

Appendix A. County Resolution

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Appendix B. Planning Team Members

All-Hazard Mitigation Planning Team		
Department/Agency	Name	Title
Anne Arundel County Chief Administrative Office	Alvin Collins	Chief of Staff
Anne Arundel County Fire Department	Allan Graves	Captain
Anne Arundel County Emergency Management	Barbara Fay	Community Educator
Anne Arundel County Permits & Inspections	William Bryant	Chief of Inspectors
Anne Arundel County Communications/IT	William Ryan	Assistant IT Manager
Anne Arundel County Public Schools	Robert Yatsuk	Project Manager
Constellation Energy Group	Bonnie Johansen	Government Relations Representative
Anne Arundel County Department of Human Services	Carole Kauffman	Project Manager for Communicable Diseases
Anne Arundel County Geographic Data Services	Caroline Gaulke	GIS Manager
Anne Arundel County Executive Office	Cecelia Fabula	Director of Community and Constituent Services
Anne Arundel County Office of Planning and Zoning	Charles Abrahamson	Planner 3
Anne Arundel County Emergency Management	Cathy Close	Management Aid
Maryland Cooperative Extension Service	David Myers	County Agricultural Extension Agent
Anne Arundel County Fire Department	David Povlitz	Lieutenant- HAZMAT
Anne Arundel County Department of Human Services	Dennis Hoyle	Assistant to Human Services Officer
Anne Arundel County	Dennis Ward	Assistant Chief of

Department of Public Works		Highways
Anne Arundel County Central Services	Donna Goins	Safety & Insurance Manager
Anne Arundel County Fire Department	Frank Stokes	Division Chief- FMO
Anne Arundel County Culture and Environmental Resources	Ginger Ellis	Environmental Planning Administrator
Anne Arundel County	James Pittman	Deputy Director of Waste Management
Anne Arundel County Emergency Management	James Weed	Director
Anne Arundel County Soil Conservation District	Jeff Opel	District Manager
Anne Arundel County Soil Conservation District	James Stein	Erosion Specialist
Anne Arundel County Fire Department	John Scholz	Public Information Officer
Anne Arundel County Department of Public Works	Kenneth McCall	Safety and Biosolids Management Coordinator
Anne Arundel County Health Department	Kerry Topovski	Environmental
Anne Arundel County Emergency Management	Lisa Richards	Mitigation Intern
Anne Arundel County School District	Mark Black	Supervisor of School Security
Anne Arundel County Emergency Management	Michael O'Connell	Division Chief
Anne Arundel County Health Department	Percina Curtis	Health Administrator for the Office of Emergency Preparedness
Anne Arundel County Fire Department	Robert Ray	Deputy Chief
Anne Arundel County Department of Planning	Spurge Eismeier	Director of Inspections and Permits
Anne Arundel County	Steven Taylor	Emergency Management

Emergency Management		Planner
Anne Arundel County Police Department	Timothy Bowman	Captain
Anne Arundel County Department of Public Works	Thomas Forgette	Emergency Services Manager of Security
Anne Arundel County Police Department	Tony Pugliese	Police- Special Ops
Anne Arundel County Administration	Walter Chitwood	Assistant CAO

Appendix C. Hazard History Documentation

	Hazard or Event Description	Source of Information
Natural Hazards		
1. Animal Disease, Outbreak, Blight, or Infestation AAC-AD	None noted. 1/1/1992 – 12/31/2002	<i>Maryland Agricultural Statistics Summaries for 1992- 2002.</i> Maryland Department of Agriculture 50 Harry S. Truman Parkway Annapolis, MD 21401 Norm Bennett, State Statistician, Maryland Department of Agriculture
2. Coastal Flooding AAC-CF	1. Along The Chesapeake 09/06/1996 2. Along the Coast 02/04/1998 3. East Portion 09/05/1999 4. Annapolis 04/21/2000 5. Annapolis 04/27/2000 6. Along the Chesapeake 09/18/2003 1/1/1996 – 1/31/2004 See C:\Documents and Settings\fdtay569\My Documents\Mitigation Plan\Individual Hazard Documents\Coastal Flooding.doc	<ul style="list-style-type: none"> • EOC personnel • National Climate Data Center http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent-storms
3. Drought AAC-DR	1. 1930-31 drought. The 13-month period from January, 1930 to January, 1931 2. 4-year period from January, 1963 through December, 1966 3. July, 1998 through July, 1999 13-month totals 4. September 2001 through August of 2002 1/1/1930 – 12/31/2003	1. Office of the Maryland State Climatologist Department of Meteorology 4360 Computer and Space Sciences Building University of Maryland College Park, MD 20742 http://www.atmos.umd.edu/~climate/ 2. Maryland Department of the Environment http://www.mde.state.md.us/Water/Drought/home/index.asp
4. Earthquake AAC-EQ	1. Annapolis: 4/25/1758 2. Annapolis: 1/30/1876 3. Round Bay – Severna Park: 11/1/1930 4. Round Bay – Severna Park: 11/1/1930 5. Glen Burnie – Pasadena – Gambrills – Millersville: 10/28/1994 See: C:\Documents and Settings\fdtay569\My Documents\Mitigation Plan\Individual Hazard Documents\Earthquake.doc	R.D. Conkwright, Maryland Geological Survey 2300 St Paul Street Baltimore, MD 21218 http://www.mgs.md.gov/esic/brochure/earthquake.html
5. Extreme Heat AAC-EH	1. 8/7/2001 – 8/10/2001 2. 6/24/2002 – 6/26/2002 3. 7/2/2002 – 7/4/2002 4. 7/22/2002 – 7/23/2002	National Weather Service http://www.erh.noaa.gov/er/lwx/climate.htm

	<p>5. 7/28/2002 – 7/29/2002 6. 8/1/2002 – 8/2/2002 7. 8/12/2002 – 8/19/2002</p> <p>1/1/2000 – 12/31/2003 See: C:\Documents and Settings\fdtay569\My Documents\Mitigation Plan\Data Tables for Report\Mean temperatures for bwi.exe</p>	
<p>6. Hurricane, Nor'easters, or Tropical Storm AAC-HU</p>	<p>1. Nor'easter 2/13/1914 2. Nor'easter 3/1/1914 – 3/2/1914 3. Nor'easter 2/4/1920 – 2/6/1920 4. Nor'easter 1/27/1922 – 1/28/1922 5. Nor'easter 1/1/1924 6. Nor'easter 2/3/1926 7. Nor'easter 2/9/1926 – 2/10/1926 8. Hurricane August 1933 08/22/1933 08/23/1933 9. Nor'easter 2/15/1958 – 2/17/1958 10. Hurricane Hazel 10/15/1954 11. Hurricane Connie 8/3/1995 12. Hurricane Diane 8/19/1955 13. Nor'easter 3/5/1962 – 3/9/1962 14. Tropical Storm Doria 8/28/1971 15. Hurricane Agnes 8/21/1972 16. Tropical Storm Eloise 9/24/1975 17. Tropical Storm David 9/6/1979 18. Tropical Storm Gloria 9/27/1985 19. Tropical Storm Juan 11/1/1985 20. Nor'easter 3/13/1993 – 3/14/1993 21. Tropical Storm Floyd 9/17/1999 22. Nor'easter 1/25/2000 23. Tropical Storm Isabel 9/20/2003</p> <p>1/1/1901 – 12/31/2003</p> <p>See: C:\Documents and Settings\fdtay569\My Documents\Mitigation Plan\Individual Hazard Documents\Hurricane.doc</p>	<ul style="list-style-type: none"> • 1995 EOP, Annex V • Baltimore Sun, Hurricane Timeline http://www.baltimoresun.com/newweather/hurricane/sfl-hc-history-1495to1800,0,49620.htmlstory?coll=hl-hurricanes-storyutil • Barbara Watson, National Weather Service Weather Forecast Office 44087 Weather Service Rd. Sterling, VA 20166 <p>http://www.erh.noaa.gov/er/lwx/Hurricane_Events/md-winter.html</p>
<p>7. Landslide or Slope Failure AAC-LA</p>	<p>No historic data. Provided maps, landslide hazard.</p>	<p>Jim Reger, Maryland Geological Society 2300 St. Paul Street Baltimore, MD 21218</p>
<p>8. Public Health Emergency AAC-PH</p>	<p>1. 01/04/2001 Restaurant 2. 01/10/2001 Restaurant 3. 01/12/2001 Nursing Home 4. 01/19/2001 Assisted Living 5. 02/08/2001 Nursing Home 6. 02/09/2001 Restaurant 7. 02/13/2001 Restaurant 8. 02/15/2001 Restaurant 9. 02/22/2001 Restaurant 10. 02/26/2001 Restaurant 11. 02/26/2001 Day Care 12. 03/07/2001 Restaurant 13. 03/16/2001 Restaurant 14. 03/29/2001 Nursing Home 15. 04/02/2001 Elementary School 16. 04/05/2001 Nursing Home</p>	<p>Carole Kauffman, R.N., M.H.A. Program Manager Communicable Diseases and Epidemiology Anne Arundel County Health Department 3 Harry S. Truman Pkwy. Annapolis, MD 21401</p>

17.	04/09/2001	Restaurant
18.	04/13/2001	Restaurant
19.	05/01/2001	Elementary School
20.	05/02/2001	Day Care
21.	05/08/2001	Hospital
22.	05/11/2001	Elementary School
23.	05/11/2001	Elementary School
24.	05/15/2001	Cruise Line
25.	05/22/2001	Elementary School
26.	06/01/2001	Restaurant
27.	06/08/2001	Restaurant
28.	06/14/2001	Nursing Home
29.	06/19/2001	Restaurant
30.	06/25/2001	Restaurant
31.	06/28/2001	Restaurant
32.	08/10/2001	Nursing Home
33.	08/14/2001	Restaurant
34.	08/17/2001	Restaurant
35.	08/17/2001	Day Care
36.	08/20/2001	Restaurant
37.	09/17/2001	Restaurant
38.	10/01/2001	Nursing Home
39.	10/25/2001	Elementary School
40.	12/10/2001	Restaurant
41.	12/18/2001	Restaurant
42.	01/04/2002	Nursing Home
43.	01/09/2002	Restaurant
44.	01/14/2002	Grocery Store
45.	01/22/2002	Restaurant
46.	01/22/2002	Hospital
47.	01/28/2002	Nursing Home
48.	01/30/2002	Nursing Home
49.	02/06/2002	Nursing Home
50.	02/20/2002	Nursing Home
51.	02/21/2002	Elementary School
52.	03/08/2002	Restaurant
53.	03/08/2002	Private Home
54.	03/13/2002	Restaurant
55.	03/18/2002	Restaurant
56.	03/20/2002	Nursing Home
57.	03/21/2002	Day Care
58.	04/03/2002	Restaurant
59.	04/17/2002	Restaurant
60.	04/29/2002	Hospital
61.	05/01/2002	Restaurant
62.	04/26/2002	Restaurant
63.	05/08/2002	Restaurant
64.	05/06/2002	Hospital
65.	05/09/2002	Restaurant
66.	05/15/2002	Restaurant
67.	05/20/2002	Restaurant
68.	05/23/2002	Elementary School
69.	05/24/2002	Private Home
70.	05/29/2002	Restaurant
71.	06/20/2002	Private Home
72.	08/08/2002	Private Home
73.	08/13/2002	Private Home
74.	08/19/2002	Restaurant
75.	08/21/2002	Nursing Home
76.	08/27/2002	Restaurant

	77. 08/28/2002 Nursing Home 78. 08/30/2002 Restaurant 79. 10/04/2002 Elementary School 80. 11/22/2002 Nursing Home 81. 12/02/2002 Hospital 82. 12/04/2002 Nursing Home 83. 12/09/2002 Nursing Home 84. 12/11/2002 Nursing Home 85. 12/17/2002 Nursing Home 86. 12/20/2002 Nursing Home 87. 12/30/2002 Nursing Home 88. 01/02/2003 Nursing Home 89. 01/03/2003 Nursing Home 90. 01/06/2003 Assisted Living 91. 01/16/2003 Assisted Living 92. 01/17/2003 Nursing Home 93. 01/17/2003 Restaurant 94. 01/27/2003 Nursing Home 95. 01/28/2003 Restaurant 96. 01/31/2003 Nursing Home 97. 02/03/2003 Nursing Home 98. 03/05/2003 Nursing Home 99. 03/17/2003 Elementary School 100. 03/31/2003 Nursing Home 101. 04/04/2003 Restaurant 102. 04/04/2003 Nursing Home 103. 05/01/2003 Elementary School 104. 06/30/2003 Restaurant 105. 07/02/2003 Restaurant 106. 07/07/2003 Hospital 107. 07/22/2003 Nursing Home 108. 07/30/2003 Restaurant 109. 07/31/2003 Nursing Home 110. 08/14/2003 Cookie Company 111. 09/03/2003 Nursing Home 112. 09/30/2003 Cruise Line 113. 10/27/2003 Community Increase 114. 11/24/2003 Elementary School 115. 12/19/2003 Nursing Home 116. 12/30/2003 Nursing Home 1/1/2000 – 12/31/2003	
9. Riverine Flooding AAC-RF	1. Countywide 12/05/1993 2. SW Border 06/24/1995 3. Countywide 01/19/1996 4. N Portion 06/19/1996 5. Glen Burnie 09/11/1996 6. Central Portion 10/18/1996 7. N Portion 11/08/1996 8. N Portion 12/13/1996 9. Countywide 02/04/1998 10. West Portion 03/09/1998 11. Countywide 08/26/1999 12. Countywide 09/16/1999 13. Countywide 03/21/2000 14. Countywide 07/14/2000 15. Countywide 07/15/2000 16. Countywide 07/26/2000 17. North Portion 08/30/2001 18. Countywide 04/18/2002	<ul style="list-style-type: none"> National Climate Data Center: http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent-storms

