

**APPENDIX D**

Detailed Description of Study Procedure

## D. DETAILED DESCRIPTION OF STUDY PROCEDURE

This appendix describes the activities that were performed to compute Evacuation Time Estimates. The individual steps of this effort are represented as a flow diagram in Figure D-1. Each numbered step in the description that follows corresponds to the numbered element in the flow diagram.

### Step 1

The first activity was to obtain EPZ boundary information and create a GIS base map. The base map extends beyond the Shadow Region which extends approximately 15 miles (radially) from the power plant location. The base map incorporates the local roadway topology, a suitable topographic background and the EPZ boundary.

### Step 2

2010 Census block information was obtained in GIS format. This information was used to estimate the resident population within the EPZ and Shadow Region and to define the spatial distribution and demographic characteristics of the population within the study area. Transient, employment, and special facility data were obtained from Exelon, county emergency management agencies, and phone calls to individual facilities.

### Step 3

Next, a physical survey of the roadway system in the study area was conducted to determine the geometric properties of the highway sections, the channelization of lanes on each section of roadway, whether there are any turn restrictions or special treatment of traffic at intersections, the type and functioning of traffic control devices, gathering signal timings for pre-timed traffic signals, and to make the necessary observations needed to estimate realistic values of roadway capacity.

### Step 4

The results of a telephone survey of households within the EPZ were obtained from Exelon to identify household dynamics, trip generation characteristics, and evacuation-related demographic information of the EPZ population. This information was used to determine important study factors including the average number of evacuating vehicles used by each household, and the time required to perform pre-evacuation mobilization activities.

### Step 5

A computerized representation of the physical roadway system, called a link-node analysis network, was developed using the UNITES software (see Section 1.3) developed by KLD. Once the geometry of the network was completed, the network was calibrated using the information gathered during the road survey (Step 3). Estimates of highway capacity for each link and other link-specific characteristics were introduced to the network description. Traffic signal timings were input accordingly. The link-node analysis network was imported into a GIS map. 2010 Census data were overlaid in the map, and origin centroids where trips would be generated during the evacuation process were assigned to appropriate links.

### Step 6

The EPZ is subdivided into 13 Sub-areas. Based on wind direction and speed, Regions (groupings of Sub-areas) that may be advised to evacuate, were developed.

The need for evacuation can occur over a range of time-of-day, day-of-week, seasonal and weather-related conditions. Scenarios were developed to capture the variation in evacuation demand, highway capacity and mobilization time, for different time of day, day of the week, time of year, and weather conditions.

### Step 7

The input stream for the DYNEV II model, which integrates the dynamic traffic assignment and distribution model, DTRAD, with the evacuation simulation model, was created for a prototype evacuation case – the evacuation of the entire EPZ for a representative scenario.

### Step 8

After creating this input stream, the DYNEV II System was executed on the prototype evacuation case to compute evacuating traffic routing patterns consistent with the appropriate NRC guidelines. DYNEV II contains an extensive suite of data diagnostics which check the completeness and consistency of the input data specified. The analyst reviews all warning and error messages produced by the model and then corrects the database to create an input stream that properly executes to completion.

The model assigns destinations to all origin centroids consistent with a (general) radial evacuation of the EPZ and Shadow Region. The analyst may optionally supplement and/or replace these model-assigned destinations, based on professional judgment, after studying the topology of the analysis highway network. The model produces link and network-wide measures of effectiveness as well as estimates of evacuation time.

### Step 9

The results generated by the prototype evacuation case are critically examined. The examination includes observing the animated graphics (using the EVAN software which operates on data produced by DYNEV II) and reviewing the statistics output by the model. This is a labor-intensive activity, requiring the direct participation of skilled engineers who possess the necessary practical experience to interpret the results and to determine the causes of any problems reflected in the results.

Essentially, the approach is to identify those bottlenecks in the network that represent locations where congested conditions are pronounced and to identify the cause of this congestion. This cause can take many forms, either as excess demand due to high rates of trip generation, improper routing, a shortfall of capacity, or as a quantitative flaw in the way the physical system was represented in the input stream. This examination leads to one of two conclusions:

- The results are satisfactory; or
- The input stream must be modified accordingly.

This decision requires, of course, the application of the user's judgment and experience based upon the results obtained in previous applications of the model and a comparison of the results of the latest prototype evacuation case iteration with the previous ones. If the results are satisfactory in the opinion of the user, then the process continues with Step 13. Otherwise, proceed to Step 11.

#### Step 10

There are many "treatments" available to the user in resolving apparent problems. These treatments range from decisions to reroute the traffic by assigning additional evacuation destinations for one or more sources, imposing turn restrictions where they can produce significant improvements in capacity, changing the control treatment at critical intersections so as to provide improved service for one or more movements, or in prescribing specific treatments for channelizing the flow so as to expedite the movement of traffic along major roadway systems. Such "treatments" take the form of modifications to the original prototype evacuation case input stream. All treatments are designed to improve the representation of evacuation behavior.

#### Step 11

As noted above, the changes to the input stream must be implemented to reflect the modifications undertaken in Step 10. At the completion of this activity, the process returns to Step 9 where the DYNEV II System is again executed.

#### Step 12

Evacuation of transit-dependent evacuees and special facilities are included in the evacuation analysis. Fixed routing for transit buses and for school buses, ambulances, and other transit vehicles are introduced into the final prototype evacuation case data set. DYNEV II generates route-specific speeds over time for use in the estimation of evacuation times for the transit dependent and special facility population groups.

#### Step 13

The prototype evacuation case was used as the basis for generating all region and scenario-specific evacuation cases to be simulated. This process was automated through the UNITES user interface. For each specific case, the population to be evacuated, the trip generation distributions, the highway capacity and speeds, and other factors are adjusted to produce a customized case-specific data set.

#### Step 14

All evacuation cases are executed using the DYNEV II System to compute ETE. Once results are available, quality control procedures are used to assure the results are consistent, dynamic routing is reasonable, and traffic congestion/bottlenecks are addressed properly.

#### Step 15

Once vehicular evacuation results are accepted, average travel speeds for transit and special facility routes are used to compute evacuation time estimates for transit-dependent permanent residents, schools, hospitals, and other special facilities.

#### Step 16

The simulation results are analyzed, tabulated and graphed. The results were then documented, as required by NUREG/CR-7002.

#### Step 17

Following the completion of documentation activities, the ETE criteria checklist (see Appendix N) was completed. An appropriate report reference is provided for each criterion provided in the checklist.

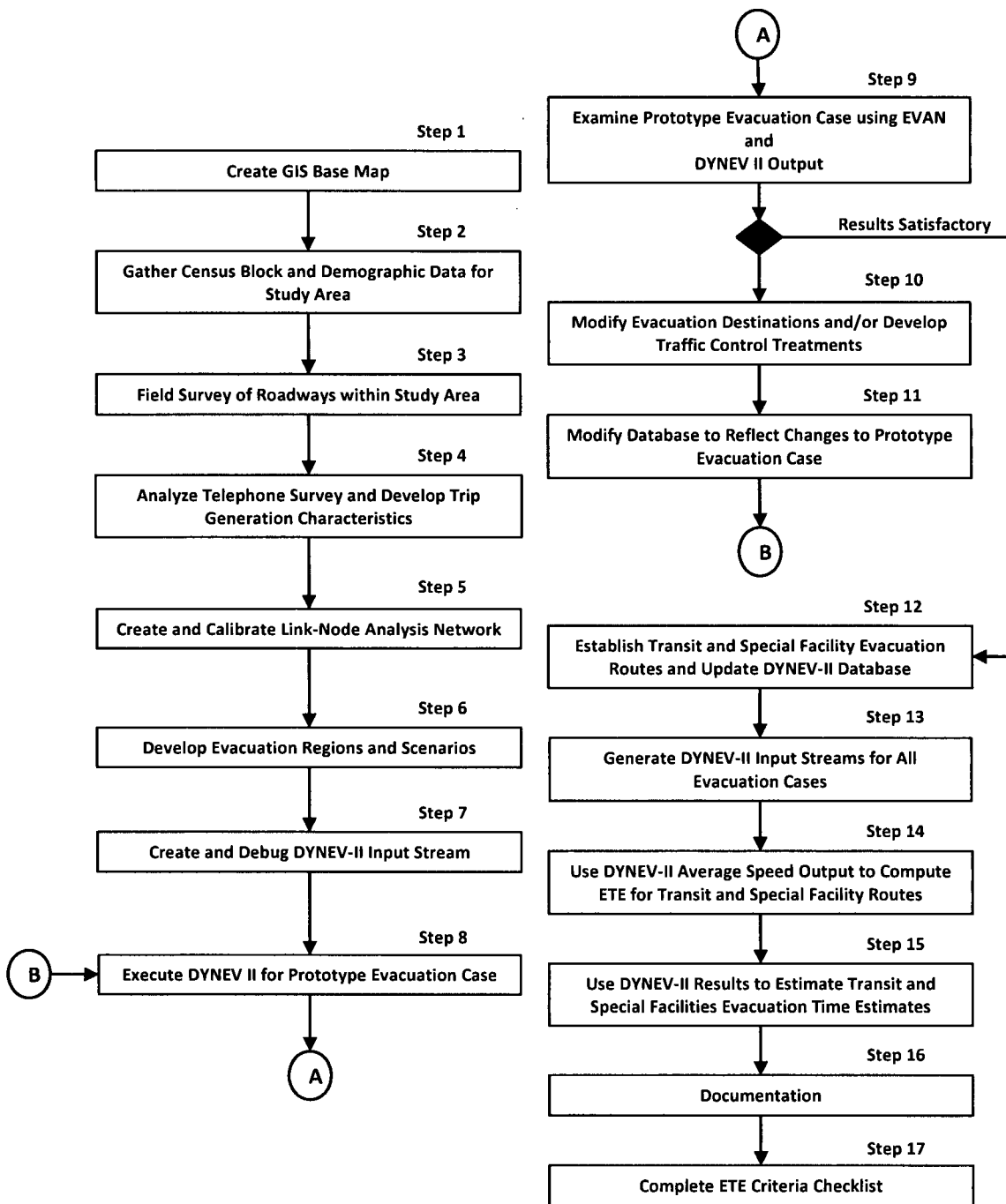


Figure D-1. Flow Diagram of Activities

**APPENDIX E**  
Special Facility Data

## **E. SPECIAL FACILITY DATA**

The following tables list population information, as of March 2014, for special facilities, recreational areas and major employers that are located within the LAS EPZ. Special facilities are defined as schools, preschools, day camps, medical facilities and military installations. Transient population data is included in the table for recreational areas. Employment data is included in the table for major employers. Each table is grouped by county. The location of the facility is defined by its straight-line distance (miles) and direction (magnetic bearing) from the center point of the plant. Maps of each school, preschool, day camp, medical facility, recreational area, military installation and major employer are also provided.



Table E-1. Schools within the EPZ

Sub-area	Distance (miles)	Direction	School Name	Street Address	Municipality	Enrollment	Staff
<b>LaSalle County, IL</b>							
4	10.5	SW	Grace Church-Rhema Christian Academy	1634 IL-23	Streator	32	N/A
5	6.4	S	Ransom Consolidated School	400 South Lane St.	Ransom	114	23
7	8.7	W	Grand Ridge Community Consolidated (CC) School	400 West Main St.	Grand Ridge	337	43
8	9.9	WNW	Central Intermediate School	711 East McKinley Rd.	Ottawa	474	N/A
8	9.9	WNW	Shepherd Middle School	701 East McKinley Rd.	Ottawa	419	80
10	5.6	NNW	Marseilles Elementary School	201 Chicago St.	Marseilles	673	80
10	5.4	NE	Seneca CC School North Campus	174 Oak St.	Seneca	292	50
10	5.1	NE	Seneca CC School South Campus	410 South Main St.	Seneca	188	49
10	5.9	NE	Seneca Township High School	307 East Scott St.	Seneca	503	104
<b>LASALLE COUNTY AND EPZ TOTAL:</b>						<b>3,032</b>	<b>429</b>

N/A: Not available

**Table E-2. Preschools and Day Camps within the EPZ**

Sub-area	Distance (miles)	Direction	School Name	Street Address	Municipality	Enrollment
<b>LaSalle County, IL</b>						
4	11.4	SW	Holy Trinity Lutheran Preschool	101 Trinity Dr.	Streator	90
8	9.2	NW	Girl Scout Camp Pokanoka	North 2703rd Rd.	Fall River	120
10	5.1	NE	Glory Land Kids Childcare Center	423 South Main St.	Seneca	22
10	5.5	NE	Seneca Head Start	104 North Main St.	Seneca	18
<b>LASSALE COUNTY AND EPZ TOTAL:</b>						<b>250</b>

**Table E-3. Medical Facilities within the EPZ**

Sub-area	Distance (miles)	Direction	Facility Name	Street Address	Municipality	Current Census	Ambulatory Patients	Wheel-chair Patients	Bed-ridden Patients
<b>LaSalle County, IL</b>									
4	11.4	SW	Heritage Manor	1525 East Main St.	Streator	125	29	96	0
8	9.3	WNW	Ottawa Friendship House	1718 North 2525th Rd.	Ottawa	15	15	0	0
11	6.3	NNW	Rivershores Center	578 Commercial St.	Marseilles	70	16	54	0
<b>LASALLE COUNTY AND EPZ TOTAL:</b>						<b>210</b>	<b>60</b>	<b>150</b>	<b>0</b>

Table E-4. Employers within the EPZ

Sub-area	Distance (miles)	Direction	Facility Name	Street Address	Municipality	Employees (max shift)	% Non-EPZ	Employees (Non EPZ)
<b>Grundy County, IL</b>								
9	5.7	NE	CF Industries	8760 West DuPont Rd.	Seneca	Not a major employer <sup>1</sup>		
9	7.5	NE	Evenson Explosives	2019 Dunn Rd.	Morris	70	75.6%	53
9	7.0	NE	Forbo Adhesives, LLC	7440 West Dupont Rd.	Morris	Not a major employer <sup>1</sup>		
9	6.8	NE	Oricha Nitrogen, LLC	7700 West Dupont Rd.	Morris			
<b>Grundy County Subtotal:</b>						<b>70</b>	<b>75.6%</b>	<b>53</b>
<b>LaSalle County, IL</b>								
1	-	-	LaSalle Generating Station	2601 North 21st Rd.	Marseilles	795	75.6%	602
1	4.3	NE	Spicer Gravel Company	2195 East Bluff St.	Marseilles	Not a major employer <sup>1</sup>		
5	6.1	S	Ransom Fertilizer	108 West Campbell St.	Ransom			
7	8.5	W	Grainco FS (Grand Ridge)	300 Railroad St.	Grand Ridge			
7	8.8	W	Mycogen	2017 IL-23	Grand Ridge			
8	9.5	WNW	Grainco FS (Ottawa)	3300 N. State Route 23	Grand Ridge			
10	5.3	N	Glen Gery Corp.	1401 East Broadway	Marseilles	50	75.6%	38
10	7.8	NNW	Hicksgas	2904 East 24th Rd.	Marseilles	Not a major employer <sup>1</sup>		
10	5.5	N	Independence Tube Corp.	1201 Broadway	Marseilles	50	75.6%	38
10	5.2	N	Infra Metals	1601 East Broadway	Marseilles	65	75.6%	50
10	5.2	N	PCS Phosphate	2651 IL-6	Marseilles	Not a major employer <sup>1</sup>		
10	5.2	N	Royster Clark	1800 East Broadway	Marseilles			
10	5.8	NE	Shipyard Terminal and Industrial Park	Shipyard Rd.	Seneca			
11	9.6	NW	ADM Growmark	Towpath Rd.	Ottawa			
11	6.2	NNW	Liberty Laser Solutions	375 Commercial St.	Marseilles	50	75.6%	38
11	10.1	NW	LMK Technologies	1779 Chessie Ln.	Ottawa	50	75.6%	38
11	6.0	NNW	Marseilles Mattress Factory	220 Commercial St.	Marseilles	Not a major employer <sup>1</sup>		
11	6.4	NNW	Marseilles Waste Treatment	2 Spicer St.	Marseilles			
11	9.9	NW	Mini-Grip Zip-Pack	1510 Warehouse Dr.	Ottawa	50	75.6%	38
11	7.8	NW	Sabic Plastics	2148 North 2753rd Rd	Ottawa	300	75.6%	227
11	10.1	NW	Silica Sand Transport	1521 Warehouse Dr.	Ottawa	Not a major employer <sup>1</sup>		
<b>LaSalle County Subtotal:</b>						<b>1,410</b>	<b>75.6%</b>	<b>1,069</b>
<b>EPZ TOTAL:</b>						<b>1,480</b>	<b>75.6%</b>	<b>1,122</b>

<sup>1</sup> Phone calls were made to facilities designated as "not a major employer" to verify the total employment is less than 50 employees.

