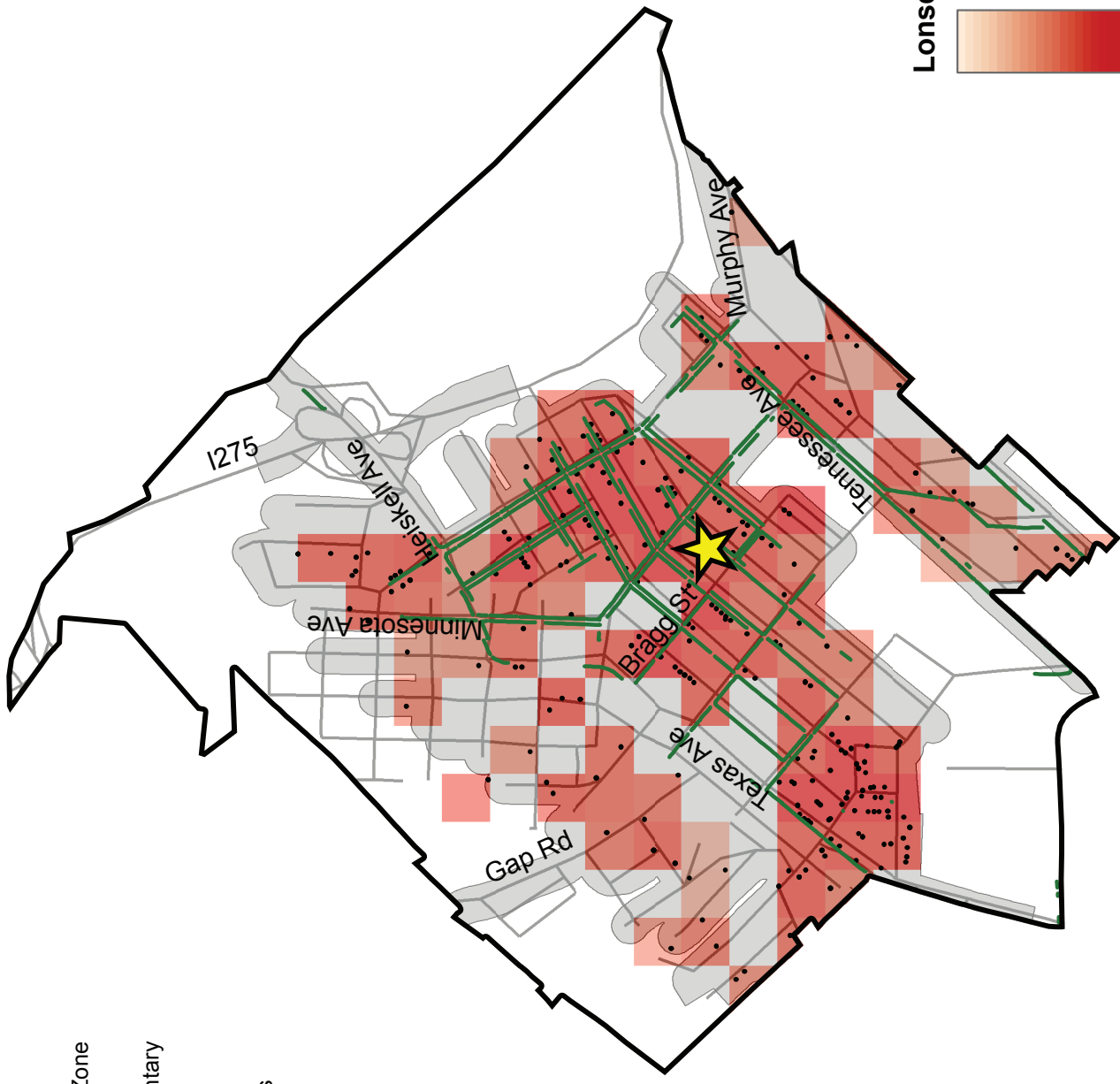
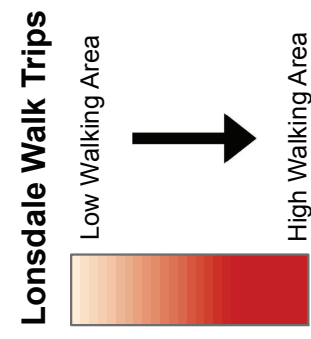


Legend

-  Lonsdale School Zone
-  Lonsdale Elementary

-  Sidewalk Network
-  Lonsdale Students
-  Lonsdale PRZ

Note: PRZ limits shown are approximate and may not reflect Knox County Schools' official PRZ.




