

---

**FINAL  
PRELIMINARY ASSESSMENT  
Stump Neck Annex  
Naval District Washington,  
Indian Head, Maryland**

---

**September 2005**

Prepared for:

**Naval District Washington, Indian Head**  
101 Strauss Avenue  
Indian Head, MD 20640-1542

Prepared by:

**Malcolm Pirnie, Inc**  
630 Freedom Business Center, Suite 203  
King of Prussia, Pennsylvania 19406

**FINAL  
PRELIMINARY ASSESSMENT  
Stump Neck Annex  
Naval District Washington,  
Indian Head, Maryland**

DoD Contract Number: N62472-02-D-1300

Reviewed and Approved by:

\_\_\_\_\_

Jeffrey R. Bennett, P.E., DEE  
Program Officer  
Malcolm Pirnie, Inc.

\_\_\_\_\_

Rhonda Stone  
Project Manager  
Malcolm Pirnie, Inc.

Malcolm Pirnie, Inc. prepared this report at the direction of Engineering Field Activity Northeast. This document should be used only with the approval of the Engineering Field Activity Northeast. This report is based, in part, on information provided in other documents and is subject to the limitations and qualifications presented in the referenced documents.

**September 2005**

# TABLE OF CONTENTS

**ACRONYMS.....I**

**GLOSSARY OF TERMS..... IV**

**EXECUTIVE SUMMARY .....1**

**1. INTRODUCTION..... 1-1**

**1.1. PURPOSE ..... 1-2**

**1.2. PROGRAMMATIC FRAMEWORK ..... 1-3**

**1.3. PROJECT MANAGEMENT..... 1-4**

**1.4. PRELIMINARY ASSESSMENT APPROACH ..... 1-4**

**2. INSTALLATION BACKGROUND..... 2-1**

**2.1. LOCATION AND SETTING..... 2-1**

**2.2. INSTALLATION HISTORY ..... 2-1**

**2.3. MUNITIONS RELATED TRAINING / STORAGE / USAGE ..... 2-4**

**3. PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS..... 3-1**

**3.1. CLIMATE..... 3-1**

**3.2. TOPOGRAPHY ..... 3-1**

**3.3. GEOLOGY ..... 3-2**

**3.4. SOIL AND VEGETATION TYPES ..... 3-3**

**3.5. HYDROLOGY..... 3-4**

**3.6. HYDROGEOLOGY..... 3-5**

**3.7. CULTURAL AND NATURAL RESOURCES..... 3-7**

**3.8. ENDANGERED AND SPECIAL STATUS SPECIES..... 3-7**

**4. SUMMARY OF DATA COLLECTION EFFORT ..... 3.8-1**

**4.1. HISTORICAL ARCHIVE REPOSITORIES (OFF-RANGE)..... 4.1-1**

**4.2. PERSONAL INTERVIEWS ..... 4.2-4**

**4.3. ON-SITE DATA REPOSITORIES..... 4.3-5**

**4.4. VISUAL SURVEY ..... 4.4-6**

**4.5. OFF-SITE DATA SOURCES ..... 4.5-6**

**5. SITE CHARACTERISTICS..... 4.5-1**

**5.1. AIR BLAST POND ..... 5.1-1**

**5.1.1. History and Site Description..... 5.1-1**

            5.1.1.1. Topography ..... 5.1-5

            5.1.1.2. Geology ..... 5.1-5

            5.1.1.3. Soil and Vegetation Types ..... 5.1-6

            5.1.1.4. Hydrology ..... 5.1-6

            5.1.1.5. Hydrogeology ..... 5.1-6

            5.1.1.6. Cultural and Natural Resources ..... 5.1-7

            5.1.1.7. Endangered and Special Status Species ..... 5.1-7

**5.1.2. Visual Survey Observations and Results..... 5.1-7**

5.1.3. *Munitions and Munitions Related Materials Associated with the Site* ..... 5.1-9

5.1.4. *MEC Presence* ..... 5.1-11

    5.1.4.1. Known MEC Areas..... 5.1-11

    5.1.4.2. Suspected MEC Areas ..... 5.1-11

    5.1.4.3. Areas Not Suspected to Contain MEC..... 5.1-11

5.1.5. *Ordnance Penetration Estimates* ..... 5.1-11

5.1.6. *Munitions Constituents* ..... 5.1-12

5.1.7. *Contaminant Migration Routes*..... 5.1-19

5.1.8. *Receptors*..... 5.1-19

    5.1.8.1. Nearby Populations..... 5.1-19

    5.1.8.2. Buildings Near/Within Site..... 5.1-19

    5.1.8.3. Utilities On/Near Site..... 5.1-21

5.1.9. *Land Use* ..... 5.1-21

5.1.10. *Access Controls / Restrictions* ..... 5.1-21

5.1.11. *Conceptual Site Model*..... 5.1-22

5.1.12. *Summary* ..... 5.1-30

**5.2. AREA 8** ..... **5.2-1**

    5.2.1. *History and Site Description*..... 5.2-1

        5.2.1.1. Topography ..... 5.2-5

        5.2.1.2. Geology..... 5.2-6

        5.2.1.3. Soil and Vegetation Types ..... 5.2-6

        5.2.1.4. Hydrology ..... 5.2-7

        5.2.1.5. Hydrogeology ..... 5.2-8

        5.2.1.6. Cultural and Natural Resources ..... 5.2-8

        5.2.1.7. Endangered and Special Status Species ..... 5.2-9

    5.2.2. *Visual Survey Observations and Results*..... 5.2-9

    5.2.3. *Munitions and Munitions Related Materials Associated with the Site* ..... 5.2-11

    5.2.4. *MEC Presence* ..... 5.2-11

        5.2.4.1. Known MEC Areas..... 5.2-12

        5.2.4.2. Suspected MEC Areas ..... 5.2-12

        5.2.4.3. Areas Not Suspected to Contain MEC..... 5.2-12

    5.2.5. *Ordnance Penetration Estimates* ..... 5.2-12

    5.2.6. *Munitions Constituents* ..... 5.2-12

    5.2.7. *Contaminant Migration Routes*..... 5.2-15

    5.2.8. *Receptors*..... 5.2-16

        5.2.8.1. Nearby Populations..... 5.2-16

        5.2.8.2. Buildings Near/Within Site..... 5.2-16

        5.2.8.3. Utilities On/Near Site..... 5.2-18

    5.2.9. *Land Use* ..... 5.2-18

    5.2.10. *Access Controls / Restrictions* ..... 5.2-19

    5.2.11. *Conceptual Site Model*..... 5.2-20

    5.2.12. *Summary* ..... 5.2-29

**5.3. EOD SCHOOL DEMOLITION AREA** ..... **5.3-1**

    5.3.1. *History and Site Description*..... 5.3-1

        5.3.1.1. Topography ..... 5.3-3

        5.3.1.2. Geology..... 5.3-3

5.3.1.3.	Soil and Vegetation Types .....	5.3-3
5.3.1.4.	Hydrology .....	5.3-4
5.3.1.5.	Hydrogeology .....	5.3-4
5.3.1.6.	Cultural and Natural Resources .....	5.3-4
5.3.1.7.	Endangered and Special Status Species .....	5.3-5
5.3.2.	<i>Visual Survey Observations and Results</i> .....	5.3-5
5.3.3.	<i>Munitions and Munitions Related Materials Associated with the Site</i> .....	5.3-5
5.3.4.	<i>MEC Presence</i> .....	5.3-6
5.3.4.1.	Known MEC Areas.....	5.3-6
5.3.4.2.	Suspected MEC Areas .....	5.3-6
5.3.4.3.	Areas Not Suspected to Contain MEC.....	5.3-6
5.3.5.	<i>Ordnance Penetration Estimates</i> .....	5.3-7
5.3.6.	<i>Munitions Constituents</i> .....	5.3-7
5.3.7.	<i>Contaminant Migration Routes</i> .....	5.3-7
5.3.8.	<i>Receptors</i> .....	5.3-8
5.3.8.1.	Nearby Populations.....	5.3-8
5.3.8.2.	Buildings Near/Within Site.....	5.3-8
5.3.8.3.	Utilities On/Near Site.....	5.3-8
5.3.9.	<i>Land Use</i> .....	5.3-8
5.3.10.	<i>Access Controls / Restrictions</i> .....	5.3-9
5.3.11.	<i>Conceptual Site Model</i> .....	5.3-9
5.3.12.	<i>Summary</i> .....	5.3-16
<b>5.4.</b>	<b>IED PRACTICAL TRAINING AREA (BASIC IED AREA).....</b>	<b>5.4-1</b>
5.4.1.	<i>History and Site Description</i> .....	5.4-1
5.4.1.1.	Topography .....	5.4-3
5.4.1.2.	Geology.....	5.4-3
5.4.1.3.	Soil and Vegetation Types .....	5.4-3
5.4.1.4.	Hydrology .....	5.4-4
5.4.1.5.	Hydrogeology .....	5.4-4
5.4.1.6.	Cultural and Natural Resources .....	5.4-5
5.4.1.7.	Endangered and Special Status Species .....	5.4-5
5.4.2.	<i>Visual Survey Observations and Results</i> .....	5.4-5
5.4.3.	<i>Munitions and Munitions Related Materials Associated with the Site</i> .....	5.4-6
5.4.4.	<i>MEC Presence</i> .....	5.4-8
5.4.4.1.	Known MEC Areas.....	5.4-8
5.4.4.2.	Suspected MEC Areas .....	5.4-8
5.4.4.3.	Areas Not Suspected to Contain MEC.....	5.4-8
5.4.5.	<i>Ordnance Penetration Estimates</i> .....	5.4-8
5.4.6.	<i>Munitions Constituents</i> .....	5.4-9
5.4.7.	<i>Contaminant Migration Routes</i> .....	5.4-11
5.4.8.	<i>Receptors</i> .....	5.4-11
5.4.8.1.	Nearby Populations.....	5.4-11
5.4.8.2.	Buildings Near/Within Site.....	5.4-11
5.4.8.3.	Utilities On/Near Site.....	5.4-12
5.4.9.	<i>Land Use</i> .....	5.4-12
5.4.10.	<i>Access Controls / Restrictions</i> .....	5.4-12

5.4.11. *Conceptual Site Model*..... 5.4-13

5.4.12. *Summary* ..... 5.4-21

**5.5. IOD AREA (ADVANCED IED AREA) ..... 5.5-1**

5.5.1. *History and Site Description*..... 5.5-1

5.5.1.1. Topography ..... 5.5-4

5.5.1.2. Geology ..... 5.5-4

5.5.1.3. Soil and Vegetation Types ..... 5.5-4

5.5.1.4. Hydrology ..... 5.5-5

5.5.1.5. Hydrogeology ..... 5.5-5

5.5.1.6. Cultural and Natural Resources ..... 5.5-5

5.5.1.7. Endangered and Special Status Species ..... 5.5-5

5.5.2. *Visual Survey Observations and Results*..... 5.5-5

5.5.3. *Munitions and Munitions Related Materials Associated with the Site* ..... 5.5-6

5.5.4. *MEC Presence* ..... 5.5-7

5.5.4.1. Known MEC Areas ..... 5.5-8

5.5.4.2. Suspected MEC Areas ..... 5.5-8

5.5.4.3. Areas Not Suspected to Contain MEC ..... 5.5-8

5.5.5. *Ordnance Penetration Estimates* ..... 5.5-8

5.5.6. *Munitions Constituents* ..... 5.5-9

5.5.7. *Contaminant Migration Routes*..... 5.5-10

5.5.8. *Receptors*..... 5.5-11

5.5.8.1. Nearby Populations ..... 5.5-11

5.5.8.2. Buildings Near/Within Site ..... 5.5-11

5.5.8.3. Utilities On/Near Site ..... 5.5-12

5.5.9. *Land Use* ..... 5.5-12

5.5.10. *Access Controls / Restrictions* ..... 5.5-12

5.5.11. *Conceptual Site Model*..... 5.5-13

5.5.12. *Summary* ..... 5.5-20

**THIS MAP IS LOCATED ON THE CD ROM IN CD\_1\_REPORT&MAPS\STUMP\_NECK\_MAPS5.5-23**

**5.6. MARINE RIFLE RANGE..... 5.6-1**

5.6.1. *History and Site Description*..... 5.6-1

5.6.1.1. Topography ..... 5.6-6

5.6.1.2. Geology ..... 5.6-6

5.6.1.3. Soil and Vegetation Types ..... 5.6-6

5.6.1.4. Hydrology ..... 5.6-7

5.6.1.5. Hydrogeology ..... 5.6-7

5.6.1.6. Cultural and Natural Resources ..... 5.6-8

5.6.1.7. Endangered and Special Status Species ..... 5.6-8

5.6.2. *Visual Survey Observations and Results*..... 5.6-9

5.6.3. *Munitions and Munitions Related Materials Associated with the Site* ..... 5.6-10

5.6.4. *MEC Presence* ..... 5.6-12

5.6.4.1. Known MEC Areas ..... 5.6-12

5.6.4.2. Suspected MEC Areas ..... 5.6-12

5.6.4.3. Areas Not Suspected to Contain MEC ..... 5.6-12

5.6.5. *Ordnance Penetration Estimates* ..... 5.6-12

5.6.6. *Munitions Constituents* ..... 5.6-13

5.6.7.	<i>Contaminant Migration Routes</i> .....	5.6-13
5.6.8.	<i>Receptors</i> .....	5.6-14
5.6.8.1.	Nearby Populations.....	5.6-14
5.6.8.2.	Buildings Near/Within Site.....	5.6-14
5.6.8.3.	Utilities On/Near Site.....	5.6-15
5.6.9.	<i>Land Use</i> .....	5.6-16
5.6.10.	<i>Access Controls / Restrictions</i> .....	5.6-16
5.6.11.	<i>Conceptual Site Model</i> .....	5.6-17
5.6.12.	<i>Summary</i> .....	5.6-25
<b>5.7.</b>	<b>OLD DEMOLITION RANGE</b> .....	<b>5.7-1</b>
5.7.1.	<i>History and Site Description</i> .....	5.7-1
5.7.1.1.	Topography.....	5.7-2
5.7.1.2.	Geology.....	5.7-2
5.7.1.3.	Soil and Vegetation Types.....	5.7-2
5.7.1.4.	Hydrology.....	5.7-3
5.7.1.5.	Hydrogeology.....	5.7-3
5.7.1.6.	Cultural and Natural Resources.....	5.7-3
5.7.1.7.	Endangered and Special Status Species.....	5.7-3
5.7.2.	<i>Visual Survey Observations and Results</i> .....	5.7-4
5.7.3.	<i>Munitions and Munitions Related Materials Associated with the Site</i> .....	5.7-4
5.7.4.	<i>MEC Presence</i> .....	5.7-5
5.7.4.1.	Known MEC Areas.....	5.7-6
5.7.4.2.	Suspected MEC Areas.....	5.7-6
5.7.4.3.	Areas Not Suspected to Contain MEC.....	5.7-6
5.7.5.	<i>Ordnance Penetration Estimates</i> .....	5.7-6
5.7.6.	<i>Munitions Constituents</i> .....	5.7-7
5.7.7.	<i>Contaminant Migration Routes</i> .....	5.7-8
5.7.8.	<i>Receptors</i> .....	5.7-8
5.7.8.1.	Nearby Populations.....	5.7-9
5.7.8.2.	Buildings Near/Within Site.....	5.7-9
5.7.8.3.	Utilities On/Near Site.....	5.7-9
5.7.9.	<i>Land Use</i> .....	5.7-9
5.7.10.	<i>Access Controls / Restrictions</i> .....	5.7-9
5.7.11.	<i>Conceptual Site Model</i> .....	5.7-10
5.7.12.	<i>Summary</i> .....	5.7-16
<b>5.8.</b>	<b>OLD SKEET AND TRAP RANGE</b> .....	<b>5.8-1</b>
5.8.1.	<i>History and Site Description</i> .....	5.8-1
5.8.1.1.	Topography.....	5.8-1
5.8.1.2.	Geology.....	5.8-2
5.8.1.3.	Soil and Vegetation Types.....	5.8-2
5.8.1.4.	Hydrology.....	5.8-2
5.8.1.5.	Hydrogeology.....	5.8-2
5.8.1.6.	Cultural and Natural Resources.....	5.8-2
5.8.1.7.	Endangered and Special Status Species.....	5.8-3
5.8.2.	<i>Visual Survey Observations and Results</i> .....	5.8-3
5.8.3.	<i>Munitions and Munitions Related Materials Associated with the Site</i> .....	5.8-3

5.8.4.	<i>MEC Presence</i> .....	5.8-4
5.8.4.1.	Known MEC Areas .....	5.8-5
5.8.4.2.	Suspected MEC Areas .....	5.8-5
5.8.4.3.	Areas Not Suspected to Contain MEC.....	5.8-5
5.8.5.	<i>Ordnance Penetration Estimates</i> .....	5.8-5
5.8.6.	<i>Munitions Constituents</i> .....	5.8-6
5.8.7.	<i>Contaminant Migration Routes</i> .....	5.8-6
5.8.8.	<i>Receptors</i> .....	5.8-7
5.8.8.1.	Nearby Populations.....	5.8-7
5.8.8.2.	Buildings Near/Within Site.....	5.8-7
5.8.8.3.	Utilities On/Near Site.....	5.8-7
5.8.9.	<i>Land Use</i> .....	5.8-7
5.8.10.	<i>Access Controls / Restrictions</i> .....	5.8-8
5.8.11.	<i>Conceptual Site Model</i> .....	5.8-8
5.8.12.	<i>Summary</i> .....	5.8-15
<b>5.9.</b>	<b>ROACH ROAD RIFLE RANGE.....</b>	<b>5.9-1</b>
5.9.1.	<i>History and Site Description</i> .....	5.9-1
5.9.1.1.	Topography .....	5.9-3
5.9.1.2.	Geology.....	5.9-3
5.9.1.3.	Soil and Vegetation Types .....	5.9-3
5.9.1.4.	Hydrology .....	5.9-4
5.9.1.5.	Hydrogeology .....	5.9-4
5.9.1.6.	Cultural and Natural Resources .....	5.9-4
5.9.1.7.	Endangered and Special Status Species.....	5.9-5
5.9.2.	<i>Visual Survey Observations and Results</i> .....	5.9-5
5.9.3.	<i>Munitions and Munitions Related Materials Associated with the Site</i> .....	5.9-6
5.9.4.	<i>MEC Presence</i> .....	5.9-7
5.9.4.1.	Known MEC Areas.....	5.9-7
5.9.4.2.	Suspected MEC Areas .....	5.9-7
5.9.4.3.	Areas Not Suspected to Contain MEC.....	5.9-7
5.9.5.	<i>Ordnance Penetration Estimates</i> .....	5.9-7
5.9.6.	<i>Munitions Constituents</i> .....	5.9-8
5.9.7.	<i>Contaminant Migration Routes</i> .....	5.9-8
5.9.8.	<i>Receptors</i> .....	5.9-8
5.9.8.1.	Nearby Populations.....	5.9-8
5.9.8.2.	Buildings Near/Within Site.....	5.9-9
5.9.8.3.	Utilities On/Near Site.....	5.9-9
5.9.9.	<i>Land Use</i> .....	5.9-9
5.9.10.	<i>Access Controls / Restrictions</i> .....	5.9-9
5.9.11.	<i>Conceptual Site Model</i> .....	5.9-9
5.9.12.	<i>Summary</i> .....	5.9-16
<b>5.10.</b>	<b>RUM POINT SKEET RANGE .....</b>	<b>5.10-1</b>
5.10.1.	<i>History and Site Description</i> .....	5.10-1
5.10.1.1.	Topography .....	5.10-1
5.10.1.2.	Geology.....	5.10-2
5.10.1.3.	Soil and Vegetation Types .....	5.10-2

5.10.1.4. Hydrology ..... 5.10-3

5.10.1.5. Hydrogeology ..... 5.10-3

5.10.1.6. Cultural and Natural Resources ..... 5.10-3

5.10.1.7. Endangered and Special Status Species ..... 5.10-5

5.10.2. *Visual Survey Observations and Results*..... 5.10-5

5.10.3. *Munitions and Munitions Related Materials Associated with the Site* ..... 5.10-7

5.10.4. *MEC Presence* ..... 5.10-7

5.10.4.1. Known MEC Areas..... 5.10-8

5.10.4.2. Suspected MEC Areas ..... 5.10-8

5.10.4.3. Areas Not Suspected to Contain MEC..... 5.10-8

5.10.5. *Ordnance Penetration Estimates* ..... 5.10-8

5.10.6. *Munitions Constituents* ..... 5.10-9

5.10.7. *Contaminant Migration Routes*..... 5.10-11

5.10.8. *Receptors*..... 5.10-11

5.10.8.1. Nearby Populations..... 5.10-11

5.10.8.2. Buildings Near/Within Site..... 5.10-11

5.10.8.3. Utilities On/Near Site..... 5.10-12

5.10.9. *Land Use* ..... 5.10-12

5.10.10. *Access Controls / Restrictions* ..... 5.10-12

5.10.11. *Conceptual Site Model*..... 5.10-13

5.10.12. *Summary* ..... 5.10-19

**5.11. SMALL ARMS RANGE (PISTOL RANGE) ..... 5.11-1**

5.11.1. *History and Site Description*..... 5.11-1

5.11.1.1. Topography ..... 5.11-2

5.11.1.2. Geology..... 5.11-2

5.11.1.3. Soil and Vegetation Types ..... 5.11-2

5.11.1.4. Hydrology ..... 5.11-2

5.11.1.5. Hydrogeology ..... 5.11-3

5.11.1.6. Cultural and Natural Resources ..... 5.11-3

5.11.1.7. Endangered and Special Status Species ..... 5.11-3

5.11.2. *Visual Survey Observations and Results*..... 5.11-3

5.11.3. *Munitions and Munitions Related Materials Associated with the Site* ..... 5.11-4

5.11.4. *MEC Presence* ..... 5.11-6

5.11.4.1. Known MEC Areas..... 5.11-6

5.11.4.2. Suspected MEC Areas ..... 5.11-6

5.11.4.3. Areas Not Suspected to Contain MEC..... 5.11-6

5.11.5. *Ordnance Penetration Estimates* ..... 5.11-6

5.11.6. *Munitions Constituents* ..... 5.11-7

5.11.7. *Contaminant Migration Routes*..... 5.11-7

5.11.8. *Receptors*..... 5.11-7

5.11.8.1. Nearby Populations..... 5.11-8

5.11.8.2. Buildings Near/Within Site..... 5.11-8

5.11.8.3. Utilities On/Near Site..... 5.11-8

5.11.9. *Land Use* ..... 5.11-8

5.11.10. *Access Controls / Restrictions* ..... 5.11-9

5.11.11. *Conceptual Site Model*..... 5.11-9

5.11.12. *Summary* ..... 5.11-15

**5.12. STUMP NECK IMPACT AREA ..... 5.12-1**

5.12.1. *History and Site Description*..... 5.12-1

5.12.1.1. Topography ..... 5.12-2

5.12.1.2. Geology ..... 5.12-2

5.12.1.3. Soil and Vegetation Types ..... 5.12-2

5.12.1.4. Hydrology ..... 5.12-3

5.12.1.5. Hydrogeology ..... 5.12-3

5.12.1.6. Cultural and Natural Resources ..... 5.12-3

5.12.1.7. Endangered and Special Status Species ..... 5.12-3

5.12.2. *Visual Survey Observations and Results*..... 5.12-4

5.12.3. *Munitions and Munitions Related Materials Associated with the Site* ..... 5.12-4

5.12.4. *MEC Presence* ..... 5.12-5

5.12.4.1. Known MEC Areas ..... 5.12-5

5.12.4.2. Suspected MEC Areas ..... 5.12-5

5.12.4.3. Areas Not Suspected to Contain MEC..... 5.12-5

5.12.5. *Ordnance Penetration Estimates* ..... 5.12-6

5.12.6. *Munitions Constituents* ..... 5.12-6

5.12.7. *Contaminant Migration Routes*..... 5.12-7

5.12.8. *Receptors*..... 5.12-7

5.12.8.1. Nearby Populations ..... 5.12-7

5.12.8.2. Buildings Near/Within Site ..... 5.12-7

5.12.8.3. Utilities On/Near Site..... 5.12-8

5.12.9. *Land Use* ..... 5.12-8

5.12.10. *Access Controls / Restrictions* ..... 5.12-8

5.12.11. *Conceptual Site Model*..... 5.12-9

5.12.12. *Summary* ..... 5.12-16

**5.13. TEST AREA 1 ..... 5.13-1**

5.13.1. *History and Site Description*..... 5.13-1

5.13.1.1. Topography ..... 5.13-1

5.13.1.2. Geology ..... 5.13-2

5.13.1.3. Soil and Vegetation Types ..... 5.13-2

5.13.1.4. Hydrology ..... 5.13-2

5.13.1.5. Hydrogeology ..... 5.13-2

5.13.1.6. Cultural and Natural Resources ..... 5.13-2

5.13.1.7. Endangered and Special Status Species ..... 5.13-3

5.13.2. *Visual Survey Observations and Results*..... 5.13-3

5.13.3. *Munitions and Munitions Related Materials Associated with the Site* ..... 5.13-3

5.13.4. *MEC Presence* ..... 5.13-4

5.13.4.1. Known MEC Areas ..... 5.13-4

5.13.4.2. Suspected MEC Areas ..... 5.13-4

5.13.4.3. Areas Not Suspected to Contain MEC..... 5.13-4

5.13.5. *Ordnance Penetration Estimates* ..... 5.13-4

5.13.6. *Munitions Constituents* ..... 5.13-5

5.13.7. *Contaminant Migration Routes*..... 5.13-5

5.13.8. *Receptors*..... 5.13-5

5.13.8.1.	Nearby Populations .....	5.13-5
5.13.8.2.	Buildings Near/Within Site .....	5.13-5
5.13.8.3.	Utilities On/Near Site .....	5.13-6
5.13.9.	<i>Land Use</i> .....	5.13-6
5.13.10.	<i>Access Controls / Restrictions</i> .....	5.13-6
5.13.11.	<i>Conceptual Site Model</i> .....	5.13-6
5.13.12.	<i>Summary</i> .....	5.13-14
<b>5.14.</b>	<b>TEST AREA 2 .....</b>	<b>5.14-1</b>
5.14.1.	<i>History and Site Description</i> .....	5.14-1
5.14.1.1.	Topography .....	5.14-3
5.14.1.2.	Geology .....	5.14-4
5.14.1.3.	Soil and Vegetation Types .....	5.14-4
5.14.1.4.	Hydrology .....	5.14-4
5.14.1.5.	Hydrogeology .....	5.14-4
5.14.1.6.	Cultural and Natural Resources .....	5.14-4
5.14.1.7.	Endangered and Special Status Species .....	5.14-4
5.14.2.	<i>Visual Survey Observations and Results</i> .....	5.14-5
5.14.3.	<i>Munitions and Munitions Related Materials Associated with the Site</i> .....	5.14-5
5.14.4.	<i>MEC Presence</i> .....	5.14-5
5.14.4.1.	Known MEC Areas .....	5.14-5
5.14.4.2.	Suspected MEC Areas .....	5.14-6
5.14.4.3.	Areas Not Suspected to Contain MEC .....	5.14-6
5.14.5.	<i>Ordnance Penetration Estimates</i> .....	5.14-6
5.14.6.	<i>Munitions Constituents</i> .....	5.14-6
5.14.7.	<i>Contaminant Migration Routes</i> .....	5.14-6
5.14.8.	<i>Receptors</i> .....	5.14-6
5.14.8.1.	Nearby Populations .....	5.14-7
5.14.8.2.	Buildings Near/Within Site .....	5.14-7
5.14.8.3.	Utilities On/Near Site .....	5.14-7
5.14.9.	<i>Land Use</i> .....	5.14-7
5.14.10.	<i>Access Controls / Restrictions</i> .....	5.14-7
5.14.11.	<i>Conceptual Site Model</i> .....	5.14-8
5.14.12.	<i>Summary</i> .....	5.14-12
<b>5.15.</b>	<b>THE VALLEY IMPACT AREA .....</b>	<b>5.15-1</b>
5.15.1.	<i>History and Site Description</i> .....	5.15-1
5.15.1.1.	Topography .....	5.15-2
5.15.1.2.	Geology .....	5.15-2
5.15.1.3.	Soil and Vegetation Types .....	5.15-2
5.15.1.4.	Hydrology .....	5.15-2
5.15.1.5.	Hydrogeology .....	5.15-2
5.15.1.6.	Cultural and Natural Resources .....	5.15-3
5.15.1.7.	Endangered and Special Status Species .....	5.15-4
5.15.2.	<i>Visual Survey Observations and Results</i> .....	5.15-4
5.15.3.	<i>Munitions and Munitions Related Materials Associated with the Site</i> .....	5.15-5
5.15.4.	<i>MEC Presence</i> .....	5.15-7
5.15.4.1.	Known MEC Areas .....	5.15-7

5.15.4.2. Suspected MEC Areas ..... 5.15-7

5.15.4.3. Areas Not Suspected to Contain MEC..... 5.15-7

5.15.5. Ordnance Penetration Estimates ..... 5.15-8

5.15.6. Munitions Constituents ..... 5.15-8

5.15.7. Contaminant Migration Routes..... 5.15-8

5.15.8. Receptors..... 5.15-9

5.15.8.1. Nearby Populations..... 5.15-9

5.15.8.2. Buildings Near/Within Site..... 5.15-9

5.15.8.3. Utilities On/Near Site..... 5.15-9

5.15.9. Land Use ..... 5.15-10

5.15.10. Access Controls / Restrictions ..... 5.15-10

5.15.11. Conceptual Site Model..... 5.15-10

5.15.12. Summary ..... 5.15-18

**5.16. TORPEDO BURIAL SITE ..... 5.16-1**

5.16.1. History and Site Description..... 5.16-1

5.16.1.1. Topography ..... 5.16-1

5.16.1.2. Geology..... 5.16-2

5.16.1.3. Soil and Vegetation Types ..... 5.16-2

5.16.1.4. Hydrology ..... 5.16-2

5.16.1.5. Hydrogeology ..... 5.16-3

5.16.1.6. Cultural and Natural Resources ..... 5.16-3

5.16.1.7. Endangered and Special Status Species ..... 5.16-3

5.16.2. Visual Survey Observations and Results..... 5.16-4

5.16.3. Munitions and Munitions Related Materials Associated with the Site ..... 5.16-5

5.16.4. MEC Presence ..... 5.16-6

5.16.4.1. Known MEC Areas..... 5.16-6

5.16.4.2. Suspected MEC Areas ..... 5.16-6

5.16.4.3. Areas Not Suspected to Contain MEC..... 5.16-6

5.16.5. Ordnance Penetration Estimates ..... 5.16-6

5.16.6. Munitions Constituents ..... 5.16-7

5.16.7. Contaminant Migration Routes..... 5.16-8

5.16.8. Receptors..... 5.16-8

5.16.8.1. Nearby Populations..... 5.16-8

5.16.8.2. Buildings Near/Within Site..... 5.16-8

5.16.8.3. Utilities On/Near Site..... 5.16-8

5.16.9. Land Use ..... 5.16-9

5.16.10. Access Controls / Restrictions ..... 5.16-9

5.16.11. Conceptual Site Model..... 5.16-9

5.16.12. Summary ..... 5.16-18

**5.17. TORPEDO CASING DISPOSAL AREA ..... 5.17-1**

5.17.1. History and Site Description..... 5.17-1

5.17.1.1. Topography ..... 5.17-2

5.17.1.2. Geology..... 5.17-2

5.17.1.3. Soil and Vegetation Types ..... 5.17-2

5.17.1.4. Hydrology ..... 5.17-3

5.17.1.5. Hydrogeology ..... 5.17-3

5.17.1.6. Cultural and Natural Resources ..... 5.17-3

5.17.1.7. Endangered and Special Status Species ..... 5.17-3

5.17.2. Visual Survey Observations and Results..... 5.17-4

5.17.3. Munitions and Munitions Related Materials Associated with the Site ..... 5.17-5

5.17.4. MEC Presence ..... 5.17-5

5.17.4.1. Known MEC Areas..... 5.17-5

5.17.4.2. Suspected MEC Areas ..... 5.17-5

5.17.4.3. Areas Not Suspected to Contain MEC..... 5.17-6

5.17.5. Ordnance Penetration Estimates ..... 5.17-6

5.17.6. Munitions Constituents ..... 5.17-6

5.17.7. Contaminant Migration Routes..... 5.17-6

5.17.8. Receptors..... 5.17-7

5.17.8.1. Nearby Populations ..... 5.17-7

5.17.8.2. Buildings Near/Within Site..... 5.17-7

5.17.8.3. Utilities On/Near Site..... 5.17-7

5.17.9. Land Use ..... 5.17-7

5.17.10. Access Controls / Restrictions ..... 5.17-8

5.17.11. Conceptual Site Model..... 5.17-8

5.17.12. Summary ..... 5.17-14

**APPENDICES**

APPENDIX A: REFERENCES

APPENDIX B: PROJECT SOURCE DATA – GENERAL

APPENDIX C: PROJECT SOURCE DATA – SITE SPECIFIC

APPENDIX D: ORDNANCE TECHNICAL DATA SHEETS

**MAPS**

MAP 2.3-1: AREA LOCATION MAP ..... 2-12

MAP 2.3-2: STUMP NECK ANNEX AREA LOCATION MAP ..... 2-13

MAP 5.1-1: VISUAL SURVEY: AIR BLAST POND ..... 5.1-31

MAP 5.1-2: RANGE/SITE DETAILS: AIR BLAST POND ..... 5.1-32

MAP 5.1-3: MUNITIONS CHARACTERIZATION: AIR BLAST POND ..... 5.1-33

MAP 5.2-1: VISUAL SURVEY: AREA 8..... 5.2-30

MAP 5.2-2: RANGE/SITE DETAILS: AREA 8 ..... 5.2-31

MAP 5.2-3: MUNITIONS CHARACTERIZATION: AREA 8..... 5.2-32

MAP 5.3-1: VISUAL SURVEY: EOD SCHOOL DEMOLITION AREA ..... 5.3-17

**FINAL PRELIMINARY ASSESSMENT**

MAP 5.3-2: RANGE/SITE DETAILS: EOD SCHOOL DEMOLITION AREA ..... 5.3-18

MAP 5.3-3: MUNITIONS CHARACTERIZATION: EOD SCHOOL DEMOLITION AREA 5.3-19

MAP 5.4-1: VISUAL SURVEY: BASIC IED AREA ..... 5.4-22

MAP 5.4-2: RANGE/SITE DETAILS: BASIC IED AREA ..... 5.4-23

MAP 5.4-3: MUNITIONS CHARACTERIZATION: BASIC IED AREA ..... 5.4-24

MAP 5.5-1: VISUAL SURVEY: ADVANCED IED AREA ..... 5.5-21

MAP 5.5-2: RANGE/SITE DETAILS MAP: ADVANCED IED AREA ..... 5.5-22

MAP 5.5-3: MUNITIONS CHARACTERIZATION: ADVANCED IED AREA ..... 5.5-23

MAP 5.6-1: VISUAL SURVEY: MARINE RIFLE RANGE ..... 5.6-26

MAP 5.6-2: RANGE/SITE DETAILS: MARINE RIFLE RANGE ..... 5.6-27

MAP 5.6-3: MUNITIONS CHARACTERIZATION: MARINE RIFLE RANGE ..... 5.6-28

MAP 5.7-1: VISUAL SURVEY: OLD DEMOLITION RANGE ..... 5.7-17

MAP 5.7-2: RANGE/SITE DETAILS: OLD DEMOLITION RANGE ..... 5.7-18

MAP 5.7-3: MUNITIONS CHARACTERIZATION: OLD DEMOLITION RANGE ..... 5.7-19

MAP 5.8-1: VISUAL SURVEY: OLD SKEET AND TRAP RANGE ..... 5.8-16

MAP 5.8-2: RANGE/SITE DETAILS: OLD SKEET AND TRAP RANGE ..... 5.8-17

MAP 5.8-3: MUNITIONS CHARACTERIZATION: OLD SKEET AND TRAP RANGE 5.8-18

MAP 5.9-1: VISUAL SURVEY: ROACH ROAD RIFLE RANGE ..... 5.9-17

MAP 5.9-2: RANGE/SITE DETAILS: ROACH ROAD RIFLE RANGE ..... 5.9-18

MAP 5.9-3: MUNITIONS CHARACTERIZATION: ROACH ROAD RIFLE RANGE .... 5.9-19

MAP 5.10-1: VISUAL SURVEY: RUM POINT SKEET RANGE ..... 5.10-20

MAP 5.10-2: RANGE/SITE DETAILS: RUM POINT SKEET RANGE ..... 5.10-21

MAP 5.10-3: MUNITIONS CHARACTERIZATION: RUM POINT SKEET RANGE ... 5.10-22

MAP 5.11-1: VISUAL SURVEY: SMALL ARMS (PISTOL) RANGE ..... 5.11-16

MAP 5.11-2: RANGE/SITE DETAILS: SMALL ARMS (PISTOL) RANGE ..... 5.11-17

MAP 5.11-3: MUNITIONS CHARACTERIZATION: SMALL ARMS (PISTOL) RANGES 5.11-18

MAP 5.12-1: RANGE/SITE DETAILS: STUMP NECK IMPACT AREA ..... 5.12-17

MAP 5.12-2: MUNITIONS CHARACTERIZATION: STUMP NECK IMPACT AREA 5.12-18

MAP 5.13-1: VISUAL SURVEY: TEST AREA 1 ..... 5.13-15

MAP 5.13-2: RANGE/SITE DETAILS: TEST AREA 1 ..... 5.13-16

MAP 5.13-3: MUNITIONS CHARACTERIZATION: TEST AREA 1 ..... 5.13-17

MAP 5.14-1: VISUAL SURVEY: TEST AREA 2 ..... 5.14-13

MAP 5.14-2: RANGE/SITE DETAILS: TEST AREA 2 ..... 5.14-14

MAP 5.14-3: MUNITIONS CHARACTERIZATION: TEST AREA 2..... 5.14-15  
MAP 5.15-1: VISUAL SURVEY: THE VALLEY IMPACT AREA..... 5.15-19  
MAP 5.15-2: RANGE/SITE DETAILS: THE VALLEY IMPACT AREA..... 5.15-20  
MAP 5.15-3: MUNITIONS CHARACTERIZATION: THE VALLEY IMPACT AREA. 5.15-21  
MAP 5.16-1: VISUAL SURVEY: TORPEDO BURIAL SITE..... 5.16-19  
MAP 5.16-2: RANGE/SITE DETAILS: TORPEDO BURIAL SITE..... 5.16-20  
MAP 5.16-3: MUNITIONS CHARACTERIZATION: TORPEDO BURIAL SITE..... 5.16-21  
MAP 5.17-1: VISUAL SURVEY: TORPEDO CASING DISPOSAL AREA ..... 5.17-15  
MAP 5.17-2: RANGE/SITE DETAILS: TORPEDO CASING DISPOSAL AREA ..... 5.17-16  
MAP 5.17-3: MUNITIONS CHARACTERIZATION: TORPEDO CASING DISPOSAL AREA5.17-17

**FIGURES**

FIGURE 2.3-1: THE VALLEY FIRING FAN..... 2-5  
FIGURE 5.1-1: AIR BLAST POND LAYOUT AS DEPICTED IN 1998 RFI/VI..... 5.1-2  
FIGURE 5.1-2: 1956 LOCATION PLAN FOR AIR BLAST POND SHOWING BURROW  
AREA..... 5.1-3  
FIGURE 5.1-3: 1956 PROFILE OF CONSTRUCTION FOR AIR BLAST POND ..... 5.1-3  
FIGURE 5.1-4: 1956 DESIGN OF AIR BLAST POND ..... 5.1-4  
FIGURE 5.1-5 VEGETATION SURROUNDING AIR BLAST POND..... 5.1-6  
FIGURE 5.1-6: OVERGROWN BERM AT THE AIR BLAST POND..... 5.1-7  
FIGURE 5.1-7: FLAG ON BERM IDENTIFYING LOCATION OF 57MM PROJECTILE. 5.1-8  
FIGURE 5.1-8: METAL DRUMS LOCATED SOUTH OF POND..... 5.1-8  
FIGURE 5.1-9: WOODEN DEBRIS..... 5.1-8  
FIGURE 5.1-10: STEEL CYLINDERS DISCARDED ON-RANGE ..... 5.1-9  
FIGURE 5.1-11: CURRENT VIEW OF BERM, STAIRS, AND CONCRETE TANK ..... 5.1-9  
FIGURE 5.1-12: 57-MM PROJECTILE IDENTIFIED DURING THE VISUAL SURVEY5.1-10  
FIGURE 5.1-13: END CAP OF C-4 BLOCK IDENTIFIED DURING VISUAL SURVEY5.1-13  
FIGURE 5.1-14: RFI/VI SAMPLE LOCATIONS..... 5.1-14  
FIGURE 5.1-15: FIELD SCREENING TEST LOCATIONS..... 5.1-15  
FIGURE 5.1-16: 1983 MAP SHOWING FORMER BUILDINGS AND POND..... 5.1-20  
FIGURE 5.1-17: WOODEN BUNKER STILL PRESENT AT THE AIR BLAST POND.. 5.1-21  
FIGURE 5.1-18: CONCRETE TANK STILL PRESENT AT THE AIR BLAST POND..... 5.1-21

FIGURE 5.1-19: MEC EXPOSURE PATHWAY ANALYSIS..... 5.1-29

FIGURE 5.2-1: WATER AND AIR SHOT LOCATIONS AT AREA 8 FROM 1995 VI WORK PLAN ..... 5.2-4

FIGURE 5.2-2: MAP FROM 1977 SHOWING EOD TRAINING AREA IN CHICAMUXEN CREEK ..... 5.2-5

FIGURE 5.2-3: VIEW OF POND AT AREA 8 AND THE SURROUNDING VEGETATION.5.2-6

FIGURE 5.2-4: VIEW OF WOODS SURROUNDING AREA 8 EAST OF ROACH ROAD.5.2-7

FIGURE 5.2-5: VIEW OF CHICAMUXEN CREEK IMMEDIATELY WEST OF AREA 8 AND ROACH ROAD..... 5.2-8

FIGURE 5.2-6: VIEW OF POND AND BUILDING 60SN AT AREA 8..... 5.2-10

FIGURE 5.2-7: VIEW OF POND LOOKING NORTH FROM BUILDING 60SN ..... 5.2-10

FIGURE 5.2-8: VIEW OF TRAIL WALKED IN WOODS EAST OF ROACH ROAD..... 5.2-10

FIGURE 5.2-9: 1995 VI SAMPLE LOCATIONS AT AREA 8..... 5.2-14

FIGURE 5.2-10: VIEW OF PARKING LOT LOOKING EAST FROM ROACH ROAD.. 5.2-16

FIGURE 5.2-11: VIEW OF BUILDING 2210SN LOOKING EAST FROM ROACH ROAD.5.2-16

FIGURE 5.2-12: FORMER BUILDINGS AS SHOWN ON 1983 MAP OF RESERVATION, STUMP NECK AREA ..... 5.2-18

FIGURE 5.2-13: MEC EXPOSURE PATHWAY ANALYSIS..... 5.2-27

FIGURE 5.2-14: MC EXPOSURE PATHWAY ANALYSIS ..... 5.2-28

FIGURE 5.3-1: CURRENT SITE CONDITIONS OF THE EOD SCHOOL DEMOLITION AREA..... 5.3-1

FIGURE 5.3-2: 1945 MAP SHOWING EOD DEMOLITION AREA..... 5.3-2

FIGURE 5.3-3: 1949 MAP SHOWING EOD DEMOLITION AREA..... 5.3-3

FIGURE 5.3-4: CULTURAL RESOURCES IDENTIFIED IN SHOVEL TEST PITS ..... 5.3-4

FIGURE 5.3-5: MEC EXPOSURE PATHWAY ANALYSIS..... 5.3-14

FIGURE 5.3-6: MC EXPOSURE PATHWAY ANALYSIS ..... 5.3-15

FIGURE 5.4-1: FORMER TRAINING AREAS AND SAMPLING LOCATIONS AT THE BASIC IED AREA. .... 5.4-2

FIGURE 5.4-2: ACCESS ROAD AND VEGETATION ACROSS THE BASIC IED AREA.5.4-4

FIGURE 5.4-3: LOOKING SOUTH AT BUILDING 2087 LOCATED ON THE NORTHERN PORTION OF BASIC IED AREA..... 5.4-6

FIGURE 5.4-4 MEC EXPOSURE PATHWAY ANALYSIS..... 5.4-19

FIGURE 5.4-5 MC EXPOSURE PATHWAY ANALYSIS ..... 5.4-20

FIGURE 5.5-1: MAP DISPLAYING LOCATION OF ADVANCED IED AREA. .... 5.5-1

FIGURE 5.5-2: LOCATION OF SWMU #27 ON MAP FROM 1996 VI REPORT ..... 5.5-2

FIGURE 5.5-3: VIEW OF NORTHERN SIDE OF ADVANCED IED AREA ..... 5.5-3

FIGURE 5.5-4: VIEW OF SOUTHERN SIDE OF ADVANCED IED AREA..... 5.5-4

FIGURE 5.5-5: SWMU #27 SAMPLE LOCATIONS FROM 1996 VI REPORT ..... 5.5-10

FIGURE 5.5-6: MEC EXPOSURE PATHWAY ANALYSIS..... 5.5-18

FIGURE 5.5-7: MC EXPOSURE PATHWAY ANALYSIS ..... 5.5-19

FIGURE 5.6-1: VIEW OF MARINE RIFLE RANGE LOOKING WEST TOWARD BUILDING 2195. .... 5.6-1

FIGURE 5.6-2: RIFLE RANGE, WINTHROP, MARYLAND AS SHOWN ON 1913 INSTALLATION MAP ..... 5.6-2

FIGURE 5.6-3: OCTOBER 19, 1913. RIFLE RANGE AT WINTHROP, MARYLAND, SHOWING FIRING LINE ..... 5.6-3

FIGURE 5.6-4: OCTOBER 19, 1913. RIFLE RANGE AT WINTHROP, MARYLAND, SHOWING FIRING LINE AND RANGE HOUSE..... 5.6-3

FIGURE 5.6-5: OCTOBER 19, 1913. RIFLE RANGE AT WINTHROP, MARYLAND, SHOWING TARGET MECHANISMS ..... 5.6-4

FIGURE 5.6-6: OCTOBER 19, 1913. RIFLE RANGE AT WINTHROP, MARYLAND, SHOWING TARGETS AND EMBANKMENT ..... 5.6-4

FIGURE 5.6-7: VIEW OF GRASSLAND AT MARINE RIFLE RANGE ..... 5.6-7

FIGURE 5.6-8: CULTURAL RESOURCES IDENTIFIED IN SHOVEL TEST PITS ..... 5.6-8

FIGURE 5.6-9: VIEW OF EARTHEN MOUND IDENTIFIED DURING VISUAL SURVEY..... 5.6-9

FIGURE 5.6-10: METAL DEBRIS OBSERVED IN THE WOODS AT THE MARINE RIFLE RANGE..... 5.6-10

FIGURE 5.6-11: TYPICAL SDZ FOR A 500-YARD RIFLE RANGE ..... 5.6-11

FIGURE 5.6-12: MC EXPOSURE PATHWAY ANALYSIS ..... 5.6-24

FIGURE 5.7-1: CURRENT CONDITIONS AT THE OLD DEMOLITION RANGE ..... 5.7-1

FIGURE 5.7-2: METAL DEBRIS OBSERVED DURING THE OLD DEMOLITION RANGE SURVEY..... 5.7-4

FIGURE 5.8-1: CURRENT CONDITIONS AT THE OLD SKEET AND TRAP RANGE .. 5.8-1

FIGURE 5.8-2: MC EXPOSURE PATHWAY ANALYSIS ..... 5.8-14

FIGURE 5.9-1 1963 LAYOUT FOR ‘NEW PISTOL RANGE’ ..... 5.9-1

FIGURE 5.9-2: 1972 AERIAL VIEW OF THE ROACH ROAD RIFLE RANGE. .... 5.9-2

FIGURE 5.9-3: RANGE AS SHOWN ON THE 1981 MAP..... 5.9-3

FIGURE 5.9-4: VEGETATION AT THE ROACH ROAD RIFLE RANGE..... 5.9-3

FIGURE 5.9-5: CULTURAL RESOURCES IDENTIFIED IN SHOVEL TEST PITS ..... 5.9-5

FIGURE 5.9-6 CONSTRUCTION DEBRIS IDENTIFIED DURING THE SITE VISIT ..... 5.9-5

FIGURE 5.9-7: MC EXPOSURE PATHWAY ANALYSIS ..... 5.9-15

FIGURE 5.10-1: GRASS SURROUNDING THE CONCRETE FIRING PAD AND  
BORDERING HARDWOOD FOREST..... 5.10-2

FIGURE 5.10-2: LOCATION OF SITE 18CH391..... 5.10-4

FIGURE 5.10-3: LOCATION OF THE RUM POINT SKEET RANGE AND 18CH628 AND  
18CH630..... 5.10-5

FIGURE 5.10-4: CONCRETE PAD AND FIRING LINES VISIBLE ON THE SOUTHERN  
EDGE OF THE RANGE ..... 5.10-6

FIGURE 5.10-5: CLAY TARGET (WHITE AA FLYER) FOUND AT THE RUM POINT  
SKEET RANGE. .... 5.10-7

FIGURE 5.10-6: TYPICAL SHOT FALL LAYOUT FOR A SKEET RANGE ..... 5.10-9

FIGURE 5.10-7: LOCATION OF THEORETICAL VS. ACTUAL SHOT FALL ZONES ON  
THE RUM POINT SKEET RANGE..... 5.10-10

FIGURE 5.10-8: MC EXPOSURE PATHWAY ANALYSIS ..... 5.10-18

FIGURE 5.11-1: SILVER CONTAMINATED SOIL..... 5.11-1

FIGURE 5.11-2: WOODEN SHACK OBSERVED AT NORTHWESTERN END OF SMALL  
ARMS RANGE ..... 5.11-4

FIGURE 5.11-3: WOODEN STANDS OBSERVED BEHIND THE SHACK AT THE SMALL  
ARMS RANGE ..... 5.11-4

FIGURE 5.11-4: SDZ FOR A TYPICAL .45-CAL PISTOL RANGE..... 5.11-5

FIGURE 5.11-5: HILL USED FOR TARGET PRACTICE AND ARCHERY TARGETS . 5.11-8

FIGURE 5.11-6: MC EXPOSURE PATHWAY ANALYSIS ..... 5.11-14

FIGURE 5.12-1: CRATER FORMATIONS APPEAR AS DOTS IN THE IMPACT AREA ON  
THIS AERIAL PHOTOGRAPH. .... 5.12-1

FIGURE 5.12-2: VEGETATION AT THE STUMP NECK IMPACT AREA (LOOKING  
WEST FROM ROACH ROAD)..... 5.12-2

FIGURE 5.12-3: WETLANDS AT THE STUMP NECK IMPACT AREA ..... 5.12-3

FIGURE 5.12-4: HEAVY SHRUBS OBSERVED FROM THE PERIPHERY OF THE  
IMPACT AREA..... 5.12-4

FIGURE 5.12-5: MEC EXPOSURE PATHWAY ANALYSIS..... 5.12-14

FIGURE 5.12-6: MC EXPOSURE PATHWAY ANALYSIS ..... 5.12-15

FIGURE 5.13-1: ANTENNA DISH PARTIALLY OVERGROWN BY VEGETATION ..... 5.13-1

FIGURE 5.13-2: TEST AREA 1 IS CURRENTLY A WOODEN, OVERGROWN AREA 5.13-1

FIGURE 5.13-3: CURRENT STRUCTURES AT TEST AREA 1 USED IN THE ROBOTICS  
TESTING ..... 5.13-6

FIGURE 5.13-4: MEC EXPOSURE PATHWAY ANALYSIS..... 5.13-12

FIGURE 5.13-5: MC EXPOSURE PATHWAY ANALYSIS ..... 5.13-13

FIGURE 5.14-1: CURRENT CONDITIONS AT TEST AREA 2 – OFF -SET PVC TEST  
PORTS ..... 5.14-2

FIGURE 5.14-2: TEST EQUIPMENT AT TEST AREA 2 ..... 5.14-2

FIGURE 5.14-3: INTERMODAL STORAGE CONTAINERS ..... 5.14-3

FIGURE 5.14-4: STORED/STOCKPILED INERT ORDNANCE FOR ACTIVE TESTING  
MAGNETIC EQUIPMENT ..... 5.14-3

FIGURE 5.15-1: ARCHEOLOGICAL SITES WITHIN THE EASTERN MOST PORTION OF  
THE..... 5.15-3

FIGURE 5.15-2: ARCHEOLOGICAL SITES WITHIN THE CENTRAL PORTION OF THE  
VALLEY IMPACT AREA..... 5.15-4

FIGURE 5.15-3: ARCHEOLOGICAL SITES WITHIN THE SOUTHWESTERN TIP OF THE  
VALLEY IMPACT AREA..... 5.15-4

FIGURE 5.15-4: MEC EXPOSURE PATHWAY ANALYSIS..... 5.15-16

FIGURE 5.15-5: MC EXPOSURE PATHWAY ANALYSIS ..... 5.15-17

FIGURE 5.16-1: VEGETATION ON THE TORPEDO BURIAL SITE (LOOKING EAST  
DOWN THE UTILITY ROW)..... 5.16-2

FIGURE 5.16-2: SMALL TRIBUTARY THAT BISECTS THE TORPEDO BURIAL SITE  
(LOOKING SOUTH TOWARDS THE WETLANDS)..... 5.16-3

FIGURE 5.16-3: METALLIC DEBRIS SCATTERED AROUND SITE: MUNITIONS DEBRIS  
(LEFT); OLD METAL PLOW (RIGHT) ..... 5.16-4

FIGURE 5.16-4: 21-INCH TORPEDO CASING APPEARS TO BE DEMILITARIZED BY  
HOLE IN SIDE..... 5.16-5

FIGURE 5.16-5: WWII ERA TORPEDOES RESEMBLING THOSE ALLEGEDLY BURIED  
AT THIS RANGE..... 5.16-7

FIGURE 5.16-6: MEC EXPOSURE PATHWAY ANALYSIS..... 5.16-15

FIGURE 5.16-7: MC EXPOSURE PATHWAY ANALYSIS ..... 5.16-16

FIGURE 5.16-8: TORPEDO BURIAL SITE GRAPHICAL ILLUSTRATION ..... 5.16-17

FIGURE 5.17-1: THE TORPEDO CASING DISPOSAL AREA AND..... 5.17-4

FIGURE 5.17-2: MC EXPOSURE PATHWAY ANALYSIS ..... 5.17-13

**TABLES**

TABLE ES-1: SUMMARY OF OTHER THAN OPERATIONAL RANGES .....2

TABLE 2.2-1: TIMELINE OF HISTORICAL EVENTS AT NDW, INDIAN HEAD ..... 2-3

TABLE 3.8-1: SUMMARY OF KNOWN OR POTENTIAL PROTECTED SPECIES ..... 3-8

TABLE 4.2-1: NDW, INDIAN HEAD PERSONNEL INTERVIEWED DURING SITE VISITS4.2-4

TABLE 5.1-1 1998 AIR BLAST POND SOIL AND SEDIMENT RESULTS..... 5.1-16

TABLE 5.1-2: AIR BLAST POND BUILDING DESCRIPTIONS ..... 5.1-20

TABLE 5.1-3: CONCEPTUAL SITE MODEL INFORMATION PROFILES – AIR BLAST POND..... 5.1-22

TABLE 5.2-1: AREA 8 BUILDING DESCRIPTIONS..... 5.2-17

TABLE 5.2-2: CONCEPTUAL SITE MODEL INFORMATION PROFILES – AREA 8.. 5.2-20

TABLE 5.3-1: CONCEPTUAL SITE MODEL INFORMATION PROFILES – EOD SCHOOL DEMO AREA..... 5.3-9

TABLE 5.4-1 SUMMARY OF FORMER BUILDINGS/STRUCTURES LOCATED ON THE BASIC IED AREA. .... 5.4-12

TABLE 5.4-2: CONCEPTUAL SITE MODEL INFORMATION PROFILES – BASIC IED AREA..... 5.4-13

TABLE 5.5-1: CONCEPTUAL SITE MODEL INFORMATION PROFILES – ADVANCED IED AREA ..... 5.5-13

TABLE 5.6-1 MARINE RIFLE RANGE BUILDING DESCRIPTIONS ..... 5.6-15

TABLE 5.6-2: CONCEPTUAL SITE MODEL INFORMATION PROFILES – MARINE RIFLE RANGE..... 5.6-17

TABLE 5.7-1: CONCEPTUAL SITE MODEL INFORMATION PROFILES – OLD DEMOLITION RANGE..... 5.7-10

TABLE 5.8-1: CONCEPTUAL SITE MODEL INFORMATION PROFILES – OLD SKEET AND TRAP RANGE..... 5.8-8

TABLE 5.9-1: CONCEPTUAL SITE MODEL INFORMATION PROFILES – ROACH ROAD RIFLE RANGE..... 5.9-10

TABLE 5.10-1: CONCEPTUAL SITE MODEL INFORMATION PROFILES – RUM POINT SKEET RANGE ..... 5.10-13

TABLE 5.11-1: CONCEPTUAL SITE MODEL INFORMATION PROFILES – SMALL ARMS RANGE ..... 5.11-9

TABLE 5.12-1: CONCEPTUAL SITE MODEL INFORMATION PROFILES – STUMP NECK IMPACT AREA..... 5.12-9

TABLE 5.13-1: CONCEPTUAL SITE MODEL INFORMATION PROFILES – TEST AREA  
1..... 5.13-7

TABLE 5.14-1: CONCEPTUAL SITE MODEL INFORMATION PROFILES – TEST AREA 25.14-8

TABLE 5.15-1: CONCEPTUAL SITE MODEL INFORMATION PROFILES – THE VALLEY  
IMPACT AREA..... 5.15-10

TABLE 5.16-1: CONCEPTUAL SITE MODEL INFORMATION PROFILES – TORPEDO  
BURIAL SITE ..... 5.16-9

TABLE 5.17-1: CONCEPTUAL SITE MODEL INFORMATION PROFILES – TORPEDO  
CASING DISPOSAL AREA..... 5.17-8

## ACRONYMS

°F	Degrees Fahrenheit
µg/L	Micrograms per liter
AA&D	Advanced Access and Disablement
AOC	Area of Concern
BEHP	bis(2-ethylhexyl)phthalate
bgs	Below Ground Surface
BRAC	Base Realignment and Closure
CAP	Corrective Action Permit
CD	Compact Disc
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CSM	Conceptual Site Model
CWM	Chemical Warfare Materiel
DDESB	Department of Defense Explosive Safety Board
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
DU	Depleted Uranium
EFACHES	Engineering Field Activity Chesapeake
EFANE	Engineering Field Activity Northeast
EO	Explosive Ordnance
EOD	Explosive Ordnance Disposal
ft <sup>2</sup> /d	Feet squared per day
FUDS	Formerly Used Defense Site
FY	Fiscal Year
GIS	Geographic Information System
HMX	Cyclotetramethylenetetranitramine
IED	Improvised Explosive Device
IND	Improvised Nuclear Device
IOD	Inert Ordnance Disposal

**FINAL PRELIMINARY ASSESSMENT**

IR	Installation Restoration
ITRC	Interstate Technology and Regulatory Council
LANTDIV	Atlantic Division
MC	Munitions Constituents
MCB	Marine Corp Base
MCL	Maximum Contaminant Level
MEC	Munitions and Explosives of Concern
MMRP	Military Munitions Response Program
MRP	Munitions Response Program
MSL	Mean Sea Level
NAVEODTECHDIV	Naval Explosives Ordnance Disposal Technology Division
NAVFAC	Naval Facilities Engineering Command
NAVSEA	Naval Sea Systems Command
NAVSCOLEOD	Naval School, Explosive Ordnance Disposal
NCP	National Contingency Plan
NDW	Naval District Washington
NG	Nitroglycerine
NOL	Naval Ordnance Laboratory
OB/OD	Open Burning/Open Detonation
OE	Ordnance and Explosives
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychloryl Biphenyl
PETN	Pentaerythritol Tetranitrate
ppb	Parts per billion
ppm	Parts per million
RBC	Risk-Based Concentrations
RCRA	Resource Conservation Recovery Act
RDX	Hexahydro-Trinitro-Triazine
RFI	RCRA Facility Investigation
RG	Record Groups
RPM	Remedial Project Manager
SARA	Superfund Amendment and Reauthorization Act

**FINAL PRELIMINARY ASSESSMENT**

SDZ	Safety Danger Zone
SVOC	Semi-volatile Organic Compound
SWMU	Solid Waste Management Unit
TNT	2,4,6-trinitrotoluene
TPH	Total Petroleum Hydrocarbons
U.S.	United States
U.S.C.	United States Code
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
UXO	Unexploded Ordnance
VI	Verification Investigation
VIP	Very Important People
VOC	Volatile Organic Compound
WWII	World War II

## GLOSSARY OF TERMS

**Base Realignment and Closure (BRAC)** – A Department of Defense (DoD) program that focuses on compliance and cleanup efforts at military installations undergoing closure or re-alignment, as authorized by Congress in four rounds of base closures for 1988, 1991, 1993, and 1995. (Defense Environmental Restoration Program [DERP] Management Guidance, September 2001)

**Closed Range** – A range that has been taken out of service as a range and that either has been put to new uses that are incompatible with range activities or is not considered by the military to be a potential range area. A closed range is still under the control of a DoD component. (DERP Management Guidance, September 2001)

**Defense Site** – All locations that are or were owned by, leased to, or otherwise possessed or used by the DoD. The term does not include any operational range, operating storage or manufacturing facility, or facility that is used or was permitted for the treatment or disposal of military munitions. (10 United States Code [U.S.C] 2710(e)(1))

**Discarded Military Munitions** – Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include unexploded ordnance (UXO), military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of consistent with applicable environmental laws and regulations. (10 U.S.C. 2710(e)(2))

**Explosive Ordnance Disposal (EOD)** – The detection, identification, field evaluation, rendering-safe, recovery, and final disposal of UXO. It may also include the rendering-safe and/or disposal of explosive ordnance (EO) that has become hazardous by damage or deterioration when disposal of such EO requires techniques, procedures, or equipment that exceed the normal requirements for routine disposal. (OPNAVINST 8027.1G, 14 Feb 92)

**Explosives Safety** – A condition where operational capability and readiness, personnel, property, and the environment are protected from the unacceptable effects of an ammunition or explosives mishap. (DoD Directive 6055.9 July 1996)

**Formerly Used Defense Site (FUDS)** – Real property that was formerly owned by, leased by, possessed by, or otherwise under the jurisdiction of the Secretary of Defense or the components (including governmental entities that are the legal predecessors of DoD or the components) and those real properties where accountability rested with DoD but where activities at the property were conducted by contractors (i.e., government-owned, contractor-operated [GOCO] properties) that were transferred from DoD control prior to October 17, 1986. The status of a range as a FUDS is irrespective of current ownership or current responsibility within the federal government. (DERP Management Guidance, September 2001)

**Munitions Constituents (MC)** – Any materials originating from UXO, discarded military munitions or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions. (10 U.S.C. 2710 (e)(4))

**Munitions and Explosives of Concern (MEC)** – This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks, means: unexploded ordnance, discarded military munitions or munitions constituents (e.g., TNT, RDX) present in high enough concentrations to pose an explosive hazard. (OUSD(AT&L) 18 December 2003)

**Operational Range** – A range that is under the jurisdiction, custody, or control of the Secretary of Defense and that is used for range activities, or although not currently being used for range activities, that is still considered by the Secretary to be a range and has not been put to a new use that is incompatible with range activities. (10 U.S.C. 101 (e)(3))

**Other than Operational Range** – Encompasses closed, transferred and transferring ranges.

**Range** – A designated land or water area set aside, managed, and used for range activities of the DoD. Ranges include firing lines and positions, maneuver areas, firing lanes, test pads, detonation pads, impact areas, electronic scoring sites, buffer zones with restricted access and exclusionary areas, and airspace areas designated for military use in accordance with regulations and

procedures prescribed by the Administrator of the Federal Aviation Administration. (10 U.S.C. 101 (e)(3))

**Transferred Range** – A property formerly used as a military range that is no longer under military control and had been leased by the DoD, transferred, or returned from the DoD to another entity, including federal entities. This includes a range that is no longer under military control but was used under the terms of a withdrawal, executive order, special-use permit or authorization, right-of-way, public land order, or other instrument issued by the federal land manager. (DERP Management Guidance, September 2001)

**Transferring Range** – A range that is proposed to be transferred or returned from the DoD to another entity, including federal entities. This includes a range that is used under the terms of a withdrawal, executive order, act of Congress, special-use permit or authorization, right-of-way, public land order, or other instrument issued by the federal land manager or property owner. An operational or closed range will not be considered a “transferring range” until the transfer is imminent. (DERP Management Guidance, September 2001)

**Unexploded Ordnance (UXO)** – Military munitions that have been primed, fused, armed, or otherwise prepared for action; have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and remain unexploded either by malfunction, design, or any other cause. (10 U.S.C. 101(e)(5))

## **EXECUTIVE SUMMARY**

The Department of Defense (DoD) has established the Military Munitions Response Program under the Defense Environmental Restoration Program to address munitions and explosives of concern (MEC) [including unexploded ordnance (UXO) and discarded military munitions (DMM)] and munitions constituents (MC) at other than operational ranges and other sites. Closed, transferred, and transferring military ranges and sites not located on an operational range are considered other than operational. This report addresses other than operational ranges and sites at an active installation. It may include transferred and/or transferring ranges and munitions disposal sites associated with an active installation, if they are not included in a Base Realignment and Closure site or a Formerly Used Defense Site.

This report presents a Preliminary Assessment (PA) for the other than operational ranges at the Naval District Washington (NDW), Indian Head Stump Neck Annex, Maryland. PAs for other than operational ranges at the NDW, Indian Head Main Installation are addressed in a separate report. The DoD, Navy, and United States (U.S.) Environmental Protection Agency guidance for conducting and documenting PAs was followed and tailored where appropriate, to address the unique aspects of MEC and MC. This PA is limited by visual survey range inspections and a review of readily available information sources. By definition, PAs do not include intrusive work such as environmental sampling.

NDW, Indian Head is located in northwestern Charles County, Maryland approximately 25 miles southwest of Washington, D.C. The 1,100-acre Stump Neck Annex, a part of NDW, Indian Head, is a peninsula located at the confluence of the Potomac River and the Chicamuxen Creek. The Stump Neck Annex was acquired by the Navy in 1901 to support the growing activities of the Main Installation. It is not contiguous to the 2,300-acre Main Installation. The Main Installation and the Stump Neck Annex are separated by the Mattawoman Creek.

This PA Report includes seventeen other than operational ranges at the Stump Neck Annex. Table ES-1 provides a summary of the Stump Neck Annex other than operational ranges.

Table ES-1: Summary of Other Than Operational Ranges				
Site Name <sup>a</sup>	NORM Site No.	Size (acres)	Use <sup>b</sup>	Dates of Use
Air Blast Pond	UXO 000001	3.72	Testing of bulk explosives	1955-1975
Area 8	UXO 000002	22.61	Training on and defusing of explosive devices	1957-1998
EOD School Demo Area	UXO 000028	4.64	Demolition Area	1940s-1950s
Basic IED Area	UXO 000004	3.79	Training and demonstration of IEDs	1957-1996
Advanced IED Area	UXO 000005	10.07	Training and demonstration of IEDs	1968-1995
Marine Rifle Range	UXO 000014	30.44	Rifle range	1911-1918
Old Demolition Range	UXO 000007	1.70	OB/OD	Unknown - 1960s
Old Skeet and Trap Range	UXO 000015	29.33	Skeet and trap range	1966-1991
Roach Road Rifle Range	UXO 000025	0.27	Rifle Range	1967-1980s
Rum Point Skeet Range	UXO 000016	33.45	Skeet and trap range	1991-2001
Small Arms (Pistol) Range	UXO 000017	2.41	Pistol range	Mid 1980s - 1991
Stump Neck Impact Area	UXO 000010	32.88	Impact area	1891-1940
Test Area 1	UXO 000021	4.52	Communication experiments, AA&D training, IED/IND training, robotics testing	1950-1990s
Test Area 2	UXO 000022	3.66	Potential testing of bulk high explosives	Unknown - 1978
The Valley Impact Area	UXO 000026	694	Safety Danger Zone (SDZ)	1891 - 1921
Torpedo Burial Site	UXO 000012	0.88	Burial of torpedoes	Late 1940s – Early 1950s
Torpedo Casing Disposal Area	UXO 000023	0.74	Burial of torpedo casings	1950s

Notes:

- a. EOD – Explosive ordnance disposal  
IED – Improvised explosive device
- b. OB/OD – Open burning/open detonation  
AA&D – Advanced access and disablement  
IND – Improvised nuclear device

**Air Blast Pond** – The Air Blast Pond is a 3.72-acre area located in the central portion of the Stump Neck Annex, south of Archer Avenue. The Air Blast Pond was reportedly used by the Naval Ordnance Laboratory for testing bulk high explosives from 1955 to 1975. The range is currently inactive and the land remains undeveloped. The Air Blast Pond is also identified as Solid Waste Management Unit (SWMU) #6 and the Installation Restoration (IR) Site #62 in the NDW, Indian Head Resource Conservation Recovery Act (RCRA) and IR programs, respectively. During the visual survey, an end cap for a C-4 block and a 57mm projectile were observed on the berm of the pond. There were also several rusted metal pipes standing upright on the earthen floor of the pit, and metal pipes were exposed in the berm.

**Area 8** – Area 8 is a 22.61-acre area located on the central portion of the Stump Neck Annex off of Roach Road. Area 8 was used from 1957 to 1999 to train military personnel to defuse explosive devices. The area is currently in use by the Joint Services EOD Equipment Magnetic Evaluation Facility. Area 8 is also identified as SWMU#25 and IR Site #63 in the NDW, Indian Head RCRA and IR programs, respectively. No evidence of explosives or MEC was observed during the visual survey.

**EOD School Demolition Area** – The EOD School Demolition Area is approximately 5-acres located in the central portion of Stump Neck Annex, south of Archer Ave. The site is adjacent to the Marine Rifle Range and the Torpedo Burial Site. The EOD School Demolition Area was in use from approximately 1944 to 1949. The site was used as a demonstration area to introduce graduating students to live explosives. The area is currently an unused, open field surrounded by hardwood forest. No evidence of MEC was observed during the visual survey.

**Basic IED Area** – The Basic Improvised Explosive Devices (IED) Area is a 3.79-acre area identified during the U.S. Navy's Range Inventory. The Basic IED Area is located in the western-central portion of Stump Neck Annex. The site was in use from 1957 until approximately 1996. The Basic IED Area was formerly used as a training, testing, and demonstration range for various explosive devices and chemicals. There are several potential areas of concern including: former Building 2158 (the bleachers); former Building 2118 (chemical mixing); former Building 2063 (observation area); two former unnamed storage buildings; the Incendiary Demonstration Area; and the Detonation Demonstration Area. The only building/structure remaining on the range is Building 2087, which was used for offices. The range is currently unused. No evidence of MEC or MC was observed during the visual survey.

**Advanced IED Area** – The Advanced IED Area was identified as the Inert Ordnance Devices (IOD) Site during the U.S. Navy’s Range Inventory. The Advanced IED Area is a 10.07-acre range located on the western-central portion of Stump Neck Annex. It straddles Archer Avenue with Parker Road running down the center of the Advanced IED Area. Based on information reviewed, the Advanced IED Area was part of the EOD School’s Division II Area 1A. The EOD School was responsible for teaching all practical training in dropped/projected munitions and clandestine devices from as late as 1968 until approximately 1995. The use of this area prior to 1968 has not been confirmed. Currently, the Advanced IED Area is an unused parcel, and all of the buildings once located adjacent to the parcel have been demolished. Various types of MEC and MEC Debris items were observed during the visual survey, both on the ground near to and within the concrete bunker.

**Marine Rifle Range** – The 30.44-acre Marine Rifle Range is located on the central portion of the Stump Neck Annex, south of Archer Avenue. The Marine Rifle Range was used by the Marines from approximately 1911 to 1918 for rifle, and possibly pistol, training. The western portion of the range is developed with offices and storage. The remainder of the range is mostly undeveloped, with few buildings. Numerous pieces of metallic and wood debris were identified in the woods during the visual survey. The metallic debris was determined non-ordnance or munition related. No ordnance, MEC, or related debris were observed during the range visit.

**Old Demolition Range** – The 1.70-acre Old Demolition Area is located in the western portion of Stump Neck Annex, along the shore of the Chicamuxen Creek. It was used for OB/OD of bulk propellant, bulk high explosives, demolition charges, primers, detonators, fuzes, and squibs. An expended Smokey Sam was discovered adjacent to the range during the visual inspection; however, the source of the Smokey Sam is unknown. Dates of exact use are not known, but historical documents state that it was used for “many years prior to 1962”. The central portion is mainly open grass field, with a small developed portion (Building 2107). Currently, the area is an active Hypervelocity Testing Area (Range 2).

**Old Skeet and Trap Range** – The Old Skeet and Trap Range is located in the north central portion of Stump Neck Annex, north of Archer Avenue and south of the Potomac River. The Old Skeet and Trap Range comprises approximately 29.33 acres. The range was constructed between 1967 and 1972, and was operational through June 1991. The skeet range was used for

recreational purposes. Clay pigeons were used as targets. The range is currently used for recreation and contains a helicopter pad. No ordnance, MEC, or related debris were observed during the visual survey. There were no physical indications of where the firing points were located.

**Roach Road Rifle Range** – The Roach Road Rifle Range is approximately 0.3-acres located in the central portion of Stump Neck Annex northwest of Roach Road. The site was formerly used for small arms training from 1963 to 1986. Based on interviews and historical maps, small bore rifle and pistols were used at the site. The site is currently undeveloped and covered with vegetation. During the visual survey, construction related debris including old concrete pipes and old telephone poles were observed in the central portion of the range immediately north of Roach Road. No evidence of MEC was found during the visual survey.

**Rum Point Skeet Range** – The Rum Point Skeet Range is 33.5 acres located on the northeast section of Stump Neck Annex. The Rum Point Skeet Range was constructed and became operational in 1991 as part of the Morale, Welfare, and Recreation program. It was used almost exclusively by the Potomac River Gun Club until its closure in 2001. One empty shotgun shell and several clay targets were found during the visual survey. The area has two skeet ranges side-by-side that are separated by a wooden fence. The range is well maintained, including the low, trap, and high houses. Building 2153 was previously used as the Potomac River Gun Club's headquarters. The site is currently not in use.

**Small Arms Range (Pistol Range)** – The Small Arms Range (Pistol Range) is 2.41-acres and is located at the far eastern side of the Stump Neck peninsula. Navy personnel used this range for training and qualifying activities from the mid 1980s until 1991 when the range was closed due to its proximity to the General Smallwood State Park. Based on available records and historical maps, the Small Arms Range was undeveloped and unused prior to its use as a small arms range. It is reported that after the cessation of range activities, silver-contaminated soil was buried at the Small Arms Range. The Small Arms Range is a SWMU Area of Concern pending additional investigation (identified as Stump Neck SWMU #29 – Pistol Range). Evidence of the former range was observed during the visual survey, including three firing lines and target boards. Concrete walkways, a small wooden shack, and wooden stands were also observed at the Small Arms Range. Currently, the Small Arms Range is an open, unused field.

**Stump Neck Impact Area** – The Stump Neck Impact Area is a 32.88-acre marshland impact area located in the central portion of the Stump Neck Annex, about 200 meters south of Archer Road and surrounded by Chicamuxen Creek. The range is believed to have been used as a target area for the testing of rockets and projectiles fired from The Valley (1891-1921) and Marine Corp Base Quantico (1931-1940). The range is undeveloped and is protected by the Wetlands Protection Act. No MEC or MC was identified during the visual survey.

**Test Area 1** – Test Area 1, which comprises approximately 4.52-acres, is located near the center of the Stump Neck Annex peninsula. In the 1950s, the Naval Research Laboratory (NRL) constructed a 220-foot by 263-foot “hole-in-the-ground” antenna at the range that was used in pioneer moon relay communication experiments to transmit shore-to-ship radio signals. During the 1960s and 1970s, Test Area 1 was used for Advanced Access and Disablement (AA&D) trainings (such as booby traps and trip wires). In the 1980s, Test Area 1 was used for IED and IND training. From the 1990s to the present, Test Area 1 has been used primarily as an area for various robotics testing. Several small wooden structures used for the current robotics testing are located to the north of the antenna. There were no physical indications of MEC observed during the visual survey.

**Test Area 2** – Test Area 2 is a 3.66-acre parcel located in the southern central portion of the Stump Neck Annex of NDW, Indian Head, off an unnamed dirt road extending from the southern side of Old Range Road. Test Area 2 was reportedly used for testing bulk high explosives (primary/initiating). No dates of use or information confirming this use were found during this PA. Test Area 2 has been used as a Non-Explosive Magnetic Test Range since 1978. The only ordnance observed during the visual survey was documented inert ordnance actively used to test the magnetic equipment.

**The Valley Impact Area** – The Valley Impact Area is approximately 694 acres and covers the majority of the western portion of the Stump Neck Annex. The acreage for The Valley Impact Area excludes areas covered by other MRP sites. This site was land portion of the SDZ for the gun proving site at The Valley on Main Installation from 1891 through 1921. Fire was also received from a MCB Quantico range established in the vicinity of Rum Point. Other PA sites located within the boundary of The Valley Impact Area include Old Demolition Range, Advanced IED Area, Basic IED Area, Marine Rifle Range, Air Blast Pond, Stump Neck Impact Area, Old Skeet and Trap Range, Torpedo Burial Site, Sonar Training Area, EOD School Demo

Area. During the visual survey, MEC was observed along the western shoreline of the site; however, the MEC was attributed to the active Range 6 located nearby. No additional MEC attributable to The Valley Impact Area was observed.

**Torpedo Burial Site** – The Torpedo Burial Site is a 0.88-acre area located in a wooded area in the north-central portion of the Stump Neck Annex, about 100 meters south of Building 2075. This location was allegedly used in the late 1940s and early 1950s as a burial range for torpedo waste material. A 21-inch torpedo shell section was found at this location during a visual survey. The range is undeveloped and is used for recreational activities only.

**Torpedo Casing Disposal Area** – The Torpedo Casing Disposal Area is a 0.74 acre area located in the central portion of Stump Neck Annex. The Torpedo Casing Disposal Area was used as a disposal range for torpedo casings during the 1950s. The exact dates of use are unknown. The depth or number of torpedo casings buried is also unknown. The torpedo casings may have originated from training at the EOD School or from use during World War II. The range overlaps a wildlife-protected area, which was converted from a firebreak in 1981. The range is currently unused by the installation. No evidence of MEC was observed during the visual survey.

## 1. INTRODUCTION

The Department of Defense (DoD) has established the Military Munitions Response Program under the Defense Environmental Restoration Program (DERP) to address munitions and explosives of concern (MEC) (including unexploded ordnance [UXO] and discarded military munitions) and munitions constituents (MC) at other than operational military ranges and other sites. Closed, transferred, and transferring military ranges and sites not located on an operational range are considered other than operational. This report addresses other than operational ranges and sites at an active installation. It may include transferring and/or transferred ranges and munitions disposal sites associated with an active installation if they are not included in a Base Realignment and Closure site or a Formerly Used Defense Site.

The DoD and the United States (U.S.) Navy (Navy) are currently establishing policy and guidance for munitions response actions under the Navy Munitions Response Program (MRP). However, key program drivers developed to date conclude that munitions response actions will be conducted under the process outlined in the National Contingency Plan (40 Code of Federal Regulations [CFR] 300) (NCP) as authorized by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, (42 United States Code [U.S.C.] 9605), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), Pub. L. 99-499, (hereinafter referred to as CERCLA).

This report presents a Preliminary Assessment (PA) for the other than operational ranges at the Stump Neck Annex of Naval District Washington (NDW)<sup>1</sup>, located in Indian Head, Charles County, Maryland. DoD, Navy, and U.S. Environmental Protection Agency (USEPA) guidance for conducting and documenting PAs were followed and tailored, where appropriate, to address the unique aspects of MEC and MC.

This PA Report is organized into the following sections:

- Section 1 – Introduction
- Section 2 – Installation Background

---

<sup>1</sup> *On 1 October 2003, the installation management functions at Indian Head transferred from Naval Surface Warfare Center – Indian Head Division to Naval District Washington. References to this installation will now be Naval District Washington, Indian Head (NDW, IH).*

- Section 3 – Physical and Environmental Characteristics
- Section 4 – Summary of Data Collection Effort
- Section 5 – Site Characteristics

The following supporting information is appended to this PA:

- References (Appendix A)
- Project Source Data – General (Appendix B)
- Project Source Data – Site Specific (Appendix C)
- Ordnance Technical Data Sheets (Appendix D)

An interactive compact disc (CD) report for NDW, Indian Head, Stump Neck Annex will be included with the final version of this report. The CD will include electronic files of the report text, tables, and figures; appendices; project source data; additional range photographs; and interactive maps of the installation and ranges.

### **1.1. Purpose**

This PA considers the history of munitions use for the following seventeen former ranges at the Stump Neck Annex:

- Air Blast Pond
- Area 8
- EOD School Demolition Area
- Basic IED Area
- Advanced IED Area
- Marine Rifle Range
- Old Demolition Range
- Old Skeet and Trap Range
- Roach Road Rifle Range
- Rum Point Skeet Range
- Small Arms (Pistol) Range
- Stump Neck Impact Area
- Test Area 1
- Test Area 2
- The Valley Impact Area
- Torpedo Burial Site
- Torpedo Casing Disposal Area

The PA provides an assessment of the current conditions with respect to MEC and MC based on a non-intrusive survey. The PA provides the necessary information for Navy and regulatory decision-makers to 1) eliminate from further consideration those MEC sites that pose minimal or no threat to public health or the environment; 2) differentiate MEC sites that may not require further munitions response actions from those that will require further investigation and/or

munitions response actions; 3) determine if an imminent explosives safety hazard from MEC is present that warrants an accelerated response action; and 4) determine if, from MC, an imminent hazard to human health or the environment is present and warrants an accelerated response action.

## **1.2. Programmatic Framework**

The regulatory structure for managing Navy MRP sites is guided by a series of federal, state, and local laws, as well as DoD and Navy regulations and guidance, and provides the necessary information for Navy decision makers to properly manage its facilities. The key legislation, policy, and guidance directing the program includes, but is not limited to, the following:

### **Defense Environmental Restoration Program (DERP) Management Guidance (September 2001)**

The DERP Management Guidance establishes a MRP element for MEC and MC defense sites. The history of DERP dates back to the Superfund Amendments and Reauthorization Act (SARA) of 1986<sup>2</sup>. The scope of the DERP is defined in 10 U.S.C. §2701(b), which states that the: Goals of the program shall include the following: "... (1) The identification, investigation, research and development, and cleanup of contamination from hazardous substances, and pollutants and contaminants. (2) Correction of other environmental damage (such as detection and disposal of unexploded ordnance) which creates an imminent and substantial endangerment to the public health or welfare or to the environment ..."

### **Draft DoD Directive Military Munitions Response Policy on Other Than Operational Ranges**

The Draft DoD Directive 4715.MRP (September 2003 version) states that munitions response will be conducted "in accordance with CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP)".

---

<sup>2</sup> SARA was signed into law on October 17, 1986, and CERCLA of 1980, 42 U.S.C. §9601 et seq. Related sections in Title 10 of the U.S.C. (10 U.S.C. §§2702-2710 and §§2810-2811) further define the program.

### **National Defense Authorization Act (FY02) (Sections 311-312)**

Sections 311-312 of the National Defense Authorization Act of FY02 reinforced the DoD's 2001 DERP Management Guidance by tasking the DoD to develop and maintain an inventory of defense sites that are known or suspected to contain MEC and/or MC. Section 311 requires the DoD to develop a protocol for prioritizing defense sites for response activities in consultation with the states and Tribes. Section 312 requires the DoD to create a separate program element to ensure that the DoD can identify and track munitions response funding.

The September 2001 Management Guidance for the DERP and the Defense Authorization Act 2002, described above, established the MRP. The DoD provides program guidance and methods for conducting a baseline inventory of defense sites containing, or potentially containing, MEC and/or MC. The Navy baseline inventory of sites was completed in FY02 and was used to establish the sites where PAs are needed to further evaluate the potential for MEC and MC.

### **1.3. Project Management**

This PA has been coordinated and managed by the Navy Engineering Field Activity Northeast (EFANE), a component of the Atlantic Division (LANTDIV) of the Naval Facilities Engineering Command (NAVFAC). The EFANE performs engineering functions for Navy installations throughout the northeast U.S. and is the Program Manager for this PA. Malcolm Pirnie, Inc. has been contracted by EFANE to prepare this PA. The Navy Remedial Project Manager (RPM) from Naval Facilities Washington<sup>3</sup> (NAVFAC Washington) and the installation point of contact for NDW, Indian Head provided valuable information and assistance throughout the PA data collection process.

### **1.4. Preliminary Assessment Approach**

CERCLA implementing guidance, which was prepared for sites contaminated with hazardous substances, describes the PA as a limited-scope investigation based upon existing and available data. However, the guidance also states that the PA process developed under CERCLA is not equally applicable to all sites and all contaminants and that variation from the guidance may be necessary. Sites containing MEC are prime examples of sites where the CERCLA process does

---

<sup>3</sup> On July 23, 2004 Engineering Field Activity Chesapeake (EFACHES) was decommissioned and is now part of Naval District Washington (NAVFAC Washington).

## FINAL PRELIMINARY ASSESSMENT

not fully address potential environmental and safety issues that may be present at a range. Unique explosives safety issues associated with MEC cannot be assessed solely with the parameters developed for chemical and hazardous waste contaminants. While this PA generally follows CERCLA guidance, certain elements of the report have been tailored to address the unique explosives safety aspects of MEC.

The PA process for each range involves collecting and reviewing available information regarding the range. Data collection activities included on and off-range research and interviews. They also included a visual survey to observe physical evidence that might indicate presence of MEC (e.g., discarded munitions items, ordnance penetration holes, scarred trees) and MC (e.g., ground scarring, stressed vegetation, and chemical residue). The Malcolm Pirnie data collection team conducted the on-range portion of the data collection and visual survey during four multi-day range visits: June 23-27, 2003; November 17-21, 2003; December 1-2, 2003; and June 2-4, 2004. The substantial field time and multiple visits were required due to the large number of sites and potentially available data sources.

This PA is inclusive and makes use of readily available data relating to munitions use at the NDW, Indian Head, including historical records, field data, anecdotal evidence, interviews with range personnel, and professional knowledge and experience. It is based, in part, on information provided in documents referenced in Appendix A and is subject to the limitations and qualifications presented in the referenced documents.

## 2. INSTALLATION BACKGROUND

The following sections provide general information about NDW, Indian Head, Stump Neck Annex, including its location and setting; a brief history of the installation; its missions over time; and a history of munitions related training, storage, and usage.

### 2.1. Location and Setting

The location of Stump Neck Annex and the other than operational ranges subject to this PA are shown on Map 2.3-1 and Map 2.3-2. The Stump Neck Annex covers approximately 1,100 acres in Charles County Maryland. The Stump Neck peninsula is located at the confluence of the Potomac River and Chicamuxen Creek. The Main Installation lies to the north of the Stump Neck Annex, across the Mattawoman Creek. General Smallwood State Park and private property lie east of the Stump Neck Annex. The proximity of the town of Indian Head to the Maryland 210 corridor and wildlife management areas makes the area a destination for outdoors enthusiasts including boaters, hunters, and fisherman.

The NDW, Indian Head population breakdown is as follows:

- Civilian: 2,200
- Military: 500
- Contractor: 800
- Dependents: 550

The 2000 U.S. Census Bureau Statistics indicate 3,422 residents for the town of Indian Head and 120,546 residents for all of Charles County.

### 2.2. Installation History

Established in 1890, NDW, Indian Head is the Navy's oldest ordnance station. Throughout its long and distinguished history, the facility has proved guns, armor and propellants, developed and manufactured powder and propellants and is recognized as a leader in energetics research and development. Shortly after operations commenced, additional property was acquired by the Navy to increase the size of the installation. The most notable acquisition was of Stump Neck Annex as

an impact area and safety buffer in 1901. The Main Installation and Stump Neck Annex have had separate and joint missions. Therefore, from a historical perspective, these sites are discussed together.

With the opening of the nearby Dahlgren Naval Proving Ground in the early 1930s, the primary focus of Indian Head turned to powder manufacturing. Additional acquisition and improvement to the installation continued through the 1960s to increase operational capacity and safety buffers required for the manufacture, testing and storage of energetic materials.

Stump Neck Annex has played a key role in the development of EOD research and training. In 1941, Stump Neck Annex was chosen as an isolated location for the practical instruction syllabus associated with the Navy's Advanced Mine School in Washington, D.C. The remote location and proximity to the new Explosives Investigation Laboratory (Main Installation) made Stump Neck an ideal choice.

Shortly thereafter, the requirements for "bomb disposal", ordnance demilitarization (enemy and allied) and reverse engineering of foreign ordnance grew increasingly important, mainly due to World War II (WWII). The newly formed EOD unit at Stump Neck Annex, responsible for these tasks had grown to where individual EOD detachments could be deployed for mission support. Stump Neck Annex could then be used to support the powder plant, as well as a school for EOD officers and enlisted personnel. In 1953, the Naval EOD Technical Center was formed at the Stump Neck Annex with the purpose of training EOD personnel in all service branches. The training function was renamed the Naval School, Explosive Ordnance Disposal (NAVSCOLEOD). In 1993, the Naval EOD Technical Center was renamed the Naval Explosive Ordnance Disposal Technical Division (NAVEODTECHDIV), a division of the newly established Naval Ordnance Center. The NAVEODTECHDIV was operated until 1999, at which time it was relocated to Eglin Air Force Base, Florida. Stump Neck Annex is home of the IED School where research is conducted on render safe technologies for items encountered in hostile situations by law enforcement and security personnel. EOD Technology Division is a tenant of Stump Neck Annex. Their mission is to utilize technology in order to develop and deliver EOD information, tool, equipment, and to meet the needs of Joint Services EOD operating forces and other customers.

In recent decades, NDW, Indian Head has come to be known as a center of excellence in the development and manufacture of specialized energetic materials used in demolition and propulsion. Now under the direction of the Naval Sea Systems Command (NAVSEA), the current mission of NDW, Indian Head is to:

- Provide services in energetics for all warfare centers through engineering, fleet and operational support, manufacturing technology, limited production, and industrial base support.
- Provide research, development, testing and evaluation of energetic materials, ordnance devices and components, and other engineering standards including chemicals, propellants, propulsion systems, explosives, pyrotechnics, warheads and simulators.
- Provide support to all warfare centers, military departments and the ordnance industry for special weapons, explosives safety and ordnance environmental issues.

Table 2.2-1 summarizes the key milestones in the history of NDW, Indian Head.

**Table 2.2-1: Timeline of Historical Events at NDW, Indian Head**

Time Period	NDW, Indian Head Milestones
1890 - 1900	<ul style="list-style-type: none"> <li>• Constructed on 659 acres on Cornwallis Neck in 1890 as the <i>Naval Proving Ground</i> to test guns, armor, shells and mounts.</li> <li>• Within one year, added the 222.75-acre Mount Pleasant Farm.</li> </ul>
1900 - 1910	<ul style="list-style-type: none"> <li>• Factory constructed for smokeless powder production.</li> <li>• Stump Neck Annex property purchased in 1901 to extend firing range.</li> </ul>
1910 -1920	<ul style="list-style-type: none"> <li>• Work gradually moved from proving of guns and armor to include standardization of shells and powder.</li> <li>• Acquired 1,160 acres of land adjacent to the Main Installation in 1918.</li> <li>• 161 acres acquired for a railroad right-of-way running from the Naval Proving Ground to the Pennsylvania Railroad junction at White Plains, Maryland; 13.8-mile railroad spur constructed.</li> </ul>
1920 – 1940	<ul style="list-style-type: none"> <li>• Mission gradually shifted from a Naval gun proving ground to a chemical factory, research laboratory and an Explosive D factory.</li> <li>• Facility changed name to the <i>Naval Powder Factory</i>.</li> <li>• All proving ground activities were moved to Dahlgren, Virginia.</li> </ul>
1940 – 1950	<ul style="list-style-type: none"> <li>• Navy established <i>Explosives Investigation Laboratory</i> where extensive examination of captured enemy ordnance was performed.</li> <li>• Practical applications for the EOD School moved from Washington, D.C. to Stump Neck Annex.</li> <li>• Joint forces EOD School led by Navy formed in 1947.</li> <li>• Propellant research and development added to installation mission.</li> <li>• Jet Propulsion Research Lab founded (1940-1944).</li> </ul>
1950 – 1960	<ul style="list-style-type: none"> <li>• Facility changed its name to the <i>Naval Propellant Plant</i>.</li> <li>• Research and development on the Polaris and other rocket programs</li> </ul>

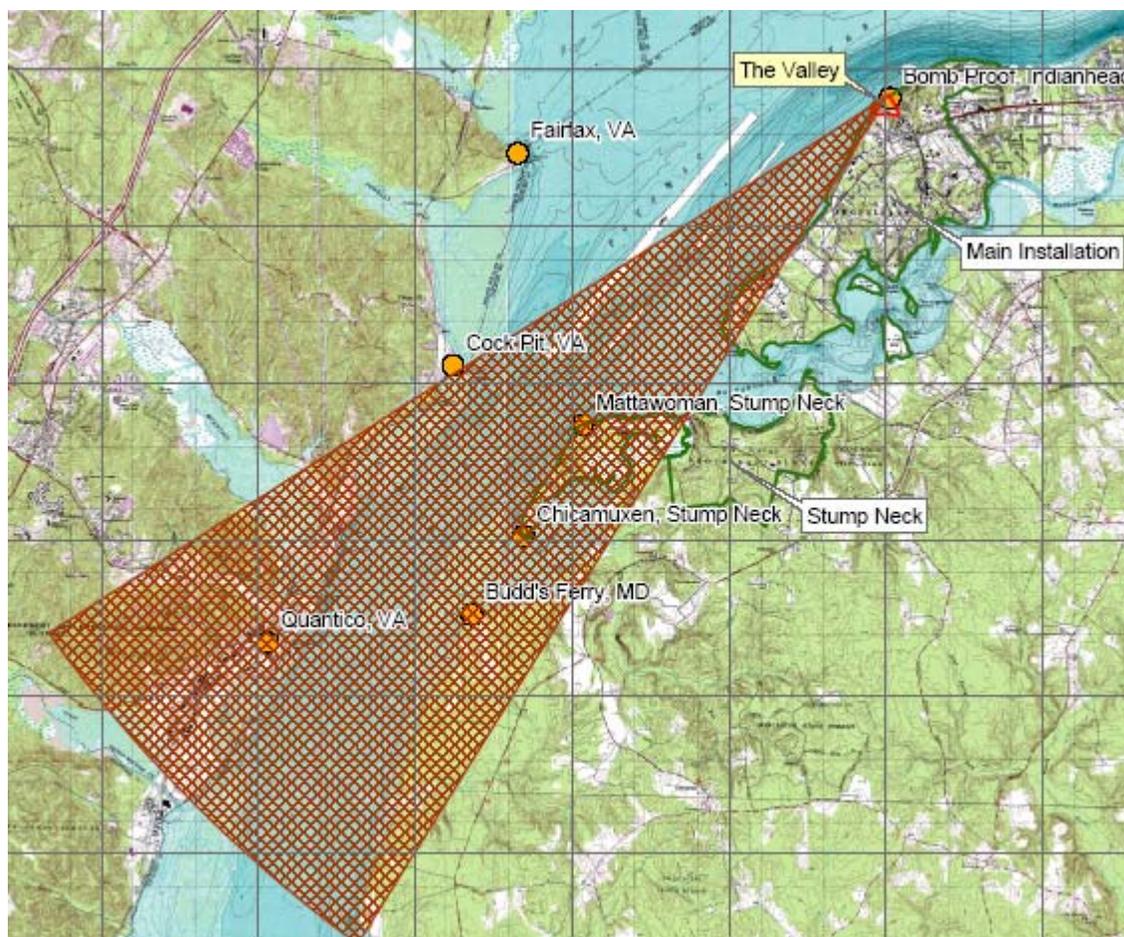
Time Period	NDW, Indian Head Milestones
	began.
1960 – 1980	<ul style="list-style-type: none"> <li>• Rum Point, an 80-acre promontory on the Mattawoman Creek, was acquired by condemnation in 1966.</li> <li>• Bullets Neck, a separate 47-acre promontory in the Mattawoman Creek, was purchased in five small acquisitions (1965-1966).</li> <li>• The Naval Propellant Plant changed its name to the <i>Naval Ordnance Station</i> to reflect the diversification from propellants into related fields of chemistry, engineering, and production contract management.</li> </ul>
1980 - 1990	<ul style="list-style-type: none"> <li>• Full-scale production at the Naval Ordnance Station concentrated on several processes/products too unprofitable, too dangerous, or too difficult for the private sector to manufacture.</li> <li>• The Naval Ordnance Station became the center of excellence for the following technologies: guns, rockets and missiles; energetic chemicals; ordnance devices; missile weapon simulators; explosive process development engineering; and explosive safety, occupational safety and health, and environmental protection.</li> </ul>
1990 - present	<ul style="list-style-type: none"> <li>• EOD School on Stump Neck was closed in 1999.</li> <li>• Currently, the mission of the NDW, Indian Head is to ensure operational readiness of U.S. and allied forces by providing the full spectrum technical capabilities necessary to rapidly move any “energetics” product from concept through production to operational deployment.</li> </ul>

### 2.3. Munitions Related Training / Storage / Usage

This section is limited to the sites that are the subject of this assessment. Current storage near any of the sites is not addressed for security concerns. Based on the historical account provided, it is evident that munitions training, storage and use have been extensive over the operational history of the Stump Neck Annex. Ordnance items accounted for include mines, torpedoes, rockets, missiles, small arms, mortars, grenades, bombs, Naval guns, explosives and their byproducts from testing.

As illustrated in Figure 2.3-1, the western portion of the Stump Neck peninsula was within the estimated firing fan for The Valley site located adjacent to the Potomac River on the northwest portion of NDW, Indian Head Main Installation. The Valley is a 21-acre site that was used for developing and testing numerous ordnance items from 1891 through 1921. According to historical documentation, practically all forms of Naval ordnance used from the 1890s until the 1920s had been tested and/or developed at The Valley. Thus, there is a potential for munitions associated with The Valley to be present in the areas within the estimated limits of this firing fan. Refer to Section 5.7 in the PA Report for the NDW, Indian Head Main Installation for a more

detailed description of the activities. Information on The Valley will also be provided in this PA report under Section 5.15, The Valley Impact Area.



**Figure 2.3-1: The Valley Firing Fan**

A brief description of the usage of each of the seventeen other than operational ranges that are the subject of this PA is provided below. Note that information for the MEC and/or MC related to The Valley firing fan has not been repeated in these sections.

**Air Blast Pond** – Air Blast Pond is 3.72-acres located on the central portion of the Stump Neck Annex south of Archer Avenue. The Naval Ordnance Laboratory (NOL) used the Air Blast Pond for testing bulk high explosives from 1955 to 1975. The bulk explosives were suspended over a water filled man-made earthen pit approximately 100 feet in diameter, and repercussion factors in the water were measured. Potential MC related materials include Pentolite, HBX-1, HBX-2, H-6, and C4. The Air Blast Pond is located within the estimated firing fan from The Valley.

**Area 8** – Area 8 is 22.61-acres located on the central portion of the Stump Neck Annex off of Roach Road. Area 8 was operational from 1957 until 1998 for testing demolition charges: primers, detonators, fuzes and squibs. Numerous water and air shot locations and a pond were used to train military personnel to defuse explosive devices. Potential MC related materials include TNT, PETN, and military dynamite. There is a potential for MEC (inert mines and/or torpedoes) to remain at the range.

**EOD School Demolition Area** – The EOD School Demolition Area is approximately 5-acres. The site is located in the central portion of the Stump Neck Annex immediately adjacent to the Marine Rifle Range and the Torpedo Burial Site. The site was used as a demonstration area from September 1944 until approximately June 1949 to introduce students to live explosives. Student would observe demonstrations with blocks of TNT, Tetryl packs, caps, primer cord, safety fuse, shape charges and live bombs. Munitions constituents potentially at the EOD School Demolition Area include metal, TNT, explosive residuals, and Tetryl. The EOD School Demolition Area is located within the estimated firing fan from The Valley.

**Basic IED Area** – The Basic IED Area is a 3.79-acre site located on the western-central portion of Stump Neck Annex, south of Archer Avenue. The site was used for testing the potential for various chemical mixtures to explode. These chemicals included common household or industrial chemicals. Munitions used on-site included small arms, bulk high explosives, demolition charges, primers, detonators, fuzes, and squibs. Soil and groundwater sampling performed in 1996 confirmed the presence of contamination including inorganic and organic chemicals and elevated metals. The Basic IED Area is located within the estimated firing fan from The Valley.

**Advanced IED Area** – The Advanced IED Area is a 10.07-acre site located on the western-central portion of Stump Neck Annex. The Advanced IED Area straddles Archer Avenue with Parker Road running down its center. Based on the information reviewed, the Advanced IED Area was part of the EOD School's Division II Area 1A from 1968 until 1995. Division II was responsible for teaching all practical training in dropped/projected munitions and clandestine devices. The specific types of training that occurred in training at Area 1A included:

- Dropped munitions
- Fuze stripping

- Tools and methods
- Explosive analysis
- Baltograph (polaroid)
- Accidents/incidents related to dropped munitions
- New developments

Potential MEC items associated with these activities include:

- Submunitions (cluster bombs)
- Practice rockets
- Snake eye fin tubes
- Smoke canisters
- Bomb fuzes
- Random OE debris

The Advanced IED Area is located within the estimated firing fan from The Valley.

**Marine Rifle Range** – The 30.44-acre Marine Rifle Range is located on the central portion of the Stump Neck Annex south of Archer Avenue. The Marine Rifle Range was used by the Marines from approximately 1911 to 1918 for rifle, and possibly pistol, training. The primary MC of concern is lead from shot. Since MEC are not associated with small arms, no MEC are expected to be present. The Marine Rifle Range is located within the former fan from The Valley.

**Old Demolition Range** – The Old Demolition Range is located in the western portion of Stump Neck Annex, along the shore of Chicamuxen Creek. It was used for open burning/open detonation (OB/OD) of bulk propellant bulk high explosives, demolition charges, primers, detonators, fuzes, and squibs. However, an expended Smokey Sam was discovered during the visual inspection. The source of the Smokey Sam is unknown. Suspected MC include TNT, RDX, and HMX as they are constituents associated with high explosives. Exact dates of use are not known; however, historical documents state that it was used for EOD training “for many years prior to 1962.” The Old Demolition Range is 1.70 acres in size. The central portion is mainly open grass field, with a small developed portion (Building 2107). The area is currently in

use by an active Hypervelocity Test Area. The Old Demolition Range is located within the estimated firing fan from The Valley.

**Old Skeet and Trap Range** – The Old Skeet and Trap Range is located in the north central portion of Stump Neck Annex, north of Archer Avenue and south of the Potomac River. The Old Skeet and Trap Range comprises approximately 29.33 acres. The range became operational between 1967 and 1972, and was closed in 1991. The skeet range was used for recreational purposes. Clay pigeons were used as targets. Therefore, it is reasonable that lead shots remains on the ground at the skeet range. The Old Skeet and Trap Range is located within the estimated firing fan from The Valley.

**Roach Road Rifle Range** – The 0.3-acre Roach Road Rifle Range is located in the central portion of the Stump Neck Annex northwest of Roach Road. It was used from 1963 to 1986 for small arms training, specifically small bore rifle and pistols. Since MEC are not associated with small arms, no MEC is expected to be present. For small arms, the primary MC of concern is lead from bullets. Other associated MC less likely to be of concern may include antimony, arsenic, copper, magnesium, nickel, strontium, tin, zinc, and lead styphnate/lead azide.

**Rum Point Skeet Range** – The Rum Point Skeet Range is a 33.45-acre site located on the northeast portion of the Stump Neck Annex off of Rum Point Road. The range was operational for recreational purposes from 1991 until 2001. An estimated 53,000 pounds of lead shot was deposited on the range during its use. Firing took place from the concrete firing lines visible in the south end of the range towards the northern tree line. The primary potential MC related materials include lead from shot ammunition and polycyclic aromatic hydrocarbons (PAHs) found within the clay targets. Other associated MC less likely to be of concern may include: antimony, arsenic, copper, magnesium, nickel, strontium, tin, zinc, and lead styphnate/lead azide.

**Small Arms Range (Pistol Range)** – The Small Arms Range (Pistol Range) is approximately 2.41-acres and is located on the far eastern side of the Stump Neck peninsula. Navy personnel used this range for training and qualifying activities from the mid 1980s until 1991 when the range was closed due to its proximity to the General Smallwood State Park. Based on historical documents and information obtained during the data collection process, there is no evidence of MEC at the Small Arms Range as only small arms were used. For small arms, the primary MC of

concern is lead from bullets. Other associated MC less likely to be of concern may include antimony, arsenic, copper, magnesium, nickel, strontium, tin, zinc, and lead styphnate/lead azide.

**Stump Neck Impact Area** – The Stump Neck Impact Area is a 32.88-acre marshland impact area located in the central portion of the Stump Neck Annex, about 200 meters south of Archer Avenue and surrounded by Chicamuxen Creek. The range was allegedly used for testing projectiles and rockets fired from The Valley and Marine Corps Base (MQB) Quantico. Firing activities from The Valley used 1-inch to 14-inch long range Navy guns and spanned a 30-year period from 1891 through 1921. By 1931, MCB Quantico had obtained permission to fire 75-mm Pack Howitzers into the impact area. The arrangement was renewed in 1934 and included 37mm and 155mm Howitzer. Training is believed to have continued up until about 1940. Other suspected activities include surface and underwater demolitions testing, but this could not be confirmed. Potential MC could include metals, various explosives, and various chemicals associated with pyrotechnics, such as perchlorate and propellants. No MEC have been identified on the range. The range is undeveloped and protected by the Wetlands Protection Act.

**Test Area 1** – Test Area 1, which comprises approximately 4.52 acres, is located near the center of the Stump Neck Annex peninsula. During the 1980s, Test Area 1 was used for IED and Improvised Nuclear Device (IND) training. All training items were inert; however, the devices were connected to working components that would set off a quarter-pound block of TNT located a short distance from the training item. The charges were sized for total consumption; however, it is expected that small amounts of residue may be present in the soil. Based on historic use of the range for IED and IND training, all of Test Area 1 is suspected to potentially have MEC present. Potential munitions constituents at Test Area 1 include TNT and TNT breakdown products (2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene, 1,3,5-trinitrobenzene, 2,4-dinitrotoluene, and p-dinitrobenzene).

**Test Area 2** – Test Area 2 is a 3.66-acre parcel located in the south-central portion of the Stump Neck Annex of NDW, Indian Head, off an unnamed dirt road extending from the southern side of Old Range Road. Test Area 2 was identified during the U.S. Navy's Range Inventory. It was reportedly used for testing bulk high explosives (primary/initiating). No dates of use or information confirming this use were found during this PA. Test Area 2 has been used as a Non-Explosive Magnetic Test Range since 1978. The Non-Explosive Magnetic Test Range is used to measure the effectiveness of magnetic equipment. Based on the current use of Test Area 2 as a

Non-Explosive Magnetic Test Range, it is highly unlikely that any MEC debris is located on the parcel, as any debris would have been detected during magnetic testing.

**The Valley Impact Area** – The Valley Impact Area covers approximately 694 acres of the western portion of the Stump Neck Annex. The site was an SDZ from 1891 to 1921 for various calibers of guns (4-inch through 16-inch) proved at The Valley on the Main Installation. Tested shells contained different types of explosive fillers, including black powder, smokeless powder, brown prismatic powder, emmensite, joveite, wet gun cotton, randite and other high explosives (e.g., Thorite). In addition to munitions received from The Valley, 75mm projectiles fired from Marine Corp Base (MCB) Quantico impacted The Valley Impact Area. 75mm projectiles and howitzer shells (type unknown) were also fired from a marine range located in the vicinity of Rum Point. During the visual survey, potential impact craters were observed at the site. MC present at The Valley Impact Area could include Explosive D, Black powder, TNT, magnesium, NH powder, CTNT, other various metals and chemicals associated with pyrotechnics, such as perchlorate and propellants.

**Torpedo Burial Site** – The Torpedo Burial Site is a 0.88-acre range located in the north-central portion of the Stump Neck Annex, in the woods north of Chicamuxen Creek. The range is situated below Archer Avenue and north of Chicamuxen Creek about 100 meters south of Building 2075. The range is accessed by a dirt road off of Archer Avenue. The range is believed to contain an unlined earthen pit of unknown dimension that was used as a burial range for torpedoes, primers, detonators, fuzes, and squibs that were transported from a torpedo station near Washington, DC to this location in the late 1940s and early 1950s. MC are suspected to be present at this range. Some MC that are commonly found in torpedoes include: TNT, RDX, Composition A, Composition B, Composition C, Torpex, PETN, dynamite, nitrocellulose, cordite, and perchlorate. During the range visit, numerous streams and pools of standing water were observed on the range. Metallic debris was scattered throughout the range, and a 21-inch torpedo shell section was found in a pool of standing water. The torpedo appeared to have been demilitarized because there was a hole in the casing. The Torpedo Burial Site is located within the estimated firing fan from The Valley.

**Torpedo Casing Disposal Area** – The Torpedo Casing Disposal Area is located on Stump Neck Annex approximately 200 feet north of Archer Ave. The 0.74-acre range was used as a disposal range for torpedo casings during the 1950s. According to installation personnel, a magnetic

## FINAL PRELIMINARY ASSESSMENT

training range was established in the mid 1970s in the area between the north end of the current wildlife area and the Potomac River. This range was used only until Test Area 2 was constructed in the late 1970s. MC would include metals from the weathering of the torpedo casings and possibly residue left on the inside of the casings when buried.

**Map 2.3-1: Area Location Map**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 2.3-2: Stump Neck Annex Area Location Map**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

### **3. PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS**

The following sections provide general information for Stump Neck Annex including: its climate; topography; geology; soil and vegetation types; hydrology; hydrogeology; cultural and natural resources; and threatened, endangered, and protected species.

#### **3.1. Climate**

Stump Neck Annex, located on the eastern shore of the Potomac River in Charles County, Maryland, has a continental-type climate with four well-defined seasons. Located in the middle latitudes of North America, atmospheric flow is from west to east. The Potomac River and its tributaries significantly affect the climate, moderating extreme temperatures and causing higher humidity in the region. In the winter, the Blue Ridge and Appalachian mountain ranges located west of the Stump Neck Annex obstruct the cold, continental air. The coldest period occurs in late January and early February, with low temperatures averaging 29 degrees Fahrenheit (°F). July is the warmest month with average high temperatures of 85°F. Annual precipitation is well distributed, with July and August as the wettest months. Average annual precipitation is 44 inches. Maximum snow accumulation averages nine inches between November and March. The growing season lasts approximately 190 days, starting in mid-April.

#### **3.2. Topography**

NDW, Indian Head occupies two peninsulas along the eastern shore of the Potomac River. The Stump Neck Annex is on the southern peninsula, and the Main Installation is located on the northern peninsula. The two peninsulas are separated by Mattawoman Creek. The general topography of the mainland areas of Charles County can be described as gently rolling lands with a few steep slopes. This area includes many drainage swales and streams. Shoreline areas at NDW, Indian Head are generally steeply sloped.

The Stump Neck Annex has a relatively low topographic profile. The highest point is the northeastern portion of the peninsula at an elevation of approximately 140 feet above mean sea level (msl). The lowest points lie along the shorelines of the Stump Neck Annex adjacent to Mattawoman Creek and Chicamuxen Creek. These areas are mostly flat, tidal marsh areas, although several 50- to 60-foot bluffs exist along Mattawoman Creek.

### 3.3. Geology

The Stump Neck Annex lies within the Atlantic Coastal Plain Physiographic Province eight to ten miles east of the Fall Line that marks the western extent of the physiographic province. The regional geology consists of a sedimentary wedge of Cretaceous to Quaternary, fluvial and marine deposits overlying crystalline Precambrian metamorphic and igneous bedrock. The sedimentary wedge dips and thickens eastward and ranges in thickness from 550 feet to 900 feet in the vicinity of the Stump Neck Annex (Vroblesky, 1991; Hiortdahl, 1990). It lies nonconformably on the crystalline basement rock surface, which dips to the east. The geologic units underlying NDW, Indian Head, in stratigraphically ascending order, are the Lower Cretaceous Potomac Group, the Tertiary age Aquia Formation of the Pamunkey Group, fluvial-estuarine deposits of Tertiary to early Quaternary age, and undivided Quaternary deposits.