Table E-5. Recreational Areas within the EPZ

Sub-area	Distance (miles)	Direction	Facility Name	Street Address	Municipality	Transients	Vehicles
<b>LaSalle County, IL</b>							
1	4.8	NE	Black's Marina (Anchor Inn Marina)	1 East DuPont Rd.	Seneca	150	65
1	5.4	NNW	Illini State Park	Illinois and Michigan Canal	Marseilles	2,000	870
1	1.7	ENE	LaSalle Lake Fish and Wildlife Area	2651 North 21st Rd.	Marseilles	450	196
1	5.4	NNW	Marseilles Boat Club	2451 N 2659th Rd.	Marseilles	32	14
1	2.4	NNW	Marseilles Wildlife Area	2374 East 25th Rd.	Marseilles	20	9
1	4.6	NE	Seneca Yacht Club	219 West River Dr.	Seneca	100	44
1	4.2	NNE	Spring Brook Marina	623 North 2553rd Rd.	Seneca	450	196
3	4.4	NW	Troll Hollow Campground	2265 N 2453 Rd.	Marseilles	150	75
10	6.3	N	Four Star Campground (Whispering Pines)	2776 East 2625th Rd.	Marseilles	400	200
10	5.9	NNW	Glenwood Farms Campground	551 LaSalle St.	Marseilles	400	200
10	4.7	NE	Mariners Village and Marina	320 Village Ln.	Seneca	348	151
10	6.0	NE	Seneca Hunt Club	3 East Union St	Seneca	50	22
10	6.7	NNE	Woodsmoke Ranch	2795 East 28th Rd.	Seneca	3,416	1,871
11	9.2	NW	Heritage Harbor	1982 North 2753rd Rd.	Ottawa	278	121
<b>LASALLE COUNTY AND EPZ TOTAL:</b>						<b>8,244</b>	<b>4,034</b>

Table E-6. Military Training Center within the EPZ

Sub-area	Distance (miles)	Direction	Facility Name	Street Address	Municipality	Personnel	Vehicles
<b>LaSalle County, IL</b>							
1	1.6	NNW	Illinois National Guard Training Center	1700 Army Rd.	Marseilles	556	278
<b>LASALLE COUNTY AND EPZ TOTAL:</b>						<b>556</b>	<b>278</b>

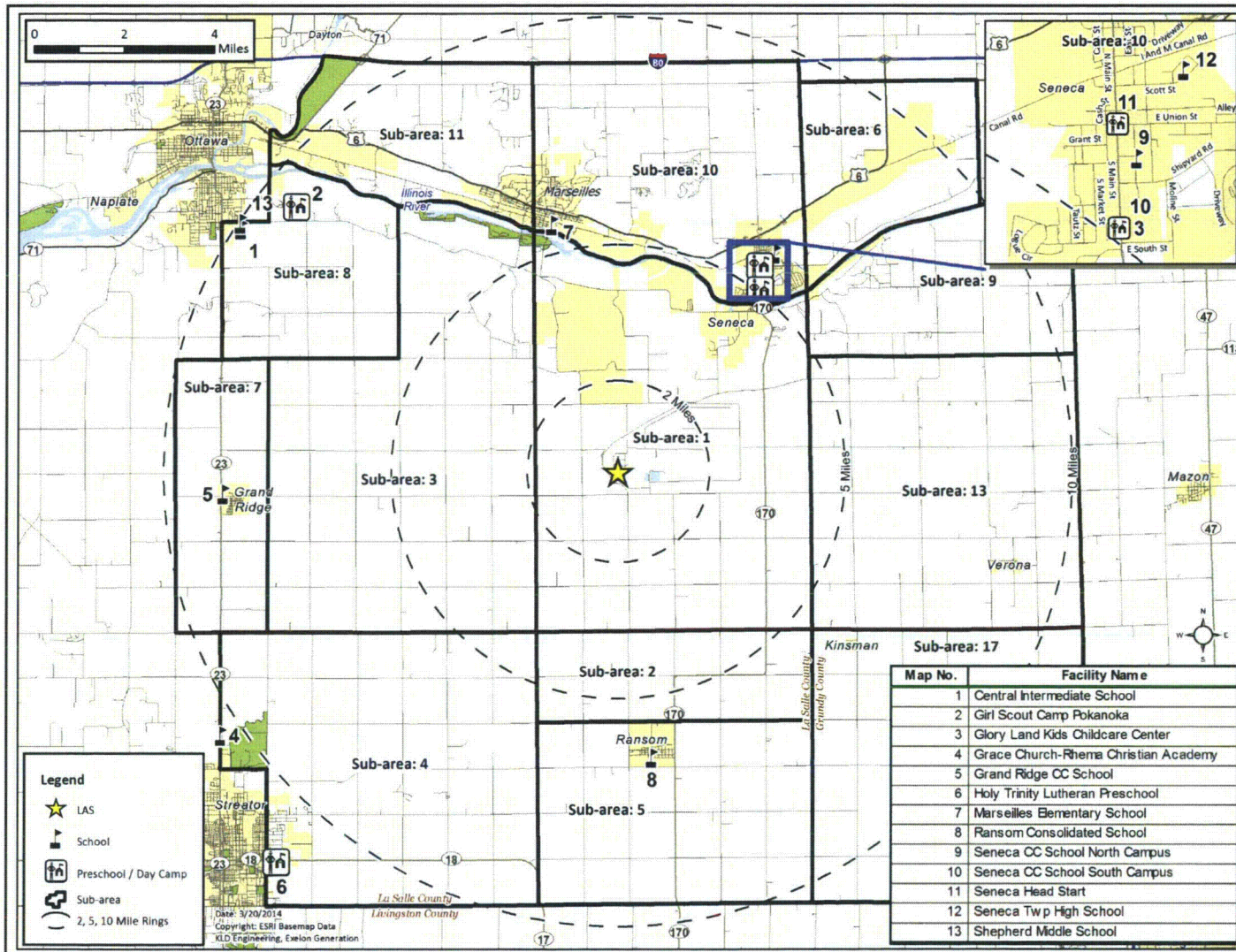


Figure E-1. Schools, Preschools and Day Camps within the LAS EPZ

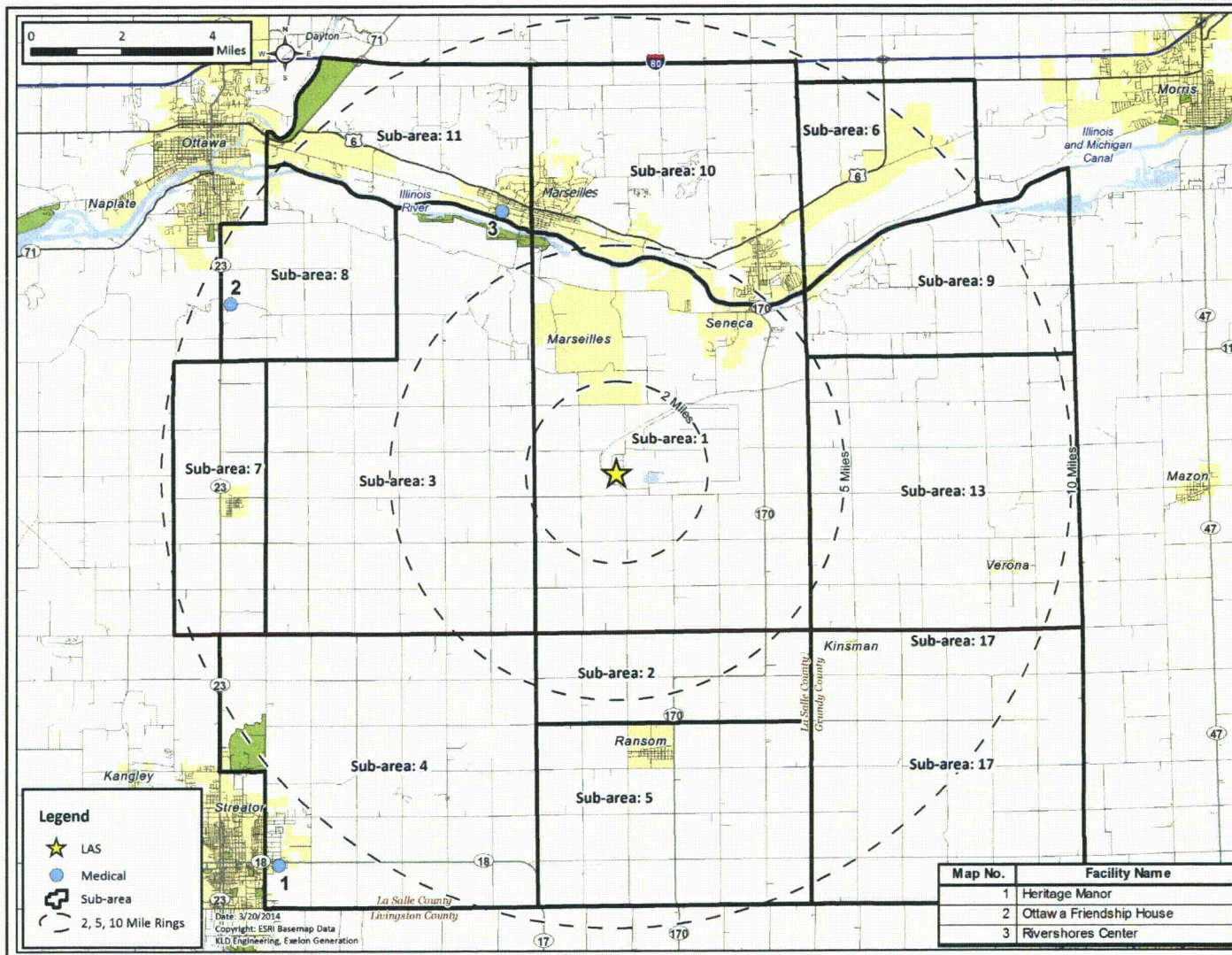


Figure E-2. Medical Facilities within the LAS EPZ

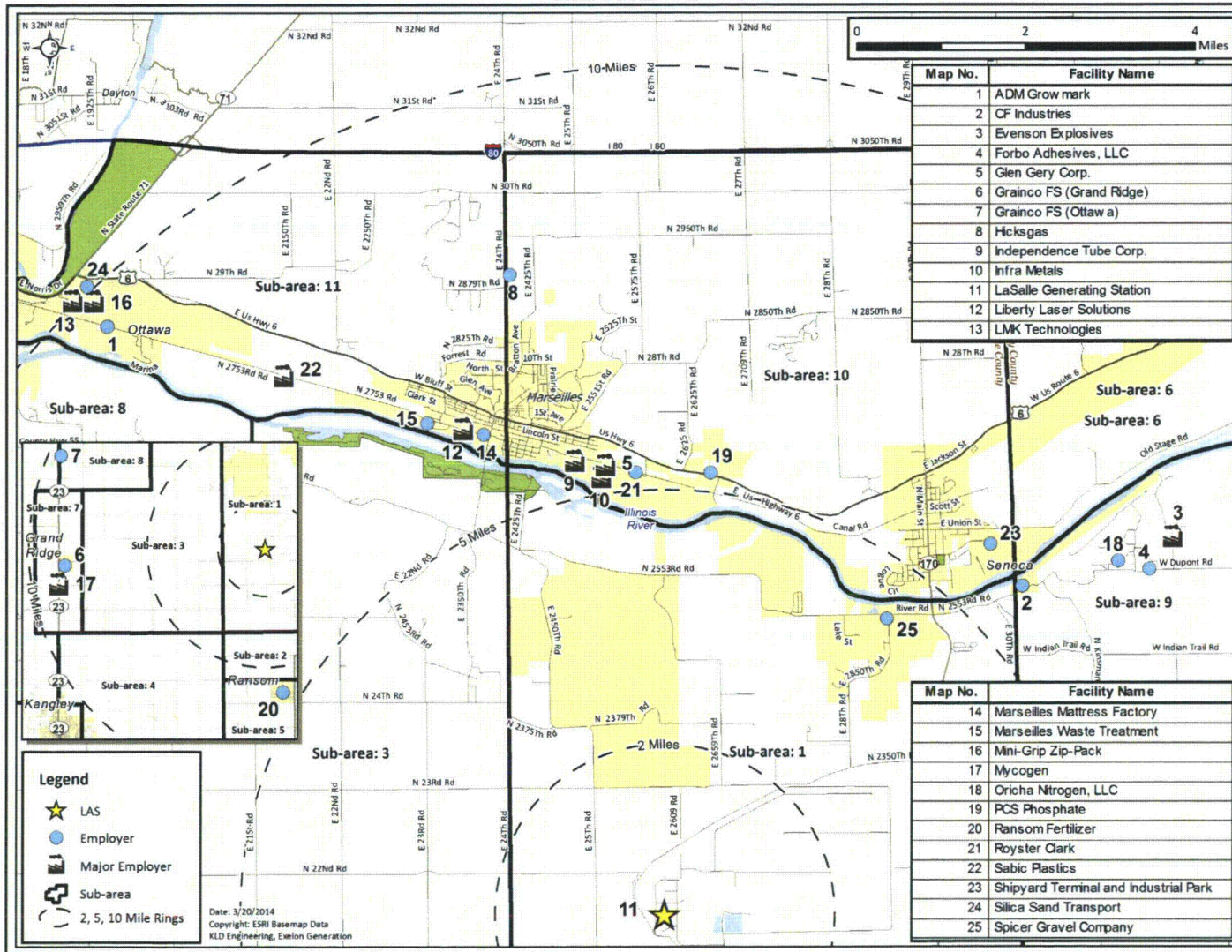


Figure E-3. Employers within the LAS EPZ

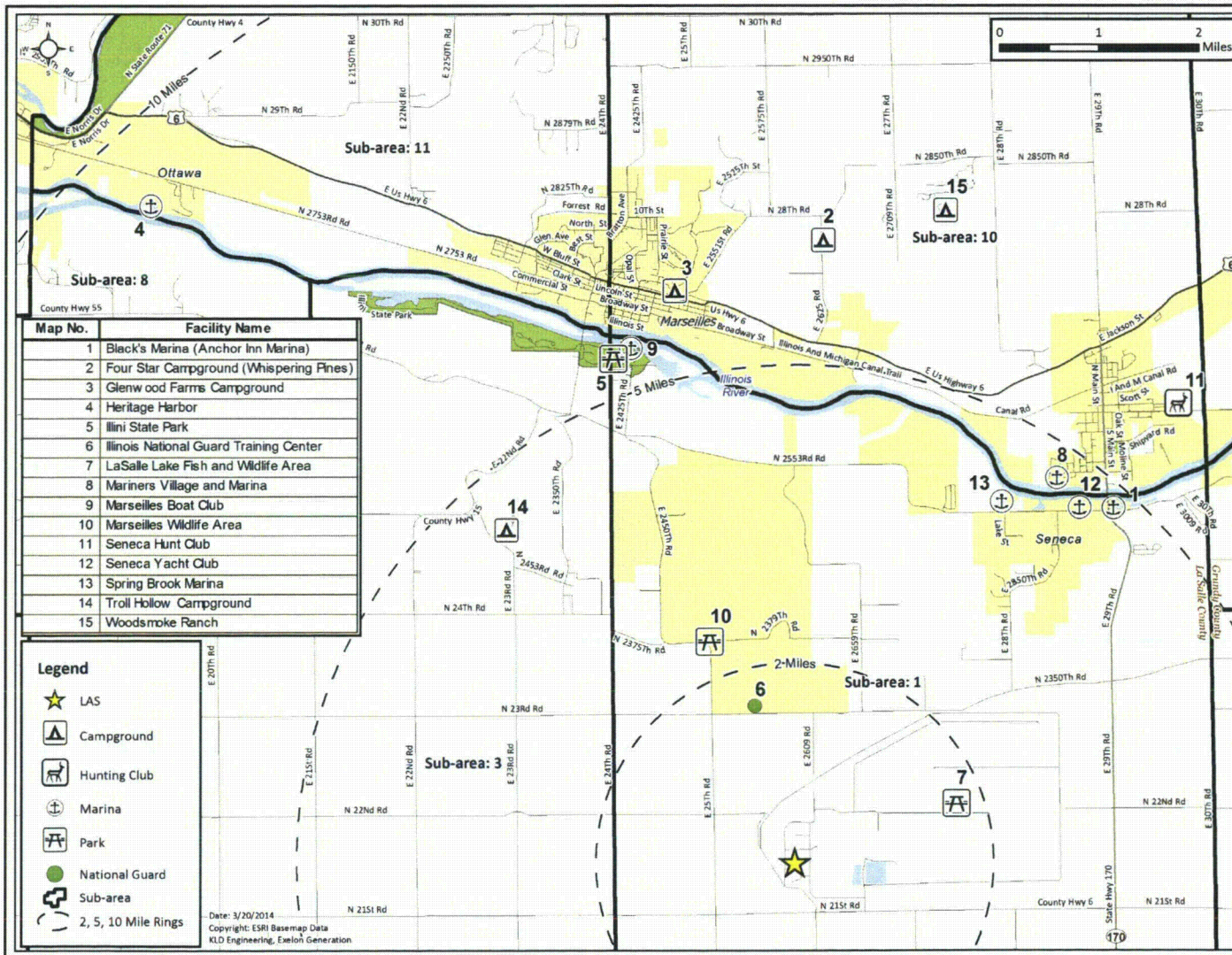


Figure E-4. Recreation Areas and Military Training Centers within the LAS EPZ



**APPENDIX F**  
Telephone Survey

## F. TELEPHONE SURVEY

### F.1 Introduction

The development of evacuation time estimates for the LAS EPZ requires the identification of travel patterns, car ownership and household size of the population within the EPZ. Demographic information can be obtained from Census data. The use of this data has several limitations when applied to emergency planning. First, the Census data do not encompass the range of information needed to identify the time required for preliminary activities (mobilization) that must be undertaken prior to evacuating the area. Secondly, Census data do not contain attitudinal responses needed from the population of the EPZ and consequently may not accurately represent the anticipated behavioral characteristics of the evacuating populace.

These concerns are addressed by conducting a telephone survey of a representative sample of the EPZ population. The survey is designed to elicit information from the public concerning family demographics and estimates of response times to well defined events. The design of the survey includes a limited number of questions of the form "What would you do if ...?" and other questions regarding activities with which the respondent is familiar ("How long does it take you to ...?")

Attachment A presents the final survey instrument used in this study. A sample size of 376 **completed** survey forms yields results with a sampling error of  $\pm 5\%$  at the 95% confidence level. The sample must be drawn from the EPZ population.

The preliminary determination of whether a household was located inside the EPZ was based on "land-line" telephone listings with street addresses. Telephone surveys were then conducted using those numbers, selected in random order, until the target level of surveys was completed, or the entire calling list was exhausted. Rejections or households outside the EPZ were discarded. Numbers with "no answer" were re-cycled for up to ten attempts in different time windows.

### F.2 Survey Results

The results of the survey fall into two categories. First, the household demographics of the area can be identified. Demographic information includes such factors as household size, automobile ownership, and automobile availability. The distributions of the time to perform certain pre-evacuation activities are the second category of survey results. These data are processed to develop the trip generation distributions used in the evacuation modeling effort, as discussed in Section 5.

A review of the survey instrument reveals that several questions have a "don't know" (DK) or "refused" entry for a response. It is accepted practice in conducting surveys of this type to accept the answers of a respondent who offers a DK response for a few questions or who refuses to answer a few questions. To address the issue of occasional DK/refused responses from a large sample, the practice is to assume that the distribution of these responses is the same as the underlying distribution of the positive responses. In effect, the DK/refused responses are ignored and the distributions are based upon the positive data that is acquired.

## F.2.1 Household Demographic Results

### Household Size

Figure F-1 presents the distribution of household size within the EPZ. The average household contains 2.30 people.