Legend

 Blue Grass School Zone

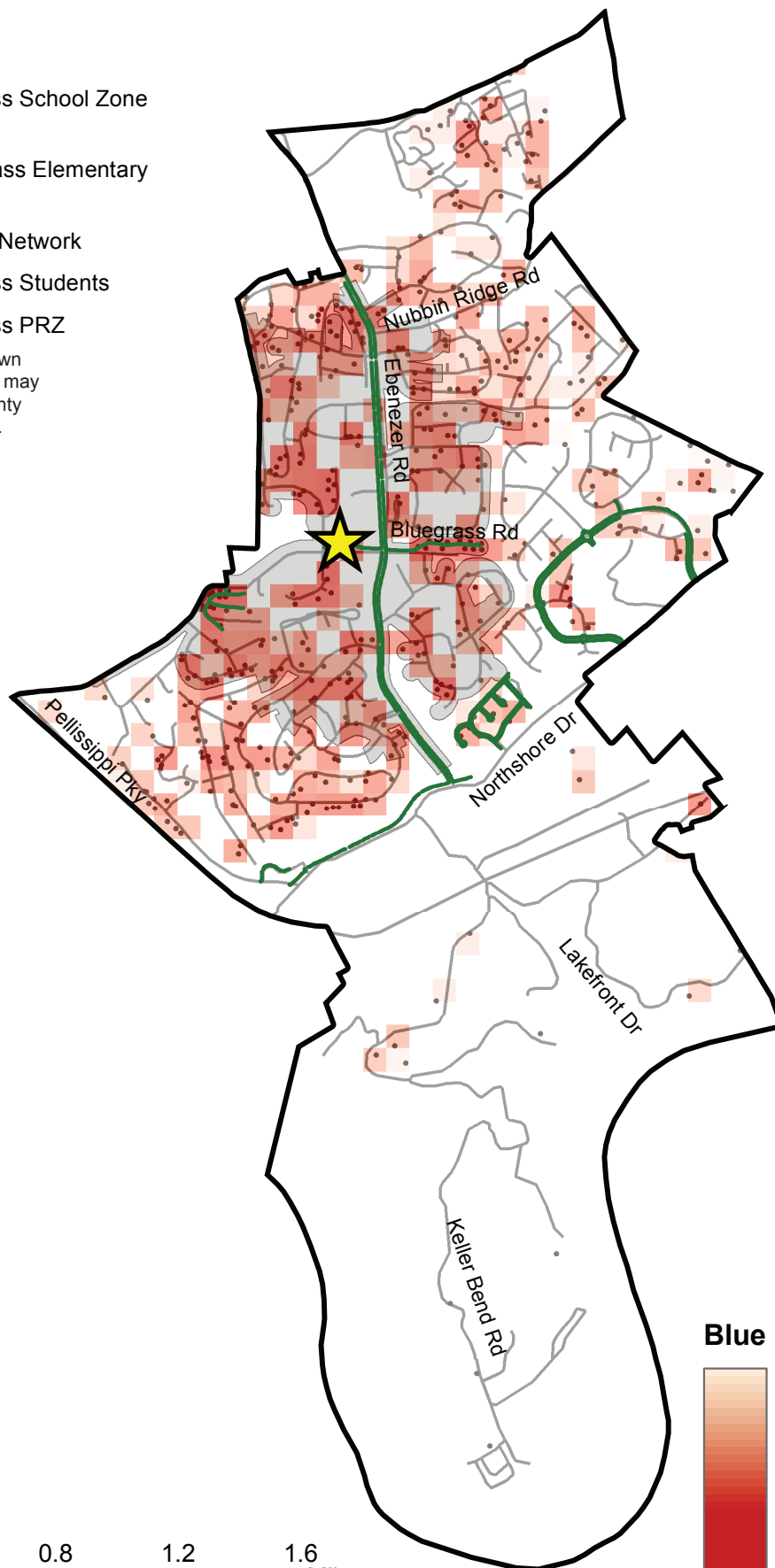
 Blue Grass Elementary

 Sidewalk Network

 Blue Grass Students

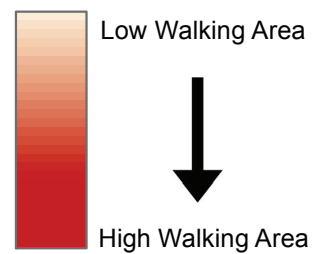
 Blue Grass PRZ

Note: PRZ limits shown are approximate and may not reflect Knox County Schools' official PRZ.