	<p>19. Countywide 02/22/2003 20. East Portion 08/09/2003 21. Countywide 09/23/2003 22. Countywide 12/11/2003</p> <p>1/1/1993-2003</p> <p>See C:\Documents and Settings\fdtay569\ My Documents\Mitigation Plan\Individual Hazard Documents\Flash Flooding (Riverine) Information.doc</p>	
<p>10. Severe Thunderstorm or Hailstorm AAC-TH</p>	<p>1. Anne Arundel 06/13/1958 2. Anne Arundel 07/13/1961 3. Anne Arundel 05/27/1965 4. Anne Arundel 04/30/1968 5. Anne Arundel 06/24/1968 6. Anne Arundel 08/18/1969 7. Anne Arundel 03/26/1970 8. Anne Arundel 05/23/1970 9. Anne Arundel 06/14/1971 10. Anne Arundel 06/04/1973 11. Anne Arundel 09/03/1973 12. Anne Arundel 05/12/1974 13. Anne Arundel 07/14/1975 14. Anne Arundel 03/21/1976 15. Anne Arundel 07/29/1976 16. Anne Arundel 08/14/1976 17. Anne Arundel 09/06/1977 18. Anne Arundel 08/11/1979 19. Anne Arundel 06/15/1980 20. Anne Arundel 07/17/1980 21. Anne Arundel 07/22/1980 22. Anne Arundel 08/01/1980 23. Anne Arundel 08/05/1980 24. Anne Arundel 04/03/1982 25. Anne Arundel 07/08/1982 26. Anne Arundel 04/17/1983 27. Anne Arundel 05/15/1983 28. Anne Arundel 07/04/1983 29. Anne Arundel 07/06/1983 30. Anne Arundel 08/01/1983 31. Anne Arundel 08/29/1983 32. Anne Arundel 06/07/1984 33. Anne Arundel 05/28/1985 34. Anne Arundel 07/10/1985 35. Anne Arundel 07/25/1985 36. Anne Arundel 07/20/1986 37. Anne Arundel 08/02/1986 38. Anne Arundel 11/18/1986 39. Anne Arundel 07/01/1987 40. Anne Arundel 08/09/1987 41. Anne Arundel 08/15/1988 42. Anne Arundel 05/23/1989 43. Anne Arundel 06/15/1989 44. Anne Arundel 06/16/1989 45. Anne Arundel 11/16/1989 46. Anne Arundel 03/17/1990 47. Anne Arundel 06/09/1990 48. Anne Arundel 06/22/1990 49. Anne Arundel 07/01/1990</p>	<p>National Climate Data Center. http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent-storms</p>

50. Anne Arundel	07/12/1990	
51. Anne Arundel	07/21/1990	
52. Anne Arundel	08/29/1990	
53. Anne Arundel	10/18/1990	
54. Anne Arundel	05/06/1991	
55. Anne Arundel	07/08/1991	
56. Anne Arundel	04/24/1992	
57. Anne Arundel	06/30/1992	
58. Anne Arundel	07/01/1992	
59. Anne Arundel	07/15/1992	
60. Anne Arundel	07/21/1992	
61. Anne Arundel	07/31/1992	
62. Anne Arundel	08/04/1992	
63. Anne Arundel	08/11/1992	
64. Anne Arundel	08/28/1992	
65. Anne Arundel	05/12/1993	
66. Anne Arundel	05/25/1994	
67. Crofton	06/19/1994	
68. South Portion	09/22/1994	
69. Riviera Beach	10/01/1994	
70. Riviera Beach	11/01/1994	
71. Glen Burnie	04/09/1995	
72. Anne Arundel	05/18/1995	
73. Annapolis	07/01/1995	
74. Riviera Beach	10/21/1995	
75. Countywide	11/11/1995	
76. Countywide	02/24/1996	
77. Countywide	03/03/1996	
78. Countywide	03/19/1996	
79. Countywide	04/23/1996	
80. Edgewater	06/24/1996	
81. Countywide	08/16/1996	
82. Countywide	09/06/1996	
83. Countywide	10/08/1996	
84. Annapolis	11/26/1996	
85. Countywide	02/27/1997	
86. Riviera Beach	06/22/1997	
87. Crownsville	06/26/1997	
88. Annapolis	07/09/1997	
89. Annapolis	07/28/1997	
90. Linthicum Hgts	08/17/1997	
91. Deale	08/17/1997	
92. Countywide	01/28/1998	
93. Countywide	02/04/1998	
94. Countywide	02/17/1998	
95. Countywide	02/24/1998	
96. Annapolis	06/02/1998	
97. Annapolis	06/02/1998	
98. Countywide	06/26/1998	
99. Waysons Corner	07/21/1998	
100. Countywide	12/30/1998	
101. Countywide	01/18/1999	
102. Arnold	03/03/1999	
103. Annapolis	06/14/1999	
104. Countywide	08/14/1999	
105. North Portion	09/30/1999	
106. Countywide	11/02/1999	
107. Countywide	01/13/2000	
108. North Portion	03/25/2000	
109. Annapolis	05/10/2000	

110. South Portion	05/13/2000
111. Countywide	05/24/2000
112. Lothian	06/02/2000
113. Glen Burnie	06/15/2000
114. Countywide	06/17/2000
115. North Portion	06/21/2000
116. Countywide	07/10/2000
117. Countywide	07/16/2000
118. Lothian	08/24/2000
119. Countywide	08/27/2000
120. Countywide	12/12/2000
121. Countywide	12/17/2000
122. Countywide	01/27/2001
123. Countywide	02/09/2001
124. Countywide	03/06/2001
125. Countywide	03/13/2001
126. Countywide	03/21/2001
127. Rivera Beach	05/27/2001
128. Severna Park	06/29/2001
129. Annapolis	06/30/2001
130. Linthicum Hgts	08/30/2001
131. North Portion	08/31/2001
132. Maryland City	09/24/2001
133. Countywide	02/01/2002
134. Countywide	03/21/2002
135. Countywide	04/18/2002
136. Glen Burnie	05/12/2002
137. Jessup	05/12/2002
138. Countywide	05/13/2002
139. Countywide	05/14/2002
140. South Portion	06/05/2002
141. North Portion	06/06/2002
142. North Portion	07/09/2002
143. Countywide	02/23/2003
144. Arnold	05/31/2003
145. Countywide	06/01/2003
146. North Portion	06/12/2003
147. North Portion	07/06/2003
148. Rivera Beach	07/09/2003
149. Arnold	07/11/2003
150. North Portion	08/22/2003
151. Countywide	08/26/2003
152. Countywide	10/15/2003
153. Countywide	11/05/2003
154. Countywide	11/13/2003
155. Anne Arundel	07/02/1968
156. Anne Arundel	01/26/1971
157. Anne Arundel	06/16/1974
158. Anne Arundel	03/21/1983
159. Anne Arundel	05/23/1988
160. Anne Arundel	03/31/1989
161. Anne Arundel	06/08/1990
162. Anne Arundel	04/24/1991
163. Anne Arundel	07/07/1991
164. Linthicum Heights	11/08/1996
165. Crofton	04/17/1998
166. Crofton	06/02/1998
167. Millersville	06/13/1998
168. South Portion	06/15/1998
169. Linthicum Hgts	05/24/2000

	<p>170. Millersville 05/31/2002</p> <p>1/1/1958 – 5/31/2002</p> <p>See: C:\Documents and Settings\fdtay569\My Documents\Mitigation Plan\IndividualHazard Documents\Thunderstorm & Hail.doc</p>	
<p>11. Severe Winter Storm AAC-WS</p>	<ol style="list-style-type: none"> 1. Countywide Cold 1/7/1906 2. Countywide Snow & Ice 3/3/1909 – 3/4/1909 3. Countywide Cold 1/13/1912 – 1/14/1912 4. Blizzard (Nor'easter) 2/13/1914 5. Blizzard (Nor'easter) 3/1/1914 – 3/2/1914 6. Western County Snow 4/8/1916 – 4/9/1916 7. Countywide Cold 12/30/1917 8. Nor'easter 2/4/1920 – 2/6/1920 9. Nor'easter 1/27/1922 – 1/28/1922 10. Nor'easter 4/1/1924 11. Countywide Snow 1/31/1924 – 1/2/1925 12. Northern County Ice (Nor'easter) 2/3/1926 13. Countywide Snow (Nor'easter) 2/9/1926 – 2/10/1926 14. Countywide Snow 2/7/1936 15. Countywide Snow 11/24/1938 – 11/25/1938 16. Countywide Snow 3/29/1942 – 3/30/1942 17. Blizzard (Nor'easter) 2/15/1958 – 2/17/1958 18. Nor'easter 3/5/1962 – 3/9/1962 19. Countywide High Winds 12/1/1974 20. Countywide Cold 1/25/1987 21. Countywide Snow (Nor'easter) 3/13/1993 – 3/14/1993 22. Countywide Cold 1/19/1994 – 1/21/1994 23. Southern County Ice 2/10/1994 – 2/11/1994 24. Countywide Snow and Flooding 11/1995 25. Countywide Snow 1/7/1996 – 1/13/1996 26. Countywide Snow 2/2/1996 - 2/3/1996 27. Countywide Snow 2/16/1996 28. Countywide Ice Storm 1/14/1999 – 1/15/1999 29. Countywide Snow 03/9/1999 30. Countywide Snow (Nor'easter) 01/25/2000 31. Countywide Snow Storm 02/15/2003 - 02/17/2003 <p>1/1/1901 – 12/31/2003</p>	<p>Barbara Watson, National Weather Service Weather Forecast Office 44087 Weather Service Rd. Sterling, VA 20166</p> <p>http://www.erh.noaa.gov/er/lwx/Historic_Events/md-winter.html</p>
<p>12. Tornado AAC-TO</p>	<ol style="list-style-type: none"> 1. 8/21/1888: Near Millersville 2. 8/21/1888: Jacobsville to the Patapsco River 3. 6/30/1906: Annapolis area 4. 8/2/1934: Magothy River 5. 9/4/1935: Southern Anne Arundel County 6. 2/21/1937: Extreme Southern Anne 	<p>Barbara Watson, National Weather Service Weather Forecast Office 44087 Weather Service Rd. Sterling, VA 20166</p> <p>National Weather Service,</p>

	<p>Arundel County</p> <p>7. 7/2/1953: Near the Chesapeake Bay Bridge</p> <p>8. 4/26/1960</p> <p>9. 6/9/1961</p> <p>10. 7/13/1961</p> <p>11. 5/12/1974: Pasadena</p> <p>12. 7/14/1975: Arnold</p> <p>13. 8/14/1976: Crofton Mews area</p> <p>14. 6/28/1977: Hillsmere Shores</p> <p>15. 7/31/1978: Near Fort Meade</p> <p>16. 9/5/1979: Crofton</p> <p>17. 9/28/1992</p> <p>18. 9/28/1992</p> <p>19. 5/12/1993</p> <p>20. 9/27/1993: Millersville</p> <p>21. 7/27/1994</p> <p>22. 7/27/1994</p> <p>23. 10/5/1995: Arnold</p> <p>24. 10/5/1995: Odenton to Glen Burnie areas</p> <p>25. 10/14/1995: Arnold</p> <p>26. 6/24/1996: Waysons Corner</p> <p>27. 7/10/2000: Northeast of Laurel</p> <p>1/1/1888 – 12/31/2003</p> <p>See: C:\Documents and Settings\fdtay569\My Documents\Mitigation Plan\Individual Hazard Documents\Tornado.doc</p>	<p>Baltimore/Washington</p> <p>http://www.erh.noaa.gov/lwx/Historicvents/MDcnty-tornado-events.htm</p>
<p>13. Wildfire</p> <p>AAC-WF</p>	<p>2000 – 617</p> <p>2001 – 935</p> <p>2002 – 816</p> <p>1/1/2000 – 12/31/2002</p> <p>See: C:\Documents and Settings\fdtay569\My Documents\Mitigation Plan\Individual Hazard Documents\NFWA Annual Statistics 2000 – 2001</p>	<p>John Scholz Public Information Officer Anne Arundel County Fire Department 8501 Veterans Highway Millersville, MD 21108</p> <p>NFWA Annual Statistics</p>
<p>Man-made Hazards</p>		
<p>14. Air Pollution</p> <p>AAC-AP</p>	<p>Red or Purple days (ozone):</p> <ol style="list-style-type: none"> 1. 6/25/03 2. 6/26/03 3. 6/10/02 4. 6/24/02 5. 6/25/02 6. 7/2/02 7. 7/9/02 8. 7/17/02 9. 7/18/02 10. 8/12/02 11. 8/13/02 12. 6/20/01 13. 6/26/01 14. 6/27/01 15. 8/9/01 	<p>Air Quality Index – AIRNow http://www.epa.gov/cgi-bin/airnow.cgi?MapDisplay=SELECTMAPARCHIVES&region=northeast</p> <p>Brian Hug, Planner III Maryland Department of the Environment Air and Radiation Management 1800 Washington Blvd. Baltimore, MD 21230</p>