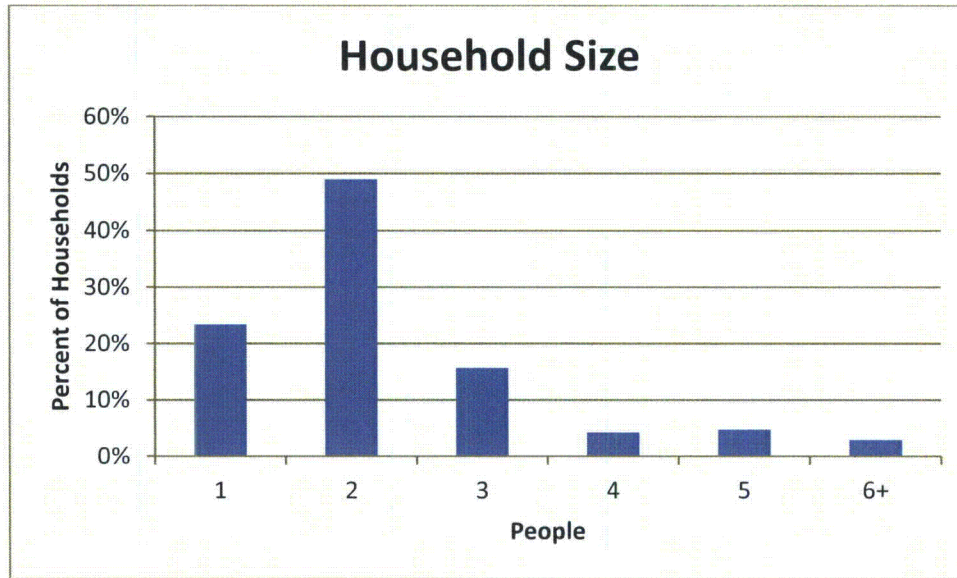


Figure F-1. Household Size in the EPZ

### Automobile Ownership

The average number of automobiles available per household in the EPZ is 2.03. 4.28% of households do not have a vehicle available, as shown in Figure F-2.

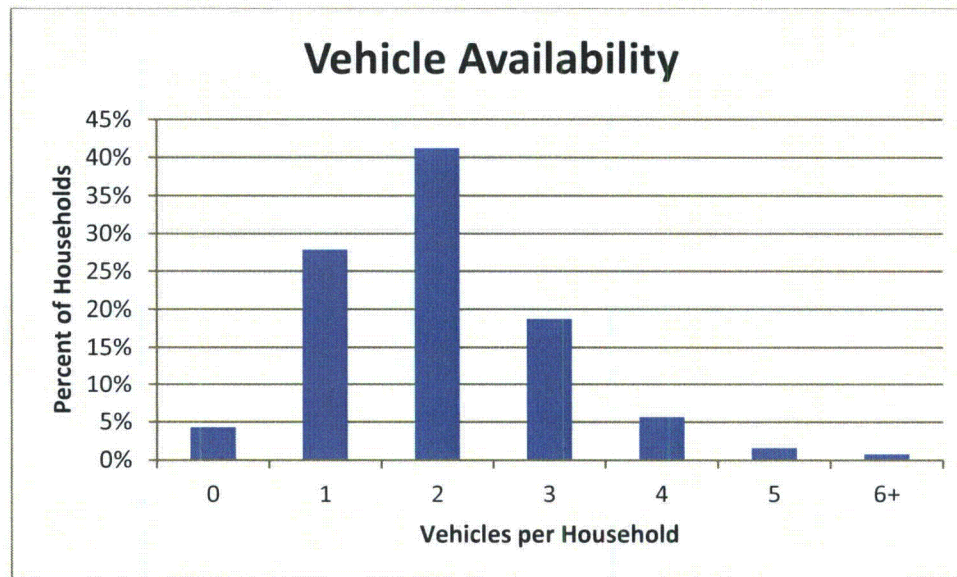


Figure F-2. Household Vehicle Availability

## Commuters

Figure F-3 presents the distribution of the number of commuters in each household. Commuters are defined as household members who travel to work or college on a daily basis. The data shows an average of 0.84 commuters in each household in the EPZ, and 49% of households have at least one commuter.

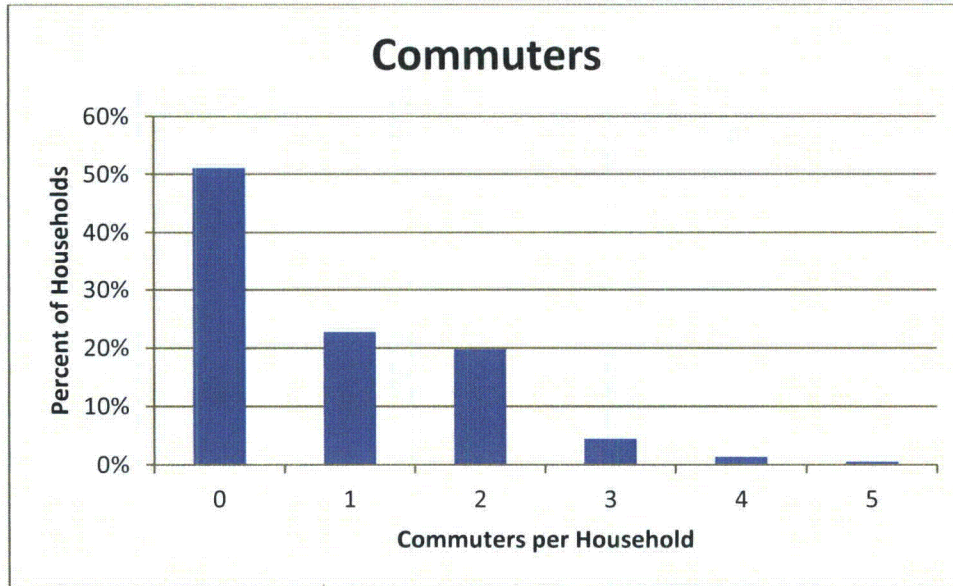


Figure F-3. Commuters in Households in the EPZ

## F.2.2 Evacuation Response

Questions were asked to gauge the population's response to an emergency. These are now discussed:

***"How many vehicles would your household take if an evacuation were ordered when all household members were at home??"*** The response is shown in Figure F-4. On average, evacuating households would use 1.26 vehicles.

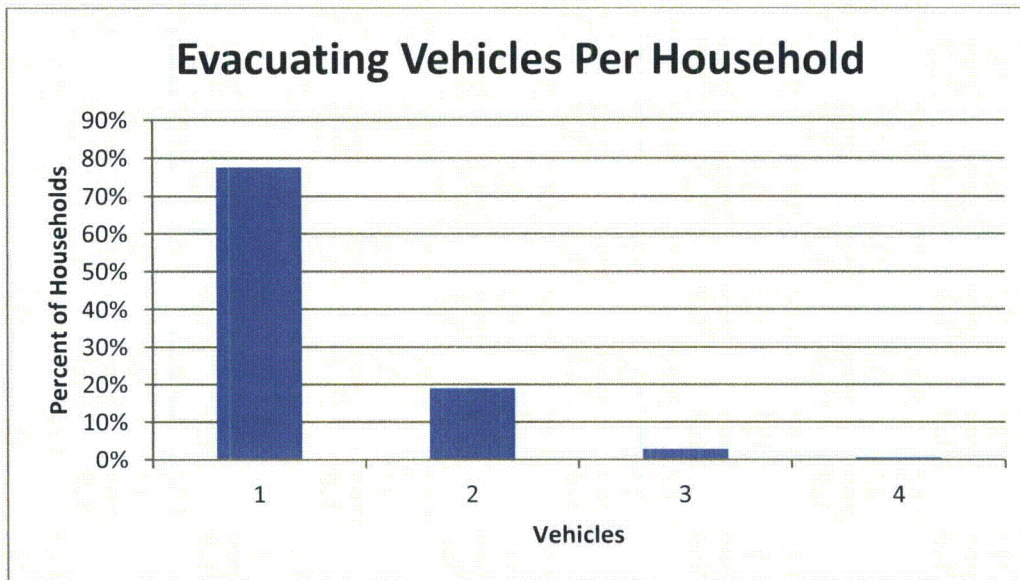
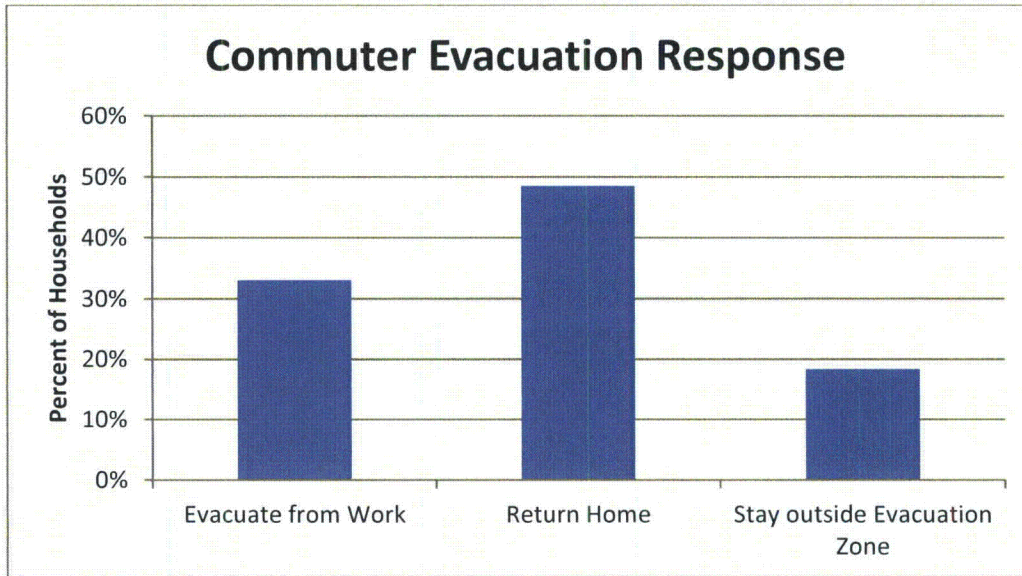


Figure F-4. Number of Vehicles Used for Evacuation

***“If an evacuation notice were given while [the primary commuter] was at work, do you think they would most likely...”*** The response is shown in Figure F-5. Of the survey participants who responded, 33 percent indicated they would evacuate from work, 49 percent said they would return home first and then evacuate, and 18 percent indicated that they would stay outside the evacuation zone where they work.



**Figure F-5. Commuter Evacuation Response**

### F.2.3 Time Distribution Results

The survey asked several questions about the amount of time it takes to perform certain pre-evacuation activities. These activities involve actions taken by residents during the course of their day-to-day lives. Thus, the answers fall within the realm of the responder's experience.

The mobilization distributions provided below are the result of having applied the analysis described in Section 5.4.1 on the component activities of the mobilization.

***"How long do you think it would take [the primary commuter] to get prepared and actually leave work?"*** Figure F-6 presents the cumulative distribution; in all cases, the activity is completed within 75 minutes. Ninety-four percent can leave within 30 minutes.

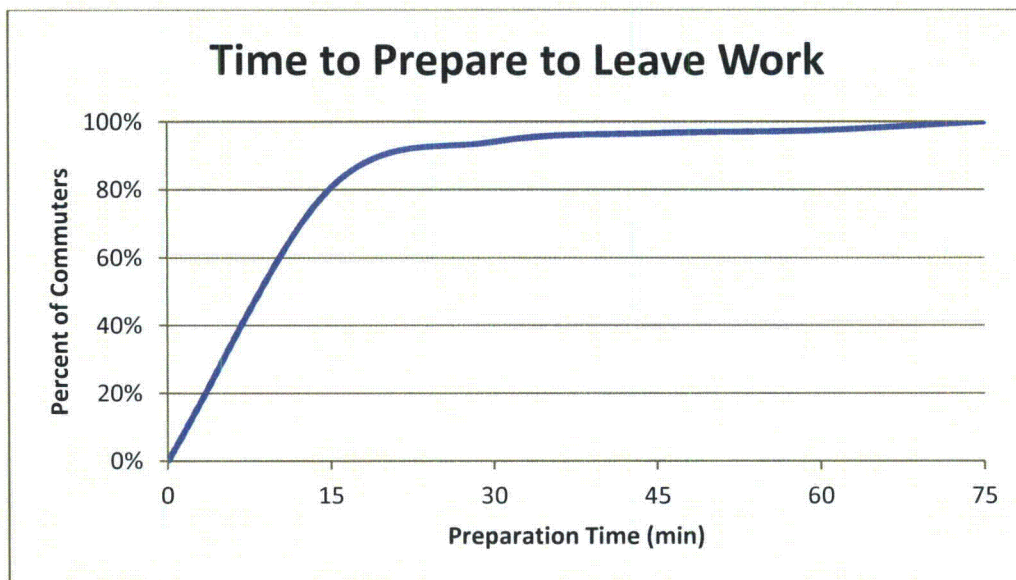
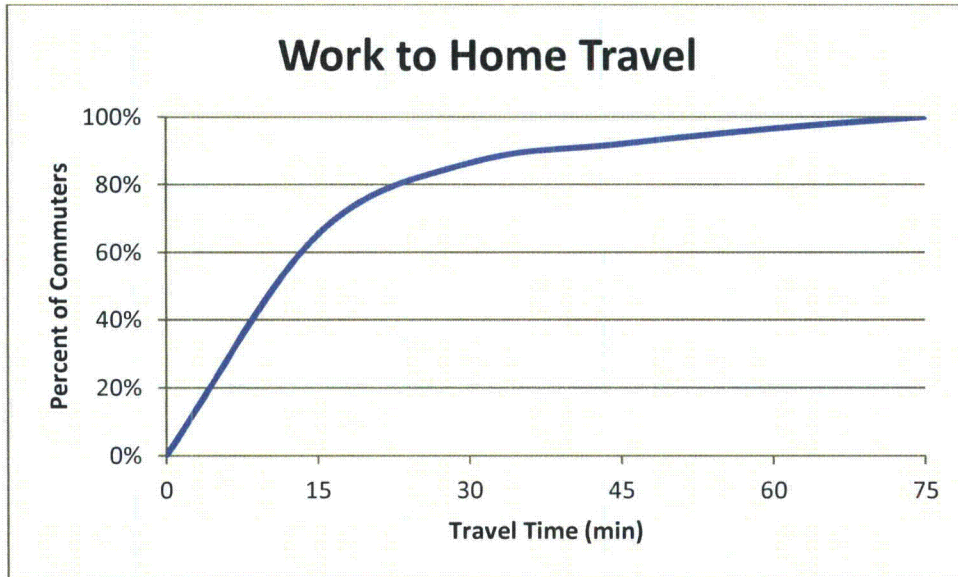


Figure F-6. Time Required to Prepare to Leave Work

**“About how long does it take [the primary commuter] to get from work to home?”** Figure F-7 presents the work to home travel time for the EPZ. Approximately 86 percent of commuters can arrive home within 30 minutes of leaving work; all within 75 minutes.

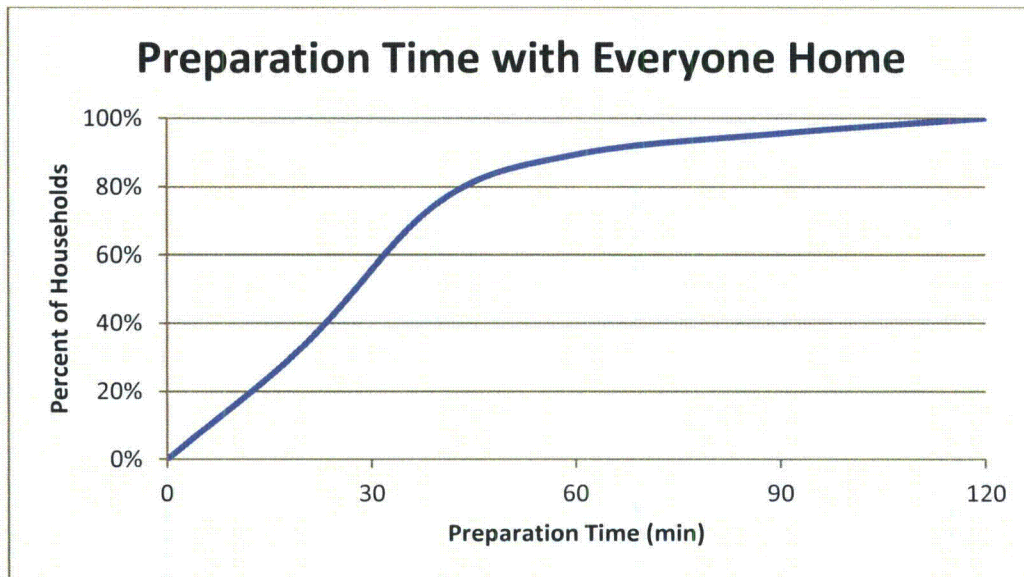


**Figure F-7. Work to Home Travel Time**



***“If an evacuation were ordered when all household members were at home (for example, at night or on a weekend), approximately how long would it take your household to prepare to depart? Please assume that you are advised to plan to be away from your home for 3 days.”***

Figure F-8 presents the time required to prepare for leaving on an evacuation trip. In many ways this activity mimics a family’s preparation for a short holiday or weekend away from home. Hence, the responses represent the experience of the responder in performing similar activities. About 76 percent of households can be ready to leave home within 40 minutes; the remaining households require up to an additional 80 minutes.



**Figure F-8. Time to Prepare Home for Evacuation**

The survey conducted in support of this study did not ask residents how long it would take them to remove snow from their driveway if there were snow on the ground when an evacuation was ordered. As discussed in Section 5.3, the response to the snow removal question in a survey conducted in 2012 in support of ETE development for the Duane Arnold Energy Center (DAEC) is adapted for this study. DAEC is located in Iowa, approximately 170 miles west-northwest of LAS. It is assumed that snowfall and snow removal times are comparable in both EPZs.

***"How long would it take you to clear 6 to 8 inches of snow from your driveway?"*** During adverse, snowy weather conditions, an additional activity must be performed before residents can depart on the evacuation trip. Although snow scenarios assume that the roads and highways have been plowed and are passable (albeit at lower speeds and capacities), it may be necessary to clear a private driveway prior to leaving the home so that the vehicle can access the street. Figure F-9 presents the time distribution for removing 6 to 8 inches of snow from a driveway. The time distribution for clearing the driveway has a long tail; about 96 percent of driveways are passable within 60 minutes. The last driveway is cleared two hours after the start of this activity. Note that those respondents (46%) who answered that they would not take time to clear their driveway were assumed to be ready immediately at the start of this activity. Essentially they would drive through the snow on the driveway to access the roadway and begin their evacuation trip.

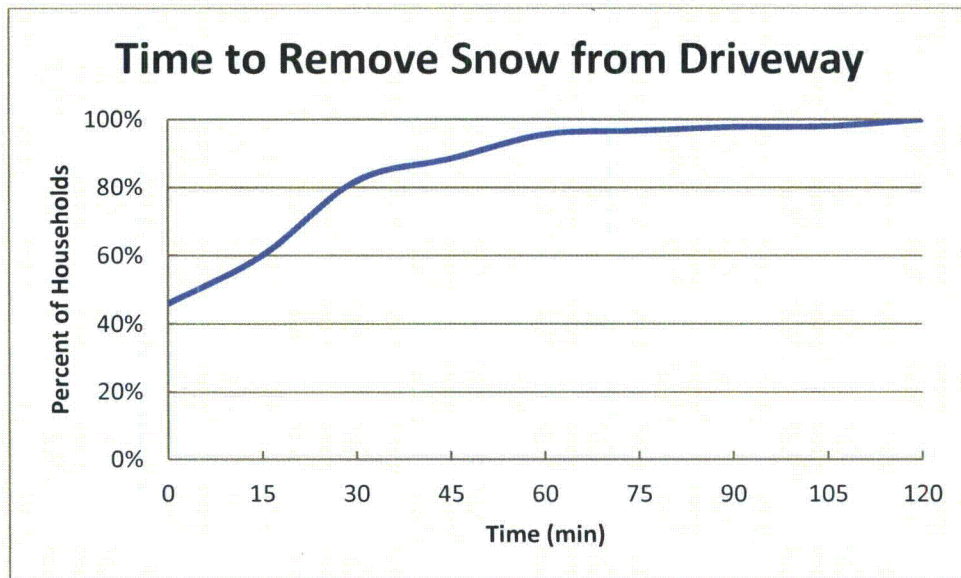


Figure F-9. Time to Clear Driveway of 6"-8" of Snow

### F.3 Conclusions

The telephone survey provides valuable, relevant data associated with the EPZ population, which have been used to quantify demographics specific to the EPZ, and "mobilization time" which can influence evacuation time estimates.

