FINAL SAFETY ANALYSIS REPORT

CHAPTER 2

SITE CHARACTERISTICS

2.0 SITE CHARACTERISTICS

{This Chapter of the U.S. EPR FSAR is incorporated by reference with the following departures and/or supplements.

Chapter 2 describes the geological, seismological, hydrological, and meteorological characteristics of the Bell Bend Nuclear Power Plant (BBNPP) site and vicinity. The site characteristics are described in conjunction with present and projected population distribution, land use, and site activities and controls. The BBNPP site characteristics were developed in accordance with the relevant requirements of Title 10 CFR Part 20, Subpart D (CFR, 2007a); Title 10 CFR Part 50 (CFR, 2007b); Title 10 CFR Part 100 (CFR, 2007c); and Regulatory Guide 1.206 (NRC, 2007).}

The U.S. EPR FSAR includes the following COL Item in Section 2.0:

> A COL applicant that references the U.S. EPR design certification will compare the characteristics of its proposed site to the site parameters in Table 2.1-1. If the characteristics of the site fall within the assumed site parameters in Table 2.1-1, then the U.S. EPR standard design is bounding for the site. For site-specific characteristics that are outside the bounds of the assumptions presented in Table 2.1-1, the COL applicant will demonstrate that the U.S. EPR design acceptably meets the regulatory requirements, given the site specific characteristic. In such an instance, the COL applicant will also demonstrate that the design commitments and acceptance criteria described in the FSAR do not need to be changed, or will propose new design commitments or acceptance criteria, or both.

This COL Item is addressed as follows:

{The site-specific characteristics have been reviewed and compared to determine if they are within the bounds of the assumed parameters for a U.S. EPR. This comparison is provided in Table 2.0-2 and Table 2.0-3. For the site-specific characteristics that are outside the bounds of the conservative limiting assumptions presented in Table 2.0-2 and Table 2.0-3, justification of the acceptability of these conditions is provided in the associated section of Chapter 3, Design of Structures, Components, Equipment and Systems or as specified in the table.}

Table 2.0-2— {U.S. EPR Site Design Envelope Comparison}

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	U.S. EPR FSAR Design Parameter Value	BBNPP Site Characteristic Value
	Precipitation	
Rainfall rate	≤19.4 in/hr	17.5 in/hr (44.5 cm/hr) (See Section 2.4.3)
Sum of normal winter precipitation event and extreme frozen winter precipitation event ground load.	≤ 143 psf (note c) (100-year MRI)	67.7 lb/ft^2 (330.6 kg/m^2)
	Seismology	
Horizontal SSE Acceleration	0.3g PGA for EUR and 0.21g PGA for HF (CSDRS shapes – See Section 3.7.)	Exceeds 0.3 g primarily in the high frequency region (note a) (See Sections 2.5.2 and 3.7)
Vertical SSE Acceleration	0.3g PGA for EUR and 0.18g PGA for HF (CSDRS shapes – See Section 3.7.)	Exceeds 0.3 g primarily in the high frequency region (note a) (See Sections 2.5.2 and 3.7)
Fault Displacement Potential	No fault displacement is considered for safety-related SSCs in U.S. EPR design certification.	No fault displacement potential (See Section 2.5.3)
	Soil	
Minimum Static Bearing Capacity	Maximum static bearing demand is 22,000 lbs/ft^2 at the bottom of the Seismic Category I structure basemats. The ultimate static bearing capacity divided by 3.0 is greater than or equal to the maximum static bearing demand.	22 ksf in localized areas of the NI Basemat and 15 ksf on the average across the total area of the bottom of the NI basemat (See section 2.5.4.10)
Minimum Dynamic Bearing Capacity	Maximum dynamic bearing demand is 35,000 lbs/ft^2 at the toe of the Seismic Category I structure basemats. The ultimate dynamic bearing capacity divided by 2.0 is greater than or equal to the maximum dynamic bearing demand.	
Minimum Shear Wave Velocity (Low strain best estimate average value at bottom of basemat)	1000 fps	>1000 fps (See Section 2.5.4)

Table 2.0-2— {U.S. EPR Site Design Envelope Comparison}
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	U.S. EPR FSAR Design Parameter Value	BBNPP Site Characteristic Value
Liquefaction	None	None (See section 2.5.4)
Slope Failure Potential	No slope failure potential is considered in the design of safety-related SSCs for U.S. EPR design certification.	No slope failure potential that would adversely affect the safety of the proposed BBNPP (See Section 2.5.5)
Maximum Settlement (across the basemat)		
1. Differential Settlement	Figure 3.8-124 through Figure 3.8-136	< 0.1 inch in 50 ft for common Basemat in any direction (See Section 2.5.4)
2. Tilt Settlement	1/2 inch in 50 feet in any direction	<0.1 inch in 50 ft in any direction for both EPGB and ESWB (See Section 2.5.4)
Angle of Internal Friction (in situ and backfill)	26.6 degrees (minimum) 30 degrees (maximum)	TBD
Soil Density (γ) (in situ and backfill)	110 lb/ft^3 ≤ γ ≤ 134 lb/ft^3	TBD
Maximum Ground Water	3.3 ft below grade	Groundwater ranges between 12.9 and 19.0 ft (3.9-5.8 m) below grade for all safety-related structures in the power block area. Groundwater ranges between 7.0 and 18.0 ft (2.1-5.5 m) below grade near the ESWEMS Pumphouse. These values are all within design parameters.
Minimum Coefficient of Static Friction for Category I Structures (representative of all interfaces between basemat and soil)	0.5	(See Subsection 2.5.4)
NAB Coefficients of Friction	0.5 ≤ μ ≤ 0.7	TBD
EPGB Coefficient of Side Wall Friction	μ ≥ 0.36	TBD
Inventory of Radionuclides Which Could Potentially Seep Into the Groundwater		
Bounding Values for Component Radionuclide Inventory	See Table 2.0-3	See Table 2.0-3
Flood Level		

Table 2.0-2— {U.S. EPR Site Design Envelope Comparison}
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	U.S. EPR FSAR Design Parameter Value	BBNPP Site Characteristic Value
Maximum Flood (or Tsunami)	1 ft below grade	Approximately 3 ft (0.9 m) below grade except for the pumpwell structure of the ESWEMS Pumphouse which is normally submerged (note a) (See Sections 2.4.1 and 2.4.2, 2.4.10, 3.4.2, 3.4.3.10, 3.8.4.1.11, 3.8.4.3, and 9.2.5)
Wind		
Maximum Speed (Other than Tornado)	145 mph (Based on 3-sec gust at 33 ft above ground level and factored for 50-yr mean recurrence interval.)	90 mph (40.2 m/s) (parameter referred to as Wind Gust in this FSAR) (Based on 3 second gust at 33 feet for 50-year recurrence interval.) (See Section 2.3.1)
Importance Factor	1.15 (Safety-related structures for 100-year mean recurrence interval.)	1.15 (Safety-related structures for 100-year mean recurrence interval.) (See Section 2.3.1)
Tornado		
Maximum Pressure and rate of Drop	1.2 psi at 0.5 psi/sec	1.2 psi (83 mb) at 0.5 psi/sec (34.5 mb/sec) (See Section 2.3.1)
Maximum Rotational Speed	184 mph	184 mph (82 m/s) (See Section 2.3.1)
Maximum Translational Speed	46 mph	46 mph (21 m/s) (See Section 2.3.1)
Maximum Wind Speed	230 mph	230 mph (103 m/s) (See Section 2.3.1)
Radius of Maximum Rotational Speed	150 ft	150 feet (45.7 m) (See Section 2.3.1)
Missile Spectra	6 in Schedule 40 pipe, 6.625 in diameter x 15 ft long, 287 lb, 34.5 in^2 impact area, impact velocity of 135 ft/sec horizontal and 90 ft/sec vertical.	Design values are enveloped. (See Section 3.5)
	Automobile, 16.4 ft x 6.6 ft x 4.3 ft, 4000 lb, 4086.7 in^2 impact area, impact velocity of 135 ft/sec horizontal & 90 ft/sec vertical. (Automobile missile is considered at elevations up to 30.0 ft above grade elevation.)	Design values are enveloped. (See Section 3.5)
	Solid steel sphere, 1 in diameter, 0.147 lb, 0.79 in^2 impact area, impact velocity of 26 ft/sec horizontal & 17 ft/sec Vertical.	Design values are enveloped. (See Section 3.5)

Table 2.0-2— {U.S. EPR Site Design Envelope Comparison}
(Page 4 of 6)

	U.S. EPR FSAR Design Parameter Value			BBNPP Site Characteristic Value
Temperature				
Air	0% Exceedance Values[g]	Maximum	115°F Dry Bulb / 80°F Wet Bulb (mean coincident)	100°F (37.8°C) Dry Bulb /71.7°F (22.1°C) Wet Bulb (coincident) (See Section 9.2.5.3.3)
		Minimum	-40°F	-17.5°F (-27.5°C) (See Section 2.3.1)
	1% Exceedance Values[h]	Maximum	100°F Dry Bulb / 77°F Wet Bulb (mean coincident)	89.1°F (37.7°C) Dry Bulb / 65.1°F (18.4°C) Wet Bulb (coincident)
			80°F Wet Bulb (non-coincident)	75.0°F (23.9°C) (non-coincident)
		Minimum	-10°F	1.0°F (-17.2°C)
Atmospheric Dispersion and Deposition Factors (χ/Q)(D/Q)				
Maximum Annual Average (limiting sector)	≤ 4.973E-6 sec/m^3(χ/Q) ≤ 5.0E-08 m^{-2}(D/Q)			6.718E-06 sec/m^3 (χ/Q) (note b) 2.268E-08 m^{-2}(D/Q) (See Section 2.3.5)
Accident				
0-2 hr (Exclusion Area Boundary, (EAB))	≤ 1E-3 sec/m^3			1.495E-03 sec/m^3(note b) (See Section 2.3.4)
0-2 hr (Low Population Zone (LPZ)	≤ 1.75E-4 sec/m^3			2.766E-04 sec/m^3 (note b) (See Section 2.3.4)
2-8 hr (Low Population Zone (LPZ)	≤ 1.35E-4 sec/m^3			1.648E-04 sec/m^3 (note b) (See Section 2.3.4)
8-24 hr (Low Population Zone (LPZ)	≤ 1.00E-4 sec/m^3			1.038E-04 sec/m^3 (note b) (See Section 2.3.4)
1-4 day (Low Population Zone (LPZ)	≤ 5.40E-5 sec/m^3			5.106E-05 sec/m^3 (See Section 2.3.4)
4-30 day (Low Population Zone (LPZ)	≤ 2.20E-5 sec/m^3			1.845E-05 sec/m^3 (See Section 2.3.4)

Table 2.0-2— {U.S. EPR Site Design Envelope Comparison}

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Main Control Room and Technical Support Center Intake Atmospheric Dispersion Factors for Onsite Accident Dose Analysis (χ/Q) (note e)					
Time Period	**Vent Stack Base**	**Releases via Safeguard Building Canopy**	**Equipment Hatch Releases via Material Lock (note d)**	**Depressurization Shaft Releases (note d)**	**Main Steam Relief Train Silencer**
0–2 hours (s/m^3)	1.93E-03 / 1.41E-03	6.52E-03 / 4.86E-03			4.30E-03 / 2.99E-03
2–8 hours (s/m^3)	1.73E-03 / 1.16E-03	5.68E-03 / 3.88E-03			3.71E-03 / 2.53E-03
8–24 hours (s/m^3)	6.74E-04 / 4.83E-04	2.34E-03 / 1.64E-03			1.46E-03 / 1.03E-03
1–4 days (s/m^3)	5.12E-04 / 3.66E-04	1.63E-03 / 1.20E-03			1.12E-03 / 7.93E-04
4–30 days (s/m^3)	4.72E-04 / 2.86E-04	1.50E-03 / 9.23E-04			1.03E-03 / 6.26E-04
Main Control Room/Technical Support Center Unfiltered Inleakage Atmospheric Dispersion Factors for Onsite Accident DoseAnalysis (χ/Q) (notes e & f)					
Time Period	**Vent Stack Base**	**Releases via Safeguard Building Canopy**	**Equipment Hatch Releases via Material Lock (note d)**	**Depressurization Shaft Releases (note d)**	**Main Steam Relief Train Silencer**
0–2 hours (s/m^3)	4.30E-03 / 4.30E-03	1.67E-02 / 1.67E-02			1.76E-02 / 1.76E-02
2–8 hours (s/m^3)	3.71E-03 / 3.71E-03	1.47E-02 / 1.47E-02			1.48E-02 / 1.48E-02
8–24 hours (s/m^3)	1.46E-03 / 1.46E-03	5.96E-03 / 5.96E-03			5.88E-03 / 5.88E-03
1–4 days (s/m^3)	1.12E-03 / 1.12E-03	4.28E-03 / 4.28E-03			4.55E-03 / 4.55E-03
4–30 days (s/m^3)	1.03E-03 / 1.03E-03	3.89E-03 / 3.89E-03			4.16E-03 / 4.16E-03

Table 2.0-2— {U.S. EPR Site Design Envelope Comparison}
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Notes:
a. Value is a departure from a design parameter and is listed in Part 7 of the COL Application. Justification is provided in Chapter 3.
b. Value is a departure from a design parameter and is listed in Part 7 of the COL Application. Justification is provided in Part 7 of the COL Application.
c. The effect of the extreme liquid winter precipitation event on roof loads is negligible due to the lack of parapets.
d. The atmospheric dispersion parameters for the equipment hatch and depressurization shaft releases are bounded by the parameters for the release via the Safeguards Building canopy.
e. First value for U.S. EPR/second value for BBNPP
f. The same meterological data are used to calculate unfiltered χ/Q values. Since the site-specific control room χ/Q values were demonstrated to be bounded by the U.S. EPR χ/Q values, the calculation of site-specific atmospheric dispersion factors for unfiltered inleakage was not necessary. BBNPP incorporates by reference the doses for the main control room presented in the U.S. EPR FSAR.
g. By definition, zero percent exceedance temperature values exclude peaks of temperatures less than two hours in duration. The zero percent exceedance temperature values are based on conservative estimates of 100-year return period values and historic extreme values, whichever is bounding.
h. For maximum values, data from the summer months of June, July, and August are used. For minimum values, data from the winter months of December, January, and February are used.

Table 2.0-3— {Comparison of Inventory of Radionuclides Which Could Potentially Seep Into the Groundwater}

(Page 1 of 2)

	U.S. EPR FSAR Design Parameter Value	BBNPP Site Characteristic Value (See Section 2.4.13)
Nuclide	**Activity (Ci/g)**	**Activity (Ci/g)**
Br-83	3.2E-02	3.2E-02
Br-84	1.7E-02	1.7E-02
Br-85	2.0E-03	2.0E-03
I-129	4.6E-08	4.6E-08
I-130	5.0E-02	5.0E-02
I-131	7.4E-01	7.4E-01
I-132	3.7E-01	3.7E-01
I-133	1.3E+00	1.3E+00
I-134	2.4E-01	2.4E-01
I-135	7.9E-01	7.9E-01
Cs-134	1.7E-01	1.7E-01
Cs-136	5.3E-02	5.3E-02
Cs-137	1.1E-01	1.1E-01
Cs-138	2.2E-01	2.2E-01
Cr-51	2.0E-03	2.0E-03
Mn-54	1.0E-03	1.0E-03
Fe-55	7.6E-04	7.6E-04
Fe-59	1.9E-04	1.9E-04
Co-58	2.9E-03	2.9E-03
Co-60	3.4E-04	3.4E-04
Na-24	3.7E-02	3.7E-02
Zn-65	3.2E-04	3.2E-04
W-187	1.8E-03	1.8E-03
Rb-88	1.0E+00	1.0E+00
Rb-89	4.7E-02	4.7E-02
Sr-89	6.3E-04	6.3E-04
Sr-90	3.3E-05	3.3E-05
Sr-91	1.0E-03	1.0E-03
Sr-92	1.7E-04	1.7E-04
Y-90	7.7E-06	7.7E-06
Y-91m	5.2E-04	5.2E-04
Y-91	8.1E-05	8.1E-05
Y-92	1.4E-04	1.4E-04
Y-93	6.5E-05	6.5E-05
Zr-95	9.3E-05	9.3E-05
Nb-95	9.3E-05	9.3E-05

Table 2.0-3— {Comparison of Inventory of Radionuclides Which Could Potentially Seep Into the Groundwater}

(Page 2 of 2)

	U.S. EPR FSAR Design Parameter Value	BBNPP Site Characteristic Value (See Section 2.4.13)
Mo-99	1.1E-01	1.1E-01
Tc-99m	4.6E-02	4.6E-02
Ru-103	7.7E-05	7.7E-05
Ru-106	2.7E-05	2.7E-05
Rh-103m	6.8E-05	6.8E-05
Rh-106	2.7E-05	2.7E-05
Ag-110m	2.0E-07	2.0E-07
Te-127m	4.4E-04	4.4E-04
Te-129m	1.5E-03	1.5E-03
Te-129	2.4E-03	2.4E-03
Te-131m	3.7E-03	3.7E-03
Te-131	2.6E-03	2.6E-03
Te-132	4.1E-02	4.1E-02
Te-134	6.7E-03	6.7E-03
Ba-137m	1.0E-01	1.0E-01
Ba-140	6.2E-04	6.2E-04
La-140	1.6E-04	1.6E-04
Ce-141	8.9E-05	8.9E-05
Ce-143	7.6E-05	7.6E-05
Ce-144	6.9E-05	6.9E-05
Pr-143	8.8E-05	8.8E-05
Pr-144	6.9E-05	6.9E-05
Np-239	8.7E-04	8.7E-04
H3	1.0E+00	1.0E+00

2.1 GEOGRAPHY AND DEMOGRAPHY

This section of the U.S. EPR FSAR is incorporated by reference with the following supplements.

The U.S. EPR FSAR includes the following COL Item in Section 2.1:

> A COL applicant that references the U.S. EPR design certification will provide site-specific information related to site location and description, exclusion area authority and control, and population distribution.

This COL Item is addressed as follows:

{Site specific information related to site location and description is addressed in Section 2.1.1. Exclusion area authority and control is addressed in Section 2.1.2, and population distribution is addressed in Section 2.1.3.}

2.1.1 Site Location and Description

{Section 2.1.1.1 through Section 2.1.1.3 are added as a supplement to the U. S. EPR FSAR.

2.1.1.1 Specification of Location

A site area map for the BBNPP site is provided in Figure 2.1-1. The coordinates of the center of the containment building for BBNPP are provided in Table 2.1-1 for both the Geodetic Latitude/Longitude and the Universal Transverse Mercator (UTM) coordinate systems.

Figure 2.1-2 and Figure 2.1-3 depict the BBNPP site and the surrounding area within 50 miles (80 km) and 10 miles (16 km), respectively. The BBNPP site occupies 975 ac (395 ha). No commercial, industrial, institutional, or recreational structures are located within the BBNPP site. There are several residential structures located within the BBNPP site that are owned by PPL and will be vacated prior to plant operation.

The BBNPP site is located in Salem Township in western Luzerne County, Pennsylvania and approximately 3 mi (4.8 km) east of Columbia County, Pennsylvania. The BBNPP site is on the west bank of the Susquehanna River. The prominent natural features of the BBNPP site region are two state parks (Nescopeck and Ricketts Glen State Parks), a county park (Moon Lake Park), and several mountains including, the Nescopeck and Hess Mountains on the eastern side of the river and Lee, Huntington, Penobscot, and Shickshinny Mountains to the north of the site. The Susquehanna River, another natural feature, is approximately 1,000 to 1,600 feet (300 to 500 meters) across and too shallow for navigation other than for small recreational watercraft; no ports are located along the river in the vicinity of the BBNPP site.

Luzerne County includes many incorporated cities and boroughs, including Hazelton, Nanticoke, Nescopeck, Shickshinny, West Hazelton, and Wilkes-Barre. Columbia County also has many incorporated cities, towns, and boroughs, including Berwick and Bloomsburg. Berwick, Nescopeck, and Shickshinny are located within 10 miles (16 km) of the BBNPP site. The Luzerne County seat, Wilkes-Barre, PA, is approximately 20 miles (32 km) northeast of the site. The Columbia County seat, Bloomsburg, PA, is approximately 16 miles (26 km) west of the site.

U.S. Route 11 is the closest main road to the BBNPP site and runs south and then east of the site. Pennsylvania State Routes 93 and 239 are located south of the site and I-80 and I-81 are located south and east of the site, respectively. Route 11 provides the main access to the site via North Market Street, Confers Lane, and Beach Grove Road. Two railroads are located within

the vicinity of the site. The North Shore Railroad, which only makes deliveries to Susquehanna Steam Electric Station (SSES), follows the west bank of the Susquehanna River and has a spur that serves the SSES site. The other railroad, the Canadian Pacific, is located on the east bank of the Susquehanna River.

A Pennsylvania National Guard facility is located approximately 4 mi (6.4 km) southwest of the site in the borough of Berwick. The other closest military facilities are the Tobyhanna Army Depot, located about 38 mi (61 km) to the east, and Fort Indiantown Gap, located about 50 mi (80.5 km) to the southwest. Several industrial facilities are located within the vicinity of the BBNPP site, including the SSES Units 1 and 2 (immediately east of the site), Deluxe Building Systems (southwest of the site), Leggett and Platt, (north-northwest of the site), Heller's Gas and Custom Made Fireplaces (southeast of the site), Western International Distribution Center (south-southeast of the site), two industrial parks on the east and south sides of Berwick, and UGIES Hunlock Air Propane Plant (northeast of the site). These industrial facilities and parks are depicted on Figure 2.1-3.

The metropolitan centers closest to the BBNPP site are Wilkes-Barre, PA, approximately 20 mi (32 km) to the northeast; Scranton, PA, approximately 35 mi (56 km) to the northeast; Allentown, PA, approximately 50 mi (80 km) to the southeast; Harrisburg, PA, approximately 70 mi (113 km) to the west-southwest; Philadelphia, PA, approximately 95 mi (153 km) to the southeast; and New York City, NY, approximately 120 mi (193 km) to the east-southeast Figure 2.1-2 provides the location of the closest cities and towns.

2.1.1.2 Site Area Map

A site area map for the BBNPP site is provided in Figure 2.1-1. This map shows the following attributes:

- Plant property lines. The plant property area is 975 ac (395 ha).
- Exclusion Area Boundary (EAB). Figure 2.1-4 provides an enlarged site area map that provides a scaled plot plan of the exclusion area in 22 ½ degree segments centered on the 16 cardinal compass points.
- Location and orientation of principal plant structures within the site area. Figure 2.1-5 shows an enlarged view of BBNPP.
- Location of BBNPP, which is the only industrial structure on the site. There are several residential structures located within the BBNPP site that are owned by PPL and will be vacated prior to plant operation. Besides BBNPP and the several residential structures, no commercial, industrial, institutional, or recreational structures are located within the BBNPP site.
- True North and Plant North.
- Highways, railways, and waterways that traverse or are adjacent to the site.
- Prominent natural and man-made features in the site area.