	<p>16. 6/9/00 17. 6/10/00 18. 6/7/99 19. 7/19/99 20. 7/23/99 21. 7/31/99 22. 8/17/99 23. 5/16/98 24. 5/30/98 25. 6/25/98 26. 7/21/98 27. 8/22/98 28. 8/29/98 29. 9/12/98 30. 9/13/98</p> <p>1/1/1998 – 12/31/2003</p>	
<p>15. Building, Dwelling, or Vessel Fire AAC-FI</p>	<p>2000: Structure: 502 Other Fire (not Wildfire): 772 Total: 1274 2001: Structure: 489 Other Fire (not Wildfire): 826 Total: 1315 2002: Structure: 461 Other Fire (not Wildfire): 777 Total: 1238</p> <p>See: C:\Documents and Settings\fdtay569\My Documents\Mitigation Plan\Individual Hazard Documents\NFA Annual Statistics 2000 – 2001</p>	<p>John Scholz Public Information Officer Anne Arundel County Fire Department 8501 Veterans Highway Millersville, MD 21108</p> <p>NFA Annual Statistics</p>
<p>16. Communication Failure AAC-CO</p>	<p><i>This data has been removed for security purposes.</i></p> <p>See: See: C:\Documents and Settings\fdtay569\My Documents\Mitigation Plan\Individual Hazard Documents\Communications Disruptions</p>	<p>Dean Bickerstaff Engineer Baltimore Gas & Electric Operations Department</p> <p>Wayne Sanders Verizon Area Manager Customer Operations Patuxent</p>
<p>17. Critical Fuel Shortage AAC-CS</p>	<p>1. 1/1974 – 9/1974 fuel shortage 2. 1/1979 – 10/1979 fuel shortage</p> <p>1/1/1974 – 12/31/2004</p>	<p>1995 EOP, Annex V</p> <p>Donna Goins Central Services Safety & Insurance Manager 2662 Riva Road Annapolis, MD 21401</p>
<p>18. Dam Failure and Releases AAC-DM</p>	<p>0 releases from high hazard dams.</p> <p>1/1/1978 – 12/31/2003</p>	<p>Todd Supple Senior Civil Engineer Washington Suburban Sanitary Commission 14501 Sweitzer Lane Laurel, MD 20707</p> <p>Brad Iarossi,</p>

		Chief, Dam Safety Division, Maryland Department of the Environment 1800 Washington Blvd. Baltimore, MD 21230
19. Hazardous Materials Incident (fixed facility) AAC-HM	<ol style="list-style-type: none"> 1. 3/10/2003 Hazmat Team Level B Response 2. 4/25/2003 Hazmat Team Level A Response 3. 6/5/2003 Hazmat Team Level A Response 4. 8/8/2003 Hazmat Team Level A Response 5. 11/12/2003 Hazmat Team Level B Response 6. 11/21/2003 Hazmat Team Level A Response 7. 12/27/2003 Hazmat Team Level B Response 8. 3/1/2004 Hazmat Team Level B Response <p>1/1/2003 – 5/26/2004</p>	Lieutenant David Povlitz Company 23 Jones Station Road 960 Ritchie Highway Severna Park, MD 21146
20. Mass Transportation Accident AAC-MT	<p>Aircraft</p> <p><i>BWI</i></p> <ol style="list-style-type: none"> 1. Small craft 5/14/04. 2. 2 fatalities- Bell 206B, 8/1/01 3. injuries- DOUGLAS DC-10 DC 10, evacuation 1/2/90 4. 3 fatalities- PIPER PA-31T 2/23/79 5. 2 fatalities, 5 injuries- BEECH E18S, crash, 7/19/89 6. injuries- Douglas DC 8, evacuation 1/16/77 <p><i>Tipton</i></p> <ol style="list-style-type: none"> 1. 2 injuries- Cessna 172H, 8/22/90 <p><i>Lee</i></p> <ol style="list-style-type: none"> 1. 2 injuries- Cessna 206, 7/8/00 2. 1 injury- Luscombe LL-8-A, 6/11/97 3. 2 injuries- American AA-5, 8/23/96 <p><i>Suburban</i></p> <ol style="list-style-type: none"> 1. 1 injury- Clipped Wings Special II, 8/9/94 2. 1 injury- Piper PA-38-112, 9/31/91 3. 2 injuries- Sabreliner/NA265-40, Glen Burnie, 1/9/85 4. 1 fatality- Cessna 210E, Glen Burnie, 5/20/84 <p>1/1/1970 – 5/31/2004</p> <p>Railway</p> <p>None reported Amtrak.</p> <p>1/1/1963 – 12/31/2003</p>	<p>Aircraft</p> <p>National Transportation Safety Board 490 L'Enfant Plaza, SW Washington, DC 20594 http://www.nts.gov/nts/query.asp</p> <p>Lieutenant Joiner Baltimore Washington International Airport Fire Department</p> <p>Railway</p> <p>Doug Holmes Assistant Division Engineer Amtrak</p> <p>Doug Simms Safety Officer MARC</p> <p>Lieutenant Joiner Baltimore Washington International Airport Fire Department</p> <p>Bus</p> <p>Winship Wheatley Anne Arundel County Public Schools 2660 Riva Rd. Annapolis, MD 21401</p> <p>Danielle Sydne Matland, Director Annapolis Department of Transportation 308 Chinquapin Round Rd. Annapolis, MD 21401</p> <p>Julie Hershorn, Executive Assistant to the Director of Bus Operations Washington Metropolitan Area Transit Authority</p>

	<p>None reported MARC</p> <p>1/1/2000 – 12/31/2003</p> <p>Maryland Light Rail</p> <ol style="list-style-type: none"> 1. Accident: February 2000 2. Accident: March 2001 <p>1/1/1992 – 12/31/2003</p> <p>Bus</p> <p><i>Anne Arundel Public Schools</i></p> <ol style="list-style-type: none"> 1. One child run over, serious injury. <p>1/1/1975 – 12/31/2003</p> <p><i>Annapolis Bus</i></p> <ol style="list-style-type: none"> 1. 1 incident. Serious accident: rear end, injured individual taken to shock trauma. <p>1/1/1978 – 12/31/2003</p> <p><i>MetroBus</i></p> <ol style="list-style-type: none"> 1. 1 Accident: 10/17/2002 <p>1/1/2002 – 12/31/2003</p> <p><i>Corridor Transportation Corporation</i></p> <p>None reported.</p> <p>1/1/2001 – 12/31/2003</p> <p>Marine</p> <p>None reported.</p> <p>1/1/1956 – 12/31/2003</p>	<p>Fred Baumgardner Corridor Transportation Corporation Quality Service Manager 312 Marshall Ave. Suite 104 Laurel, MD 20707</p> <p>Marine U.S. Coast Guard http://www.uscg.mil/hq/g-m/moa/reportindexcas.htm</p>
<p>21. Pipeline AAC-PL</p>	<p>None reported.</p> <p>1/1/1970 – 12/31/2003</p>	<p>National Transportation Safety Board 490 L'Enfant Plaza, SW Washington, DC 20594 http://www.nts.gov/Publictn/P_Acc.htm</p>
<p>22. Transportation Accident AAC-TA</p>	<p>Highways</p> <ol style="list-style-type: none"> 1. April 23, 1979. Ford courier pickup truck. Ten passengers were killed and one passenger was seriously injured; the driver was injured slightly. Patuxent Road near Crofton. <p>1/1/1970 – 12/31/2003</p> <p>Mobile Hazardous Materials</p> <ol style="list-style-type: none"> 1. 12/9/1991: Jessup, Fuel spill 2. 4/2/1993: Jessup, Fuel spill 3. 9/19/1994: Jessup, Fuel spill 	<p>Highways</p> <p>National Transportation Safety Board 490 L'Enfant Plaza, SW Washington, DC 20594 http://www.nts.gov/Publictn/H_Acc.htm</p> <p>Mobile Hazardous Materials</p> <p>National Transportation Safety Board 490 L'Enfant Plaza, SW Washington, DC 20594 http://www.nts.gov/Publictn/Z_Acc.htm</p>

	<p>4. 5/18/1995: Jessup, Vapor release from tank car</p> <p>5. 10/27/1995: Jessup, Vapor release from tank car</p> <p>6. 3/30/1997: Laurel, Fuel spill</p> <p>7. 7/29/1998: Elk Ridge, Abandoned drums</p> <p>8. 8/2/1998: Jessup, Fuel spill</p> <p>9. 9/17/1998: Glen Burnie, Abandoned drums</p> <p>10. 6/30/2002: Jessup, Hydraulic oil leak</p> <p>1/1/1991 – 12/31/2003</p> <p>Railroad</p> <p>None reported.</p> <p>1/1/1970 – 12/31/2003</p> <p>Marine</p> <p>None reported.</p> <p>1/1/1956 – 12/31/2003</p>	<p>Thomas Murta, P.G, CHMM Director – Infrastructure Protection CSX Transportation 500 Water Street Jacksonville, FL 32202</p> <p>Railroad</p> <p>National Transportation Safety Board 490 L'Enfant Plaza, SW Washington, DC 20594 http://www.nts.gov/Publictn/R_Acc.htm</p> <p>Marine</p> <p>U.S. Coast Guard http://www.uscg.mil/hq/g-m/moa/reportindexcas.htm</p>
23. Utility Disruption AAC-UD	<p>Sustained Outages (Critical Infrastructure)</p> <p><i>This data has been removed for security purposes.</i></p> <p>Average: 5.21 outages at critical facilities.</p> <p>1/1/2001 - 6/14/2004 (exclusive of Isabel)</p> <p>See: C:\Documents and Settings\fdtay569\My Documents\Mitigation Plan\Individual Hazard Documents\Utilities – electric\Critical Infrastructure Outage history</p>	<p>Dean Bickerstaff Engineer Baltimore Gas & Electric Operations Department</p> <p>Tom Forgette Department of Public Works 2662 Riva Road Annapolis, Maryland 21401</p>
Terrorism Hazards		
24. Civil Disorder AAC-CD	<p><i>This data has been removed for security purposes.</i></p> <p>1/1/1981 – 12/31/2003</p>	<p>Michael O'Connell Division Chief Anne Arundel County Fire Department</p> <p>1995 EOP, Annex V</p>
25. Cyber Crime AAC-CC	<p><i>This data has been removed for security purposes.</i></p> <p>1/1/1979 – 12/31/2003</p>	<p>Bill Ryan, Assistant Information Technology Manager, Anne Arundel County Office of Information Technology</p>
26. Terrorism or Sabotage AAC-TS	<p><i>This data has been removed for security purposes.</i></p>	<p>Allan Graves, County Fire Marshall Anne Arundel County Fire Department</p>

	1/1/2001 – 12/31/2003 See: C:\Documents and Settings\fdtay569\My Documents\Mitigation Plan\Individual Hazard Documents\Explosives	
27. Weapons of Mass Destruction Attack AAC-WD	<i>This data has been removed for security purposes.</i> 1/1/1978 – 12/31/2003	Michael O'Connell Division Chief Anne Arundel County Fire Department Allan Graves, County Fire Marshall Anne Arundel County Fire Department
Hazards to be Addressed in Next Iteration		
28. Land and Water Pollution		
Hazards Considered but Not Addressed		
29. Asteroid Impact		
30. Rising Sea (Global Warming)		
31. Tsunami		
32. Volcano		

Appendix D. Full Vulnerability and Risk Assessment

Purpose

The purpose of a hazard and vulnerability analysis is to systematically identify and study the natural and man-made hazards that threaten Anne Arundel County. The result of this analysis serves as the basis for evaluating mitigation strategies, enhancing response capability, and for multi-year program development planning to improve emergency management.