The lithology of the Potomac Group consists of interbedded clay, silt, sand, and gravel deposited in fluviodeltaic environments (Hiortdahl, 1990). The Potomac Group ranges in thickness from 650 to 750 feet in the vicinity of the Stump Neck Annex (Vroblesky, 1991; Harsh and Lacznik, 1990) and consists of three geologic units (in ascending stratigraphic order): the Patuxent Formation, the Arundel Formation, and the Patapsco Formation.

The Patuxent Formation consists of sand and pebbles with thin clay interbeds and is 300-400 feet thick in the study area. The Arundel Formation generally consists of a massive clay with abundant lignite and siderite concretions and is less than 100 feet thick beneath most of the study area. The Patapsco Formation generally consists of sand and silt separated by thick clay layers. The interpreted thickness of the Patapsco Formation in the study area varies from about 200 feet to more than 450 feet (Hiortdahl, 1997).

The Aquia Formation (Upper Paleocene) consists of marine deposits of olive black to olive gray, micaceous, glauconitic quartz sand interbedded with sand, silt, and clay. The formation is zero to 80 feet thick in the NDW, Indian Head peninsula area. The younger units of the Pamunkey Group and the Chesapeake Group have been removed by erosion in the study area.

Overlying the Aquia Formation are fluvial-sedimentary deposits consisting of gravel, sand, and loam. These sediments are referred to as "upland deposits" and range in age from Pliocene to early Pleistocene (Hiortdahl, 1997). The upland deposits crop out at the surface in the northern

portion of NDW, Indian Head where surface elevations exceed 40 feet. However, beneath most of the study area, the surficial sediments consist of Pleistocene paleochannel deposits and Holocene alluvial and paludal deposits (Hiortdahl, 1997). These deposits consist of gravel, sand, silt, clay, and peat mixtures with irregular bedding, with an aggregate thickness of zero to approximately 40 feet. The Aquia Formation and younger upland deposits are missing in many locations in the NDW, Indian Head peninsula area due to erosion and deposition in Pleistocene and Holocene paleochannels. Where this occurs, the overlying Quaternary deposits directly overlie the Cretaceous formations.

### **3.4. Soil and Vegetation Types**

Charles County is located within the inner Potomac Coastal Plain geologic province. The soils in this area are derived from unconsolidated marine sediments that vary from sandy to clayey texture and from excessively well drained to poorly drained. Hydric and erodible soils are prevalent. High water tables, severe erosion, earthslides and hardpans are common.

The U.S. Department of Agriculture (USDA) mapped the soils of the Stump Neck Annex in the Soil Survey of Charles County, Maryland, 1974. The main soil series in this area are the Beltsville, and Keyport, and Elkton Silt Loams. Some additional soil types found at the Stump Neck Annex are cut-and-fill land, gravelly land, and tidal marsh, and Mattawan soil, and cut-and-fill land. The following discussion is a description of the soil types at the Stump Neck Annex.

The eastern area of the Stump Neck Annex is primarily composed of the Beltsville silt loam, with a small area of gravelly land. The Beltsville series soils consist of silt and sand with moderate amounts of clay. They are nearly level to moderately sloping, moderately deep, strongly acidic, slowly permeable and well drained. Gravelly land is composed of gravelly deposits with unidentifiable soil types due to severe erosion.

The western and central areas are primarily composed of tidal marsh and Keyport silt loam. Tidal marshes consist of materials ranging from sand to clay, with occurrences of peat and muck. The Keyport silt loam is a clayey silt loam soil that is slowly permeable.

A small area in the western end of the Stump Neck Annex is comprised of Mattawan loamy sand and cut-and-fill land. The Mattawan Series consists of soils that are nearly level to gently

sloping, moderately well drained to well drained, and slowly permeable. These soils formed on uplands in a sandy mantle over loamy sediment. Cut-and-fill lands are areas where the native soils have been removed and graded or filled with other material or soil.

The land around the Stump Neck Annex is heavily vegetated. There are five basic vegetation types present including pine, hardwood, pine-hardwood mix, tidal and non-tidal wetlands, and urban landscape. The hardwoods and the pine-hardwood mix can be further subdivided into upland and wetlands divisions. Most of the forested land is either second or third growth; little, if any, virgin forest remains. The most abundant trees are Virginia Pine, Sweet Gum, Red Oak, and Yellow Poplar.

Hardwood forest dominates approximately 1,075 acres (nearly 50%) of NDW, Indian Head. Species common to the upland portions of hardwood forests include Red, White, and Chestnut Oak, Tulip Poplar, and Hickories. The wetland portion is typically comprised of Red Maple, Sweet Gum, Green Ash and American Sycamore.

Along the shoreline of the Potomac River the following species are common: Black Persimmon, Grape, Sea Myrtle, False Indigo, Poison Ivy, Virginia Creeper, and Phlox. In addition, the following grasses are present: Gama Grass, Panic Grass, Bermuda Grass, and Finger Grass. Marsh areas dominate along the shores of Mattawoman Creek. They are characterized by Jewelweed, Alger, Marsh Cattail, Weedgrass, Sedge, Three Square Bulrush, Wild Rice, Saltmarsh Cordgrass, Smartweek, and Marsh Mallow.

### **3.5. Hydrology**

The three primary waterways in the area are the Potomac River, Mattawoman Creek, and Chicamuxen Creek. The Potomac River and Mattawoman Creek border the Main Installation, while the Potomac River, Mattawoman Creek and Chicamuxen Creek border the Stump Neck Annex. The Potomac River is a continuous, slow-moving, slightly brackish, tidal tributary to the Chesapeake Bay. Mattawoman Creek and Chicamuxen Creek are tributaries to the Potomac River and are also tidally influenced. Both have large floodplains and contain large expanses of tidal wetlands and swamps. Many small streams cross the area, most of which drain directly into one of the three major waterways.

The Stump Neck Annex is bordered by and contains large tracts of both tidal and non-tidal wetlands. Wetlands and floodplains are valuable habitat for wildlife, important groundwater recharge areas, and filters for surface water runoff, thus minimizing siltation and erosion. They are also important aesthetic buffers, scientific resources, and, in some cases, recreational areas.

Based on the drainage divides derived from the topography of the area shown in a 1983 Initial Assessment Study conducted at NDW, Indian Head, the majority of the natural drainage at the Stump Neck Annex flows to both Mattawoman Creek and Chicamuxen Creek. Treated wastewater effluent is discharged directly to the Potomac River or Mattawoman Creek and is also discharged from outfalls to tributaries of these two waterways. The wastewater consists of industrial, sanitary, and storm effluents, or combinations thereof.

### 3.6. Hydrogeology

The hydrogeologic framework of the Indian Head area consists of a surficial aquifer and three major underlying confined aquifers: the lower Patapsco aquifer, upper Patuxent aquifer, and lower Patuxent aquifer. Although underlying the surficial aquifer, the upper Patapsco aquifer is considered a poor producer of groundwater in the area and is not considered to be a major aquifer at NDW, Indian Head. Rather than continuous bodies of sands, the individual confined aquifers consist of multiple sand layers interbedded with lower permeability layers. The aquifers are described in detail below.

*Surficial aquifer:* Shallow, unconfined to semi-confined groundwater at the NDW, Indian Head occurs in the surficial aquifer from near surface to approximately 45 feet below ground surface (bgs), with water table elevations ranging from sea level to approximately 65 feet above msl. Depending on location, the surficial aquifer is composed of Quaternary paleochannel deposits, Tertiary to Quaternary upland deposits, the Aquia Formation, or even sediments of Patapsco Formation. Typically, the shallow groundwater occurs in perched water-bearing zones and is recharged from infiltration (Hart, 1983). In some lowland areas, surface water intrusion may be an additional source of recharge of the shallow aquifer along the edge of water bodies and during periods of high tide. Shallow groundwater flow follows topography and discharges to local surface water bodies.

The descriptions and hydrogeologic properties of the confined aquifers presented in this section are derived primarily from Andreasen (1999).

Lower Patapsco aquifer: The top of the lower Patapsco aquifer lies at 70-200 feet below sea level in the study area, with a thickness ranging from 65 to 140 feet. The transmissivity of the lower Patapsco aquifer ranges from about 190 to 700 feet-squared per day ( $\text{ft}^2/\text{d}$ ) near Indian Head. The aquifer is underlain by relatively low permeability sediments of the Patapsco Formation and is underlain by the low permeability Arundel Clay. In most places the Arundel Clay serves as an effective confining unit between the lower Patapsco and upper Patuxent aquifers, although a hydraulic connection occurs where the Arundel Clay is thin or more heterogeneous.

The lower Patapsco aquifer is the principal water-supply aquifer at NDW, Indian Head, and its potable water wells are typically screened in multiple sand layers within this aquifer at an average depth of 200 to 300 feet. These potable water wells serve an approximate population of 4,050 people, including civilian and enlisted Navy employees and contractor employees. According to the installation, there are two potable wells located on the Stump Neck Annex. Well #42 SN was installed in 1945 and currently has minimal output. This well is being considered for rehab. The other well, #2012 SN, was installed in 1953. NDW, Indian Head is considering several rehabilitation options including closing #42 SN and using #2012 SN as the main well or installing of an additional well on Stump Neck Annex. There are also several private wells near Rum Point. These wells are tested quarterly or monthly, if regularly used. Although none of the NDW, Indian Head wells supply reserves or residences beyond the facility boundaries, the lower Patapsco aquifer is used extensively for domestic and municipal water supplies in northwestern Charles County. Several production wells are screened in this aquifer northeast of NDW, Indian Head, in and near the towns of Indian Head and Potomac Heights.

Upper Patuxent aquifer: The upper Patuxent aquifer lies at 400-600 feet below sea level in the study area and is about 50-70 feet thick. The transmissivity of the upper Patuxent aquifer ranges from about 150 to 2600  $\text{ft}^2/\text{d}$  in northwestern Charles County. Relatively low permeability sediments of the Patuxent Formation underlie this aquifer.

Lower Patuxent aquifer: The top of the lower Patuxent aquifer lies at 800-1,000 feet below sea level in the study area and is about 100 feet thick. Few potable water wells are screened in the lower Patuxent aquifer due to availability of water from the overlying confined aquifers. The lower Patuxent aquifer is underlain by crystalline basement rock. Water levels in the upper and

lower Patuxent aquifer are generally similar due to the leaky nature of the intervening confining unit.

### **3.7. Cultural and Natural Resources**

A Phase I Cultural Resources Survey and Supplemental Architectural Investigations were conducted at Stump Neck in 1996. As a result, 33 sites were identified and investigated. Only 17 of 33 were recommended for a Phase II evaluation to determine their eligibility for listing on the National Register of Historic Places. Six of these sites that are considered to potentially overlap with former ranges discussed in this report. These six sites are:

- Site 18CH388 – overlaps with the Old Skeet and Trap Range and with the Marine Rifle Range
- Site 18CH391 – overlaps with the Rum Point Skeet Range
- Site 18CH628 – overlaps with the Rum Point Skeet Range
- Site 18CH630 – overlaps with the Rum Point Skeet Range
- Site 18CH638 – overlaps with Test Area 2
- Site 18CH644 – overlaps with the Small Arms Range (Pistol Range)

The architectural evaluation verified three National Register eligible historic districts and identified one additional district, as follows: the Indian Head Residential Historic District containing 64 contributing resources; the Naval Powder Factory District containing 124 contributing resources; the Naval Proving Ground Historic District containing zero contributing resources; and the Extrusion Plant Historic District containing 63 contributing resources. An additional area of the base, the Polaris facility, was recommended for further research, as it was considered potentially eligible for the National Register as an exceptionally significant area. The exact location of the contributing resources within these districts were not available.

### **3.8. Endangered and Special Status Species**

According to the 1997 Wildlife Management Plan, four endangered species are reported to be located within the Stump Neck Annex. Of these four species, three of them are federally endangered: the American bald eagle, rainbow snake, and the joint-vetch (flowering plant of the pea family). The fourth species, the scaly blazing-star (perennial herb), is a species of special concern in the State of Maryland. As of the July 2001 Threatened and Endangered Plant/Animal

Species of Charles County, Maryland report, the Maryland Department of Natural Resources Wildlife and Heritage Service still listed these four species as federal and state endangered for Charles County.

Protected species that are known to or have the potential to inhabit Stump Neck Annex are listed in Table 3.8-1:

Table 3.8-1: Summary of Known or Potential Protected Species	
Ecological Receptors	Species
Federal Endangered	<ul style="list-style-type: none"> <li>• American bald eagle</li> <li>• Rainbow snake</li> <li>• Joint-vetch</li> </ul>
Federal Threatened	None reported
State Endangered	Scaly blazing-star
State Threatened	None reported
Other Ecological Receptors	None reported

\*Sources of data include:

- NDW, Indian Head Wildlife Management Plan, 1997.
- Threatened and Endangered Plant/Animal Species of Charles County, Maryland, July 2001. Maryland Department of Natural Resources.

## 4. SUMMARY OF DATA COLLECTION EFFORT

Five primary sources of information were researched as part of the data collection effort for the PA. The sources of data included:

- 1) Historical archives;
- 2) Personal interviews;
- 3) Installation data repositories (including the Administrative Record);
- 4) Visual surveys; and
- 5) Off-range data sources and repositories, such as local libraries and museums.

These data sources are discussed below, as well as their applicability relative to this PA. References for the data obtained are included in Appendix A. Appendix B contains the source data listed in Appendix A.

### 4.1. Historical Archive Repositories (off-range)

The data collection team reviewed archival records located at the National Archives in College Park, Maryland, and in Washington, D.C. The data collection team researched the following records and record groups (RG) for documents relating to munitions usage at NDW, Indian Head. An asterisk (\*) indicates the material was photocopied.

#### Textual Records:

##### **RG 71, Bureau of Yards and Docks**

Naval Property Case Files, Boxes 580\*, 581\*, 582\*, 583\*, 584  
Unprocessed Naval Property Case Files, Box 36

##### **RG 72, Bureau of Aeronautics**

Entry 67, Confidential Correspondence, 1922-1944, Boxes 977, 1205\*  
Entry 67-A, Confidential General Correspondence, 1945, Box  
Entry 62-B, General Correspondence, 1943-1945, Boxes 2320, 2931, 2946, 2938,  
2978, 2982, 2996, 2998, 3003, 3010, 3050, 3066, 3078, 3470,

**RG 74, Bureau of Ordnance**

Entry 25, General Correspondence, 1926-1944, Boxes 937\*, 938\*, 939\*, 940, 941\*

Entry 25-C, General Correspondence, Confidential, 1926-1939, Box 98

Entry 25-E, General Correspondence, Confidential, 1940-1942, Box 189\*

Entry 25-I, General Correspondence, 1942, Confidential, Box 212\*

Entry 25-J, General Correspondence, 1942, Restricted, Boxes 512\*, 513\*, 514

Entry 25-M, General Correspondence, 1943, Confidential, Box 389

Entry 25-O, General Correspondence, 1943, Restricted, Boxes 600-602

Entry 25-U, General Correspondence, 1944, Confidential, Boxes 557-561

Entry 25-V, General Correspondence, 1944, Restricted, Boxes 1031, 1032\*, 1033-1035

Entry 1001, General Correspondence, 1907-1949

1947, Box 36

1948, Box 64

1949, Box 103

Entry 1003 A, General Correspondence, 1948, Boxes 129\*, 173, 174, 175

Entry 1003 A, General Correspondence, 1949, Box 534\*

Construction and Procurement Subject Files

1945, Boxes 828, 1222, 1256, 1257, 1264, 1265, 1284, 1285, 1354\*, 1355\*, 1356\*, 1357\*, 1358\*, 1359\*, 1360\*, 1390-1393, 1443\*, 1444\*, 1445\*, 1446\*, 1488\*, 1489\*, 1600

1946, Boxes 309\*, 310\*, 311\*

**RG 127, U.S. Marine Corps, Office of the Commandant**

General Correspondence, 1939-1850, Boxes 230, 840, 1805, 1806

**RG 334, Records of Inter-Service Agencies, Armed Forces Explosives Safety Board**

Entry 15, Explosion Files, 131, 234, 329

**Cartographic Records:**

**RG 23, Coast and Geodetic Survey**

Folders for Charts 559\*, 560\*

**RG 57, U.S. Geological Survey**

**RG 71, Bureau of Yards and Docks**

Maps for facility 502\*, 509, codes 1, 2, 3, 15, 16, 32, 34, 42, 44-48

Series I microfilm, Rolls 500\*, 501, 502, 503\*, 516\*

Series II Index Boxes 67-69, 73

Series II Microfilm, Reels 418\*, 419\*, 420, 444\*, 1344\*, 1345\*

**RG 77, Department of Army**

Army Mapping Service, AMS-V833\*

**RG 385, Naval Facilities Engineering Command, 1917-1989**

Architectural and Engineering Plans, Boxes 2, 185

Restricted UIC Architectural and Engineering Plans, Boxes C27, C28, C29,

C30\*, C31, C38\*

**Aerial Photographs:**

**RG 373, Defense Intelligence Agency**

Can ON 38542

**Still Photos:**

**RG 71, Bureau of Yards and Docks**

Entry 71-CA, Construction Projects, 1879-1943, Box 191\*

Entry 71-CB, Construction Projects, 1940-1943, Boxes 52, 136

Entry 71-CP, Construction Projects, 1941-1953, Boxes 33-35, 70, 78, 83

**NAVAL HISTORICAL CENTER, WASHINGTON, D.C.**

Photo Archives, Aerials \*

Photo Archives, Card File

Operational Archives

Command Histories, 1945-1991\*

**NATIONAL ARCHIVES, REGIONAL OFFICE, PHILADELPHIA**

**RG 181, U.S. Naval Districts and Shore Establishments**

Central Subject Files, Naval Powder Factory, 1907-1925, Boxes 1, 2, 3\*, 4, 5, 6\*, 7-11, 12\*, 13\*, 14, 15\*, 16\*, 17\*, 18\*, 19-30

Upon receipt of this information from the archive research subcontractor, Nicklason Research Associates, Malcolm Pirnie’s project team organized the information by subject matter and reviewed the content for applicability in the PA process. The relevant information was then digitized and will be provided as a part of the project record contained in the CD to be submitted with the final PA.

**4.2. Personal Interviews**

The NDW personnel listed in Table 4.2-1 were interviewed during the range visits or via telephone. Relevant interviews have been documented and are included in Appendix C.

<b>Table 4.2-1: NDW, Indian Head Personnel Interviewed During Site Visits</b>	
<b>Name</b>	<b>Office</b>
Christina Adams	Public Affairs
Dave Bode	Safety Department
Jeff Bossart	Natural Resources
Tom Cox	Public Works
Bruce Dalton	Safety Department, Retired
Jim Dolph	Navy Historian
Frank Ehrenreih	Retired Marine Corp EOD
Kathy Frey	Environmental Office
Jim Hersey	UXO Program Director
Frank James	Safety Department/EOD
Shawn Jorgensen	Environmental Department
Larry Kijek	EODTC Environmental/Safety
Cee Cee Krawlings	Base Security

<b>Table 4.2-1: NDW, Indian Head Personnel Interviewed During Site Visits</b>	
<b>Name</b>	<b>Office</b>
Chris Lopez	Equipment Specialist, Technical Support Branch
Elaine Magdinec	Environmental Office
Jack Meyers	EODTC Safety Department, Retired
Gordon Miller	Retired Marine Corp EOD
Heidi Morgan	Environmental Office
Jeff Morris	RPM NAVFAC WASHINGTON
Andy Pedersen	EODTC Engineer
William Penn	NDW, Indian Head Retired
Allison Poe	Public Works Office/ Geographic Information System (GIS) Specialist
Ben Redmond	CH2MHill, VP of OE
Diana Rose	Environmental Office
Lou Scalafari	Former Public Works Employee
Earl Scroggins	EODTC, Technical Support Branch Head
John Stacey	Public Works/Master Plan
David Stewart	Public Works/Utilities

### 4.3. On-Site Data Repositories

The following is a partial list of data sources accessed for this PA. A complete, detailed listing will be provided with the CD.

- NDW, Indian Head Environmental Office
- NAVEODTECHDIV Environmental Office
- NDW, Indian Head Natural Resources Office
- NDW, Indian Head Cultural Resources Office
- NDW, Indian Head NEPA Program Office
- NDW, Indian Head Public Works Office
- NDW, Indian Head Safety Office
- Ordnance and Explosives Support Office
- NAVEODTECHDIV Technical Library
- NDW, Indian Head Technical Library

- NDW, Indian Head Public Affairs Office
- NDW, Indian Head Installation Repository (“The Barn”)
- NDW, Indian Head Public Works Map Room (“The Vault”)
- NDW, Indian Head Photo Lab
- Jim Dolph, Navy Historian

#### 4.4. Visual Survey

A visual survey of each other than operational range was part of the data collection effort to identify MEC related materials (e.g., expended rounds, fragmentation, range debris, old targets), evidence of MC (such as ground scarring, stressed vegetation, or observable chemical residue), and/or surface features that could provide additional information to aid in the characterization of the range. The visual survey was also used to enhance, augment, or confirm the archival data and, in some cases, provide new information regarding the historical use and current conditions of the range. The surveys were completed on June 23-27, 2003; November 17-21, 2003; December 1-2, 2003; and June 2-4, 2004. A description of the other than operational ranges surveyed and the results of the surveys are provided in Section 5.

#### 4.5. Off-Site Data Sources

The following off-range repositories were contacted by Malcolm Pirnie to obtain information for the PAs. A listing of informational resources provided is included.

Potomac Branch Library, Indian Head, Maryland- The book, *Praising the Bridge that Brought Me Over*, which was already in our possession, was provided.

Indian Head, Maryland Town Hall- No relevant information was provided.

Maryland Historic Society- *Maryland A to Z, a Topographical Dictionary; Gun Powder Town on the Potomac* and a newspaper article regarding town history were provided and reviewed.

Torpedo Factory Art Center, Alexandria, Virginia\*- No references to Indian Head were discovered.

Alexandria Central Library\*- No relevant information was provided.

\*Researched based on speculation that torpedoes manufactured at the former facility may have been sent to NDW, Indian Head for testing.

## 5. SITE CHARACTERISTICS

The following sections provide specific information about each of the other than operational ranges located on Stump Neck Annex, NDW, Indian Head, Maryland including history and range description; land use; access controls and restrictions; visual survey observation and results; contaminant migration routes; and receptors.

### 5.1. AIR BLAST POND

#### *5.1.1. History and Site Description*

Air Blast Pond was identified as a 3.72-acre range in the Navy Range Inventory. The Naval Ordnance Laboratory (NOL) used the Air Blast Pond for bulk high explosive testing from 1955 to 1975. The NOL discontinued this use in 1975 and the activity was moved to Naval Surface Warfare Center Dahlgren Division (NSWCDD). The Air Blast Pond is located approximately 100 feet north of the Chicamuxen Creek, and it is accessed by a dirt road that intersects with Archer Avenue. The area surrounding the Air Blast Pond is wooded on the north, south, and west sides. Two intermittent streams are also present at the range.

The Air Blast Pond is an unlined earthen pit approximately 100 feet in diameter with a capacity of approximately 1.3 million gallons. The pit is surrounded by a man-made earthen berm approximately ten feet tall. The pond was filled with water from the Chicamuxen Creek by means of a 14-inch diameter steel pipe at a rate of 1,300 gallons per minute. Water was periodically discharged through the same pipe (industrial outfall IW32) into the Chicamuxen Creek. According to Diana Rose of the NDW, Indian Head Environmental Office, permits were not issued for the discharge from the Air Blast Pond. The pond was emptied and refilled two to three times per year. The pond reportedly developed a slow leak and periodically needed to be refilled (topped off).

To test the bulk high explosives, wire was strung across the pond to measure the concussion factors of various explosives. Test explosives were detonated above and in water. The tests were

observed on-range as well as recorded by the NOL. According to the 1998 RCRA Facility Investigation/Verification Investigation (RFI/VI), three to four detonation events (shots) were conducted per day, with an estimated 1,500 shots over the unit's active life. A map of the Air Blast Pond provided in the 1998 RFI/VI report is provided as Figure 5.1-1. The explosives tested include Pentolite, HBX-1, HBX-2, H-6, and C4. Although the Air Blast Pond was designed to capture the detonations within the pond, the nature of the operations conducted at the range produced a spray of detonated explosives (MC) during testing.

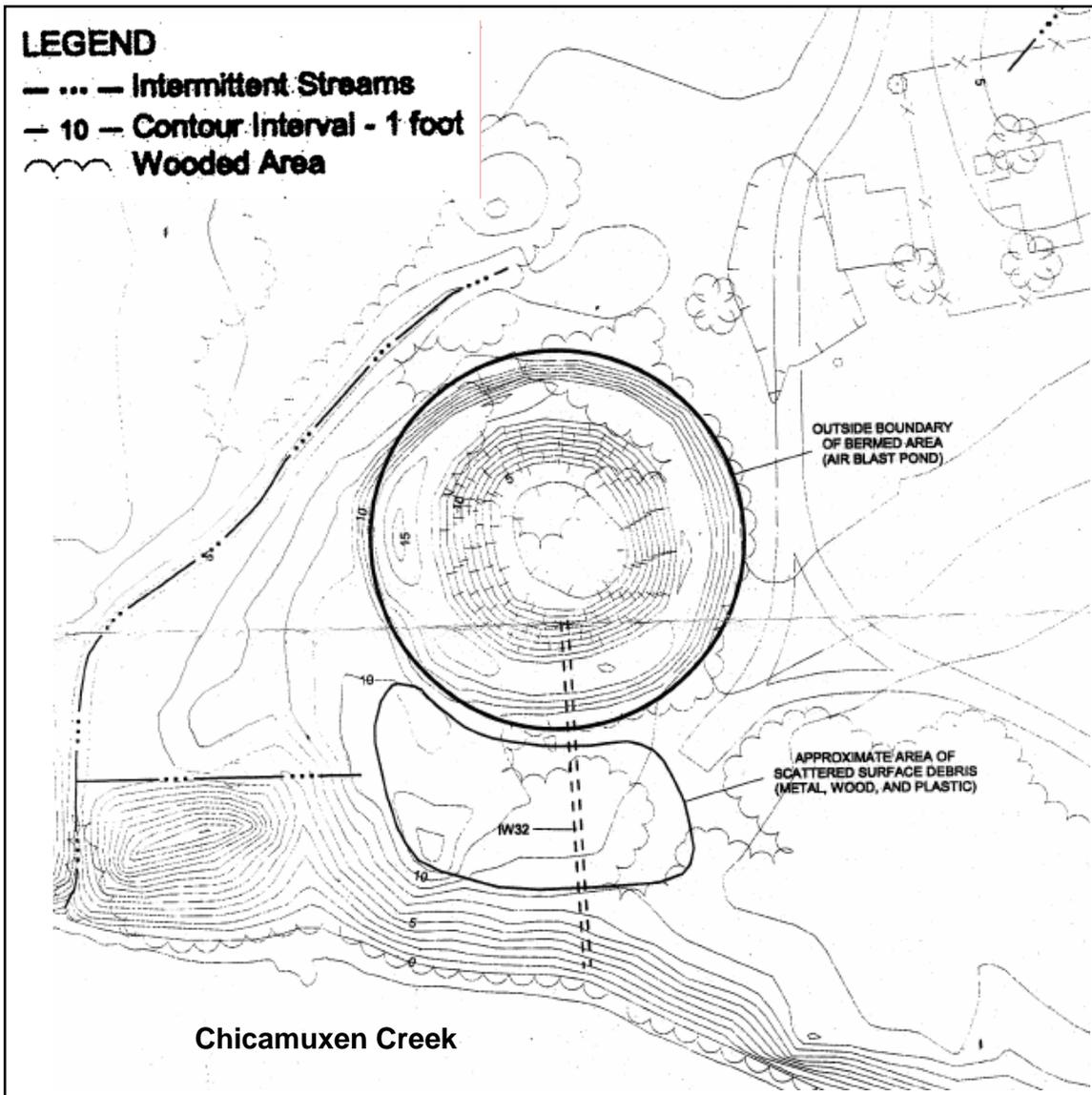
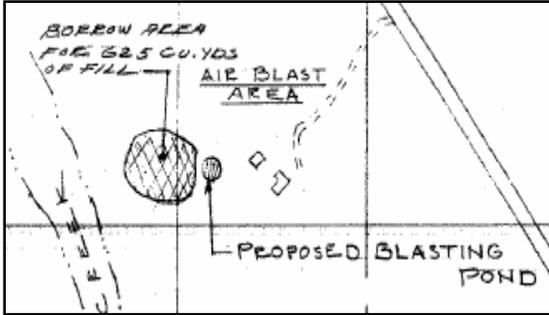


Figure 5.1-1: Air Blast Pond layout as depicted in 1998 RFI/VI

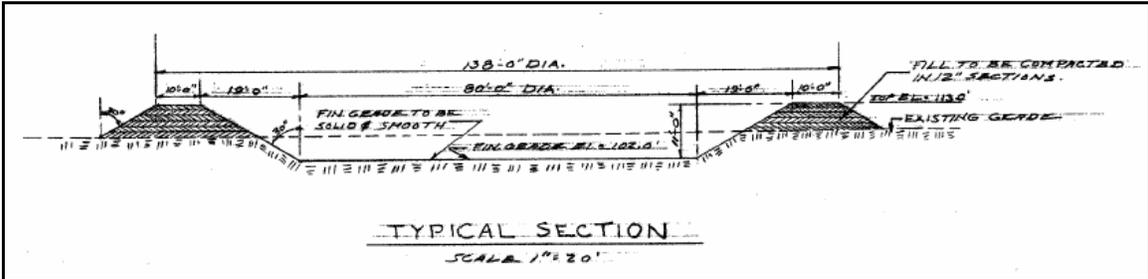


Construction plans for the Air Blast Pond are dated 1956. The 1956 Location Plan (Figure 5.1-2) identifies a borrow area for fill on-range west of the constructed pond. It is assumed that fill material from this borrow pit was used to construct the earthen berm at the Air Blast Pond. Figure 5.1-3 shows the cross

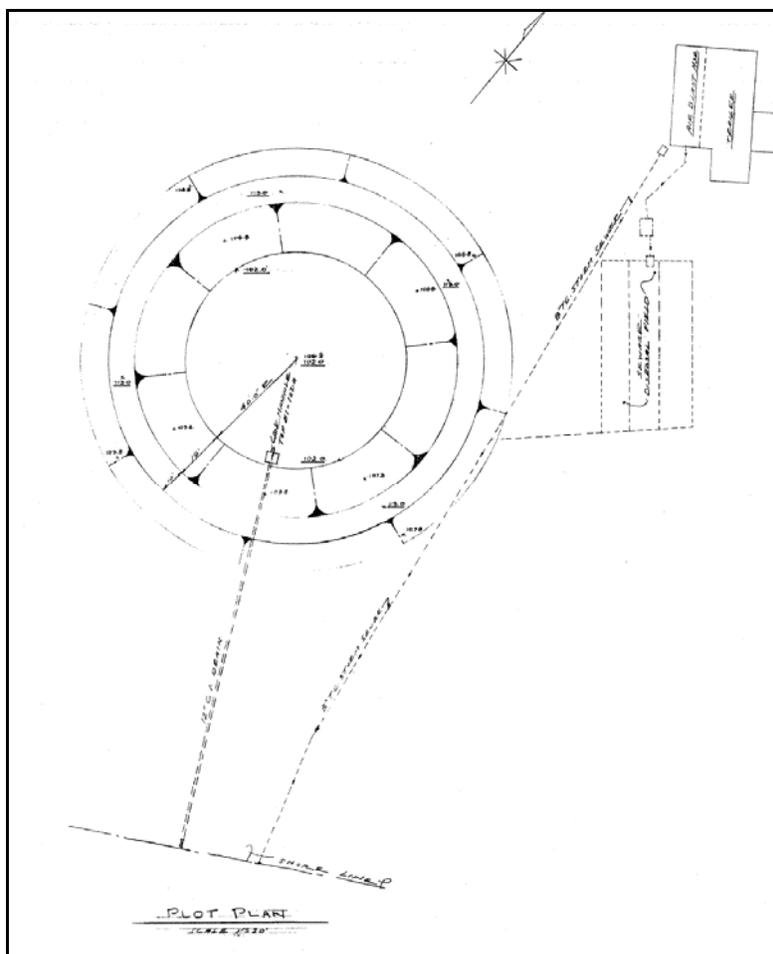
section of the pit, including existing grade, final grade, and diameter of the pit. Figure 5.1-4 shows the 1956 Plot Plan and design of the Air Blast Pond. The original building, septic field, storm drain, discharge pipe, and berm are identified on this figure. The updated 1984 cross

section includes a set of towers connected by cables crossing the pond. The towers were approximately 97 feet tall and oriented northwest to southeast. The updated plan also identifies a sump pit in the southeast interior of the pond and a pump with gate valve and strainer at the discharge point to the Chicamuxen Creek.

**Figure 5.1-2: 1956 Location Plan for Air Blast Pond showing borrow area**



**Figure 5.1-3: 1956 profile of construction for Air Blast Pond**



**Figure 5.1-4: 1956 design of Air Blast Pond**

The pit currently contains no water and is overgrown with small trees, grass and other vegetation. There are several rusted metal pipes standing upright on the earthen floor of the pit that were reportedly used to hold monitoring devices while the Air Blast Pond was operational. Additional metal pipes and wire scattered on the berm were reportedly used to anchor the center supports. The wooded area between the pit and the Chicamuxen Creek contains scattered metal and wood debris. Solid steel cylinders and rusted drums were located in this area. The cylinders were reportedly used for explosive shaped charge tests, but use was discontinued, and the cylinders were left at the range. Buildings were present at the range to support activities at the Air Blast Pond. These buildings have since been razed, but other structures associated with operation of the pond still exist. These remaining structures include a wooden observation platform, stairs, a wooden bunker, and a concrete and wooden tank with platform. The concrete and wooden tank

was used to hold cameras that recorded the underwater explosions. The location and general features of the Air Blast Pond are displayed on Map 5.1-1. (located at the end of Section 5.1).

The Air Blast Pond boundaries were identified in the Navy Range Inventory. The buildings, discharge piping, and scattered surface debris are included within the range boundary. In 1991, the Air Blast Pond was identified as SWMU#6, IR Site #62 in 1991 pursuant to the requirements of the RCRA Corrective Action Permit issued in 1990 by the USEPA. The Navy completed a RFI/VI in January 1998, and the results are summarized in Section 5.1.6 of this PA.

There is no record of additional testing or MEC usage at the Air Blast Pond. However The Air Blast Pond is located within the estimated firing fan from The Valley, located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Air Blast Pond. Refer to Section 5.7 in the Final PA Report for the Main Installation, Indian Head for information on The Valley. Information on The Valley is also provided in the current PA repost under Section 5.15, The Valley Impact Area.

#### **5.1.1.1. Topography**

Section 3.2 provides a general description of topography for the Stump Neck Annex. Elevations at the Air Blast Pond range from zero to 15 meters above msl. The topography of the Air Blast Pond is dominated by the earthen berm. The berm slopes steeply from five to 15 meters above msl. The area surrounding the Air Blast Pond is relatively level at approximately five meters above msl.

#### **5.1.1.2. Geology**

Section 3.3 provides a geologic description for Indian Head and the Stump Neck Annex. Subsurface conditions at the Air Blast Pond were investigated through the drilling and logging of four soil borings during the 1998 RFI/VI. The subsurface materials were relatively consistent across the area, both vertically and horizontally. The material encountered in and beneath the berm generally consisted of a nine to 12-foot thickness of natural, reworked material classified as silty sand and was generally underlain by sand and gravel. The fill material used to construct the berm was obtained from a burrow pit immediately west of the pond. The northern portion of the area was underlain by silty clay. No waste material was reported to have been encountered during the 1998 RFI/VI subsurface investigation.

### 5.1.1.3. Soil and Vegetation Types

Section 3.4 provides a description of the soil and vegetation types at Indian Head and the Stump Neck Annex. According to the Soil Survey of Charles County, the predominant soil type associated with the Air Blast Pond is sand-silt to sand-clay. Specifically, Keyport silt loam with a two to five percent slope is present. Vegetation surrounding the Air Blast Pond is primarily woodland with grassland surrounding the access road and location of the former buildings (see Figure 5.1-5).



Figure 5.1-5 Vegetation surrounding Air Blast Pond

### 5.1.1.4. Hydrology

Section 3.5 provides a description of hydrology at Indian Head and the Stump Neck Annex. An intermittent unnamed tributary runs along the northwestern edge of the pond and empties into the Chicamuxen Creek. A smaller intermittent unnamed tributary south of the pit runs perpendicular to and intersects the larger stream approximately 75 feet before it empties into the Chicamuxen Creek. The intermittent streams are shown on Figure 5.1-1. The Chicamuxen Creek discharges to the Potomac River.

### 5.1.1.5. Hydrogeology

Section 3.6 provides a description of hydrogeology for Indian Head and the Stump Neck Annex. No monitoring wells were installed at the Air Blast Pond during the RFI/VI. Based on topography and the proximity to Chicamuxen Creek, the groundwater is presumed to flow toward

and discharge into the Chicamuxen Creek. Due to the nature of historic activities at the Air Blast Pond, the pond likely discharged large volumes of water into the subsurface through infiltration.

#### **5.1.1.6.Cultural and Natural Resources**

General cultural and natural resources for the Stump Neck Annex are provided in Section 3.7. According to the 2003-2004 Stump Neck Annex Hunting Map, hunting is permitted at the Air Blast Pond. The Chicamuxen Wildlife Management Area is located on the other side of Chicamuxen Creek from the Air Blast Pond.

Although the potential for cultural resources exists for the area in which the range is located, there have not been any specific archeological or cultural sites identified at the Air Blast Pond. Approximately 30 shovel tests were excavated in this area during the Phase I Cultural Resources Survey of Stump Neck Annex and Supplemental Architectural Investigations from August 1996. Positive prehistoric and historic artifacts were uncovered during the shovel tests. No sites were identified on the Maryland Register of Historic Places (State Register) or the National Register of Historic Places.

#### **5.1.1.7.Endangered and Special Status Species**

As discussed in Section 3.8, endangered and special status species are reported to exist at the Stump Neck Annex. The reported endangered and special status species have the potential to inhabit the area, but none are known to inhabit the Air Blast Pond.

### ***5.1.2. Visual Survey Observations and Results***



A visual survey of the Air Blast Pond was conducted on June 24, 2003. Malcolm Pirnie personnel who conducted the range visit included Mr. Hien Dinh, Mr. Svend Egholm, Ms. Denise Tegtmeier, Mr. Dan Hains, and Mr. Ray McManus. Ms. Heidi Morgan, NDW, Indian Head Environmental Office, accompanied the team. The area

**Figure 5.1-6: Overgrown berm at the Air Blast Pond**

was visually inspected by walking along the berm of the Air Blast Pond. The area south of the pond and surrounding the dirt access road were also visually inspected. Current conditions of the berm are shown in Figure 5.1-6. An end cap for a C-4 block and a 57mm projectile were observed on the berm of the pond. Figure 5.1-7 shows the flag at the northern side of the berm that marks the spot of the 57mm projectile. The 57mm projectile is rusted and the cutting grooves on the copper rotating band indicated that it had been fired. The C-4 end cap was found on the southwestern portion of the berm.



**Figure 5.1-7: Flag on berm identifying location of 57mm projectile**



**Figure 5.1-9: Wooden debris**

A wooden platform is located at the northwest side of the berm; a concrete and wood tank with platform is located adjacent to the stairs at the northeast side of the berm (Figure 5.1-11). The stairs on the interior and exterior of the berm are wooden. A dilapidated wooden bunker is located at the western side of the berm. No evidence of the towers

Wooden debris, metal drums, and several steel cylinders were observed around the berm of the pond. (Figure 5.1-8, Figure 5.1-9 and Figure 5.1-10). There are several rusted metal pipes standing upright on the earthen floor of the pit, and metal pipes are also exposed in the berm.



**Figure 5.1-8: Metal drums located south of pond**



**Figure 5.1-10: Steel cylinders discarded on-range**

was identified during the visual survey. Multiple flags were located along the rim of the berm. According to installation personnel, the flags represent sampling locations for the RFI/VI. At the time of the visual survey, the intermittent streams surrounding the pit were dry.



**Figure 5.1-11: Current view of berm, stairs, and concrete tank**

A visual depiction of the range reconnaissance is provided on Map 5.1-1 located at the end of Section 5.1. Additional range/site details are illustrated on Map 5.1-2 also located at the end of Section 5.1.

### ***5.1.3. Munitions and Munitions Related Materials Associated with the Site***

This section describes the munitions or munitions related materials known or suspected to be at the range. This includes both MEC and non-hazardous munitions related debris (e.g., fragmentation, base plates, inert mortar fins).

Records indicate that bulk high explosives were tested at the range from 1955 to 1975. However, a 57-mm projectile was discovered during the visual survey (Figure 5.1-12). The source of the 57-mm projectile is unknown as this is inconsistent with bulk explosives testing. The fragmentation radius for a 57-mm projectile is approximately 1,500 feet, which is shown on Map 5.1-2. The Air Blast Pond is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Air Blast Pond. Technical data sheets are included in Appendix D. Refer to Section 5.7 in the PA Report for the Main Installation, NDW, Indian Head for information on The Valley. Information on The Valley is also provided in the current PA report under Section 5.15, The Valley Impact Area.



**Figure 5.1-12: 57-mm projectile identified during the visual survey**

The northern portion of the Air Blast Pond is overlapped by the Marine Rifle Range. Refer to Section 5.6 for details on the Marine Rifle Range.

The Air Blast Pond is not suspected to contain chemical warfare material (CWM) filled munitions, electrically fused munitions, or depleted uranium (DU) associated munitions.

#### **5.1.4. MEC Presence**

The entire range has been subdivided and categorized into one of three levels of MEC presence including: known MEC areas, suspected MEC areas, and areas where no evidence exists to indicate that MEC is known or is suspected to be at the range. The MEC presence is discussed below. The Air Blast Pond is located within the estimated firing fan from The Valley, located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Air Blast Pond. Refer to Section 5.7 in the Final PA Report for the Main Installation, Indian Head for information on The Valley. Information on The Valley is also provided in the current PA report under Section 5.15, The Valley Impact Area. For the purpose of the PA, only MEC presence specifically related to the Air Blast Pond is considered. Map 5.1-3 illustrates the munitions characterization of the Air Blast Pond and is provided at the end of Section 5.1.

##### **5.1.4.1. Known MEC Areas**

The only known MEC at the Air Blast Pond is the 57-mm projectile identified during the visual survey. Thus, the area immediately surrounding the 57-mm projectile is identified as a known MEC area (Map 5.1-3).

##### **5.1.4.2. Suspected MEC Areas**

The remainder of the Air Blast Pond is identified as a range where evidence of MEC is suspected. Since the source of the 57-mm projectile is unknown, there is the potential for similar MEC to be located throughout the remainder of the Air Blast Pond. The suspect MEC area is depicted in Map 5.1-3.

##### **5.1.4.3. Areas Not Suspected to Contain MEC**

There are no areas at the Air Blast Pond not suspected to contain MEC.

#### **5.1.5. Ordnance Penetration Estimates**

The depth to which munitions penetrate below the ground surface depends on many factors, including the type of soil, the angle of impact, the size of the munitions, the velocity at impact, and range-specific environmental conditions. Over the years, the DoD has studied and modeled munitions penetration depths and has issued various guidance and technical documents on the

subject. For the purposes of the PA, maximum probable penetration depths are estimated following guidance listed in the latest draft (July 2002) of the DoD Directive on Explosives Safety issued by the DoD Explosives Safety Board (DDESB) [*DoD Directive 6055.9 (DoD Ammunition and Explosives Safety Standards)*]. The Directive refers to *TM 5.855.1* and *NAVFAC P-1080*.

The estimated penetration depth for the 57-mm projectile found at the Air Blast Pond, if fired, ranges from four feet in sandy soil to 8.5 feet in clayey soil. Air Blast Pond is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Range. The ordnance penetration depth associated with munitions fired from The Valley is provided in The Valley Impact Area in Section 5.15.5. For the purpose of the PA, the ordnance penetration depth is only considered for munitions items specifically related to the Air Blast Pond.

#### ***5.1.6. Munitions Constituents***

Based on historical uses at the Air Blast Pond suspected MC include:

- Pentolite (a mixture of TNT and PETN)
- HBX-1 (a mixture of RDX, TNT, and aluminum)
- HBX-2 (a mixture of RDX, TNT, and aluminum)
- H-6 (a mixture of RDX, TNT, and aluminum)
- C-4 (a mixture of RDX and plasticizer; over 90% is RDX)
- Composition B (a 59/40/1 mixture of RDX, TNT, and beeswax)

Maximum charge weights were eight pounds per shot. The use of C-4 was confirmed by the finding of a C-4 end cap on the berm during the visual survey (Figure 5.1-13).



**Figure 5.1-13: End cap of C-4 block identified during visual survey**

As part of the 1998 RFI/VI, surface soil, subsurface soil, and sediment samples were collected. Five initial field screening samples (one at 6 to 12 inches, one at 12 to 24 inches, and three at 0 to 6 inches) were collected from three locations within the pond. These samples were analyzed using field test kits sensitive to the explosives TNT and RDX. Four samples were then collected from locations surrounding the pond and were analyzed using the field test kits. Field screening sample locations are shown in Figure 5.1-15. None of these samples had positive detections for explosives. Seven surface soil samples and seven subsurface soil samples were collected and analyzed for Appendix IX metals, Appendix IX VOA, Appendix IX SVOA, and explosives (Figure 5.1-14). Three surface soil samples, ABPSS01 through ABPSS03, were collected from locations within the pond. Four surface soil samples ABPSS04 through ABPSS07 were collected from the top of the berm. Soil borings ABPSB01 through ABPSB04 were advanced at location in the top of the berm equidistant around the pond. Seven subsurface soil samples were collected from the four soil borings. Four sediment samples, ABPSD01 through ABPSD04, were also collected and analyzed for Appendix IX metals, Appendix IX VOA, Appendix IX SVOA, and explosives. Groundwater samples were not collected as part of this investigation.

Two VOCs, 3 SVOCs, and 15 inorganics were detected in surface soil (0 to 2 feet bgs). No VOCs and SVOCs were present in surface soil at concentrations in excess of the RBCs (Risk Based Concentrations) or SSLs (Soil Screening Levels). Arsenic was the only inorganic in surface soil which exceeded the RBCs for industrial exposures. Two VOCs, one SVOC, and 13 inorganics were detected in subsurface soil (2 to 12 feet bgs). No compounds were present in

subsurface soil at concentrations in excess of the RBCs or SSLs. Two VOCs, 15 SVOCs, and 14 inorganics were detected in sediment samples. Arsenic was the only compound in sediment which exceeded the RBCs for industrial exposures. The RBC for arsenic is 3.8 mg/kg. No explosives were detected in any of the samples. Results are presented in Table 5.1-1.

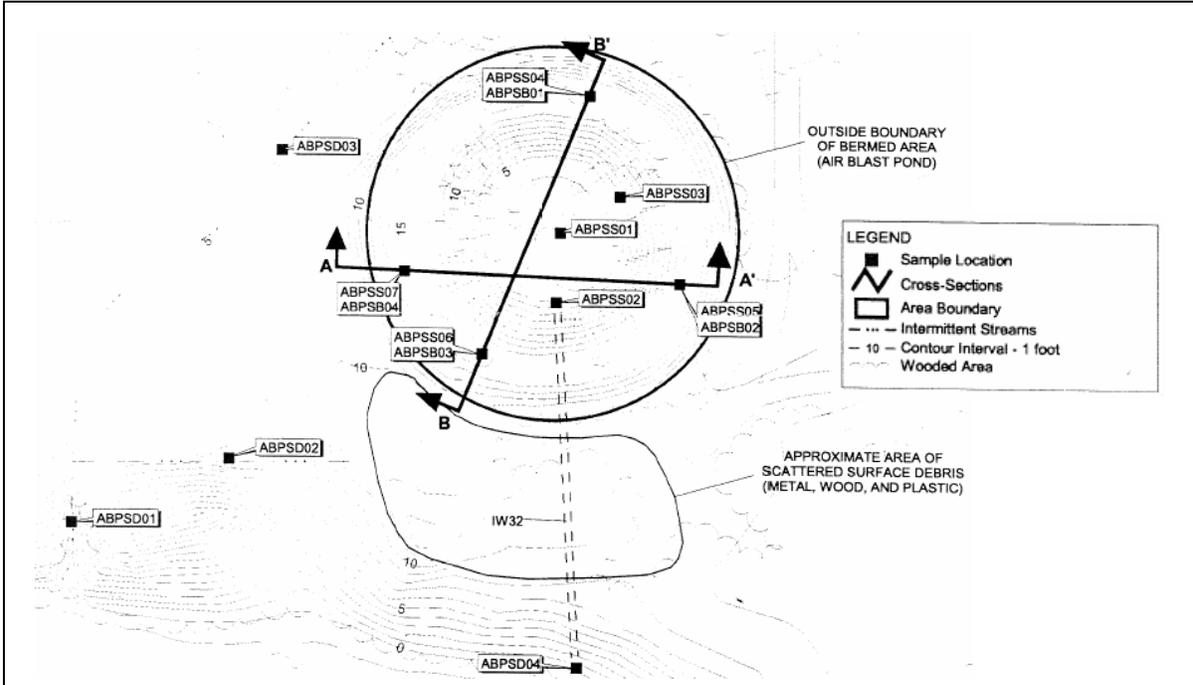


Figure 5.1-14: RFI/VI sample locations

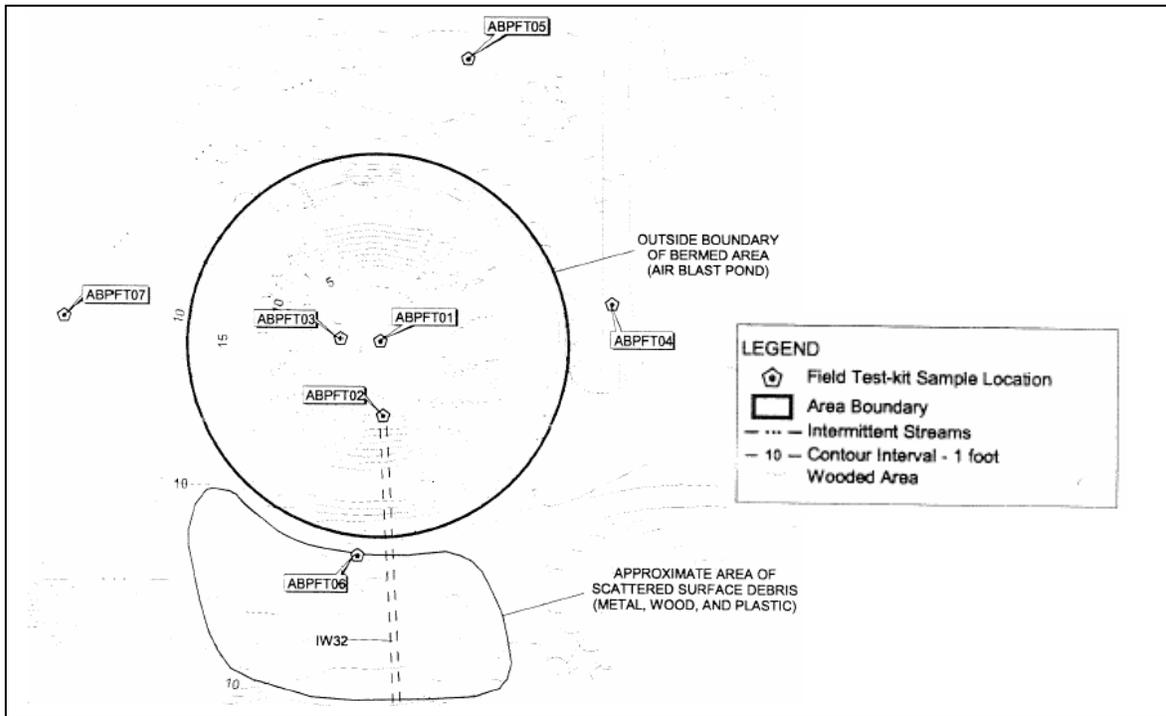


Figure 5.1-15: Field screening test locations

Table 5.1-1 1998 Air Blast Pond Soil and Sediment Results

<b>SURFACE SOIL SAMPLE RESULTS</b>					
<b>Sample</b>	<b>ABPSS01</b>	<b>ABPSS02</b>	<b>ABPSS03</b>	<b>ABPSS04</b>	<b>ABPSS04-Duplicate</b>
<b>Sample Depth (feet bgs)</b>	<b>0-2</b>	<b>0-2</b>	<b>0-2</b>	<b>0-2</b>	<b>0-2</b>
<b>Units</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>
<b>VOLATILES</b>					
Acetone					
Styrene	92				
<b>SEMIVOLATILES</b>					
Bis(2-Ethylhexyl)phthalate	51 J		110 J		
Chrysene					
Phenanthrene					
<b>METALS</b>					
Antimony	0.46 L		0.24 L	0.36 L	0.28 L
Arsenic	<b>9.6</b>		1.7	3.0	2.9
Barium	8.2	6.2	15.5	49.6 J	40.0 J
Beryllium			0.22	0.47	0.51
Cadmium	0.69	0.59 K	0.22 K		
Chromium	5.9 J	4.3 J	9.8 J	22.1 J	26.3 J
Cobalt	2.3	0.59	1.1	3.1	2.5
Copper	33.8	33.1	20.8	9.1	8.5
Lead	47.0 J	8.2 J	15.0 J	10.0 J	8.9 J
Mercury	0.02	0.02	0.05	0.06	0.04
Nickel	7.6	1.2	2.8	6.2	5.6
Selenium	1.1	0.29	0.58	0.98	0.95
Silver					
Vanadium	6.5	5.0	15.0	30.6	32.4
Zinc	80.8 J	58.8 J	19.7 J	22.0 J	21.1 J

<b>Sample</b>	<b>ABPSS05</b>	<b>ABPSS06</b>	<b>ABPSS06-Duplicate</b>	<b>ABPSS07</b>
<b>Sample Date</b>	<b>0-2</b>	<b>0-2</b>	<b>0-2</b>	<b>0-2</b>
<b>Units</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>
<b>VOLATILES</b>				
Acetone	2000			660 J
Styrene				
<b>SEMIVOLATILES</b>				
Bis(2-Ethylhexyl)phthalate			2600 J	
Chrysene		67 J		
Phenanthrene		63 J		
<b>METALS</b>				
Antimony	0.58 L	0.30 L		0.24 J
Arsenic	2.5	2.8	2.7	1.7
Barium	32.9 J	27.8 J	12.5 J	47.0 J
Beryllium	0.41	0.27	0.21	0.44
Cadmium		0.16		
Chromium	22.4 J	15.9 J	9.9 J	10.2 J
Cobalt	2.2	2.4	3.9	4.0
Copper	7.6	10.9	12.6	17.3

**FINAL PRELIMINARY ASSESSMENT**

Lead	8.9 J	8.4 J	9.3 J	9.1 J
Mercury	0.04	0.03	0.04	0.03
Nickel	4.5	5.5	3.6	4.1
Selenium	1.1	0.77	0.61	0.58
Silver			0.08	
Vanadium	28.3	19.4	16.3	16.2
Zinc	19.2 J	25.1 J	13.8 J	20.3

<b>SUBSURFACE SOIL SAMPLE RESULTS</b>				
<b>Sample</b>	<b>ABPSB01</b>	<b>ABPSB02</b>	<b>ABPSB02</b>	<b>ABPSB03</b>
<b>Sample Depth</b>	<b>4-6</b>	<b>4-6</b>	<b>10-12</b>	<b>4-6</b>
<b>Units</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>
<b>VOLATILES</b>				
Acetone		830 J	530 J	
Methylene Chloride				
<b>SEMIVOLATILES</b>				
Bis(2-Ethylhexyl)phthalate	2100 J			
<b>METALS</b>				
Antimony		0.48 L	0.24 L	
Arsenic	3.0	2.5	1.8	
Barium	70.8 J	38.5 J	27.7 J	37.1 J
Beryllium	0.40	0.47	0.40	
Chromium	18.5 J	24.2	28.2 J	13.8 J
Cobalt	3.2	2.8	1.1	2.9
Copper	11.9	7.6		9.4
Lead	14.7 J	9.4 J	6.6 J	7.9 J
Mercury	0.05	0.04		
Nickel	5.9	5.5	3.1	
Selenium	0.85	0.67	0.70	1.8
Vanadium	26.5	30.3	28.8	19.0
Zinc	21.6	19.7 J	13.7 J	20.0 J

<b>Sample</b>	<b>ABPSB03</b>	<b>ABPSB04</b>	<b>ABPSB04</b>
<b>Sample Depth</b>	<b>9-11</b>	<b>4-6</b>	<b>10-12</b>
<b>Units</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>
<b>VOLATILES</b>			
Acetone	600 J	1100 J	970 J
Methylene Chloride		7 J	
<b>SEMIVOLATILES</b>			
Bis(2-Ethylhexyl)phthalate			1200 J
<b>METALS</b>			
Antimony		0.37 L	0.34 L
Arsenic	1.4	2.7	3.5
Barium	22.9 J	40.4 J	21.1 J
Beryllium	0.40	0.50	0.45
Chromium	22.7 J	14.3 J	19.4 J
Cobalt	1.5	3.9	2.6
Copper		6.6	6.5
Lead	6.3 J	12.8 J	5.6 J
Mercury		0.03	0.02
Nickel	3.0	5.5	3.2
Selenium	0.65	0.76	1.2

**FINAL PRELIMINARY ASSESSMENT**

Vanadium	23.1	22.5	20.9
Zinc	12.8 J	22.8 J	13.2 J

<b>SEDIMENT SAMPLE RESULTS</b>				
<b>Sample</b>	<b>ABPSD01</b>	<b>ABPSD02</b>	<b>ABPSD03</b>	<b>ABPSD04</b>
<b>Units</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>
<b>VOLATILES</b>				
1,1,1 Trichloroethane		2 J	2 K	
Carbon Disulfide				3 J
<b>SEMIVOLATILES</b>				
Acenaphthylene			170 J	
Anthracene			160 J	
Benzo(a)anthracene			580 J	
Benzo(a)pyrene			510 J	
Benzo(b)fluoranthene			950 J	
Benzo(g,h)perylene			320 J	
Benzo(k)fluoranthene			720 J	
Bis(2-ethylhexyl)phthalate			150 J	58 J
Chrysene			810 J	
Di-n-butyl phthalate				40 J
Dibenzo(a,h)anthracene			130 J	
Fluoranthene			860 J	
Indeno(1,2,3-cd)pyrene			340 J	
Phenanthrene			99 J	
Pyrene			970 J	
<b>METALS</b>				
Arsenic	1.5	2.9	<b>5.8</b>	1.2
Barium	19.0 J	23.5 J	80.6 J	18.3 J
Beryllium		0.37 K	0.52 K	
Cadmium			0.39 K	0.18 K
Chromium	10.7 J	18.7 J	20.0 J	6.4 J
Cobalt	1.1	1.9	4.4	2.1
Copper	5.7	15.5	90.0	8.6
Lead	9.3	14.2	141	7.9
Mercury	0.03	0.02	0.12	0.03
Nickel	2.3	4.1	11.5	4.3
Selenium	0.51	0.89	1.1	0.35
Tin			10.0	
Vanadium	18.2 J	30.9 J	40.5 J	9.1 J
Zinc	15.9 J	18.3 J	337 J	32.9 J

Arsenic in surface soils was determined to be the only constituent of potential concern. However, the maximum concentration detected (9.6 mg/kg) is similar to the 95 percent upper tolerance limit value established for the base-wide background surface soils (4.25 mg/kg) and background soils concentrations reported for the State of Maryland (7.1 mg/kg). Therefore, as a result of the soil and sediment investigation at the Air Blast Pond, “No further action” was recommended. Groundwater samples, however, were not collected as part of the 1998 RFI/VI.

The Air Blast Pond is located within the estimated firing fan from The Valley, located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Air Blast Pond. Refer to Section 5.7 in the Final PA Report for the Main Installation, Indian Head for information on The Valley. For the purposed of the PA, only the munitions constituents that specifically relate to the Air Blast Pond are considered.

#### ***5.1.7. Contaminant Migration Routes***

Samples collected during the 1998 RFI/VI indicate that no explosive compounds were present in the soils at the Air Blast Pond. Therefore, there are no contaminant migration routes for MC at the Air Blast Pond.

#### ***5.1.8. Receptors***

Potential human receptors of MEC include authorized Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users (hunters) and trespassers. Plant and animal biota are also potential MEC receptors. Examples of ecological receptors include deer, wild turkey, and waterfowl.

##### **5.1.8.1. Nearby Populations**

Charles County contains approximately 261.5 people/mi<sup>2</sup> according to the 2000 U.S. Census. NDW, Indian Head and its tenant commands employ approximately 3,600 military and civilian personnel. Indian Head is the county's largest employer. Over 76 percent of the employees at the base live within Charles County. Approximately 500 military and family members live on the installation; however, no military or family members live on Stump Neck Annex. Recreation on and around the installation includes hunting and fishing by permit. The Chicamuxen Wildlife Management Area is located adjacent to the Air Blast Pond, and it is used by recreational hikers, hunters, and fishers. Residential properties are located within two miles south of the range.

##### **5.1.8.2. Buildings Near/Within Site**

The buildings associated with the Air Blast Pond have been demolished, and no buildings remain at the range. Based on installation maps and interviews, it is estimated that the buildings were

demolished in the mid-1990s. Table 5.1-2 lists the details of the former buildings and Figure 5.1-16 shows the locations of the former buildings.

Table 5.1-2: Air Blast Pond Building Descriptions				
Building No.	Location	Date Built	Use	Status
2001	Northeast of pond	1946	NOL Office	Demolished
2002	Northeast of pond	1955	NOL Air Blast Pond Control House	Demolished
2003	Northeast of pond	1956	NOL Air Blast Pond	Demolished
2064	Northeast of pond	1946	NOL Ordnance Storage	Demolished
2097	Northeast of pond	1946	NOL Camera Building	Demolished

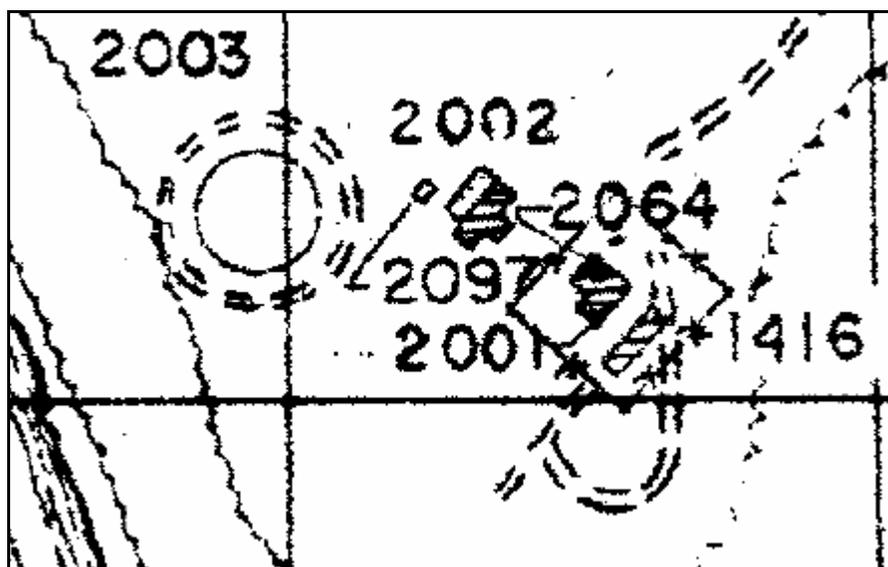
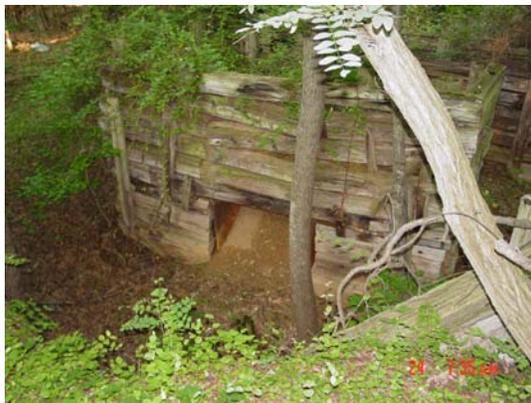


Figure 5.1-16: 1983 map showing former buildings and pond

Other structures associated with the pond still exist; however, they are in disrepair. These structures include a wooden observation platform, stairs, a wooden bunker, and a concrete and wooden tank with platform (Figure 5.1-17 and Figure 5.1-18).



**Figure 5.1-17: Wooden bunker still present at the Air Blast Pond**



**Figure 5.1-18: Concrete tank still present at the Air Blast Pond**

### **5.1.8.3. Utilities On/Near Site**

A sanitary sewer line runs through the Air Blast Pond. The sanitary sewer line was probably left in place after the buildings were demolished. The construction plans identify a septic field by the buildings and an 8-inch storm drain leading to the creek. The historic storm sewer line is shown on the design plan in Figure 5.1-4.

### **5.1.9. Land Use**

Prior to construction of the Air Blast Pond, the area was undeveloped. For example, a 1949 map showing the conditions at Stump Neck lists this area as “cultivated.” From 1955 until 1975, the range was used by the NOL for testing bulk high explosives. After the NOL relocated the training to Dahlgren, the buildings were demolished. The Air Blast Pond and surrounding area are currently unused. According to the installation, there are no planned changes to activities at the Air Blast Pond.

### **5.1.10. Access Controls / Restrictions**

No public access is authorized at the Stump Neck Annex. Signs, partial fencing, locked/secured gates, login book/office check-in, and vehicle security patrol are used to control the entire facility. The Air Blast Pond is surrounded by forests on the north, east, and west. Chicamuxen Creek borders the range to the south; access from the water is not controlled. According to the 2003-2004 Stump Neck Annex Hunting Map, hunting is permitted within the Air Blast Pond. There are no access control features specific to the Air Blast Pond.

According to the Master Plan Update, many of the soil types on Stump Neck and Indian Head have load bearing capacity limitations as a result of high water tables and extreme erodability conditions. Based on this information, the installation has limited construction and the use of septic systems in specific areas of concern. The Air Blast Pond is located in a region that has seasonal high water table. The range is also located in a restricted area in which a waiver is required for septic systems.

**5.1.11. Conceptual Site Model**

This Conceptual Site Model (CSM) was developed following guidance documents issued by the USEPA for hazardous waste sites and by the U.S. Army Corps of Engineers (USACE) for OE sites. Guidance documents included the USEPA’s Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (EPA/540/G-89/004) and the USACE CSM Guidance Development of Integrated Conceptual Site Models for Environmental OE Sites, which was final as of February 2003.

The CSM describes the range and its environmental setting. The CSM presents information regarding: 1) MEC and/or MC known or suspected to be at the range; 2) current and future reasonably anticipated or proposed uses of the real property; and 3) actual, potentially complete, or incomplete exposure pathways that link them. The CSM is the basis for the risk evaluation, prioritization, and remediation cost estimate.

The CSM is presented in a series of information profiles that presents information about the range. The information profiles are included in Table 5.1-3 below.

<b>Table 5.1-3: Conceptual Site Model Information Profiles – AIR BLAST POND</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
<b>Range/Site Profile</b>	Installation Name	NDW, Indian Head
	Installation Location	Indian Head, Charles County, Maryland
	Range/Site Name	Air Blast Pond
	Range/Site Location	Air Blast Pond is located in the Stump Neck Annex portion of NDW, Indian Head. It is located south of Archer Avenue and north of the Chicamuxen Creek.

**Table 5.1-3: Conceptual Site Model Information Profiles – AIR BLAST POND**

Profile Type	Information Needs	Preliminary Assessment Findings
	Range/Site History	The Air Blast Pond was used for testing bulk high explosives from 1955 to 1975.
	Range/Site Area and Layout	This 3.72-acre range is roughly circular in shape. The range consists of an unlined earthen pit approximately 100 feet in diameter. The pit is man-made and is surrounded by an earthen berm. The range is overgrown and scattered with metal, wood and concrete debris.
	Range/Site Structures	<p>All buildings at the range have been demolished. However, there are numerous structures associated with testing at the Air Blast Pond that remain, including:</p> <ul style="list-style-type: none"> <li>• Wooden steps into the pond</li> <li>• Tank on a platform</li> <li>• Wooden bunker</li> <li>• Wooden observation platform</li> <li>• Concrete steps to top of berm</li> <li>• Metal piping in pond and on berm</li> </ul>
	Range/Site Boundaries	<p>N: Undeveloped property, consisting of an emergent forest, forms the northern boundary of the range.</p> <p>S: Chicamuxen Creek forms the southern boundary of the range.</p> <p>W: Undeveloped property forms the western boundary of the range.</p> <p>E: The unnamed access road and a grass field form the eastern boundary of the range.</p>
	Range/Site Security	The Air Blast Pond is located on the Stump Neck Annex, which is a fenced and guarded installation. Once within the Stump Neck Annex, access to the Air Blast Pond is not controlled.
<b>Munitions/ Release Profile</b>	Munitions Types	Records indicate that bulk high explosives were tested at the range. However, a 57-mm projectile was discovered during the visual survey. The source of the 57-mm projectile is unknown. Munitions associated from The Valley firing fan are potentially located at the Air Blast Pond.

**Table 5.1-3: Conceptual Site Model Information Profiles – AIR BLAST POND**

Profile Type	Information Needs	Preliminary Assessment Findings
	Maximum Probability Penetration Depth	The range was reportedly used for testing concussion factors of various bulk high explosives suspended above or in the water. Based on this information, there is no associated penetration depth for the bulk high explosives. However, the 57mm projectile observed on the berm has an estimated penetration depth of four feet in sandy soil to 8.5 feet in clayey soil. Penetration depth associated with munitions from The Valley firing fan are included in Section 5.15.5
	MEC Density	The location of the 57mm is classified as a Known MEC Area. The remainder of the Air Blast Pond is classified as a Suspect MEC Area. The density of MEC at the Air Blast Pond is medium. The density is estimated at medium because MEC was discovered during the range visit.
	Munitions Debris	Various types of Munitions Debris were observed during the visual survey of the range. These items included an end cap for a C-4 block and random MEC debris. Munitions Debris were not observed outside the general vicinity of the former pond.
	Associated Munitions Constituents	<p>Historical evidence indicates that MC could include:</p> <ul style="list-style-type: none"> <li>• Pentolite (a mixture of TNT and PETN)</li> <li>• HBX-1 (a mixture of RDX, TNT, and aluminum)</li> <li>• HBX-2 (a mixture of RDX, TNT, and aluminum)</li> <li>• H-6 (a mixture of RDX, TNT, and aluminum)</li> <li>• C-4 (a mixture of RDX and plasticizer, over 90% is RDX)</li> </ul> <p>As part of the 1998 RFI/VI, surface soil, subsurface soil, and sediment samples were collected. No MC was found within samples.</p>
	Migration Routes/Release Mechanisms	No migration routes are considered for the Air Blast Pond since sampling results confirmed MC is not present in soil.

**Table 5.1-3: Conceptual Site Model Information Profiles – AIR BLAST POND**

Profile Type	Information Needs	Preliminary Assessment Findings
Physical Profile	Climate	Indian Head, Maryland has a continental-type climate with four well-defined seasons. The coldest period occurs in late January and early February, with low temperatures averaging at 29°F. July is the warmest month with average maximum temperatures of 85°F. The normal annual precipitation is approximately 44 inches, with normal monthly precipitation varying from 2.25 (February) to 4.60 (August) inches.
	Topography	Elevations at the range range from zero to 15 meters above sea level asl. The berm slopes steeply from five to 15 meters above msl. The area surrounding the Air Blast Pond is relatively level at approximately five meters above msl.
	Geology	Indian Head and Stump Neck lie within the Atlantic Coastal plain physiographic province. The geology of the area is comprised of Precambrian igneous and metamorphic bedrock overlain by 500 to 600 feet of unconsolidated fluvial and marine deposits of the Potomac Group. The Potomac Group consists of, in descending order, the Patapsco, Arundel, and Patuxent Formations.
	Soil	Soils in the area consist of silty sand with gravel at the ground surface underlain by silty sand with clay. Specifically, Keyport silt loam with a two to five percent slope is present at the range.
	Hydrogeology	The hydrogeological makeup of the Indian Head area consists of a surficial aquifer and several deeper confined and semi-confined aquifers in the Patapsco and Patuxent Formations. The surficial aquifer is expected to be connected to and influenced by the surface water bodies. Regional water supplies, including that of NDW, Indian Head, are obtained from the lower and middle sands of the Patapsco and Patuxent Formations of the Potomac Group. The surficial aquifer (i.e., water table) is not used for water supply at NDW, Indian Head.

Table 5.1-3: Conceptual Site Model Information Profiles – AIR BLAST POND		
Profile Type	Information Needs	Preliminary Assessment Findings
	Hydrology	Surface water at the Air Blast Pond drains either directly into the Chicamuxen Creek or to an unnamed tributary of Chicamuxen Creek. Water was pumped from the Chicamuxen Creek to fill the pond, and water was discharged through the same pipe system to Chicamuxen Creek.
	Vegetation	Vegetation at the range is a mixture of grass and hardwood forest.
Land Use and Exposure Profile	Current Land Use	The Air Blast Pond is currently undeveloped and is no longer in use as a testing facility.
	Current Human Receptors	Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users, and trespassers.
	Current Activities (frequency, nature of activity)	The Air Blast Pond is accessed infrequently. At the time of the visual survey, it was evident that the grass area along the access road had not been mowed recently.
	Potential Future Land Use	There is no known planned change in future land use.
	Potential Future Human Receptors	Navy personnel (military and civilian), visitors, trespassers, contractors, construction workers (if intrusive work is necessary) and maintenance and operations workers, as well as recreational users (hunters).
	Potential Future Land Use-Related Activities:	There is no anticipated change in land use or related activities.
	Zoning/Land Use Restrictions	The range is located in a restricted area in which a waiver is required for septic systems based on highly erodible soils and high water tables.
	Demographics/Zoning	Charles County population density is approximately 260 persons per square mile, while NDW, Indian Head and its tenant commands employ approximately 3,600 military and civilian personnel.
	Beneficial Resources	None.
Ecological Profile	Habitat Type	The range consists of grassland and hardwood forest. The surrounding area includes the following habitats: emergent forest, mature forest, stream, and wetland.

Table 5.1-3: Conceptual Site Model Information Profiles – AIR BLAST POND		
Profile Type	Information Needs	Preliminary Assessment Findings
	Degree of Disturbance	Low – Site is/will be unused; habitat and species present are/will be undisturbed (i.e., undisturbed grassland and forest). However, if the grass area is mowed in the future the degree of disturbance would be moderate. Moderate – Activities at the site include (will include) moderate disturbance (i.e., mowing).
	Ecological Receptors	
	Federal Endangered Species:	American bald eagle, rainbow snake, sensitive joint-vetch
	Federal Threatened Species:	None
	State Endangered Species:	Scaly blazing-star
	State Threatened Species:	None
	Other Ecological Receptors:	Other ecological receptors include numerous species of birds, reptiles and mammals such as the white tailed deer, wild turkey, the red-bellied woodpecker and the eastern box turtle.
Relationship of MEC/MC Sources to Habitat and Potential Receptors	Receptors may contact MEC in the subsurface soil. Receptors may have contact with MC directly through surface water/soil or indirectly through the food chain (bioaccumulated in plants and animals).	

A key element of the CSM is the exposure pathway analysis. For MEC, a complete or potentially complete exposure pathway must include the following components: 1) a source (e.g., locations where MEC are expected to be found); 2) access (e.g., controlled or uncontrolled access, items on the surface or within the subsurface); 3) an activity (e.g., non-intrusive grounds maintenance or intrusive construction); and 4) receptors (e.g., Navy personnel [military and civil servants], construction workers, recreational users, authorized visitors, ecological receptors). It is important to recognize that environmental mechanisms (e.g., erosion) and/or human intervention may result in the repositioning of MEC.

For MC, a complete or potentially complete exposure pathway must include the following components: 1) a source (e.g., locations where MC are expected to be found); 2) an exposure medium (e.g., surface soil); 3) an exposure route (e.g., dermal contact); and 4) receptors (e.g., Navy personnel [military and civil servants], construction workers, recreational users, authorized

visitors, ecological receptors). If the point of exposure is not at the same location as the source, the pathway may also include a release mechanism (e.g., volatilization) and a transport medium (e.g., air).

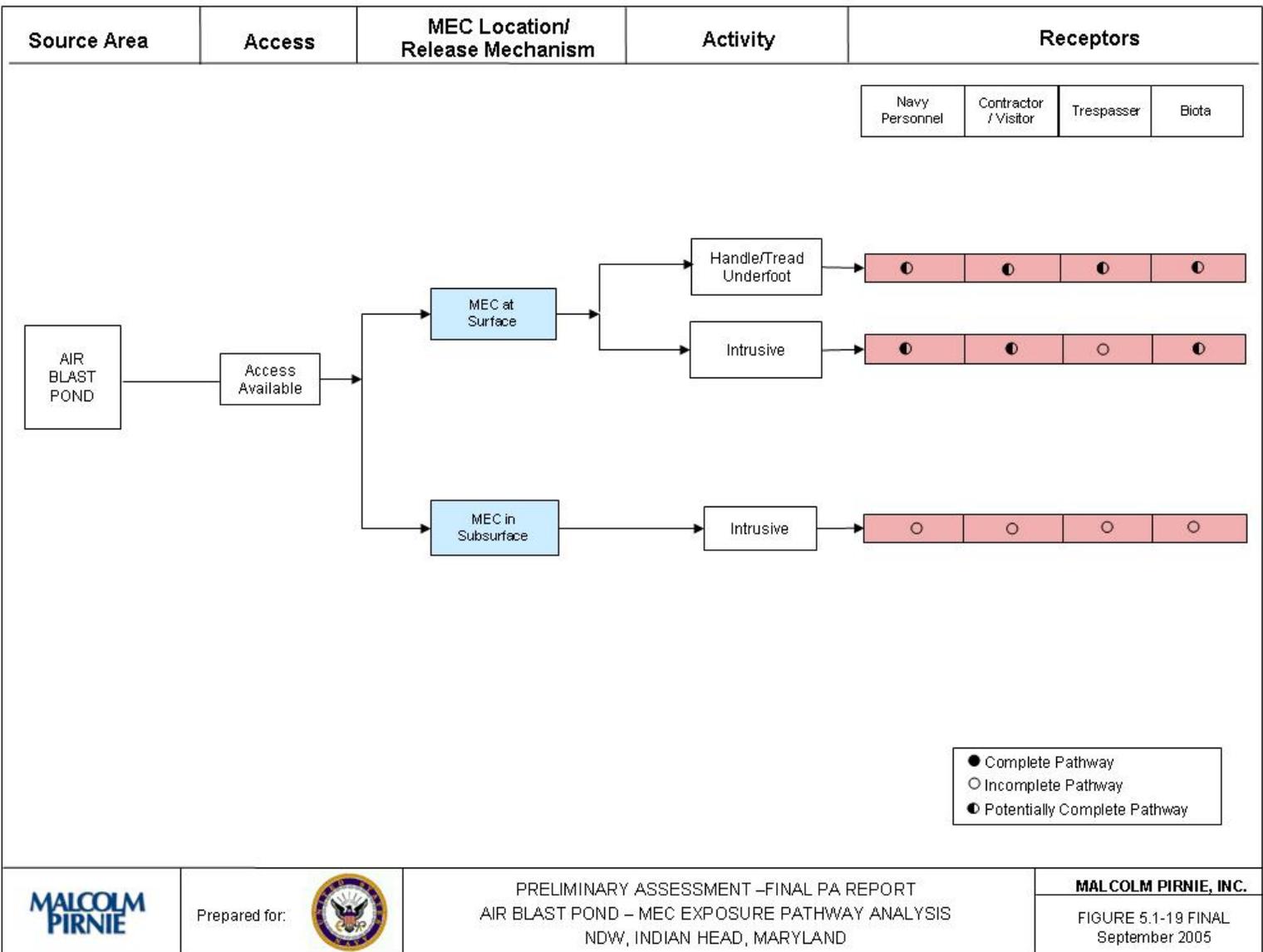
The potential interactions between the source and receptors are assessed differently between MEC and MC. For MEC, interaction between the potential receptors and a MEC source has two components. The receptor must have access to the source and must engage in some activity that results in contact with individual MEC items within the source area. For MC, interaction between the source and receptors involves a MC release mechanism, an exposure medium containing the MC, and an exposure route that places the receptor into contact with the contaminated medium. An exposure pathway is incomplete if any one component is lacking and unlikely to be present in the future. All potential exposure pathways are typically initially considered and then information on current and reasonably anticipated future conditions is used to assess whether an exposure pathway is complete, potentially complete, or incomplete.

The following CSM exposure pathways analysis focuses only on the Air Blast Pond and does not consider impacts from The Valley firing fan. For exposure pathway analysis for The Valley Impact Area, refer to Section 5.5.11.

At the Air Blast Pond, evidence found during the visual survey suggests that MEC may be present; however, the density of the MEC is not known. Therefore, potentially complete pathways exist for human and ecological receptors for MEC in the surface soil. This includes receptors for hand/tread underfoot contact as well as surface intrusive work that may be conducted at the Air Blast Pond. These activities include, but are not limited to, excavation, plowing, tilling, construction, and environmental sampling for human receptors. Ecological receptors may come in contact with MEC through burrowing, nesting, or feeding activities that disturb surface soil. Trespassers are anticipated to be exposed to non-intrusive surface soil activities at the range, but it is unlikely they would be exposed to subsurface soil through intrusive activities. MEC are not expected in the subsurface. An Exposure Pathway Analysis figure for MEC is presented in Figure 5.1-19.

According to sampling results from the 1998 RFI/VI, there is no MC present at the Air Blast Pond. Thus, there is no MC Exposure Pathway Analysis figure.

Figure 5.1-19: MEC Exposure Pathway Analysis



*5.1.12. Summary*

The Air Blast Pond is 3.72-acres located in the central portion of the NDW, Indian Head Stump Neck Annex. The Air Blast Pond was used by the NOL for testing bulk high explosives from 1955 to 1975. The bulk explosives were suspended over a water filled man-made earthen pit approximately 100 feet in diameter, and repercussion factors in the water were measured. Potential MC related materials include Pentolite, HBX-1, HBX-2, H-6, and C-4. A 57mm projectile was found during visual survey; but the source of the projectile is unknown. The Air Blast Pond is currently undeveloped and wooded. Limited sampling of soil and sediment were conducted in 1998. No energetic compounds were detected in the samples. Arsenic in surface soil and sediment was the only constituent of potential concern found during the investigation. Arsenic levels, however, were found to be close to background levels; thus “No further action” was recommended. No groundwater samples, however, were collected during the 1998 RFI/VI.

**Map 5.1-1: Visual Survey: Air Blast Pond**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.1-2: Range/Site Details: Air Blast Pond**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.1-3: Munitions Characterization: Air Blast Pond**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

## 5.2. AREA 8

### 5.2.1. *History and Site Description*

Area 8, the Underwater Ordnance Training Area, is a 22.61-acre range in the central portion of the Stump Neck Annex south of Archer Avenue along Roach Road. Roach Road bisects Area 8 in an approximate north-to-south direction. A one-acre former ten to 15 foot deep explosive test pond is located in the southern portion of Area 8. A volleyball court was also once present southeast of former Building 2104. The Joint Services EOD Equipment Magnetic Evaluation Facility (Building 2210) is currently located on the former range. The building and its associated parking lot and landscaping were constructed in 2003. The remainder of Area 8 is undeveloped and heavily wooded with trails throughout the woods. Area 8 is surrounded by the former Munitions Disassembly Facility to the north, Chicamuxen Creek to the north and northwest, the current Munitions Disassembly Facility to the east, and undeveloped property on the south, northeast, and southwest.

Area 8 was identified as a 20-acre range in the Navy Range Inventory and as a 9.6-acre range in the VI Report. The Area 8 footprint was revised based on field reconnaissance, historic maps, and additional data obtained for this PA. Buffer areas were applied to the water and air shot locations (Map 5.2-2) to determine the revised boundary of Area 8. The test location in the Chicamuxen Creek was also included in the revised footprint for Area 8. The 23-acre size of Area 8 is used in this report.

Area 8 was identified as SWMU #25, IR Site #63, in 1991 pursuant to the requirements of the RCRA Corrective Action Permit issued in 1990 by the USEPA. The Navy completed a Verification Investigation (VI) in June 1996. A summary of the VI findings are included in this PA.

The EOD School classified Area 8 as part of Division IV, Underwater Ordnance and Diving (classroom and practical). Division IV included two practical training areas: the underwater ordnance practical training area (Area 8, Building 19) and a diving locker (Building 1444) located at NDW, Indian Head Main Installation. Area 8 was the Underwater Ordnance Training Area used to train military personnel to defuse explosives devices from 1957 until 1999 when the EOD School relocated to Eglin Air Force Base. The pond was last used in 1993. Between 1957 and

## FINAL PRELIMINARY ASSESSMENT

1999, Area 8 was used in support of Navy EOD Basic Training and VIP (very important people) courses. The basic courses were used to test the students' abilities to locate, identify, and gather intelligence from an item; dispose of the item; and render the item safe. The VIP courses were provided to high ranking officers from different branches of the U.S. military and foreign services, along with civilian and governmental agencies, for good will purposes or for abbreviated instruction.

Navy EOD students received an additional two months of training on underwater devices, such as mines and torpedoes, at the EOD School. Navy students, who were qualified divers, would be required to confront Area 8. The Navy students would be required to confront any of the 72 test procedures or "problems" salting the mud and waters at Area 8. Each practice problem was connected to a half-pound block of TNT, located at a safe designated distance away. The practice item was designed to detonate under the same conditions that a real device would. The explosive would be set off if the student did not follow proper procedures to disarm the device. This hands-on practice was used to teach students what would happen when an improper procedure was used while deactivating a device. Students practiced on an assortment of devices including foreign devices (e.g. Soviet), WW II torpedoes, and Civil War ordnance. According to Mr. Gordon Miller, a retired EOD technician, there was also a line of underwater mines area near the pond. Inert underwater mines were setup along the road for render-safe procedures. Mr. Miller also mentioned that torpedoes were used in the pond and that students were responsible for two to three problems/procedures a day.

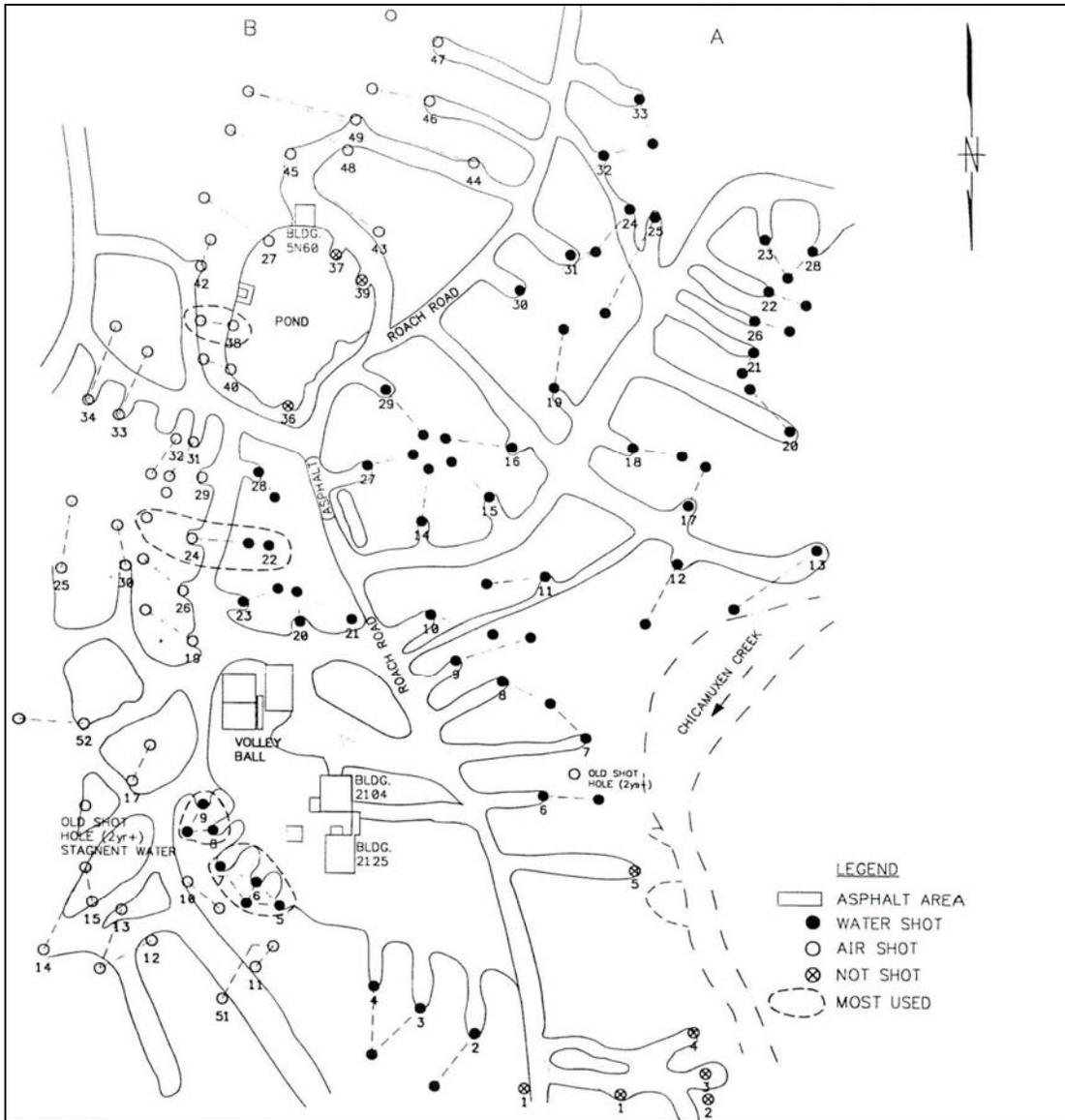
Area 8 included numerous water and air shot locations. In addition, the pond located in Area 8 was used to train military personnel to defuse underwater explosive devices. It was used for testing demolition charges: primers, detonators, fuzes and squibs. Training exercises at Area 8 were performed ten months out of the year, and approximately 12 classes used the training course each year. It is estimated that approximately 50 to 75 pounds of ordnance (net explosive weight) were used at this training facility every year. No more than 0.5 pounds of explosives was used at the air or water shot locations during training exercises. The type of ordnance used included TNT block, PETN, military dynamite, blasting caps, detonation cord, and similar devices.

The water and air shot locations have been the primary locations for training and testing activities. The known forty-one water shot and 30 air shot locations are located throughout Area 8 as shown in Figure 5.2-1. The 28 water shot locations to the west of Roach Road are known as

the “A-side” locations. The 13 water shot and 30 air shot locations east of Roach Road are known as the “B-side” locations. B-side locations 5, 6, 7, 8, 9, 22, and 23 were the most used water shot location; and B-side locations 24 and 38 were the most used air shot locations. A-side water shot location 7 is the closest to the Chicamuxen Creek and was the most used water shot location on A-side. The most used shot locations are also identified on Figure 5.2-1. A stagnant waterhole is also identified on Figure 5.2-1, and according to the 1996 VI, the stagnant waterhole was last used in 1993. An additional old shot location is identified on Figure 5.2-1 near Chicamuxen Creek, but details about this location were not provided in the VI.

The water shot locations consisted of six- to nine-foot deep holes, a few feet in diameter, that were filled with surface water to a depth of four to five feet. The explosive was placed between two and five feet below the water surface and the student would work on an inert item 30 feet away from the water shot location. The air shot locations had explosives suspended on a wire approximately two feet above the ground, and the student would work on an inert item 75 feet away from the air shot location.

The pond at Area 8 was also used for training. Inert mines and inert torpedoes were placed at the bottom of the pond, and students were required to dive to the bottom and perform reconnaissance on the inert items. There were approximately ten to 15 items on the bottom of the pond. There were also approximately 5 problems located along the edge of the pond, as shown in Figure 5.2-1.



**Figure 5.2-1: Water and air shot locations at Area 8 from 1995 VI Work Plan**

The Notice to Navigation Interests memorandum dated April 3, 1978 identifies an Underwater Demolition Training Area in the Chicamuxen Creek immediately west of Building 2104. Figure 5.2-2 shows the location of the 100-foot by 30-foot training area. The 1978 memo states that the demolition training operations were transferred to this range from the Potomac River. It also states:

Explosions will occur at irregular and intermittent periods during daylight hours only, approximately 350 times per year, at the training range. A warning patrol will be

maintained during explosive operations and charges will not be detonated at such times as they might endanger marine traffic passing the area. The demolition training area will be indicated by displaying a BRAVO flag on flagpole. Vessels are advised not to remain within one-eighth mile of the training range. No tests are to be conducted during the months of April and May in any year.

According to a retired Navy EOD technician, the Chicamuxen Creek was used for training associated with Area 8. In approximately 1981, a mine was half buried in the creek, and students would be required to perform reconnaissance and complete a problem on the half buried mine. The training in the creek was identical to the air and water shot training conducted in the rest of Area 8, but this problem was complicated by the muddy conditions at the creek. All training, with the exception of shot training, involved inert items. The time period of training in the creek is estimated as 1978 to 1999 based on the memo and the closure of the EOD School.

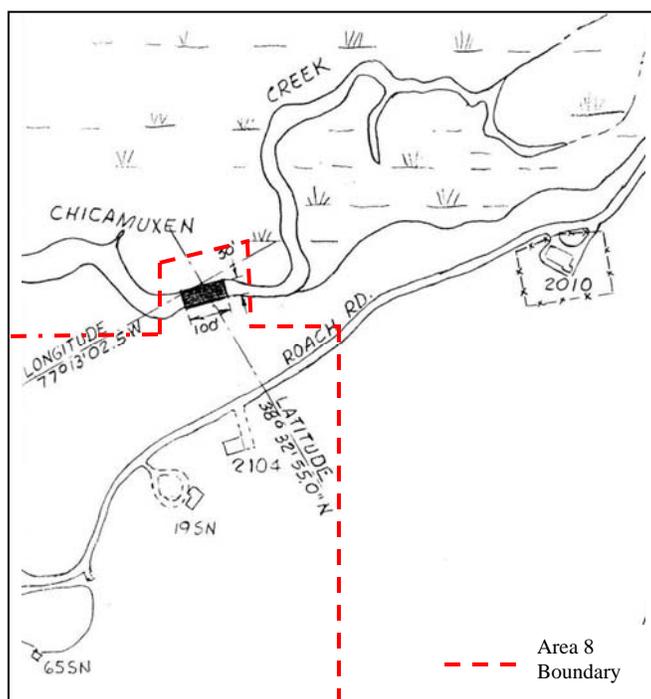


Figure 5.2-2: Map from 1977 showing EOD training area in Chicamuxen Creek

### 5.2.1.1. Topography

Section 3.2 provides a general description of topography for the Stump Neck Annex. The terrain at Area 8 is very steep and slopes from about 90 feet above msl in the southeast to above msl in the northwest. The high point of Area 8 is located in the southern portion of the range. The

southern portion of the range slopes steeply downward toward the pond, which is located in the central portion of the range. The pond is located at an elevation of approximately 35 feet above msl. The northern portion of Area 8 has a more gradual downward slope towards the Chicamuxen Creek and its surrounding wetlands in the northwest portion of the range. Two acres of wetlands border the range to the northwest. Due to the topography of the area and the complete vegetative ground cover, severe erosion is not considered to be a problem.

#### 5.2.1.2. Geology

Section 3.3 provides a geologic description for Indian Head and the Stump Neck Annex. Subsurface soil was classified in the field for the three soil borings and three monitoring wells installed at the range during the 1996 VI. This information was used to classify the range geologic conditions. The shallow subsurface geology of the study area, as observed from the boring logs, consisted of silty sand with clay. The relative amounts of sand, silt, and clay varied somewhat at each location.

#### 5.2.1.3. Soil and Vegetation Types

Section 3.4 provides a description of the soil and vegetation types at Indian Head and the Stump Neck Annex. Area 8 is heavily wooded hardwood forest except for cleared areas surrounding the pond and the on-range buildings, as well as the wetland areas in the northwestern portion of the range. There is minimal undergrowth on the slopes and more undergrowth, such as ferns, closer to the creek and wetlands. The wetland area on-range is classified by the installation as Palustrine forested broad-leaved deciduous wetland. Figure 5.2-3 shows the pond and the surrounding vegetation, and Figure 5.2-4 shows the woodland vegetation at Area 8.



**Figure 5.2-3: View of pond at Area 8 and the surrounding vegetation.**

According to the Soil Survey of Charles County, soil at Area 8 is a mixture of Aura gravelly sandy loam with five to ten percent slopes, Aura gravelly sandy loam with ten to 15 percent slopes, and steep gravelly land. The majority of the range is five to ten percent slope, including the central portion and the portion of the range west of Roach Road adjacent to the Chicamuxen Creek. A small portion of the southeastern corner of the range is ten to 15 percent slope. The soils are



**Figure 5.2-4: View of woods surrounding Area 8 east of Roach Road.**

moderately eroded soils with moderately slow permeability, moderate available moisture capacity, and suitability for building and woodland. A section of the steep gravelly land extends on a north to south line along the eastern boundary of the range. The gravel content of this unit ranges from about 20 to 80 percent by volume. Most of the gravel is quartz pebbles, and the slopes range from about 15 to 20 percent in grade.

During construction of the Joint Forces EOD Equipment Magnetic Evaluation Facility in 2003, activities affecting the soil included earth movement and excavation of the top six feet of soil. It is not known if the excavated soil was transported off-range or used as fill material on-range during construction.

#### **5.2.1.4. Hydrology**

Section 3.5 provides a description of hydrology at Indian Head and the Stump Neck Annex. Two acres of wetlands are located on and bordering the northwestern portion of Area 8. Chicamuxen Creek borders Area 8 to the north and northwest and is shown in Figure 5.2-5. Surface water drains to these two surface water bodies, the former training pond, and drainage swales adjacent to Building 2210SN and its parking lot. The wetlands and Chicamuxen Creek drain to the Potomac River. A major portion of Area 8 is located within the 100-year floodplain.



**Figure 5.2-5: View of Chicamuxen Creek immediately west of Area 8 and Roach Road**

#### **5.2.1.5. Hydrogeology**

Section 3.6 provides a description of the hydrogeology for Indian Head and the Stump Neck Annex. Hydrogeological conditions at Area 8 have been interpreted from data obtained during the VI field investigations. Three monitoring wells were installed on-range during the VI. The range is characterized by a shallow groundwater table contained within a silty sand with clay aquifer. The groundwater table in Area 8 ranges from the surface, at the wetlands located in the northwestern portion of the range, to 30 feet bgs. A potentiometric groundwater map created in 1995 shows groundwater flowing toward the wetlands to the northwest at a gradient of approximately 0.047. Using this potentiometric surface gradient and an effective aquifer porosity of 30 percent, the groundwater velocity was calculated to be 84 feet per year. Rising-head and falling-head slug tests performed in 1995 showed the average hydraulic conductivity to be 1.47 feet per day.

#### **5.2.1.6. Cultural and Natural Resources**

General cultural and natural resources for the Stump Neck Annex are provided in Section 3.7. Since the majority of the range is undeveloped, there is the potential for wildlife to exist at the

range. The pond at Area 8 is also stocked for fishing. According to the 2003-2003 Stump Neck Annex Hunting Map, hunting is not permitted in Area 8. The Chicamuxen Wildlife Management Area is located approximately 1000 feet downstream of Area 8.

Although the potential for cultural resources exists for the area in which the range is located, there have not been any specific archeological or cultural sites identified near the range. A total of 70 shovel tests were excavated in this area during the Phase I Cultural Resources Survey of Stump Neck Annex and Supplemental Architectural Investigations from August 1996. A single isolated artifact, a fragment of quartz block/shatter, was recovered from Area 8. The survey concluded that such an isolated prehistoric artifact probably reflects nothing more than a single episode of tool curation or cobble testing. No sites were identified on the Maryland Register of Historic Places (State Register) or the National Register of Historic Places.

#### **5.2.1.7. Endangered and Special Status Species**

As discussed in Section 3.8, endangered and special status species are reported to exist at the Stump Neck Annex. No endangered or special status species are known to inhabit the Area 8. However, the reported endangered and special status species noted in Section 3.8 have the potential to inhabit Area 8. Area 8 is located within an eagle protection area and in a designated species protection area.

#### **5.2.2. Visual Survey Observations and Results**

A visual survey of Area 8 was conducted on June 24, 2003. Malcolm Pirnie personnel who conducted the range visit included Mr. Dinh, Mr. Egholm, Ms. Tegtmeier, Mr. Hains, and Mr. McManus. Ms. Morgan and Ms. Cave of NDW, Indian Head Environmental Office, accompanied the team. The range was inspected by walking around the approximate perimeter of the training areas. The team walked around the pond (Figure 5.2-7 and Figure 5.2-6), through the woods east of Roach Road, and around Building 2210SN as shown on Map 5.2-1. The team followed trails through the woods where possible (Figure 5.2-8). Monitoring well 25M02 was also located during the visual survey. No evidence of explosives or MEC was observed during the visual survey. No evidence of the former buildings was identified during the visual survey. The area of the former volleyball courts remains undeveloped and grass covered. At the time of

the visual survey, construction of Building 2210SN was complete but the landscaping and the parking lot were being completed.



**Figure 5.2-7: View of pond looking north from Building 60SN**



**Figure 5.2-6: View of pond and Building 60SN at Area 8**



**Figure 5.2-8: View of trail walked in woods east of Roach Road**

A visual depiction of the range reconnaissance is provided on Map 5.2-1 located at the end of Section 5.2. Additional range/site details are illustrated on Map 5.2-2 also located at the end of Section 5.2.

### **5.2.3.      *Munitions and Munitions Related Materials Associated with the Site***

This section describes the munitions or munitions related materials known or suspected to be at the range. This includes both MEC and non-hazardous munitions related debris (e.g., fragmentation, base plates, inert mortar fins).

Area 8 was used for testing demolition charges: primers, detonators, fuzes and squibs. Numerous water- and air-shot locations and a pond that were used to train military personnel to defuse explosive devices define Area 8. Inert ordnance items, including inert torpedoes and mines in the pond, were used for training of EOD personnel. Since no MEC were observed during the visual survey, it is probable that the training MEC were removed and transported to the new EOD School when Area 8 was closed in 1999.

In addition to the explosives used at Area 8 (TNT, PETN, and military dynamite) the following explosive devices were used at Area 8:

- Blasting caps
- Detonation cord

The fragmentation radius associated with training at Area 8 corresponds to the distance between the students and the explosives (30 feet for the water shots and 75 feet for the air shots). The water and air shots and their associated buffer areas are shown on Map 5.2-2.

Based on the information obtained during the data collection process, Area 8 is not suspected to contain CWM filled munitions, electrically fuzed munitions, or DU associated munitions.

### **5.2.4.      *MEC Presence***

The entire range has been subdivided and categorized into one of three levels of MEC presence including: known MEC areas, suspected MEC areas, and areas where no evidence exists to indicate that MEC is known or is suspected to be at the range. The MEC presence is discussed below. Map 5.2-3 illustrates the munitions characterization of the Area 8 and is provided at the end of Section 5.2.

#### **5.2.4.1. Known MEC Areas**

There are no known MEC areas associated with the range because the range was closed and operations were relocated in 1999.

#### **5.2.4.2. Suspected MEC Areas**

Based on historical evidence, Area 8 is identified as a range where evidence of MEC is suspected. The potential exists for MEC to be found throughout the range at the air and water shot locations, as well as at the bottom of the pond. The suspect MEC area is depicted in Map 5.2-3.

#### **5.2.4.3. Areas Not Suspected to Contain MEC**

Since no MEC was identified during the excavation for the Joint Forces EOD Equipment Magnetic Evaluation Facility, no MEC is suspected in the excavated area. Soil was excavated to a depth of six feet, and no MEC is expected below this depth based on the reported training that occurred at Area 8.

#### ***5.2.5. Ordnance Penetration Estimates***

The depth to which munitions penetrate below the ground surface depends on many factors, including the type of soil, the angle of impact, the size of the munitions, the velocity at impact, and range-specific environmental conditions.

Explosives at Area 8 were placed at two to five feet below the ground surface in holes filled with water for water shots. At the air shots locations, the explosives were suspended (on wire) approximately two feet above the ground surface. No penetration depth is associated with the air and water shots since the explosives were either immersed in water or suspended in the air. Additionally, no penetration depth would be associated with the inert devices used in the training since they were placed on the surface by the EOD School and not fired and contained no projectile.

#### ***5.2.6. Munitions Constituents***

Based on historical uses at Area 8, associated MC include TNT, PETN, military dynamite (75% RDX, 15% TNT, 5% motor oil), and metals.

## FINAL PRELIMINARY ASSESSMENT

It is estimated that approximately 50 to 75 pounds of ordnance (net explosive weight) were used at Area 8 every year. No more than 0.5 pounds of explosives were used at the air or water shot locations during training exercises. The types of ordnance used included TNT block, PETN, military dynamite, blasting caps, detonation cord, and similar devices.

The 1990 Environmental Regulation of Ordnance and Ordnance Ranges states that the following ordnance items (and quantities) were expended annually: M041 TNT half-pound block (1,030 each); M591 M-1 Dynamite (120 each); and M130 Electric Blasting Caps (1,090 each). There are no records of EOD responses for training at Area 8. Technical data for the associated MC are provided in Appendix D.

Sampling of soil, sediment, surface water, and groundwater were conducted in 1995 as part of the VI (Figure 5.2-9). Twenty-five of the most used water- and air-shot locations (including the surface water and sediment from the water-shot locations and the surface soil from the air shot locations) were sampled and analyzed by field test-kit screening for the presence of TNT, HMX, and RDX. The results of the field screening were used to locate the soil and monitoring well borings. Three soil borings and three monitoring wells were installed to evaluate the potential for soil contamination. A boring (S25-SB01) was installed at the most used air shot location (24B). Borings S25-SB02 and S25-SB03 were selected based on the results of the field screenings at air shot locations 36/37B and 44/48B. Monitoring well S25-MW1 was installed adjacent to water shot location 7A, and monitoring well S25-MW02 was drilled adjacent to water shot location 7B. Monitoring well SB5-MW03 was installed upgradient of all water and air shot locations to characterize the background soil and groundwater. Two soil samples were collected from each boring, one from the zero to two foot interval and the other just above the water table.

Four surface water and sediment samples were collected at Area 8 using both field test-kit screening and fixed-based laboratory. Sets of surface water and sediment samples were collected from the following location: water shot location 7B, water shot location 23B, Chicamuxen Creek adjacent to water shot location 7A, and the Chicamuxen Creek upstream of all water and air shots.

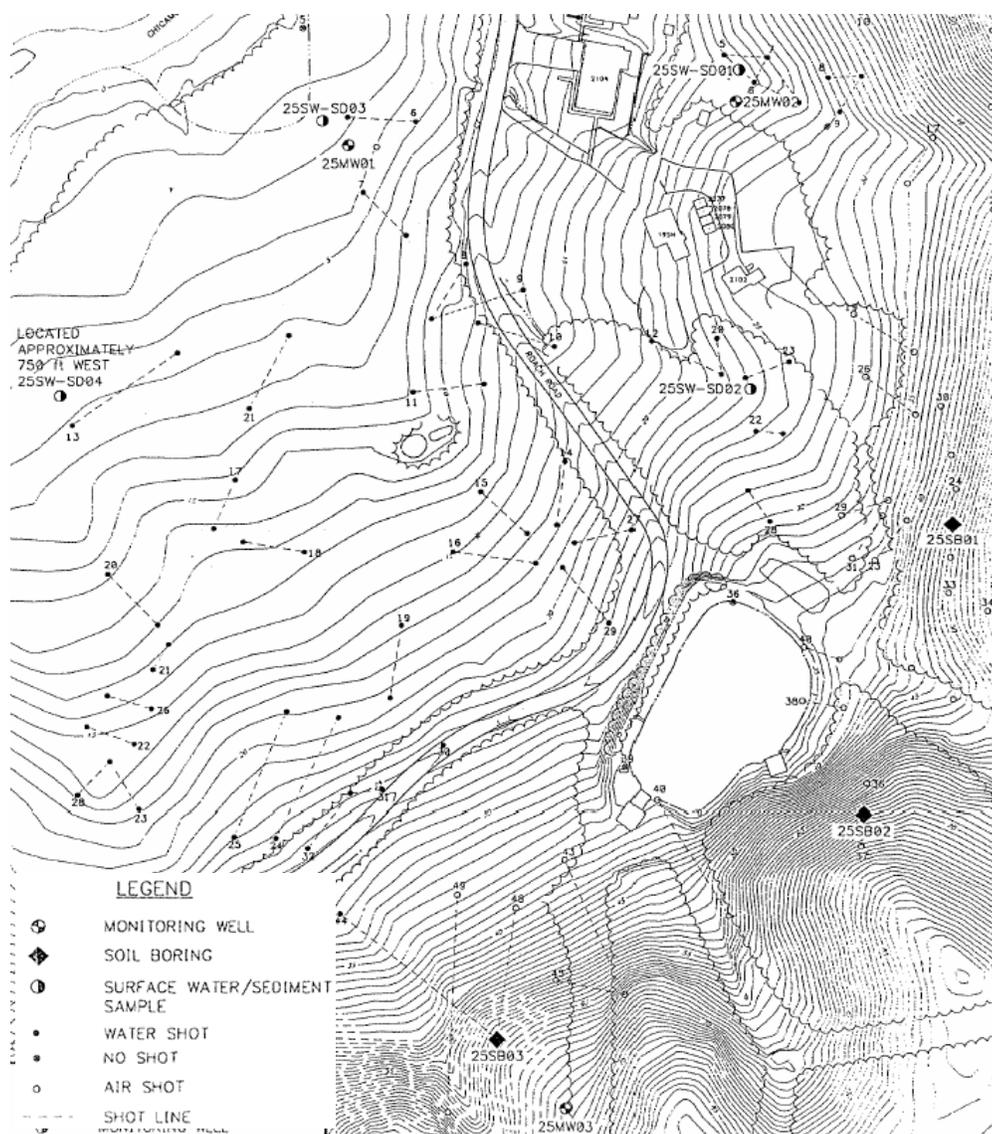


Figure 5.2-9: 1995 VI sample locations at Area 8

Visual observations and PID readings of the soil borings did not identify any apparent contamination. Laboratory soil samples contained no semivolatile organic compounds (SVOCs) or energetic compounds; however, TNT and RDX were identified in the surface soil field screenings. TNT and RDX were detected in the surface soil field screening samples at concentrations from less than 0.5 parts per million (ppm) to 1.5 ppm. All concentrations were detected below Region III RBCs for RDX and TNT. Metals were found in the soil samples at equal to or greater than two times the background concentrations. Maximum metals concentrations were generally detected in subsurface soil samples, particularly in the sample collected at the most used air shot location (SB01). Chloroform and bis(2-ethylhexyl)phthalate

(BEHP) were the only target analyte organics found in the groundwater at Area 8. No energetic compounds were detected in groundwater at the range. Metal concentrations in the unfiltered groundwater samples exceeded the primary federal standards. Groundwater constituent concentrations were generally higher in samples from upgradient monitoring well samples; which may indicate that groundwater at Area 8 has not been affected by range activities. BEHP, 4-amino-2,6-dinitrotoluene (an energetic compound), and metals were detected in Area 8 laboratory analysis of surface waters. Benzo(a)pyrene, BEHP, naphthalene, phenanthrene, and metals were detected in laboratory analysis of sediment samples in Area 8. TNT and RDX were detected in the surface water and sediment field screening samples at concentrations from less than five parts per billion (ppb) to 15 ppb.

#### ***5.2.7. Contaminant Migration Routes***

Explosive soil could be present at Area 8 because the water shot locations had explosives between two and five feet below the water surface in six to nine foot deep holes and the air shots were suspended above the ground surface. MC were not released into the pond during training at Area 8 because the problems in the pond were connected to air shots located outside of the pond (Figure 5.2-1).

Contaminants at Area 8 may potentially migrate within the soil, groundwater, surface water and sediment. Although erosion on range is considered to be minimal, contaminants may become mobile within the surface soil, particularly during extended periods of surface runoff. Stump Neck Annex has an extensive surface water hydrology system including the Potomac River, Chicamuxen and Mattawoman Creeks and wetland areas. Portions of Area 8 are in a low-lying area containing wetlands on the northwestern edge of the range. Surface water runoff would flow into the wetlands on the northwestern edge of the range or into the pond. Contaminants migrating within surface water will follow the same paths until eventually reaching the Potomac River via the Chicamuxen Creek. The sediment has the potential to migrate downstream if it is suspended in the surface water flow. Based on a review of hydrogeological data, it is unlikely that MC in shallow groundwater would migrate to the deeper aquifers that are used as a water supply. However, shallow groundwater is still considered a potential exposure media.