2.1.1.3 Boundary for Establishing Effluent Release Limits

The exclusion area boundary (EAB) for BBNPP is a circle with a radius of 2,272 ft (692 m) or approximately 0.43 mi (0.69 km) measured from the centerpoint of the Reactor Containment Building, except on the west side where the minimum distance has been calculated to be 0.33

mi (0.53 km), as depicted on Figure 2.1-4. In accordance with 10 CFR 50.34(a)(1)(ii)(D)(1), an individual assumed to be located at any point on the EAB will not receive a radiation dose in excess of 25 rem TEDE over any two hour period following a postulated fission product release into the containment (CFR, 2007b). The EAB is established in accordance with 10 CFR 100.21(a) and 10 CFR 100.3 (CFR, 2007c).}

This area will be conspicuously posted and administrative procedures, including security patrols will be imposed to control access to the area. Section 2.1.2.1 provides additional discussion regarding the control of access to the EAB.

2.1.2 Exclusion Area Authority and Control

Section 2.1.2.1 through Section 2.1.2.4 are added as a supplement to the U. S. EPR FSAR.

2.1.2.1 Authority

The BBNPP site is approximately 975 ac (395 ha) and is comprised of multiple parcels ranging in size from 1 acre (0.4 hectares) to 228 acres (92 hectares) that are or were originally owned by either PPL Susquehanna, LLC, other entities of PPL Corporation, or private land owners.

PPL Susquehanna, LLC, a subsidiary of PPL Generation, LLC owns 90% of the existing SSES Units 1 and 2. Allegheny Electric Cooperative owns 10%. PPL Bell Bend, LLC, owns the BBNPP project. PPL Bell Bend, LLC and PPL Susquehanna, LLC, for their respective parceled areas within the BBNPP EAB, possess the authority to determine all activities including the exclusion and removal of personnel and property. PPL Bell Bend, LLC, and PPL Susquehanna, LLC, for their respective parceled area within the BBNPP EAB, will exercise dominion and control in the event of an emergency to afford protection of public health and safety. Control of access to the BBNPP EAB within the site boundary is provided by posting the boundary and performing security patrols.

2.1.2.2 Control of Activities Unrelated to Plant Operations

No activities unrelated to plant operation are planned within the BBNPP EAB. All residences located within the BBNPP EAB will be vacated prior to plant operation.

2.1.2.3 Arrangements for Traffic Control

North Market Street, Beach Grove Road, Stone Church Road and Thomas Road traverse the BBNPP EAB. U.S. Route 11 provides direct access to both the SSES Units 1 and 2 and the BBNPP site. Confers Lane travels between BBNPP and SSES and provides access to Beach Grove Road from U.S. Route 11 to the south. PPL Bell Bend, LLC will make arrangements with Salem Township and with the Pennsylvania State Police for control of traffic on North Market Street, Beach Grove Road, Stone Church Road and Thomas Road in the event of an emergency. The Pennsylvania Emergency Management Agency and Salem Township will incorporate traffic control provisions in their emergency procedures.

2.1.2.4 Abandonment or Relocation of Roads

There are no public roads traversing the BBNPP EAB that will have to be abandoned or relocated because of their location. Current site plans contemplate the abandonment and removal of the portion of Confers Lane that traverses the BBNPP site.

2.1.3 Population Distribution

The resident and transient population surrounding the site, up to a 50 mi (80 km) radius, was estimated based on the two most recent U.S. Census Bureau decennial census data (1990 and

2000) (USCB, 2000a), transient population information detailed in Section 2.1.3.3 and additional county population projections for 2010, 2020, and 2030 obtained from the Pennsylvania State Data Center which used a cohort-component demographic projection model (PA Census, 2008a; PA Census, 2008b). Quadratic or linear equations were fit to trend lines for the years 1990, 2000, 2010, 2020, and 2030 for Pennsylvania counties to calculate resident and transient population projections for each county at decadal intervals for the period 2040 through 2080. The resident population distribution for counties were projected within SECPOP 2000 population rosette and tables (NRC, 2003) in 10 concentric bands at 0 to 1 mi (0 to 1.6 km), 1 to 2 mi (1.6 to 3.2 km), 2 to 3 mi (3.2 to 4.8 km), 3 to 4 mi (4.8 to 6.4 km), 4 to 5 mi (6.4 to 8.0 km), 5 to 10 mi (8.0 to 16 km), 10 to 20 mi (16 to 32 km), 20 to 30 mi (32 to 48 km), 30 to 40 mi (48 to 64 km), and 40 to 50 mi (64 to 80 km) from the site, and 16 directional sectors, each direction consisting of 22 ½ degrees. In addition, the same population information was generated for the year of initial plant operation, and the end of the initial license period. This information is used for comparison against NRC population density criteria. It is projected that initial plant operation will occur in 2018. The license would expire 40 years after initial operation. For the purposes of this evaluation, the year 2058 is the expiration of the plant license. These populations are included with the decade populations that follow and are addressed in detail in Section 2.1.3.6.

Section 2.1.3.1 through Section 2.1.3.6 are added as a supplement to the U. S. EPR FSAR.

2.1.3.1 Population Within 10 mi (16 km)

Figure 2.1-6 shows places of significant population grouping, such as cities and towns, and other features within 10 mi (16 km) of the site. The map includes concentric circles drawn with the BBNPPP site at the center point, at distances of 1, 2, 3, 4, 5, and 10 mi (1.6, 3.2, 4.8, 6.4, 8.0, and 16 km). The map is divided into 22 ½ degree segments with each segment centered on one of the 16 compass points. According to data in the U.S. Census Bureau 2000 decennial census data (USCB, 2000a), Berwick is the largest community with a population of 10,744. Other major towns within the 10 mi (16 km) radius include Conyngham (population of 1,958), East Berwick (population of 1,998), Glen Lyon (population of 1,881), Mifflinville (population of 1,213), Nescopek (population of 1,528), and Shickshinny (population of 959).

The resident population distribution within 10 mi (16 km) of the BBNPP site was computed using SECPOP 2000 which overlays the 2000 census block point data (the smallest unit of census data) on the grid of concentric circles and 16 directional sectors (NRC, 2003). Radii for concentric circles are defined by the user prior to SECPOP 2000 computations. SECPOP calculation results can be displayed, printed, or saved as a rosette, a table, a MACCS2 (MELCOR Accident Consequence Code System) site file, or a MACCS2 like comma separated variable file.

The transient distribution within 10 mi (16 km) of the BBNPP site was computed as described in Section 2.1.3.3.

The population projections within the 10 mi (16 km) of the BBNPP site were obtained for 2010, 2020, and 2030 (PA Census, 2008a; PA Census, 2008b) to plot resident and transient population trend lines for counties. Quadratic or linear equations were fit to trend lines to calculate population projections for each county at decadal intervals. Population projections were entered into the population multiplier in SECPOP 2000 for decadal years 2010 through 2080. Population multipliers in SECPOP 2000 are applied to the census block point data to project resident populations within each sector of the SECPOP 2000 rosette. The overall trend for the period 2000 to 2080 is for an increase in resident population. Demographic

characteristics for the resident and transient populations in the years beyond 2000 are assumed to reflect the ratios found in the year 2000.

The sum of resident and transient population distributions and related information were calculated for all distances and in all sixteen directions and presented in Figure 2.1-7 through Figure 2.1-15 for the year 2000, and projected populations (by decade) through the year 2080. The figures include a tabulation of the total population for each concentric ring and the cumulative population from 0 to 10 mi (16 km). Each figure was developed using ESRI Arc GIS Version 9.2, and for each time interval the grid sectors were populated with the sum of resident population data generated from SECPOP 2000 and transient population information presented in Section 2.1.3.3.1 (ESRI, 2009; NRC, 2003). Figure 2.1-16 and Figure 2.1-17 show population projections for the year of initial operation and the year of initial license expiration. Each figure shows population by direction and radius, and has been provided in lieu of tabulation. It is required that projected changes in population growth "within about 5 years" after initial site approval be evaluated. Initial site approval would occur in the 2012 time frame. Plant construction is scheduled to begin in 2012. Therefore, the 2010 decade population and the 2018 population for initial operation are suitable for this evaluation.

Resident, transient and total populations within the 10 mi (16 km) radius are presented for the years 2000 to 2080, including the years of initial operation and initial license expiration in Table 2.1-2. Resident populations for Columbia, Luzerne, and Schuylkill counties are presented in Table 2.1-3.

2.1.3.2 Population Between 10 and 50 mi (16 and 80 km)

The 50 mi (80 km) radius centered at the BBNPP site includes all or parts of 22 Pennsylvania counties (Berks, Bradford, Carbon, Columbia, Dauphin, Lackawanna, Lebanon, Lehigh, Luzerne, Lycoming, Monroe, Montour, Northampton, Northumberland, Pike, Schuylkill, Snyder, Sullivan, Susquehanna, Union, Wayne, and Wyoming). Figure 2.1-18 identifies significant population groupings, such as cities and towns within the 50 mi (80 km) radius. Concentric rings are drawn at 10 mi (16 km) increments between 10 and 50 mi (16 and 80 km) using the BBNPP as the center point. Radii divided the rings into 22 ½ degree segments centered on one of the 16 compass points. Census data for the years 1990 and 2000 along with transient population information were used, as well as population projections for the years 2010, 2020, and 2030, to compute total population between 10 and 50 mi (16 and 80 km) (UCSB, 2000a; USCB, 2005). The same methodology was used to develop the 10 mi (16 km) population grid. The population grid from 10 and 50 mi (16 to 80 km) is illustrated on Figure 2.1-18.

The 50 mi (80 km) decadal population distributions, which include both resident and transient populations, for the years 2000 through 2080 and the years of initial operation and initial license expiration for BBNPP are shown in Figure 2.1-19 through Figure 2.1-29, and have been provided in lieu of tabulation. Resident, transient and total populations for each time period, including the years of initial operation and initial license expiration are summarized in Table 2.1-4. County resident population projections for counties within or intersected by the 50 mi (80 km) radius are summarized in Table 2.1-5.

2.1.3.3 Transient Population

2.1.3.3.1 Transient Population Within 10 Mi (16 km)

The transient population within 10 mi (16 km) of the BBNPP is summarized in Table 2.1-6. Transients within the 10 mi (16 km) radius include commuters (workers of major employers and college students) and visitors. The visitor population incorporates use of motels/hotels, campgrounds, recreational, seasonal and occasional housing and additional recreational

opportunities such as golf courses, fishing and hunting. Table 2.1-7 lists the major employers and colleges/universities in the area. Table 2.1-8 lists the recreational resources and campgrounds/RV parks within a 10 mi (16 km) radius. Transients were identified by distance and sector within a 10 mi (16 km) radius of the site.

Information on the campsites within the 10 mi (16 km) radius was obtained directly from either the campground, the Luzerne County Visitor's Bureau, or the Pennsylvania Visitor's Network (PVN, 2009). Private campgrounds that accommodate tent and recreational vehicles include: Council Cup Campground, Camp Louise, Hidden Lake Campground, Paradise Campground, Moyers Grove Campground, and Whispering Pines Camping Estates. To estimate the number of transients using Moyers Grove, Hidden Lake, Paradise Campground, and Whispering Pines, the average number of persons per site was estimated to be four, and the average occupancy for each site was assumed to be 47% based on a national survey (Woodall, 2004). Also listed in Table 2.1-8 are estimates of transients based on fishing, hunting and use of golf courses.

The number of motel/hotel rooms was taken from the AAA Tour Book listings (AAA, 2010). Table 2.1-9 identifies motels, hotels and bed and breakfast establishments within a 10 mi (16 km) radius of the site. Each facility was located within a sector based on its address and the proximate distance from the BBNPP site. The number of people occupying motel rooms was calculated using the most recently published 2007 average hotel occupancy for Pennsylvania (61.9%) (PTO, 2007). The number of people per room was assumed to be 1.57 (AHLA, 2009).

Seasonal housing data were taken from the 2000 US Census. LandView©6 software was used to determine the number of housing units for each concentric circle for the 0-50 mi (0-80 km) radii based on block data (USCB 2009a; USCB 2000b). For each radius, the number of housing units was then multiplied by the percentage of total housing units in the corresponding block classified as recreation, seasonal, or occasional. The number of seasonal housing units was then multiplied by the PA state average household size (2.48 persons) to calculate the maximum seasonal population. It was assumed that only three quarters of the seasonal housing units would be occupied for three months of the year.

To estimate the transient housing population by sector and distance within the 50 mi (80 km) area, it was assumed that transient housing would be distributed in proportion to the resident population. The resident population for each sector and distance within the 50 mi (80 km) area was estimated by SECPOP2000 (NRC, 2003) for the 2000 U.S. Census.

In order to avoid double counting individuals that are likely to have been captured as residents within the 10 mi (16 km) region, the transient estimate does not include populations at: primary and secondary schools, hospitals (other than as a major employer), nursing homes (other than as a major employer), prisons (other than as a major employer) or other institutions. In contrast, it is assumed that all populations associated with seasonal housing, motels/hotels and campgrounds are transient and come from outside the 10 mi (16 km) area even if certain portions of those populations are likely to originate from within the region.

Agricultural workers have also been excluded from the analysis, as the Commonwealth of Pennsylvania does not collect data on migrant or seasonal agricultural workers (USDA, 2007). Additionally, there are currently no significant special events that generate large transient populations within the BBNPP 10 mi (16 km) area.

The transient population within the 10 mi (16 km) radius is estimated to be 3,599 individuals. Transients were identified by distance and sector within a 10 mi (16 km) radius of the site. This estimate will fluctuate during the summer, and reaches the maximum number during the recreational camping period from April to October.

2.1.3.3.2 Transient Population Between 10 and 50 mi (16 and 80 km)

Transient populations within 10 mi (16 km) increments out to 50 mi (80 km) from the BBNPP site are shown in Table 2.1-10. Transient estimates within the 10-50 mi radii include seasonal housing, motels/hotels, and campgrounds. The methods used to calculate transient populations associated with seasonal housing and lodging establishments are discussed in Section 2.1.3.3.1 for the 0-10 mi (16 km) area.

Within the 10-50 mi (16-80 km) area, the campground and RV park transient population was estimated by compiling listings of campground and RV parks from PA counties within 50 mi (80 km) of the BBNPP site (PVN, 2009). Each site listing a website was reviewed for information on the maximum number of camping, cabin, and RV sites within each campground and RV park. To estimate the maximum transient population associated with campgrounds and RV sites, the average number of persons per site was assumed to be four, and the average occupancy for each site was assumed to be 47% based on a national survey (Woodall, 2004).

There are an estimated 47,740 transients within the 0-50 mile area, and of these approximately 44,141 occur within the 10-50 mi (16-80 km) radii. With the exception of seasonal housing, transients were identified by distance and sector within the 10-50 mi (16-80 km) radii.

In order to avoid double counting individuals that are likely to have been captured as residents within the 10-50 mi (16-80 km) region, the transient analysis does not include populations at primary and secondary schools; hospitals, nursing homes, prisons and other institutions; workplaces and colleges; or recreational areas and local attractions. In contrast, it is assumed that all populations associated with seasonal housing, motels/hotels and campgrounds are transient and come from outside the 50 mi (80 km) area even if certain portions of those populations are likely to originate from within the region. Additionally, agricultural workers have been excluded from the analysis, as the Commonwealth of Pennsylvania does not collect data on migrant or seasonal agricultural workers.

Significant special events that generate large transient populations in the BBNPP 50 mi (80 km) area for short periods of time include the Poconos Raceway (NASCAR) in Long Pond, PA and the Little League World Series in Williamsport, PA. The Poconos Raceway, which is estimated to attract many visitors on race weekends, has a seating capacity of 76,812. Two NASCAR Sprint Cup races are held at this venue; one in June and another in August (NASCAR, 2009). Williamsport also hosts the Little League World Series. Seating capacity for the Lamade Stadium, where the Series is held, is approximately 40,000; 10,000 seats with additional space for 30,000 spectators on the grass (Little League, 2009). The Little League World Series in Williamsport typically occurs in August.

Although both of these events feature large transient populations, as suggested in NRC Regulatory Guide 4.7 (NRC, 1998), transient populations of short duration should be weighted appropriately to reduce their significance relative to other permanent and transient populations. Therefore, transients associated with these special events have not been included with the other transient groups mentioned above in estimating cumulative total transient populations present in the 10-50 mi (16-80 km) area.

2.1.3.4 Low Population Zone

The Low Population Zone (LPZ) for Bell Bend is a 1.5 mi (2.4 km) radius centered on BBNPP. It is completely contained within the LPZ for SSES Units 1 and 2 which consists of the area within a 3 mi (4.8 km) radius of the SSES Unit 1 (Figure 2.1-30). For conservatism, the BBNPP LPZ will be defined as the entire area of the SSES Units 1 and 2 LPZ. The communities of Beach Haven, East Berwick, Nescopeck, and Wapwallopen lie within the LPZ. There are no nursing homes, hospitals, prisons, or schools operating within the LPZ. The major employer within the LPZ is the PPL Susquehanna, LLC.

The population of residents and transients within the 3 mi (4.8 km) LPZ for each decade from 2000 through 2080, including years 2018 and 2058, the expected years of initial operation and license expiration for BBNPP, respectively, are summarized in Table 2.1-11 (USCB, 2000a).

There is a significant increase in daily transient population at the BBNPP site. Residents in the LPZ would have the highest population at night as resident return from commutes to worksites within Luzerne and surrounding counties (Table 2.1-11)(USCB, 2000b).

In accordance with 10 CFR 50.34(a)(1)(ii)(D)(2), an individual located on the outer radius of the LPZ for the course of the postulated accident (assumed to be 30 days) would not receive a radiation dose in excess of 25 rem TEDE (CFR, 2007b). For SSES Units 1 and 2, the LPZ encompasses an area within 3 mi (4.8 km) radius from a centerpoint between the SSES Units 1 and 2 Reactor Buildings. It has been determined that the BBNPP could achieve the 25 rem TEDE within 1.5 mi (2.4 km). Onsite emergency preparedness personnel have developed an Emergency Planning Zone (EPZ) that extends beyond the BBNPP site boundary and its Emergency Plan establishes evacuation routes both onsite and offsite. Under these plans, emergency preparedness personnel would have ample time to take appropriate protective measures to all affected individuals within and beyond the LPZ.

Facilities and institutions in and beyond the LPZ that may require special consideration when evaluating emergency plans are defined out to a distance of 10 mi (16 km) (KLD, 2008). The 10 mi (16 km) radius includes the LPZ and approximates the SSES Units 1 and 2 EPZ. Hospitals and nursing homes within the EPZ include the Berwick Hospital Center and the Berwick Retirement Village and are detailed in Table 2.1-13. Schools within the EPZ are listed in Table 2.1-14. Susquehanna Riverlands is the only recreational area in the LPZ.

2.1.3.5 Population Center

The nearest population centers that meet the definition contained in 10 CFR 100.3 (distance from the reactor to the nearest boundary of a densely populated center containing more than about 25,000 residents) are Back Mountain, PA located approximately 20 miles (32 km) from BBNPP with a population of 26,690, Wilkes-Barre located approximately 20 miles (32 km) from BBNPP with a population of 43,123, and Scranton, PA located approximately 35 miles (56 km) from BBNPP with a population of 76,415 (USCB, 2000a). All three are located north-east of BBNPP. The distance between Back Mountain, Wilkes-Barre, Scranton, and the BBNPP site is approximately 12.5, 12.5, and 22.7 times the 1.5 mi (2 km) radius of the BBNPP LPZ respectively. Therefore, it meets the requirement that the population center distance be at least one and one-third times the distance from the reactor to the outer boundary of the LPZ as defined in 10 CFR Part 100.21(b) (CFR, 2007a). Transient populations were not used to establish the nearest population center.

The largest population center within the 10 mi (8 km) radial distance from the BBNPP is Berwick, PA. Berwick's population was 10,744 as reported in the 2000 Census Report (USCB, 2000a).

2.1.3.6 Population Density

This section describes populations and resulting population densities (resident and transient combined) in the years of initial operation and at the end of the initial license period (See Figure 2.1-16 and Figure 2.1-17; Figure 2.1-28, Figure 2.1-29 and Figure 2.1-31). For the purposes of this study, it is assumed that initial operation of BBNPP begins in 2018 and the end of operation is upon license expiration which is projected to be 2058, 40 years thereafter.

Additional population data is illustrated for the decades 2000 through 2080 in Figure 2.1-7 through Figure 2.1-15 for the 10 mi (16 km) vicinity and in Figure 2.1-19 through Figure 2.1-27 for the 50 mi (80 km) vicinity.

Table 2.1-15 shows the cumulative population, including transients, in year 2000 within 30 mi (48 km) of the BBNPP site and projected cumulative populations in years 2018, (assumed year of initial operations) the decadal years 2020 through 2080, and 2058 (assumed year for end of initial license period). Table 2.1-15 shows the actual (2000 Census) and projected population density (persons/mi^2) to demonstrate that the population density does not exceed 500 persons/mi^2 (200 persons/km^2) at the time of the projected COL approval and within 5 years thereafter consistent with guidance provided in Regulatory Guide 4.7, Position C.4 (NRC, 1998) and Regulatory Guide 1.206 (NRC, 2007). The population for the startup year (2018) is below a population density of 500 persons/mi^2 (200 persons/km^2) for all radial distances 1, 2, 3, 4, 5, 10, 20, and 30 mi (1.6, 3.2, 4.8, 6.4, 8.0, 16, 32, and 49 km). The highest population density at startup (2018) is projected to be 283 persons/mi^2 (110 persons/km^2) at the 20 mi (32 km) radial distance. The land area calculated at this distance is 1,256 mi^2 (3,253 km^2).

Table 2.1-16 presents the population density at the end of the initial license period (2058). For all radial distances 1,2, 3, 4, 5, 10, 20, and 30 mi (1.6, 3.2, 4.8, 6.4, 8.0, 16, 32, and 49 km), the population is below the 500 persons/mi^2 (200 persons/km^2) density criterion. The highest projected population density in 2080 is 400 persons/mi^2 (154 persons/km^2) at the 20 mi radial distance. The land area at the 20 mi (32 km) radial distance is 1,256 mi^2 (3,253 km^2).

2.1.4 References

{This section is added as a supplement to the U. S. EPR FSAR.

AAA, 2010. American Automobile Association Tour Book for New Jersey and Pennsylvania. AAA Publishing, 1000 AAA Drive, Heathrow, FL 32746-5063.

AHLA, 2009. Lodging Industry Profile, American Hotel and Lodging Association, The Typical Lodging Customer in 2008, D.K. Shifflet & Associates, Ltd. Website: http://www.ahla.com/content.aspx?id=28832. Date accessed: May 11, 2010.

CFR, 2007a. Title 10, Part 100, Code of Federal Regulations, Reactor Site Criteria, 2007.

CFR, 2007b. Title 10, Part 50.34, Code of Federal Regulations, Contents of construction permit and operating license applications; technical information, 2007.

