

DRAFT ENVIRONMENTAL IMPACT STATEMENT

SPACEX STARSHIP-SUPER HEAVY LAUNCH VEHICLE AT LAUNCH COMPLEX 39A

at the Kennedy Space Center, Merritt Island, Florida

Volume II, Appendix C.1, Part 2

August 2025



**Federal Aviation
Administration**

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TABLE OF CONTENTS

Appendix C	Resource Area Supporting Information	C-1
C.1	Noise Assessment and Noise Assessment Appendix.....	C-1
C.1.1	Noise Assessment	C-1
C.1.2	Noise Assessment Appendix.....	C-2
C.2	Air Quality Assessment.....	C-3
C.2.1	Engine Emissions Analysis	C-3
C.2.2	ACAM Construction Analysis	C-6
C.3	Biological Resources Supplemental Information.....	C-143
C.3.1	State-Listed Species	C-143
C.3.2	Migratory Bird Species	C-145
C.3.3	Marine Mammal Species in the Study Area	C-148

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C.1.2 Noise Assessment Appendix

STARSHIP AT KENNEDY SPACE CENTER LAUNCH COMPLEX 39A EIS NOISE REPORT APPENDIX

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Leidos, Inc.



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Table of Contents

Sections

1	INTRODUCTION	4
2	CUMULATIVE ROCKET NOISE AND SONIC BOOM MODELING RESULTS AT LC-39A.....	5
2.1	CUMULATIVE ROCKET NOISE RESULTS AT LC-39A	5
2.1.1	Day-Night Average Sound Level (DNL) Contour Figures: Mean Annual	5
2.1.2	DNL Contour Figures: Summer Day	12
2.1.3	DNL Contour Figures: Summer Night.....	16
2.1.4	DNL Contour Figures: Winter Day.....	20
2.1.5	DNL Contour Figures: Winter Night	24
2.1.6	DNL at Points of Interest for All Weather Variations.....	28
2.2	CUMULATIVE SONIC BOOM EXPOSURE RESULTS AT LC-39A	35
2.2.1	C-weighted Day-Night Average Sound Level (CDNL) Contour Figures: Mean Annual.....	35
2.2.2	CDNL Contour Figures: Summer Day	42
2.2.3	CDNL Contour Figures: Summer Night	46
2.2.4	CDNL Contour Figures: Winter Day.....	50
2.2.5	CDNL Contour Figures: Winter Night.....	54
2.2.6	CDNL at Points of Interest for All Weather Variations.....	58
3	SINGEL EVENT STARSHIP NOISE AND SONIC BOOM MODELING RESULTS AT LC-39A.....	65
3.1	SINGLE EVENT ROCKET NOISE RESULTS AT LC-39A	65
3.1.1	Single Event Rocket Noise Contour Figures: Maximum A-weighted Sound Level (L_{Amax}), Sound Exposure Level (SEL), and Maximum Unweighted Sound Level (L_{max}): Mean Annual	65
3.1.2	Rocket Noise: L_{Amax} , SEL, and L_{max} Contour Figures: Summer Day	88
3.1.3	Rocket Noise: L_{Amax} , SEL, and L_{max} Contour Figures: Summer Night.....	110
3.1.4	Rocket Noise: L_{Amax} , SEL, and L_{max} Contour Figures: Winter Day.....	132
3.1.5	Rocket Noise: L_{Amax} , SEL, and L_{max} Contour Figures: Winter Night	154
3.1.6	Rocket Noise: L_{Amax} , SEL, and L_{max} Levels at Points of Interest [Tables]	176
3.2	SINGLE EVENT SONIC BOOM EXPOSURE RESULTS AT LC-39A.....	212
3.2.1	Single Event Sonic Boom Contour Figures: Overpressure (psf): Mean Annual	212
3.2.2	Overpressure Contour Figures: Summer Day	218
3.2.3	Overpressure Contour Figures: Summer Night	224

3.2.4 Overpressure Contour Figures: Winter Day 230

3.2.5 Overpressure Contour Figures: Winter Night..... 236

3.2.11 Single Event Sonic Boom Exposure Results at Points of Interest [Tables] 242

4 REFERENCES 263

1 INTRODUCTION

Space Exploration Technologies Corporation (SpaceX) proposes to conduct launch, reentry, and ground test operations of their Starship launch vehicle at Kennedy Space Center (KSC) Launch Complex 39A (LC-39A). Under the supervision of the Federal Aviation Administration (FAA) Office of Commercial Space Transportation as lead agency, and with the National Aeronautics and Space Administration (NASA) participating as a cooperating agency, SpaceX is preparing an Environmental Impact Statement (EIS) to evaluate the potential environmental impacts of proposed infrastructure construction and Starship operations. To support the EIS, KBR, Inc. has estimated noise levels for the Starship operations at LC-39A. The Starship spacecraft, which is currently under development, has a length of seventy meters and a diameter of nine meters, will be attached to a Super Heavy booster rocket (length of eighty meters) to form the Starship launch vehicle intended to provide long-duration cargo- and passenger-carrying capability. Both vehicles have vertical take-off and landing (VTOL) capability and are fully reusable. The Starship spacecraft would use nine Raptor engines that each provide sea-level thrust of about 3.19 Meganewtons (MN) (or 6.45 million (MM) pound-force total) during flight operations and static fire tests. The Super Heavy, or booster, would use thirty-five Raptor engines that each provide sea-level thrust of about 2.94 MN (or 23.1 MM pound-force total) during launch and static fire tests.

A noise study¹ was conducted to estimate single event and cumulative noise levels, including rocket noise and sonic boom exposure, from future Starship launches, Starship spacecraft and booster Return to Launch Site (RTLS) landings, and static fire tests of both vehicles at LC-39A. Five weather conditions representing Cape Canaveral were analyzed in the noise study: Mean Annual, Summer Day, Summer Night, Winter Day, and Winter Night. While the noise study¹ reported noise results for the Mean Annual condition, as is typical for environmental noise studies, this appendix to the noise report contains all the noise results from the study, for all five weather conditions.

The table of contents indicates the organization of this appendix to the noise report which includes the cumulative rocket noise and sonic boom modeling results at LC-39A in Section 2 and the single event Starship rocket noise and sonic boom noise results in Section 3. Starship single event operations analyzed include Starship orbital launch, Starship spacecraft descent, Super Heavy booster descent (on 3 trajectories from an 80-degree heading (Nominal), 40-degrees, and 115-degrees), Starship spacecraft static fire test, and Super Heavy booster static fire test. Sections 2 and 3 contain subsections for the rocket noise results and sonic boom results generated in the study which show, for all five weather conditions and noise metrics analyzed, the resulting noise contour figures and the noise levels at the twenty-four noise sensitive receptors or points of interest.

The reader is referred to the noise report to understand the full details of the Starship at LC-39A noise modeling study and how the noise results presented in this appendix were generated.

2 CUMULATIVE ROCKET NOISE AND SONIC BOOM MODELING RESULTS AT LC-39A

2.1 CUMULATIVE ROCKET NOISE RESULTS AT LC-39A

2.1.1 Day-Night Average Sound Level (DNL) Contour Figures: Mean Annual

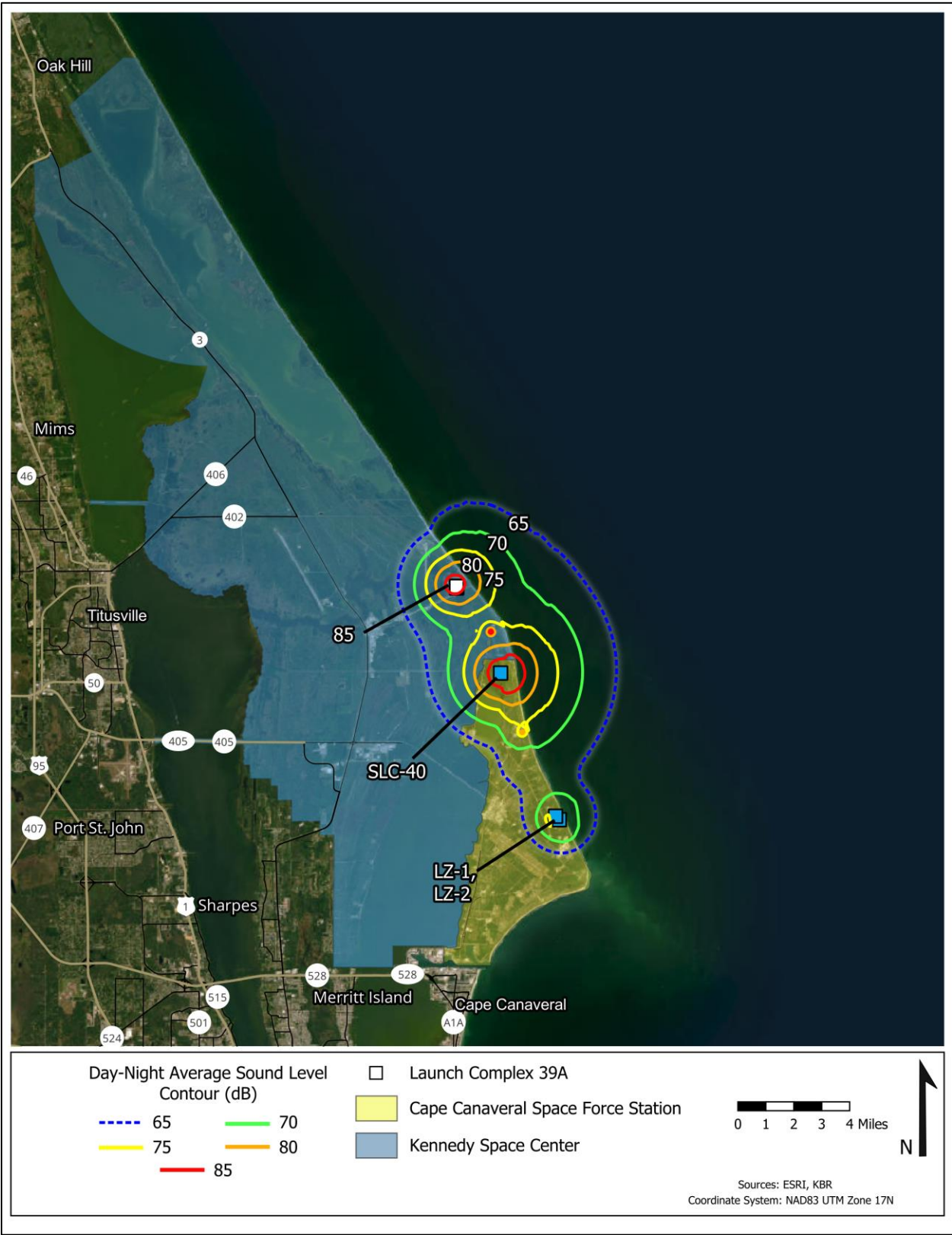


Figure 1. KSC and CCSFS Baseline Rocket Noise Exposure: Mean Annual: DNL Contours

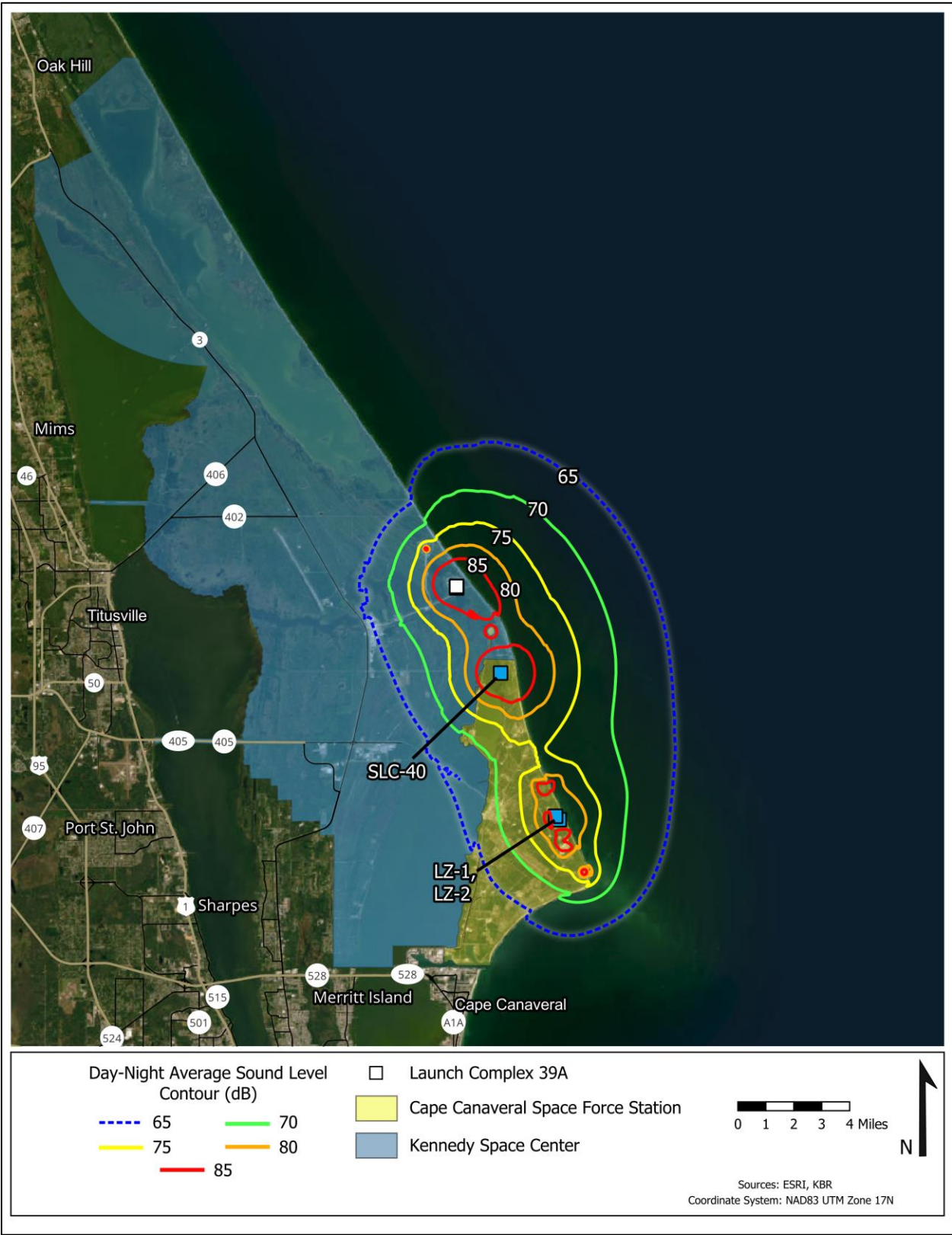


Figure 2. KSC and CCSFS No Action Rocket Noise Exposure: Mean Annual: DNL Contours

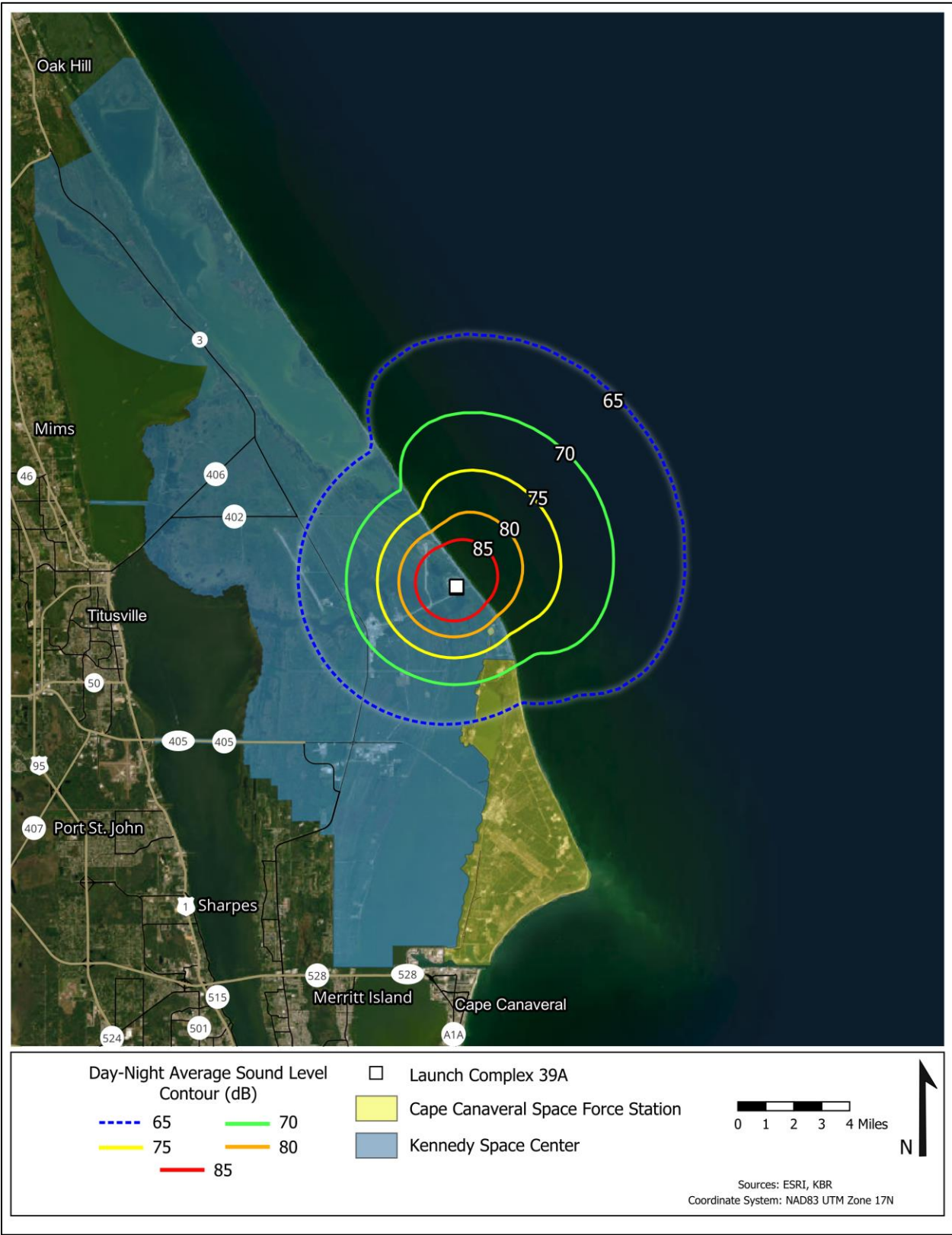


Figure 3. Starship Combined Operations at LC-39A: Mean Annual: DNL Contours

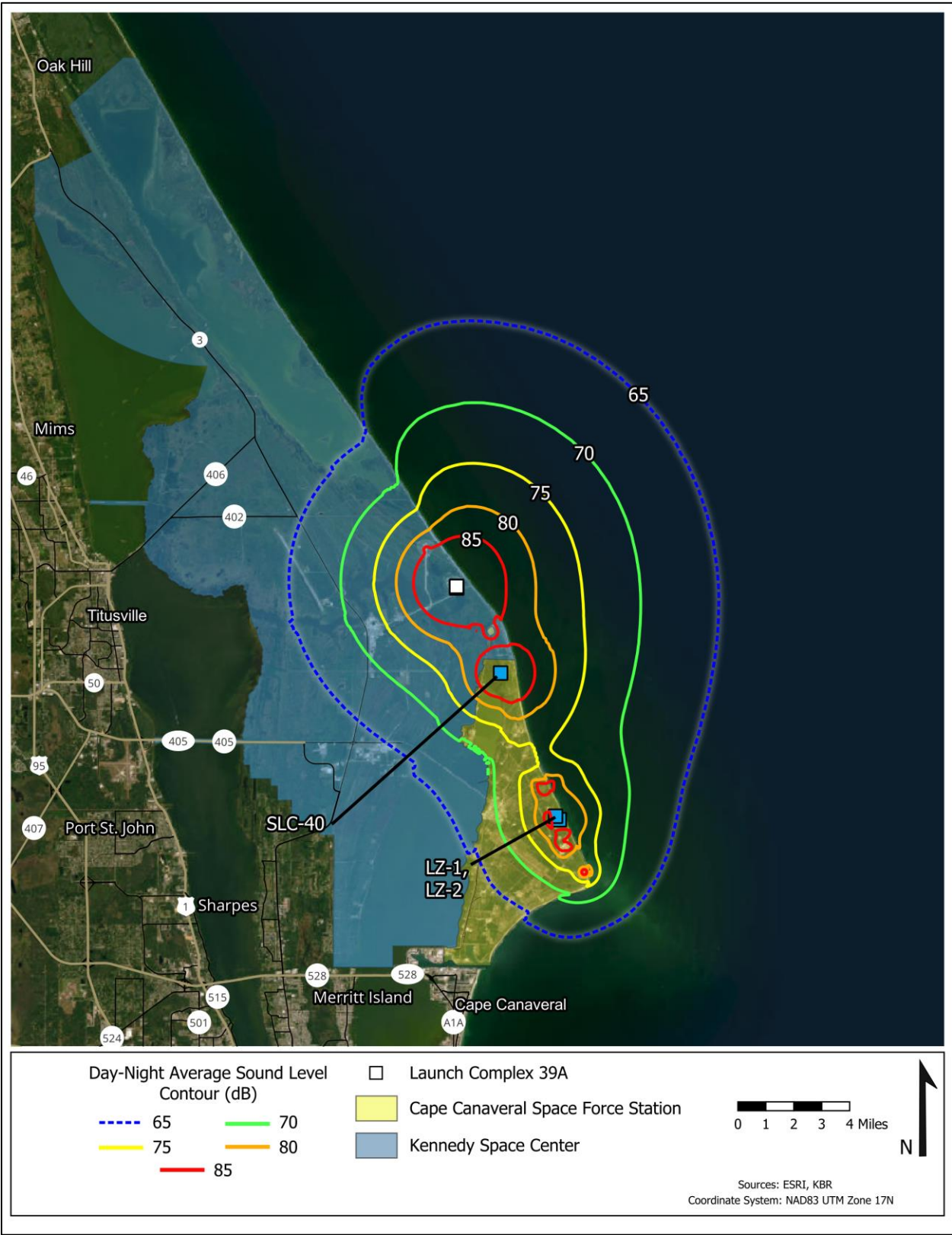


Figure 4. Proposed Action Rocket Noise Exposure: Mean Annual: DNL Contours

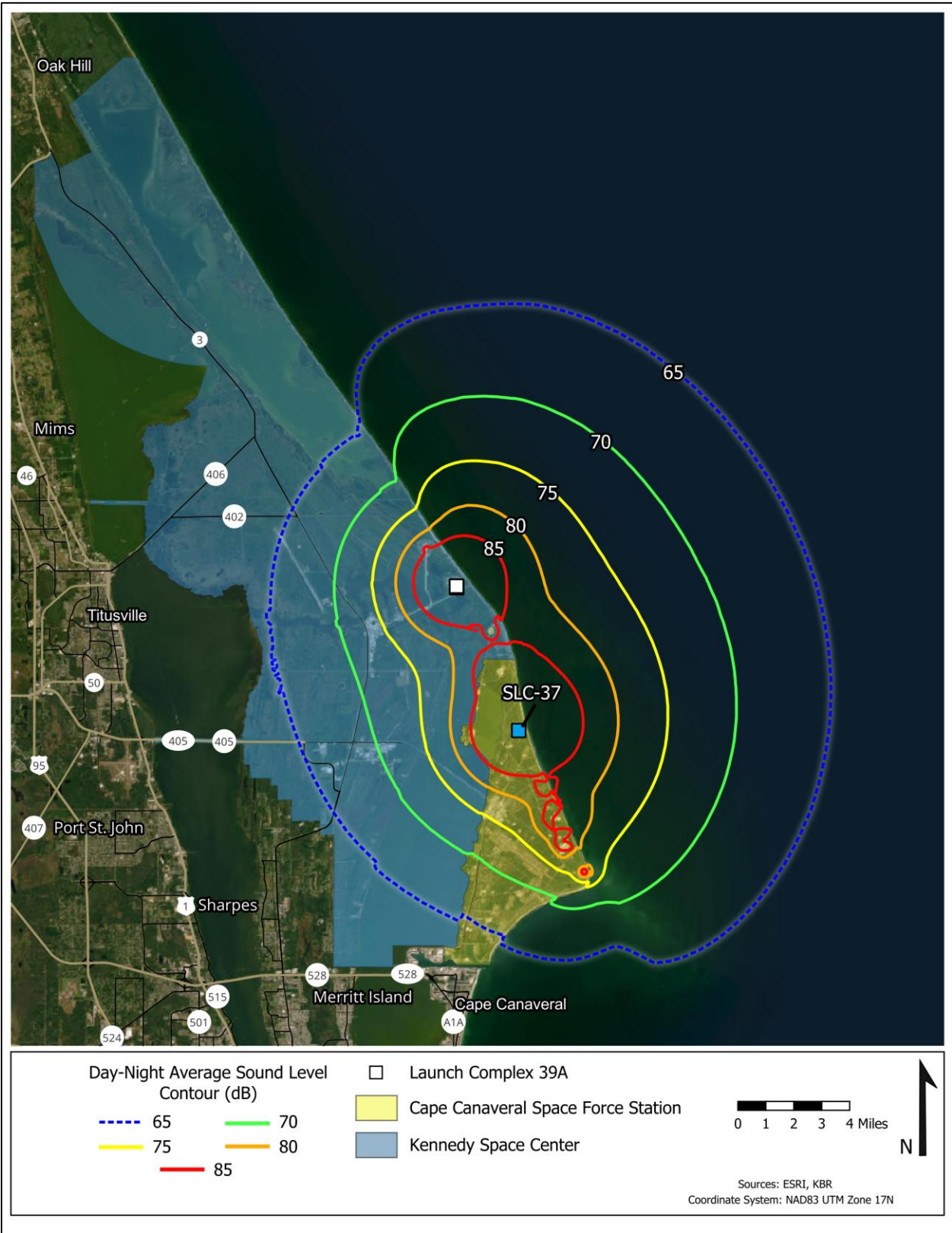


Figure 5. Reasonably Foreseeable Future Actions Rocket Noise Exposure: Mean Annual: DNL Contours