Situation

Emergency planning should be based on a realistic analysis of those hazards that pose a threat to Anne Arundel County. The planning for, preparedness, mitigation, response and recovery from natural and man-made hazards grows more complex as increased population and urbanization places larger numbers of people at risk to natural hazards such as hurricanes, tornadoes, and floods. Technology generates new types of hazards to be considered, such as accidents at nuclear power plants, toxic waste disposal, and transportation accidents involving hazardous materials. Economic and political developments may generate hazards such as resource shortages or terrorist attacks. Regardless of the hazard, it is essential to know the nature of the threat, the probability of it occurring, and the likely impact on the residents of Anne Arundel County should the hazardous event or situation occur.

Methodology

To perform a hazard vulnerability and risk analysis for Anne Arundel County, certain assumptions are required. In a perfect world, there would be sufficient information to determine exactly what our risks are, and how great they are. Unfortunately, we are dealing with incomplete information. In an ideal world we would be able to say, "an extremely hazardous event will occur on a particular day, in a particular location." Since this is impossible, we are left to make informed judgments about the probability that an extremely hazardous event will occur and do our best to plan accordingly.

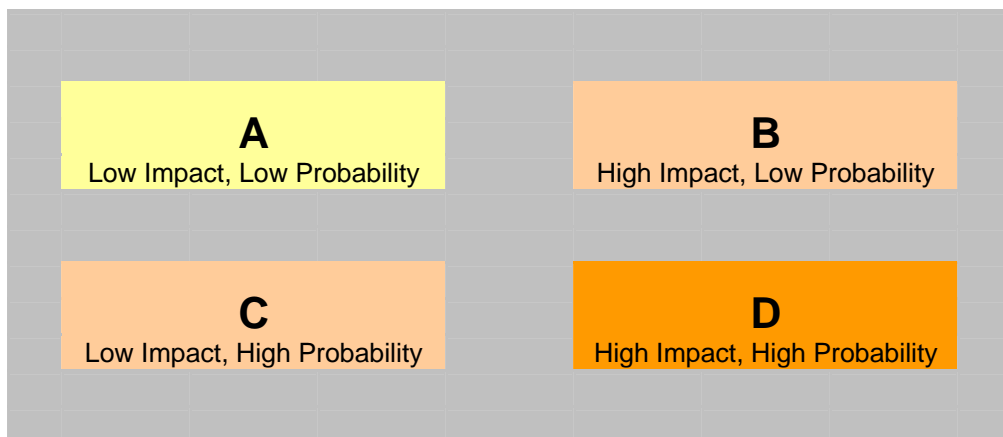
To assess the probability that an event will occur, the best predictor we have is history. Consequently, a great deal of time and effort has been expended in determining when and where past disasters have occurred in the county. This involved interviewing numerous people, searching databases of information, and reading various reports.

Risk is not simply a probability that an event will occur, however. There is another component to risk, and that is the potential impact that a specific hazardous event will have upon a community. For the purposes of our analysis, we defined the impact as the cumulative effects an event has on the economy, environment, disruption of essential government services, health and welfare, and quality of life of Anne Arundel County and its residents.

Moreover, these cumulative effects are not equal. We acknowledge that some have more importance than others. Therefore, weights were assigned to each of the identified factors. To assign weights to each factor, a survey was submitted to a representative group of county officials for their informed feedback. The results were then compiled.

After weighting was accomplished, the same group of individuals was asked to take a list of specific natural and man-made hazards that had been assembled earlier and assign a value from 1 (low) to 5 (high) for each of the specific factors. These values were intended to gauge the degree of negative impact to the county's economy, environment, essential government services, health and welfare, and quality of life as a result of a hazard event.

By combining the weighting factors and the risk values, a balanced representation of the County's exposure to risk was obtained. Subsequently, the risk factor was used in conjunction with the probability figure in a matrix to prioritize the hazards.



Hazard Probability

Probability: the likelihood that a particular hazard event will occur in Anne Arundel County within a given calendar year.

The following factors were considered for each of the identified hazards:

- History: The frequency of the occurrence of this hazard in a given span of years.
- Probability: Based on historical data, the likelihood that a given event will occur in any specified period.

A ratio was calculated by dividing the number of events by a time period (years). Values range from 0 – 1275.

Ratio	Probability
< 0.1	not probable
0.1 to 0.99	low probability
1 to 1.99	moderate probability
2 to 5	high probability
> 5	nearly certain

Any hazard ratio of 1.49 or less was placed into the upper half of the risk matrix, while those above 1.5 were placed in the lower half of the risk matrix.

Vulnerability Analysis

Impact: (or Vulnerability, or Risk) – the degree to which people, property, the environment, or social and economic activity are susceptible to injury, damage, disruption, or loss should the hazard occur.

The following factors were considered for each of the identified hazards:

- Maximum Threat: An estimate of the highest degree of destructiveness resulting from a single event.
- Vulnerability: Potential impact upon population, property, economy, environment and recovery ability.

Value	Impact
0 - 1	minimal impact
1.01 - 2	low impact
2.01 - 3	moderate impact
3.01 - 4	high impact
4.01 - 5	devastating impact

Any impact 2.49 or lower was placed in the left half of the risk matrix while those 2.5 or greater were placed in the right half of the risk matrix.

Concept of Operations

As in the basic Emergency Operations Plan (EOP).

Direction and Control

As in the basic EOP.

Continuity of Government

As in the basic EOP.

Administration and Logistics

As in the basic EOP.

Hazard Identification/ Vulnerability Analysis Development and Maintenance

- Primary responsibility for the development and maintenance of the hazard and vulnerability analysis belongs to the Office of Emergency Management (OEM).
- Every five years, OEM will conduct a comprehensive review and update of this analysis, in conjunction with the review of the All-Hazard Mitigation Plan.
- Every two years and any time Anne Arundel County is impacted by a disaster that receives a Presidential Disaster Declaration, OEM will review and this analysis to ensure its continued relevance.
- Assistance with review and analysis of specific hazards is assigned as follows:

Natural Hazard	Agency
1. Animal Disease Outbreak, Blight, or Infestation	Emergency Management (with the assistance of Maryland Department of Agriculture)AACO Cooperative Extension Agent, Police Department, Animal Control
2. Coastal Flooding	Emergency Management, Planning and Zoning
3. Drought	Emergency Management (with the assistance of Maryland Department of Agriculture), MDE
4. Earthquake	Emergency Management
5. Extreme Heat	Emergency Management
6. Hurricane, Tropical Storm, or Nor'easter	Emergency Management
7. Landslide or Slope Failure	Emergency Management
8. Public Health Emergency	Local and State Health Departments
9. Riverine Flooding	Emergency Management, Planning and Zoning
10. Severe Storm or Hailstorm	Emergency Management
11. Severe Winter Storm	Emergency Management
12. Tornado	Emergency Management
13. Wildfire	Fire Department
Man-Made Hazards	Agency
14. Air Pollution	MDE, EPA, Health Department
15. Building, Dwelling, or Vessel Fires	Fire Department
16. Communication Failure	Information Technology, Emergency Management (with the assistance of Verizon)
17. Critical Fuel Shortage	Central Services (with the assistance of Risk Management)
18. Dam Failure and Release	Emergency Management (with the assistance of Washington Suburban Sanitary Commission), Public Works
19. Hazardous Materials Incident (Fixed Facility)	Emergency Management, Fire Department, HAZMAT
20. Mass Transportation Accident	Emergency Management (with the assistance of BWI, Tipton Airport, Lee Airport, Suburban Airport, Amtrak, CSX, MARC, Light Rail, MTA, AACo. Schools, Annapolis Bus, Coast Guard)
21. Pipeline Accident	Emergency Management (with the

	assistance of Baltimore Gas & Electric Company, Colonial Pipeline)
22. Transportation Accident	Police/Fire
23. Utilities Disruption	Public Works & Emergency Management (with the assistance of Baltimore Gas & Electric Company)
Terrorism Hazards	Agency
24. Civil Disturbance	Police Department
25. Cyber Crime	Information Technology
26. Terrorism or Sabotage	Police Department
27. Weapons of Mass Destruction Attack (Chemical, biological, radiological, nuclear, explosive)	Emergency Management
Hazards to be Addressed in Next Iteration	Agency
28. Land and Water Pollution	Health Department, MDE, EPA
Hazards Considered But Disregarded	
29. Near-Earth-Object Impact 30. Rising Sea (Global Warming) 31. Tsunami 32. Volcano	

Hazard Analysis

This analysis is broken into five parts: natural hazards, man-made hazards, terrorism hazards, hazards to be addressed at the time of the next review, and hazards that were identified but not addressed. The hazards have been arranged in alphabetical order without regard to priority or potential impact.

By their nature, these results are subjective. Individual readers may draw different conclusions from the same body of evidence.

Natural Hazards

Hazard: Animal Disease Outbreak, Blight, or Infestation

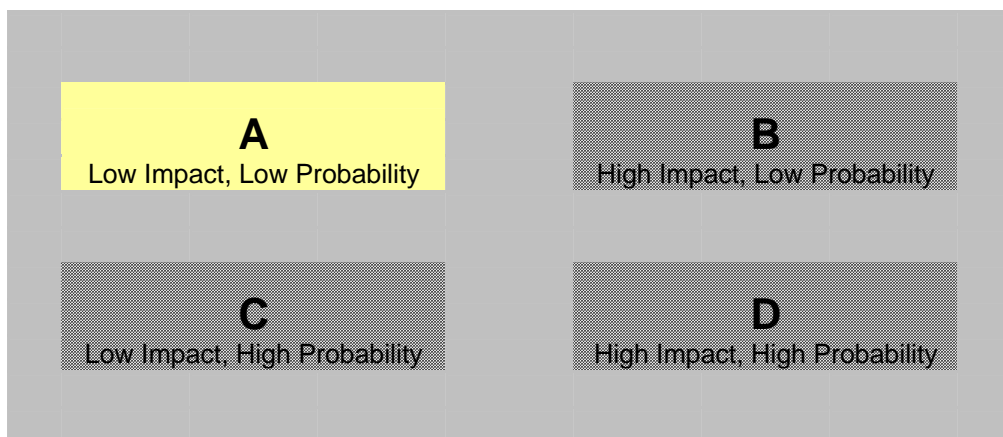
Definition: Any atmospheric or soil condition, parasite, or insect that kills, withers, or checks the growth of animals or plants in agricultural production.

Probability/History: Within the past ten years, no reported episodes of disease, outbreak, blight, or infestation were reported to the Maryland Department of Agriculture.

Impact/Vulnerability: Blights often occur without warning. The greatest impact would probably be in South County, where the largest agricultural acreage is located. Human lives may not be lost, but life styles could be dramatically altered and the economic effects felt Countywide.

Evaluation:

0 (not probable) + 2.31 (moderate)
Probability Rating Impact Rating



Hazard: Coastal Flooding

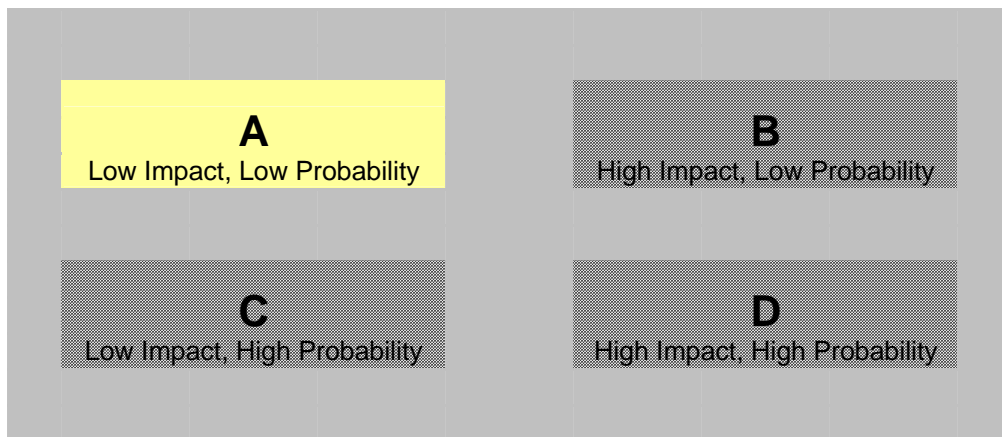
Definition: General and temporary condition of partial or complete inundation of normally dry land areas adjacent to an ocean.

Probability/History: Within the past seven years, National Oceanic and Atmospheric Administration data identified six occurrences of coastal flooding that affected Anne Arundel County.

Impact/Vulnerability: Coastal flooding occurs with some degree of warning. The greatest impact would be in those areas of the County that are adjacent to the Chesapeake Bay. Since many of the County's residents live near the shore, there is the potential for considerable loss of human life and the economic effects would be felt throughout the County.