ESRI, 2009. Environmental Systems Research Institute, ArcGIS software version 9.3.1.

KLD, 2008. Susquehanna Steam Electric Station (SSES)/Bell Bend Development of Evacuation Time Estimates, Appendix E, Special Facilities, Revision 2, November 2008.

Little League, 2009. Little League Online, Baseball & Softball, Media, General Information for the 2009 Little League Baseball World Series. Website: http://www.littleleague.org/Assets/forms_pubs/media/WSMediaGuide09.pdf. Date accessed: May 5, 2010.

NASCAR, 2009. NASCAR.COM, Schedule, Tracks, Pocono Raceway. Website: http://www.nascar.com/races/tracks. Date accessed: May 6, 2010.

NRC, 1998. Regulatory Guide 4.7 – General Site Suitability Criteria for Nuclear Power Stations, Revision 2, April 1998.

NRC, 2003. SECPOP2000: Sector Population Land Fraction, and Economic Estimation Program. Sandia National Laboratories. U.S. Nuclear Regulatory Commission, NUREG/CR-62525, Rev 1. Washington, DC.

NRC, 2007. Combined License Applications for Nuclear Power Plants. Regulatory Guide 1.206, Nuclear Regulatory Commission, June, 2007.

PTO, 2007. Pennsylvania Tourism Trends 2007 Review: Pennsylvania Tourism Office. Website: http://pennsylvaniastories.barkleyus.com/dmo/statistics/pa-tourism-trends/index.aspx. Date accessed: May 5, 2010.

PVN, 2009. Pennsylvania Visitors Network, Pennsylvania Campgrounds. Website: http://www.pavisnet.com/cgi-bin/campgroundsdata.cgi. Date accessed: June 1, 2010.

PA Census, 2008a. The Pennsylvania Department of Corrections, Institutions and Inmate Statistics. http://www.cor.state.pa.us/portal/cwp/view.asp?a=376&q=126815&portalNav=|. Date Accessed: April 22, 2009

PA Census, 2008b. The Pennsylvania Department of Corrections, County Jail Data. http://www.cor.state.pa.us/portal/cwp/view.asp?a=376&q=126815&countyNav=|. Date Accessed: April 22, 2009

USCB, 2000a. United States Census Bureau, U.S. Department of Commerce, American FactFinder, Census 2000 Summary File 1 (SF 1) 100-Percent Data, Website: http://factfinder.census.gov. Date Accessed: June 15, 2010.

USCB, 2000b. United States Census Bureau, U.S. Department of Commerce, County-to County Worker Flow Files, Website: http://www.census.gov/population/www/cen2000/commuting.html. Date accessed: June, 2008.

USCB, 2005. United States Census Bureau, U.S. Department of Commerce, Interim Projections of the Total Population, Website: http://www.census.gov/population/projections/SummaryTabA1.xls. Accessed June 16, 2008.

USCB, 2009a. LandView 6: a viewer for the Environmental Protection Agency, U.S. Census Bureau, and U.S. Geological Survey Data and Maps.

USCB, 2009b. US Census Bureau, American FactFinder, Census 2000 Summary File 1 (SF1), Group quarters population by group quarters type (52) – Universe: Population in group quarters. Website: http://factfinder.census.gov/. Date accessed: May 8, 2010.

USDA, 2007. USDA, National Agricultural Statistics Service, 2007 Census of Agriculture – County Data; Table 7. Hired Farm Labor - Workers and Payroll: 2002. Website: http://www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_2_County_Level/ Pennsylvania/st42_2_007_007.pdf. Date accessed May 18, 2010.

Woodall, 2004. RV.net, Press Release, National Survey Indicates RVers and Campers Spend Billions of Dollars, August 30, 2004, Woodall's/ARVC RV Park and Campground Survey, Michigan State University, Woodall Publications Corporation and National Association of RV Parks and Campgrounds (ARVC). Website: http://www.rv.net/output.cfm?ID=866107. Date Accessed: May 8, 2010.

Table 2.1-1— {BBNPP Specific Location of the Center of the Containment Structure}

Latitude/Longitude (NAD 27) (Degrees)	Latitude/Longitude (NAD 83) (Degrees)	UTM, Zone 18N (78W to 72W) (NAD 27) (Meters)	UTM, Zone 18N (78W to 72W) (NAD 83) (Meters)
N 41° 05′ 20.89″	41° 05′ 21.19″	North/South 4,549,095.19	North/South 4,549,316.16
W 76° 09′ 58.59″	76° 09′ 57.34″	East/West 402,043.20	East/West 402,075.08

Table 2.1-2— {Total Population Within 10 mi (16 km) Radius of BBNPP (2000 - 2080}

Year	Resident	Transient	Total
2000	49,787	3,599	53,386
2010	52,142	3,821	55,963
2018	54,680	4,000	58,680
2020	55,296	4,045	59,341
2030	58,272	4,253	62,525
2040	62,925	4,587	67,512
2050	66,377	4,843	71,220
2058	69,292	5,044	74,336
2060	69,956	5,092	75,048
2070	73,578	5,349	78,927
2080	77,332	5,622	82,954

Table 2.1-3— {Resident Population for Counties Within 10mi (16 km) Radius of BBNPP (2000 - 2080)}

Year	County Population		
	Columbia	Luzerne	Schuylkill
2000	64,151	319,250	150,336
2010	64,573	306,900	147,565
2018	66,701	299,358	147,477
2020	67,233	297,473	146,872
2030	69,944	288,847	146,567
2040	73,672	279,743	147,388
2050	78,209	271,440	149,159
2058	82,432	265,154	151,259
2060	83,570	263,632	151,879
2070	89,754	256,319	155,547
2080	96,751	249,502	160,165

Table 2.1-4— {Total Population Within 50 mi (80 km) Radius of BBNPP (2000 - 2080)}

Year	Resident	Transient	Total
2000	1,651,909	47,740	1,699,649
2010	1,729,160	50,104	1,779,264
2018	1,813,611	52,529	1,866,140
2020	1,834,941	53,137	1,888,078
2030	1,933,616	55,910	1,989,526
2040	2,088,545	60,412	2,148,957
2050	2,202,757	63,765	2,266,522
2058	2,298,662	66,485	2,365,147
2060	2,321,416	67,168	2,388,584
2070	2,441,203	67,433	2,508,636
2080	2,566,162	74,206	2,640,368

Table 2.1-5— {Resident Population Census and Projections (2010-2080) for Counties Within 50 mile (80 km) Radius of BBNPP}

County	Year										
	2000	2010	2018	2020	2030	2040	2050	2058	2060	2070	2080
Berks	373,638	412,708	443,994	451,816	493,080	535,110	578,408	622,897	622,897	668,576	715,446
Bradford	62,761	60,763	59,775	59,528	58,864	56,269	53,449	50,035	50,035	46,028	41,428
Carbon	58,802	63,311	66,325	67,079	69,340	72,990	76,251	79,493	79,493	82,716	85,921
Columbia	64,151	64,573	66,701	67,233	69,944	73,672	78,209	83,570	83,570	89,754	96,761
Dauphin	251,798	256,478	261,854	263,198	270,543	273,403	275,469	275,929	275,929	274,783	272,032
Lackawanna	213,295	205,061	200,906	199,867	195,388	191,130	187,888	185,459	185,459	183,842	183,037
Lebanon	120,327	122,619	125,641	126,397	131,470	134,601	137,986	141,152	141,152	144,099	146,827
Lehigh	312,090	318,365	328,837	331,455	350,262	363,206	378,223	393,599	393,599	409,334	425,427
Luzerne	319,250	306,900	299,358	297,473	288,847	279,743	271,440	263,632	263,632	256,319	249,502
Lycoming	120,044	116,071	113,961	113,434	110,322	104,923	98,806	91,610	91,610	83,335	73,980
Monroe	138,687	173,612	201,635	208,641	240,385	268,017	292,765	314,319	314,319	332,679	347,843
Montour	18,236	17,299	17,074	17,018	17,080	16,604	16,240	15,845	15,845	15,418	14,959
Northampton	267,066	288,886	308,917	313,925	338,632	366,453	395,801	426,964	426,964	459,942	494,737
Northumberland	94,556	93,363	93,169	93,121	92,481	93,104	94,153	95,788	95,788	98,008	100,815
Pike	46,302	63,739	77,561	81,017	94,707	108,479	120,573	131,317	131,317	140,711	148,755
Schuylkill	150,336	147,227	146,943	146,872	146,567	147,388	149,159	151,879	151,879	155,547	160,165
Snyder	37,546	38,358	38,984	39,140	39,068	39,116	38,800	38,212	38,212	37,352	36,219
Sullivan	6,556	6,352	6,334	6,330	6,303	5,993	5,622	5,140	5,140	4,548	3,844
Susquehanna	42,238	48,625	59,202	61,846	77,835	128,036	160,626	198,229	198,229	240,847	288,478
Union	41,624	46,497	49,439	50,174	52,471	53,981	54,346	53,640	53,640	51,862	49,014
Wayne	47,722	52,604	59,146	60,781	67,349	74,478	81,703	89,052	89,052	96,527	104,126
Wyoming	28,080	26,919	24,644	24,075	20,631	19,888	17,999	16,109	16,109	14,220	12,330
Total	2,815,105	2,930,330	3,050,402	3,080,420	3,231,569	3,406,584	3,563,916	3,723,870	3,723,870	3,886,446	4,051,645

Table 2.1-6— {Summary of Transient Populations within 10 mi (16 km) of the BBNPP Site, by Sector and Distance}

Sector/Type of Population	Population by Radii/Distance mi (km)						
	0 to 1 mi (0 to 2 km)	1 to 2 mi (2 to 3 km)	2 to 3 mi (3 to 5 km)	3 to 4 mi (5 to 6 km)	4 to 5 mi (6 to 8 km)	5 to 10 mi (8 to 16 km)	0 to 10 mi (0 to16 km)
N Total	0	16	0	1	1	256	274
NNE Total	0	0	0	4	1	18	23
NE Total	0	2	0	1	1	170	174
ENE Total	0	159	0	276	1	4	440
E Total	360	1	0	1	1	48	411
ESE Total	0	2	0	3	1	325	331
SE Total	0	1	0	1	1	198	201
SSE Total	0	2	0	2	1	4	9
S Total	0	1	0	3	1	3	8
SSW Total	0	2	0	2	1	2	7
SW Total	0	1	0	13	31	9	54
WSW Total	0	3	0	195	269	586	1,053
W Total	0	0	0	3	1	6	10
WNW Total	0	1	0	1	1	519	522
NW Total	0	1	0	1	1	3	6
NNW Total	0	1	0	70	1	4	76
Total Population	360	193	0	577	314	2,155	3,599
Seasonal Housing	0	34	0	60	26	110	230
Campgrounds	0	0	0	275	28	1,033	1,336
Recreational Resources	0	159	0	68	0	341	568
Lodging	0	0	0	0	23	303	326
Commuters	360	0	0	174	237	368	1,139
Total	360	193	0	577	314	2,155	3,599

Table 2.1-7— {Transient Population Facilities - Major Employers and Colleges/Universities Within 10 mi (16 km) Radius of BBNPP}

Name of Facility	Address	Distance from BBNPP *mi (km)*	Direction from BBNPP	Total Population of Employees and/ or Students	Transient Population of Employees and/or Students
Berwick Hospital Center	701 East 16th Street Berwick, PA 18603	3.5 (5.6)	WSW	600	
Berwick Offray	2015 West Front Street Berwick, PA 18603	5.9 (9.6)	WSW	1,100	260
Berwick Retirement Village	801 East 16th Street Berwick, PA 18603	3.5 (5.7)	WSW	134	32
DeLuxe Building Systems	499 West Third Street Berwick, PA 18603	4.6 (7.3)	WSW	105	25
Luzerne Community College	107 South Main St Berwick, PA 18603	4.2 (6.8)	WSW	6 employees 100 students	6 employees 100 students
PPL Susquehanna	769 Salem Blvd. Berwick PA 18603	0.9 (1.5)	E	1,247	360
SCI Retreat	660 State Route 11 Hunlock Creek, PA 18621	8.1 (13.1)	NE	457	108
Wise Foods	228 Rasely Street Berwick, PA. 18603	5.3 (8.5)	WSW	450	106
			Totals:	4,199	1,139

Table 2.1-8— {Transient Population Facilities - Recreational Areas and Campgrounds/RV Parks Within 10 mi (16 km) Radius of BBNPP}

Name of Facility	Address	Distance from BBNPP mi (km)	Direction from BBNPP	Estimated Transient Campground Population
Council Cup Campground	212 Ruckel Hill Rd Wapwallopen, PA 18660	3.4 (5.5)	ENE	275 (250-300 year round)
Camp Louise (campground)	195 Hawk Rd Shickshinny, PA 18655	5.6 (8.9)	WNW	350
Hidden New Lake Campground	745 Hunlock-Harveyville Shickshinny, PA 18655	9.2 (14.8)	N	250 (200-300 April- October)
Moyers Grove Campground	309 Moyers Grove Rd Wapwallopen, PA 18660	5.6 (9.0)	ESE	320
Paradise Campground	376 Old Mt. Road Nescopek, PA 18636	4.5 (7.2)	SW	28
Whispering Pines Camping	1557 N Bendertown Rd Stillwater, PA 17878	9.3 (15.0)	WNW	113 (April-October)
Arnolds Golf Course	490B West 3rd Street Mifflinville, PA	9.4 (15.1)	WSW	4
Blue Ridge Trail Golf Club	260 Country Club Drive Mountain Top, PA	10 (16)	E	44
Berwick Golf Club	473 Martzville Road Berwick, PA	5.1 (8.3)	WSW	44
Briar Creek Lake	Berwick, PA	6.1 (9.8)	WSW	32
Lily Lake (fishing)	Shickshinny, PA	5.6 (8.9)	NE	55
Rolling Pines Golf Course	355 Golf Course Road Berwick, PA	7.9 (12.7)	WSW	70
State Game Lands 55 (hunting)	Fishing Creek Township, PA	7.3 (11.7)	WNW	54
State Game Lands 224 (hunting)	Plymouth Township, PA	8.1 (13.0)	NNE	11
State Game Lands 260 (hunting)	Salem Township, PA	3.4 (5.5)	NNW	68
Susquehanna River, North Branch (fishing)	Berwick, PA	8.3 (13.4)	WSW	27
Susquehanna Riverlands (fishing)	634 Salem Blvd. Berwick, PA 18603	1.4 (2.2)	ENE	159
			Total:	**1,904**

Table 2.1-9— {Transient Population Facilities - Hotel, Motel, and Bed & Breakfast Establishments within 10 mi (16 km) of the BBNPP Site}

Name of Facility	Address	Distance from BBNPP mi (km)	Direction from BBNPP	Number of Rooms	Estimated Lodging Population
Best Value Inn	1064 SR 93, Drums, PA	6.4 (10.4)	SE	51	50
Hampton Inn	1 Top of the 80s Rd, West Hazleton, PA	9.8 (15.9)	SE	123	120
Lookout Motor Lodge	1279 SR 93, Drums, PA	6.0 (9.7)	SE	19	18
Motel 6	488 W 3rd, Mifflinville, PA	8.3 (13.4)	WSW	65	63
Red Maple Inn	7545 Columbia Blvd Berwick, PA	4.2 (6.8)	WSW	18	17
Super 8 Motel	450 W 3rd, Mifflinville, PA	8.1 (13.1)	WSW	53	52
White Birch B& B	1301 N Market St , Berwick, PA	4.1 (6.7)	WSW	6	6
			Totals:	335	326

Table 2.1-10— {Summary of Transient Populations within 10-50 mi (16-80 km) of the BBNPP Site, by 10 mi (16 km) radii}

Distance from BBNPP Site	Estimated Seasonal Housing Population	Estimated Campground Population	Estimated Lodging Population	Total Estimated Transient Population
10-20 mi (16–32 km)	1,307	1,196	1,316	3,819
20-30 mi (32–48 km)	2,845	2,419	1,778	7,042
30-40 mi (48–64 km)	6,369	5,506	2,949	14,824
40-50 mi (64–80 km)	6,751	5,824	5,881	18,456
10-50 mi (16–80 km)	17,272	14,945	11,924	44,141

Table 2.1-11— {Current Population and Population Projections (Resident and Transient) For the BBNPP Low Population Zone}

Year	LPZ Population			Average Annual Percent Change for the 10 Year Period
	Resident	Transient(1)	Total	
2000	2,434	1,822	4,256	NA
2010	2,550	1,909	4,459	0.47%
2018	2,672	2,002	4,674	NA
2020	2,702	2,025	4,727	0.59%
2030	2,849	2,132	4,981	0.52%
2040	3,075	2,303	5,378	0.77%
2050	3,245	2,431	5,676	0.54%
2058	3,389	2,535	5,924	NA
2060	3,418	2,561	5,979	0.52%
2070	3,596	2,694	6,290	0.51%
2080	3,780	2,830	6,610	0.50%

Notes:
(1)Transient population includes the total SSES workforce (1,247), the peak capacity of Susquehanna Riverlands (300), and the peak capacity of Council Cup Campground (275).

Table 2.1-12— {Commuting Patterns To and From Columbia and Luzerne Counties (2000)}

Parameter	County	Count
Worker Outflow from Columbia and Luzerne County to Counties in 50 mi (80 km) Radius	Berks	196
	Bradford	39
	Carbon	653
	Dauphin	271
	Lackawanna	8,190
	Lebanon	81
	Lehigh	828
	Lycoming	431
	Monroe	1,706
	Montour	2,146
	Northampton	159
	Northumberland	1,117
	Pike	306
	Schuylkill	1,582
	Snyder	69
	Sullivan	114
	Susquehanna	71
	Union	240
	Wayne	163
	Wyoming	910
	Total	19,272
Worker Outflow from Columbia and Luzerne Counties to Areas Outside 50 mi (80 km) Radius	Total	2,966
Worker Inflow to Columbia and Luzerne County from Counties in 50 mi (80 km) Radius	Berks	78
	Bradford	91
	Carbon	2,242
	Dauphin	54
	Lackawanna	6,993
	Lebanon	45
	Lehigh	245
	Lycoming	469
	Monroe	667
	Montour	1,056
	Northampton	116
	Northumberland	1,290
	Pike	133
	Schuylkill	3,750
	Snyder	96
	Sullivan	75
	Susquehanna	234
	Union	56
	Wayne	327
	Wyoming	2,214
	Total	20,231
Worker Inflow to Columbia and Luzerne Counties from Areas Outside 50 mi (80 km) Radius	Total	8,250
Net Worker Inflow to Columbia and Luzerne Counties	Total	6,243

Table 2.1-13— {Special Facilities — Hospitals and Nursing Homes Within the 10 mi (16 km) Zone of BBNPP}

Name of Facility	Address	Distance from BBNPP mi (km)	Direction from BBNPP	Population of Patients	Population of Employees
Berwick Hospital Center	701 East 16th Street Berwick, PA 18603	3.5 (5.6)	WSW	341	600
Berwick Retirement Village	801 East 16th Street Berwick, PA 18603	3.5 (5.7)	WSW	240	134

Table 2.1-14— {Special Facilities — Schools Within the 10 mi (16 km) Zone of BBNPP}

Name of Facility	Address	Distance from BBNPP mi (km)	Direction from BBNPP	Total Population of Employees and/or Students
Luzerne Community College	107 South Main St Berwick, PA 18603	4.2 (6.8)	WSW	6 employees 100 students
Salem Elementary School	810 East Tenth Street Berwick, PA 18603	3.2 (5.6)	WSW	32 employees 496 students
Fairview Friends School	1541 Fairview Ave Berwick, PA 18603	5.0 (8.9)	WSW	4 employees 12 students
Heritage Christian Academy	112 Butternut Street Berwick, PA 18603	3.5 (6.2)	WSW	2 employees 11 students
Fourteenth Street Elementary School	1401 N Market Street, Berwick, PA 18603	3.7 (6.6)	WSW	15 employees 214 students
Mulberry Street Elementary	West 6th & Mulberry Street Berwick, PA 18603	4.0 (7.1)	WSW	10 staff 104 students
Orange Street Elementary School	845 Orange Street Berwick, PA 18603	4.4 (7.8)	WSW	29 employees 386 students
Berwick Area High School	1100 Fowler Ave Berwick, PA 18603	3.3 (5.9)	WSW	70 employees 992 students
Nescopeck Elementary School	315 Dewey Street Nescopeck, PA 18635	3.3 (5.9)	SW	19 employees 276 students
Berwick Area Middle School	1100 Evergreen Drive Berwick, PA 18603	3.2 (5.7)	WSW	68 employees 897 students
Garrison Memorial School	West Vine Street Shickshinny, PA 18655	4.0 (7.1)	N	12 employees 186 students
Hunlock Creek School	21 Sunset Lake Road Shickshinny, PA 18655	7.2 (12.9)	NNE	17 employees 304 students
Huntington Mills School	417 Shickshinny Lake Road Shickshinny, PA 18655	7.2 (12.7)	NNW	19 employees 315 students
Northwest Area High School	243 Thorne Hill Road Shickshinny, PA 18655	6.0 (10.6)	NNW	42 employees 646 students

Table 2.1-15— {Actual (2000) and Projected (2018-2058) Population Within the 1 mi (1.6 km) to 30 mi (48 km) Zones of BBNPP}

	Total Population (Resident and Transient) by Radii/Distance mi (km) Land Area mi^2							
	1 mi (1.6 km) 3.1 mi^2	2 mi (3.2 km) 12.6 mi^2	3 mi (4.8 km) 28.3 mi^2	4 mi (6.4 km) 50.2 mi^2	5 mi (8.0 km) 78.5 mi^2	10 mi (16 km) 314 mi^2	20 mi (32 km) 1,256 mi^2	30 mi (48 km) 2,826 mi^2
Year								
2000	564	1,855	3,006	10,955	20,081	53,386	323,135	616,374
2010	592	1,958	3,161	11,503	21,067	55,963	338,414	645,320
2018	620	2,048	3,313	12,055	22,092	58,680	354,897	676,818
2020	627	2,072	3,350	12,184	22,340	59,341	359,000	684,725
2030	660	2,813	3,530	12,841	23,531	62,525	378,287	721,535
2040	714	2,355	3,807	13,860	25,406	67,512	408,513	779,272
2050	753	2,482	4,018	14,625	26,801	71,220	430,915	821,943
2058	785	2,591	4,194	15,263	27,979	74,336	449,703	857,745
2060	793	2,613	4,231	15,412	28,243	75,048	454,169	866,251
2070	834	2,749	4,448	16,207	29,708	78,927	477,372	910,142
2080	876	2,888	4,677	17,032	31,216	82,954	501,996	957,569

Table 2.1-16— {Actual (2000) and Projected (2018-2058) Population Density (persons/mi^2) Within the 1 mi (1.6 km) to 30 mi (48 km) Zones of BBNPP}