0 0.2 0.4 0.8 1.2 1.6 Miles


Blue Grass Walk Trips




Legend

 Belle Morris School Zone

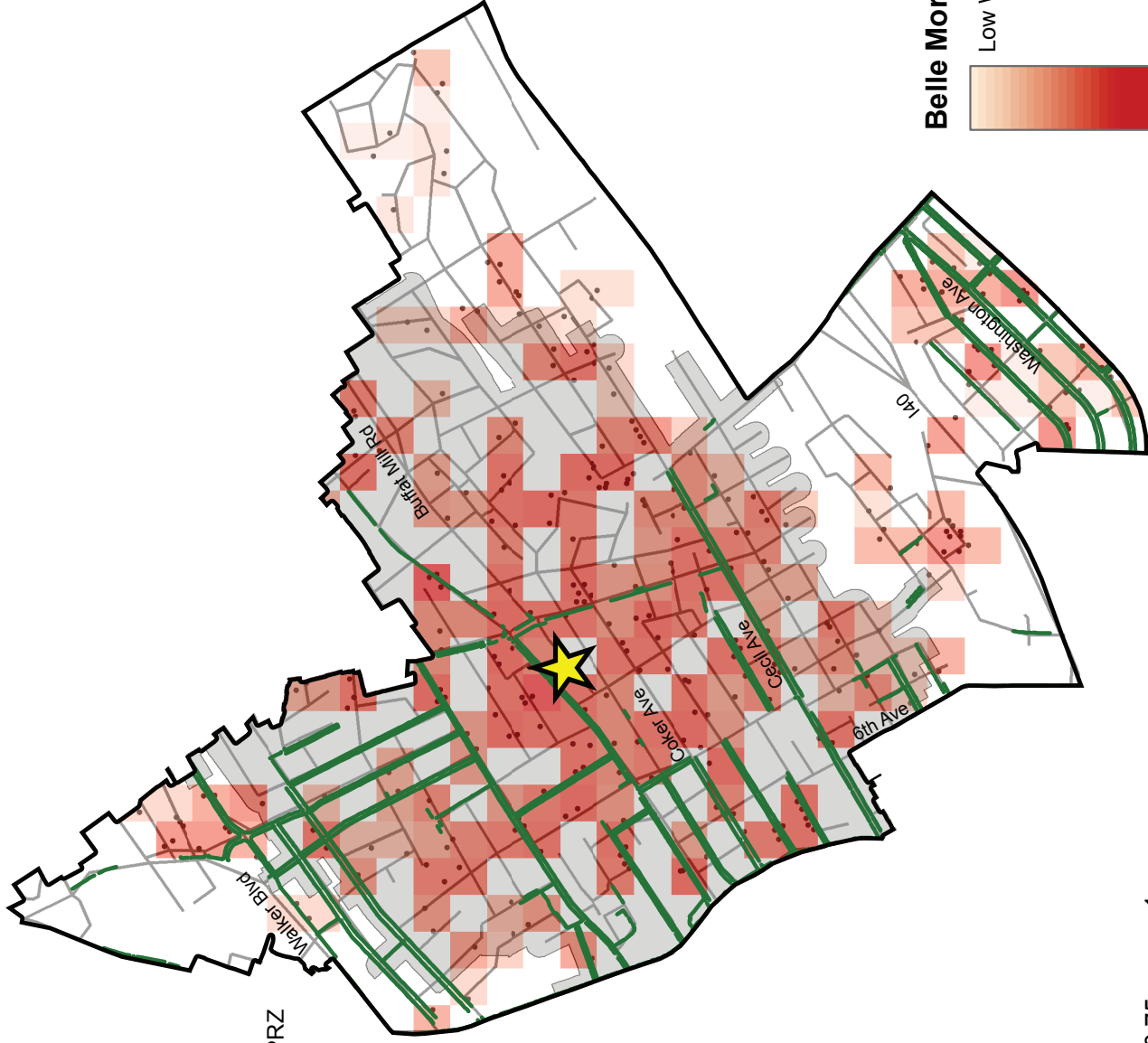
 Belle Morris Elementary

 Sidewalk Network

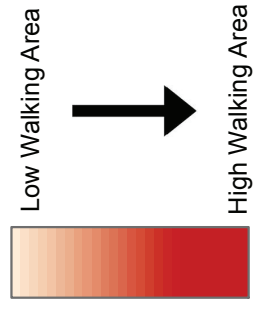
 Belle Morris Students

 Belle Morris Elementary PRZ


Note: PRZ limits shown are approximate and may not reflect Knox County Schools' official PRZ.