### **5.2.8. Receptors**

Potential human receptors include authorized Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users and trespassers. Plant and animal biota are also potential receptors. Examples of ecological receptors include deer, wild turkey, waterfowl, amphibians, and fish.

#### **5.2.8.1. Nearby Populations**

Nearby populations are as discussed in Section 5.1.8.1. Area 8 overlaps a wildlife protection area.

#### **5.2.8.2. Buildings Near/Within Site**

The Joint Services EOD Equipment Magnetic Evaluation Facility, Building 2210SN, is located within Area 8. A storage shed, Building 60SN, and a nonmagnetic tank, Building 65 SN, are located at the pond. Figure 5.2-11 and Figure 5.2-10 show the new Joint Forces EOD Equipment Magnetic Evaluation Facility. All other structures at the range have been demolished.



**Figure 5.2-11: View of Building 2210SN looking east from Roach Road.**

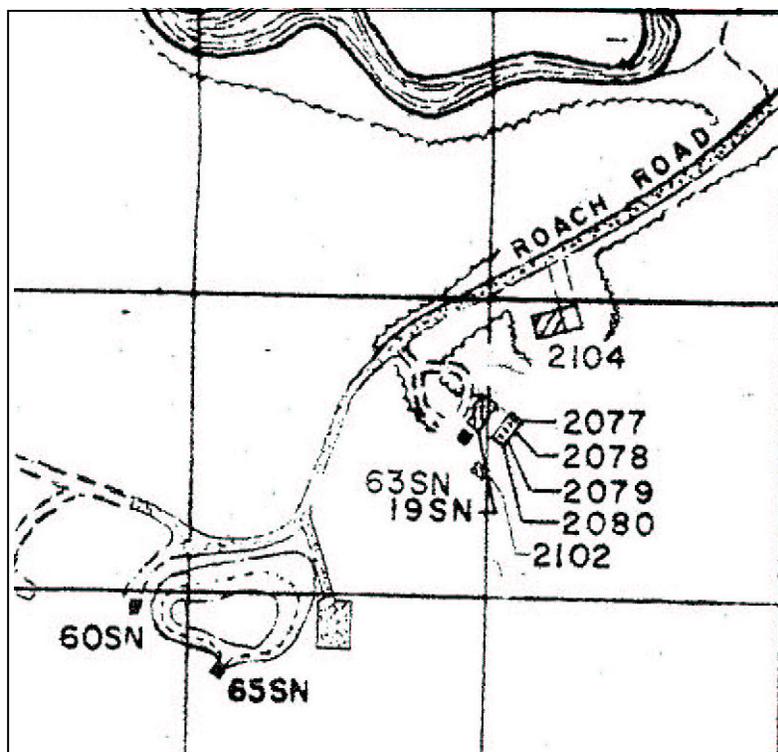


**Figure 5.2-10: View of parking lot looking east from Roach Road.**

When Area 8 was an active training area Buildings 2104, 19SN, 60SN, 63SN, 65SN, 2077, 2078, 2079, 2080, and 2102 were in use. Refer to Table 5.2-1 for details on the historic and current buildings at Area 8. The information in Table 5.2-1 was obtained from historic maps and the Indian Head building database. An example of the historic maps used to identify the former buildings and range layout is included as Figure 5.2-12.

**Table 5.2-1: Area 8 Building Descriptions**

Building	Location	Date Built	Use	Other
2104	East of Roach Road	1972	Underwater Ordnance Applications Building	Demolished
19SN	East of current parking lot	1943	Training building	Demolished
60SN	East of pond	1943	Diver training building	
63SN	East of current parking lot		Storage shed	Demolished
65SN	South of pond	1931	Nonmagnetic tank	
2077	East of current parking lot	1966	Storage shed	Demolished
2078	East of current parking lot	1966	Storage shed	Demolished
2079	East of current parking lot	1966	Storage shed	Demolished
2080	East of current parking lot	1966	Storage shed	Demolished
2102	East of current parking lot	1972	Shelter	Demolished
2125	East of Roach Road, north of former Building 2104	1984	Training building	Demolished
2210SN	East of Roach Road, former location of Building 19SN	2003	Joint Services EOD Equipment Magnetic Evaluation Facility	



**Figure 5.2-12: Former buildings as shown on 1983 Map of Reservation, Stump Neck Area**

### 5.2.8.3. Utilities On/Near Site

The Joint Services EOD Equipment Magnetic Evaluation Facility at Area 8 is serviced by electricity, potable water, and sanitary sewer. The training building (60SN) is also serviced by electricity.

### 5.2.9. Land Use

There is no readily available information on the land use prior to 1957, but based on historic maps, it is assumed that this area was undeveloped. From 1957 until 1999, the range was maintained as an underwater demolition training area for the EOD School. After the school relocated, the buildings were demolished to make way for the Joint Services EOD Equipment Magnetic Evaluation Facility, which was built in 2003. Navy personnel use the pond at Area 8 for recreational fishing and picnicking. The wooded area surrounding the pond and existing building is unused. According to the installation, there are no planned changes to activities at Area 8.

**5.2.10. Access Controls / Restrictions**

Access to the Stump Neck Annex is limited by gated entrances, a security patrol and a perimeter fence. Only Navy personnel and authorized contractors/visitors are allowed on the installation. A fence partially surrounds Area 8. A gate is located at the intersection of Roach Road and Archer Avenue. Forests on the east, south, and west sides surround the area. Wetlands and Chicamuxen Creek border the northwestern edge of the side. Access from the water is not controlled. According to the 2003-2004 Stump Neck Annex Hunting Map hunting is not permitted within Area 8.

The wetlands, located on the northwest edge of the range, are protected under Executive Order 11990, which prohibits construction in a wetland area unless there is no practicable alternative and all possible measures are taken to minimize the environmental impacts. Wetlands are also protected under Section 404 of the Clean Water Act, which requires a permit to be obtained from the USACE before any work in a wetland can commence. The wetlands found at Area 8 are under the category of Palustrine forested broad-leaved deciduous wetland.

The 100-year floodplains that cover a major portion of Area 8 are protected under Executive Order 11988, which restricts development within the 100-year floodplain to water dependent activities. Any construction within the floodplain must be in accordance with regulations promulgated by the Federal Insurance Administration pursuant to the National Flood Insurance Act of 1968. Permits for construction within the 100-year floodplain are also required and are administered by the Waterway Permits Division of the Maryland Department of Natural Resources.

According to the Master Plan Update, many of the soil types on Stump Neck and Indian Head have load bearing capacity limitations as a result of high water tables and extreme erodability conditions. Based on this information, the installation has limited construction and the use of septic systems in specific areas of concern. Area 8 is located in a region that has a seasonal high water table and overlaps an area containing hydric soils. The range also overlaps a restriction area in which septic systems are prohibited.

**5.2.11. Conceptual Site Model**

A general description of the CSM is provided in Section 5.1.11. The CSM is presented in a series of information profiles that presents information about the range. The information profiles are included in Table 5.2-2 below.

<b>Table 5.2-2: Conceptual Site Model Information Profiles – AREA 8</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
<b>Range/Site Profile</b>	Installation Name	NDW, Indian Head
	Installation Location	Indian Head, Charles County, Maryland
	Range/Site Name	Area 8
	Range/Site Location	Area 8 is located in the Stump Neck Annex portion of NDW, Indian Head. It is located along Roach Road, south of Archer Avenue and east of the Chicamuxen Creek.
	Range/Site History	Area 8 was used for training exercises for EOD students at the joint services EOD School starting in 1957. Students were required to “render safe” an inert test item. The item was rigged to an explosive charge at a safe distance away. If the student made a mistake in the procedures to render the test item safe, the charge would explode.  The Joint Forces EOD Equipment Magnetic Evaluation facility was built on Area 8 in the spring of 2003.
	Range/Site Area and Layout	Area 8 is 22.61 acres. Roach Road bisects Area 8 in an approximate north-to-south direction. The 28 water shot locations to the west of Roach Road are known as the “A-side” locations. The 13 water shot and 30 air shot locations east of Roach Road are known as the “B-side” locations. A man-made pond, approximately one-acre in area and 10-15 feet deep, is located east of Roach Road in the southern portion of the range. Building 60SN borders the pond to the south. The Joint Forces EOD Equipment Magnetic Evaluation facility is located in the center of Area 8 at the rangeite of former Buildings 2104 and 2125.

Table 5.2-2: Conceptual Site Model Information Profiles – AREA 8		
Profile Type	Information Needs	Preliminary Assessment Findings
	Range/Site Structures	Identifiable structures at Area 8 include the former one-acre explosive test pond, Building 60SN, and the Joint Forces EOD Equipment Magnetic Evaluation facility.
	Range/Site Boundaries	N: Chicamuxen Creek borders Area 8 to the northwest. Two acres of wetlands border Area 8 to the northwest. S: A heavily wooded undeveloped area borders Area 8 to the south. W: A heavily wooded undeveloped area borders Area 8 to the west. E: A heavily wooded undeveloped area borders Area 8 to the east.
	Range/Site Security	A fence partially surrounds Area 8. A gate is located at the intersection of Roach Road and Archer Avenue. Area 8 is patrolled by NDW, Indian Head security.
<b>Munitions/ Release Profile</b>	Munitions Types	Inert ordnance items were used for training of EOD personnel. The following explosive devices were used at Area 8: <ul style="list-style-type: none"> <li>• TNT block</li> <li>• PETN</li> <li>• Military Dynamite</li> <li>• Blasting caps</li> <li>• Detonation cord</li> </ul>
	Maximum Probability Penetration Depth	Explosives were placed at six to nine feet below the ground surface in holes filled with water for water shots. The air shots had explosives above the ground surface. The pond contained only inert torpedoes and mines.
	MEC Density	Inert ordnance items were used for training of EOD personnel. Explosives were setup 30 feet away from the training item for water shots and 75 feet away for the air shots.  The Joint Forces EOD Equipment Magnetic Evaluation building was constructed in the spring of 2003. During the construction activities, the six feet of soil was excavated for the foundation. No MEC were noted during this excavation.
	Munitions Debris	None

Table 5.2-2: Conceptual Site Model Information Profiles – AREA 8		
Profile Type	Information Needs	Preliminary Assessment Findings
	Associated Munitions Constituents	<p>Historically identified MC include:</p> <ul style="list-style-type: none"> <li>• TNT block</li> <li>• PETN</li> <li>• Military dynamite – 75% RDX, 15% TNT, 5% motor oil, and 5% cornstarch</li> <li>• Metals</li> </ul> <p>Sampling of soil, sediment, surface water, and groundwater were conducted in 1995. Soil samples contained no SVOCs or energetic compounds. Metals were found in the soil samples at equal to or greater than two times the background concentrations. Chloroform and BEHP were the only target analyte organics found in the groundwater at Area 8. No energetic compounds were detected in groundwater at the range. Metal concentrations in the unfiltered groundwater samples exceeded the primary federal standards. BEHP, 4-amino-2,6-dinitrotoluene (an energetic compound), and metals were detected in Area 8 surface waters. Benzo(a)pyrene, BEHP, naphthalene, phenanthrene, and metals were detected in sediment samples in Area 8.</p>
	Migration Routes/Release Mechanisms	Soil surface runoff; groundwater discharge; range maintenance; construction; excavation
Physical Profile	Climate	Indian Head, Maryland has a continental-type climate with four well-defined seasons. The coldest period occurs in late January and early February, with low temperatures averaging at 29°F. July is the warmest month with average maximum temperatures of 85°F. The normal annual precipitation is approximately 44 inches, normal monthly precipitation varying from 2.25 (February) to 4.60 (August) inches.
	Topography	The terrain at Area 8 is very steep and slopes from about 80 feet above msl to msl in the northwest. The high point of Area 8 is located in the southern portion of the range. Two acres of wetlands border the range to the northwest.

Table 5.2-2: Conceptual Site Model Information Profiles – AREA 8		
Profile Type	Information Needs	Preliminary Assessment Findings
	Geology	Indian Head and Stump Neck lie within the Atlantic Coastal plain physiographic province. The geology of the area is comprised of Precambrian igneous and metamorphic bedrock overlain by 500 to 600 feet of unconsolidated fluvial and marine deposits of the Potomac Group. The Potomac Group consists of, in descending order, the Patapsco, Arundel, and Patuxent Formations.
	Soil	The soil within the Area 8 is a mixture of silty loam and gravel deposits.
	Hydrogeology	<p>The hydrogeological makeup of the Indian Head, Maryland area consists of a surficial aquifer and several deeper confined and semi-confined aquifers in the Patapsco and Patuxent Formations. The surficial aquifer is expected to be connected to and influenced by the surface water bodies. Regional water supplies, including that of NDW, Indian Head, are obtained from the lower and middle sands of the Patapsco and Patuxent Formations of the Potomac Group. The surficial aquifer (i.e., water table) is not used for water supply at NDW, Indian Head.</p> <p>The groundwater table in Area 8 ranges from the surface, at the wetlands located in the northwestern portion of the range, to 30 feet below ground surface. A potentiometric groundwater map created in 1995 shows groundwater flowing toward the wetlands to the northwest at a gradient of approximately 0.047. Rising- and falling-slug tests performed in 1995 showed the average hydraulic conductivity to be 1.47 feet per day.</p>
	Hydrology	Two acres of wetlands are located on and border the northwestern portion of Area 8. Chicamuxen Creek borders Area 8 to the northwest. Surface water drains to these two surface water bodies, as well as the former training pond. A major portion of Area 8 is located within the 100-year floodplain.

Table 5.2-2: Conceptual Site Model Information Profiles – AREA 8		
Profile Type	Information Needs	Preliminary Assessment Findings
	Vegetation	Area 8 is heavily wooded hardwood forest except for cleared areas surrounding the pond and the on-range buildings and the wetland areas in the northwestern portion of the range.
<b>Land Use and Exposure Profile</b>	Current Land Use	Area 8 is the location of the current Joint Services EOD Equipment Magnetic Evaluation Facility. The pond is currently stocked for fishing. The rest of Area 8 is undeveloped.
	Current Human Receptors	Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users, and trespassers.
	Current Activities (frequency, nature of activity)	The current Joint Services EOD Equipment Magnetic Evaluation Facility is accessed daily by Navy personnel. Navy personnel use the pond at Area 8 for recreational fishing. The wooded area is unused.
	Potential Future Land Use	There is no known future change in land use.
	Potential Future Human Receptors	Navy personnel (military and civilian), visitors, trespassers, contractors, construction workers (if intrusive work is necessary) and maintenance and operations workers, as well as recreational users (hunters).
	Potential Future Land Use-Related Activities:	There is no anticipated change in land use or related activities
	Zoning/Land Use Restrictions	The range is located within an eagle protection area. The area is affected by load bearing capacity limitations as a result of high water tables. Wetlands located on the range are federally protected.
	Demographics/Zoning	Charles County population density is approximately 260 persons per square mile, while NDW, Indian Head and its tenant commands employ approximately 3,600 military and civilian personnel.
	Beneficial Resources	None
<b>Ecological Profile</b>	Habitat Type	Area 8 has wetland habitat in the northern portion of the range and the remaining area is hardwood forest. Developed grass habitat is located along Roach Road and surrounding the range buildings and Area 8.

Table 5.2-2: Conceptual Site Model Information Profiles – AREA 8		
Profile Type	Information Needs	Preliminary Assessment Findings
	Degree of Disturbance	The degree of disturbance surrounding the buildings is medium because the building and parking lot are used daily by employees and the surrounding grass is mowed. Habitat disturbance in the remainder of the range is currently low and is expected to remain so in the future. The wetland area and the hardwood forest of Area 8 will not be disturbed. The former training pond is used for recreational fishing.
	Ecological Receptors	
	Federal Endangered Species:	American bald eagle, rainbow snake, sensitive joint-vetch
	Federal Threatened Species:	None
	State Endangered Species:	Scaly blazing-star
	State Threatened Species:	None
	Other Ecological Receptors:	Other ecological receptors include numerous species of birds, fish, amphibians, reptiles and mammals such as the white tailed deer, wild turkey, the red-bellied woodpecker and the eastern box turtle.
Relationship of MEC/MC Sources to Habitat and Potential Receptors	Receptors may contact MEC in the subsurface soil. Receptors may have contact with MC directly through surface water/soil or indirectly through the food chain (bioaccumulated in plants and animals).	

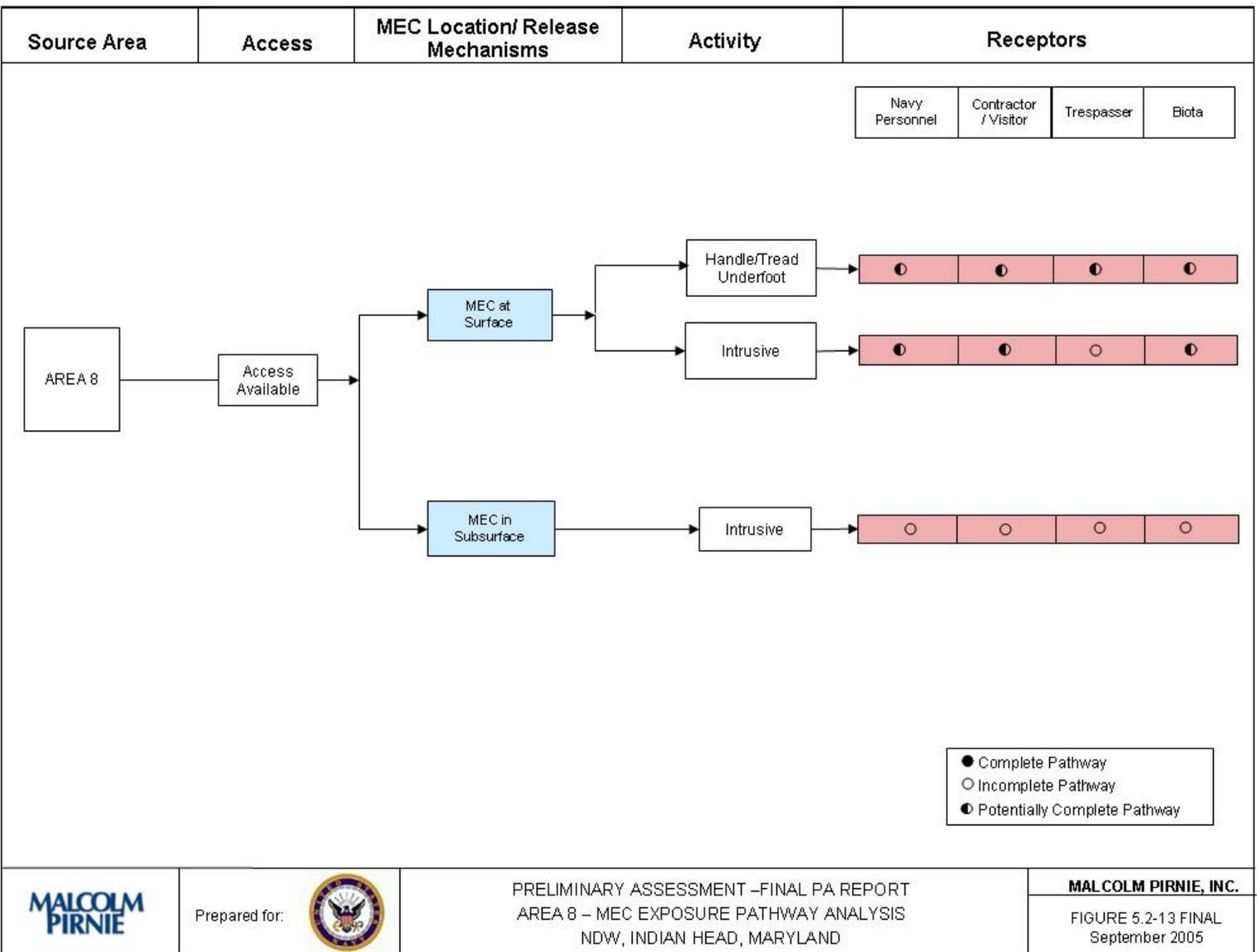
A general description of the CSM exposure pathway analysis is included in Section 5.1.11.

As seen in Figure 5.2-13, the MEC Exposure Pathway Analysis, the potential exists for MEC at the surface at the range. Given this potential, the figure identifies the exposure pathways through which range receptors could come in contact with or be impacted by MEC. Potentially complete pathways exist for human and ecological receptors for MEC in the surface soil. This includes receptors for hand/tread underfoot contact as well as surface intrusive work that may be conducted at Area 8. These activities include, but are not limited to, excavation, plowing, tilling, construction, and environmental sampling for human receptors. Ecological receptors may come in contact with MEC through burrowing, nesting, or feeding activities that disturb surface soil. Trespassers are anticipated to be exposed to non-intrusive surface soil activities at the range, but

it is unlikely they would be exposed to subsurface soil through intrusive activities. MEC are not anticipated in the subsurface soil at the range because the items were placed on the surface, so this is not included as a potential pathway in Figure 5.2-13.

As illustrated in the MC Exposure Pathways Analysis (Figure 5.2-14) soil and surface water/sediments impacted by MC represent a primary source medium. Potential receptors include both human and ecological receptors that may disturb, unbury, or remove the source medium from the range. Potentially complete exposure pathways exist for surface soil through ingestion, dermal contact, and inhalation for both human and ecological receptors. Runoff, discharges, and/or erosion may transport the MC from surface soil to surface water/sediments, so potentially complete pathways also exist for all human and ecological receptors of surface water/sediments. Soil also represents an exposure medium when considering plant/animal uptake for biota (including game such as deer) and human receptors consuming the affected biota (e.g., fishing and hunting). Although hunting is not permitted at Area 8, hunters may wander into the range or consume game that came in contact with MC at the range. Explosive soil could be present because the water shot locations had explosives between two and five feet below ground surface in the six- to nine-foot deep water shot locations; however, samples from the VI do not support this. There is potential for the MC present in the water to infiltrate to the subsurface soil or surficial groundwater. Thus, potentially complete exposure pathways exist for MC in subsurface soils (direct contact, ingestion and inhalation during intrusive work activities) for all human and ecological receptors with the exception of trespassers. It is not anticipated that trespassers would come in contact with subsurface soils. Although confining layers are expected to prevent the migration of MC to the lower aquifers used for water supply, potentially complete pathways exist for MC in shallow groundwater for human receptors.

Figure 5.2-13: MEC Exposure Pathway Analysis



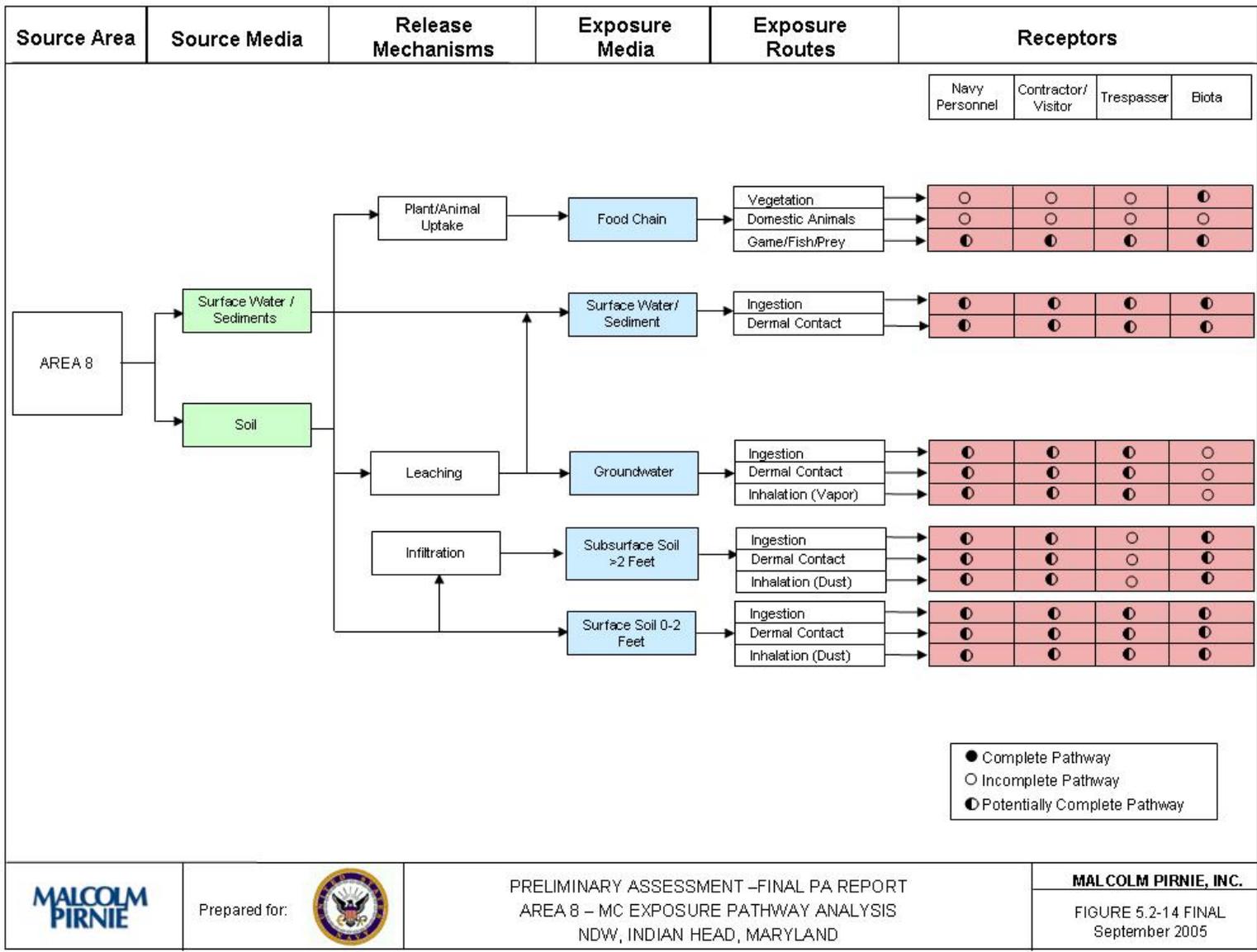


Figure 5.2-14: MC Exposure Pathway Analysis



Prepared for:



PRELIMINARY ASSESSMENT –FINAL PA REPORT  
AREA 8 – MC EXPOSURE PATHWAY ANALYSIS  
NDW, INDIAN HEAD, MARYLAND

MALCOLM PIRNIE, INC.

FIGURE 5.2-14 FINAL  
September 2005

*5.2.12. Summary*

Area 8 is 22.61 acres, located in the central portion of the NDW, Indian Head Stump Neck Annex. The area was used from 1957 to 1999 for testing demolition charges: primers, detonators, fuzes and squibs. Numerous water and air shot locations and a pond that were used to train military personnel to defuse explosive devices define Area 8. Area 8 is the location of the current Joint Services EOD Equipment Magnetic Evaluation Facility. Navy personnel use the pond at Area 8 for recreational fishing. The wooded area is unused, and the land use of Area 8 is not proposed to change. Area 8 is considered a suspect MEC area, and MC associated with Area 8 include TNT, PETN, and military dynamite. Historical documentation and NDW, Indian Head personnel indicated that no other explosives or munitions were used at the range, and that the range was not used for any other purposes. Sampling of soil, sediment, surface water, and groundwater were conducted in 1995. Laboratory analysis of collected soil samples detected no SVOCs or energetic compounds; however, TNT and RDX were identified in the surface soil field screening. No energetic compounds were detected in groundwater at the range. Metal concentrations in the unfiltered groundwater samples exceeded the primary federal standards, and metals were detected in Area 8 surface waters. Groundwater constituent concentrations were generally higher in samples from upgradient monitoring wells indicating that groundwater at Area 8 has not been affected by range activities.

**Map 5.2-1: Visual Survey: Area 8**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.2-2: Range/Site Details: Area 8**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.2-3: Munitions Characterization: Area 8**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

### 5.3. EOD SCHOOL DEMOLITION AREA

#### 5.3.1. *History and Site Description*

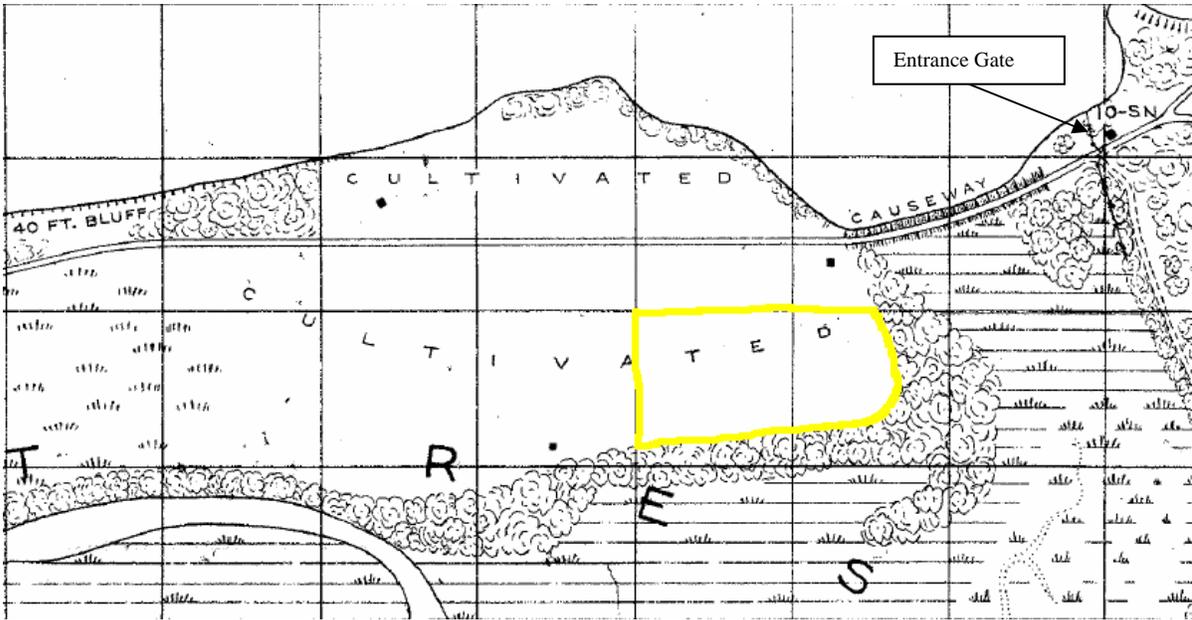
The EOD School Demolition Area, an area approximately 5 acres, is located on Stump Neck Annex; within the boundaries of the Marine Rifle Range and partially within the boundaries of the Torpedo Burial Site. The EOD School Demolition Area consists of an open field and wooded areas (see Figure 5.3-1). The EOD School Demolition Area is mentioned in a report written by a former bomb disposal officer who was employed at Stump Neck Annex from September 1944 to November 1945. The report



**Figure 5.3-1: Current site conditions of the EOD School Demolition Area**

describes a "large field," on the left side of the road, immediately past the former entrance gate, where he and his colleague would introduce graduating students to live explosives. They would demonstrate "the use of blocks of TNT, Tetryl packs, caps, primer cord, safety fuse and shape charges." The report further states that "students took their turns using the cap blaster, blasting blocks of TNT, shearing rails and trees, creating blow holes in the ground and splitting live bombs in situ by using shape charges." The clearing described in this report is visible in a map showing conditions of Stump Neck on June 30, 1945 (see Figure 5.3-2).

As shown on Figure 5.3-2, the entrance gate (Bldg. 10-SN) in 1945 is located east of the Causeway, just before the intersection of Roach Road and Archer Avenue. Heading west on Archer Ave. and past the Causeway, the clearing is visible on the map immediately south of Archer Ave., as described in the former bomb disposal officer's report. This clearing appears unchanged in later maps, until a June 30, 1949 map shows a Ballistic Mortar Shed (Bldg. 2075) on the eastern side of the clearing (see Figure 5.3-3).



**Figure 5.3-2: 1945 map showing EOD Demolition Area**

Therefore, it is assumed that this EOD School Demolition Area was used from September 1944, until approximately June 1949 when the building was built on the clearing, preventing its use as a demolition area. The EOD Demolition Area is located within the estimated firing fan from The Valley located at NDW, Indian Head, Main Installation. Refer to Section 5.7 in the Final PA Report for the Main Installation, Indian Head for information on The Valley. Information on The Valley is also provided in the current PA report under Section 5.15, The Valley Impact Area.

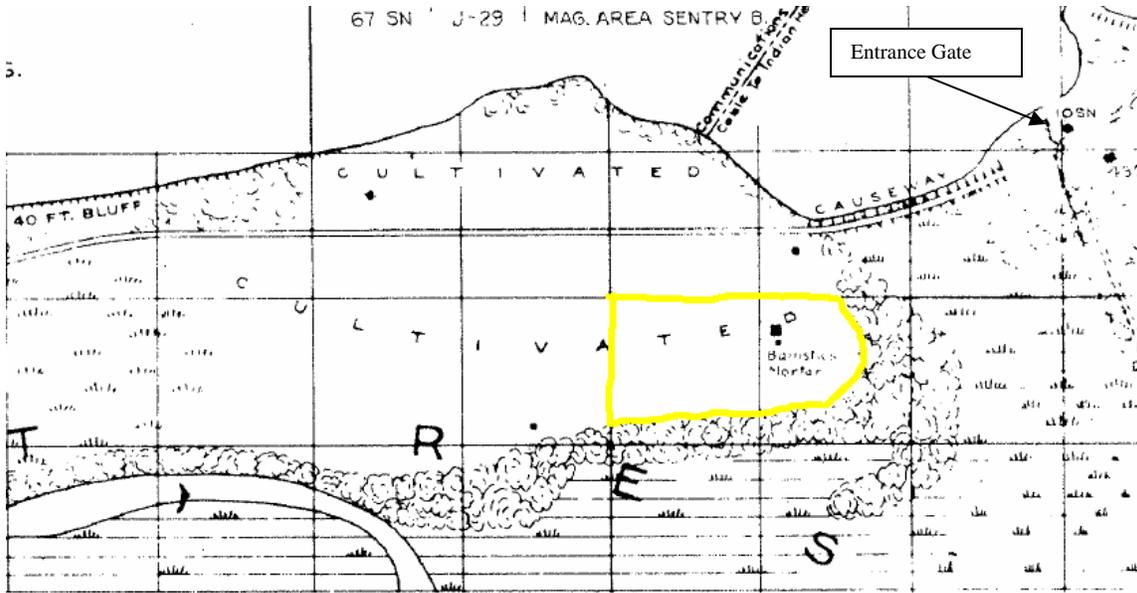


Figure 5.3-3: 1949 map showing EOD Demolition Area

**5.3.1.1. Topography**

Section 3.2 provides a general description of topography for the Stump Neck Annex. At the area known as the EOD School Demolition Area, the topography is relatively flat. Elevations at the EOD School Demolition Area range from 5 to 10 feet above MSL.

**5.3.1.2. Geology**

Section 3.3 provides a geologic description for the Stump Neck Annex. This general description is applicable to the EOD School Demolition Area.

**5.3.1.3. Soil and Vegetation Types**

Section 3.4 provides a description of the soil and vegetation types at the Stump Neck Annex. The EOD School Demo Area is located in a hardwood forest area, with wetland areas to the south and east. According to the Soil Survey of Charles County, the soil at the EOD School Demo Area is classified as a Mattapex silt loam with 0 to 2 percent slope.

**5.3.1.4.Hydrology**

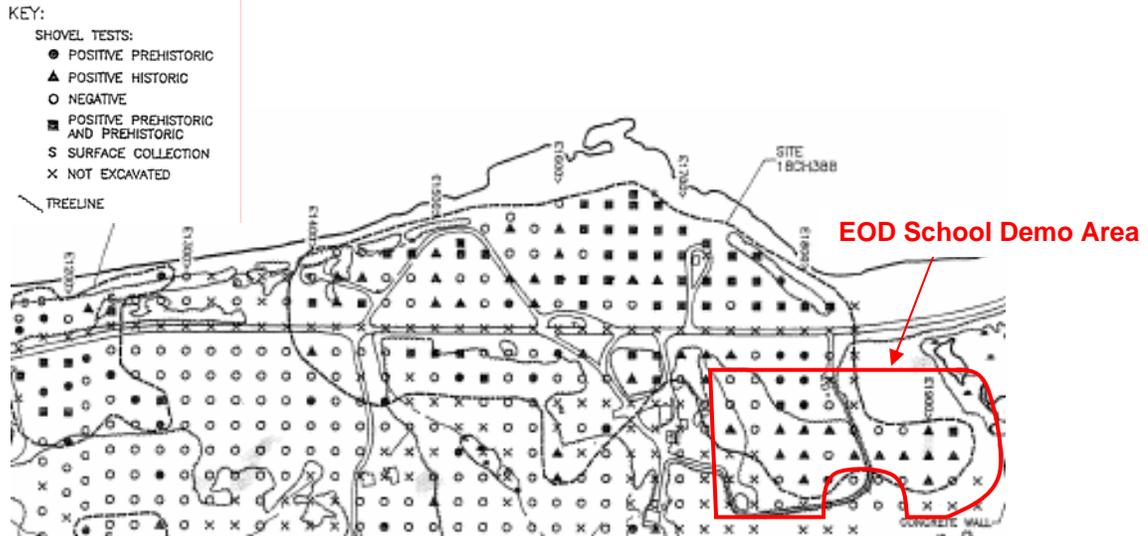
Section 3.5 provides a description of hydrology at the Stump Neck Annex. The EOD School Demolition Area is bounded by Archer Ave., wooded areas, and wetlands. Surface runoff is in the direction of the Chicamuxen Creek.

**5.3.1.5.Hydrogeology**

Section 3.6 provides a description of hydrogeology for the Main Installation. This information is applicable to the area of the EOD School Demolition Area.

**5.3.1.6.Cultural and Natural Resources**

General cultural and natural resources for Stump Neck Annex are provided in Section 3.7. The Phase I Cultural Resources Survey of Stump Neck Annex and Supplemental Architectural Investigations from August 1996 identified one site within the EOD School Demolition Area. The sites and associated locations of positive prehistoric and historic findings are identified on Figure 5.3-4.



**Figure 5.3-4: Cultural resources identified in shovel test pits**

### **5.3.1.7. Endangered and Special Status Species**

As discussed in Section 3.8, endangered and special status species are reported to exist at the Stump Neck Annex of NDW, Indian Head, and thus, have the potential to inhabit the EOD School Demolition Area.

### **5.3.2. *Visual Survey Observations and Results***

A visual survey of the EOD School Demolition Area was conducted on June 2, 2004. Malcolm Pirnie personnel who conducted the visual survey included Ms. Julie Grim, Ms. Rhonda Stone, Mr. Svend Egholm, Mr. Dan Hains, Ms. Alicia Lo Galbo, and Mr. Ricardo Campos. Ms. Heidi Morgan, NDW Environmental Office, accompanied the team. However, the visual survey was conducted at an area adjacent to the EOD School Demolition Area, which was believed to be the location of the site at the time. Since the EOD School Demolition Area is located within the Marine Rifle Range, the area was visually surveyed during the initial site visit on June 26, 2003. No MEC was observed within the EOD School Demolition Area during the June 2003 site visit.

A visual depiction of the site reconnaissance route is provided on Map 5.3-1. Additional range/site details are illustrated on Map 5.3-2.

### **5.3.3. *Munitions and Munitions Related Materials Associated with the Site***

This section describes the munitions or munitions related materials known or suspected to be at the range, including the types and estimated maximum penetration depths. This includes both MEC and non-hazardous munitions related debris (e.g., fragmentation, base plates, inert mortar fins). Potential ordnance concentration areas are presented along with a discussion on the presence of any special consideration ordnance.

Based on historical documents and information obtained during the data collection process, it is expected that TNT, Tetryl packs, shape charges, caps, primer cords, safety fuses, 100 lb. bombs, and other live bombs were used at the EOD School Demolition Area.

The EOD School Demolition Area is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the EOD School Demolition Area. Refer to Section 5.15 for information on The Valley Impact Area.

Based on the information obtained during the data collection process, the EOD School Demolition Area is not suspected to contain CWM filled munitions, electrically fused munitions, or DU associated munitions.

#### ***5.3.4. MEC Presence***

The EOD School Demolition Area has been assessed based on the likelihood of MEC contamination and assigned to one of three categories: (1) Known MEC Area; (2) Suspect MEC Area; or (3) Area Where No MEC Evidence Exists. The EOD School Demolition Area is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the EOD School Demolition Area. Refer to Section 5.15 for information on The Valley Impact Area. For the purpose of the PA, only MEC presence specifically related to the EOD School Demolition Area is considered. Map 5.3-3 illustrates the munitions characterization of the EOD School Demolition Area and is provided at the end of Section 5.3.

##### **5.3.4.1. Known MEC Areas**

Based on historical documents and information obtained during the data collection process, there are no areas at the EOD School Demolition Area known to contain MEC.

##### **5.3.4.2. Suspected MEC Areas**

Based on its reported use, the entire EOD School Demolition Area is a suspected MEC Area.

##### **5.3.4.3. Areas Not Suspected to Contain MEC**

There are no areas of the EOD School Demolition Area not suspected to contain MEC.

### ***5.3.5. Ordnance Penetration Estimates***

The depth to which munitions penetrate below the ground surface depends on many factors, including the type of soil, the angle of impact, the size of the munitions, the velocity at impact, and site-specific environmental conditions.

There is no ordnance penetration depth associated with the EOD School Demo Area. Explosives were used on the surface for demonstration purposes. No firing of munitions took place at this site. The EOD School Demo Area is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the EOD School Demo Area. The ordnance penetration depth associated with munitions fired from The Valley is provided in Section 5.15.5, The Valley Impact Area.

### ***5.3.6. Munitions Constituents***

Munitions constituents potentially at the EOD School Demolition Area include metals, TNT, explosive residuals, and Teteryl. The EOD School Demolition Area is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus there is a potential for the munitions associated with The Valley to be present at the EOD School Demolition Area. Refer to Section 5.7 in the Final PA Report for the Main Installation, Indian Head for information on The Valley. For the purpose of the PA, only the munitions constituents that specifically relate to the EOD School Demolition Area are considered.

### ***5.3.7. Contaminant Migration Routes***

Environmental media through which MC may migrate from the EOD School Demolition Area include soil, groundwater, surface water, and sediment. Direct human or biota contact with surficial and subsurface soil is possible if the soil is disturbed. The EOD School Demolition Area proximity to the Chicamuxen Creek provides possible migration routes to surface water. The majority of the area is sloped toward the creeks, and storm water discharges to surface water via overland flow. Groundwater flow in the shallow water table aquifer also likely trends towards the Chicamuxen Creek; therefore, MC leaching from soils into shallow groundwater may migrate to surface water. Based on a review of hydrogeological data, it is unlikely that MC in shallow

groundwater would migrate to the deeper aquifers that are used as a water supply. However, shallow groundwater is still considered a potential exposure media. Sediments can act as contaminant repositories, and sediment mixing and dredging can act as migration routes to surface water. MC in surface soils and sediments may migrate via plant/animal uptake.

### **5.3.8. Receptors**

Potential human receptors include authorized Navy personnel (military and civilian), visitors, contractors, maintenance workers, hunters and trespassers. Plant and animal biota are also potential receptors. Examples of ecological receptors include deer, wild turkey, and water fowl.

#### **5.3.8.1. Nearby Populations**

Nearby populations are as discussed in Section 5.1.8.1. The Chicamuxen Wildlife Management Area is located approximately 75 meters downstream of the EOD School Demo Area, and it is used by recreational hikers, hunters, and fishers. Residential properties are located two miles south of the range.

#### **5.3.8.2. Buildings Near/Within Site**

A number of buildings, including Buildings 2019 (Influence Mine Test), 2075 (Ballistic Motor Shed), 2101 (Vehicle shelter), 2156, and D-21CSN are located within the EOD School Demo Area. Building 2012 and Building 2174 are located across from Archer Avenue, to the north and the north west of the EOD School Demo Area, respectively.

#### **5.3.8.3. Utilities On/Near Site**

There are utilities within the EOD School Demo Area including potable water on the west side and sanitary sewer towards the center of the range. Electric utilities are located outside of the range boundary at the northwest corner.

### **5.3.9. Land Use**

During its use as the EOD School Demolition Area, the range was an open field. Buildings 2075 (Ballistic Mortar Shed), 2019 (Influence Mine Test), 2101 (Vehicle shelter), 2156, and D-21CSN are located on this site. The rest of the site consists of unused wooded or mowed grass areas.

The EOD School Demolition Area is located within an upland hunting area according to the 2003-2004 Stump Neck Annex Hunting Map.

**5.3.10. Access Controls / Restrictions**

No public access is authorized at NDW, Indian Head. Signs, partial fencing, locked/secured gates, login book/office check-in, and vehicle security patrol control the entire facility. There are no access control features specific to the EOD School Demo Area. Access from the water is not controlled. There are no known land use/development restrictions for the range.

**5.3.11. Conceptual Site Model**

A general description of the CSM is provided in Section 5.1.11. The CSM is presented in a series of information profiles that presents information about the range. The information profiles are included in Table 5.3-1.

<b>Table 5.3-1: Conceptual Site Model Information Profiles – EOD SCHOOL DEMO AREA</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
<b>Range/Site Profile</b>	Installation Name	NDW, Indian Head
	Installation Location	Indian Head, Charles County, MD
	Range/Site Name	EOD School Demo Area
	Range/Site Location	The site is located on Stump Neck Annex; within the boundaries of the Marine Rifle Range and the Torpedo Burial Site.
	Range/Site History	This site was used as an EOD School Demolition Area from approximately September 1944 to June 1949. Graduating EOD students were introduced to live explosives at this site.  Prior to its use as the EOD School Demolition Area, the area was a portion of the Marine Rifle Range.
	Range/Site Area and Layout	During its use as the EOD School Demolition Area, the 4.99-acre site was an open field, and is currently partially overgrown with wooded vegetation.

<b>Table 5.3-1: Conceptual Site Model Information Profiles – EOD SCHOOL DEMO AREA</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
	Range/Site Structures	During its use as the EOD School Demolition Area, a wooden structure was located on a knoll near the entrance.  Currently, buildings 2019, 2101, 2156, and D-21CSN are located on the range.
	Range/Site Boundaries	N: Archer Ave. S: Hardwood forest, swamp W: Hardwood forest E: Hardwood forest
	Range/Site Security	NDW, Indian Head has installation wide security and access restrictions. Once within the installation, no additional access restriction features exist for the EOD School Demo Area.
<b>Munitions/ Release Profile</b>	Munitions Types	TNT, Tetryl packs, shape charges, caps, primer cords, safety fuses, 100 lb. bombs, other live bombs. Refer to Section 5.15 for information on munitions associate with The Valley Impact Area.
	Maximum Probability Penetration Depth	There is no associated penetration depth. Munitions were not fired at this site. Penetration depths associated with munitions fired from The Valley are provided in Section 5.15.5.
	MEC Density	The anticipated MEC density at the site is low due to the development that has occurred at the site over the past 50 years.
	Munitions Debris	None anticipated
	Associated Munitions Constituents	Potential munitions constituents include metals, TNT, explosive residuals, and Tetryl.
	Migration Routes/Release Mechanisms	Soil surface runoff; soil leaching; groundwater discharge; site maintenance; construction; excavation.
<b>Physical Profile</b>	Climate	Indian Head, MD has a continental-type climate with four well-defined seasons. The coldest period occurs in late January and early February, with low temperatures averaging at 29°F. July is the warmest month with average maximum temperatures of 85°F. The normal annual precipitation is approximately 44 inches, normal monthly precipitation varying from 2.25 (February) to 4.60 (August) inches.
	Topography	The topography at the site is relatively flat.

<b>Table 5.3-1: Conceptual Site Model Information Profiles – EOD SCHOOL DEMO AREA</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
	Geology	The Indian Head peninsula lies within the Atlantic Coastal plain physiographic province. The geology of the area is comprised of Precambrian igneous and metamorphic bedrock overlain by 500 to 600 feet of unconsolidated fluvial and marine deposits of the Potomac Group. The Potomac Group consists of, in descending order, the Patapsco, Arundel, and Patuxent Formations.
	Soil	Potomac River basin the Atlantic Coastal Plain and consists of gravel, sand, silt, and clay.
	Hydrogeology	The hydrogeological makeup of the Indian Head, MD area consists of a surficial aquifer and several deeper confined and semi-confined aquifers in the Patapsco and Patuxent Formations. The surficial aquifer is expected to be connected to and influenced by the surface water bodies. Regional water supplies, including that of NDW, are obtained from the lower and middle sands of the Patapsco and Patuxent Formations of the Potomac Group. The surficial aquifer (i.e., water table) is not used for water supply at NDW.
	Hydrology	The site is bounded by Archer Ave., wooded areas, and wetlands. Surface runoff is likely to reach the Chicamuxen Creek.
	Vegetation	Vegetation within the area consists of a coniferous-deciduous mix. The remainder of the site consists of mowed grass areas.
<b>Land Use and Exposure Profile</b>	Current Land Use	Buildings 2075 (Ballistic Mortar Shed), 2019 (Influence Mine Test), 2101 (Vehicle shelter), 2156, and D-21CSN are located on this site. The rest of the site consists of unused wooded or mowed grass areas.
	Current Human Receptors	Navy personnel (military and civilian), visitors, contractors, maintenance workers, hunters and trespassers.
	Current Activities (frequency, nature of activity)	Current activities at the site include vegetation clearing, grass cutting, driving, human activity.
	Potential Future Land Use	None reported.

Table 5.3-1: Conceptual Site Model Information Profiles – EOD SCHOOL DEMO AREA		
Profile Type	Information Needs	Preliminary Assessment Findings
	Potential Future Human Receptors	Navy personnel (military and civilian), visitors, trespassers, hunters, and contractors. These receptors would include construction workers (if intrusive work is necessary) and maintenance and operations workers (if the range use changes) as well as recreational users.
	Potential Future Land Use-Related Activities:	None.
	Zoning/Land Use Restrictions	None reported.
	Demographics/Zoning	Charles County population density is approximately 260 persons per square mile. NDW and its tenant commands employ approximately 3,600 military and civilian personnel.
	Beneficial Resources	None
<b>Ecological Profile</b>	Habitat Type	Developed areas, with surrounding wooded areas consisting of a coniferous-deciduous mix. The remainder of the site consists of mowed grass areas.
	Degree of Disturbance	Moderate – Vegetation is kept to a minimum.
	Ecological Receptors	
	Federal Endangered Species:	American bald eagle, rainbow snake, sensitive joint-vetch
	Federal Threatened Species:	None
	State Endangered Species:	Scaly blazing-star
	State Threatened Species:	None
	Other Ecological Receptors:	Other ecological receptors include numerous species of birds, reptiles and mammals such as the white tailed deer, wild turkey, the red-bellied woodpecker and the eastern box turtle.
Relationship of MEC/MC Sources to Habitat and Potential Receptors	Receptors may have direct or indirect contact with MEC/MC that exist in the environment or have been incorporated into the food chain.	

A general description of the CSM exposure pathway analysis is included in Section 5.1.11. The following CSM exposure pathways analysis focuses only on the EOD School Demo Area and does not consider impacts from The Valley firing fan. For exposure pathway analysis for The Valley, refer to Section 5.15.11.

The nature of the activity that presumably occurred at the EOD School Demolition Area suggests that MEC may be present. Therefore, potentially complete pathways exist for human and ecological receptors for MEC in the surface soil. This includes receptors for hand/tread underfoot contact as well as intrusive work that may be conducted at the EOD School Demolition Area. Trespassers are anticipated to be exposed to non-intrusive surface soil activities at the range, but it is unlikely they would be exposed to subsurface soil through intrusive activities. MEC is not anticipated within the subsurface as explosives were only used on the surface at this site. An Exposure Pathway Analysis figure for MEC is presented in Figure 5.3-5.

As illustrated in Figure 5.3-6, the MC Exposure Pathway Analysis, soil impacted by MC represents a primary source medium. Exposures to surface soil, subsurface soil, and surface water/sediments containing MC may present potentially complete pathways for human and ecological receptors. All human and ecological receptors have potentially complete exposure pathways for direct contact with MC in surface soil, which includes dermal contact, ingestion, and inhalation (dust). Runoff and/or erosion may transport the MC from surface soil to surface water/sediments, so a potentially complete pathway also exists for all human and ecological receptors of surface water/sediments. Precipitation infiltration may provide for contaminant mobility into the subsurface soil and into the shallow or surficial groundwater aquifer, which is assumed to be connected to the nearby surface water bodies. Potentially complete exposure pathways exist for MC in subsurface soils (direct contact, ingestion and inhalation during intrusive work activities). The food chain is also a potentially complete pathway given that hunting is permitted within much of the site. Although confining layers are expected to prevent the migration of MC to the lower aquifers used for water supply, potentially complete pathways exist for MC in shallow groundwater for human receptors.

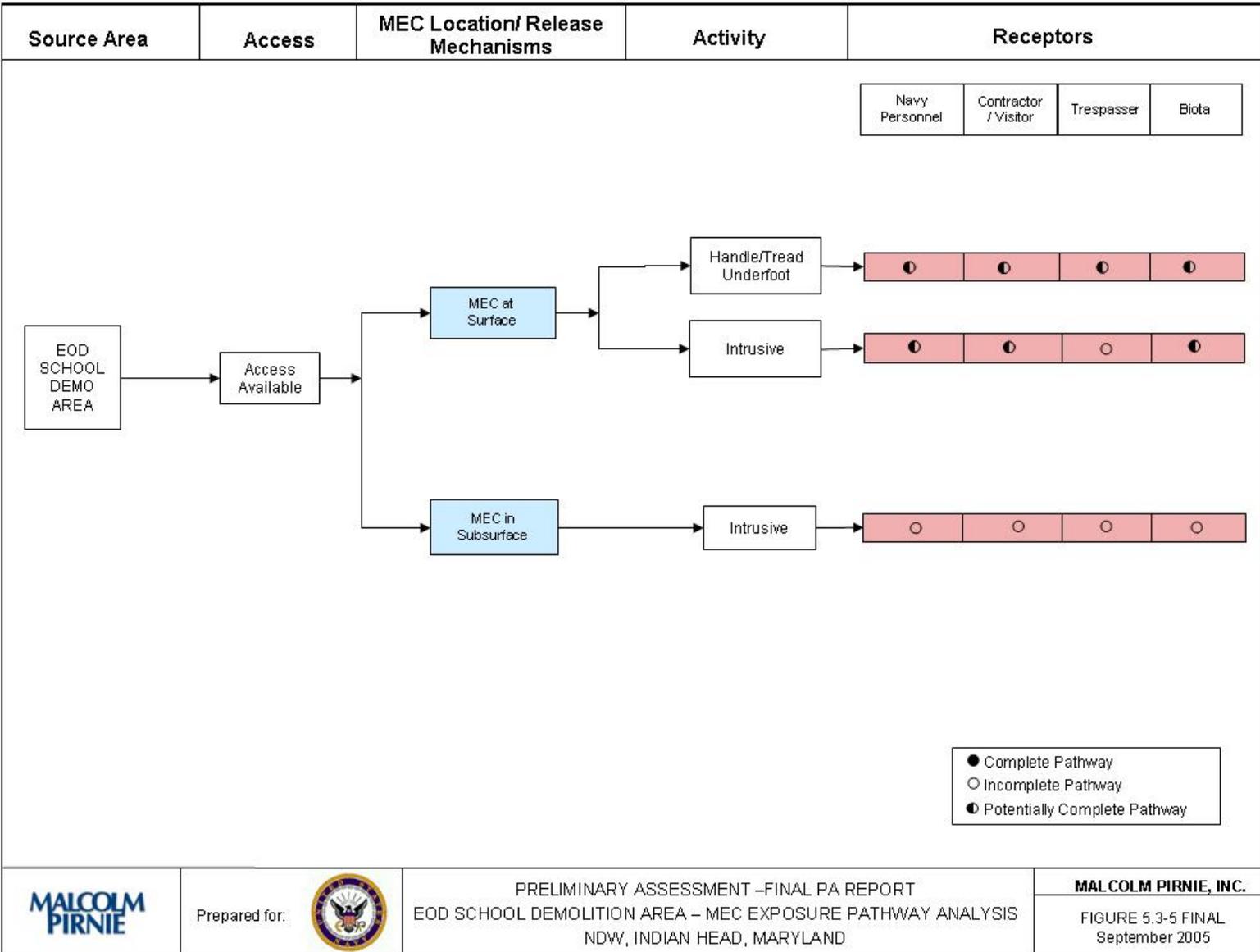


Figure 5.3-5: MEC Exposure Pathway Analysis

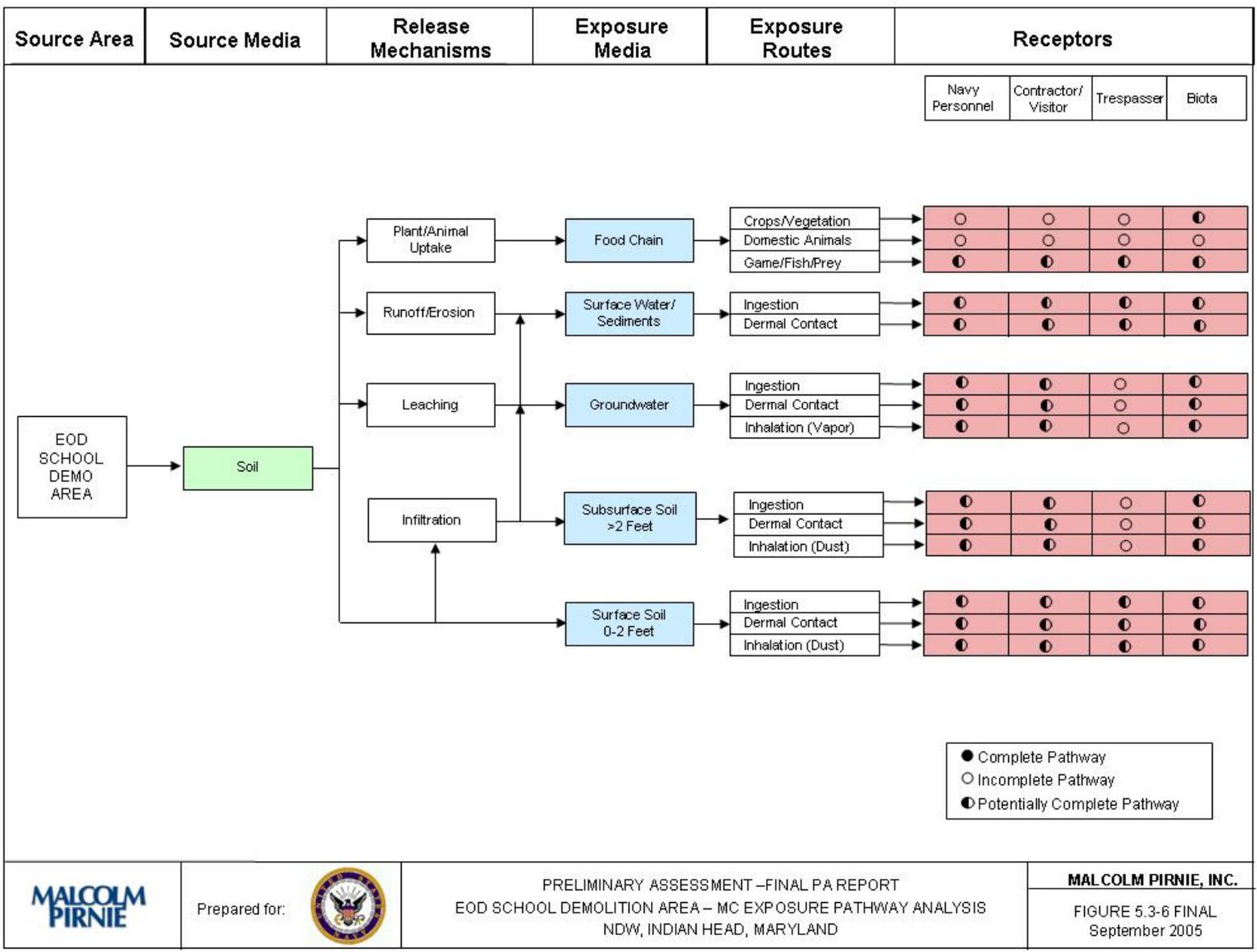


Figure 5.3-6: MC Exposure Pathway Analysis



Prepared for:



PRELIMINARY ASSESSMENT –FINAL PA REPORT  
EOD SCHOOL DEMOLITION AREA – MC EXPOSURE PATHWAY ANALYSIS  
NDW, INDIAN HEAD, MARYLAND

MALCOLM PIRNIE, INC.

FIGURE 5.3-6 FINAL  
September 2005

***5.3.12. Summary***

From information gathered during the PA, the EOD School Demolition Area was used from 1944 to 1949 as a training area to introduce graduating students to live explosives. The site is located on Stump Neck Annex; within the boundaries of the Marine Rifle Range and the Torpedo Burial Site. Both MEC and MC are expected to be present at the EOD School Demolition Area. Potential MEC include TNT, Tetryl packs, shape charges, caps, primer cords, safety fuses, 100 lb. bombs, other live bombs. The primary MC of concern are metals, explosive residuals, TNT and Tetryl.

**Map 5.3-1: Visual Survey: EOD School Demolition Area**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.3-2: Range/Site Details: EOD School Demolition Area**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.3-3: Munitions Characterization: EOD School Demolition Area**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

## 5.4. IED PRACTICAL TRAINING AREA (BASIC IED AREA)

### 5.4.1. *History and Site Description*

The Basic IED Area was originally identified as the IED Area during the U.S. Navy's Range Inventory. The name was changed as a result of information obtained during the research conducted to prepare this report. The Basic IED Area is a 3.79-acre range located on the western-central portion of Stump Neck Annex, south of Archer Avenue. The range is accessed by an unnamed dirt road extending from Archer Avenue through the middle of the range and into the southern portion of the range. The range is overgrown with open grassy fields and shrub/wooded areas.

The Basic IED Area was used from November 1957 until approximately 1996 for the testing and demonstration of various explosive devices. Based on historical documentation and maps available for review, the Basic IED Area was formerly part of the EOD School at NDW, Indian Head. The EOD School was broken into Divisions I through V. Division II was further broken down into Areas 1A and 1B. The Basic IED Area corresponds to Division II Area 1B. At this area, students received demonstration and were trained in making and dismantling IEDs. It is assumed that the entire area was closed by 1996 when a VI study was performed. One portion of the area was used until 1991 to demonstrate the explosive potential of common household chemical mixtures.

The Basic IED Area had several features including the following sites of interest: Building 2158 (bleachers), Building 2118 (mixing with French drain), Building 2063 (observation area), two unnamed storage buildings, the Incendiary Demonstration Area, and the Detonation Demonstration Area. In Building 2118, containers used to measure IED chemicals were rinsed in the sink which discharged to the French drain and then directly to the ground. The storage buildings are sites of interest because IED chemicals were stored there for approximately 20 years. The other sites of interest were used for a variety of demonstration purposes. The bleachers were specifically used when demonstrating the effects of mixing household chemicals to students. Specific information about the types of munitions used at each area of concern is not available. The layout of these designated areas is illustrated in Figure 5.4-1. Only Building 2087, formerly used for instructor office space, remains. Former building 42SN was used as a classroom and a workshop.

In 1996, a VI Report was submitted on the Naval School EOD sites. Investigations were performed on four SWMU sites, including the Basic IED Area (SWMU #26, also IR Site #64). Soil and groundwater samples were collected and analyzed to determine the nature and extent of contamination. Seven soil borings were drilled at the range with two samples taken from each boring. Three of the borings were then converted to monitoring wells: 26MW01, 26MW02, 26MW03. The study concluded that no further action was needed at the Basic IED Area; however, the USEPA disagreed and decided that the range needed further investigation. The results of this study are discussed in more detail in Section 5.4.6. The Basic IED Area is located within the estimated firing fan from The Valley. Refer to Section 5.7 in the Final PA Report for the Main Installation, Indian Head for information on The Valley. Information on The Valley is also provided in the current PA report under Section 5.15, The Valley Impact Area.

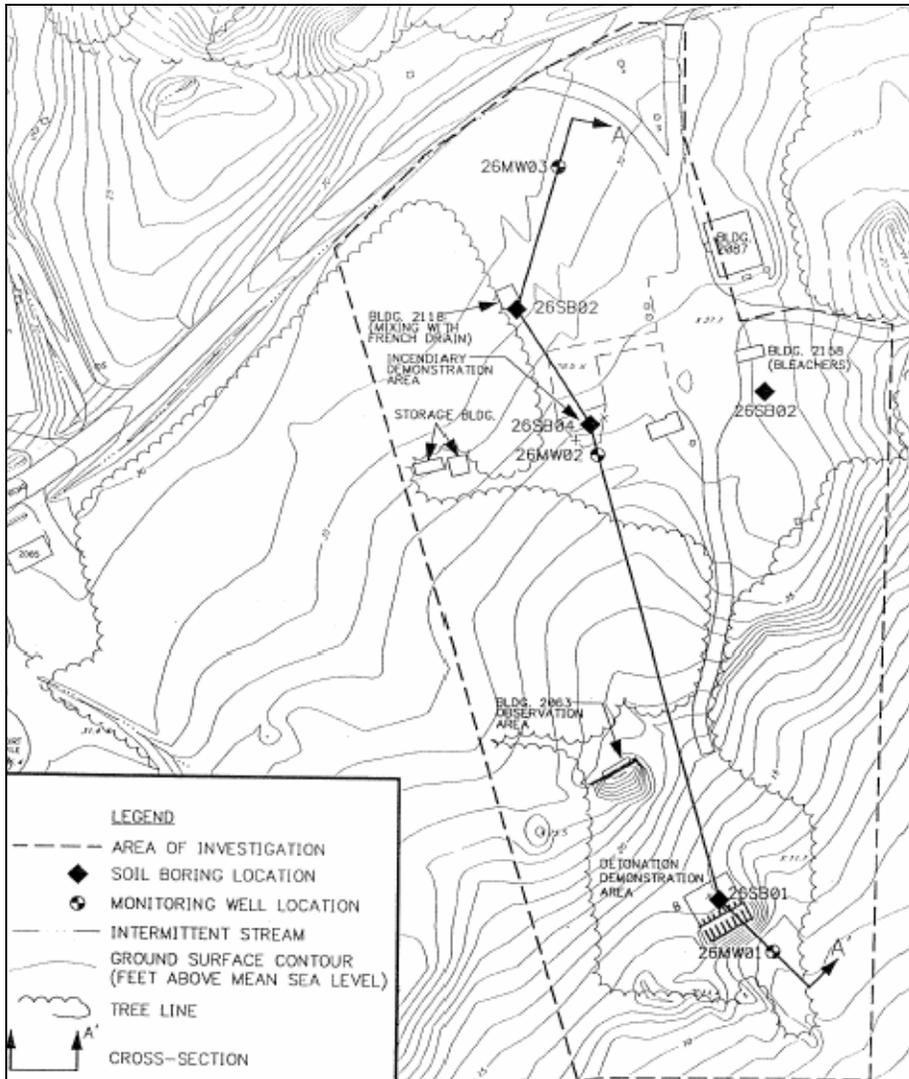


Figure 5.4-1: Former training areas and sampling locations at the Basic IED Area.

#### **5.4.1.1.Topography**

Section 3.2 provides a general description of topography for the Stump Neck Annex. Elevation at the Basic IED Area ranges from approximately five to 30 feet above grade. The topography is flat to gently sloping in the northern portion of the range and steeply sloping in the south-southeast portion of the range. The overall topography of the Basic IED Area is downward sloping from northwest to southeast. Erosion would be most severe in the southern portion of the range where the slopes are the steepest. The land continues to slope down to a wetland located 50 feet south of the range.

#### **5.4.1.2.Geology**

Section 3.3 provides a geologic description for Indian Head and the Stump Neck Annex. Range-specific geology is based on boring and geophysical logs taken by Brown & Root Environmental during the VI in 1996. The geology at the range consists of silty-sand and gravel fill material from approximately zero to two feet below grade; the fill is underlain by silty-sand with some clay. The relative amounts of sand, silt, and clay vary across the range. A clay lens was observed at approximately five to seven feet below grade in boring 26SB-03 near the French drain area of Building 2118. The deepest boring on-range was 22 feet below grade; bedrock was not reported to have been encountered during drilling. Based on the regional geology of Stump Neck Annex, it is expected that bedrock occurs approximately 600-700 feet below msl.

#### **5.4.1.3.Soil and Vegetation Types**

Section 3.4 provides a description of the soil and vegetation types at Indian Head and the Stump Neck Annex. According to the Soil Survey of Charles County, soils at the Basic IED Area are classified as Keyport silt loams with two to five percent slope over the northern portion and five-12 percent slope over the southern portion. These soils are considered moderately eroded with only a thin layer of surface soil remaining. In some cases the subsoil is exposed. The soils are moderately drained with a high moisture capacity and low permeability. These soils are at risk for severe erosion.

Vegetation at the Basic IED Area is characterized by large wooded areas and open grassy areas. The vegetation on-range is illustrated in Figure 5.4-2. A wetland area is located south of the range.



**Figure 5.4-2: Access road and vegetation across the Basic IED Area.**

#### **5.4.1.4. Hydrology**

Section 3.5 provides a description of hydrology at Indian Head and the Stump Neck Annex. There are no surface water bodies within the boundaries of the Basic IED Area. Surface water runoff drains to marsh and wetland areas and then into the Chicamuxen Creek. There are wetlands located approximately 200 feet south of the range. Drainage follows the local topography in the south-southeasterly direction.

#### **5.4.1.5. Hydrogeology**

Section 3.6 provides a description of hydrogeology for Indian Head and the Stump Neck Annex. There are three monitoring wells at the range that were installed during the 1996 VI. These three wells, 26MW01, 26MW02, and 26MW03, penetrate to maximum depths of 15-20 feet below grade. Shallow groundwater at the range is typically encountered at eight to 12 feet below grade. Based upon data collected from slug testing, the groundwater gradient is approximately 0.034 ft/ft and the average velocity is calculated to be at least 35 feet per year. The groundwater flow direction is southeasterly across the range. The average hydraulic conductivity of the aquifer is approximately 0.85 feet per day.

#### **5.4.1.6.Cultural and Natural Resources**

General cultural and natural resources for NDW, Indian Head are provided in Section 3.7. According to the 1996 Phase I Cultural Resources Survey of Stump Neck Annex there are no archeological/cultural sites within the Basic IED Area. Several shovel test pits were taken within the site boundaries and all were found negative for artifacts.

#### **5.4.1.7.Endangered and Special Status Species**

As discussed in Section 3.8, endangered and special status species are reported to exist at the Stump Neck Annex. According to the Navy Inventory, the Basic IED Area is located within a wildlife protection area that does not contain eagle nesting sites. No endangered or special status species are known to exist at the range.

#### ***5.4.2. Visual Survey Observations and Results***

A visual survey of the Basic IED Area was conducted on June 25, 2003. Malcolm Pirnie personnel who conducted the visual survey included Mr. Dinh, Mr. Egholm, Ms. Tegtmeyer, Mr. Hains, and Mr. McManus. Ms. Morgan, NDW, Indian Head Environmental Office, accompanied the team. During the visual survey, Malcolm Pirnie personnel walked the perimeter of the range and then walked several transects through the range. The Basic IED Area consists of large wooded and grass areas and one building (Building 2087). Building 2087 is shown in Figure 5.4-3. There was no ordnance observed during the visual survey. A visual depiction of the range reconnaissance is provided on Map 5.4-1 located at the end of Section 5.4. Additional range details, including the locations of the monitoring wells and Building 2087, are illustrated on Map 5.4-2 also located at the end of Section 5.4.



**Figure 5.4-3: Looking south at Building 2087 located on the northern portion of Basic IED Area**

#### ***5.4.3. Munitions and Munitions Related Materials Associated with the Site***

This section describes the munitions or munitions related materials known or suspected to be at the range, including the types and estimated maximum penetration depths. This includes both MEC and non-hazardous munitions related debris (e.g., fragmentation, base plates, inert mortar fins).

The Basic IED Area was used for demonstration and testing purposes on a variety of explosive devices and chemicals. Munitions used on-range include small arms, bulk high explosives, demolition charges, primers, detonators, fuzes, and squibs. According to the 1996 VI report, the area was used for approximately 40 years at a rate of 10 pounds of ordnance (net explosive weight) per year.

According to William Penn, former head of the IED Department, the Basic IED Area was used for a variety of training and testing purposes in the mid 1970s. Law enforcement officers were trained here to disarm explosive devices. Foreign explosives were brought to the range for anti-terrorism training. Newly developed ordnance was also tested and evaluated here by the EOD technicians before being used by the Navy. Practical exercises were set up using letters, parcels and pipe bombs with chlorates and thorates as part of the EOD School. Also, there were simulated real life situations in which EOD technicians would be required to disarm explosive devices set up within car carcasses, helicopters and other structures. Fragment producing devices

with TNT were used in such exercises. Mr. Penn recalls metallic sodium and potassium chlorate, which are explosive and incendiary chemicals, were frequently used at the range. Ammonia nitrol fuel oil, brake fluid and industrial/household products were also frequently used on-range. Explosives used at the range included electric and non-electric blasting caps, DETA sheets (a rubber like explosive), military grade (without nitroglycerine [NG]) and civilian (with NG) dynamite, C-4, C-3, astro-pac (a binary liquid explosive), and military thermite and thermate. Black powder was made on-range using sulfur, charcoal, and salt peter.

According to EOD technicians interviewed about the Basic IED Area, real explosives were not used in the practical exercises with students. Explosives were primarily used for testing or demonstration purposes. Training exercises would normally consist of simulated bombs, which students would be called on to practice disarming. The students would be instructed to first x-ray the item and then devise the best approach to render it safe. The only explosive used in this process was smokeless powder within 50-caliber rounds that were sometimes used to disarm the devices.

A 1970 memo discussing Division II of the EOD School references a Viet Cong trail that opened at the Basic IED Area in May 1969 and was then enlarged in April 1970. This trail was used to simulate actual situations that students could encounter in Vietnam. The location of the trail on the Basic IED Area is unknown.

The Basic IED Area is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Basic IED Area. Technical data sheets are included in Appendix D. Refer to Section 5.7 in the PA Report for the Main Installation, Indian Head for information on The Valley. Information on The Valley is also provided in the current PA report under Section 5.15, the Valley Impact Area.

Based on the information obtained during the data collection process, the Basic IED Area is not suspected to contain CWM filled munitions or DU associated munitions.

#### **5.4.4. MEC Presence**

The entire range has been subdivided and categorized into one of three levels of MEC presence including: known MEC areas, suspected MEC areas, and areas where no evidence exists to indicate that MEC is known or is suspected to be at the range. The MEC presence is discussed below. The Basic IED Area is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Basic IED Area. Technical data sheets are included in Appendix D. Refer to Section 5.15 for information on The Valley. For the purpose of the PA, only MEC presence specifically related to the Basic IED Area is considered. Map 5.4-3 illustrates the munitions characterization of the Basic IED Area and is provided at the end of Section 5.4.

##### **5.4.4.1. Known MEC Areas**

There are no known MEC areas at the range.

##### **5.4.4.2. Suspected MEC Areas**

As illustrated in Map 5.4-3, there are six sites of interest within the Basic IED Area, which are also suspected MEC areas. The six areas are: 1) Building 2158 (bleachers); 2) Building 2118 (mixing with French drain); 3) Building 2063 (observation area); 4) two unnamed storage buildings; 5) the Incendiary Demonstration Area; and 6) the Detonation Demonstration Area. A thorough survey of the range, including a geophysical investigation, would be required to confirm the absence or presence of MEC.

##### **5.4.4.3. Areas Not Suspected to Contain MEC**

The remaining Basic IED Area, outside of the six sites of interest, is not suspected to contain MEC.

#### **5.4.5. Ordnance Penetration Estimates**

According to the EOD technicians interviewed about this range, there is no ordnance penetration depth associated with the Basic IED Area. All ordnance used at this area was for testing or demonstration purposes and was only used on the surface. The Basic IED Area is overlapped by

the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Basic IED Area. The ordnance penetration depth associated with munitions fired from The Valley is provided in Section 5.15.5 for The Valley Impact Area.

**5.4.6. Munitions Constituents**

The Basic IED Area was used for testing and demonstrating the effects of IEDs, as well as various chemical mixtures. During the demonstrations, small amounts of chemicals or residual waste were discarded on the ground. The following chemical/explosives are known to have been used at the range:

- Sulfuric acid
- Potassium chloride
- Potassium permanganate
- Sodium chloride
- Gasoline
- Aluminum powder
- Nitric acid
- Glycerin
- Detonation cord
- Iron Oxide
- TNT
- Black Powder
- Red phosphorous
- Sodium peroxide
- Hydrogen peroxide
- Magnesium powder
- Calcium hypochlorite
- Potassium nitrate
- Ammonium nitrate
- Ferrous oxide
- Potassium hypochlorate

Under the 1996 VI study, groundwater and soil samples were collected to determine the extent of the contamination in four sites of interest on the Basic IED Area: the Incendiary Demonstration Area; the Detonation Demonstration Area; the French drain system in the vicinity of Building 2118; and the area in front of the bleachers. These areas, as well as the sampling locations, are noted in Figure 5.4-1. Soil and groundwater samples were analyzed for volatile organic compounds (VOC), SVOCs, polychloryl biphenyls (PCB), energetics, and inorganics. Over 100 target analytes were evaluated using USEPA National and Region III guidelines.

There were no organic compounds detected in surface or subsurface soil samples collected from the French drain area near Building 2118. Soil samples taken from the Detonation Demonstration Area contained low levels of toluene, carbon disulfide, chloroform, and methylene chloride. At

the Incendiary Demonstration Area, chloroform and bis(2-ethylhexyl)phthalate were detected in soil samples. Methylene chloride was detected in soil samples taken from the area in front of the bleachers. The organic concentrations at each of these areas did not vary significantly with depth. PCBs and energetics were not detected in any of the soil samples at the Basic IED Area.

Several inorganic compounds were detected in soil samples at concentrations two times greater than in background samples. Silver and arsenic were detected at concentrations five times greater than background in the Incendiary Demonstration Area. Ammonium nitrate, TOC, and TPH were also detected at levels higher than background at this area. Inorganic compounds were found in higher concentrations in the down gradient location rather than source location. At the Detonation Demonstration Area, calcium and copper were detected at ten times the background level and nickel was detected at five times the background level. In this case, concentrations were found to be slightly higher in the source area over the down gradient location. At Building 2118, lead, sodium, and zinc were the only inorganics detected. The compounds were detected at higher concentrations in the shallow soil samples. Antimony and sodium were the only inorganics detected in the area in front of the bleachers. Ammonia and TPH were also detected at higher than background levels.

VOCs, SVOCs, and energetics were not detected in any of the groundwater samples taken from on-range monitoring wells. Metals detected in the groundwater included arsenic, barium, calcium, cobalt, iron, magnesium, manganese, and sodium. Only iron and manganese were detected at greater than five times the background levels. Inorganic compounds detected in the Basic IED groundwater samples did not exceed federal primary maximum concentration levels (MCLs). Aluminum, iron, and manganese concentrations did exceed federal secondary MCLs.

The Basic IED Area is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Basic IED Area. Refer to Section 5.15 for information on The Valley. For the purpose of this PA, only munitions constituents that specifically relate to the Basic IED Area are considered.

#### **5.4.7. Contaminant Migration Routes**

Contaminants at the Basic IED Area may potentially migrate within the soil, groundwater, and surface water runoff. Human activities that may disturb MEC include construction, excavation, plowing or tilling, and surface soil or vegetation removal. Based on the soil type found on-range, erosion is considered a potential problem. Due to the topography and slope of the land, surface water runoff would flow in a southeasterly direction. Adjacent to the south edge of the Basic IED Area is a large wetland, which drains into the Chicamuxen Creek. Precipitation infiltration may provide for contaminant mobility through the subsurface to the shallow or surficial groundwater aquifer, which is assumed to be connected to the nearby surface water bodies. Surface water runoff could potentially erode the soil on-range and transport contaminants off-range to the wetland. Based on a review of hydrogeological data, it is unlikely that MC in shallow groundwater would migrate to the deeper aquifers that are used as a water supply. However, shallow groundwater is still considered a potential exposure media.

#### **5.4.8. Receptors**

Potential human receptors include authorized Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users and trespassers. Plant and animal biota are also potential receptors. Examples of ecological receptors include deer, wild turkey, and waterfowl.

##### **5.4.8.1. Nearby Populations**

Nearby populations are as discussed in Section 5.1.8.1.

##### **5.4.8.2. Buildings Near/Within Site**

Building 2087 is the only building remaining at the range. This building was constructed in 1967 and was used for offices. There were additional buildings/structures on-range while the Basic IED Area was in use, all which have now been demolished. Table 5.4-1 provides known information on the buildings/structures formerly located on-range.

**Table 5.4-1 Summary of former buildings/structures located on the Basic IED Area.**

Building/Structure Number	Former Use
42-SN	Classroom/workshop
2012	Chlorinator house
2063	Observation area
2090	Training building
2118	Mixing chemicals/storage
2119	Storage
2120	Storage
2158	Bleachers

#### **5.4.8.3. Utilities On/Near Site**

According to the installation's 2003 Utilities Data map there are potable water, sewer, and utility lines to Building 2087 at the Basic IED Area range. The electric lines were noted during the visual survey.

#### **5.4.9. Land Use**

As mentioned in previous sections, land use at the Basic IED Area has included operations and training for Navy personnel from 1957 to the late 1990s. There is no readily available information on the land use prior to 1957. The Basic IED Area is presently closed and unused by the installation. There is no information of any future land use plans for the range.

#### **5.4.10. Access Controls / Restrictions**

Access to the Stump Neck Annex is limited by gated entrances, a security patrol and a perimeter fence. Only Navy personnel and authorized contractors/visitors are allowed on the installation. The Basic IED Area is accessed by an unpaved, unnamed road off of Archer Avenue. Access to the Basic IED Area is not specifically controlled. Forests surround the Basic IED Area on the east, west, and south sides. The south side of the range is adjacent to a wetland area. The range is located within a wildlife protection area.

According to the Soil Survey of Charles County, many of the soil types on Stump Neck and Indian Head have load bearing capacity limitations as a result of high water tables and extreme erodability conditions. This includes the soils found at the Basic IED Area. Based on this information, the installation has limited the construction and use of septic systems in specific areas of concern. The Basic IED Area is located in a region that has a seasonally high water table and, therefore, a waiver is required for all septic systems.

**5.4.11. Conceptual Site Model**

A general description of the CSM is provided in Section 5.1.11. The CSM is presented in a series of information profiles that presents information about the range. The information profiles are included in Table 5.4-2 below.

<b>Table 5.4-2: Conceptual Site Model Information Profiles – BASIC IED AREA</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
<b>Range/Site Profile</b>	Installation Name	NDW, Indian Head
	Installation Location	Indian Head, Charles County, Maryland
	Range/Site Name	Basic IED Area
	Range/Site Location	Western central portion of Stump Neck Annex, south of Archer Avenue in the vicinity of Building 2087.
	Range/Site History	This range was used to test and demonstrate various explosive devices and the explosive potential of chemical mixtures. The range was first used in November of 1957 as an active demonstration area. Although an exact date could not be determined, the range was closed at some point before 1996.
	Range/Site Area and Layout	Test areas may exist throughout the range; the most likely test areas include the Incendiary Demonstration Area, the Detonation Demonstration Area,, former Building 2118 area (used for mixing chemicals), two storage buildings, Building 2063 used for observation, and the area in front of the former bleachers (Building 2158). The Basic IED Area covers a total of 3.8 acres.
	Range/Site Structures	One building is located at the range Building 2087.

Table 5.4-2: Conceptual Site Model Information Profiles – BASIC IED AREA		
Profile Type	Information Needs	Preliminary Assessment Findings
	Range/Site Boundaries	<p>N: The range is bounded on the north by Archer Avenue.</p> <p>S: Bounded predominantly by grass and shrub/tree vegetated hills.</p> <p>W: Bounded predominantly by grass and shrub/tree vegetated hills.</p> <p>E: Bounded predominantly by grass and shrub/tree vegetated hills.</p>
	Range/Site Security	The Basic IED Area is located on Stump Neck Annex, which is a fenced and guarded installation. Access to the Basic IED Area is not controlled.
	Munitions Types	The types of munitions used on the range are as follows: small arms, bulk high explosive, demolition charges, primers, detonators, fuzes, squibs. Chemicals/explosives used include: ammonium nitrate, sulfuric acid, potassium chloride, sodium chloride, gasoline, aluminum powder, nitric acid, glycerin, black powder, red phosphorous, sodium peroxide, hydrogen peroxide, magnesium powder, calcium hypochlorite, potassium nitrate, ferrous oxide, and explosive D. Refer to Section 5.15 for munitions associated with The Valley firing fan.
	Maximum Probability Penetration Depth	There is no penetration depth at the Basic IED Area; demonstrations were only on the surface and no firing of munitions took place. Ordnance penetration depths for munitions fired from The Valley can be found in Section 5.15.5.
	MEC Density	The MEC density on-range is unknown.
	Munitions Debris	No debris or fragments of MEC were identified during the visual survey or identified by range personnel.
	Associated Munitions Constituents	<p>Associated MC include ammonium nitrate, sulfuric acid, potassium chloride, sodium chloride, gasoline, aluminum powder, nitric acid, glycerin, black powder, red phosphorous, sodium peroxide, hydrogen peroxide, magnesium powder, calcium hypochlorite, potassium nitrate, ferrous oxide, and explosive D.</p> <p>Soil and groundwater samples taken in 1996 showed detections of some organics and inorganics. No energetics or PCBs were detected.</p>

Table 5.4-2: Conceptual Site Model Information Profiles – BASIC IED AREA		
Profile Type	Information Needs	Preliminary Assessment Findings
	Migration Routes/Release Mechanisms	Soil surface runoff; groundwater discharge; range maintenance; construction; excavation
Physical Profile	Climate	Indian Head, Maryland has a continental-type climate with four well-defined seasons. The coldest period occurs in late January and early February, with low temperatures averaging at 29°F. July is the warmest month with average maximum temperatures of 85°F. The normal annual precipitation is approximately 44 inches, with normal monthly precipitation varying from 2.25 (February) to 4.60 (August) inches.
	Topography	Elevations at the site vary from approximately five to 30 feet above grade. The topography slopes to the south-southeast and the slope is sharpest at the southeastern extent.
	Geology	Indian Head and Stump Neck lie within the Atlantic Coastal plain physiographic province. The geology of the area is comprised of Precambrian igneous and metamorphic bedrock overlain by 500 to 600 feet of unconsolidated fluvial and marine deposits of the Potomac Group. The Potomac Group consists of, in descending order, the Patapsco, Arundel, and Patuxent Formations.
	Soil	The soils at the range are classified as Keyport silt loams with two to five percent slope over the northern portion and five to 12 percent slope over the southern portion. The soils are considered moderately eroded and moderately drained with a high moisture capacity, and have low permeability.
	Hydrogeology	The hydrogeological makeup of the Indian Head, Maryland area consists of a surficial aquifer and several deeper confined and semi-confined aquifers in the Patapsco and Patuxent Formations. The surficial aquifer is expected to be connected to and influenced by the surface water bodies. Regional water supplies, including that of NDW, Indian Head, are obtained from the lower and middle sands of the Patapsco and Patuxent Formations of the Potomac Group. The surficial aquifer (i.e., water table) is not used for water supply at NDW, Indian Head.

Table 5.4-2: Conceptual Site Model Information Profiles – BASIC IED AREA		
Profile Type	Information Needs	Preliminary Assessment Findings
	Hydrology	There are no surface water bodies located on the range. Surface water runoff follows local topography and drains southeast to a wetland area, which then drains into the Chicamuxen Creek.
	Vegetation	The vegetation at the range consists of large wooded and grassy areas.
<b>Land Use and Exposure Profile</b>	Current Land Use	The range is currently closed.
	Current Human Receptors	Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users, and trespassers.
	Current Activities (frequency, nature of activity)	The range is currently closed. There are no current activities on-range except for occasional maintenance (i.e., mowing).
	Potential Future Land Use	According to the installation, there is no expected change in land use.
	Potential Future Human Receptors	Navy personnel (military and civilian), visitors, trespassers, and contractors. These receptors would include construction workers (if intrusive work is necessary) and maintenance and operations workers as well as recreational users (hunters).
	Potential Future Land Use-Related Activities:	There are no known future land use-related activities at the Basic IED Area.
	Zoning/Land Use Restrictions	The Basic IED Area is located within a wildlife protected area. The range is also characterized by a seasonally high water table and highly eroded soils. A waiver is required for installation of septic systems.
	Demographics/Zoning	Charles County population density is approximately 260 persons per square mile. NDW, Indian Head and its tenant commands employ approximately 3,600 military and civilian personnel.
	Beneficial Resources	None
<b>Ecological Profile</b>	Habitat Type	The property of the range and the surrounding area includes wooded areas, open grass fields and shrubs. Wetlands lie 200 feet south of the range.
	Degree of Disturbance	Medium disturbance; the range is currently maintained through mowing.
	Ecological Receptors	

Table 5.4-2: Conceptual Site Model Information Profiles – BASIC IED AREA		
Profile Type	Information Needs	Preliminary Assessment Findings
	Federal Endangered Species:	American bald eagle, rainbow snake, and sensitive joint-vetch.
	Federal Threatened Species:	None.
	State Endangered Species:	Scaly blazing star.
	State Threatened Species:	None.
	Other Ecological Receptors:	Other ecological receptors include numerous species of birds, amphibians, reptiles and mammals such as the white tailed deer, wild turkey, the red-bellied woodpecker and the eastern box turtle.
	Relationship of MEC/MC Sources to Habitat and Potential Receptors	Receptors may have direct or indirect contact with MEC and MC that exist in the environment or have been incorporated into the food chain.

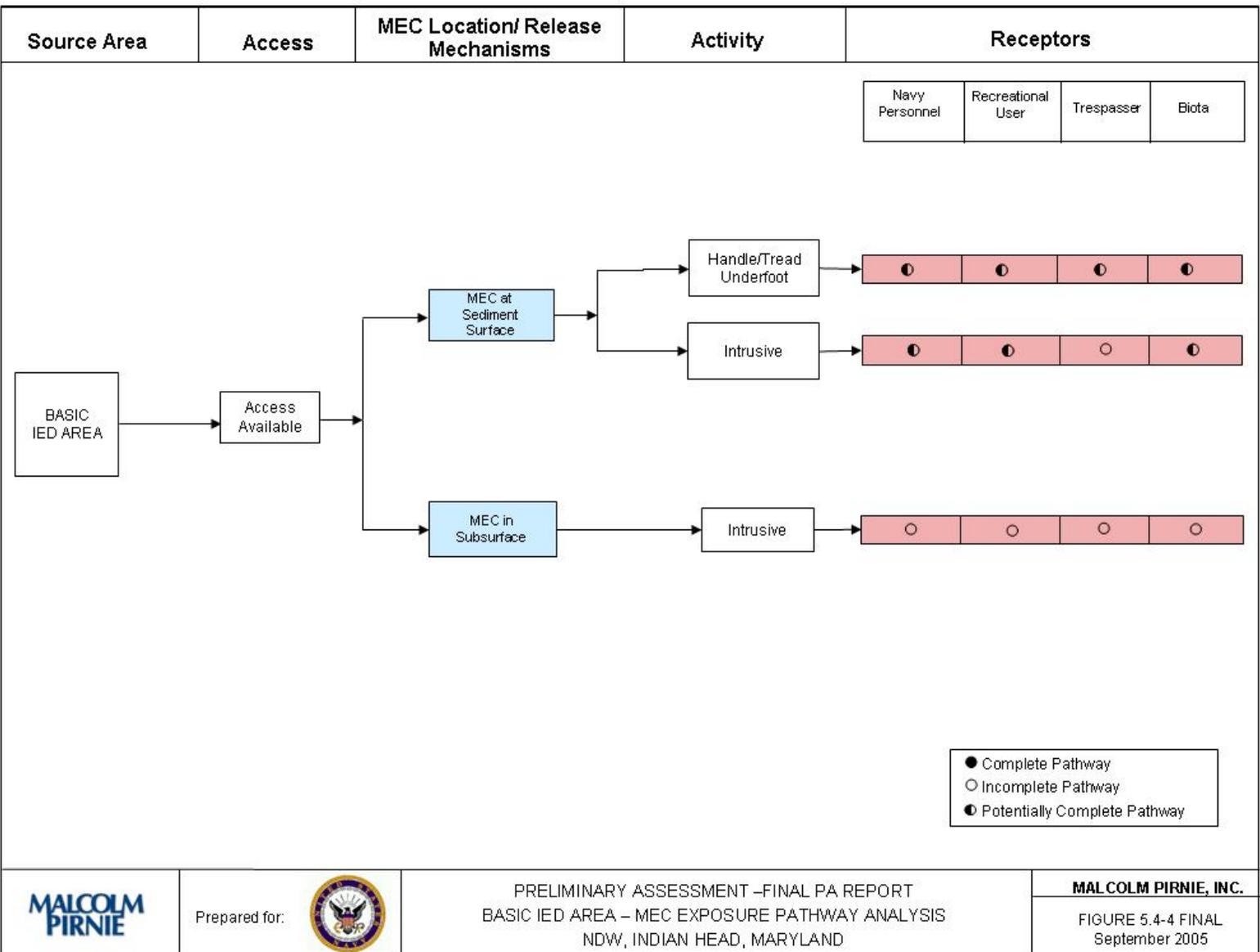
A general description of the CSM exposure pathway analysis is included in Section 5.1.11. The following CSM exposure pathways analysis focuses only on the Basic IED Area and does not consider impacts from The Valley firing fan. For exposure pathway analysis for The Valley Impact Area, refer to Section 5.15.11.

Historical evidence indicates that MEC may be present at the range; therefore, an Exposure Pathway Analysis for MEC was created (Figure 5.4-4). Based on available information, MEC are considered suspect over the six sites of interest at the Basic IED Area in both surface. Therefore, potentially complete pathways exist for human and ecological receptors for MEC in the surface soil. This includes receptors for hand/tread underfoot contact as well as surface intrusive work that may be conducted at the Basic IED Area. These activities include, but are not limited to, excavation, plowing, tilling, construction, and environmental sampling for human receptors. Ecological receptors may come in contact with MEC through burrowing, nesting, or feeding activities that disturb surface soil. Trespassers are anticipated to be exposed to non-intrusive surface soil activities at the range, but it is unlikely they would be exposed to surface soil through intrusive activities. MEC is not expected in the subsurface.

There are also potentially complete pathways for MC as illustrated in the Exposure Pathway Analysis Figure 5.4-5 for MC. The primary source medium for exposure is soil. Exposures to surface soil, subsurface soil, and surface water runoff containing MC may present potentially

complete pathways for human and ecological receptors. All human and ecological receptors have potentially complete exposure pathways for direct contact with MC in surface soil, which includes dermal contact, ingestion, and inhalation (dust). While there is no surface water directly on the Basic IED Area, there is a large wetland area located directly south of the range. Surface water runoff at the Basic IED Area drains into this wetland area. Thus, potentially complete pathways exist for all human and ecological receptors of surface water/sediments. The food chain also becomes a potential pathway as hunting is allowed near to the Basic IED Area. Human receptors have the potential to accumulate MC from game animals collected at or near the range. Precipitation infiltration may provide for contaminant mobility into the subsurface soil and into the shallow or surficial groundwater aquifer, which is assumed to be connected to the nearby surface water bodies. MC within subsurface soil are only likely to affect Navy personnel and/or contractors on-range through intrusive activities such as construction or sampling, as well as biota. It is not anticipated that trespassers would come in contact with subsurface soils. Although confining layers are expected to prevent the migration of MC to the lower aquifers used for water supply, potentially complete pathways exist for MC in shallow groundwater for human receptors.

Figure 5.4-4 MEC Exposure Pathway Analysis



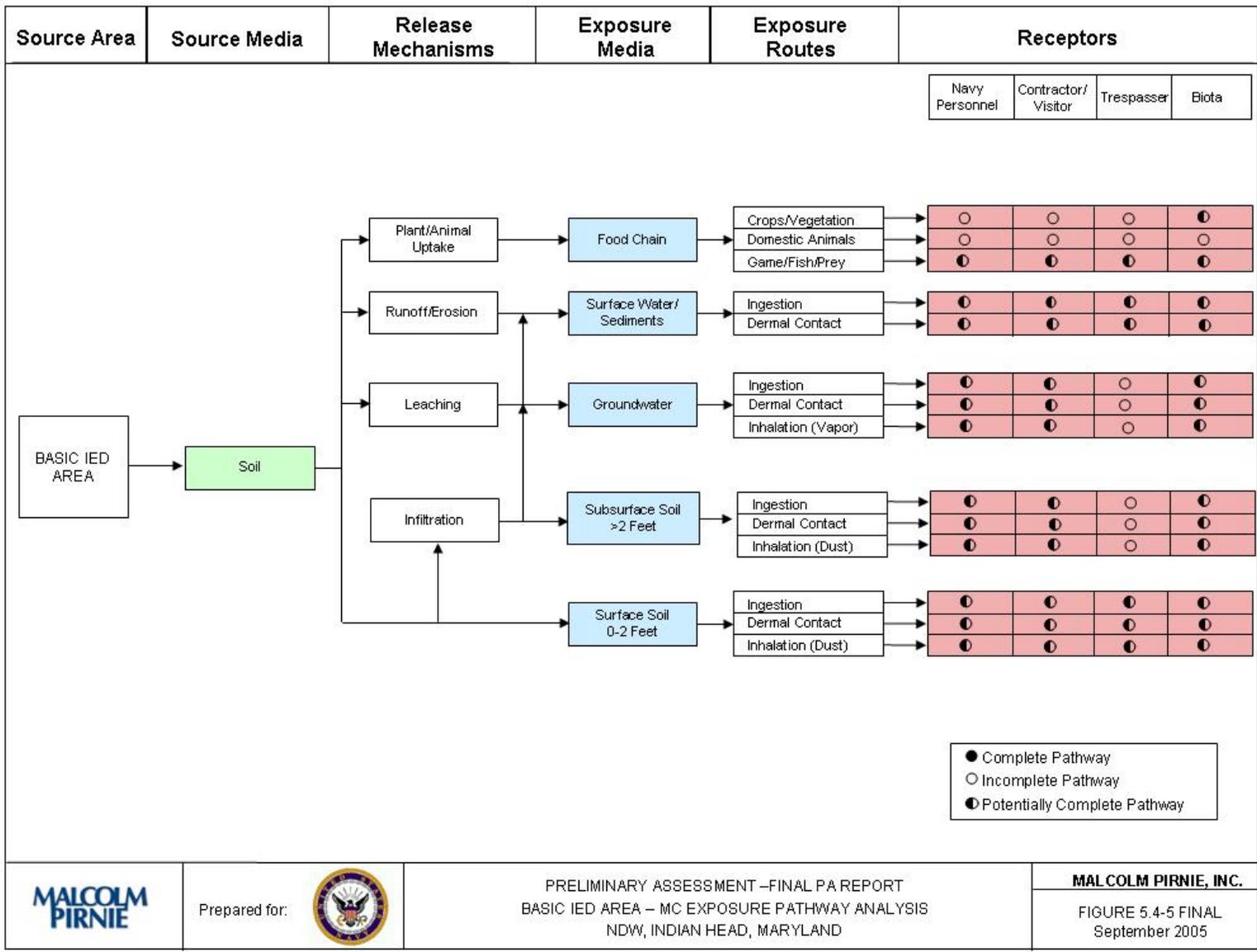


Figure 5.4-5 MC Exposure Pathway Analysis



Prepared for:



PRELIMINARY ASSESSMENT –FINAL PA REPORT  
BASIC IED AREA – MC EXPOSURE PATHWAY ANALYSIS  
NDW, INDIAN HEAD, MARYLAND

MALCOLM PIRNIE, INC.

FIGURE 5.4-5 FINAL  
September 2005

*5.4.12. Summary*

The Basic IED Area was used for testing and demonstration of various explosive devices including mixtures of household and industrial chemicals. It was first used in November 1957 as an active demonstration area for the EOD School. Although an exact date could not be determined, the range was closed prior to 1996. The range originally contained six areas of concern: Building 2158 (the bleachers), Building 2118 (French drain for mixing of chemicals), Building 2063 (observation area), two unnamed storage buildings, the Incendiary Demonstration Area, and the Detonation Demonstration Area. These structures have since been removed. Only Building 2087, formerly used for offices, remains on the former range.

Although no evidence of MEC/MC was observed during the visual survey at the range, there is historical and physical evidence to suggest that residual MC may exist based on sampling performed in the 1996 VI. Without further sampling, the presence of MEC cannot be confirmed or denied. The six sites of interest are suspect for MEC. In the 1996 VI, samples were taken from seven soil borings and three monitoring wells installed at the range to investigate potential contamination. During this investigation, no MEC was encountered. As detailed in Section 5.4.6, several inorganics and organics were detected above background levels in soil and groundwater samples; however, no explosives were detected.

**Map 5.4-1: Visual Survey: Basic IED Area**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.4-2: Range/Site Details: Basic IED Area**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.4-3: Munitions Characterization: Basic IED Area**

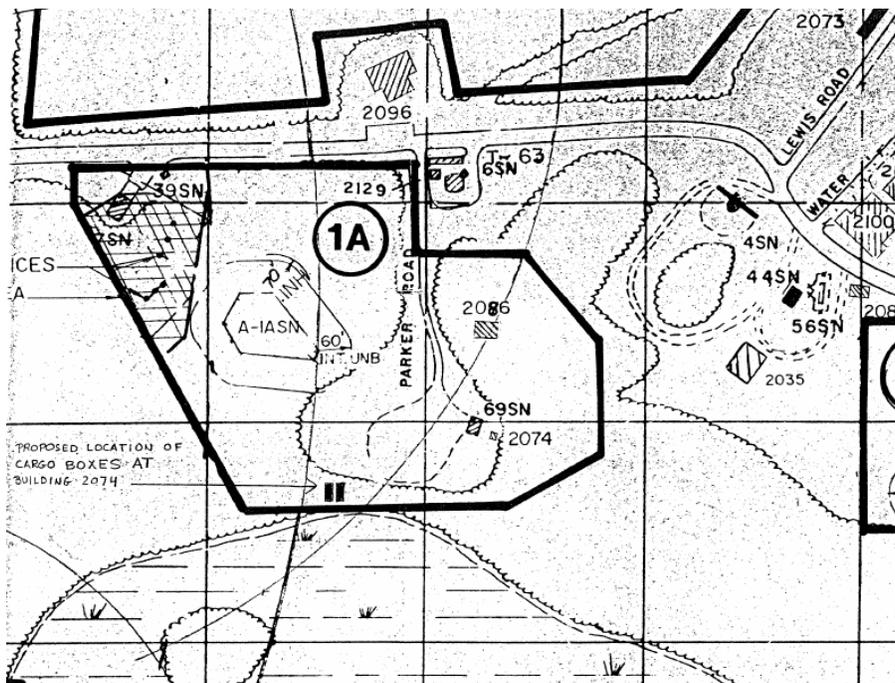
This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**5.5. IOD AREA (ADVANCED IED AREA)**

**5.5.1. History and Site Description**

The Advanced IED Area, initially identified as the Inert Ordnance Devices (IOD) Area from the U.S. Navy’s Range Inventory, is a 10.07-acre range located on the western-central portion of Stump Neck Annex. The Advanced IED Area lies adjacent to Archer Avenue. Parker Road runs down the center of the Advanced IED Area. The name and boundaries of the range was changed after reviewing several memorandums and maps identifying the area.

Based on historical documentation and maps available for review, the Advanced IED Area was formerly part of the EOD School at NDW, Indian Head. The Secretary of the Navy established the EOD School at NDW, Indian Head in 1947. According to a memorandum from the Commanding Officer of the EOD School to the Chief of Naval Operations dated 1970, the EOD School began using the property associated with the Advanced IED Area in 1968. The EOD School was broken into Divisions I through V. Division II was further broken down into Areas 1A and 1B. The Advanced IED Area corresponds to Division II, Area 1 A. The Advanced IED Area, shown as Area 1 A, is provided in Figure 5.5-1.



**Figure 5.5-1: Map displaying location of Advanced IED Area.**

Division II began using the Advanced IED Area for teaching all practical training in dropped/projected munitions and clandestine devices in 1968. Training that occurred in Area 1A was described as dropped munitions, fuze stripping, tools and methods, explosive analysis, baltograph (polaroid), accidents/incidents related to dropped munitions, and new developments.

The 1996 VI report, completed for the Naval School EOD Sites at Stump Neck Annex, included SWMU #27 (now IR Site #65). The Advanced IED Area overlaps SWMU #27. According to information in the VI report, the EOD School likely used the SWMU #27 area for training and to dispose of inert ordnance items and training aids. Based on the results of the VI, a no further action recommendation was assigned to SWMU #27. Since SWMU #27 is located in the southeast portion of the Advanced IED Area (as depicted in Figure 5.5-2) and was used by the EOD School, the potential MEC associated with SWMU #27 is being considered as part of this PA for the Advanced IED Area.

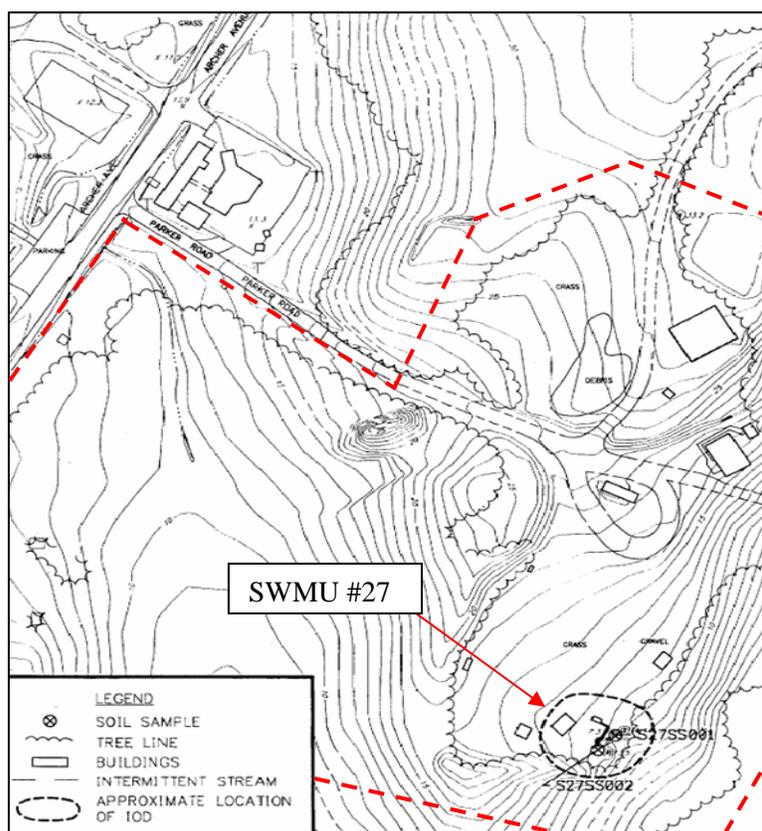


Figure 5.5-2: Location of SWMU #27 on map from 1996 VI report

What is believed to be a concrete bunker (approximately 18 feet x 12 feet), built into the side of a gently sloping grass covered hill, is located on SWMU #27, within the boundaries of the Advanced IED Area. The bunker reportedly had two manhole-type openings through what is assumed to be the roof. The manhole-type openings were filled with concrete sometime during the 1980s. According to the correspondence regarding the range, the concrete layer also covered the discarded ordnance items that were assumed to be inert ordnance items and training aids used by the EOD School; however, during the visual survey ordnance items were observed inside the concrete bunker (see Section 5.5.2).

An aircraft fuselage, used for training exercises (simulating the deactivation of unexploded ordnance aboard an aircraft), was also once reportedly located on the range. This is consistent with information obtained during an interview with Mr. Earl Scroggins. Mr. Scroggins referred to this area as the Air Practical Area where the EOD School used TNT (quarter- to half-pound) and detonator cord as training aids between 1967 and 1970.

The EOD School was in operation from 1947 until 1995 when the school was moved to Eglin Air Force Base. As mentioned previously, the EOD School began using the area associated with SWMU #27 and the Advanced IED Area in 1968. However, based on the fact that building 69SN



was constructed in 1953 and the EOD School was established in 1947 it is possible this area was actually used from 1953 through 1995. The buildings associated with the EOD School were located north of the range and have all been demolished. The current conditions at the Advanced IED Area are shown in Figure 5.5-3 and Figure 5.5-4.

**Figure 5.5-3: View of northern side of Advanced IED Area**

The Advanced IED Area is located within the estimated firing fan from The Valley. Refer to Section 5.7 in the Final PA Report for the Main Installation, Indian Head for Information on The Valley. Information for The Valley is also provided in the current PA report under Section 5.15, The Valley Impact Area.



**Figure 5.5-4: View of southern side of Advanced IED Area**

#### **5.5.1.1. Topography**

Section 3.2 provides a general description of topography for the Stump Neck Annex. The elevation across the Advanced IED Area ranges from five to 15 feet above msl gently sloping from the northwest to the southeast toward the wetlands.

#### **5.5.1.2. Geology**

Section 3.3 provides a geologic description for Indian Head and the Stump Neck Annex, which is applicable to the Advanced IED Area. No range-specific geology exists for the Advanced IED Area.

#### **5.5.1.3. Soil and Vegetation Types**

Section 3.4 provides a description of the soil and vegetation types at Indian Head and the Stump Neck Annex. According to the Soil Survey of Charles County, the predominant soil type associated with the Advanced IED Area is a Keyport Silt Loam, moderately eroded, with two to five percent slope. These soils are characterized by a thin silt loam surface layer or potentially exposed subsoil. These soils have high available moisture content and low permeability. The Advanced IED Area is a grass covered area and is surrounded by a mix of coniferous and deciduous trees. A large wetland lies within approximately 200 feet of the eastern, western, and southern boundaries of the Advanced IED Area.

#### **5.5.1.4.Hydrology**

Section 3.5 provides a description of hydrology at Indian Head and the Stump Neck Annex. Drainage from the Advanced IED Area drains either directly into the wetland areas surrounding the site and then into the Chicamuxen Creek, or directly into the creek.

#### **5.5.1.5.Hydrogeology**

Section 3.6 provides a description of hydrogeology for Indian Head and the Stump Neck Annex, which is applicable to the Advanced IED Area.

#### **5.5.1.6.Cultural and Natural Resources**

General cultural and natural resources for NDW, Indian Head are provided in Section 3.7. According to the 1996 Phase I Cultural Resources Survey of Stump Neck Annex there are no archeological/cultural sites within the Advanced IED Area. Several shovel test pits were taken within the site boundaries and all were found negative for historic artifacts.

#### **5.5.1.7.Endangered and Special Status Species**

As discussed in Section 3.8, endangered and special status species are reported to exist at the Stump Neck Annex. According to the 2003-2004 Stump Neck Annex Hunting Map, the Advanced IED Area lies within an eagle protection area and access is restricted from December 15 through June 15. While their presence has not been confirmed, the reported endangered and special status species are expected to inhabit the Advanced IED Area.

### ***5.5.2. Visual Survey Observations and Results***

The Advanced IED Area visual survey was conducted on June 23, 2003. Malcolm Pirnie personnel who conducted the range visit included Mr. Dinh, Mr. Engholm, Ms. Tegtmeyer, Mr. Dan Hains, and Mr. McManus. Ms. Morgan, NDW, Indian Head Environmental Office, accompanied the team. Methods used during the range walk were as follows: a perimeter walk was conducted around range, followed by a north to south transect across the parcel within the perimeter. Site coverage was estimated at 40 percent walked with 100 percent of the range visually observed.

Various types of munitions debris items were observed within the area covered by SWMU #27 both on the ground and within the concrete bunker. These items included submunitions (cluster bombs), practice rockets, snake eye fin tubes, smoke canisters, bomb fuzes, and random munitions debris. According to installation personnel and on-site EOD personnel, these ordnance items were inert. A visual depiction of the range reconnaissance route is provided on Map 5.5-1, provided at the end of Section 5.5.

**5.5.3. *Munitions and Munitions Related Materials Associated with the Site***

This section describes the munitions or munitions related materials known or suspected to be at the range, including the types and estimated maximum penetration depths. This includes both MEC and non-hazardous munitions related debris (e.g., fragmentation, base plates, inert mortar fins). Potential ordnance concentration areas are presented along with a discussion on the presence of any special consideration ordnance.