ATTACHMENT A

Telephone Survey Instrument

# Telephone Survey Instrument

Exelon Survey  
Final v6 - August 23, 2011

## INTRODUCTION

*Hello, my name is \_\_\_\_\_ and I am calling from MDC Research, a public opinion firm. We are conducting a brief survey to gather information from households in your area about emergency response planning, and we'd like to include your opinions. This survey is being conducted on behalf of the (insert facility name) Nuclear Facility, and will take approximately 5 minutes to complete. We are not trying to sell you anything. The information gathered from this survey will help local agencies more effectively provide community assistance should an emergency situation arise.*

*Can I please speak with an adult member of the household?*

## SCREENER

S1. What is the zip code of your primary residence? This is the home where you live the majority of the time. **DO NOT READ ZIP CODE LIST**  
List of appropriate zip codes will be displayed here

99999 Location outside the EPZ – **THANK & TERMINATE**

S2. Which of the following categories best describes your age?

11 Under 18 yrs of age – **ASK FOR REFERRAL or THANK & TERMINATE**

12 18 to 24

13 25 to 34

14 35 to 44

15 45 to 54

16 55 to 64

17 65 to 74

18 75 or older

98 (DO NOT READ) Refused

## QUESTIONNAIRE

Q1 How many people currently reside in your household?

Record: \_\_\_\_\_ # of residents

98 (DO NOT READ) Refused – **THANK & TERMINATE**

Q2 How many motor vehicles are normally based at your home?

Record: \_\_\_\_\_ # of vehicles

997 None - **SKIP TO Q14**

998 (DO NOT READ) Refused

Q3 How many members of your household are over the age of 16?

Record: \_\_\_\_\_ # of residents

998 (DO NOT READ) Refused

Q4 How many members of your household are licensed drivers?

Record: \_\_\_\_\_ # of drivers

998 (DO NOT READ) Refused

Q5 How many of the adults in your household work outside the home?

Record  Skip to Q6A

997 None – Continue to Q5A

998 (DO NOT READ) Refused

If refused, explain; The nature of this project is to estimate traffic volumes and flow in the event of an emergency evacuation, so this data is necessary in order for us to continue with the survey.

If still refused - THANK & TERMINATE

Q5A (ONLY ASK IF Q5=997) Which of the following best describes the non-working adults in your household? MULTIPLE MENTION – IP NOTE: No more mentions than Q3 mentions.

11 Currently unemployed/actively looking for work

12 Retired

13 On Disability or leave of absence

14 Student/continuing education

15 Homemaker

99 Other – please specify

SKIP TO Q11

Repeat the following Q6A-F sequence for each working adult cited in Q5

For each of the working adults you just referenced, I'd like to ask a few questions related to what their likely actions would be in the case of an emergency evacuation. I understand that I will be asking you to speculate on what other members of the household may do in this situation, but your best guesses are just fine for our purposes.

Q6A Who is the first working adult in the household that you are thinking about? What is their relationship to you?

1 Self

2 Spouse or significant other

3 Parent of child

4 Other relative or in-law

5 Roommate

6 Boarder

7 Other

Q6B Which of the following best describes this person's usual work schedule?

- 1 Monday – Friday, 8:00am to 5:00pm
- 2 Swing Shift
- 3 Graveyard
- 4 Evenings and weekends
- 5 Rotating shifts
- 6 Other or irregular schedule
- 7 **(DO NOT READ)** Don't know

Q6C Does this person generally use a personal vehicle to commute back and forth to work?

- 1 Yes
- 2 No
- 7 **(DO NOT READ)** Don't know

Q6D If an evacuation notice were given while this person was at work, do you think they would most likely...

- 1 Evacuate directly from work
- 2 Come home first and then evacuate, or
- 3 Stay outside the evacuation zone where they work  **Skip to Q7**
- 7 **(DO NOT READ)** Don't know

Q6E How long do you think it would take this person to get prepared and actually leave work?

**(Read list if necessary)**

- 1 Less than 15 minutes
- 2 15 to 30 minutes
- 3 30 to 45 minutes
- 4 45 to 60 minutes
- 5 More than 60 minutes
- 7 **(DO NOT READ)** Don't know

If response at 6D is 1, skip from here to Q7

Q6F About how long does it take this household member to get from work to home?

**(Read list if necessary)**

- 1 Less than 15 minutes
- 2 15 to 30 minutes
- 3 30 to 45 minutes
- 4 45 to 60 minutes
- 5 More than 60 minutes

7 **(DO NOT READ)** Don't know

Q7A-F Repeat Q6 sequence for worker #2

Q8A-F Repeat Q6 sequence for worker #3

Q9A-F Repeat Q6 sequence for worker #4

Q10 And once everyone who is coming home from work has arrived, how long would it take to prepare and depart from home, taking into consideration whether or not someone else is usually home who may be starting these preparation while they are travelling?

- 1 Less than 15 minutes
- 2 15 to 30 minutes
- 3 30 to 45 minutes
- 4 45 to 60 minutes
- 5 More than 60 minutes
- 7 (DO NOT READ) Don't know

Q11 Are any of the licensed drivers in your household restricted to daytime driving only?

- 1 Yes
- 2 No
- 9 (DO NOT READ) Refused

Q12 If an evacuation were ordered when all household members were at home (for example, at night or on a weekend), approximately how long would it take your household to prepare to depart? Please assume that you are advised to plan to be away from your home for 3 days. Would you say that it would take... READ LIST

- 1 Less than 20 minutes to depart
- 2 20 to 40 minutes to depart
- 3 40 to 60 minutes to depart
- 4 60 to 90 minutes to depart; or
- 5 More than 90 minutes to depart

Q13 How many vehicles would your household take if an evacuation were ordered when all household members were at home?

Record: \_\_\_\_\_ # of vehicles  
998 (DO NOT READ) Refused

Q14 Are any members of your household seasonal residents? And by seasonal we mean any people who do not reside in your home the majority of the year.

- 1 Yes
- 2 No - SKIP TO Q15
- 9 (DO NOT READ) Refused

Q14A (ASK IF Q14=1) How many of your <insert Q1 response> household members are seasonal?

Record: \_\_\_\_\_ # of seasonal household members  
998 (DO NOT READ) Refused

Q14B (ASK IF Q14=1) What seasons do they live in another location away from your home?  
READ LIST – Multiple Mention

- 1 Spring
- 2 Summer
- 3 Fall

4 Winter

Q15 Would any member of your household require a specialized vehicle, such as a wheelchair, van or ambulance, to evacuate from your home in case of an emergency?

1 Yes

2 No

9 **(DO NOT READ)** Refused

This is all the questions we have for you today/tonight. Thank you for participating in this survey. Your responses will help us to make an accurate prediction of traffic conditions during an emergency situation. If you have any questions about this survey, please feel free to contact <insert contact name, job title, and phone number/email>.



**APPENDIX G**  
Traffic Management Plan

## **G. TRAFFIC MANAGEMENT PLAN**

NUREG/CR-7002 indicates that the existing TCPs and ACPs identified by the offsite agencies should be used in the evacuation simulation modeling. The traffic and access control plans for the EPZ were provided by the Illinois Emergency Management Agency.

These plans were reviewed and the TCPs and ACPs were modeled accordingly.

### **G.1 Traffic Control Points**

As discussed in Section 9, traffic control points at intersections (which are controlled) are modeled as actuated signals. If an intersection has a pre-timed signal, stop, or yield control, and the intersection is identified as a traffic control point, the control type was changed to an actuated signal in the DYNEV II system. Table K-2 provides the control type and node number for those nodes which are controlled. If the existing control was changed due to the point being a TCP, the control type is indicated as "TCP – Actuated" or "TCP – Uncontrolled" in Table K-2. The TCPs and ACPs within the study area are mapped in Figure G-1.

### **G.2 Access Control Points**

It is assumed that ACPs will be established within 2 hours of the advisory to evacuate to discourage through travelers from using major through routes which traverse the EPZ. As discussed in Section 3.6, external traffic was considered on the major route which traverses the study area – I-80 – in this study. The generation of the external trips ceases at 2 hours after the advisory to evacuate in the simulation due to the ACPs.

As shown in Figure G-1, the TCPs and ACPs identified in the county and state emergency plans are concentrated along major evacuation routes and on roadways giving access to the EPZ. These TCPs and ACPs would be manned during evacuation by traffic guides who would direct evacuees in the proper direction away from the plant and facilitate the flow of traffic through the intersections.

Detailed descriptions of each of the TCPs and ACPs and the actions to be taken by traffic guides at these intersections are provided in the county and state plans. These actions were modeled explicitly in the DYNEV II system. For additional information, refer to the county and state plans.

As discussed in Section 9, this study did not identify any additional intersections as TCPs or ACPs. The existing county and state traffic management plans are comprehensive in terms of discouraging traffic from entering the EPZ.

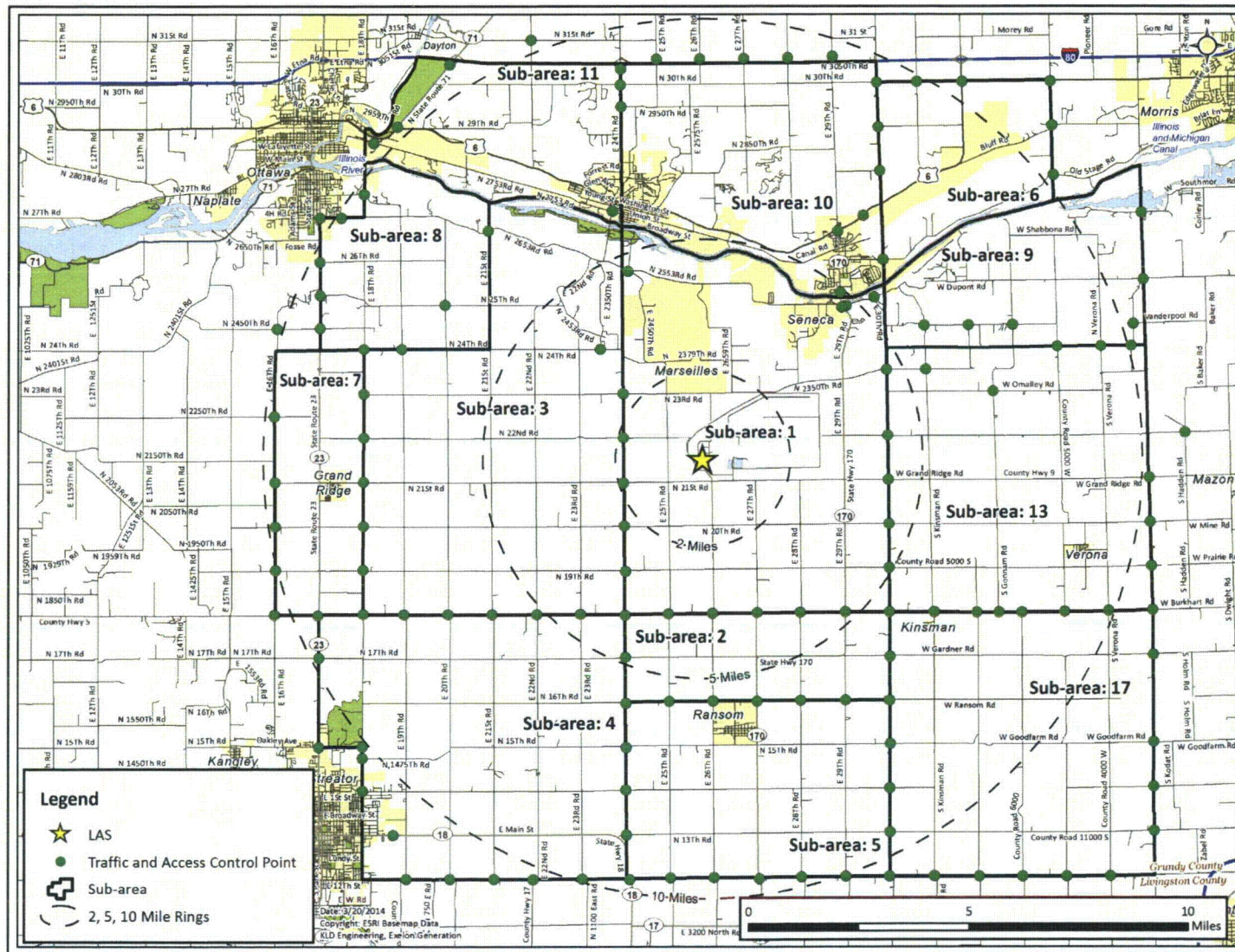


Figure G-1. Traffic and Access Control Points for the LaSalle County Generating Station

**APPENDIX H**  
Evacuation Regions

## H. EVACUATION REGIONS

This appendix presents the evacuation percentages for each Evacuation Region (Table H-1) and maps of all Evacuation Regions (Figure H-1 through Figure H-22). The percentages presented in Table H-1 are based on the methodology discussed in assumption 5 of Section 2.2 and shown in Figure 2-1.

Note the baseline ETE study assumes 20 percent of households will not comply with the shelter advisory, as per Section 2.5.2 of NUREG/CR-7002.

The City of Marseilles, Illinois is split between 2 Sub-areas. The eastern half of the city is in Sub-area 10, while the western half is in Sub-area 11. Based on discussions with Exelon and the offsite agencies, the city would always evacuate as a whole when wind is blowing toward the city (Sub-area 10, 11, or both included in keyhole). Thus, keyholes wherein Sub-area 10 is included, but not Sub-area 11 would still result in the City of Marseilles evacuating entirely. For example Region R08 is an evacuation of the 5-mile radius and downwind to the EPZ boundary with wind toward the northeast or east-northeast. When the wind is toward the northeast, Marseilles is in the keyhole (when using the 3-sector approach described in Section 6) and the entire city evacuates. When the wind is toward the east-northeast, the city is not within the keyhole, but Sub-area 10 (which includes Marseilles) is. Thus, the entire city evacuates. Similarly, keyholes wherein Sub-area 11 is included, but not Sub-area 10 would also result in the entire city evacuating. For example, Region R17, with the wind blowing toward the west-northwest, Marseilles is not within the keyhole, but Sub-area 11 (which includes Marseilles) is. Thus, the entire city evacuates. The evacuation of the City of Marseilles is shown graphically in Figures H-6 through H-8 and H-17 through H-19.

Table H-1. Percent of Sub-area Population Evacuating for Each Region

Region	Description	Sub-area													
		1	2	3	4	5	6	7	8	9	10	11	13	17	
R01	2-Mile Ring	100%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	
R02	5-Mile Ring	100%	100%	100%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	
R03	Full EPZ	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
<b>Evacuate 2-Mile Radius and Downwind to 5 Miles</b>															
Region	Wind Direction Toward:	Sub-area													
		1	2	3	4	5	6	7	8	9	10	11	13	17	
N/A	N, NNE, NE, ENE, E, ESE	Refer to Region R01													
R04	SE, SSE, S	100%	100%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	
N/A	SSW	Refer to Region R02													
R05	SW, WSW, W, WNW, NW, NNW	100%	20%	100%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	
<b>Evacuate 5-Mile Radius and Downwind to the EPZ Boundary</b>															
Region	Wind Direction Toward:	Sub-area													
		1	2	3	4	5	6	7	8	9	10	11	13	17	
R06	N	100%	100%	100%	20%	20%	100%	20%	20%	20%	100%	100%	20%	20%	
R07	NNE	100%	100%	100%	20%	20%	100%	20%	20%	100%	100%	20%	20%	20%	
R08	NE, ENE	100%	100%	100%	20%	20%	100%	20%	20%	100%	100%	20%	100%	20%	
R09	E	100%	100%	100%	20%	20%	20%	20%	20%	100%	20%	20%	100%	100%	
R10	ESE	100%	100%	100%	20%	20%	20%	20%	20%	20%	20%	20%	100%	100%	
R11	SE	100%	100%	100%	20%	100%	20%	20%	20%	20%	20%	20%	100%	100%	
R12	SSE	100%	100%	100%	20%	100%	20%	20%	20%	20%	20%	20%	20%	100%	
R13	S	100%	100%	100%	100%	100%	20%	20%	20%	20%	20%	20%	20%	100%	
R14	SSW	100%	100%	100%	100%	100%	20%	20%	20%	20%	20%	20%	20%	20%	
R15	SW, WSW	100%	100%	100%	100%	20%	20%	100%	20%	20%	20%	20%	20%	20%	
R16	W	100%	100%	100%	100%	20%	20%	100%	100%	20%	20%	20%	20%	20%	
R17	WNW	100%	100%	100%	20%	20%	20%	100%	100%	20%	20%	100%	20%	20%	
R18	NW	100%	100%	100%	20%	20%	20%	20%	100%	20%	20%	100%	20%	20%	
R19	NNW	100%	100%	100%	20%	20%	20%	20%	100%	20%	100%	100%	20%	20%	
<b>Staged Evacuation - 2-Mile Radius Evacuates, then Evacuate Downwind to 5 Miles</b>															
Region	Wind Direction Toward:	Sub-area													
		1	2	3	4	5	6	7	8	9	10	11	13	17	
R20	5-Mile Ring	100%	100%	100%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	
N/A	N, NNE, NE, ENE, E, ESE	Refer to Region R01													
R21	SE, SSE, S	100%	100%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	
N/A	SSW	Refer to Region R02													
R22	SW, WSW, W, WNW, NW, NNW	100%	20%	100%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	
<b>Sub-area(s) Evacuate</b>		<b>Sub-area(s) Shelter-in-Place</b>					<b>Shelter-in-Place until 90% ETE for R01, then Evacuate</b>								

Note: The entire city of Marseilles evacuates when either Sub-area 10 or Sub-area 11 evacuates.