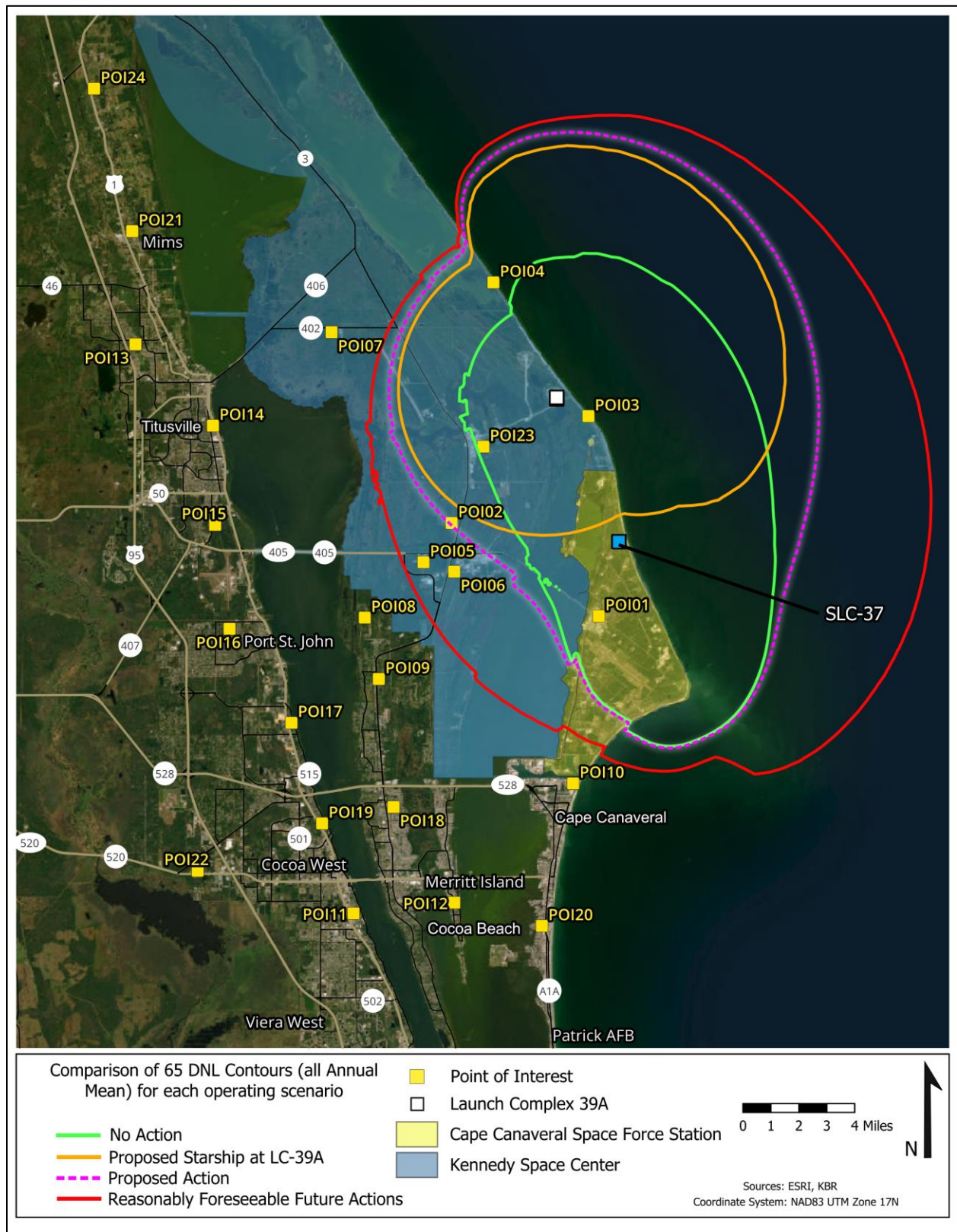


Figure 6. Comparison of 65 DNL Contours for All Operation Scenarios: Mean Annual

2.1.2 DNL Contour Figures: Summer Day

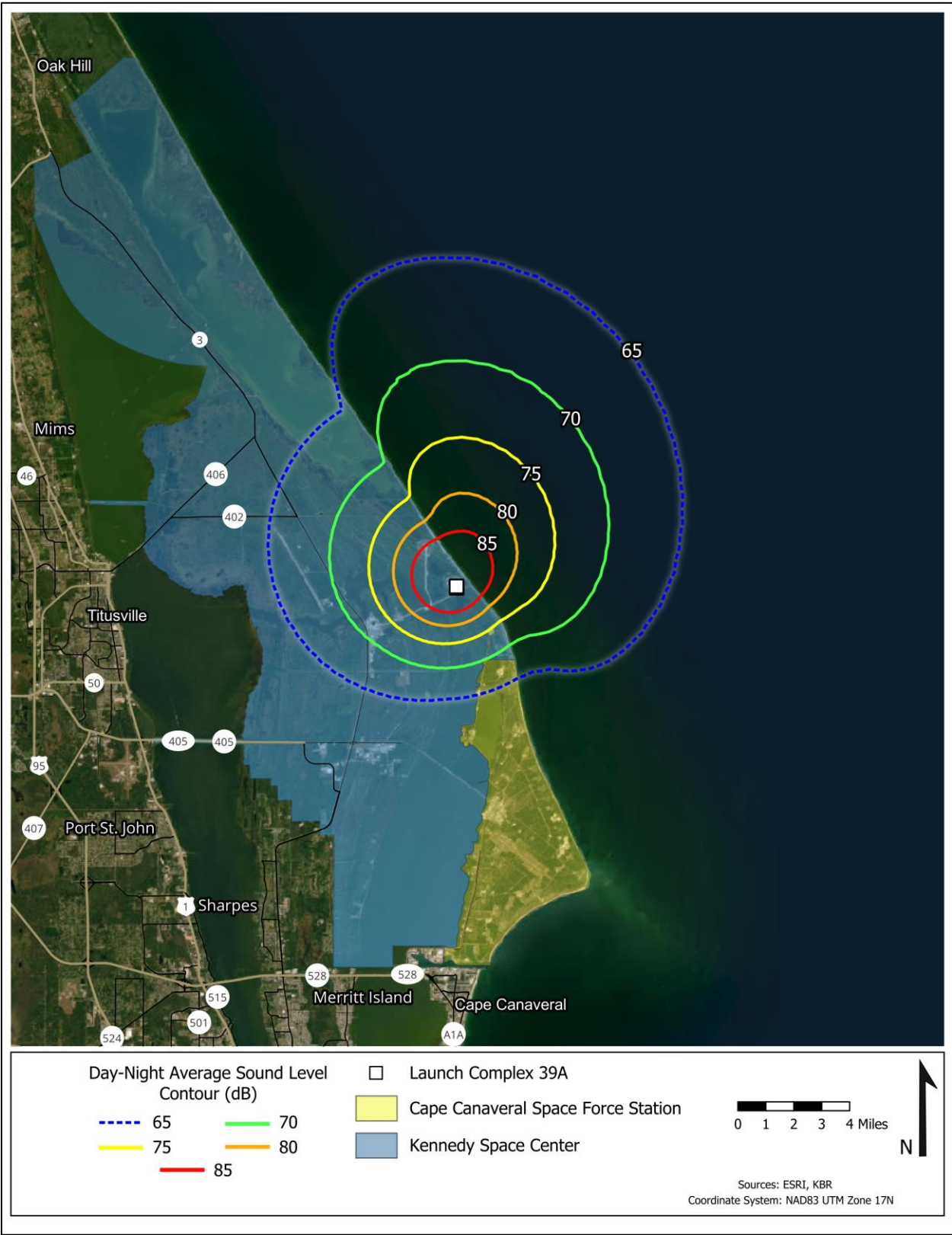


Figure 7. Starship Combined Operations at LC-39A: Summer Day: DNL Contours

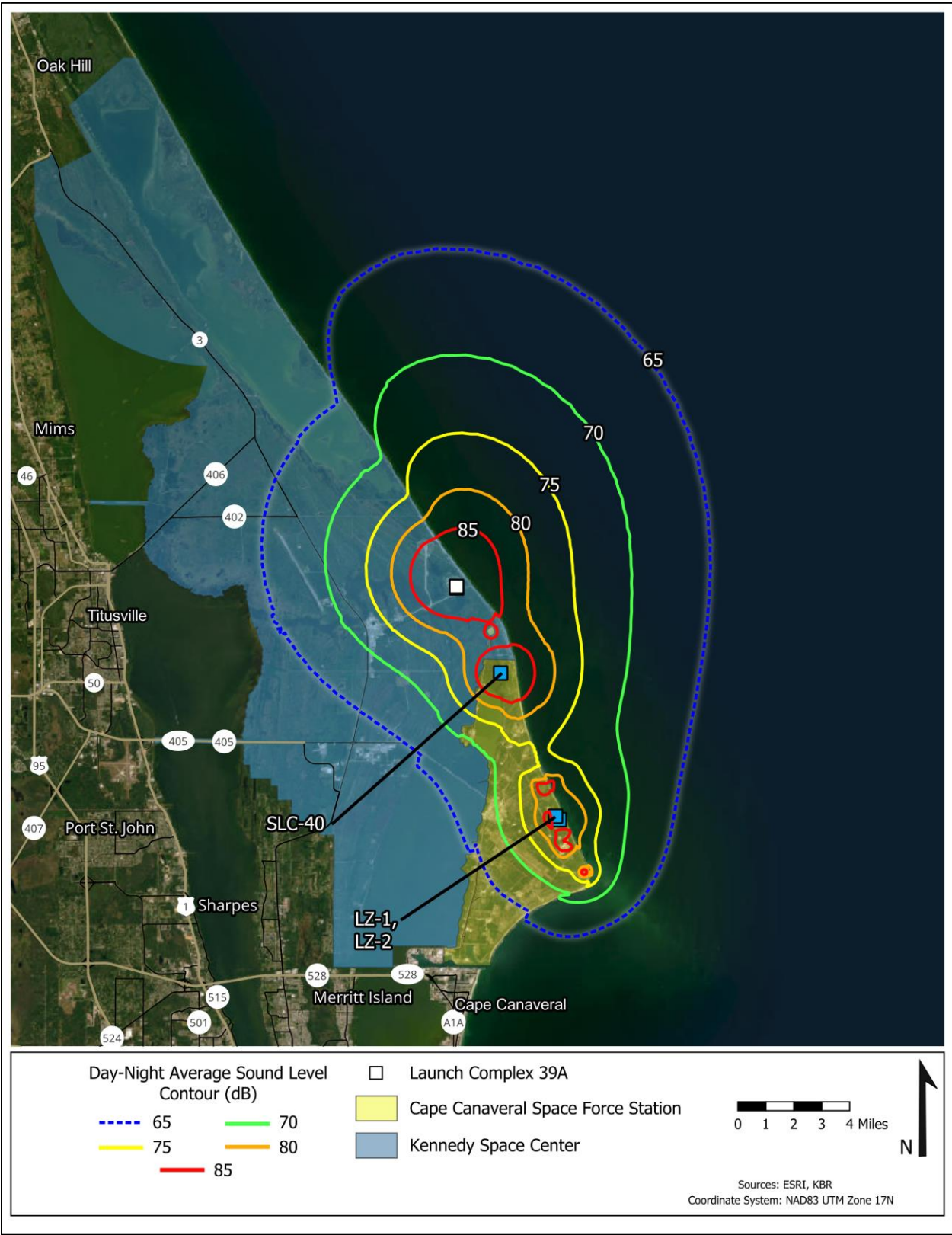


Figure 8. Proposed Action Rocket Noise Exposure: Summer Day: DNL Contours

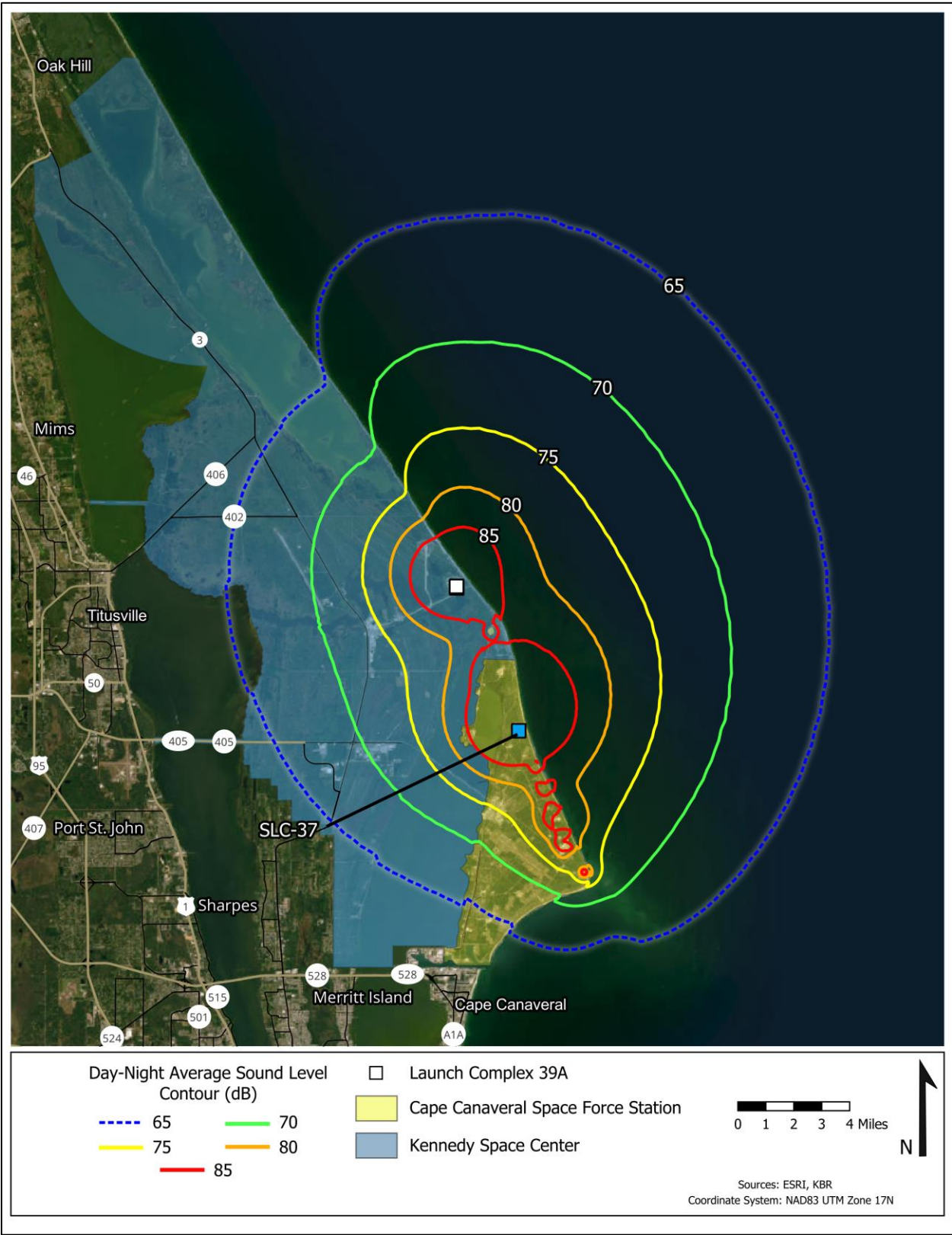


Figure 9. Reasonably Foreseeable Future Actions Rocket Noise Exposure: Summer Day: DNL Contours

2.1.3 DNL Contour Figures: Summer Night

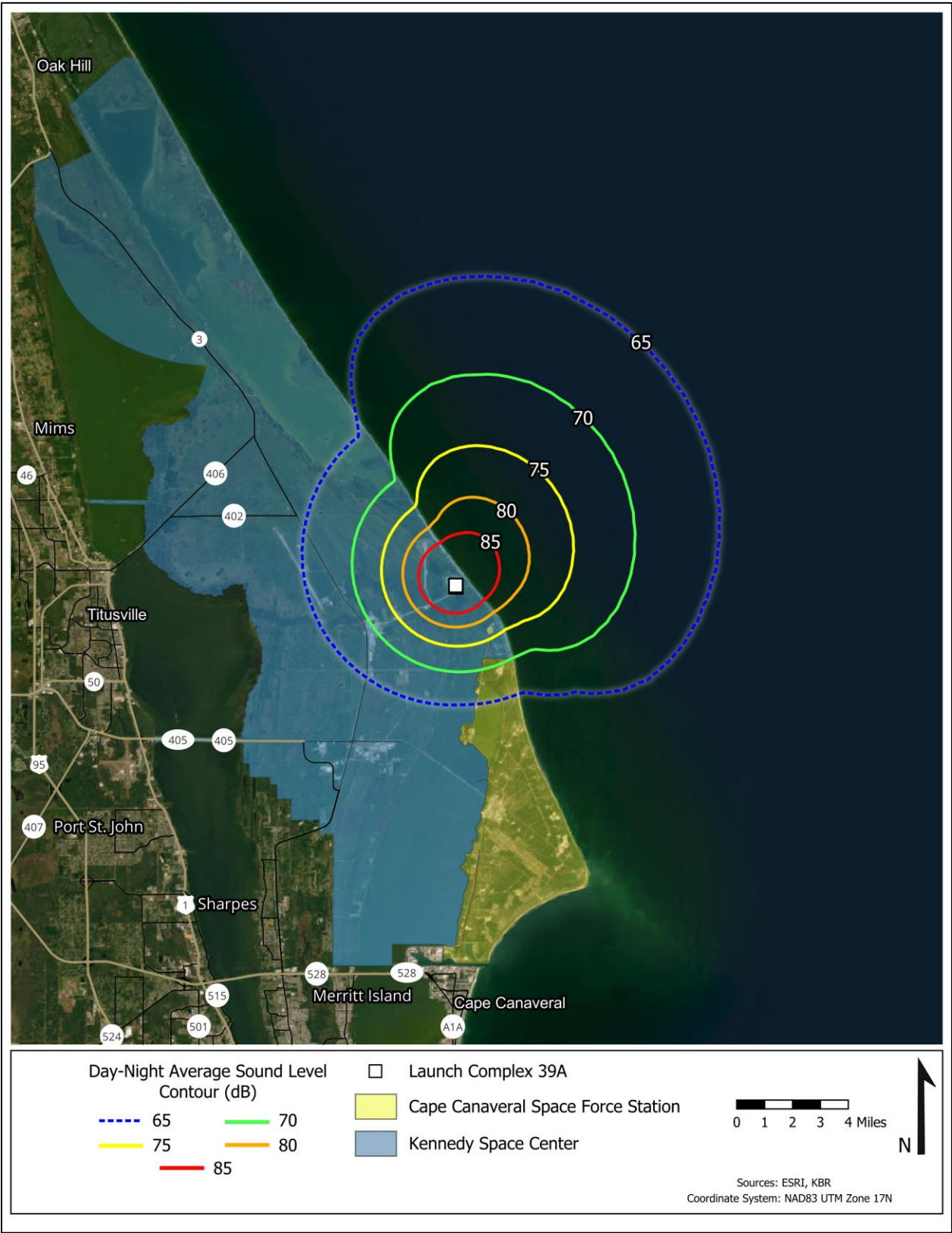


Figure 10. Starship Combined Operations at LC-39A: Summer Night: DNL Contours

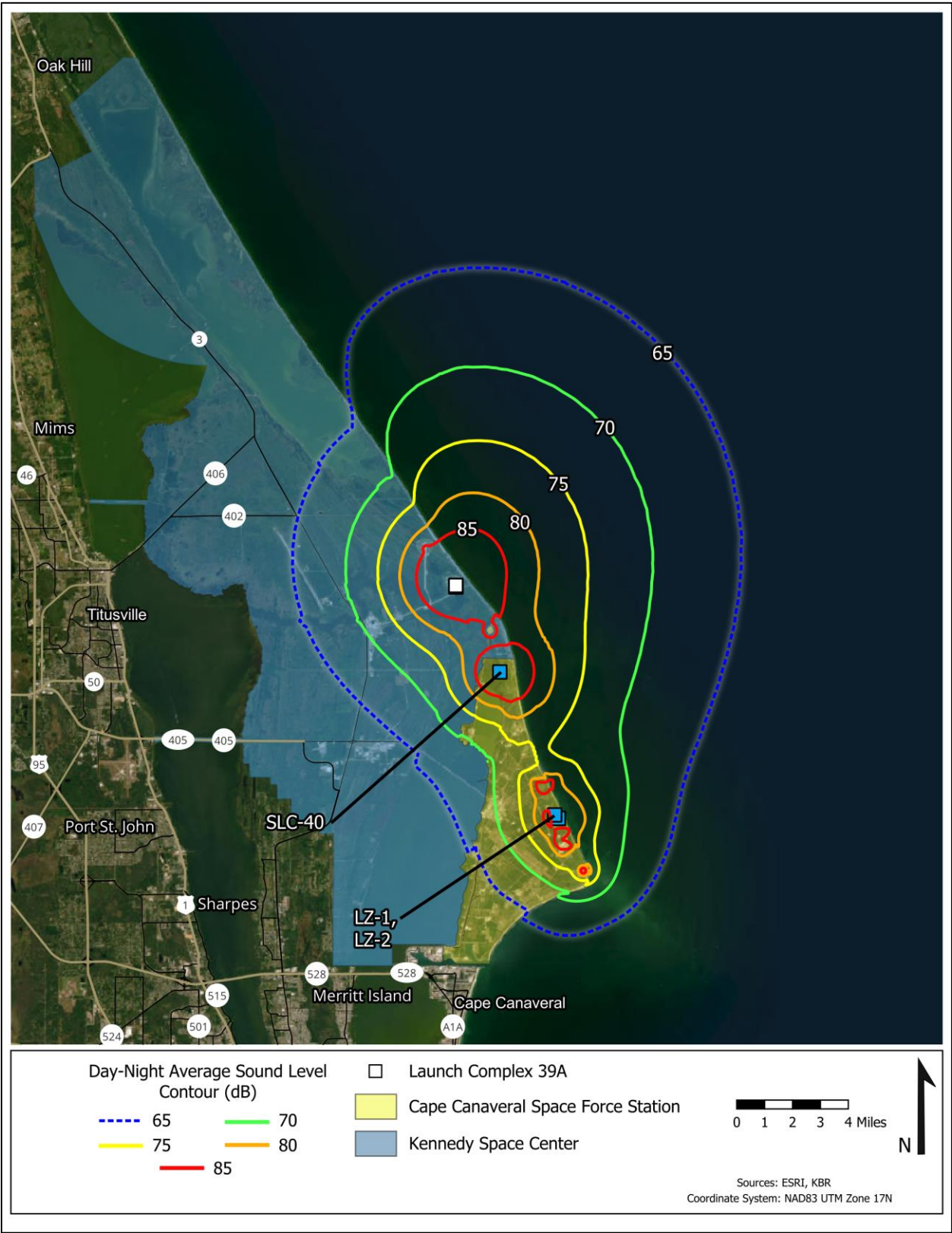


Figure 11. Proposed Action Rocket Noise Exposure: Summer Night: DNL Contours

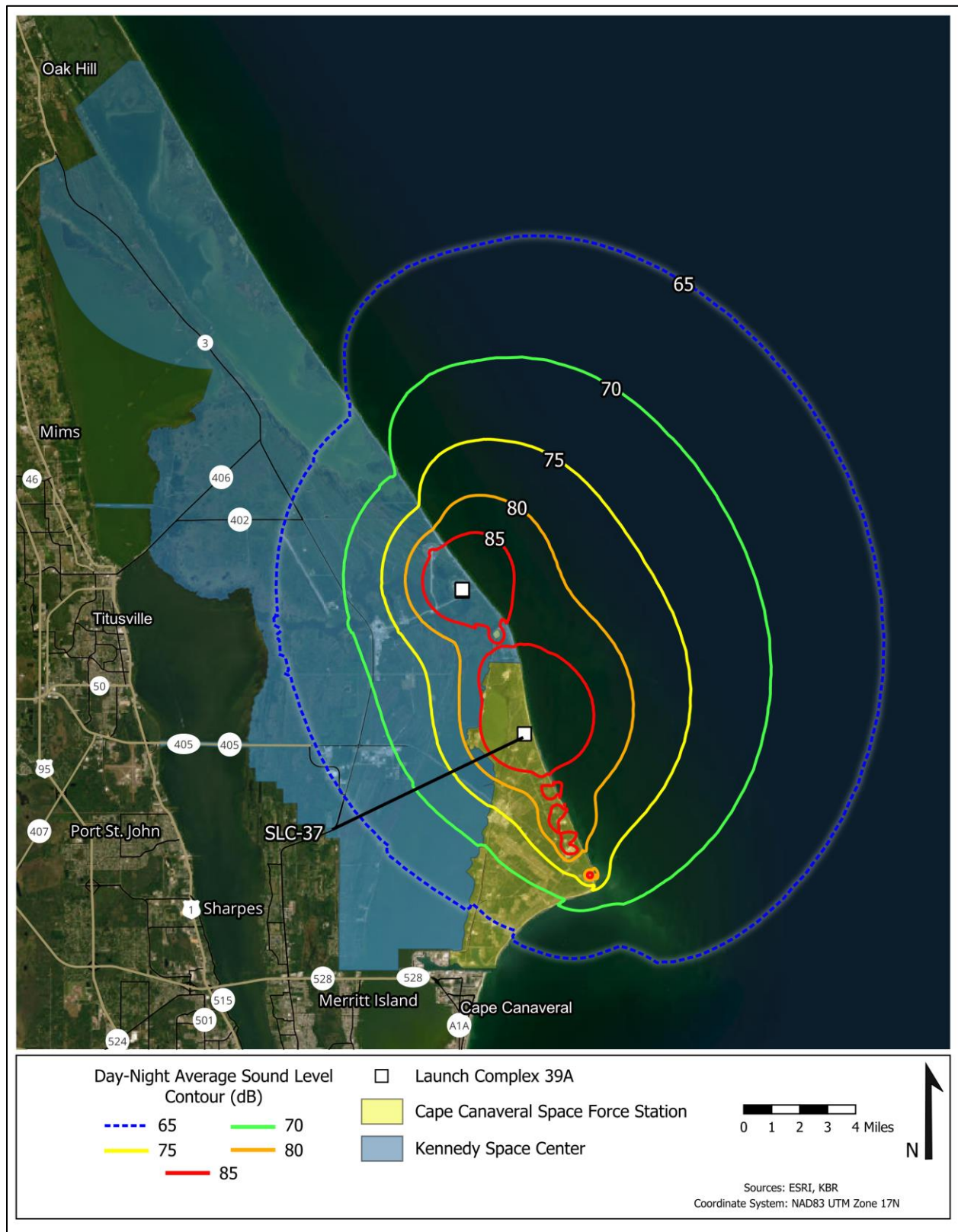
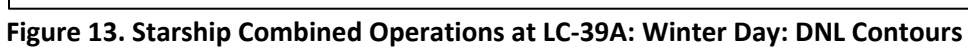


Figure 12. Reasonably Foreseeable Future Actions Rocket Noise Exposure: Summer Night: DNL Contours

2.1.4 DNL Contour Figures: Winter Day



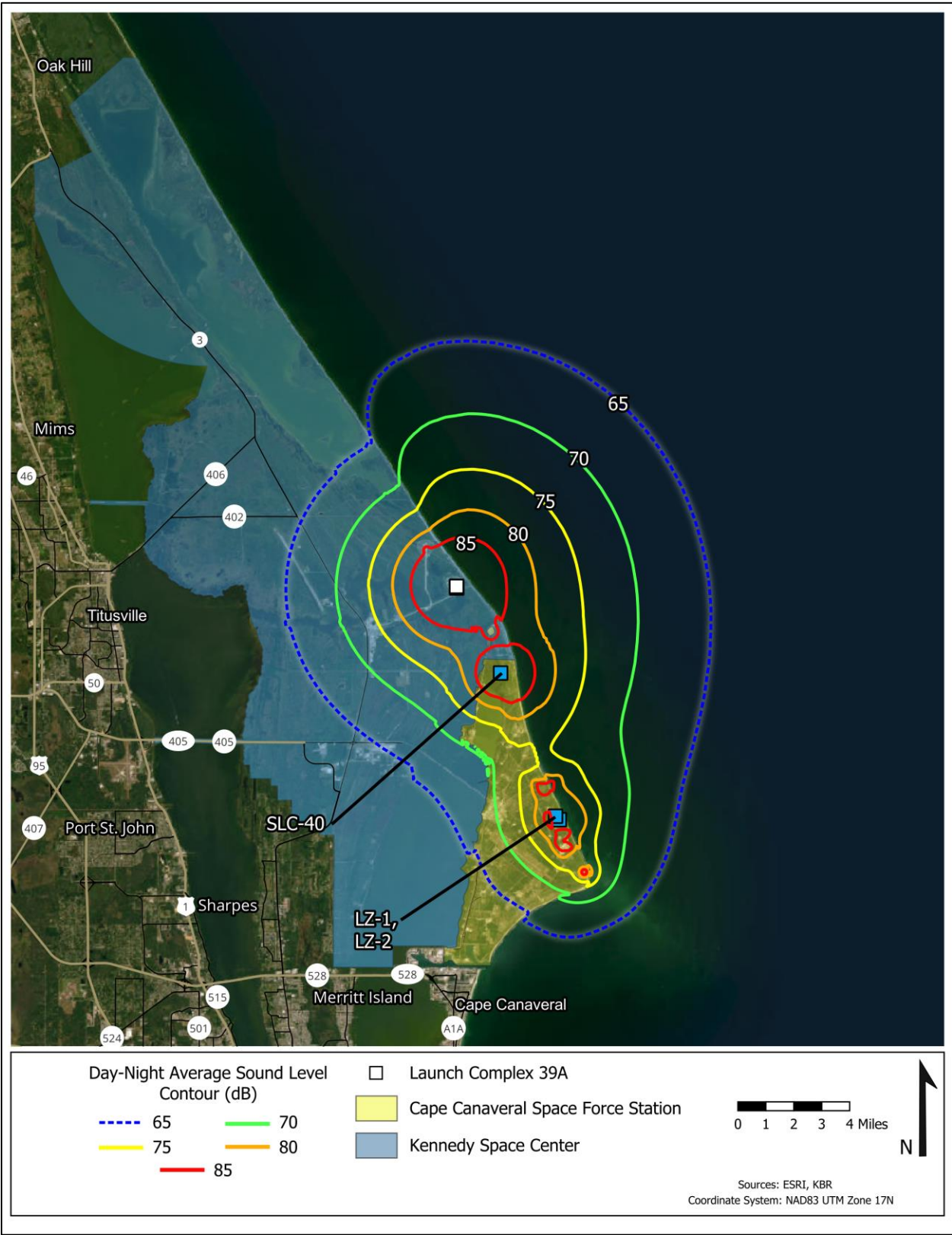


Figure 14. Proposed Action Rocket Noise Exposure: Winter Day: DNL Contours

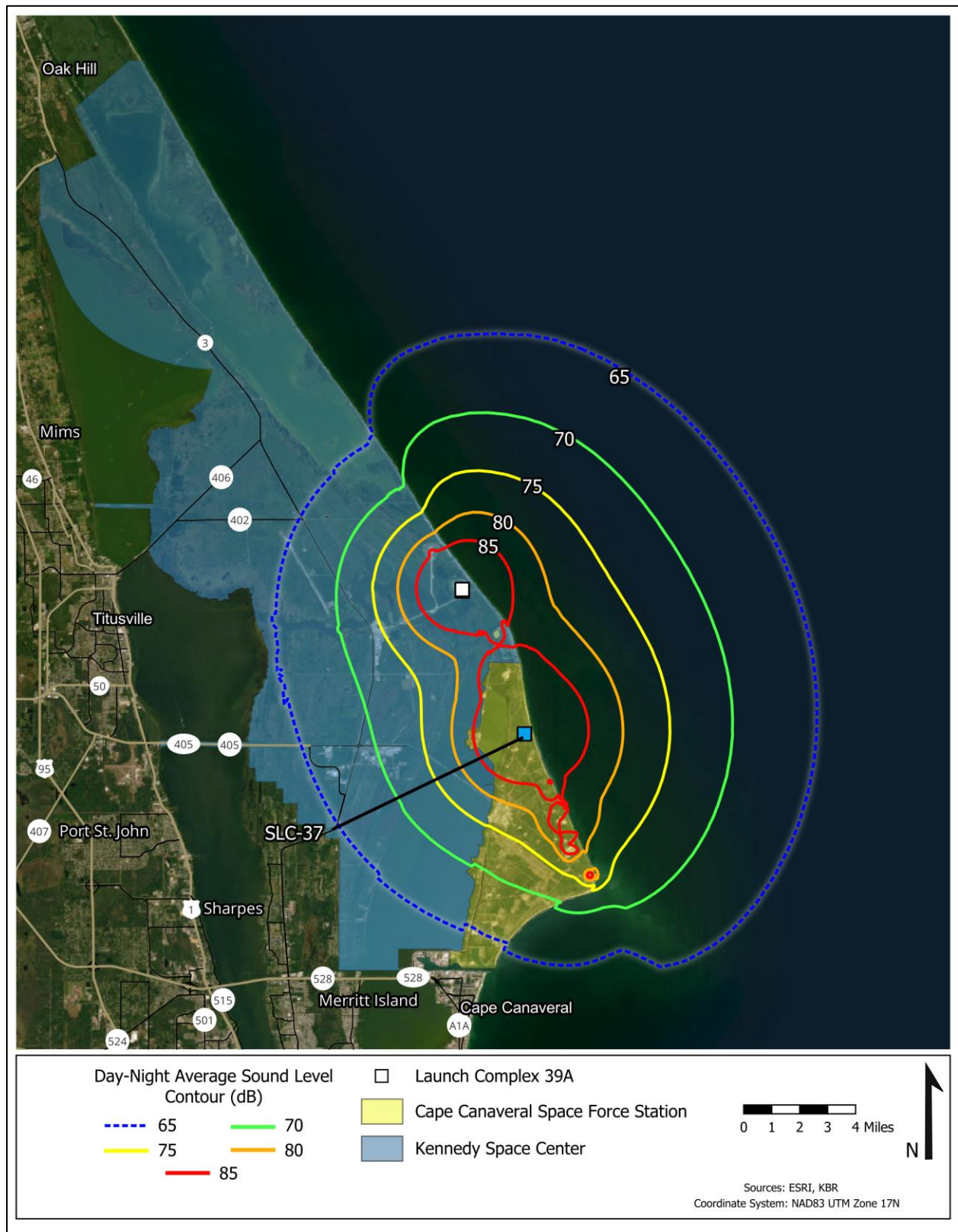


Figure 15. Reasonably Foreseeable Future Actions Rocket Noise Exposure: Winter Day: DNL Contours