	Total Population Density (Resident and Transient) (persons/mi^2) by Radii/Distance mi (km) Land Area mi^2							
	1 mi (1.6 km) 3.1 mi^2	2 mi (3.2 km) 12.6 mi^2	3 mi (4.8 km) 28.3 mi^2	4 mi (6.4 km) 50.2 mi^2	5 mi (8.0 km) 78.5 mi^2	10 mi (16 km) 314 mi^2	20 mi (32 km) 1,256 mi^2	30 mi (48 km) 2,826 mi^2
Year								
2000	182	147	106	218	256	170	257	218
2010	191	155	112	229	268	178	269	228
2018	200	163	117	240	281	187	283	239
2020	202	164	118	243	285	189	286	242
2030	213	223	125	256	300	199	301	255
2040	230	187	135	276	324	215	325	276
2050	243	197	142	291	341	227	343	291
2058	253	206	148	304	356	237	358	304
2060	256	207	150	307	360	239	362	307
2070	269	218	157	323	378	251	380	322
2080	283	229	165	339	398	264	400	339

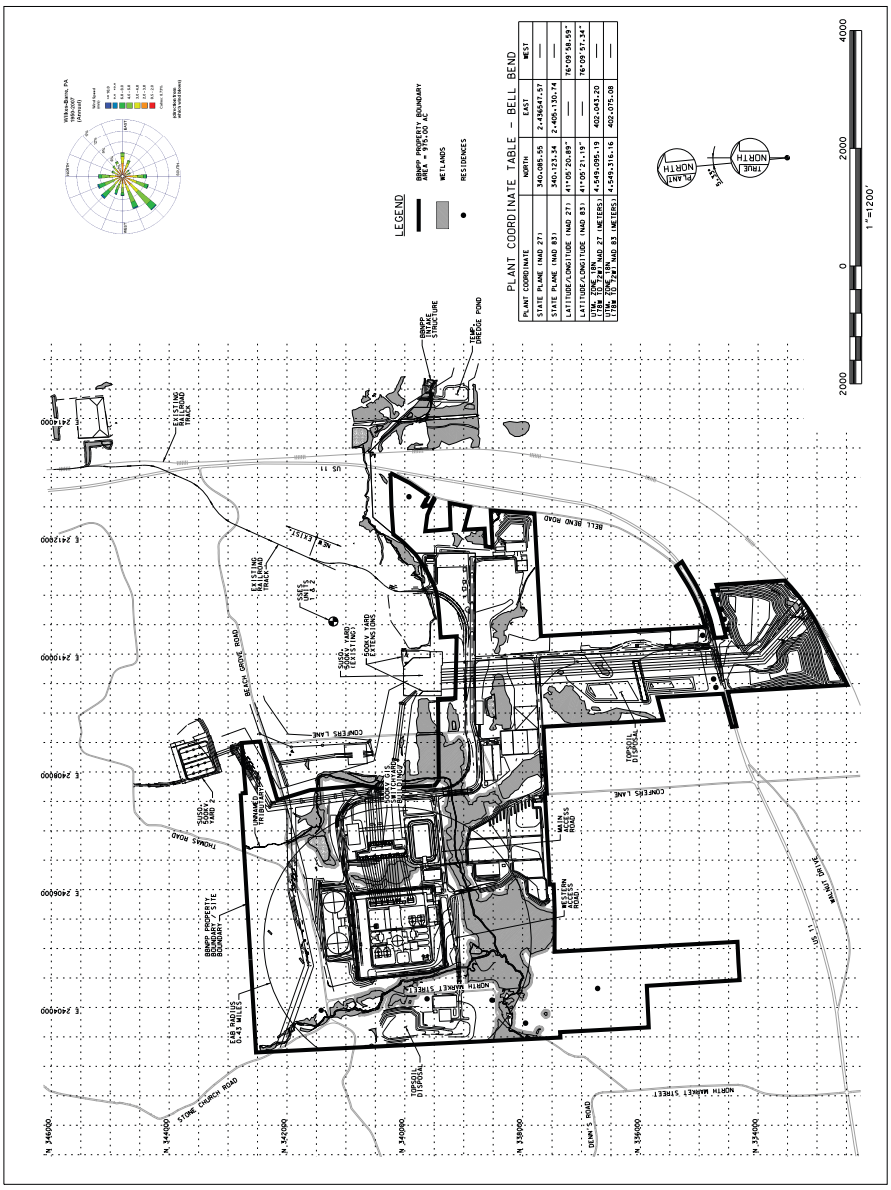
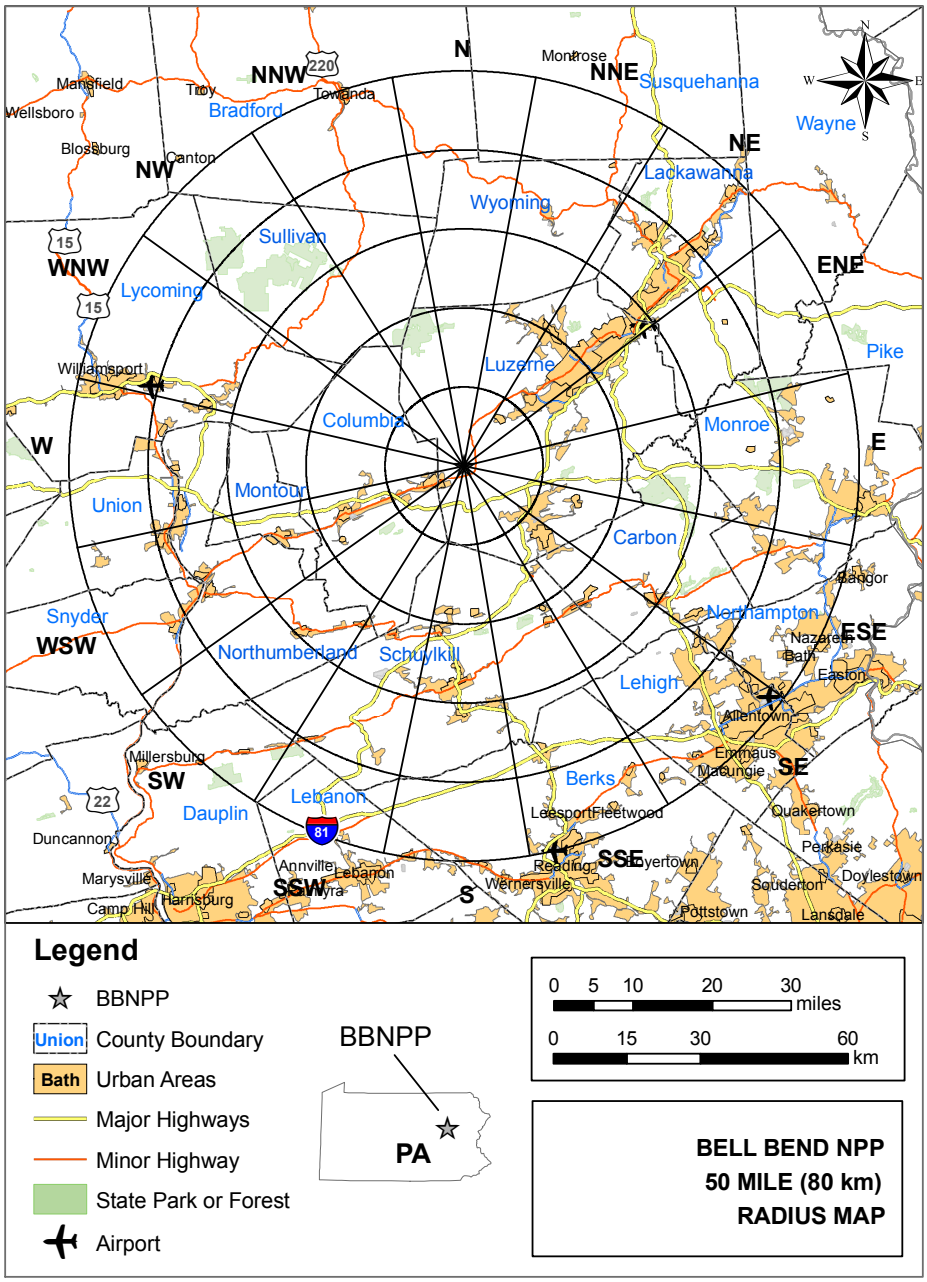