As mentioned previously the EOD School's Division II Area 1A began using the property adjacent to and associated with the Advanced IED Area in 1968. The types of training that occurred at Area 1A included:

- Dropped munitions
- Fuze stripping
- Tools and methods
- Explosive analysis
- Baltograph (polaroid)
- Accidents/incidents related to dropped munitions
- New developments

According to Ms. Heidi Morgan, red flags were posted along the northern and western boundaries of the Advanced IED Area that stated "active explosive operations in progress". Reportedly, during nearby groundwater sampling in 1997-1998, Ms. Morgan heard "fire in the hole" followed by loud explosions. This further confirms the use of this area by the EOD School for training activities.

Based on information obtained from the VI report, the concrete bunker and surrounding area identified as SWMU #27, located within the boundaries of the Advanced IED Area, was used for

both training and the disposal of inert ordnance items and training aids once used by the EOD School. Listed below are the inert ordnance and munitions debris items that were observed on or near the concrete bunker during the visual survey conducted in June 2003.

- Submunitions (cluster bombs)
- Practice rockets
- Snake eye fin tubes
- Smoke canisters
- Bomb fuzes
- Random munitions debris

The Advanced IED Area is overlapped by the firing fans from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Advanced IED Area. Technical data sheets are included in Appendix D. Refer to Section 5.7 in the PA Report for the Main Installation, Indian Head for information on The Valley. Information on The Valley is also provided in the current PA report under Section 5.15, The Valley Impact Area.

Based on the information obtained during the data collection process, no CWM filled munitions, or DU associated munitions were found or are expected to be found at the Advanced IED Area.

#### ***5.5.4. MEC Presence***

The entire range has been subdivided and categorized into one of three levels of MEC presence including: known MEC areas, suspected MEC areas, and areas where no evidence exists to indicate that MEC is known or is suspected to be at the range. The MEC presence is discussed below. The Advanced IED Area is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Advanced IED Area. Technical data sheets are included in Appendix D. Refer to Section 5.7 in the Final PA Report for the Main Installation, Indian Head for information on The Valley. For the purpose of the PA, only MEC presence specifically related to the Advanced IED Area is considered. Map 5.5-3 illustrates the munitions characterization of the Advanced IED Area and is provided at the end of Section 5.5.

#### **5.5.4.1. Known MEC Areas**

During the visual survey, various inert ordnance and munitions debris were observed within the concrete bunker located on the Advanced IED Area. As no live MEC was observed at the site, there are no known MEC areas at the Advanced IED Area.

#### **5.5.4.2. Suspected MEC Areas**

According to historical documents and information obtained during the data collection process, there is evidence of prior MEC use at the Advanced IED Area. Inert ordnance and munitions debris were also observed during the visual survey. Therefore, the entire Advanced IED Area is considered a suspect MEC area. Map 5.5-3 illustrates the munitions characterization of the Advanced IED Area and is provided at the end of Section 5.5.

#### **5.5.4.3. Areas Not Suspected to Contain MEC**

According to historical documents and information obtained during the data collection process, there is no evidence of the absence of MEC at the Advanced IED Area. Therefore, there are no portions of the Advanced IED Area that are not expected to contain MEC.

#### **5.5.5. *Ordnance Penetration Estimates***

The Advanced IED Area was used for training and, potentially, disposal. Based on the fact that the Advanced IED Area was used by the EOD School, the types of training that may have occurred did not involve firing projectile-type ordnance items. Therefore, there is no estimated ordnance penetration depth for this range. The Advanced IED Area is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Advanced IED Area. The ordnance penetration depth associated with munitions fired from The Valley is provided in Section 5.15.5.

### 5.5.6. *Munitions Constituents*

During the VI conducted in 1996, two subsurface soil samples (zero to two feet below ground surface) were collected approximately 25 feet south and east of the concrete bunker. The sample locations are provided on Figure 5.5-5. These samples were analyzed for the following analytes:

- VOCs
- Target Analyte List metals
- Cyanide
- Nitrate-nitrite
- NG
- Nitroguanidine
- Method 8330 explosives  
(including TNT, HMX, and RDX)
- SVOCs
- Tin
- Total organic carbon
- Ammonia
- Nitrocellulose
- PETN

No energetic (explosive) or semivolatile analytes were detected in the samples collected. Elevated levels of methylene chloride, toluene, and several inorganic compounds were detected in the soil samples collected. The inorganic compounds with elevated concentrations (two to five times above background at the nearby Basic Inert Explosive Devices Site) include:

- Antimony
- Cadmium
- Calcium
- Copper
- Magnesium,
- Tin
- Zinc

Both a human health risk assessment and an ecological risk assessment were conducted for SWMU #27. This risk assessment only considered chemical constituents and not explosives. Based on the results, it was found that the contaminants detected at SWMU #27 were unlikely to pose a risk to human health or the environment under current and anticipated future land use scenarios. Therefore, a no further action recommendation was made for SWMU #27.

Although the source of the methylene chloride and toluene are unknown, they are not likely related to MEC. The elevated metals concentrations detected may be related to the MEC and MEC debris in and around the concrete bunker. Based on the results of these samples collected from SWMU #27, the MC suspected to be present in this area may include inorganic compounds. The concentrations of the inorganic compounds present are not known.

The Advanced IED Area is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Advanced IED Area. Refer to Section 5.7 in the Final PA Report for the Main Installation, Indian Head for information on the Valley. For the purpose of the PA, only the munitions constituents that specifically relate to the Advanced IED Area are considered.

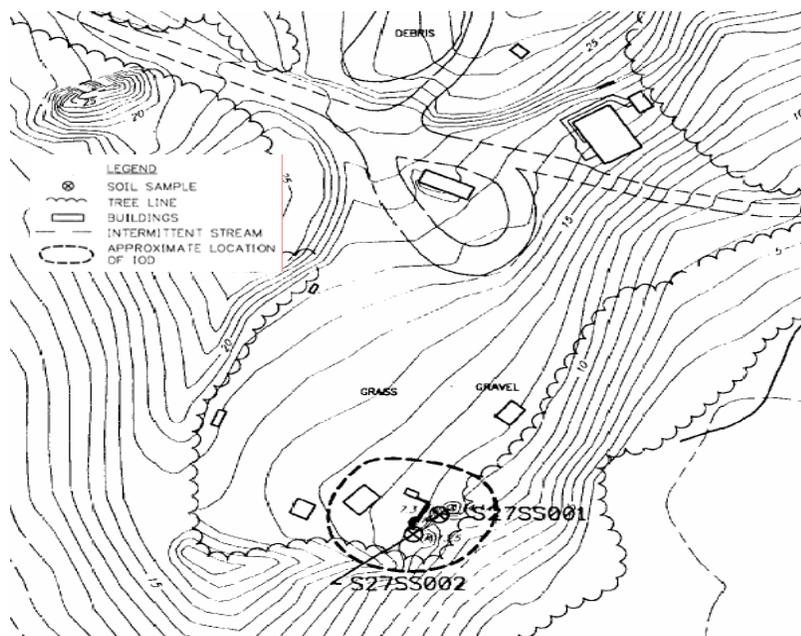


Figure 5.5-5: SWMU #27 sample locations from 1996 VI report

**5.5.7. Contaminant Migration Routes**

Contaminants at the Advanced IED Area may potentially migrate within the soil, groundwater and surface water runoff. Since the Advanced IED Area is grass covered and is only gently sloping, erosion would likely only occur during a major storm event involving a torrential downpour, or as a result of construction/demolition or other intrusive activities. Surface water

runoff would drain to the wetlands south of the range. MC in the soil could potentially migrate into the shallow groundwater through infiltration. Based on a review of hydrogeological data, it is unlikely that MC in shallow groundwater would migrate to the deeper aquifers that are used as a water supply. However, shallow groundwater is still considered a potential exposure media.

### **5.5.8. Receptors**

Potential human receptors include authorized Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users and trespassers. Plant and animal biota are also potential receptors. Examples of ecological receptors include deer, wild turkey, and waterfowl.

#### **5.5.8.1. Nearby Populations**

Nearby populations are as discussed in Section 5.1.8.1. There are no residential properties located on the Stump Neck Annex.

#### **5.5.8.2. Buildings Near/Within Site**

There are no buildings located on the Advanced IED Area. Several buildings were located just north of the Advanced IED Area before, during, and after its use by the EOD School, all which have since been demolished. Several buildings were identified as being part of the EOD School's Division II Area 1A, including:

- Building 2086SN (used as office/storage/class room space)
- Building 69SN (used as a work shop/publication storage/student coffee mess)
- Building 6SN (used for fuze stripping procedures)
- Building 7SN [used for baltograph (Polaroid)].

All of the buildings have since been demolished. Building 6SN was identified in the October 1970 memo as part of the Division II Area 1A; however, the corresponding map (Figure 5.5-1) shows Building 6SN outside the range boundaries.

### **5.5.8.3. Utilities On/Near Site**

The Utilities Data Map of the Main Installation indicates no utilities present within the boundaries of the Advanced IED Area. Potable water, sewage, and electrical lines run parallel to the northern side of Parker Road but do not overlap the boundaries of the Advanced IED Area.

### **5.5.9. Land Use**

As mentioned previously the Advanced IED Area was used by the EOD School for training, and potentially for the disposal of inert ordnance items and training aids. The area is currently undeveloped and unused. However, the grass covering the Advanced IED Area is mowed regularly. According to the 2003-2004 Stump Neck Annex Hunting Map hunting is permitted within the Advanced IED Area. Although no changes to the current land use are planned, it is assumed that the Advanced IED Area potentially could be redeveloped in the future.

### **5.5.10. Access Controls / Restrictions**

Access to the Stump Neck Annex is limited by gated entrances, a security patrol and a perimeter fence. There are no access control features specific to the Advanced IED Area. Access to the Advanced IED Area is gained via Parker Road, which extends from the eastern side of Archer Avenue. The Advanced IED Area is surrounded to the east, west, and south by a mix of conifer and deciduous trees. A large wetland lies within approximately 200 feet of the eastern, western, and southern boundaries of the Advanced IED Area. According to the 2003-2004 Stump Neck Hunting Map, the Advanced IED Area is located within an eagle protection area and access is restricted from December 14 through June 15.

According to the Soil Survey of Charles County, many of the soil types on the Stump Neck Annex have load bearing capacity limitations as a result of high water tables and extreme erodability conditions. This includes the soils found at the Advanced IED Area. Based on this information, the installation has limited construction and the use of septic systems in specific AOCs. The Advanced IED Area is located in a region that has a seasonally high water table and, therefore, a waiver is required for all septic systems.

**5.5.11. Conceptual Site Model**

A general description of the CSM is provided in Section 5.1.11. The CSM is presented in a series of information profiles that presents information about the range. The information profiles are included in Table 5.5-1 below.

<b>Table 5.5-1: Conceptual Site Model Information Profiles – ADVANCED IED AREA</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
<b>Range/Site Profile</b>	Installation Name	NDW, Indian Head
	Installation Location	Indian Head, Charles County, Maryland
	Range/Site Name	Advanced IED Area
	Range/Site Location	Located on the western-central portion of Stump Neck Annex adjacent to Archer Avenue. Parker Road runs parallel down the center of the Advanced IED Area.
	Range/Site History	Used by the EOD School for training, and and potentially the disposal of inert ordnance items and training aids. The Advanced IED Area was used from approximately 1953 through 1995.
	Range/Site Area and Layout	This 10.07-acre range is roughly rectangular in shape. The parcel is orientated diagonally from the northwest to the southeast. A portion of the parcel is grass covered and is surrounded by a mix of coniferous and deciduous trees. A large wetland lies within approximately 200 feet of the eastern, western, and southern boundaries of the Advanced IED Area.
	Range/Site Structures	No structures are currently located at the range.
	Range/Site Boundaries	N: Archer Avenue/coniferous and deciduous trees S: Coniferous and deciduous trees/wetland area W: Archer Avenue/coniferous and deciduous trees / wetland area E: Coniferous and deciduous trees/wetland area
	Range/Site Security	Access to Stump Neck Annex is limited by gated entrances, a security patrol and a perimeter fence. Only Navy personnel and authorized contractors and visitors are allowed on the installation. There are no access control features specific to the Advanced IED Area.

<b>Table 5.5-1: Conceptual Site Model Information Profiles – ADVANCED IED AREA</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
<b>Munitions/ Release Profile</b>	Munitions Types	Submunitions (cluster bombs), practice rockets, snake eye fin tubes, smoke canisters, bomb fuzes, and random munitions debris. Refer to Section 5.15 for munitions types associated with The Valley firing fan.
	Maximum Probability Penetration Depth	Penetration depth not applicable. The training that may have occurred did not involve firing projectile-type ordnance items. Ordnance penetration depths for munitions fired from The Valley can be found in Section 5.15.5.
	MEC Density	Unknown
	Munitions Debris	Unknown
	Associated Munitions Constituents	Metals
	Migration Routes/Release Mechanisms	Soil surface runoff; groundwater discharge; range maintenance; construction; excavation
<b>Physical Profile</b>	Climate	Indian Head, Maryland has a continental-type climate with four well-defined seasons. The coldest period occurs in late January and early February, with low temperatures averaging at 29°F. July is the warmest month with average maximum temperatures of 85°F. The normal annual precipitation is approximately 44 inches, with normal monthly precipitation varying from 2.25 (February) to 4.60 (August) inches.
	Topography	The elevation across the Advanced IED Area ranges from five to 15 feet above msl gently sloping from the northwest to the southeast toward the wetlands.
	Geology	Indian Head and Stump Neck lie within the Atlantic Coastal plain physiographic province. The geology of the area is comprised of Precambrian igneous and metamorphic bedrock overlain by 500 to 600 feet of unconsolidated fluvial and marine deposits of the Potomac Group. The Potomac Group consists of, in descending order, the Patapsco, Arundel, and Patuxent Formations.
	Soil	The predominant soil type associated with the Advanced IED Area is Keyport silt loam with two to five percent slope.

<b>Table 5.5-1: Conceptual Site Model Information Profiles – ADVANCED IED AREA</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
	Hydrogeology	The hydrogeological makeup of the Indian Head, Maryland area consists of a surficial aquifer and several deeper confined and semi-confined aquifers in the Patapsco and Patuxent Formations. The surficial aquifer is expected to be connected to and influenced by the surface water bodies. Regional water supplies, including that of NDW, Indian Head, are obtained from the lower and middle sands of the Patapsco and Patuxent Formations of the Potomac Group. The surficial aquifer (i.e., water table) is not used for water supply at NDW, Indian Head.
	Hydrology	Drainage from the Advanced IED Area drains either directly into the wetland areas surrounding the site and then into the Chicamuxen Creek, or directly into the creek.
	Vegetation	The Advanced IED Area is predominantly a grass covered and is surrounded by a mix of coniferous and deciduous trees.
<b>Land Use and Exposure Profile</b>	Current Land Use	The area is currently undeveloped and unused. However, the grass covering the Advanced IED Area is however, mowed regularly. According to the 2003-2004 Stump Neck Annex Hunting Map hunting is permitted within the Advanced IED Area.
	Current Human Receptors	Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users, and trespassers.
	Current Activities (frequency, nature of activity)	Although the Advanced IED Area is unused, the grass is mowed regularly.
	Potential Future Land Use	No planned change from current use is reported.
	Potential Future Human Receptors	Navy personnel (military and civilian), visitors, trespassers, contractors, construction workers (if intrusive work is necessary) and maintenance and operations workers as well as recreational users (hunters).
	Potential Future Land Use-Related Activities:	There is no expected change in land use activities.

<b>Table 5.5-1: Conceptual Site Model Information Profiles – ADVANCED IED AREA</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
	Zoning/Land Use Restrictions	The Advanced IED Area is located within an eagle protection area, and access is restricted from December 15 through June 15. The area is also characterized by a seasonally high water table and highly eroded soils. A waiver is required for installation of septic systems.
	Demographics/Zoning	Charles County population density is approximately 260 persons per square mile. NDW, Indian Head and its tenant commands employ approximately 3,600 military and civilian personnel.
	Beneficial Resources	None
<b>Ecological Profile</b>	Habitat Type	The Advanced IED Area is predominantly grass covered and is surrounded by a mix of coniferous and deciduous trees. A large wetland lies within approximately 200 feet of the eastern, western, and southern boundaries of the Advanced IED Area.
	Degree of Disturbance	Low – The Advanced IED Area is occasionally mowed.
	Ecological Receptors	
	Federal Endangered Species:	American bald eagle, rainbow snake, and the joint-vetch
	Federal Threatened Species:	None
	State Endangered Species:	Scaly blazing-star
	State Threatened Species:	None
	Other Ecological Receptors:	Other ecological receptors include numerous species of birds, reptiles and mammals such as the white tailed deer, wild turkey, the red-bellied woodpecker and the eastern box turtle.
	Relationship of MEC/MC Sources to Habitat and Potential Receptors	Receptors may contact MEC in the subsurface soil. Receptors may have contact with MC directly through surface water/soil or indirectly through the food chain (bioaccumulated in plants and animals).

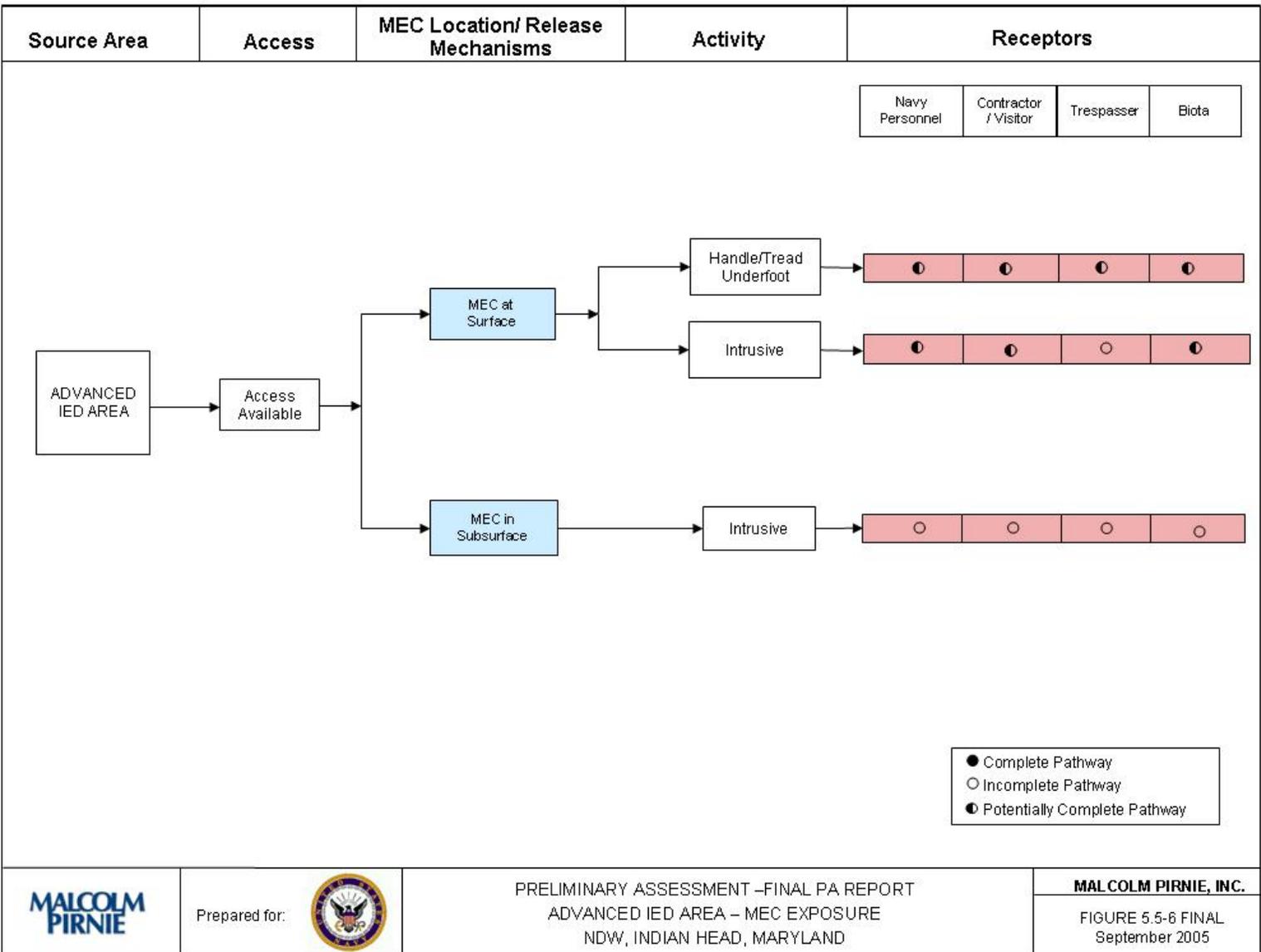
A general description of the CSM exposure pathway analysis is included in Section 5.1.11. The following CSM exposure pathways analysis focuses only on the Advanced IED Area and does

not consider impacts from The Valley firing fan. For exposure pathway analysis for The Valley Impact Area, refer to Section 5.15.11.

The MEC Exposure Pathway Analysis (Figure 5.5-6) illustrates that potentially complete pathways exist for human and ecological receptors for MEC in the surface soil. This includes receptors for hand/tread underfoot contact as well as surface intrusive work that may be conducted at the Advanced IED Area. These activities include, but are not limited to, excavation, plowing, tilling, construction, and environmental sampling for human receptors. Ecological receptors may come in contact with MEC through burrowing, nesting, or feeding activities that disturb surface soil. Trespassers are anticipated to be exposed to non-intrusive surface soil activities at the range, but it is unlikely they would be exposed to subsurface soil through intrusive activities. MEC are not expected in the subsurface.

As illustrated in MC Exposure Pathway Analysis Figure 5.5-7, soil impacted by MC represents a primary source medium. Exposures to surface soil, subsurface soil, and surface water runoff containing MC may present potentially complete pathways for human and ecological receptors. All human and ecological receptors have potentially complete exposure pathways for direct contact with MC in surface soil, which includes dermal contact, ingestion, and inhalation (dust). While there is no surface water directly on the Advanced IED Area, a large wetland lies within approximately 200 feet of the eastern, western, and southern boundaries of the range providing an exposure medium for receptors. Thus, potentially complete exposure pathways exist between surface water runoff and all receptors (human and ecological) at the Advanced IED Area. Given that the range is located within an upland hunting area, human and ecological receptors have a potentially complete pathway by ingesting game/prey that has previously consumed contaminated vegetation or prey. Precipitation infiltration may provide for MC mobility to the subsurface and the shallow or surficial groundwater aquifer, which is assumed to be connected to the nearby surface water bodies. Potentially complete exposure pathways exist for MC in subsurface soils (direct contact, ingestion and inhalation during intrusive work activities) for all human and ecological receptors with the exception of trespassers. It is not anticipated that trespassers would come in contact with subsurface soils. Surficial groundwater in the area is not used, and confining layers are expected to prevent the migration of MC to the lower aquifers used for water supply. Therefore, exposure to human receptors and biota are incomplete pathways for groundwater.

Figure 5.5-6: MEC Exposure Pathway Analysis



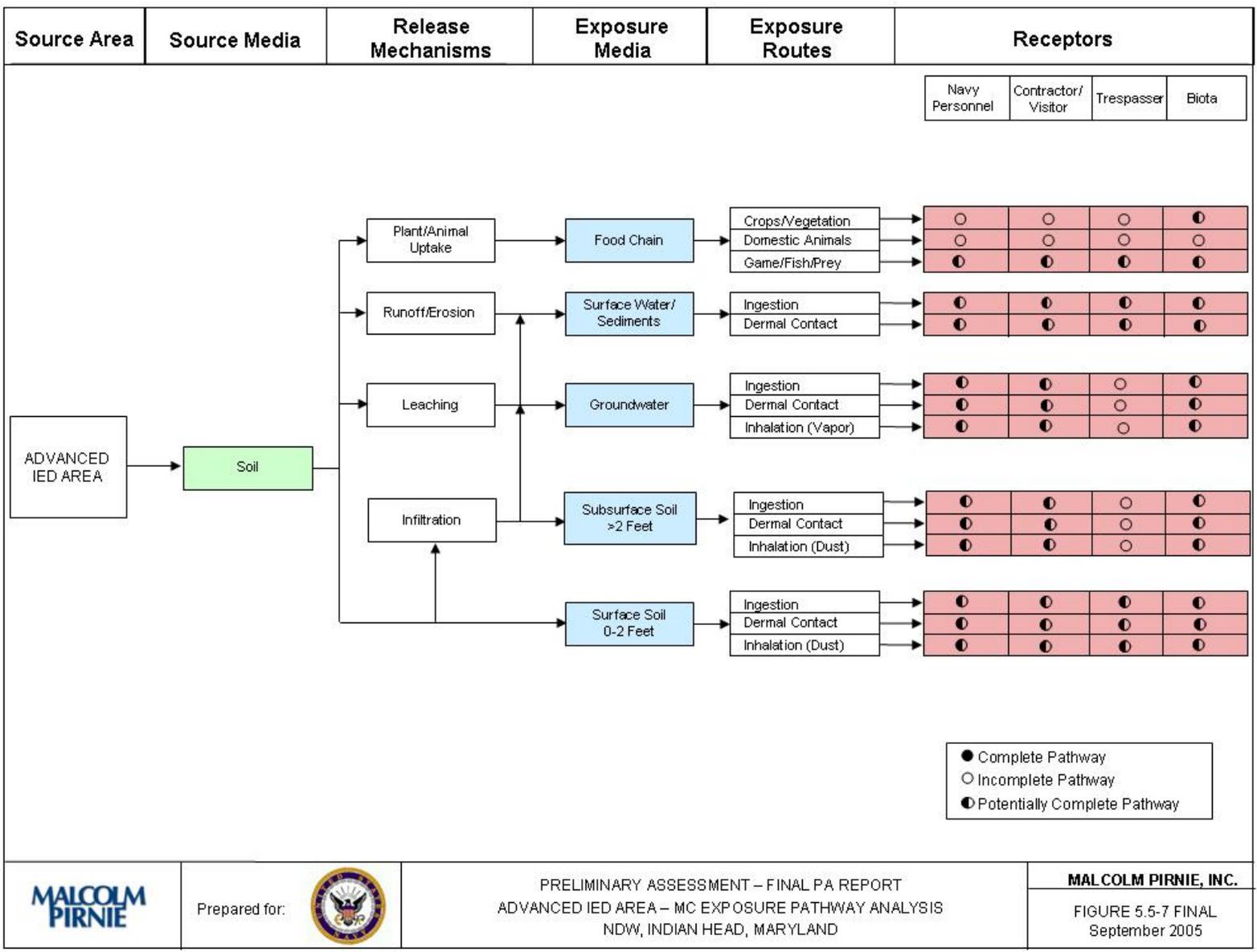


Figure 5.5-7: MC Exposure Pathway Analysis



Prepared for:



PRELIMINARY ASSESSMENT – FINAL PA REPORT  
ADVANCED IED AREA – MC EXPOSURE PATHWAY ANALYSIS  
NDW, INDIAN HEAD, MARYLAND

MALCOLM PIRNIE, INC.

FIGURE 5.5-7 FINAL  
September 2005

*5.5.12. Summary*

The Advanced IED Area is a 7.98-acre site located on the western-central portion of Stump Neck Annex. The boundaries of the range, originally identified during the Navy's Range Inventory, were adjusted based on several maps found identifying the location of the Advanced IED Area. Based on information reviewed, the Advanced IED Area was part of the EOD School's Division II Area 1A. Division II Area 1A was responsible for teaching all practical training in dropped/projected munitions and clandestine devices beginning in 1968.

Based on historical documents of Division II Area 1A training activities, there is evidence of prior MEC use at the Advanced IED Area. Additionally, inert ordnance and munition debris were noted both on the ground and within the concrete bunker during the visual survey. This included submunitions (cluster bombs), practice rockets, snake eye fin tube, smoke canisters, bomb fuzes, and random OE debris. Therefore, the Advanced IED Area is considered a suspect MEC area and the bunker is considered a known MEC area.

During the VI conducted in 1996, elevated concentrations of several inorganic compounds were detected in two subsurface (zero to two feet bgs) soil samples that were collected approximately 25 feet south and east of the concrete bunker. Based on the results of these samples, the MC suspected to be present in this area includes inorganic compounds.

**Map 5.5-1: Visual Survey: Advanced IED Area**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.5-2: Range/Site Details Map: Advanced IED Area**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.5-3: Munitions Characterization: Advanced IED Area**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

## 5.6. MARINE RIFLE RANGE

### 5.6.1. History and Site Description

The Marine Rifle Range was formerly used for small arms training from approximately 1911 to 1918. The Marine Rifle Range was identified in the Navy Range Inventory. The estimated limits of the Marine Rifle Range, shown on Map 5.6-1, were mapped based on field reconnaissance, additional data collection, and historic maps obtained for this PA. Based on this evaluation, the size of the Marine Rifle Range is estimated at 30.44-acres. The boundaries of the range were altered from the Navy Range Inventory to incorporate the firing lines and target butts identified on historic maps. The boundaries were also changed to exclude the areas occupied by other MRP sites. The Safety Danger Zone (SDZ) for the Marine Rifle Range covers approximately 1369 acres.



**Figure 5.6-1: View of Marine Rifle Range looking west toward Building 2195.**

The range is located on the Stump Neck Annex, south of Archer Avenue, parallel to Archer Avenue from the causeway west to Building 2105 (Figure 5.6-1). The western portion of the range is developed, and the central and eastern portions of the range are wooded with sporadic structures. Earthen mounds are present in the woods along Archer Avenue and east of Building 2075. The Marine Rifle Range is also surrounded by the Air Blast Pond to the south, the Torpedo Burial Site to the south, and the Old Skeet and Trap Range to the north. When the Marine Rifle Range was an active training area, two range houses, barracks, and associated support buildings were present at the range.

The estimated period of use, 1911 to 1918, is based on historic maps and documents. The Marine Rifle Range is identified on historic maps from 1913, 1915 and 1918, is also referred to as the Rifle Range, Winthrop, Maryland. The range was identified on a January 1913 *Government Reservation at Stump Neck, Maryland* map, which was obtained from the National Archives (Figure 5.6-2). Photographs of the conditions at the Marine Rifle Range in 1913 were also obtained from the National Archives (Figure 5.6-3, Figure 5.6-4, and Figure 5.6-5). The 1915 map obtained from the National Archives (as well as the installation and Navy historian) provides

details of the layout of the Marine Rifle Range, including buildings, target butts, and firing lines. The 1918 map shows the location of the range within the installation as well as a rough outline of the range as shown in Figure 5.6-2. According to the 1918 Annual Report from the Commandant of the Marine Corps, this range was used for Marine recruits from the Norfolk and Philadelphia depots for small arms training with rifles. An April 1917 memorandum from the Marine Corps states that the range was still in use and that it was dangerous to enter the portion of the reservation to the rear of the rifle butts. The 1918 Annual Report of the Chief of the Bureau of Ordnance states that “the buildings vacated by the Marines on Stump Neck were moved to Machodoc Creek (Virginia) to form the nucleus of the station”. A 1931 memorandum from the Major General Commandant of the Marine Corps states that the buildings at Winthrop were “understood to be quite dilapidated and of no value”. A 1949 map showing the conditions at Stump Neck lists this area as “cultivated”. Therefore, it is assumed that the range was closed between April 1917 and 1918.

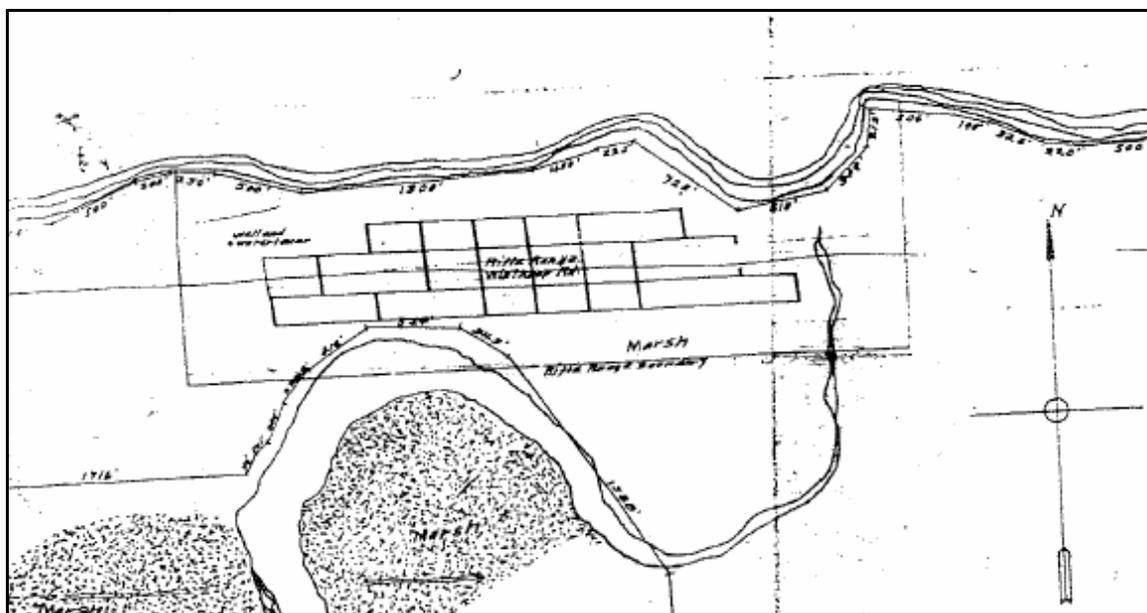


Figure 5.6-2: Rifle Range, Winthrop, Maryland as shown on 1913 installation map



**Figure 5.6-3: October 19, 1913. Rifle Range at Winthrop, Maryland, showing firing line**

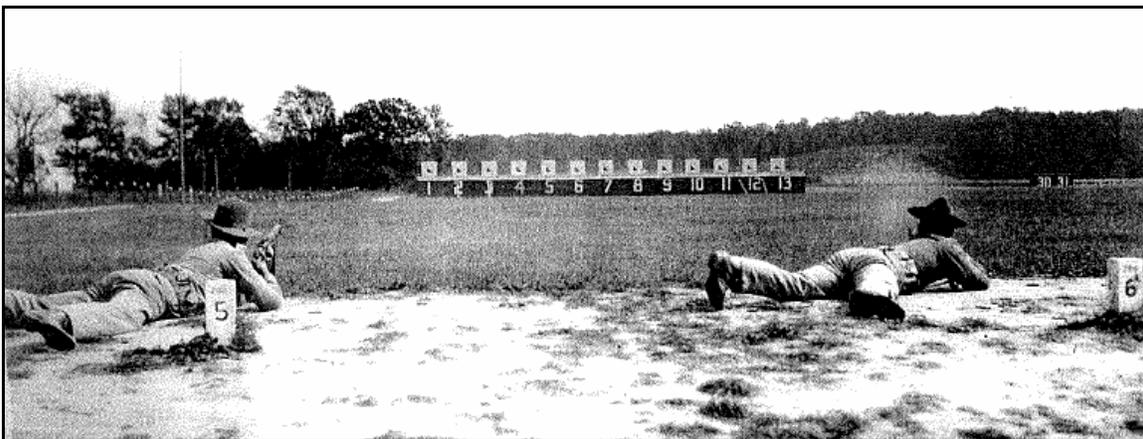


**Figure 5.6-4: October 19, 1913. Rifle Range at Winthrop, Maryland, showing firing line and range house**



**Figure 5.6-5: October 19, 1913. Rifle Range at Winthrop, Maryland, showing target mechanisms**

Mr. Miller, retired Marine Corp EOD, stated that the rifle range paralleled the Potomac river. He also stated that pistols may have been used at the range and that an embankment was present behind the targets, as seen in Figure 5.6-6.



**Figure 5.6-6: October 19, 1913. Rifle Range at Winthrop, Maryland, showing targets and embankment**

Details from the 1915 map are shown on Map 5.6-2. Two target butts were located at the eastern end of the range. Two sets of firing lines, one for each target butt, were located at 100-meter increments to a maximum of 1000 meters. Range houses (Figure 5.6-4), barracks, and other support buildings were also identified on the 1915 map. According to historic photographs, (Figure 5.6-6) there were 13 targets in each target butt. The number of targets, location of firing lines, and recommended Small Arms Range Design and Construction guidance document were used to establish the Safety Danger Zone (SDZ), as shown on Map 5.6-2. The SDZ for the Marine Rifle Range extends over Chicamuxen Creek, Potomac River, and east over the Stump Neck Annex and off-post. These features were used to establish the size, shape, and orientation of the Marine Rifle Range as it appears in this PA.

The Marine Rifle Range is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Refer to Section 5.7 in the Final PA Report for the Main Installation, Indian Head for Information on The Valley. Information for The Valley is also provided in the current PA report under Section 5.15, The Valley Impact Area.

The 1914 Annual Report states that the Marine Rifle Range is a source of delay for the Proving Ground. Despite precautions taken at the range, the requirements at the rifle range made it necessary to suspend or curtail work at the Naval proving ground. However, work from the proving ground also caused delays and interferences with training at the rifle range when projectiles were fired toward Stump Neck. The dwellings and barracks on Stump Neck were close to the line of the 10-inch, 12-inch, and 14-inch guns and were inside the SDZ established by the Navy. Although stringent orders existed to vacate the Marine Rifle Range when firing over it was necessary, there was always an element of danger present. According to a 1911 Bureau of Ordnance memorandum, no projectiles had been reported to have landed in the rifle range. The Marine Rifle Range was relocated to MCB Quantico in 1918 in order to eliminate the interferences between training at the rifle range and at the proving ground.

The Marine Rifle Range is not identified as a SWMU or as an IR range; however, the following SWMUs are overlapped by or adjacent to the Marine Rifle Range:

- SWMU #6 – Air Blast Pond
- SWMU #8 – Tool Burial Site – Site 34
- SWMU #9 – Torpedo Burial Site – Site 35

- SWMU #12 – Waste Oil Storage Site
- SWMU #18 – Waste Pile

The Air Blast Pond and Torpedo Burial Site are addressed in this PA (Sections 5.1 and 5.16, respectively). The EOD School Demo Area is also adjacent to the Marine Rifle Range and is addressed in Section 5.3. The overlapping areas are not included in the acreage for the Marine Rifle Range.

#### **5.6.1.1. Topography**

Section 3.2 provides a general description of topography for the Stump Neck Annex. The terrain at the Marine Rifle Range is relatively flat. Elevations at the range range from five to 30-meters above msl. The central and eastern portions of the range are relatively flat at an elevation of approximately ten meters above msl. The western portion of the range has a slight slope from 10 to 30 meters above msl. Wetlands border the range to the east, and wetlands also surround an unnamed tributary in the central portion of the range. Due to the topography of the area and the complete vegetative ground cover, severe erosion is not considered to be a problem.

#### **5.6.1.2. Geology**

Section 3.3 provides a geologic description for the Indian Head Stump Neck Annex, which is applicable to the Marine Rifle Range. No range-specific geology was available for the Marine Rifle Range.

#### **5.6.1.3. Soil and Vegetation Types**

Section 3.4 provides a description of the soil and vegetation types at the Stump Neck Annex. Vegetation at this range is a mixture of mowed grass, grass fields, hardwood forest, and wetlands as illustrated in Figure 5.6-7. The wetland area on-range is classified by the installation as Palustrine forested broad-leaved deciduous wetland. According to the Soil Survey of Charles County, soils in the area consist of silty sand with gravel at the ground surface underlain by silty sand with clay. Specifically, Keyport silt (western portion), Elkton silt loam (central portion), and Mattapex silt loam (eastern portion) are present at the range.



**Figure 5.6-7: View of grassland at Marine Rifle Range**

#### **5.6.1.4.Hydrology**

Section 3.5 provides a description of hydrology at Indian Head and the Stump Neck Annex. Wetlands are located on and bordering the eastern portion and in the central portion of the range surrounding an unnamed tributary. Surface water drains to two unnamed tributaries, one in the central portion and one in the eastern portion of the range. Surface water also drains to drainage swales located along Archer Avenue and surrounding the building in the western portion of the range. The surface water drains to the wetlands and the Chicamuxen Creek which drain to the Potomac River. A portion of Marine Rifle Range along the wetlands is located within the 100-year floodplain.

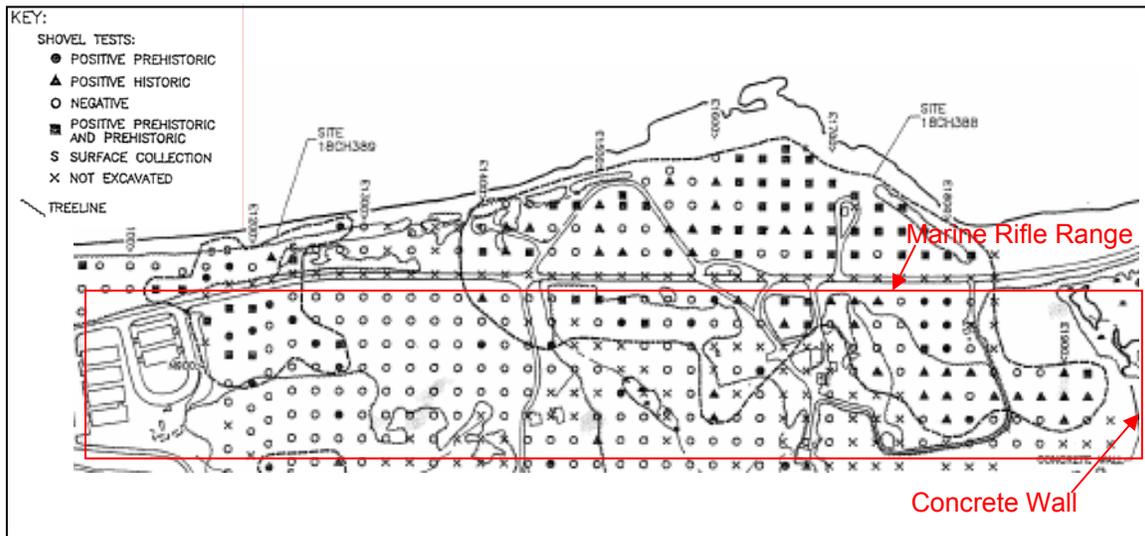
#### **5.6.1.5.Hydrogeology**

Section 3.6 provides a description of hydrogeology for Indian Head and the Stump Neck Annex, which is applicable to the area of the Marine Rifle Range. It is assumed that shallow groundwater flow from the Marine Rifle Range follows topography and is connected to the area's dominant surface water bodies (the Mattawoman Creek, the Chicamuxen Creek, and the Potomac River). No monitoring wells are located within the Marine Rifle Range; however, one of the potable production wells for the Stump Neck Annex, #2012 SN, is located across Archer Avenue.

**5.6.1.6.Cultural and Natural Resources**

General cultural and natural resources for Stump Neck Annex are provided in Section 3.7. Since a portion of this range is undeveloped, there is the potential for wildlife to exist at the range. According to the 2003-2004 Stump Neck Annex Hunting Map hunting is permitted in the undeveloped portions of the Marine Rifle Range. The Chicamuxen Wildlife Management Area is located approximately 75 meters south of the Marine Rifle Range.

The Phase I Cultural Resources Survey of Stump Neck Annex and Supplemental Architectural Investigations from August 1996 identified two sites within the Marine Rifle Range. The sites and associated locations of positive prehistoric and historic findings are identified on Figure 5.6-8. A reinforced concrete retaining wall approximately 130 feet long and 33 feet high was identified in the area bordering the marsh in the eastern edge of the Marine Rifle Range. No sites were identified on the Maryland Register of Historic Places (State Register) or the National Register of Historic Places.



**Figure 5.6-8: Cultural resources identified in shovel test pits**

**5.6.1.7.Endangered and Special Status Species**

Endangered or special status species located on the Stump Neck Annex are presented in Section 3.8. The species potentially inhabit the Marine Rifle Range.

**5.6.2. Visual Survey Observations and Results**

A visual survey of the Marine Rifle Range was conducted during the range visit on June 26, 2003. Malcolm Pirnie personnel who conducted the range visit included Mr. Dinh, Mr. Egholm, Ms. Tegtmeier, Mr. Hains, Mr. McManus, Mr. Wiley, Mr. Baker, and Mr. Rice. Ms. Morgan and Mr. Jorgensen of NDW, Indian Head Environmental Office, accompanied the team. The Marine Rifle Range was inspected through several transects across the former range. Numerous pieces of metallic and wood debris were identified in the woods during the visual survey. The metallic debris was determined non-ordnance or munition related. Earthen mounds were observed in the woods along Archer Avenue and east of Building 2075. These earthen mounds may be the remnants of the embankments discussed in Section 5.6.1. No ordnance, MEC, or related debris were observed during the range visit.



**Figure 5.6-9: View of earthen mound identified during visual survey**



**Figure 5.6-10: Metal debris observed in the woods at the Marine Rifle Range**

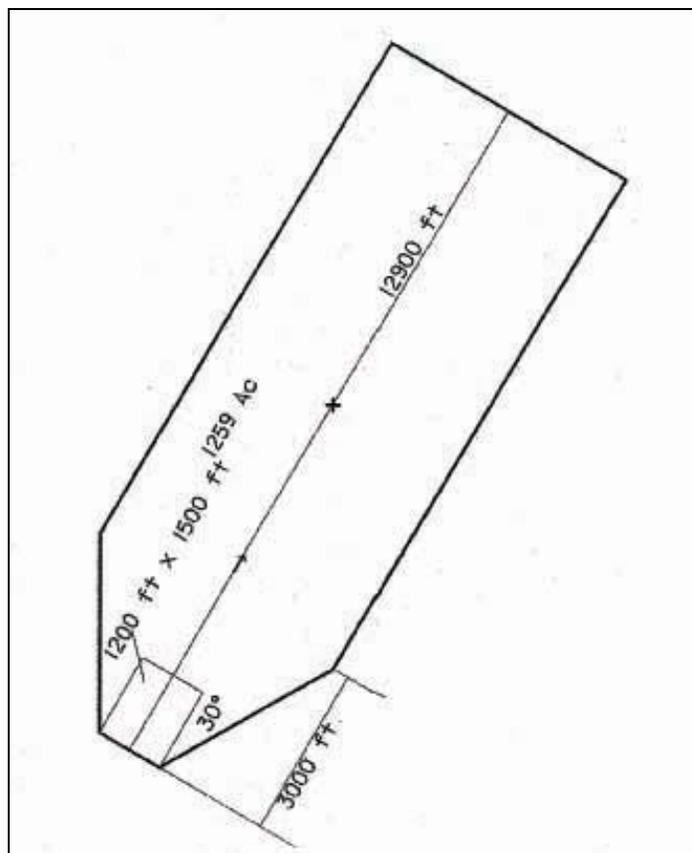
A visual depiction of the range reconnaissance is provided on Map 5.6-1 located at the end of Section 5.6. Additional range/site details are illustrated on Map 5.6-2 also located at the end of Section 5.6.

### ***5.6.3. Munitions and Munitions Related Materials Associated with the Site***

This section describes the munitions or munitions related materials known or suspected to be at the range. This includes both MEC and non-hazardous munitions related debris (e.g., fragmentation, base plates, inert mortar fins).

The Marine Rifle Range was used for small arms training. Historic maps and documents state that rifles were used at the range; however, Mr. Miller also stated that pistols were reportedly used at the range. Specific ordnance types used at the range are not known; however, general rifle ammunition from the early 1900s included .30-caliber ammunition. According to the Army Technical Manuals (AR 750-10, TM 9-855), the maximum range for .30-caliber ammunition is 10,350 feet and the muzzle velocity is 2,700 feet per second. The SDZ extends from the end of each firing line in a 30° angle for 3,000 feet down range, at which point it continues for and additional 8,700 feet parallel to the direction of fire. An example of a typical SDZ for a rifle

range is provided in Figure 5.6-11. The SDZ for the Marine Rifle Range covers 1,369 acres and is shown on Map 5.6-2.



**Figure 5.6-11: Typical SDZ for a 500-yard rifle range**

Lead shot is suspected within the target butts. No munitions related debris items were identified at the Marine Rifle Range. No munitions related debris items were identified in the shovel tests conducted for the Phase I Cultural Resources Survey of Stump Neck Annex and Supplemental Architectural Investigations. Technical data sheets for small arms ammunition are included in Appendix D.

The Marine Rifle Range is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Marine Rifle Range. However, a 1911 memo from the Bureau of Ordnance states that no projectiles were reported to have landed on the Marine Rifle Range. Technical data sheets are included in Appendix D. Refer to Section 5.7 in the PA Report for the Main Installation,

Indian Head for information on The Valley. Information on The Valley is also provided in the current PA report under Section 5.15, The Valley Impact Area.

Based on the information obtained during the data collection process, the Marine Rifle Range is not suspected to contain CWM filled munitions, electrically fuzed munitions, or DU associated munitions.

#### ***5.6.4. MEC Presence***

The entire range has been subdivided and categorized into one of three levels of MEC presence including: known MEC areas, suspected MEC areas, and areas where no evidence exists to indicate that MEC are known or are suspected to be at the range. The MEC presence is discussed below. The Marine Rifle Range is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Marine Rifle Range. Technical data sheets are included in Appendix D. Refer to Section 5.7 in the Final PA Report for the Main Installation, Indian Head for information on The Valley. For the purposes of the PA, only MEC presence specifically related to the Marine Rifle Range is considered. Map 5.6-3 illustrates the munitions characterization of the Marine Rifle Range and is provided at the end of Section 5.6.

##### **5.6.4.1. Known MEC Areas**

There are no readily apparent MEC areas associated with the Marine Rifle Range, as small arms do not pose an explosive hazard.

##### **5.6.4.2. Suspected MEC Areas**

There are no suspected MEC areas expected at this range, as small arms do not pose an explosive hazard.

##### **5.6.4.3. Areas Not Suspected to Contain MEC**

Small arms are not explosive; therefore, the entire 35-acre range is not suspected to contain MEC.

#### ***5.6.5. Ordnance Penetration Estimates***

For small arms ranges, the Interstate Technology and Regulatory Council (ITRC) has prepared a document titled, "Characterization and Remediation of Soils at Closed Small Arms Firing

Ranges”, dated January 2003, to provide information on the general layout of small arms ranges, as well as information on areas that may be impacted with MC and/or MEC as a result of range use and the characteristics of the munitions used. According to the ITRC guidance, the penetration depth of small arms on the range floor is one foot or less. The document states that rounds that impact the range floor are typically a flat trajectory that fell short of or missed the target, or those resulting from ricochet, and these fragments are usually found within the top six inches of soil. MC presence is expected to be concentrated in the target butts.

The Marine Rifle Range is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Marine Rifle Range. The ordnance penetration depth associated with munitions fired from The Valley is provided in Section 5.15.5.

#### ***5.6.6. Munitions Constituents***

For small arms ammunition, the primary MC of concern is lead from shot. Other associated MC less likely to be of concern may include antimony, arsenic, copper, nickel, and lead styphnate/lead azide. These MC items are not consumed when the munitions items function as they are designed. Therefore, these MC may exist at the Marine Rifle Range. There was no record found of environmental sampling on the range. The Marine Rifle Range is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Marine Rifle Range. Refer to Section 5.7 in the Final Report for the Main Installation, Indian Head for information on The Valley. For the purposes of the PA, only the munitions constituents that specifically relate to the Marine Rifle Range are considered.

#### ***5.6.7. Contaminant Migration Routes***

Contaminants at the Marine Rifle Range may potentially migrate within the soil, groundwater, surface water and sediment. The Marine Rifle Range’s proximity to the Chicamuxen Creek and the unnamed tributaries provides possible migration routes to surface water. Storm water discharges to surface water via overland flow. Groundwater flow in the shallow water table aquifer also likely trends towards the Chicamuxen Creek; therefore, MC leaching from soils into shallow groundwater may migrate to surface water. Sediments can act as contaminant

repositories, and sediment mixing and dredging can act as migration routes to surface water. MC in surface soils and sediments may migrate via plant/animal uptake. Direct human or biota contact with surficial and subsurface soil is possible if the soil is disturbed. Based on a review of hydrogeological data, it is unlikely that MC in shallow groundwater would migrate to the deeper aquifers that are used as a water supply. However, shallow groundwater is still considered a potential exposure media.

### **5.6.8. Receptors**

Potential human receptors include authorized Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users and trespassers. Plant and animal biota are also potential receptors. Examples of ecological receptors include deer, wild turkey, and waterfowl.

#### **5.6.8.1. Nearby Populations**

Nearby populations are as discussed in Section 5.1.8.1. The Chicamuxen Wildlife Management Area is located approximately 75 meters downstream of the Marine Rifle Range, and it is used by recreational hikers, hunters, and fishers. Residential properties are located two miles south of the range.

#### **5.6.8.2. Buildings Near/Within Site**

Building 2195 is located at the western edge of the range. Building 2195 is home to Code 45 as the “Joint Services EOD Equipment Support Facility”. Additional buildings surrounding Building 2195 are used for offices and storage. A fenced maintenance yard including Building 2156 and the former range of Buildings 2019 and 2101 are located in the central portion of the range. Building 2075 at the eastern edge of the range is a former shredder, which is currently condemned. The majority of the buildings were constructed after the Marine Rifle Range was closed.

Refer to Table 5.6-1 for details on the buildings at the Marine Rifle Range. The information was obtained from historic maps and the Indian Head building database.

**Table 5.6-1 Marine Rifle Range Building Descriptions**

Building	Location	Date Built	Use	Status
2019	Central portion	1962	offices	Demolished
2075	Eastern portion	1949	Shredder Building	
2101	Central portion	1972	shelter	Demolished
2105	Western portion	1974	storage	Demolished
2128	Western portion	1988	storage	Demolished
2147	Western portion	2002	equipment maintenance support	
2147	Western portion	1990	storage	
2148	Western portion	1990	storage	
2150	Western portion	1991	office/storage	
2151	Western portion	1991	storage	
2155	Western portion	1991	offices	
2156	Central portion		Fenced storage yard	
2165	Western portion	1991	Air conditioning	Demolished
2195	Western portion	1991	Offices and storage	
D- 21CSN	Eastern portion	1918	Testing building	Demolished

### 5.6.8.3. Utilities On/Near Site

Electrical lines, telephone lines, sanitary sewer lines, and potable water lines run through the Marine Rifle Range. The primary electric lines, sanitary sewer lines, and potable water lines are adjacent to and parallel Archer Avenue. Secondary utility lines service the buildings within the footprint of the Marine Rifle Range.

### **5.6.9. Land Use**

There is no readily available information on the land use prior to 1911. From 1911 until 1918 the range was maintained as a rifle range for the Marines. After the Marines relocated, the buildings were abandoned and eventually demolished to make way for development of the Stump Neck Annex. Buildings within the Marine Rifle Range are primarily used as offices and storage. The west portion of the range contains Building 2195, which is used by the Joint Services EOD Equipment Support Facility. The central and eastern portions of the range are primarily undeveloped with sporadic structures (Buildings 2156 and 2075). There is a fenced maintenance yard in the central portion of the range. The maintenance yard is used to store equipment (e.g., dump trucks, back hoes). The wooded area surrounding the existing buildings and the wetland area in the eastern portion of the range are currently unused. According to the installation personnel, there are no planned changes to activities at the Marine Rifle Range.

### **5.6.10. Access Controls / Restrictions**

No public access is authorized at NDW, Indian Head. Signs, partial fencing, locked/secured gates, login book/office check-in, and vehicle security patrol are used to control the entire facility. There are no access control features specific to the Marine Rifle Range. According to the 2003-2004 Stump Neck Annex Hunting Map, hunting is permitted within the undeveloped portions of the Marine Rifle Range.

The wetlands located on the eastern edge of the range are protected under Executive Order 11990, which prohibits construction in a wetland area unless there is no practicable alternative and all possible measures are taken to minimize the environmental impacts. Wetlands are also protected under Section 404 of the Clean Water Act, which requires a permit to be obtained from the USACE before any work in a wetland can commence. The wetlands found at the Marine Rifle Range are under the category of Palustrine forested broad-leaved deciduous wetland.

A portion of the Marine Rifle Range is located in the 100-year floodplain surrounding the wetlands. Executive Order 11988 restricts development within the 100-year floodplain to water dependent activities. Any construction within the floodplain must be in accordance with regulations promulgated by the Federal Insurance Administration pursuant to the National Flood Insurance Act of 1968. Permits for construction within the 100-year floodplain are also required,

and are administered by the Waterway Permits Division of the Maryland Department of Natural Resources.

**5.6.11. Conceptual Site Model**

A general description of the CSM is provided in Section 5.1.11. The CSM is presented in a series of information profiles that presents information about the range. The information profiles are included in Table 5.6-2 below.

<b>Table 5.6-2: Conceptual Site Model Information Profiles – MARINE RIFLE RANGE</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
<b>Range/Site Profile</b>	Installation Name	NDW, Indian Head
	Installation Location	Indian Head, Charles County, Maryland
	Range/Site Name	Marine Rifle Range
	Range/Site Location	The 30.44-acre Marine Rifle Range is located at Stump Neck Annex and situated south of Archer Avenue between the causeway and Building 2195.
	Range/Site History	The Marine Rifle Range was used for small arms training from approximately 1911 to 1918.
	Range/Site Area and Layout	Two target butts were located at the eastern end of the range. Earth embankments were present behind the target butts. Two sets of firing lines were located at 100-meter increments to a maximum of 1000 meters. There were 13 targets in each target butt. The SDZ for the Marine Rifle Range extends over the Chicamuxen Creek, Potomac River, and east over the Stump Neck Annex and off-post.
	Range/Site Structures	Building 2195 is located at the western edge of the range. Building 2195 is home to Code 45 as the Joint Services EOD Equipment Support Facility. A fenced maintenance yard (including Building 2156) and the former range of Buildings 2019 and 2101 are located in the central portion of the range. Building 2075 at the eastern edge of the range is a former shredder, which is currently condemned. The range houses, barracks, and other buildings that supported the Marine Rifle Range have all been demolished.

Table 5.6-2: Conceptual Site Model Information Profiles – MARINE RIFLE RANGE		
Profile Type	Information Needs	Preliminary Assessment Findings
	Range/Site Boundaries	<p>N: Archer Avenue forms the northern boundary of the range</p> <p>S: The Torpedo Burial Site, Air Blast Pond, EOD School Demo Area and undeveloped woodland form the southern boundary of the range.</p> <p>W: Building 2195 forms the western boundary of the range.</p> <p>E: An undeveloped swamp area and the causeway form the eastern boundary of the range.</p>
	Range/Site Security	The Marine Rifle Range is located on the Stump Neck Annex, which is a fenced and guarded installation. With the exception of the fenced maintenance yard, access to the Marine Rifle Range is not controlled.
<b>Munitions/ Release Profile</b>	Munitions Types	No evidence of ordnance is present at the range. The range was used for small arms training. Specific ordnance types used at the range are not known; however, general rifle ammunition from the early 1900s included .30-caliber ammunition. Refer to Section 5.15 for munitions types associated with The Valley.
	Maximum Probability Penetration Depth	The maximum probability penetration depth is likely less than six inches below the ground surface. Ordnance penetration depths for munitions fired from The Valley can be found in Section 5.15.5.
	MEC Density	Reportedly only small arms ammunitions were used at the range; therefore, there is no MEC density at the range. It is apparent that portions of the area have been regraded for construction of the nearby Navy buildings. The only possible evidence of the rifle range that remains are dirt mounds in the central portion of the range.
	Munitions Debris	None
	Associated Munitions Constituents	The primary MC of concern is lead from shot. Other associated MC may include antimony, arsenic, copper, nickel, and lead styphnate/lead azide. Sampling data was not available for the range.
	Migration Routes/Release Mechanisms	Soil surface runoff; groundwater discharge; range maintenance; construction; excavation

Table 5.6-2: Conceptual Site Model Information Profiles – MARINE RIFLE RANGE		
Profile Type	Information Needs	Preliminary Assessment Findings
Physical Profile	Climate	Indian Head, Maryland has a continental-type climate with four well-defined seasons. The coldest period occurs in late January and early February, with low temperatures averaging at 29°F. July is the warmest month with average maximum temperatures of 85°F. The normal annual precipitation is approximately 44 inches, with normal monthly precipitation varying from 2.25 (February) to 4.60 (August) inches.
	Topography	Elevations at the range range from 5 to 30-meters above msl. The central and eastern portions of the range are relatively flat at an elevation of approximately 10-meters above msl. The western portion of the range has a slight slope from ten to 30-metes above msl.
	Geology	Indian Head and Stump Neck lie within the Atlantic Coastal plain physiographic province. The geology of the area is comprised of Precambrian igneous and metamorphic bedrock overlain by 500 to 600 feet of unconsolidated fluvial and marine deposits of the Potomac Group. The Potomac Group consists of, in descending order, the Patapsco, Arundel, and Patuxent Formations.
	Soil	Soils in the area consist of silty sand with gravel at the ground surface underlain by silty sand with clay. Specifically, Keyport silt (western portion), Elkton silt loam (central portion), and Mattapex silt loam (eastern portion) are present at the range.
	Hydrogeology	The hydrogeological makeup of the Indian Head, Maryland area consists of a surficial aquifer and several deeper confined and semi-confined aquifers in the Patapsco and Patuxent Formations. The surficial aquifer is expected to be connected to and influenced by the surface water bodies. Regional water supplies, including that of NDW, Indian Head, are obtained from the lower and middle sands of the Patapsco and Patuxent Formations of the Potomac Group. The surficial aquifer (i.e., water table) is not used for water supply at NDW, Indian Head.

Table 5.6-2: Conceptual Site Model Information Profiles – MARINE RIFLE RANGE		
Profile Type	Information Needs	Preliminary Assessment Findings
	Hydrology	Surface water at the Marine Rifle Range drains either directly into the wetland areas surrounding the range or into unnamed tributaries at the range, which feed the wetland. The wetland areas drain into the Chicamuxen Creek.
	Vegetation	Vegetation at the range is a mixture of mowed grass, grass fields, forest, and wetlands.
<b>Land Use and Exposure Profile</b>	Current Land Use	The west portion of the range contains Building 2195 which is used by the Joint Services EOD Equipment Support Facility. The central and eastern portions of the range are primarily undeveloped with sporadic structures (Buildings 2156 and 2075). There is a fenced maintenance yard in the central portion of the range. The maintenance yard is used to store equipment (e.g., dump trucks, back hoes).
	Current Human Receptors	Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users, and trespassers.
	Current Activities (frequency, nature of activity)	The central and eastern portions of the range are used infrequently. Usage of these portions is limited to grass mowing and access to the maintenance yard. The western portion is used frequently (daily) because it is developed and contains office buildings and parking lots.
	Potential Future Land Use	There is no foreseen change to current use in the central and western portions of the range. However, it is anticipated that the office complex at the western portion of the range will be further developed (e.g., additional parking area).
	Potential Future Human Receptors	Navy personnel (military and civilian), visitors, trespassers, contractors, construction workers (if intrusive work is necessary) and maintenance and operations workers, as well as recreational users (hunters).
	Potential Future Land Use-Related Activities:	With the exception of additional workers at the office buildings, there are no foreseen changes in the land use-related activities at the range.
	Zoning/Land Use Restrictions	The wetlands and 100-year floodplains present at the range are protected against future development/construction.

Table 5.6-2: Conceptual Site Model Information Profiles – MARINE RIFLE RANGE		
Profile Type	Information Needs	Preliminary Assessment Findings
	Demographics/Zoning	Charles County population density is approximately 260 persons per square mile, while NDW, Indian Head and its tenant commands employ approximately 3,600 military and civilian personnel. There is no military housing at the Stump Neck Annex.
	Beneficial Resources	The Chicamuxen Wildlife Management Area is located south of the range.
Ecological Profile	Habitat Type	The undeveloped portions of the range and the surrounding area contain the following habitats: wetland, forest, grass fields, mowed lawns
	Degree of Disturbance	<ul style="list-style-type: none"> <li>• Low – Activities in the undeveloped portions of the range are (and will be) low. The areas are (and will be) unused habitat and species present are (and will be) undisturbed (i.e., undisturbed grassland, forest, wetland).</li> <li>• Moderate – Activities along Archer Avenue and surrounding the maintenance yard and Building 2075 include (and will include) moderate disturbance (i.e., mowing and infrequent use for vehicle storage).</li> <li>• High – Activities at the western portion of the range include (and will include) a high level of disturbance (i.e., vegetation is mowed and the area is heavily used office building and parking).</li> </ul>
	Ecological Receptors	
	Federal Endangered Species:	American bald eagle, rainbow snake, sensitive joint-vetch
	Federal Threatened Species:	None
	State Endangered Species:	Scaly blazing-star
	State Threatened Species:	None
	Other Ecological Receptors:	Other ecological receptors include numerous species of birds, reptiles and mammals such as the white tailed deer, wild turkey, the red-bellied woodpecker and the eastern box turtle.

Table 5.6-2: Conceptual Site Model Information Profiles – MARINE RIFLE RANGE		
Profile Type	Information Needs	Preliminary Assessment Findings
	Relationship of MEC/MC Sources to Habitat and Potential Receptors	It is not anticipated that receptors would come into direct contact with MEC because munitions use at the range was limited to small arms ammunitions. However, receptors may have contact with MC directly through surface water/soil or indirectly through the food chain (bioaccumulated in plants and animals).

A general description of the CSM exposure pathway analysis is included in Section 5.1.11. The following CSM exposure pathways analysis focuses only on the Marine Rifle Range and does not consider impacts from The Valley firing fan. For exposure pathway analysis for The Valley Impact Area, refer to Section 5.15.11.

Historical and visual evidence indicate that MEC are not present at the range; therefore, there are no complete exposure pathways for MEC. As such, an Exposure Pathway Analysis Figure for MEC was not created.

Soil and surface water/sediments impacted by MC represents a primary potential source medium, as illustrated in the Exposure Pathway Analysis Figure for MC (Figure 5.6-12). Exposures to surface soil, subsurface soil, and surface water/sediments containing MC may present potentially complete pathways for human and ecological receptors. All human and ecological receptors have potentially complete exposure pathways for direct contact with MC in surface soil at the embankment behind the former target butts, which include dermal contact, ingestion, and inhalation (dust). Runoff, discharges, and/or erosion may transport the MC from surface soil to surface water/sediments. Since there are two tributaries at the Marine Rifle Range, potentially complete pathways also exist for all human and ecological receptors of surface water/sediments.

Soil also represents an exposure medium when considering plant/animal uptake for biota (including game such as deer and wild turkey) and human receptors consuming the affected biota (e.g., hunting). There is a potential for the MC present in the surface soil to infiltrate to the subsurface. Potentially complete exposure pathways exist for MC in subsurface soils (direct contact, ingestion and inhalation during intrusive work activities) for all human and ecological receptors with the exception of trespassers. It is not anticipated that trespassers would come in contact with subsurface soils. Although confining layers are expected to prevent the migration of

**FINAL PRELIMINARY ASSESSMENT**

MC to the lower aquifers used for water supply, potentially complete pathways exist for MC in shallow groundwater for human receptors.

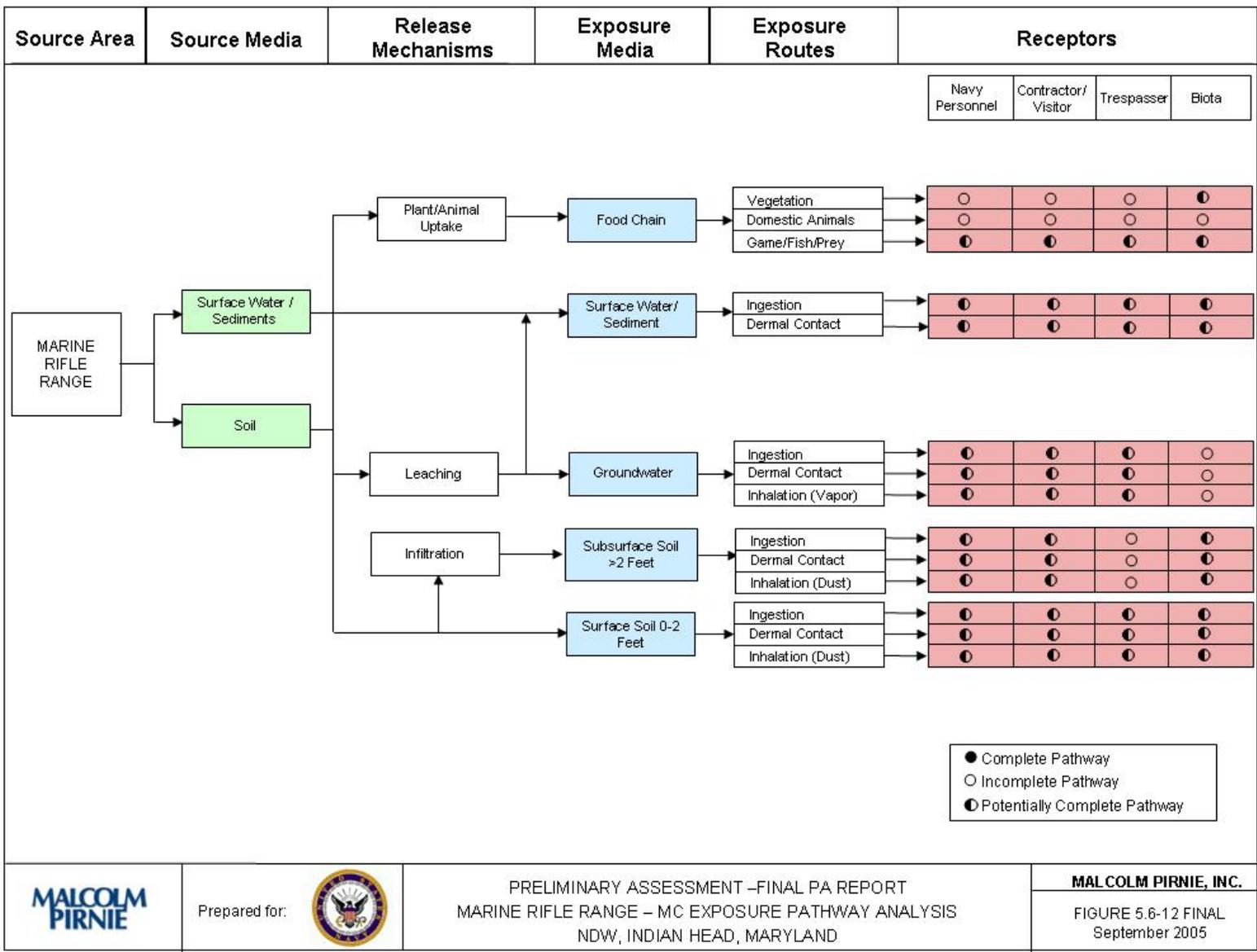


Figure 5.6-12: MC Exposure Pathway Analysis



Prepared for:



PRELIMINARY ASSESSMENT –FINAL PA REPORT  
MARINE RIFLE RANGE – MC EXPOSURE PATHWAY ANALYSIS  
NDW, INDIAN HEAD, MARYLAND

MALCOLM PIRNIE, INC.

FIGURE 5.6-12 FINAL  
September 2005

***5.6.12. Summary***

The 30.44-acre Marine Rifle Range was used by the Marines for small arms (rifle, and possibly pistol) practice from approximately 1911 to 1918. The range is located in the central portion of the Stump Neck Annex along Archer Avenue. The boundaries of the range have been altered from the Navy Range Inventory to incorporate the firing lines and target butts identified on historic maps, as well as to remove acreage associated with overlapping AOCs and MRP sites. Since only small arms are expected to have been used at the Marine Rifle Range, and MEC are not associated with small arms, no MEC is expected to be present. The primary MC of concern, given the suspected nature of use, is lead from shot.

**Map 5.6-1: Visual Survey: Marine Rifle Range**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.6-2: Range/Site Details: Marine Rifle Range**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.6-3: Munitions Characterization: Marine Rifle Range**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

## 5.7. OLD DEMOLITION RANGE

### 5.7.1. *History and Site Description*

The Old Demolition Range is located in the western portion of Stump Neck Annex, adjacent to the Chicamuxen Creek at the end of Porter Road. The Old Demolition Range is 1.70 acres in size. The former range is an open grass field, with a small portion developed (Building 2107) and is surrounded by hardwood forests. The former range was identified during the Navy Range Inventory. The current conditions of the range are shown in Figure 5.7-1. The area is currently an active Hypervelocity Testing Area (Range 2). Since the Old Demolition Range is currently occupied by an active testing area that uses munitions, by definition, this range is not eligible for cleanup with MRP funds at this time. However, since data had already been collected and evaluated prior to obtaining the information on the status of the current activities in the hypervelocity building, the information is included in this PA report.



**Figure 5.7-1: Current conditions at the Old Demolition Range**

The Old Demolition Range boundaries were altered from the Navy Inventory after a review of historical maps and sampling data in the 1998 RFI/VI report. The former and current boundaries of the site are shown in Figure 5.7-2.

The exact dates of use of the Old Demolition Range remain unknown. The Old Demolition Range was reportedly used for OB/OD of bulk propellant, bulk high explosives, demolition charges, primers, detonators, fuzes, and squibs.

The range also was used for EOD training in 1962 and potentially for “many years prior to 1962” according to the Initial Assessment Study of Naval Ordnance Station Indian Head, Maryland. Training activities may have included the use of TNT and C-4 to destroy projectiles, shells, and mines. Reportedly, these activities were conducted on bare soil. According to the RCRA Facility Assessment Report of the U.S. Naval Explosive Ordnance Disposal Technology Center for Stump Neck Annex, the range is thought to have been used in 1974 for detonation training.

The Old Demolition Range is located completely within the eastern portion of the Chicamuxen Creek's Edge Dump Site B. It is not known which types of materials were disposed or how long this unlined landfill was used. The Chicamuxen Creek's Edge Dump Site B (SWMU #4) was one of six SWMUs included in a RCRA Corrective Action Permit (CAP) for the Stump Neck Annex facility in January 1991. In response to the CAP, the Navy developed a RCRA RFI/VI report for Stump Neck Annex. The Chicamuxen Creek's Edge Dump Site B was one of six SWMUs studied as part of the RFI/VI Report for Stump Neck Annex. Surface soil, subsurface soil, and groundwater samples were collected from the Old Demolition Range as part of the RFI/VI study. Sample results collected from the Old Demolition Range are provided in Section 5.7.6. The Old Demolition Range is located within the estimated firing fan from The Valley. Refer to Section 5.7 in the Final PA Report for the Main Installation, Indian Head for Information on The Valley. Information on The Valley is also provided in the current PA report under Section 5.15, The Valley Impact Area.

#### **5.7.1.1. Topography**

Section 3.2 provides a general description of topography for the Stump Neck Annex. Elevations at the Old Demolition Range vary from zero to 32.8 feet above msl. The northern and eastern portions of the range are approximately 16.4 feet above msl, while the southern and western portions are approximately zero and 32.8 feet above msl, respectively.

#### **5.7.1.2. Geology**

Section 3.3 provides a geologic description for Indian Head and the Stump Neck Annex. This general description is applicable to the Old Demolition Range.

#### **5.7.1.3. Soil and Vegetation Types**

Section 3.4 provides a description of the soil and vegetation types at Indian Head and the Stump Neck Annex. Surficial deposits at the Old Demolition Range consist of yellow and brown, silt, sand, and clay mixtures and range in thickness from six to 12 feet. These materials are underlain by a coarsening-downward sequence of medium to coarse sand and gravel. According to the Soil Survey of Charles County, the soils in the area of the Old Demolition Range primarily consist of moderately eroded Keyport silt loam with two to five percent slopes and steep gravelly land. The Old Demolition Range also overlaps a region characterized by tidal marsh. Vegetation at the range consists of an open grass field surrounded by hardwood forests.

#### **5.7.1.4.Hydrology**

Section 3.5 provides a description of hydrology at Indian Head and the Stump Neck Annex. The three principal waterways in the vicinity of the Old Demolition Range are the Potomac River, Mattawoman Creek, and Chicamuxen Creek. The Potomac River is a tidally influenced estuary and is slightly brackish. Mattawoman and Chicamuxen Creeks are tributaries to the Potomac River and are also tidally influenced. Surface water at the Old Demolition Range drains into the wetland area adjacent to the range or into the Chicamuxen Creek. The wetlands drain into Chicamuxen Creek during low tide conditions.

#### **5.7.1.5.Hydrogeology**

Section 3.6 provides a description of hydrogeology for Indian Head and the Stump Neck Annex. According to well data recorded in the 1998 RFI VI study, groundwater beneath the Old Demolition Range occurs under semiconfining and unconfined conditions and ranges in depth from 2.3 to 14 feet bgs.

#### **5.7.1.6.Cultural and Natural Resources**

General cultural and natural resources for NDW, Indian Head are provided in Section 3.7. According to the 1996 Phase I Cultural Resources Survey of Stump Neck Annex there are no archeological/cultural sites within the Old Demolition Range. Several shovel test pits were taken on the site and all were found negative for artifacts.

#### **5.7.1.7.Endangered and Special Status Species**

As discussed in Section 3.8, endangered and special status species are reported to exist at the Stump Neck Annex. The reported endangered and special status species are expected to inhabit the Main Installation and, thus, have the potential to inhabit the Old Demolition Range. This range is a designated eagle protection area.

### ***5.7.2. Visual Survey Observations and Results***

A visual survey of the Old Demolition Range was conducted on June 23, 2003. Malcolm Pirnie personnel conducting the range visit included Mr. Dinh, Mr. Egholm, Ms. Tegtmeier, Mr. Hains, and Mr. McManus. Ms. Morgan of NDW, Indian Head Environmental Office, accompanied the team. The Old Demolition Range was inspected by a modified perimeter walk along Chicamuxen Creek and the woods. A random pattern was used to survey the grass field. The entire grass field and an estimated 25% of the wooded area were visually surveyed during the range visit. The Hypervelocity Test Building (Building 2107), which is located in the middle of the grass field portion of the Old Demolition Range, was the only building observed at the Old Demolition Range.

Various types of metal debris and fragments were observed during the visual survey (Figure 5.7-2). One MEC item, a Smokey Sam (a pyrotechnic signal discharge), was observed approximately 150 ft west of the Old Demolition Range. The source of the Smokey Sam is unknown. A visual depiction of the range reconnaissance is provided on Map 5.7-1 located at the end of Section 5.7. Additional range/site details are illustrated on Map 5.7-2 also located at the end of Section 5.7.



**Figure 5.7-2: Metal debris observed during the Old Demolition Range survey**

### ***5.7.3. Munitions and Munitions Related Materials Associated with the Site***

This section describes the munitions or munitions related materials known or suspected to be at the range, including the types and estimated maximum penetration depths. This includes both

MEC and non-hazardous munitions related debris (e.g., fragmentation, base plates, inert mortar fins).

Based on the reported information regarding the Old Demolition Range, it is assumed the munitions were limited to OB/OD of bulk propellant, bulk high explosives, demolition charges, primers, detonators, fuzes, and squibs. Documented records of the types and quantities of munitions used at the Old Demolition Range were not available.

The Old Demolition Range is overlapped by the firing fan from The Valley, located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Old Demolition Range. Technical data sheets are included in Appendix D. Refer to Section 5.7 in the PA Report for the Main Installation, Indian Head for information on The Valley. Information on The Valley is also provided in the current PA report under Section 5.15, The Valley Impact Area.

The Old Demolition Range is not suspected to contain CWM filled munitions, electrically fuzed munitions, or DU associated munitions.

#### ***5.7.4. MEC Presence***

The entire range has been subdivided and categorized into one of three levels of MEC presence including: known MEC areas, suspected MEC areas, and areas where no evidence exists to indicate that MEC are known or are suspected to be at the range. The Old Demolition Range is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Old Demolition Range. Technical data sheets are included in Appendix D. Refer to Section 5.7 in the Final PA Report for the Main Installation, Indian Head. Information on The Valley is also provided in the current PA report under Section 5.15, The Valley Impact Area. For the purpose of the PA, only MEC presence specifically related to the Old Demolition Area is considered. Map 5.7-3 illustrates the munitions characterization of the Old Demolition Range and is provided at the end of Section 5.7.

#### **5.7.4.1. Known MEC Areas**

The Old Demolition Range is not classified as a Known MEC Area since no MEC were observed during the visual survey.

#### **5.7.4.2. Suspected MEC Areas**

The Old Demolition Range is considered a Suspect MEC Area based on historic use of the range and results of the visual survey. MEC may be located on this range resulting from incomplete demolition and/or kickout from historic OB/OD and EOD training activities on-range. Various types of metal debris were observed during the visual survey and could be the result of these historical range activities. This debris could also be the result of materials disposed of at the Chicamuxen Creek's Edge Dump Site B. A Smokey Sam was observed outside of the western border of the Old Demolition Range (see Map 5.7-3), further indicating MEC could be located in the nearby Old Demolition Range. The source of the Smokey Sam is unknown. A map depicting the range fan from firing at The Valley indicates that impacts from The Valley may have occurred in the area because the range fan extends into the Old Demolition Range, providing further evidence the Old Demolition Range is a Suspect MEC Area.

#### **5.7.4.3. Areas Not Suspected to Contain MEC**

Areas not suspected to contain MEC are not found at the Old Demolition Range.

#### **5.7.5. *Ordnance Penetration Estimates***

The depth to which munitions penetrate below the ground surface depends on many factors, including the type of soil, the angle of impact, the size of the munitions, the velocity at impact, and range-specific environmental conditions. Over the years, the DoD has studied and modeled munitions penetration depths and has issued various guidance and technical documents on the subject. For the purposes of the PA, maximum probable penetration depths are estimated following guidance listed in the latest draft (July 2002) of the DoD Directive on Explosives Safety issued by the DDESB [DoD Directive 6055.9 (DoD Ammunition and Explosives Safety Standards)]. The Directive refers to TM 5.855.1 and NAVFAC P-1080.

The range was used for OB/OD of various munitions. The types of munitions reportedly used would have been placed on the ground surface and then burned or detonated. Based on this

information, there is no associated penetration depth. The Old Demolition Range is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the range. The ordnance penetration depth associated with munitions fired from The Valley is provided in Section 5.15.5. For the purposes of the PA, the ordnance penetration depth is only considered for the munitions items specifically related to the Old Demolition Range.

#### ***5.7.6. Munitions Constituents***

Suspected MC include TNT, RDX, and HMX as they are constituents associated with high explosives. According to the RCRA Facility Assessment Report of the U.S. Naval Explosive Ordnance Disposal Technology Center for Stump Neck Annex, small quantities of shrapnel and castings from the detonation of explosives are other MC expected at the range. Various types of metal debris were observed during the visual survey.

The 1998 RFI/VI report indicated former OB/OD and EOD training activities did not result in significant contamination of surface soils or subsurface soils at the Old Demolition Range. No explosives, components of explosives, or degradation by-products of explosives were detected in surface soils or subsurface soils at the Old Demolition Range. Several inorganic compounds were detected in soil samples at maximum concentrations exceeding the 95% upper tolerance limits (UTL95%) calculated for the background soil dataset. However, since these concentrations did not exceed maximum concentrations within the range of soil concentrations reported for soils of the eastern U.S., these inorganic compounds may have resulted from another source than OB/OD and EOD training activities at the range. Concentrations of metals in subsurface soils were similar to those in the surface soil and were within range or similar to background soil samples collected at the facility and may have resulted from another source than OB/OD and EOD training activities at the range. SVOCs were detected in surface as well as subsurface soils; the maximum concentration of SVOCs in surface and subsurface soils were less than their respective EPA Region III RBCs. Detected SVOCs in surface and subsurface soils, may have resulted from another source than OB/OD and EOD training activities at the range.

The RFI/VI report indicated former OB/OD and EOD training activities did result in significant contamination of groundwater at the Old Demolition Range. RDX was the only explosive detected in groundwater at the range. The amount of RDX detected in the groundwater at this range exceeded the action level for the facility. RDX was not detected in soil samples at the Old

Demolition Range. Metals were also detected in the groundwater; all maximum concentrations of metals in the groundwater were less than the EPA Region III RBCs for tap water ingestion. Various metals were detected in the groundwater at Chicamuxen Creek's Edge Dump Site B; lead and mercury were the only inorganics detected in unfiltered groundwater at concentrations exceeding the facility background levels. The concentrations of these inorganics detected in the groundwater were similar to or less than the EPA Region III RBCs for tap water ingestion and may have resulted from another source than the historic range activities on the range. VOCs and SVOCs were not detected in the groundwater samples collected at the Old Demolition Range. The Old Demolition Range is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Old Demolition Area. Refer to Section 5.7 in the Final PA Report for the Main Installation, Indian Head for information on The Valley. Information on The Valley is also provided in the current PA report under Section 5.15, The Valley Impact Area. For the purpose of the PA, only the munitions constituents that specifically relate to the Old Demolition Area are considered.

#### ***5.7.7. Contaminant Migration Routes***

Contaminants at the Old Demolition Range may potential migrate through groundwater, surface water and sediment. According to the results of the RFI/VI report, there are no contaminants related to activities at the Old Demolition Range present in soil. Thus, there are no potential migration routes from soil. Explosives and metals were detected in shallow groundwater during the RFI/VI. Precipitation infiltration may provide for contaminant mobility into the shallow or surficial groundwater aquifer, which is assumed to be connected to the nearby surface water bodies. Based on a review of hydrogeological data, it is unlikely that MC in shallow groundwater would migrate to the deeper aquifers that are used as a water supply. However, shallow groundwater is still considered a potential exposure media. Potential migration routes from current activities have not been evaluated.

#### ***5.7.8. Receptors***

Potential receptors at the Old Demolition Range were not evaluated because the area is currently occupied by the Hypervelocity Testing Area and is considered active. Potential receptors can be evaluated at a later date if Hypervelocity Testing activities are terminated.

### **5.7.8.1.Nearby Populations**

Nearby populations are as discussed in Section 5.1.8.1.

### **5.7.8.2.Buildings Near/Within Site**

Building 2107, the Hypervelocity Test Building, is located within the confines of the Old Demolition Range. There are no other buildings located within half a mile of the Old Demolition Range.

### **5.7.8.3.Utilities On/Near Site**

The only utility associated with the Old Demolition Range is an electrical power line to Building 2107. The line is above ground and runs down Porter Road from Archer Avenue.

### **5.7.9. Land Use**

Historically, the Old Demolition Range was used for EOD training and OB/OD of bulk propellant, bulk high explosives, demolition charges, primers, detonators, fuzes, and squibs. The type and amount of materials disposed at the Chicamuxen Creek's Edge Dump Site B (SWMU #4) at the Old Demolition Range are unknown.

Currently, the Hypervelocity Testing Area (Range 2) is located at the former Old Demolition Range. The Hypervelocity Testing Area is an active range with capability up to 5-pound of explosive with Building 2107 located at the center of the range. The range is used by the Research and Development personnel to test and evaluate various X-ray and disrupter systems for the EOD communities. Public access on the range is not allowed.

### **5.7.10. Access Controls / Restrictions**

The Old Demolition Range is located on the Stump Neck Annex, which is a fenced and guarded installation. Access to the area is not controlled once on the installation. There is no fence along the Chicamuxen Creek shoreline; therefore, the area is potentially accessible to trespassers via the creek. The range is located within an eagle protection area, where access is restricted each year from December 15 until June 15. According to the 2003-2004 Stump Neck Annex Hunting Map, the Old Demolition Range is also located within two separate explosive arcs.

According to the Master Plan Update, many of the soil types on Stump Neck and Indian Head have load bearing capacity limitations as a result of high water tables and extreme erodability conditions. Based on this information, the installation has limited construction and the use of septic systems in specific areas of concern. The Old Demolition Range is located in a region that has seasonal high water table and overlaps an area containing hydric soils. The range overlaps a restriction area in which septic systems are prohibited.

**5.7.11. Conceptual Site Model**

A general description of the CSM is provided in Section 5.1.11. The CSM is presented in a series of information profiles that presents information about the range. The information profiles are included in Table 5.7-1 below.

<b>Table 5.7-1: Conceptual Site Model Information Profiles – OLD DEMOLITION RANGE</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
<b>Range/Site Profile</b>	Installation Name	NDW, Indian Head
	Installation Location	Indian Head, Charles County, Maryland
	Range/Site Name	Old Demolition Range
	Range/Site Location	The Old Demolition Range is located in the western portion of Stump Neck Annex long the shore of Chicamuxen Creek.
	Range/Site History	The Old Demolition Range was used for OB/OD of bulk propellant, bulk high explosives, demolition charges, primers, detonators, fuzes, and squibs. The exact dates of use of the Old Demolition Range are not known; the range was used for EOD training in 1962. The Old Demolition Range is located within the Chicamuxen Creek’s Edge Dump Site B; materials formerly disposed at this unlined landfill remain unknown. The Old Demolition Range was included in a RCRA CAP for Stump Neck Annex. In response to the CAP, the Navy developed a RFI/VI.
	Range/Site Area and Layout	The Old Demolition Range is 1.70 acres in size. The range is an open grass field, with a small portion developed (Building 2107).

Table 5.7-1: Conceptual Site Model Information Profiles – OLD DEMOLITION RANGE		
Profile Type	Information Needs	Preliminary Assessment Findings
	Range/Site Structures	Building 2107, the Hypervelocity Test Building, is located in the center of the range.
	Range/Site Boundaries	N: Wooded area forms the northern boundary of the range. S: Chicamuxen Creek forms the southern boundary of the range. W: Wooded area forms the western boundary of the range. E: Wetlands form the eastern boundary of the range.
	Range/Site Security	The Old Demolition Range is located on the Stump Neck Annex, which is a fenced and guarded installation. Access to the Old Demolition Range is not controlled once on the installation. There is no fence along the Chicamuxen Creek shoreline; therefore, the range is potentially accessible to trespassers via the water.
<b>Munitions/ Release Profile</b>	Munitions Types	Records indicate that bulk propellant, bulk high explosives, demolition charges, primers, detonators, fuzes, and squibs were used at the Old Demolition Range for an unknown period of time. Refer to Section 5.15 for munitions types associated with The Valley.
	Maximum Probability Penetration Depth	The range was reportedly used for OB/OD of various munitions. The types of munitions reportedly used would have been placed on the ground surface and then burned or detonated. Based on this information, there is no associated penetration depth. Ordnance penetration depths for munitions fired from The Valley can be found in Section 5.15.5.
	MEC Density	Suspected MEC density is low since no MEC was observed during the visual survey and metal debris and fragments were the only suspect MC observed during the visual survey.
	Munitions Debris	No MEC were observed during the visual survey. A Smokey Sam was observed outside of the border of the Old Demolition Range.
	Associated Munitions Constituents	Suspected MC include TNT, RDX, and HMX and associated metal debris.

Table 5.7-1: Conceptual Site Model Information Profiles – OLD DEMOLITION RANGE		
Profile Type	Information Needs	Preliminary Assessment Findings
	Migration Routes/Release Mechanisms	Migration routes were not evaluated for the Old Demolition Range because the area is occupied by an active Hypervelocity Test Area.
Physical Profile	Climate	Indian Head, Maryland has a continental-type climate with four well-defined seasons. The coldest period occurs in late January and early February, with low temperatures averaging at 29°F. July is the warmest month with average maximum temperatures of 85°F. The normal annual precipitation is approximately 44 inches, with normal monthly precipitation varying from 2.25 (February) to 4.60 (August) inches.
	Topography	Elevations at the Old Demolition Range vary from 0 to 32.8 feet above msl. The northern and eastern portions of the range are approximately 16.4 feet above msl, while the southern and western portions are approximately 0 and 32.8 feet above msl, respectively.
	Geology	Indian Head and Stump Neck lie within the Atlantic Coastal plain physiographic province. The geology of the area is comprised of Precambrian igneous and metamorphic bedrock overlain by 500 to 600 feet of unconsolidated fluvial and marine deposits of the Potomac Group. The Potomac Group consists of, in descending order, the Patapsco, Arundel, and Patuxent Formations.
	Soil and Vegetation Types	Surficial deposits at the Old Demolition Range consist of yellow and brown silt, sand, and clay mixtures and range in thickness from six to 12 feet. These materials are underlain by a coarsening-downward sequence of medium to coarse sand and gravel.

Table 5.7-1: Conceptual Site Model Information Profiles – OLD DEMOLITION RANGE		
Profile Type	Information Needs	Preliminary Assessment Findings
	Hydrogeology	<p>The hydrogeological makeup of the Indian Head, Maryland area consists of a surficial aquifer and several deeper confined and semi-confined aquifers in the Patapsco and Patuxent Formations. The surficial aquifer is expected to be connected to and influenced by the surface water bodies. Regional water supplies, including that of NDW, Indian Head, are obtained from the lower and middle sands of the Patapsco and Patuxent Formations of the Potomac Group. The surficial aquifer (i.e., water table) is not used for water supply at NDW, Indian Head.</p> <p>Groundwater beneath the Old Demolition Range occurs under semiconfining and unconfined conditions and ranges in depth from 2.3 to 14 feet below ground surface.</p>
	Hydrology	<p>The three principal waterways in the vicinity of the Old Demolition Range are the Potomac River, Mattawoman Creek, and Chicamuxen Creek. The Potomac River is a tidally influenced estuary and is slightly brackish. Mattawoman and Chicamuxen Creeks are tributaries to the Potomac River and are also tidally influenced. Surface water at the Old Demolition Range drains either into the wetland areas surrounding the range or into Chicamuxen Creek. The wetlands drain into Chicamuxen Creek during low tide conditions.</p>
	Vegetation	<p>The bulk of the area of the Old Demolition Range is dominated by grassy vegetation and is surrounded by hardwood forests.</p>
<b>Land Use and Exposure Profile</b>	Current Land Use	<p>The Hypervelocity Test Building is used infrequently. This area is used for hunting activities, and grounds keeping maintenance occurs on-range.</p>
	Current Human Receptors	<p>Receptors were not evaluated for the Old Demolition Range because the area is occupied by an active Hypervelocity Test Area.</p>
	Current Activities (frequency, nature of activity)	<p>The area formerly occupied by the Old Demolition Range is now an active Hypervelocity Test Area.</p>
	Potential Future Land Use	<p>There is no foreseen change to current use at this range.</p>

Table 5.7-1: Conceptual Site Model Information Profiles – OLD DEMOLITION RANGE		
Profile Type	Information Needs	Preliminary Assessment Findings
	Potential Future Human Receptors	Receptors were not evaluated for the Old Demolition Range because the area is occupied by an active Hypervelocity Test Area.
	Potential Future Land Use-Related Activities:	There are no foreseen changes in the land use-related activities at the range.
	Zoning/Land Use Restrictions	The range is located within an eagle protection area. The area is affected by load bearing capacity limitations as a result of high water tables.
	Demographics/Zoning	Charles County population density is approximately 260 persons per square mile, while NDW, Indian Head and its tenant commands employ approximately 3,600 military and civilian personnel.
	Beneficial Resources	The Chicamuxen Wildlife Refuge is located near the range.
<b>Ecological Profile</b>	Habitat Type	The undeveloped portions of the Old Demolition Range and the surrounding area contain the following habitats: <ul style="list-style-type: none"> <li>• Mature forest</li> <li>• Grass fields</li> <li>• Shoreline</li> </ul>
	Degree of Disturbance	High – the area is currently an active Hypervelocity Test Area.
	Ecological Receptors	Receptors were not evaluated for the Old Demolition Range because the area is occupied by an active Hypervelocity Test Area.
	Relationship of MEC/MC Sources to Habitat and Potential Receptors	None

A general description of the CSM exposure pathway analysis is included in Section 5.1.11. The Old Demolition Range is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Old Demolition Range. However, for the purpose of the PA, only MEC and/or MC associated with the Old Demolition Range is considered within the CSM exposure pathway analysis. For exposure pathway analysis for The Valley Impact Area, refer to Section 5.15.11.

## FINAL PRELIMINARY ASSESSMENT

There are no MEC or MC exposure pathway analysis figures included for the Old Demolition Range. The area formerly occupied by the Old Demolition Range is currently the Hypervelocity Testing Area and is an active range. Exposure pathway analysis will be evaluated when the current activities are terminated.

### *5.7.12. Summary*

The Old Demolition Range was reportedly used for OB/OD of bulk propellant, bulk high explosives, demolition charges, primers, detonators, fuzes, and squibs and was also used for EOD training in 1962 and 1974 and, potentially, for several years prior to 1962. The Old Demolition Range composes the eastern portion of the former Chicamuxen Creek's Edge Dump Site B (evaluated separately under RCRA as SWMU #4). It is not known which types of materials were disposed or how long this unlined landfill was used.

Data gathered for the 1998 RFI/VI report indicated historic range activities at the Old Demolition Range did not result in significant contamination of surface soils and subsurface soils. No explosives, components of explosives, or degradation by-products of explosives were detected in surface soils or subsurface soils. Detected concentrations of SVOCs and metals in the soils and metals in the groundwater may have resulted from another source other than OB/OD and EOD training activities conducted at the range. RDX was detected above background levels for the facility indicating former OB/OD and EOD training activities did result in significant contamination of groundwater at the Old Demolition Range.

Based on information from the visual survey, the RFI/VI report, and historical range use information, the Old Demolition Range is classified as a suspected MEC Area. Various types of metal debris and fragments were the only MEC observed during the visual survey. This debris could be the result of materials disposed of at the unlined landfill. A Smokey Sam was observed outside of the western border of the Old Demolition Range. The source of the Smokey Sam is unknown. A map depicting the range fan from firing at The Valley indicates that the range fan extends into the Old Demolition Range. Impacts from The Valley may have occurred in the area, providing further evidence the Old Demolition Range is a Suspected MEC Area. The area is currently used as a Hypervelocity Testing Area and is considered an active range. Therefore, further evaluation under MRP cannot be conducted at this time.

**Map 5.7-1: Visual Survey: Old Demolition Range**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.7-2: Range/Site Details: Old Demolition Range**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.7-3: Munitions Characterization: Old Demolition Range**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

## 5.8. OLD SKEET AND TRAP RANGE

### 5.8.1. History and Site Description

The Old Skeet and Trap Range is located in the north central portion of Stump Neck Annex, north of Archer Avenue along the Potomac River. The eastern and western boundaries of the range



**Figure 5.8-1: Current conditions at the Old Skeet and Trap Range**

consist of open fields. The Old Skeet and Trap Range comprises 29.33 acres and was reportedly used for small arms recreational activities. Firing may have occurred out into the Potomac River. Through interviews, it was determined that the range was in use for approximately 25 years and closed in June 1991. The Old Skeet and Trap Range was identified on an April 1972 aerial photograph of Stump Neck Annex. The range does not appear on a previous aerial, dated September 1967. Therefore,

the Old Skeet and Trap Range was constructed between 1967 and 1972.

The Old Skeet and Trap Range lies on what was initially identified as SWMU #20, Disposal Area 2, in the RCRA CAP, a SWMU for which no further action was recommended. However, this investigation took place while the range was still active. In 1992, the range was again added to the RCRA program as SWMU #28. At this time, the Old Skeet and Trap Range was inactive, and it was determined that lead shot still remained on the ground and in the Potomac River. The Old Skeet and Trap Range is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Refer to Section 5.7 in the Final PA Report for the Main Installation, Indian Head. Information on The Valley is also provided in the current PA report under Section 5.15, The Valley Impact Area.

#### 5.8.1.1. Topography

Section 3.2 provides a general description of topography for the Stump Neck Annex. The relief of the Old Skeet and Trap Range is relatively flat with an elevation for the entire range at five

meters above msl. Surface runoff is to the Potomac River either directly or via a drainage ditch along Archer Avenue.

### **5.8.1.2. Geology**

Section 3.3 provides a geologic description for Indian Head and the Stump Neck Annex. The Old Skeet and Trap Range is characterized by unconsolidated fluvial and marine deposits overlying older, Precambrian, igneous and metamorphic bedrock.

### **5.8.1.3. Soil and Vegetation Types**

Section 3.4 provides a description of the soil and vegetation types at Indian Head and the Stump Neck Annex. According to the Soil Survey of Charles County, the soils at the Old Skeet and Trap Range consist of a Mattapex fine sandy loam with zero to two percent slope. Soils in this area generally have a surface layer of sandy silt and are moderately well drained. Available moisture capacity is high, and permeability is moderately low. Vegetation at the range consists of a grass field.

### **5.8.1.4. Hydrology**

Section 3.5 provides a description of hydrology at Indian Head and the Stump Neck Annex. Surface water at the Old Skeet and Trap Range drains directly into the Potomac River.

### **5.8.1.5. Hydrogeology**

Section 3.6 provides a description of hydrogeology for Indian Head and the Stump Neck Annex. There is no range-specific hydrogeology for the Old Skeet and Trap Range.

### **5.8.1.6. Cultural and Natural Resources**

General cultural and natural resources for the Stump Neck Annex are provided in Section 3.7. According to the 1996 Phase I Cultural Resources Survey of Stump Neck Annex there is one archaeological site located within the Old Skeet and Trap Range. Site 18CH388 contained a mix of prehistoric and historic artifacts. This site may correspond to Indian Head Quad File #4, a Late Woodland Indian village. A total of 645 artifacts were recovered at this site, however the site covers the Old Skeet and Trap Range and the Marine Rifle Range.

### **5.8.1.7. Endangered and Special Status Species**

As discussed in Section 3.8, endangered and special status species are reported to exist at the Stump Neck Annex. The reported endangered and special status species are expected to inhabit the Main Installation and thus, have the potential to inhabit the Old Skeet and Trap Range.

### ***5.8.2. Visual Survey Observations and Results***

A visual survey of the Old Skeet and Trap Range was conducted on June 24, 2003. Personnel conducting the range visit included, Mr. Dinh, Mr. Egholm, Ms. Tegtmeier, Mr. Hains, Mr. McManus and Ms. Morgan. The Old Skeet and Trap Range was inspected by a perimeter walk of the range (as previously identified during the inventory) and through several random transects across the range to visually inspect the entire location. The site walk only covered a small area in the southern portion of the range according to the current range boundaries. The range consisted of a neatly mowed grassy area, which is now used for recreational purposes. There were no physical indications of where the firing points were located. No ordnance, MEC, or related debris were observed during the visual survey.

Facilities north of Archer Avenue consist of a recreational pavilion (Building 2174) located approximately 75 meters from the western boundary and a utility shed (Building 2012) approximately 75 meters from the eastern boundary. The former range is also currently designated as a helicopter landing pad.

A visual depiction of the range reconnaissance is provided on Map 5.8-1 located at the end of Section 5.8. Additional range/site details are illustrated on Map 5.8-2 also located at the end of Section 5.8.

### ***5.8.3. Munitions and Munitions Related Materials Associated with the Site***

This section describes the munitions or munitions related materials known or suspected to be at the range, including the types and estimated maximum penetration depths. This includes both MEC and non-hazardous munitions related debris (e.g., fragmentation, base plates, inert mortar fins). Potential ordnance concentration areas are presented along with a discussion on the presence of any special consideration ordnance. The data collections team was unable to locate

specific records of the types and quantities of small arms ammunition used at the Old Skeet and Trap Range. However, an inventory listing from the Potomac River Gun Club for 1979 revealed the following on hand for resale: .410-, 28-, 20-, and 12-gauge shells; clay targets, five pound containers of bulk smokeless powder, and shot. These items would be consistent with munitions normally associated with a skeet and trap range. No evidence of ordnance was found at the range during the visual survey.

The Old Skeet and Trap Range is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Old Skeet and Trap Range. Technical data sheets are included in Appendix D. Refer to Section 5.7 in the PA Report for the Main Installation, Indian Head for information on The Valley. Information on The Valley is also provided in the current PA report under Section 5.15, The Valley Impact Area.

Based on the information obtained during the data collection process, Old Skeet and Trap Range is not suspected to contain CWM filled munitions, electrically fuzed munitions, or DU associated munitions.

#### ***5.8.4. MEC Presence***

The entire range has been subdivided and categorized into one of three levels of MEC presence including: known MEC areas, suspected MEC areas, and areas where no evidence exists to indicate that MEC are known or are suspected to be at the range. The MEC presence is discussed below. The Old Skeet and Trap Range is overlapped by the firing fan from The Valley, located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Old Skeet and Trap Range. Technical data sheets are included in Appendix D. Refer to Section 5.7 in the PA Report for the Main Installation, Indian Head for information on The Valley. Information on The Valley is also provided in the current PA report under Section 5.15, The Valley Impact Area. For the purpose of the PA only MEC presence specifically related to the Old Skeet and Trap Range is considered. Map 5.8-3 illustrates the munitions characterization of the Old Skeet and Trap Range and is provided at the end of Section 5.8.

#### **5.8.4.1. Known MEC Areas**

Based on historical documents and information obtained during the data collection process, there is no evidence of MEC at the Old Skeet and Trap Range as only shotguns were used. Therefore, there is no known MEC areas associated with the Old Skeet and Trap Range.

#### **5.8.4.2. Suspected MEC Areas**

Based on historical documents and information obtained during the data collection process, there is no evidence of MEC at the Old Skeet and Trap Range as only shotguns were used. Thus, there are no suspected MEC areas at the Old Skeet and Trap Range.

#### **5.8.4.3. Areas Not Suspected to Contain MEC**

Based on historical documents and information obtained during the data collection process, there is no evidence of MEC at the Old Skeet and Trap Range as only shotguns were used. Therefore, the entire range is not suspected to contain MEC.

#### **5.8.5. *Ordnance Penetration Estimates***

The depth to which munitions penetrate below the ground surface depends on many factors, including the type of soil, the angle of impact, the size of the munitions, the velocity at impact, and range-specific environmental conditions.

For small arms ranges, the Interstate Technology and Regulatory Council (ITRC) has prepared a document titled, "Characterization and Remediation of Soils at Closed Small Arms Firing Ranges", dated January 2003, to provide information on the general layout of small arms ranges, as well as information on areas that may be impacted with MC and/or MEC as a result of range use and the characteristics of the munitions used. According to the ITRC guidance, the penetration depth of small arms on the range floor is one foot or less. The document states that rounds that impact the range floor are typically a flat trajectory that fell short of or missed the target, or those resulting from ricochet, and these fragments are usually found within the top six inches of soil. For trap and skeet ranges, the ammunition is dispersed as pellets over a small area in the direction of fire. According to the 1958 Programming Guide, the minimum safe range from a skeet/trap range is 900 feet. Pellets dispersed from a shotgun would be deposited on the ground surface and not significantly penetrate the ground unless disturbed.

The Old Skeet and Trap Range is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Old Skeet and Trap Range. The ordnance penetration depth associated with munitions fired from The Valley is provided in Section 5.15.5. For the purpose of the PA, only the munitions constituents that specifically relate to the Old Skeet and Trap Range are considered.

#### ***5.8.6. Munitions Constituents***

For shotgun ammunition and clay targets, the primary MC of concern include lead from shot and PAHs from pitch tar used in clay pigeons. Other associated MC less likely to be of concern may include antimony, arsenic, nickel, and lead styphnate/lead azide. These MC items are not consumed when the munitions items function as they are designed. Therefore, these MC may exist at the Old Skeet and Trap Range. The Old Skeet and Trap Range is overlapped by the firing fan from The Valley, located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Old Skeet and Trap Range. Refer to Section 5.7 in the PA Report for the Main Installation, Indian Head for information on The Valley. Information on The Valley is also provided in the current PA report under Section 5.15, The Valley Impact Area. For the purposes of the PA, only the munitions constituents that specifically relate to the Old Skeet and Trap Area are considered.

#### ***5.8.7. Contaminant Migration Routes***

Contaminants at the Old Skeet and Trap Range may potentially migrate within the soil, groundwater, surface water and sediment. Sediment contamination in the Mattawoman Creek may have resulted from shooting into the direction of the Mattawoman Creek. Although erosion on-range is considered to be minimal, contaminants may become mobile within the surface soil, particularly during extended periods of surface runoff. Runoff would occur in the direction of the Mattawoman Creek. Direct human or biota contact with surficial and subsurface soil is possible if the soil is disturbed. Precipitation infiltration may provide for contaminant mobility through the subsurface to the shallow or surficial groundwater aquifer, which is assumed to be connected to the nearby surface water bodies. Based on a review of hydrogeological data, it is unlikely that MC in shallow groundwater would migrate to the deeper aquifers that are used as a water supply. However, shallow groundwater is still considered a potential exposure media.

### **5.8.8. Receptors**

Potential human receptors include authorized Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users and trespassers. Plant and animal biota are also potential receptors. Examples of ecological receptors include deer, wild turkey, fish and waterfowl (ducks/geese).

#### **5.8.8.1. Nearby Populations**

Nearby populations are as discussed in Section 5.1.8.1.

#### **5.8.8.2. Buildings Near/Within Site**

Currently, only five small structures are located in the vicinity of the range both north and south of Archer Avenue. The facilities north of Archer Avenue consist of a recreational pavilion (Building 2174) located approximately 75 meters from the western boundary and a utility shed (Building 2012) approximately 75 meters from the eastern boundary. The Building 2156 is south of Archer Avenue and about 75 meters from the southern boundary of the range. Buildings 2019 and 2101 are located approximately 100 and 175 meters southeast of the boundary, respectively. Both buildings are associated with the Marine Rifle Range and are not designed for a continuous dense population of personnel. The remaining area south of Archer Avenue is lightly wooded with some wetlands.

#### **5.8.8.3. Utilities On/Near Site**

There are no utilities located on the Old Skeet and Trap Range; however, above ground electrical power lines run along Archer Avenue behind the range.

### **5.8.9. Land Use**

The Old Skeet and Trap Range was used for small arms recreational activities. This range is currently a grass field, which is used for a helicopter pad and recreation. According to the Master Plan, the anticipated future land use is for the range to remain a grass field for a helicopter pad and recreational use.

**5.8.10. Access Controls / Restrictions**

No public access is authorized at NDW Indian Head, Stump Neck Annex. Signs, partial fencing, locked/secured gates, login book/office check-in, and vehicle security patrol are used to control the entire facility. There are no access control features specific to the Old Skeet and Trap Range. Access from the water is not controlled. There are no known land use/development restrictions for the range.

The Coastal Zone of Maryland includes all land and water lying within coastal counties, one of which is Charles County. Within the Coastal Zone, Maryland has defined an area within which strict land use management is needed to protect the Chesapeake Bay. The critical area is defined as a 1,000-foot wide strip of land surrounding the bay and its tidal tributaries. Most construction within 100 feet of the Mean High Water Line (buffer) is prohibited. The area of Old Skeet and Trap Range falls mostly within the 100-foot buffer.

**5.8.11. Conceptual Site Model**

A general description of the CSM is provided in Section 5.1.11. The CSM is presented in a series of information profiles that present information about the range. The information profiles are included in Table 5-8.1 below.

<b>Table 5.8-1: Conceptual Site Model Information Profiles – OLD SKEET AND TRAP RANGE</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
<b>Range/Site Profile</b>	Installation Name	NDW, Indian Head
	Installation Location	Indian Head, Charles County, Maryland
	Range/Site Name	Old Skeet and Trap Range
	Range/Site Location	The Old Skeet and Trap Range is located at Stump Neck Annex, which is located south of the Main Installation. Specifically, the range is located in the north central portion of Stump Neck Annex north of Archer Avenue and south of the Potomac River.
	Range/Site History	The Old Skeet and Trap Range was reportedly used for small arms recreational activities. The range was constructed between 1967 and 1972. The closure date was June 1991.

Table 5.8-1: Conceptual Site Model Information Profiles – OLD SKEET AND TRAP RANGE		
Profile Type	Information Needs	Preliminary Assessment Findings
	Range/Site Area and Layout	This 29.33-acre range is roughly rectangular in shape. The parcel parallels Archer Avenue to the south. The entire range area is grass-covered open field.
	Range/Site Structures	Pavilion (Building 2174) and utility shed (Building 2012)
	Range/Site Boundaries	N: Potomac River forms the northern boundary of the range. S: Archer Avenue forms the southern boundary of the range. W: Open field forms the western boundary of the range. E: Open field forms the eastern boundary of the range.
	Range/Site Security	The Old Skeet and Trap Range is located on the Stump Neck Annex, which is a fenced and guarded installation. Access to the Old Skeet and Trap Range is not controlled once on the installation. There is no fence along the Chicamuxen Creek and Potomac River shorelines; therefore the range is potentially accessible to trespassers via the water.
<b>Munitions/ Release Profile</b>	Munitions Types	Shotgun pellets. Refer to Section 5.15 for munitions types associated with The Valley.
	Maximum Probability Penetration Depth	Six inches or less for small arms. Ordnance penetration depths for munitions fired from The Valley can be found in Section 5.15.5.
	MEC Density	None
	Munitions Debris	None
	Associated Munitions Constituents	Metal from shotgun pellets, including lead, copper, nickel, and antimony; PAHs from pitch tar used in clay targets
	Migration Routes/Release Mechanisms	Soil surface runoff; groundwater discharge; range maintenance; construction; excavation

Table 5.8-1: Conceptual Site Model Information Profiles – OLD SKEET AND TRAP RANGE		
Profile Type	Information Needs	Preliminary Assessment Findings
Physical Profile	Climate	Indian Head, Maryland, has a continental-type climate with four well-defined seasons. The coldest period occurs in late January and early February, with low temperatures averaging at 29°F. July is the warmest month with average maximum temperatures of 85°F. The normal annual precipitation is approximately 44 inches, with normal monthly precipitation varying from 2.25 (February) to 4.60 (August) inches.
	Topography	The relief of the Old Skeet and Trap Range is relatively flat with an elevation for the entire range at five meters above msl.
	Geology	Indian Head and Stump Neck lie within the Atlantic Coastal plain physiographic province. The geology of the area is comprised of Precambrian igneous and metamorphic bedrock overlain by 500 to 600 feet of unconsolidated fluvial and marine deposits of the Potomac Group. The Potomac Group consists of, in descending order, the Patapsco, Arundel, and Patuxent Formations.
	Soil	The predominant soil type associated with the Old Skeet and Trap Range is silty sand with gravel at the ground surface underlain by silty sand with clay.
	Hydrogeology	The hydrogeological makeup of the Indian Head, Maryland, area consists of a surficial aquifer and several deeper confined and semi-confined aquifers in the Patapsco and Patuxent Formations. The surficial aquifer is expected to be connected to and influenced by the surface water bodies. Regional water supplies, including that of NDW, Indian Head, are obtained from the lower and middle sands of the Patapsco and Patuxent Formations of the Potomac Group. The surficial aquifer (i.e., water table) is not used for water supply at NDW, Indian Head.
	Hydrology	Surface water at the Old Skeet and Trap Range drains directly into the Potomac River. Groundwater discharges into the Potomac River as well.
	Vegetation	Vegetation at the range is a grass field.