2.1.5 DNL Contour Figures: Winter Night

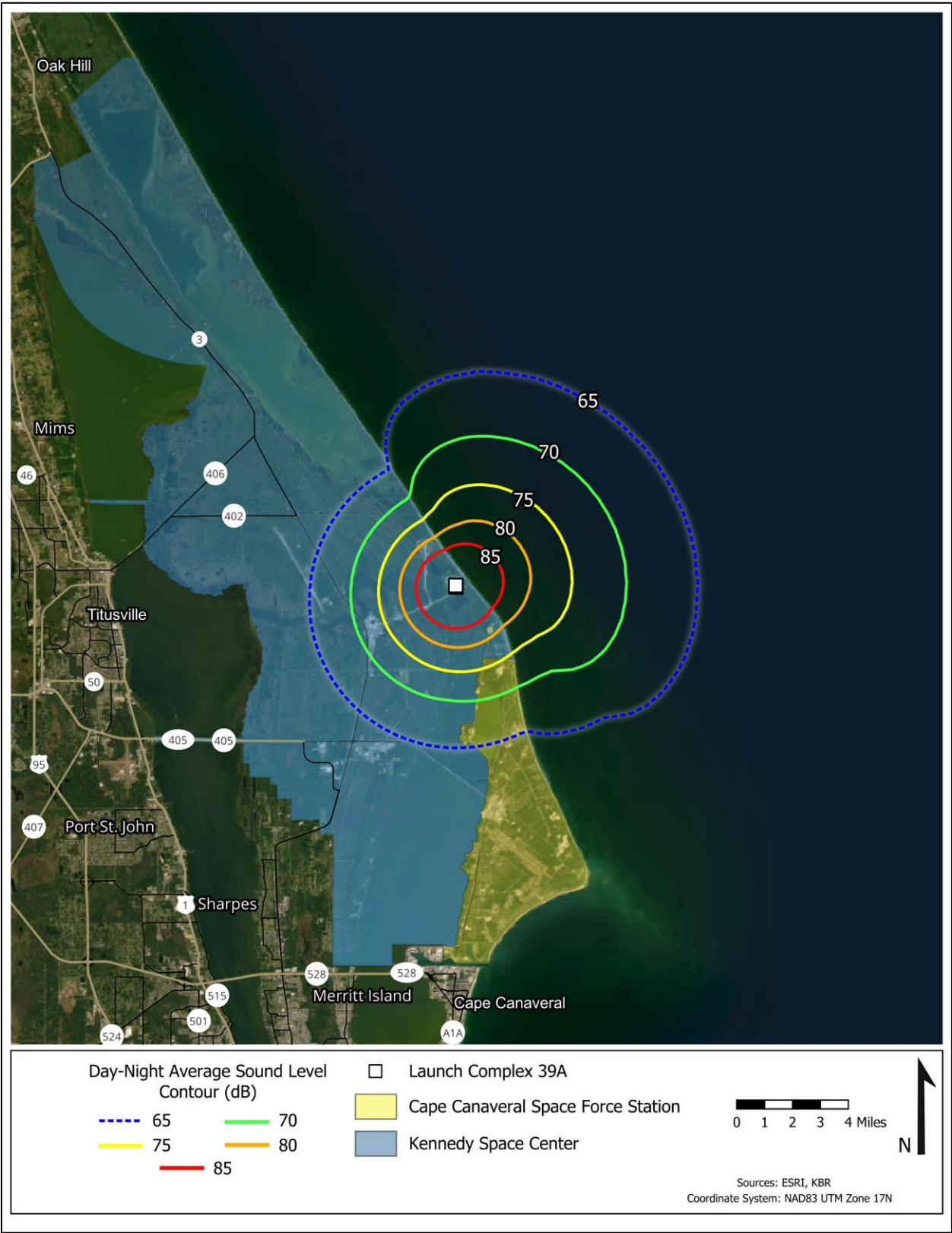


Figure 16. Starship Combined Operations at LC-39A: Winter Night: DNL Contours

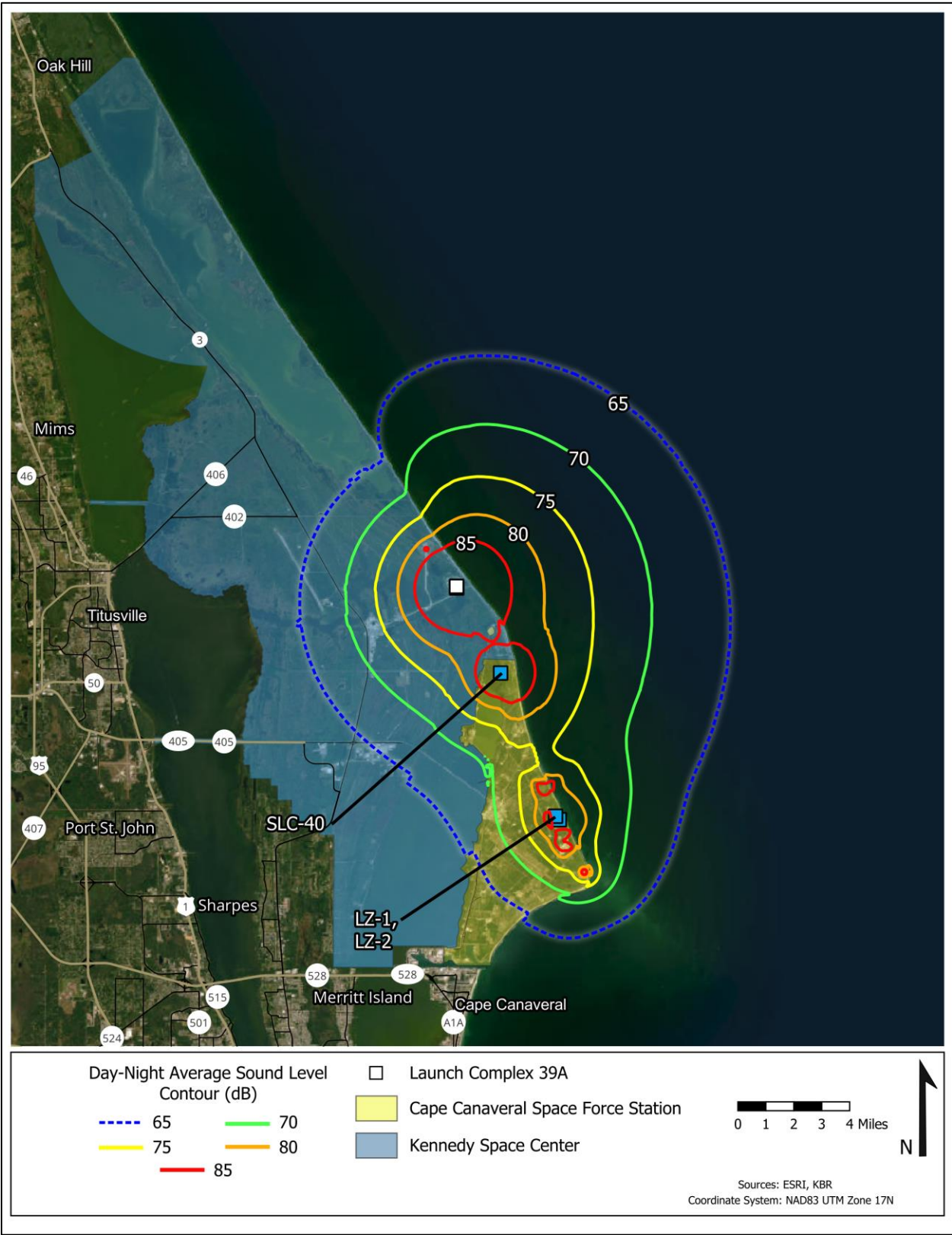


Figure 17. Proposed Action Rocket Noise Exposure: Winter Night: DNL Contours

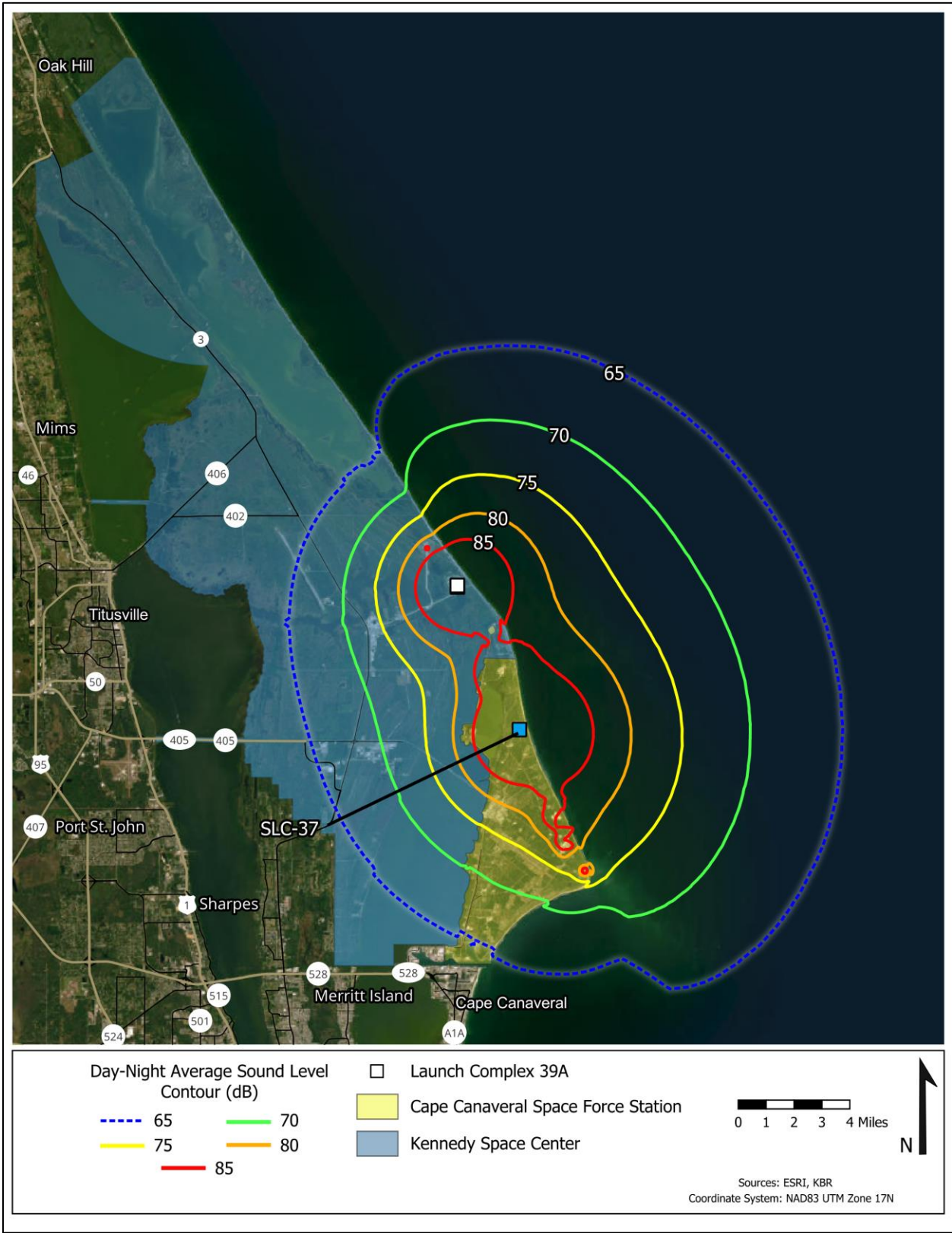


Figure 18. Reasonably Foreseeable Future Actions Rocket Noise Exposure: Winter Night: DNL Contours

2.1.6 DNL at Points of Interest for All Weather Variations

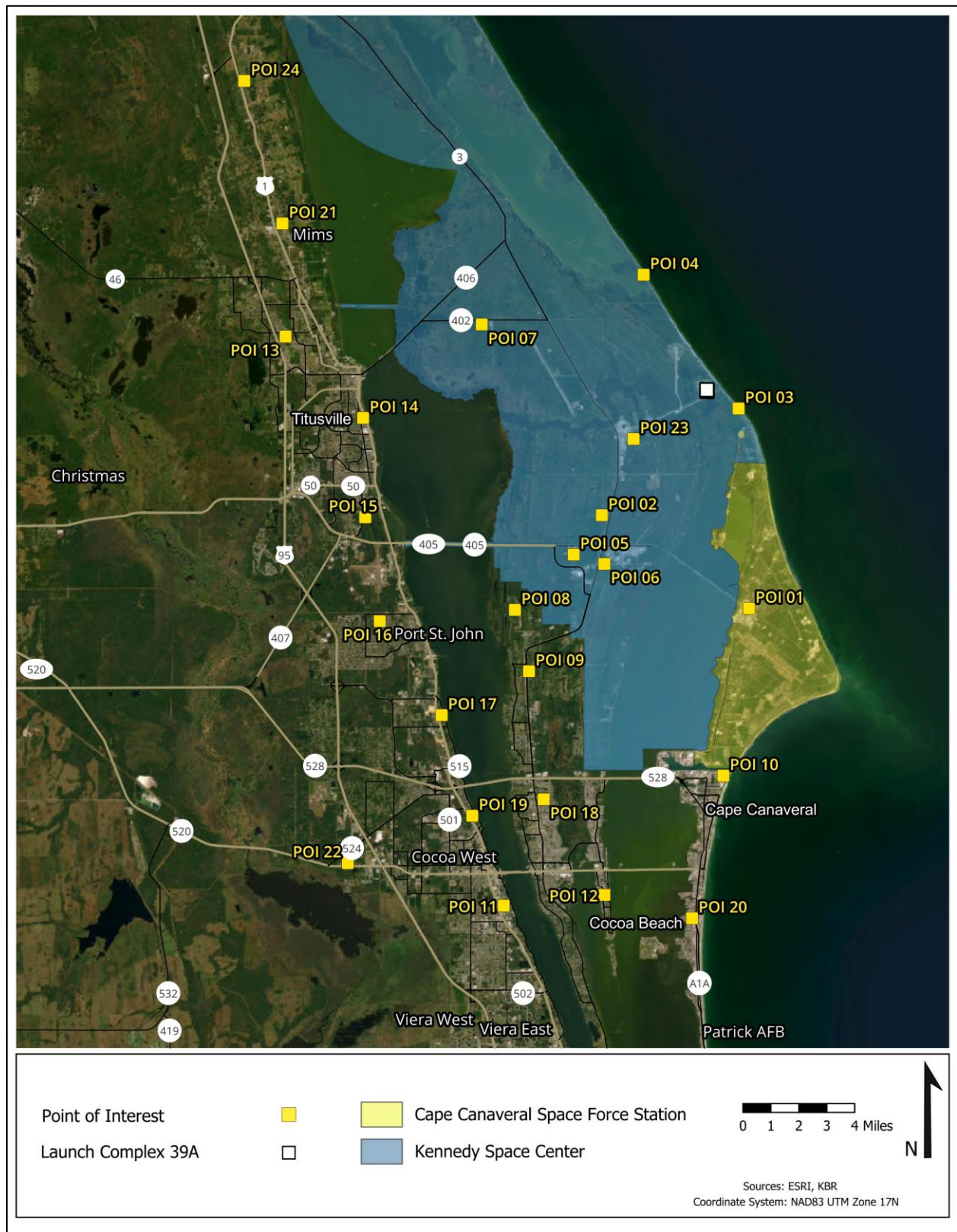


Figure 19. Points of Interest (POIs) In the Vicinity of LC-39A

Table 1. Comparison of DNL at the Points of Interest for all Operation Scenarios: Annual Mean

Point of Interest	Day-Night Average Sound Level (dBA)				
	Baseline	No Action	Proposed Starship Operations	Proposed Action	Reasonably Foreseeable Future Actions (RFFA)
Cape Canaveral Space Force Station (CCSFS)	61.9	70.4	58.3	70.6	77.7
SpaceX Operations Area	54.3	60.1	63.5	65.1	68.9
Titusville Beach	75.0	92.8	84.0	93.3	93.3
Playalinda Beach	53.7	61.1	68.4	69.2	69.6
Kennedy Space Center Visitor Complex	51.0	57.0	60.0	61.8	66.2
KSC Child Development Center	52.5	58.4	60.5	62.6	67.9
Merritt Island National Wildlife Refuge Visitor Center	46.2	52.8	59.7	60.5	61.9
Pine Island Conservation Area/Pine Island Estates	46.2	52.6	55.6	57.4	61.9
Kings Park Estates - Courtenay	<45	51.5	53.6	55.7	60.8
Jetty Park Campground	48.4	56.8	50.8	57.7	62.0
Rockledge High School	<45	<45	45.5	48.1	53.1
Merritt Island	<45	46.9	46.5	49.7	54.9
Oak Park Elementary School	<45	45.0	51.1	52.0	54.2
Titusville High School	<45	48.2	54.1	55.1	57.4
Summerwood Villas	<45	47.9	53.0	54.2	57.2
Atlantis Elementary School	<45	47.2	51.3	52.8	56.5
Fairglen Elementary School	<45	47.6	50.3	52.1	56.7
Lewis Carroll Elementary School	<45	48.4	49.2	51.8	57.1
Cocoa	<45	46.1	47.8	50.0	55.0
Cocoa Beach	<45	48.7	46.1	50.6	55.3
Pinegrove Estates	<45	<45	50.1	51.0	53.0
Fern Meadows	<45	<45	<45	46.6	51.1
KSC Office Outside BDA	59.7	65.9	72.4	73.3	74.2
The Rock Church	<45	<45	46.9	47.8	49.8

Notes: DNL = Day-Night Average Sound Level; dBA = A-weighted decibels.

Table 2. Comparison of DNL at the Points of Interest for all Operation Scenarios: Summer Day

Point of Interest	Day-Night Average Sound Level (dBA)				
	Baseline	No Action	Proposed Starship Operations	Proposed Action	Reasonably Foreseeable Future Actions (RFFA)
Cape Canaveral Space Force Station (CCSFS)	61.9	70.4	55.9	70.5	75.7
SpaceX Operations Area	54.3	60.1	62.6	64.5	70.1
Titusville Beach	75.0	92.8	80.5	93.0	93.1
Playalinda Beach	53.7	61.1	71.8	72.2	72.7
Kennedy Space Center Visitor Complex	51.0	57.0	59.3	61.3	67.3
KSC Child Development Center	52.5	58.4	59.4	61.9	68.8
Merritt Island National Wildlife Refuge Visitor Center	46.2	52.8	62.6	63.0	64.8
Pine Island Conservation Area/Pine Island Estates	46.2	52.6	55.3	57.2	62.8
Kings Park Estates - Courtenay	<45	51.5	52.9	55.3	61.2
Jetty Park Campground	48.4	56.8	48.9	57.4	60.8
Rockledge High School	<45	<45	<45	47.7	52.8
Merritt Island	<45	46.9	45.4	49.2	54.2
Oak Park Elementary School	<45	45.0	54.1	54.6	57.3
Titusville High School	<45	48.2	56.3	56.9	59.9
Summerwood Villas	<45	47.9	54.4	55.3	59.2
Atlantis Elementary School	<45	47.2	52.0	53.3	58.0
Fairglen Elementary School	<45	47.6	50.2	52.1	57.4
Lewis Carroll Elementary School	<45	48.4	48.3	51.3	56.8
Cocoa	<45	46.1	47.3	49.8	55.1
Cocoa Beach	<45	48.7	<45	50.1	54.3
Pinegrove Estates	<45	<45	53.7	54.1	56.6
Fern Meadows	<45	<45	<45	46.7	51.6
KSC Office Outside BDA	59.7	65.9	71.9	72.9	74.7
The Rock Church	<45	<45	51.1	51.5	53.9

Notes: DNL = Day-Night Average Sound Level; dBA = A-weighted decibels.

Table 3. Comparison of DNL at the Points of Interest for all Operation Scenarios: Summer Night

Point of Interest	Day-Night Average Sound Level (dBA)				
	Baseline	No Action	Proposed Starship Operations	Proposed Action	Reasonably Foreseeable Future Actions (RFFA)
Cape Canaveral Space Force Station (CCSFS)	61.9	70.4	57.3	70.6	75.9
SpaceX Operations Area	54.3	60.1	61.8	64.0	68.3
Titusville Beach	75.0	92.8	83.1	93.2	93.2
Playalinda Beach	53.7	61.1	69.8	70.4	70.9
Kennedy Space Center Visitor Complex	51.0	57.0	58.5	60.8	65.5
KSC Child Development Center	52.5	58.4	58.9	61.7	67.0
Merritt Island National Wildlife Refuge Visitor Center	46.2	52.8	60.0	60.8	62.5
Pine Island Conservation Area/Pine Island Estates	46.2	52.6	54.4	56.6	61.2
Kings Park Estates - Courtenay	<45	51.5	52.4	55.0	59.9
Jetty Park Campground	48.4	56.8	50.0	57.6	61.1
Rockledge High School	<45	<45	<45	47.7	52.3
Merritt Island	<45	46.9	45.8	49.4	54.1
Oak Park Elementary School	<45	45.0	51.6	52.4	55.0
Titusville High School	<45	48.2	53.9	55.0	57.7
Summerwood Villas	<45	47.9	52.5	53.8	57.1
Atlantis Elementary School	<45	47.2	50.6	52.2	56.2
Fairglen Elementary School	<45	47.6	49.4	51.6	56.1
Lewis Carroll Elementary School	<45	48.4	48.3	51.3	56.2
Cocoa	<45	46.1	47.0	49.6	54.2
Cocoa Beach	<45	48.7	45.5	50.4	54.6
Pinegrove Estates	<45	<45	51.1	51.8	54.1
Fern Meadows	<45	<45	<45	46.2	50.6
KSC Office Outside BDA	59.7	65.9	70.5	71.8	73.2
The Rock Church	<45	<45	48.6	49.2	51.5

Notes: DNL = Day-Night Average Sound Level; dBA = A-weighted decibels.

Table 4. Comparison of DNL at the Points of Interest for all Operation Scenarios: Winter Day

Point of Interest	Day-Night Average Sound Level (dBA)				
	Baseline	No Action	Proposed Starship Operations	Proposed Action	Reasonably Foreseeable Future Actions (RFFA)
Cape Canaveral Space Force Station (CCSFS)	61.9	70.4	58.7	70.7	78.9
SpaceX Operations Area	54.3	60.1	64.4	65.8	69.2
Titusville Beach	75.0	92.8	84.6	93.4	93.4
Playalinda Beach	53.7	61.1	67.9	68.7	69.1
Kennedy Space Center Visitor Complex	51.0	57.0	60.6	62.2	66.5
KSC Child Development Center	52.5	58.4	61.2	63.0	68.3
Merritt Island National Wildlife Refuge Visitor Center	46.2	52.8	59.4	60.3	61.4
Pine Island Conservation Area/Pine Island Estates	46.2	52.6	55.9	57.6	62.0
Kings Park Estates - Courtenay	<45	51.5	53.8	55.8	61.0
Jetty Park Campground	48.4	56.8	50.7	57.7	62.3
Rockledge High School	<45	<45	45.2	47.9	52.9
Merritt Island	<45	46.9	46.3	49.6	54.9
Oak Park Elementary School	<45	45.0	50.4	51.5	53.5
Titusville High School	<45	48.2	53.7	54.8	56.9
Summerwood Villas	<45	47.9	52.8	54.1	56.8
Atlantis Elementary School	<45	47.2	51.2	52.7	56.3
Fairglen Elementary School	<45	47.6	50.3	52.1	56.7
Lewis Carroll Elementary School	<45	48.4	49.1	51.8	57.2
Cocoa	<45	46.1	47.7	50.0	54.9
Cocoa Beach	<45	48.7	45.8	50.5	55.3
Pinegrove Estates	<45	<45	49.1	50.2	52.0
Fern Meadows	<45	<45	<45	46.4	50.8
KSC Office Outside BDA	59.7	65.9	74.0	74.6	75.3
The Rock Church	<45	<45	45.5	46.7	48.5

Notes: DNL = Day-Night Average Sound Level; dBA = A-weighted decibels.

Table 5. Comparison of DNL at the Points of Interest for all Operation Scenarios: Winter Night

Point of Interest	Day-Night Average Sound Level (dBA)				
	Baseline	No Action	Proposed Starship Operations	Proposed Action	Reasonably Foreseeable Future Actions (RFFA)
Cape Canaveral Space Force Station (CCSFS)	61.9	70.4	60.5	70.8	79.8
SpaceX Operations Area	54.3	60.1	64.5	65.8	68.4
Titusville Beach	75.0	92.8	86.7	93.7	93.7
Playalinda Beach	53.7	61.1	66.0	67.2	67.5
Kennedy Space Center Visitor Complex	51.0	57.0	60.8	62.3	65.7
KSC Child Development Center	52.5	58.4	61.6	63.3	67.6
Merritt Island National Wildlife Refuge Visitor Center	46.2	52.8	57.6	58.8	59.8
Pine Island Conservation Area/Pine Island Estates	46.2	52.6	56.0	57.6	61.3
Kings Park Estates - Courtenay	<45	51.5	54.2	56.0	60.6
Jetty Park Campground	48.4	56.8	52.2	58.1	63.1
Rockledge High School	<45	<45	46.0	48.4	53.2
Merritt Island	<45	46.9	47.4	50.2	55.5
Oak Park Elementary School	<45	45.0	48.7	50.2	52.0
Titusville High School	<45	48.2	52.3	53.7	55.5
Summerwood Villas	<45	47.9	51.9	53.4	55.7
Atlantis Elementary School	<45	47.2	50.8	52.4	55.5
Fairglen Elementary School	<45	47.6	50.4	52.2	56.3
Lewis Carroll Elementary School	<45	48.4	49.9	52.2	57.3
Cocoa	<45	46.1	48.2	50.3	54.9
Cocoa Beach	<45	48.7	47.2	51.0	56.2
Pinegrove Estates	<45	<45	47.1	48.8	50.3
Fern Meadows	<45	<45	<45	46.5	50.6
KSC Office Outside BDA	59.7	65.9	73.6	74.2	74.7
The Rock Church	<45	<45	<45	45.3	46.9

Notes: DNL = Day-Night Average Sound Level; dBA = A-weighted decibels.

2.2 CUMULATIVE SONIC BOOM EXPOSURE RESULTS AT LC-39A

2.2.1 C-weighted Day-Night Average Sound Level (CDNL) Contour Figures: Mean Annual

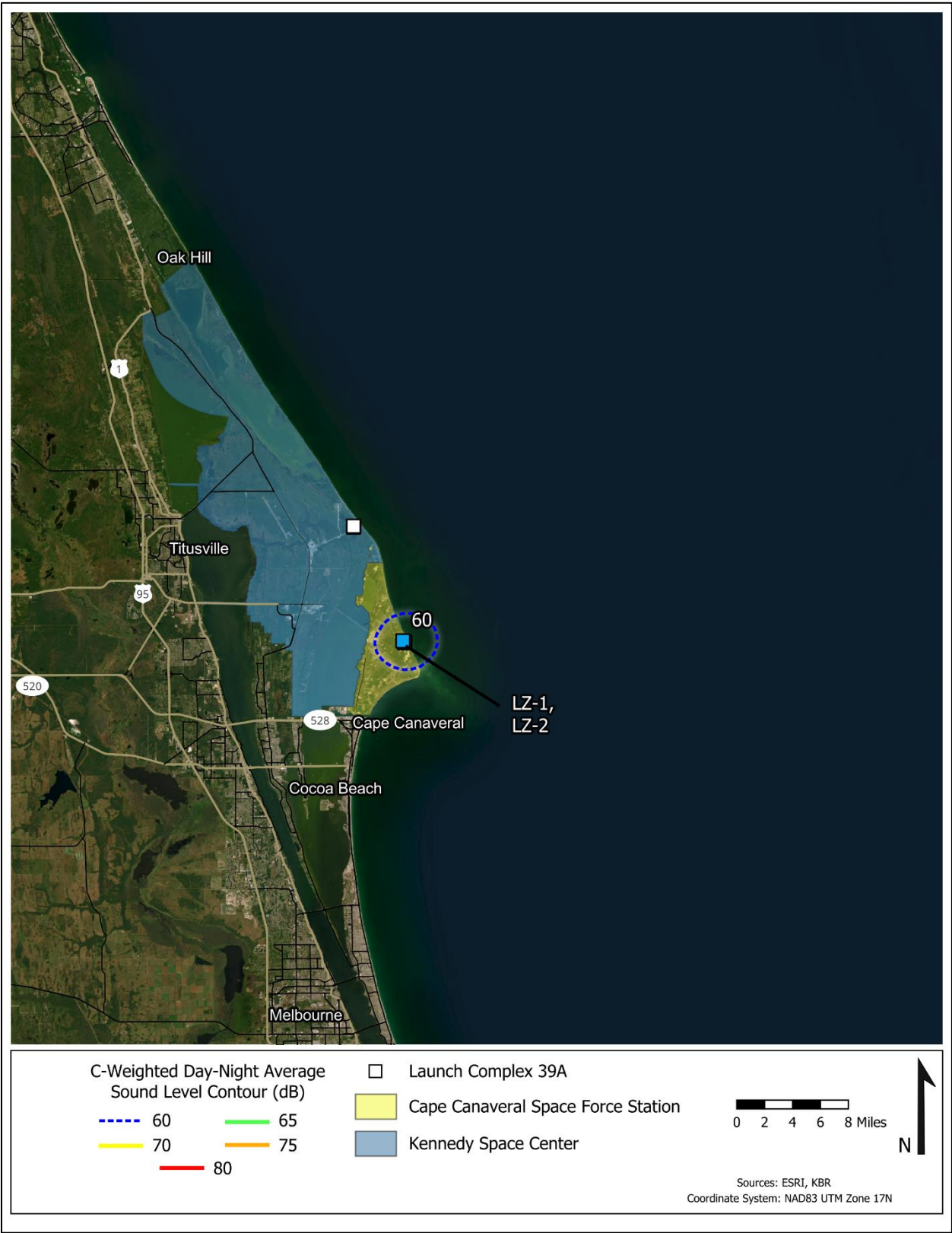


Figure 20. KSC and CCSFS Baseline Sonic Boon Exposure: Mean Annual: CDNL Contours

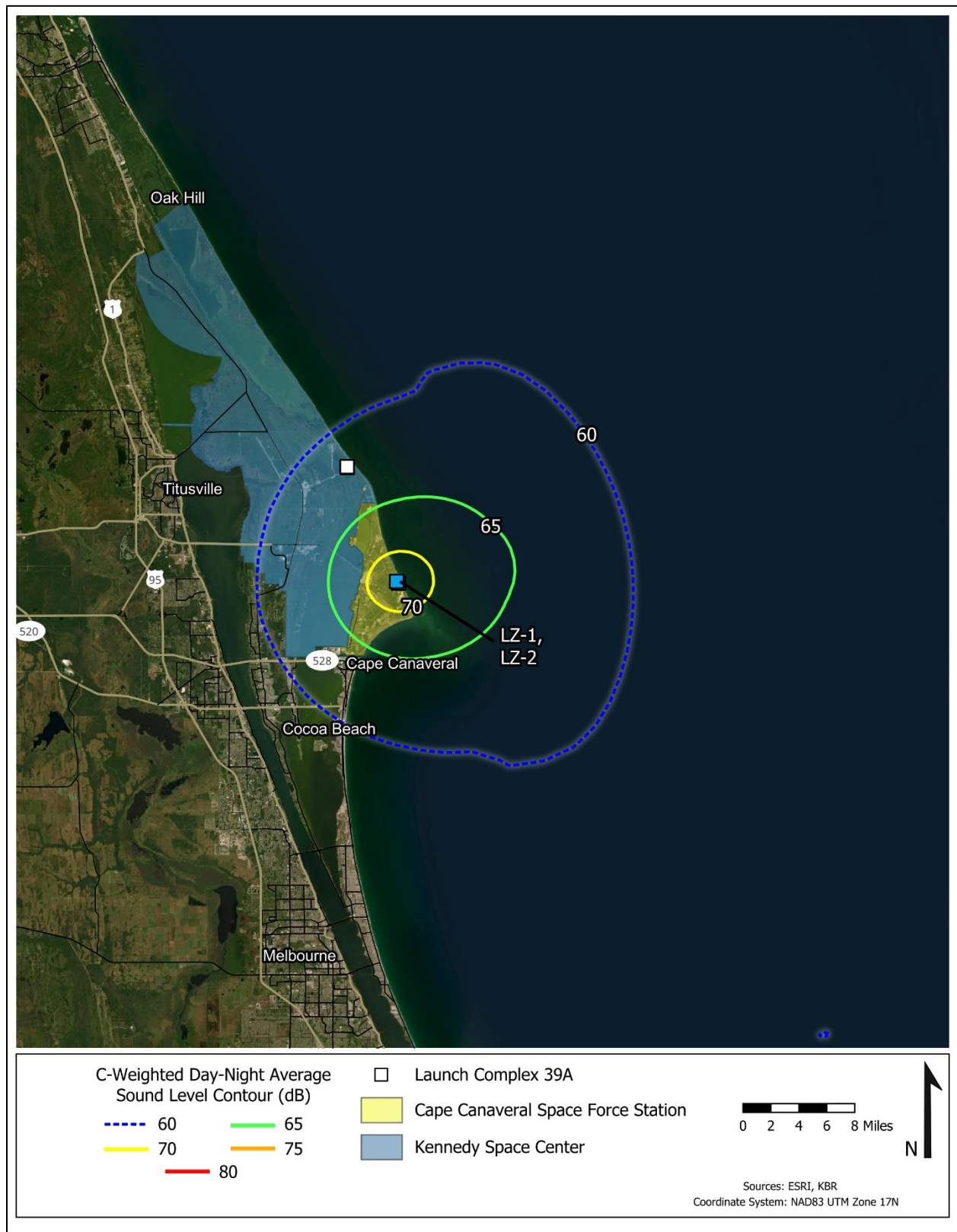


Figure 21. KSC and CCSFS No Action Sonic Boon Exposure: Mean Annual: CNL Contours