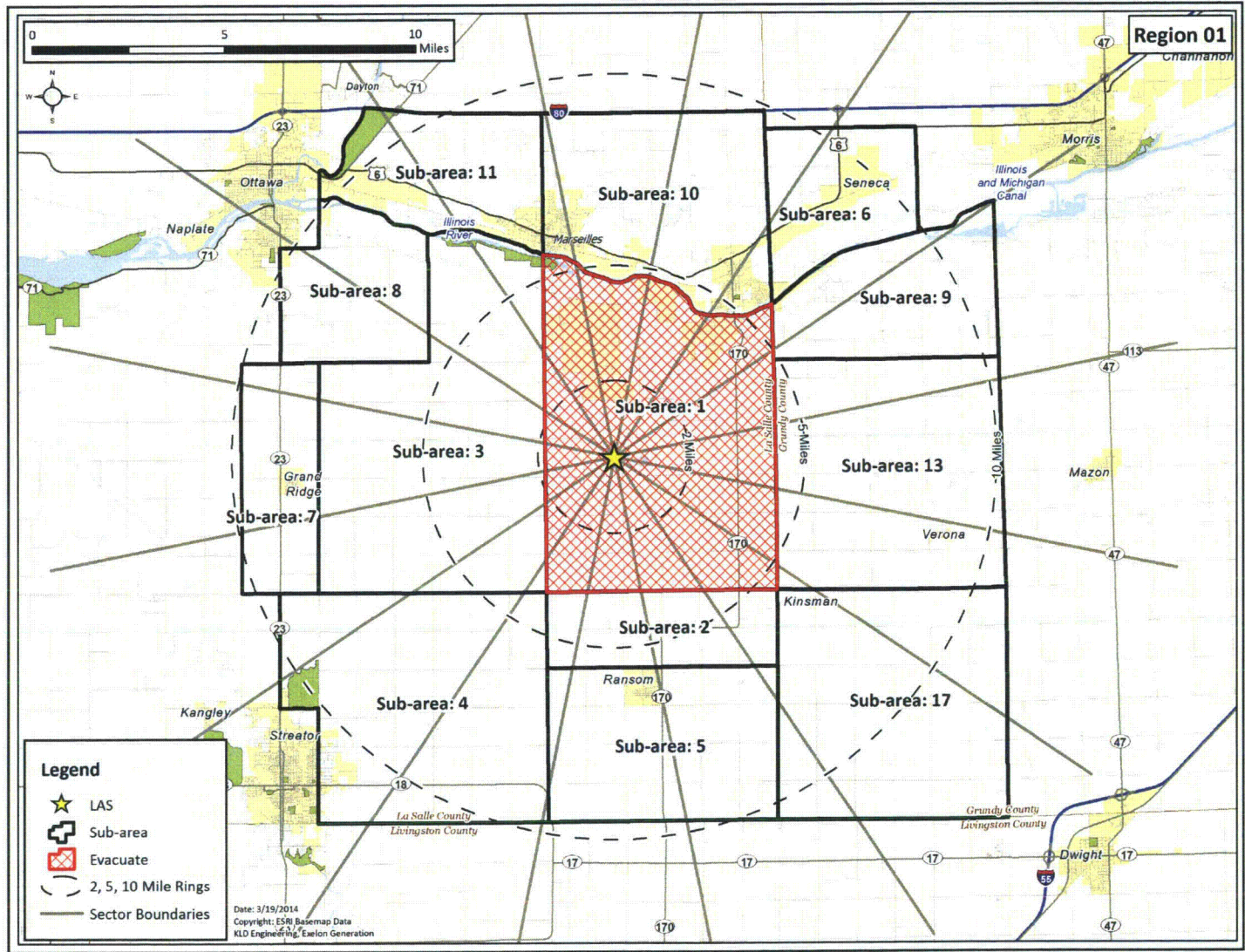


Figure H-1. Region R01

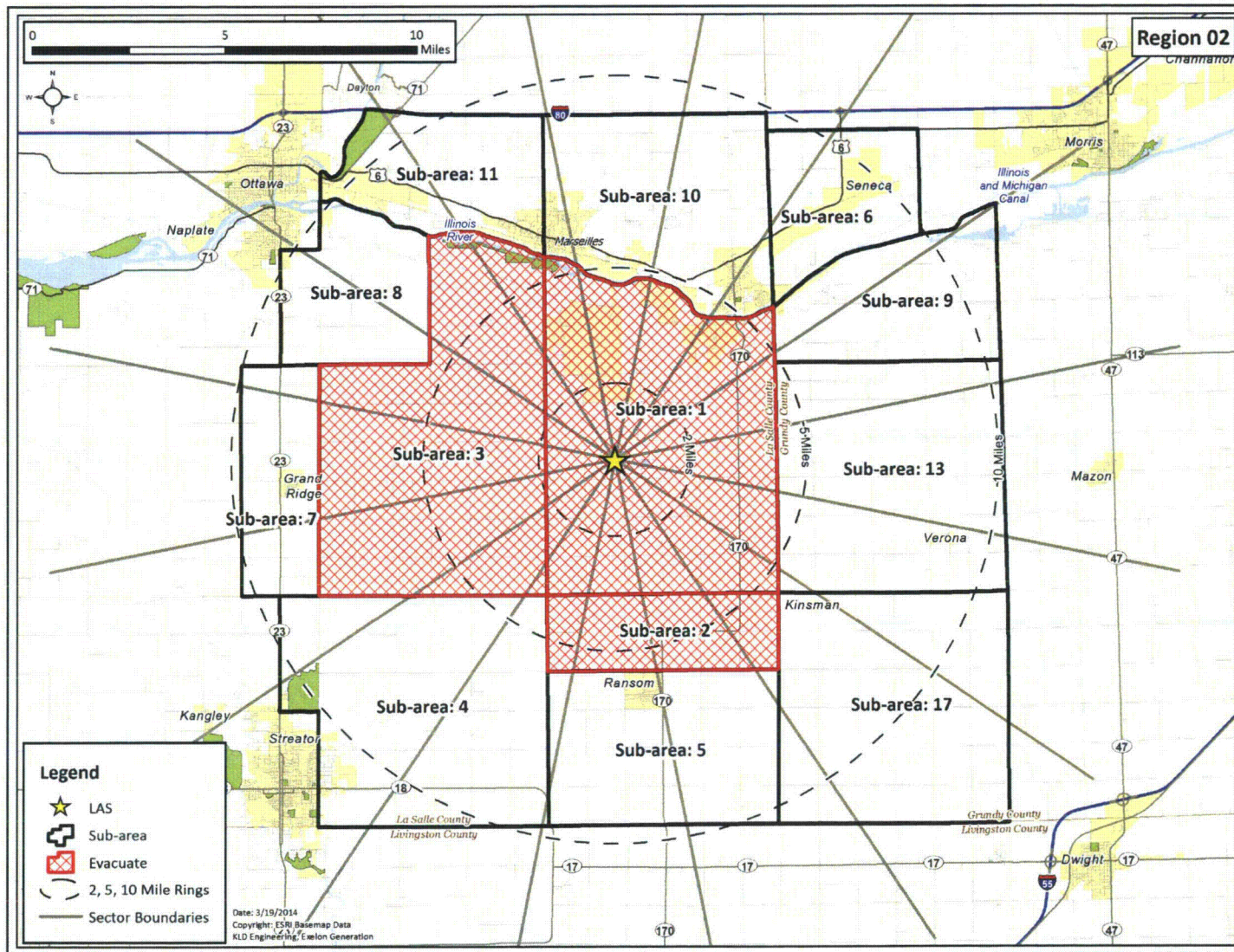


Figure H-2. Region R02





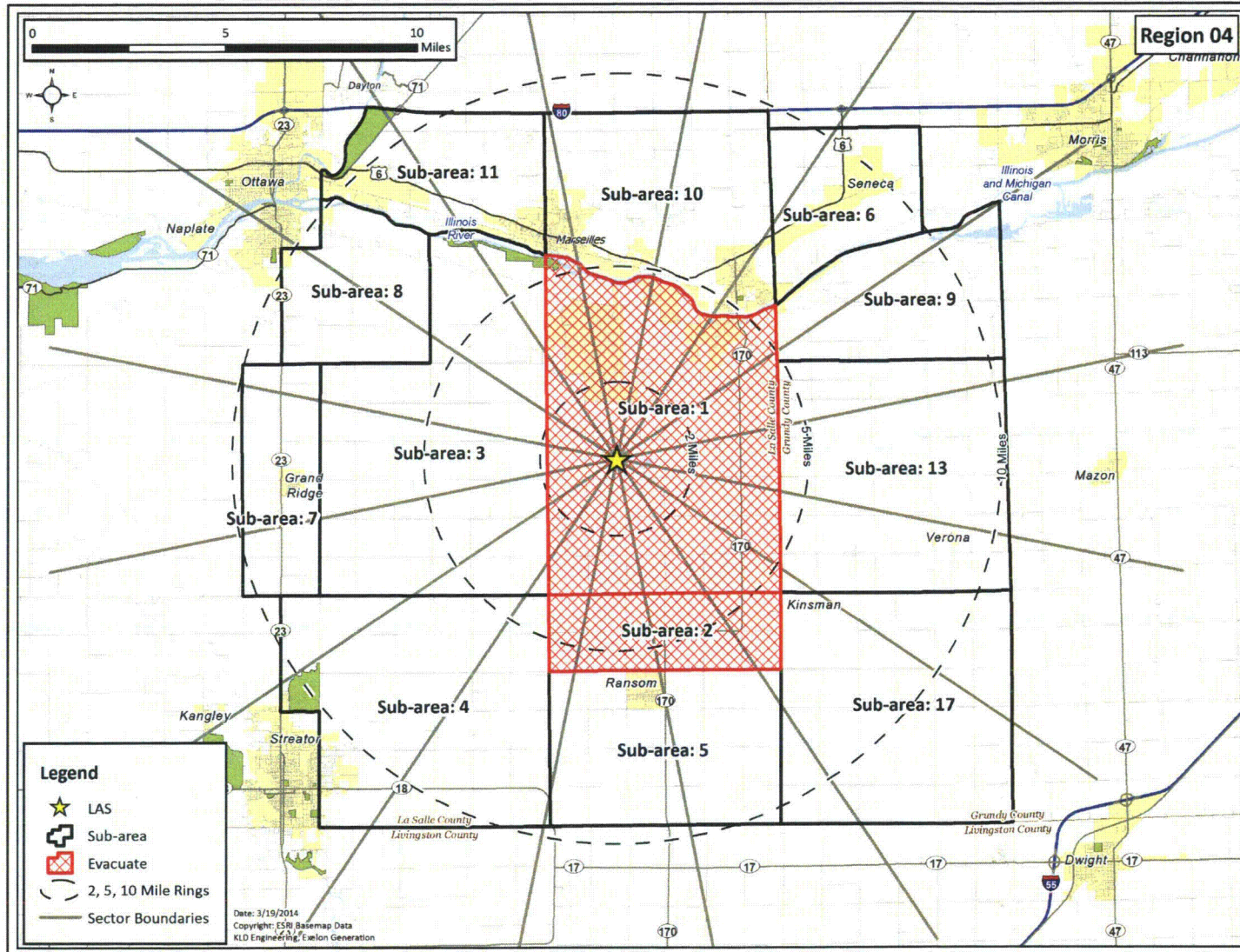


Figure H-4. Region R04

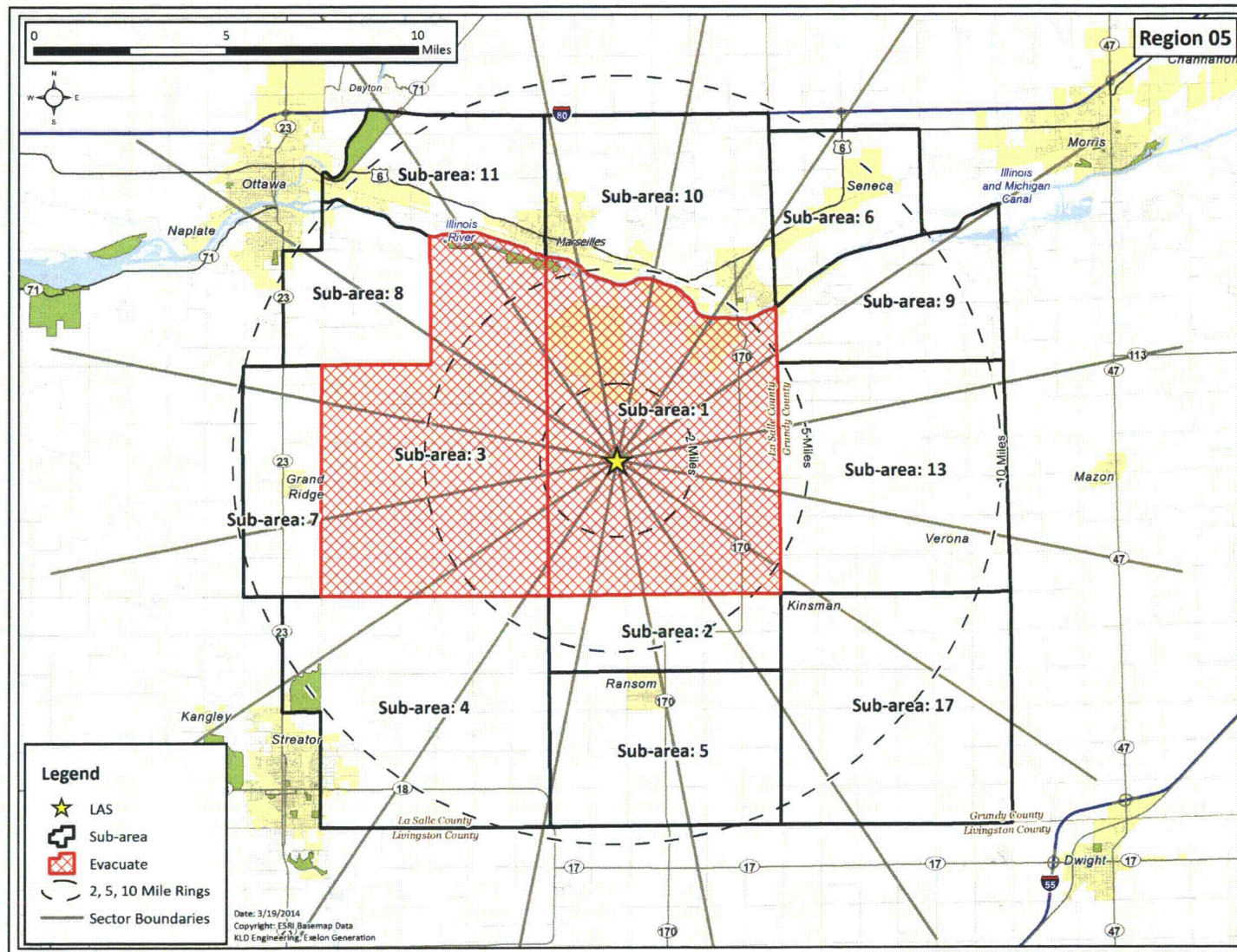


Figure H-5. Region R05

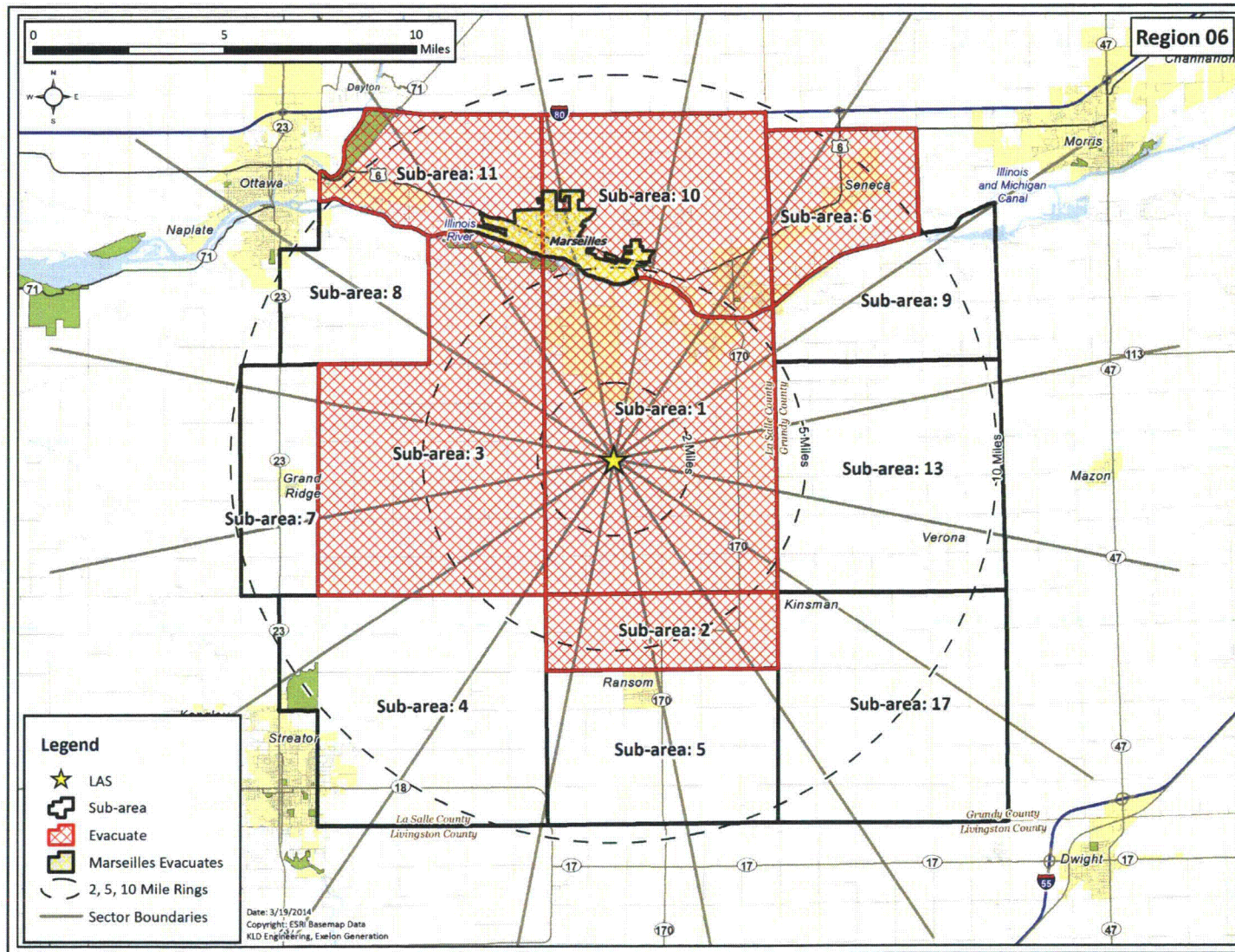


Figure H-6. Region R06