<b>Table 5.8-1: Conceptual Site Model Information Profiles – OLD SKEET AND TRAP RANGE</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
<b>Land Use and Exposure Profile</b>	Current Land Use	The grass field is used for a helicopter pad and recreation. Grounds keeping maintenance occurs on-range.
	Current Human Receptors	Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users, and trespassers.
	Current Activities (frequency, nature of activity)	Grounds keeping of the open field occur as necessary. Navy personnel infrequently utilize the open field for recreational activities.
	Potential Future Land Use	There is no foreseen change to current use at this range.
	Potential Future Human Receptors	Navy personnel (military and civilian), visitors, trespassers, contractors, construction workers (if intrusive work is necessary) and maintenance and operations workers as well as recreational users (hunters).
	Potential Future Land Use-Related Activities:	There are no foreseen changes in the land use-related activities at the range.
	Zoning/Land Use Restrictions	The Coastal Zone of Maryland includes all land and water lying within coastal counties, one of which is Charles County. Within the Coastal Zone, Maryland has defined an area within which strict land use management is needed to protect the Chesapeake Bay. The critical area is defined as a 1,000-foot wide strip of land surrounding the bay and its tidal tributaries. Most construction within 100 feet of the Mean High Water Line (buffer) is prohibited. The area of Old Skeet and Trap Range falls mostly within the 100-foot buffer.
	Demographics/Zoning	Charles County population density is approximately 260 persons per square mile, while NDW, Indian Head and its tenant commands employ approximately 3,600 military and civilian personnel.
	Beneficial Resources	None
<b>Ecological Profile</b>	Habitat Type	The Old Skeet and Trap Range is a grass field.
	Degree of Disturbance	Medium – the area is maintained for a helicopter pad
	Ecological Receptors	

<b>Table 5.8-1: Conceptual Site Model Information Profiles – OLD SKEET AND TRAP RANGE</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
	Federal Endangered Species:	American bald eagle, rainbow snake, sensitive joint-vetch
	Federal Threatened Species:	None
	State Endangered Species:	Scaly blazing-star
	State Threatened Species:	None
	Other Ecological Receptors:	Other ecological receptors include numerous species of birds, fish, waterfowl, reptiles and mammals such as the white tailed deer, wild turkey, the red-bellied woodpecker, ducks, geese, and the eastern box turtle.
	Relationship of MEC/MC Sources to Habitat and Potential Receptors	Receptors may have contact with MC directly through surface water/soil or indirectly through the food chain (bioaccumulated in plants and animals).

A general description of the CSM exposure pathway analysis is included in Section 5.1.11. The Old Skeet and Trap Range is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Old Skeet and Trap Range. However, for the purpose of the PA only MEC and/or MC associated with the Old Skeet and Trap Range is considered within the CSM exposure pathway analysis. For exposure pathway analysis for The Valley Impact Area, refer to Section 5.15.11.

For the Old Skeet and Trap Range, historical and visual evidence indicate that MEC are not present. Therefore, no complete exposure pathways exist for MEC. As such, no exposure pathway analysis was completed for MEC.

MC may be present; therefore, potential MC exposure pathways do exist. The MC exposure pathway analysis for the Old Skeet and Trap Range is presented in Figure 5.8-2. Soil, surface water, and sediments impacted by MC represent primary potential source media. Potential receptors include both human and ecological receptors that may disturb, unbury, or remove the source medium from the range. Potentially complete exposure pathways exist for surface soil through ingestion, dermal contact, and inhalation for both human and ecological receptors. Runoff, discharges, and/or erosion may transport the MC from surface soil to surface water/sediments, so potentially complete pathways also exist for all human and ecological

## FINAL PRELIMINARY ASSESSMENT

receptors of surface water/sediments. Soil also represents an exposure medium when considering plant/animal uptake for biota (including game such as deer) and human receptors consuming the affected biota (e.g., fishing and hunting). Although hunting is not permitted on the Old Skeet and Trap Range, there are upland hunting areas nearby. Fishing is permitted in the Mattawoman Creek. There is a potential for the MC present in the water to infiltrate to the subsurface soil or surficial groundwater. Potentially complete exposure pathways exist for MC in subsurface soils (direct contact, ingestion and inhalation during intrusive work activities) for all human and ecological receptors with the exception of trespassers. It is not anticipated that trespassers would come in contact with subsurface soils. Although confining layers are expected to prevent the migration of MC to the lower aquifers used for water supply, potentially complete pathways exist for MC in shallow groundwater for human receptors.

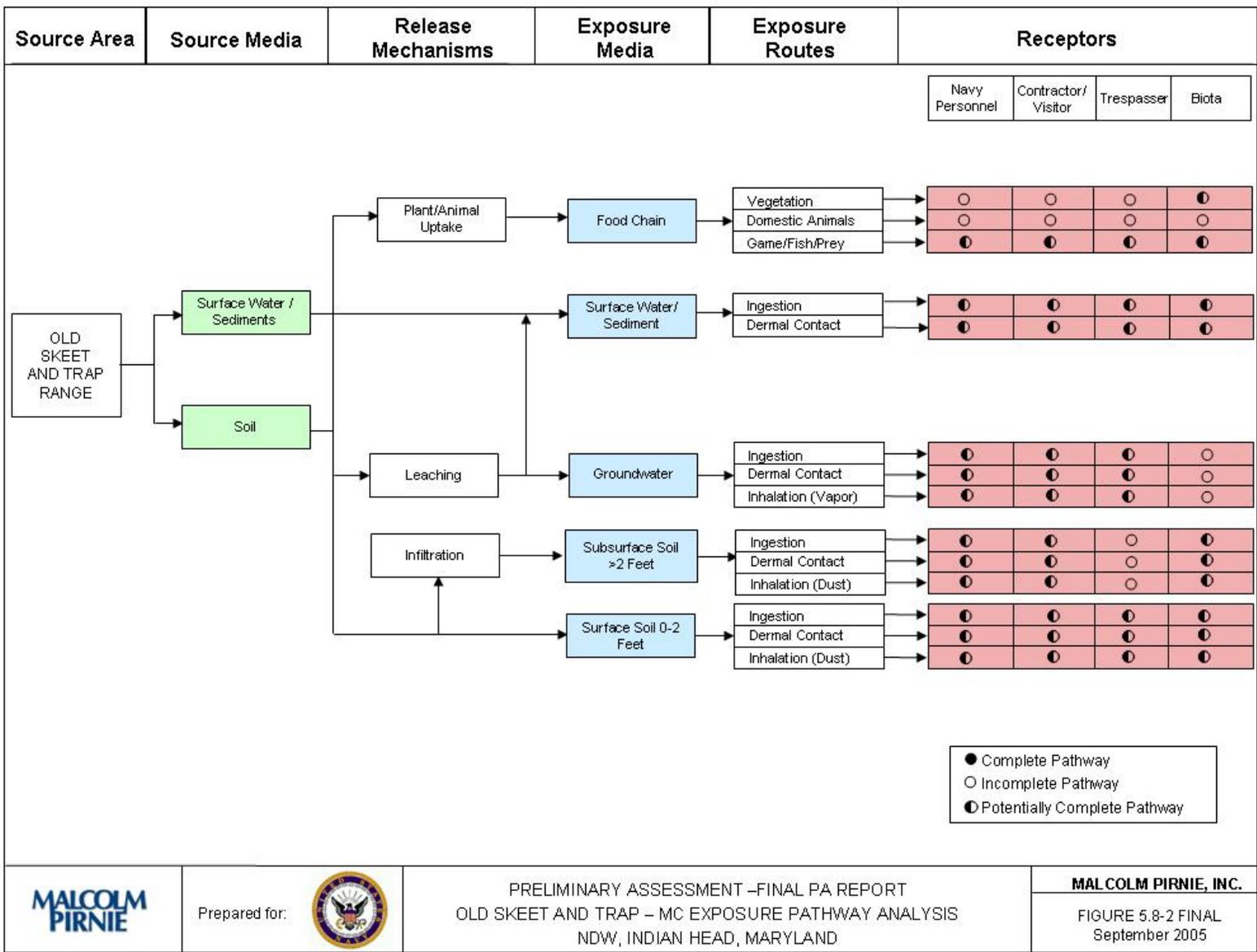


Figure 5.8-2: MC Exposure Pathway Analysis



Prepared for:



PRELIMINARY ASSESSMENT –FINAL PA REPORT  
OLD SKEET AND TRAP – MC EXPOSURE PATHWAY ANALYSIS  
NDW, INDIAN HEAD, MARYLAND

MALCOLM PIRNIE, INC.

FIGURE 5.8-2 FINAL  
September 2005

*5.8.12. Summary*

The 29.33 acre Old Skeet and Trap Range is located in the north central portion of Stump Neck Annex, north of Archer Avenue and south of the Potomac River. The range was constructed between 1967 and 1972, and was closed in June 1991. The Old Skeet and Trap Range was reportedly used for small arms recreational activities. Firing may have occurred out into the Potomac River.

No signs (e.g., berm, targets, or firing lines) of the Old Skeet and Trap Range remain. This was confirmed through a visual range survey. The area is currently used for a helicopter pad and recreation. There are no reported plans to change the current use. The Coastal Zone of Maryland includes all land and water lying within coastal counties, one of which is Charles County. Within the Coastal Zone, Maryland has defined an area within which strict land use management is needed to protect the Chesapeake Bay. The critical area is defined as a 1,000-foot wide strip of land surrounding the bay and its tidal tributaries. Most construction within 100 feet of the Mean High Water Line (buffer) is prohibited. The area of Old Skeet and Trap Range falls mostly within the 100-foot buffer.

There is potential for MC contamination from small arms munitions and clay pigeons (targets). Indirect pathways to ecological receptors (e.g., animals, birds, fish and humans) do exist. Additionally, a map depicting the range fan from firing at The Valley indicates that firing from The Valley occurred over this area because the range fan extends over the Old Skeet and Trap Range.

**Map 5.8-1: Visual Survey: Old Skeet and Trap Range**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.8-2: Range/Site Details: Old Skeet and Trap Range**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.8-3: Munitions Characterization: Old Skeet and Trap Range**

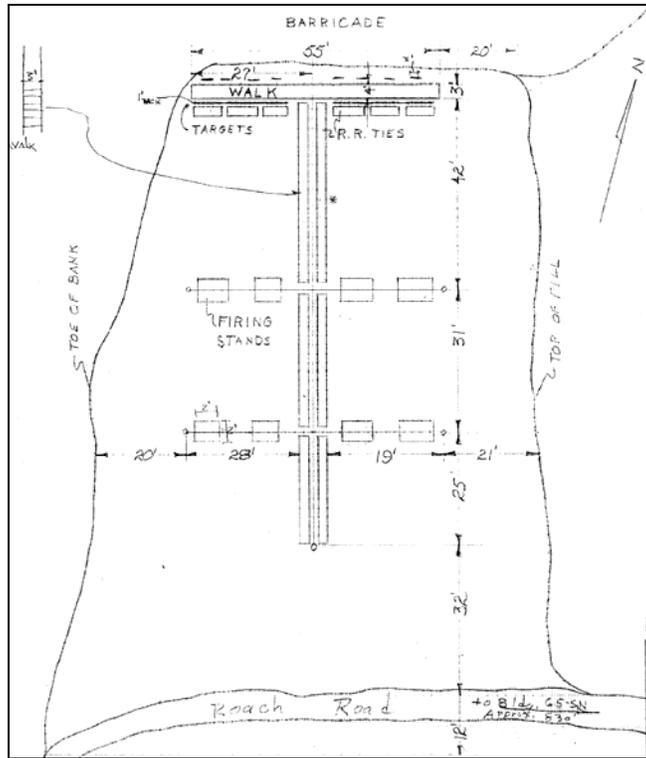
This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**5.9. ROACH ROAD RIFLE RANGE**

**5.9.1. History and Site Description**

The Roach Road Rifle Range is located in the central portion of Stump Neck Annex, immediately west of Roach Road. The 0.3-acre site was formerly used for small arms training from approximately 1963 to 1986.

The Roach Road Rifle Range is first referenced in 1963 memorandum from the Department of Public Works. The 1963 hand-drawn layout for the ‘new pistol range’ includes eight firing stands, six targets constructed of railroad ties, and walkways, as shown in Figure 5.9-1. The plan indicates that the range is north of Roach Road and approximately 830-feet east of Building 65SN (located at Area 8). According to his interview, Mr. John Bartellson, a retired EOD technician, participated in the construction of the small arms range in the 1960s.



**Figure 5.9-1 1963 layout for ‘New Pistol Range’**

The range is first visible on a 1967 aerial photograph and is still visible on a 1987 aerial photograph. The range is visible on the 1967 aerial photograph as a cleared area surrounded by

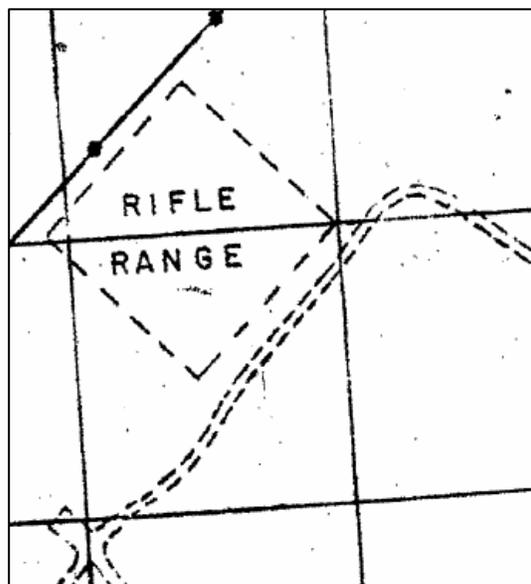
dense vegetation. The range is more distinct on a 1972 aerial photograph (Figure 5.9-2), and it is shown as a cleared area immediately north of the ninety degree turn in Roach Road. On maps dating from 1967 to 1976, the range is labeled as #2070, a small bore and pistol range. On these maps, #2070 is located immediately north of the ninety degree turn in Roach Road, which corresponds to the aerial photographs from this time period. A cleared area is also visible across Roach Road on the 1972 aerial photograph (possibly a parking lot). The 1982 aerial photograph shows a southern shift in the road to the southern side of the cleared area. The range is shown as a square rifle range on maps dating from 1981 to 1988 (Figure 5.9-3). These maps show the rifle range as a square area just south of the ninety degree turn in Roach Road. The 1987 aerial photograph shows vegetative cover over the range and Roach Road in its current location.



Figure 5.9-2: 1972 aerial view of the Roach Road Rifle Range.

Due to the different location of the range presented on the 1963 memorandum, on the maps from 1967 to 1976, and the maps from 1981 to 1988, the location of the range was mapped for this PA using the aerial photographs. The size of the range was established using the layout presented in the 1963 memorandum. The location of the range is provided on Map 5.9-1.

The Roach Road Rifle Range is not identified as a SWMU or as an IR range.



**Figure 5.9-3: Range as shown on the 1981 map**

#### **5.9.1.1. Topography**

Section 3.2 provides a general description of topography for the Stump Neck Annex. The terrain at the Roach Road Rifle Range is relatively flat. The elevation at the Roach Road Rifle Range is approximately 50 feet above sea level (asl). The majority of the site is flat with a small downward slope toward the north. Due to the topography of the area and the predominant vegetative ground cover, the potential for erosion is limited.

#### **5.9.1.2. Geology**

Section 3.3 provides a geologic description for the Stump Neck Annex, which is applicable to the Roach Road Rifle Range.

#### **5.9.1.3. Soil and Vegetation Types**

Section 3.4 provides a description of the soil and vegetation types at the Stump Neck Annex. Vegetation at this range is a mixture of shrubs and forest as illustrated in Figure 5.9-4. According to the Soil Survey of Charles County, soils in the area



**Figure 5.9-4: Vegetation at the Roach Road Rifle Range**

consist of silty sand with gravel at the ground surface underlain by silty sand with clay. Specifically, Aura gravelly sandy loam is present at the range.

#### **5.9.1.4.Hydrology**

Section 3.5 provides a description of hydrology at the Stump Neck Annex. There are no surface water bodies present at the Roach Road Rifle Range. Based on topography, surface water flows to the north and toward the Chicamuxen Creek which drains to the Potomac River.

#### **5.9.1.5.Hydrogeology**

Section 3.6 provides a description of hydrogeology for the Stump Neck Annex, which is applicable to the area of the Roach Road Rifle Range. It is assumed that shallow groundwater flow from the Roach Road Rifle Range follows topography and is connected to the area's dominant surface water bodies (the Mattawoman Creek, the Chicamuxen Creek, and the Potomac River). No monitoring wells are located within the Roach Road Rifle Range.

#### **5.9.1.6.Cultural and Natural Resources**

General cultural and natural resources for Stump Neck Annex are provided in Section 3.7. Since a portion of this range is undeveloped, there is the potential for wildlife to exist at the range. According to the 2003-2004 Stump Neck Annex Hunting Map, hunting is permitted in the undeveloped portions of the Roach Road Rifle Range. The Chicamuxen Wildlife Management Area is located approximately 500 feet north of the Roach Road Rifle Range and is located within an eagle protection area.

The Phase I Cultural Resources Survey of Stump Neck Annex and Supplemental Architectural Investigations from August 1996 did not identify archeological sites within the Roach Road Rifle Range. Historic and prehistoric artifacts were recovered, but not in sufficient concentrations to warrant a site designation. The locations of positive prehistoric and historic findings are identified on Figure 5.9-5. No sites were identified on the Maryland Register of Historic Places (State Register) or the National Register of Historic Places.

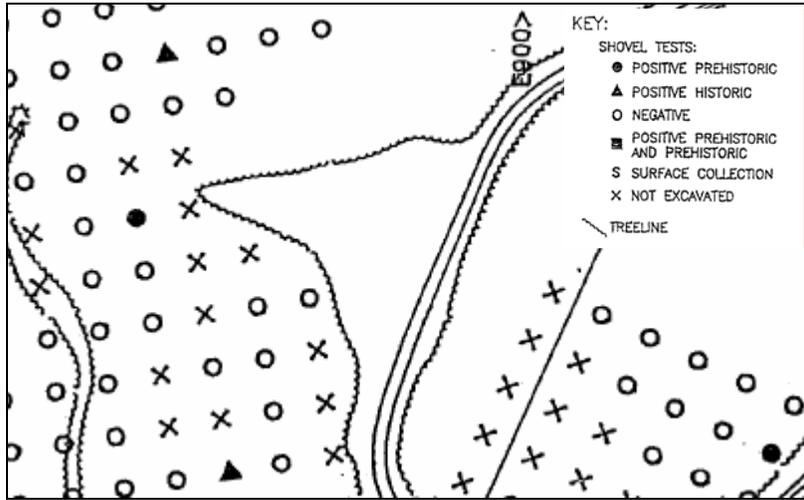


Figure 5.9-5: Cultural resources identified in shovel test pits

5.9.1.7. Endangered and Special Status Species

Endangered or special status species located on the Stump Neck Annex are presented in Section 3.8. The species potentially inhabit the Roach Road Rifle Range.

5.9.2. Visual Survey Observations and Results

A visual survey of the Roach Road Rifle Range was conducted during the range visit on June 2, 2004. Malcolm Pirnie personnel who conducted the range visit included Mr. Hien Dinh, Mr. Svend Egholm, Ms. Rhonda Stone, Mr. Bobby Atkinson, Ms. Alicia Lo Galbo, Mr. Dan Hains, Ms. Julie Grim, and Mr. Ricardo Campos. Ms. Heidi Morgan, Mr. Bob Harrison, and Mr. Seth Berry from NDW, Indian Head accompanied the team.

The team walked the area north of Roach Road, which historically was the cleared area across from the range (possibly a parking lot). Since the location



Figure 5.9-6 Construction debris identified during the site visit

of the Roach Road Rifle Range was determined by the aerial photograph analysis after the site visit, the majority of the range was not inspected in the field. Thus, the presence or absence of former berms cannot be confirmed. A wooded area was observed that appeared to have been cleared approximately 25 years ago. Smaller shrubs and trees were located in the area of the suspected clearing. Larger trees and pines surrounded this area. The perimeter of this area was visually inspected; however, the survey was limited because of safety issues associated with swarms of yellow jackets that were present in the area. No ordnance, MEC, or related debris were observed during the range visit.

The area inspected is currently used for storage of construction related debris which was observed during the visual survey. Construction debris/rubble including old concrete pipes and old telephone poles were observed in the central portion of the range immediately north of Roach Road (Figure 5.9-6). Piles of dirt and gravel were also observed throughout the site. The central portion of the site is cleared and covered with gravel and dirt.

A visual depiction of the range reconnaissance is provided on Map 5.9-1 located at the end of Section 5.9. Additional range/site details are illustrated on Map 5.9-2 also located at the end of Section 5.9.

### ***5.9.3. Munitions and Munitions Related Materials Associated with the Site***

This section describes the munitions or munitions related materials known or suspected to be at the range. This includes both MEC and non-hazardous munitions related debris (e.g., fragmentation, base plates, inert mortar fins).

The Roach Road Rifle Range was used for small arms training. Historic maps and documents state that rifles and pistols were used at the range. Mr. Gordon Miller, a former EOD employee of NDW, Indian Head, also stated that pistols were used at the range. Specific ordnance types used at the range are not known. Lead shot is suspected within the target butts. No munitions related debris items were identified at the Roach Road Rifle Range. No bullets or metallic debris were reported to have been identified in the shovel tests conducted for the Phase I Cultural Resources Survey of Stump Neck Annex and Supplemental Architectural Investigations. Technical data sheets for small arms ammunition are included in Appendix D.

Based on the information obtained during the data collection process, the Roach Road Rifle Range is not suspected to contain CWM filled munitions, electrically fuzed munitions, or DU associated munitions.

***5.9.4. MEC Presence***

The entire range has been subdivided and categorized into one of three levels of MEC presence including: known MEC areas, suspected MEC areas, and areas where no evidence exists to indicate that MEC are known or are suspected to be at the range. The MEC presence is discussed below. Map 5.9-3 illustrates the munitions characterization of the Roach Road Rifle Range and is provided at the end of Section 5.9.

**5.9.4.1. Known MEC Areas**

There are no readily apparent MEC areas associated with the Roach Road Rifle Range, as small arms do not pose an explosive hazard.

**5.9.4.2. Suspected MEC Areas**

There are no suspected MEC areas expected at this range, as small arms do not pose an explosive hazard.

**5.9.4.3. Areas Not Suspected to Contain MEC**

Small arms are not MEC; therefore, there are no areas suspected to contain MEC.

***5.9.5. Ordnance Penetration Estimates***

For small arms ranges, the Interstate Technology and Regulatory Council (ITRC) has prepared a document titled, "Characterization and Remediation of Soils at Closed Small Arms Firing Ranges", dated January 2003, to provide information on the general layout of small arms ranges, as well as information on areas that may be impacted with MC and/or MEC as a result of range use and the characteristics of the munitions used. According to the ITRC guidance, the penetration depth of small arms on the range floor is one foot or less. The document states that rounds that impact the range floor are typically a flat trajectory that fell short of or missed the target, or those resulting from ricochet, and these fragments are usually found within the top six inches of soil. MC presence is expected to be concentrated in the target butts.

### **5.9.6. *Munitions Constituents***

For small arms ammunition, the primary MC of concern is lead from shot. Other associated MC less likely to be of concern may include antimony, arsenic, copper, nickel, and lead styphnate/lead azide. These MC items are not consumed when the munitions items function as they are designed. Therefore, these MC may exist at the Roach Road Rifle Range. There was no record found of environmental sampling on the range.

### **5.9.7. *Contaminant Migration Routes***

Contaminants at the Roach Road Rifle Range may potentially migrate within the soil, groundwater, surface water and sediment. The Roach Road Rifle Range's proximity to the Chicamuxen Creek and the unnamed tributaries provides possible migration routes to surface water. Storm water discharges to surface water via overland flow. Groundwater flow in the shallow water table aquifer also likely trends towards the Chicamuxen Creek; therefore, MC leaching from soils into shallow groundwater may migrate to surface water. Sediments can act as contaminant repositories, and sediment mixing and dredging can act as migration routes to surface water. MC in surface soils and sediments may migrate via plant/animal uptake. Direct human or biota contact with surficial and subsurface soil is possible if the soil is disturbed. Based on a review of hydrogeological data, it is unlikely that MC in shallow groundwater would migrate to the deeper aquifers that are used as a water supply. However, shallow groundwater is still considered a potential exposure media.

### **5.9.8. *Receptors***

Potential human receptors include authorized Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users and trespassers. Plant and animal biota are also potential receptors. Examples of ecological receptors include deer, wild turkey, and waterfowl.

#### **5.9.8.1. *Nearby Populations***

Nearby populations are as discussed in Section 5.1.8.1. The Chicamuxen Wildlife Management Area is located approximately 500 feet north of the Roach Road Rifle Range, and it is used by

recreational hikers, hunters, and fishers. Residential properties are located one mile south of the range.

#### **5.9.8.2. Buildings Near/Within Site**

There are no buildings currently located at the Roach Road Rifle Range. Firing stands, targets, and walkways were present at the site when it was active.

#### **5.9.8.3. Utilities On/Near Site**

There are no electrical lines, telephone lines, sanitary sewer lines, and potable water lines that run through the Roach Road Rifle Range.

#### **5.9.9. Land Use**

There is no readily available information on land use prior to 1963. From 1963 until 1986 the range was maintained as a rifle range. The site is currently undeveloped, and is adjacent to an area used for storage of dirt, gravel, telephone poles, and other road construction supplies. According to the installation personnel, there are no planned changes to activities at the Roach Road Rifle Range. According to the 2003-2004 Stump Neck Annex Hunting Map, the Roach Road Rifle Range is located within an upland hunting area.

#### **5.9.10. Access Controls / Restrictions**

No public access is authorized at NDW, Indian Head. Signs, partial fencing, locked/secured gates, login book/office check-in, and vehicle security patrol are used to control the entire facility. There are no access control features specific to the Roach Road Rifle Range. According to the 2003-2004 Stump Neck Annex Hunting Map, hunting is permitted within the Roach Road Rifle Range.

#### **5.9.11. Conceptual Site Model**

A general description of the CSM is provided in Section 5.1.11. The CSM is presented in a series of information profiles that presents information about the range. The information profiles are included in Table 5.9-1 below.

Table 5.9-1: Conceptual Site Model Information Profiles – ROACH ROAD RIFLE RANGE		
Profile Type	Information Needs	Preliminary Assessment Findings
<b>Range/Site Profile</b>	Installation Name	NDW, Indian Head,
	Installation Location	Indian Head, Charles County, Maryland
	Range/Site Name	Roach Road Rifle Range
	Range/Site Location	The Roach Road Rifle Range is located in the central portion of Stump Neck Annex. Specifically, the site is situated on the west side of Roach Road approximately 830 feet from Building 65SN.
	Range/Site History	The Roach Road Rifle Range was reportedly used for small arms training from approximately 1963 to 1986.
	Range/Site Area and Layout	This 0.3-acre site is roughly rectangular in shape. The former range included firing stands, targets, a walk, and a barricade. The direction of fire was toward the northwest.
	Range/Site Structures	There are no structures currently at the site, and the historic maps do not indicate the presence of structures.
	Range/Site Boundaries	N: An undeveloped swamp area and Chicamuxen Creek form the northern boundary of the site S: Roach Road forms the southern boundary of the site. W: An undeveloped swamp area forms the western boundary of the site E: An undeveloped area and Area 8 form the eastern boundary of the site.
	Range/Site Security	NDW, Indian Head has installation wide security and access restrictions. Once within the installation, no additional access restriction features exist for the Roach Road Rifle Range.
<b>Munitions/Release Profile</b>	Munitions Types	No evidence of ordnance is present at the site. The site was used for small arms training. While rifles and pistols were used at this site, the exact caliber is unknown.
	Maximum Probability Penetration Depth	There is no penetration depth associated with small arms ammunitions. The maximum probability penetration depth for the lead projectiles would be 6-inches below ground surface.

Table 5.9-1: Conceptual Site Model Information Profiles – ROACH ROAD RIFLE RANGE		
Profile Type	Information Needs	Preliminary Assessment Findings
	MEC Density	Reportedly only small arms ammunitions were used at the site; therefore, there is no MEC density at the site. No evidence of the rifle range remains at the site.
	Munitions Debris	No Munitions Debris were found during the visual survey.
	Associated Munitions Constituents	Lead is the only munitions constituent suspected at the site; however, sampling data was not available for the site.
	Migration Routes/Release Mechanisms	Soil surface runoff; groundwater discharge; site maintenance; construction; excavation
<b>Physical Profile</b>	Climate	Indian Head, MD has a continental-type climate with four well-defined seasons. The coldest period occurs in late January and early February, with low temperatures averaging at 29°F. July is the warmest month with average maximum temperatures of 85°F. The normal annual precipitation is approximately 44 inches, normal monthly precipitation varying from 2.25 (February) to 4.60 (August) inches.
	Topography	The elevation at the Roach Road Rifle Range is approximately 50 feet asl. The majority of the site is flat with a small ridge present at both the northern and western boundaries of the site.
	Geology	The Indian Head peninsula lies within the Atlantic Coastal plain physiographic province. The geology of the area is comprised of Precambrian igneous and metamorphic bedrock overlain by 500 to 600 feet of unconsolidated fluvial and marine deposits of the Potomac Group. The Potomac Group consists of, in descending order, the Patapsco, Arundel, and Patuxent Formations.
	Soil	Soils in the area consist of silty sand with gravel at the ground surface underlain by silty sand with clay. Specifically, Aura gravelly sand loam is present at the site.

Table 5.9-1: Conceptual Site Model Information Profiles – ROACH ROAD RIFLE RANGE		
Profile Type	Information Needs	Preliminary Assessment Findings
	Hydrogeology	The hydrogeological makeup of the Indian Head, MD area consists of a surficial aquifer and several deeper confined and semi-confined aquifers in the Patapsco and Patuxent Formations. The surficial aquifer is expected to be connected to and influenced by the surface water bodies. Regional water supplies, including that of NDW, are obtained from the lower and middle sands of the Patapsco and Patuxent Formations of the Potomac Group. The surficial aquifer (i.e., water table) is not used for water supply at NDW.
	Hydrology	Surface water at the Roach Road Rifle Range drains either directly into the wetland areas surrounding the site or into ground surface at the site. The wetland areas drain into the Chicamuxen Creek
	Vegetation	Portions of the site are barren and covered with dirt and gravel piles. The remainder of the site is covered with grass and hardwood forest. Wetlands and additional forest are adjacent to the site.
Land Use and Exposure Profile	Current Land Use	The site is currently used for storage of dirt, gravel, telephone poles, and other road construction supplies.
	Current Human Receptors	Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users, and trespassers
	Current Activities (frequency, nature of activity)	The site is currently used periodically for access to the stored materials. Roach Road is adjacent the site and it is used daily by Navy personnel, visitors, and contractors.
	Potential Future Land Use	There is no foreseen change to current use at the site.
	Potential Future Human Receptors	Navy personnel (military and civilian), visitors, trespassers, and contractors. These receptors would include construction workers (if intrusive work is necessary) and maintenance and operations workers (if the range use changes) as well as recreational users.

Table 5.9-1: Conceptual Site Model Information Profiles – ROACH ROAD RIFLE RANGE		
Profile Type	Information Needs	Preliminary Assessment Findings
	Potential Future Land Use-Related Activities:	There are no foreseen changes in the land use-related activities at the site.
	Zoning/Land Use Restrictions	None
	Demographics/Zoning	Charles County population density is approximately 260 persons per square mile. NDW and its tenant commands employ approximately 3,600 military and civilian personnel.
	Beneficial Resources	The Chicamuxen Wildlife Management Area is located south of the range.
<b>Ecological Profile</b>	Habitat Type	The undeveloped site and the surrounding area contain the forest and shoreline habitats.
	Degree of Disturbance	Low – Activities in the undeveloped range area are (and will be) low. The areas are (and will be) unused habitat and species present are (and will be) undisturbed (i.e., undisturbed grassland, forest, wetland).
	Ecological Receptors	
	Federal Endangered Species:	American bald eagle, rainbow snake, sensitive joint-vetch
	Federal Threatened Species:	None
	State Endangered Species:	Scaly blazing-star
	State Threatened Species:	None
	Other Ecological Receptors:	Other ecological receptors include numerous species of birds, reptiles and mammals such as the white tailed deer, wild turkey, the red-bellied woodpecker and the eastern box turtle.
	Relationship of MEC/MC Sources to Habitat and Potential Receptors	Receptors may have direct or indirect contact with MC that exist in the environment or have been incorporated into the food chain.

A general description of the CSM exposure pathway analysis is included in Section 5.1.11.

Historical and visual evidence indicate that MEC are not present at the site; therefore, there are no complete exposure pathways for MEC. As such, an Exposure Pathway Analysis Figure for MEC was not created. Soil impacted by MC does represent a potential source medium, as illustrated in the Exposure Pathway Analysis Figure 5.9-7 for MC. Potential receptors include both human

## FINAL PRELIMINARY ASSESSMENT

(Navy personnel, contractor/visitors, and trespassers) and ecological receptors (biota) that may contact MC in soil. A potentially complete exposure pathway exists for surface soil through ingestion, inhalation, and dermal contact for both human and ecological receptors. Soil also represents an exposure medium when considering plant/animal uptake for biota (including game such as deer and wild turkey) and human receptors consuming the affected biota (e.g., hunting). Precipitation infiltration may provide for contaminant mobility into the subsurface soil and into the shallow or surficial groundwater aquifer, which is assumed to be connected to the nearby surface water bodies. Subsurface soil represents an exposure medium when considering potential future construction or ground disturbances by Navy personnel, contractors/visitors, and biota. Runoff/erosion impacting surface water/sediment also presents a potential exposure medium to human receptors and biota. Although confining layers are expected to prevent the migration of MC to the lower aquifers used for water supply, potentially complete pathways exist for MC in shallow groundwater for human receptors.

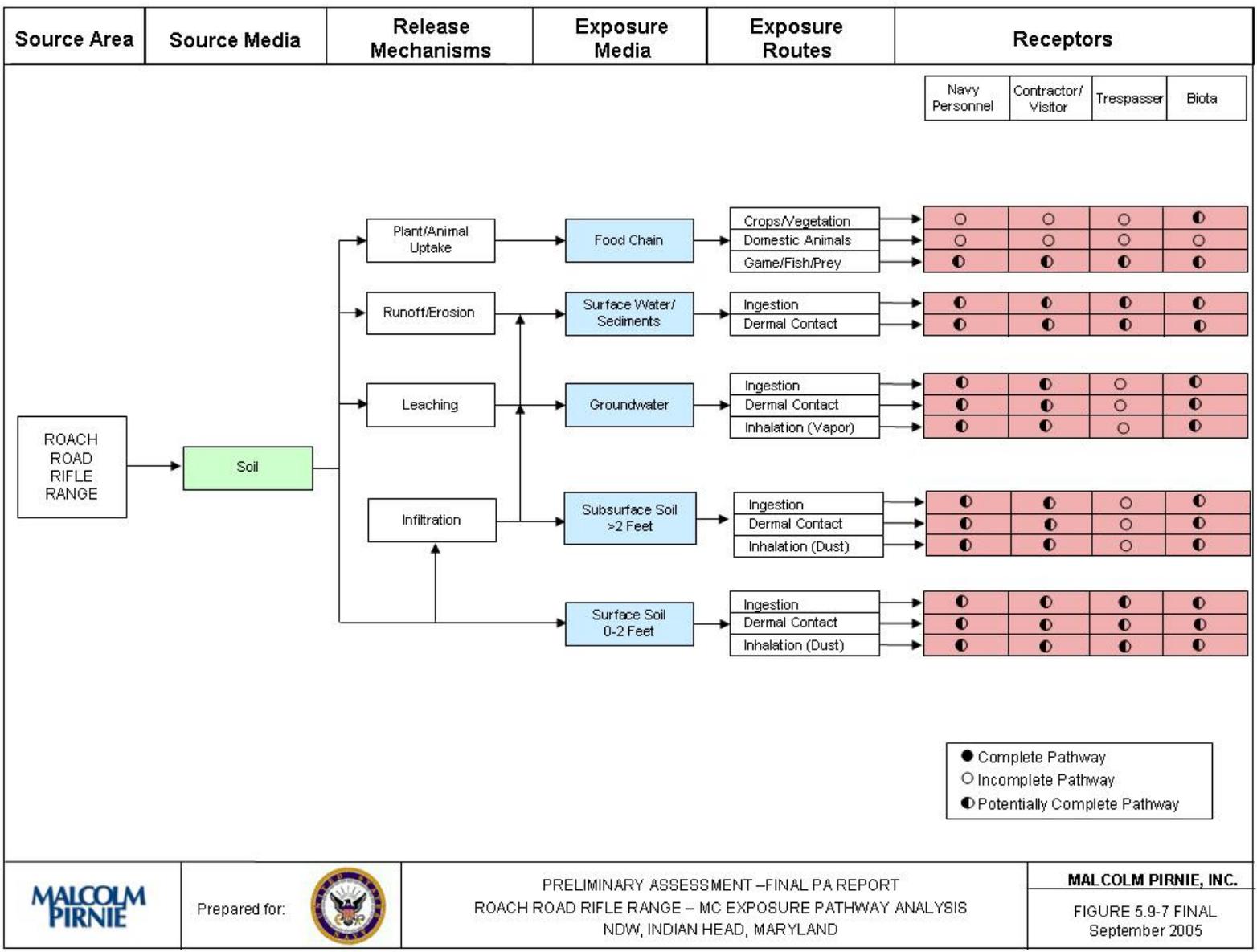


Figure 5.9-7: MC Exposure Pathway Analysis



Prepared for:



PRELIMINARY ASSESSMENT –FINAL PA REPORT  
ROACH ROAD RIFLE RANGE – MC EXPOSURE PATHWAY ANALYSIS  
NDW, INDIAN HEAD, MARYLAND

MALCOLM PIRNIE, INC.

FIGURE 5.9-7 FINAL  
September 2005

*5.9.12. Summary*

The 0.3-acre Roach Road Rifle Range was used from 1963 to 1986 for small arms training. Information gathered from interviews and historic maps indicate that arms used at the site were limited to small bore rifle and pistols. The range is located in the central portion of the Stump Neck Annex northwest of Roach Road. Since the location of the range was determined after the site visit through a review of aerial photographs, a visual survey was not performed on the entire site. The status of any former berms at the range is unknown. Since only small arms are expected to have been used at the Roach Road Rifle Range, and MEC are not associated with small arms, no MEC is expected to be present. The primary MC of concern, given the suspected nature of use, is lead from shot.

**Map 5.9-1: Visual Survey: Roach Road Rifle Range**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.9-2: Range/Site Details: Roach Road Rifle Range**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.9-3: Munitions Characterization: Roach Road Rifle Range**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

## **5.10. RUM POINT SKEET RANGE**

### ***5.10.1. History and Site Description***

The Rum Point Skeet Range was constructed and became operational in 1991 as part of the Morale, Welfare, and Recreation program. The area has two skeet ranges side-by-side that are separated by a wooden fence. A 30-foot by 60-foot modular administrative building was constructed in the observation area directly south of the shooting points. An August 1990 range plan drawing outlines the construction plans for the skeet and trap houses, the concrete pads and walkways, the new access road and parking lot, and the new clearing limits. According to installation personnel, this range was used exclusively as a recreational facility. The Potomac River Gun Club used and maintained the range as a private combination skeet, trap and 3D archery range. During this time, the administration (Building #2153) became the gun club's headquarters. The skeet range was closed in 2001.

The former range covers approximately 33.45 acres located on the northeast section of the Stump Neck Annex. This acreage covers a 900-foot arc from the firing points on the south end of the range to the northern edge of the Rum Point Skeet Range. This distance complies with the skeet range safety requirements as stated in the 1958 U.S. Naval Aeronautical Shore Facilities Programming Guide. According to the 1999 Environmental Management Plan produced by the Potomac River Gun Club, an estimated 85,000 targets were thrown per year for practice and competition shooting. Only shotguns were used at the range. Approximately 5,300 pounds of lead were deposited at the skeet range each year. From this estimation, roughly 53,000 pounds of lead shot fell within the shot fall zone at the range during its 10 years of operation.

#### **5.10.1.1. Topography**

Section 3.2 provides a general description of topography for the Stump Neck Annex. The topography of the former Rum Point Skeet range is gently sloping from southeast to northwest. Over 94 percent of the range is located on upland terrain. The cleared area of the range is fairly flat. West of the cleared area, the land has a gradual downward slope towards the wetland area and beyond. Approximately 90 percent of the Rum Point Skeet Range is located at or above an elevation of 30 feet. Due to topography of the area and the complete vegetative ground cover, severe erosion is not considered to be a problem.

**5.10.1.2. Geology**

Section 3.3 provides a geologic description for Indian Head and the Stump Neck Annex. There is no range-specific geology for the Rum Point Skeet Range, as there are no wells located within the boundaries and no sampling has been performed.

**5.10.1.3. Soil and Vegetation Types**

Section 3.4 provides a description of the soil and vegetation types at Indian Head and the Stump Neck Annex. According to the Soil Survey of Charles County, the surface soil at the Rum Point

Skeet Range consists of a thick series of silty clays. The subsurface soil is a combination of Sassafras sandy loams with zero to five percent slope and moderate erodability. These soils form on upland terrain that is nearly level to moderately sloping. They are well drained soils with moderate permeability.



**Figure 5.10-1: Grass surrounding the concrete firing pad and bordering hardwood forest.**

During construction of the range in 1991, activities affecting the soil included earth movement and excavation of the range grade to level the firing pad area. Grasses and shrubs have now taken root directly within the disturbed surface soil, thus limiting possible erosion. The vegetation on the range is characterized by open fields with maintained grass surrounded by hardwood forests and wetlands. High grasses of the family Gramineae and genus *Festuca*, such as Kentucky Fescue 31, were planted by the Potomac River Gun Club within specific zones in order to dissuade birds and waterfowl from grazing or nesting on the range. There is a 100-yard transition zone between the grasses and the tree line containing a mix of high scrub, bushes and tall grasses. The trees are approximately 50 – 75 feet tall. The wetland area is classified by the installation as Palustrine forested broad-leaved deciduous wetland. Figure 5.10-1 illustrates the vegetation on the range.

#### 5.10.1.4. Hydrology

Section 3.5 provides a description of hydrology at Indian Head and the Stump Neck Annex. There are two small unnamed tributaries on the Rum Point Skeet Range, as well as a wetland area on the western portion of the range. Surface water runoff occurs in the direction of the wetlands. The Potomac River Gun Club planted tall Fescue grass along the shot fall zone to minimize overland flow. The range was also graded so that surface runoff is directed away from the shot fall zone to the western edge of the range. The wetlands and tributaries eventually drain into the Mattawoman Creek.

#### 5.10.1.5. Hydrogeology

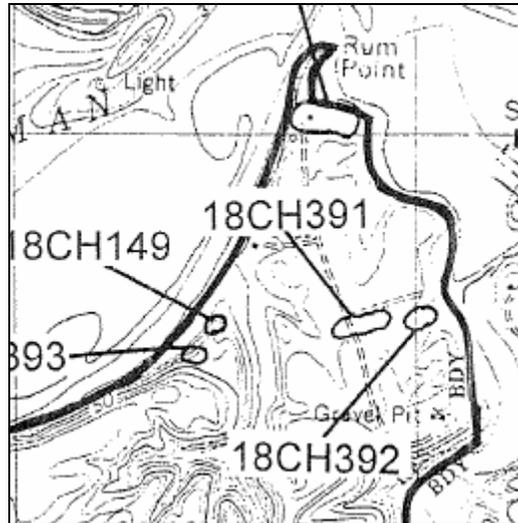
Section 3.6 provides a description of hydrogeology for Indian Head and the Stump Neck Annex. There are no wells located on the Rum Point Skeet Range; however, there is a monitoring well adjacent to the south side of the range. The well is not used for drinking water and there is no available data. The closest potable well to the Rum Point Skeet Range is a private well located on Rum Point, approximately 1200 feet north of the range along Rum Point Road. The well is considered to be private due to the low population density. This well is tested quarterly or monthly if used. The well was installed in 1978 at an elevation of four feet above msl with a screened interval of 231-246 feet below msl. The well is installed within the lower Patapsco aquifer with an estimated flow rate of 15 gallons per minute. The static water level is 18 feet below sea level. This well is located down gradient from the Rum Point Skeet Range.

#### 5.10.1.6. Cultural and Natural Resources

General cultural and natural resources for the Stump Neck Annex are provided in Section 3.7. The range is located in a species protected area and contains a wetland area on the western side. The 1996 Phase I Cultural Resources Survey and Supplemental Architectural Investigations identified three sites that partially overlap the Rum Point Skeet Range.

Site 18CH391: This site was previously identified in a 1966 historic survey. Artifacts recovered from this site were from the Late Archaic through the Late Woodland periods. The size and nature of the site suggest that it was once a base camp or village. Many of the prehistoric materials were from the Ap horizon. It was recommended for a Phase II evaluation. The site

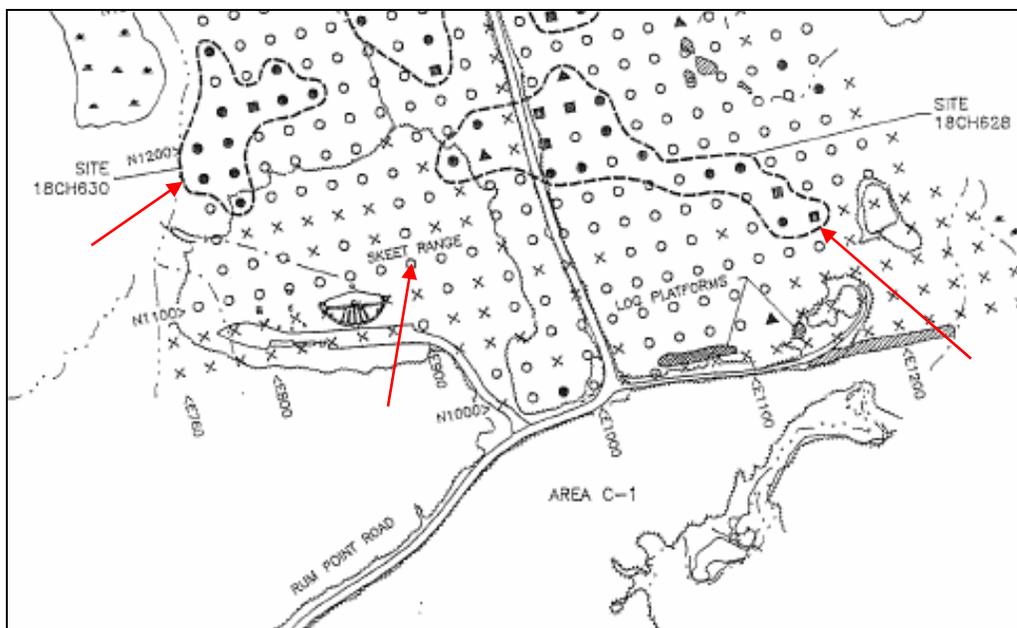
overlaps the northeastern portion of the Rum Point Skeet Range, and its location is provided in Figure 5.10-2.



**Figure 5.10-2: Location of Site 18CH391.**

*Site 18CH628:* This small Late Woodland site contained a wide variety of artifact classes including debitage, flake tools, ceramics, and fire-cracked rock. The artifacts provide evidence that the site was a resource procurement site or a briefly occupied camp. Cores and primary debitage were located in the southeastern portion of the site. Ceramic artifacts were located in the northwest portion of the site. Recovered historic artifacts were most likely from field scatter. The site was recommended for a Phase II evaluation. This site overlaps the eastern side of the Rum Point Skeet Range (Figure 5.10-3).

*Site 18CH630:* A diverse collection of prehistoric artifacts including debitage, a flake tool, a core, ceramics, and fire-cracked rock fragments were recovered at this small Late Woodland site. The artifacts were uncovered in unplowed Sassafras Silt Loam soils. A Phase II evaluation of the site was recommended. The entire site is overlain by the northwestern section of the Rum Point Skeet Range (Figure 5.10-3).



**Figure 5.10-3: Location of the Rum Point Skeet Range and 18CH628 and 18CH630.**

#### **5.10.1.7. Endangered and Special Status Species**

As discussed in Section 3.8, endangered and special status species are reported to exist at the Stump Neck Annex. These reported endangered and special status species have the potential to inhabit the area, but none are known to inhabit the Rum Point Skeet Range. The former Rum Point Skeet Range is located within an eagle protection area and in a designated species protection area.

#### **5.10.2. Visual Survey Observations and Results**

A visual survey of the Rum Point Skeet Range was conducted on June 25, 2003. Malcolm Pirnie personnel who conducted the visual survey included Mr. Dinh, Mr. Egholm, Ms. Tegtmeyer, Ms. Grim, Mr. Rice, Mr. Hains, Mr. Wiley, Mr. Baker, and Mr. McManus. Mr. Jorgensen and Ms. Morgan, NDW, Indian Head Environmental Office, accompanied the team. The survey team walked the tree line of the range and several transects through the middle of the range. The range is semicircular in shape and accessed from the south at the end of Skeet Range Way. A wooden fence divides the range from the roadway and the small parking area, which are lined with streetlights. Building 2153RP is located on the south side of Skeet Range Way. The building appeared to be in working condition and in use. The range boundaries overlap Rum Point Road

and a small area of land directly east of the road. This road and the cleared portion of the range are separated by forest. The western portion of the range is transected by wetlands. The range appears to be well maintained, and the grass is mowed. The cleared area of the range is approximately six acres. The semicircular concrete pads and firing lines for both ranges are still clearly visible on the range as illustrated in Figure 5.10-4. There are five concrete walkways on each range.



**Figure 5.10-4: Concrete pad and firing lines visible on the southern edge of the range**

The target houses for the ranges still remain. Each range has its own trap house, its own low or high house and shares the one combination high/low house located in the center of the two ranges. There is a 34-foot long, 8-foot high wooden protection fence behind the combination house that separates the two ranges. Firing occurred from the concrete pads towards the north edge of the range.

Clay targets (White AA flyers) were found along the northeast tree line of the range; an example is shown in Figure 5.10-5. Storage boxes/trailers labeled C45, C12, C13 and C44 were located at the end of Skeet Range Way along the southwest range perimeter. Four empty 55-gallon steel drums were found next to the southwest side of the range. One empty shotgun shell casing was identified next to the drums. A visual depiction of the range reconnaissance is provided on Map 5.10-1 located at the end of Section 5.10. Additional range/site details are illustrated on Map 5.10-2 also located at the end of Section 5.10.



**Figure 5.10-5: Clay target (White AA flyer) found at the Rum Point Skeet Range.**

### ***5.10.3. Munitions and Munitions Related Materials Associated with the Site***

This section describes the munitions or munitions related materials known or suspected to be at the range. This includes both MEC and non-hazardous munitions related debris (e.g., fragmentation, base plates, inert mortar fins).

The Rum Point Skeet Range was used as a recreational small arms range. According to the installation and documents from the Potomac River Gun Club only shotguns were used on range.

Based on the information obtained during the data collection process, the Rum Point Skeet Range is not suspected to contain CWM filled munitions, electrically fuzed munitions, or DU associated munitions.

### ***5.10.4. MEC Presence***

The entire range has been subdivided and categorized into one of three levels of MEC presence including: known MEC areas, suspected MEC areas, and areas where no evidence exists to indicate that MEC are known or are suspected to be at the range. The MEC presence is discussed below.

Map 5.10-3 illustrates the munitions characterization of the Rum Point Skeet Range and is provided at the end of Section 5.10.

**5.10.4.1. Known MEC Areas**

There are no readily apparent MEC areas associated with this range, as small arms do not pose an explosive hazard.

**5.10.4.2. Suspected MEC Areas**

There are no suspected MEC areas expected at this range, as small arms do not pose an explosive hazard.

**5.10.4.3. Areas Not Suspected to Contain MEC**

Small arms are not explosive; therefore, the entire range is not suspected to contain MEC.

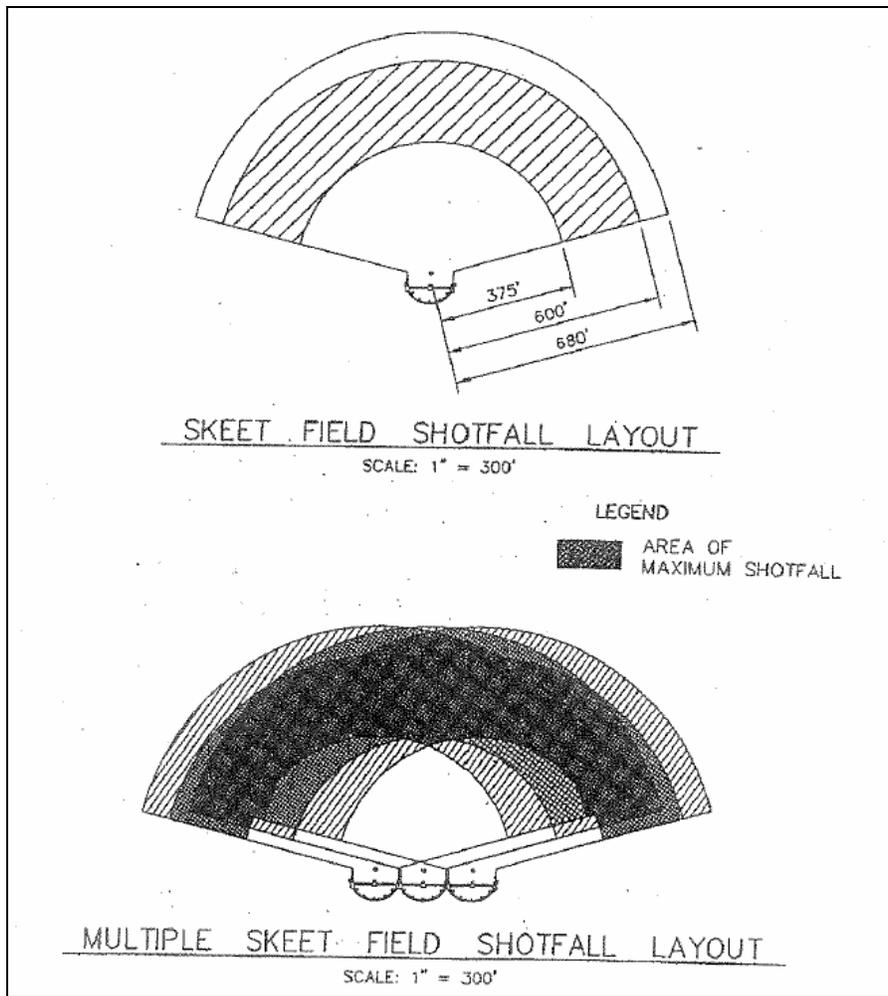
**5.10.5. *Ordnance Penetration Estimates***

The depth to which munitions penetrate below the ground surface depends on many factors, including the type of soil, the angle of impact, the size of the munition, the velocity at impact, and range-specific environmental conditions.

For small arms ranges, the Interstate Technology and Regulatory Council (ITRC) has prepared a document titled, "Characterization and Remediation of Soils at Closed Small Arms Firing Ranges", dated January 2003, to provide information on the general layout of small arms ranges, as well as information on areas that may be impacted with MC and/or MEC as a result of range use and the characteristics of the munitions used. According to the ITRC guidance, the penetration depth of small arms on the range floor is one foot or less. The document states that rounds that impact the range floor are typically a flat trajectory that fell short of or missed the target, or those resulting from ricochet, and these fragments are usually found within the top six inches of soil. For trap and skeet ranges, the ammunition is dispersed as pellets over a small area in the direction of fire. According to the 1958 Programming Guide, the minimum safe range from a skeet/trap range is 900 feet. Pellets dispersed from a shotgun would be deposited on the ground surface and not significantly penetrate the ground unless disturbed.

**5.10.6. Munitions Constituents**

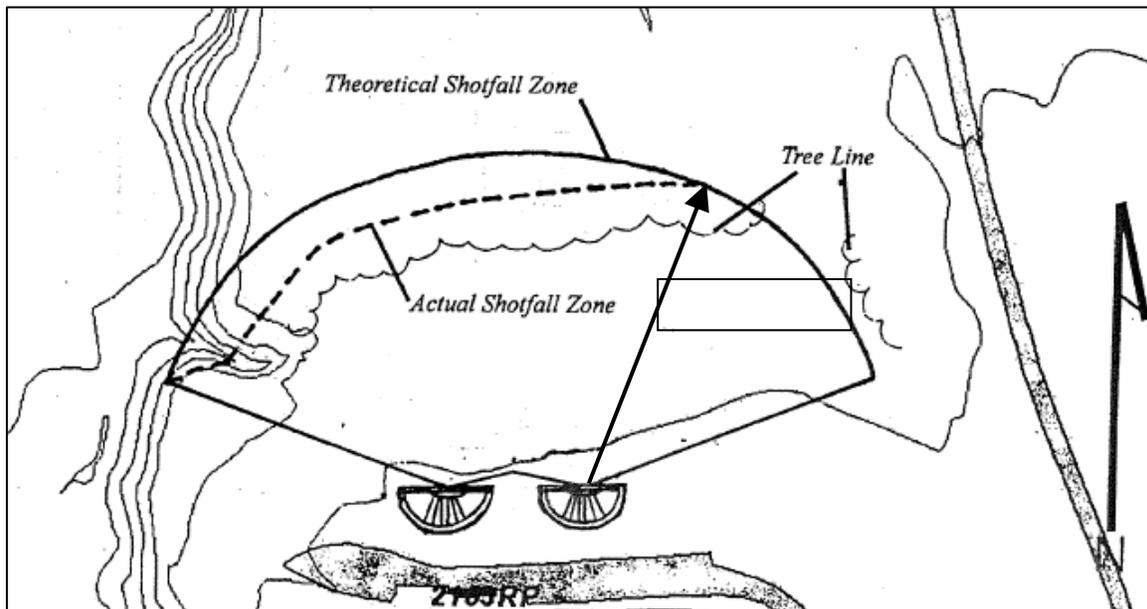
The potential for lead contamination exists over the entire 900-foot arc covered by the Rum Point Skeet Range. According to the ITRC guidance, the positions of the shooters and the angles at which the skeet targets are thrown create a fan shaped shot fall zone. Figure 5.10-6 provides the typical shot fall layout of a skeet range. Depending upon the shot angle, wind, and the blocking effect of the trees, the typical shotfall zone extends up to 680 feet. As illustrated in the figure, the overlapping fans create an area of maximum shot fall, which is positioned approximately 375 ft – 600 feet from the firing point. The maximum shot fall zone is the area in which the highest concentrations of lead and skeet are expected.



**Figure 5.10-6: Typical shot fall layout for a skeet range**

At the Rum Point Skeet Range, the cleared area of the range extends approximately 400 feet from the firing point. Thus, the theoretical maximum shot fall zone would extend past the tree line.

The actual shot fall zone is an area slightly less than the theoretical shot fall zone due to the blocking effect of the trees. The theoretical and actual shot fall zones at the Rum Point Skeet Range as provided by the Potomac River Gun Club are illustrated on Figure 5.10-7.



**Figure 5.10-7: Location of theoretical vs. actual shot fall zones on the Rum Point Skeet Range.**

The potential for lead contamination is greatest along the actual shot fall zone located at the tree line. There is a concern that the lead shot is embedded within the trees or possibly within the wetland area located on the west edge of the range. There was no record found of any excavations or environmental sampling on the range. Other MC may include elevated metals such as antimony, copper, zinc and arsenic from bullets, fragments and bullet jackets. The only munition related debris items located on-range were clay targets. These targets normally contain approximately 32 percent petroleum pitches (CAS 68334-31-6, CAS 68187-58-6) and 67 percent dolomitic limestone (CAS 16389-88-1). Petroleum pitch contains PAHs, some of which are classified as carcinogens. The targets are not considered an explosive or fire hazard. Several of these targets were found at the range during the visual survey.

### ***5.10.7. Contaminant Migration Routes***

Contaminants at Rum Point Skeet Range may potentially migrate within the soil, groundwater, surface water and sediment. Direct human or biota contact with surficial and subsurface soil is possible if the soil is disturbed. The Rum Point Skeet Range's unnamed tributaries, wetlands and proximity to the Mattawoman Creek provide possible migration routes to surface water. The majority of the range area is sloped toward the wetland area and the Mattawoman Creek. Storm water discharges to surface water via overland flow. Groundwater flow in the shallow water table aquifer also likely trends towards the Mattawoman Creek; therefore, MC leaching from soils into shallow groundwater may migrate to surface water. Sediments can act as contaminant repositories, and sediment mixing and dredging can act as migration routes to surface water. MC in surface soils and sediments may migrate via plant/animal uptake. Based on a review of hydrogeological data, it is unlikely that MC in shallow groundwater would migrate to the deeper aquifers that are used as a water supply. However, shallow groundwater is still considered a potential exposure media.

### ***5.10.8. Receptors***

Potential human receptors include authorized Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users and trespassers. Plant and animal biota are also potential receptors. Examples of ecological receptors include deer, wild turkey, and waterfowl.

#### **5.10.8.1. Nearby Populations**

Nearby populations are as discussed in Section 5.1.8.1. The Rum Point Skeet Range overlaps a wildlife protection area.

#### **5.10.8.2. Buildings Near/Within Site**

Building 2153 is located on Skeet Range Way on the south side of the former range. The Potomac River Gun Club used the building while the range was operational. A wooden fence divides the building from the firing area on-range. The other structures on-range include storage boxes/trailers designated C12, C13, C45, and C44 that are positioned at the end of Skeet Range Way. The low, high, and trap houses that were once used for the skeet range are still in tact. The

two trap houses are numbered 2169RP and 2163RP; the high house is 2170RP; the one combination house is Building 2164RP, and the low house is Building 2162. There are no other installation structures on or nearby the range.

#### **5.10.8.3. Utilities On/Near Site**

Building 2153, the former Potomac River Gun Club Headquarters, has water and electricity. Streetlights are located along Skeet Range Way. No overhead power lines are visible. A 1990 construction map of the range outlines installation of a ¾-inch conduit including ground wires to be installed 18 inches below the surface. The wires are shown connecting the low, high, and trap houses to an unidentified trailer on the range, which is assumed to be Building 2153.

#### **5.10.9. Land Use**

There is no readily available information on the land use prior to 1991. From 1991 until 2001, the area was maintained as a skeet and trap range. The range was primarily used and maintained by the Potomac River Gun Club. The Club was operational at NDW, Indian Head for approximately 15 years at another location on the Stump Neck Annex prior to its move to the Rum Point Skeet Range in 1991. The Club volunteered to relocate due to environmentally sensitive issues at its previous location. Building 2153 was used as the Club's headquarters.

#### **5.10.10. Access Controls / Restrictions**

A locked gate at the beginning of Skeet Range Way limits access to the range; however, the Rum Point Skeet Range is not within the Stump Neck secured perimeter fence. A wooden split rail fence runs along the south and east edges of the Rum Point Skeet Range. Skeet Range Way leads directly to the south edge of the range. The area is surrounded by forests on the north and east sides. Wetlands transect the western portion of the site.

According to the 2003-2004 Stump Neck Annex Hunting Map the former skeet range is located within an eagle protection area as designated by the installation. Hunting is permitted within this region by permission.

The wetlands located on the west edge of the range are protected under Executive Order 11990, which prohibits construction in a wetland area unless there is no practicable alternative and all

possible measures are taken to minimize the environmental impacts. Wetlands are also protected under Section 404 of the Clean Water Act, which requires a permit to be obtained from the USACE before any work in a wetland can commence. The wetland found on the former skeet range is under the category of Palustrine forested broad-leaved deciduous wetland.

According to the Soil Survey of Charles County, many of the soil types on Stump Neck and Indian Head have load bearing capacity limitations as a result of high water tables and extreme erodability conditions. Based on this information, the installation has limited construction and the use of septic systems in specific areas of concern. The former Rum Point Skeet Range is located in a region that has a seasonal high water table and overlaps an area containing hydric soils. The range overlaps two restriction areas: one in which septic systems are prohibited and the other in which a waiver is required for septic systems.

**5.10.11. Conceptual Site Model**

A general description of the CSM is provided in Section 5.1.11. The CSM is presented in a series of information profiles that presents information about the range. The information profiles are included in Table 5.10-1 below.

<b>Table 5.10-1: Conceptual Site Model Information Profiles – RUM POINT SKEET RANGE</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
<b>Range/Site Profile</b>	Installation Name	NDW, Indian Head
	Installation Location	Indian Head, Charles County, Maryland
	Range/Site Name	Rum Point Skeet Range
	Range/Site Location	The range is located on the northeast section of the Stump Neck Annex. The range is directly north of Skeet Range Way.
	Range/Site History	The Potomac River Gun Club formerly used the range as a recreational skeet range from 1991 until 2001.
	Range/Site Area and Layout	The 33.45-acre range is semi-circular in shape with the firing point on the south side of the range. Firing took place from the concrete pad towards northern tree line. Targets consisted of clay pigeons.

**FINAL PRELIMINARY ASSESSMENT**

<b>Table 5.10-1: Conceptual Site Model Information Profiles – RUM POINT SKEET RANGE</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
	Range/Site Structures	Building 2153, located on Skeet Range Way at the southern edge of the range, was used as the Potomac River Gun Club headquarters. The low, trap, and high houses remain on range. Several storage boxes/trailers are located at the end of Skeet Range Way.
	Range/Site Boundaries	N: Hardwood forest, Medium Caliber Gun Testing Facility S: Skeet Range Way, Building 2153 E: Hardwood forest W: Hardwood forest
	Range/Site Security	Access to the Rum Point Skeet Range is controlled by a locked gate at the entrance to Skeet Range Way.
<b>Munitions/ Release Profile</b>	Munitions Types	The small arms range was limited to shotguns.
	Maximum Probability Penetration Depth	The maximum probability penetration depth is likely less than six inches below the ground surface.
	MEC Density	Small arms are not explosive; therefore, there is no MEC density.
	Munitions Debris	None
	Associated Munitions Constituents	MC may include lead, antimony, copper, zinc, arsenic, and PAHs from bullets, fragments, bullet jackets, and related sporting material (e.g., clay targets).
	Migration Routes/Release Mechanisms	Soil surface runoff; groundwater discharge; range maintenance; construction; excavation
<b>Physical Profile</b>	Climate	Indian Head, Maryland has a continental-type climate with four well-defined seasons. The coldest period occurs in late January and early February, with low temperatures averaging at 29°F. July is the warmest month with average maximum temperatures of 85°F. The normal annual precipitation is approximately 44 inches, with normal monthly precipitation varying from 2.25 (February) to 4.60 (August) inches.
	Topography	The topography of the Rum Point Skeet Range is gently sloping downward from north to south. The land slopes downward from the northwestern corner to the wetland area.

Table 5.10-1: Conceptual Site Model Information Profiles – RUM POINT SKEET RANGE		
Profile Type	Information Needs	Preliminary Assessment Findings
	Geology	Indian Head and Stump Neck lie within the Atlantic Coastal plain physiographic province. The geology of the area is comprised of Precambrian igneous and metamorphic bedrock overlain by 500 to 600 feet of unconsolidated fluvial and marine deposits of the Potomac Group. The Potomac Group consists of, in descending order, the Patapsco, Arundel, and Patuxent Formations.
	Soil	The soil within the Rum Point Skeet Range is a mixture of Sassafras sandy loam and gravel deposits.
	Hydrogeology	The hydrogeological makeup of the Indian Head, Maryland area consists of a surficial aquifer and several deeper confined and semi-confined aquifers in the Patapsco and Patuxent Formations. The surficial aquifer is expected to be connected to and influenced by the surface water bodies. Regional water supplies, including that of NDW, Indian Head, are obtained from the lower and middle sands of the Patapsco and Patuxent Formations of the Potomac Group. The surficial aquifer (i.e., water table) is not used for water supply at NDW, Indian Head.
	Hydrology	Surface water at the Rum Point Skeet Range drains into the wetland area on the western portion of the range. The wetlands drain into the Mattawoman Creek, which is approximately 450 feet downstream.
	Vegetation	Vegetation at the range is a mixture of high and low grasses, hardwood forest, and wetlands.
<b>Land Use and Exposure Profile</b>	Current Land Use	The land is currently used for storage.
	Current Human Receptors	Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users, and trespassers.
	Current Activities (frequency, nature of activity)	The area is well maintained, and the grass is mowed regularly.
	Potential Future Land Use	There is no known future change in land use.

Table 5.10-1: Conceptual Site Model Information Profiles – RUM POINT SKEET RANGE		
Profile Type	Information Needs	Preliminary Assessment Findings
	Potential Future Human Receptors	Navy personnel (military and civilian), visitors, trespassers, contractors, construction workers (if intrusive work is necessary) and maintenance and operations workers, as well as recreational users (hunters).
	Potential Future Land Use-Related Activities:	There is no anticipated change in land use or related activities
	Zoning/Land Use Restrictions	The Rum Point Skeet Range is located within an eagle protection area. The area is affected by load bearing capacity limitations as a result of high water tables. Wetlands located on the western portion of the range are federally protected.
	Demographics/Zoning	Charles County population density is approximately 260 persons per square mile. NDW, Indian Head and its tenant commands employ approximately 3,600 military and civilian personnel.
	Beneficial Resources	None
<b>Ecological Profile</b>	Habitat Type	The habitats within and around this former range include wetlands, grasses, mature forest and successional forest.
	Degree of Disturbance	Medium disturbance; the range is currently well maintained and used for storage.
	Ecological Receptors	
	Federal Endangered Species:	American bald eagle, rainbow snake, sensitive joint-vetch
	Federal Threatened Species:	None
	State Endangered Species:	Scaly blazing star
	State Threatened Species:	None
	Other Ecological Receptors:	Other ecological receptors include numerous species of birds, reptiles and mammals such as the white tailed deer, wild turkey, the red-bellied woodpecker and the eastern box turtle.
	Relationship of MEC/MC Sources to Habitat and Potential Receptors	It is not anticipated that receptors would come into direct contact with MEC because munitions use at the range was limited to small arms ammunitions. Receptors may have direct or indirect contact with MC that exist in the environment or have been incorporated into the food chain.

A general description of the CSM exposure pathway analysis is included in Section 5.1.11.

Historical and visual evidence indicate that MEC are not present at the range; therefore, there are no complete exposure pathways for MEC. As such, an Exposure Pathway Analysis Figure for MEC was not created. Soil and surface water/sediments impacted by MC represent a primary potential source medium, as illustrated in the Exposure Pathway Analysis for MC (Figure 5.10-8). Exposures to surface soil, subsurface soil, and surface water/sediments containing MC may present potentially complete pathways for human and ecological receptors. All human and ecological receptors have potentially complete exposure pathways for direct contact with MC in surface soil, which includes dermal contact, ingestion, and inhalation (dust). Runoff, discharges, and/or erosion may transport the MC from surface soil to surface water/sediments. Since the area is partially located on a wetland there are also potentially complete pathways for all human and ecological receptors of surface water/sediments. The food chain also represents an exposure medium when considering plant/animal uptake for biota (including game such as deer and wild turkey). Hunting is permitted on-range during certain periods of the year and by permit only, creating potentially complete pathways from the food chain to all human receptors. Precipitation infiltration may provide for lead and PAH mobility into the subsurface soil and to the surficial groundwater aquifer. Potentially complete exposure pathways exist for MC in subsurface soils (direct contact, ingestion and inhalation during intrusive work activities) for all human and ecological receptors with the exception of trespassers. It is not anticipated that trespassers would come in contact with subsurface soils. Although confining layers are expected to prevent the migration of MC to the lower aquifers used for water supply, potentially complete pathways exist for MC in shallow groundwater for human receptors.

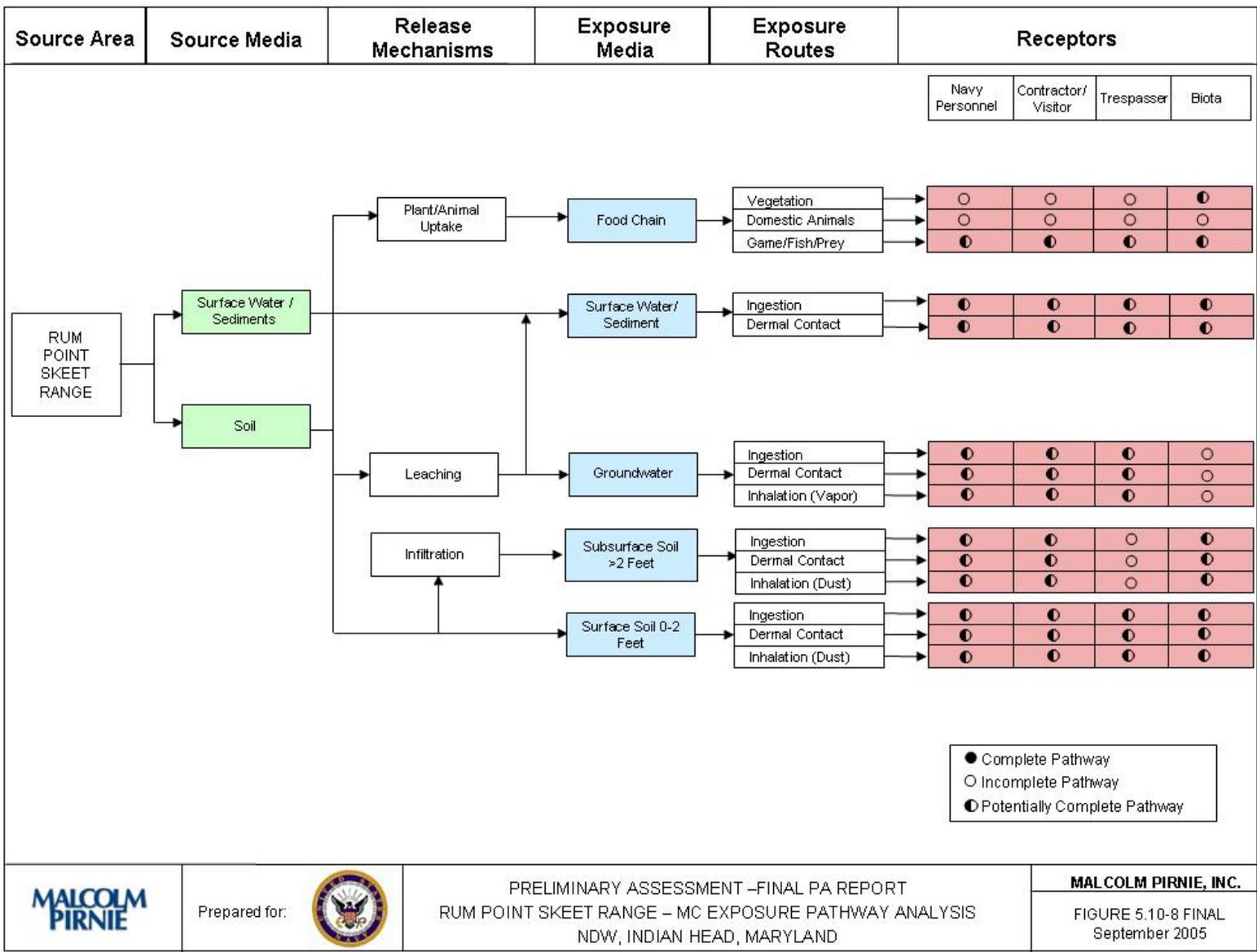


Figure 5.10-8: MC Exposure Pathway Analysis



Prepared for:



PRELIMINARY ASSESSMENT –FINAL PA REPORT  
RUM POINT SKEET RANGE – MC EXPOSURE PATHWAY ANALYSIS  
NDW, INDIAN HEAD, MARYLAND

MALCOLM PIRNIE, INC.

FIGURE 5.10-8 FINAL  
September 2005

**5.10.12. Summary**

The Rum Point Skeet Range was operational for recreational purposes from 1991 until 2001. The range was used almost exclusively by the Potomac River Gun Club. Only shotguns were used on the range, and it is estimated that 53,000 pounds of lead shot were deposited on the range during its use. The range is approximately 33.45-acres. The range is well maintained with the low, trap, and high houses still in tact. Firing took place from the concrete firing lines visible in the south end of the range towards the northern tree line. The range is currently used for storage. One empty shotgun shell and several clay targets were found during the visual survey. There are no explosives safety threats associated with the range as only small arms were used.

No known environmental or geophysical sampling has been performed within the range. It is unknown if the Navy performed any lead removal from the range when it was active or after it was closed. Potential MC related materials include lead from shot ammunition and PAHs found within the clay targets. There are wetlands located on the western side of the range that drain into the Mattawoman Creek. The range is located within an eagle protection area, although hunting is allowed by permit during specific times of the year.

**Map 5.10-1: Visual Survey: Rum Point Skeet Range**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.10-2: Range/Site Details: Rum Point Skeet Range**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.10-3: Munitions Characterization: Rum Point Skeet Range**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

## 5.11. SMALL ARMS RANGE (PISTOL RANGE)

### 5.11.1. History and Site Description

The Small Arms Range (Pistol Range) is approximately 2.41 acres in area, and is located at the eastern extremity of the Stump Neck peninsula. The SDZ, which extends east of the Small Arms Range, covers 382.12 acres. Navy personnel used this range for training and qualifying activities from the mid 1980s until 1991. Rounds were fired into the side of a hill located on the range. The Small Arms Range was closed in August 1991 due to its proximity to General Smallwood State Park, which borders the range on the target side, presenting the potential for stray rounds to enter the park. Subsequently, the range was used for bow qualification, the exact dates of which are unknown.

The Small Arms Range is also known as the Old Pistol Range. When used as a pistol range, the range had three firing lines with north-south orientation, two concrete walkways with east-west orientation, and a stone walkway located in the northern portion of the range. According to personnel interviews, silver-contaminated soils from the X-ray facility (IR Site #5, Building 731 on the Main Installation) were buried and covered with a clay layer at the Small Arms Range after the range was closed. The buried soil is in two earthen mounds that are located near the center of the Small Arms Range and is not considered part of the range (see Figure 5.11-1). Currently the Small Arms Range is an open field.



**Figure 5.11-1: Silver contaminated soil**

In 1992, this range was added to the IR Program as a SWMU at the Stump Neck Annex. The Small Arms Range is identified as SWMU #29: Pistol Range. In January 2002, a desktop audit was performed and concluded that insufficient information was available; therefore, the Small Arms Range still remains an AOC pending investigation.

#### **5.11.1.1. Topography**

Section 3.2 provides a general description of topography for the Stump Neck Annex. The topography of the Small Arms Range can be described as relatively flat with a hill on the eastern side, bordering General Smallwood State Park. The highest point on the Small Arms Range is in the northeast corner at an elevation of approximately 100 feet above msl.

#### **5.11.1.2. Geology**

Section 3.3 provides a geologic description for Indian Head and the Stump Neck Annex., which is applicable to the Small Arms Range. There is no range-specific geological data for the Small Arms Range.

#### **5.11.1.3. Soil and Vegetation Types**

Section 3.4 provides a description of the soil and vegetation types at Indian Head and the Stump Neck Annex. According to the Soil Survey of Charles County, the predominant soil types associated with the Small Arms Range are silty loams and gravelly sandy loam. Specifically, the soils consist of a moderately eroded, Beltsville silt loam with two to five percent slope and a moderately eroded Aura gravelly loam with ten to 15 percent slope. The Small Arms Range is located within a hardwood forest area.

#### **5.11.1.4. Hydrology**

Section 3.5 provides a description of hydrology at Indian Head and the Stump Neck Annex. The closest water body to the Small Arms Range is an unnamed tributary creek along the western boundary of the range. Surface water runoff likely follows topography at the range towards the unnamed tributary creek. There are no known wetlands at the area.

#### **5.11.1.5. Hydrogeology**

Section 3.6 provides a description of hydrogeology for Indian Head and the Stump Neck Annex, which includes the Small Arms Range. It is assumed that shallow groundwater flow from the Small Arms Range follows topography towards the unnamed tributary creek and is connected to the area's dominant surface water bodies (the Mattawoman Creek and Potomac River).

#### **5.11.1.6. Cultural and Natural Resources**

General cultural and natural resources for NDW, Indian Head are provided in Section 3.7. According to the 1996 Phase I Cultural Resources Survey of Stump Neck Annex there are no archeological/cultural sites within the Small Arms Range. Several shovel test pits were taken on the site and all were found negative for artifacts.

#### **5.11.1.7. Endangered and Special Status Species**

As discussed in Section 3.8, endangered species are reported to exist at the Stump Neck Annex. These species may be present at the Small Arms Range.

#### ***5.11.2. Visual Survey Observations and Results***

A visual reconnaissance of the Small Arms Range was conducted on June 25, 2003 by Mr. Hains, Mr. Rice, and Ms. Grim of Malcolm Pirnie, Inc. and Mr. Wiley and Mr. Baker. Ms. Morgan and Mr. Jorgensen accompanied the team. The Small Arms Range was inspected by a walk from the southwestern corner of the range towards the northwestern corner. The Small Arms Range currently consists of an open field. Two berms are located in the central portion of the Small Arms Range. According to range personnel, silver-contaminated soils from the X-ray Facility had been buried on site in approximately 1992. The majority of the range is covered by thick vegetation including tall grasses and hardwood species. Evidence of the former range was observed, including three firing lines and target boards. Concrete walkways, a small wooden shack, and wooden stands were also observed at the Small Arms Range (see Figure 5.11-2 and Figure 5.11-3). The wooden stands were likely used as tree stands to shoot at the targets. However, it is not known if the tree stands were used for pistol shooting, bow shooting, or both.



**Figure 5.11-2: Wooden shack observed at northwestern end of Small Arms Range**



**Figure 5.11-3: Wooden stands observed behind the shack at the Small Arms Range**

There were no physical indications of MEC observed during the inspection of the Small Arms Range. Since only small arms were used at the Small Arms Range, MEC is not anticipated at the Small Arms Range. Although no munitions and/or ordnance items were observed on the surface of the areas walked during the survey, the possibility that MC may remain beneath the surface cannot be ruled out based on the use as a small arms range.

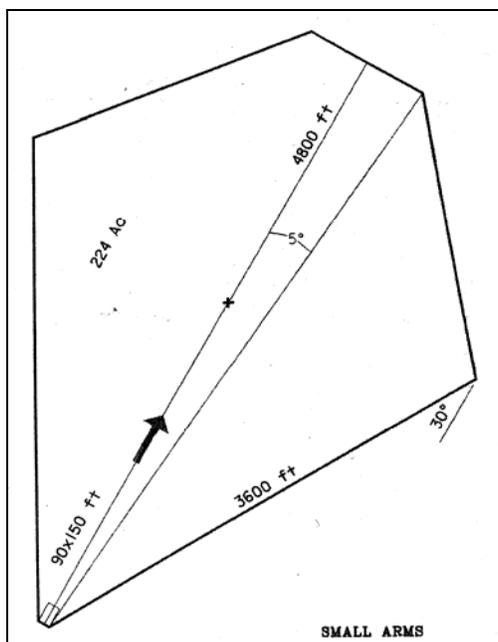
A visual depiction of the range reconnaissance is provided on Map 5.11-1 located at the end of Section 5.11. Additional range/site details are illustrated on Map 5.11-2 also located at the end of Section 5.11.

### ***5.11.3. Munitions and Munitions Related Materials Associated with the Site***

This section describes the munitions or munitions related materials known or suspected to be at the range, including the types and estimated maximum penetration depths. This includes both MEC and non-hazardous munitions related debris (e.g., fragmentation, base plates, inert mortar fins). Potential ordnance concentration areas are presented along with a discussion on the presence of any special consideration ordnance.

According to the Army Technical Manuals on small arms ranges (AR 750-10, TM 9-855), the maximum range for .22-cal is 4,500 feet with a muzzle velocity of 1,100 feet per second. The maximum range for .45-cal is 4,800 feet with a muzzle velocity of 802 feet per second. The SDZ for a .45-cal pistol range extends downrange from each end of each firing line at a 5° angle for

4,800 feet. An additional SDZ, also originating from end of each firing line, extends downrange at a 25° angle for 3,600 feet. An example of a typical SDZ for a pistol range is provided in Figure 5.11-4.



**Figure 5.11-4: SDZ for a typical .45-cal pistol range**

According to a 1991 memorandum regarding the Small Arms Range, the SDZ reportedly extends 6,234 feet from the firing line. From this information, ammunition fired at the Small Arms Range likely included .50-cal, which travels further than the typical .22-cal and .45-cal ammunition. The Stump Neck Annex property line lies approximately 900 feet from the firing line. The SDZ projects east of the installation boundary into the General Smallwood State Park. The SDZ for the Small Arms Range is shown on Map 5.11-2.

Detailed records of the types and quantities of small arms ammunition used at the Small Arms Range were not available. However, the following small arms ammunition were likely used at the Small Arms Range: .22-cal, 9-mm, .45-cal, and .50-cal. Technical data sheets for small caliber ammunition are provided in Appendix D.

Based on the information obtained during the data collection process, the Small Arms Range is not suspected to contain CWM filled munitions, electrically fuzed munitions, or DU associated munitions.

**5.11.4. MEC Presence**

The entire range has been subdivided into one of three levels of MEC presence including: known MEC areas, suspected MEC areas, and areas where no evidence exists to indicate that MEC are known or are suspected to be at the range. The MEC presence is discussed below.

Map 5.11-3 illustrates the munitions characterization of the Small Arms Range and is provided at the end of Section 5.11.

**5.11.4.1. Known MEC Areas**

Based on historical documents and information obtained during the data collection process, there is no evidence of MEC at the Small Arms Range, as only small arms were used. Therefore, there are no known MEC areas.

**5.11.4.2. Suspected MEC Areas**

Based on historical documents and information obtained during the data collection process, there is no evidence of MEC at the Small Arms Range, as only small arms were used. Therefore, there are no suspected MEC areas.

**5.11.4.3. Areas Not Suspected to Contain MEC**

Based on historical documents and information obtained during the data collection process, there is no evidence of MEC at the Small Arms Range, as only small arms were used. Therefore, the entire Small Arms Range is not suspected to contain MEC.

**5.11.5. Ordnance Penetration Estimates**

The depth to which munitions penetrate below the ground surface depends on many factors, including the type of soil, the angle of impact, the size of the munitions, the velocity at impact, and range-specific environmental conditions.

For small arms ranges, the Interstate Technology and Regulatory Council (ITRC) has prepared a document titled, "Characterization and Remediation of Soils at Closed Small Arms Firing Ranges" (January 2003), to provide information on the general layout of small arms ranges, as

well as information on areas that may be impacted with MC and/or MEC as a result of range use and the characteristics of the munitions used. According to the ITRC guidance, the penetration depth of small arms on the range floor is one foot or less. The document states that rounds that impact the range floor are typically a flat trajectory that fell short of or missed the target or those resulting from ricochet, and these fragments are usually found within the top six inches of soil. Penetration depths within the side of the hill may vary depending on the soil type and other conditions but are expected to be up to one foot or more.

#### ***5.11.6. Munitions Constituents***

For small arms, the primary MC of concern is lead from bullets. Other associated MC less likely to be of concern may include antimony, arsenic, copper, magnesium, nickel, strontium, tin, zinc, and lead styphnate/lead azide. These items are not consumed when the munitions items function as they are designed. Therefore, the potential exists for these constituents to reside in the surface soils at the Small Arms Range.

#### ***5.11.7. Contaminant Migration Routes***

Contaminants at the Small Arms Range may potentially migrate within the soil, groundwater, surface water and sediment. Direct human or biota contact with surficial soil is considered the most likely exposure scenario. An unnamed tributary creek is located near the western boundary of the Small Arms Range, which represents a primary source medium for MC. MC could potentially infiltrate from the surface soils to subsurface soils or groundwater. Based on a review of hydrogeological data, it is unlikely that MC in shallow groundwater would migrate to the deeper aquifers that are used as a water supply. However, shallow groundwater is still considered a potential exposure media. MC in surface soils may also migrate via plant/animal uptake.

#### ***5.11.8. Receptors***

Potential human receptors include authorized Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users and trespassers. Plant and animal biota are also potential receptors. Examples of ecological receptors include deer, wild turkey, and waterfowl.

**5.11.8.1. Nearby Populations**

Nearby populations are as discussed in Section 5.1.8.1.

**5.11.8.2. Buildings Near/Within Site**

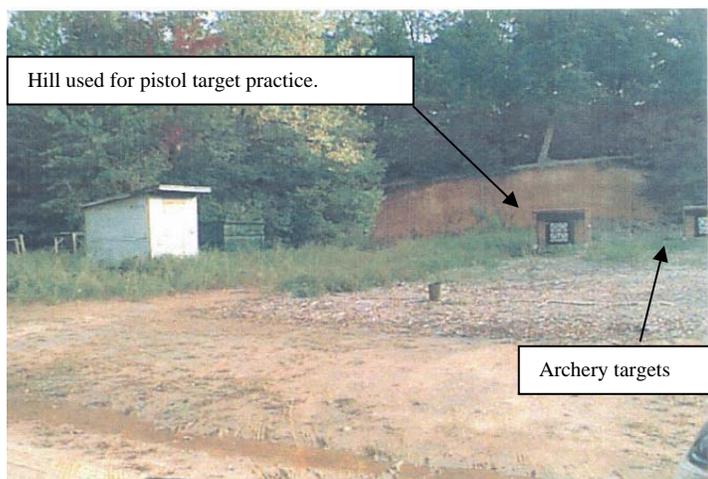
A wooden shack, which possibly was used for the storage of targets and ammunition, is located in the northwestern portion of the Small Arms Range. Structures located near the Small Arms Range include facilities in General Smallwood State Park, located approximately 800 feet to the southwest of the Small Arms Range. There are also installation buildings located approximately 1,200 feet to the west and north of the Small Arms Range.

**5.11.8.3. Utilities On/Near Site**

Based on the Stump Neck GIS utility mapping, no utilities exist at the Small Arms Range.

**5.11.9. Land Use**

The Small Arms Range was used for pistol training and qualifying activities by the facility's Security Department until 1991. Subsequently, the range was used for bow qualification. It is not known when bow qualification was discontinued at the Small Arms Range. However, the Small Arms Range is currently not used. The range is covered with high grass and surrounded by trees on the northern edge (Figure 5.11-5). Open fields, trees, grass, and an access road surround the range. The area to the east and south of the Small Arms Range is General Smallwood State Park. Rum Point Road runs along the west of the range. The Rum Point Skeet Range is north of the Small Arms Range.



**Figure 5.11-5: Hill used for target practice and archery targets**

**5.11.10. Access Controls / Restrictions**

No public access is authorized at NDW, Indian Head. Signs, partial fencing, locked/secured gates, login book/office check-in, and vehicle security patrol are used to control the entire facility. The Small Arms Range is located outside of the complex along Rum Point Road. A locked gate prevents access to the Small Arms Range; however, the area is not guarded. There are no known land use/development restrictions for the range.

**5.11.11. Conceptual Site Model**

A general description of the CSM is provided in Section 5.1.11. The CSM is presented in a series of information profiles that presents information about the range. The information profiles are included in Table 5.11-1 below.

Table 5.11-1: Conceptual Site Model Information Profiles – SMALL ARMS RANGE		
Profile Type	Information Needs	Preliminary Assessment Findings
Range/Site Profile	Installation Name	NDW, Indian Head
	Installation Location	Indian Head, Charles County, Maryland
	Range/Site Name	Small Arms Range (Pistol Range)
	Range/Site Location	The Small Arms Range is located on the eastern-most portion of the Stump Neck Annex peninsula.
	Range/Site History	The Small Arms Range was used as a training and qualifying area for handling small arms from the mid 1980s to 1991. Based on historical maps, the area was undeveloped and unused prior to the mid 1980s. After the Small Arms Range was closed, the area was reportedly used as an area to deposit silver-contaminated soils from the X-Ray facility (Building 731 on the main installation). The range was also used for bow qualification. The range is currently an unused open field.
	Range/Site Area and Layout	The Small Arms Range is 2.41-acres. There is a firing line with north-south orientation. The targets were placed along a hillside on the east side of the range.
	Range/Site Structures	A wooden shack is located in the northwest end of the Small Arms Range.

Table 5.11-1: Conceptual Site Model Information Profiles – SMALL ARMS RANGE		
Profile Type	Information Needs	Preliminary Assessment Findings
	Range/Site Boundaries	N: Rum Point Skeet Range S: General Smallwood State Park W: Rum Point Road E: General Smallwood State Park
	Range/Site Security	No public access is authorized at the Stump Neck Annex. Signs, partial fencing, locked/secured gates, login book/office check-in, and vehicle security patrol are utilized for the entire facility at the Stump Neck Annex. A locked gate prevents access to the Small Arms Range; however, the area is not guarded.
Munitions/ Release Profile	Munitions Types	Small arms pistol (.22-cal, 9-mm, .45-cal, .50-cal)
	Maximum Probability Penetration Depth	Less than one foot.
	MEC Density	None
	Munitions Debris	None
	Associated Munitions Constituents	Primary MC of concern is lead from bullets. Other associated MC less likely to be of concern may include antimony, arsenic, copper, magnesium, nickel, strontium, tin, zinc, and lead styphnate/lead azide.
	Migration Routes/Release Mechanisms	Soil surface runoff; groundwater discharge; range maintenance; construction; excavation
Physical Profile	Climate	Indian Head, Maryland has a continental-type climate with four well-defined seasons. The coldest period occurs in late January and early February, with low temperatures averaging at 29°F. July is the warmest month with average maximum temperatures of 85°F. The normal annual precipitation is approximately 44 inches, with normal monthly precipitation varying from 2.25 (February) to 4.60 (August) inches.
	Topography	The range area is relatively flat; a hill is located on the eastern side of the range.

Table 5.11-1: Conceptual Site Model Information Profiles – SMALL ARMS RANGE		
Profile Type	Information Needs	Preliminary Assessment Findings
	Geology	Indian Head and Stump Neck lie within the Atlantic Coastal plain physiographic province. The geology of the area is comprised of Precambrian igneous and metamorphic bedrock overlain by 500 to 600 feet of unconsolidated fluvial and marine deposits of the Potomac Group. The Potomac Group consists of, in descending order, the Patapsco, Arundel, and Patuxent Formations
	Soil	Moderately eroded Beltsville silt loam with two to five percent slope and Aura gravelly loam with ten to 15 percent slope.
	Hydrogeology	The hydrogeological makeup of the Indian Head, Maryland area consists of a surficial aquifer and several deeper confined and semi-confined aquifers in the Patapsco and Patuxent Formations. The surficial aquifer is expected to be connected to and influenced by the surface water bodies. Regional water supplies, including that of NDW, Indian Head, are obtained from the lower and middle sands of the Patapsco and Patuxent Formations of the Potomac Group. The surficial aquifer (i.e., water table) is not used for water supply at NDW, Indian Head.
	Hydrology	The closest water body to the Small Arms Range is an unnamed tributary creek along the western boundary of the range. Surface water runoff likely follows topography at the Small Arms Range. There are no known wetlands at the Small Arms Range.
	Vegetation	Grasses and hardwood species
<b>Land Use and Exposure Profile</b>	Current Land Use	The Small Arms Range is currently an undeveloped open field and is not used.
	Current Human Receptors	Navy personnel (military and civilian), visitors, contractors, maintenance workers, and trespassers.
	Current Activities (frequency, nature of activity)	Infrequent activity – the Small Arms Range is not used.
	Potential Future Land Use	No future changes in the land use are anticipated.

Table 5.11-1: Conceptual Site Model Information Profiles – SMALL ARMS RANGE		
Profile Type	Information Needs	Preliminary Assessment Findings
	Potential Future Human Receptors	Navy personnel (military and civilian), visitors, trespassers, contractors, construction workers (if intrusive work is necessary) and maintenance and operations workers, as well as recreational users (hunters).
	Potential Future Land Use-Related Activities:	Infrequent activity – There are no reported future plans for the Small Arms Range.
	Zoning/Land Use Restrictions	None
	Demographics/Zoning	Charles County population density is approximately 260 persons per square mile. NDW, Indian Head and its tenant commands employ approximately 3,600 military and civilian personnel.
	Beneficial Resources	None
<b>Ecological Profile</b>	Habitat Type	Open grasslands and hardwood forest
	Degree of Disturbance	Low disturbance: habitat and species present are/will be undisturbed.
	Ecological Receptors	
	Federal Endangered Species:	American bald eagle, rainbow snake, and the joint-vetch
	Federal Threatened Species:	None
	State Endangered Species:	Scaly blazing-star
	State Threatened Species:	None
	Other Ecological Receptors:	Other ecological receptors include numerous species of birds, reptiles and mammals such as the white tailed deer, wild turkey, the red-bellied woodpecker and the eastern box turtle.
Relationship of MEC/MC Sources to Habitat and Potential Receptors	It is not anticipated that receptors would come into direct contact with MEC because munitions use at the range was limited to small arms ammunitions. Receptors may have direct or indirect contact with MC that exist in the environment or have been incorporated into the food chain.	

A general description of the CSM exposure pathway analysis is included in Section 5.1.11.

For the Small Arms Range, historic and visual evidence indicate that MEC are not present. Therefore, no complete exposure pathways exist for MEC. As such, no exposure pathway analysis was completed for MEC. MC may be present; therefore, potential MC exposure pathways do exist. As illustrated in Figure 5.11-6, soil and surface water/sediments impacted by MC represent a primary source medium. All human and ecological receptors have potentially complete exposure pathways for direct contact with MC in surface soil, which includes dermal contact, ingestion, and inhalation (dust). Runoff, discharges, and/or erosion may transport the MC from surface soil to surface water/sediments. There is a small tributary on the western edge of the Small Arms Range, so potentially complete pathways exist for all human and ecological receptors of surface water/sediments. The Small Arms Range is located within an upland hunting area. Human and ecological receptors have potentially complete pathways by ingesting game/prey that has previously consumed contaminated vegetation or prey. Precipitation infiltration and leaching may provide for lead and copper mobility into the subsurface soils and shallow groundwater. Potentially complete exposure pathways exist for MC in subsurface soils (direct contact, ingestion and inhalation during intrusive work activities) for all human and ecological receptors with the exception of trespassers. It is not anticipated that trespassers would come in contact with subsurface soils. Although confining layers are expected to prevent the migration of MC to the lower aquifers used for water supply, potentially complete pathways exist for MC in shallow groundwater for human receptors.

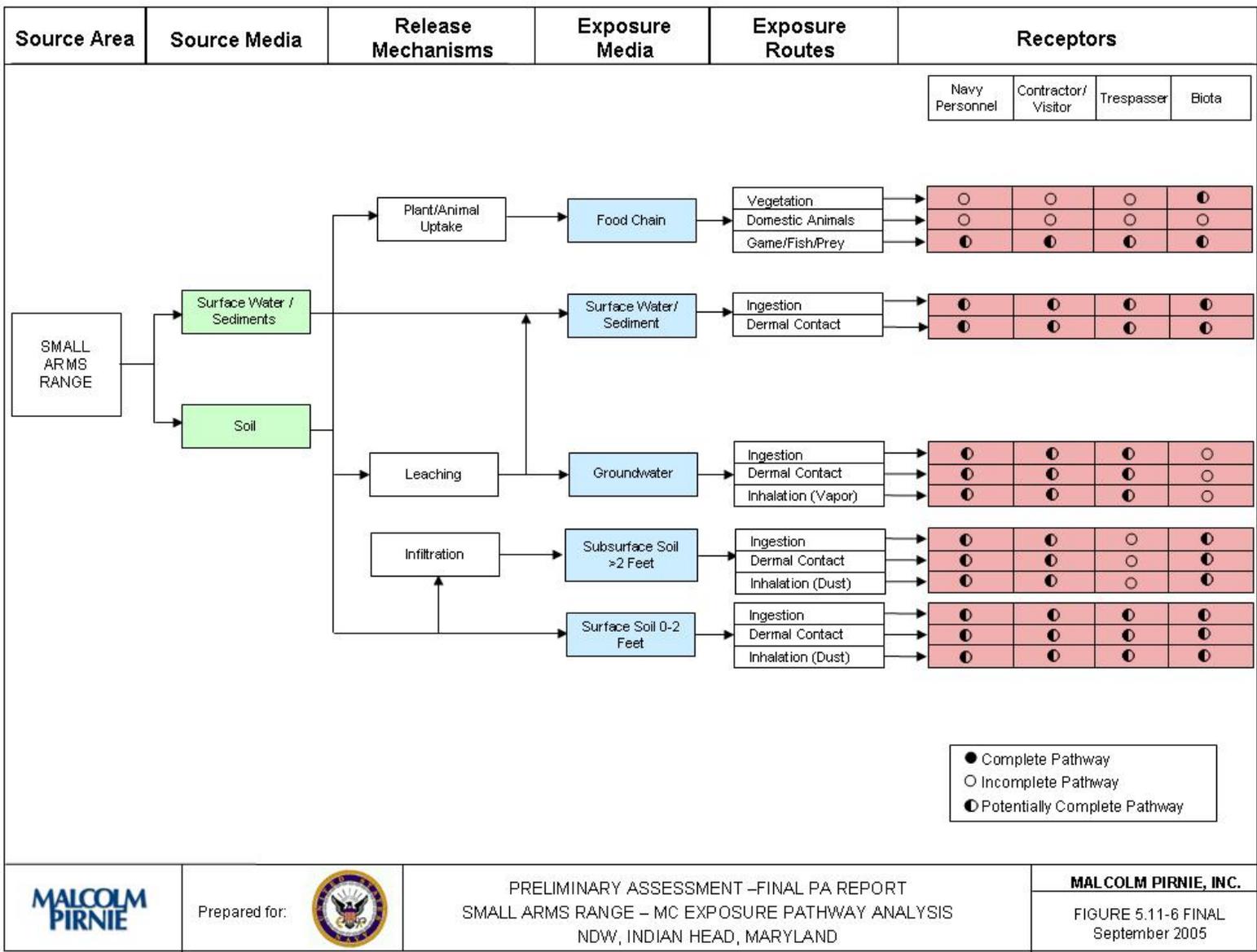


Figure 5.11-6: MC Exposure Pathway Analysis



Prepared for:



PRELIMINARY ASSESSMENT –FINAL PA REPORT  
SMALL ARMS RANGE – MC EXPOSURE PATHWAY ANALYSIS  
NDW, INDIAN HEAD, MARYLAND

MALCOLM PIRNIE, INC.

FIGURE 5.11-6 FINAL  
September 2005

**5.11.12. Summary**

The Small Arms Range is a 2.4-acre range located in the eastern portion of the Stump Neck Annex. The Small Arms Range is a former training area where small caliber ammunition (.22-cal, 9-mm, and .45-cal) were used. The primary MC of concern, given the nature of use, is lead from bullets. Other MC may include antimony, copper, arsenic, magnesium, nickel, strontium, tin, zinc, and lead styphnate/lead azide. The combination of MC presence, access to the area, and migration pathways indicate that potentially complete MC exposure pathways exist. Since only small arms, which are not classified as MEC, are expected to have been used at the Small Arms Range, no MEC are expected to be present at the Small Arms Range.

**Map 5.11-1: Visual Survey: Small Arms (Pistol) Range**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.11-2: Range/Site Details: Small Arms (Pistol) Range**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.11-3: Munitions Characterization: Small Arms (Pistol) Range**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

## 5.12. STUMP NECK IMPACT AREA

### 5.12.1. *History and Site Description*

The Stump Neck Impact Area is a 32.88-acre range located in the central portion of Stump Neck Annex. The range was initially identified as SWMU #23 in the 1983 Initial Assessment Study and in a 1990 draft RCRA Facilities Assessment (RFA). The range has since been identified as IR Site #30. Sources indicate the area was once a target/impact area for several firing activities. The Navy Range Inventory database states that Naval gun testing fire originating from The Valley, now known as Indian Head Main Installation, occurred from January 24, 1891 to July 21, 1921. The firing point was located on the northern side of The Valley, where long-range guns (1-inch to 16-inch) were fired south toward primary impact areas at Stump Neck Annex and the Potomac River. By 1924, Headquarters U.S. Marine Corps (HQMC) tried to secure permission to fire 75-mm guns from Quantico across the Potomac to Stump Neck Annex. The status of the request is unknown. In 1931, another request was made, and permission granted to fire 75-mm guns and howitzers at Stump Neck from a firing point in the vicinity of Rum Point. This



**Figure 5.12-1: Crater formations appear as dots in the impact area on this aerial photograph.**

arrangement lasted until about 1934. Another request was made and approved that same year to fire 75-mm pack howitzer, 75-mm guns, 155-mm guns, and the 37-mm or Naval one-pounder, sub caliber for the 6-inch Navy gun. It is unknown when this arrangement expired. Aerial photography, such as that shown in Figure 5.12-1 depicting several impact craters in what is believed to be the impact area, corroborates such firing activities. It is unclear which activities in particular created the craters. Other sources indicate that rockets may have also been fired into the impact area until about 1947, but the duration of this activity and the location of the firing point are not known. Furthermore, based on discussions with retired EOD personnel (Mr. Miller) and historical correspondence provided by a Navy Historian (Mr. Dolph), it is believed that a variety of other training activities, including land surface demolition testing and underwater testing (prior to construction of the Area 8 Pond), may have occurred in what is believed to be the impact area. However, no physical or historical evidence has been discovered to support those assertions.

#### 5.12.1.1. Topography

Section 3.2 provides a general description of topography for the Stump Neck Annex. The impact area is a wetland surface comprised of scattered vegetation, tidal pools and marsh. Surrounding hydrologic features and drain patterns suggest a slight slope from north to south.

#### 5.12.1.2. Geology

Section 3.3 provides a geologic description for Indian Head and the Stump Neck Annex. This general description is applicable to the Stump Neck Impact Area.

#### 5.12.1.3. Soil and Vegetation Types

Section 3.4 provides a description of the soil and vegetation types at Indian Head and the Stump Neck Annex. According to the Soil Survey of Charles County, the soil at the Stump Neck Impact Area is classified as tidal marsh. The vegetation at the Stump Neck Impact Area is characterized by heavy shrubs and small trees. This range is classified by the installation as Palustrine emergent/broad-leaved



**Figure 5.12-2: Vegetation at the Stump Neck Impact Area (looking west from Roach Road)**

deciduous scrub-shrub wetland. Hardwood forests surround the range. Figure 5.12-2 illustrates the vegetation at the Stump Neck Impact Area.

#### **5.12.1.4. Hydrology**

Section 3.5 provides a description of hydrology at the Stump Neck Annex. The Chicamuxen Creek surrounds the Stump Neck Impact Area. The area is dotted with small pools of standing water and small streams that weave through the marsh (Figure 5.12-3). The percentage of surface water coverage and level of ground saturation will vary with the tidal flow, seasonal climates, and rainfall. Water that does not percolate to groundwater will drain into the Chicamuxen Creek and eventually reach the Potomac River.



**Figure 5.12-3: Wetlands at the Stump Neck Impact Area**

#### **5.12.1.5. Hydrogeology**

Section 3.6 provides a description of hydrogeology at the Stump Neck Annex. This information is applicable to the Stump Neck Impact Area.

#### **5.12.1.6. Cultural and Natural Resources**

General cultural and natural resources for the Stump Neck Annex are provided in Section 3.7. The Stump Neck Impact Area is within an eagle protection area and a wildlife protection area. According to the 1996 Phase I Cultural Resources Survey of Stump Neck Annex there are no archeological/cultural sites within the Stump Neck Impact Area.

#### **5.12.1.7. Endangered and Special Status Species**

As discussed in Section 3.8, endangered and special status species are reported to exist at the Stump Neck Annex. The reported endangered and special status species have the potential to inhabit the Stump Neck Impact Area.

### ***5.12.2. Visual Survey Observations and Results***

A visual survey of the Stump Neck Impact Area took place June 24, 2003. Malcolm Pirnie personnel who conducted the visual survey included Mr. Dinh, Mr. Egholm, Ms. Tegtmeyer, Ms. Grim, Mr. Rice, Mr. Hains, Mr. Wiley, Mr. Baker, and Mr. McManus. Mr. Jorgensen and Ms.



**Figure 5.12-4: Heavy shrubs observed from the periphery of the impact area**

Morgan NDW, Indian Head Environmental Office, accompanied the team. The visual survey was conducted from peripheral locations to the north and east of the impact area. The survey team was unable to conduct a full visual survey due to the water barriers and the protected status of the wetland. The visual survey covered approximately 25% of the site. Heavy shrubs covered the marshy ground (Figure 5.12-4). No evidence of MEC/MC was observed during the survey, nor are there any reported sightings in the historical record. No geophysical inspection of the range has been completed to date.

Additional range details are provided on Map 5.12-1 located at the end of Section 5.12.

### ***5.12.3. Munitions and Munitions Related Materials Associated with the Site***

This section describes the munitions or munitions related materials known or suspected to be at the range. This includes both MEC and non-hazardous munitions related debris (e.g., fragmentation, base plates, inert mortar fins). Historical documentation asserts that rockets and various calibers of guns (1-inch through 16-inch) were proved at The Valley, and that several

other projectiles ranging from 75-mm to 155-mm were fired from Quantico. These projectiles contained different types of high explosives and explosive fillers including black powder, smokeless powder, brown prismatic powder, emmensite, joveite, wet gun cotton, and randite. No physical evidence of MEC/MC was observed at this area. Based on the information obtained during the data collection process, the Stump Neck Impact Area is not suspected to contain CWM filled munitions, electrically fuzed munitions, or DU associated munitions.

Refer to Section 5.7 in the Final PA Report for the Main Installation, Indian Head for information on The Valley. Information on The Valley is also provided in the current PA report under Section 5.15, The Valley Impact Area.

#### ***5.12.4. MEC Presence***

The entire range has been subdivided and categorized into one of three levels of MEC presence including: known MEC areas, suspected MEC areas, and areas where no evidence exists to indicate that MEC are known or are suspected to be at the range. The MEC presence is discussed below.

Map 5.12-2 illustrates the munitions characterization of the Stump Neck Impact Area and is provided at the end of Section 5.12.

##### **5.12.4.1. Known MEC Areas**

According to historical documents and information obtained during the data collection process, there are no known MEC areas at the Stump Neck Impact Area.

##### **5.12.4.2. Suspected MEC Areas**

The entire Stump Neck Impact Area is considered a suspect MEC area; however, the potential relative concentration or density of MEC is not known.

##### **5.12.4.3. Areas Not Suspected to Contain MEC**

According to historical documents and information obtained during the data collection process, there is evidence of the presence of MEC at the Stump Neck Impact Area. Therefore, there are no areas at the Stump Neck Impact Area that are not suspected to contain MEC.

### ***5.12.5. Ordnance Penetration Estimates***

The depth to which munitions penetrate below the ground surface depends on many factors, including the type of soil, the angle of impact, the size of the munitions, the velocity at impact, and range-specific environmental conditions. Estimated penetration depths for the munitions believed fired into the impact area range from four to 12 feet.

The Stump Neck Impact Area is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Range. The ordnance penetration depth associated with munitions fired from The Valley is provided in Section 5.15.5.

### ***5.12.6. Munitions Constituents***

No surface or subsurface sampling has been conducted at the Stump Neck Impact Area to determine what specific MC may be present at the range. Potential MC could include metals, various explosives, and various chemicals associated with pyrotechnics, such as perchlorate and propellants. A partial list of known explosives tested in The Valley was documented and is provided below:

- 1894 Annual Report - Powder expended during testing: 56,981 pounds
- 1897 Annual Report - Powder expended during testing: 50,000 pounds, including:
  - Wet gun cotton: 47 pounds
  - Shell powder: 220.25 pounds
  - Randite: 4 pounds and 3.2 ounces
  - Joveite: 10.75 pounds
  - Picric acid: 2 pounds
- 1901 Annual Report - Powder: 46 pounds
- 1901 Annual Report - Powder: 350 pounds
- 1919 Annual Report - Smokeless powder: 831, 033 pounds
- 1920 Annual Report - Smokeless powder: 419,607 pounds

Some MC that are commonly found in 75-mm, 37-mm, and 155-mm ammunition are listed below:

- TNT
- HMX

- Composition B
- Composition D
- Perchlorate

The relative concentration of these MC is not known, but it is not anticipated to exceed 10% concentration in soil. No MC were observed during the visual survey.