Evaluation:

$$\frac{0.86 \text{ (low probability)}}{\text{Probability Rating}} + \frac{2.21 \text{ (moderate)}}{\text{Impact Rating}}$$



Hazard: Drought

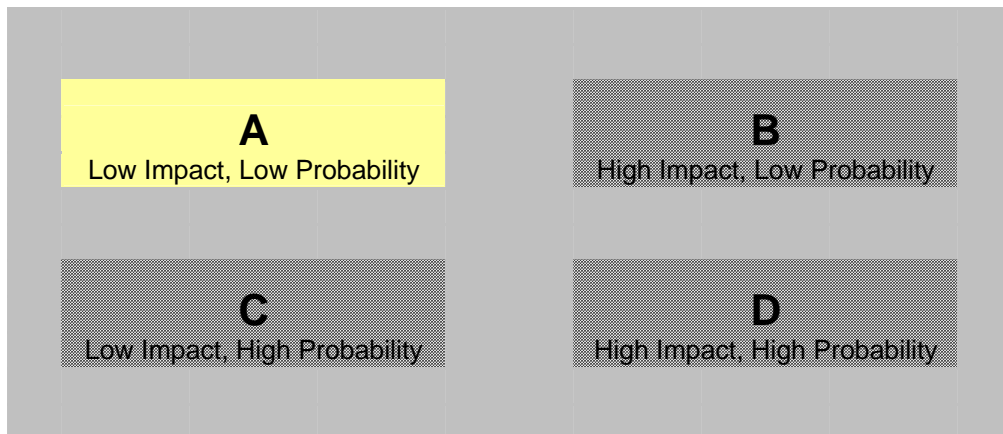
Definition: Protracted period of time without substantial rainfall. Affects large areas, with decreasing water supply for human consumption and use. Can damage or destroy crops, grazing land, edible plants, and trees.

Probability/History: Over the past 73 years, Anne Arundel County has experienced four droughts, as reported by the Office of the Maryland State Climatologist.

Impact/Vulnerability: Drought occurs with a great deal of warning. Human lives may not be lost, but life styles could be dramatically altered and the economic effects felt Countywide.

Evaluation:

$$\frac{0.05 \text{ (not probable)}}{\text{Probability Rating}} + \frac{1.99 \text{ (low)}}{\text{Impact Rating}}$$



Hazard: Earthquake

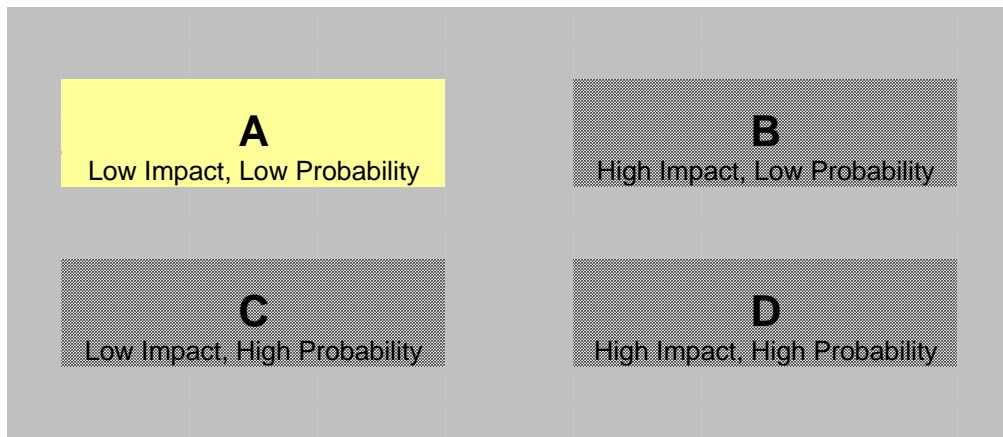
Definition: Sudden motion or trembling of the earth’s crust caused by a release of strain accumulated within or along the edge of the earth’s tectonic plates.

Probability/History: Over the past 245 years, Anne Arundel County has experienced five earthquakes according to the Maryland Geological Survey data.

Impact/Vulnerability: Human lives are not likely to be lost as a result of an earthquake in Anne Arundel County. There is little likelihood of any detrimental effect on the County’s economy, residents’ lifestyle, or physical structures.

Evaluation:

$$\frac{0.02 \text{ (not probable)}}{\text{Probability Rating}} + \frac{2.47 \text{ (moderate)}}{\text{Impact Rating}}$$



Hazard: Extreme Heat

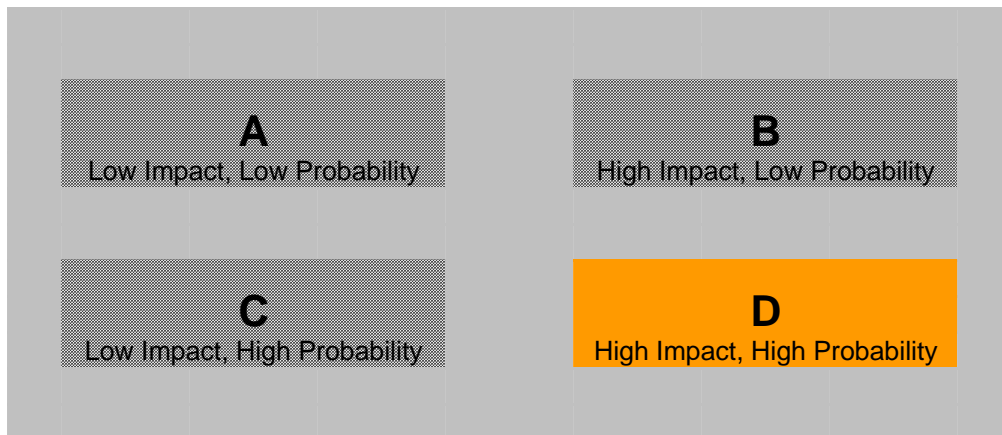
Definition: Temperatures that hover 10 degrees or more above the average high temperature for a particular region and last for an extended period of time. Humid or muggy conditions can exacerbate the effects of high heat and occur when a “dome” of high atmospheric pressure traps hazy, damp air near the ground.

Probability/History: Over the past four years, Anne Arundel County has experienced seven episodes of extreme heat, according to National Weather Service data.

Impact/Vulnerability: Excessive heat can have a major impact on the County, causing multiple deaths, but generally sparing property. Excessive heat can also cause utility outages due to an increased demand for electricity.

Evaluation:

$$\frac{(1.75 \text{ moderate probability})}{\text{Probability Rating}} + \frac{2.59 \text{ (moderate)}}{\text{Impact Rating}}$$



Hazard: Hurricane, Tropical Storm, or Nor'easter

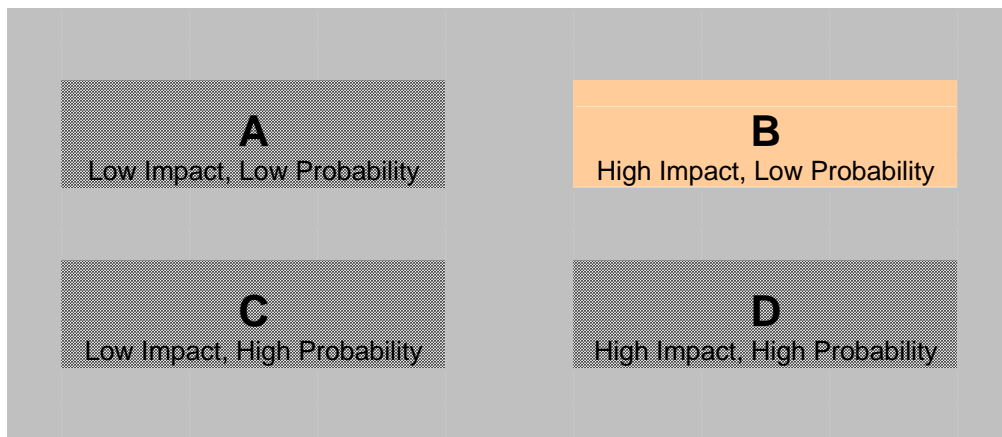
Definition: Hurricanes are large cyclonic storms with associated high winds and extreme rainfall that form over warm ocean areas in the north Atlantic Ocean or northeast Pacific Ocean. Nor'easters are storms with strong winds coming from the northeast with effects similar to a tropical storm.

Probability/History: Over the past 104 years, Anne Arundel County has had twelve hurricanes, tropical storms, or nor'easters strike, according to National Weather Service data.

Impact/Vulnerability: These types of storms can have a tremendous impact on the County, with a high potential for loss of life and property and the capacity to greatly impact the economy.

Evaluation:

$$\frac{0.12 \text{ (low probability)}}{\text{Probability Rating}} + \frac{2.51 \text{ (moderate)}}{\text{Impact Rating}}$$



Hazard: Landslide or Slope Failure

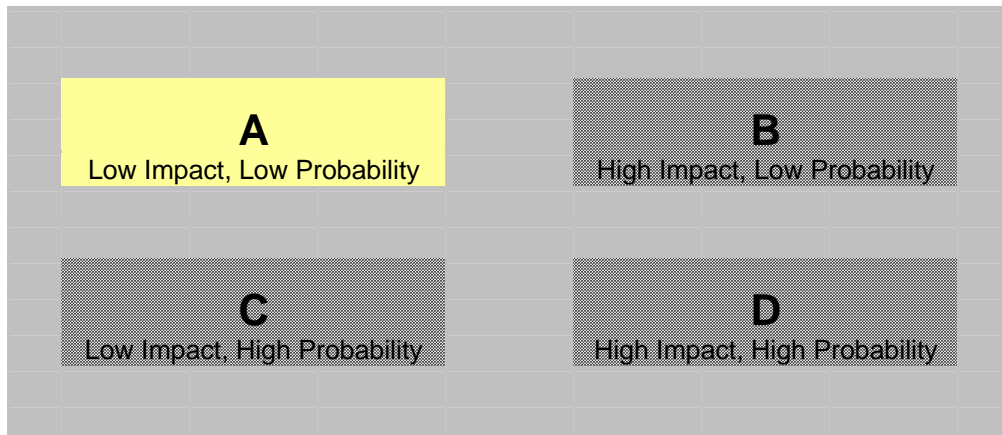
Definition: Mass of sliding mud or rocks that occurs in mountainous or hilly terrain.

Probability/History: Although there have been no reported landslides in Anne Arundel County, terrain features such as steep slopes combined with clay soils in certain parts of the County ensure that this hazard is present.

Impact/Vulnerability: Landslides could affect isolated parts of the County. They have the potential for loss of life and property damage.

Evaluation:

$$\frac{0 \text{ (low probability)}}{\text{Probability Rating}} + \frac{1.66 \text{ (low)}}{\text{Impact Rating}}$$



Hazard: Public Health Emergency

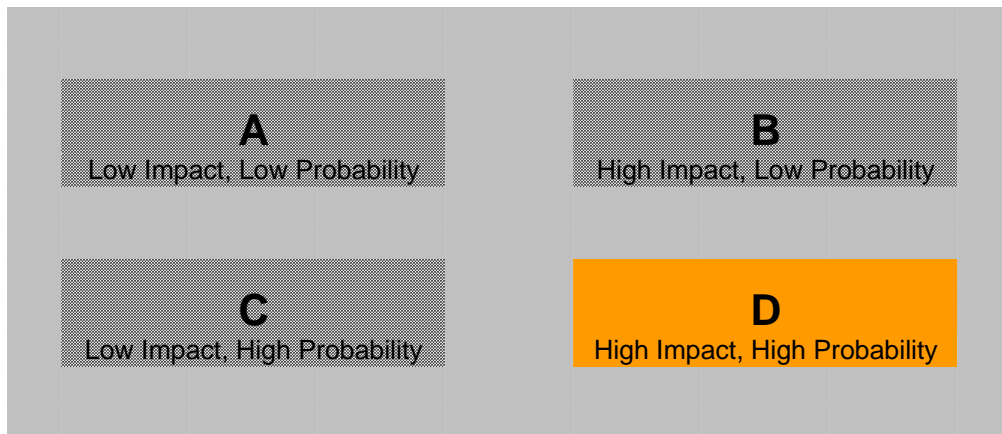
Definition: Outbreak of infectious, deadly diseases responsible for causing thousands of cases of illness, claiming many lives, disrupting important routine health care efforts, causing substantial economic losses, and great public concern.

Probability/History: Over the past three years, Anne Arundel County has experienced 116 outbreaks according to Anne Arundel County Health Department data.

Impact/Vulnerability: Human lives are likely to be lost as a result of a public health emergency in Anne Arundel County. There is the potential for serious consequences to the County's economy and residents' lifestyle.