Figure 2.1-1— {BBNPP Site Area Map}

Figure 2.1-2— {BBNPP Site 50 Mile (80 km) Radius}



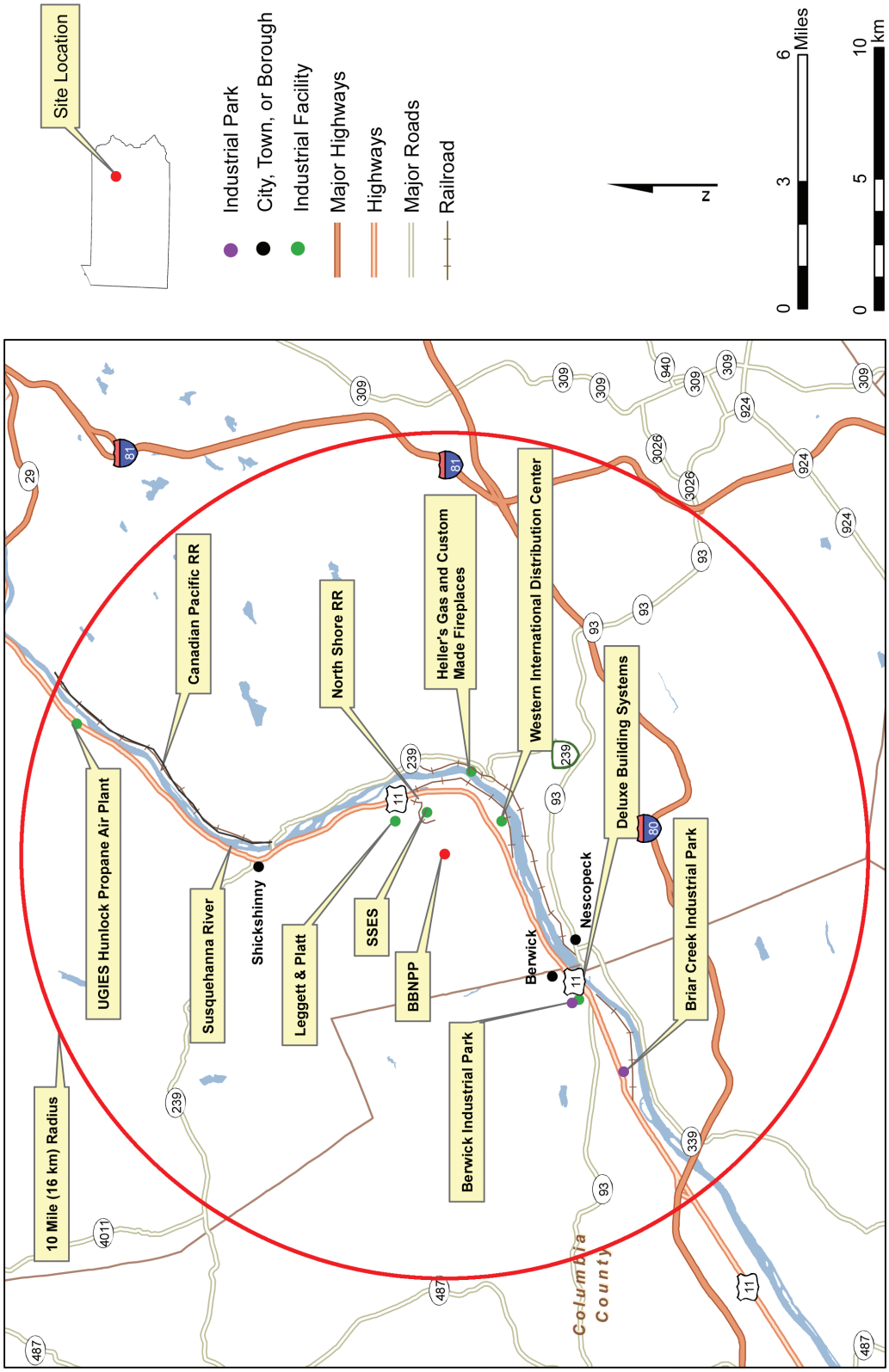


Figure 2.1-3— {BBNPP Site 10 Mile (16 km) Radius}

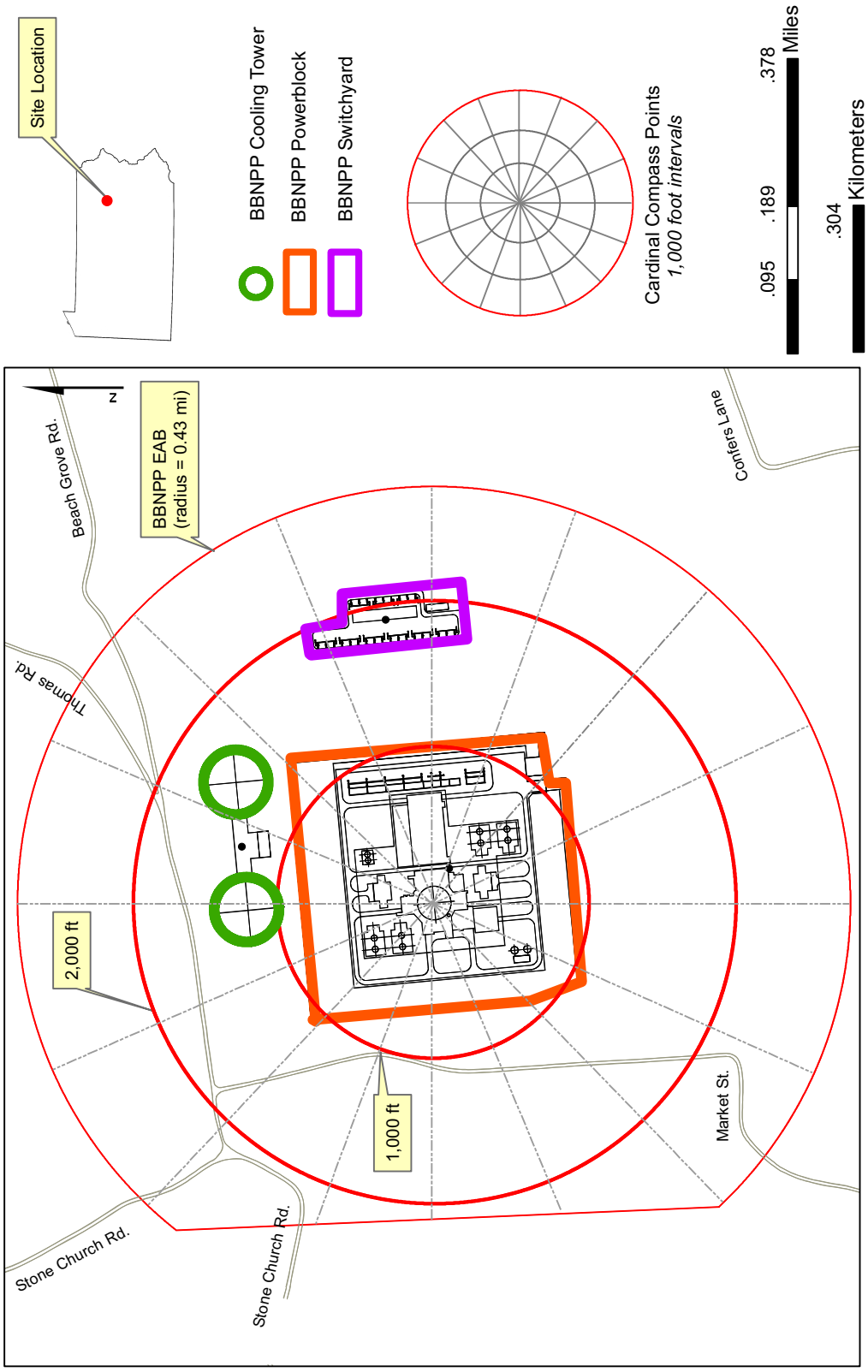


Figure 2.1-4— {BBNPP Exclusion Area Boundary}

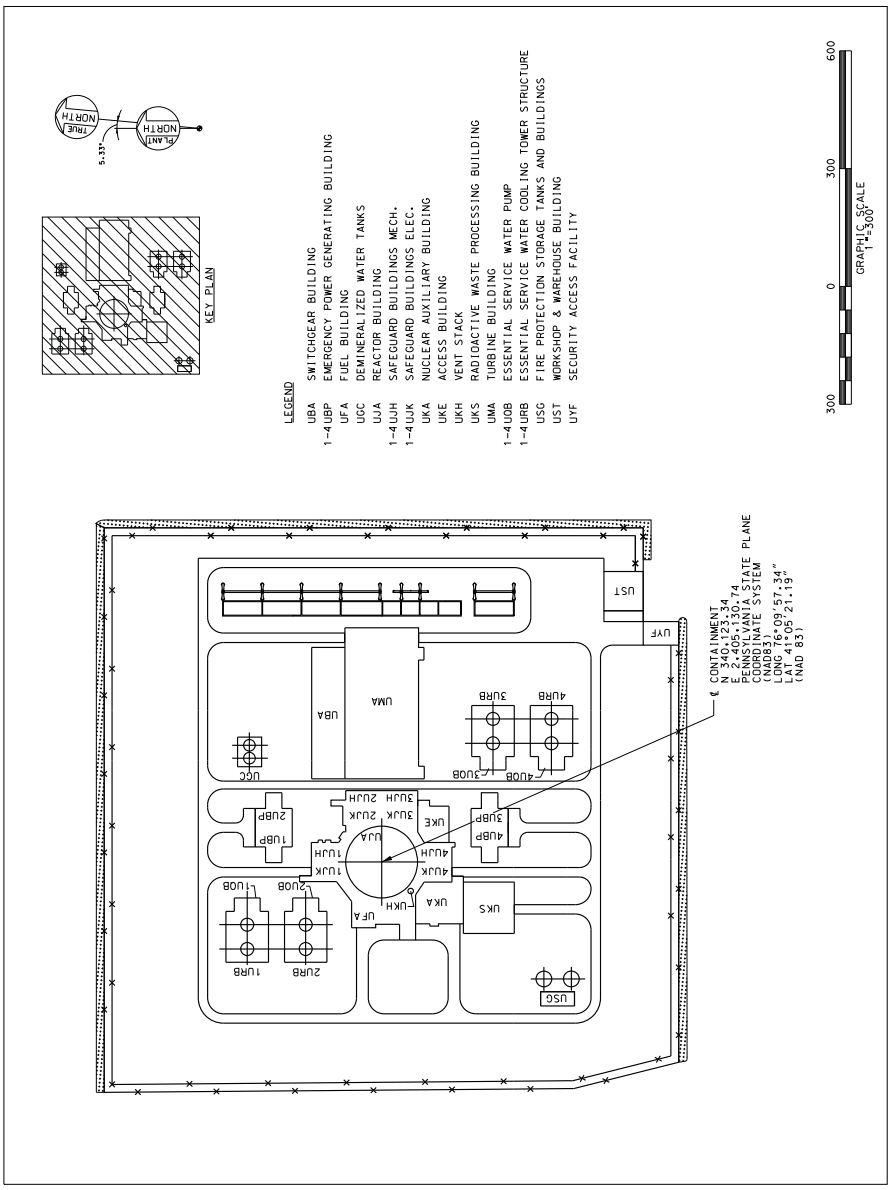


Figure 2.1-5— {BBNPP Principle Plant Structures}

Figure 2.1-6— {BBNPP 10 Mile (16 km) Radius Map}

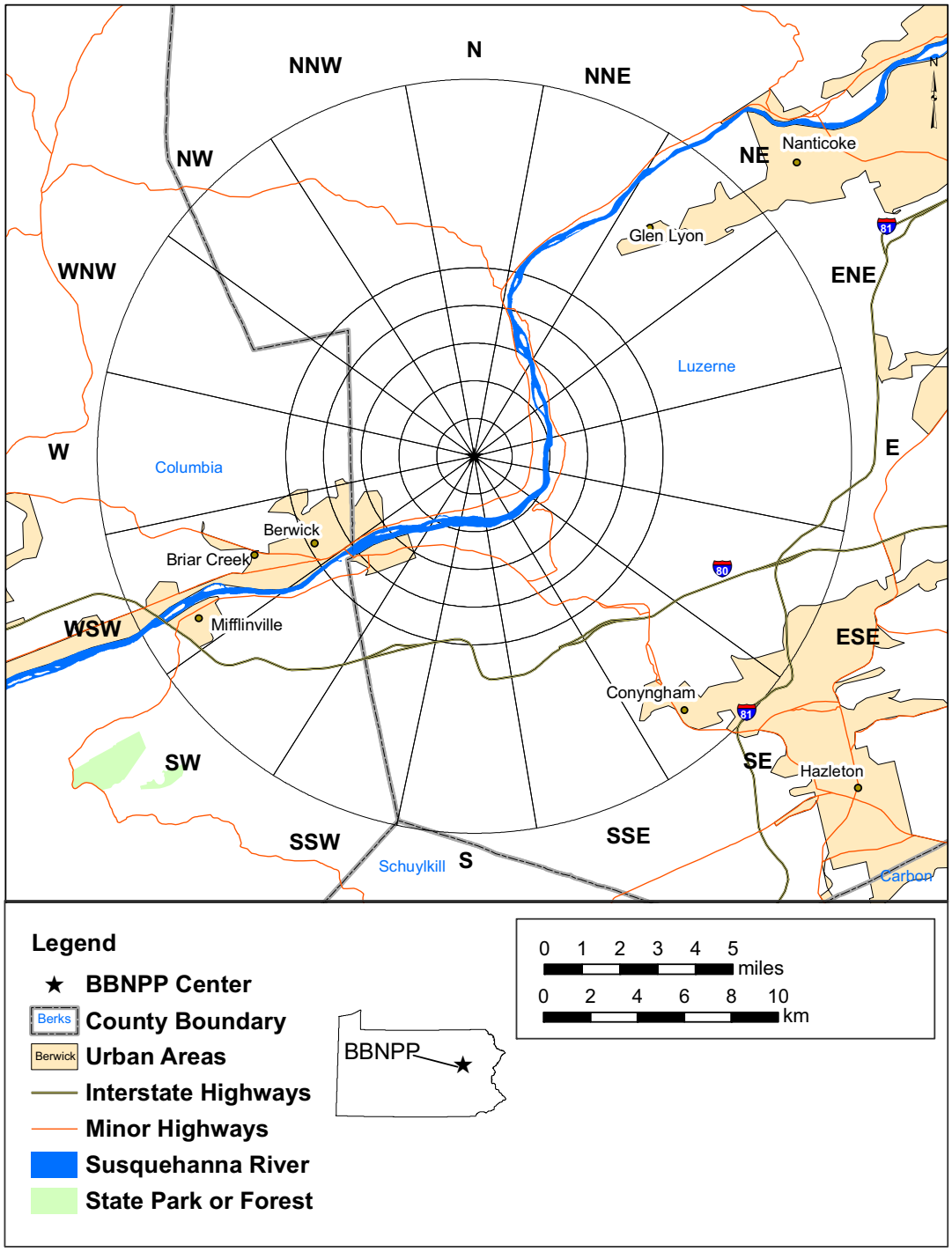


Figure 2.1-7— {BBNPP 10 Mile (16 km) 2000 Population Distribution}

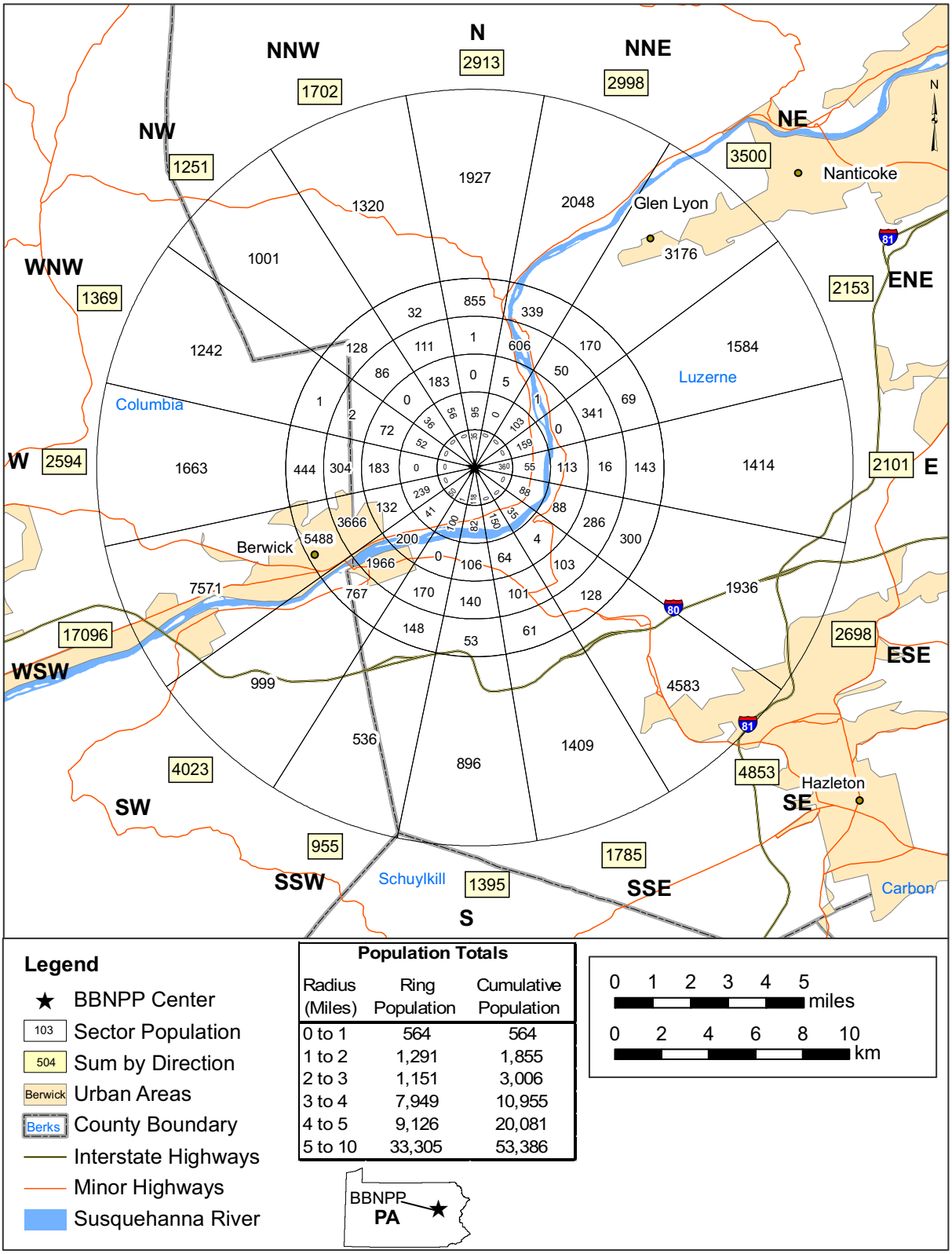


Figure 2.1-8— {BBNPP 10 Mile (16 km) 2010 Population Distribution}

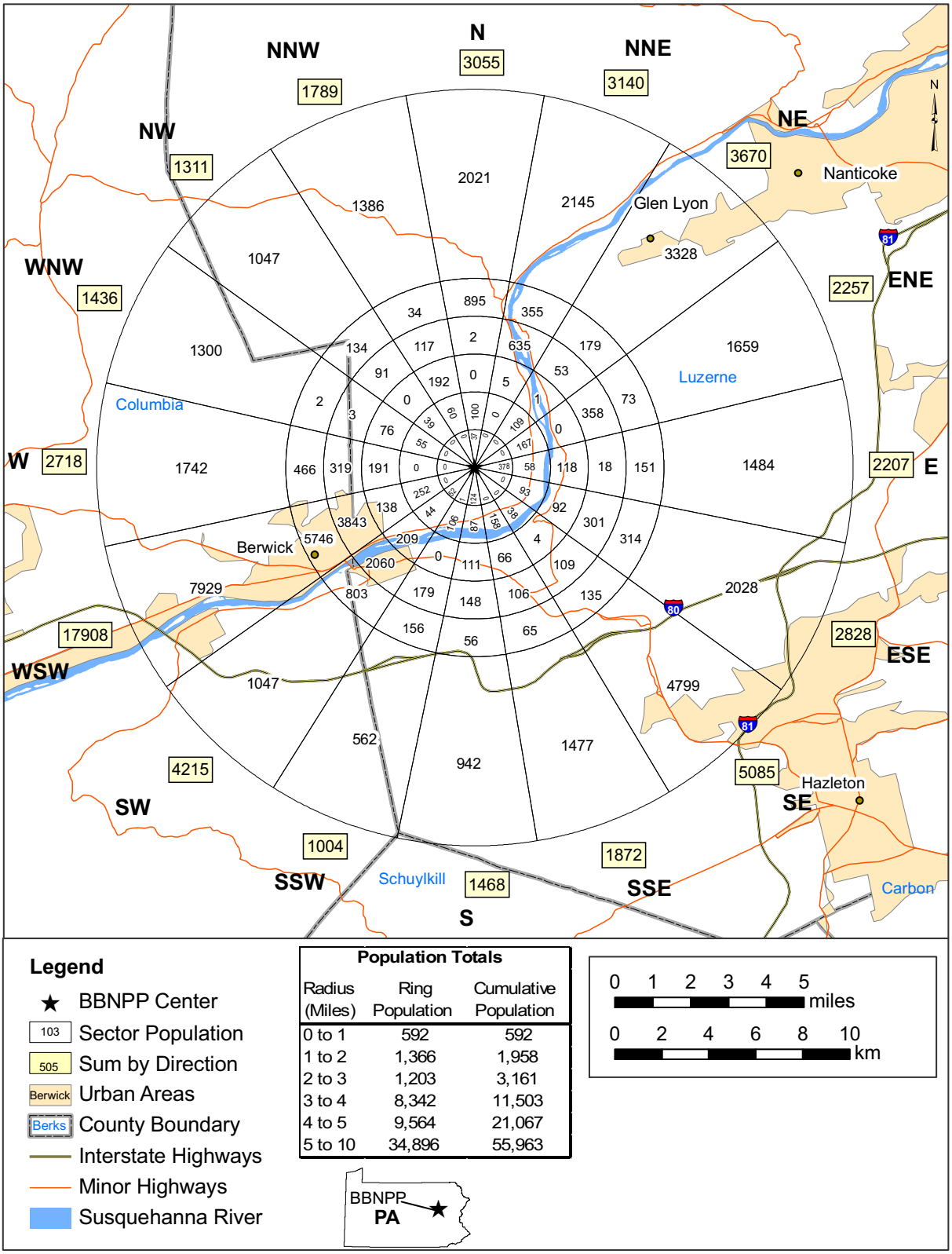


Figure 2.1-9— {BBNPP 10 Mile (16 km) 2020 Population Distribution}

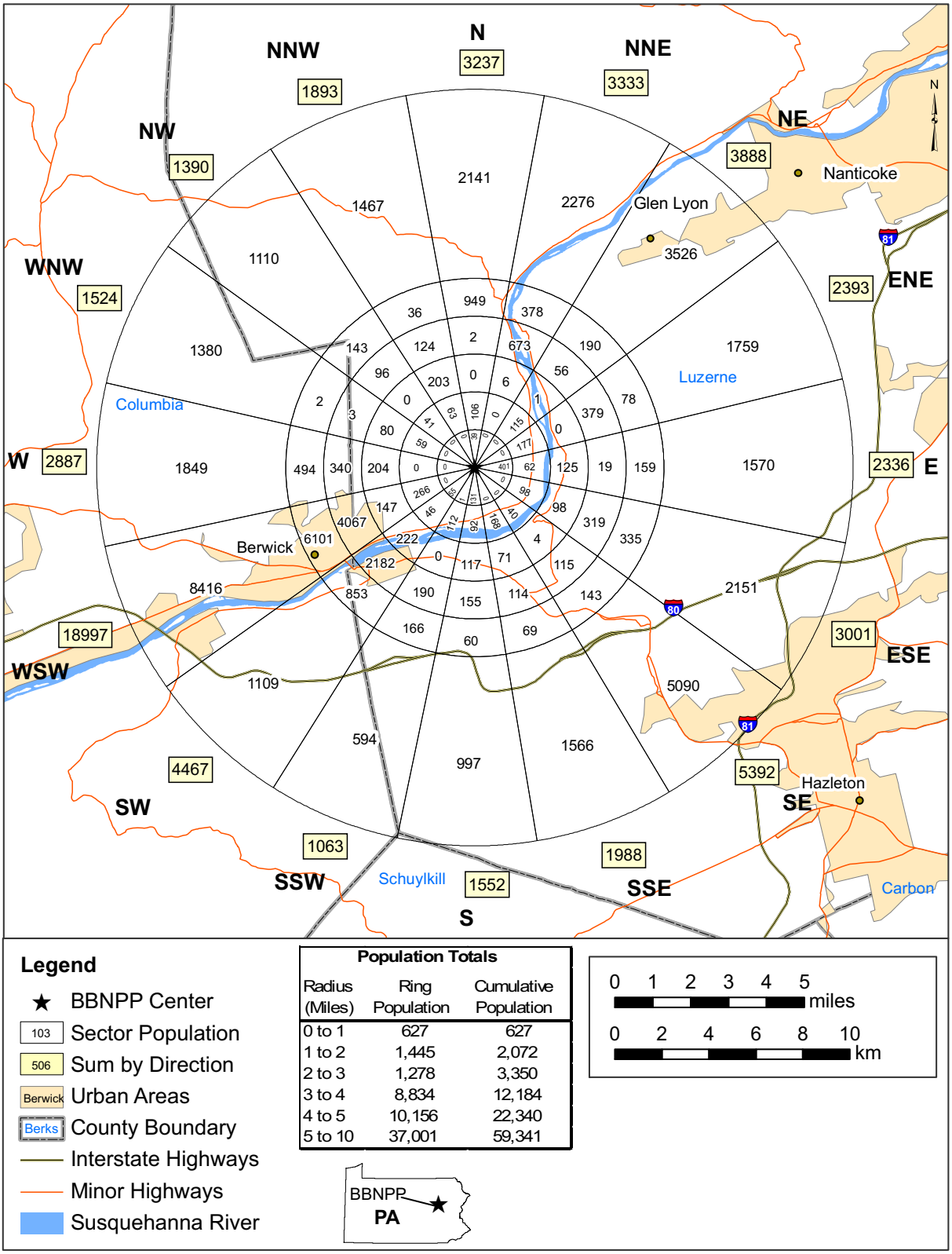