#### ***5.12.7. Contaminant Migration Routes***

Contaminants at the Stump Neck Impact Area may potentially migrate within the soil, groundwater, surface water and sediment. Due to the high erodability of the soils at the Stump Neck Area, contaminants may become mobile within the surface soil, particularly during extended periods of rainfall and during high tide. MC in the surface water may eventually reach the Potomac River. Contaminants on-range can potentially migrate to shallow groundwater through infiltration. The top of the aquifer is at a depth just below the land surface within the boundaries of Stump Neck Impact Area. Based on a review of hydrogeological data, it is unlikely that MC in shallow groundwater would migrate to the deeper aquifers that are used as a water supply. However, shallow groundwater is still considered a potential exposure media.

#### ***5.12.8. Receptors***

Potential human receptors include authorized Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users and trespassers. Plant and animal biota are also potential receptors. Examples of ecological receptors include deer, wild turkey, and waterfowl.

##### **5.12.8.1. Nearby Populations**

Nearby populations are as discussed in Section 5.1.8.1. The Stump Neck Impact Area overlaps a wildlife protection area.

##### **5.12.8.2. Buildings Near/Within Site**

There are no buildings in close proximity to the Stump Neck Impact Area. There is no evidence of any preexisting structure at the range.

### **5.12.8.3. Utilities On/Near Site**

There is no evidence of utilities in use in the Stump Neck Impact Area.

### **5.12.9. Land Use**

There is no additional information about this range's land use other than as an impact area and munitions testing area. According to the installation, there are no planned future activities at the range.

### **5.12.10. Access Controls / Restrictions**

No public access is authorized to the Stump Neck Annex. Signs, partial fencing, locked/secured gates, login book/office check-in, and vehicle security patrol are used to control the entire facility. There are no access control features specific to the Stump Neck Impact Area. Access from the water is not controlled.

The wetlands are protected under Executive Order 11990, which prohibits construction in a wetland area unless there is no practicable alternative and all possible measures are taken to minimize the environmental impacts. Wetlands are also protected under Section 404 of the Clean Water Act, which requires a permit to be obtained from the USACE before any work in a wetland can commence. The wetland associated with this range is categorized as Palustrine emergent/broad-leaved deciduous scrub-shrub wetland. Hunting is permitted within this region by permission only after December 15.

According to the Soil Survey of Charles County, many of the soil types on Stump Neck and Indian Head have load bearing capacity limitations as a result of high water tables and extreme erodability conditions. Based on this information, the installation has limited construction and the use of septic systems in specific areas of concern. The Stump Neck Impact Area is located in a region that contains hydric soils where septic systems are prohibited.

**5.12.11. Conceptual Site Model**

A general description of the CSM is provided in Section 5.1.11. The CSM is presented in a series of information profiles that presents information about the range. The information profiles are included in Table 5.12-1 below.

<b>Table 5.12-1: Conceptual Site Model Information Profiles – STUMP NECK IMPACT AREA</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
	Installation Name	NDW, Indian Head
	Installation Location	Indian Head, Charles County, Maryland
	Range/Site Name	Stump Neck Impact Area
	Range/Site Location	Located in the central portion of Stump Neck Annex. The range is situated south of Archer Avenue, west of Roach Road and north of Chicamuxen Creek.
	Range/Site History	A target/impact area for Naval gun testing fire originating from The Valley (January 24, 1891 to July 21, 1921), as well as Naval gun fire and artillery from Quantico (1931 through at least 1934); suspected land and underwater demolitions testing.
	Range/Site Area and Layout	The Stump Neck Impact Area is about 32.88 acres. The area is dotted with small pits that are believed to be impact craters. The Chicamuxen Creek surrounds the impact area.
	Range/Site Structures	There are no structures on or in close proximity to the impact area.
	Range/Site Boundaries	N: Wooded area (Torpedo Burial Site) and then Archer Avenue S: Chicamuxen Creek W: Chicamuxen Creek E: Chicamuxen Creek and then Roach Road
	Range/Site Security	Security for the entire Stump Neck Annex includes partial fencing, lock/secured gates and security patrol. There are no specific access controls or restrictions for the Stump Neck Impact Area.

Table 5.12-1: Conceptual Site Model Information Profiles – STUMP NECK IMPACT AREA		
Profile Type	Information Needs	Preliminary Assessment Findings
Munitions/ Release Profile	Munitions Types	Rockets and various projectiles, associated with 1", 3", 4", 5", 6", 7", 8", 10", 12" and 14" guns, (1891-1921); 155-mm, 37-mm, 75-mm and one-pounder, subcaliber for the 6-inch Navy gun (1931 through at least 1934). Refer to Section 5.15 on munitions types associated with The Valley.
	Maximum Probability Penetration Depth	The estimated penetration depth is four to 12 feet. Ordnance penetration depths for munitions fired from The Valley can be found in Section 5.15.5.
	MEC Density	This is a suspected MEC Area. No MEC have been found or reported.
	Munitions Debris	None
	Associated Munitions Constituents	Sampling data not available. Potential for MC include TNT, HMX, Composition B and D, perchlorate and other explosives such as black powder, smokeless powder, brown prismatic powder, emmensite, joveite, wet gun cotton, and randite.
	Migration Routes/Release Mechanisms	Soil surface runoff; groundwater discharge; range maintenance; construction; excavation
Physical Profile	Climate	Indian Head, Maryland has a continental-type climate with four well-defined seasons. The coldest period occurs in late January and early February, with low temperatures averaging at 29°F. July is the warmest month with average maximum temperatures of 85°F. The normal annual precipitation is approximately 44 inches, with normal monthly precipitation varying from 2.25 (February) to 4.60 (August) inches.
	Topography	The topography of the Stump Neck Impact Area is a wetland surface comprised of scattered vegetation, tidal pools and marsh. Surrounding hydrologic features and drain patterns suggest a slight slope from north to south. The area is dotted with what are believed to be impact craters.

<b>Table 5.12-1: Conceptual Site Model Information Profiles – STUMP NECK IMPACT AREA</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
	Geology	Indian Head and Stump Neck lie within the Atlantic Coastal plain physiographic province. The geology of the area is comprised of Precambrian igneous and metamorphic bedrock overlain by 500 to 600 feet of unconsolidated fluvial and marine deposits of the Potomac Group. The Potomac Group consists of, in descending order, the Patapsco, Arundel, and Patuxent Formations.
	Soil	The soil at the Stump Neck Impact Area is classified as tidal marsh.
	Hydrogeology	The hydrogeological makeup of the Indian Head, Maryland area consists of a surficial aquifer and several deeper confined and semi-confined aquifers in the Patapsco and Patuxent Formations. The surficial aquifer is expected to be connected to and influenced by the surface water bodies. Regional water supplies, including that of NDW, Indian Head, are obtained from the lower and middle sands of the Patapsco and Patuxent Formations of the Potomac Group. The surficial aquifer (i.e., water table) is not used for water supply at NDW, Indian Head.
	Hydrology	The area is wetland. Surface water flows with the tide, making its way into the Chicamuxen Creek, and, eventually, into the Potomac River.
	Vegetation	The range contains some heavy shrubs and is surrounded by hardwood forests.
<b>Land Use and Exposure Profile</b>	Current Land Use	The land is not currently used for any formal purpose. Recreational activities do occur on a permit basis.
	Current Human Receptors	Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users, and trespassers.
	Current Activities (frequency, nature of activity)	Minimal activity on range and possibly environmental, ecological, and/or cultural surveys, hunting and other outdoor recreational activities.
	Potential Future Land Use	No future change in land use is anticipated.

<b>Table 5.12-1: Conceptual Site Model Information Profiles – STUMP NECK IMPACT AREA</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
	Potential Future Human Receptors	Navy personnel (military and civilian), visitors, trespassers, contractors, construction workers (if intrusive work is necessary) and maintenance and operations workers as well as recreational users
	Potential Future Land Use-Related Activities:	There is no anticipated change in land use or related activities
	Zoning/Land Use Restrictions	The range is partially located within an eagle protection area. Construction is restricted. Septic tank installation is restricted without a permit.
	Demographics/Zoning	Charles County population density is approximately 260 persons per square mile, while NDW, Indian Head and its tenant commands employ approximately 3,600 military and civilian personnel.
	Beneficial Resources	The area is a federally protected wetland.
<b>Ecological Profile</b>	Habitat Type	The habitats within and around the impact area include wetlands, grasses, mature forest and successional forest.
	Degree of Disturbance	Low: The range is currently not maintained and not used for any purpose other than recreational activities.
	Ecological Receptors	
	Federal Endangered Species:	American bald eagle, rainbow snake, sensitive joint-vetch
	Federal Threatened Species:	None
	State Endangered Species:	Scaly blazing-star
	State Threatened Species:	None
	Other Ecological Receptors:	Other ecological receptors include numerous species of birds, reptiles and mammals such as the white tailed deer, wild turkey, the red-bellied woodpecker and the eastern box turtle.
	Relationship of MEC/MC Sources to Habitat and Potential Receptors	Receptors may contact MEC in the subsurface soil. Receptors may have contact with MC directly through surface water/soil or indirectly through the food chain (bioaccumulated in plants and animals).

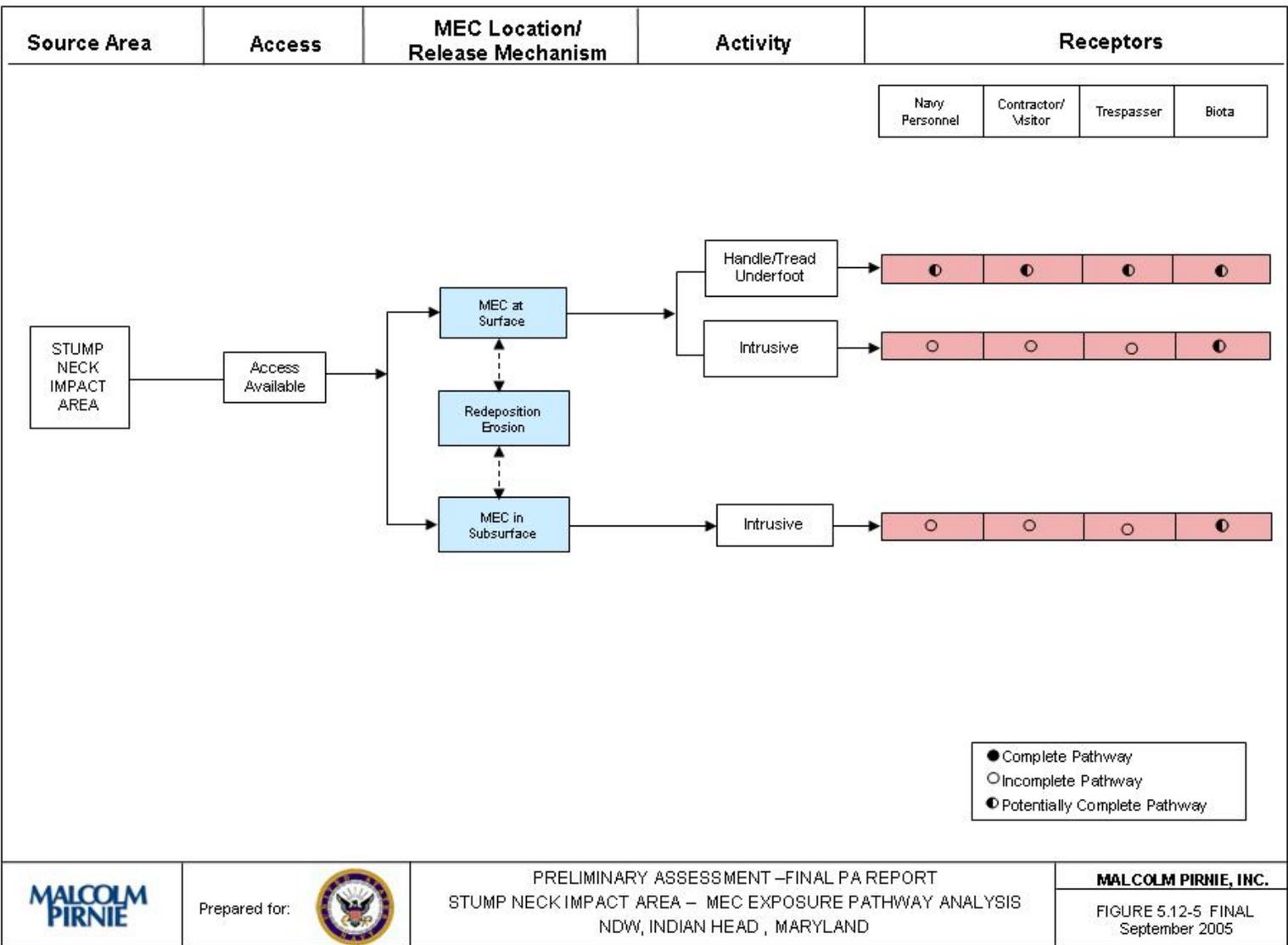
A general description of the CSM exposure pathway analysis is included in Section 5.1.11. The following CSM exposure pathways analysis focuses only on the Stump Neck Impact Area and

does not consider impacts from The Valley firing fan. For exposure pathway analysis for The Valley Impact Area, refer to Section 5.15.11.

Historical evidence indicates that MEC may be present at the range. As such, an Exposure Pathway Analysis Figure for MEC was created and is shown in Figure 5.12-5. A potentially complete pathway exists for all human and ecological receptors for hand/tread underfoot contact at the Stump Neck Impact Area. Wetland areas are protected against intrusive activities such as digging, excavation and construction. As such, there are no potentially complete pathways to MEC for intrusive work in the surface and subsurface for human receptors. Ecological receptors may come in contact with MEC through burrowing, nesting, or feeding activities that disturb surface soil. Trespassers are anticipated to be exposed to non-intrusive surface soil activities at the range, but it is unlikely they would be exposed to subsurface soil through intrusive activities.

Soil and surface water/sediments impacted by MC does represent a primary potential source medium, as illustrated in the Exposure Pathway Analysis Figure for MC, Figure 5.12-6. Exposures to surface soil, subsurface soil, and surface water/sediments containing MC may present potentially complete pathways for human and ecological receptors. All human and ecological receptors have potentially complete exposure pathways for direct contact with MC in surface soil, which includes dermal contact, ingestion, and inhalation (dust). Recreational fishing occurs in this area. Therefore, human and ecological receptors have potentially complete pathways by ingesting fish that have previously consumed contaminated vegetation or prey. Runoff, discharges, and/or erosion may transport the MC from surface soil to surface water/sediments. The Stump Neck Impact Area is a wetland area, so potentially complete pathways also exist for all human and ecological receptors of surface water/sediments. There is also the potential for the MC present in the surface water or soils to infiltrate to the subsurface. As construction or excavation is prohibited within the wetland areas, potentially complete exposure pathways do not exist for MC in subsurface soils for any human receptors. Although confining layers are expected to prevent the migration of MC to the lower aquifers used for water supply, potentially complete pathways exist for MC in shallow groundwater for human receptors.

Figure 5.12-5: MEC Exposure Pathway Analysis



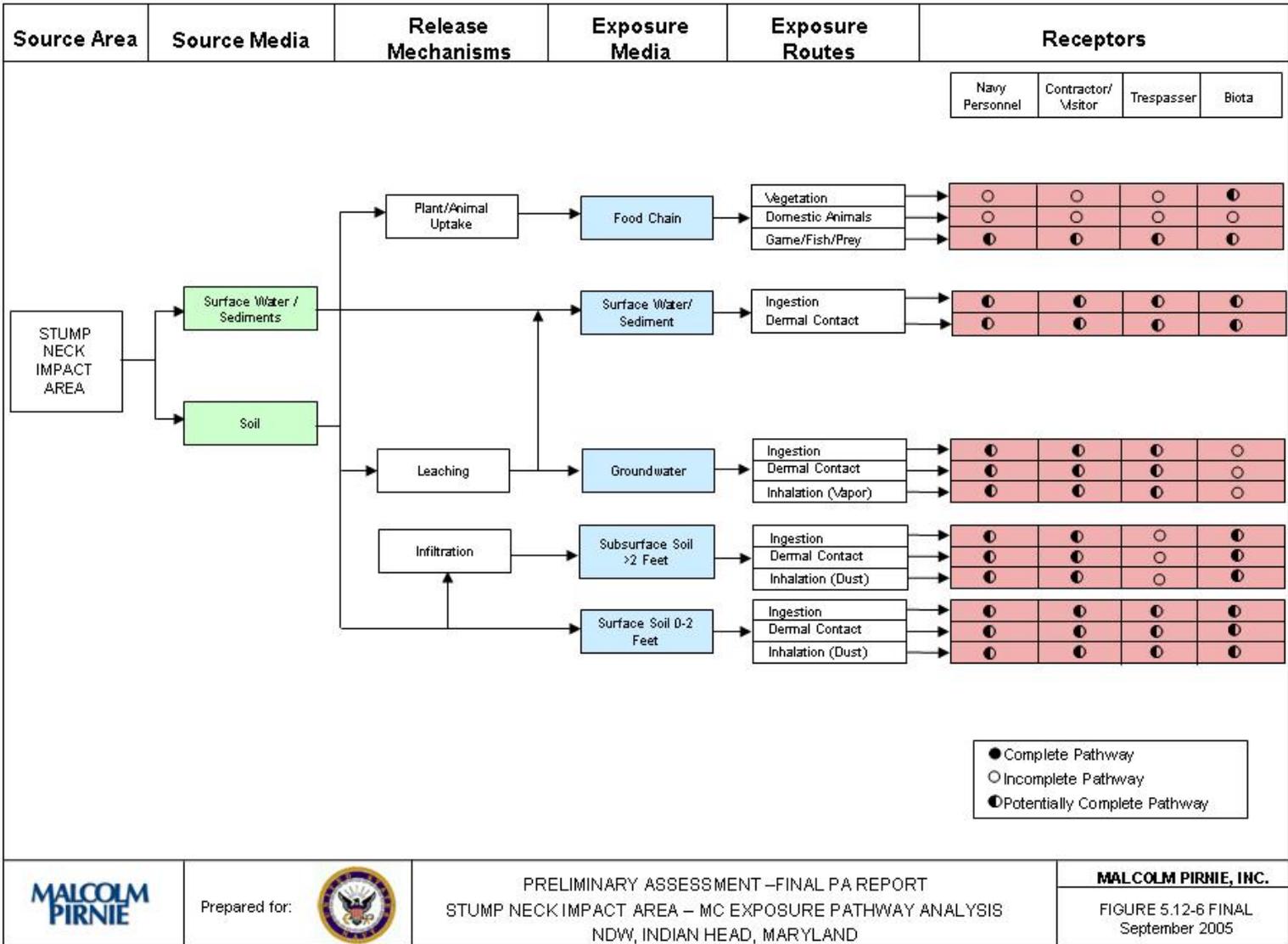


Figure 5.12-6: MC Exposure Pathway Analysis



Prepared for:

PRELIMINARY ASSESSMENT – FINAL PA REPORT  
STUMP NECK IMPACT AREA – MC EXPOSURE PATHWAY ANALYSIS  
NDW, INDIAN HEAD, MARYLAND

**MALCOLM PIRNIE, INC.**  
FIGURE 5.12-6 FINAL  
September 2005

*5.12.12. Summary*

The 32.88-acre Stump Neck Impact Area is located in the central region of Stump Neck Annex. The range is situated in the wetlands south of Archer Avenue, bordered by the Chicamuxen Creek on the south, east and west sides. The northern side is bordered by hardwood forest. The range was first identified in a 1983 Initial Assessment Study while the USEPA was preparing to issue a RCRA permit to the Navy for its facility on Stump Neck, and again during a 1990 RFA. Under a Federal Facility Agreement (FFA) between the USEPA and the Navy, the range (also known as IR Site #30) was proposed to undergo a Site Screening Process to determine if a remedial investigation, feasibility study, or no further action would be required. The results of the Site Screening Process are unknown. Sources indicate that this area was used as an impact area for Naval gun testing from the early 1890s to the early 1920s, an impact area for artillery and naval gun testing from MCB Quantico, and as a land and underwater demolitions testing area. Aerial photography depicting what is believed to be impact craters in the Stump Neck Impact Area supports the reported use of the range.

**Map 5.12-1: Range/Site Details: Stump Neck Impact Area**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.12-2: Munitions Characterization: Stump Neck Impact Area**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

## 5.13. TEST AREA 1

### 5.13.1. History and Site Description

Test Area 1, which comprises approximately 4.52 acres, is located near the center of the Stump Neck Annex peninsula. In the 1950s, the Naval Research Laboratory constructed a 220-foot by 263-foot “hole-in-the-ground” antenna at the range that was used in pioneer moon relay communication experiments. Figure 5.13-1 and Figure 5.13-2 show current conditions of Test Area 1. During the 1960s and 1970s, Test Area 1 was used for Advanced, Access, and Disablement (AA&D) trainings (such as booby traps and trip wires). In the 1980s, Test Area 1 was used for IED and IND training. All training items were inert; however, the devices were connected to working components that would set off small charges (a quarter pound block of TNT) located a short distance from the training item. The charges were sized for total consumption; however, it is possible that small amounts of residue may remain. From the 1990s to the present, Test Area 1 has been used primarily as an area for robotics testing.



**Figure 5.13-1: Antenna dish partially overgrown by vegetation**



**Figure 5.13-2: Test Area 1 is currently a wooden, overgrown area**

#### 5.13.1.1. Topography

Section 3.2 provides a general description of topography for the Stump Neck Annex. The antenna located at Test Area 1 is located within a man-made depression. The outer rim of the antenna is at a higher elevation (approximately 125 feet above msl) than the surrounding area and was likely built up with soil excavated during the antenna construction. The south side of Test Area 1 is naturally at higher elevation than the north side of Test Area 1.

#### **5.13.1.2. Geology**

Section 3.3 provides a geologic description for Indian Head and Stump Neck Annex, which is applicable to Test Area 1. There is no range-specific geology for Test Area 1.

#### **5.13.1.3. Soil and Vegetation Types**

Section 3.4 provides a description of the soil and vegetation types at Indian Head and the Stump Neck Annex. According to the Soil Survey of Charles County, the predominant soil type associated with Test Area 1 is moderately eroded, Beltsville silt loam with two to five percent slope. Test Area 1 is located within a hardwood forest area.

#### **5.13.1.4. Hydrology**

Section 3.5 provides a description of hydrology at Indian Head and the Stump Neck Annex. Test Area 1 is located near the center of the Stump Neck peninsula. The closest water body is the Mattawoman Creek, approximately 2,000 feet to the north. Surface water runoff likely follows topography at Test Area 1; however, since Test Area 1 is at a local high, it is not known in which direction surface water would flow. There are no known wetlands at Test Area 1.

#### **5.13.1.5. Hydrogeology**

Section 3.6 provides a description of hydrogeology for Indian Head and the Stump Neck Annex, which includes Test Area 1. It is assumed that shallow groundwater flow from Test Area 1 follows topography and is connected to the area's dominant surface water bodies (the Mattawoman Creek and Potomac River). However, since Test Area 1 is at a local high, it is not known in which direction groundwater would flow.

#### **5.13.1.6. Cultural and Natural Resources**

General cultural and natural resources for the Stump Neck Annex are provided in Section 3.7. According to the 1996 Phase I Cultural Resources Survey of Stump Neck Annex there are no archeological/cultural sites within Test Area 1. Several shovel test pits were taken on the site and all were found negative for artifacts.

### **5.13.1.7. Endangered and Special Status Species**

As discussed in Section 3.8, endangered and special status species are reported to exist at the Stump Neck Annex. The reported endangered and special status species have the potential to inhabit Test Area 1.

### **5.13.2. Visual Survey Observations and Results**

A visual reconnaissance of Test Area 1 was conducted on June 25, 2003. Personnel conducting the visual survey included Mr. Rice, Mr. Wiley and Mr. McManus. Mr. Jorgensen accompanied the team. Test Area 1 was inspected by a walk along the perimeter of the area. The majority of Test Area 1 is comprised of a “hole-in-the-ground” antenna that has been overgrown by vegetation. Several small wooden structures used for the current robotics testing are located to the north of the antenna. There were no physical indications of MEC observed during the inspection of Test Area 1.

A visual depiction of the range reconnaissance is provided on Map 5.13-1 located at the end of Section 5.13. Additional range/site details are illustrated on Map 5.13-2 also located at the end of Section 5.13.

### **5.13.3. Munitions and Munitions Related Materials Associated with the Site**

This section describes the munitions or munitions related materials known or suspected to be at Test Area 1, including the types and estimated maximum penetration depths. This includes both MEC and non-hazardous munitions related debris (e.g., fragmentation, base plates, inert mortar fins). Potential ordnance concentration areas are presented along with a discussion on the presence of any special consideration ordnance.

Based on the interviews with range personnel regarding Test Area 1, TNT was used at the range. Test Area 1 was formerly used for IED and IND training. All training items were inert; however, the devices were connected to working components that would set off a small charge (a quarter-pound block of TNT) located a short distance from the training item. The exact locations of these small charges are not known. The charges were sized for total consumption; however it is

possible that small amounts of residue may remain. A technical data sheet for TNT is provided in Appendix D.

Based on the information obtained during the data collection process, Test Area 1 is not suspected to contain CWM filled munitions, electrically fuzed munitions, or DU associated munitions.

#### ***5.13.4. MEC Presence***

The entire range has been subdivided and categorized into one of three levels of MEC presence including: known MEC areas, suspected MEC areas, and areas where no evidence exists to indicate that MEC are known or are suspected to be at the range. The MEC presence is discussed below.

Map 5.13-3 illustrates the munitions characterization of Test Area 1 and is provided at the end of Section 5.13.

##### **5.13.4.1. Known MEC Areas**

There are no known MEC areas associated with Test Area 1.

##### **5.13.4.2. Suspected MEC Areas**

Based on historic use of the range for IED and IND training, all of Test Area 1 is a suspected area for MEC.

##### **5.13.4.3. Areas Not Suspected to Contain MEC**

There are no areas of Test Area 1 that are not suspected to contain MEC.

#### ***5.13.5. Ordnance Penetration Estimates***

The depth to which munitions penetrate below the ground surface depends on many factors, including the type of soil, the angle of impact, the size of the munition, the velocity at impact, and range-specific environmental conditions. Over the years, the DoD has studied and modeled munitions penetration depths and has issued various guidance and technical documents on the subject. For the purposes of the PA, maximum probable penetration depths are estimated following guidance listed in the latest draft (July 2002) of the DoD Directive on Explosives

Safety issued by the DoD Explosives Safety Board [*DoD Directive 6055.9 (DoD Ammunition and Explosives Safety Standards)*]. The Directive refers to *TM 5.855.1* and *NAVFAC P-1080*.

TNT charges as described to the audit team do not penetrate the ground; residue would be expected to be found on the ground surface or within the immediate soil horizon.

#### **5.13.6. Munitions Constituents**

MC include TNT and TNT breakdown products (2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene, 1,3,5-trinitobenzene, 2,4-dinitrotoluene, and p-dinitrobenzene).

#### **5.13.7. Contaminant Migration Routes**

Contaminants at Test Area 1 may potentially migrate within the soil, groundwater or surface water runoff. Direct human or biota contact with surficial soil is considered the most likely exposure scenario. Precipitation infiltration may provide for contaminant mobility through the subsurface to the shallow or surficial groundwater aquifer, which is assumed to be connected to the nearby surface water bodies. Based on a review of hydrogeological data, it is unlikely that MC in shallow groundwater would migrate to the deeper aquifers that are used as a water supply. However, shallow groundwater is still considered a potential exposure media.

#### **5.13.8. Receptors**

Potential human receptors include authorized Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users and trespassers. Plant and animal biota are also potential receptors. Examples of ecological receptors include deer, wild turkey, and waterfowl.

##### **5.13.8.1. Nearby Populations**

Nearby populations are as discussed in Section 5.1.8.1.

##### **5.13.8.2. Buildings Near/Within Site**

Buildings 2191 and 2192, which are used for equipment storage, are located within the boundaries of Test Area 1. Several other small structures, which are currently used for the

robotics training, and two towers, which were formerly used in operating the antenna, are also at Test Area 1. Building 2172 is located approximately 150 meters east of Test Area 1.

**5.13.8.3. Utilities On/Near Site**

As shown on the Stump Neck GIS utilities map, a potable water line is located in the eastern portion of Test Area 1. Although not shown on this map, electrical power lines, which were installed in 1995, also run to Test Area 1.

**5.13.9. Land Use**

The majority of Test Area 1 is occupied by a former moon relay communication antenna: a reflector formed by a parabolically shaped depression in the ground with lip to lip dimensions of 220 feet by 263 feet coupled with a collector suspended above the reflector by a boom. To the north of this “hole-in-the-ground” antenna, are a storage building and several small structures used for the current robotics testing at Test Area 1 (see Figure 5.13-3). The



**Figure 5.13-3: Current structures at Test Area 1 used in the robotics testing**

anticipated and potential future activities at the range/site include continued training and operations, and construction, maintenance, and operations related to any future development.

**5.13.10. Access Controls / Restrictions**

No public access is authorized at NDW, Indian Head. Signs, partial fencing, locked/secured gates, login book/office check-in, and vehicle security patrol are used to control the entire facility. There are no access control features specific to Test Area 1. There are no known land use/development restrictions for Test Area 1.

**5.13.11. Conceptual Site Model**

A general description of the CSM is provided in Section 5.1.11. The CSM is presented in a series of information profiles that presents information about the range. The information profiles are included in Table 5.13-1 below.

**Table 5.13-1: Conceptual Site Model Information Profiles – TEST AREA 1**

<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
<b>Range/Site Profile</b>	Installation Name	NDW, Indian Head
	Installation Location	Indian Head, Charles County, Maryland
	Range/Site Name	Test Area 1
	Range/Site Location	Test Area 1 is located near the center of the Stump Neck Annex peninsula.
	Range/Site History	<p>1950s - A 220-foot by 263-foot “hole-in-the-ground” antenna was constructed at Test Area 1 that was used in pioneer moon relay communication experiments to transmit shore-to-ship radio signals.</p> <p>1960s and 1970s – Test Area 1 was used for AA&amp;D trainings, such as booby traps and trip wires.</p> <p>1980s – Test Area 1 was used for IED and IND training.</p> <p>1990s to present – Test Area 1 has been used for robotics testing.</p>
	Range/Site Area and Layout	<p>The majority of Test Area 1 is occupied by a moon relay communication antenna: a reflector formed by a parabolically shaped depression in the ground with lip to lip dimensions of 220 feet by 263 feet coupled with a collector suspended above the reflector by a boom.</p> <p>To the north of the “hole-in-the-ground” antenna, are a storage building and several small structures used for the current robotics testing at Test Area 1.</p>
	Range/Site Structures	<p>Buildings 2191 and 2192, which are used for equipment storage</p> <p>Several structures, which are currently used for the robotics training</p> <p>Two towers, which were formerly used in operating the antenna</p>
Range/Site Boundaries	<p>N: Howard Road</p> <p>S: Wooded, hilly areas</p> <p>W: Wooded, hilly areas</p> <p>E: Wooded, hilly areas, beyond which Building 2172 complex is located</p>	

Table 5.13-1: Conceptual Site Model Information Profiles – TEST AREA 1		
Profile Type	Information Needs	Preliminary Assessment Findings
	Range/Site Security	No public access is authorized at the Stump Neck Annex. Signs, partial fencing, locked/secured gates, login book/office check-in, and vehicle security patrol are utilized for the entire facility at the Stump Neck Annex. Access to Test Area 1 is not specifically controlled within Stump Neck.
<b>Munitions/ Release Profile</b>	Munitions Types	TNT
	Maximum Probability Penetration Depth	NA
	MEC Density	None
	Munitions Debris	None
	Associated Munitions Constituents	TNT and TNT breakdown products (2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene, 1,3,5-trinitrobenzene, 2,4-dinitrotoluene, and p-dinitrobenzene).
	Migration Routes/Release Mechanisms	Soil surface runoff; groundwater discharge; range maintenance; construction; excavation
<b>Physical Profile</b>	Climate	Indian Head, Maryland has a continental-type climate with four well-defined seasons. The coldest period occurs in late January and early February, with low temperatures averaging at 29°F. July is the warmest month with average maximum temperatures of 85°F. The normal annual precipitation is approximately 44 inches, with normal monthly precipitation varying from 2.25 (February) to 4.60 (August) inches.
	Topography	The antenna located at Test Area 1 is located within a man-made depression. The outer rim of the antenna is at a higher elevation (approximately 125 feet above msl) than the surrounding area.
	Geology	Indian Head and Stump Neck lie within the Atlantic Coastal plain physiographic province. The geology of the area is comprised of Precambrian igneous and metamorphic bedrock overlain by 500 to 600 feet of unconsolidated fluvial and marine deposits of the Potomac Group. The Potomac Group consists of, in descending order, the Patapsco, Arundel, and Patuxent Formations.
	Soil	The predominant soil type associated with Test Area 1 is sand-silt/sand-clay.

**Table 5.13-1: Conceptual Site Model Information Profiles – TEST AREA 1**

<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
	Hydrogeology	The hydrogeological makeup of the Indian Head, Maryland area consists of a surficial aquifer and several deeper confined and semi-confined aquifers in the Patapsco and Patuxent Formations. The surficial aquifer is expected to be connected to and influenced by the surface water bodies. Regional water supplies, including that of NDW, Indian Head, are obtained from the lower and middle sands of the Patapsco and Patuxent Formations of the Potomac Group. The surficial aquifer (i.e., water table) is not used for water supply at NDW, Indian Head.
	Hydrology	Test Area 1 is located near the center of the Stump Neck peninsula. The closest water body is the Mattawoman Creek, approximately 2,000 feet to the north. Surface water runoff likely follows topography at Test Area 1.
	Vegetation	Test Area 1 is located in a hardwood forest area.
<b>Land Use and Exposure Profile</b>	Current Land Use	Test Area 1 is currently utilized by Navy personnel for various robotics training.
	Current Human Receptors	Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users, and trespassers.
	Current Activities (frequency, nature of activity)	The robotics training is performed at Test Area 1 on an irregular basis. It is approximated that the training occurs quarterly, and the individual training sessions can last from several days to several weeks.
	Potential Future Land Use	No future changes in the land use are anticipated.
	Potential Future Human Receptors	Navy personnel (military and civilian), visitors, trespassers, contractors, construction workers (if intrusive work is necessary) and maintenance and operations workers, as well as recreational users (hunters).
	Potential Future Land Use-Related Activities:	The anticipated future activities at Test Area 1 include continued training and operations and could potentially include construction, maintenance, and operations related to any future development.
	Zoning/Land Use Restrictions	None

Table 5.13-1: Conceptual Site Model Information Profiles – TEST AREA 1		
Profile Type	Information Needs	Preliminary Assessment Findings
	Demographics/Zoning	Charles County population density is approximately 260 persons per square mile. NDW, Indian Head and its tenant commands employ approximately 3,600 military and civilian personnel.
	Beneficial Resources	None.
Ecological Profile	Habitat Type	Test Area 1 provides mature forest habitats.
	Degree of Disturbance	Based on the IED and IND testing and operations activities at Test Area 1, an intermediate level of disturbance is expected.
	Ecological Receptors	
	Federal Endangered Species:	American bald eagle, rainbow snake, and the joint-vetch
	Federal Threatened Species:	None
	State Endangered Species:	Scaly blazing-star
	State Threatened Species:	None
	Other Ecological Receptors:	Other ecological receptors include numerous species of birds, reptiles and mammals such as the white tailed deer, wild turkey, the red-bellied woodpecker and the eastern box turtle.
	Relationship of MEC/MC Sources to Habitat and Potential Receptors	Receptors may contact MEC in the subsurface soil. Receptors may have contact with MC directly through surface water/soil or indirectly through the food chain (bioaccumulated in plants and animals).

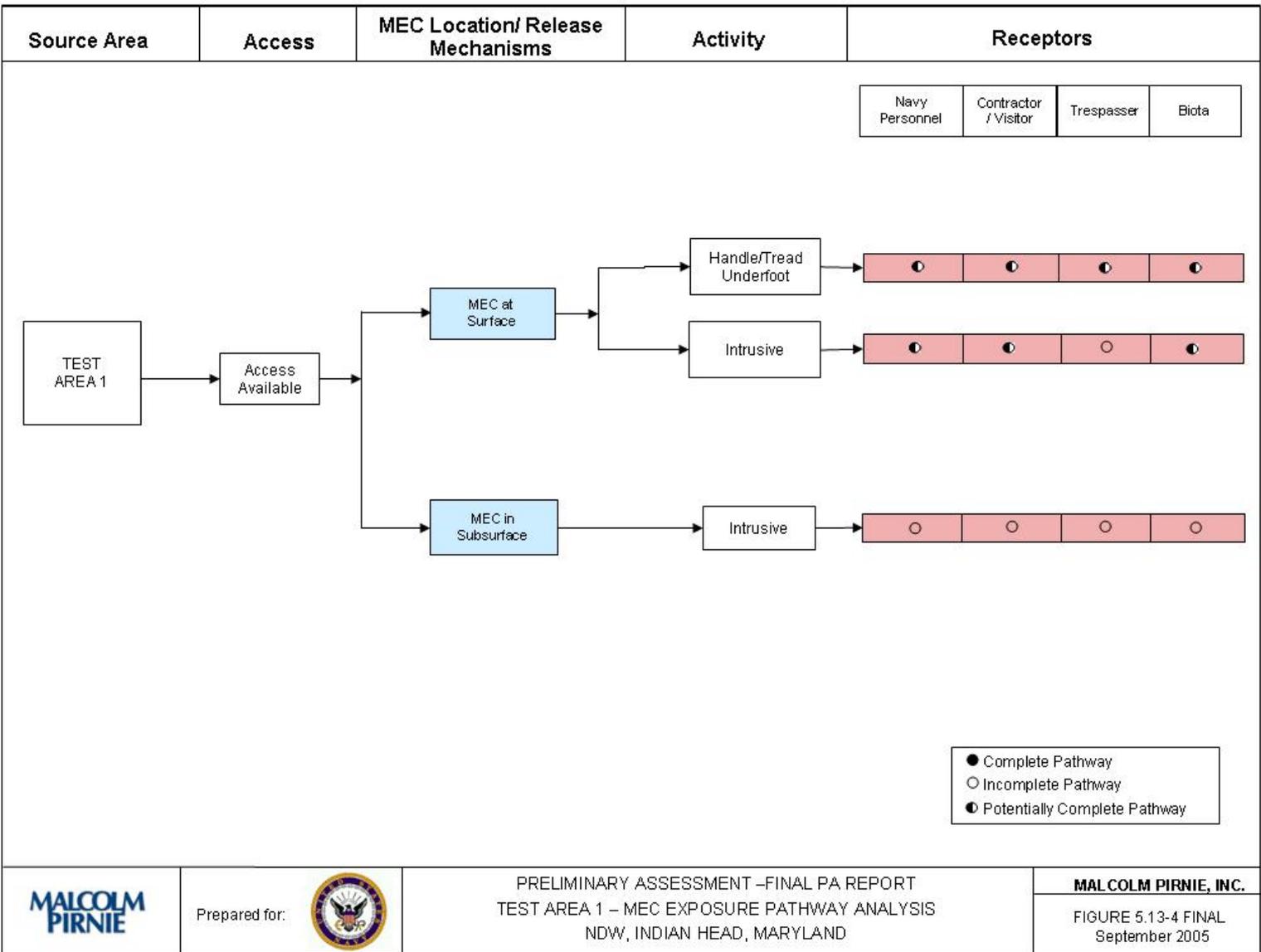
A general description of the CSM exposure pathway analysis is included in Section 5.1.11.

At Test Area 1, historic evidence indicates that MEC may be present. The Exposure Pathway Analysis figure for MEC is provided in Figure 5.13-4. As illustrated in the figure, potentially complete pathways exist for human and ecological receptors for MEC in the surface soil. This includes receptors for hand/tread underfoot contact as well as surface intrusive work that may be conducted at Test Area 1. These activities include, but are not limited to, excavation, plowing, tilling, construction, and environmental sampling for human receptors. Ecological receptors may come in contact with MEC through burrowing, nesting, or feeding activities that disturb surface soil. Trespassers are anticipated to be exposed to non-intrusive surface soil activities at the range,

but it is unlikely they would be exposed to subsurface soil through intrusive activities. MEC are not expected in the subsurface.

Residual TNT and breakdown constituents may be present in the soil as a result of IED and IND training conducted at Test Area 1 in the 1980s. The Exposure Pathway Analysis Figure for MC (Figure 5.13-5) illustrates several potentially complete exposure pathways for receptors. Soil represents the primary potential source media. All human and ecological receptors have potentially complete exposure pathways for direct contact with MC in surface soil, which includes dermal contact, ingestion, and inhalation (dust). Plants may accumulate MC as well. Given that Test Area 1 is located within an upland hunting area, MC entering the food chain may provide migration pathways for human and ecological receptors. There are no surface water bodies on Test Area 1; however, surface water runoff may transport the MC from surface soil off-range. Potentially complete pathways exist for all human and ecological receptors of surface water runoff. There is also a potential for the MC present in the surface soil to infiltrate to the subsurface. Potentially complete exposure pathways exist for MC in subsurface soils (direct contact, ingestion and inhalation during intrusive work activities) for all human and ecological receptors with the exception of trespassers. It is not anticipated that trespassers would come in contact with subsurface soils. Although confining layers are expected to prevent the migration of MC to the lower aquifers used for water supply, potentially complete pathways exist for MC in shallow groundwater for human receptors.

Figure 5.13-4: MEC Exposure Pathway Analysis



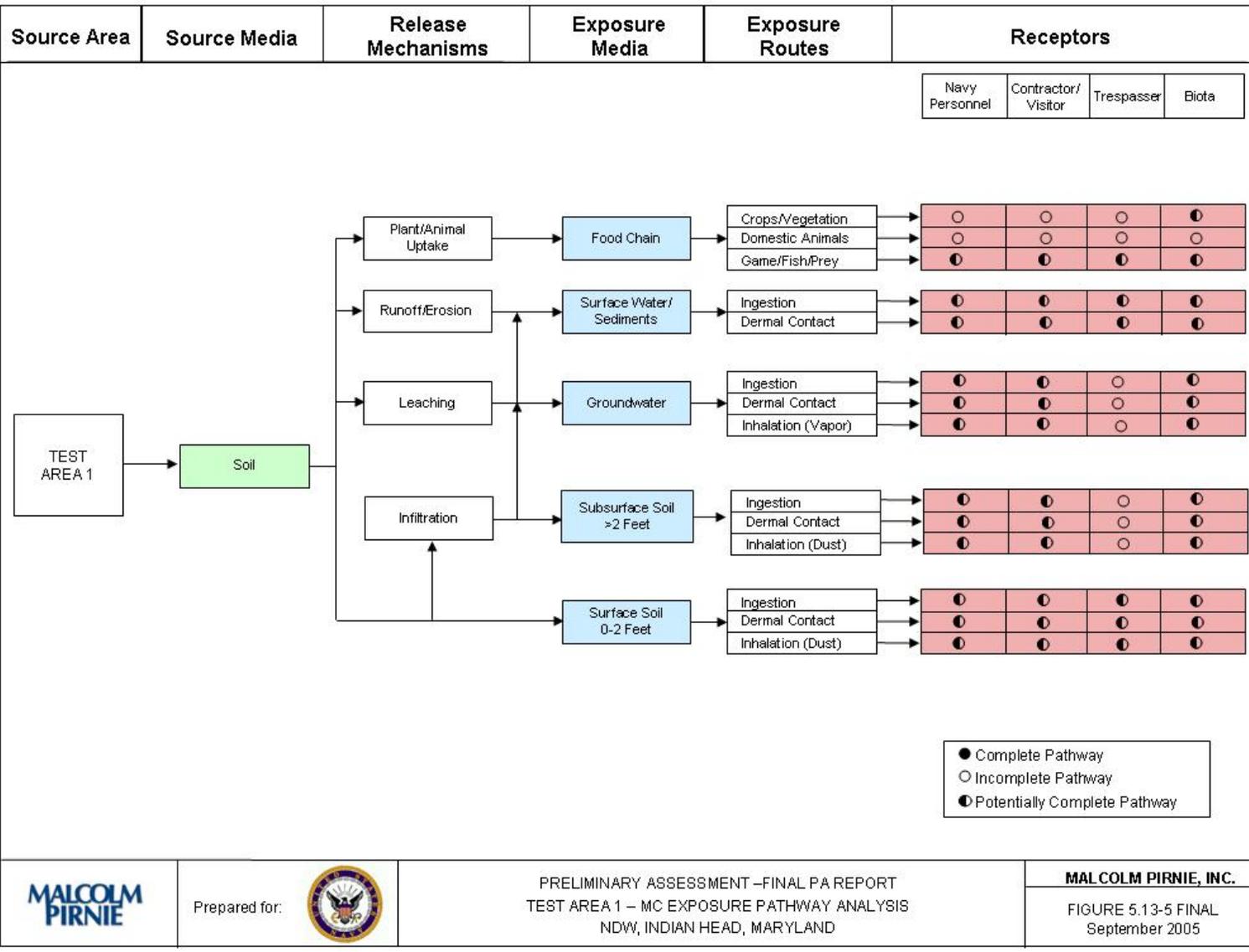


Figure 5.13-5: MC Exposure Pathway Analysis



Prepared for:



PRELIMINARY ASSESSMENT –FINAL PA REPORT  
TEST AREA 1 – MC EXPOSURE PATHWAY ANALYSIS  
NDW, INDIAN HEAD, MARYLAND

**MALCOLM PIRNIE, INC.**

FIGURE 5.13-5 FINAL  
September 2005

**5.13.12. Summary**

Test Area 1 is 4.5-acres located on the central portion of Stump Neck Annex. It was initially developed for moon relay communications testing. Subsequently, IED and IND testing was reported to have been conducted at Test Area 1 during the 1980s. All training items were inert; however, the devices were connected to working components that would set off small charges (a quarter-pound block of TNT) located a short distance from the training item. The charges were sized for total consumption; however, it is expected that small amounts of residue may remain. Test Area 1 is considered a suspected MEC area, and MC (TNT and TNT breakdown products) may be present at or near the surface soil horizon.

**Map 5.13-1: Visual Survey: Test Area 1**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.13-2: Range/Site Details: Test Area 1**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.13-3: Munitions Characterization: Test Area 1**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

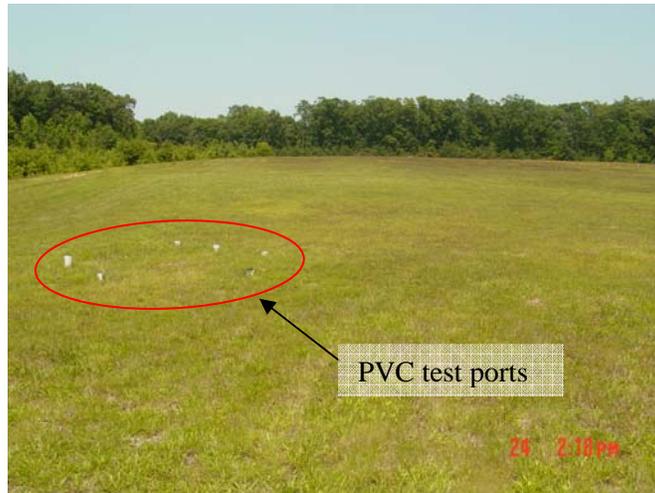
## 5.14. TEST AREA 2

### 5.14.1. *History and Site Description*

Test Area 2 is a 3.66-acre parcel located in the south-central portion of the Stump Neck Annex of NDW, Indian Head, off an unnamed dirt road extending north from Old Range Road. Test Area 2 was identified during the Navy Range Inventory. The boundaries of the range were established during the inventory. According to the Data Collection Questionnaire completed during the Range Inventory, Test Area 2 was used for testing bulk high explosives (primary/initiating). The completed questionnaire indicated that Test Area 2 may have been used for ordnance testing and/or training and that it was identified during a historical search conducted for the IR Program

According to the UXO Program Director at NAVEODTECHDIV, Indian Head, Mr. Jim Hersey, Test Area 2 was a pristine wooded area up until 1978 when the parcel was selected to be used as a Non-Explosive Magnetic Test Range. He stated that to the best of his knowledge, no explosive testing or any other ordnance testing/training ever occurred at Test Area 2. Additionally, Mr. Jorgensen of NDW, Indian Head Environmental Office was not aware of any historical searches conducted for the IR Program. To further support that explosives testing/training never occurred at Test Area 2, 16 maps of the Stump Neck Annex, dating from 1945 through 1992, were reviewed; no buildings or features suggesting evidence of ordnance testing and/or training in this area were observed. No evidence confirming the use of explosives testing/training as indicated by the range inventory was discovered during this PA.

As reported by Mr. Hersey, Test Area 2 has been used as a Non-Explosive Magnetic Test Range since 1978. The Non-Explosive Magnetic Test Range is used to measure the effectiveness of magnetic equipment. Currently, Test Area 2 consists of a grass covered field with a magnetic test well 30-40 feet deep and several polyvinyl chloride (PVC) stand pipes. The PVC pipes are off-set from the test well and are used as test ports in conjunction with the test well to measure the effectiveness of magnetic equipment. Also located on Test Area 2 are two magnetic test pits, two antenna intermodal storage containers (used to store equipment) and stored/stockpiled inert ordnance (used to test magnetic equipment). No environmental investigations have been conducted at this range. Based on the current use of Test Area 2 as a Non-Explosive Magnetic Test Range, it is highly unlikely that any ordnance debris is located on the parcel, as it would have already been uncovered during magnetic testing. Figure 5.14-1 through Figure 5.14-4 portray the current range conditions.



**Figure 5.14-1: Current conditions at Test Area 2 – Off -set PVC test ports**



**Figure 5.14-2: Test equipment at Test Area 2**



**Figure 5.14-3: Intermodal storage containers**



**Figure 5.14-4: Stored/stockpiled inert ordnance for active testing magnetic equipment**

#### **5.14.1.1. Topography**

Section 3.2 provides a general description of topography for the Stump Neck Annex. The elevation across Test Area 2 ranges from approximately 60 to 80 feet above msl gently sloping from the northeast to the southwest toward an unnamed tributary.

#### **5.14.1.2. Geology**

Section 3.3 provides a geologic description for the Stump Neck Annex, which is applicable to Test Area 2.

#### **5.14.1.3. Soil and Vegetation Types**

Section 3.4 provides a description of the soil and vegetation types at Indian Head and the Stump Neck Annex. The predominant soil type associated with the Stump Neck Annex is sand-silt to sand-clay. According to the Soil Survey of Charles County, the soil in the area is a moderately eroded, Beltsville silt loam with two to five percent slope. The Test Area 2 is grass covered and is surrounded by a mix of coniferous and deciduous trees.

#### **5.14.1.4. Hydrology**

Section 3.5 provides a description of hydrology at Indian Head and the Stump Neck Annex. Drainage from the Test Area 2 flows in a southwesterly direction towards an unnamed tributary that discharges into the Chicamuxen Creek. There are no surface water bodies within Test Area 2.

#### **5.14.1.5. Hydrogeology**

Section 3.6 provides a description of hydrogeology for Indian Head and the Stump Neck Annex, which is applicable to the area of Test Area 2. There are no wells located on Test Area 2.

#### **5.14.1.6. Cultural and Natural Resources**

General cultural and natural resources for the Stump Neck Annex are provided in Section 3.7. According to the 1996 Phase I Cultural Resources Survey of Stump Neck Annex there are no archeological/cultural sites within the Test Area 2.

#### **5.14.1.7. Endangered and Special Status Species**

As discussed in Section 3.8, endangered and special status species are reported to exist at the Stump Neck Annex. According to the 2003-2004 Stump Neck Annex Hunting Map, the Test Area 2 lies within an eagle protection area and access is restricted from December 15 through June 15. While their presence has not been confirmed, the reported endangered and special status species are expected to inhabit the Test Area 2 area.

### ***5.14.2. Visual Survey Observations and Results***

The Test Area 2 visual survey was conducted on June 24, 2003. Malcolm Pirnie personnel who conducted the range visit included Mr. Dinh, Mr Engholm, Ms. Tegtmeyer, and Mr. Hains. Ms. Morgan, NDW, Indian Head Environmental Office, accompanied the team. A modified W pattern was walked within the perimeter. Site coverage was estimated at 40 percent walked and with 100 percent of the range visually observed. The only ordnance observed was documented inert ordnance actively used to test the magnetic equipment. A visual depiction of the range reconnaissance route is provided on Map 5.14-1, provided at the end of Section 5.14.

### ***5.14.3. Munitions and Munitions Related Materials Associated with the Site***

This section describes the munitions or munitions related materials known or suspected to be at the range, including the types and estimated maximum penetration depths. This includes both MEC and non-hazardous munitions related debris (e.g., fragmentation, base plates, inert mortar fins). Potential ordnance concentration areas are presented along with a discussion on the presence of any special consideration ordnance.

No MEC was observed on Test Area 2 during the visual survey. Based on the information collected the presence of MEC is not expected.

### ***5.14.4. MEC Presence***

The entire range has been subdivided and categorized into one of three levels of MEC presence including: known MEC areas, suspected MEC areas, and areas where no evidence exists to indicate that MEC are known or are suspected to be at the range. Map 5.14-3 illustrates the munitions characterization of Test Area 2 and is provided at the end of Section 5.14.

#### **5.14.4.1. Known MEC Areas**

According to historical documents and information obtained during the data collection process, there is no evidence that at Test Area 2 had a historic use as determined in the range inventory. Therefore, there are no known MEC areas.

**5.14.4.2. Suspected MEC Areas**

According to historical documents and information obtained during the data collection process, there is no evidence that Test Area 2 had a historic munitions use as determined in the range inventory. Therefore, there are no suspected MEC areas on Test Area 2.

**5.14.4.3. Areas Not Suspected to Contain MEC**

According to historical documents and information obtained during the data collection process, there is no evidence of prior MEC use at Test Area 2. Therefore, there are no suspected MEC areas on Test Area 2.

**5.14.5. *Ordnance Penetration Estimates***

According to historical documents and information obtained during the data collection process, there is no evidence of the presence of MEC at the Test Area 2. Therefore, ordnance penetration estimates do not apply to Test Area 2.

**5.14.6. *Munitions Constituents***

Test Area 2 is not expected to be impacted by MC.

**5.14.7. *Contaminant Migration Routes***

As mentioned previously based on historical documents and information obtained during the data collection process, there is no evidence of the presence of MEC or MC at Test Area 2. Since MEC and MC are not expected on Test Area 2 potential migration routes for MEC and MC do not exist.

**5.14.8. *Receptors***

As MEC and MC are not expected on Test Area 2, there are no potential receptors.

#### **5.14.8.1. Nearby Populations**

Nearby populations are as discussed in Section 5.1.8.1. According to the 2003-2004 Stump Neck Annex Hunting Map, Test Area 2 is within a designated upland hunting area. Therefore, recreational users can be found on a seasonal basis on and in the vicinity of Test Area 2. There are no residential properties located at the Stump Neck Annex.

#### **5.14.8.2. Buildings Near/Within Site**

There are currently no buildings located on Test Area 2. Additionally, based on the information collected, no buildings were located on Test Area 2 historically.

#### **5.14.8.3. Utilities On/Near Site**

The Utilities Data Map of the Main Installation indicates that no utilities are present within the boundaries or in the immediate vicinity of Test Area 2.

#### **5.14.9. Land Use**

It is reported that the land that comprises Test Area 2 was not used prior to the development of the Non-Explosive Magnetic Test Range. Test Area 2 is currently a Non-Explosive Magnetic Test Range. According to the 2003-2004 Stump Neck Hunting Map, the Test Area 2 is located within an upland hunting area.

#### **5.14.10. Access Controls / Restrictions**

Access to the Stump Neck Annex is controlled by gated entrances, a security patrol and a perimeter fence. Only Navy personnel (military and civilian), maintenance workers, and authorized contractors/visitors are allowed on the Stump Neck Annex. Access to Test Area 2 is gained by way of an unnamed dirt road extending from the southern side of Old Range Road. Test Area 2 is surrounded to the east, west, and south by a mix of conifer and deciduous trees. There are no access control features specific to the Test Area 2.

Test Area 2 is located within an eagle protection area, and access is restricted from December 15 through June 15.

According to the Soil Survey of Charles County, many of the soil types on the Stump Neck Annex have load bearing capacity limitations as a result of high water tables and extreme erodability conditions. This includes the soils found at Test Area 2. Based on this information, the installation has limited construction and the use of septic systems in specific areas of concern. Test Area 2 is located in a region that has a seasonally high water table and, therefore, a waiver is required for all septic systems.

**5.14.11. Conceptual Site Model**

A general description of the CSM is provided in Section 5.1.11. The CSM is presented in a series of information profiles that presents information about the range. The information profiles are included in Table 5.14-1 below.

Table 5.14-1: Conceptual Site Model Information Profiles – TEST AREA 2		
Profile Type	Information Needs	Preliminary Assessment Findings
Range/Site Profile	Installation Name	NDW, Indian Head
	Installation Location	Indian Head, Charles County, Maryland
	Range/Site Name	Test Area 2
	Range/Site Location	Located in the southern central portion of the Stump Neck Annex of NDW, Indian Head, off an unnamed dirt road extending from the southern side of Old Range Road.
	Range/Site History	Test Area 2 was a pristine wooded area up until 1978 when the parcel was selected to be used as a non-magnetic testing area.
	Range/Site Area and Layout	Currently, this 3.66-acre range is a mowed field containing two magnetic test wells 30-40 feet deep and several PVC test points. Also located on the range are two antennas, stored/stockpiled inert ordnance (used to test magnetic equipment), and conex storage containers.
	Range/Site Structures	No structures are currently located at the range.
	Range/Site Boundaries	N: coniferous and deciduous trees S: coniferous and deciduous trees E: coniferous and deciduous trees W: coniferous and deciduous trees

Table 5.14-1: Conceptual Site Model Information Profiles – TEST AREA 2		
Profile Type	Information Needs	Preliminary Assessment Findings
	Range/Site Security	Access to the Stump Neck Annex is limited by gated entrances, a security patrol and a perimeter fence. Only Navy personnel (military and civilian), maintenance workers, and authorized contractors/visitors are allowed on the Stump Neck Annex. There are no access control features specific to Test Area 2.
Munitions/ Release Profile	Munitions Types	There are no MEC associated with Test Area 2.
	Maximum Probability Penetration Depth	There is no evidence of the presence of MEC at the Test Area 2.
	MEC Density	Not applicable
	Munitions Debris	Not applicable
	Associated Munitions Constituents	Since MEC is not suspected, Test Area 2 is not expected to be impacted by MC.
	Migration Routes/Release Mechanisms	Since MC impacts are not suspected, there are no anticipated migration routes.
Physical Profile	Climate	Indian Head, Maryland has a continental-type climate with four well-defined seasons. The coldest period occurs in late January and early February, with low temperatures averaging at 29°F. July is the warmest month with average maximum temperatures of 85°F. The normal annual precipitation is approximately 44 inches, with normal monthly precipitation varying from 2.25 (February) to 4.60 (August) inches.
	Topography	The elevation across Test Area 2 ranges from approximately 60 to 80 feet above msl, gently sloping from the northeast to the southwest toward an unnamed tributary.
	Geology	Indian Head and Stump Neck lie within the Atlantic Coastal plain physiographic province. The geology of the area is comprised of Precambrian igneous and metamorphic bedrock overlain by 500 to 600 feet of unconsolidated fluvial and marine deposits of the Potomac Group. The Potomac Group consists of, in descending order, the Patapsco, Arundel, and Patuxent Formations.
	Soil	The predominant soil type at Test Area 2 is sand-silt to sand-clay and generally of the Beltsville Loam association. The soils are moderately eroded with two to five percent slope.

Table 5.14-1: Conceptual Site Model Information Profiles – TEST AREA 2		
Profile Type	Information Needs	Preliminary Assessment Findings
	Hydrogeology	The hydrogeological makeup of the Indian Head, Maryland area consists of a surficial aquifer and several deeper confined and semi-confined aquifers in the Patapsco and Patuxent Formations. The surficial aquifer is expected to be connected to and influenced by the surface water bodies. Regional water supplies, including that of NDW, Indian Head, are obtained from the lower and middle sands of the Patapsco and Patuxent Formations of the Potomac Group. The surficial aquifer (i.e., water table) is not used for water supply at NDW.
	Hydrology	Drainage from Test Area 2 drains in a southwesterly direction towards an unnamed tributary.
	Vegetation	The Test Area 2 is predominantly grass covered and surrounded by a mix of coniferous and deciduous trees.
Land Use and Exposure Profile	Current Land Use	Test Area 2 is currently a Non-Explosive Magnetic Test Range. According to the 2003-2004 Stump Neck Hunting Map, the Test Area 2 is located within an upland hunting area.
	Current Human Receptors	There are no current human receptors as no MEC or MC exists at the range.
	Current Activities (frequency, nature of activity)	Test Area 2 is currently used to test magnetic equipment, hunting is permitted in the vicinity, and the grass is mowed regularly.
	Potential Future Land Use	No planned change from current use is reported.
	Potential Future Human Receptors	There are no potential future human receptors as no MEC or MC exists at the range.
	Potential Future Land Use-Related Activities:	There is no expected change in land use activities.
	Zoning/Land Use Restrictions	Test Area 2 is located within an eagle protection area, and access is restricted from December 15 through June 15. The area is also characterized by a seasonally high water table and highly eroded soils. A waiver is required for installation of septic systems.
	Demographics/Zoning	Charles County population density is approximately 260 persons per square mile. NDW, Indian Head and its tenant commands employ approximately 3,600 military and civilian personnel.
	Beneficial Resources	None

Table 5.14-1: Conceptual Site Model Information Profiles – TEST AREA 2		
Profile Type	Information Needs	Preliminary Assessment Findings
Ecological Profile	Habitat Type	Test Area 2 is predominantly grass covered and surrounded by a mix of coniferous and deciduous trees.
	Degree of Disturbance	Low – Test Area 2 is occasionally mowed.
	Ecological Receptors	
	Federal Endangered Species:	American bald eagle, rainbow snake, sensitive joint-vetch
	Federal Threatened Species:	None
	State Endangered Species:	Scaly blazing-star
	State Threatened Species:	None
	Other Ecological Receptors:	There are no ecological receptors as no MEC or MC is expected at the range.
	Relationship of MEC/MC Sources to Habitat and Potential Receptors	There is no relationship to habitat or potential receptors as no MEC/MC sources exist at Test Area 2.

A general description of the CSM exposure pathway analysis is included in Section 5.1.11.

Evidence indicates that MEC and MC are not present on Test Area 2. Therefore, no complete or potentially complete exposure pathways exist for MEC and MC, and no pathway analyses were completed for Test Area 2.

*5.14.12. Summary*

Test Area 2 is a 3.66-acre parcel located in the southern central portion of the Stump Neck Annex of NDW, Indian Head, off an unnamed dirt road extending from the southern side of Old Range Road. It was reported during the U.S. Navy's Range Inventory that Test Area 2 was used for testing bulk high explosives (primary/initiating). However, data collection efforts for the PA did not confirm this reported activity. According to Mr. Hersey, Test Area 2 was a pristine wooded area up until 1978 when the parcel was selected to be used as a Non-Explosive Magnetic Test Range. A review of 16 maps of the Stump Neck Annex, dating from 1945 through 1992, provided no evidence to support the existence of Test Area 2.

Test Area 2 has been used as a Non-Explosive Magnetic Test Range since 1978. Based on the current use of Test Area 2 as a magnetic testing area, it is unlikely that any MEC is located on the parcel. The only ordnance observed during the range visit was the stored/stockpiled inert ordnance used in current operations off-range. No available information or evidence observed confirms or supports the U.S. Navy's Range Inventory report that Test Area 2 had been used for bulk explosive testing.

**Map 5.14-1: Visual Survey: Test Area 2**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.14-2: Range/Site Details: Test Area 2**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.14-3: Munitions Characterization: Test Area 2**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

## 5.15. THE VALLEY IMPACT AREA

### 5.15.1. *History and Site Description*

The Valley Impact Area, approximately 694 acres, covers the majority of the western side of the Stump Neck Annex. The acreage of The Valley Impact Area includes the land portion of Stump Neck Annex that is covered by the firing fan (SDZ) from The Valley and excludes acreages already calculated as part of other MRP sites. Historical documentation indicates that shells may have impacted The Valley Impact Area at Stump Neck Annex due to projectiles fired from The Valley gun proving site located on the Indian Head Main Installation. The Valley Impact Area may have received a variety of projectiles from 1891 through 1921, as the firing fan (SDZ) from The Valley extends over The Valley Impact Area (see Figure 2.3-1). In addition to The Valley Impact Area, the firing fan extends over areas of the Potomac River, Chicamuxen Creek, Mattawoman Creek, and portions of land outside the installation boundary to the south of the Stump Neck Annex. These additional areas affected by The Valley firing fan are not included within this report. This report details information pertaining to the known impacts within the installation boundary on the Stump Neck Annex not previously mentioned with the information in other PA site sections.

In addition to firing from The Valley at the Main Installation, impacts to The Valley Impact Area included a firing range set up by an agreement between the installation and Quantico Marine Corps Base. According to a Quantico report, the agreement set up an approximate 5,500-yard range to fire 75mm guns and howitzers. The range was oriented to fire from the vicinity of Rum Point and impact area on the far side of Stump Neck Annex (Headquarters U.S. Marine Corps 1931); however, the exact location of the range is unknown. Therefore, the firing fan from firing in the vicinity of Rum Point has not been included on the maps in this section. In addition to the Marine Corps range, the agreement also permitted Quantico to fire large artillery at the Stump Neck Annex for several years until 1934.

Other PA sites located within the boundary of The Valley Impact Area include Old Demolition Range, Advanced IED Area, Basic IED Area, Marine Rifle Range, Air Blast Pond, Stump Neck Impact Area, Old Skeet and Trap Range, Torpedo Burial Site, Sonar Training Area, EOD School Demo Area. Other PA sites that may be located within the 5,500-yard marine range on the Stump Neck Annex include Battle Range Firing Area, Rum Point Skeet Range, Torpedo Casing

Disposal Area, Roach Road Rifle Range and Test Area 8. However, the exact firing point and targets for the 5, 500 yard Quantico range are not known.

#### **5.15.1.1. Topography**

Stump Neck Annex, which includes The Valley Impact Area, as described in Section 3.2 has a relatively low topographic profile. The lowest points lie along the Mattawoman and Chicamuxen Creek shoreline. These shoreline areas are mostly flat, tidal marsh areas, although several 50 to 60 bluffs do exist along the Mattawoman Creek.

#### **5.15.1.2. Geology**

The geology of the Stump Neck Annex is described in Section 3.3.

#### **5.15.1.3. Soil and Vegetation Types**

The soil and vegetation types identified at the Stump Neck Annex are described in Section 3.4. Because The Valley Impact Area covers such a large area, there are several varieties of vegetation and soil types associated with the site. Section 3.4 provides a summary of the vegetation and soil types that may be present at The Valley Impact Area.

#### **5.15.1.4. Hydrology**

The Potomac River, Mattawoman Creek and Chicamuxen Creek border The Valley Impact Area. As discussed in Section 3.5, the Potomac River is a tidal tributary to the Chesapeake Bay. The Mattawoman and Chicamuxen Creeks are tributaries of the Potomac River and are also tidally influenced. The Mattawoman and Chicmuxen Creeks have large flood plains and contain large areas of tidal wetlands and swamps, some of which are located within The Valley Impact Area. Many small streams are located throughout The Valley Impact Area, which flow to one of the three major waterways.

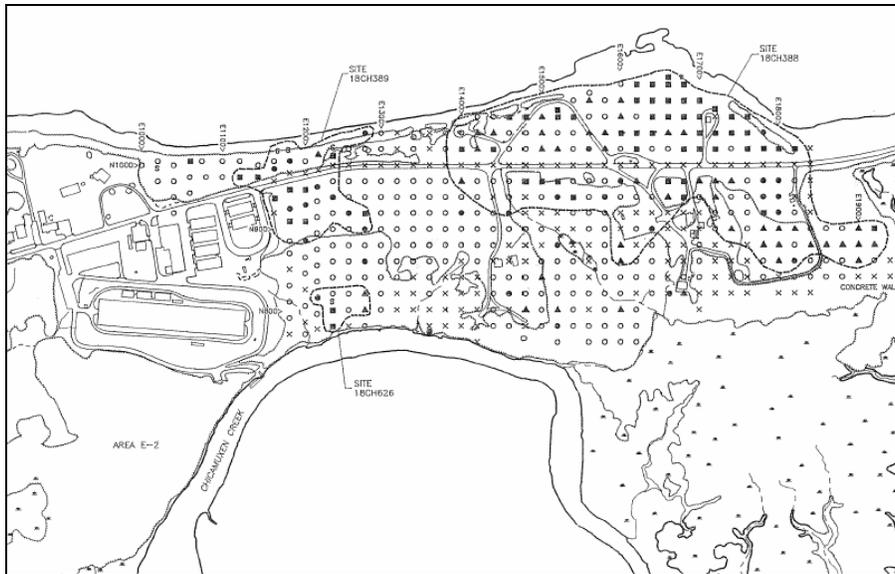
#### **5.15.1.5. Hydrogeology**

Section 3.6 provides a description of hydrogeology for the Stump Neck Annex, which includes The Valley Impact Area.

**5.15.1.6. Cultural and Natural Resources**

General cultural and natural resources for Stump Neck Annex are provided in Section 3.7. According to the 2003-2004 Stump Neck Annex Hunting Map, hunting is permitted throughout various areas of The Valley Impact Area. The Chicamuxen Wildlife Management Area is located within The Valley Impact Area; however, this area is not located within the installation boundaries.

As discussed in Section 3.7, a Phase I Cultural Resources Survey and Supplemental Architectural Investigations were conducted at Stump Neck in 1996. The survey identified ten sites of archeological and cultural significance. The sites and associated locations of positive prehistoric and historic findings are identified on Figures 5.15-1, 5.15-2, and 5.15-3.



**Figure 5.15-1: Archeological sites within the eastern most portion of The Valley Impact Area**

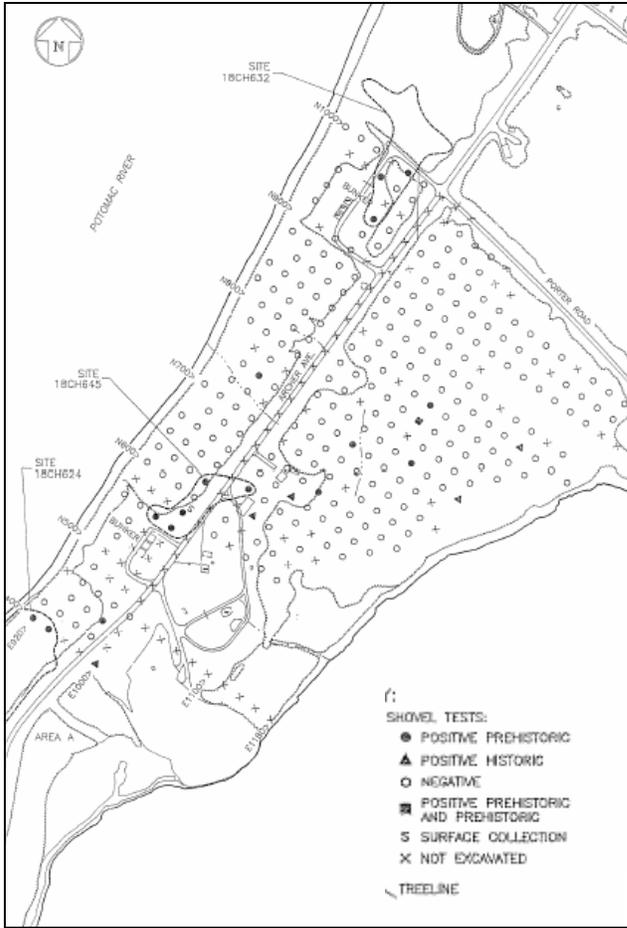


Figure 5.15-2: Archeological sites within the central portion of The Valley Impact Area

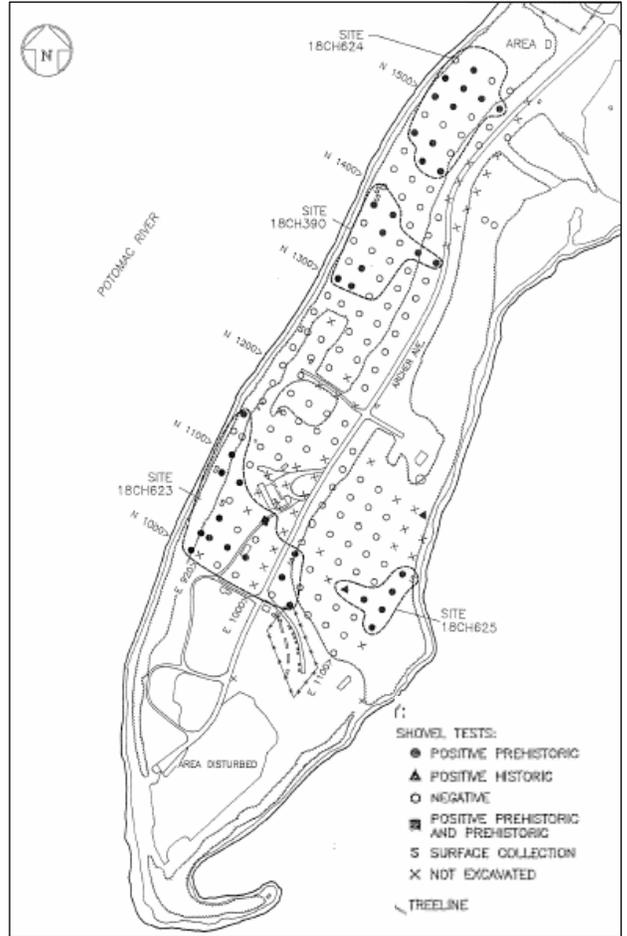


Figure 5.15-3: Archeological sites within the southwestern tip of The Valley Impact Area

**5.15.1.7. Endangered and Special Status Species**

Section 3.8 provides information regarding endangered and special status species that are known or have the potential to inhabit the Stump Neck Annex. Because The Valley Impact Area covers the majority of the western portion of the peninsula, animals and plants identified in Section 3.8 are expected to be located at The Valley Impact Area.

**5.15.2. Visual Survey Observations and Results**

A visual survey of The Valley Impact Area was conducted on June 3, 2004. Malcolm Pirnie personnel who conducted the range visit included Mr. Dan Hains, Mr. Ricardo Campos, Mr. Svend Egholm, Mr. Bobby Atkinson and Ms. Julie Grim. Mr. Bob Harrison, NDW, Indian Head Environmental Office, accompanied the team. In addition, several other portions of The Valley

Impact Area were visually observed throughout various site visits conducted in June 2003, August 2003 and November 2003. The Valley Impact Area was visually inspected by walking along the Potomac River shoreline, where the majority of impacts are anticipated to have occurred based on the firing fan down the Potomac River from The Valley. In total, the team was able to visually observe approximately 10% of The Valley Impact Area.

The visual survey revealed evidence of MEC along the western shoreline of the Stump Neck Annex peninsula; however, the MEC observed may be attributed to the active range (Range 6) near the area. No other evidence of MEC/MC associated with The Valley Impact Area was identified during the site walks.

The Valley Impact Area contains several installation development areas that include buildings, roadways and operational training areas. Since these areas are developed and used routinely, it is assumed that no MEC/MC associated with The Valley Impact Area is present within these areas. The undeveloped areas of The Valley Impact Area are overgrown wooded areas. During the visual survey, several potential impact crater holes were observed within the woodlands of The Valley Impact Area indicating impacts occurred in the area. No MEC attributable to The Valley Impact Area was observed during the site walk.

A visual depiction of the site reconnaissance is provided on Map 5.15-1 located at the end of Section 5.15. Additional range/site details are illustrated on Map 5.15-2 also located at the end of Section 5.15.

***5.15.3. Munitions and Munitions Related Materials Associated with the Site***

This section describes the munitions or munitions related materials known or suspected to be at the site, including the types and estimated maximum penetration depths. This includes both MEC and non-hazardous munitions related debris (e.g., fragmentation, base plates, inert mortar fins). Potential ordnance concentration areas are presented along with a discussion on the presence of any special consideration ordnance.

Historical documentation states that various calibers of guns (4-inch through 16-inch) were proved at The Valley with various projectiles. The Valley Impact Area received many of the

projectiles from gun proving activities at The Valley. Tested shells contained different types of explosive fillers, including black powder, smokeless powder, brown prismatic powder, emmensite, joveite, wet gun cotton, randite and other high explosives (e.g., Thorite).

Records detailing specific types and quantities of munitions at The Valley Impact Area were limited. Identified records from testing at The Valley site listed items such as the number of guns proved and/or number of projectiles used, but documentation did not indicate specific explosive types and quantities to determine the amount of MEC that may be located within the areas associated with The Valley Impact Area. Historical documents listed some quantities of explosive powders that were used during the testing activities at The Valley. These quantities of explosive powders were recorded at The Valley as tested or fired; however, some of the actual impacts of these explosive powder filled projectiles would have landed at The Valley Impact Area. Therefore, it should be assumed that The Valley Impact Area would contain those materials as well. Listed below are some of the quantities of explosive powders. This list is not exhaustive and is not intended to be all inclusive.

The 1892 Bureau of Ordnance Annual Report contained information of two specific shells filled with 42 pounds of explosive powder and 42 pounds of emmensite (high explosive). In addition, the following types and amounts of powder were documented:

- 1894 Annual Report – Powder expended during testing: 56,981 pounds
- 1897 Annual Report – Powder expended during testing: 50,000 pounds, including:
  - Wet gun cotton: 47 pounds
  - Shell Powder: 220.25 pounds
  - Randite: 4 pounds and 3.2 ounces
  - Joveite: 10.75 pounds
  - Picric Acid: 2 Pounds
- 1901 Annual Report – Powder: 46 pounds
- 1901 Annual Report – Powder: 350 pounds
- 1919 Annual Report – Smokeless Powder: 831,033 pounds
- 1920 Annual Report – Smokeless Powder: 419,607 pounds

In addition to munitions received from The Valley, 75mm projectiles fired from Marine Corp Base (MCB) Quantico impacted The Valley Impact Area. Seventy-five millimeter and howitzer

shells were also fired from a marine range located at Stump Neck. No documentation was found identifying the quantity and types of these projectiles.

Based on the information obtained during the data collection process, no special consideration munitions are known or suspected to have been used at the site; therefore, The Valley Impact Area is not suspected to contain special consideration MEC.

**5.15.4. MEC Presence**

The entire site has been subdivided and categorized into one of three levels of MEC presence including: Known MEC Areas, Suspect MEC Areas, and Areas where No Evidence exists to indicate that MEC is known or is suspected to be at the site. The MEC presence is discussed below. Map 5.15-3 illustrates the munitions characterization of The Valley Impact Area, and is provided at the end of Section 5.15.

**5.15.4.1. Known MEC Areas**

There are no known MEC areas associated with The Valley Impact Area. All identified munitions or munitions debris observed during the site visit can be attributed to the active range (Range 6) nearby.

**5.15.4.2. Suspected MEC Areas**

Since The Valley Impact Area covers the majority of the Stump Neck peninsula, the entire area overlapped by The Valley firing fan on the Stump Neck peninsula is considered suspected MEC areas. The additional other than operational ranges at Stump Neck Annex have been subtracted from the suspected MEC areas. The potential exists for MEC to be found throughout areas of the peninsula. The suspect MEC area is depicted in Map 5.15-3.

**5.15.4.3. Areas Not Suspected to Contain MEC**

There are no areas not suspected to contain MEC at The Valley Impact Area.

#### ***5.15.5. Ordnance Penetration Estimates***

The depth to which munitions penetrate below the ground surface depends on many factors, including the type of soil, the angle of impact, the size of the munition, the velocity at impact, and site-specific environmental conditions. Over the years, the DoD has studied and modeled munitions penetration depths and has issued various guidance and technical documents on the subject. For the purposes of the PA, maximum probable penetration depths are estimated following guidance listed in the latest draft (July 2002) of the DoD Directive on Explosives Safety issued by the DoD Explosives Safety Board [*DoD Directive 6055.9 (DoD Ammunition and Explosives Safety Standards)*]. The Directive refers to *TM 5.855.1* and *NAVFAC P-1080*.

Based on the historical use of The Valley Impact Area, the maximum projectile fired into the site was a 16 inch. Using the equation provided in the *TM 5.855.1*, a soil penetration constant of 6.95 (soil containing vegetation), and an ordnance weight and velocity of the calculated 155 mm M107, a penetration depth of 18.4 feet was determined. Since the 16 inch projectile is approximately 2.6 times larger than the 155 mm, an approximate penetration depth of 47 feet was calculated to be the maximum penetration depth for ordnance within The Valley Impact Area.

#### ***5.15.6. Munitions Constituents***

Several environmental media sampling events have been conducted on other PA sites located within The Valley Impact Area. Information relating to MC obtained from those sampling events is contained within each individual PA site section.

Based on the history of the range as an impact area for an assortment of Naval ordnance, potential MC present at The Valley Impact Area could include Explosive D, Black powder, TNT, magnesium, NH powder, CTNT, other various metals and chemicals associated with pyrotechnics, such as perchlorate and propellants. For a partial list of known explosives, refer to Section 5.15.3.

#### ***5.15.7. Contaminant Migration Routes***

Contaminants at The Valley Impact Area may potentially migrate within the soil, groundwater, and surface water. Human activities that may disturb MEC include construction, excavation, plowing or tilling, and surface soil or vegetation removal. Based on the soil type found at The

Valley Impact Area, erosion is considered a potential problem along the shorelines of the peninsula. Due to the topography and slope of the land, surface water runoff discharges into the Potomac River, Chicamuxen Creek or Mattawoman Creek. Numerous wetland areas are located within The Valley Impact Area. Surface water could potentially erode the soil and transport contaminants in the wetlands. Precipitation infiltration may provide for contaminant mobility through the subsurface to the shallow or surficial groundwater aquifer, which is assumed to be connected to the nearby surface water bodies. Based on a review of hydrogeological data, it is unlikely that MC in shallow groundwater would migrate to the deeper aquifers that are used as a water supply. However, shallow groundwater is still considered a potential exposure media.

#### ***5.15.8. Receptors***

Potential human receptors include authorized Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users and trespassers. Plant and animal biota are also potential receptors. Examples of ecological receptors include deer, wild turkey, and waterfowl.

##### **5.15.8.1. Nearby Populations**

Nearby populations are as discussed in Section 5.1.8.1.

##### **5.15.8.2. Buildings Near/Within Site**

As previously discussed, The Valley Impact Area encompasses the majority of the western portion of the Stump Neck Annex; therefore, numerous Navy buildings are located within the site boundaries. These buildings are used for office and classroom space as well as munitions development for training purposes.

##### **5.15.8.3. Utilities On/Near Site**

According to the installation's 2003 Utilities Data map, there are potable water, sewer and electric lines in areas of The Valley Impact Area which are not included as Species Protection Areas.

**5.15.9. Land Use**

As mentioned in previous sections, The Valley Impact Area (Stump Neck) was acquired as a target (landing spot) for test firing from The Valley site from 1891 through 1921 and a target for Marine firing from 1931 through 1934. In addition, The Valley Impact Area houses numerous Navy buildings, roads and utilities as part of the development of Stump Neck. These facilities are still used. Some portions of The Valley Impact Area are used as a Species Protection Area. There is no current information of any future land use plans for The Valley Impact Area. According to the 2003-2004 Stump Neck Annex Hunting Map, a large portion of The Valley Impact Area is located in an upland hunting area.

**5.15.10. Access Controls / Restrictions**

Access to The Valley Impact Area (Stump Neck) is limited by gated entrances, a security patrol and a perimeter fence; however, the area can be accessed by boat without any security measures. Some portions of the shorelines are steep cliffs with limited access. Forested areas are also located within portions of The Valley Impact Area. Only Navy personnel and authorized contractors/visitors are allowed on the installation.

According to the Soil Survey of Charles County, many of the soil types at The Valley Impact Area and Indian Head have load bearing capacity limitations as a result of high water tables and extreme erodability conditions. Based on this information, the installation has limited the construction and use of septic systems in specific areas of concern.

**5.15.11. Conceptual Site Model**

A general description of the CSM is provided in Section 5.1.11. The CSM is presented in a series of information profiles that presents information about the range. The information profiles are included in Table 5.15-1 below.

<b>Table 5.15-1: Conceptual Site Model Information Profiles – THE VALLEY IMPACT AREA</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
<b>Range/Site Profile</b>	Installation Name	NDW, Indian Head
	Installation Location	Indian Head, Charles County, Maryland
	Range/Site Name	The Valley Impact Area

<b>Table 5.15-1: Conceptual Site Model Information Profiles – THE VALLEY IMPACT AREA</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
	Range/Site Location	Stump Neck Annex
	Range/Site History	The site was used from 1891 through 1921 as an impact area for The Valley, which is located on Indian Head Main Installation. The Valley Impact Area received long-range projectiles fired from The Valley. Two observation stations were located at the site to identify projectile direction and landing. The site was also used as an impact area for Quantico Marine Corps Base firing until 1934.
	Range/Site Area and Layout	The Valley Impact Area is land portion of Stump Neck Annex, which is 694 acres situated within the firing fan of The Valley.  The site, along with the Potomac River, was the primary target for long-range guns tested and proved at The Valley. Since test projectiles were fired from The Valley, documentation states that shells were very erratic and may have landed anywhere within The Valley Impact Area. In addition, firing from Quantico Marine Corps Base was directed to impact Stump Neck Annex and a 5,500-yard range was situated with firing from Rum Point towards the far side of the Stump Neck Annex.
	Range/Site Structures	Because the site encompasses the majority of the western portion of the Stump Neck Annex, numerous Naval buildings used for training, testing and office space are located at the site. In addition, several paved roads have been constructed to navigate the peninsula.
	Range/Site Boundaries	N: Potomac River and Mattawoman Creek S: Chicamuxen Creek and southern Maryland E: Eastern portion of Stump Neck Annex and eastern Maryland W: Potomac River
	Range/Site Security	NDW, Indian Head had installation-wide security and access restrictions; however, unrestricted access is available by boat along the Potomac River, Chicamuxen Creek and Mattawoman Creek.
<b>Munitions/Release Profile</b>	Munitions Types	Various projectiles associated with 4", 5", 6", 7", 8", 10", 12", 14" and 16" guns (1891-1921) and 75 mm and howitzer (1931-1934).

Table 5.15-1: Conceptual Site Model Information Profiles – THE VALLEY IMPACT AREA		
Profile Type	Information Needs	Preliminary Assessment Findings
	Maximum Probability Penetration Depth	The maximum penetration depth for ordnance within The Valley Impact Area is 47 feet, based on a 16 inch projectile.
	MEC Density	The anticipated MEC density at the site is low due to the construction, development and continued use that has occurred at the site over the past 80 years.
	Munitions Debris	Various MEC debris and fragments were identified on portions of the site; however, the items found were attributed to Range 6 and not to The Valley Impact Area.
	Associated Munitions Constituents	Potential munitions constituents associated with The Valley Impact Area include: Explosive D, Black Powder, TNT, Magnesium, NH powder, CTNT and various metals and propellants.
	Migration Routes/Release Mechanisms	Soil surface runoff, soil leaching, groundwater discharge, site maintenance, construction, excavation
Physical Profile	Climate	Indian Head, MD had a continental-type climate with four well-defined seasons. The coldest period occurs in late January and early February, with low temperatures averaging 29°F. July is the warmest month with average maximum temperatures of 85°F. The normal annual precipitation is approximately 44 inches, with normal monthly precipitation varying from 2.25 (February) to 4.60 (August) inches.
	Topography	Elevations at the site range from 0 to 80 meters above sea level. The shoreline portions of the site are relatively flat with increasing slopes further inland.
	Geology	Indian Head lies within the Atlantic Coastal plain physiographic province. The geology of the area is comprised of Precambrian igneous and metamorphic bedrock overlain by 500 to 600 feet of unconsolidated fluvial and marine deposits of the Potomac Group. The Potomac Group consists of, in descending order, the Patapsco, Arundel, and Patuxent Formations.
	Soil	Soils in the area consist of silty sand with gravel at the ground surface underlain by silty sand with clay.

<b>Table 5.15-1: Conceptual Site Model Information Profiles – THE VALLEY IMPACT AREA</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
	Hydrogeology	The hydrogeological makeup of the Indian Head, MD area consists of a surficial aquifer and several deeper confined and semi-confined aquifers in the Patapsco and Patuxent Formations. The surficial aquifer is expected to be connected to and influenced by the surface water bodies. Regional water supplies, including that of NDW, Indian Head, are obtained from the lower and middle sands of the Patapsco and Patuxent Formations of the Potomac Group. The surficial aquifer (i.e., water table) is not used for water supply at NDW, Indian Head.
	Hydrology	Surface water at The Valley Impact Area drains either directly into the wetland areas within the site or into numerous un-named tributaries at the site, which feed the area wetlands. The wetland areas drain into the Chicamuxen Creek. Some areas of the site drain directly into the Potomac River and Mattawoman or Chicamuxen Creeks.
	Vegetation	Vegetation at the site is a mixture of mowed grass, grass fields, forest, and wetlands.
<b>Land Use and Exposure Profile</b>	Current Land Use	The site overlaps the majority of the Stump Neck Annex, which is currently used for a variety of Navel ordnance testing and training operations. The site encompasses numerous active and inactive locations.
	Current Human Receptors	Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users, and trespassers
	Current Activities (frequency, nature of activity)	Current activities at the site include frequent vegetation clearing, grass cutting. Navy personnel utilize the site for various types of operations including training and office space.
	Potential Future Land Use	No change anticipated
	Potential Future Human Receptors	Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users, and trespassers
	Potential Future Land Use-Related Activities:	No change anticipated

Table 5.15-1: Conceptual Site Model Information Profiles – THE VALLEY IMPACT AREA		
Profile Type	Information Needs	Preliminary Assessment Findings
	Zoning/Land Use Restrictions	A wildlife protection area exists within the site. The site is also characterized by a seasonally high water table and highly eroded soils. A waiver is required for installation of septic systems.
	Demographics/Zoning	Charles County population density is approximately 260 persons per square mile. NDW, Indian Head and its tenant commands employ approximately 3,600 military and civilian personnel.
	Beneficial Resources	The Valley Impact Area overlaps tidal wetlands
<b>Ecological Profile</b>	Habitat Type	Improved areas with mowed lawn, tidal emergent scrub-shrub with successional forests. Wetlands are also located within the site area.
	Degree of Disturbance	High – Activities at the site include a high level of disturbance (i.e., vegetation is kept to a minimum; area is heavily used for boat and vehicle traffic, portions of Stump Neck Annex are currently used for a variety of Naval ordnance testing and training operations)
	Ecological Receptors	
	Federal Endangered Species:	American bald eagle, rainbow snake and sensitive joint-vetch
	Federal Threatened Species:	None
	State Endangered Species:	Scaly blazing- star
	State Threatened Species:	None
	Other Ecological Receptors:	Other ecological receptors include numerous species of birds, amphibians, reptiles and mammals such as the white-tail deer, wild turkeys, red-bellied woodpecker and the eastern box turtle.
	Relationship of MEC/MC Sources to Habitat and Potential Receptors	Receptors may have direct or indirect contact with MEC and MC that exist in the environment or have been incorporated into the food chain.

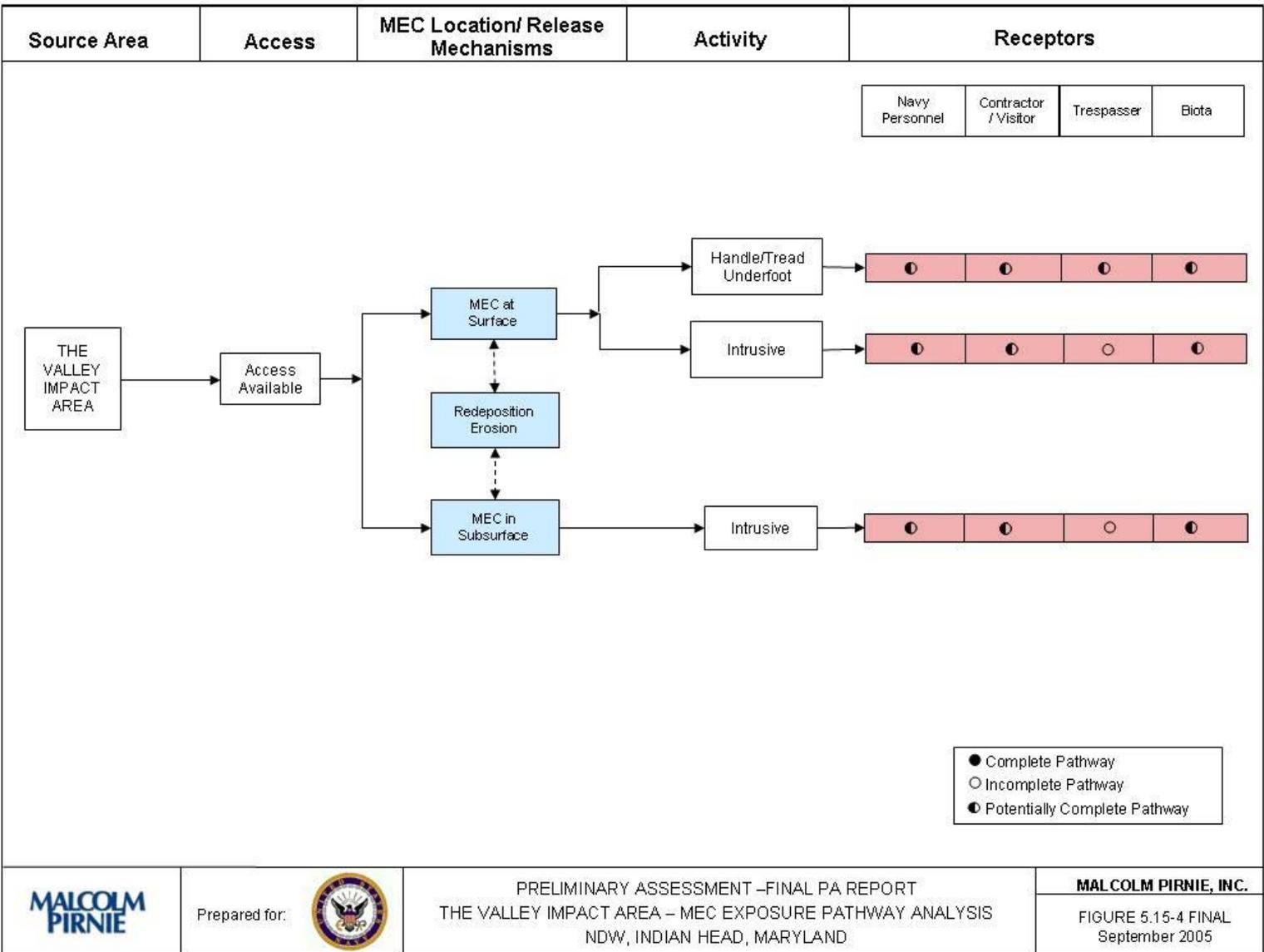
A general description of the CSM exposure pathway analysis is included in Section 5.1.11.

Historical evidence indicates that MEC may be present at The Valley Impact area; however, the density of the MEC is unknown. Therefore, potentially complete pathways exist for human and

ecological receptors for MEC in the surface and subsurface soils. This includes receptors for hand/tread underfoot contact as well as surface intrusive work that may be conducted at The Valley Impact Area. These activities include, but are not limited to, excavation, plowing, tilling, construction, and environmental sampling for human receptors. Ecological receptors may come in contact with MEC through burrowing, nesting or feeding activities that disturb surface soils. Trespassers are anticipated to be exposed to non-intrusive surface soil activities at the site, but it is unlikely they would be exposed to subsurface soil through intrusive activities. An Exposure Pathway Analysis figure for MEC is presented in Figure 5.15-4.

As illustrated in the MC Exposure Pathway Analysis (Figure 5.15-5), soil and surface water impacted by MC represents a primary source medium. Exposures to surface soil, subsurface soil, and surface water/sediments containing MC may present potentially complete pathways for human and ecological receptors. All human and ecological receptors have potentially complete exposure pathways for direct contact with MC in surface soil, which includes dermal contact, ingestion, and inhalation (dust). Runoff, discharges, and /or erosion may transport the MC from surface soil to surface water/sediments. Precipitation infiltration may provide for contaminant mobility into the subsurface soil and into the shallow or surficial groundwater aquifer, which is assumed to be connected to the nearby surface water bodies. Since The Valley Impact Area is located within an allowed hunting area, human and ecological receptors have a potentially complete pathway by ingesting game/prey that have consumed contaminated vegetation or prey. Potentially complete exposure pathways exist for MC in subsurface soils (direct contact, ingestion and inhalation during intrusive work activities) for all human and ecological receptors with the exception of trespassers because of potential infiltration. It is not anticipated that trespassers would come in contact with subsurface soils. Although confining layers are expected to prevent the migration of MC to the lower aquifers used for water supply, potentially complete pathways exist for MC in shallow groundwater for human receptors.

Figure 5.15-4: MEC Exposure Pathway Analysis



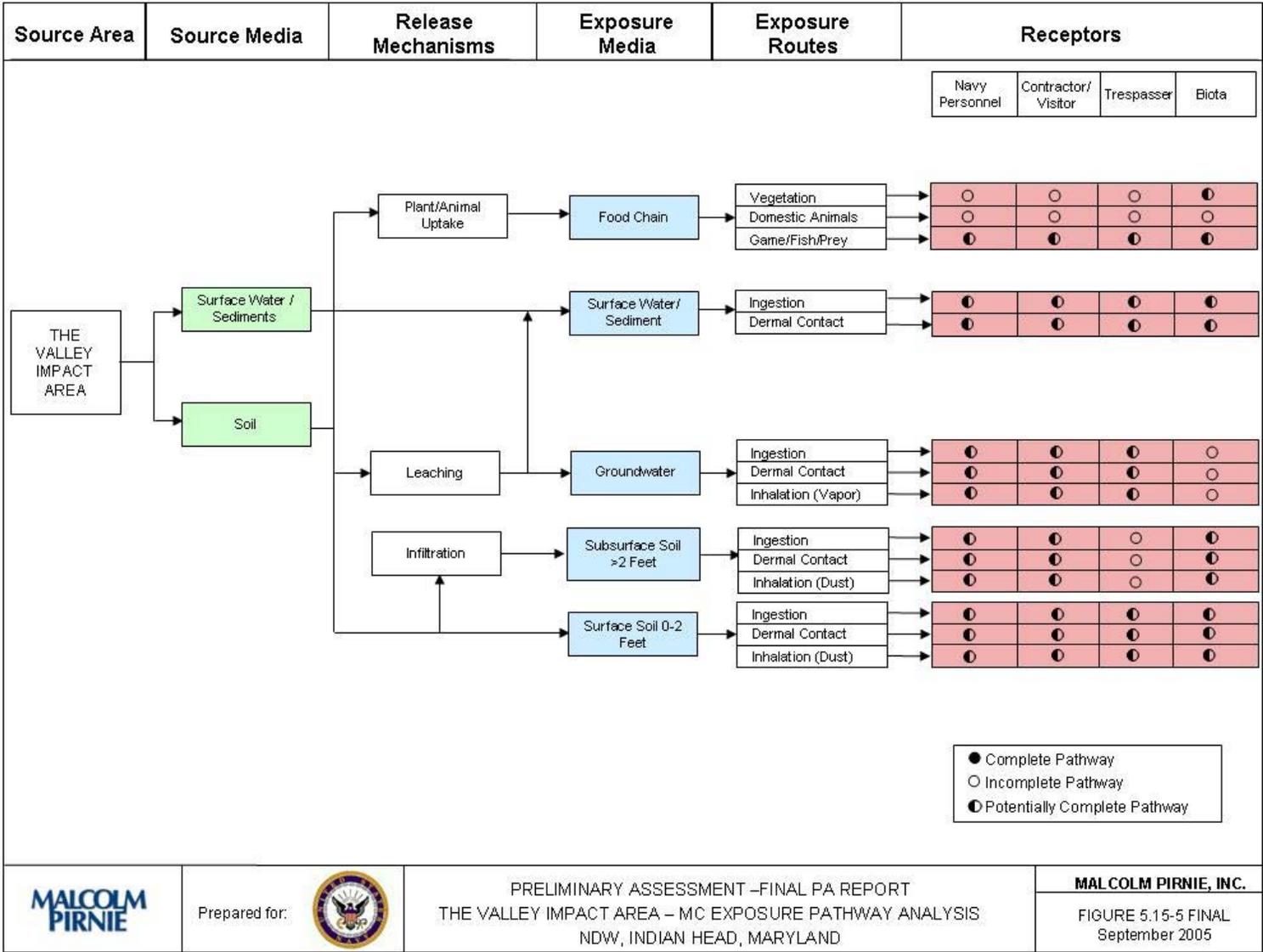


Figure 5.15-5: MC Exposure Pathway Analysis

**5.15.12. Summary**

The Valley Impact Area covers approximately 694 acres of the western portion of Stump Neck Annex. The acreage includes only land coverage within the installation boundary and excludes acreages already calculated as part of other MRP sites. The Valley Impact Area received fire from The Valley gun proving site located on the Main Installation of NDW, IH from 1891 through 1921. Various caliber guns (4-inch through 16-inch) were fired into The Valley Impact Area. The shells contained different types of explosive fillers including black powder, smokeless powder, brown prismatic powder, emmensite, joveite, wet gun cotton, randite and other high explosives (e.g., Thorite). In addition to fire from the gun proving site, The Valley Impact Area received impacts from a firing range set up in the vicinity of Rum Point. The range was established by an agreement between the installation and MCB Quantico. The exact location of the range is unknown; however, firing was oriented towards the far side of Stump Neck Annex. MCB Quantico was also permitted to fire large artillery at the Stump Neck Annex for several years until 1934. During the visual survey, MEC was observed along the western shoreline of the Potomac River; however, the MEC was attributed to the active range (Range 6) near the area. Potential MC includes Explosive D, Black powder, TNT, magnesium, NH powder, CTNT, other various metals and chemicals associated with pyrotechnics, such as perchlorate and propellants.

**Map 5.15-1: Visual Survey: The Valley Impact Area**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.15-2: Range/Site Details: The Valley Impact Area**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.15-3: Munitions Characterization: The Valley Impact Area**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

## 5.16. TORPEDO BURIAL SITE

### *5.16.1. History and Site Description*

The Torpedo Burial Site is a 0.88-acre site located in a wooded area in the central portion of the Stump Neck Annex, about 100 meters south of Building 2075. The site is laid out in a semicircular shape with the main axis oriented east-west, according to Indian Head staff (Map 5.16-1). The original site boundary, as identified in the Navy's Range Inventory, was expanded after observing a 21-inch torpedo casing during the visual survey (Map 5.16-2). Additional terrain features include a wetland marsh immediately south, and a seasonal tributary that bisects the site. The site is accessed via a southbound dirt road off of Archer Avenue, then by proceeding easterly on foot along a utility grade through the woods. The ground is wet with many small pools of standing water and is thinly covered with grass, shrubs, and trees.

Historical information on the Torpedo Burial Site is limited, so it is uncertain if torpedoes were buried at this location. According to available reports, the site consists of at least one unlined earthen pit used to bury waste material, including torpedoes, primers, detonators, fuzes, squibs, and other associated hardware transported here from a torpedo station near Washington, D.C. in the late 1940s and early 1950s. The pits are not visually observable, nor is there any evidence of its possible locations. A section of a 21-inch torpedo casing was discovered on the site, but its origin is unknown. While no details are available about the size or dimensions of the burial pits, they would have to have been greater than 15 feet in length to accommodate an average torpedo. The width and depth would depend on the quantity of waste buried. The Torpedo Burial Pit is located within the estimated firing fan from The Valley. Refer to Section 5.7 in the Final PA Report for the Main Installation, Indian Head for information on The Valley. Information is also provided in the current PA report under Section 5.15, The Valley Impact Area.

#### **5.16.1.1. Topography**

Section 3.2 provides a general description of topography for the Stump Neck Annex. The land surface at the Torpedo Burial Site gently slopes toward Chicamuxen Creek to the south. The land surface elevation across the site ranges from approximately one to five feet above msl. Due to the topography of the area and the vegetative groundcover, severe erosion is not considered to be a problem.

### 5.16.1.2. Geology

Section 3.3 provides a geologic description for Indian Head and the Stump Neck Annex. This general description is applicable to the Torpedo Burial Site.

### 5.16.1.3. Soil and Vegetation Types

Section 3.4 provides a description of the soil and vegetation types at Indian Head and the Stump Neck Annex. According to the Soil Survey of Charles County, the soil at the Torpedo Burial Site is identified as Mattapex silt loam with zero to two percent slope. Logs from soil borings and test pits installed at the Tool Burial Site (IR Site #34), less than 100 feet west of the Torpedo Burial Site, indicate shallow geologic conditions consisting primarily of sand and gravelly sand overlying clay and silt. The gravels are composed of quartz and are well rounded to subrounded. The vegetation at the Torpedo Burial Site is characterized by heavy grass, shrubs and small trees. Hardwood trees on-site are approximately 10–30 feet tall. The wetland area south of the site is classified by the installation as Palustrine emergent/broad-leaved deciduous scrub-shrub wetland. Figure 5.16-1 illustrates the vegetation on the site.



**Figure 5.16-1: Vegetation on the Torpedo Burial Site (looking east down the utility row)**

### 5.16.1.4. Hydrology

Section 3.5 provides a description of hydrology at Indian Head and the Stump Neck Annex. There is a small tributary that bisects the Torpedo Burial Site. The tributary is a surface runoff sink that overflows into the marsh directly south of the site during heavy rainfalls (Figure 5.16-2). The Chicamuxen Creek, which borders the marsh on three sides, is also an important hydrologic feature as it may be another collection point for surface water runoff from the site. The wetlands and tributaries eventually drain into the Potomac River.



**Figure 5.16-2: Small tributary that bisects the Torpedo Burial site (looking south towards the wetlands)**

#### **5.16.1.5. Hydrogeology**

Section 3.6 provides a description of hydrogeology for Indian Head and the Stump Neck Annex. This information is applicable to the Torpedo Burial Site. However, studies at the adjacent IR Site #34 indicate a shallow aquifer beneath the site that displays the characteristics of an unconfined system. Wells that were installed at IR Site #34 revealed that groundwater was approximately two to five feet bgs. The groundwater flow direction is to the northwest, away from Chicamuxen Creek.

#### **5.16.1.6. Cultural and Natural Resources**

General cultural and natural resources for the Stump Neck Annex are provided in Section 3.7. According to the 1996 Phase I Cultural Resources Survey of Stump Neck Annex there are no archeological/cultural sites within the Torpedo Burial Site. Several shovel test pits were taken on the site and all were found negative for artifacts.

#### **5.16.1.7. Endangered and Special Status Species**

As discussed in Section 3.8, endangered and special status species are reported to exist at the Stump Neck Annex. No endangered or special status species are known to inhabit the Torpedo

Burial Site. However, the reported endangered and special status species have the potential to inhabit the Torpedo Burial Site.

**5.16.2. Visual Survey Observations and Results**

A visual survey of the Torpedo Burial Site took place June 24, 2003. Malcolm Pirnie personnel who conducted the visual survey included Mr. Dinh, Mr. Egholm, Ms. Tegtmeier, Ms. Grim, Mr. Rice, Mr. Hains, Mr. Wiley, Mr. Baker, and Mr. McManus. Mr. Jorgensen and Ms. Morgan,



**Figure 5.16-3: Metallic debris scattered around site: Munitions debris (left); Old metal plow (right)**

NDW, Indian Head Environmental Office, accompanied the team. The survey team entered the area from the west via a utility row and then performed a rectangular transect through the center of the site. Grass, shrubs and a sparse population of hardwood trees covered the swampy ground. Figure 5.16-3 depicts examples of metallic debris that were scattered throughout the site. Figure 5.16-4 shows a 21-inch torpedo casing that was found in a pool of standing water. The torpedo appeared to have been demilitarized because of the hole in the casing. No geophysical inspection of the site has been completed to date.



**Figure 5.16-4: 21-inch torpedo casing appears to be demilitarized by hole in side**

Range/site details are illustrated on Map 5.16-2 located at the end of Section 5.16.

### ***5.16.3. Munitions and Munitions Related Materials Associated with the Site***

This section describes the munitions or munitions related materials known or suspected to be at the site. This includes both MEC and non-hazardous munitions related debris (e.g., fragmentation, base plates, inert mortar fins). The Torpedo Burial Site was believed to be used to dispose of torpedoes and related accessories. With the exception of the items discussed in section 5.16.2, no other MEC or munitions related debris are known at the Torpedo Burial Site.

The Torpedo Burial Site is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Torpedo Burial Site. Technical data sheets are included in Appendix D. Refer to Section 5.7 in the PA Report for the Main Installation, Indian Head for information on The Valley. Information on The Valley is also provided in the current PA report under Section 5.15, The Valley Impact Area.

Based on the information obtained during the data collection process, the Torpedo Burial Site may contain electrically fuzed munitions. It is not suspected to contain CWM filled munitions or DU associated munitions.

#### ***5.16.4. MEC Presence***

The entire site has been subdivided and categorized into one of three levels of MEC presence including: known MEC areas, suspected MEC areas, and areas where no evidence exists to indicate that MEC are known or are suspected to be at the site. Map 5.16-3 illustrates the munitions characterization of the Torpedo Burial Site and is provided at the end of Section 5.16.

##### **5.16.4.1. Known MEC Areas**

The only known MEC area at the Torpedo Burial Site is the location where the torpedo casing section was discovered.

##### **5.16.4.2. Suspected MEC Areas**

The entire Torpedo Burial Site is considered a suspect MEC area; however, the potential relative concentration or density of MEC is not known.

##### **5.16.4.3. Areas Not Suspected to Contain MEC**

According to historical documents and information obtained during the data collection process, there is evidence of the presence of MEC at the Torpedo Burial Site. Therefore, there are no areas at the Torpedo Burial Site that are not suspected to contain MEC.

#### ***5.16.5. Ordnance Penetration Estimates***

Ground penetration due to impact is not considered at this site. However, according to historical documents and information obtained during the data collection process, the site is reported to have at least one burial pit of unknown dimension. The pit would have to have been dug large enough to accommodate torpedoes averaging 15 feet in length and 21 inches in diameter. Figure 5.16-5 depicts two torpedoes from the WWII era that resemble those believed buried at this site. The Torpedo Burial Site is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Torpedo Burial Site. The ordnance penetration depth associated with munitions fired from The Valley is provided in Section 5.15.5. For the purpose of the PA, only the munitions constituents that specifically relate to the Torpedo Burial Site are considered.



**Figure 5.16-5: WWII era torpedoes resembling those allegedly buried at this range.**

**5.16.6. Munitions Constituents**

MC are suspected to be present at this site. MC commonly found in torpedoes include:

- TNT
- RDX
- Composition A
- Composition B
- Composition C
- Torpex
- PETN
- Dynamite
- Nitrocellulose
- Cordite
- Perchlorate

The relative concentration of these MC is not known, but it is not anticipated to exceed 10% concentration in soil. No MC were observed during the visual survey. There was no record found of any excavations or environmental sampling on the site. The Torpedo Burial Site is overlapped by the firing fan from The Valley, located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Torpedo Burial Site. Refer to Section 5.7 in the PA Report for the Main Installation, Indian Head for information on The Valley. Information on The Valley is also provided in the current PA report under Section 5.15, The Valley Impact Area. For the purpose of the PA, only the munitions constituents that specifically relate to the Torpedo Burial Site are considered.

### **5.16.7. Contaminant Migration Routes**

Contaminants at the Torpedo Burial Site may potentially migrate within the soil, groundwater, and surface water runoff. Due to the high erodability of the soils within the area, contaminants may become mobile within the surface soil, particularly during extended periods of surface runoff. The Torpedo Burial Site is a low-lying area bordered by wetlands on the southern edge of the site. Surface runoff occurs either easterly into the Chicamuxen Creek, southerly into the wetlands or into the seasonal tributary that bisects the site. Runoff in the direction of Mattawoman Creek is unlikely to cross Archer Avenue. Contaminants on-site can potentially migrate to the shallow groundwater through infiltration. Based on a review of hydrogeological data, it is unlikely that MC in shallow groundwater would migrate to the deeper aquifers that are used as a water supply. However, shallow groundwater is still considered a potential exposure media.