Evaluation:

$$\frac{38.67 \text{ (nearly certain)}}{\text{Probability Rating}} + \frac{2.88 \text{ (moderate)}}{\text{Impact Rating}}$$



Hazard: Riverine Flooding

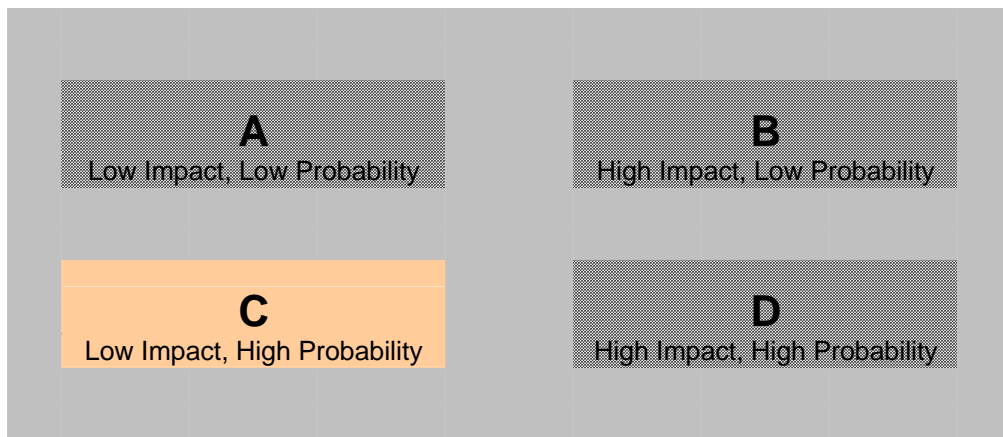
Definition: General and temporary condition of partial or complete inundation of normally dry land areas resulting from overflow of a river, stream, or other flowing body of water (not tidally influenced).

Probability/History: Over the past ten years, Anne Arundel County has experienced 22 episodes of riverine flooding according to data from the National Oceanic and Atmospheric Administration.

Impact/Vulnerability: Riverine floods may occur without much warning, and therefore have the potential for the loss of life and property damage. There is the potential for serious consequences to the County's economy and residents' lifestyle.

Evaluation:

$$\frac{2.20 \text{ (high probability)}}{\text{Probability Rating}} + \frac{1.66 \text{ (moderate)}}{\text{Impact Rating}}$$



Hazard: Severe Storm or Hailstorm

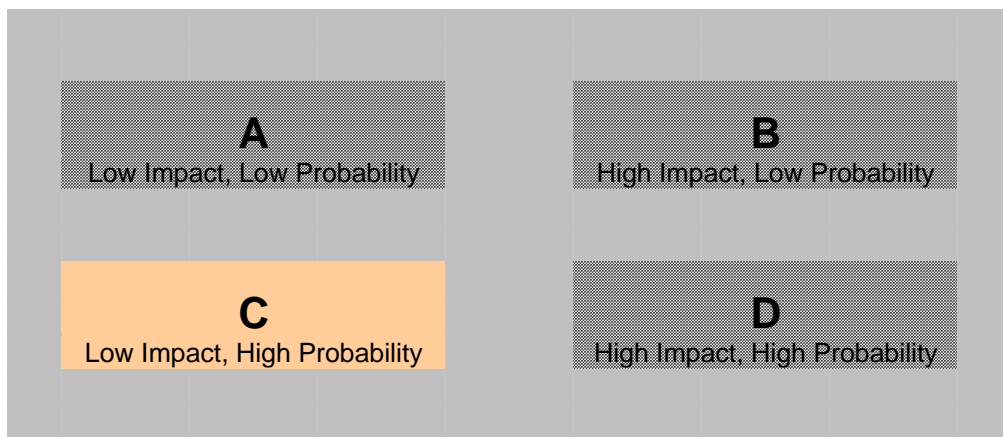
Definition: A transient, sometimes violent storm resulting from strong rising air currents; brings heavy rain or hail along with thunder and lightning.

Probability/History: Over the past 53 years, Anne Arundel County has experienced 173 severe thunderstorms or hailstorms according to data from the National Oceanic and Atmospheric Administration.

Impact/Vulnerability: Severe thunderstorms can occur with little warning; these types of storms rarely cause loss of life, but may cause damage to property.

Evaluation:

$$\frac{3.86 \text{ (high probability)}}{\text{Probability Rating}} + \frac{1.44 \text{ (low)}}{\text{Impact Rating}}$$



Hazard: Severe Winter Storm

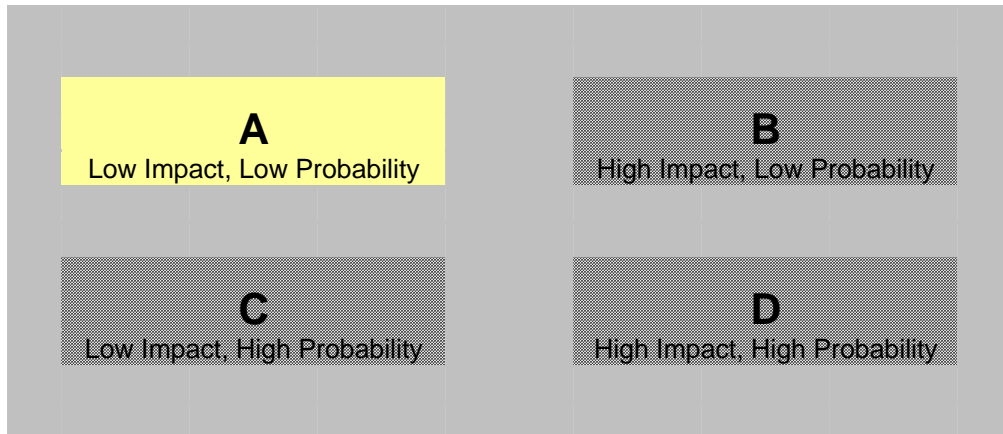
Definition: Storm that may have one or more of the following conditions: heavy snow, rain or freezing rain, wind and blowing snow, and dangerously cold temperatures.

Probability/History: Over the past 102 years, Anne Arundel County has experienced 31 severe winter storms according to National Weather Service data.

Impact/Vulnerability: Severe winter storms, though they have a long warning, bring with them the potential to cause a loss of life, damage to property, and greatly impact County's operations and economy.

Evaluation:

$$\frac{0.30 \text{ (low probability)}}{\text{Probability Rating}} + \frac{1.94 \text{ (low)}}{\text{Impact Rating}}$$



Hazard: Tornado

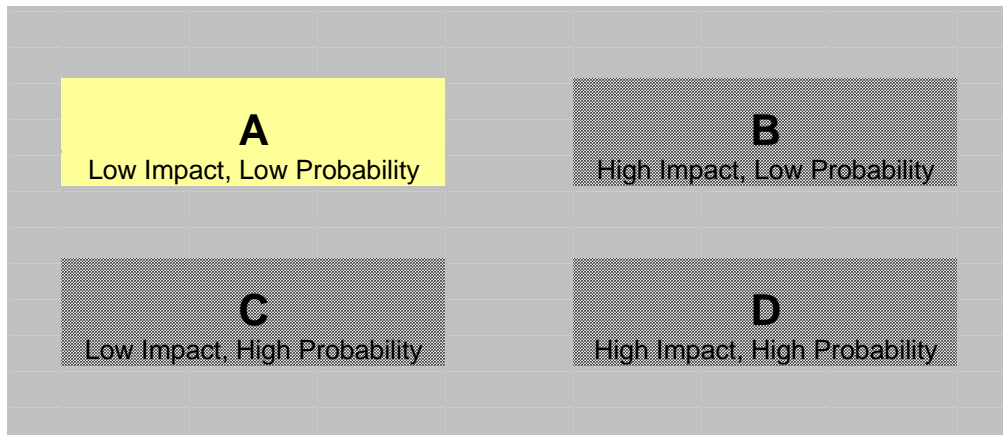
Definition: A small radius cyclonic windstorm with high velocity wind that extends from a thunderstorm to the ground.

Probability/History: Over the past 112 years, 27 tornadoes have touched down in Anne Arundel County, according to data from the National Weather Service.

Impact/Vulnerability: Tornadoes frequently occur with little or no warning, bringing a great deal of destruction and possible loss of life.

Evaluation:

$$\frac{0.24 \text{ (low probability)}}{\text{Probability Rating}} + \frac{2.14 \text{ (moderate)}}{\text{Impact Rating}}$$



Hazard: Wildfire

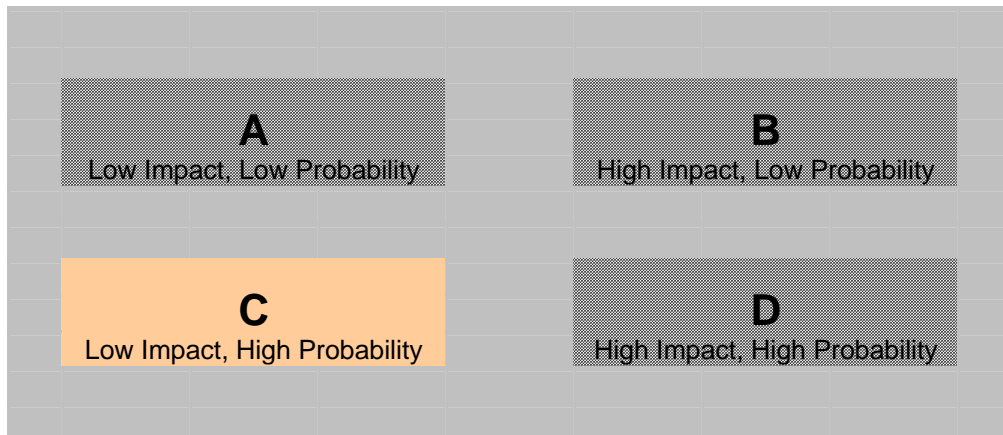
Definition: Uncontrolled, rapid burning in grasslands, brush, or woodlands.

Probability/History: Over the past three years, there have been 2,368 brush or wildfires in Anne Arundel County, according to data from the Anne Arundel County Fire Department.

Impact/Vulnerability: Wildfires can occur with little or no warning, and have the potential to cause property damage and loss of life.

Evaluation:

789.33 (nearly certain) + 1.87 (low)
Probability Rating Impact Rating



Man-made Hazards

Hazard: Air Pollution

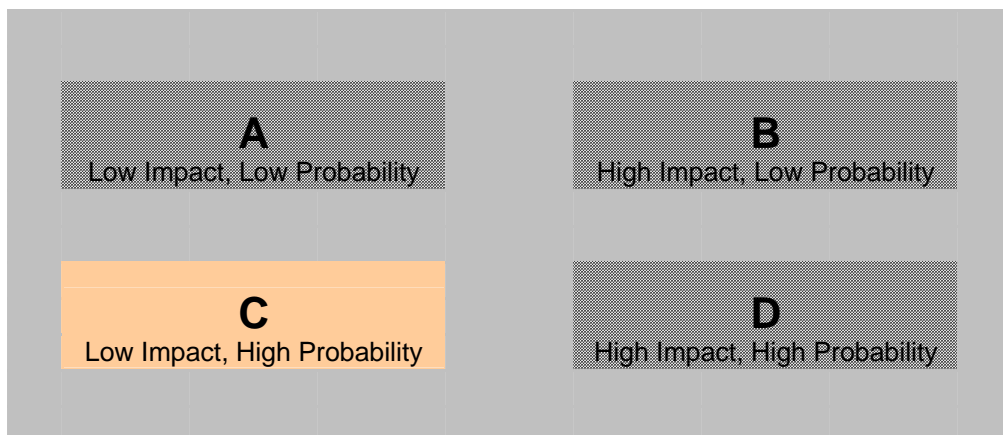
Definition: Comes from many different areas including both stationary, and mobile sources. Potential sources include factories, power plants, dry cleaners, cars, buses, trucks and even windblown dust and wildfires. Can threaten the health of human beings, trees, lakes, crops, and animals, as well as damage the ozone layer and buildings.

Probability/History: Over the past six years, there have been 30 instances when the ozone level in Anne Arundel County was either unhealthy or very unhealthy according to data from the Environmental Protection Agency.

Impact/Vulnerability: Air pollution occurs with some warning, but the persistent nature of the hazard can cause sickness or discomfort to residents.

Evaluation:

$$\frac{5 \text{ (high probability)}}{\text{Probability Rating}} + \frac{2.11 \text{ (moderate)}}{\text{Impact Rating}}$$



Hazard: Building, Dwelling, or Vessel Fires

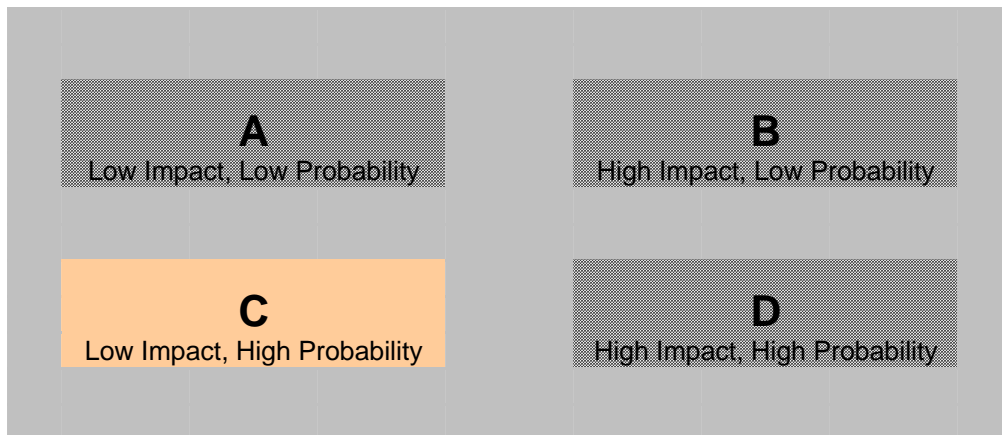
Definition: A rapid, persistent chemical change that releases heat and light and is accompanied by flame, especially the exothermic oxidation of a combustible substance; cause to burn or ignite. Causes structural damage to residential, commercial, industrial, or institutional property or personal injury or deaths due to fire.