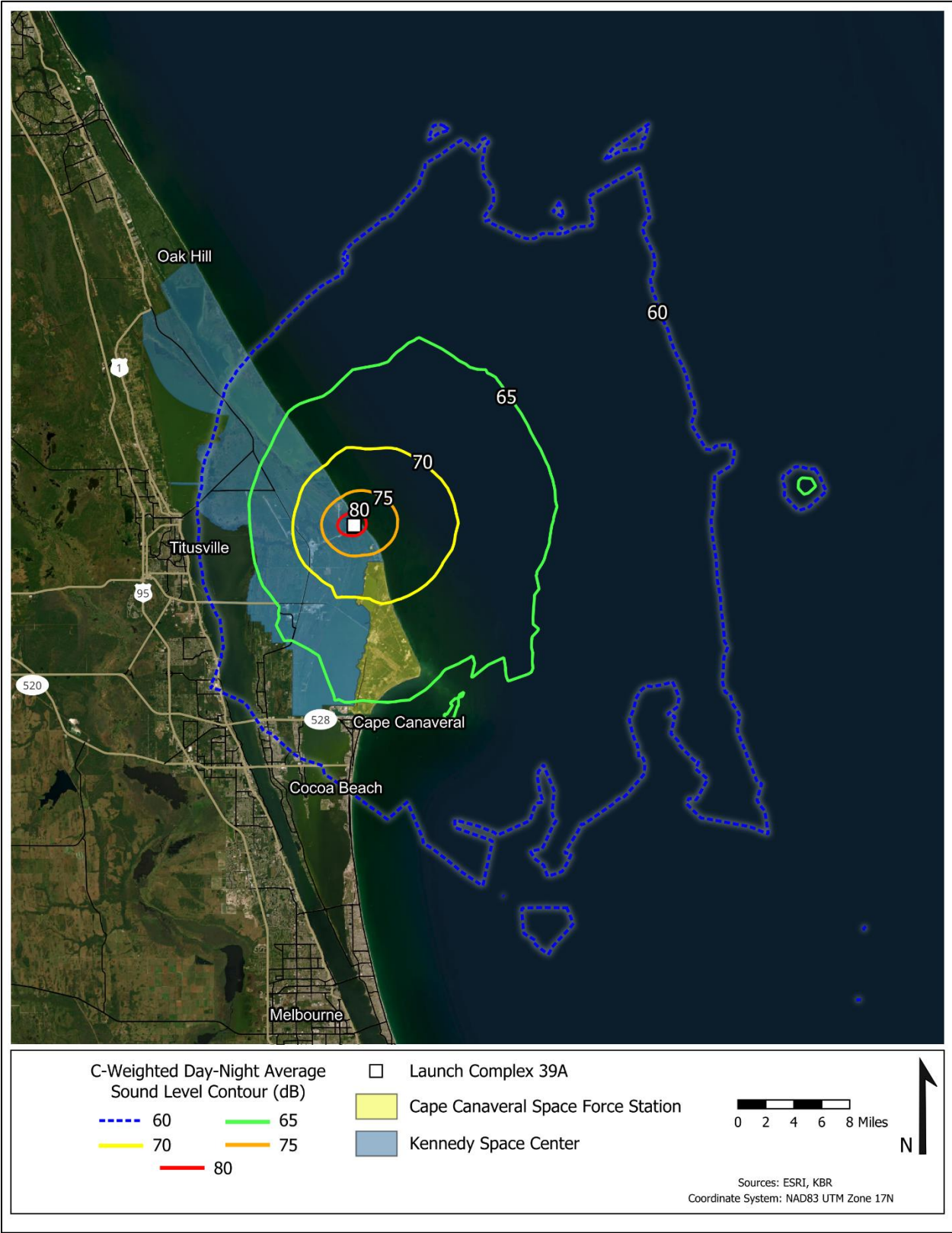


Figure 22. Starship Combined Operations Sonic Boom Exposure: Mean Annual: CDNL Contours

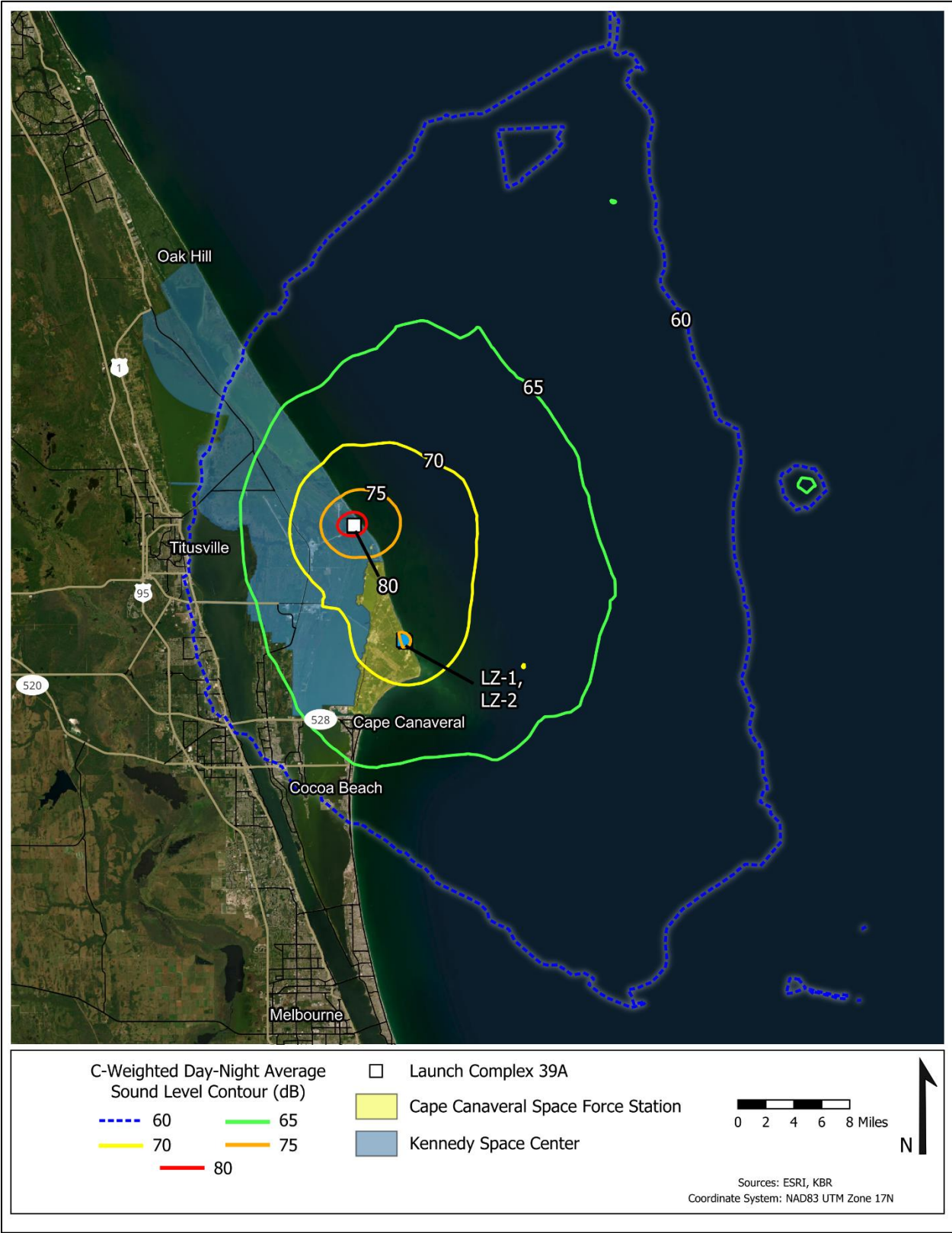


Figure 23. Proposed Action Sonic Boom Exposure: Mean Annual: CDNL Contours

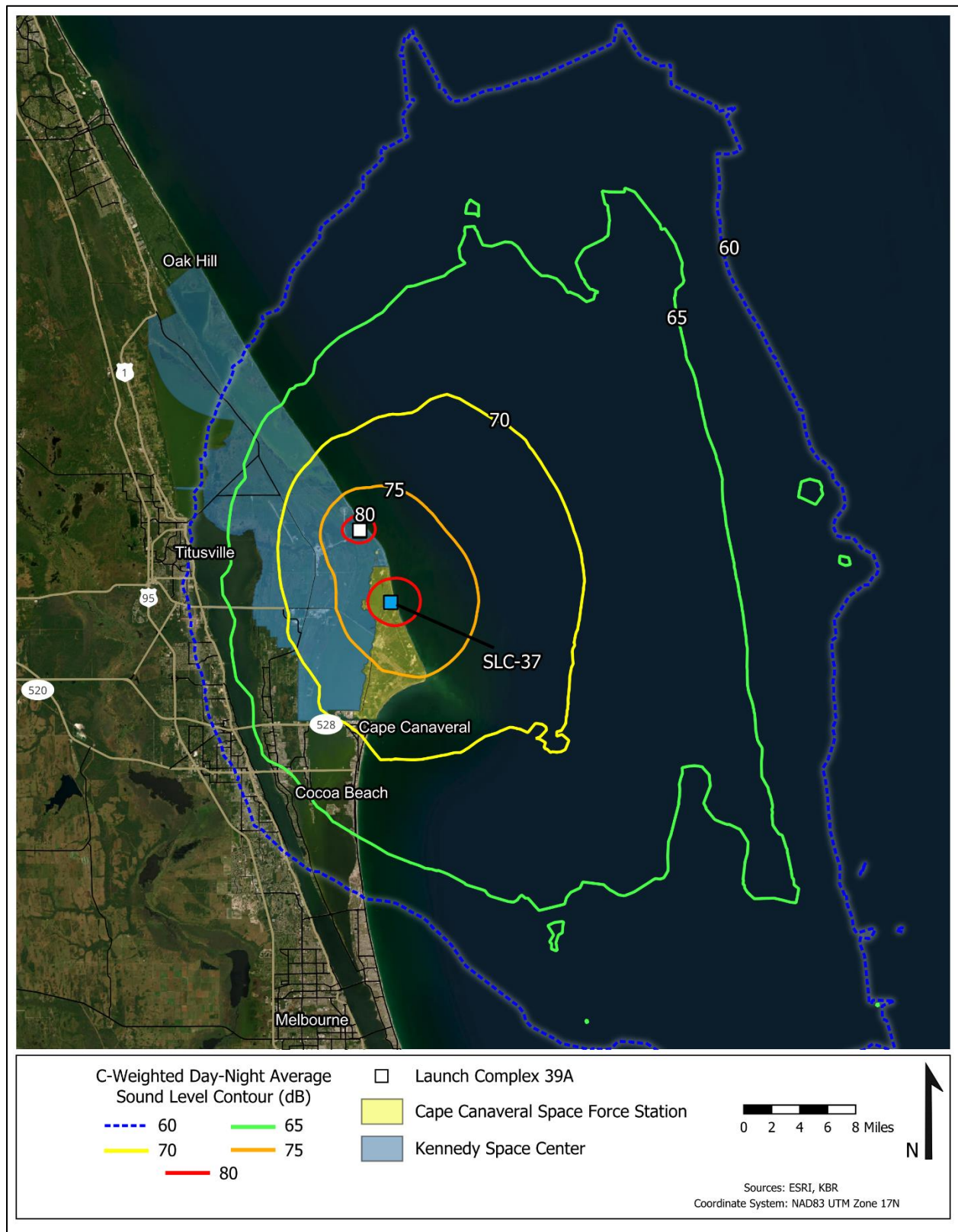


Figure 24. Reasonably Foreseeable Future Actions Sonic Boom Exposure: Mean Annual: CDNL Contours

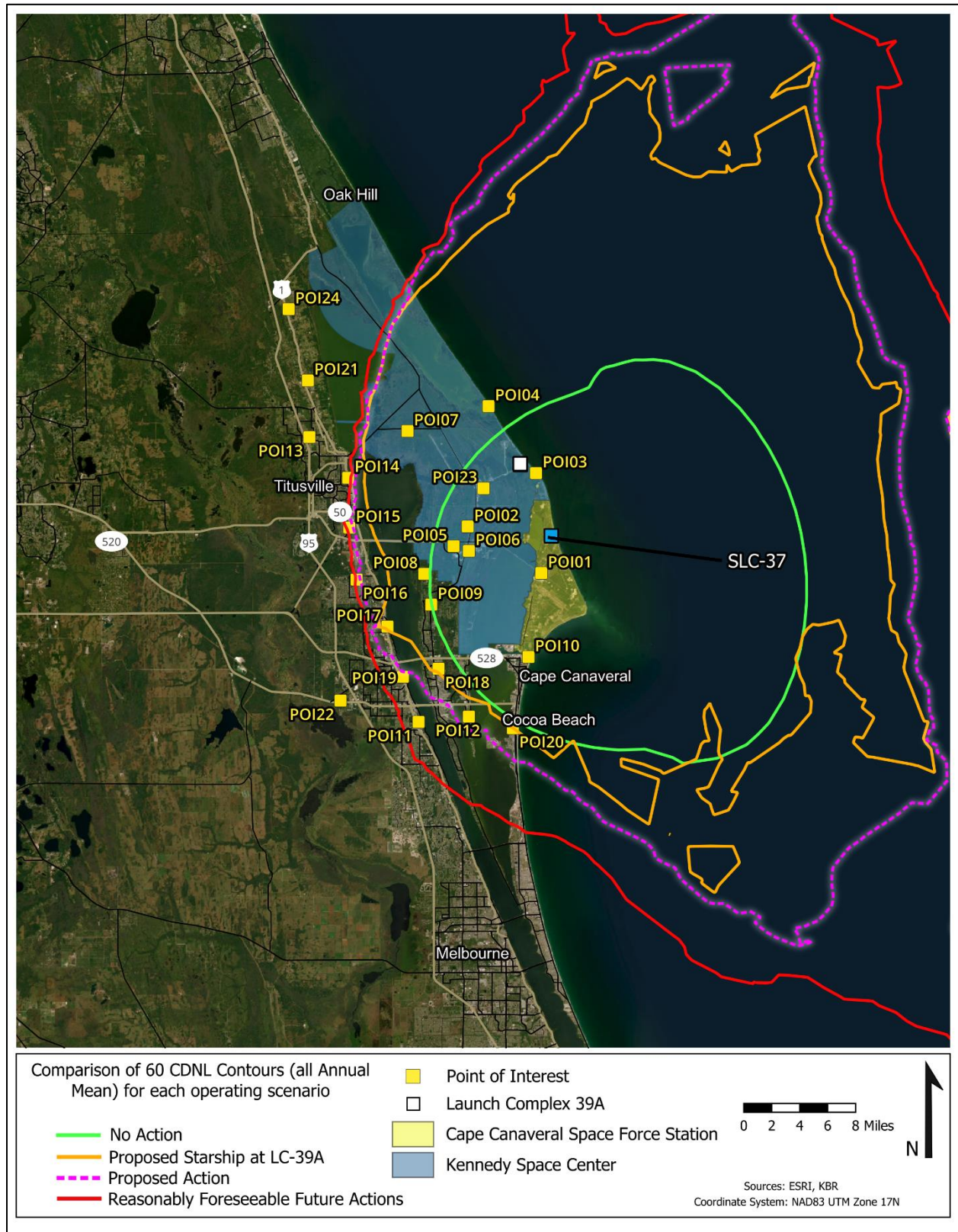


Figure 25. Comparison of 60 CDNL Contours for All Operation Scenarios: Mean Annual

2.2.2 CDNL Contour Figures: Summer Day

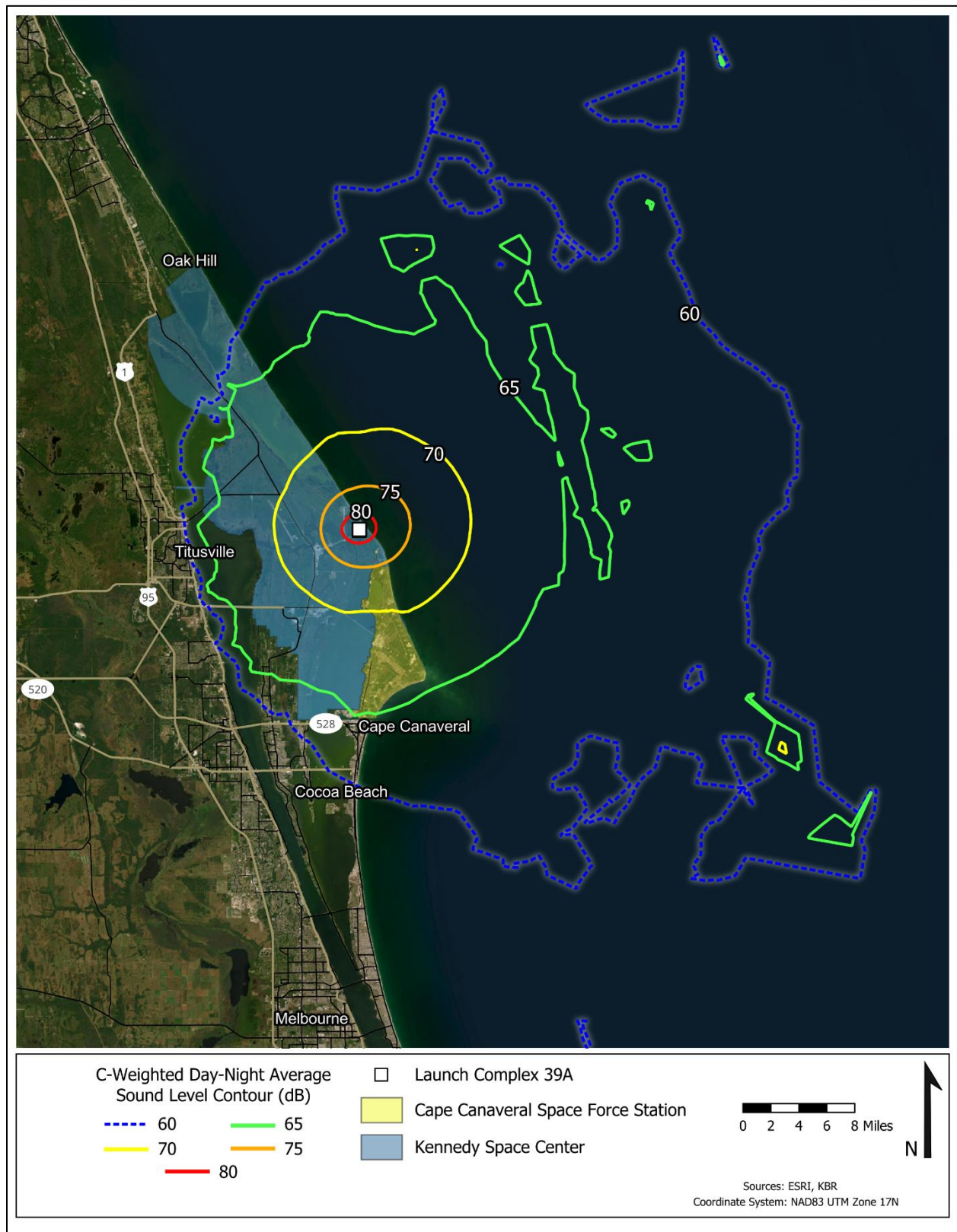


Figure 26. Starship Combined Operations Sonic Boom Exposure: Summer Day: CDNL Contours

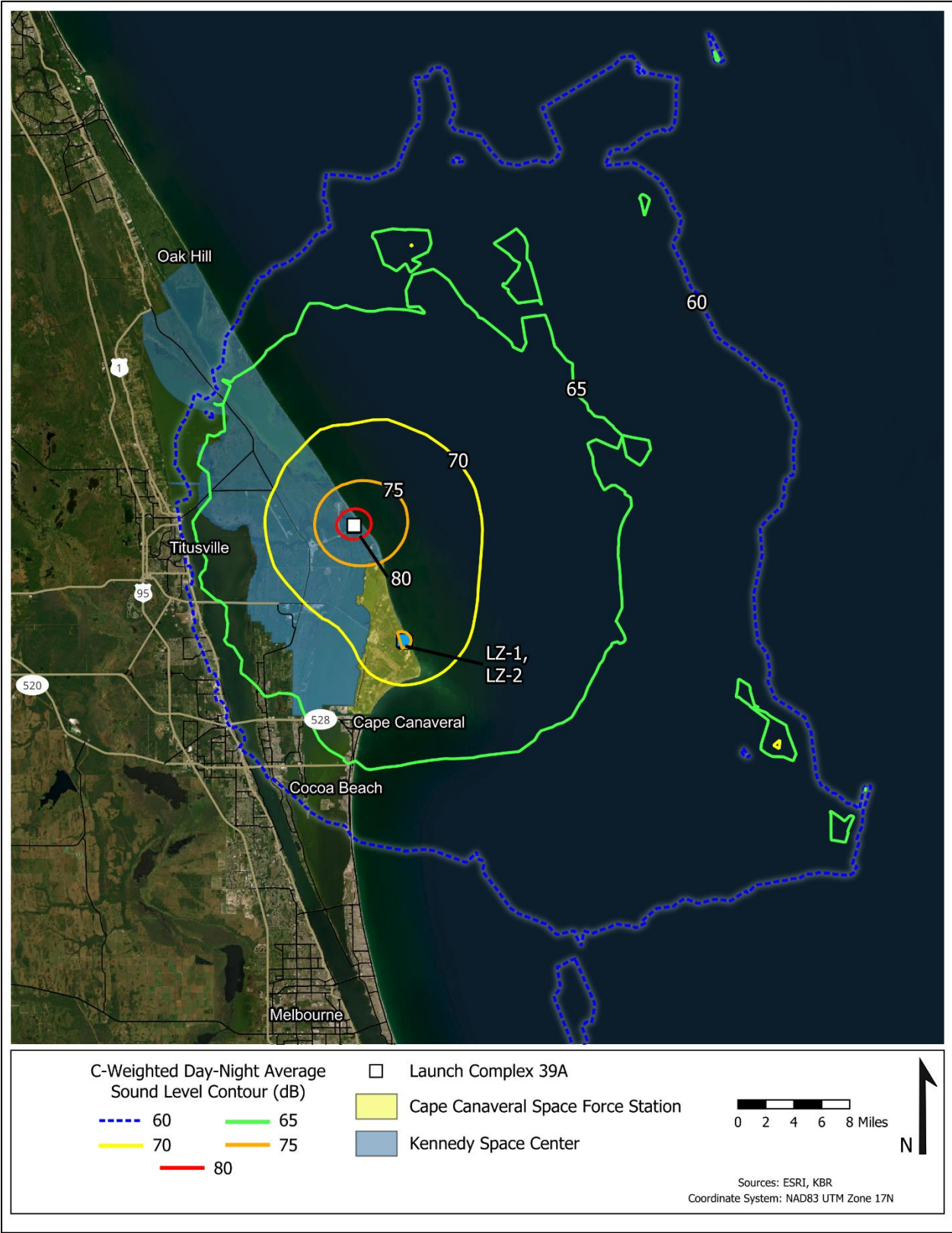


Figure 27. Proposed Action Sonic Boom Exposure: Summer Day: CDNL Contours

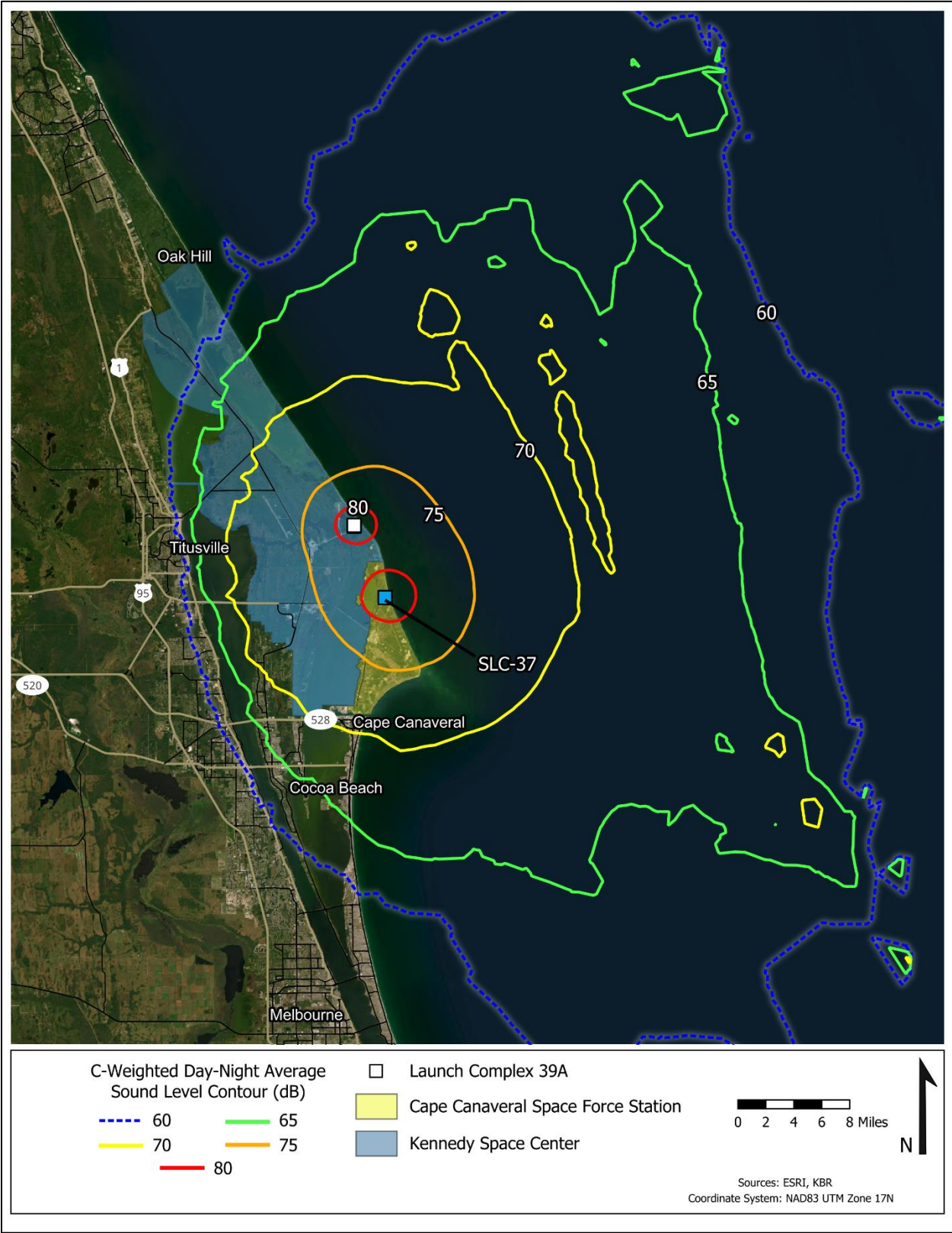


Figure 28. Reasonably Foreseeable Future Actions Sonic Boom Exposure: Summer Day: CDNL Contours

2.2.3 CDNL Contour Figures: Summer Night

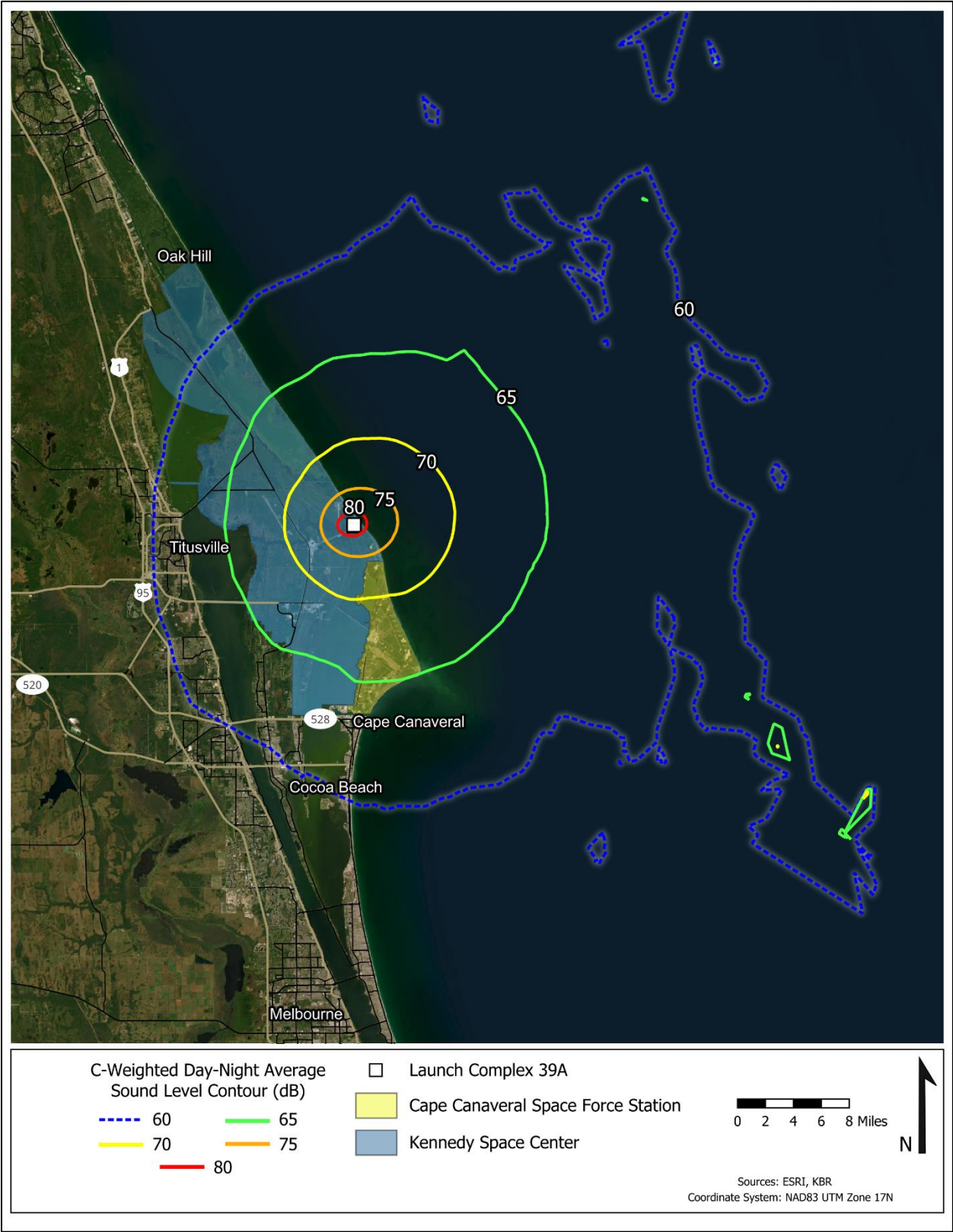


Figure 29. Starship Combined Operations Sonic Boom Exposure: Summer Night: CDNL Contours