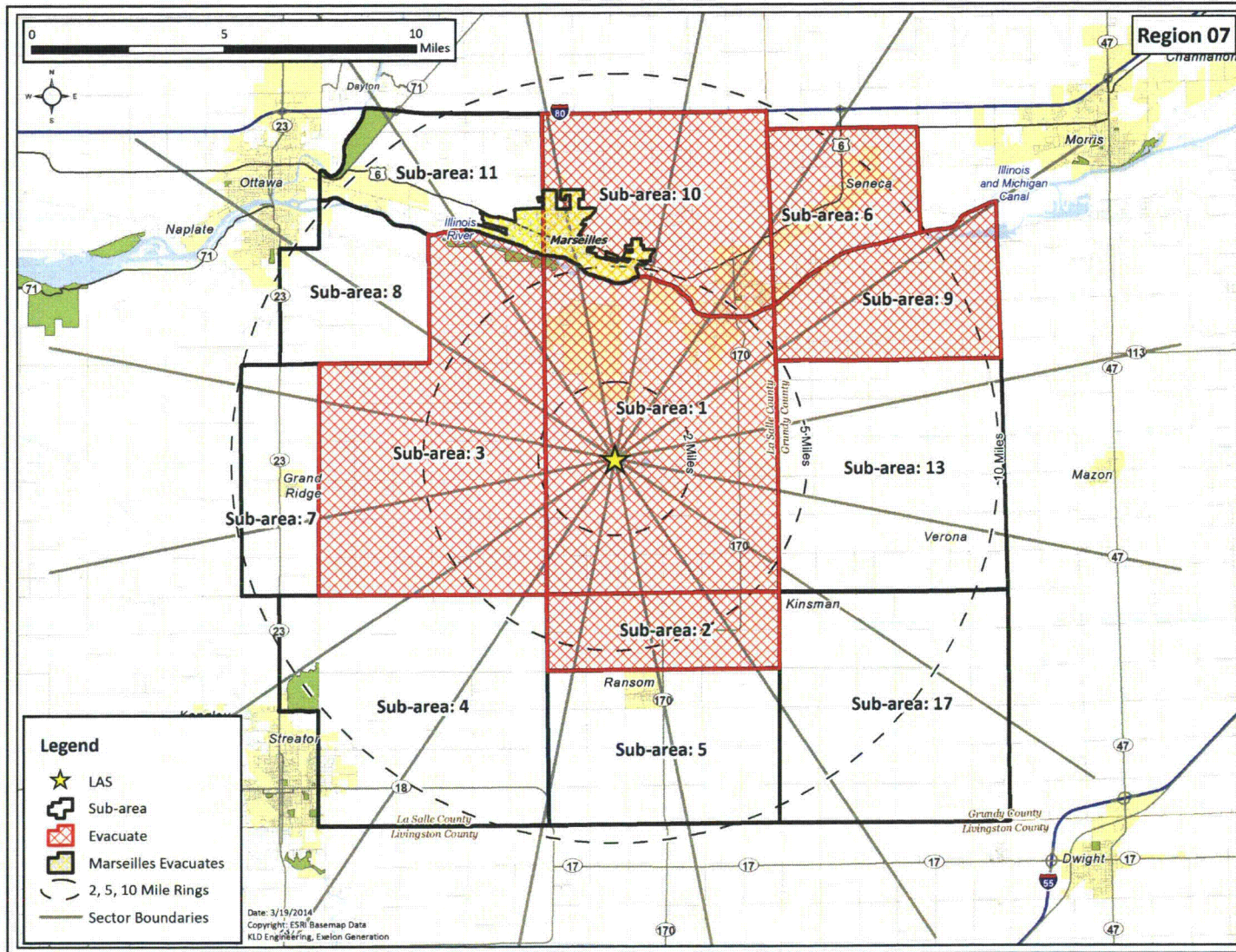


Figure H-7. Region R07

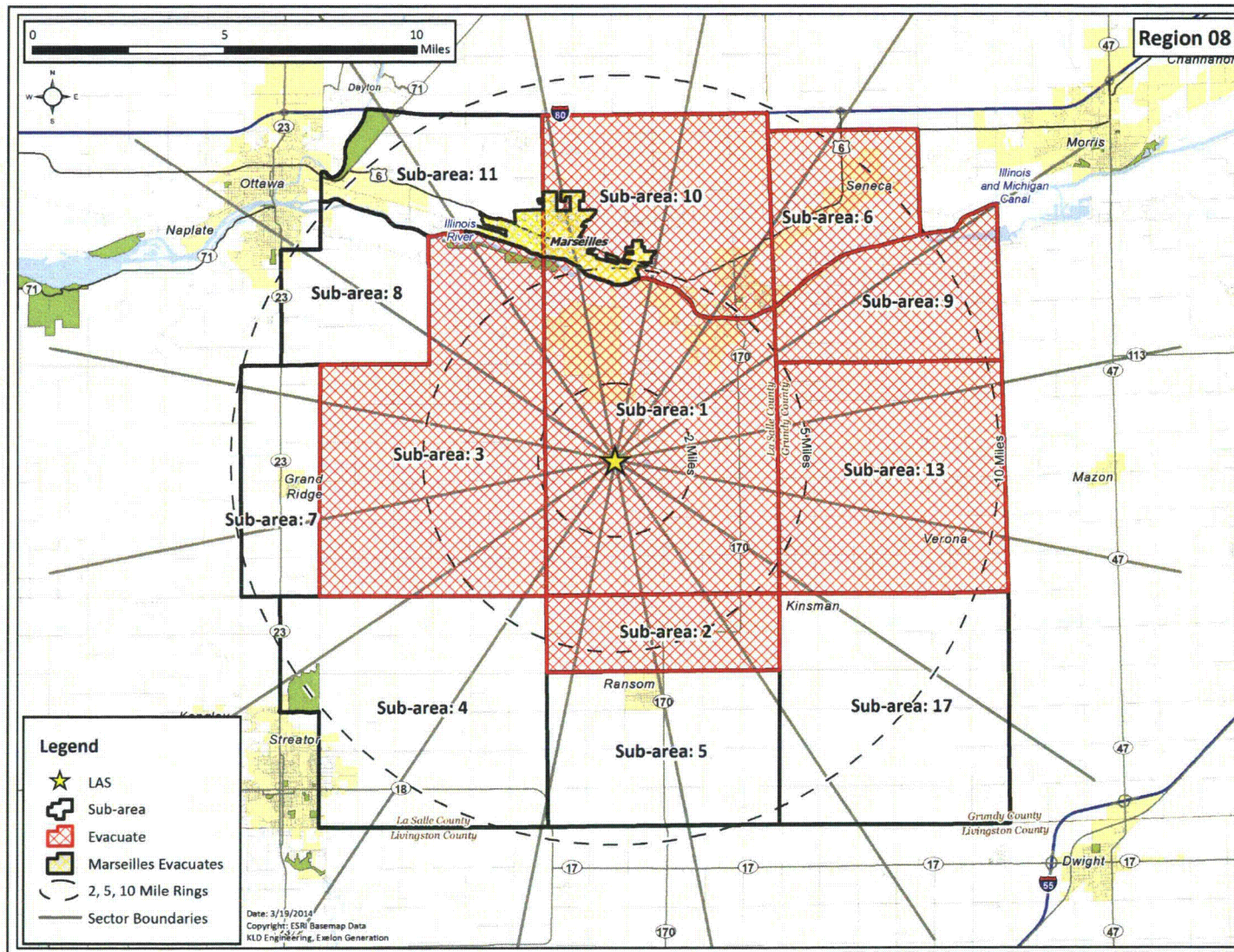


Figure H-8. Region R08

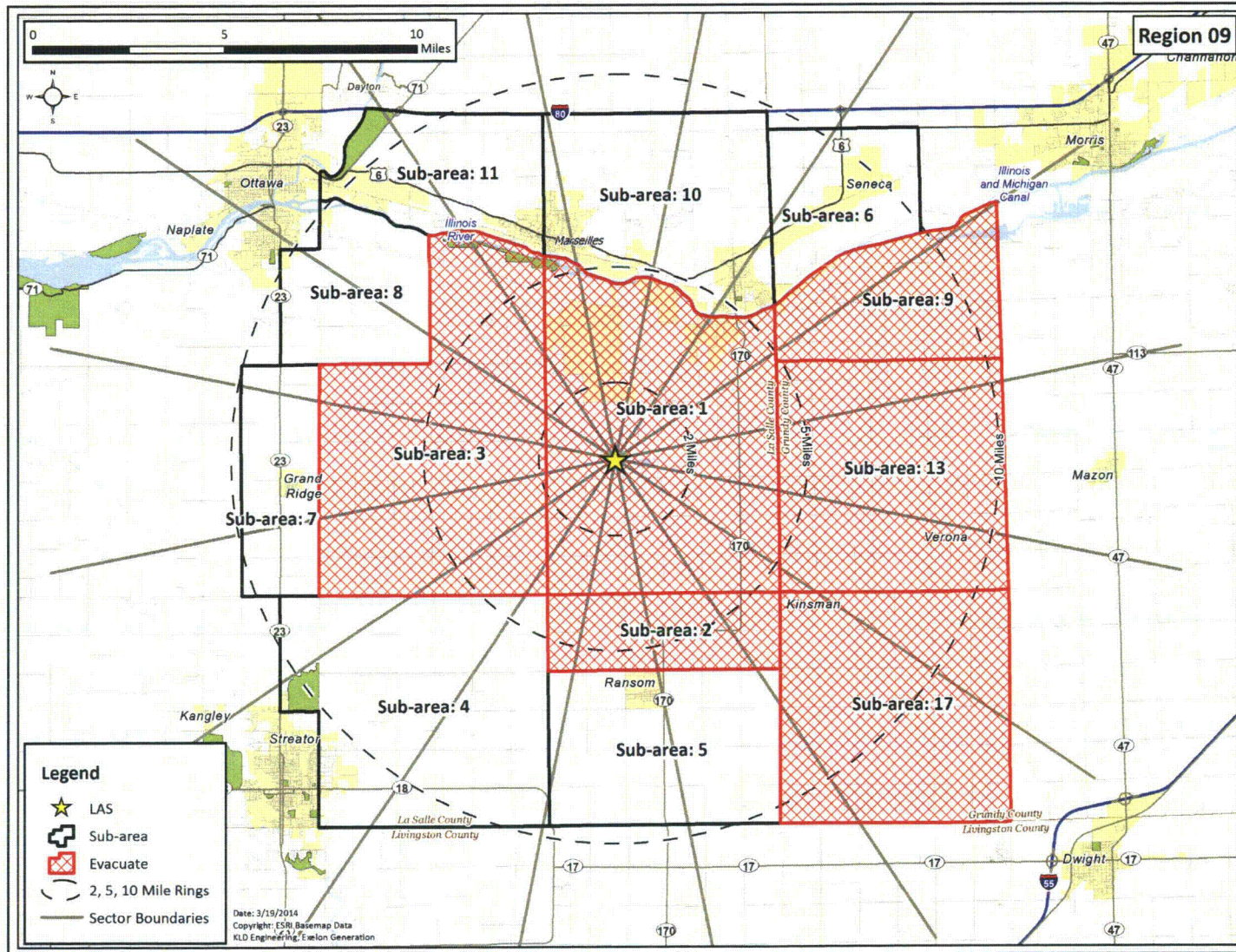


Figure H-9. Region R09

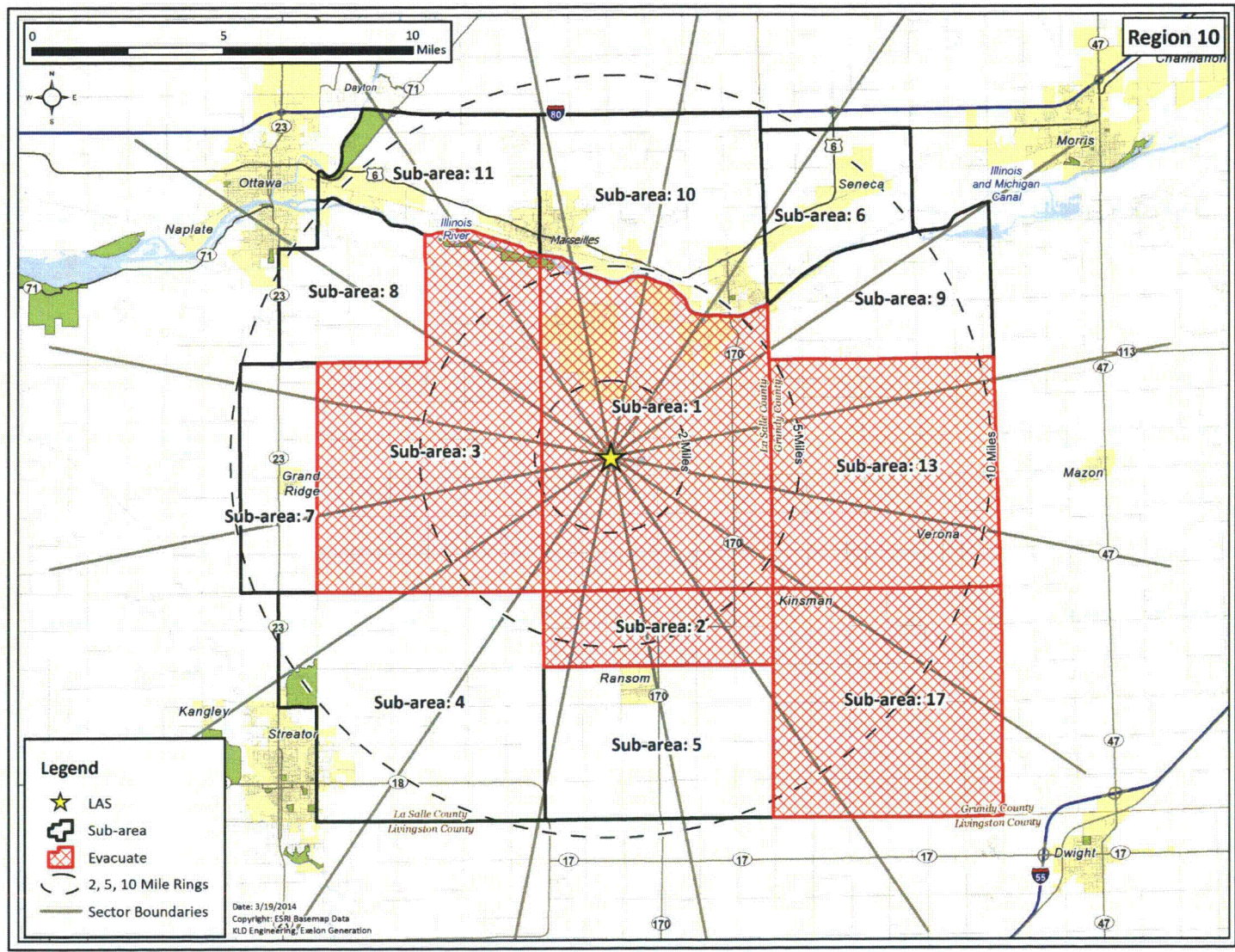


Figure H-10. Region R10



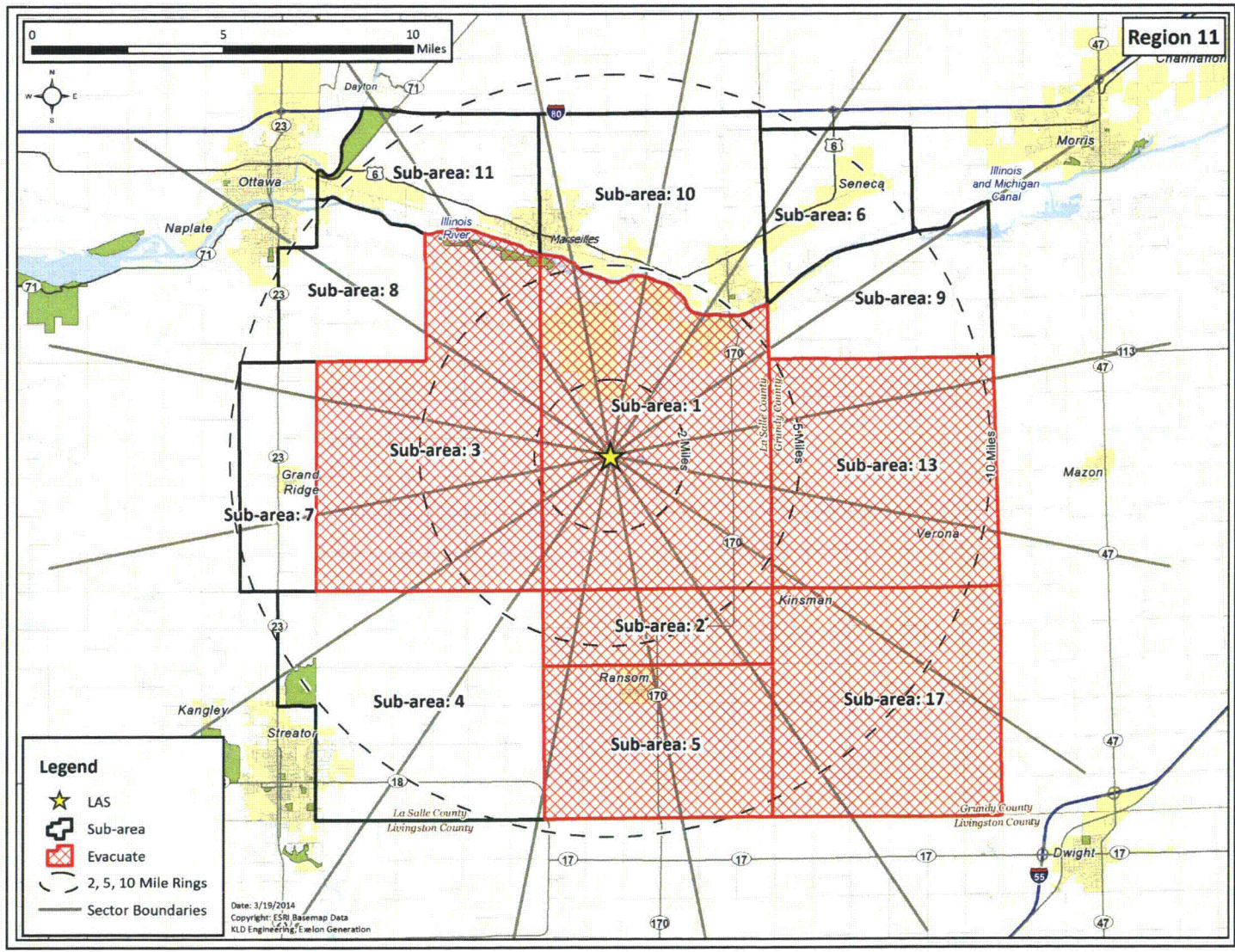


Figure H-11. Region R11