Figure 2.1-10— {BBNPP 10 Mile (16 km) 2030 Population Distribution}

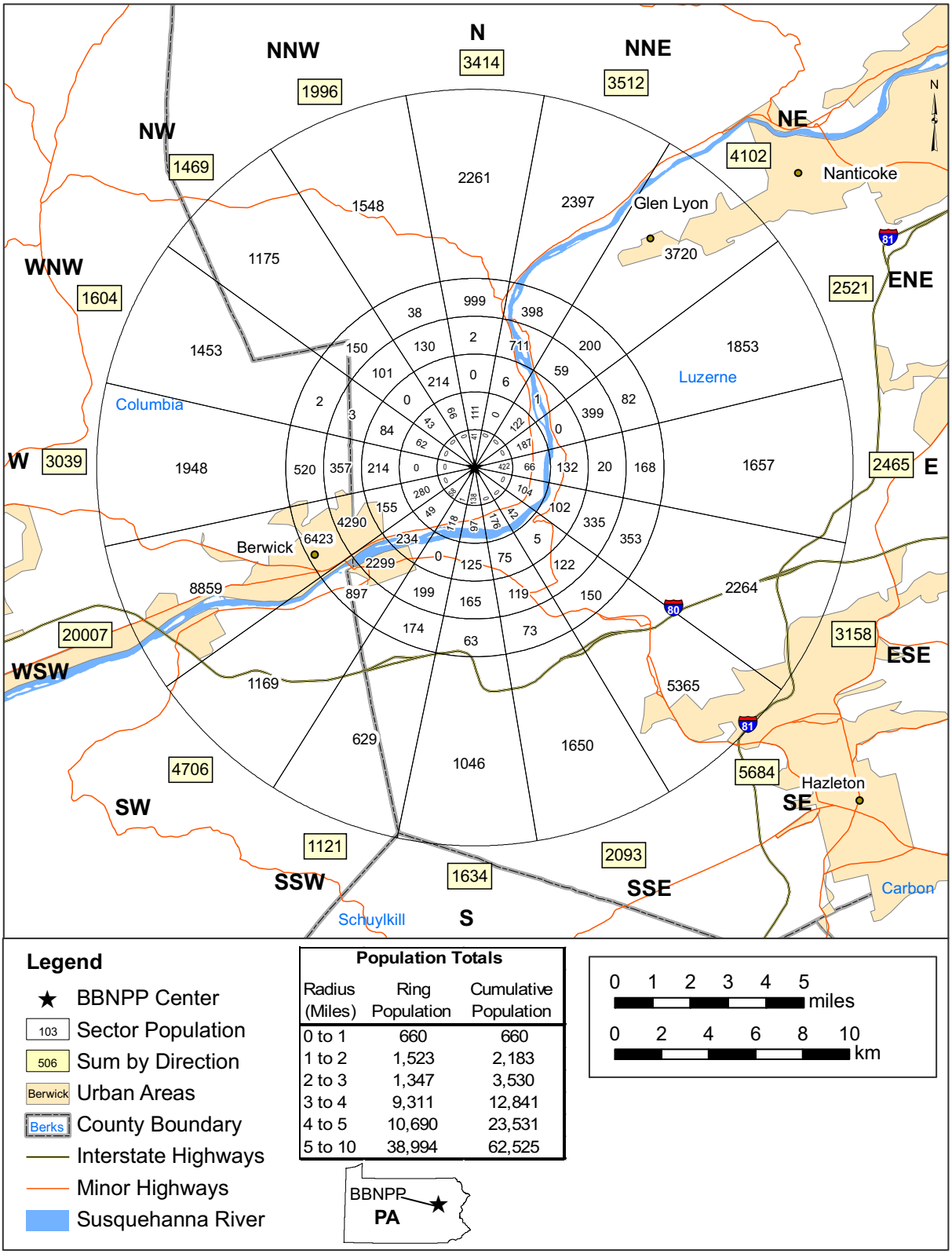


Figure 2.1-11— {BBNPP 10 Mile (16 km) 2040 Population Distribution}

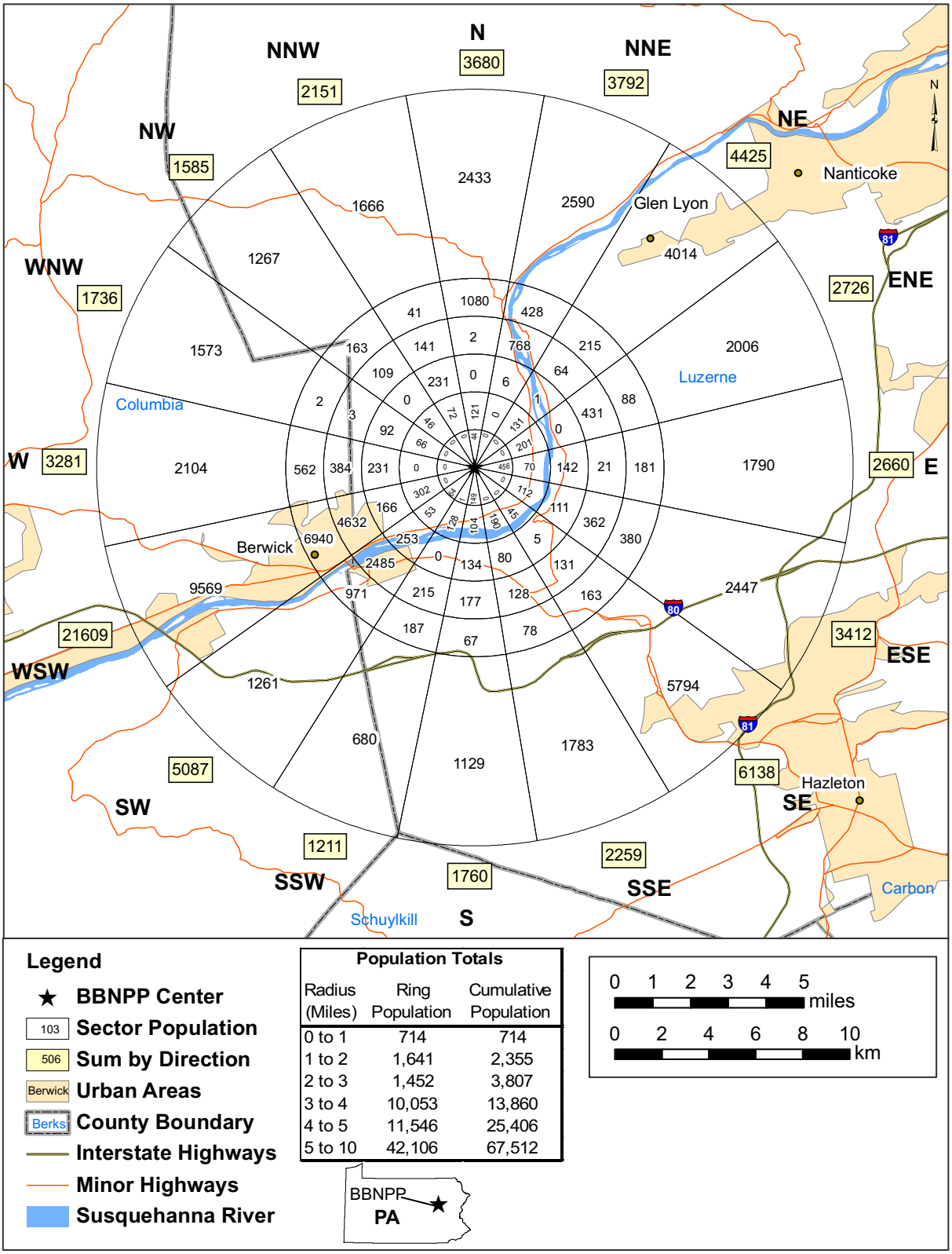


Figure 2.1-12— {BBNPP 10 Mile (16 km) 2050 Population Distribution}

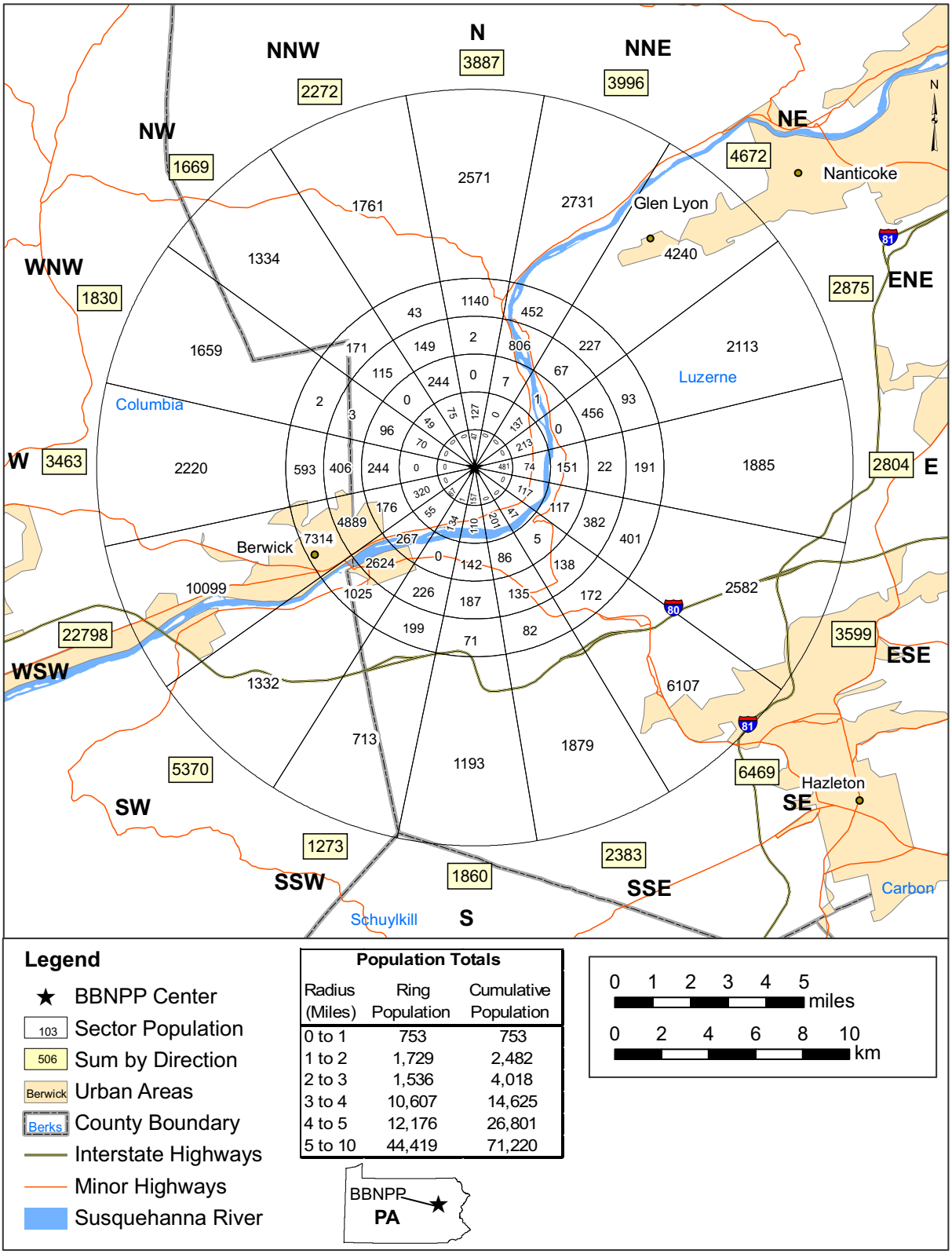


Figure 2.1-13— {BBNPP 10 Mile (16 km) 2060 Population Distribution}

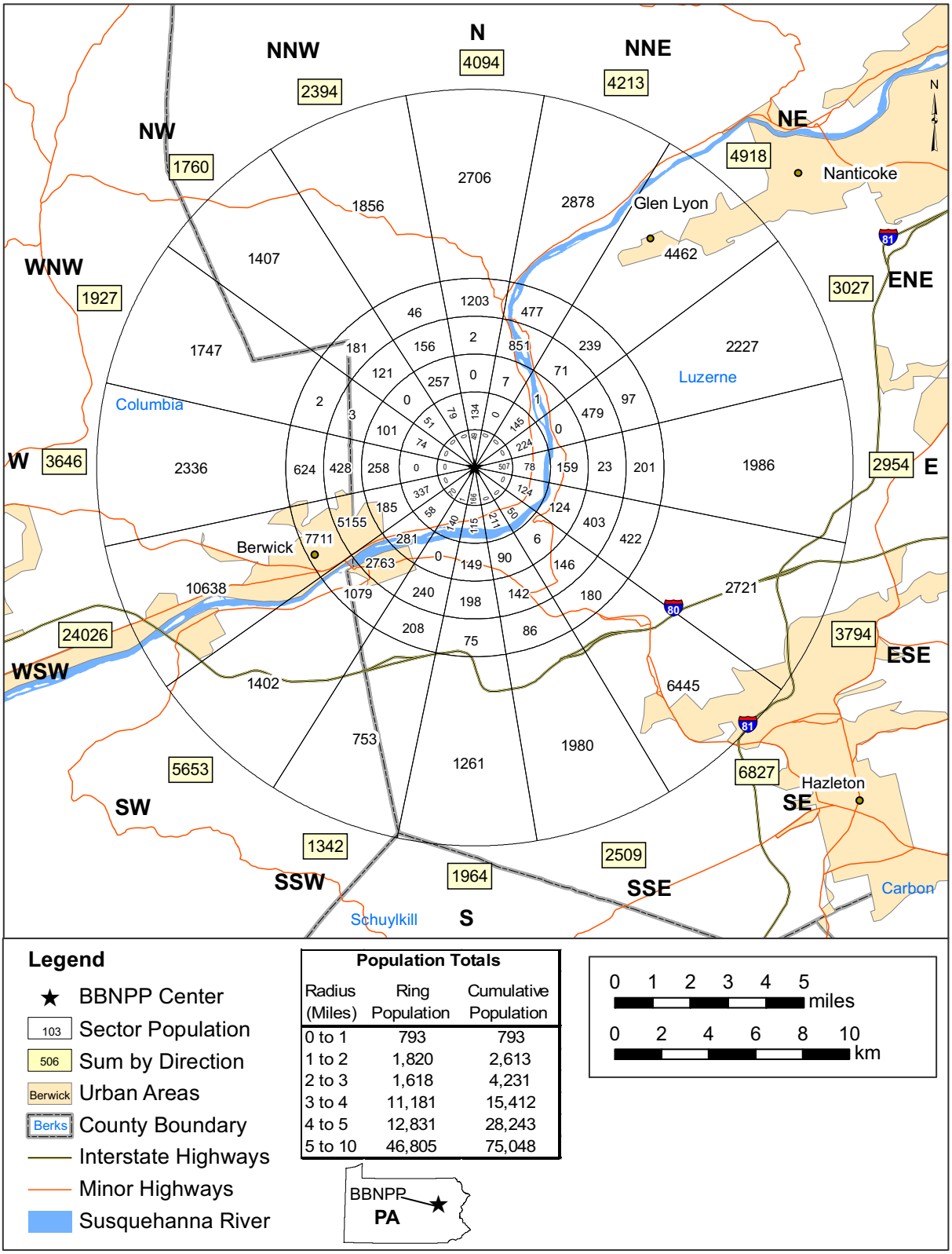


Figure 2.1-14— {BBNPP 10 mi (16 km) 2070 Population Distribution

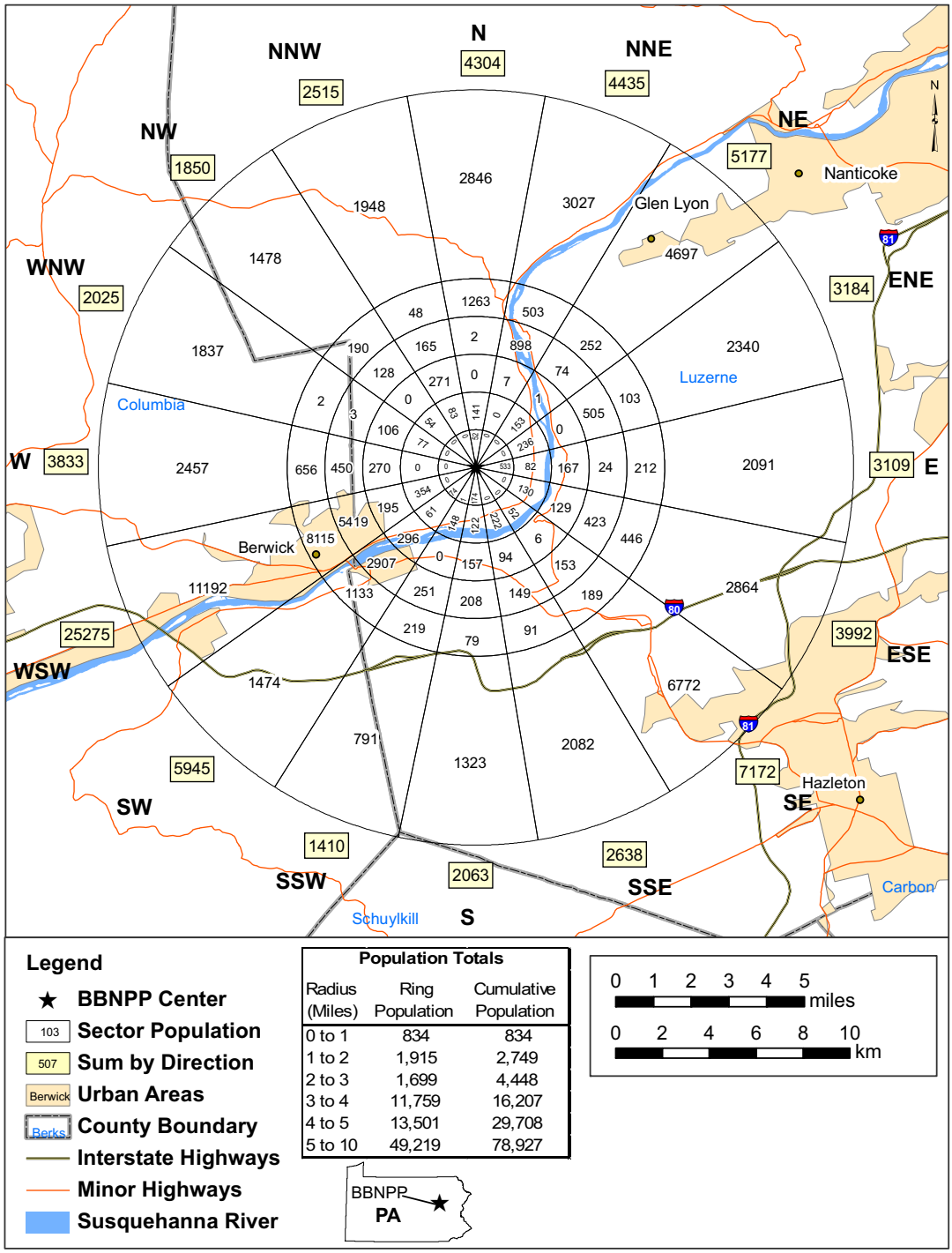


Figure 2.1-15— {BBNPP 10 mi (16 km) 2080 Population Distribution

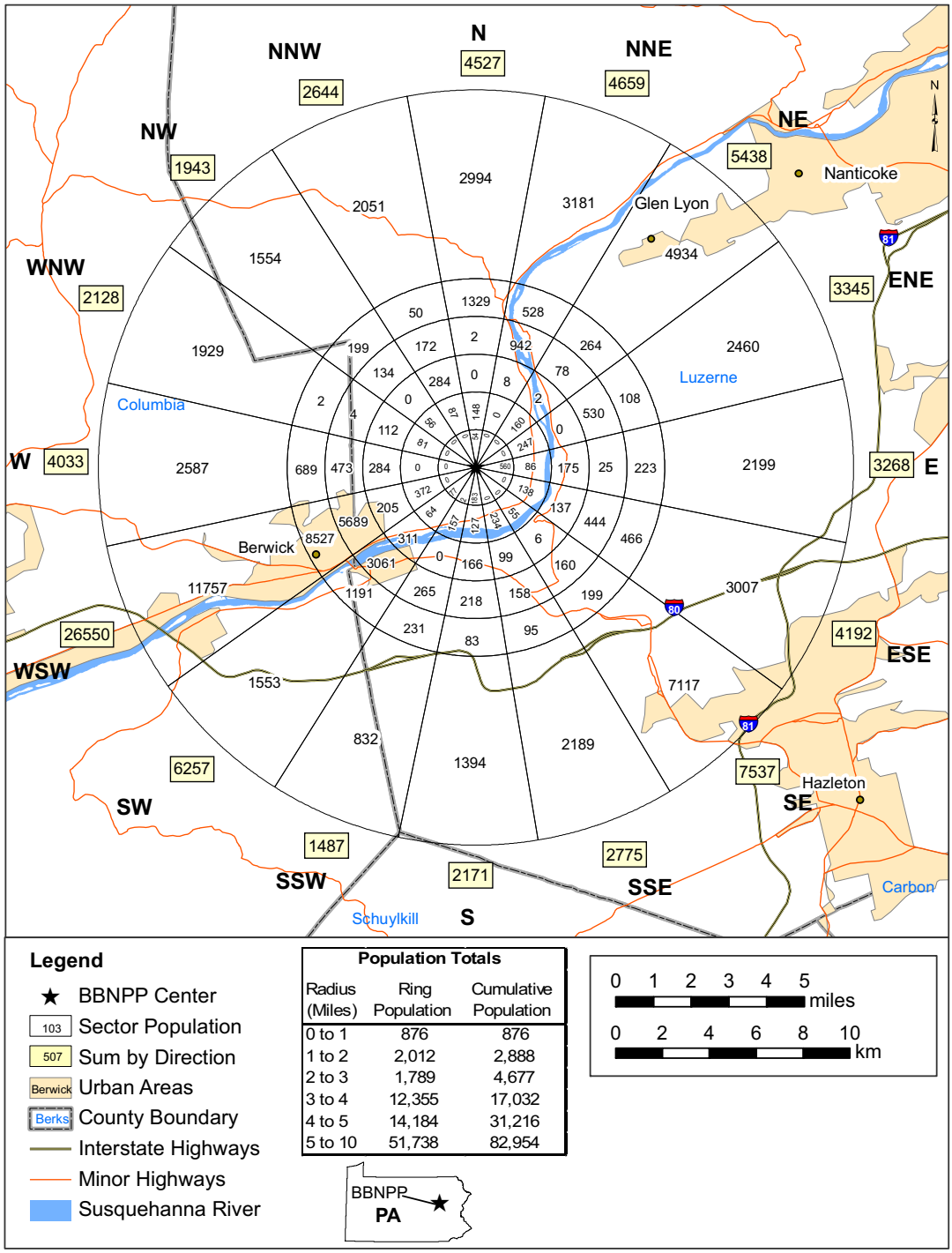


Figure 2.1-16— {BBNPP 10 Mile (16 km) 2018 Population Distribution}

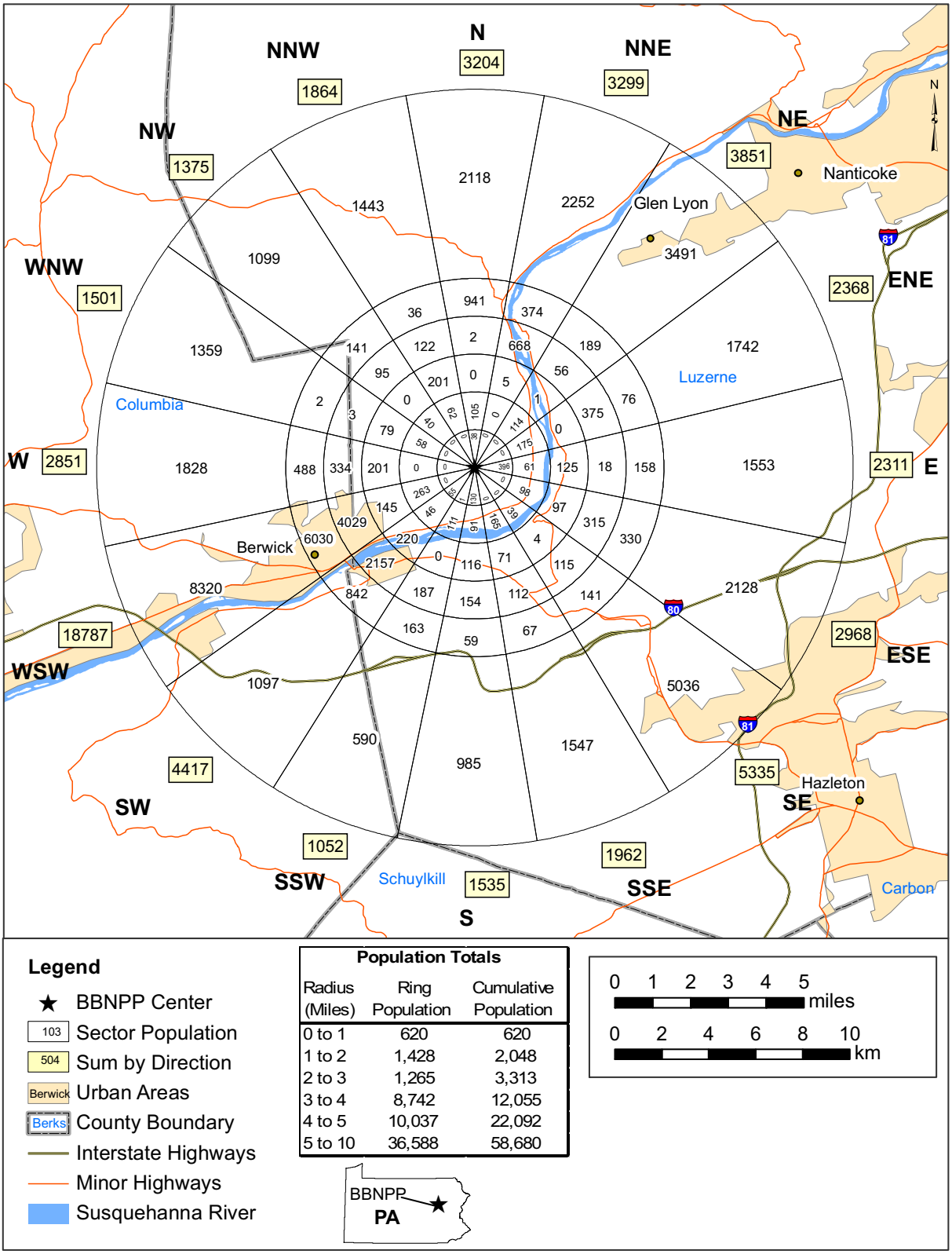