Probability/History: Over the past three years, there have been 3,827 fires involving buildings, dwellings, and vehicles in Anne Arundel County, according to data from the Anne Arundel County Fire Department.

Impact/Vulnerability: Fires can occur at any time in any location in the County; they have the potential for loss of life and destruction of property, but have minimum effect on the economy or ability of the County to conduct its business.

Evaluation:

$$\frac{1275.67 \text{ (nearly certain)}}{\text{Probability Rating}} + \frac{1.92 \text{ (low)}}{\text{Impact Rating}}$$



Hazard: Communication Failure

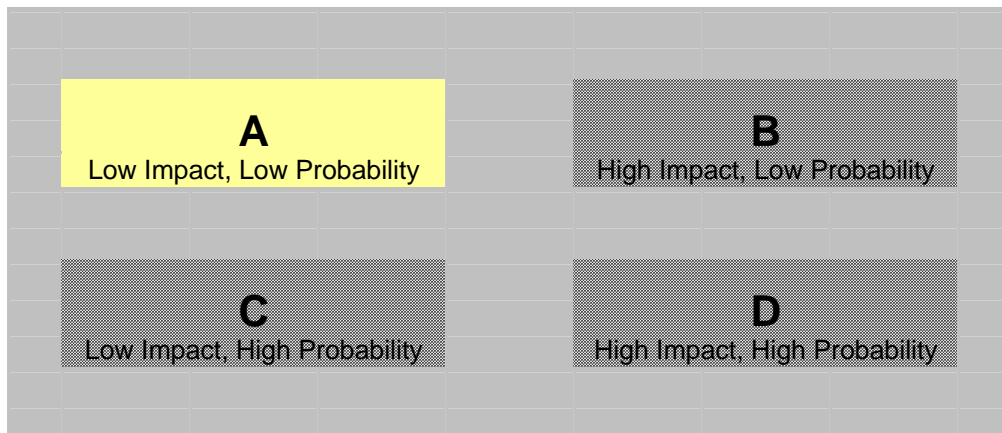
Definition: Cessation of proper functioning of a system, such as mail, telephone, or television, for sending and receiving information or messages.

Probability/History: Over the past three and a half years, there have been an average of two communications failures in Anne Arundel County, according to data from Baltimore Gas and Electric and Verizon.

Impact/Vulnerability: Communication failures generally occur during times when the electric power has been interrupted; a communication failure may occur with limited warning and may have a detrimental effect on the ability of government to function and negatively affect the economy of the County.

Evaluation:

$$\frac{(0.58 \text{ low probability})}{\text{Probability Rating}} + \frac{2.07 \text{ (moderate)}}{\text{Impact Rating}}$$



Hazard: Critical Fuel Shortage

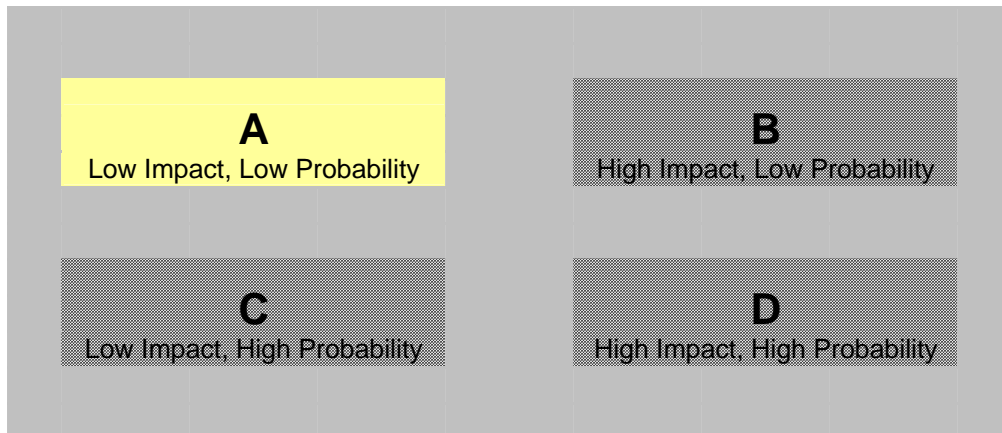
Definition: A deficiency where the quantity of fuel is less than expected or required causing disruptions or delays to essential services.

Probability/History: Over the past 29 years, there have been two critical fuel shortages in Anne Arundel County, according to data from Anne Arundel County Central Services.

Impact/Vulnerability: A critical fuel shortage would be expected to have a negative effect on the County's economy and the ability of the residents to travel about; no injuries or deaths are anticipated.

Evaluation:

$$\frac{0.07 \text{ (not probable)}}{\text{Probability Rating}} + \frac{2.23 \text{ (moderate)}}{\text{Impact Rating}}$$



Hazard: Dam Failure and Release

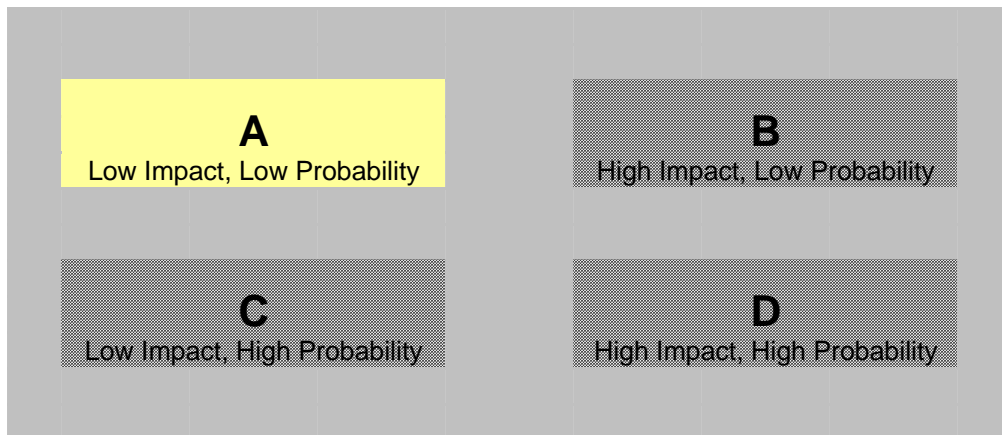
Definition: Deposition of significant quantities of water into the watershed draining into the reservoir behind the dam; volume is sufficient to overwhelm the spillway causing overtopping of the dam, and potentially failure of the structure causing downstream flooding.

Probability/History: According to the Maryland Department of the Environment, there have been no releases from high hazard dams over the past 25 years.

Impact/Vulnerability: Dam failure at one of the irrigation dams in the County would cause minimal flooding and disruption; failure of one of the high-risk dams could create an opportunity for a good deal of property damage and potential injuries or loss of life.

Evaluation:

$$\frac{(0 \text{ low probability})}{\text{Probability Rating}} + \frac{2.01 \text{ (moderate)}}{\text{Impact Rating}}$$



Hazard: Hazardous Materials Incident (Fixed Facility)

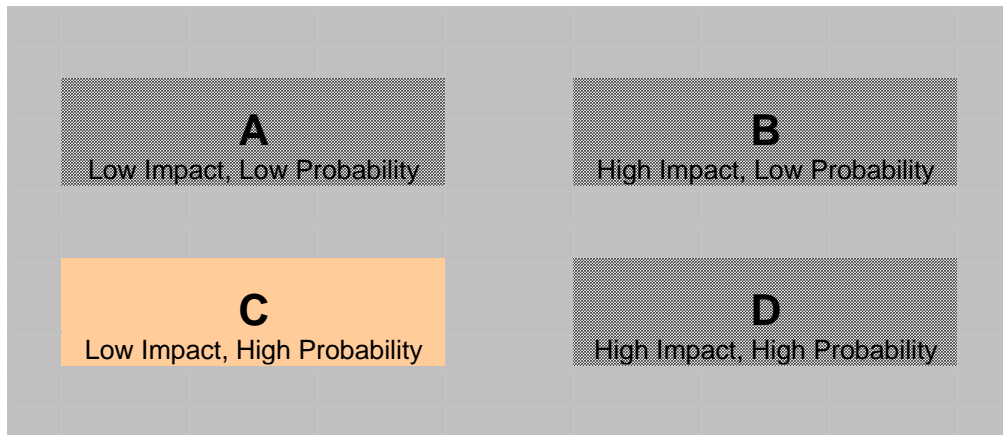
Definition: Uncontrolled release of hazardous materials from a fixed site.

Probability/History: Over the past year and a half, there have been eight incidents requiring a level A or level B response from the Anne Arundel County hazardous materials team (used as a surrogate for a hazardous materials release) in Anne Arundel County, according to data from the Anne Arundel County Fire Department.

Impact/Vulnerability: A release of hazardous materials from a fixed facility could have significant impacts on residents near the release; significant injuries or death may occur, though the impact on the economy and government services would be minimal.

Evaluation:

$$\frac{(5.61 \text{ high probability})}{\text{Probability Rating}} + \frac{2.33 \text{ (moderate)}}{\text{Impact Rating}}$$



Hazard: Mass Transportation Accident

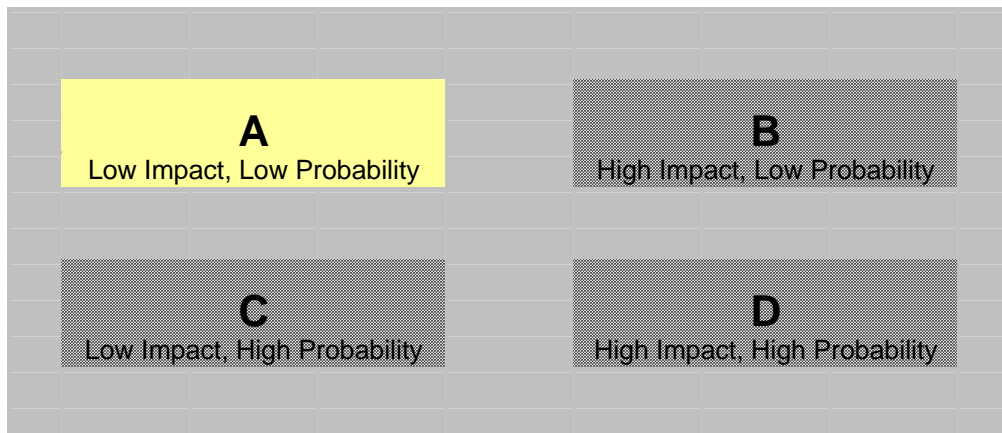
Definition: an accident involving the means, or system, that transfers large groups of individuals from one place to another; includes airlines, railroad passenger cars, metro rail travel, tour buses, city bus lines, school buses, and cruise ships.

Probability/History: There have been four times over the past three years when there has been an accident involving mass transportation in Anne Arundel County.

Impact/Vulnerability: A mass transportation accident has the potential for large numbers of injuries and deaths, though it may not have a significant impact on the County's economy or ability to provide service.

Evaluation:

$$\frac{1.38 \text{ (moderate probability)}}{\text{Probability Rating}} + \frac{1.84 \text{ (low)}}{\text{Impact Rating}}$$



Hazard: Pipeline Accident

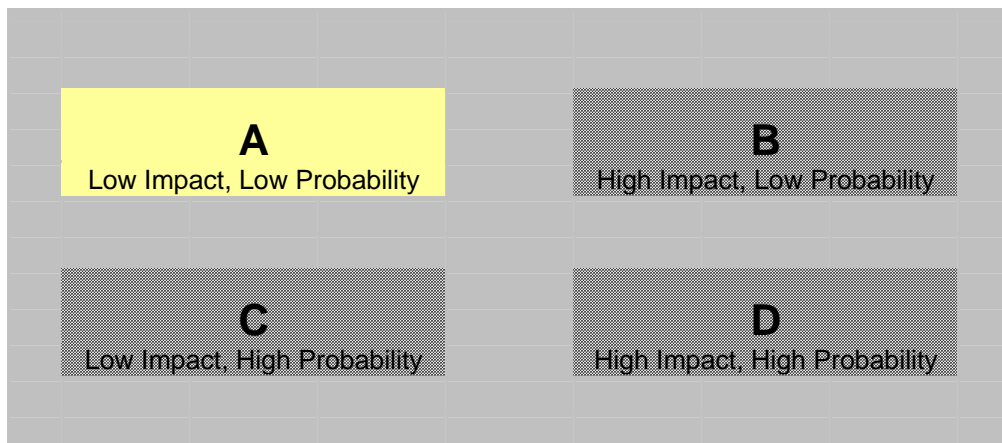
Definition: An accident involving a conduit of pipe, especially one used for the conveyance of water, gas, or petroleum products.