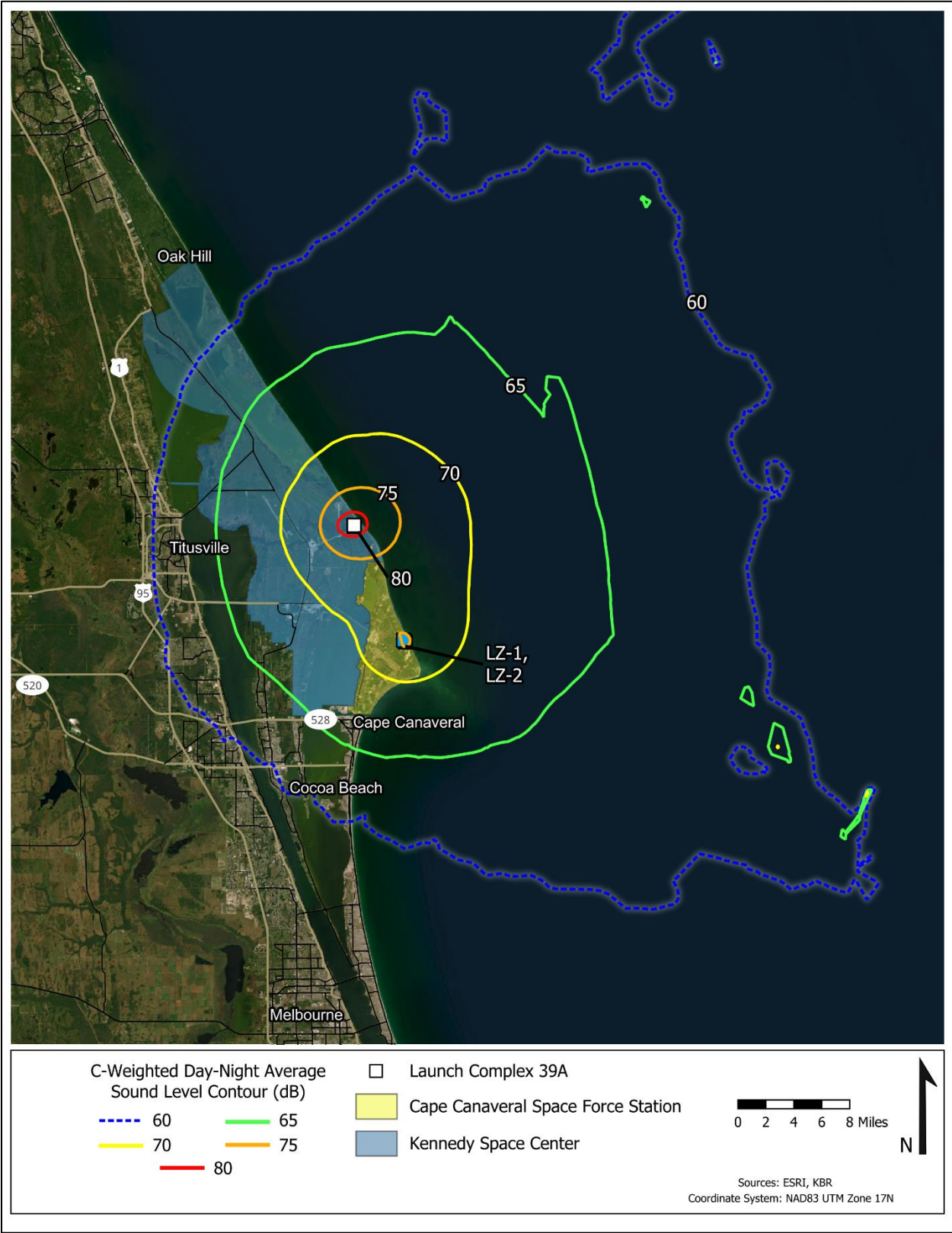


Figure 30. Proposed Action Sonic Boom Exposure: Summer Night: CDNL Contours

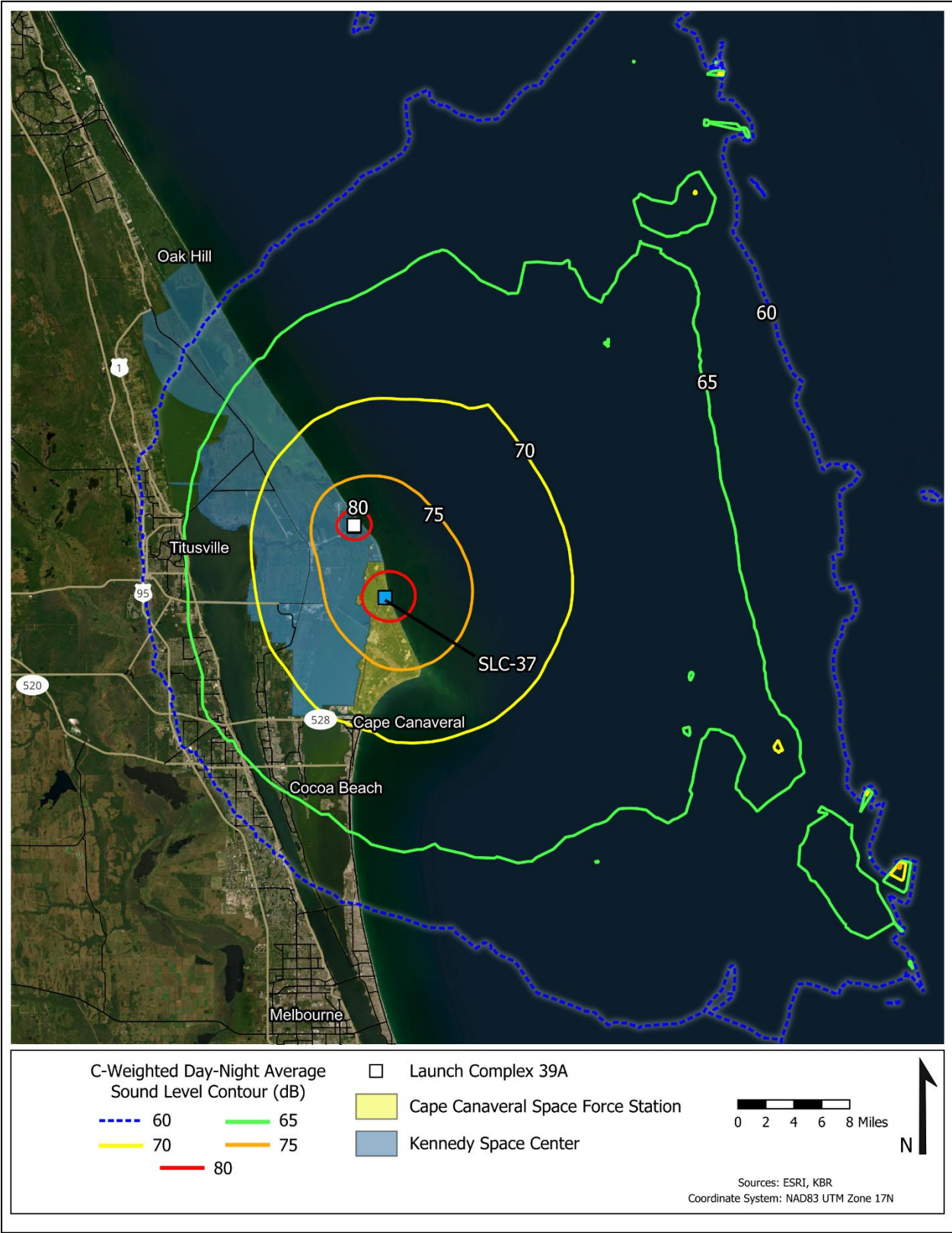


Figure 31. Reasonably Foreseeable Future Actions Sonic Boom Exposure: Summer Night: CDNL Contours

2.2.4 CDNL Contour Figures: Winter Day

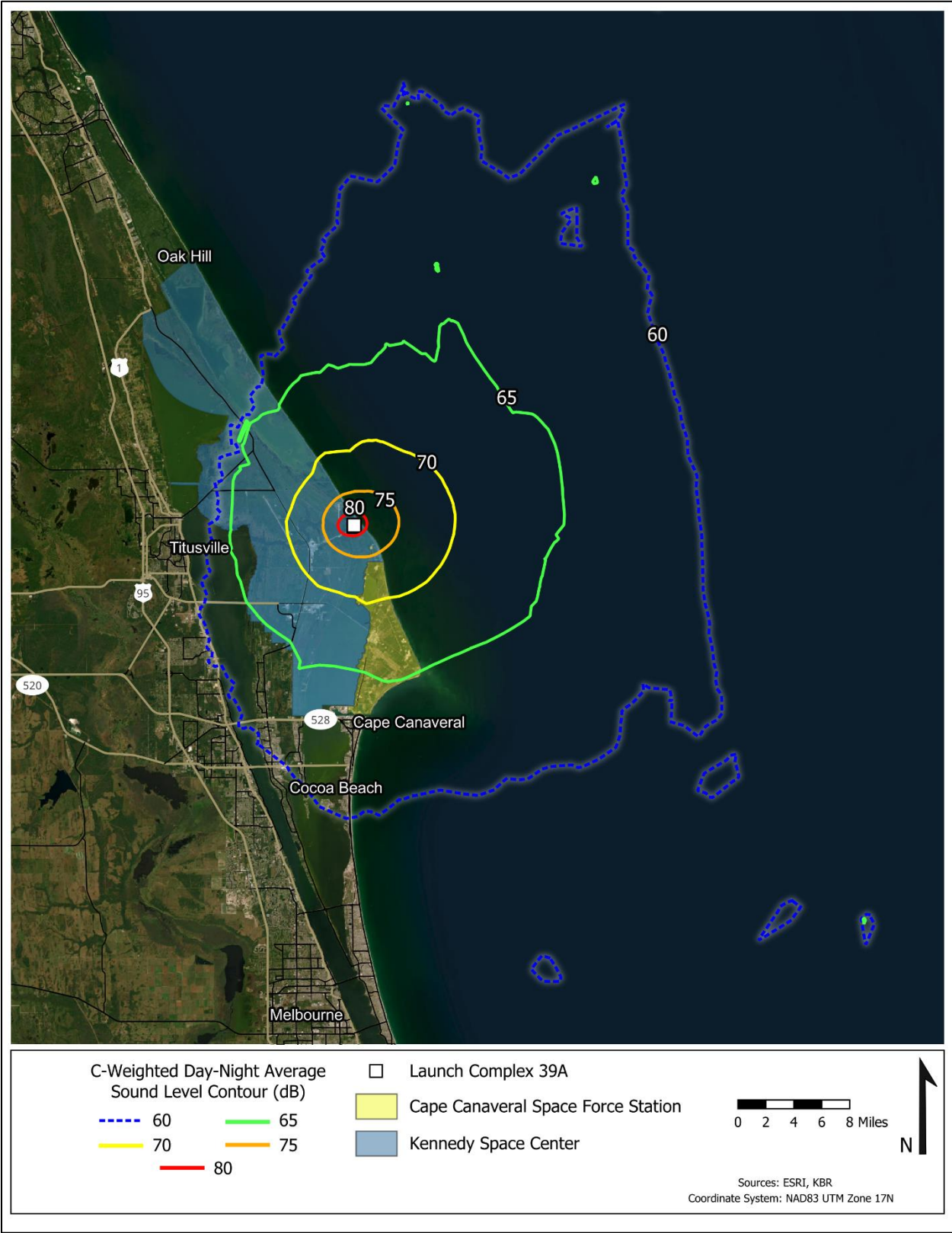


Figure 32. Starship Combined Operations Sonic Boom Exposure: Winter Day: CDNL Contours

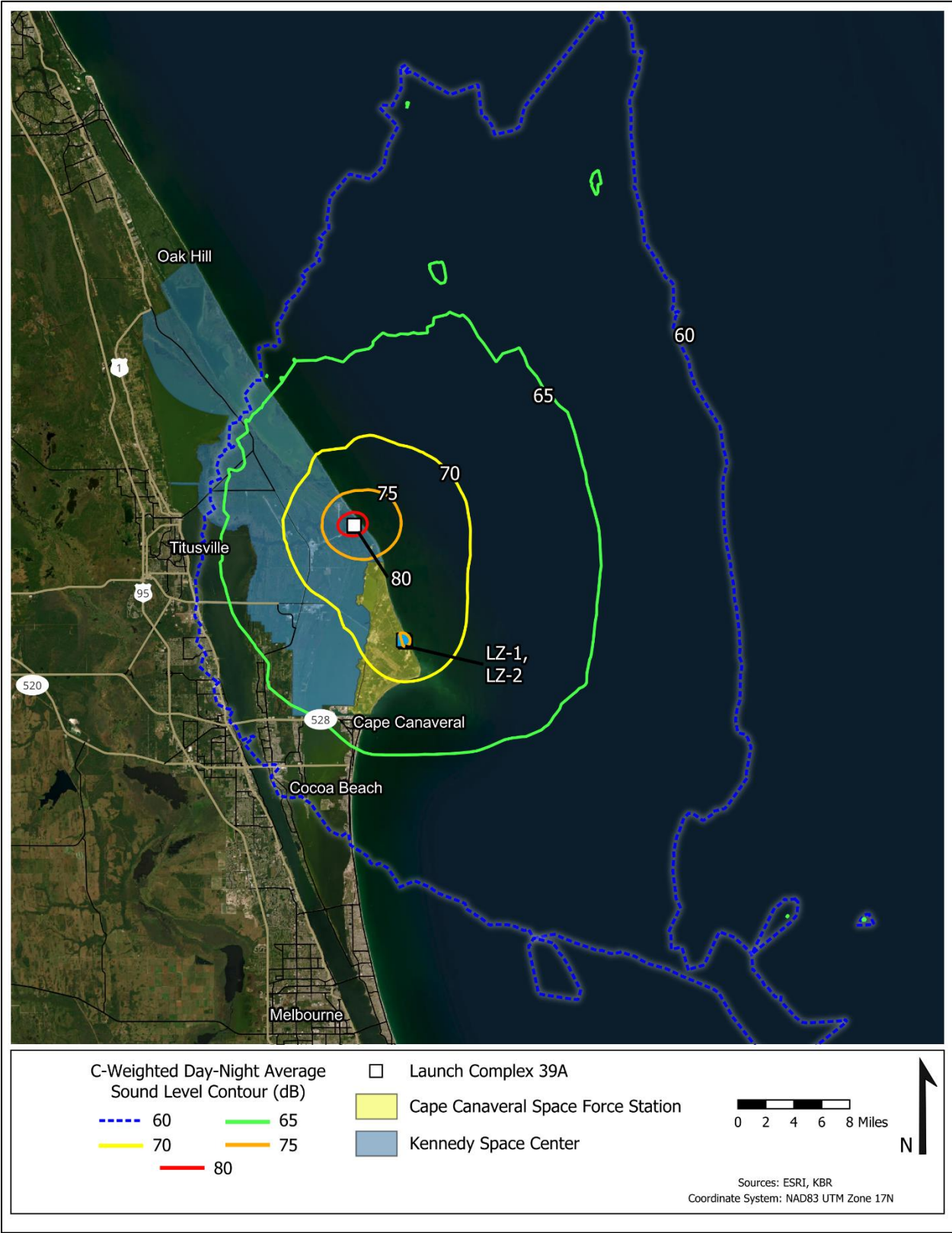


Figure 33. Proposed Action Sonic Boom Exposure: Winter Day: CDNL Contours

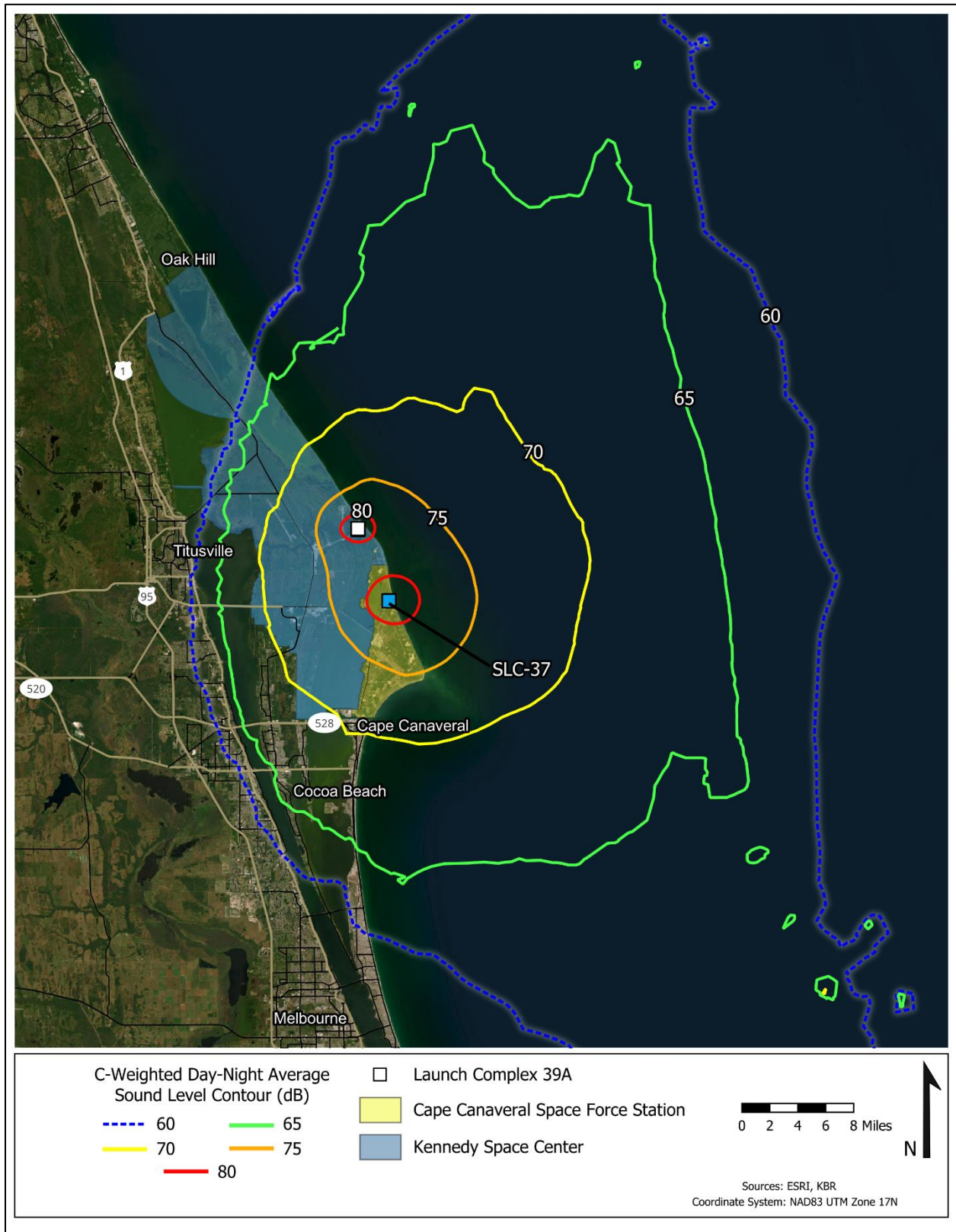


Figure 34. Reasonably Foreseeable Future Actions Sonic Boom Exposure: Winter Day: CDNL Contours

2.2.5 CDNL Contour Figures: Winter Night

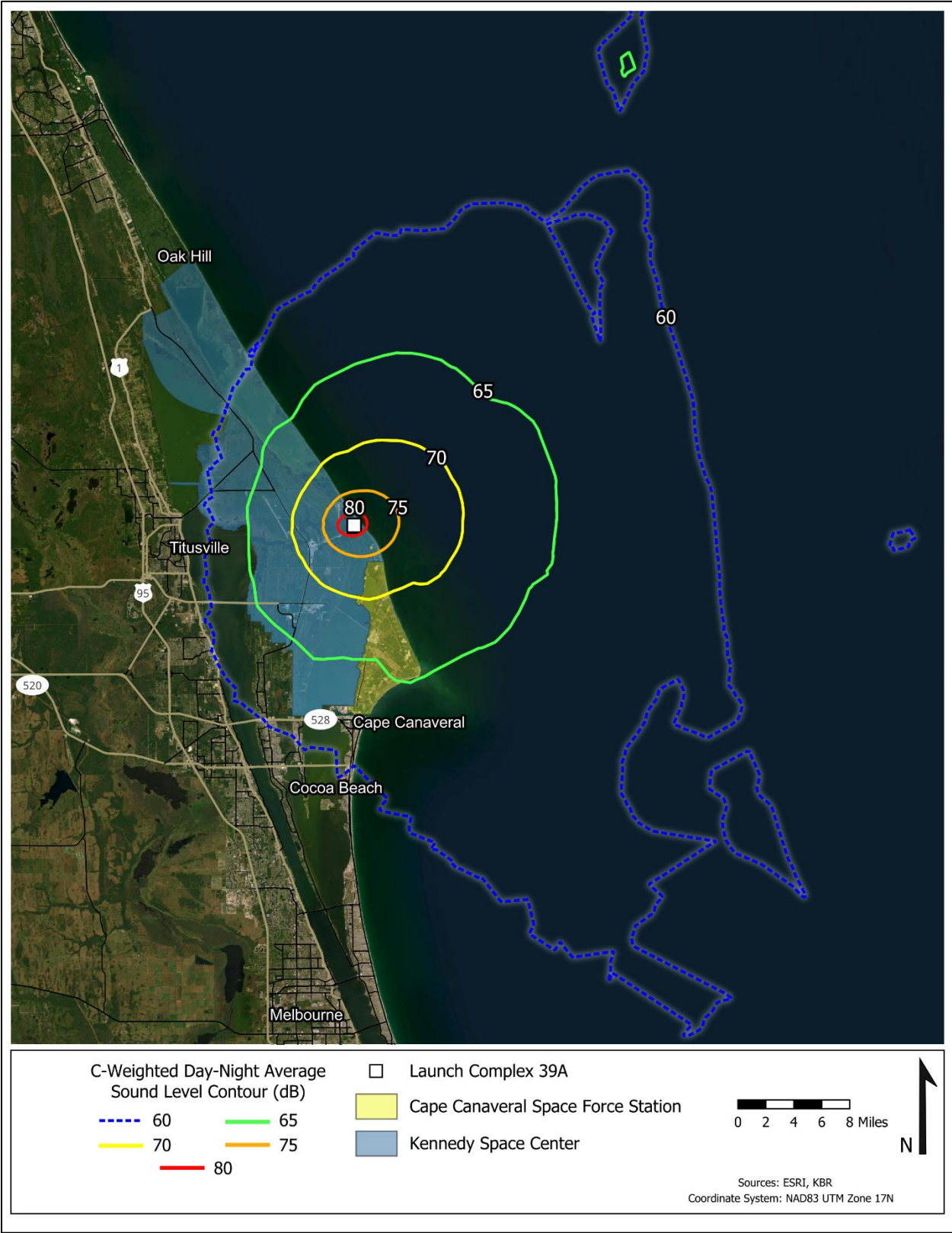


Figure 35. Starship Combined Operations Sonic Boom Exposure: Winter Night: CDNL Contours

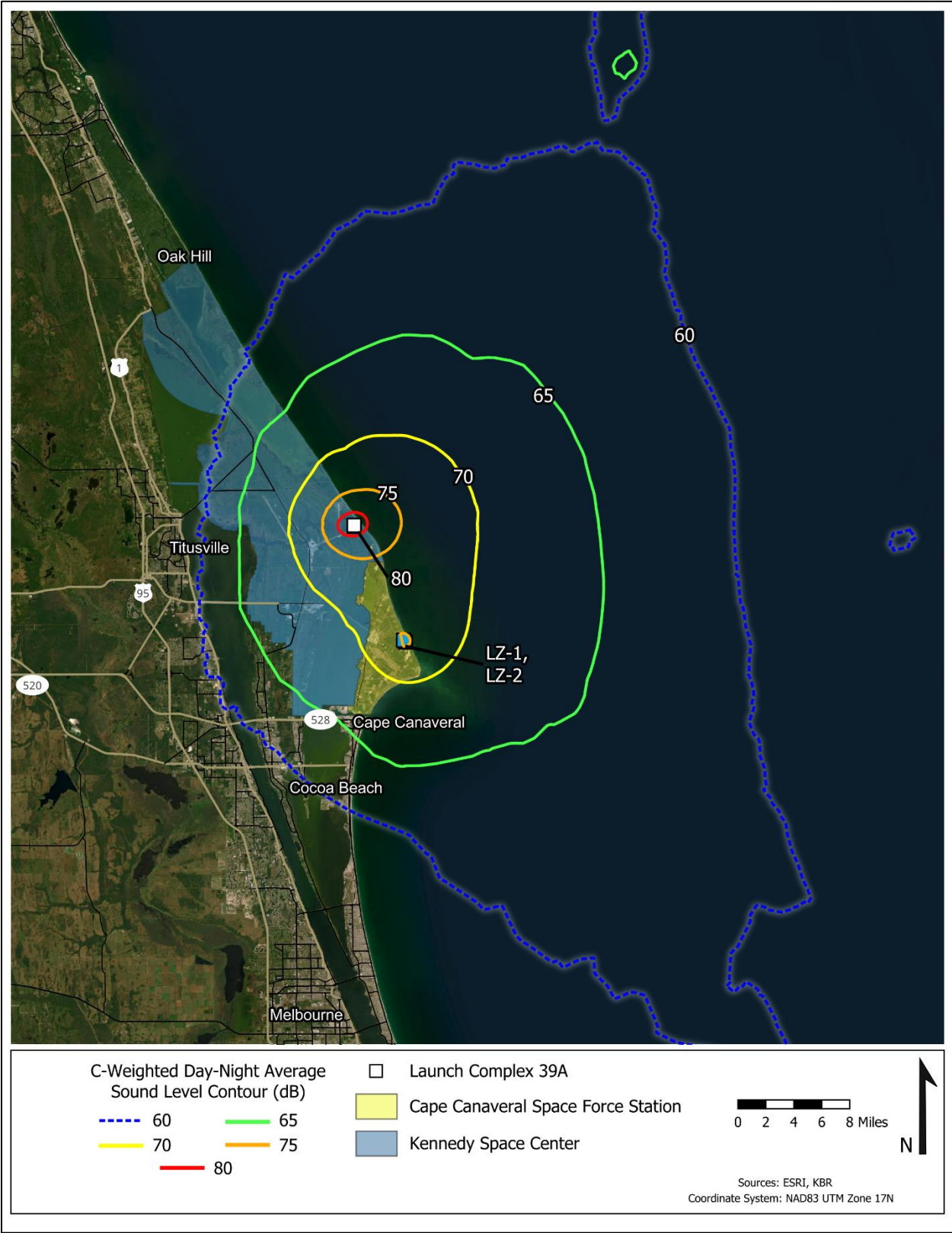


Figure 36. Proposed Action Sonic Boom Exposure: Winter Night: CDNL Contours

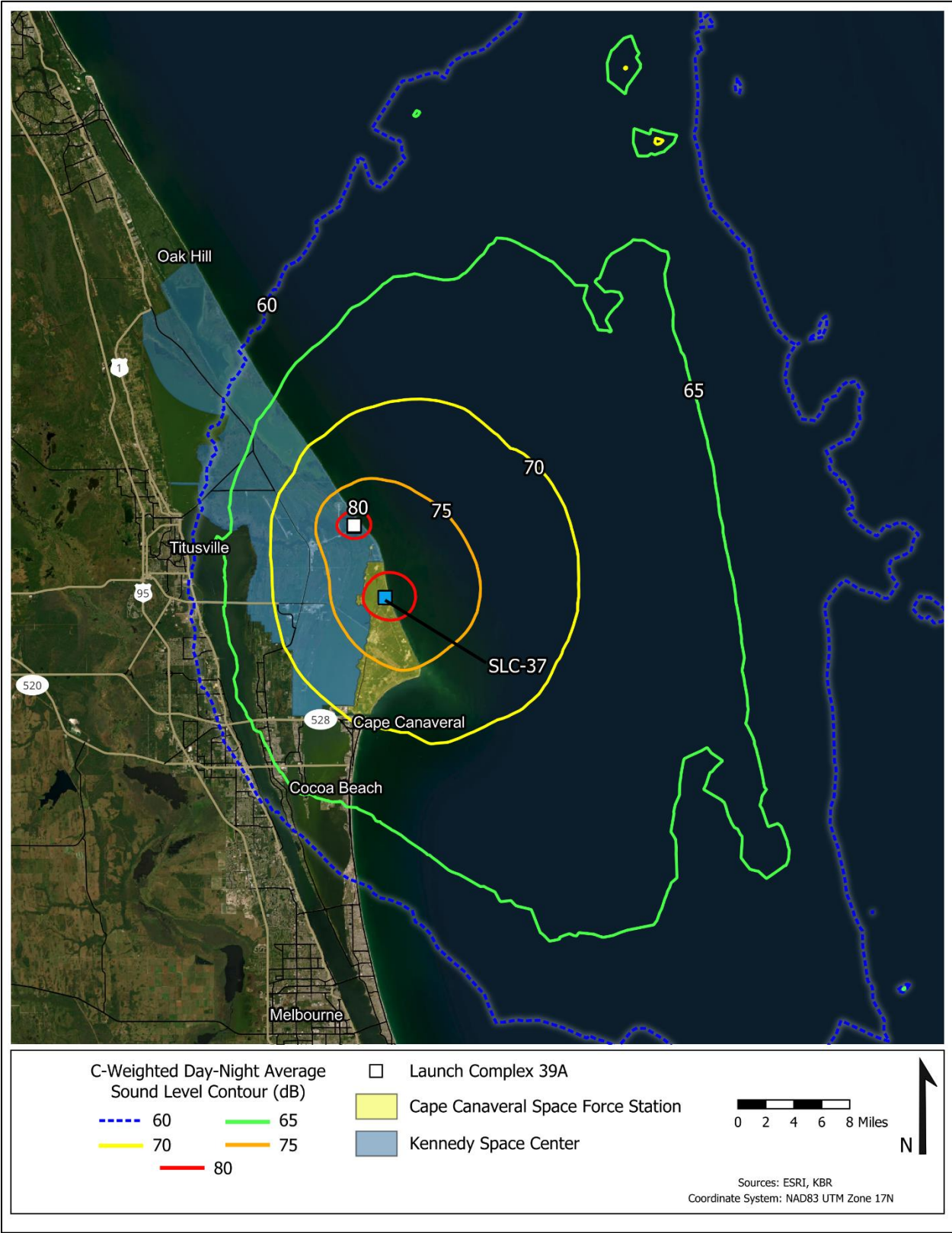


Figure 37. Reasonably Foreseeable Future Actions Sonic Boom Exposure: Winter Night: CDNL Contours

2.2.6 CDNL at Points of Interest for All Weather Variations

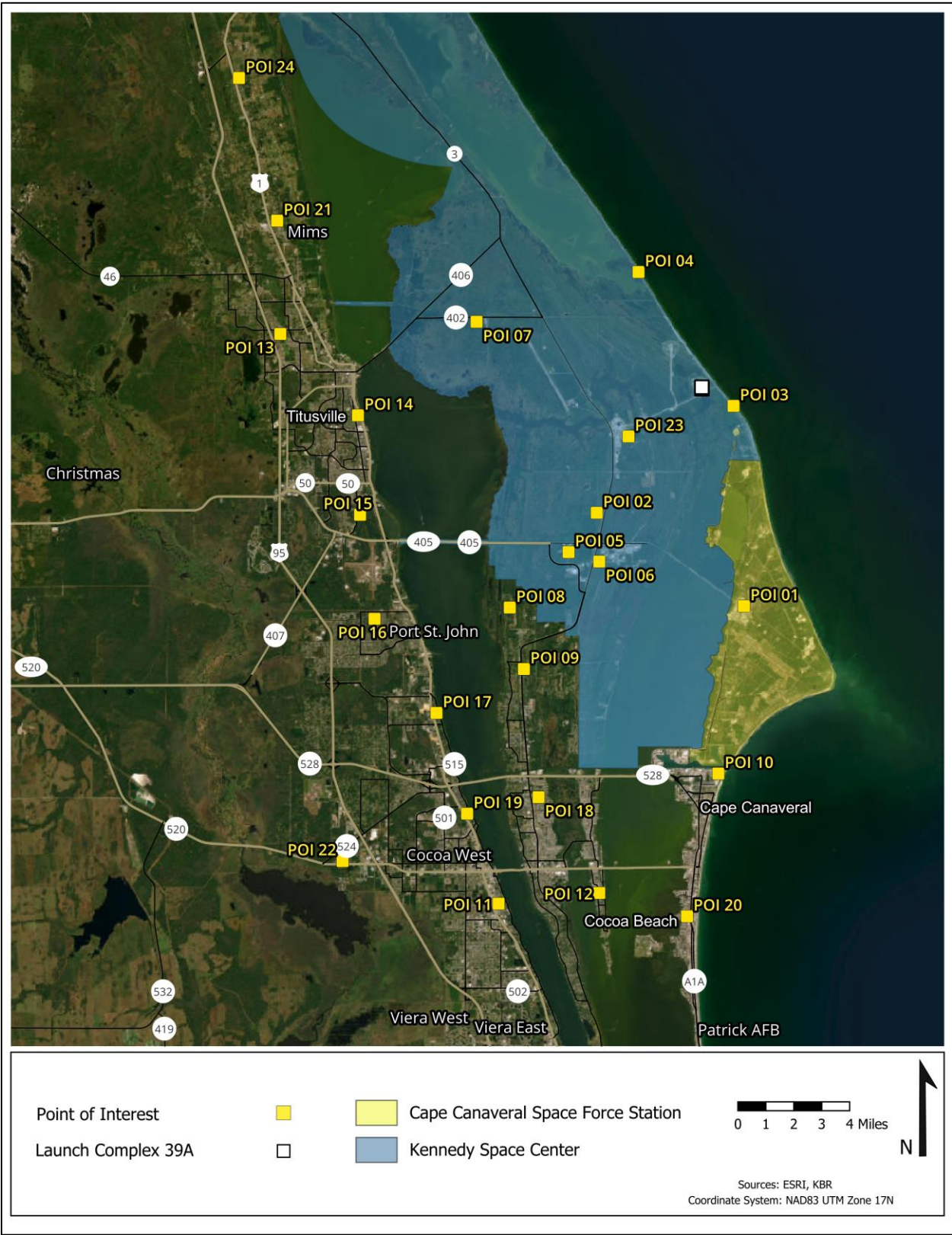


Figure 38. Points of Interest (POIs) In the Vicinity of LC-39A

Table 6. Comparison of CDNL at the Points of Interest for all Operation Scenarios: Annual Mean

Point of Interest	C-weighted Day-Night Average Sound Level (dBC)				
	Baseline	No Action	Proposed Starship Operations	Proposed Action	Reasonably Foreseeable Future Actions (RFFA)
Cape Canaveral Space Force Station (CCSFS)	59.6	70.0	68.7	72.2	77.5
SpaceX Operations Area	50.2	61.6	67.9	68.8	72.1
Titusville Beach	52.1	62.7	78.1	78.3	79.4
Playalinda Beach	45.2	58.8	70.1	70.4	71.8
Kennedy Space Center Visitor Complex	48.9	61.2	65.7	67.0	70.5
KSC Child Development Center	51.5	62.2	67.1	68.3	72.0
Merritt Island National Wildlife Refuge Visitor Center	<45	57.0	64.1	64.9	66.4
Pine Island Conservation Area/Pine Island Estates	46.6	59.7	62.7	64.4	67.6
Kings Park Estates - Courtenay	46.8	60.0	62.4	64.4	67.5
Jetty Park Campground	53.0	63.6	64.3	67.0	70.7
Rockledge High School	<45	56.4	53.8	58.4	62.9
Merritt Island	45.0	58.8	56.2	61.0	65.5
Oak Park Elementary School	<45	<45	52.3	52.3	56.0
Titusville High School	<45	<45	57.1	57.5	59.3
Summerwood Villas	<45	55.3	56.8	59.0	60.5
Atlantis Elementary School	<45	55.5	55.8	58.7	60.1
Fairglen Elementary School	<45	57.4	60.2	62.0	63.7
Lewis Carroll Elementary School	45.3	59.1	60.5	62.8	66.8
Cocoa	<45	57.3	55.6	59.6	63.2
Cocoa Beach	46.0	59.6	60.0	62.8	67.5
Pinegrove Estates	<45	<45	51.8	51.8	55.5
Fern Meadows	<45	<45	51.4	51.4	56.2
KSC Office Outside BDA	50.4	61.4	72.6	72.9	74.7
The Rock Church	<45	<45	50.8	50.8	54.6

Notes: CDNL = C-weighted Day-Night Average Sound Level; dBC = C-weighted decibels.