Figure 2.1-17— {BBNPP 10 Mile (16 km) 2058 Population Distribution}

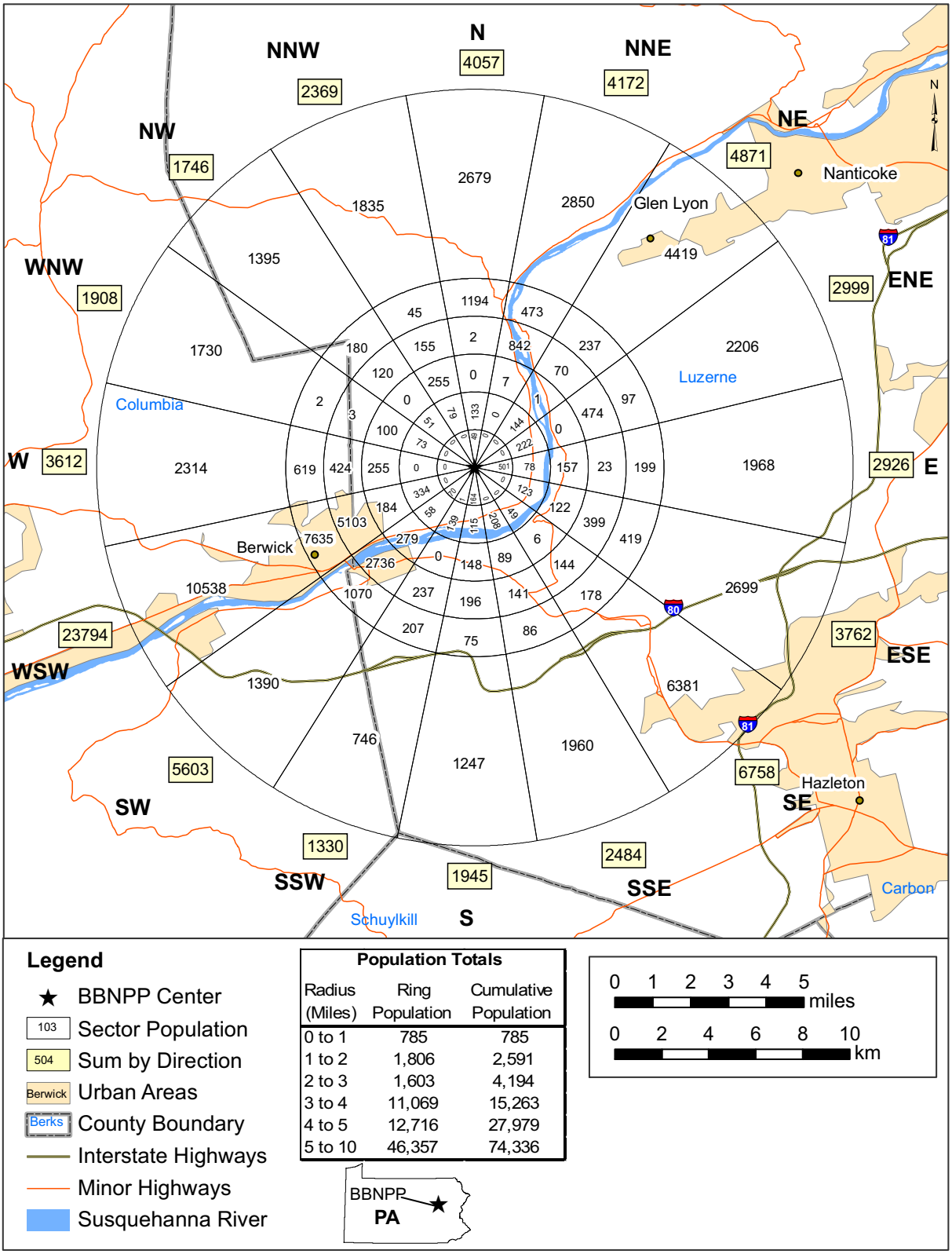


Figure 2.1-18— {BBNPP 50 Mile (80 km) Radius Map}

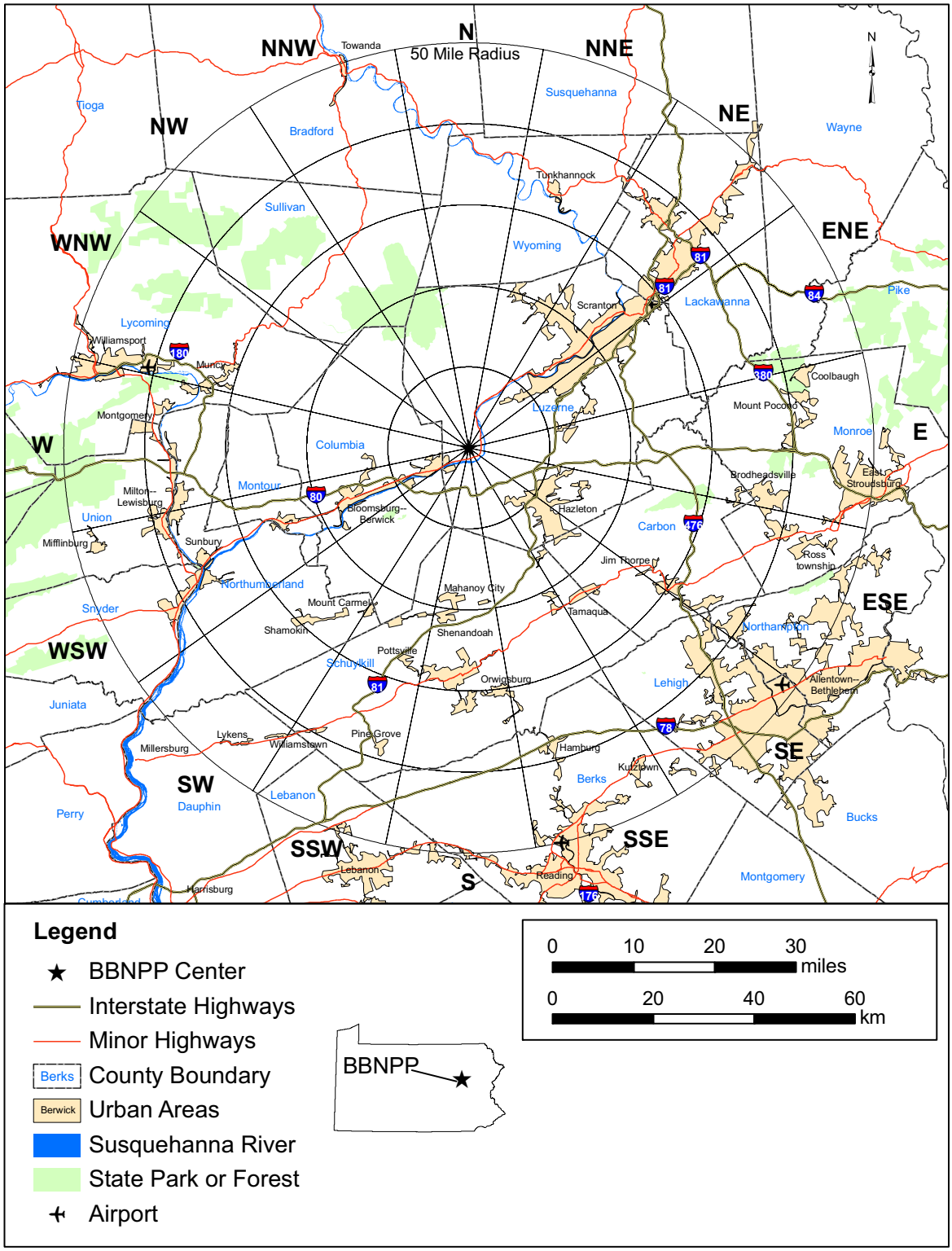


Figure 2.1-19— {BBNPP 50 Mile (80 km) 2000 Population Distribution}

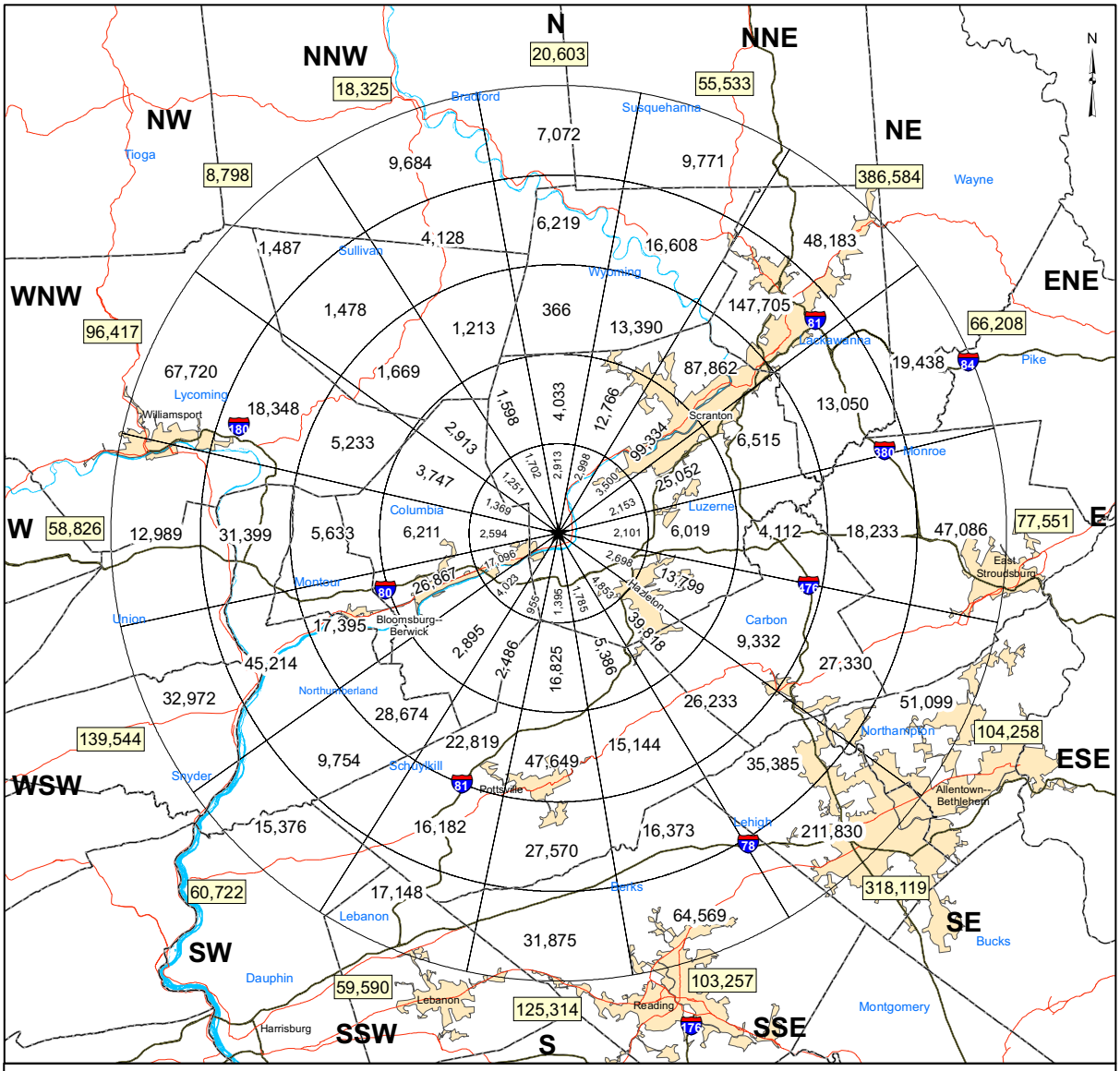


Figure 2.1-20— {BBNPP 50 Mile (80 km) 2010 Population Distribution}

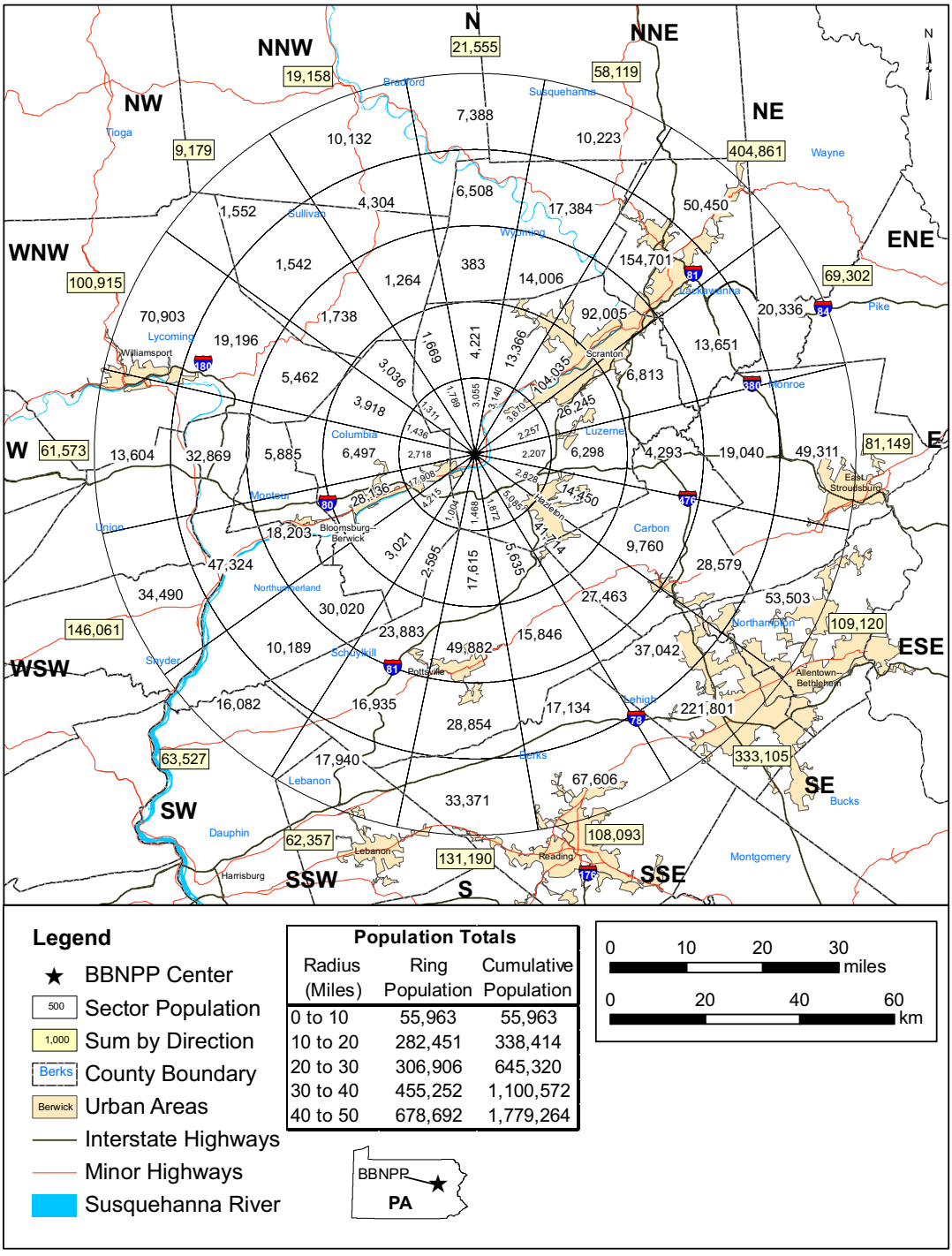


Figure 2.1-21— {BBNPP 50 Mile (80 km) 2020 Population Distribution}

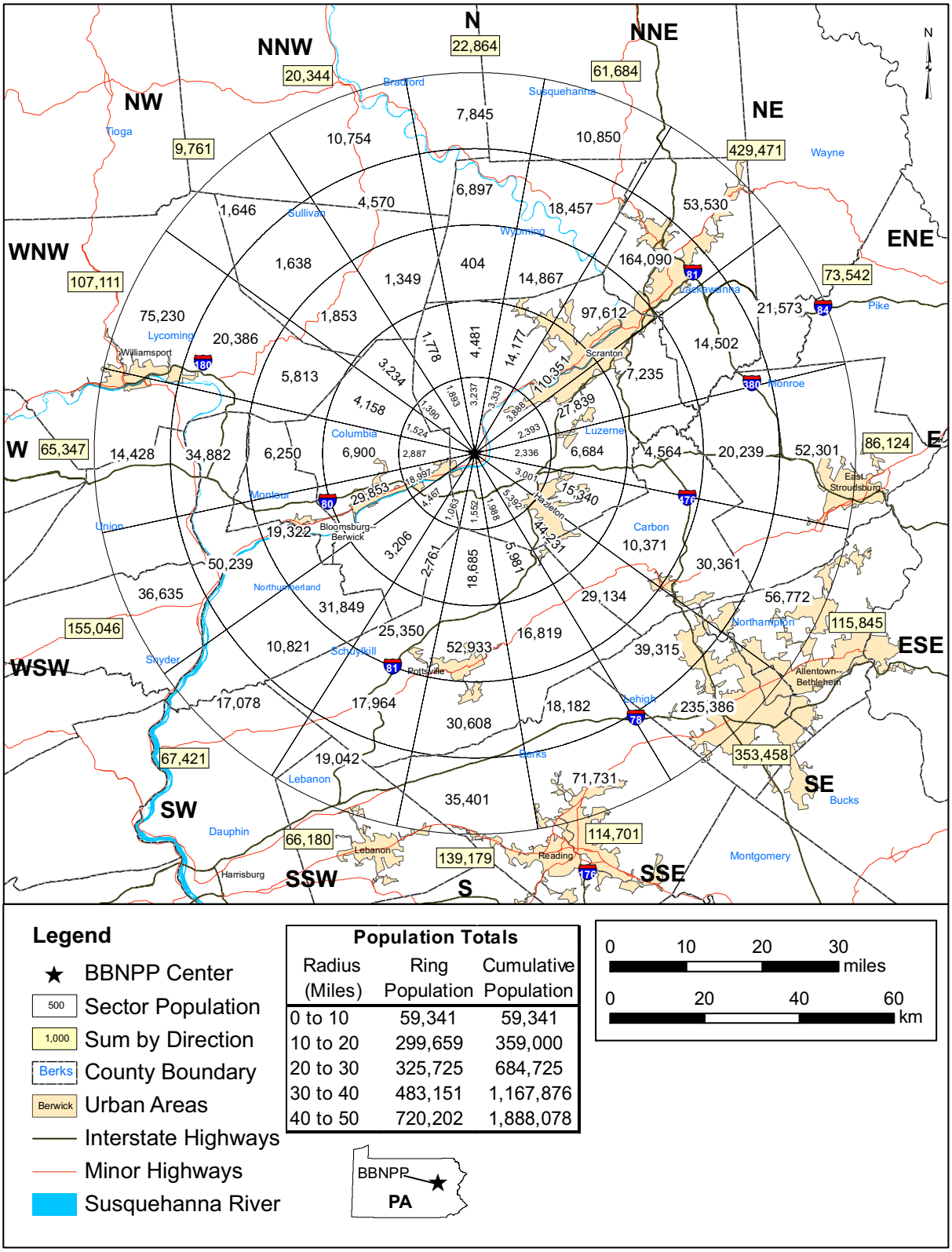


Figure 2.1-22— {BBNPP 50 Mile (80 km) 2030 Population Distribution}

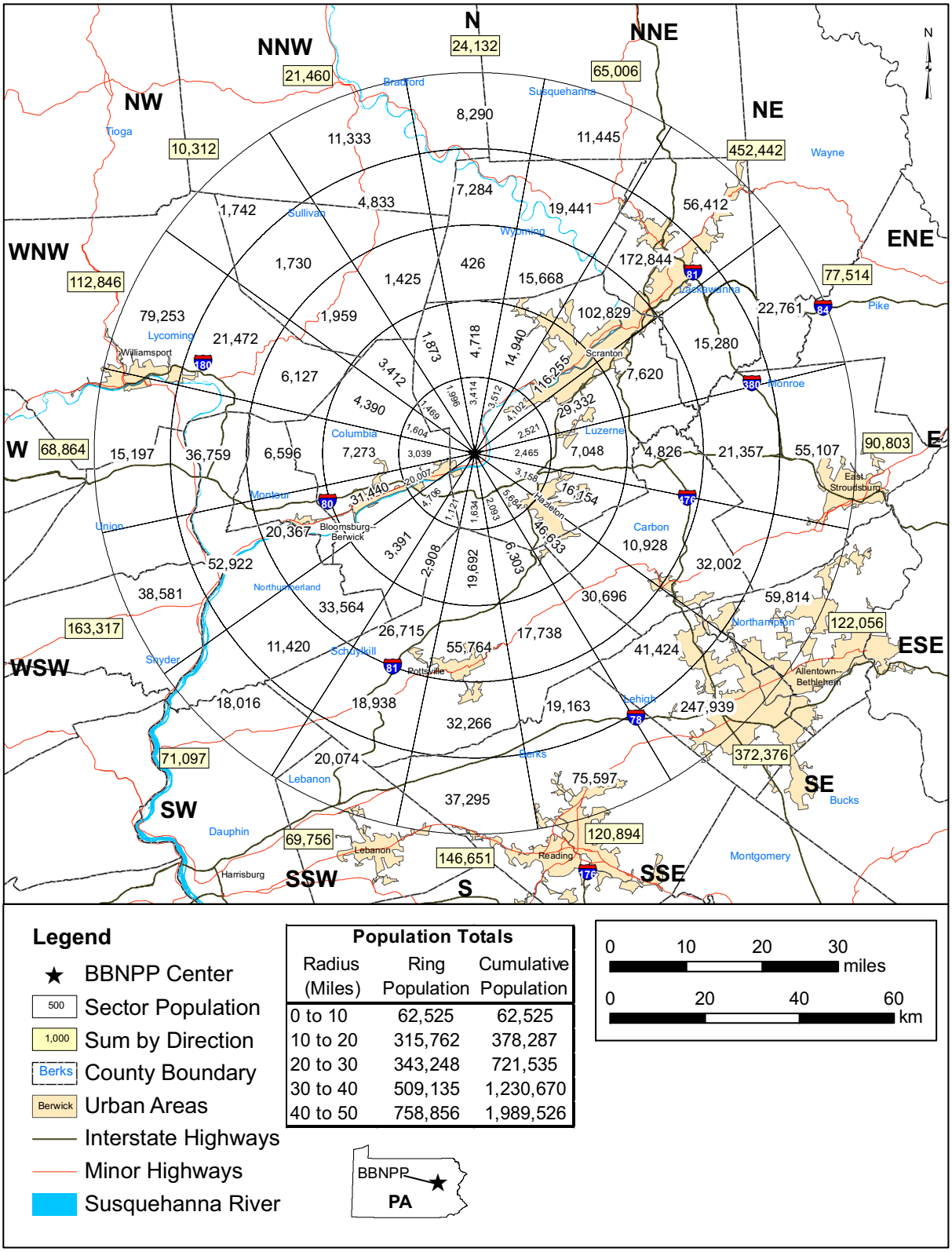


Figure 2.1-23— {BBNPP 50 Mile (80 km) 2040 Population Distribution}

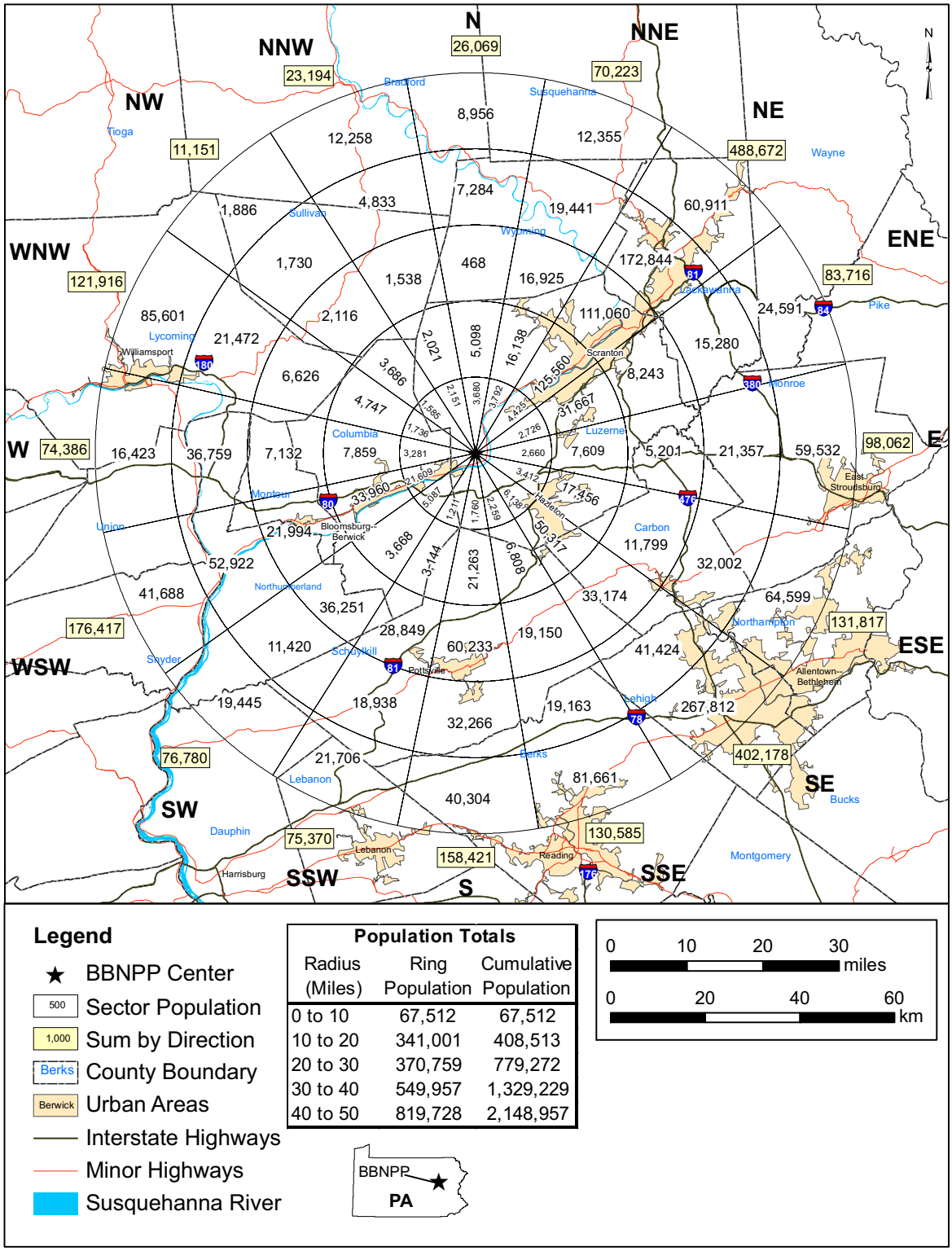


Figure 2.1-24— {BBNPP 50 Mile (80 km) 2050 Population Distribution}