### **5.16.8. Receptors**

Potential human receptors include authorized Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users and trespassers. Plant and animal biota are also potential receptors. Examples of ecological receptors include deer, wild turkey, and waterfowl.

#### **5.16.8.1. Nearby Populations**

Nearby populations are as discussed in Section 5.1.8.1.

#### **5.16.8.2. Buildings Near/Within Site**

Building 2075 is within approximately 100 meters of the Torpedo Burial Site and is the only building nearby. The building is now condemned. There is no evidence of any pre-existing structure at the site.

#### **5.16.8.3. Utilities On/Near Site**

This site is undeveloped, and there is no evidence of utilities in use on the Torpedo Burial Site. The Visual Inspection Team accessed the site via a utility row, which suggests that water, electricity, or both are available should the need arise. The aforementioned building is no longer

in use and, thus, uses no utilities; however, it is assumed that water and electricity were previously available.

**5.16.9. Land Use**

There is no additional information about this area’s land use prior to and since the late 1940s and early 1950s when it was used for torpedo burial. According to installation personnel, there are no planned future activities at the site.

**5.16.10. Access Controls / Restrictions**

No public access is authorized to the Stump Neck Annex. Signs, partial fencing, locked/secured gates, login book/office check-in, and vehicle security patrol are used to control the entire facility. There are no access control features specific to the Torpedo Burial Site. Access from the water is not controlled.

According to the Soil Survey of Charles County, many of the soil types on Stump Neck and Indian Head have load bearing capacity limitations as a result of high water tables and extreme erodability conditions. Based on this information, the installation has limited construction and the use of septic systems in specific areas of concern. The Torpedo Burial Site is located in a region that has a seasonal high water table and overlaps an area containing hydric soils. The site overlaps two restriction areas: one in which septic systems are prohibited and the other in which a waiver is required for septic systems.

**5.16.11. Conceptual Site Model**

A general description of the CSM is provided in Section 5.1.11. The CSM is presented in a series of information profiles that presents information about the site. The information profiles are included in Table 5.16-1 below.

<b>Table 5.16-1: Conceptual Site Model Information Profiles – TORPEDO BURIAL SITE</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
	Installation Name	NDW, Indian Head
	Installation Location	Indian Head, Charles County, Maryland

Table 5.16-1: Conceptual Site Model Information Profiles – TORPEDO BURIAL SITE		
Profile Type	Information Needs	Preliminary Assessment Findings
	Range/Site Name	Torpedo Burial Site
	Range/Site Location	Located in the central portion of Stump Neck Annex, the site is situated below Archer Avenue and north of Chicamuxen Creek.
	Range/Site History	In the late 1940s to the early 1950s this site may have been used to bury explosive and non-explosive munitions. The site has been inactive since the early 1950s.
	Range/Site Area and Layout	The Torpedo Burial Site is 0.88 acres. The burial pit is not visible, but is believed to coincide with a pool of standing water where a 21-inch torpedo casing section was found.
	Range/Site Structures	There is a condemned wood and metal structure (Bldg. 2075) 100 meters north of the burial site.
	Range/Site Boundaries	N: Open field and then Archer Avenue S: Wetlands (Stump Neck Impact Area) W: Dirt road off of Archer Avenue E: Woodlands
	Range/Site Security	Security for the entire Stump Neck Annex includes partial fencing, lock/secured gates and security patrol. There are no specific access controls or restrictions for the Torpedo Burial Site.
Munitions/ Release Profile	Munitions Types	The site was used for the disposal of torpedoes, casings, primers, detonators, fuzes, and squibs. Historical documents report that these munitions types were buried at the site over a period covering no less than five years. Refer to Section 5.15 for munitions types associated with The Valley.
	Maximum Probability Penetration Depth	The MEC was buried in at least one pit of unknown dimension, but it is believed to have been at least 15 feet long and 21 inches wide to accommodate the average WWII era torpedo. Ordnance penetration depths for munitions fired from The Valley can be found in Section 5.15.5.
	MEC Density	The location where the 21-inch torpedo casing section was found is a known MEC Area. The burial pit would be expected to have a high density of MEC.

Table 5.16-1: Conceptual Site Model Information Profiles – TORPEDO BURIAL SITE		
Profile Type	Information Needs	Preliminary Assessment Findings
	Munitions Debris	A 21-inch torpedo (demilitarized) was identified in standing water, and two or three other pieces of non-discernable debris were observed at the site.
	Associated Munitions Constituents	Sampling data is not available. Potential for MC from torpedoes, casings, primers, detonators, fuzes, and squibs.
	Migration Routes/Release Mechanisms	Soil surface runoff; groundwater discharge; site maintenance; construction; excavation
Physical Profile	Climate	Indian Head, Maryland has a continental-type climate with four well-defined seasons. The coldest period occurs in late January and early February, with low temperatures averaging at 29°F. July is the warmest month with average maximum temperatures of 85°F. The normal annual precipitation is approximately 44 inches, with normal monthly precipitation varying from 2.25 (February) to 4.60 (August) inches.
	Topography	The topography of the Torpedo Burial Site is gently sloping downward from north to south towards the wetland area. The land surface elevation across the site ranges from approximately one to five feet above msl.
	Geology	Indian Head and Stump Neck lie within the Atlantic Coastal plain physiographic province. The geology of the area is comprised of Precambrian igneous and metamorphic bedrock overlain by 500 to 600 feet of unconsolidated fluvial and marine deposits of the Potomac Group. The Potomac Group consists of, in descending order, the Patapsco, Arundel, and Patuxent Formations.
	Soil	The soil within the general area of the Torpedo Burial Site is sand and gravelly sand overlying clay and silt. The Soil Survey of Charles County identified the soil as Mattapex Silt Loam.

Table 5.16-1: Conceptual Site Model Information Profiles – TORPEDO BURIAL SITE		
Profile Type	Information Needs	Preliminary Assessment Findings
	Hydrogeology	The hydrogeological makeup of the Indian Head, Maryland area consists of a surficial aquifer and several deeper confined and semi-confined aquifers in the Patapsco and Patuxent Formations. The surficial aquifer is expected to be connected to and influenced by the surface water bodies. Regional water supplies, including that of NDW, Indian Head, are obtained from the lower and middle sands of the Patapsco and Patuxent Formations of the Potomac Group. The surficial aquifer (i.e., water table) is not used for water supply at NDW, Indian Head.
	Hydrology	There are several small pools of standing water and a larger seasonal tributary that bisects the site. Wetlands are immediately to the south. Surface runoff would flow into the wetlands and the Chicamuxen Creek and eventually drain into the Potomac River.
	Vegetation	The site contains some grass and shrubs and is sparsely populated with hardwood trees.
<b>Land Use and Exposure Profile</b>	Current Land Use	The land is undeveloped and not currently used for any formal purpose. Recreational activities do occur on a permit basis.
	Current Human Receptors	Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users, and trespassers.
	Current Activities (frequency, nature of activity)	Minimal activity occurs on-site. Environmental, ecological, and/or cultural surveys, hunting and other outdoor recreational activities are possible.
	Potential Future Land Use	No future change in land use is anticipated.
	Potential Future Human Receptors	Navy personnel (military and civilian), visitors, trespassers, contractors, construction workers (if intrusive work is necessary) and maintenance and operations workers, as well as recreational users (hunters).
	Potential Future Land Use-Related Activities:	There is no anticipated change in land use or related activities
	Zoning/Land Use Restrictions	Construction is restricted; septic tank installation is restricted without a permit.

Table 5.16-1: Conceptual Site Model Information Profiles – TORPEDO BURIAL SITE		
Profile Type	Information Needs	Preliminary Assessment Findings
	Demographics/Zoning	Charles County population density is approximately 260 persons per square mile, while NDW, Indian Head and its tenant commands employ approximately 3,600 military and civilian personnel.
	Beneficial Resources	None
Ecological Profile	Habitat Type	The habitats within and around this former site include wetlands, grasses, mature forest and successional forest.
	Degree of Disturbance	Low: The site is currently not maintained and not used for any purpose other than recreational activities.
	Ecological Receptors	
	Federal Endangered Species:	American bald eagle, rainbow snake, sensitive joint-vetch
	Federal Threatened Species:	None
	State Endangered Species:	Scaly blazing-star
	State Threatened Species:	None
	Other Ecological Receptors:	Other ecological receptors include numerous species of birds, reptiles and mammals such as the white tailed deer, wild turkey, the red-bellied woodpecker and the eastern box turtle.
	Relationship of MEC/MC Sources to Habitat and Potential Receptors	Receptors may contact MEC in the subsurface soil. Receptors may have contact with MC directly through surface water/soil or indirectly through the food chain (bioaccumulated in plants and animals).

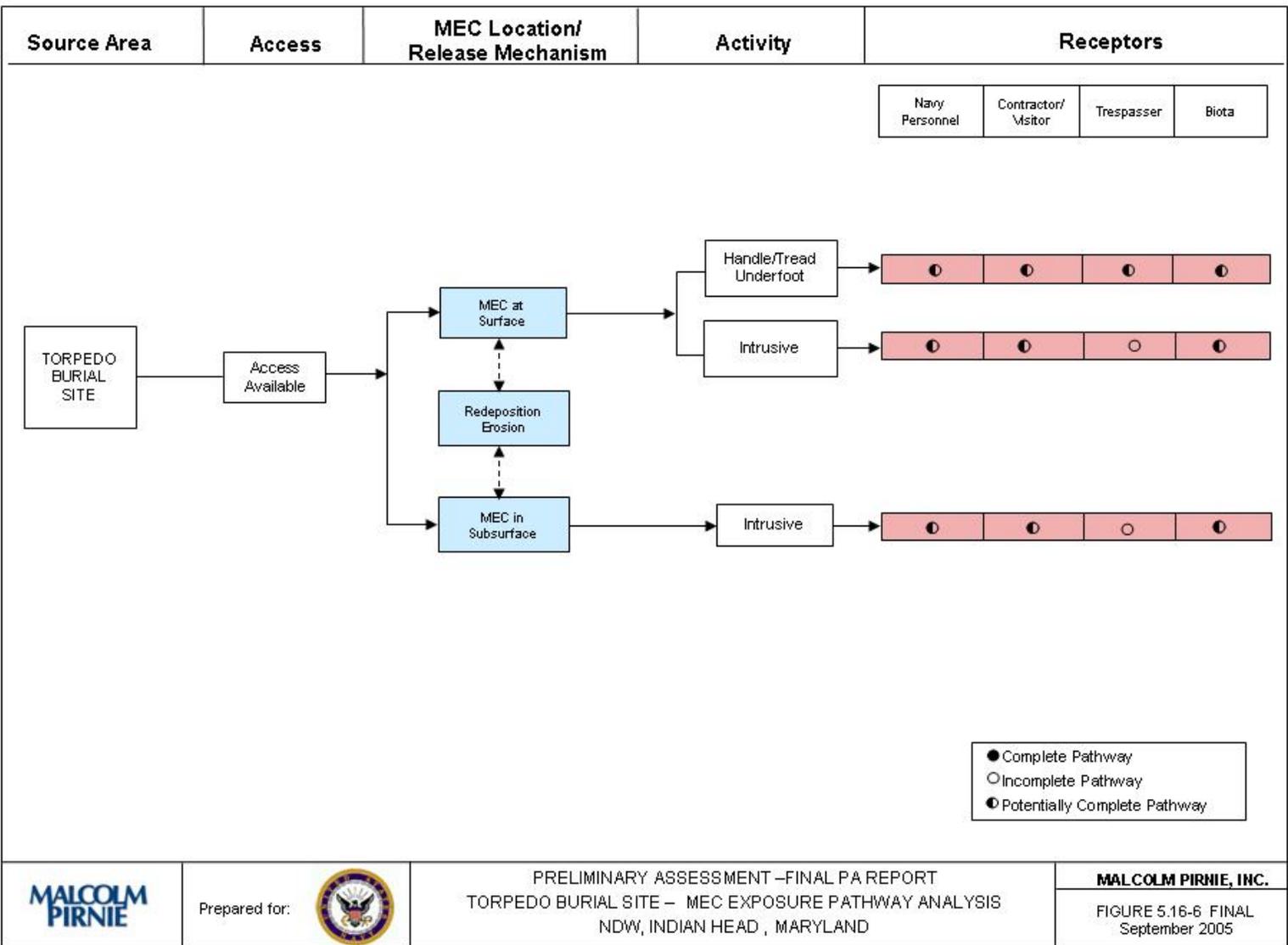
A general description of the CSM exposure pathway analysis is included in Section 5.1.11. The Torpedo Burial Site is overlapped by the firing fan from The Valley located at NDW, Indian Head, Main Installation. Thus, there is a potential for munitions associated with The Valley to be present at the Torpedo Burial Site. However for the purpose of the PA, only MEC and/or MC associated with the Torpedo Burial Site is considered within the CSM exposure pathway analysis. For exposure pathway analysis for The Valley Impact Area, refer to Section 5.15.11.

Historical and visual evidence indicate that MEC may be present at the site. As such, an Exposure Pathway Analysis Figure for MEC was created and is shown in Figure 5.16-6.

Potentially complete pathways exist for human and ecological receptors for MEC in the surface soil. This includes receptors for hand/tread underfoot contact as well as surface intrusive work that may be conducted at the Torpedo Burial Site. These activities include, but are not limited to, excavation, plowing, tilling, construction, and environmental sampling for human receptors. Ecological receptors may come in contact with MEC through burrowing, nesting, or feeding activities that disturb surface soil. Trespassers are anticipated to be exposed to non-intrusive surface soil activities at the site, but it is unlikely they would be exposed to surface soil through intrusive activities. MEC are expected to be present in subsurface soil. As such, potentially complete pathways exist for ecological and human receptors with the exception of trespassers. It is not anticipated that trespassers would come in contact with subsurface soils.

Soil and surface water/sediments impacted by MC represent a primary potential source medium, as illustrated in the Exposure Pathway Analysis Figure for MC, Figure 5.16-7. Potential receptors include both human and ecological receptors that may disturb, unbury, or remove the source medium from the site. Potentially complete exposure pathways exist for surface soil through ingestion, dermal contact, and inhalation for both human and ecological receptors. A seasonal tributary bisects the site. Runoff, discharges, and/or erosion may transport the MC from surface soil to surface water/sediments, so potentially complete pathways also exist for all human and ecological receptors of surface water/sediments. Soil also represents an exposure medium when considering plant/animal uptake for biota (including game such as deer) and human receptors consuming the affected biota (e.g., hunting). As this is a potential burial site, MC is expected to be present in the subsurface soils. It is not anticipated that trespassers would come in contact with subsurface soils. There is a potential for the MC present in the soils to infiltrate to the surficial groundwater. Although confining layers are expected to prevent the migration of MC to the lower aquifers used for water supply, potentially complete pathways exist for MC in shallow groundwater for human receptors

Figure 5.16-6: MEC Exposure Pathway Analysis



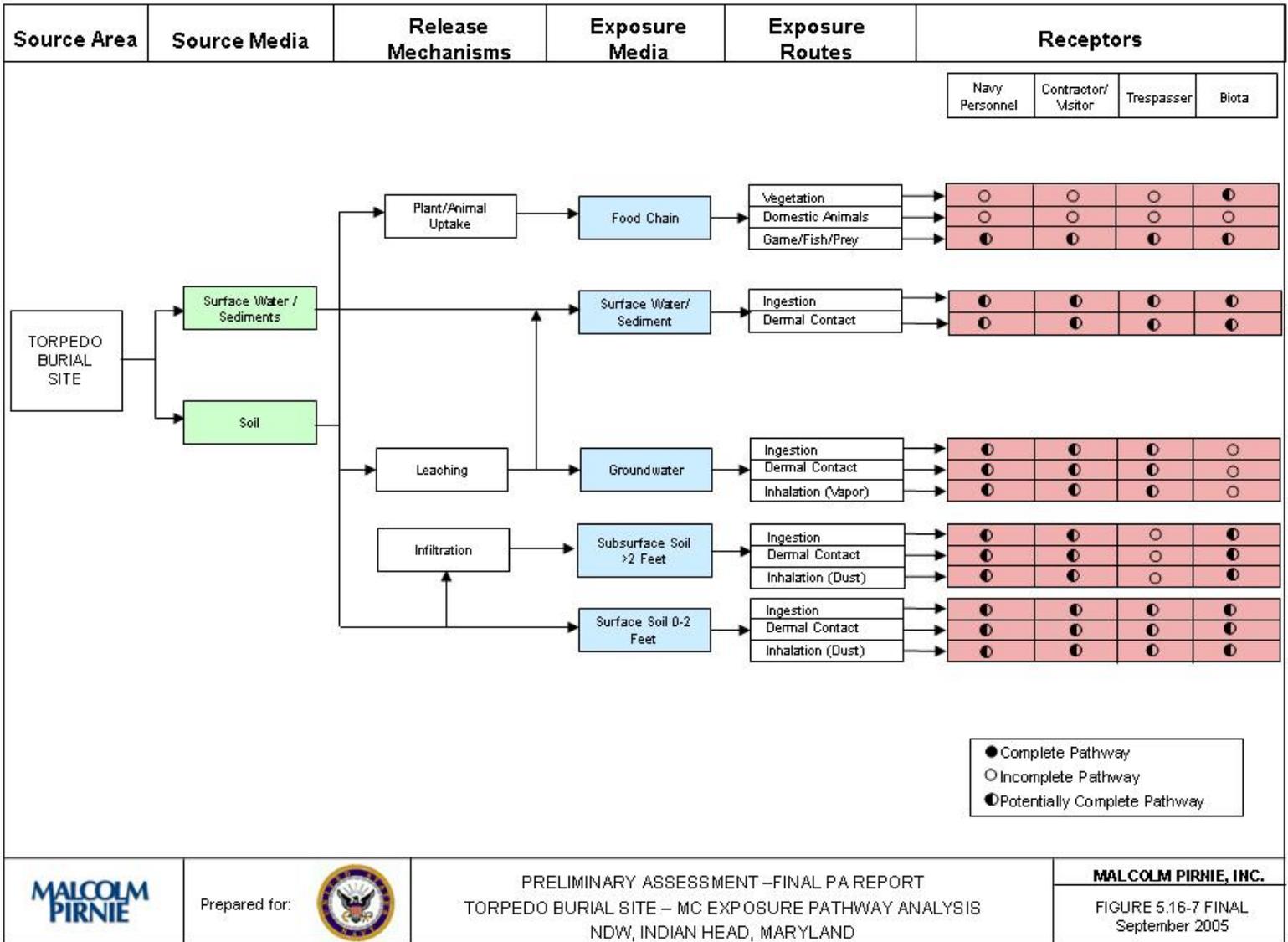


Figure 5.16-7: MC Exposure Pathway Analysis



Prepared for:

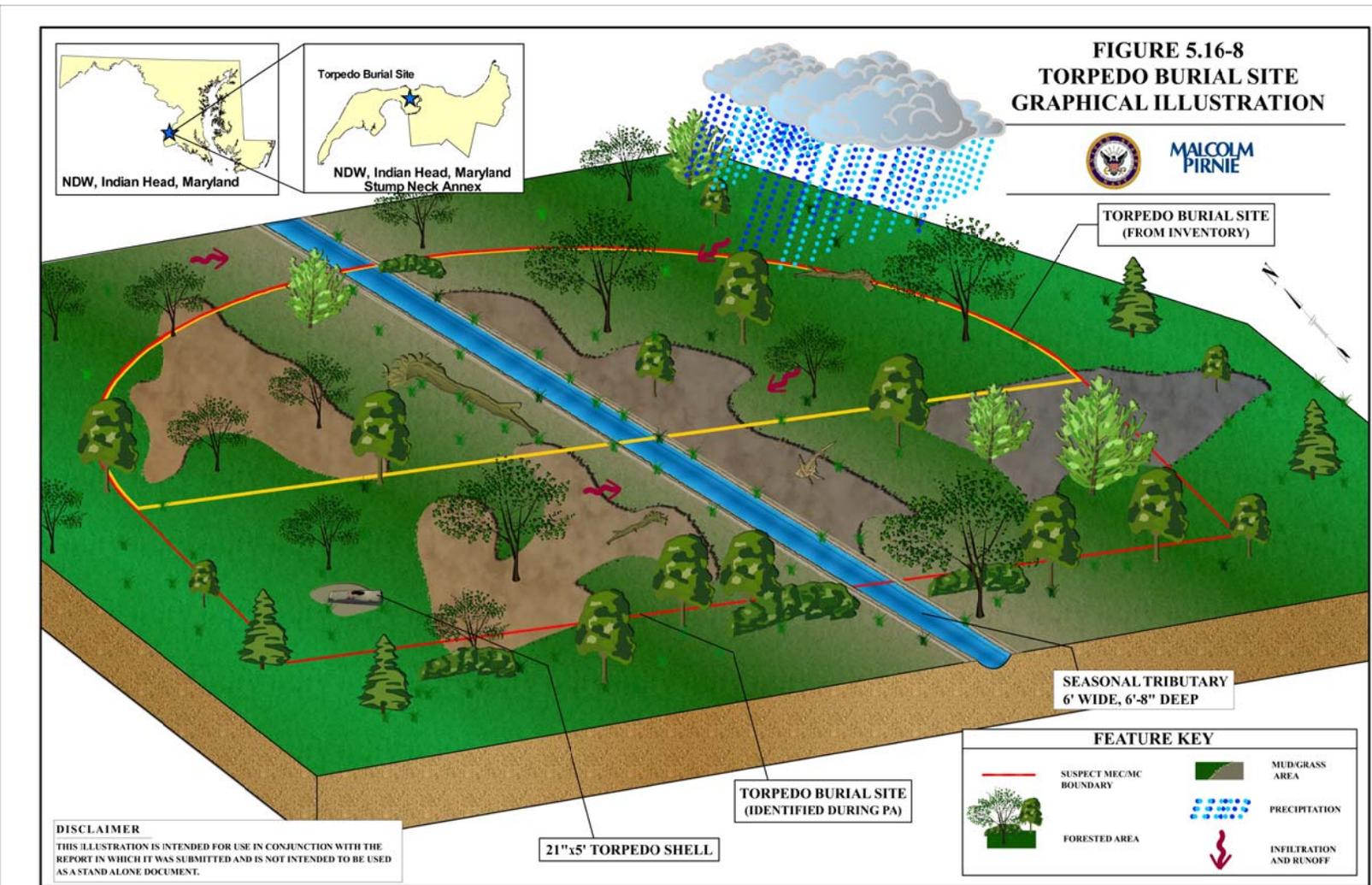


PRELIMINARY ASSESSMENT – FINAL PA REPORT  
TORPEDO BURIAL SITE – MC EXPOSURE PATHWAY ANALYSIS  
NDW, INDIAN HEAD, MARYLAND

**MALCOLM PIRNIE, INC.**

FIGURE 5.16-7 FINAL  
September 2005

Figure 5.16-8: Torpedo Burial Site Graphical Illustration



**5.16.12. Summary**

The Torpedo Burial Site is 0.88-acres located in the north central region of Stump Neck Annex. The site is situated in the woods off Archer Avenue, about 100 meters south of Bldg. 2075. The site was first identified in a 1983 Initial Assessment Study while the USEPA was preparing to issue a RCRA permit to the Navy for its facility on Stump Neck. Under a FFA between the USEPA and the Navy, the site (also known as IR Site #35) was identified as a Site Screening Area, which would undergo a Site Screening Process to determine if a remedial investigation, feasibility study, or no further action would be required. The results of the Site Screening Process are unknown. According to a 1990 Fact Sheet for Hazardous Waste Management Facility Permit, the site contained unknown quantities of inert objects including discarded torpedo shells and associated hardware deposited there between the late 1940s and the early 1950s. In that report, the USEPA concluded that “no further action” was necessary at that time.

Since then, no new historical information has surfaced to confirm or deny these findings; however, some new physical evidence raises old questions. Most compelling is the discovery of a 21-inch torpedo shell found in a small pool of standing water at the site. No further information is available about the torpedo, except that it appears to have been demilitarized. Large pieces of munitions debris and miscellaneous metal fragments have also been found at the site. It is uncertain if these items were once buried and have since resurfaced, or if they were transplanted from another location.

Geophysical sampling was performed near the Torpedo Burial Site at IR Site #34. The findings of that study are published in the Site Screening Process Report dated March, 2003. Although the study was looking for COPCs related to beryllium-copper alloy tools, no explosives were detected in groundwater samples.

**Map 5.16-1: Visual Survey: Torpedo Burial Site**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.16-2: Range/Site Details: Torpedo Burial Site**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.16-3: Munitions Characterization: Torpedo Burial Site**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

## 5.17. TORPEDO CASING DISPOSAL AREA

### 5.17.1. *History and Site Description*

The Torpedo Casing Disposal Area is approximately 0.74 acres located 200 feet north of Archer Avenue and partially within a designated wildlife area. The wildlife area is a cleared strip of land roughly 20 feet wide extending north from Archer Avenue to the Potomac River. The disposal site reportedly overlays the western edge of the cleared area and extends into the bordering tree line. The site is rectangular in shape and approximately 165 feet wide and 330 feet long. The area was identified through the Navy Range Inventory; however, its location was initially described incorrectly. Initial maps showed the area positioned under the water tower adjacent to Archer Avenue, east of the corrected location. The approximate size and shape of the Torpedo Casing Disposal Area was provided by the inventory. Map 5.17-1 (located at the end of Section 5.17) shows the location of the site and the initial incorrect location as delineated by the installation. There are no maps or aerial photographs that specifically identify the former disposal area. The cleared wildlife area/firebreak does appear on several installation maps and photographs, the earliest one dated 1947. Information about the site was primarily gathered from interviews with installation personnel.

Little available historical information about the Torpedo Casings Disposal Area exists. According to Navy personnel, the area was used as a disposal site for torpedo casings during the 1950s. The exact dates of use are unknown. The depth or number of torpedo casings buried is also unknown. The torpedo casings may have originated from training at the EOD school or from use during WWII. During WWII, foreign torpedoes were often retrieved and brought to Stump Neck for testing. A munitions factory located in Alexandria, Virginia was known to supply the base with torpedoes beginning in the 1920s. The factory produced over 10,000 MK-14 torpedoes. There is, however, no specific information about where the torpedoes originated before being buried at the Torpedo Casing Disposal Area.

According to installation personnel, a magnetic training range was established in the mid 1970s in the area between the north end of the current wildlife area and the Potomac River. This range would have been approximately 300-400 feet from the northern edge of the Torpedo Casing Disposal Area. This range was used only until Test Area 2 was constructed in the late 1970s. Inert ordnance was buried in this former range area, including empty cases of 60-mm mortar, 81-mm mortar, 105-mm projectile, 155-mm projectile, MK81s (250-pound bombs), and MK82s

(500-pound bombs). During the initial set-up of this range, a geophysical investigation was performed, which uncovered magnetic anomalies at a depth greater than three ft indicating that large items were buried in the area of the Torpedo Casing Disposal Area. At this time, the cleared wildlife area was used as a firebreak. Natural Resources converted the firebreak to a wildlife refuge area in 1981 or 1982. The entire wildlife area was disked (a method that turns and loosens the soil with a series of disks) and planted with grass. This process reportedly uncovered inert ordnance material from the magnetic testing area. According to installation personnel, most, if not all, of the ordnance buried for the magnetic testing was removed during this process.

#### **5.17.1.1. Topography**

Section 3.2 provides a general description of topography for the Stump Neck Annex. The topography at the former Torpedo Casing Disposal Area is fairly flat to slightly downward sloping from south to north. This 0.74-acre area is located at an elevation of approximately 80 feet above msl. The elevation at Archer Avenue is 95 feet and slopes down to an elevation of 75 feet at the northern end of the site. Due to the heavy vegetation and the gently sloping land, severe erosion is not considered to be a problem.

#### **5.17.1.2. Geology**

Section 3.3 provides a geologic description for Indian Head and the Stump Neck Annex. There is no site-specific geology for the Torpedo Casing Disposal Area as there are no wells within its boundaries and no sampling has been performed.

#### **5.17.1.3. Soil and Vegetation Types**

Section 3.4 provides a description of the soil and vegetation types at Indian Head and the Stump Neck Annex. The vegetation on the former disposal area is a mix of high grasses in the open field associated with the wildlife area and dense, hardwood forest throughout the rest of the area. The boundaries of the area overlap the eastern side of the wildlife area and extend into the hardwood forest. According to the Soil Survey of Charles County, the soil in this area is Beltsville silt loam with two to five percent slope and moderate erodability. These soils are generally located on terrain that is nearly level to moderately sloping. They are considered moderately well drained, strongly acidic, and slowly permeable. These soils are particularly eroded around surface water bodies or areas with poor drainage where water is able to pool on the

surface. The Torpedo Casing Disposal Area does not have any surface water bodies and is generally well drained. Thus, erosion of the soil on-site is not considered severe.

#### **5.17.1.4. Hydrology**

Section 3.5 provides a description of hydrology at Indian Head and the Stump Neck Annex. There are no streams or tributaries within the boundaries of the Torpedo Casing Disposal Area. One small stream lies to the south of the site across Archer Avenue. While there are no wetlands directly on the site, drainage most likely follows the surface topography in the direction of a small area of wetlands located northeast of the wildlife area. The land slopes downward to Mattawoman Creek, which is located approximately 1100 feet north of the site. Surface water runoff from the site drains into the wetland and Mattawoman Creek before ending up in the Potomac River

#### **5.17.1.5. Hydrogeology**

Section 3.6 provides a description of hydrogeology for Indian Head and the Stump Neck Annex. There are no potable wells located in the vicinity of the Torpedo Casing Disposal Area.

#### **5.17.1.6. Cultural and Natural Resources**

General cultural and natural resources for NDW, Indian Head are provided in Section 3.7. The eastern edge of the Torpedo Casing Disposal Area overlaps a wildlife protected area. According to the 1996 Phase I Cultural Resources Survey and Supplemental Architectural Investigations conducted at Stump Neck Annex, there are no known cultural resources located within the former Torpedo Casing Disposal Area.

#### **5.17.1.7. Endangered and Special Status Species**

As discussed in Section 3.8, endangered and special status species are reported to exist at the Stump Neck Annex. The former Torpedo Casing Disposal Area is partially located on a wildlife protected area. No endangered or special status species are known to exist at the site.

**5.17.2. Visual Survey Observations and Results**

A visual survey of the Torpedo Casing Disposal Area was conducted on June 25, 2003. Malcolm Pirnie personnel who conducted the visual survey included Mr. Rice, Mr. Baker, and Mr. Wiley. Mr. Jorgensen, NDW, Indian Head Environmental Office, accompanied the team. The approximate perimeter of the site was walked during the survey. The site walk was conducted by walking north from Archer Avenue through the open grass corridor and then returning to the road through the woods. The site is located off of Archer Avenue on the north side of the jogging trail adjacent to the road. There are “Do Not Disturb” signs posted along the trail for the wildlife area. The change in vegetation from dense forest to a grass field clearly marks the borders of the wildlife protected area. The site vegetation is illustrated in Figure 5.17-1.

There was no physical evidence (such as soil disturbance or excavation) to suggest where torpedo casings were buried on the site. The boundaries of the site were not clearly visible. There are no buildings or structures on the disposal area. No evidence of MC or MEC was observed during the survey. A visual depiction of the site reconnaissance is provided on Map 5.17-1 located at the end of Section 5.17. Additional site details are illustrated on Map 5.17-2 also located at the end of Section 5.17.



**Figure 5.17-1: The Torpedo Casing Disposal Area and wildlife protection area**

**5.17.3. *Munitions and Munitions Related Materials Associated with the Site***

This section describes the munitions or munitions related materials known or suspected to be at the site, including the types and estimated maximum penetration depths. This includes both MEC and non-hazardous munitions related debris (e.g., fragmentation, base plates, inert mortar fins). Potential ordnance concentration areas are presented along with a discussion on the presence of any special consideration ordnance.

Inert torpedo casings, which are not considered munitions, were reportedly buried at this site. No other information exists regarding the potential for munitions or MC to be buried in this area.

Based on the information obtained during the data collection process, no CWM filled munitions, electrically fuzed munitions, or DU associated munitions are known or suspected to have been used at the site.

**5.17.4. *MEC Presence***

The entire site has been subdivided and categorized into one of three levels of MEC presence including: known MEC areas, suspected MEC areas, and areas where no evidence exists to indicate that MEC are known or are suspected to be at the site. The MEC presence is discussed below.

Map 5.17-3 illustrates the munitions characterization of the Torpedo Casing Disposal Area and is provided at the end of Section 5.17.

**5.17.4.1. *Known MEC Areas***

There are no known MEC areas associated with this site. Only inert torpedo casings are known to be buried at this site.

**5.17.4.2. *Suspected MEC Areas***

There are no suspected MEC areas associated with this site. Only inert torpedo casings are reported to have been buried at this site.

#### **5.17.4.3. Areas Not Suspected to Contain MEC**

The disposal area was used exclusively for torpedo casings. The casings are reportedly inert with no explosive components, therefore, the entire site is not suspected to contain MEC.

#### **5.17.5. *Ordnance Penetration Estimates***

The depth to which munitions penetrate below the ground surface depends on many factors, including the type of soil, the angle of impact, the size of the munition, the velocity at impact, and site-specific environmental conditions. The potential burial depth of the torpedo casings on-site is unknown. A previous geophysical investigation suggests anomalies at greater than three feet bgs. There were no burial pits or areas of visible soil disturbance observed during the site survey. Reportedly, the site was exclusively used as a disposal area. No firing or explosions are known to have occurred on the site; thus, ordnance penetration depth does not apply to this site.

#### **5.17.6. *Munitions Constituents***

At the Torpedo Casing Disposal Area, only empty, inert torpedo casings were reported to have been buried. The expected MC are elevated levels of metals from the weathering of the torpedo casings. Depending on the origin and use of the torpedo casings prior to burial, there is the potential for small amounts of residue on the interior of the casing. No sampling has been performed on the area.

#### **5.17.7. *Contaminant Migration Routes***

Contaminants at the Torpedo Casing Disposal Area may potentially migrate within the soil, surface water runoff, or groundwater. At the Torpedo Casing Disposal Area, all potential contaminants from the torpedo casings would originate in the subsurface where the casings are buried. The torpedoes are estimated to be buried at a depth greater than three feet bgs. No MC are expected in the top three feet of soil and thus, there are no migration routes from surface soil at the site. Precipitation infiltration may provide for contaminant mobility through the subsurface to the shallow or surficial groundwater aquifer, which is assumed to be connected to the nearby surface water bodies. Based on a review of hydrogeological data, it is unlikely that MC in shallow groundwater would migrate to the deeper aquifers that are used as a water supply. However, shallow groundwater is still considered a potential exposure media.

**5.17.8. Receptors**

Potential human receptors include authorized Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users and trespassers. Plant and animal biota are also potential receptors. Examples of ecological receptors include deer, wild turkey, and waterfowl.

**5.17.8.1. Nearby Populations**

Nearby populations are as discussed in Section 5.1.8.1. The Torpedo Casing Disposal Area overlaps a wildlife protection area.

**5.17.8.2. Buildings Near/Within Site**

There are no buildings or structures located within the Torpedo Casing Disposal Area boundaries or on the adjacent wildlife protected area. An explosives storage complex, including over a dozen buildings, is located approximately 150 meters northwest of the site. A water tower is located 220 meters southeast of the site along Archer Avenue.

**5.17.8.3. Utilities On/Near Site**

There was no visual evidence of any utilities on the former Torpedo Casing Disposal Area. According to a 2003 Stump Neck utility map, water, electric and sewer lines run along Archer Avenue, approximately 200 feet south of the area.

**5.17.9. Land Use**

The land was formerly unused prior to its use as a burial site for torpedo casings during the 1950s. Currently, the land overlaps a wildlife refuge. The wildlife refuge was used as firebreak prior to 1981. The date of the logging and establishment of the firebreak is unknown. The protected area is not regularly maintained and is characterized by high grasses. The remainder of the site is located within a heavily forested area and is unused and not maintained.

Hunting is permitted on Stump Neck, including the Torpedo Casing Disposal Area, except for the wildlife refuge. There is no anticipated change in land use at the former site.

**5.17.10. Access Controls / Restrictions**

Access to the Stump Neck Annex is limited by gated entrances, a security patrol and a perimeter fence. Only Navy personnel and authorized contractors/visitors are allowed on the installation. The Torpedo Casing Disposal Area is accessible directly from Archer Avenue. Several “Do Not Disturb” signs along the road identify the wildlife area. There are no site-specific security measures at this site. There are no known restrictions at the Torpedo Casing Disposal Area.

**5.17.11. Conceptual Site Model**

A general description of the CSM is provided in Section 5.1.11. The CSM is presented in a series of information profiles that presents information about the site. The information profiles are included in Table 5.17-1 below.

<b>Table 5.17-1: Conceptual Site Model Information Profiles – TORPEDO CASING DISPOSAL AREA</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
<b>Range/Site Profile</b>	Installation Name	NDW, Indian Head
	Installation Location	Indian Head, Charles County, Maryland
	Range/Site Name	Torpedo Casing Disposal Area
	Range/Site Location	The site is located in the central portion of the Stump Neck Annex. The area is north of Archer Avenue and overlaps the wildlife protected area.
	Range/Site History	The site was reportedly used as a disposal site for torpedo casings during the 1950s.
	Range/Site Area and Layout	The site is approximately 0.74-acres. The eastern edge of the site is part of a wildlife refuge.
	Range/Site Structures	There are no buildings or structures within the boundaries of the disposal area.
	Range/Site Boundaries	N: Hardwood forest S: Jogging trail along Archer Avenue W: Hardwood forest E: Wildlife Protection Refuge

**FINAL PRELIMINARY ASSESSMENT**

<b>Table 5.17-1: Conceptual Site Model Information Profiles – TORPEDO CASING DISPOSAL AREA</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
	Range/Site Security	Security for the entire Stump Neck facility includes partial fencing, lock/secured gates and security patrol. There are no specific access controls for the Torpedo Casing Disposal Area.
<b>Munitions/ Release Profile</b>	Munitions Types	Inert torpedo casings were the only munition types disposed of in this area.
	Maximum Probability Penetration Depth	No firing or explosions would have occurred on the disposal area.
	MEC Density	None
	Munitions Debris	None
	Associated Munitions Constituents	Weathering of torpedo casings may create elevated levels of metals in the soil. Potential MC are from residue remaining on the inside of the torpedo casings.
	Migration Routes/Release Mechanisms	Site maintenance; construction; excavation
<b>Physical Profile</b>	Climate	Indian Head, Maryland has a continental-type climate with four well-defined seasons. The coldest period occurs in late January and early February, with low temperatures averaging at 29°F. July is the warmest month with average maximum temperatures of 85°F. The normal annual precipitation is approximately 44 inches, with normal monthly precipitation varying from 2.25 (February) to 4.60 (August) inches.
	Topography	The topography at the former disposal area is fairly flat to gently sloping downward from south to north.
	Geology	Indian Head and Stump Neck lie within the Atlantic Coastal plain physiographic province. The geology of the area is comprised of Precambrian igneous and metamorphic bedrock overlain by 500 to 600 feet of unconsolidated fluvial and marine deposits of the Potomac Group. The Potomac Group consists of, in descending order, the Patapsco, Arundel, and Patuxent Formations.
	Soil	The soil at the Torpedo Casing Disposal Area is a Beltsville silt loam, two to five percent slope.

**FINAL PRELIMINARY ASSESSMENT**

<b>Table 5.17-1: Conceptual Site Model Information Profiles – TORPEDO CASING DISPOSAL AREA</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
	Hydrogeology	The hydrogeological makeup of the Indian Head, Maryland area consists of a surficial aquifer and several deeper confined and semi-confined aquifers in the Patapsco and Patuxent Formations. The surficial aquifer is expected to be connected to and influenced by the surface water bodies. Regional water supplies, including that of NDW, Indian Head, are obtained from the lower and middle sands of the Patapsco and Patuxent Formations of the Potomac Group. The surficial aquifer (i.e., water table) is not used for water supply at NDW, Indian Head.
	Hydrology	There are no streams or wetlands within the boundaries of the Torpedo Casing Disposal Area. Surface water runoff occurs in the direction of Mattawoman Creek, located approximately 1100 feet north of the site.
	Vegetation	The site includes an open area containing low to high grasses surrounded by a dense, hardwood forest.
<b>Land Use and Exposure Profile</b>	Current Land Use	The Torpedo Disposal Area is partially located within a wildlife protected area. The land is not currently used by the installation.
	Current Human Receptors	Potential receptors include Navy personnel (military and civilian), visitors, contractors, maintenance workers, recreational users, and trespassers.
	Current Activities (frequency, nature of activity)	Minimal activity on site. The wildlife area appears to be infrequently maintained. A jogging trail lies adjacent to the site between the area and Archer Avenue.
	Potential Future Land Use	There is no future change in land use anticipated.
	Potential Future Human Receptors	Potential future receptors include Navy personnel and contractors.
	Potential Future Land Use-Related Activities:	No future change in land use is anticipated.
	Zoning/Land Use Restrictions	None
	Demographics/Zoning	Charles County population density is approximately 260 persons per square mile. NDW, Indian Head and its tenant commands employ approximately 3,600 military and civilian personnel.
	Beneficial Resources	None

Table 5.17-1: Conceptual Site Model Information Profiles – TORPEDO CASING DISPOSAL AREA		
Profile Type	Information Needs	Preliminary Assessment Findings
Ecological Profile	Habitat Type	The habitat within and around the site includes open grass fields and mature hardwood forests.
	Degree of Disturbance	Low- the site is currently unused except as a wildlife protected area.
	Ecological Receptors	
	Federal Endangered Species:	American bald eagle, rainbow snake, sensitive joint-vetch
	Federal Threatened Species:	None
	State Endangered Species:	Scaly blazing-star
	State Threatened Species:	None
	Other Ecological Receptors:	Other ecological receptors include numerous species of birds, amphibians, reptiles and mammals such as the white tailed deer, wild turkey, the red-bellied woodpecker and the eastern box turtle.
	Relationship of MEC/MC Sources to Habitat and Potential Receptors	As the casings are buried at an unknown depth and density, only intrusive activities could potentially expose receptors.

A general description of the CSM exposure pathway analysis is included in Section 5.1.11.

Historical and visual evidence indicate that MEC are not present at the site; therefore, there are no complete exposure pathways for MEC. As such, an Exposure Pathway Analysis Figure for MEC was not created. Soil impacted by MC represents a primary potential source medium, as illustrated in the Exposure Pathway Analysis for MC (Figure 5.17-2). There are no potentially complete pathways for exposure to surface soil, as the torpedo casings are buried at a depth greater than three feet. Potential receptors include Navy personnel and contractors who could disturb subsurface soil and unbury or remove the source medium from the site. Activities include excavation of the site for construction purposes or for possible environmental, intrusive sampling. It is not anticipated that trespassers would come in contact with subsurface soils. Burrowing animals may also come into contact with buried MEC. Soil also represents an exposure medium when considering plant/animal uptake for biota (including game such as deer) and human receptors consuming the affected biota (e.g., hunting). There is a potential for the MC present in the subsurface soil to infiltrate to surficial groundwater. Precipitation infiltration may provide for

## **FINAL PRELIMINARY ASSESSMENT**

contaminant mobility into the subsurface soil and into the shallow or surficial groundwater aquifer, which is assumed to be connected to the nearby surface water bodies. Thus, there are potentially complete pathways to MC in surface water/sediment for all receptors. Although confining layers are expected to prevent the migration of MC to the lower aquifers used for water supply, potentially complete pathways exist for MC in shallow groundwater for human receptors.

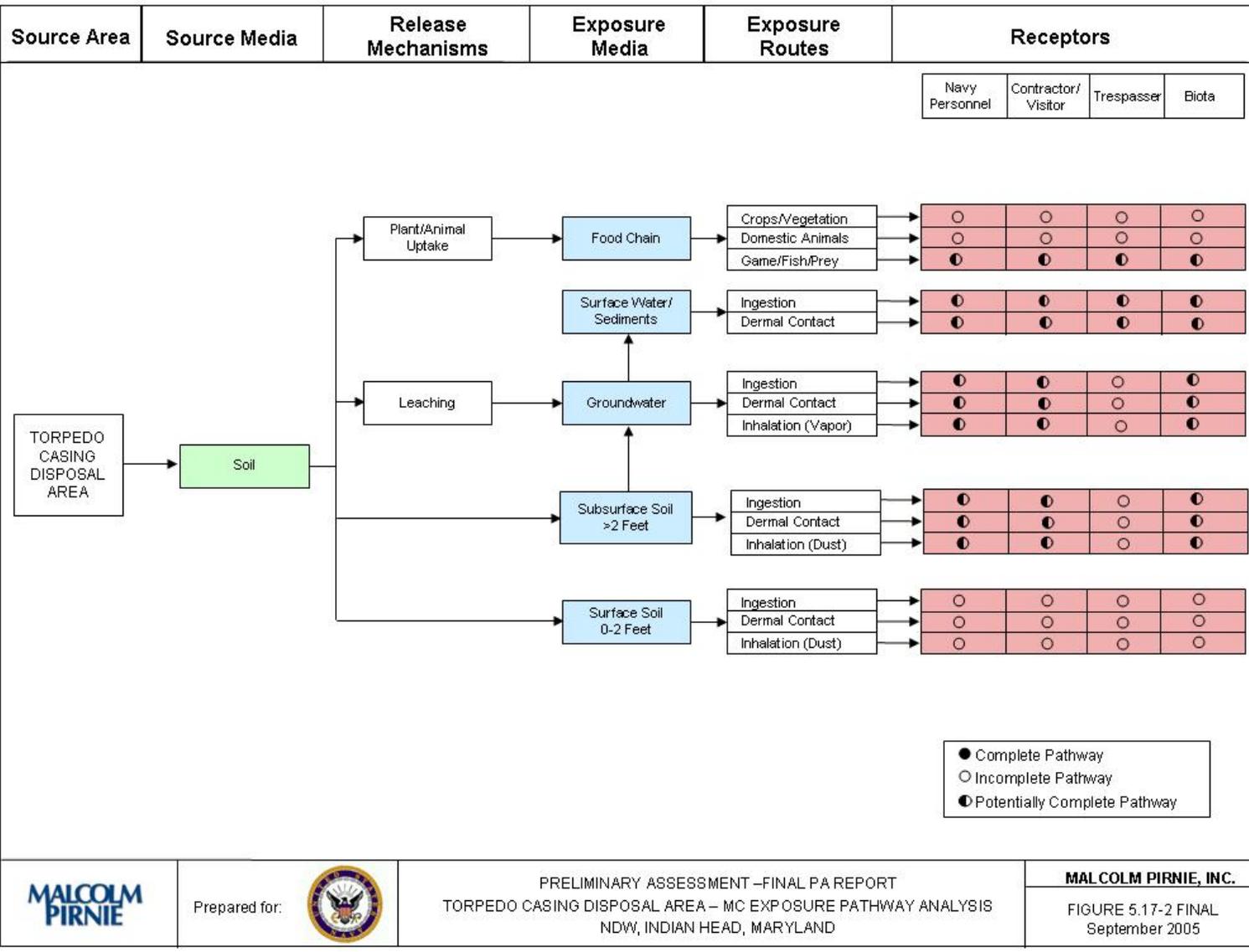


Figure 5.17-2: MC Exposure Pathway Analysis



Prepared for:



PRELIMINARY ASSESSMENT –FINAL PA REPORT  
TORPEDO CASING DISPOSAL AREA – MC EXPOSURE PATHWAY ANALYSIS  
NDW, INDIAN HEAD, MARYLAND

**MALCOLM PIRNIE, INC.**

FIGURE 5.17-2 FINAL  
September 2005

*5.17.12. Summary*

The Torpedo Casing Disposal Area is 0.74 acres located in the central portion of Stump Neck Annex. It was reportedly used during the 1950s as a burial site for torpedo casings. The precise dates of use and types of torpedo casings buried are unknown. The current conditions of the casings are also unknown. The casings are presumed to be inert with no explosive risk. Depending on the use of the torpedo, there is the possibility of residue left within the casing. Due to weathering, there may be elevated levels of metals in the soils on-site. No visual signs (e.g., casings, pits or soil disturbance) of the former disposal area remain. A former magnetic training area is located north of the Torpedo Casing Disposal Area. A geophysical investigation in this area revealed no magnetic anomalies shallower than three feet, however, there were magnetic anomalies found at greater than three feet in the location of the Torpedo Casing Disposal Area. According to installation personnel, the adjacent wildlife area was disked during its establishment in 1981 or 1982, and most or all of the buried ordnance from the magnetic test range was uncovered. The ordnance removal has not yet been confirmed.

**Map 5.17-1: Visual Survey: Torpedo Casing Disposal Area**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.17-2: Range/Site Details: Torpedo Casing Disposal Area**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Map 5.17-3: Munitions Characterization: Torpedo Casing Disposal Area**

This map is located on the CD ROM in CD\_1\_Report&Maps\Stump\_Neck\_Maps

**Preliminary Assessment  
NDW, Indian Head, Maryland**



**MALCOLM  
PIRNIE**

**Map 5.5-1  
Visual Survey  
Advanced IED Area**

**Legend**

-  Installation Boundary
-  Advanced IED Area
-  Site Reconnaissance



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005

**Preliminary Assessment  
NDW, Indian Head, Maryland**

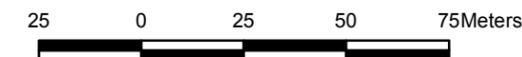


**MALCOLM  
PIRNE**

**Map 5.5-2  
Range/Site Details  
Advanced IED Area**

**Legend**

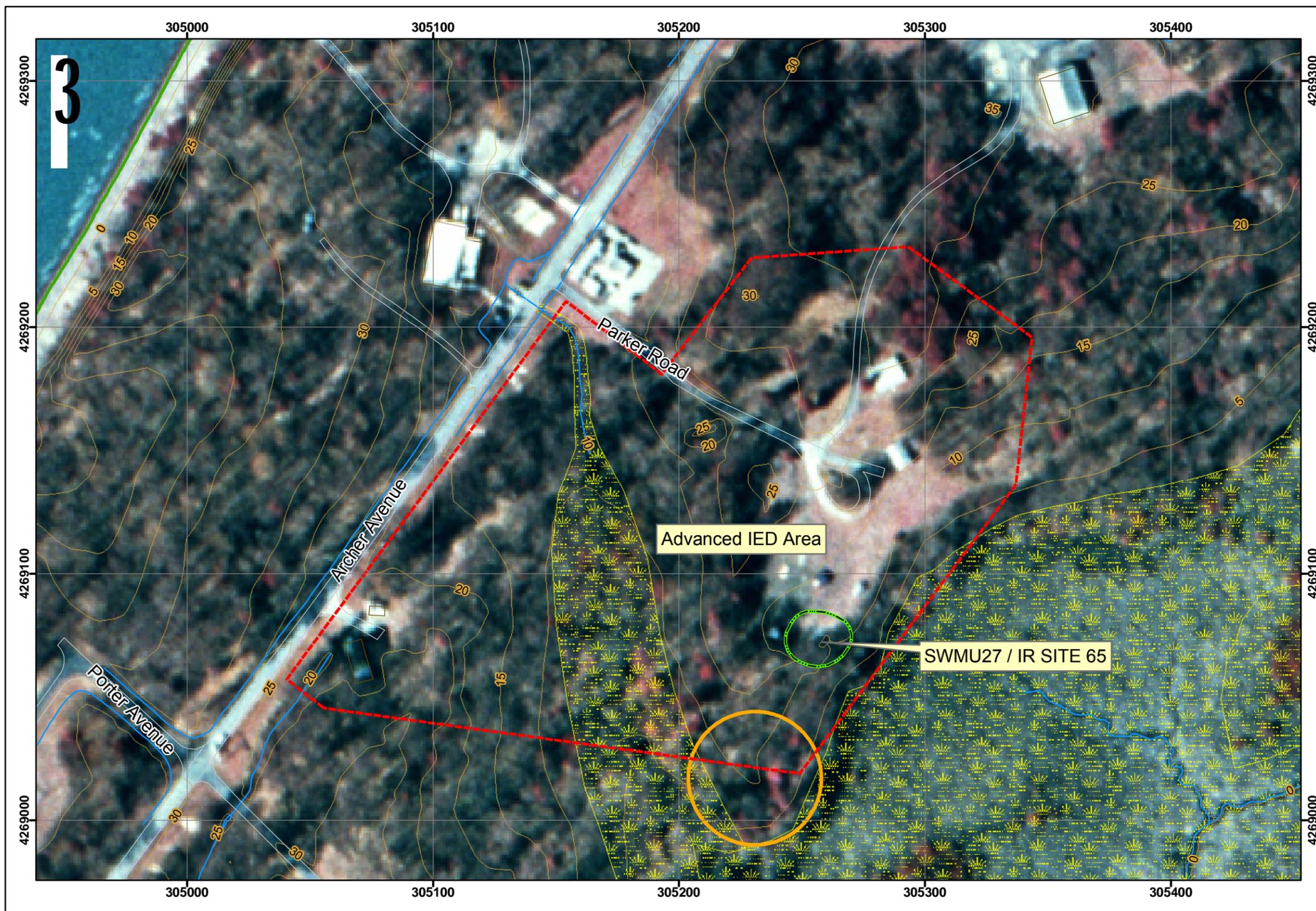
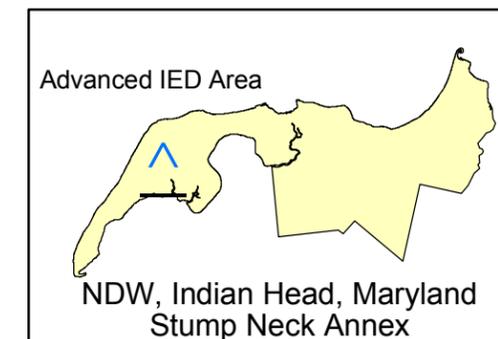
- Installation Boundary
- Structures
- Roads
- Streams
- Contours
- Wetlands
- Range Feature
- Advanced IED Area (IOD Site) from Inventory
- Advanced IED Area Identified during PA



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**



**MALCOLM  
PIRNIE**

**Map 5.5-3  
Munitions Characterization  
Advanced IED Area**

**Legend**

Installation Boundary

Advanced IED Area

**MEC Characterization**

Evidence of Munitions Use

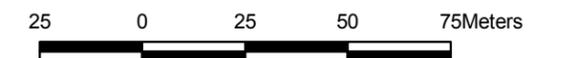
MEC Sighting

**MEC Presence**

Known

Suspect

MEC Presence was determined through review of historical documentation, interviews, and/or visual survey.



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**



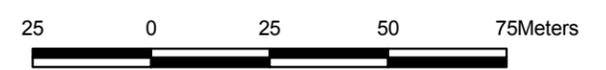
**MALCOLM  
PIRNIE**

**Map 5.1-1  
Visual Survey  
Air Blast Pond**

**Legend**

-  Installation Boundary
-  Air Blast Pond
-  Site Reconnaissance

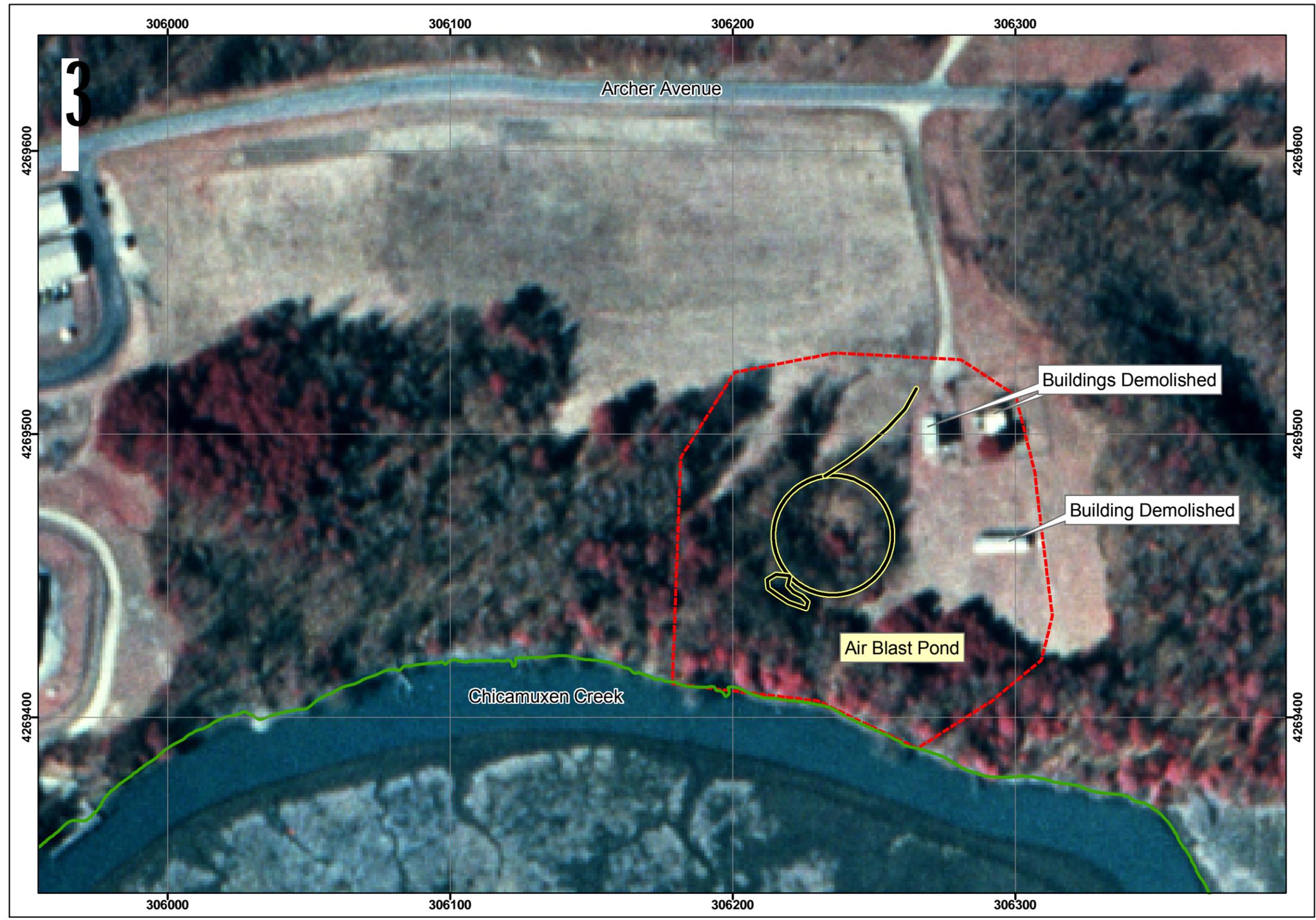
Site Reconnaissance is approximate



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**

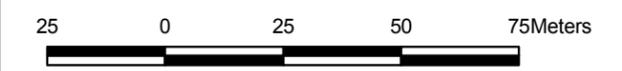


**MALCOLM  
PIRNIE**

**Map 5.1-2  
Range/Site Details  
Air Blast Pond**

**Legend**

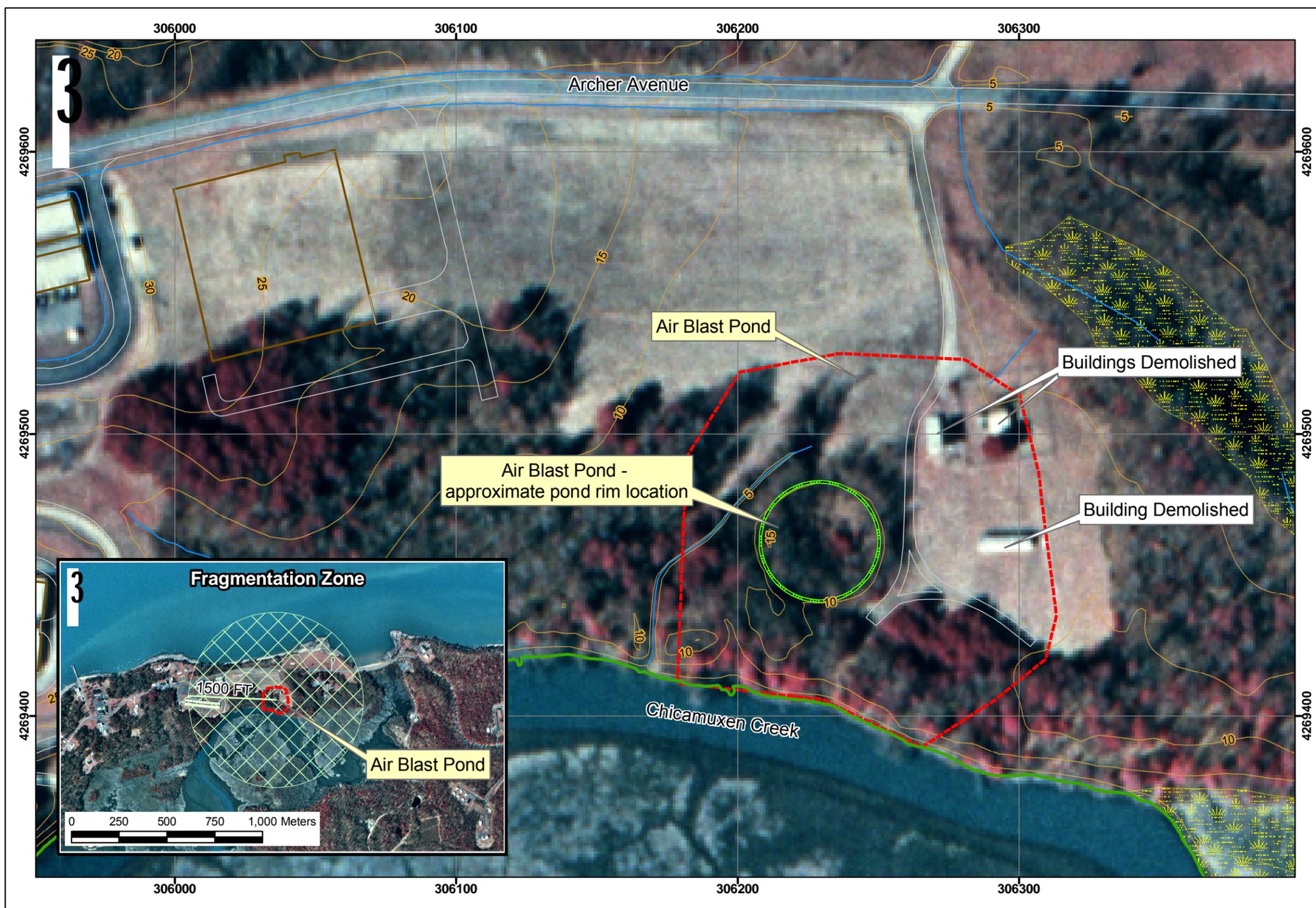
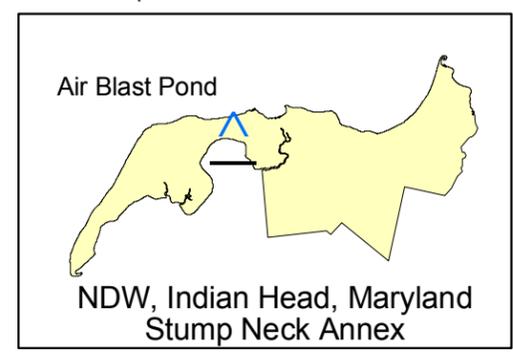
- Installation Boundary
- Structures
- Roads
- Streams
- Contours
- Wetlands
- Fragmentation Zone
- Range Details
- Air Blast Pond



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**



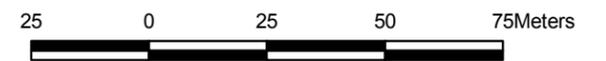
**MALCOLM  
PIRNIE**

**Map 5.1-3  
Munitions Characterization  
Air Blast Pond**

**Legend**

- Installation Boundary
- Air Blast Pond
- Range Details
- Evidence of Munitions Use
- MEC Sightings
- MEC Presence**
- Known
- Suspect

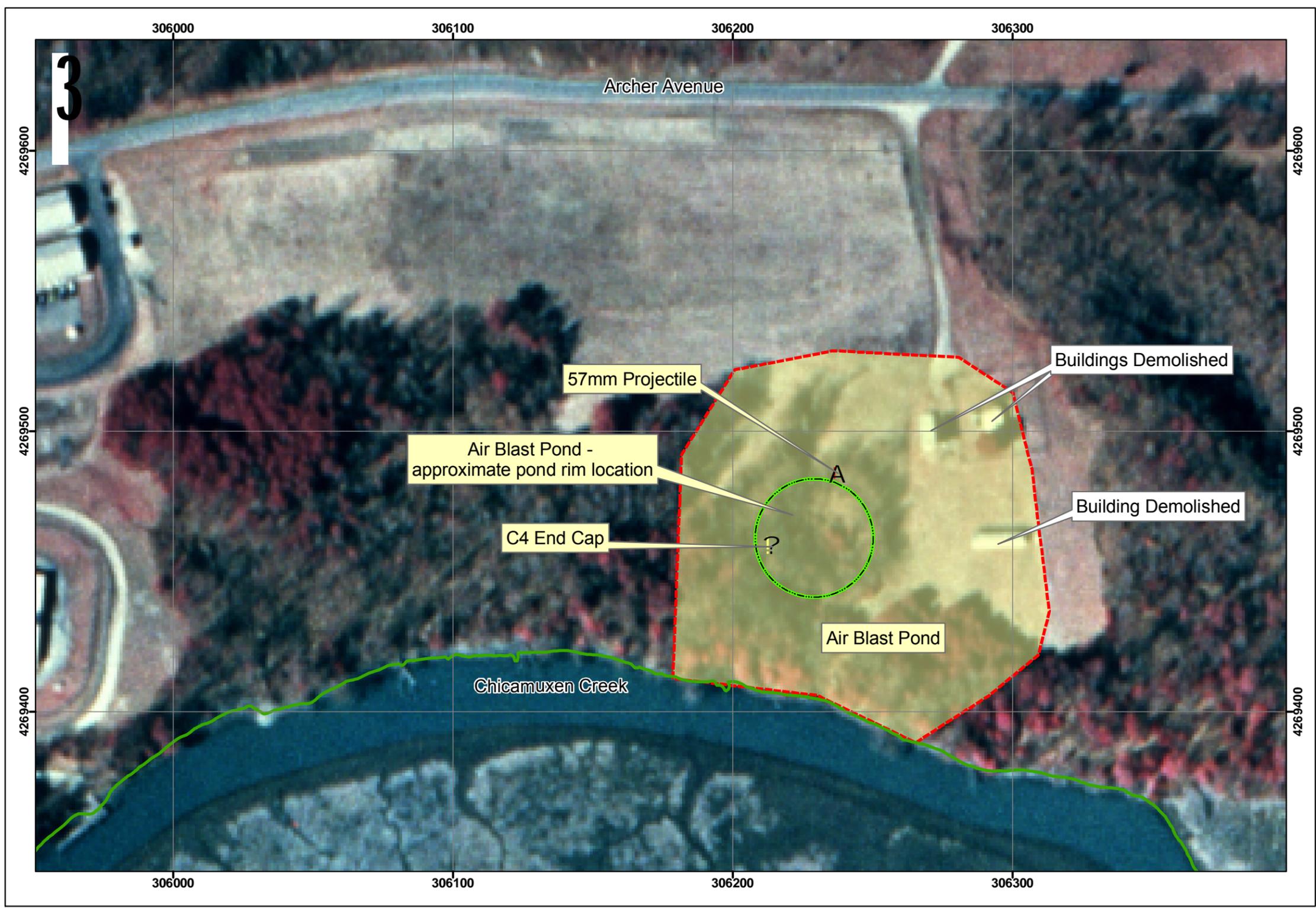
MEC Presence was determined through review of historical documentation, interviews, and/or visual survey.



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**

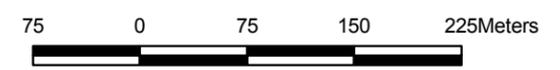
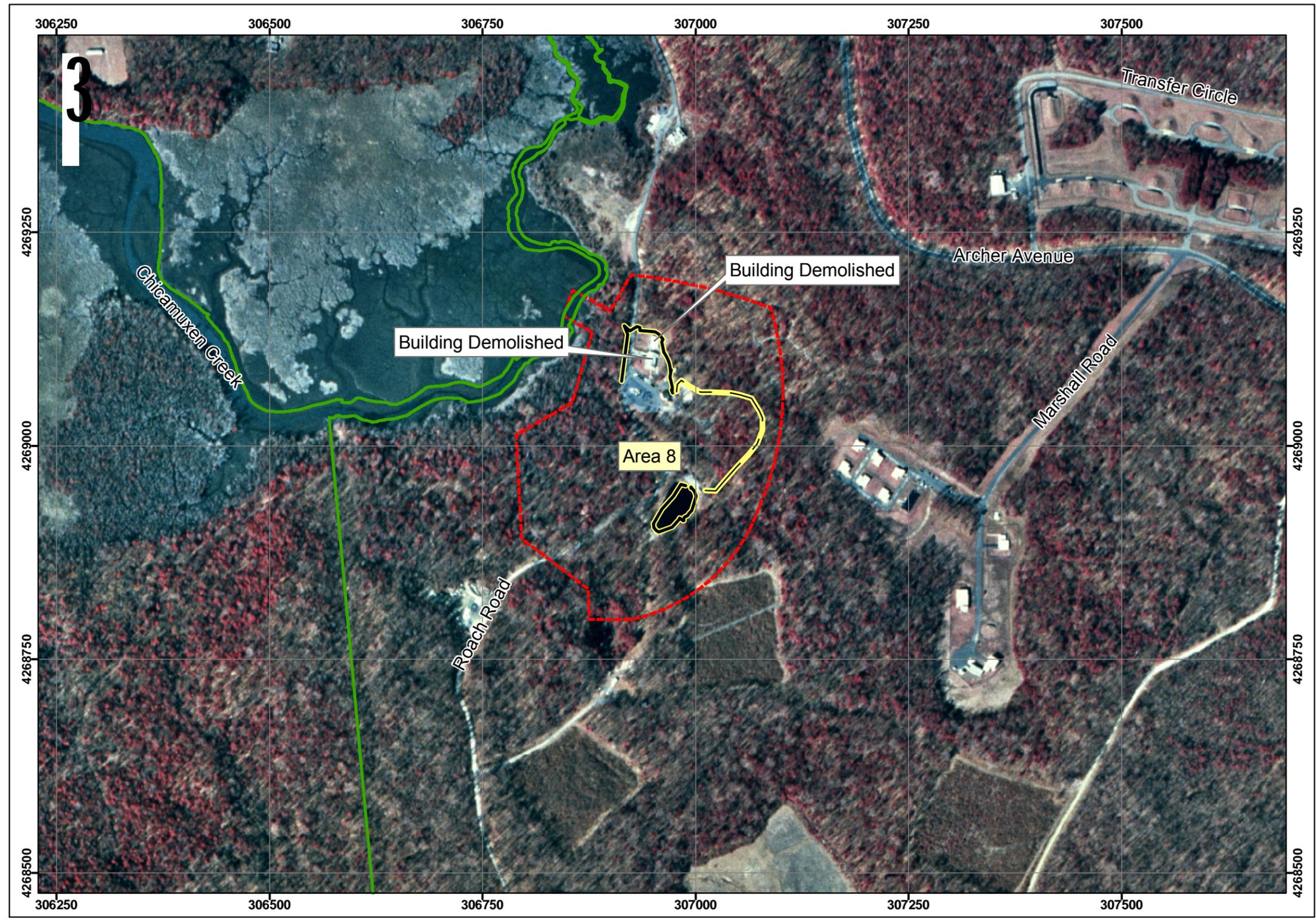


**MALCOLM  
PIRNIE**

Map 5.2-1  
Visual Survey  
Area 8

**Legend**

-  Installation Boundary
-  Area 8
- Site Reconnaissance**
-  GPS
-  Approximate



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005

**Preliminary Assessment  
NDW, Indian Head, Maryland**

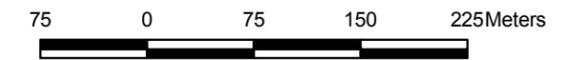


**MALCOLM  
PIRNE**

**Map 5.2-2  
Range/Site Details  
Area 8**

**Legend**

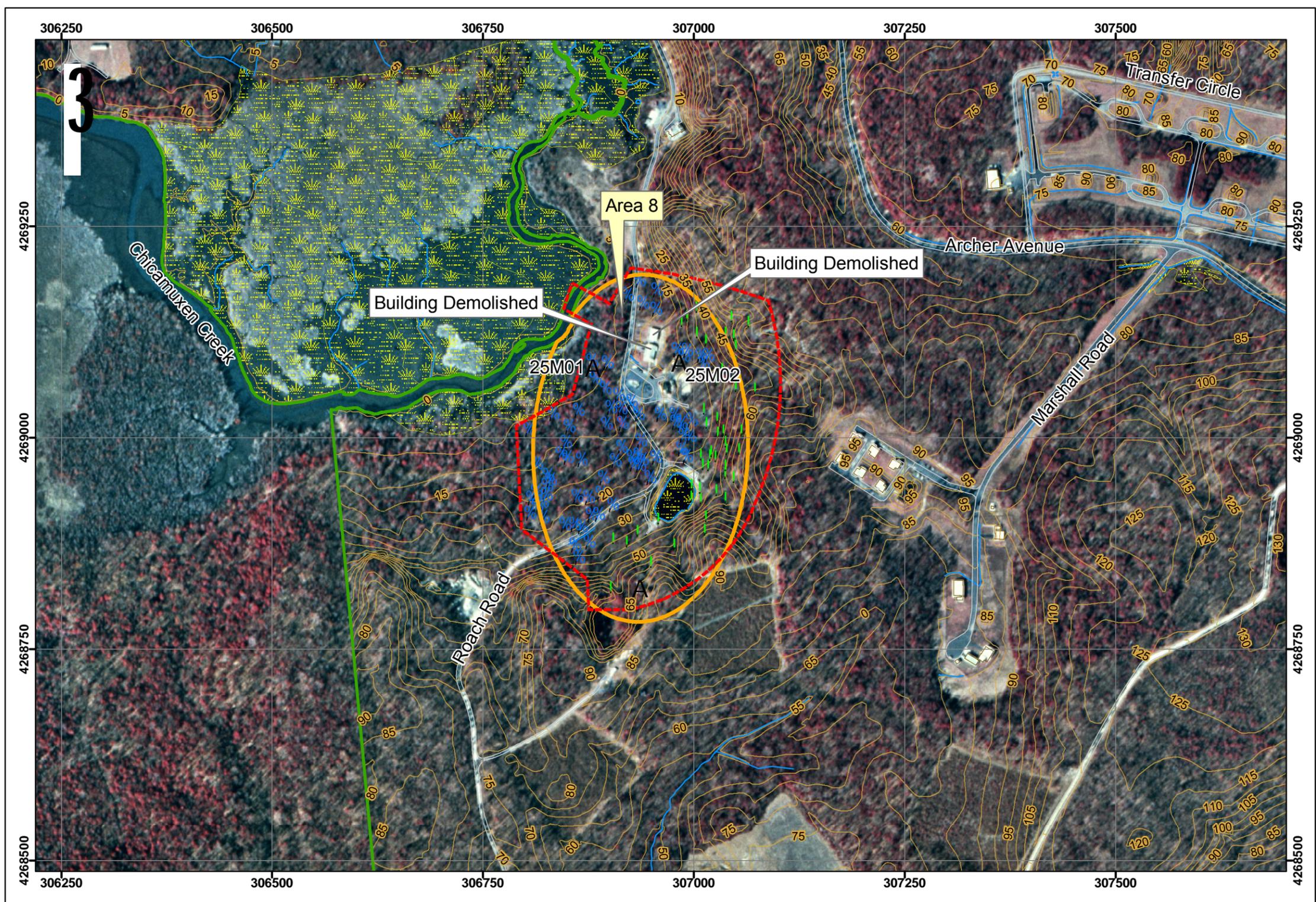
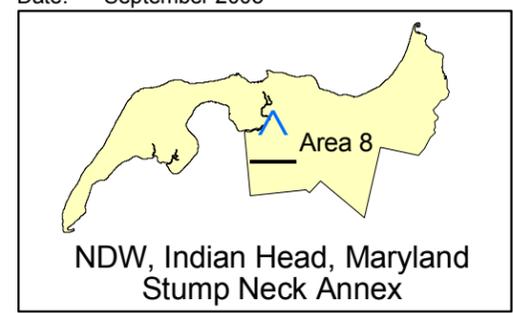
- Installation Boundary
  - Structures
  - Roads
  - Streams
  - Contours
  - Wetlands
  - Monitoring Well
  - Area 8 from Inventory
  - Area 8 Identified during PA
- Shot Locations**
- Air Shot
  - Water Shot



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data  
Air & Water Shot Location Data,  
Brown & Root Environmental, 1995

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**



**MALCOLM  
PIRNE**

Map 5.2-3  
Munitions Characterization  
Area 8

**Legend**

-  Installation Boundary
-  Area 8
- MEC Presence**
-  Known
-  Suspect

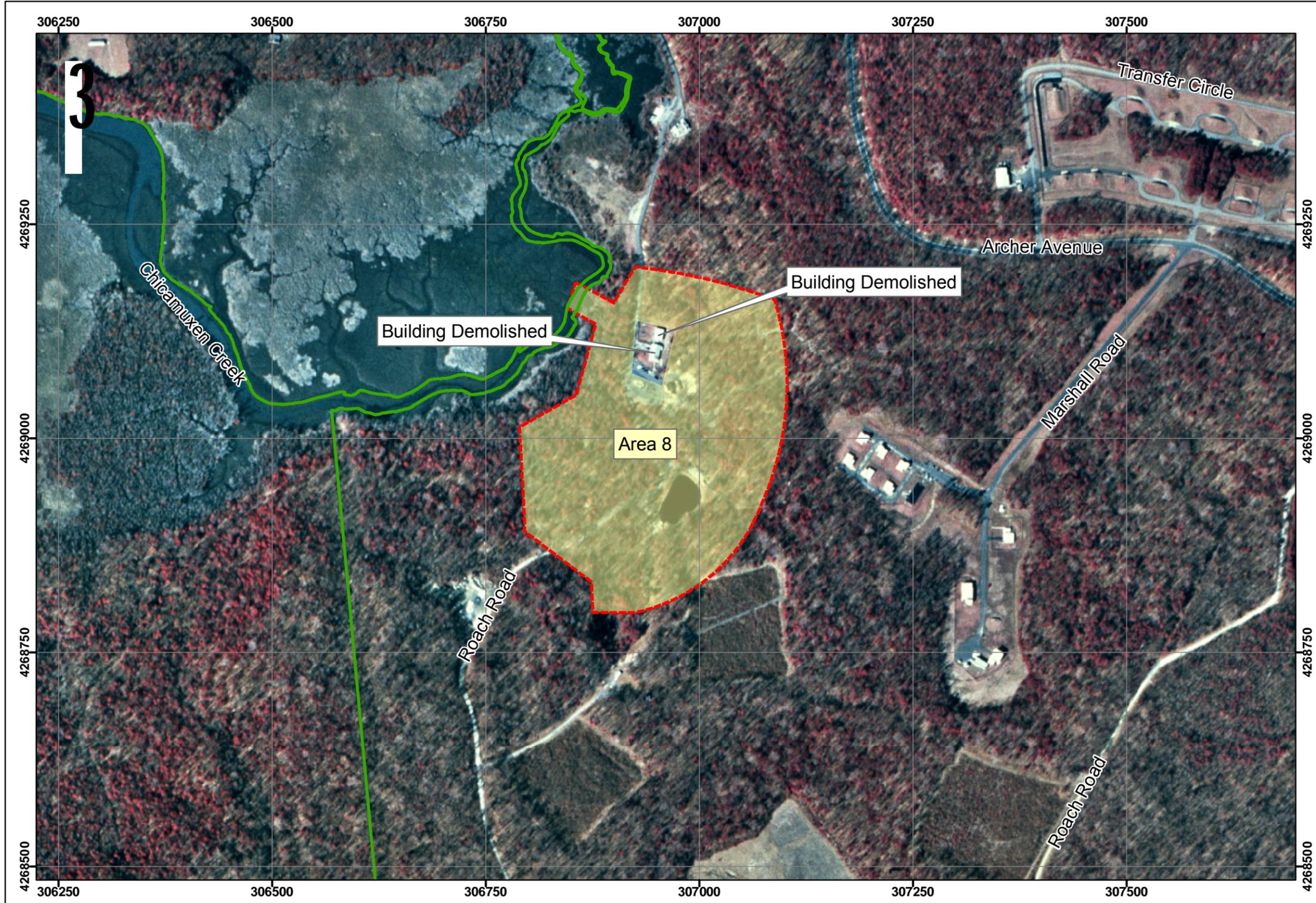
MEC Presence was determined through review of historical documentation, interviews, and/or visual survey.



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**



**MALCOLM  
PIRNIE**

**Map 5.4-1  
Visual Survey  
Basic IED Area**

**Legend**

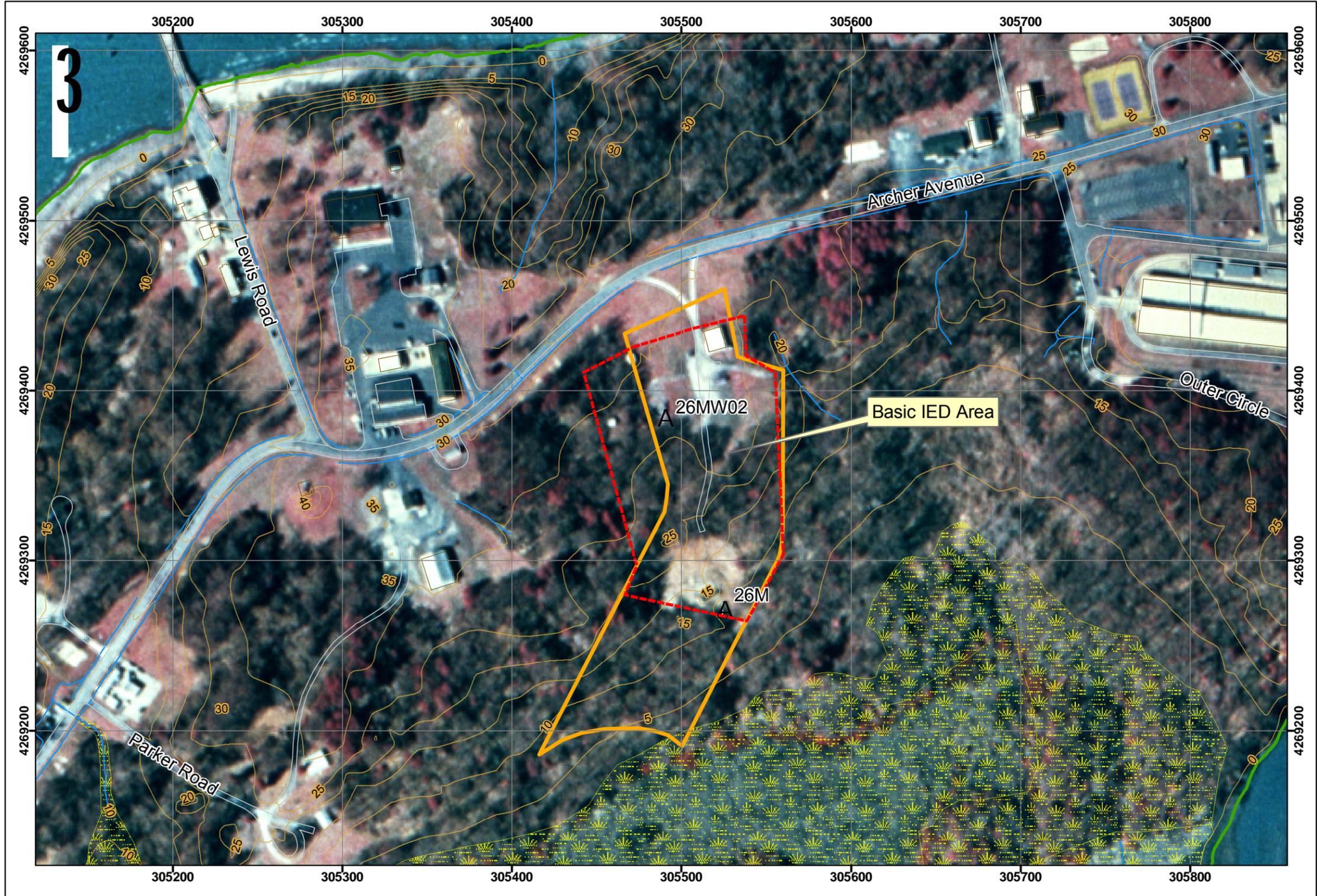
-  Installation Boundary
-  Basic IED Area
-  Site Reconnaissance



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



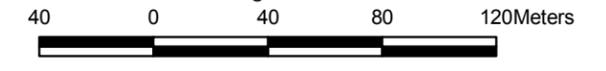
**Preliminary Assessment  
NDW, Indian Head, Maryland**



**MALCOLM  
PIRNIÉ**

**Map 5.4-2  
Range/Site Details  
Basic IED Area  
Legend**

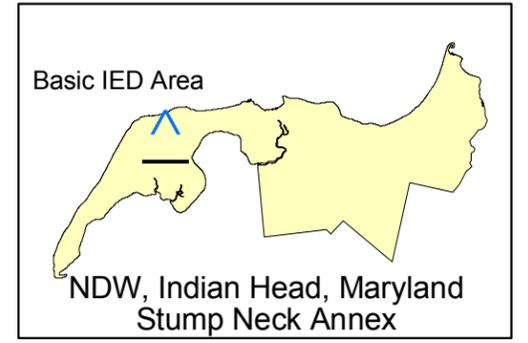
- Installation Boundary
- Structures
- Roads
- Streams
- Contours
- Wetlands
- Monitoring Well
- Basic IED Area (IED Practical Training Area)
- from Inventory
- Basic IED Area
- Identified during PA



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**



**MALCOLM  
PIRNIE**

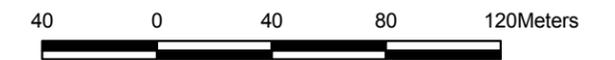
**Map 5.4-3  
Munitions Characterization  
Basic IED Area**

**Legend**

-  Installation Boundary
-  Basic IED Area
- MEC Presence**
-  Known
-  Suspect



MEC Presence was determined through review of historical documentation, interviews, and/or visual survey.



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005

**Preliminary Assessment  
NDW, Indian Head, Maryland**

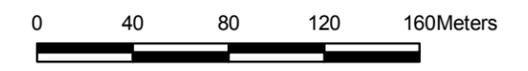
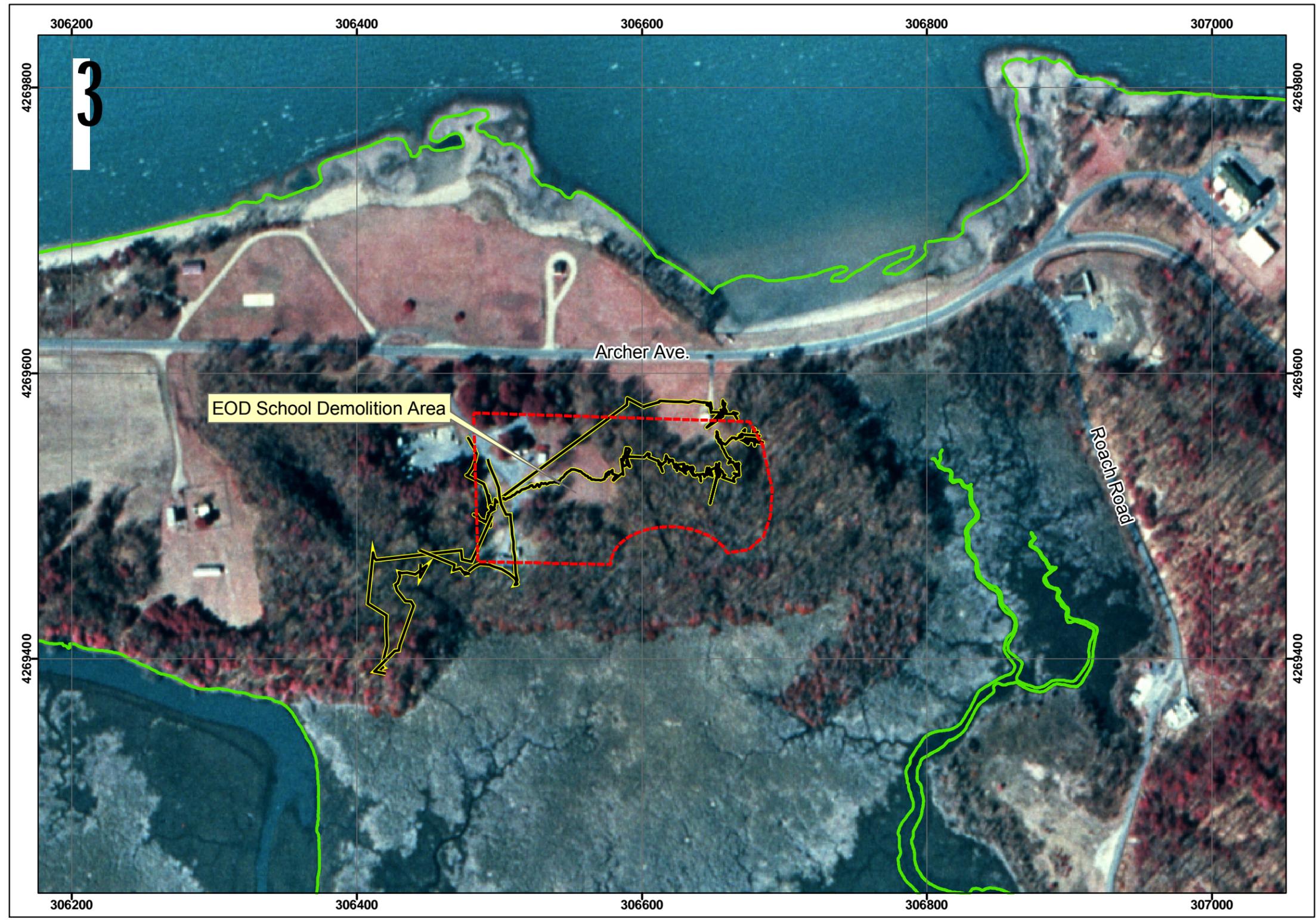


**MALCOLM  
PIRNIE**

**Map 5.3-1  
Visual Survey  
EOD School Demolition Area**

**Legend**

-  Installation Boundary
-  Site Reconnaissance
-  EOD School Demolition Area



Data Source: USGS, DOQQ Indian Head, MD, 1998

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005

**Preliminary Assessment  
NDW, Indian Head, Maryland**

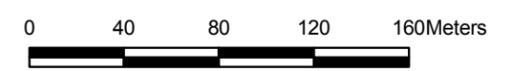


**MALCOLM  
PIRNIÉ**

**Map 5.3-2  
Range/Site Details  
EOD School Demolition Area**

**Legend**

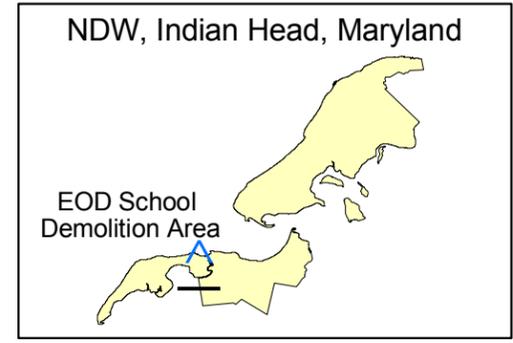
-  Installation Boundary
-  Structures
-  Roads
-  Streams
-  Contours
-  Wetlands
-  EOD School Demolition Area



Data Source: USGS, DOQQ Indian Head, MD, 1998

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**



**MALCOLM  
PIRNIE**

**Map 5.3-3  
Munitions Characterization  
EOD School Demolition Area**

**Legend**

-  Installation Boundary
-  EOD School Demolition Area
- MEC Presence\***
  -  Known
  -  Suspect

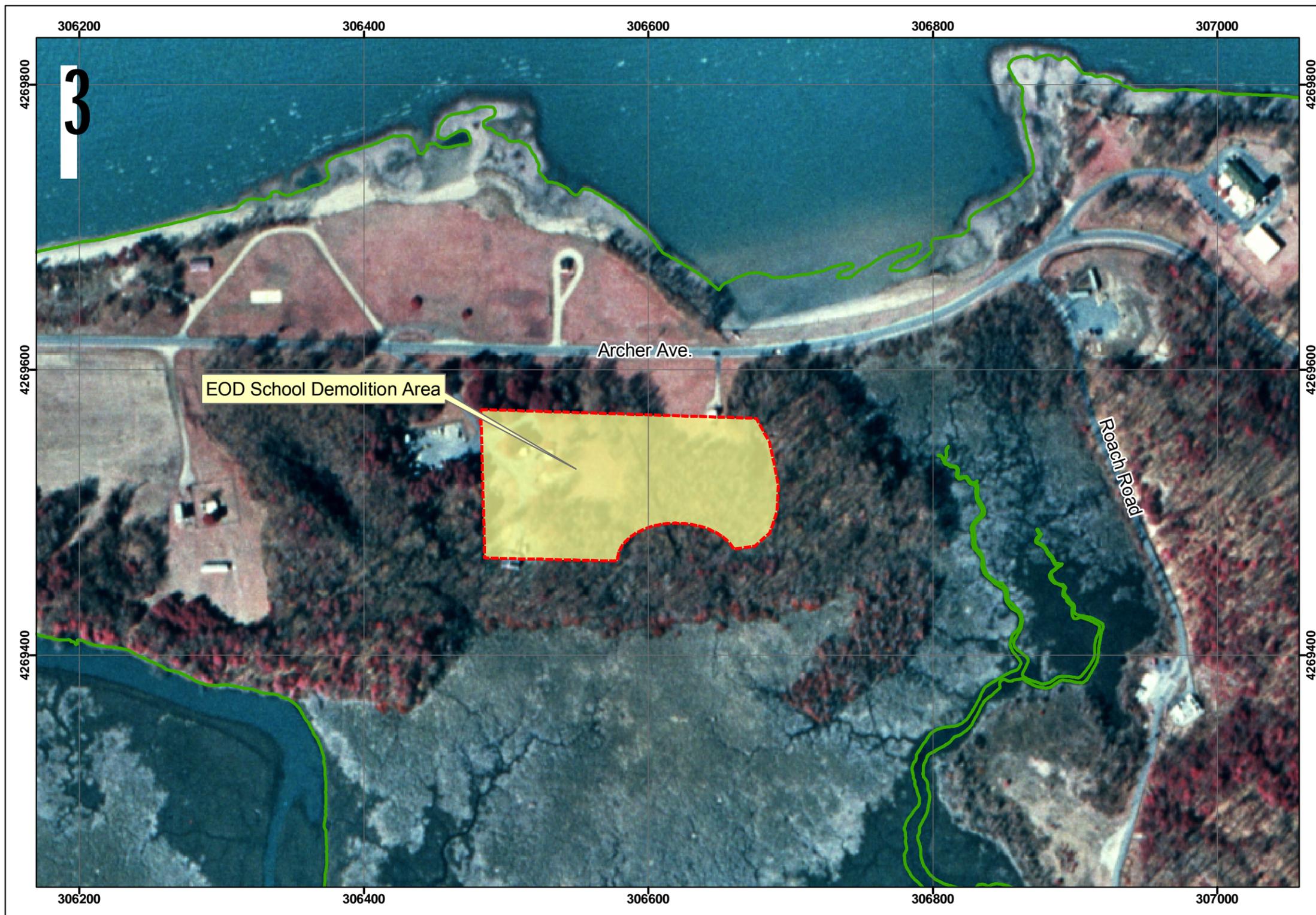
\*MEC Presence was determined through review of historical documentation, interviews, and/or visual survey.



Data Source: USGS, DOQQ Indian Head, MD, 1998

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**



**MALCOLM  
PIRNIE**

**Map 5.6-1  
Visual Survey  
Marine Rifle Range**

**Legend**

-  Installation Boundary
-  Marine Rifle Range
-  Site Reconnaissance

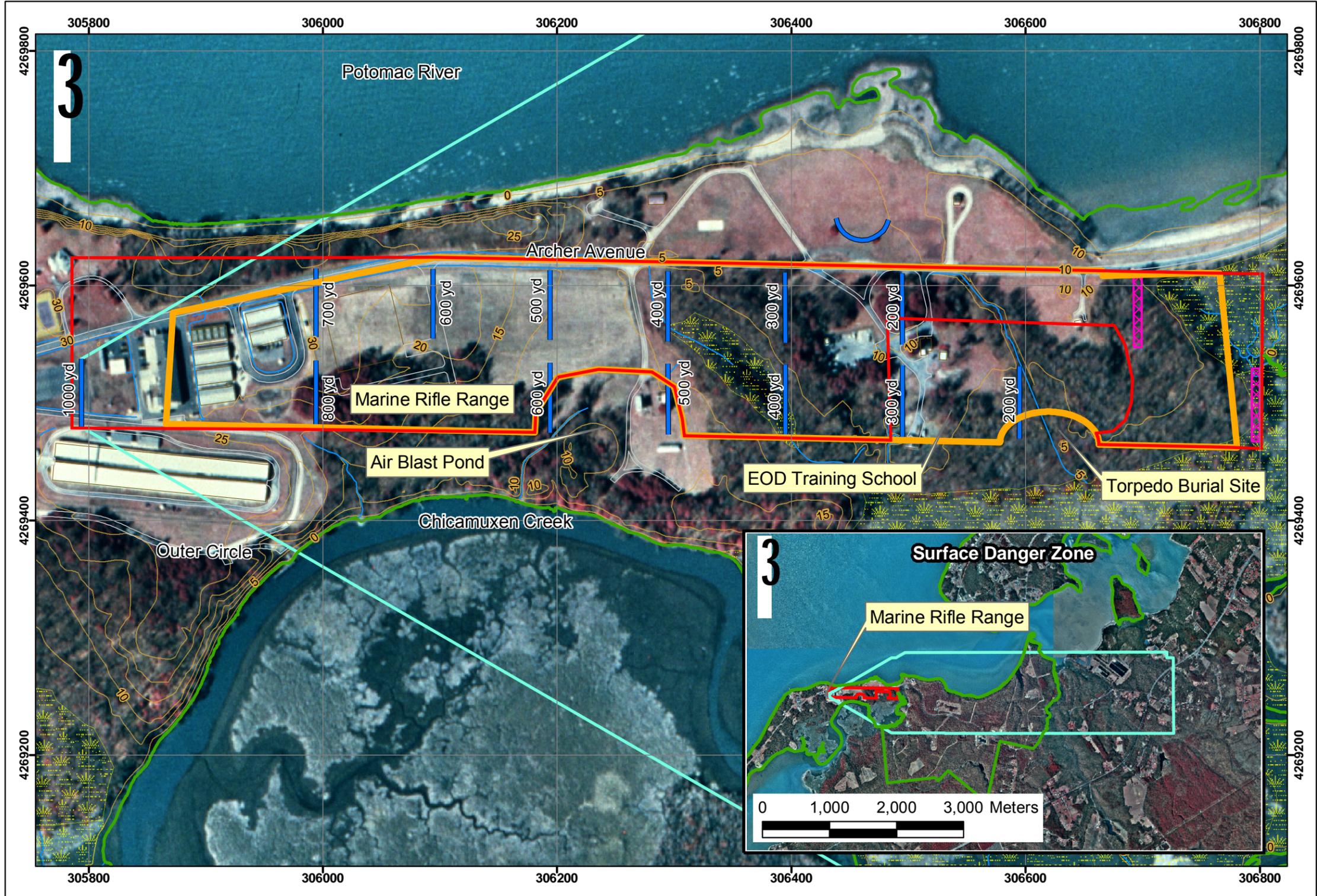


Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005





**Preliminary Assessment  
NDW, Indian Head, Maryland**



**MALCOLM  
PIRNIE**

**Map 5.6-2  
Range/Site Details  
Marine Rifle Range**

**Legend**

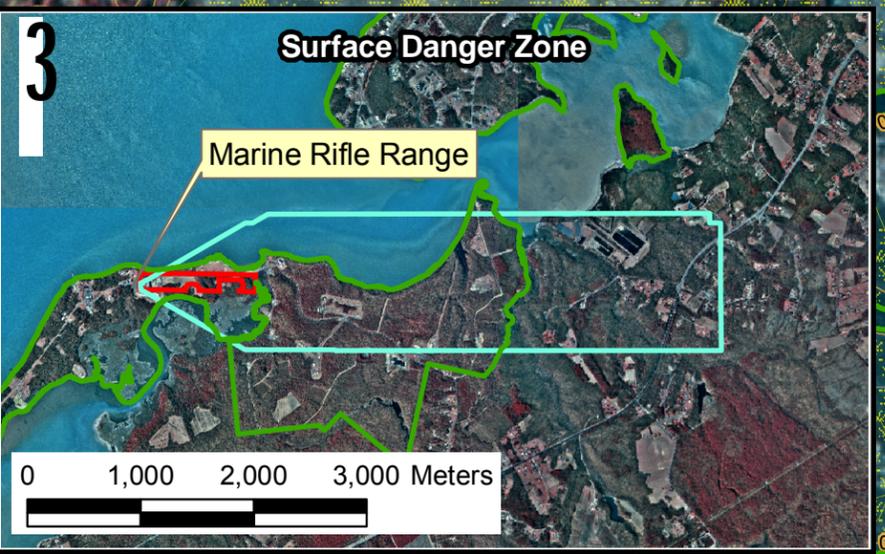
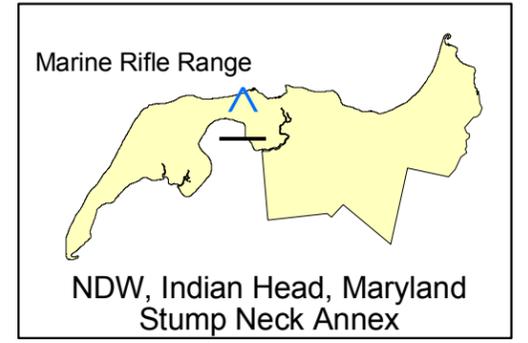
- Installation Boundary
- Structures
- Roads
- Streams
- Contours
- Wetlands
- Marine Rifle Range from Inventory
- Marine Rifle Range Identified from PA
- Firing Line
- Target Area
- Surface Danger Zone



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**



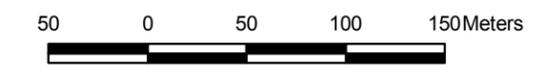
**MALCOLM  
PIRNIE**

**Map 5.6-3  
Munitions Characterization  
Marine Rifle Range**

**Legend**

-  Installation Boundary
-  Marine Rifle Range
- MEC Presence**
  -  Known
  -  Suspect

There is no evidence of MEC Presence as determined through historical documentation, interview, and/or visual survey. Visual observations and/or historical documentation indicate that MC may be present at the site, but MC Presence has not been confirmed by sampling or other means.



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**

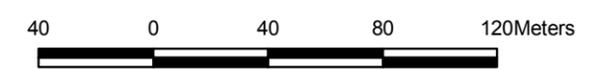
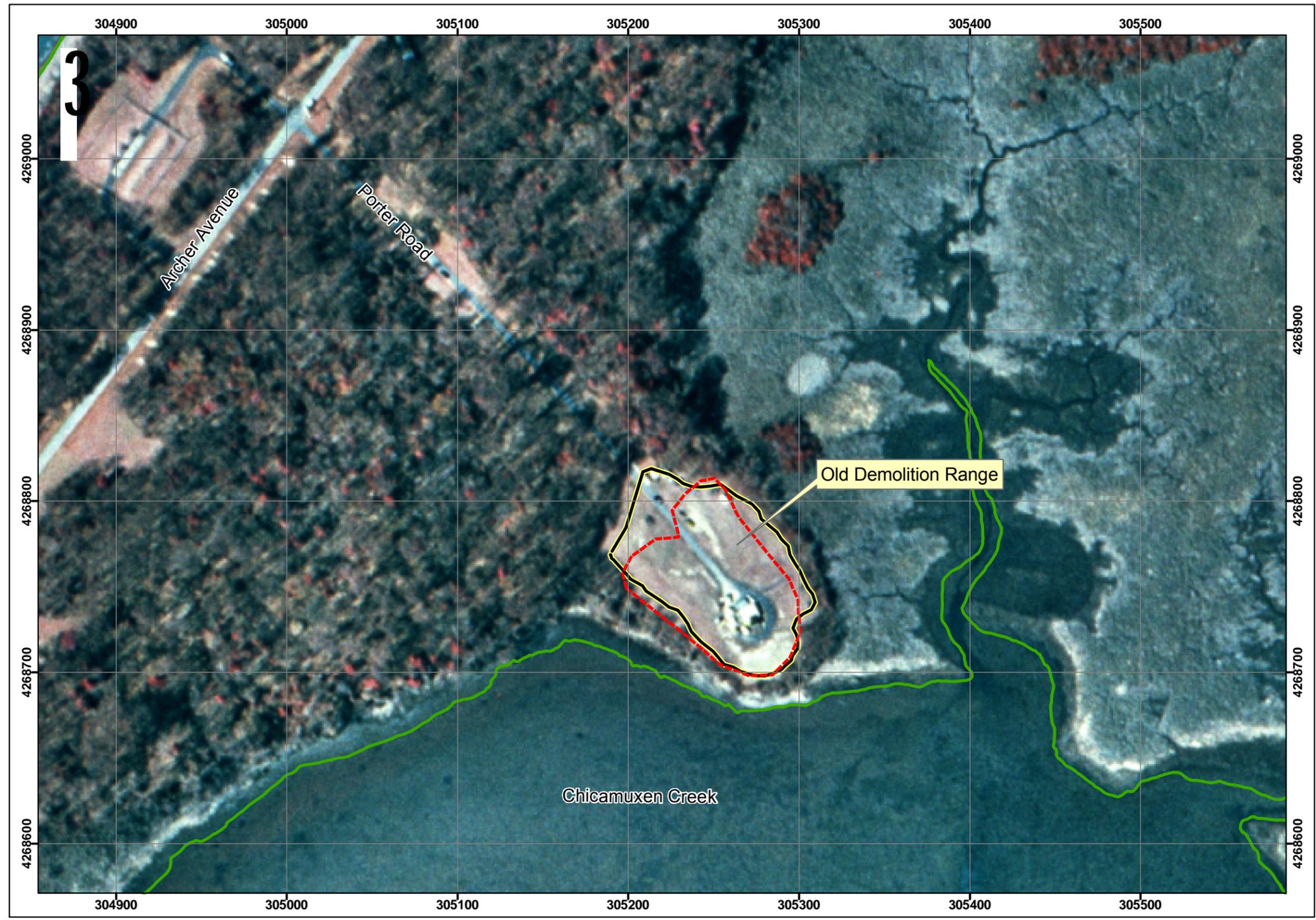


**MALCOLM  
PIRNIE**

**Map 5.7-1  
Visual Survey  
Old Demolition Range**

**Legend**

-  Installation Boundary
-  Old Demolition Range
-  Site Reconnaissance



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**

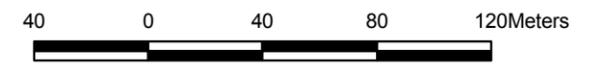


**MALCOLM  
PIRNIE**

**Map 5.7-2  
Range/Site Details  
Old Demolition Range**

**Legend**

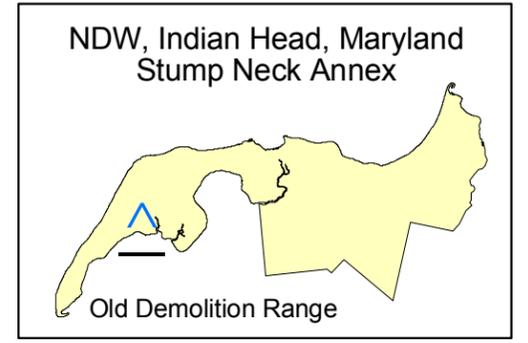
- Installation Boundary
- Structures
- Roads
- Streams
- Contours
- Wetlands
- Monitoring Well
- Old Demolition Range Identified during PA
- Old Demolition Range from Inventory



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**



**MALCOLM  
PIRNIE**

**Map 5.7-3  
Munitions Characterization  
Old Demolition Range**

**Legend**

-  Installation Boundary
-  Old Demolition Range
-  Evidence of Munitions Use
-  MEC Sighting
- MEC Presence**
-  Known
-  Suspect

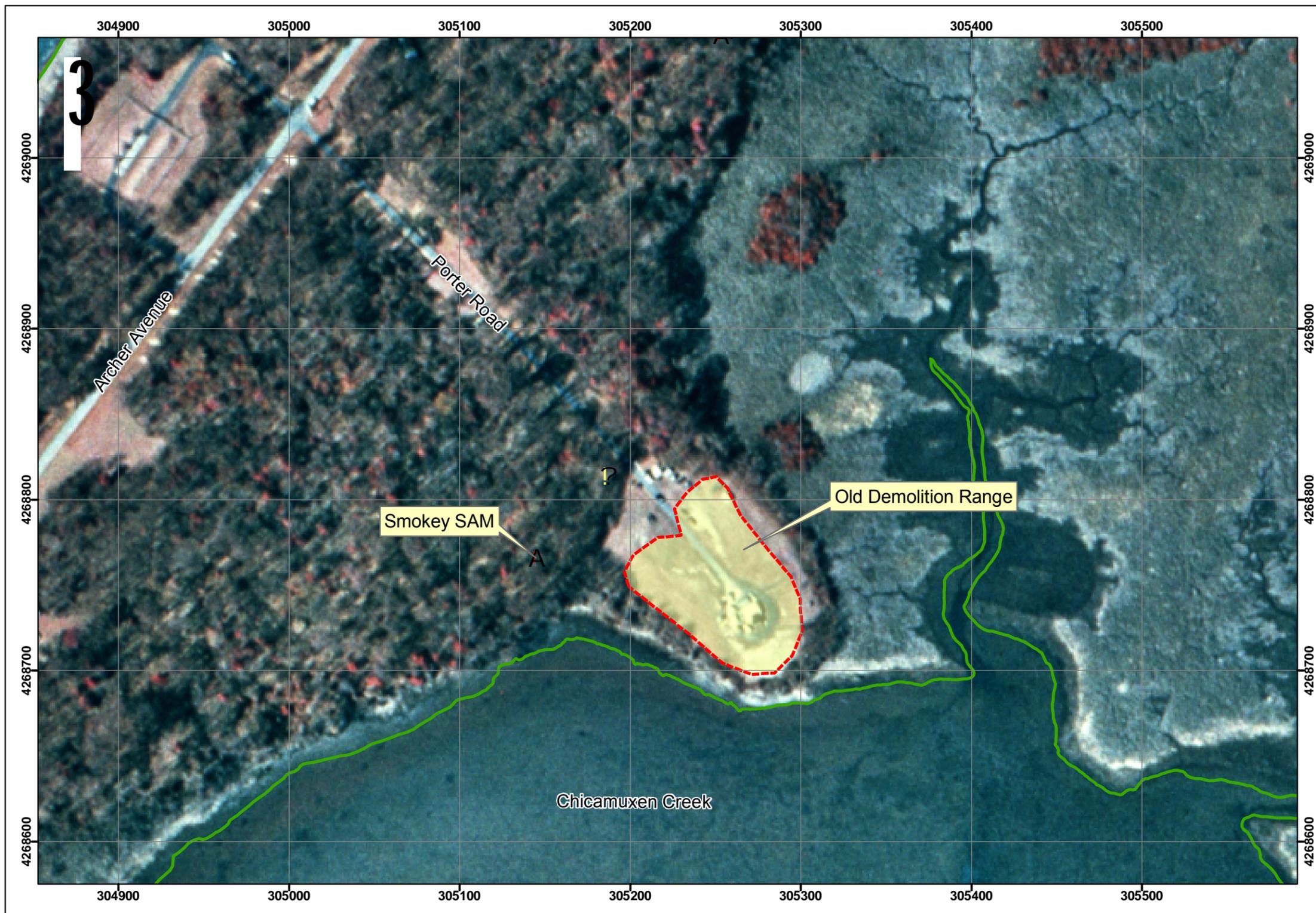
MEC Presence was determined through review of historical documentation, interviews, and/or visual survey.