Table 7. Comparison of CDNL at the Points of Interest for all Operation Scenarios: Summer Day

Point of Interest	C-weighted Day-Night Average Sound Level (dBC)				
	Baseline	No Action	Proposed Starship Operations	Proposed Action	Reasonably Foreseeable Future Actions (RFFA)
Cape Canaveral Space Force Station (CCSFS)	59.6	70.0	68.2	72.2	77.7
SpaceX Operations Area	50.2	61.6	70.0	70.6	74.1
Titusville Beach	52.1	62.7	79.3	79.4	80.4
Playalinda Beach	45.2	58.8	72.0	72.3	73.8
Kennedy Space Center Visitor Complex	48.9	61.2	68.3	69.1	72.9
KSC Child Development Center	51.5	62.2	68.6	69.5	73.6
Merritt Island National Wildlife Refuge Visitor Center	<45	57.0	67.7	68.1	69.1
Pine Island Conservation Area/Pine Island Estates	46.6	59.7	66.4	67.2	70.9
Kings Park Estates - Courtenay	46.8	60.0	65.3	66.5	70.3
Jetty Park Campground	53.0	63.6	64.9	67.2	70.9
Rockledge High School	<45	56.4	52.3	57.8	59.9
Merritt Island	45.0	58.8	56.6	60.9	65.2
Oak Park Elementary School	<45	<45	52.5	52.5	56.3
Titusville High School	<45	<45	58.1	58.1	60.1
Summerwood Villas	<45	55.3	54.5	57.9	60.1
Atlantis Elementary School	<45	55.5	52.9	57.5	59.8
Fairglen Elementary School	<45	57.4	57.9	60.7	62.3
Lewis Carroll Elementary School	45.3	59.1	58.0	61.7	66.8
Cocoa	<45	57.3	52.3	58.6	60.9
Cocoa Beach	46.0	59.6	58.6	62.3	67.0
Pinegrove Estates	<45	<45	52.0	52.0	55.7
Fern Meadows	<45	<45	51.4	51.4	56.2
KSC Office Outside BDA	50.4	61.4	74.0	74.2	76.1
The Rock Church	<45	<45	51.0	51.0	54.8

Notes: CDNL = C-weighted Day-Night Average Sound Level; dBC = C-weighted decibels.

Table 8. Comparison of CDNL at the Points of Interest for all Operation Scenarios: Summer Night

Point of Interest	C-weighted Day-Night Average Sound Level (dBC)				
	Baseline	No Action	Proposed Starship Operations	Proposed Action	Reasonably Foreseeable Future Actions (RFFA)
Cape Canaveral Space Force Station (CCSFS)	59.6	70.0	67.4	71.9	77.6
SpaceX Operations Area	50.2	61.6	68.7	69.5	73.3
Titusville Beach	52.1	62.7	78.4	78.5	79.7
Playalinda Beach	45.2	58.8	70.9	71.2	72.9
Kennedy Space Center Visitor Complex	48.9	61.2	67.1	68.0	71.9
KSC Child Development Center	51.5	62.2	67.5	68.7	72.9
Merritt Island National Wildlife Refuge Visitor Center	<45	57.0	65.8	66.4	68.7
Pine Island Conservation Area/Pine Island Estates	46.6	59.7	64.7	65.9	69.5
Kings Park Estates - Courtenay	46.8	60.0	63.7	65.2	69.2
Jetty Park Campground	53.0	63.6	63.4	66.5	70.6
Rockledge High School	<45	56.4	53.8	58.3	64.3
Merritt Island	45.0	58.8	59.6	62.4	66.6
Oak Park Elementary School	<45	<45	58.4	58.4	60.3
Titusville High School	<45	<45	62.1	62.1	64.8
Summerwood Villas	<45	55.3	61.8	62.7	64.6
Atlantis Elementary School	<45	55.5	61.3	62.3	64.8
Fairglen Elementary School	<45	57.4	61.3	62.8	66.3
Lewis Carroll Elementary School	45.3	59.1	60.9	63.2	67.6
Cocoa	<45	57.3	57.5	60.6	65.6
Cocoa Beach	46.0	59.6	60.6	63.1	67.2
Pinegrove Estates	<45	<45	56.9	56.9	59.1
Fern Meadows	<45	<45	51.4	51.4	57.2
KSC Office Outside BDA	50.4	61.4	72.9	73.2	75.3
The Rock Church	<45	<45	53.1	53.1	56.0

Notes: CDNL = C-weighted Day-Night Average Sound Level; dBC = C-weighted decibels.

Table 9. Comparison of CDNL at the Points of Interest for all Operation Scenarios: Winter Day

Point of Interest	C-weighted Day-Night Average Sound Level (dBC)				
	Baseline	No Action	Proposed Starship Operations	Proposed Action	Reasonably Foreseeable Future Actions (RFFA)
Cape Canaveral Space Force Station (CCSFS)	59.6	70.0	67.3	71.8	77.5
SpaceX Operations Area	50.2	61.6	68.8	69.6	73.1
Titusville Beach	52.1	62.7	78.3	78.4	79.6
Playalinda Beach	45.2	58.8	70.6	70.9	72.6
Kennedy Space Center Visitor Complex	48.9	61.2	66.9	67.9	71.7
KSC Child Development Center	51.5	62.2	67.1	68.3	72.6
Merritt Island National Wildlife Refuge Visitor Center	<45	57.0	65.6	66.2	66.9
Pine Island Conservation Area/Pine Island Estates	46.6	59.7	64.1	65.5	69.3
Kings Park Estates - Courtenay	46.8	60.0	63.2	64.9	69.0
Jetty Park Campground	53.0	63.6	63.2	66.4	70.8
Rockledge High School	<45	56.4	53.7	58.3	61.6
Merritt Island	45.0	58.8	60.2	62.6	66.9
Oak Park Elementary School	<45	<45	52.2	52.2	55.9
Titusville High School	<45	<45	54.3	54.3	57.2
Summerwood Villas	<45	55.3	54.0	56.4	59.2
Atlantis Elementary School	<45	55.5	56.1	58.9	60.4
Fairglen Elementary School	<45	57.4	58.2	60.9	62.6
Lewis Carroll Elementary School	45.3	59.1	61.6	63.5	67.3
Cocoa	<45	57.3	56.5	59.4	62.6
Cocoa Beach	46.0	59.6	61.1	63.3	67.1
Pinegrove Estates	<45	<45	51.7	51.7	55.4
Fern Meadows	<45	<45	51.3	51.3	56.1
KSC Office Outside BDA	50.4	61.4	72.6	72.9	74.9
The Rock Church	<45	<45	50.8	50.8	54.6

Notes: CDNL = C-weighted Day-Night Average Sound Level; dBC = C-weighted decibels.

Table 10. Comparison of CDNL at the Points of Interest for all Operation Scenarios: Winter Night

Point of Interest	C-weighted Day-Night Average Sound Level (dBC)				
	Baseline	No Action	Proposed Starship Operations	Proposed Action	Reasonably Foreseeable Future Actions (RFFA)
Cape Canaveral Space Force Station (CCSFS)	59.6	70.0	66.7	71.6	77.4
SpaceX Operations Area	50.2	61.6	68.4	69.3	72.4
Titusville Beach	52.1	62.7	78.3	78.4	79.6
Playalinda Beach	45.2	58.8	70.2	70.5	72.0
Kennedy Space Center Visitor Complex	48.9	61.2	66.4	67.6	71.0
KSC Child Development Center	51.5	62.2	67.0	68.2	72.1
Merritt Island National Wildlife Refuge Visitor Center	<45	57.0	64.1	64.9	66.1
Pine Island Conservation Area/Pine Island Estates	46.6	59.7	63.7	65.2	68.5
Kings Park Estates - Courtenay	46.8	60.0	62.9	64.7	68.1
Jetty Park Campground	53.0	63.6	62.8	66.2	70.5
Rockledge High School	<45	56.4	51.2	57.6	60.3
Merritt Island	45.0	58.8	53.9	60.0	65.6
Oak Park Elementary School	<45	<45	52.2	52.2	56.0
Titusville High School	<45	<45	54.3	54.3	57.3
Summerwood Villas	<45	55.3	53.8	55.6	59.4
Atlantis Elementary School	<45	55.5	53.7	57.7	59.6
Fairglen Elementary School	<45	57.4	56.1	59.9	61.7
Lewis Carroll Elementary School	45.3	59.1	59.5	62.3	66.4
Cocoa	<45	57.3	53.3	58.8	61.8
Cocoa Beach	46.0	59.6	55.8	61.3	65.8
Pinegrove Estates	<45	<45	51.7	51.7	55.4
Fern Meadows	<45	<45	51.3	51.3	56.1
KSC Office Outside BDA	50.4	61.4	72.5	72.8	74.6
The Rock Church	<45	<45	50.7	50.7	54.4

Notes: CDNL = C-weighted Day-Night Average Sound Level; dBC = C-weighted decibels.

3 SINGEL EVENT STARSHIP NOISE AND SONIC BOOM MODELING RESULTS AT LC-39A

3.1 SINGLE EVENT ROCKET NOISE RESULTS AT LC-39A

3.1.1 Single Event Rocket Noise Contour Figures: Maximum A-weighted Sound Level (L_{Amax}), Sound Exposure Level (SEL), and Maximum Unweighted Sound Level (L_{max}): Mean Annual

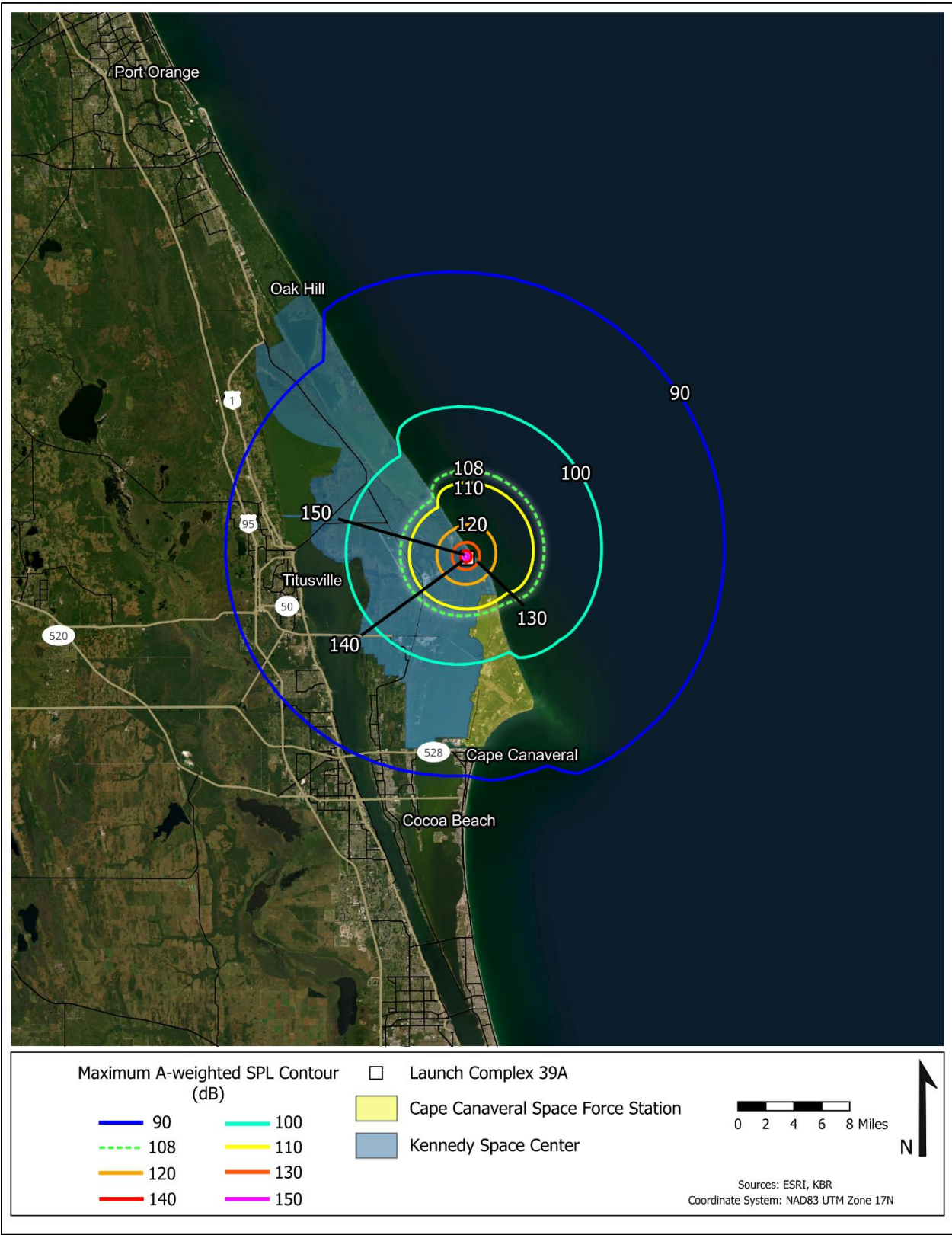


Figure 39. Starship Orbital Launch from LC-39A: Maximum A-Weighted Sound Levels: Mean Annual

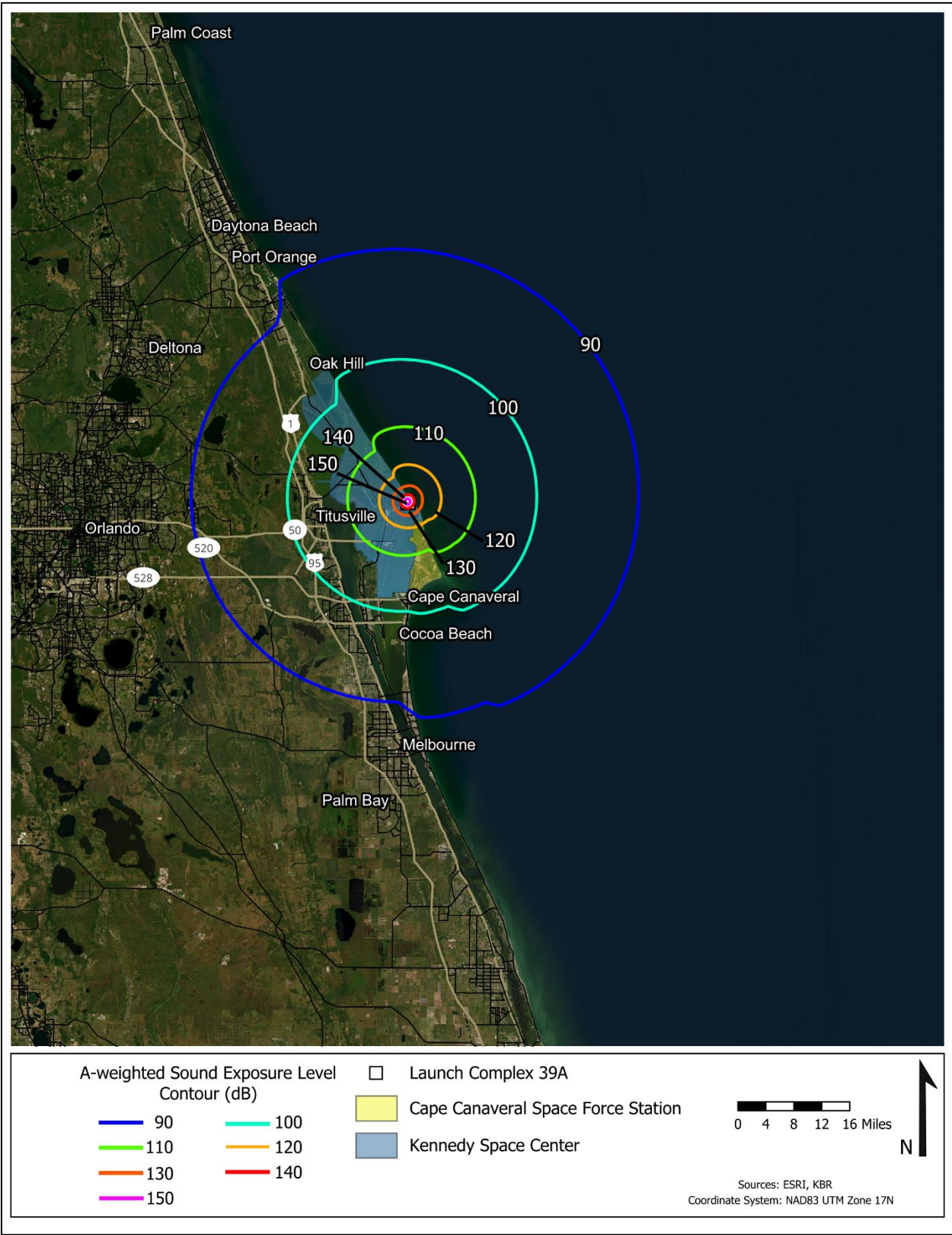


Figure 40. Starship Orbital Launch from LC-39A: Sound Exposure Levels: Mean Annual

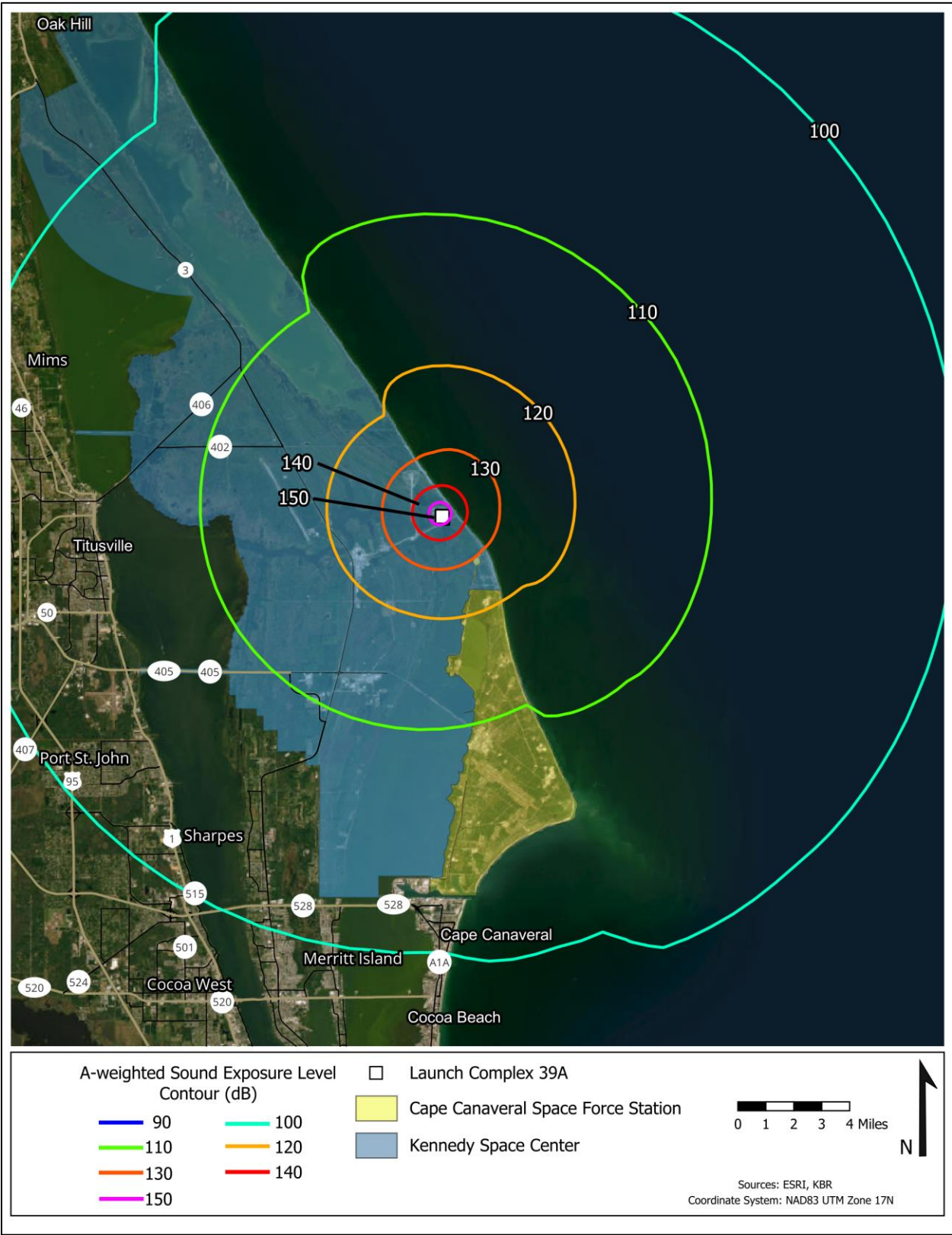


Figure 41. Starship Orbital Launch from LC-39A: Sound Exposure Levels: Mean Annual

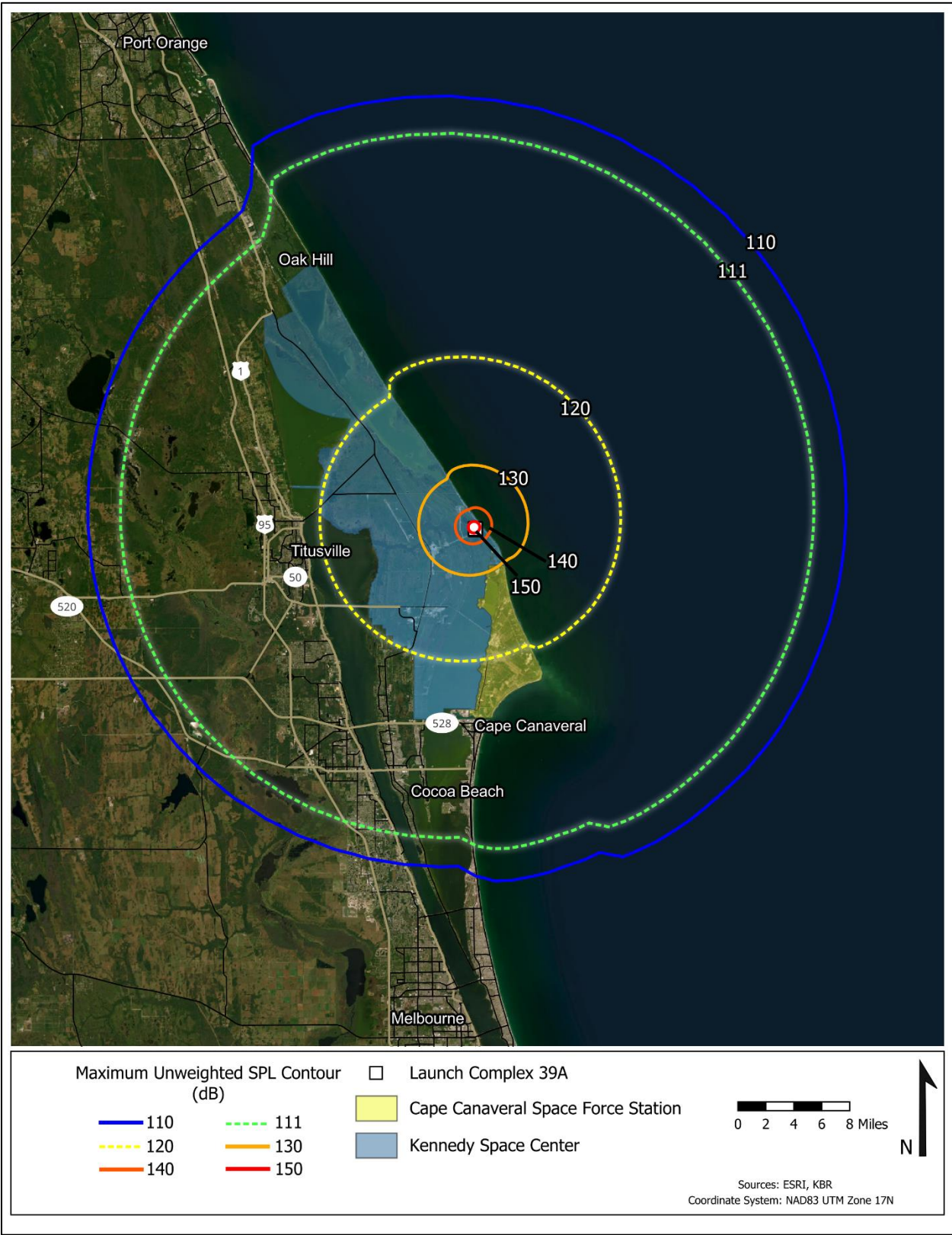


Figure 42. Starship Orbital Launch from LC-39A: Maximum Unweighted Sound Levels: Mean Annual

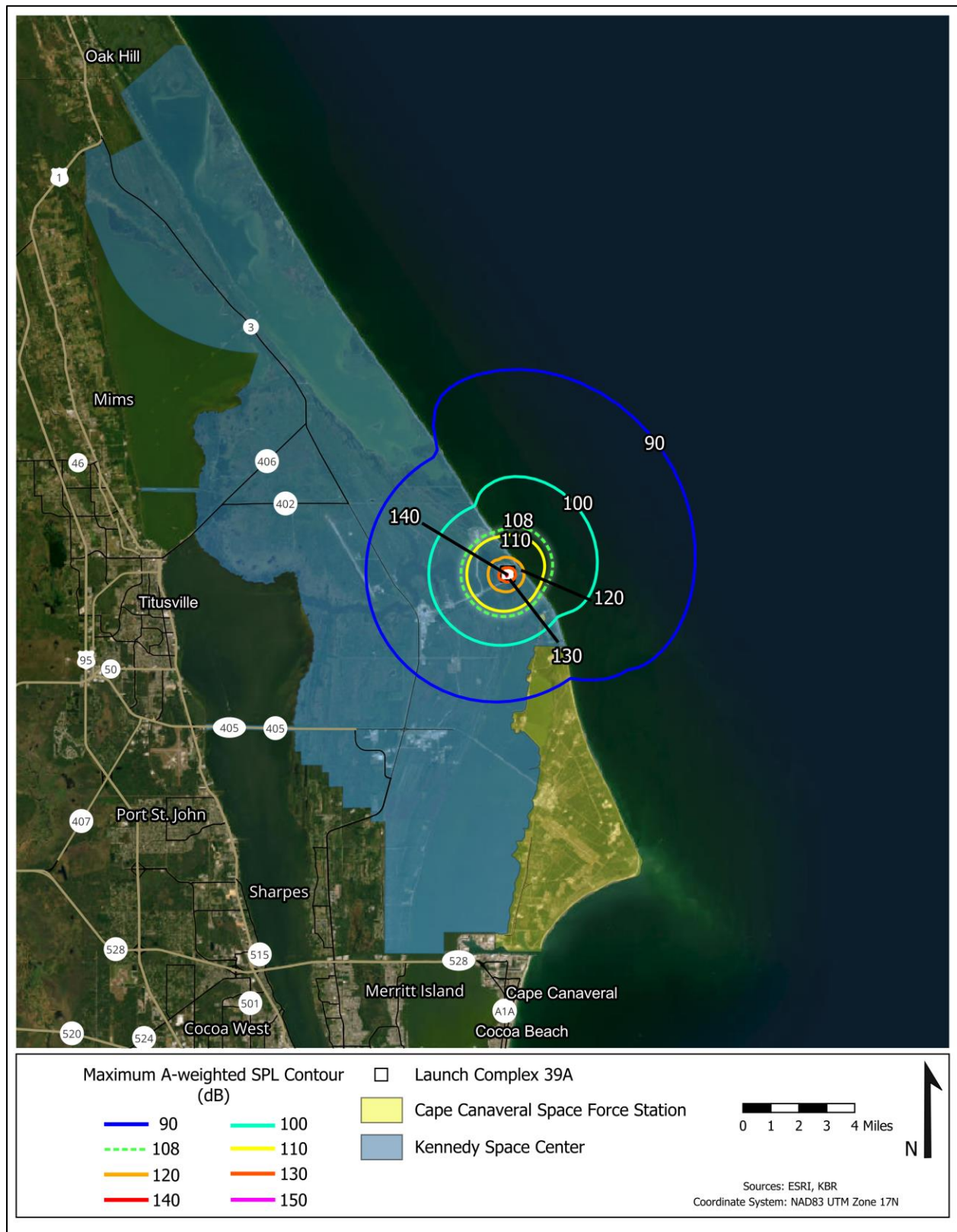


Figure 43. Starship Spacecraft Landing at LC-39A: Maximum A-Weighted Sound Levels: Mean Annual