Probability/History: Although there have been no reported pipeline accidents in Anne Arundel County, the presence of pipelines that carry petroleum and natural gas in the County ensure that this hazard is present.

Impact/Vulnerability: Over the past 33 years, there have been zero pipeline accidents in Anne Arundel County.

Evaluation:

$$\frac{0 \text{ (not probable)}}{\text{Probability Rating}} + \frac{2.05 \text{ (moderate)}}{\text{Impact Rating}}$$



Hazard: Transportation Accident

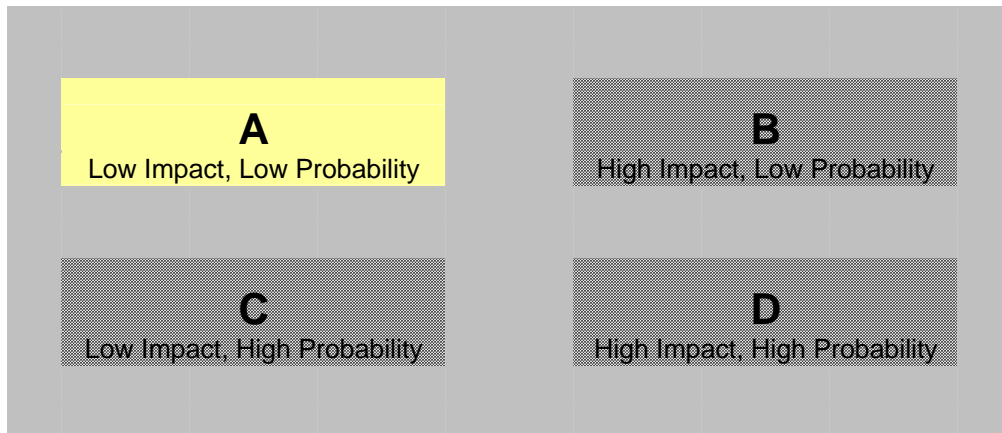
Definition: Incident involving travel via highway, air, rail, or water that results in death and/or injury; may include hazardous materials release, a multi-vehicle incident, or road/bridge blockage.

Probability/History: Over the past twelve years, there have been ten transportation accidents in Anne Arundel County.

Impact/Vulnerability: A transportation accident has the potential to cause injuries or deaths and to cause a negative impact on the County's economy and the ability to conduct routine government services.

Evaluation:

$$\frac{0.83 \text{ (low probability)}}{\text{Probability Rating}} + \frac{2.01 \text{ (moderate)}}{\text{Impact Rating}}$$



Hazard: Utility Disruption

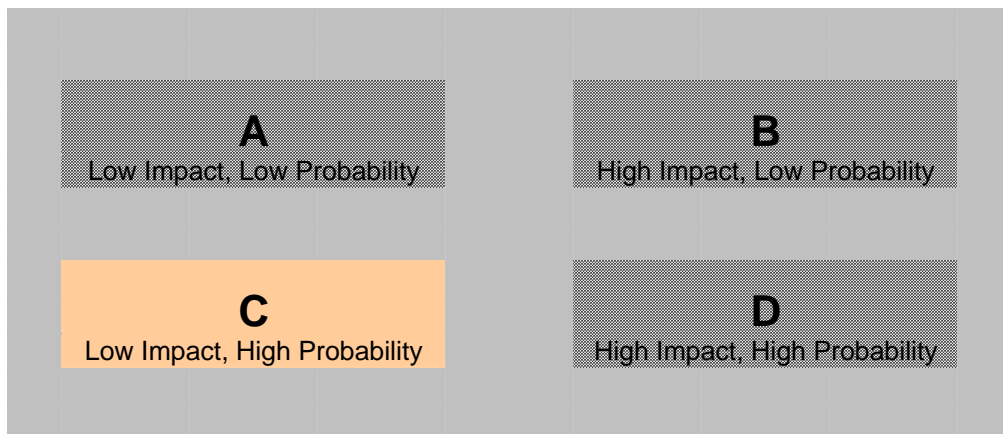
Definition: Incident that disrupts lifeline systems that deliver potable water, wastewater, or electric power.

Probability/History: There have been 5.21 utility disruptions at critical facilities over the past three and a half years in Anne Arundel County, according to data from Baltimore Gas & Electric.

Impact/Vulnerability: A utility disruption has the potential to negatively affect the economy or the environment.

Evaluation:

$$\frac{(1.53 \text{ moderate probability})}{\text{Probability Rating}} + \frac{2.46 \text{ (moderate)}}{\text{Impact Rating}}$$



Terrorism Hazards

Hazard: Civil Disturbance

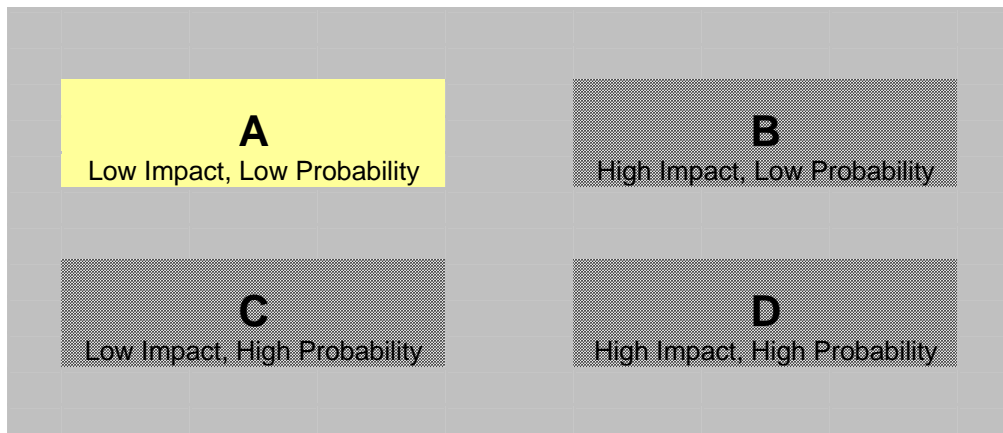
Definition: Civil disorder or a civil disturbance may take several forms, including pickets, marches, rallies, parades, sit-ins, trespassing, riots, sabotage, and criminal damage to property. In all cases of civil disorder, no matter how minor, there is always the potential for escalation into a full-scale emergency.

Probability/History: *This data has been removed for security purposes.*

Impact/Vulnerability: A civil disturbance has the potential to cause injuries and deaths. The most severe impact would be to the economy of the County.

Evaluation:

This data has been removed for security purposes.



Hazard: Cyber Crime

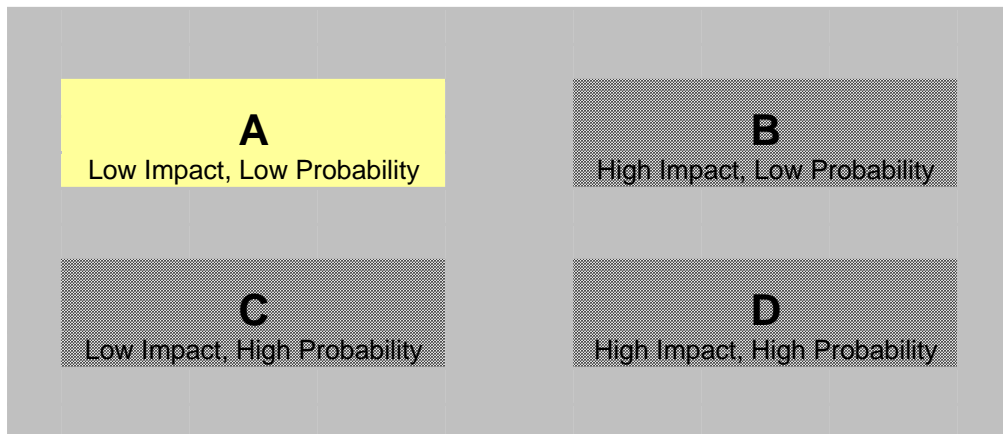
Definition: Attack on electronic infrastructure with the intent to commit illegal activity. Includes on-line fraud such as intellectual property rights, computer intrusions (hacking), economic espionage (theft of trade secrets), on-line extortion, money laundering, identity theft and other Internet- facilitated crimes.

Probability/History: *This data has been removed for security purposes.*

Impact/Vulnerability: A cyber crime in Anne Arundel County could have a serious effect on the economy or a severe effect on government operations.

Evaluation:

This data has been removed for security purposes.



Hazard: Terrorism or Sabotage

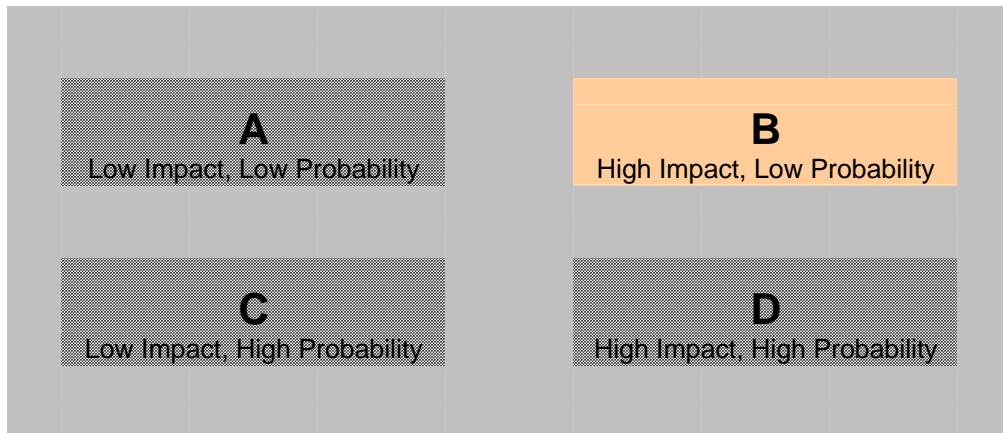
Definition: The unlawful use or threatened use of force or violence by a person or an organized group against people or property with the intention of intimidating or coercing societies or governments, often for ideological or political reasons.

Probability/History: *This data has been removed for security purposes.*

Impact/Vulnerability: Terrorist actions have the potential for grave consequences in the County including many injuries, deaths, disruption of the economy and government service provision, and negative impact to the environment.

Evaluation:

This data has been removed for security purposes.



Hazard: Weapons of Mass Destruction Attack

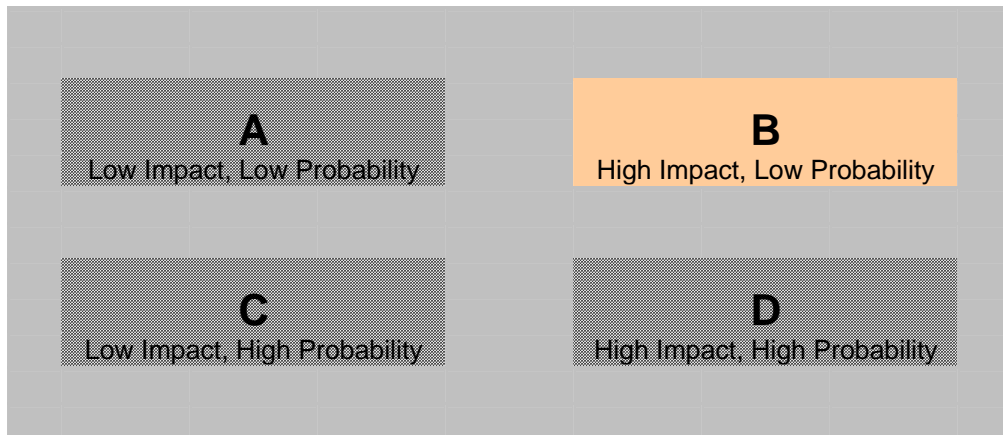
Definition: Any explosive, incendiary, or poison, gas, bomb, grenade, rocket having a propellant charge of more than four ounce, missile having an explosive or incendiary charge of more than on-quarter ounce, or mine or device similar to the preceding; poison gas; any weapon involving a disease organism; or any weapon that is designed to release radiation or radioactivity at a level dangerous to human life.

Probability/History: *This data has been removed for security purposes.*

Impact/Vulnerability: A weapons of mass destruction attack could have devastating effects on the County including loss of life, many injuries, massive disruption of the County’s economy, and a complete cessation of government functions.

Evaluation:

This data has been removed for security purposes.



Hazards to be Addressed in Next Iteration

The following hazard was determined to have a potential impact on Anne Arundel County. Data will be compiled to address this hazard for inclusion in the next iteration of the Anne Arundel County All-Hazard Mitigation Plan.

- Land and Water Pollution

Hazards Considered but Not Addressed

The following hazards were determined to have such low probability as to be not applicable to Anne Arundel County:

- Asteroid Impact
- Rising Sea (Global Warming)
- Tsunami
- Volcano