Belle Morris Walk Trips



Legend

 Norwood School Zone

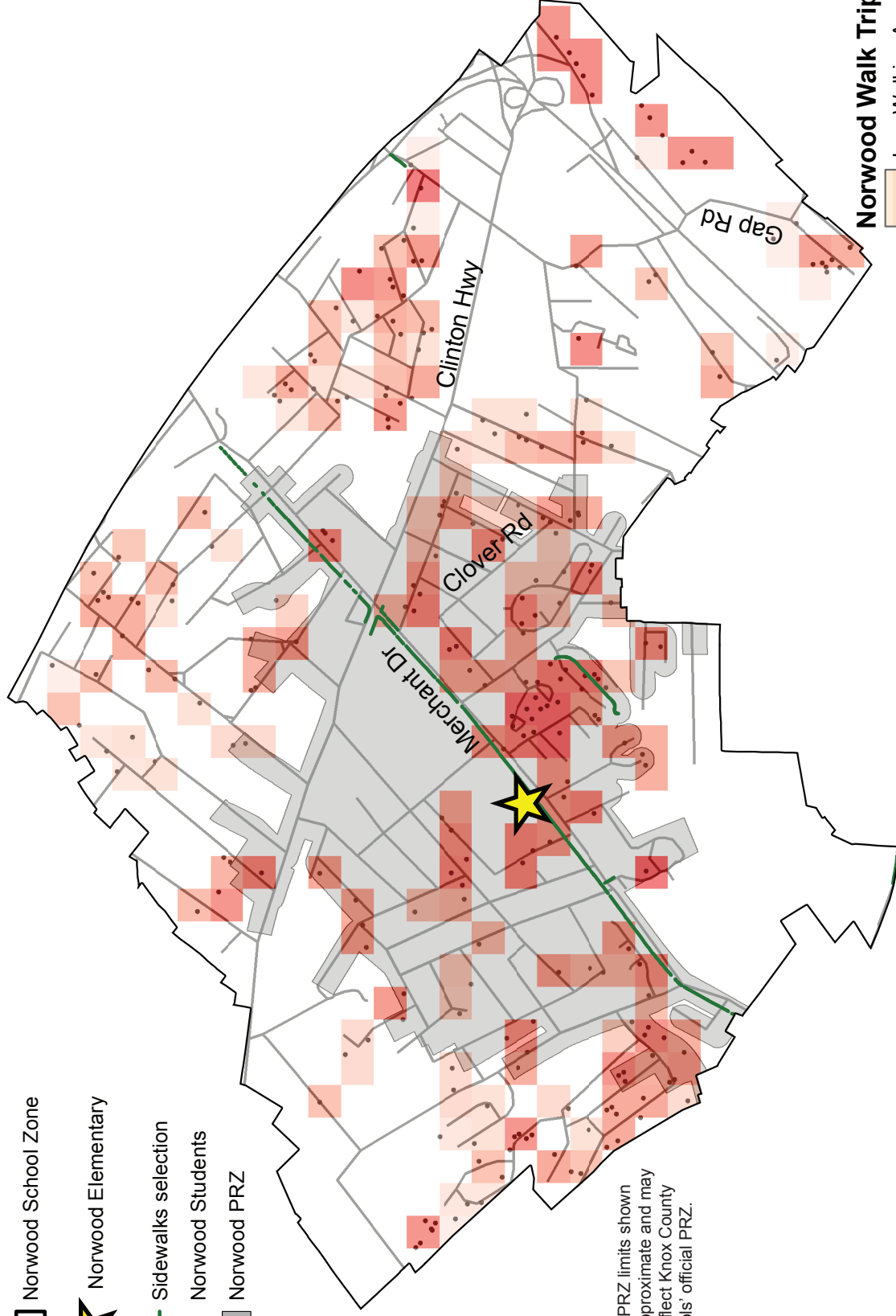
 Norwood Elementary

 Sidewalks selection

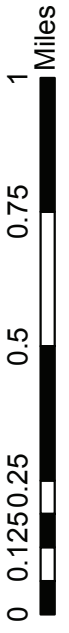
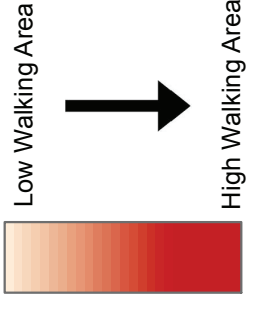
 Norwood Students