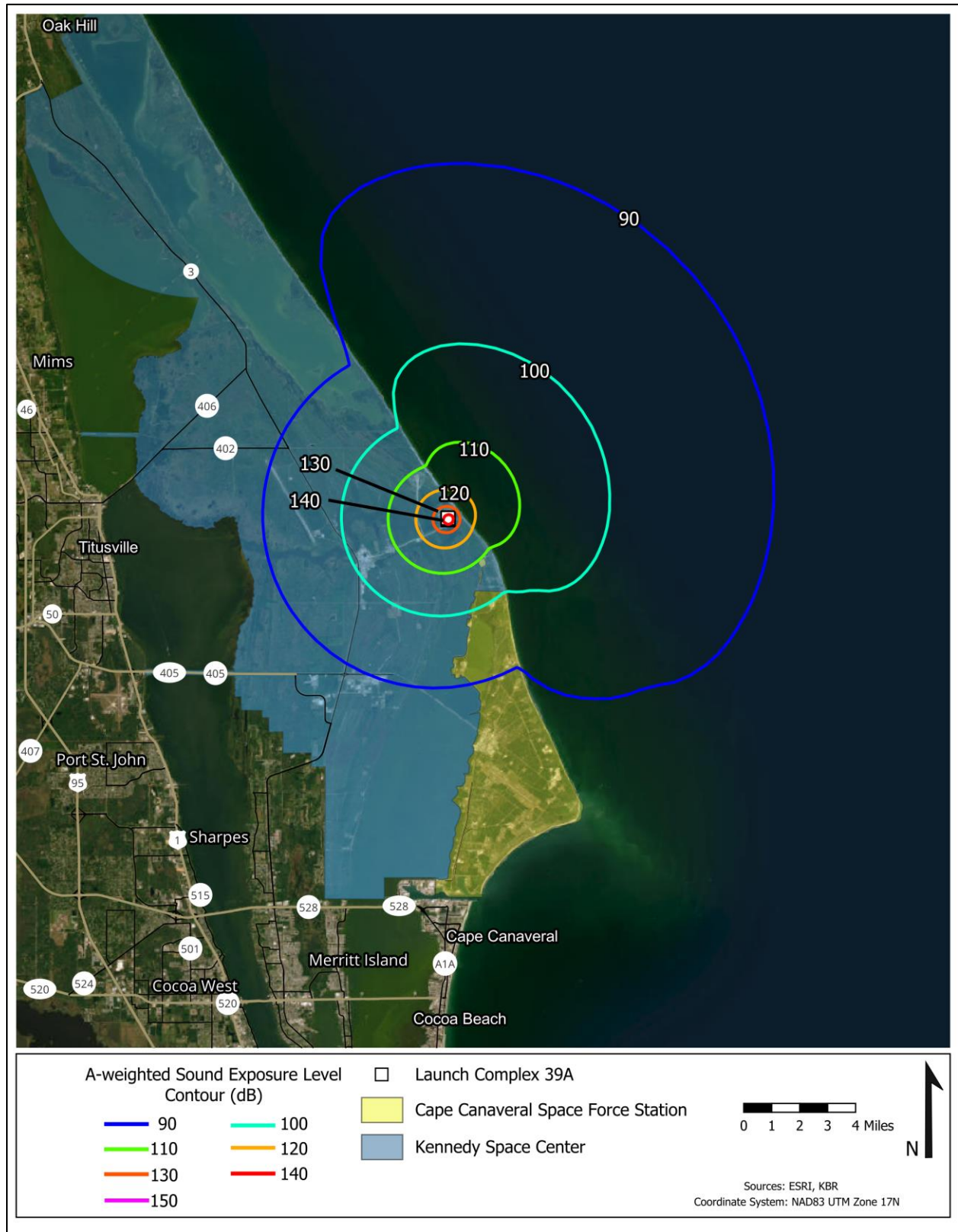


Figure 44. Starship Spacecraft Landing at LC-39A: Sound Exposure Levels: Mean Annual

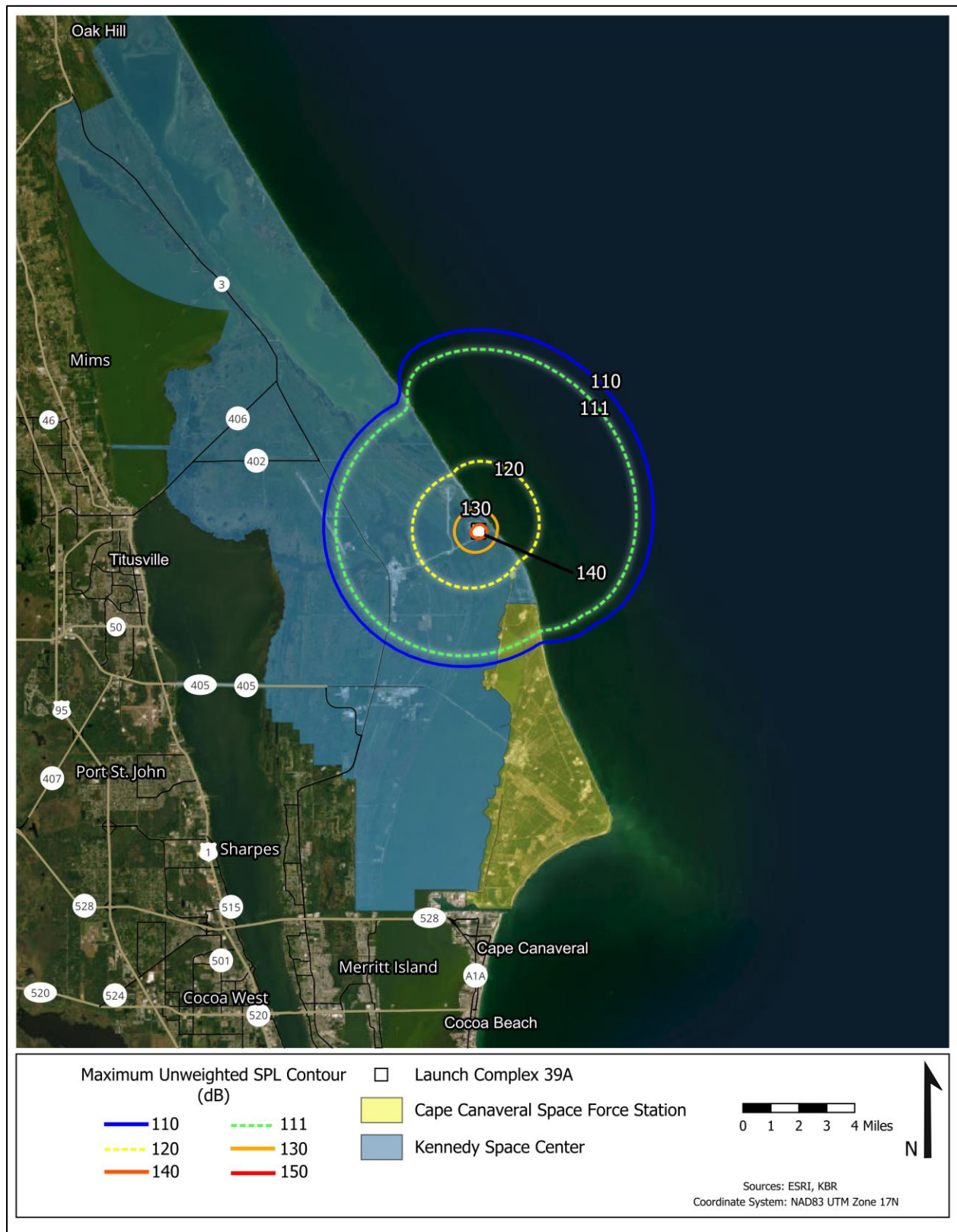


Figure 45. Starship Spacecraft Landing at LC-39A: Maximum Unweighted Sound Levels: Mean Annual

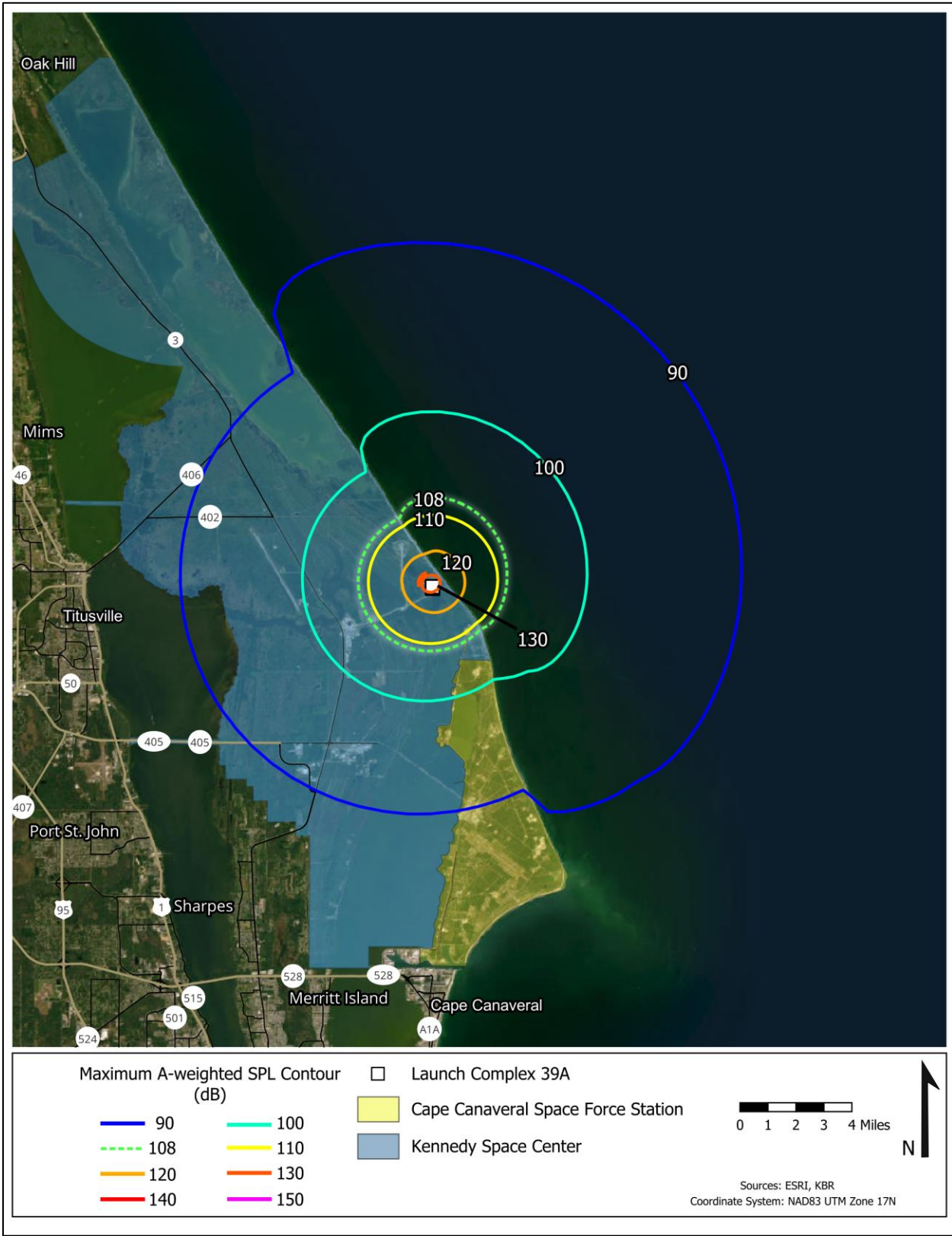


Figure 46. Super Heavy Landing at LC-39A (Nominal): Max A-Weighted Sound Levels: Mean Annual

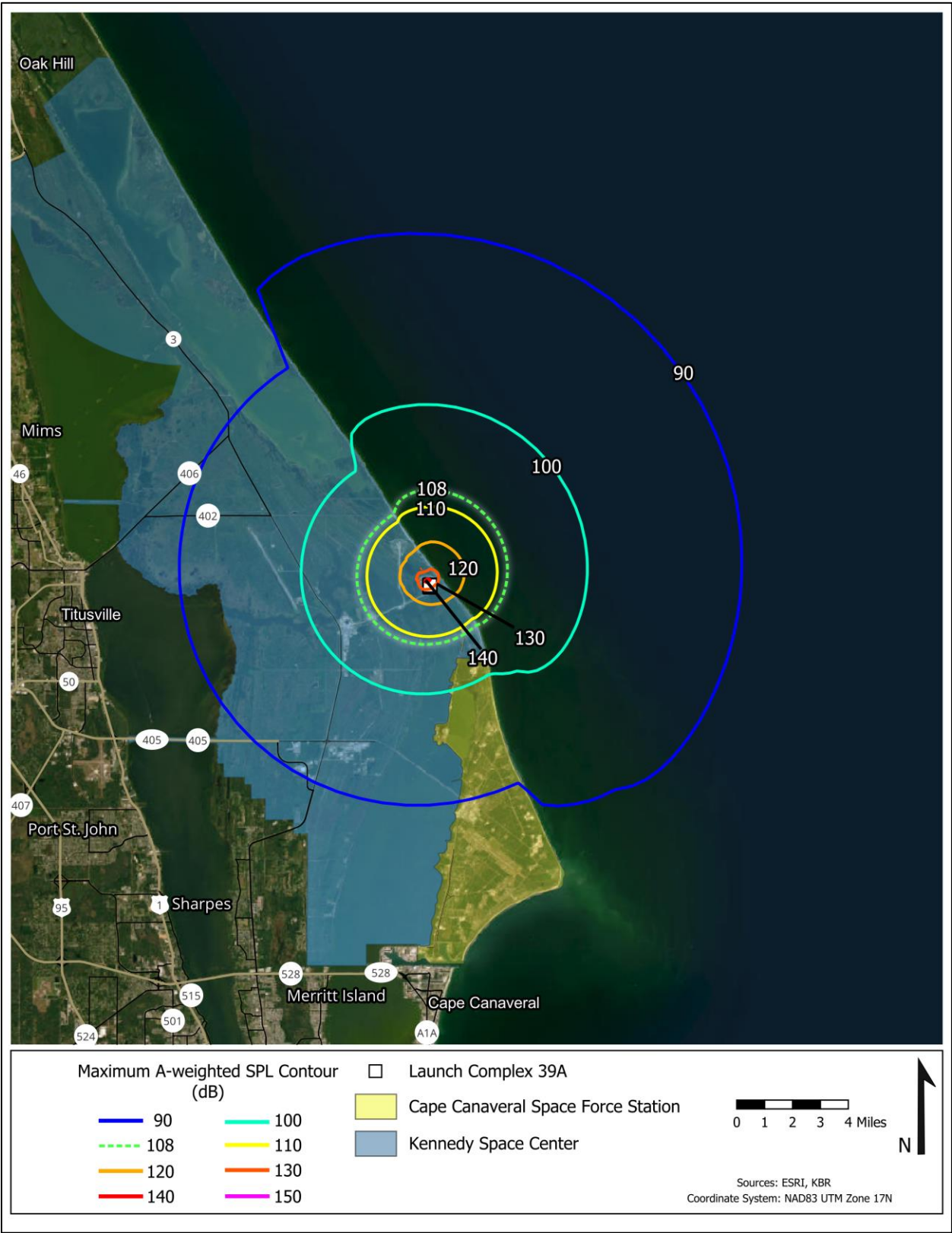


Figure 47. Super Heavy Landing at LC-39A (40-Degrees): Max A-Weighted Sound Levels: Mean Annual

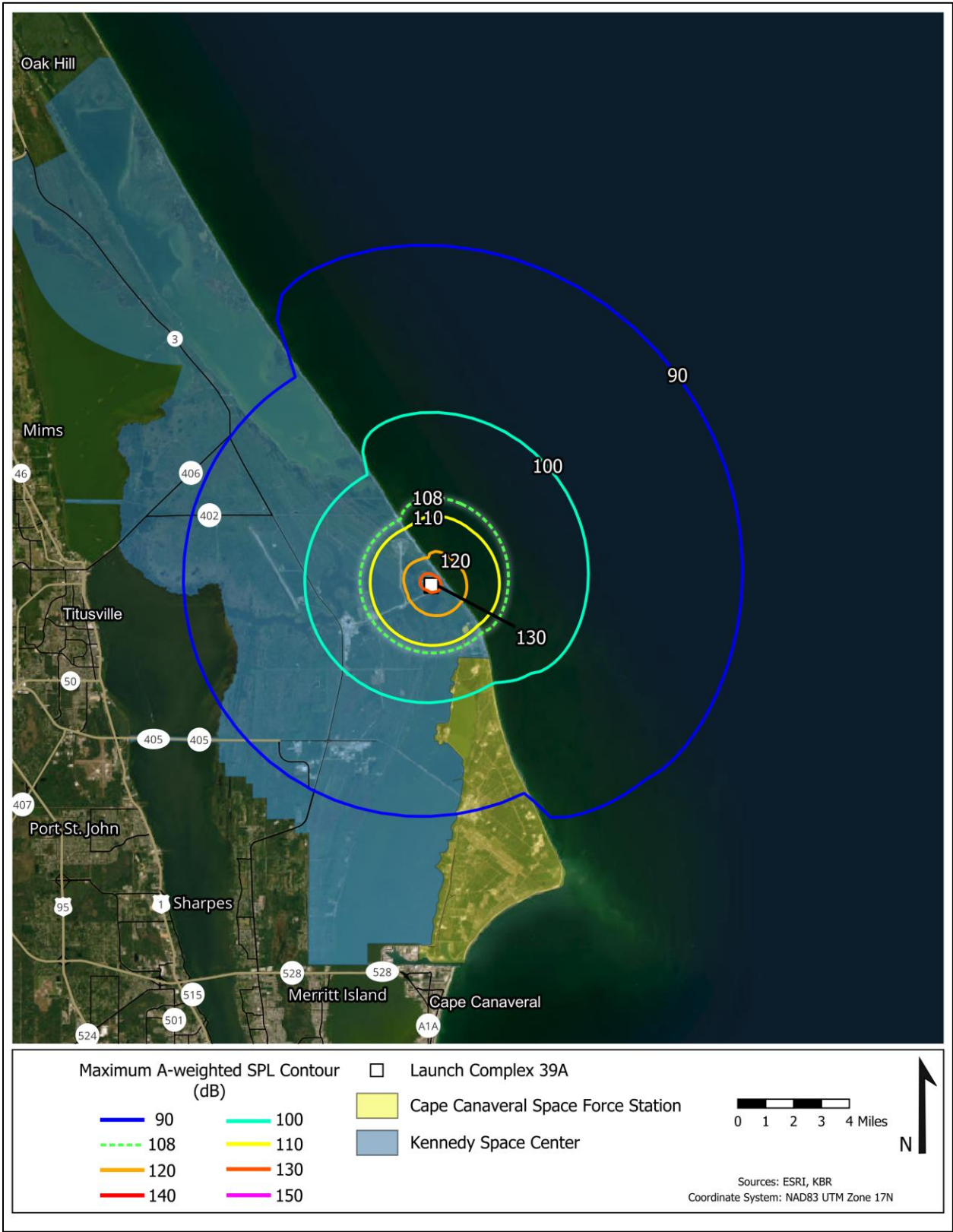


Figure 48. Super Heavy Landing at LC-39A (115-Degrees): Max A-Weighted Sound Levels: Mean Annual

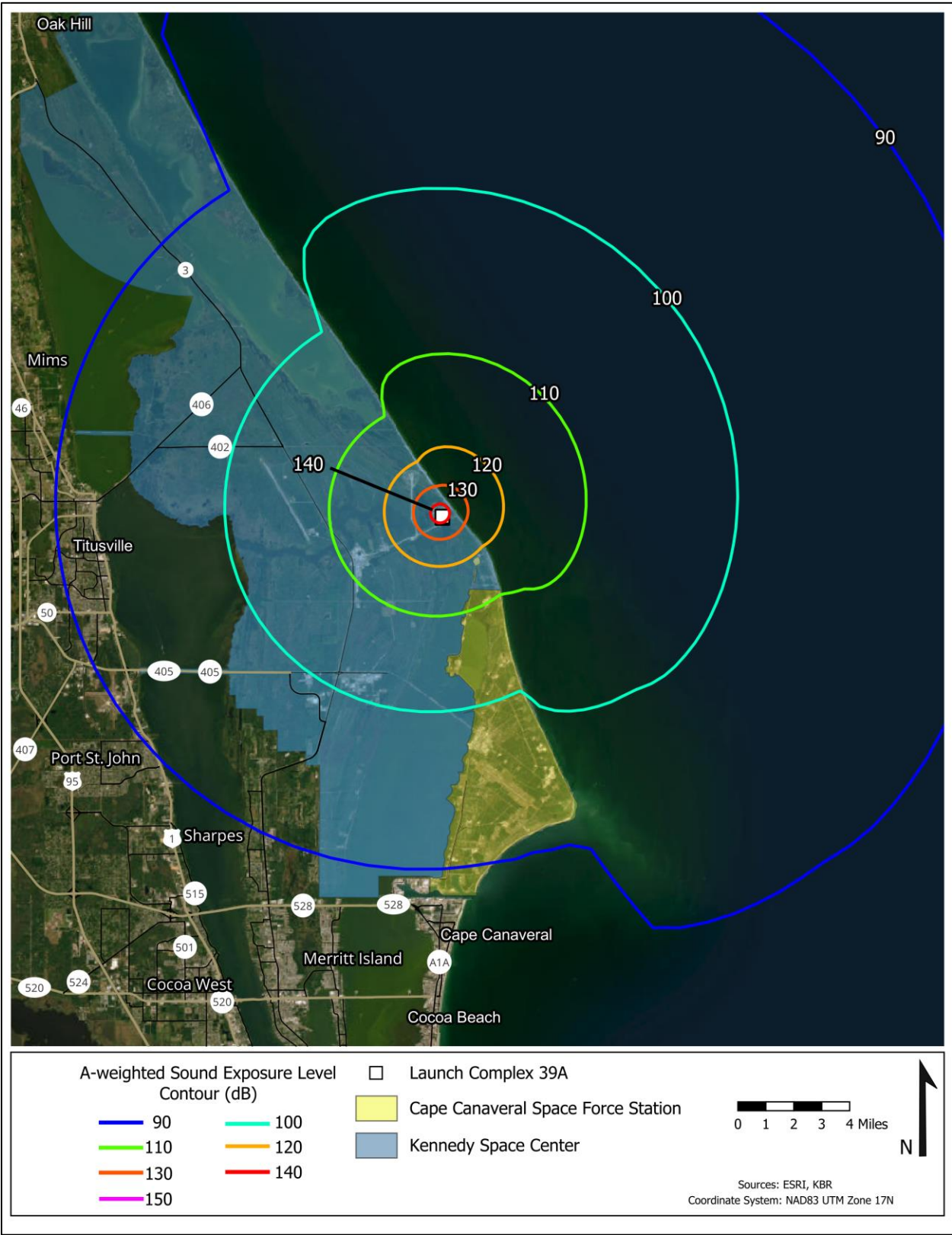


Figure 49. Super Heavy Landing at LC-39A (Nominal): Sound Exposure Levels: Mean Annual

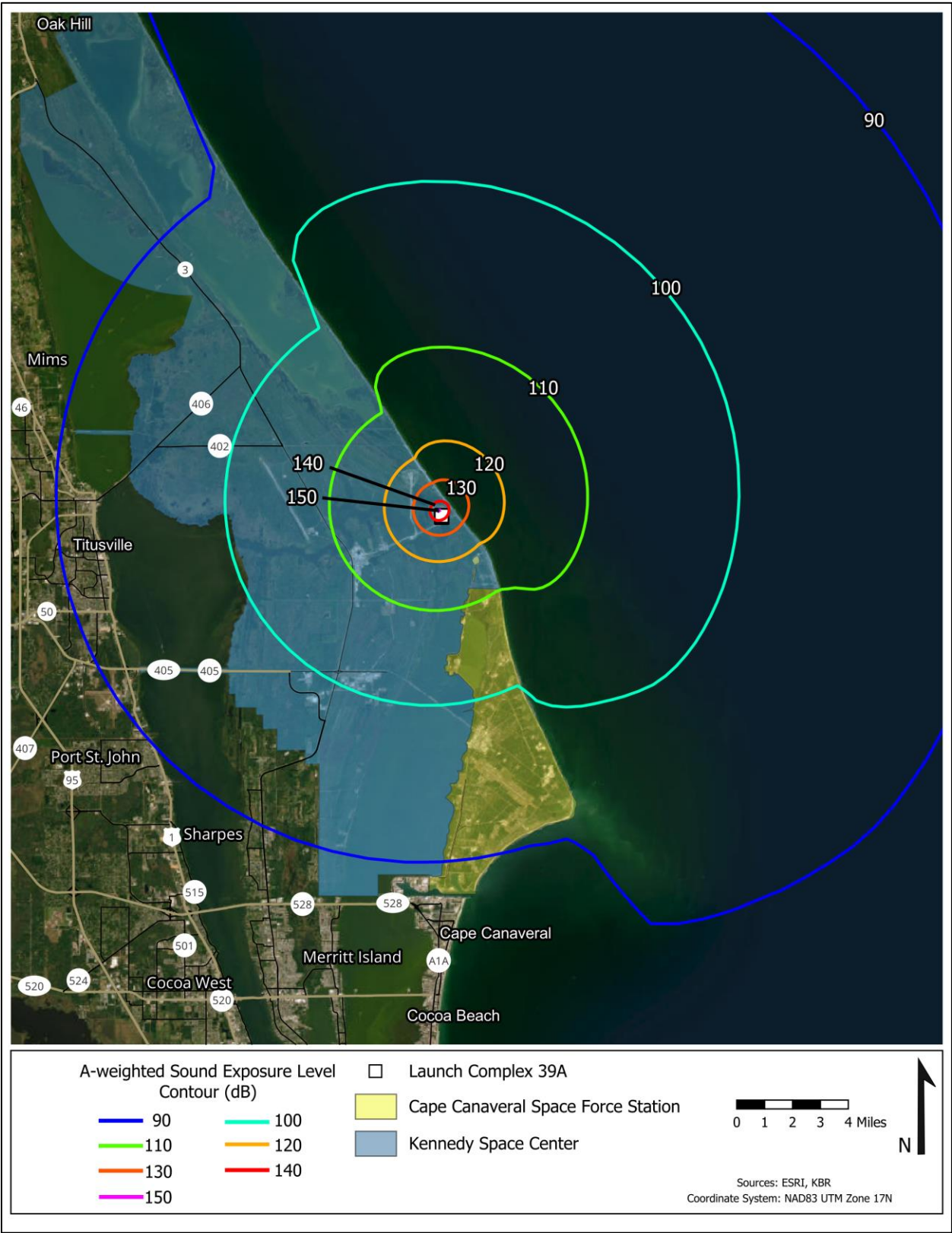


Figure 50. Super Heavy Landing at LC-39A (40-Degrees): Sound Exposure Levels: Mean Annual

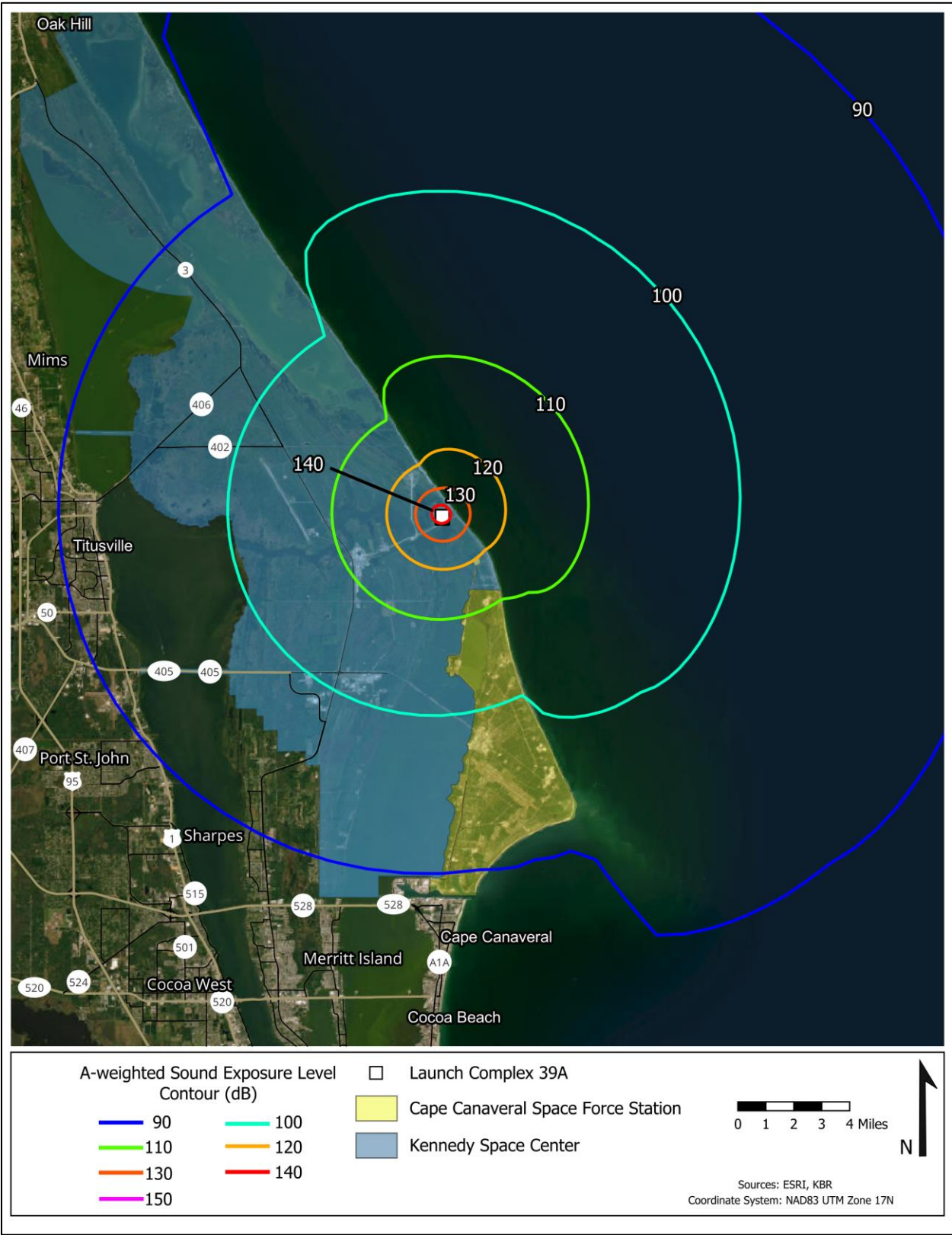


Figure 51. Super Heavy Landing at LC-39A (115-Degrees): Sound Exposure Levels: Mean Annual

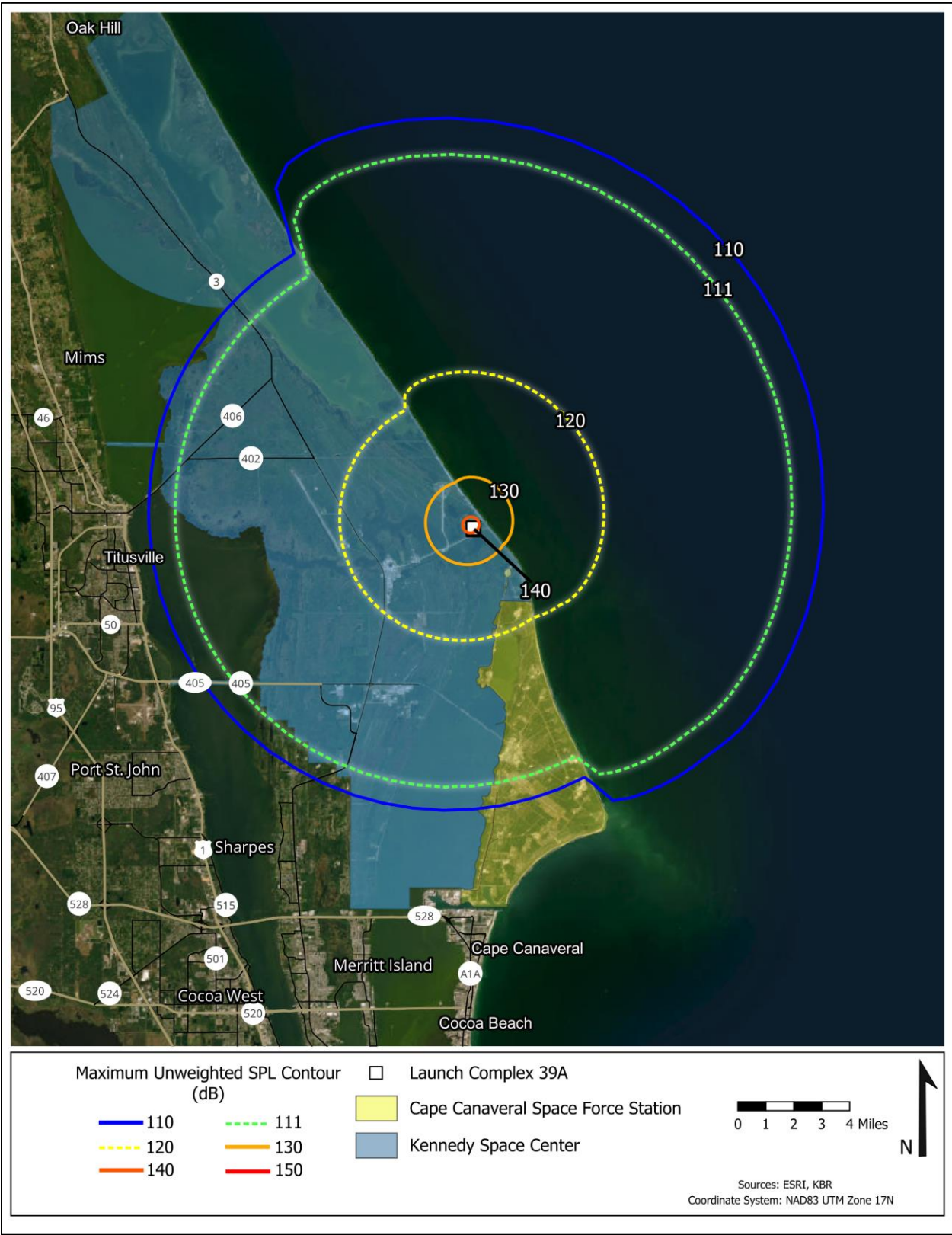


Figure 52. Super Heavy Landing at LC-39A (Nominal): Max Unweighted Sound Levels: Mean Annual