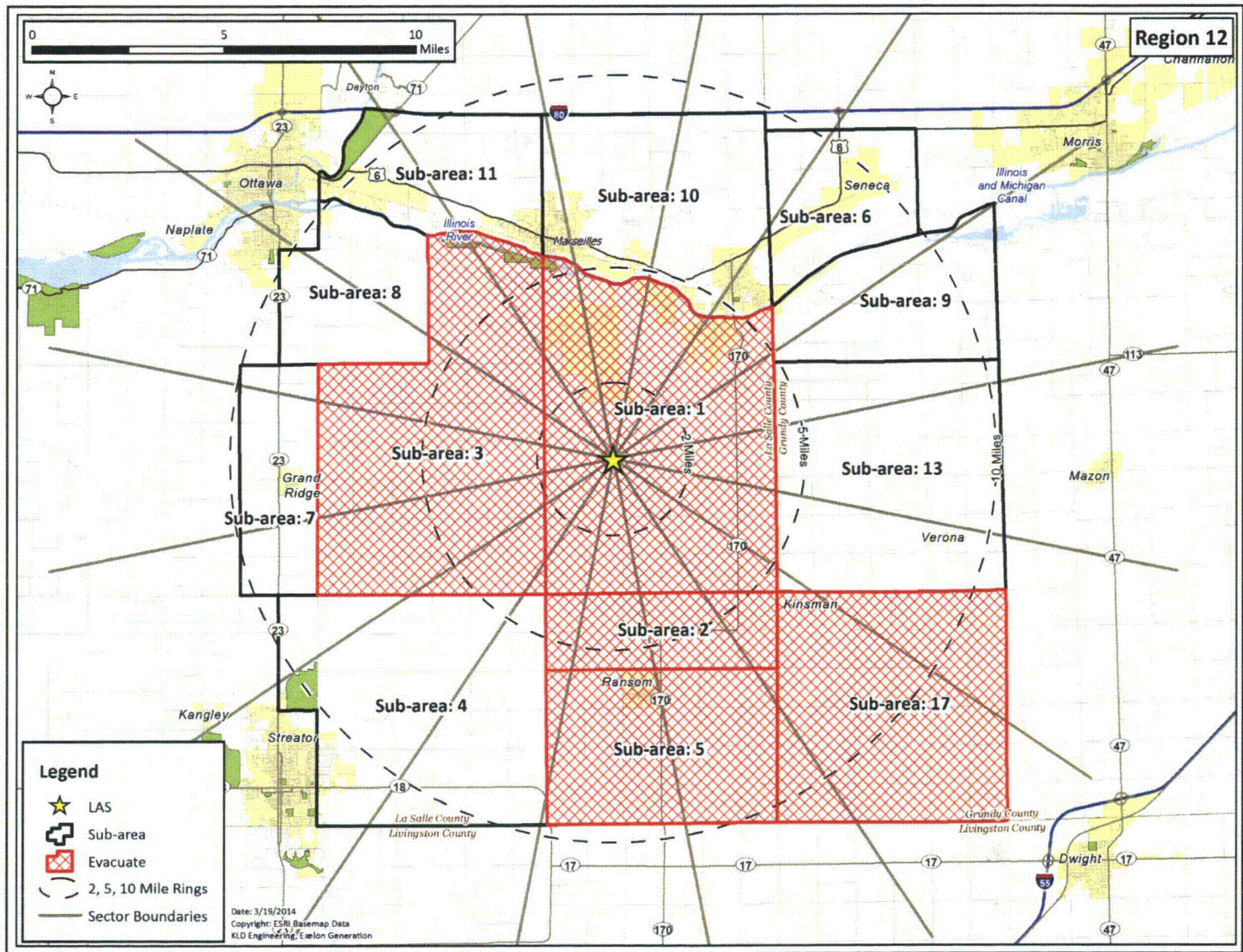


Figure H-12. Region R12

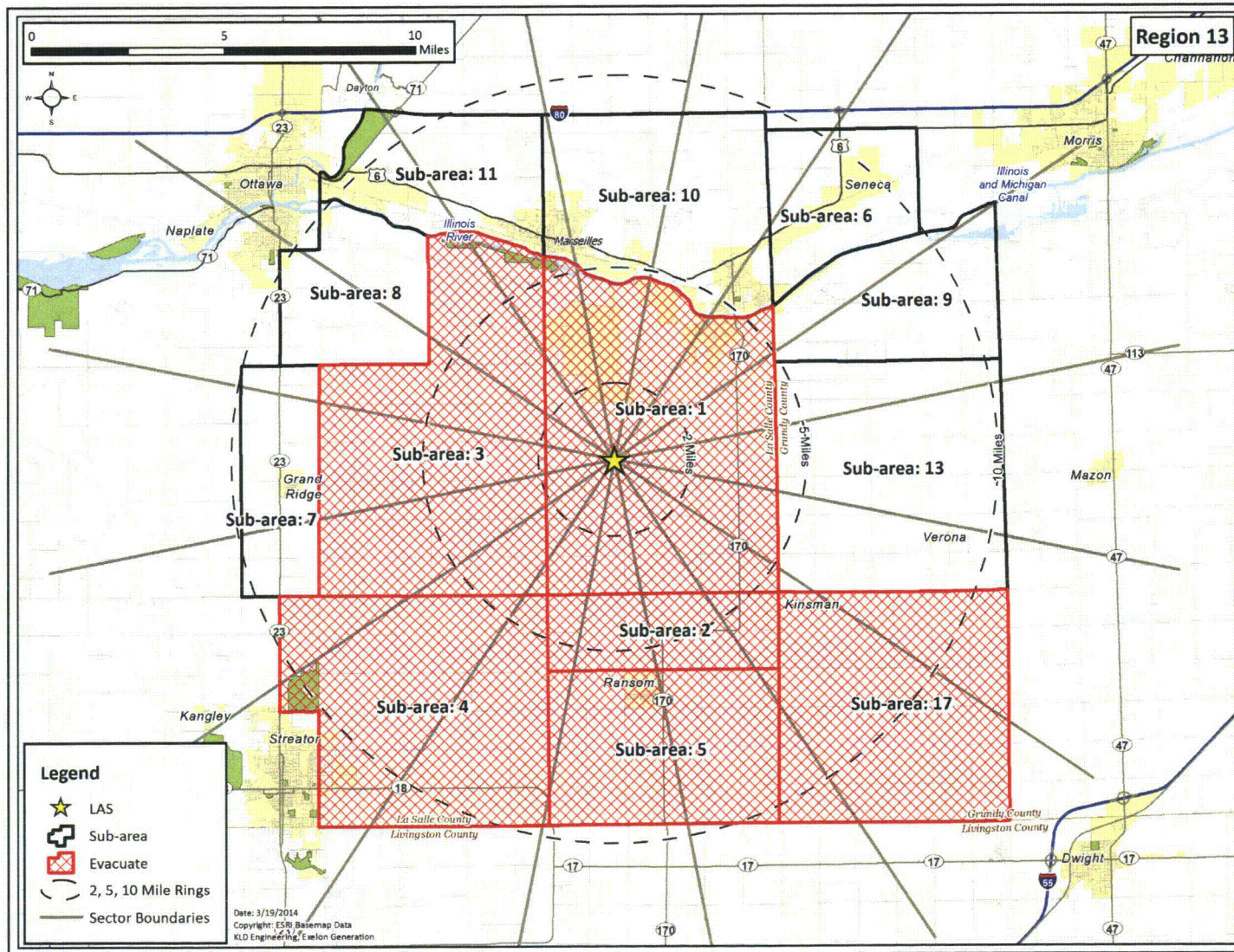


Figure H-13. Region R13

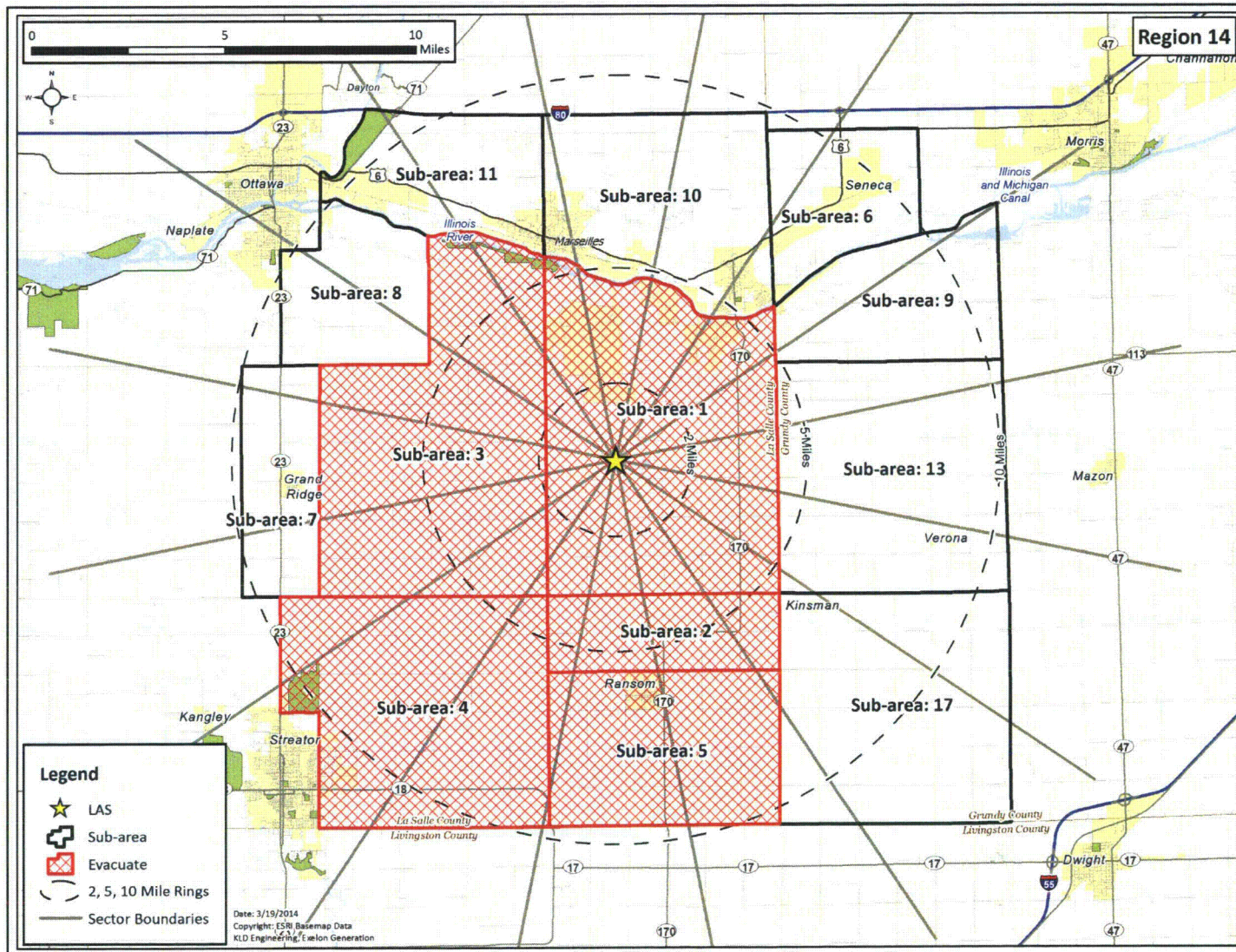


Figure H-14. Region R14

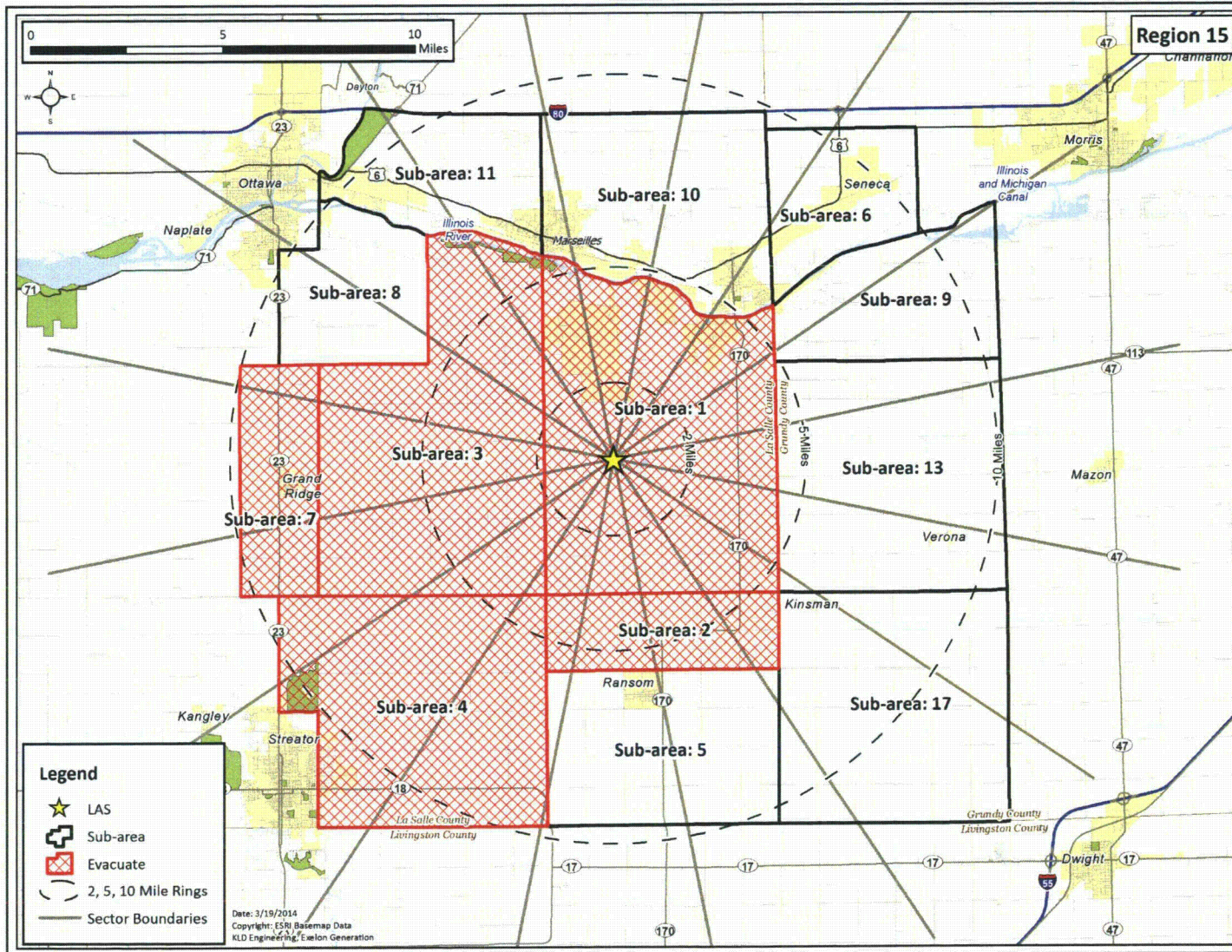


Figure H-15. Region R15

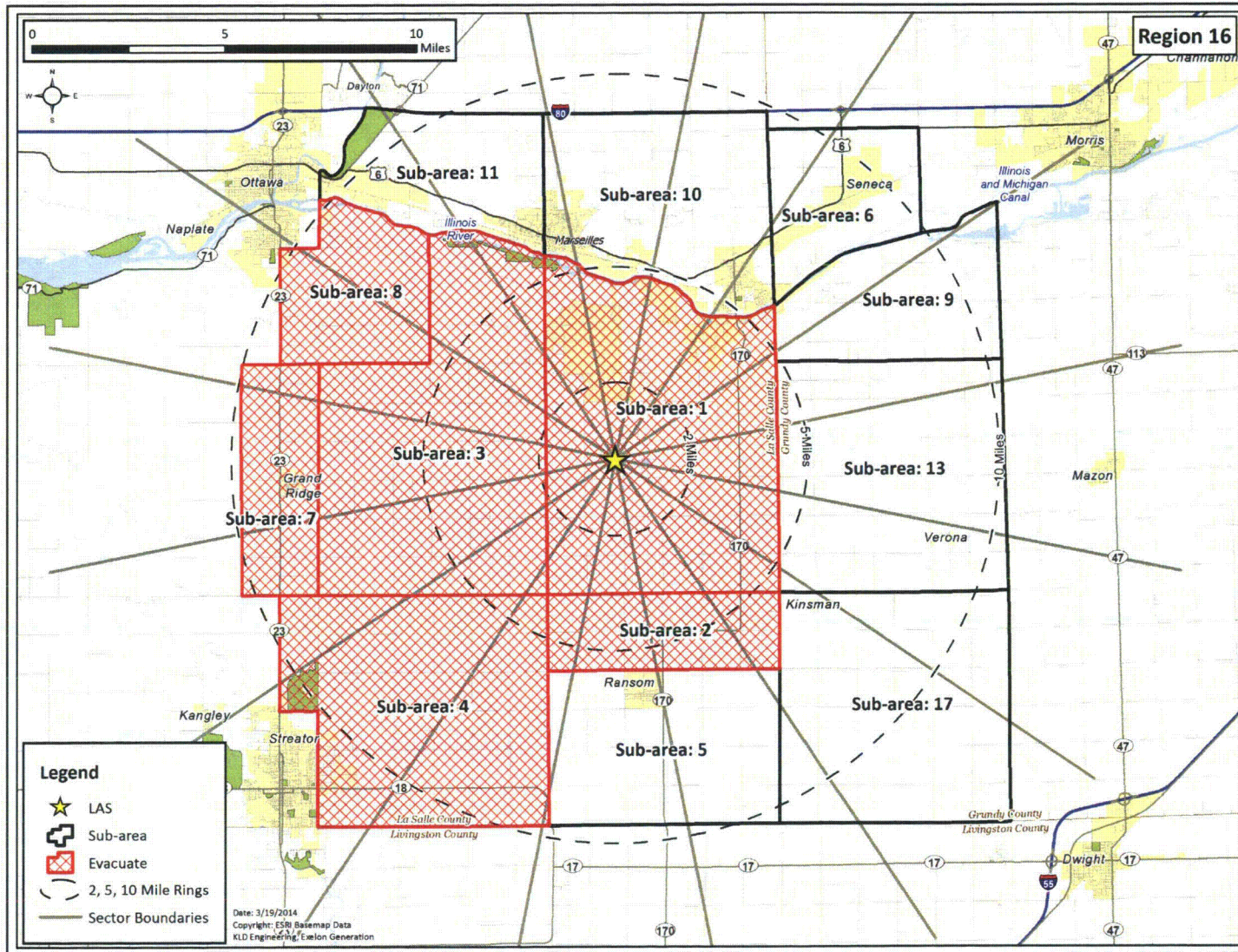


Figure H-16. Region R16