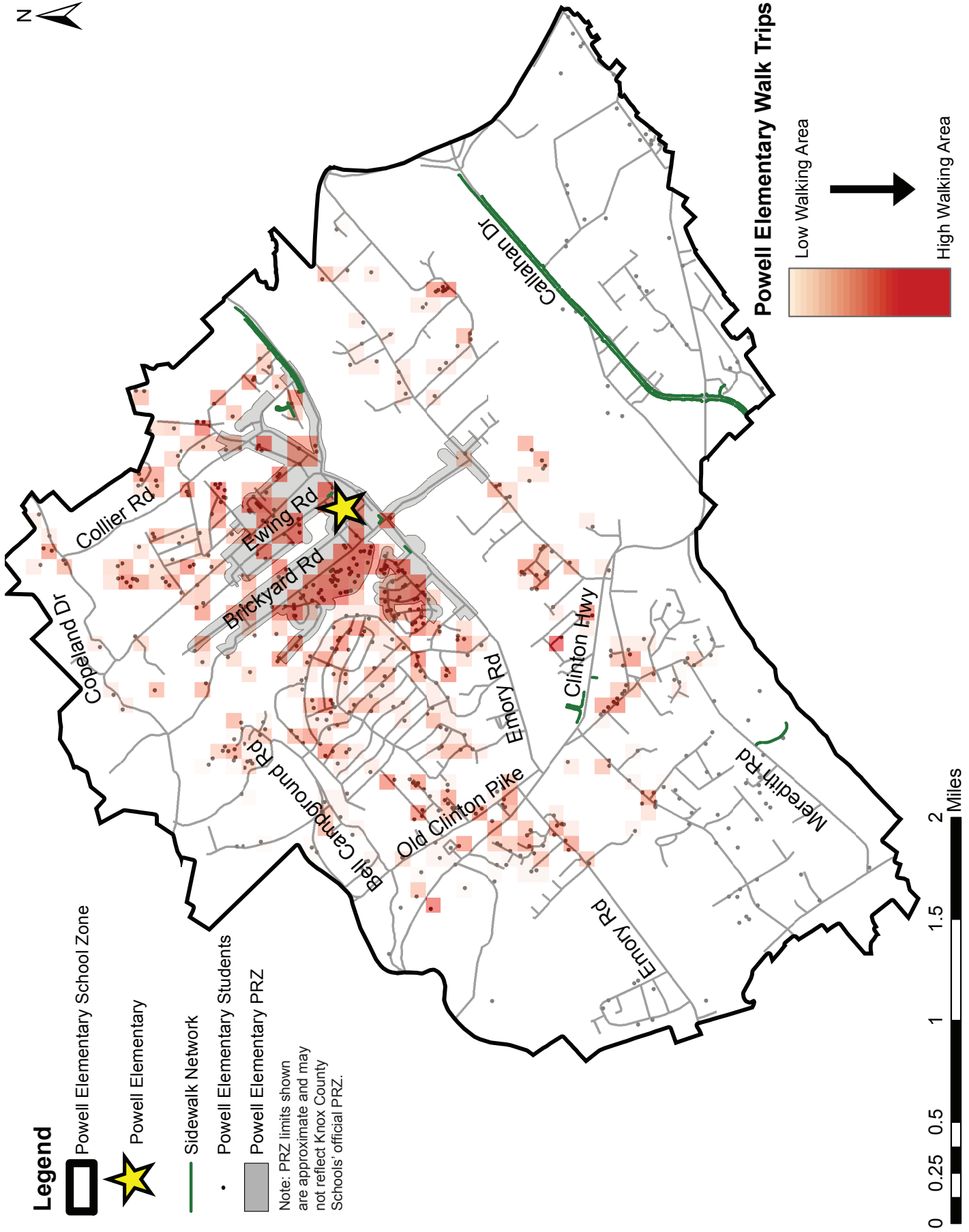
 Norwood PRZ

Note: PRZ limits shown are approximate and may not reflect Knox County Schools' official PRZ.