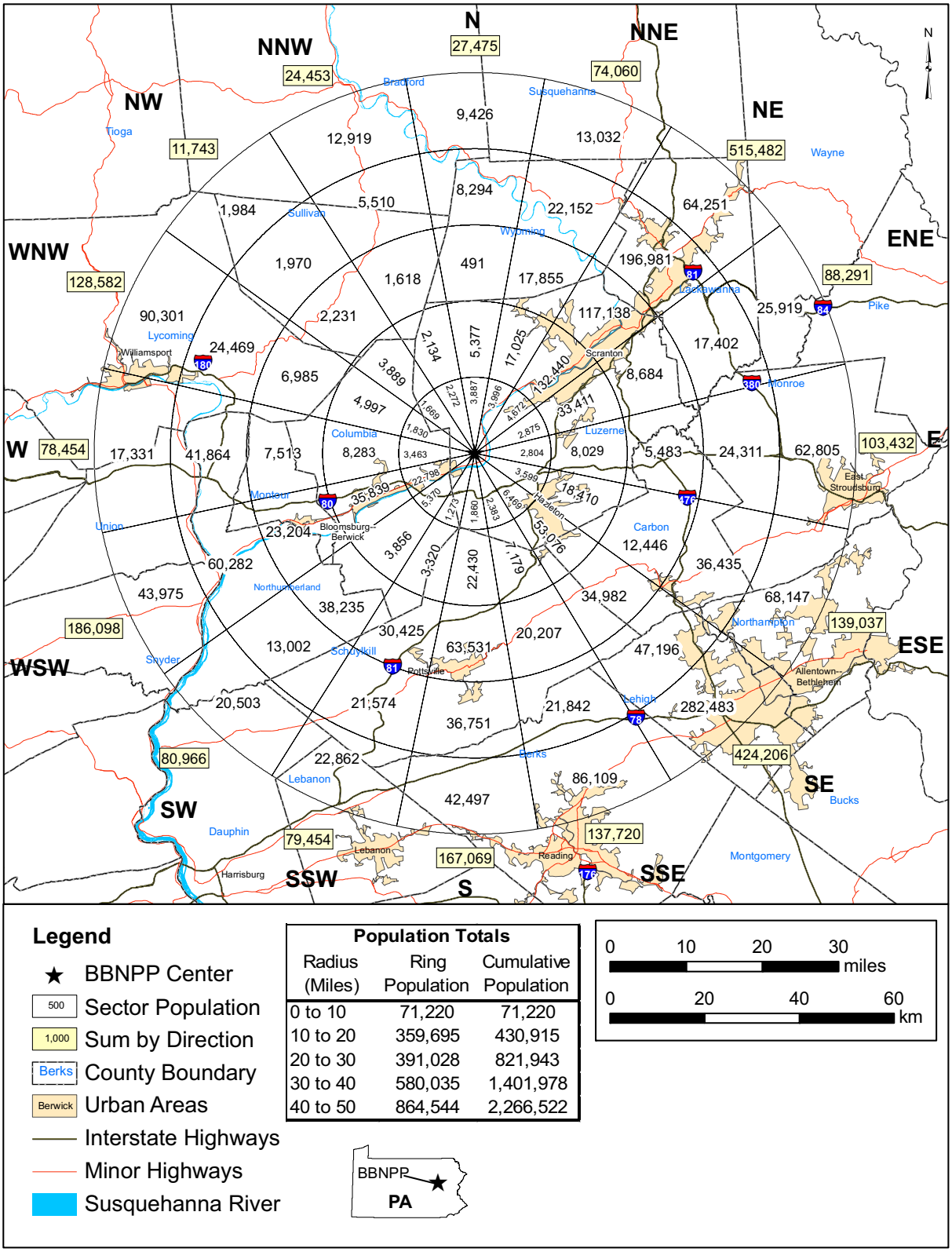


Figure 2.1-25— {BBNPP 50 Mile (80 km) 2060 Population Distribution}

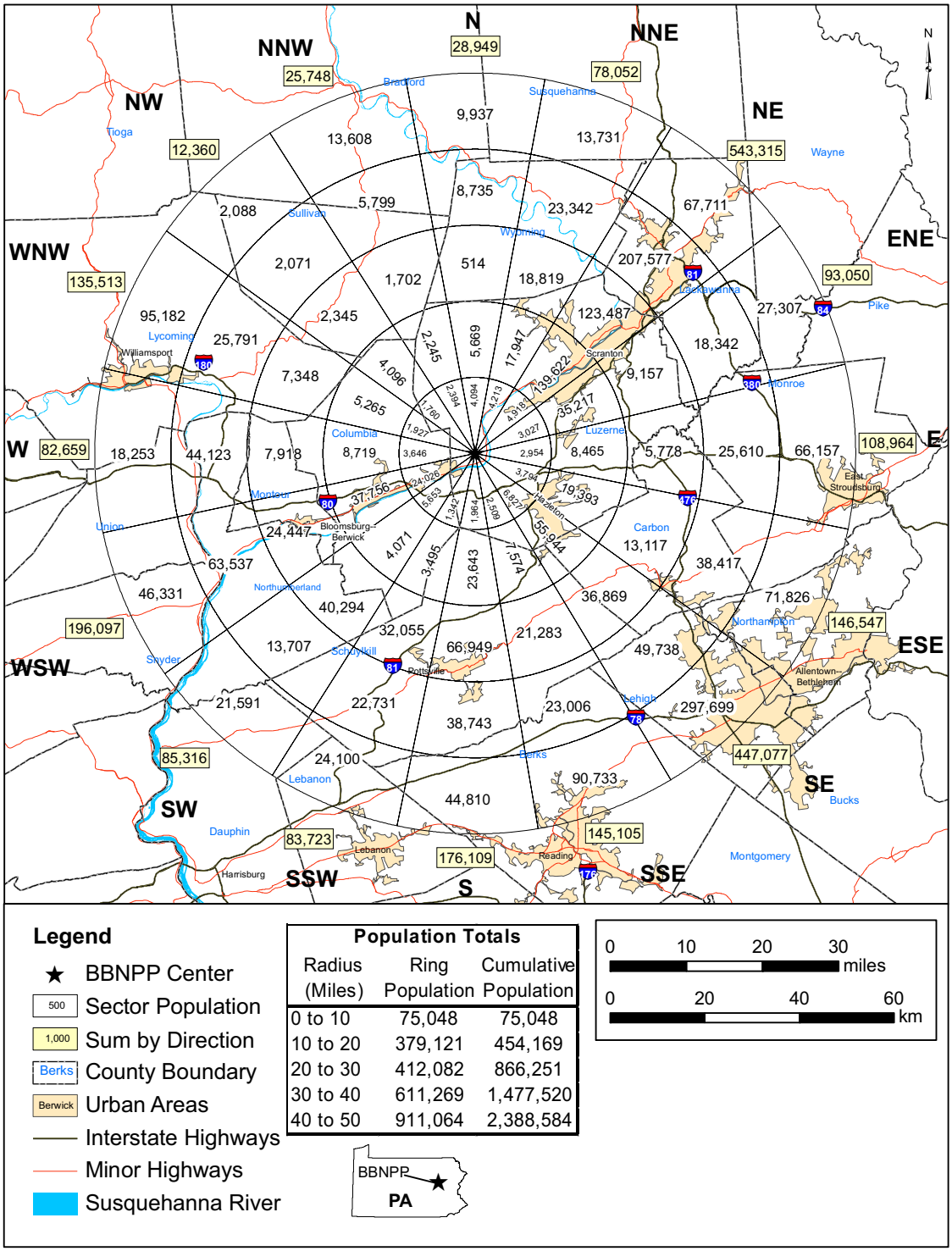


Figure 2.1-26— {BBNPP 50 mi (80 km) 2070 Population Distribution

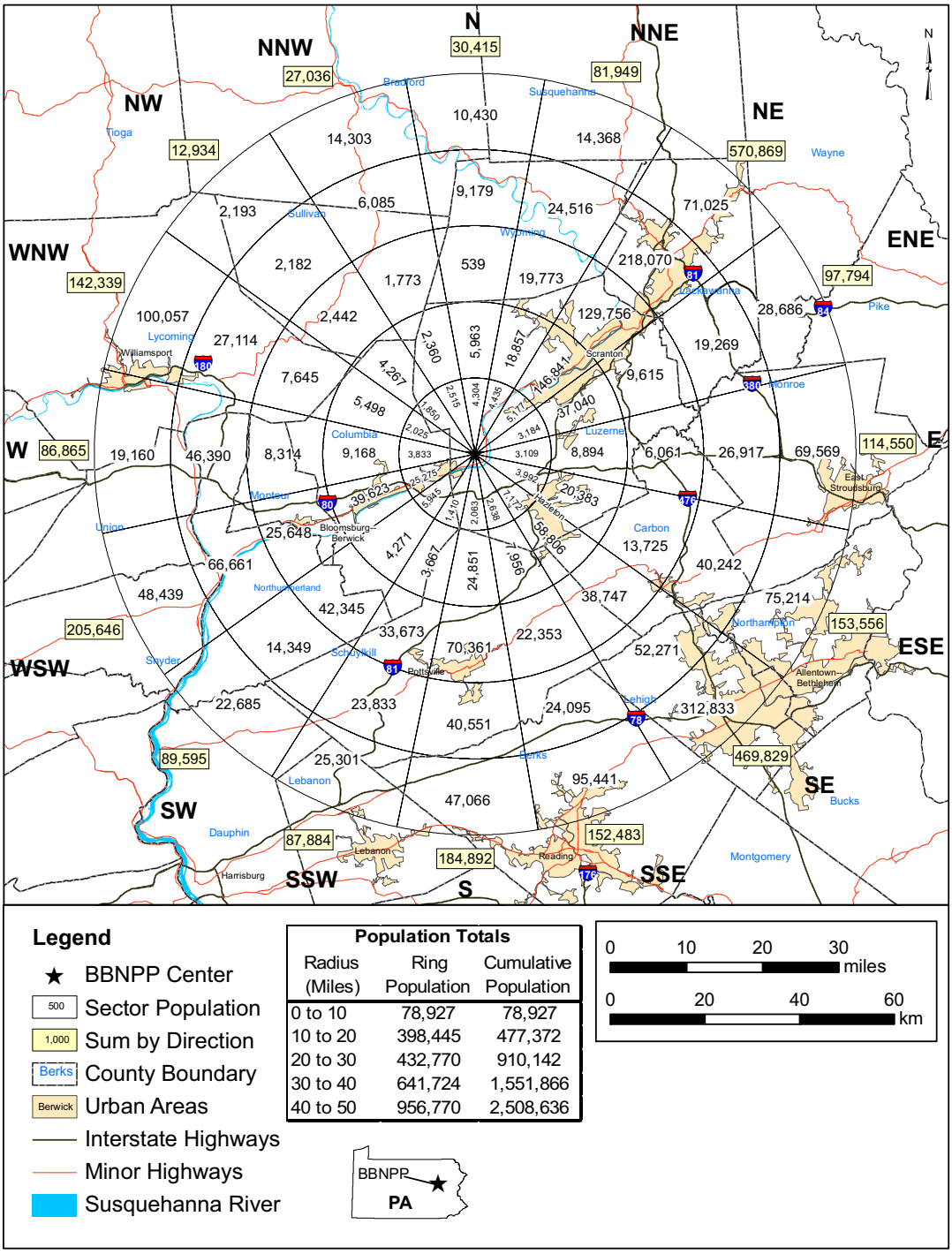


Figure 2.1-27— {BBNPP 50 mi (80 km) 2080 Population Distribution

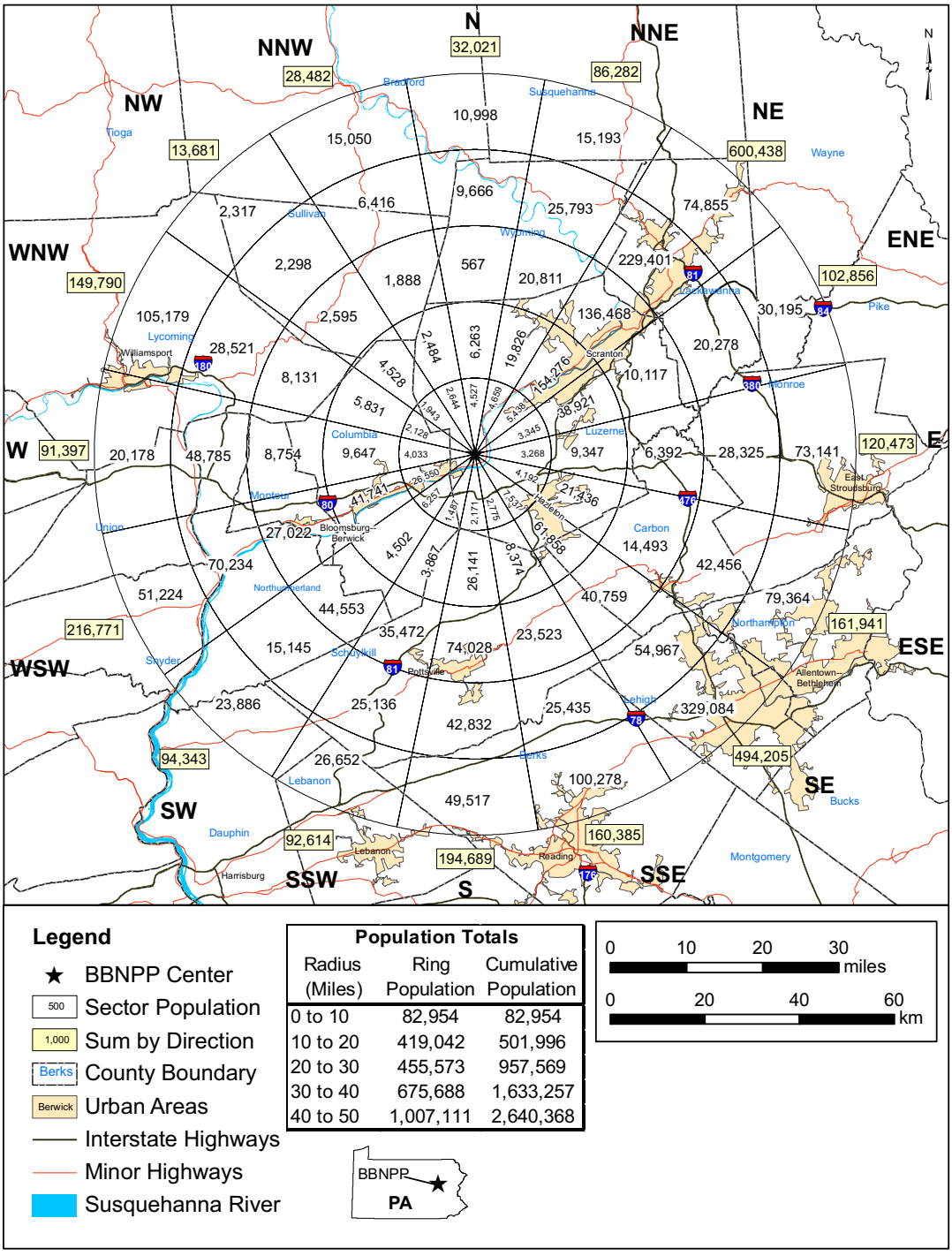


Figure 2.1-28— {BBNPP Low Population Zone}

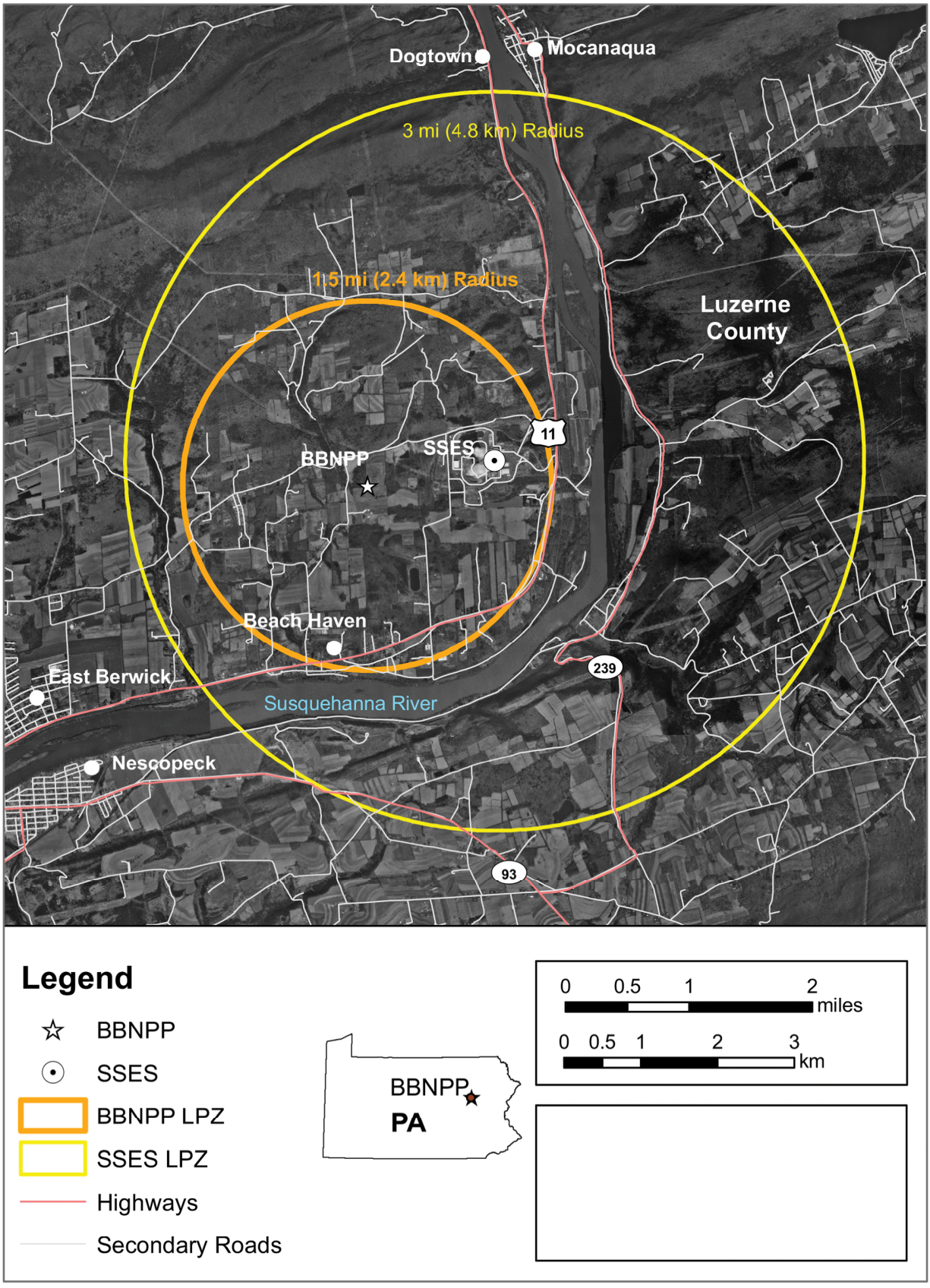


Figure 2.1-29— {BBNPP 50 Mile (80 km) 2018 Population Distribution}

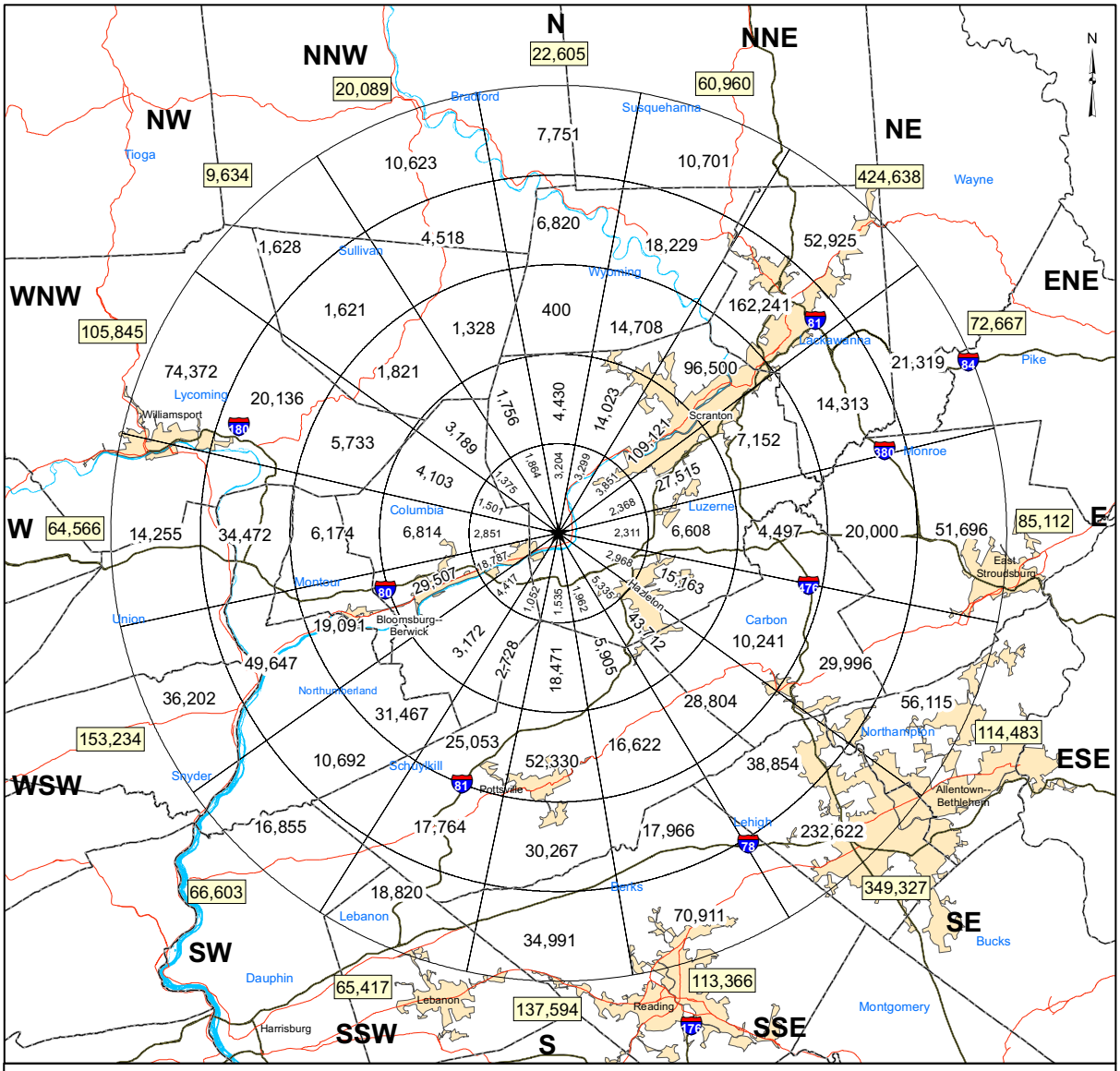


Figure 2.1-30— {BBNPP 50 Mile (80 km) 2058 Population Distribution}

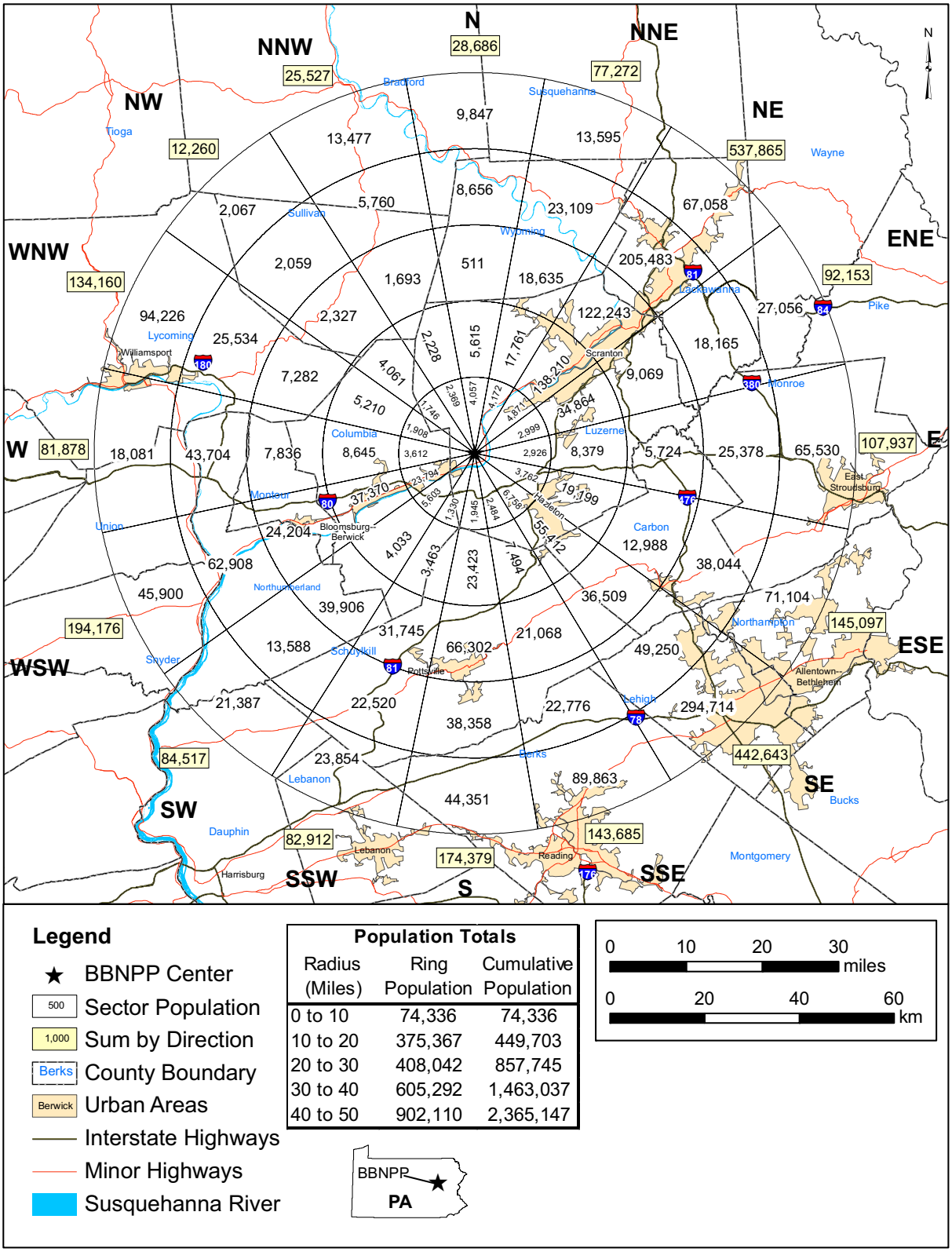


Figure 2.1-31— {BBNPP Vicinity Population Compared to NRC Siting Criteria