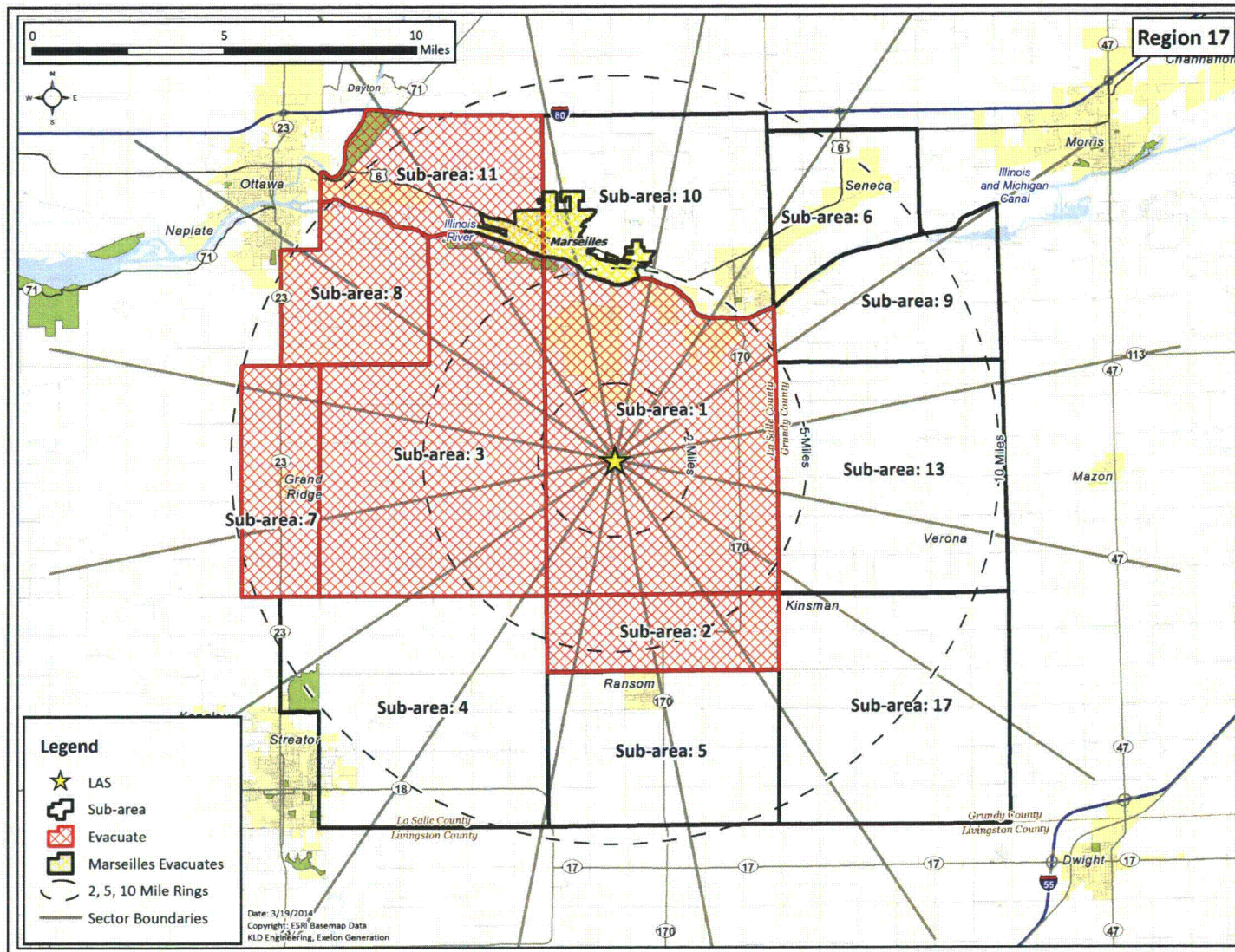


Figure H-17. Region R17

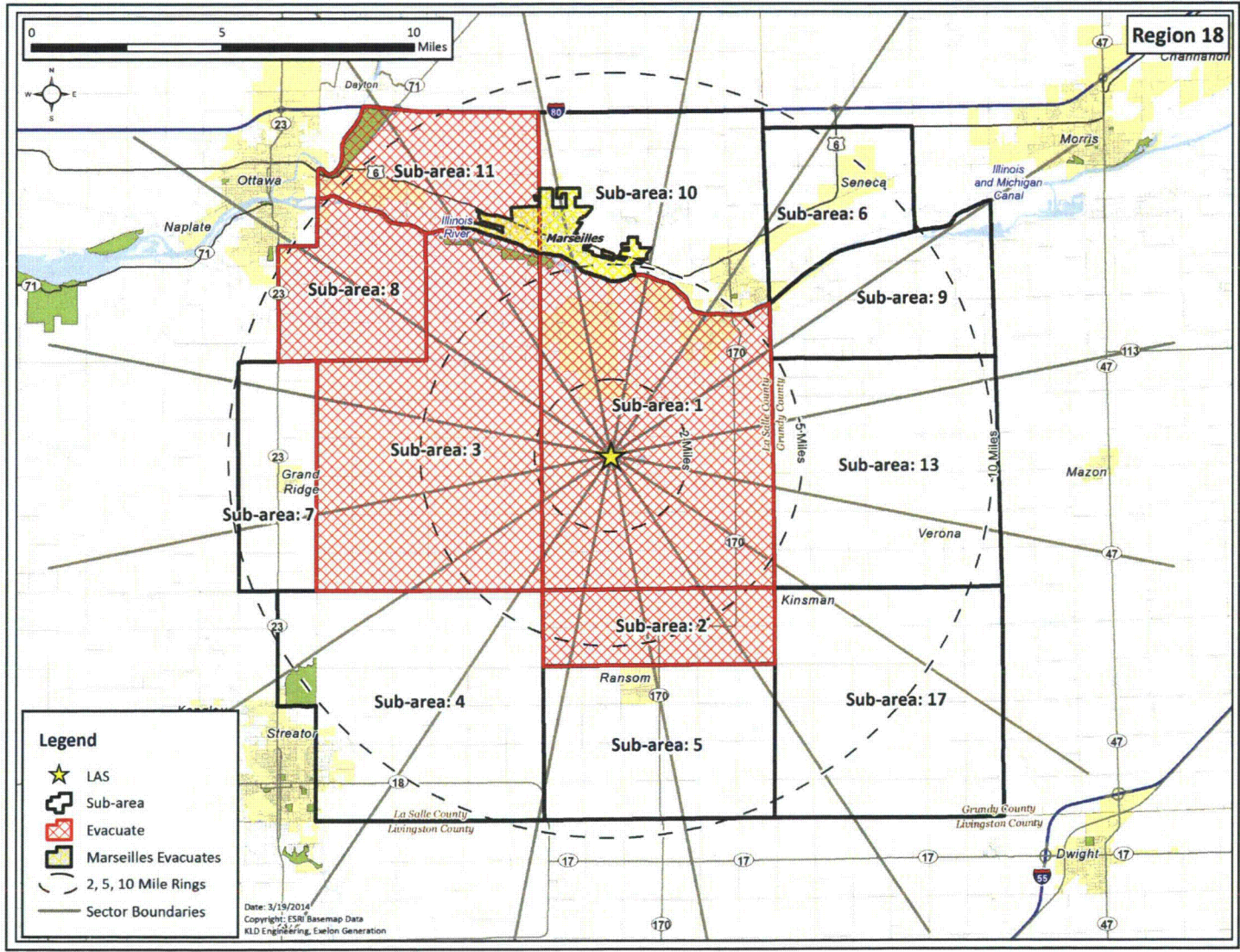


Figure H-18. Region R18



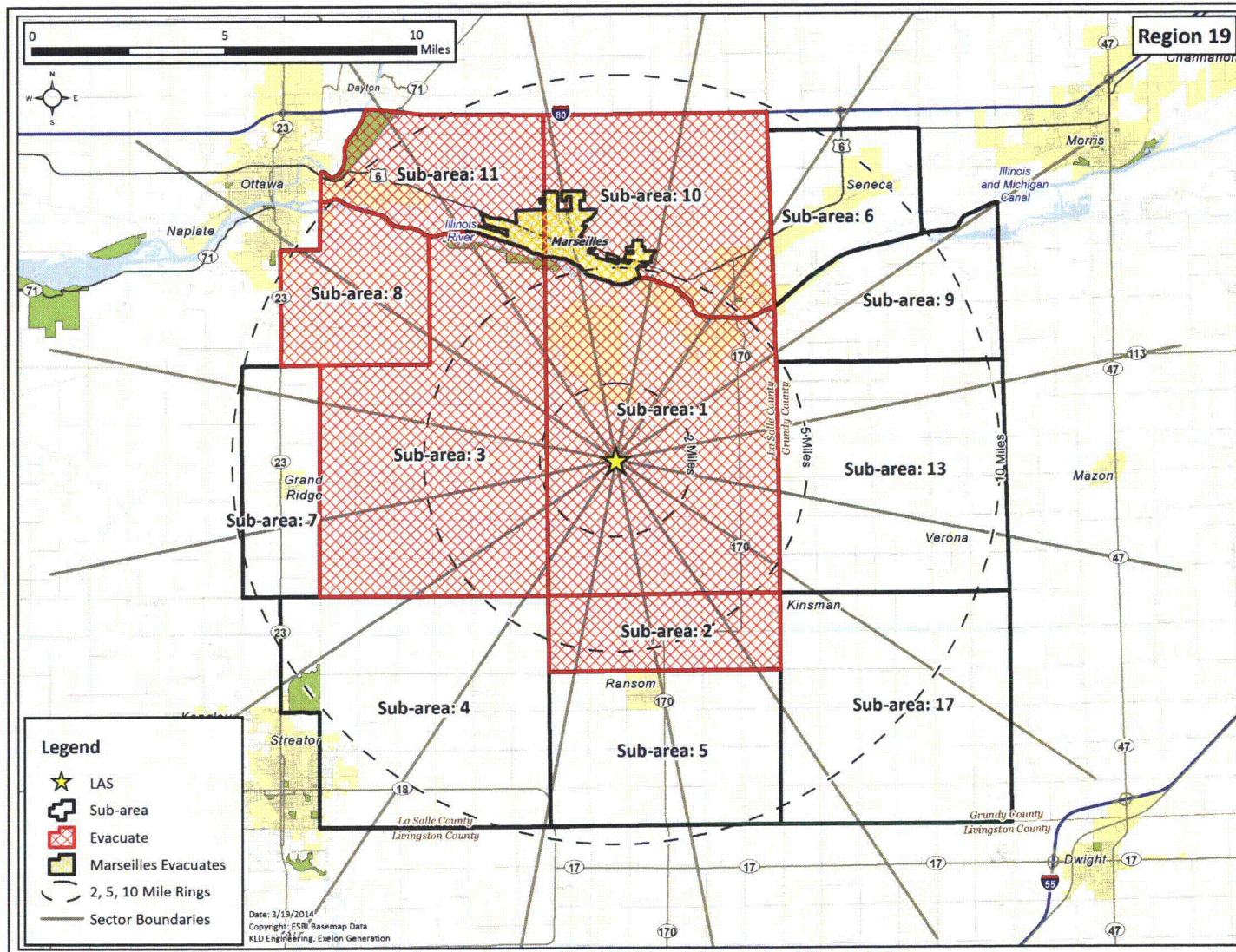


Figure H-19. Region R19



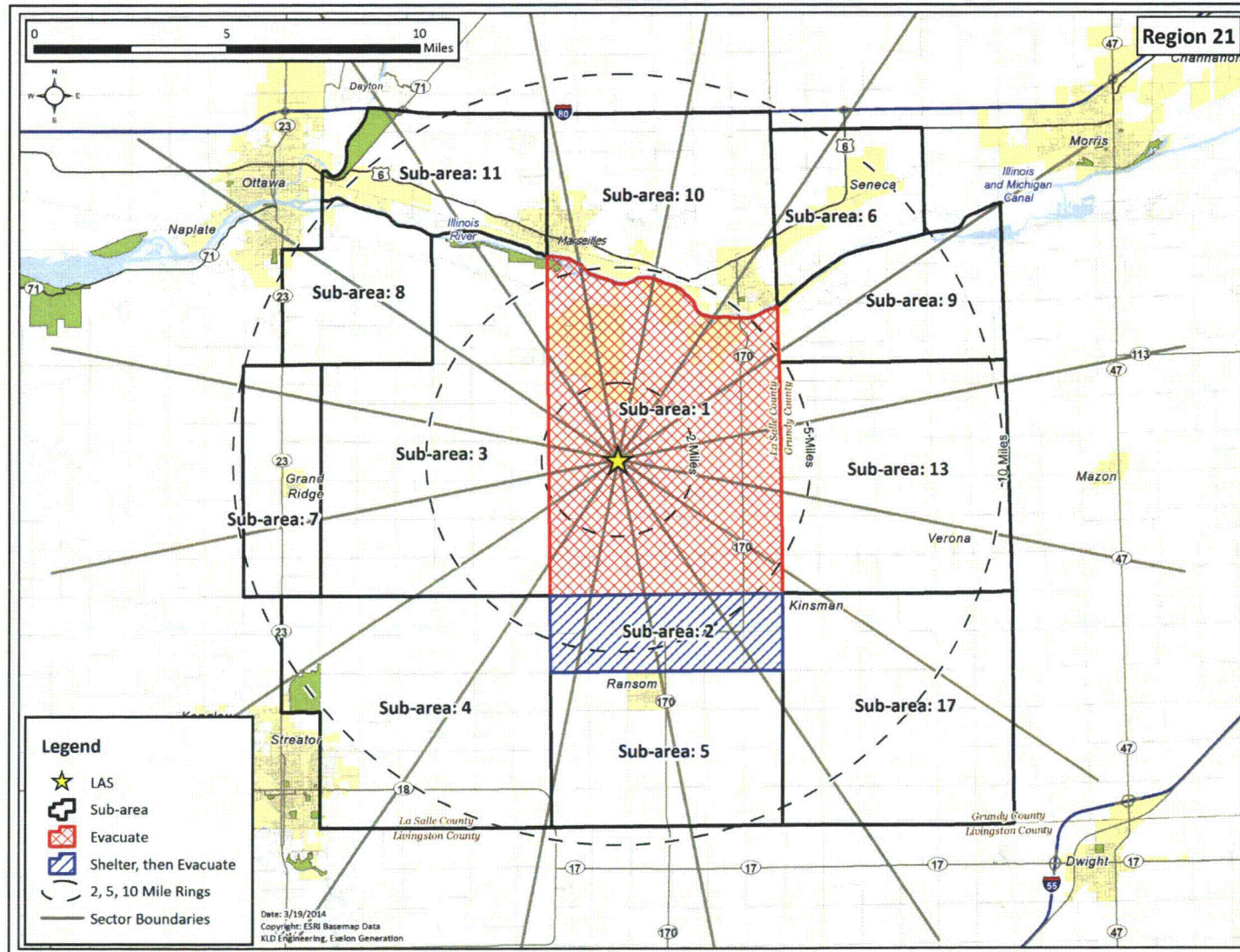


Figure H-21. Region R21

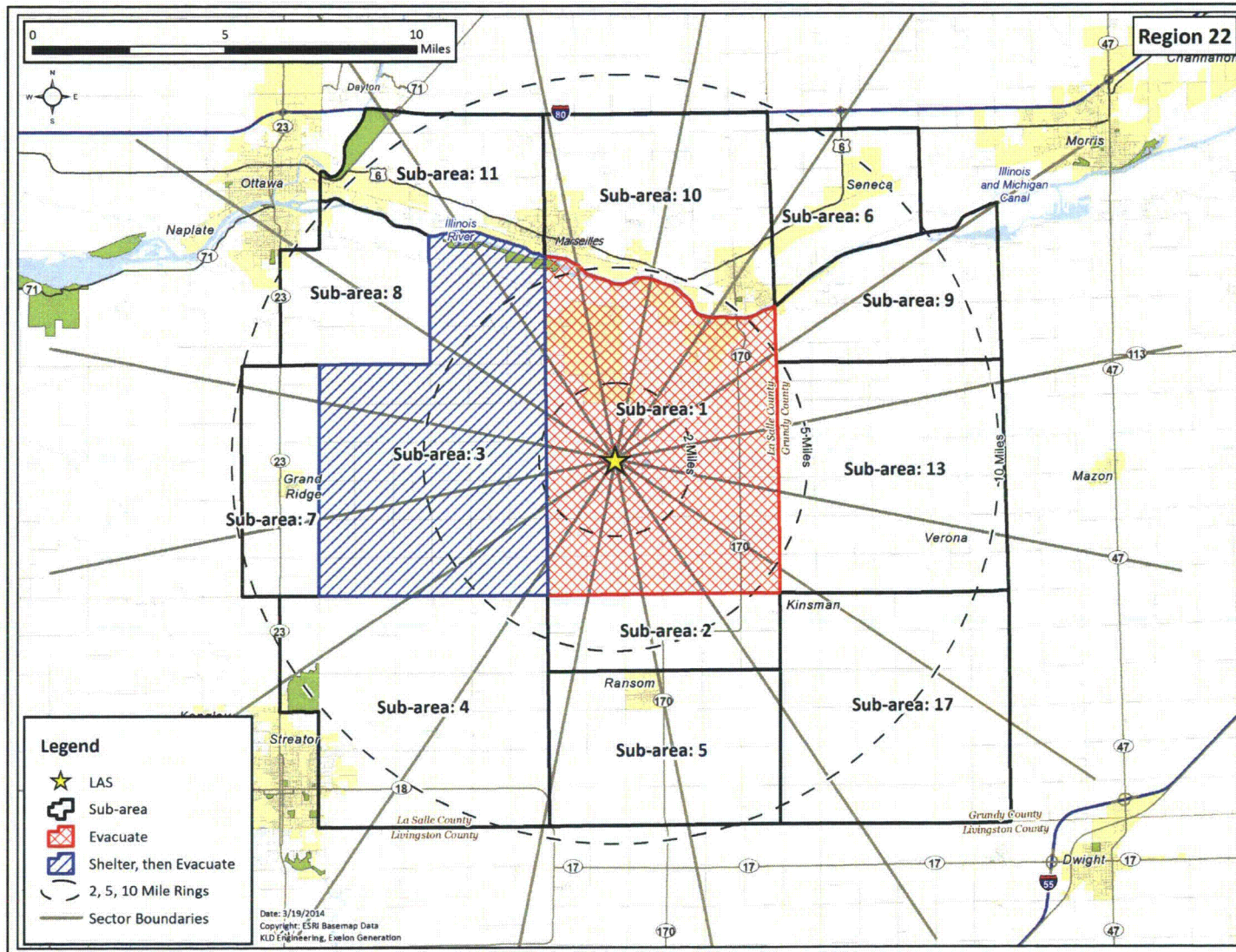


Figure H-22. Region R22