Norwood Walk Trips










Legend

 Powell High School Zone

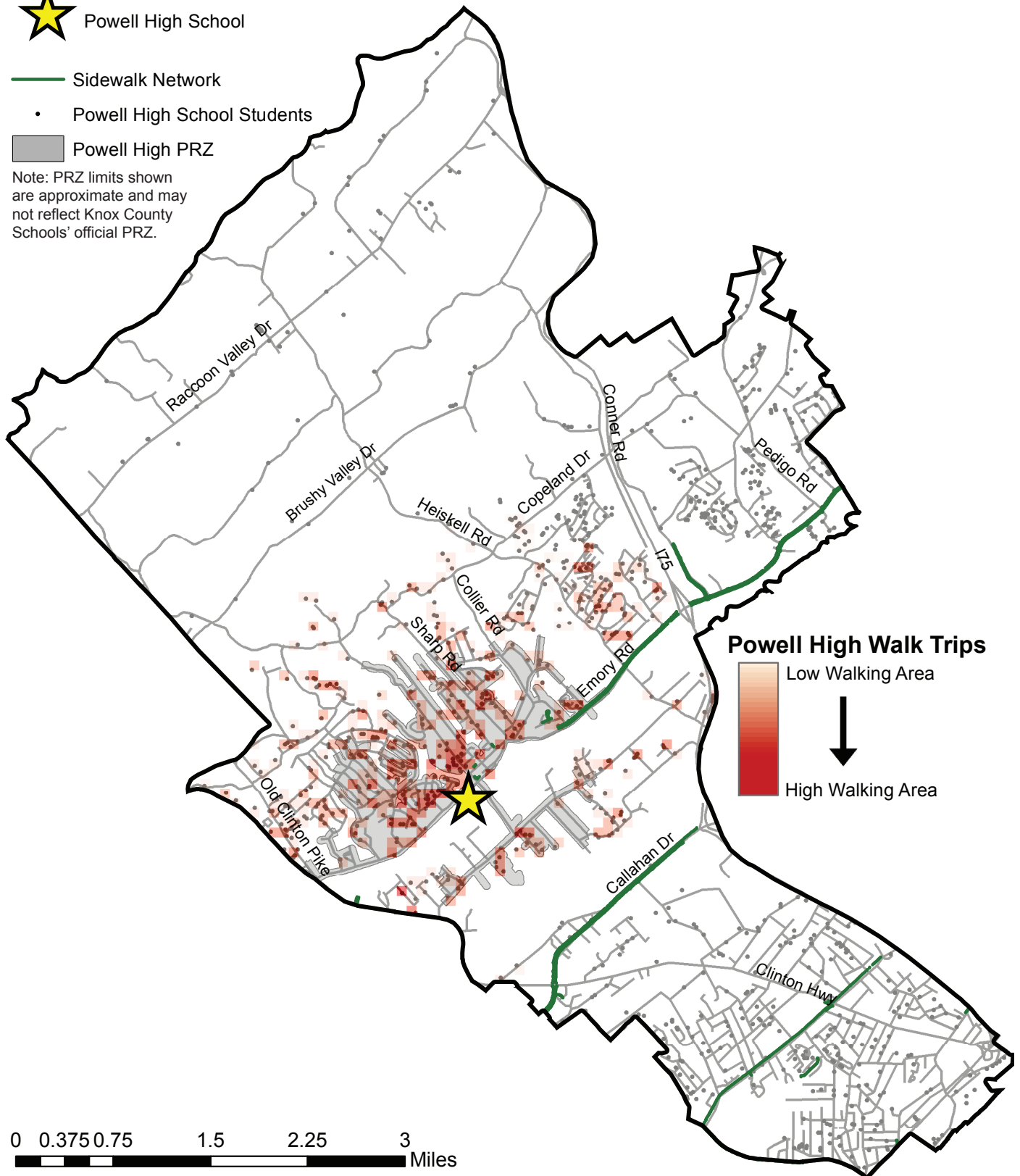
 Powell High School

 Sidewalk Network

 Powell High School Students

 Powell High PRZ


Note: PRZ limits shown are approximate and may not reflect Knox County Schools' official PRZ.




Legend

 Brickey-McCloud School Zone

 Brickey-McCloud Elementary

 Sidewalk Network

• Brickey-McCloud Students

 Brickey-McCloud PRZ

Note: PRZ limits shown are approximate and may not reflect Knox County Schools' official PRZ.



Brickey-McCloud Walk Trips