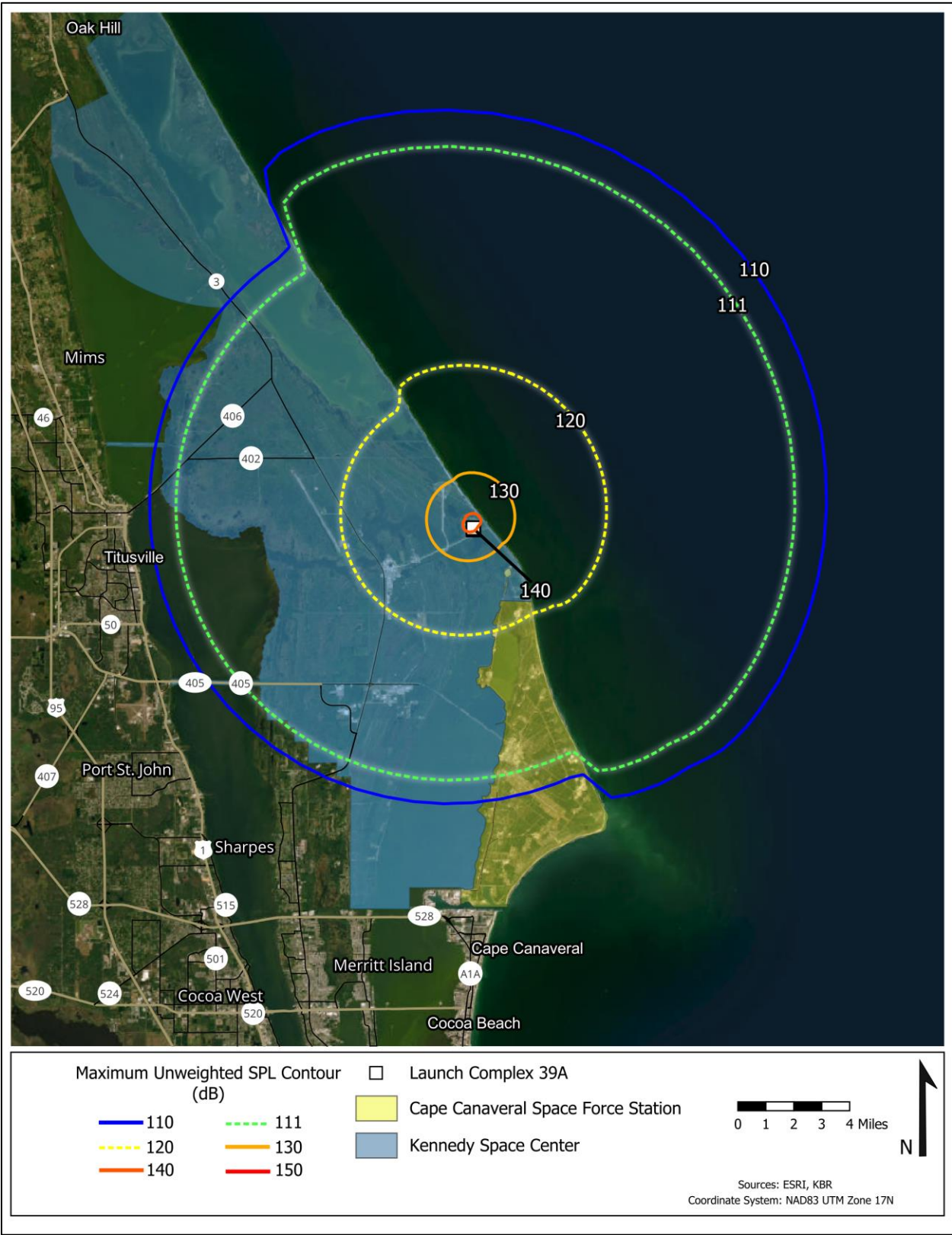


Figure 53. Super Heavy Landing at LC-39A (40-Degrees): Max Unweighted Sound Levels: Mean Annual

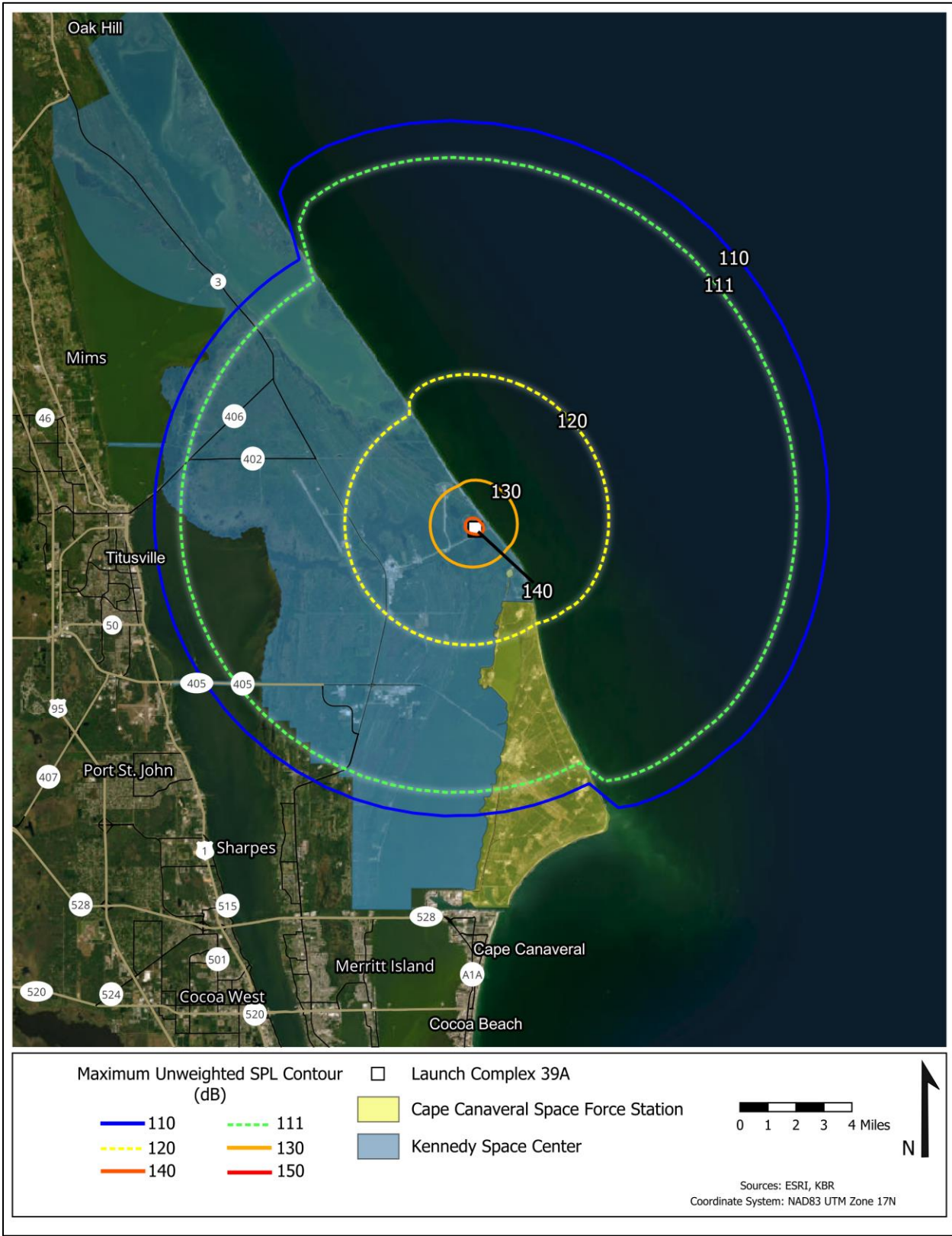


Figure 54. Super Heavy Landing at LC-39A (115-Degrees): Max Unweighted Sound Levels: Mean Annual

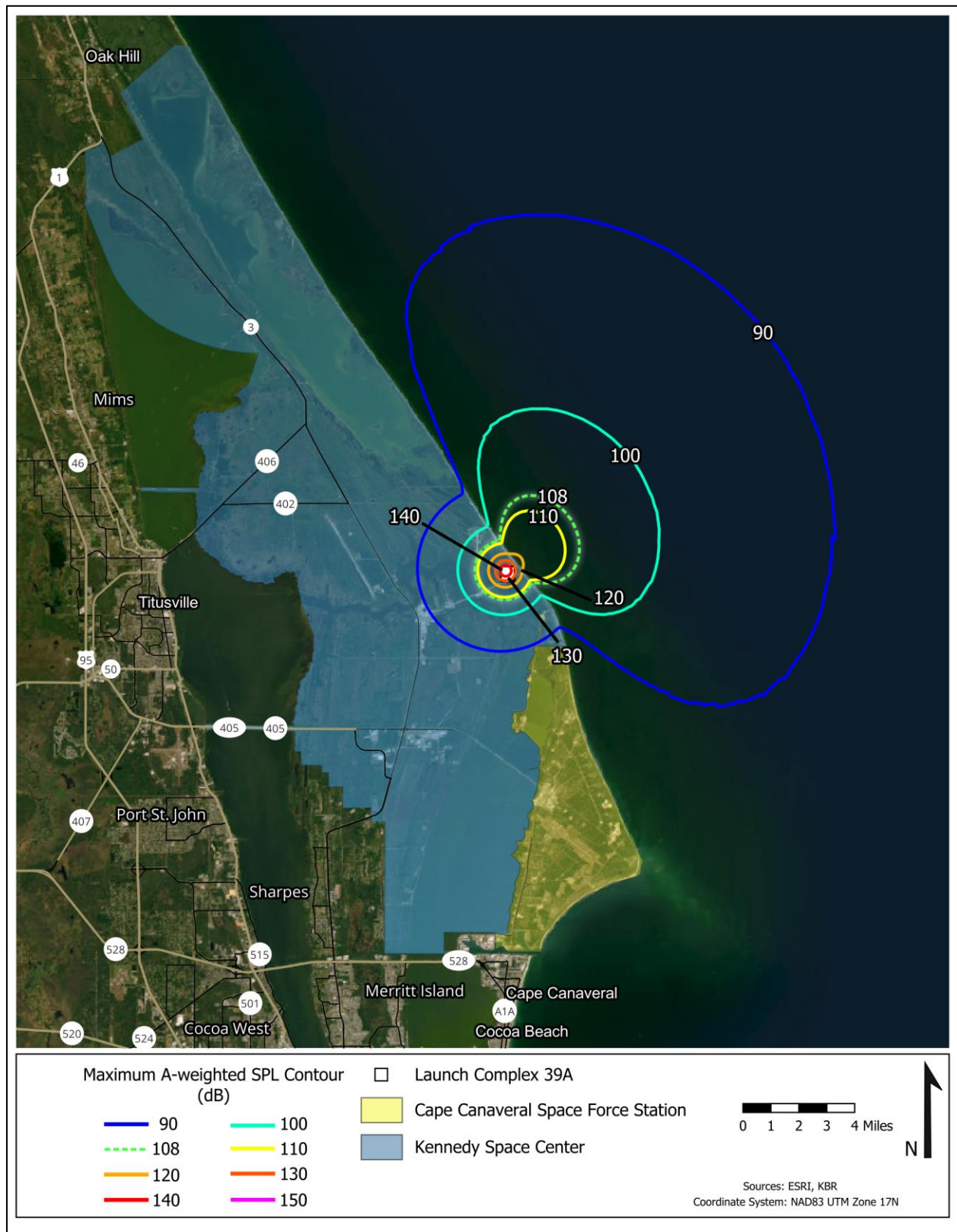


Figure 55. Starship Spacecraft Static Fire Test at LC-39A: Max A-Weighted Sound Levels: Mean Annual

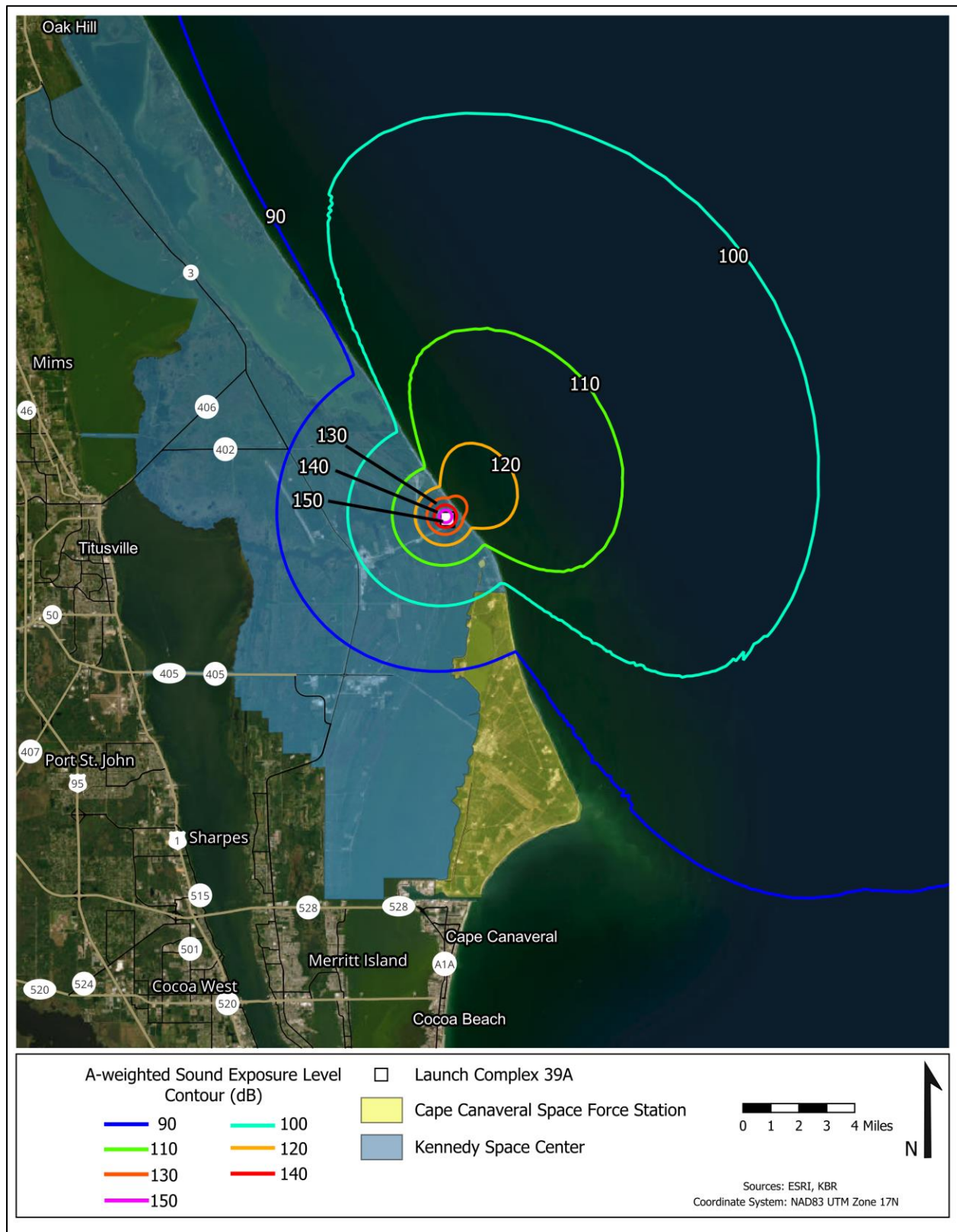


Figure 56. Starship Spacecraft Static Fire Test at LC-39A: Sound Exposure Levels: Mean Annual

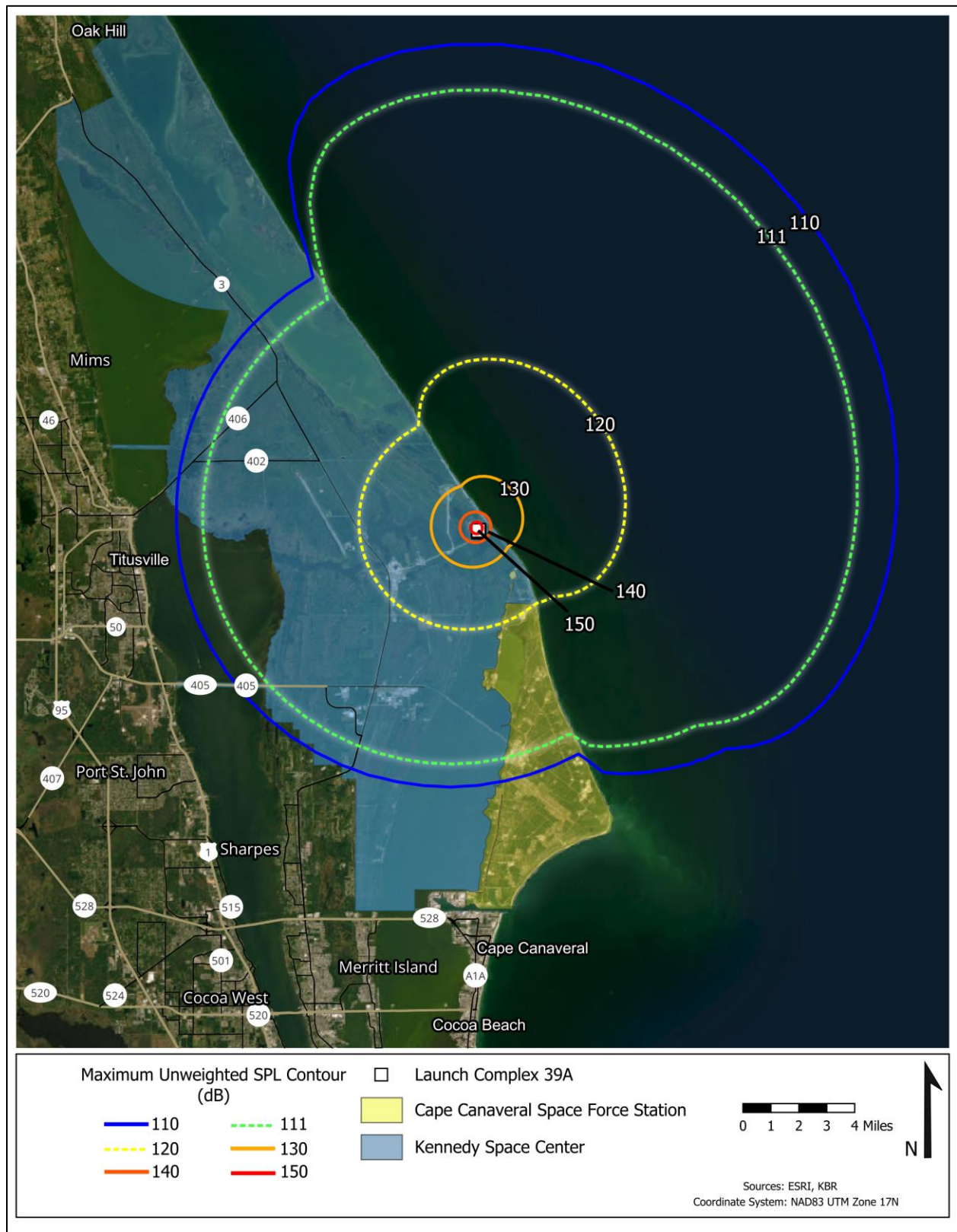


Figure 57. Starship Spacecraft Static Test at LC-39A: Max Unweighted Sound Levels: Mean Annual

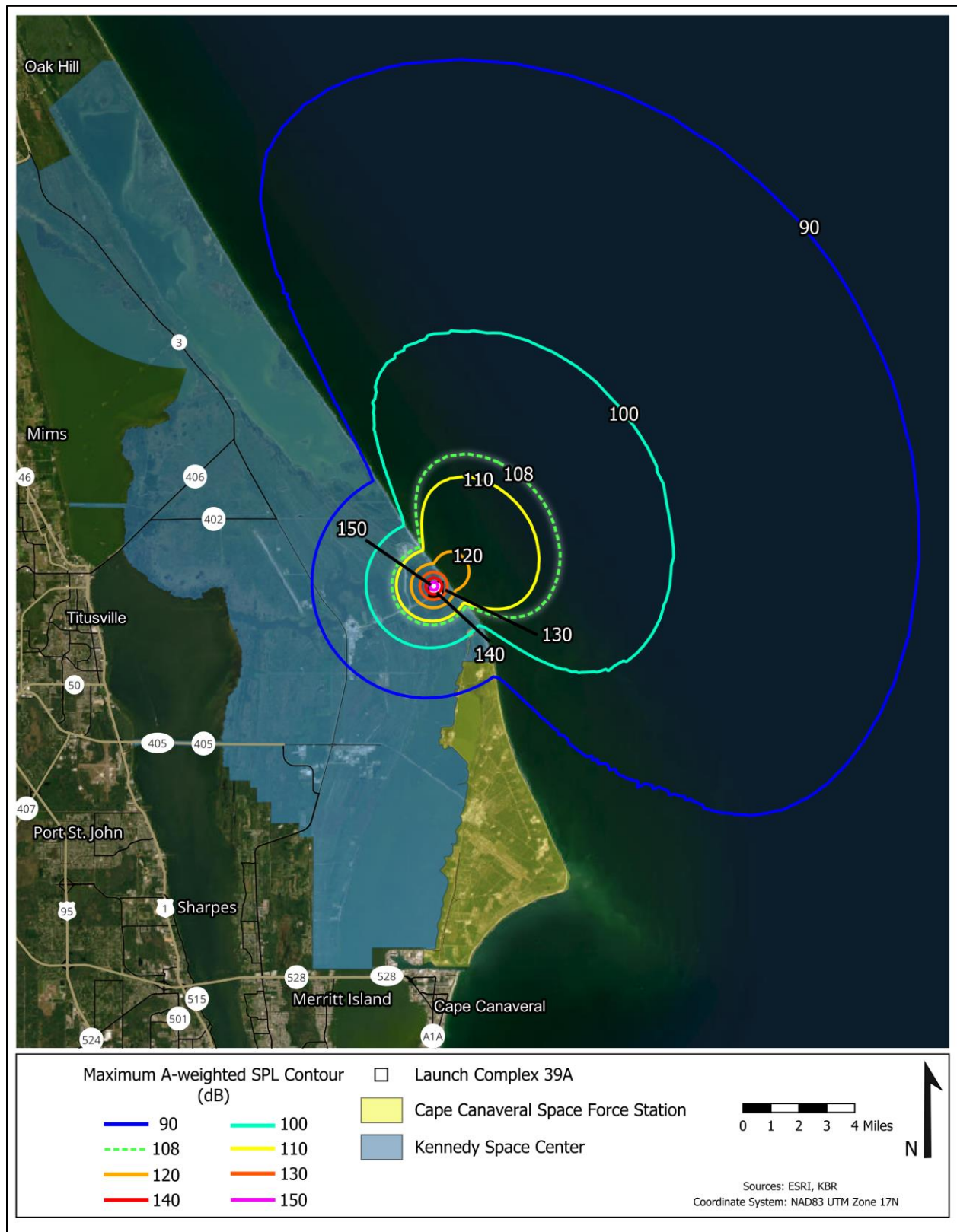


Figure 58. Super Heavy Static Fire Test at LC-39A: Maximum A-Weighted Sound Levels: Mean Annual

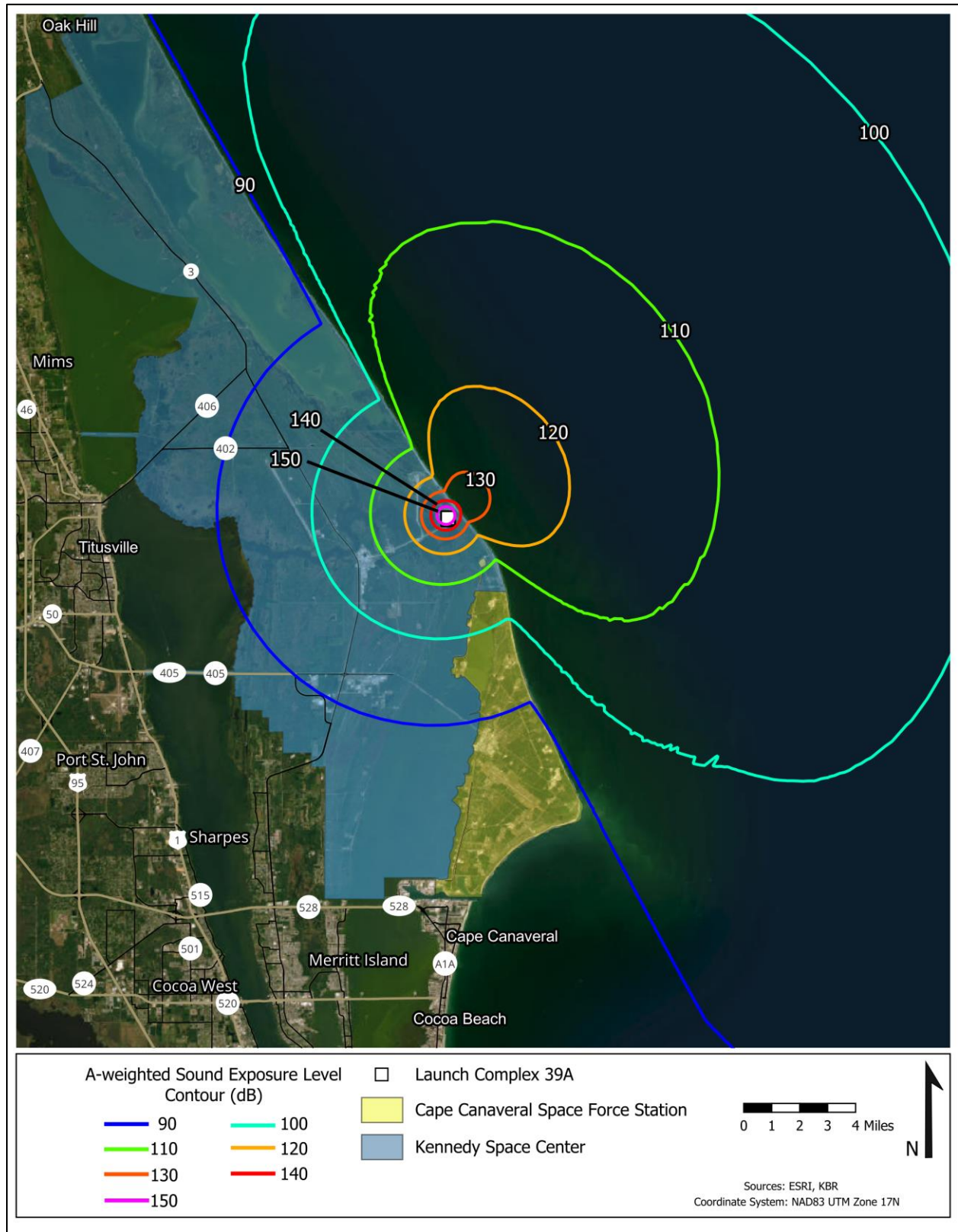


Figure 59. Super Heavy Static Fire Test at LC-39A: Sound Exposure Levels: Mean Annual

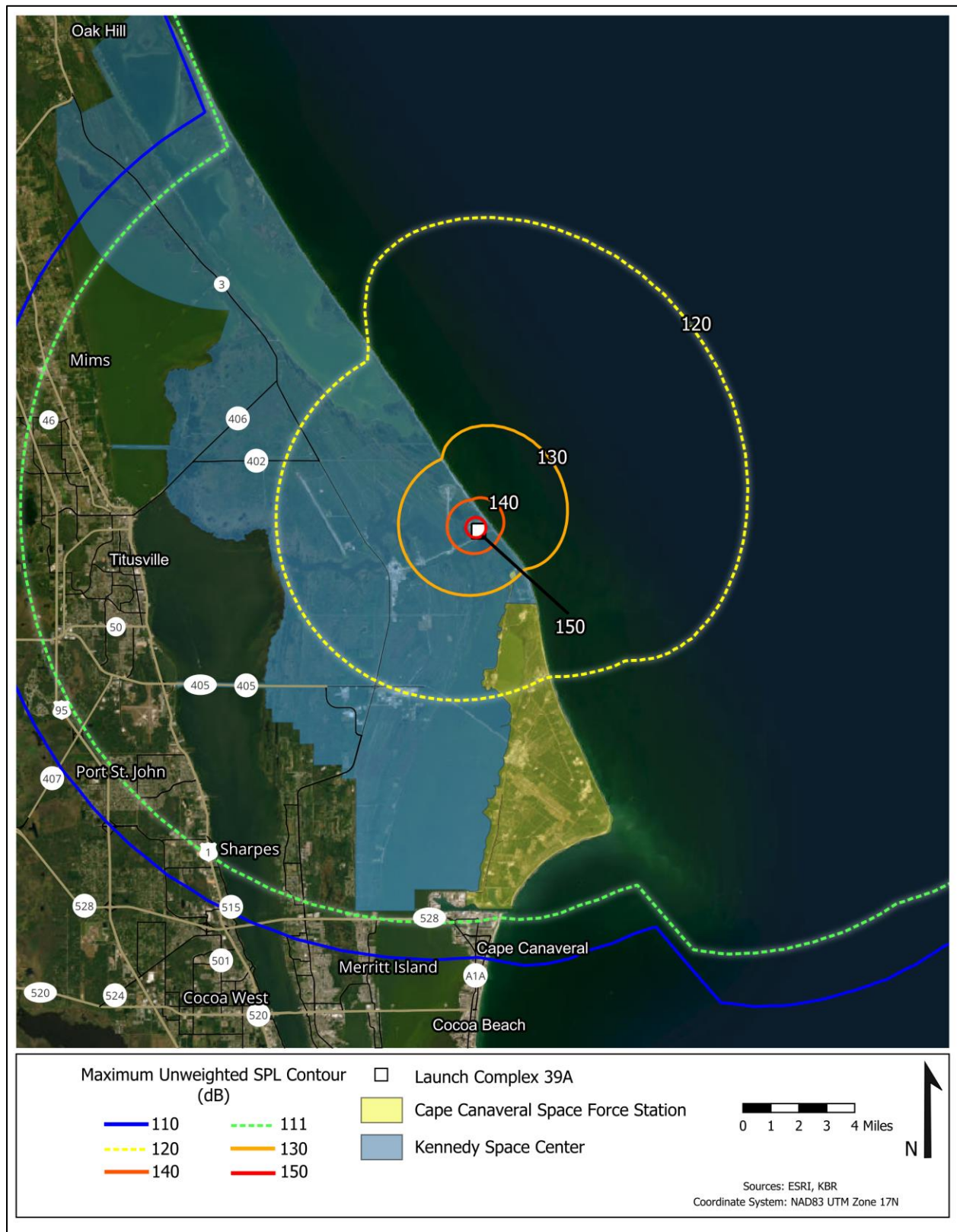


Figure 60. Super Booster Static Fire Test at LC-39A: Maximum Unweighted Sound Levels: Mean Annual