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**



**MALCOLM  
PIRNIE**

**Map 5.8-1  
Visual Survey  
Old Skeet and Trap Range**

**Legend**

-  Installation Boundary
-  Old Skeet and Trap Range
-  Site Reconnaissance



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**



**MALCOLM  
PIRNIC**

**Map 5.8-2  
Range/Site Details  
Old Skeet and Trap Range**

**Legend**

- Installation Boundary
- Structures
- Roads
- Streams
- Contours
- Wetlands
- Former Trap House
- Old Skeet and Trap Range from Inventory
- Old Skeet and Trap Range Identified during PA
- Firing Line

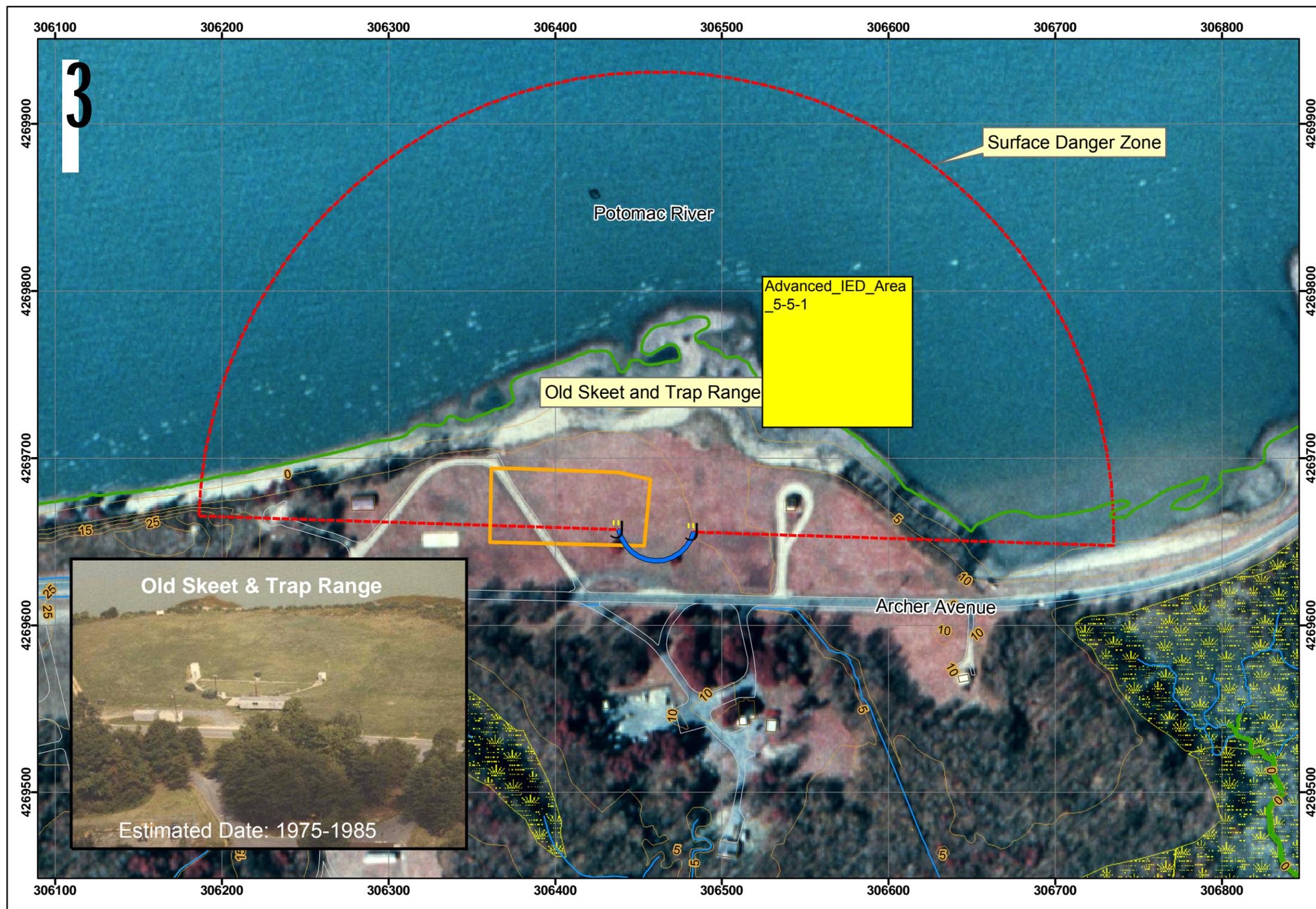
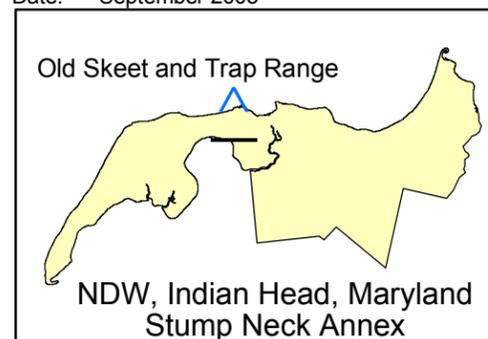
50 0 50 100Meters



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**



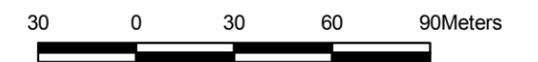
**MALCOLM  
PIRNIE**

**Map 5.8-3  
Munitions Characterization  
Old Skeet and Trap Range**

**Legend**

-  Installation Boundary
-  Old Skeet and Trap Range
- MEC Presence**
-  Known
-  Suspect

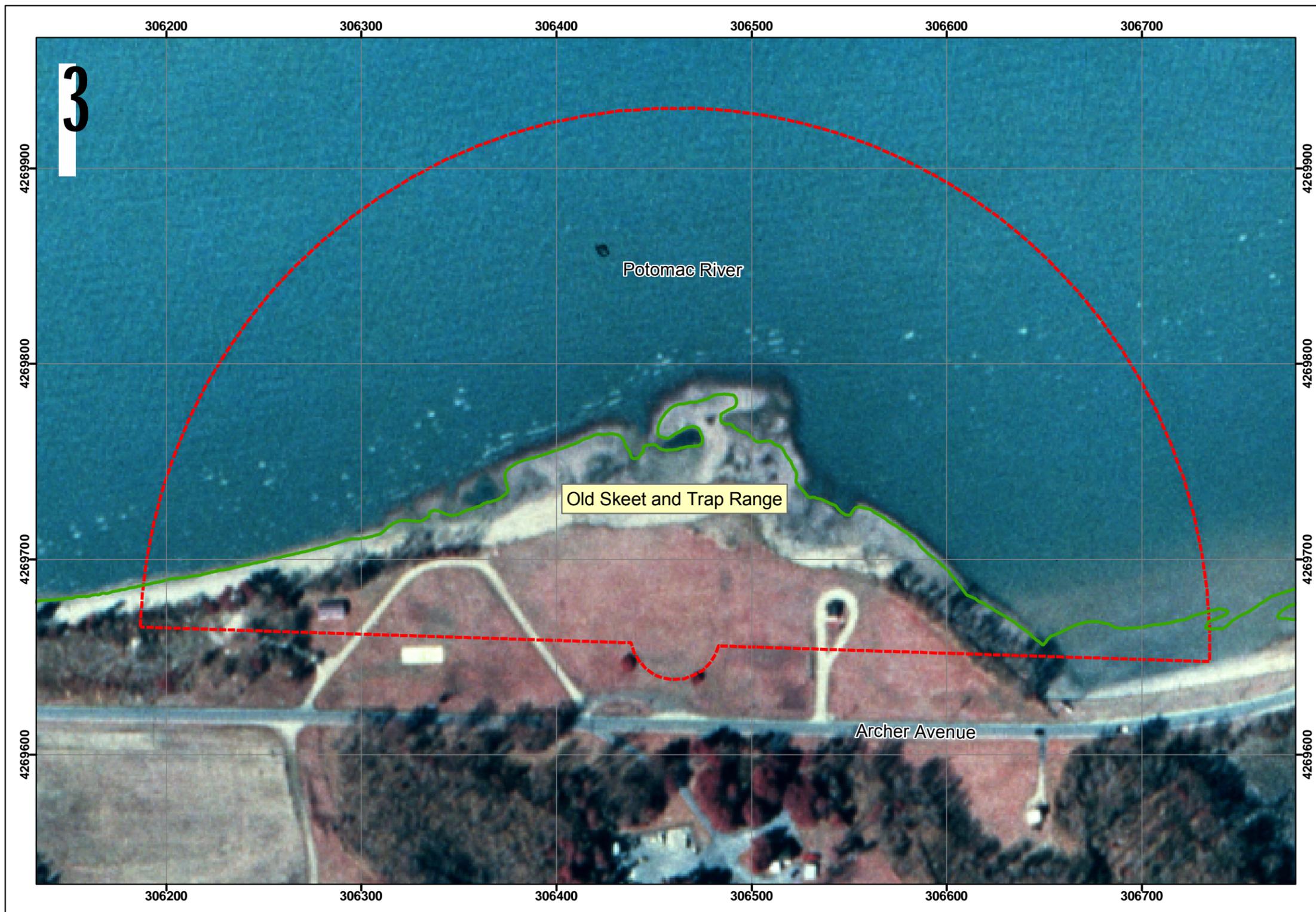
There is no evidence of MEC Presence as determined through historical documentation, interview, and/or visual survey. Visual observations and/or historical documentation indicate that MC may be present at the site, but MC Presence has not been confirmed by sampling or other means.



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**

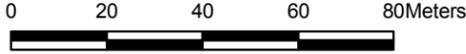


**MALCOLM  
PIRNIE**

**Map 5.9-1  
Visual Survey  
Roach Road Rifle Range**

**Legend**

-  Installation Boundary
-  Site Reconnaissance
-  Roach Road Rifle Range



Data Source: USGS, DOQQ Indian Head, MD, 1998  
Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters  
Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**

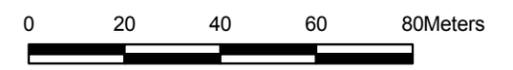


**MALCOLM  
PIRNIÉ**

**Map 5.9-2  
Range/Site Details  
Roach Road Rifle Range**

**Legend**

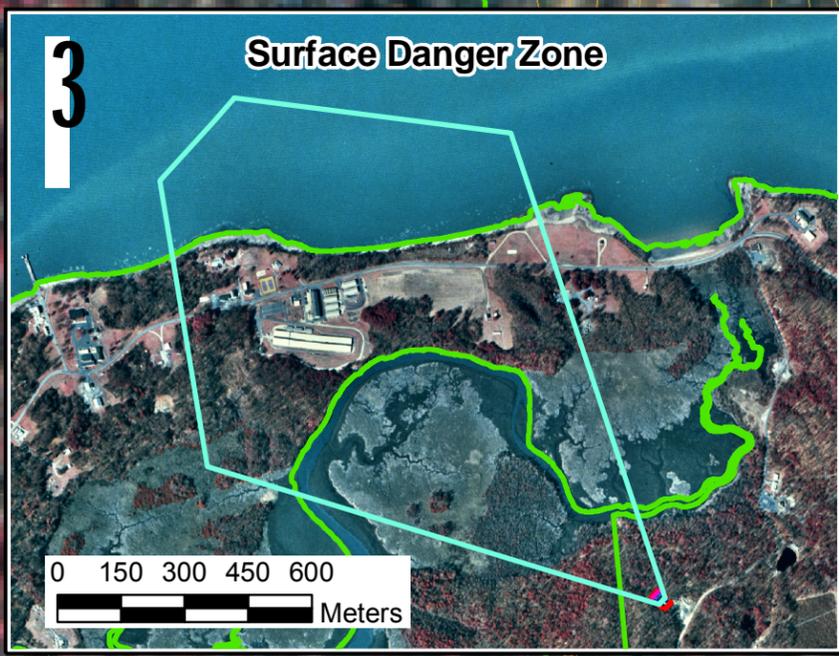
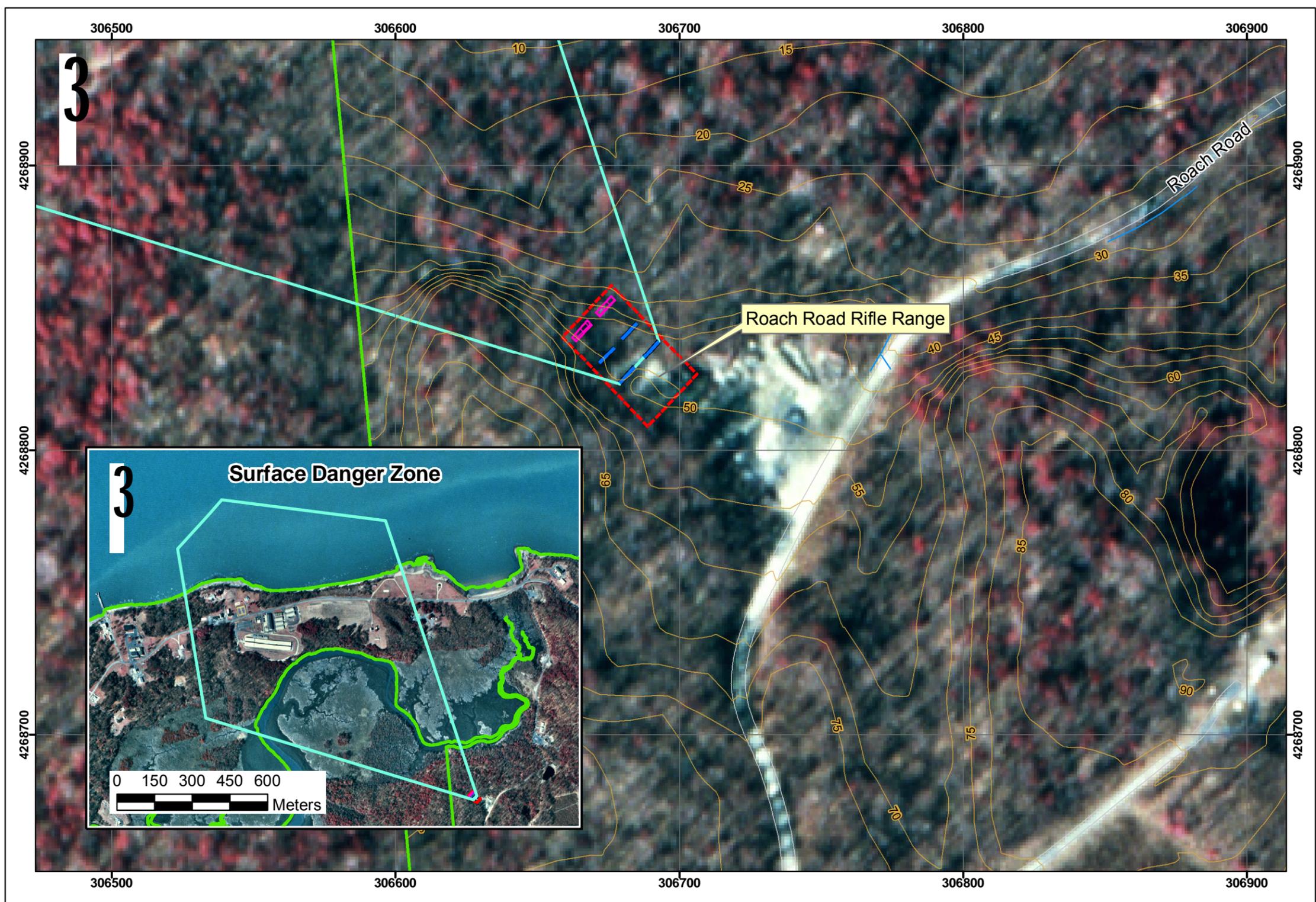
-  Installation Boundary
-  Structures
-  Roads
-  Streams
-  Contours
-  Firing Line
-  Target Area
-  Surface Danger Zone
-  Roach Road Rifle Range



Data Source: USGS, DOQQ Indian Head, MD, 1998

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**



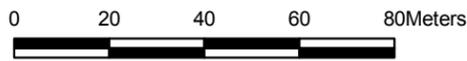
**MALCOLM  
PIRNIE**

**Map 5.9-3  
Munitions Characterization  
Roach Road Rifle Range**

**Legend**

-  Installation Boundary
-  Roach Road Rifle Range
- MEC Presence\***
  -  Known
  -  Suspect

\*There is no evidence of MEC Presence as determined through historical documentation, interview, and/or visual survey. Visual observations and/or historical documentation indicate that MC may be present at the site, but MC Presence has not been confirmed by sampling or other means.



Data Source: USGS, DOQQ Indian Head, MD, 1998  
Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters  
Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**



**MALCOLM  
PIRNIE**

Map 5.10-1  
Visual Survey  
Rum Point Skeet Range

**Legend**

-  Installation Boundary
-  Rum Point Skeet Range
-  Site Reconnaissance



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005





**Preliminary Assessment  
NDW, Indian Head, Maryland**



**MALCOLM  
PIRNIE**

**Map 5.10-2  
Range/Site Details  
Rum Point Skeet Range**

**Legend**

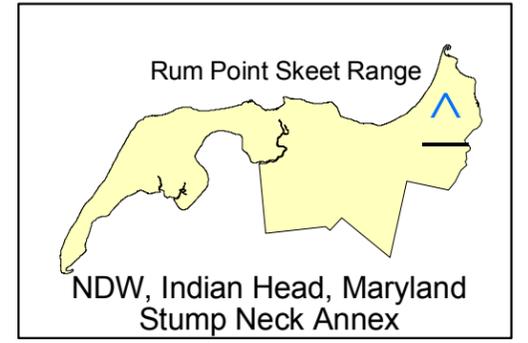
-  Installation Boundary
-  Structures
-  Roads
-  Streams
-  Wetlands
-  Firing Line
-  Rum Point Skeet Range



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**



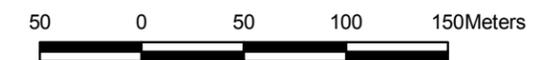
**MALCOLM  
PIRNIE**

**Map 5.10-3  
Munitions Characterization  
Rum Point Skeet Range**

**Legend**

-  Installation Boundary
-  Rum Point Skeet Range
- MEC Presence**
-  Known
-  Suspect

There is no evidence of MEC Presence as determined through historical documentation, interview, and/or visual survey. Visual observations and/or historical documentation indicate that MC may be present at the site, but MC Presence has not been confirmed by sampling or other means.

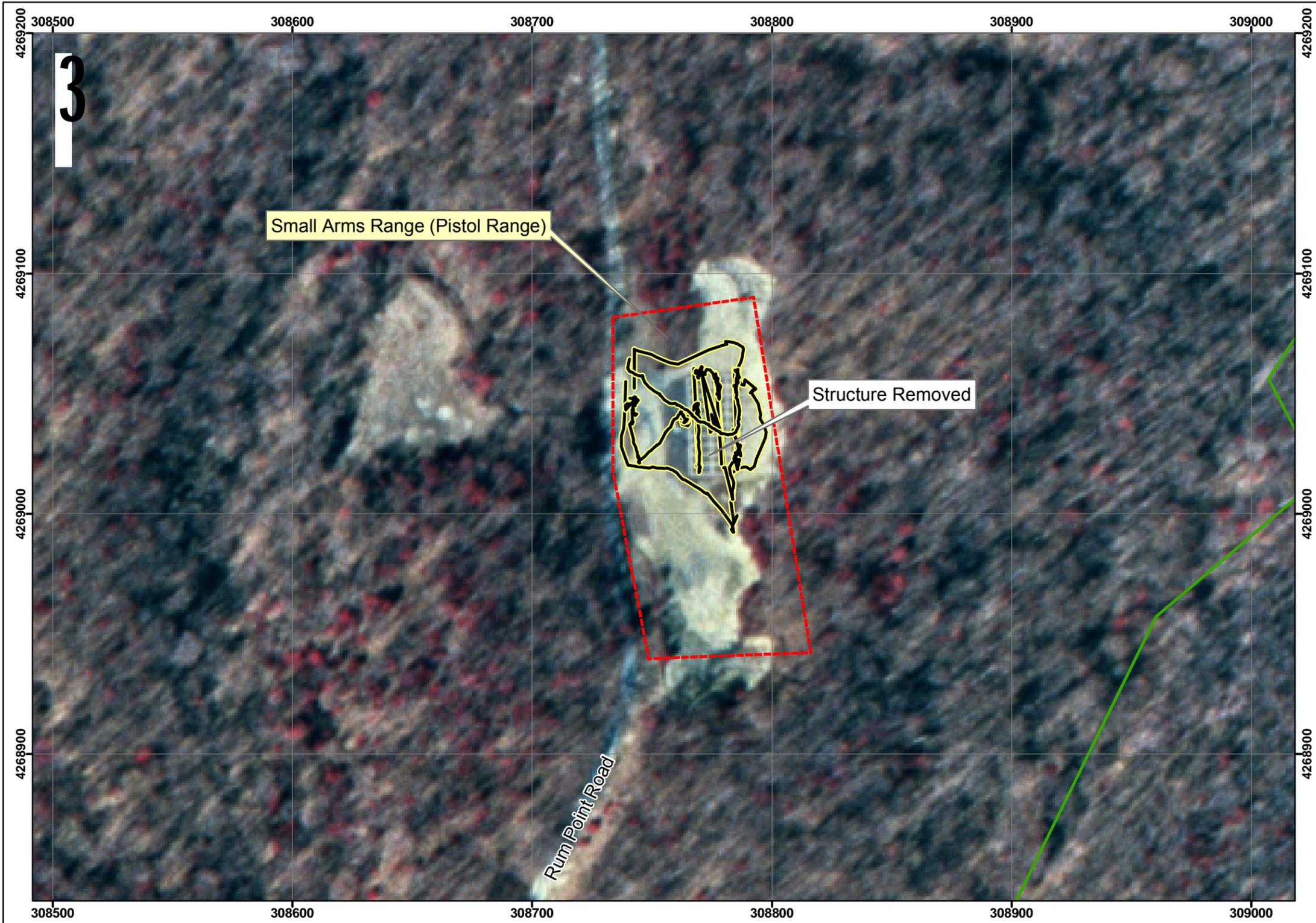


Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005





**Preliminary Assessment  
NDW, Indian Head, Maryland**



**MALCOLM  
PIRNIE**

Map 5.11-1  
Visual Survey  
Small Arms Range (Pistol Range)

**Legend**

-  Installation Boundary
-  Small Arms Range (Pistol Range)
-  Site Reconnaissance



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005

**Preliminary Assessment  
NDW, Indianhead, MD**

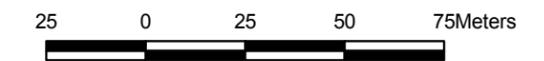


**MALCOLM  
PIRNIÉ**

**Map 5.11-2  
Range/Site Details  
Small Arms Range (Pistol Range)**

**Legend**

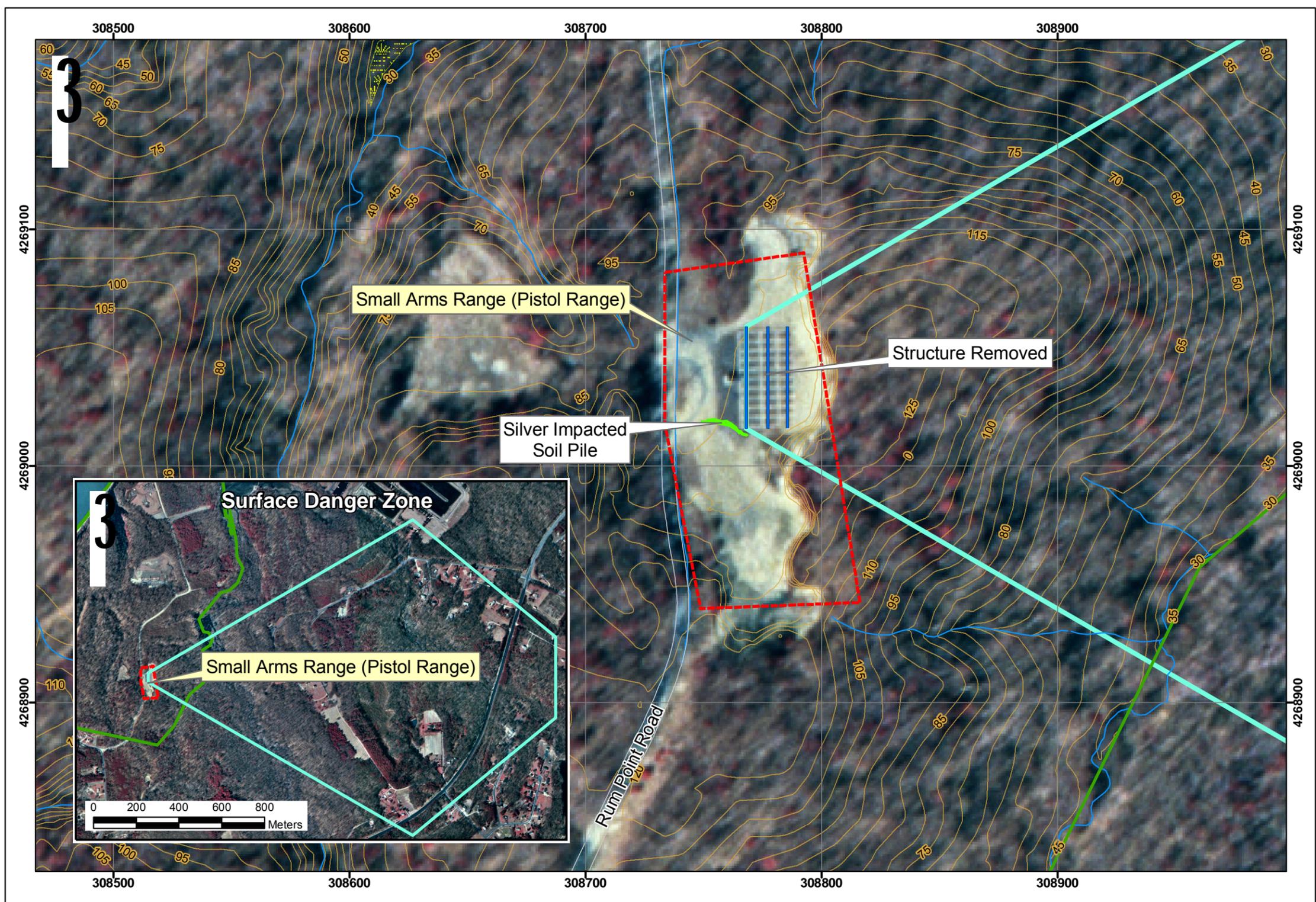
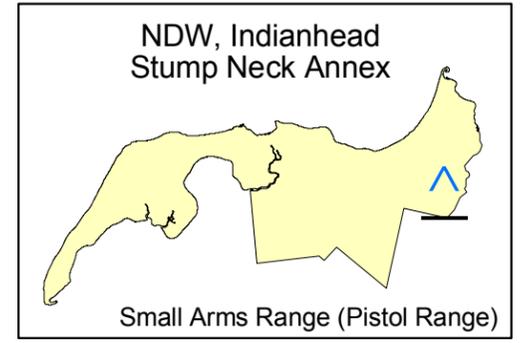
- Installation Boundary
- Structures
- Roads
- Streams
- Contours
- Wetlands
- Small Arms Range (Pistol Range)
- Firing Line
- Surface Danger Zone



Data Source: USGS 7.5 Minute Series  
Indian Head, MD, Orthophoto, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**



**MALCOLM  
PIRNIE**

**Map 5.11-3  
Munitions Characterization  
Small Arms Range (Pistol Range)**

**Legend**

-  Installation Boundary
-  Small Arms Range (Pistol Range)
- MEC Presence**
  -  Known
  -  Suspect

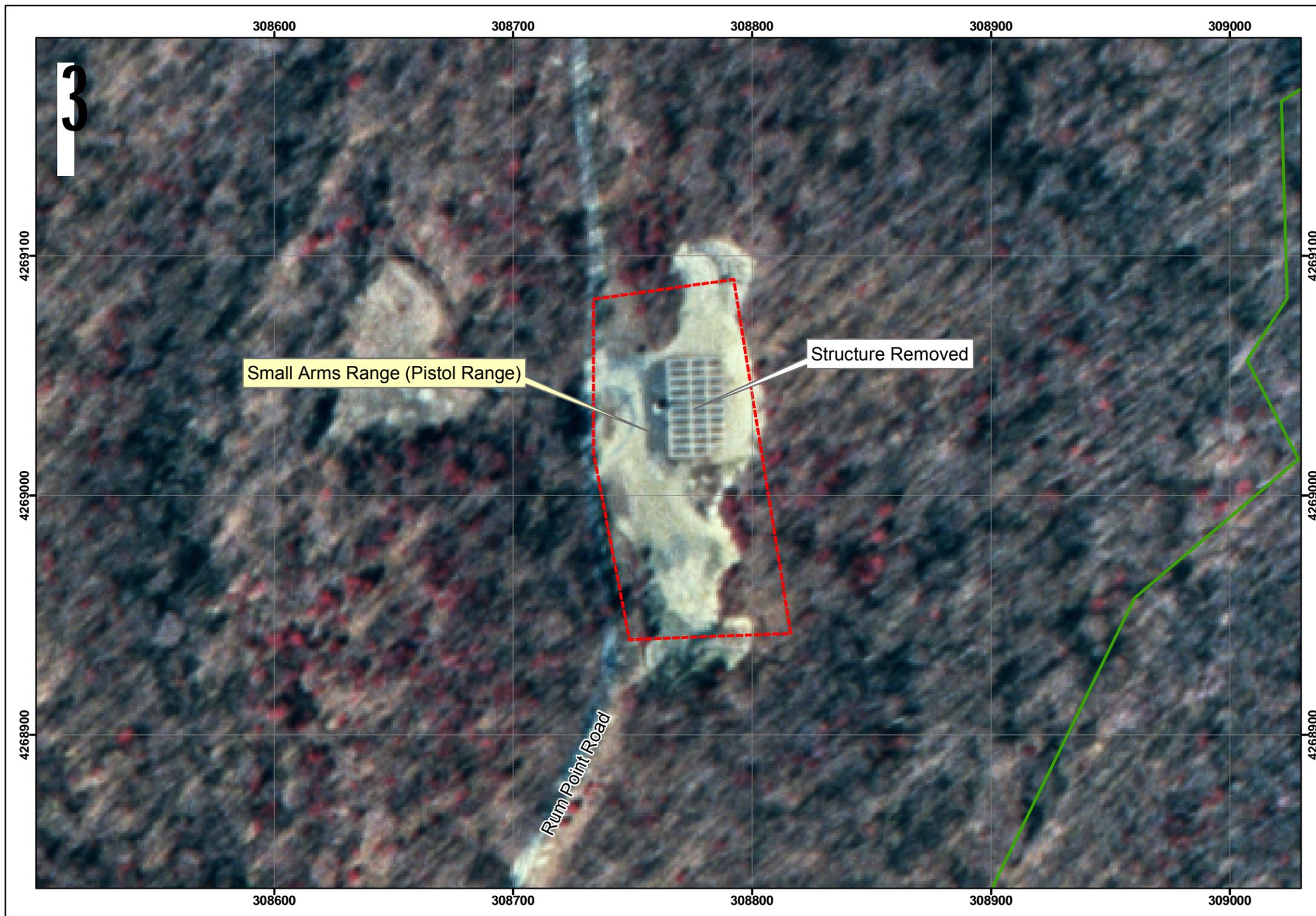
There is no evidence of MEC Presence as determined through historical documentation, interview, and/or visual survey. Visual observations and/or historical documentation indicate that MC may be present at the site, but MC Presence has not been confirmed by sampling or other means.



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**

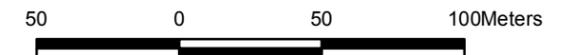


**MALCOLM  
PIRNIÉ**

**Map 5.12-1  
Range/Site Details  
Stump Neck Impact Area**

**Legend**

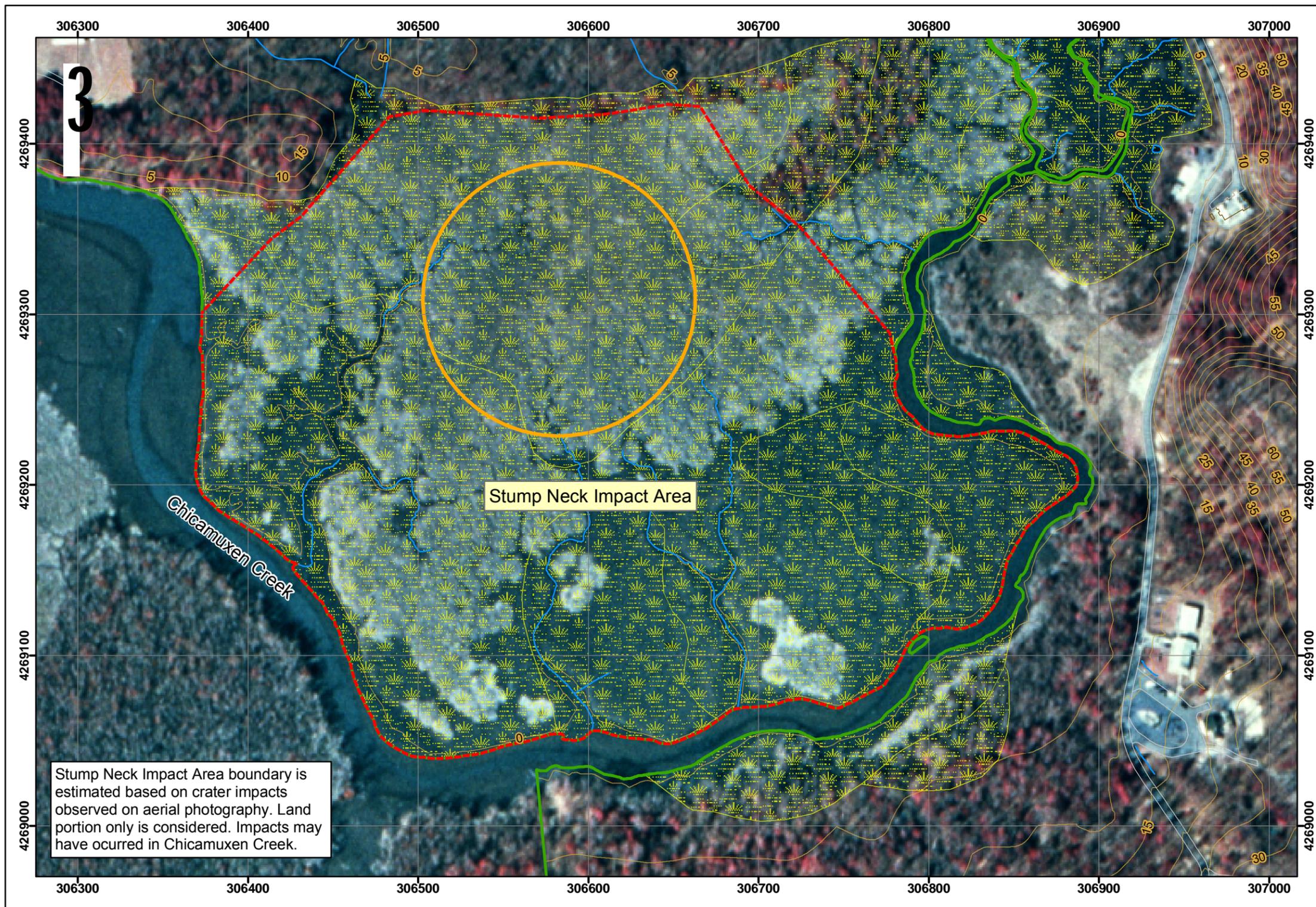
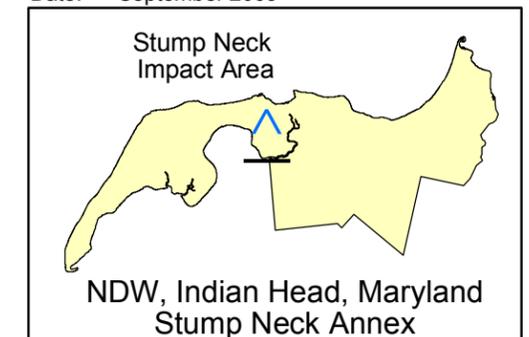
- Installation Boundary
- Structures
- Roads
- Streams
- Contours
- Wetlands
- Stump Neck Impact Area from Inventory
- Stump Neck Impact Area Identified during PA



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**



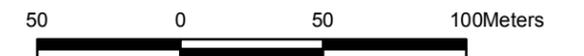
**MALCOLM  
PIRNE**

**Map 5.12-2  
Munitions Characterization  
Stump Neck Impact Area**

**Legend**

-  Installation Boundary
-  Stump Neck Impact Area
- MEC Presence**
  -  Known
  -  Suspect

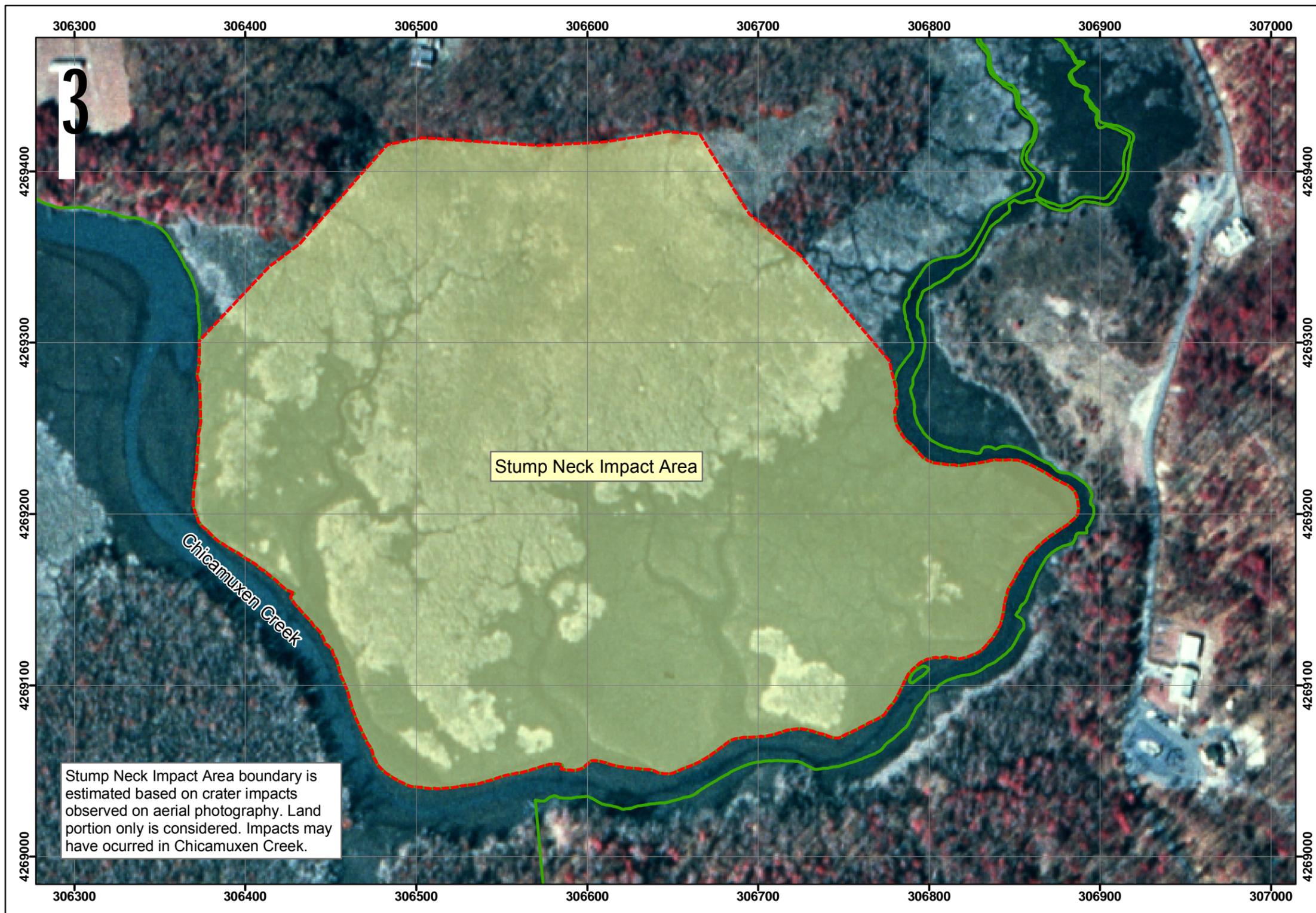
MEC Presence was determined through review of historical documentation, interviews, and/or visual survey.



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005





**Preliminary Assessment  
NDW, Indian Head, Maryland**

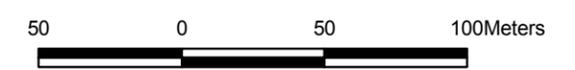


**MALCOLM  
PIRNIE**

Map 5.13-1  
Visual Survey  
Test Area 1

**Legend**

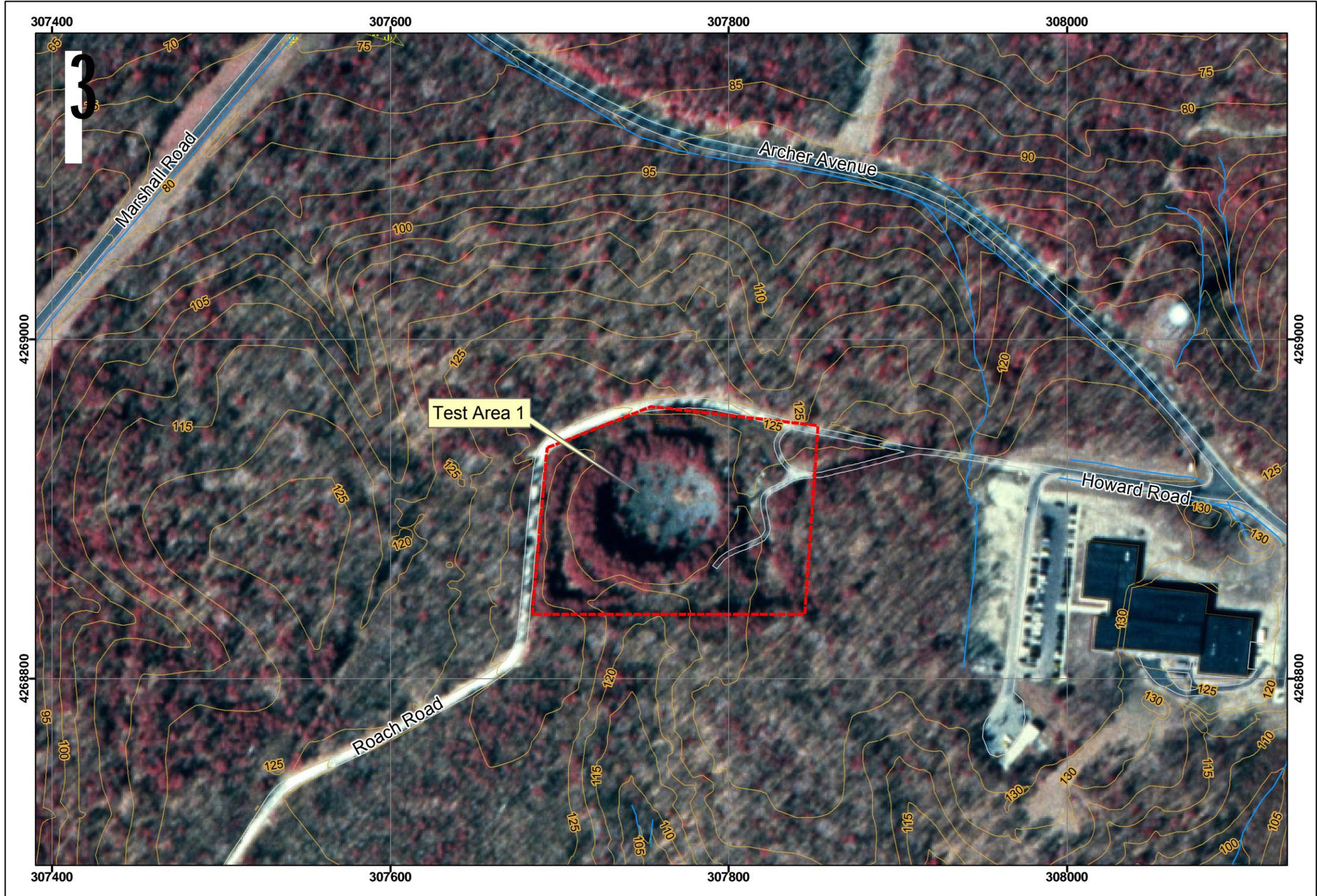
-  Installation Boundary
-  Test Area 1
-  Site Reconnaissance



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**

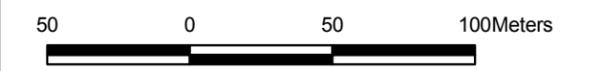


**MALCOLM  
PIRNIE**

**Map 5.13-2  
Range/Site Details  
Test Area 1**

**Legend**

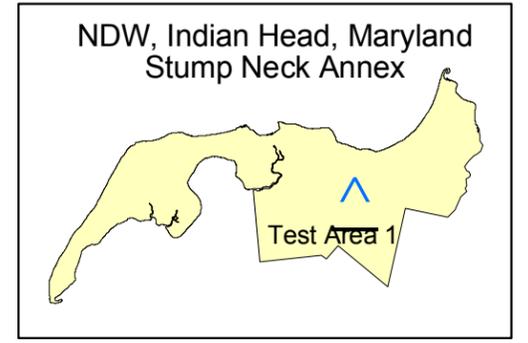
-  Installation Boundary
-  Structures
-  Roads
-  Streams
-  Contours
-  Wetlands
-  Test Area 1



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005





**Preliminary Assessment  
NDW, Indian Head, Maryland**



**MALCOLM  
PIRNIE**

**Map 5.13-3  
Munitions Characterization  
Test Area 1**

**Legend**

-  Installation Boundary
-  Test Area 1
- MEC Presence**
-  Known
-  Suspect

MEC Presence was determined through review of historical documentation, interviews, and/or visual survey.



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: December 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**

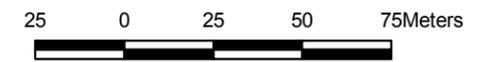


**MALCOLM  
PIRNIE**

Map 5.14-1  
Visual Survey  
Test Area 2

**Legend**

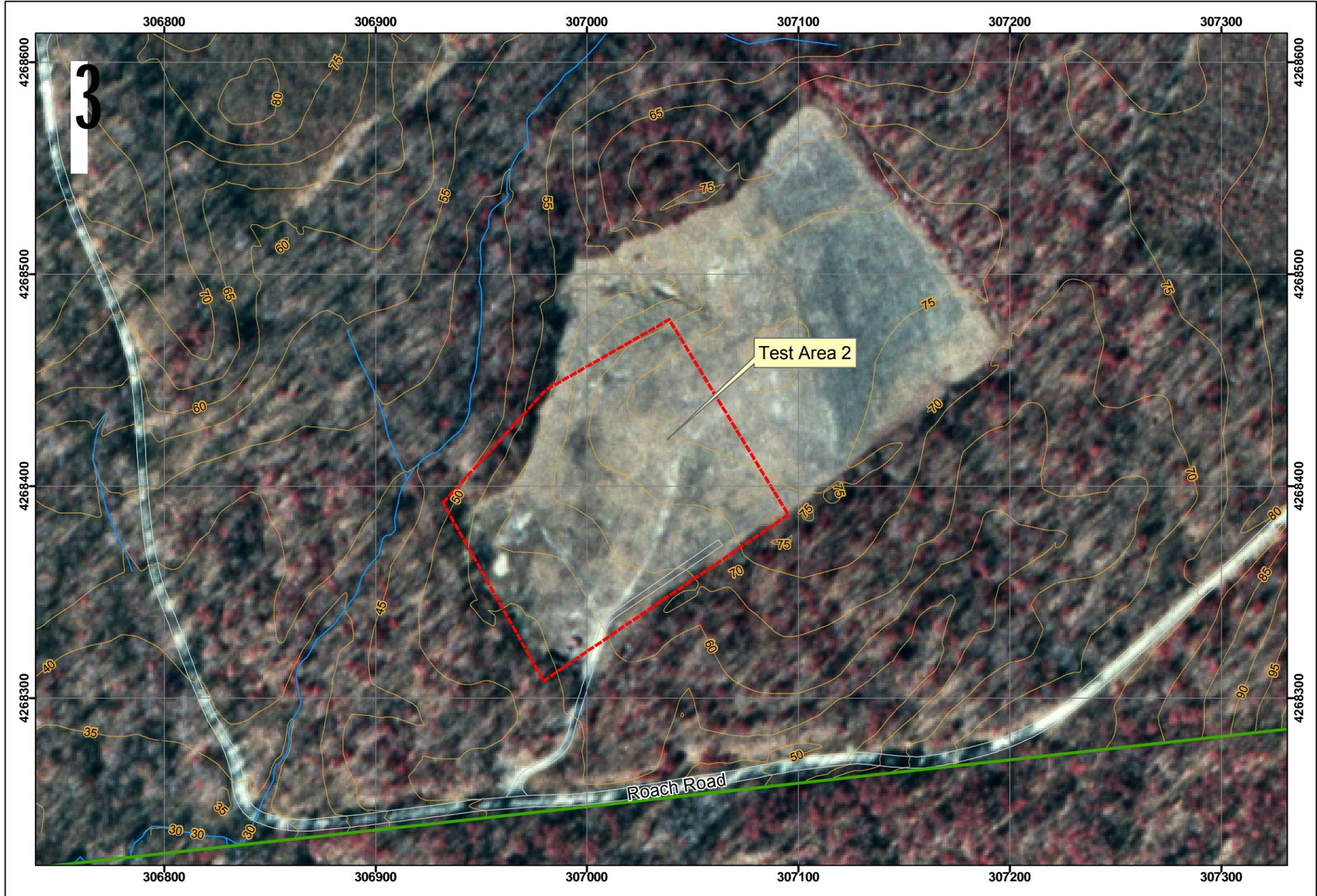
-  Installation Boundary
-  Test Area 2
-  Site Reconnaissance



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**



**MALCOLM  
PIRNIÉ**

**Map 5.14-2  
Range/Site Details  
Test Area 2**

**Legend**

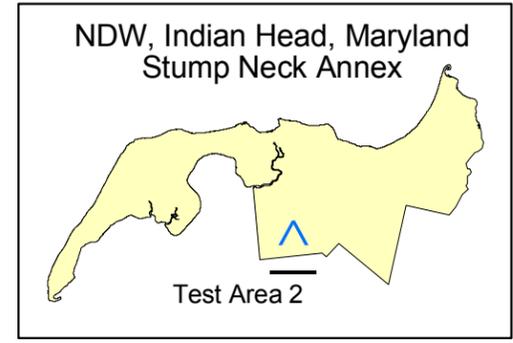
- Installation Boundary
- Structures
- Roads
- Streams
- Contours
- Wetlands
- Test Area 2



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005





**Preliminary Assessment  
NDW, Indian Head, Maryland**



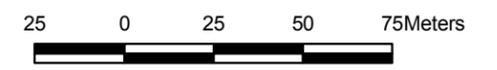
**MALCOLM  
PIRNIE**

**Map 5.14-3  
Munitions Characterization  
Test Area 2**

**Legend**

-  Installation Boundary
-  Test Area 2
- MEC Presence**
-  Known
-  Suspect

There is no evidence of MEC Presence as determined through historical documentation, interview, and/or visual survey. Visual observations and/or historical documentation indicate that MC may be present at the site, but MC Presence has not been confirmed by sampling or other means.



Data Source: USGS, DOQQ Indian Head MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005

**Preliminary Assessment  
NDW, Indian Head, Maryland**

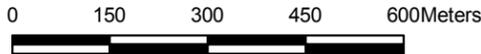


**MALCOLM  
PIRNIE**

Map 5.15-1  
Visual Survey  
The Valley Impact Area

**Legend**

-  Installation Boundary
-  Site Reconnaissance
-  The Valley Impact Area



Data Source: USGS, DOQQ Indian Head, MD, 1998

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**



**MALCOLM  
PIRNIÉ**

**Map 5.15-2  
Range/Site Details  
The Valley Impact Area**

**Legend**

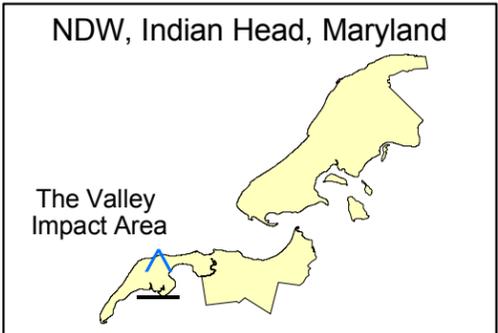
-  Installation Boundary
-  Structures
-  Roads
-  Streams
-  Contours
-  Wetlands
-  The Valley Impact Area



Data Source: USGS, DOQQ Indian Head, MD, 1998

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**



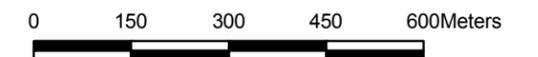
**MALCOLM  
PIRNIE**

Map 5.15-3  
Munitions Characterization  
The Valley Impact Area

**Legend**

-  Installation Boundary
-  The Valley Impact Area
- MEC Presence\***
-  Known
-  Suspect

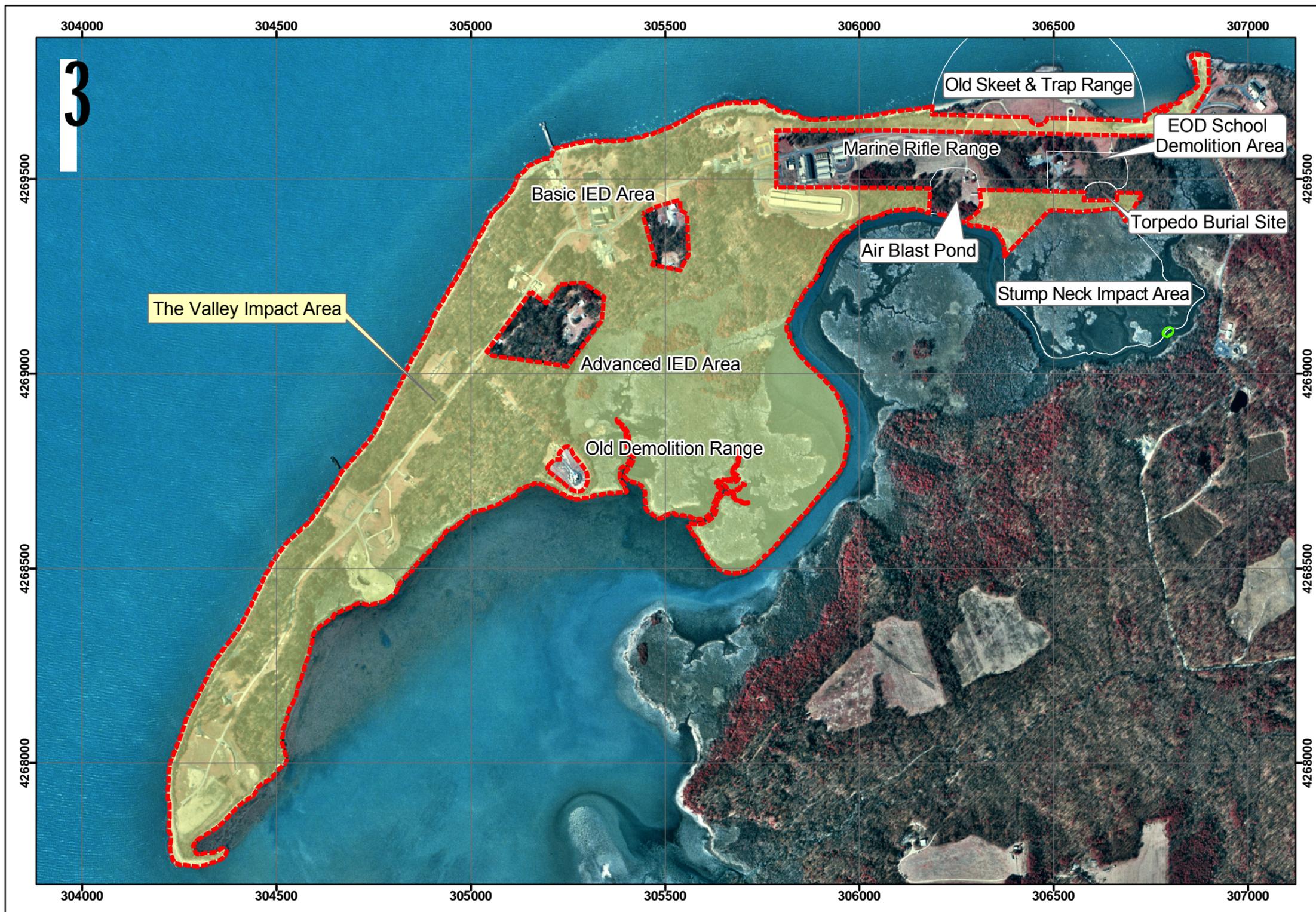
\*MEC Presence was determined through review of historical documentation, interviews, and/or visual survey.



Data Source: USGS, DOQQ Indian Head, MD, 1998

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**



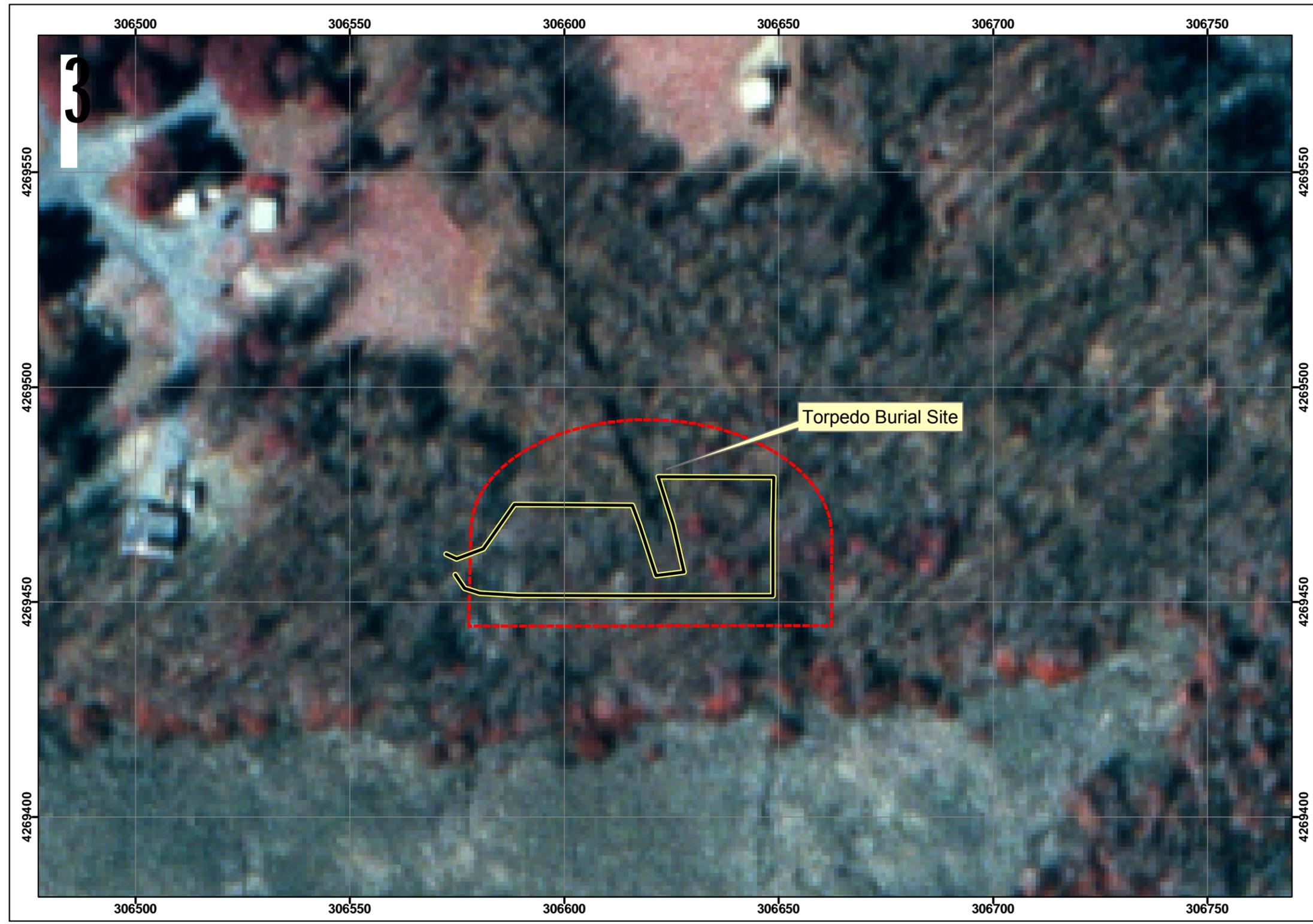
**MALCOLM  
PIRNIE**

Map 5.16-1  
Visual Survey  
Torpedo Burial Site

**Legend**

-  Installation Boundary
-  Torpedo Burial Site
-  Site Reconnaissance

Site Reconnaissance is Approximate



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005

**Preliminary Assessment  
NDW, Indian Head, Maryland**



**MALCOLM  
PIRNIÉ**

**Map 5.16-2  
Range/Site Details  
Torpedo Burial Site**

**Legend**

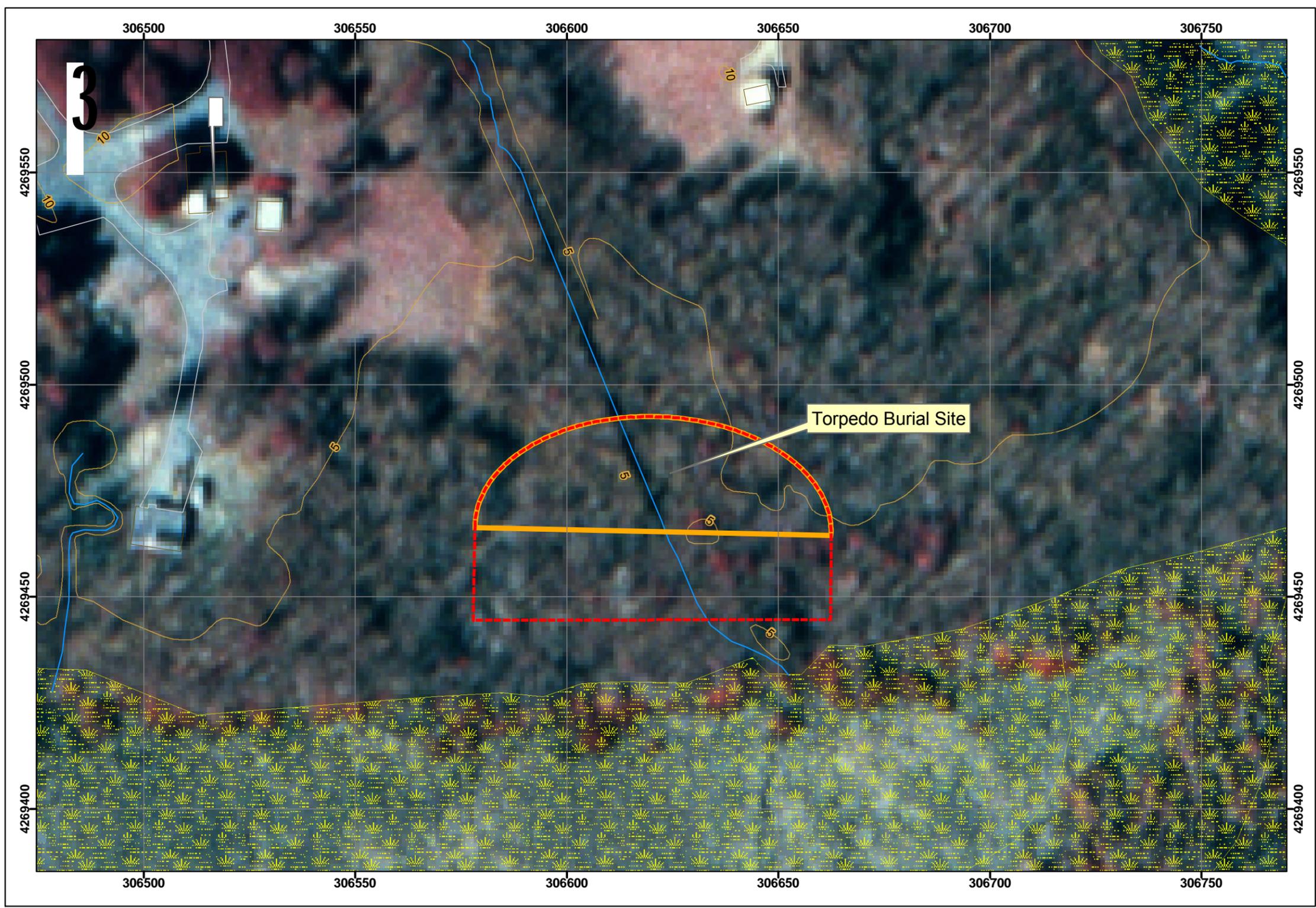
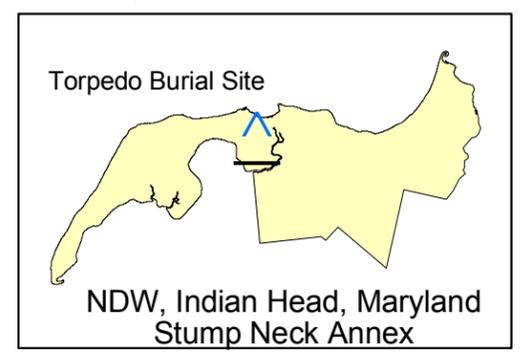
-  Installation Boundary
-  Structures
-  Roads
-  Streams
-  Contours
-  Wetlands
-  Torpedo Burial Site from Inventory
-  Torpedo Burial Site Identified during PA



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**



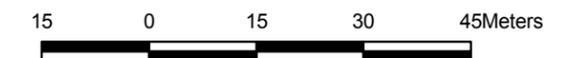
**MALCOLM  
PIRNIE**

**Map 5.16-3  
Munitions Characterization  
Torpedo Burial Site**

**Legend**

-  Installation Boundary
  -  Torpedo Burial Site
  -  Evidence of Munitions Use
  -  MEC Sighting
- MEC Presence**
-  Known
  -  Suspect

MEC Presence was determined through review of historical documentation, interviews, and/or visual survey.



Data Source: USGS, DOQQ Indian Head MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**

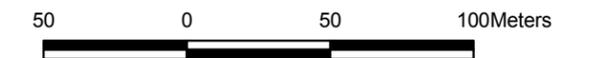


**MALCOLM  
PIRNIE**

**Map 5.17-1  
Visual Survey  
Torpedo Casing Disposal Area**

**Legend**

-  Installation Boundary
-  Magnetic Training Range
-  Torpedo Casing Disposal Area from Inventory
-  Revised Torpedo Casing Disposal Area Identified during PA
-  Site Reconnaissance



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**



**MALCOLM  
PIRNE**

**Map 5.17-2  
Range/Site Details  
Torpedo Casing Disposal Area**

**Legend**

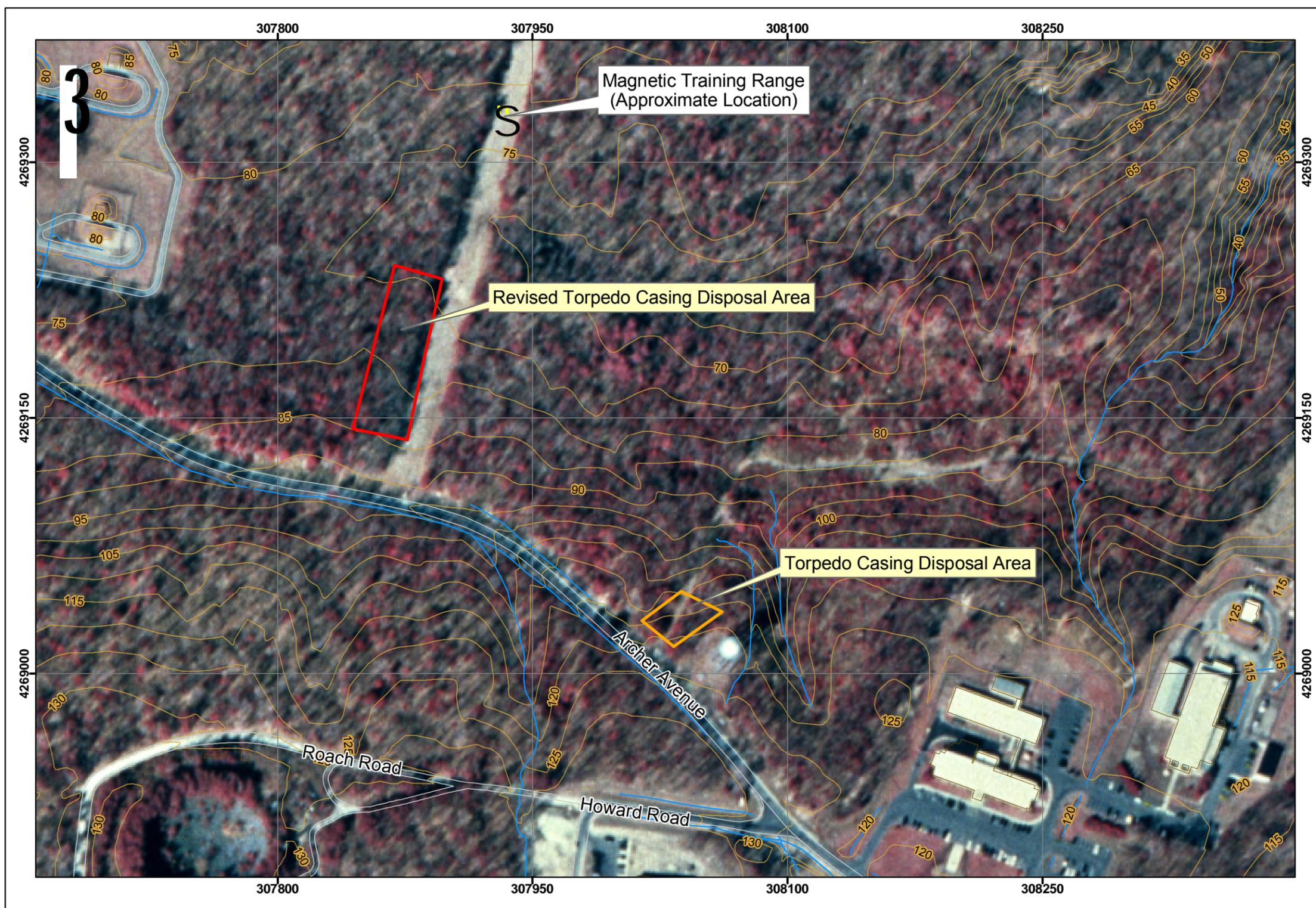
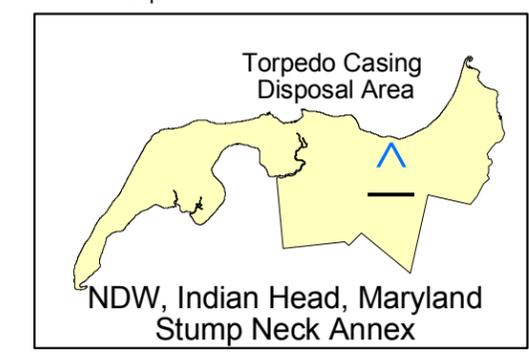
- Installation Boundary
- Structures
- Roads
- Streams
- Contours
- Wetlands
- Magnetic Training Range
- Torpedo Casing Disposal Area from Inventory
- Revised Torpedo Casing Disposal Area Identified during PA



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



**Preliminary Assessment  
NDW, Indian Head, Maryland**

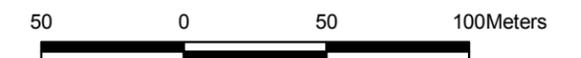


**MALCOLM  
PIRNIE**

**Map 5.17-3  
Munitions Characterization  
Torpedo Casing Disposal Area  
Legend**

-  Installation Boundary
-  Magnetic Training Range
-  Torpedo Casing Disposal Area *from Inventory*
-  Revised Torpedo Casing Disposal Area *Identified during PA*
- MEC Presence**
-  Known
-  Suspect

MEC Presence was determined through review of historical documentation, interviews, and/or visual survey.



Data Source: USGS, DOQQ Indian Head, MD, 1998  
NDW Indian Head, GIS/CAD Data

Coordinate System: UTM Zone 18N  
Datum: NAD 83  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment  
Date: September 2005



## **Appendix A: References**

**REFERENCES - GENERAL**

**Reports**

*War-Time History of the US Naval Gunpowder Factory, Indian Head Maryland,*  
Prepared by: Unknown, Post 1945.

*Programming Guide,* March 1958, United States Naval Aeronautical Shore Facilities, NAVAER  
00-100-504.

*Naval Ordnance Station Time Line,* Prepared by: Unknown, Date: 1967.

*Information Handbook of US Naval Propellant Plant Indian Head Maryland,* Prepared  
by: Unknown, Date: 1970's.

*Soil Survey of Charles County, Maryland,* Prepared by: Richard L. Hall and Earle D.  
Matthews, Department of Agriculture Soil Conservative Service, Prepared for:  
Department of Agriculture Soil Conservative Service and Maryland Agriculture  
Experiment Station, July 1974.

*Draft Report Indian Head Naval Ordnance Station Phase 1 Environmental Audit,*  
Prepared by: Sistine Environmental Consultants, May 1990.

*Master Plan Update,* Prepared by: Naval Facilities Engineering Command January 1990.

*Chesapeake Bay Coastal Ecosystems Program,* Prepared by U.S. Fish and Wildlife  
Service, August 1996.

*Part Three - Attachment for Range 2,* Produced by Indian Head Division, Naval Surface  
Warfare Center, 1996.

*Geologic Framework, Hydrogeology, and Ground-water Quality of the Potomac Group  
Aquifer System, Northwestern Charles County, Maryland,* Water Resources  
Investigations Report 91-4059. 1997. Prepared by: U.S. Geological Survey.

*RCRA Facility Investigation/ Verification Investigation Report for Stump Neck Annex,*  
Prepared by: Brown and Root Environmental, January 1998.

*Aerial Photographic Analysis, Indian Head Naval Surface Warfare Center,*  
Environmental Services Division, U.S. EPA, February 1998.

*The Geohydrology and Water-Supply Potential of the Lower Patapsco Aquifer and  
Patuxent Aquifers in the Indian Head-Bryans Road Area, Charles County, Maryland,*  
Report of Investigations No. 69. 1999. Prepared by: Maryland Department of the  
Environment and Charles County Department of Planning and Growth Management.

## FINAL PRELIMINARY ASSESSMENT

*Navy Closed, Transferred, Transferring, Active and Inactive Range Survey*, January 2000.

*Ranges Located at IHDIVNAVSURFWARCEN April 2002 Closed Ranges and Other Sites*, 2002.

*Site Screening Prcess Report for Sites: 32, 33, 34, 36, 37, 51 and 52*, Prepared by: Tetra Tech, March 2003.

*Work Plan for Remedial Investigation at Site 28*, Prepared by CH2MHill, April 2003.

*Water System Improvements Naval Surface Warfare Center Indian Head, Maryland*. April 11, 2003. Prepared by: ADTEK Engineers, Inc., Prepared for: EFA Chesapeake.

*Site Management Plan for Installation Restoration Program Indian Head*, Prepared by: Engineering Field Activity Chesapeake, May 2003.

*Pilot Study Work Plan for In Situ Bioremediation at Site 57 – Former Drum Loading Area Building 292*, Prepared by: Tetra tech NUS Inc., May 2003.

*US Navy Closed, Transferred, Transferring, Range and Other Sites Questionnaire*, Prepared by: Elaine Magdinec, 2003.

*Report about Native American Cultural Resources at Indian Head*, Prepared by: Unknown, Date Unknown.

*Indian Head Building Numbers and Information*, Prepared by: Unknown, Date Unknown.

*Hunting Program Rules and Regulations*, Prepared by: Natural Resources Office. Date Unknown.

*Pictorial Brochure of US Naval Propellant Plant*, Unknown Date.

*Data Collection Questionnaire*, US Navy CTT Ranges, 2002

*Characterization and Remediation of Soils at Closed Small Arms Firing Ranges*, Technical/Regulatory Guidelines, January 2003, Prepared by: Interstate Technology and Regulatory Council, Small Arms Firing Range Team.

*Preliminary Assessment Report Guidance Small Arms Range Fact Sheet*, Malcolm Pirnie Internal Document, May 2004.

### **Memos**

*Transmittal Concerning Possible Superfund Site at Indian Head*, From: Janet McKegg, January 14 1992.

Email Transmittal Regarding Datacall for Indian Head Rangers, From: Susanne E. Duffy (NSSC), November 2000.

*Email Transmittal Regarding NORM Data for Closed Ranges*, From: Jeffery W Morris (EFACHES), March 18 2002.

*Hunting/Trapping Season and Harvest Limits for 2003-2004*, IHDIVNAVSURFWARCEN Notice, 2004.

### **Websites**

Summary of Maryland Tidal Recreational Fisheries Regulations, ([www.dnr.state.md.us/fisheries/regulations/recregchrt.html](http://www.dnr.state.md.us/fisheries/regulations/recregchrt.html)).

*Indian Head: Land of Legend*. (<http://somdthisisliving.somd.com/index.html>)

### **Maps**

*Map From Initial Assessment Survey*, Prepared: 1990.

NSWCIH Stump Neck Annex Hunting Map, 2003-2004, IHDIV NSWC Indian Head, Maryland

*Indian Head Utilities Map*, Produced by: Unknown.

*NSWC IHDIV Gig Permits Map*, Date Unknown.

*Navy Range Survey Map Indian Head Area*, Produced by NAVSEA.

*Stump Neck Utilities Map*, Date Unknown.

### **Aerial Photos**

*Small Powder Factory*, 1932

*Oblique of Powder Factory*, 1943

*Flyover of Indian Head* 1947, 1947

*Naval Powder Factory 1948 (1)*, 1948

*Naval Powder Facility 1948 (2)*, 1948

*Naval Explosives Investigation Lab 1949*, 1949

*Naval Explosives Investigation Lab 1949 (2)*, 1949

*Naval Explosives Investigation Lab 1949 (3)*, 1949

*Full Photo of Indian Head, 1964.*

## **Field Notes**

*Indian Head Site Visit June 23-27 2003.*

## **Interviews**

*Christina Adams, Public Affairs, November 19, 2003.*

*Dave Bode, Safety Department, October 29, 2003.*

*Jeff Bossart, Indian Head – Natural resources, November 17, 2003.*

*Tom Cox, Public Works, November 18, 2003.*

*Bruce Dalton, Safety Department, November 25, 2003.*

*Jim Dolph, Navy Historian, November 21, 2003.*

*Frank Ehrenreicht, Retired Marine Corp EOD, June 27, 2003.*

*Kathy Frey, Indian Head – Well Data, November 18, 2003.*

*Jim Hersey, UXO Program Director, October 16, 2003.*

*Frank James, Indian Head – Safety Department, November 21, 2003.*

*Shawn Jorgensen, Environmental Department, November 17, 2003.*

*Larry Kijek, Stump Neck- Safety Department, November 20, 2003.*

*Cee Cee Krawlings, Base Security, November 19, 2003.*

*Chris Lopez, Equipment Specialist, Technical Support Branch, Research And Development Department, October 16, 2003.*

*Elaine Magdinec, Environmental Office, November 18, 2003.*

*John McDevitt, NDW Retired, December 5, 2003.*

*Jack Meyers, Retired Employee, NDW, September 25, 2003.*

*Gordon Miller, Retired Marine Corp EOD, June 26, 2003.*

*Heidi Morgan*, Environmental Office, November 17, 2003.

*Jeff Morris*, RPM, November 17, 2003.

*Andy Pedersen*, Senior Engineer, NDW, September 25, 2003.

*William Penn*, IHDIV, NSWC, Retired. November 18, 2003.

*Allison Poe*, Public Works Office/GIS Specialist, November 19, 2003.

*Ben Redmond*, CH2MHill - Vice President, October 1, 2003.

*Diana Rose*, Environmental Office, November 18, 2003.

*Lou Scalfari*, Indian Head – Architect, November 21, 2003.

*Earl Scroggins*, Technical Support Branch Head, October 16, 2003.

*John Stacy*, Public Works/Master Plan, November 20, 2003.

*Dave Stuart*, Installation/Office: Indian Head – PublicWorks/Utilities, November 17, 2003.

*Ivan Tominack*, Indian Head – Engineer, November 19, 2003.

**REFERENCES – SITE SPECIFIC**

**Air Blast Pond**

**Reports**

*Soil Survey of Charles County*, Submitted by: U.S. Department of Agriculture Soil Conservation Service, July 1974, Prepared by: Richard Hall and Earle Matthews, Soil Conservation Service

*Master Plan Update*, Naval Ordnance Station Indian Head, Maryland, January 1990, Prepared by: Chesapeake Division, Naval Facilities Engineering Command

*RCRA Facility Assessment Report of the U.S. Naval Explosive Ordnance Disposal Technology Center*, Stump Neck Annex, Indian Head, Maryland, Submitted by: Kearney/Centaur Division, April 1990

Memorandum from U.S. Naval Explosive Ordnance Disposal Technology Center to U.S. EPA, Subject: Comments and Corrections to the USEPA Preliminary RCRA Facility Assessment Report, May 1990

*RCRA Facility Investigation Work Plan*, NAVEOTECHDIV- Stump Neck Annex, Indian Head, Maryland, October 1995, Prepared by: EnSafe/Allen & Hoshall

*Phase I Cultural Resources Survey of Stump Neck Annex and Supplemental Architectural Investigations*, Indian Head Naval Surface Warfare Center, Charles County, Maryland, August 1996, Prepared by R. Christopher Goodwin & Associates

*RCRA Facility Investigation/Verification Investigation Report for Stump Neck Annex*, IHD NSWC, Maryland, Submitted by: Brown and Root Environmental, January 1998, Prepared by: Leeann Sinagoga, Brown and Root Environmental

**Other**

NDW, Indian Head Building database. Provided by Heidi Morgan.

**Maps**

NSWCIH Stump Neck Annex Hunting Map, 2003-2004, IHDIV NSWC Indian Head, Maryland

NSWCIH Stump Neck Annex Utilities Data Map, IHDIV NSWC Indian Head, Maryland

Air Blast Pond – 2003, At Stump Neck, Section Plan, Profile and Section, NAVFAC, Naval Ordnance Station, Indian Head, Maryland, June 8, 1956.

Air Blast Pond – 2003, At Stump Neck, Plan – Section – Details, NAVFAC, Naval Ordnance Station, Indian Head, Maryland, June 19, 1984.

Naval Ordnance Station, Indian Head, Maryland, Map of Reservation, Stump Neck Area, Conditions as of 1 January 1983.

**Interviews**

Heidi Morgan, Environmental Office, NDW, Indian Head. Interviewed on November 17, 2003 by Shelly Kolb, Denise Tegtmeier, and Rhonda Stone.

**Area 8**

**Reports**

*Command History July 1970 through December 1970*, To Chief of Operation, From Commanding Officer Moody, Naval School, Explosive Ordnance Disposal

*Soil Survey of Charles County*, Submitted by: U.S. Department of Agriculture Soil Conservation Service, July 1974, Prepared by: Richard Hall and Earle Matthews, Soil Conservation Service

*Notice to Navigation Interests*, To the Baltimore Corps of Engineers, From Assistant Chief, Operation Division, April 3, 1978

*Command History for 1988*, To Director of Naval History, From Commanding Officer Cerino, Naval School, Explosive Ordnance Disposal

*Environmental Regulation of Ordnance and Ordnance Ranges*, To Chief of Naval Education and Training, From Commanding Officer Getman, Naval School, Explosive Ordnance Disposal, August 1990

*Master Plan Update*, Naval Ordnance Station Indian Head, Maryland, January 1990, Prepared by: Chesapeake Division, Naval Facilities Engineering Command

*Verification Investigation Work Plan for the Naval School EOD Sites at the Naval Explosive Ordnance Disposal Technology Division*, NSWC, Stump Neck Annex, Indian Head Division, Maryland, Submitted by: Brown & Root Environmental, September 1995

*RCRA Facility Investigation Work Plan*, NAVEOTECHDIV- Stump Neck Annex, Indian Head, Maryland, October 1995, Prepared by: EnSafe/Allen & Hoshall

*Verification Investigation for the Naval School EOD Sites at the Naval Explosive Ordnance Disposal Technology Division*, NSWC, Stump Neck Annex, Indian Head Division, Maryland, Submitted by: Brown & Root Environmental, February 1996

*Phase I Cultural Resources Survey of Stump Neck Annex and Supplemental Architectural Investigations*, Indian head Nava surface Warfare Center, Charles County, Maryland, August 1996, Prepared by R. Christopher Goodwin & Associates

*Background Investigation Work Plan Indian Head and Stump Neck Annex*, NSWC, Indian Head Division, Maryland, Submitted by: Brown & Root Environmental, October 1997

*Indian Head Building database*, Provided by Heidi Morgan, 2003

### **Maps**

NSWCIH Stump Neck Annex Hunting Map, 2003-2004, IHDIV NSWC Indian Head, Maryland

### **Interviews**

Heidi Morgan, Environmental Office, NDW, Indian Head. Interviewed on November 17, 2003 by Shelly Kolb, Denise Tegtmeier, and Rhonda Stone.

William Penn, Former Head of the IED Department. Interviewed on November 18, 2003 by Denise Tegtmeier and Doug Sawyers.

Earl Scroggins, Technical Support Branch Head, Research and Development Department, NDW, Indian Head, Maryland. Interviewed on October 16, 2003 by Hien Dinh.

**EOD School Demolition Area**

**Reports**

Ordnance Investigation Laboratory. U.S. Naval Powder Factory. Indian Head, MD. To: Commanding Officer. From: Raymond F. Perkins Lieutenant, USNR Division Officer. Subject: Chillino, Joseph, 816 53 70, AOM3c, V-6, USNR, and Coleman, Granville R., 836 10 45, AOM3c, V-6, USNR Complimentary Mast for. March 16, 1945.

*Master Plan Update*, Prepared by: Naval Facilities Engineering Command January 1990.

**Maps**

*Map of Naval Powder Factory*. Stump Neck Area. Indian Head, MD. Showing Conditions of June 30, 1945.

*Map of Naval Powder Factory*. Stump Neck Area. Indian Head, MD. Showing Conditions of June 30, 1949 (#1).

*Map of Naval Powder Factory*. Stump Neck Area. Indian Head, MD. Showing Conditions of June 30, 1949 (#2).

*NSWC Stump Neck Annex Hunting Map* 2003-2004.

*Stump Neck Utilities Data*. Provided by the Installation.

**Basic IED Area**

**Reports**

*Master Plan Update* Naval Ordnance Station Indian Head, MD. January 1990. Prepared by: Rogers, Golden, and Halpern, Philadelphia, PA, Prepared for: Chesapeake Division, Naval Facilities Engineering Command.

*Verification Investigation Report for the Naval School EOD Sites* Naval Explosive Ordnance Disposal Technology Division, Naval Surface Warfare Center Stump Neck Annex, Indian Head Division. February 1996. Prepared by: Brown & Root Environmental, Prepared for: EFA Chesapeake.

*Geologic Framework, Hydrogeology, and Ground-water Quality of the Potomac Group Aquifer System, Northwestern Charles County, Maryland*, Water Resources Investigations Report 91-4059. 1997. Prepared by: U.S. Geological Survey.

*The Geohydrology and Water-Supply Potential of the Lower Patapsco Aquifer and Patuxent Aquifers in the Indian Head-Bryans Road Area, Charles County, Maryland*, Report of Investigations No. 69. 1999. Prepared by: Maryland Department of the Environment and Charles County Department of Planning and Growth Management.

*Water System Improvements* Naval Surface Warfare Center Indian Head, Maryland. April 11, 2003. Prepared by: ADTEK Engineers, Inc., Prepared for: EFA Chesapeake.

**Memos**

1 October 1970. From Commanding Officer, Naval School, Explosive Ordnance Disposal. To: Chief of Naval Operations. Subject: Command History.

30 October 1991. From: Director, Utilities/Environmental Division IHDIV-NSWC. To: EPA Region III RCRA Programs Branch. Notification of three additional SWMUs located on Stump Neck Annex.

## FINAL PRELIMINARY ASSESSMENT

1 December 1993. To: Commanding Officer, Naval School, Explosives Ordnance Disposal. From: Commander, Indian Head Division, Naval Surface Warfare Center. *Cost Estimate for Sampling of Possible NAVSCOLEOD SWMUs.*

18 March 1997. From: Commander, Naval Facilities Engineering Command. To: Commander, Naval Surface Warfare Center. *Environmental Cleanup Cost Associated with the Relocation of a Tenant Activity.*

### Maps

*Indian Head Utilities Data.* 2003 GIS data, Prepared by: IHDIV-NSWC.

*Hunting Map 2003-2004,* Natural Resources Office, 26 September 2003.

### Interviews

William Penn, Former Head of the IED Department. Interviewed on November 18, 2003 by Denise Tegtmeier and Doug Sawyers.

Heidi Morgan, Environmental Office, NDW, Indian Head. Interviewed on November 17, 2003 by Shelly Kolb, Denise Tegtmeier, and Rhonda Stone.

Jonathan Stacey, Public Works/Master Plan. Interviewed on November 20, 2003 by Rhonda Stone and Denise Tegtmeier.

Earl Scroggins, Technical Support Branch Head, Research and Development Department, NDW, Indian Head, Maryland. Interviewed on October 16, 2003 by Hien Dinh.

**Advanced IED Area**

**Reports**

*Soil Survey of Charles County Maryland.* July 1974. Prepared by the U.S. Department of Agriculture in Cooperation with Maryland Agriculture Experiment Station.

*Master Plan Update* Naval Ordnance Station Indian Head, MD. January 1990. Prepared by: Rogers, Golden, and Halpern, Philadelphia, PA, Prepared for: Chesapeake Division, Naval Facilities Engineering Command.

*Verification Investigation Work Plan for the Naval School EOD Sites* Naval Explosive Ordnance Disposal Technology Division, Naval Surface Warfare Center Stump Neck Annex, Indian Head Division. September 1995. Prepared for Chesapeake Division, Naval Facilities Engineering Command.

*Phase I Cultural Resources Survey of Stump Neck Annex and Supplemental Architecture Investigation,* Indian Head Naval Surface Warfare Center, Charles County, MD. August 1996. Prepared for Chesapeake Division, Naval Facilities Engineering Command.

*Verification Investigation Report for the Naval School EOD Sites* Naval Explosive Ordnance Disposal Technology Division, Naval Surface Warfare Center Stump Neck Annex, Indian Head Division. February 1996. Prepared for Chesapeake Division, Naval Facilities Engineering Command.

*Site Management Plan for Installation Restoration Program* Indian Head Division Naval Surface Warfare Center Indian Head, Maryland. Fiscal Years 2003 – 2004. Prepared by Engineering Field Activity, Chesapeake Naval Facilities Engineering Command.

**Memos**

1 October 1970. From: Commanding Officer, Naval School, Explosive Ordnance Disposal. To: Chief of Naval Operations. Command History, January 1968 through June 1970.

## FINAL PRELIMINARY ASSESSMENT

22 April 1972. From: Commanding Officer, Naval Explosive Ordnance Disposal Facility, Indian Head, Maryland. To: Director of Naval History, Washington Navy Yard, Washington, D.C. Command History.

30 October 1991. From: Kenneth D. Morin, P-E., Director, Utilities/Environmental Division at IHDIV-NSWC. To: Mr. John Humphries, III at EPA Region III: Addressing additional SWMUS not Evaluated during RCRA Corrective action permitting process.

1 August 1994. From: Commander, Indian Head Division, Naval Surface Warfare Center, Indian Head MD. To: Commander, Naval Ordnance Center, Indian Head, MD. Subject: Indian Head Division, Naval Surface Warfare Center Request for Site Approval for Local Project, "Placement of cargo boxed for the Naval School, explosive ordnance disposal."

11 September 1995. From: Frank R. Peters, NAVFAC EFACHES. To: Javier Garcia, NAVFACHQ. Point Paper DERA Funding for DEODTC Indian Head.

### Maps

Explosives Investigation Lab Conditions as of June 30 1946; PWD DWG No. 11679.

Stump Neck Area 1 May 1946; DWG. No. 19092.

Explosive Investigation Lab / Conditions as of June 30, 1947; DWG. No. 25116

Explosive Investigation Lab / Condition as of June 30, 1948; DWG. No. 25587.

Stump Neck Area Map of Naval Powder Factory Showing Conditions as of June 30, 1949; DWG. No. 26171.

Sanitary Facilities of Stump Neck Potable Water Supply Storage and Septic Tanks, June 20, 1952; Exhibit No. 15.

## FINAL PRELIMINARY ASSESSMENT

Sanitary Facilities Stump Neck / Wells, Water Distribution, System and Storage and Sewerage Systems, Septic Tanks and Sanitary Waste Discharging into River, December 1957; DWG. No. 15541-R

Master Shore Station Development Plan Part III Section 2 General Development Plan, Stump Neck Conditions as of 31 December 1957; DWG. No. 670812.

General Development Plan Stump Neck Area, Conditions as of December 31, 1959; Y&D DWG. No. 670812.

Naval Ordnance Station General Development Map / Existing and Planned Pre-M-Day, April 17, 1967.

Naval Ordnance Station, General Development Map / Industrial Discharge Sites, July 1976.

Naval Ordnance Station, Map of Reservation / Conditions as of 1 January 1981; DWG. No. 15455-A.

Naval Ordnance Station, Map of Reservation / Conditions as of 1 January 1983; DWG. No. 15455-A.

Naval Ordnance Station, Map of Reservation / Conditions as of 1 January 1988; DWG. No. 15455-A.

Naval Ordnance Station, Stump Neck Area / Conditions as of 1 January 1990; DWG. No. 15455-A.

Naval Ordnance Station, Stump Neck Area / Conditions as of 1 January 1992; DWG. No. 15455-A.

*Indian Head Utilities Data*. 2003 GIS data, Prepared by: IHDIV-NSWC.

*Hunting Map 2003-2004*, Natural Resources Office, 26 September 2003.

**Interviews**

Earl Scroggins, Technical Support Branch Head, Research and Development Department, NDW, Indian Head, Maryland. Interviewed on October 16, 2003 by Hien Dinh.

Heidi Morgan, Environmental Office, NDW, Indian Head. Interviewed on November 17, 2003 by Shelly Kolb, Denise Tegtmeier, and Rhonda Stone.

Jonathan Stacey, Public Works/Master Plan. Interviewed on November 20, 2003 by Rhonda Stone and Denise Tegtmeier.

## **Marine Rifle Range**

### **Reports**

*Ranges at the Naval Proving Ground, February 1, 1911*

*Report of the Major general Commandant of the U.S. Marine Corps, Headquarters U.S. Marine Corps, October 5, 1912*

*Defense Department Photographs, National Archives, October 19, 1913*

*Report of the Major general Commandant of the U.S. Marine Corps, Headquarters U.S. Marine Corps, October 2, 1914*

*Memorandum from Commanding Officer, U.S. Marine Corps to the Inspector of Ordnance in Charge, Naval Proving Ground, Indian Head, Subject: Rifle practice, "notification of commencement," April 3, 1917*

*Report of the Major general Commandant of the U.S. Marine Corps, Headquarters U.S. Marine Corps, October 10, 1918*

*Soil Survey of Charles County, Submitted by: U.S. Department of Agriculture Soil Conservation Service, July 1974, Prepared by: Richard Hall and Earle Matthews, Soil Conservation Service*

*Master Plan Update, Naval Ordnance Station Indian Head, Maryland, January 1990, Prepared by: Chesapeake Division, Naval Facilities Engineering Command*

*Gordon Miller, personal interview, June 26, 2003*

*Indian Head Building Database, Provided by Heidi Morgan, 2003*

### **Maps**

*NSWCIH Stump Neck Annex Hunting Map, 2003-2004, IHDIV NSWC Indian Head, Maryland*

NSWCIH Stump Neck Annex Utilities Data Map, IHDIV NSWC Indian Head, Maryland

Government Reservation at Stump Neck, Maryland, January 22, 1913

Naval Powder Factory, Indian Head, Maryland, Stump Neck, Plan of Rifle Range, Showing All Buildings Etc, May 20, 1915

**Interviews**

Heidi Morgan, Environmental Office, NDW, Indian Head. Interviewed on November 17, 2003 by Shelly Kolb, Denise Tegtmeyer, and Rhonda Stone.

## **Old Demo Range**

### **Reports**

*Master Plan Update*, Naval Ordnance Station Indian Head, Maryland, January 1990, Prepared by: Chesapeake Division, Naval Facilities Engineering Command

*Verification Investigation for the Naval School EOD Sites at the Naval Explosive Ordnance Disposal Technology Division*, NSWC, Stump Neck Annex, Indian Head Division, Maryland, Submitted by: Brown & Root Environmental, February 1996

*Uncovering History – A Native American Housing Site*, Southern Maryland Studies Center, Charles County Community College; the Indian Head Division, Naval Surface Warfare Center, 1997.

*RCRA Facility Investigation Verification Report for Stump Neck Annex*, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland, January 1998, Submitted by: Brown and Root Environmental.

*Old Demolition Range IR Site 32 (SN Annex SWMU 23) Fact Sheet*. Date unknown.

### **Maps**

Explosives Quantity Distance Map, High Explosives Test Range Improvement, Urgent Minor Construction Project P-672, 2/14/75.

NSWCIH Stump Neck Annex Hunting Map, 2002-2003, IHD NSWC Indian Head, Maryland

### **Interviews**

Shawn Jorgensen, Environmental Office, NWS, Indian Head, Maryland. Interviewed on November 17, 2003 by Shelly Kolb.

Heidi Morgan, Environmental Office, NDW, Indian Head. Interviewed on November 17, 2003 by Shelly Kolb, Denise Tegtmeyer, and Rhonda Stone.

**FINAL PRELIMINARY ASSESSMENT**

Chris Lopez, Equipment Specialist, Technical Support Branch, Research And Development Department. Interviewed October 16, 2003 by Hien Dinh.

## **Old Skeet and Trap Range**

### **Reports**

*Master Plan Update*, Naval Ordnance Station Indian Head, Maryland, January 1990, Prepared by: Chesapeake Division, Naval Facilities Engineering Command

*Uncovering History – A Native American Housing Site*, Southern Maryland Studies Center, Charles County Community College; the Indian Head Division, Naval Surface Warfare Center, 1997.

*RCRA Facility Investigation Verification Report for Stump Neck Annex*, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland, January 1989, Submitted by: Brown and Root Environmental.

*Characterization and Remediation of Soils at Closed Small Arms Firing Ranges*, Technical/Regulatory Guidelines, January 2003, Prepared by: Interstate Technology and Regulatory Council, Small Arms Firing Range Team.

### **Maps**

Explosives Quantity Distance Map, High Explosives Test Range Improvement, Urgent Minor Construction Project P-672, 2/14/75.

Shotgun & Skeet Range Map, Definitive Drawing, Bureau of Yards and Docks, 2/2/60.

Site and Location Plan, Improve Skeet Range, Naval Ordnance Station, Indian Head, Maryland, May 22, 1980.

Skeet Range Map, Bldg 2061, 10/8/86.

NSWCIH Stump Neck Annex Hunting Map, 2002-2003, IHD NSWC Indian Head, Maryland

**Interviews**

Heidi Morgan, Environmental Office, NDW, Indian Head. Interviewed on November 17, 2003 by Shelly Kolb, Denise Tegtmeyer, and Rhonda Stone.

Jim Hersey, UXO Program Director, NAVEODTECHDIV. Interviewed on October 16, 2003 by Hien Dinh.

Chris Lopez, Equipment Specialist, Technical Support Branch, Research And Development Department. Interviewed October 16, 2003 by Hien Dinh.

**Roach Road Rifle Range**

**Interviews**

Heidi Morgan, Environmental Office, NDW, Indian Head. Interviewed on November 17, 2003 by Shelly Kolb, Denise Tegtmeyer, and Rhonda Stone.

**Maps**

Naval Ordnance Station, Map of Reservation, Conditions as of 1 January 1988, DWG. No. 15455-A

Naval Ordnance Station, Map of Reservation, Conditions as of 1 January 1983, DWG. No. 15455-A

Naval Ordnance Station, Map of Reservation, Conditions as of 1 January 1981, DWG. No. 15455-A

Naval Ordnance Station, General Development Map / Industrial Discharge Sites, July 1976

Naval Ordnance Station, General Development Map / Wastewater Discharge Sites, July 1976

**Rum Point Skeet Range**

**Reports**

*Programming Guide*, March 1958, United States Naval Aeronautical Shore Facilities, NAVAER 00-100-504.

*Soil Survey of Charles County*, Submitted by: U.S. Department of Agriculture Soil Conservation Service, July 1974, Prepared by: Richard Hall and Earle Mattews, Soil Conservation Service

*Geology and Hydrologic Assessment of Coastal Plain Aquifers in the Waldorf Area, Charles County, Maryland, Report of Investigations No. 53*, Submitted by: Department of Natural Resources and Maryland Geological Survey, 1990, Prepared by: William Fleck, U.S. Geological Survey, and John Wilson, Maryland Geological Survey

*Master Plan Update*, Naval Ordnance Station Indian Head, Maryland, January 1990, Prepared by: Chesapeake Division, Naval Facilities Engineering Command

*Material Safety Data Sheet*, “Blue Rock” Trap and Skeet Targets, April 1994, Prepared by: Remington Arms Co. Inc

*RCRA Facility Investigation Work Plan*, NAVEOTECHDIV- Stump Neck Annex, Indian Head, Maryland, October 1995, Prepared by: EnSafe/Allen & Hoshall

*RCRA Facility Assessment for Stump Neck Annex*, IHD NSWC, Maryland, Submitted by: Brown and Root Environmental, January 1998, Prepared by: Leeann Sinagoga, Brown and Root Environmental

*The Geohydrology and Water-Supply Potential of the Lower Patapsco Aquifer and Patuxent Aquifers in the Indian Head-Bryans Road Area, Charles County, Maryland, Report of Investigations No. 69*, Submitted by: Department of Natural Resources, Resource Assessment Service, 1999, Prepared by: David Andreasen

*Environmental Best Management Plan for the Potomac River Gun Club Range*, Indian Head, MD, Prepared by: Potomac River Gun Club, September 1999

*Characterization and Remediation of Soils at Closed Small Arms Firing Ranges, Technical/Regulatory Guidelines*, January 2003, Prepared by: Interstate Technology and Regulatory Council, Small Arms Firing Range Team.

**Maps**

NSWCIH Stump Neck Annex Hunting Map, 2002-2003, IHD NSWC Indian Head, Maryland

Skeet and Trap Range at Rum Point, Site Plan Map, Prepared by: Naval Facilities Command, NOS Indian Head, MD, August 1990

**Interviews**

Dave Bode, Safety Office, NDW, Indian Head. Interviewed on October 29, 2003 by Shelly Kolb.

Heidi Morgan, Environmental Office, NDW, Indian Head. Interviewed on November 17, 2003 by Shelly Kolb, Denise Tegtmeier, and Rhonda Stone.

Jonathan Stacey, Public Works/Master Plan. Interviewed on November 20, 2003 by Rhonda Stone and Denise Tegtmeier.

**Small Arms (Pistol) Range**

**Reports**

*Programming Guide*, March 1958, United States Naval Aeronautical Shore Facilities, NAVAER 00-100-504.

*Soil Survey of Charles County, Maryland*, July 1974, Prepared by: Richard L. Hall and Earle D. Matthews, Department of Agriculture Soil Conservative Service, Prepared for: Department of Agriculture Soil Conservative Service and Maryland Agriculture Experiment Station

*Introduction to Ordnance Technology, Naval Ordnance Station – Indian Head, Maryland*, January 1, 1976

*Survey of Class I and II Property utilization*, May 1982

*Master Plan Update*, January 1990, Prepared by: Rogers, Golden and Halpern, Prepared for: Chesapeake Division, Naval Facilities Engineering Command

*The Geohydrology and Water-Supply Potential of the Lower Patapsco Aquifer and Patuxent Aquifers in the Indian Head-Bryans Road Area, Charles County, Maryland*, 1999, Prepared by: David C. Andreasen, Prepared for: Maryland Department of the Environment and Charles County Department of Planning and Growth Management

*Desk-Top Audit Decision Document*, Indian Head Division Naval Surface Warfare Center, Indian Head, Maryland, January 2002, Prepared by: Maryland Department of the Environment.

*Characterization and Remediation of Soils at Closed Small Arms Firing Ranges, Technical/Regulatory Guidelines*, January 2003, Prepared by: Interstate Technology and Regulatory Council, Small Arms Firing Range Team.

*Old Pistol Range IR AOC (SN Annex SWMU 29) Fact Sheet*. Date Unknown.

**Memos**

January 31, 1990 to EPA, a response to the State of Maryland's comments on the Initial Assessment Study (IAS), from Peter Ritzcovan, Director of Environmental Protection Division

October 23, 1991 to Commanding Officer, Naval Ordnance Station, Indian Head, MD from Commanding Officer, Chesapeake Division, Naval Facilities Engineering Command. Subject: Inspection/Evaluation of 25-yard Small Arms Firing Range, Stump Neck Annex.

November 13, 1992 to EPA Region III RCRA Programs Branch regarding discovering two additional SWMUs, from Kenneth Morin, Director of Environmental Division of Naval Surface Warfare Center

January 7, 1993 to the Kenneth Morin, Director of Environmental Division of Naval Surface Warfare Center to respond to the letter dated November 13, 1992, from Denis Zielinski, Acting Chief General States Permits Section of EPA Region III

**Websites**

[http://www.demilitary.com/navy/seaservices/8\\_32/national\\_news/24644-1.html](http://www.demilitary.com/navy/seaservices/8_32/national_news/24644-1.html)

<http://www.ih.navy.mil/histx.pdf>

<http://www.mgs.md.gov/esic/fs/fs2.html>

**Maps**

Map of the Reservation, United States Powder Factory, Indian Head, Maryland, May 30, 1942.

Map of the Reservation, United States Powder Factory, Indian Head, Maryland, June 30, 1950.

Map of Reservation, Stump Neck Annex, Naval Ordnance Station, Indian Head, Maryland, January, 1990.

Map of Reservation, Stump Neck Annex, Naval Ordnance Station, Indian Head, Maryland, January, 1992.

Map of Reservation, Stump Neck Annex, Naval Ordnance Station, Indian Head, Maryland, January, 1994.

Stump Neck Annex Hunting Map 2003-2004

**Interviews**

Shawn Jorgensen, Environmental Office, NWS, Indian Head, Maryland. Interviewed on November 17, 2003 by Shelly Kolb.

Heidi Morgan, Environmental Office, NDW, Indian Head. Interviewed on November 17, 2003 by Shelly Kolb, Denise Tegtmeier, and Rhonda Stone.

Earl Scroggin, Technical Support Branch Head, Research and Development Department, NDW, Indian Head, Maryland, Interviewed on October 16, 2003 by Hien Dinh.

## **Stump Neck Impact Area**

### **Reports**

*Soil Survey of Charles County*, Submitted by: U.S. Department of Agriculture Soil Conservation Service, July 1974, Prepared by: Richard Hall and Earle Matthews, Soil Conservation Service

*Master Plan Update*, Naval Ordnance Station Indian Head, Maryland, January 1990, Prepared by: Chesapeake Division, Naval Facilities Engineering Command

*Fact Sheet for Hazardous Waste Management Facility Permit*, Stump Neck Annex, Indian Head, MD, December 1990

*RCRA Facility Investigation Work Plan*, NAVEOTECHDIV- Stump Neck Annex, Indian Head, Maryland, October 1995, Prepared by: EnSafe/Allen & Hoshall

*RCRA Facility Assessment for Stump Neck Annex*, IHD NSWC, Maryland, Submitted by: Brown and Root Environmental, January 1998, Prepared by: Leeann Sinagoga, Brown and Root Environmental

*The Geohydrology and Water-Supply Potential of the Lower Patapsco Aquifer and Patuxent Aquifers in the Indian Head-Bryans Road Area, Charles County, Maryland, Report of Investigations No. 69*, Submitted by: Department of Natural Resources, Resource Assessment Service, 1999, Prepared by: David Andreasen

*Final Archive Search Report*, Marine Corps Base Quantico, September 2001, Prepared by: U.S. Army Corps of Engineers, St. Louis District

*Hunting and Trapping Operating Procedures*, Indian Head Division NSWC, IHDIVNAVSURFWARCENINST 5512.7B Code 04

### **Maps**

NSWCIH Stump Neck Annex Hunting Map, 2002-2003, IHD NSWC Indian Head, Maryland

**Interviews**

Heidi Morgan, Environmental Office, NDW, Indian Head. Interviewed on November 17, 2003 by Shelly Kolb, Denise Tegtmeyer, and Rhonda Stone.

Chris Lopez, Equipment Specialist, Technical Support Branch, Research And Development Department. Interviewed October 16, 2003 by Hien Dinh.

## **Test Area 1**

### **Reports**

*Earth Satellite Tracking Station Picks up Signals Bounced Off Moon*, News Release July 13, 1957. Department of Defense Office of Public Affairs, Washington D.C.

*Radar Tests by Navy Scientists Indicate that Moon can be Used for Radio Relay*, News Release September 3, 1957. Department of Defense Office of Public Affairs, Washington D.C.

*Navy Uses Moon to Transmit Shore-to-Ship Radio Signals*, News Release December 15, 1961. Department of Defense Office of Public Affairs, Washington D.C.

*NRL First in Radio Voice Transmission from Earth to the Moon and Back*. 1974. Naval Research Laboratory.

*Soil Survey of Charles County Maryland*. July 1974. Prepared by the U.S. Department of Agriculture in Cooperation with Maryland Agriculture Experiment Station.

*Master Plan Update* Naval Ordnance Station Indian Head, MD. January 1990. Prepared by: Rogers, Golden, and Halpern, Philadelphia, PA, Prepared for: Chesapeake Division, Naval Facilities Engineering Command.

*Phase I Cultural Resources Survey of Stump Neck Annex and Supplemental Architecture Investigation*, Indian Head Naval Surface Warfare Center, Charles County, MD. August 1996. Prepared for Chesapeake Division, Naval Facilities Engineering Command.

*U.S. Navy Radio Communications by Satellite Relay*, Naval Research Laboratory. Date Unknown.

*Communications Moon Relay Research by NRL*, Naval Research Laboratory. Date Unknown.

*Radar Astronomy*, Naval Research Laboratory. Date Unknown.

**Memos**

August 1957. From: U.S. Naval Research Laboratory, Washington D.C., Technical Information Division.

January 1960. From: U.S. Naval Research Laboratory, Washington D.C., Technical Information Division.

**Interviews**

Heidi Morgan, Environmental Office, NDW, Indian Head. Interviewed on November 17, 2003 by Shelly Kolb, Denise Tegtmeier, and Rhonda Stone.

Ben Redmond, CH2MHill - Vice President, Interviewed on October 1, 2003 by Denise Tegtmeier.

Jim Hersey, UXO Program Director, NAVEODTECHDIV. Interviewed on October 16, 2003 by Hien Dinh.

Earl Scroggins, Technical Support Branch Head, Research and Development Department, NDW, Indian Head, Maryland. Interviewed on October 16, 2003 by Hien Dinh.

## **Test Area 2**

### **Reports**

*Soil Survey of Charles County Maryland.* July 1974. Prepared by the U.S. Department of Agriculture in Cooperation with Maryland Agriculture Experiment Station.

*Master Plan Update* Naval Ordnance Station Indian Head, MD. January 1990. Prepared by: Rogers, Golden, and Halpern, Philadelphia, PA, Prepared for: Chesapeake Division, Naval Facilities Engineering Command.

*Phase I Cultural Resources Survey of Stump Neck Annex and Supplemental Architecture Investigation,* Indian Head Naval Surface Warfare Center, Charles County, MD. August 1996. Prepared for Chesapeake Division, Naval Facilities Engineering Command.

### **Maps**

Explosives Investigation Lab Conditions as of June 30 1946; PWD DWG No. 11679.

Stump Neck Area 1 May 1946; DWG. No. 19092.

Explosive Investigation Lab / Conditions as of June 30, 1947; DWG. No. 25116

Explosive Investigation Lab / Condition as of June 30, 1948; DWG. No. 25587.

Stump Neck Area Map of Naval Powder Factory Showing Conditions as of June 30, 1949; DWG. No. 26171.

Sanitary Facilities of Stump Neck Potable Water Supply Storage and Septic Tanks, June 20, 1952; Exhibit No. 15.

Sanitary Facilities Stump Neck / Wells, Water Distribution, System and Storage and Sewerage Systems, Septic Tanks and Sanitary Waste Discharging into River, December 1957; DWG. No. 15541-R

## FINAL PRELIMINARY ASSESSMENT

Master Shore Station Development Plan Part III Section 2 General Development Plan, Stump Neck Conditions as of 31 December 1957; DWG. No. 670812.

General Development Plan Stump Neck Area, Conditions as of December 31, 1959; Y&D DWG. No. 670812.

Naval Ordnance Station General Development Map / Existing and Planned Pre-M-Day, April 17, 1967.

Naval Ordnance Station, General Development Map / Industrial Discharge Sites, July 1976.

Naval Ordnance Station, Map of Reservation / Conditions as of 1 January 1981; DWG. No. 15455-A.

Naval Ordnance Station, Map of Reservation / Conditions as of 1 January 1983; DWG. No. 15455-A.

Naval Ordnance Station, Map of Reservation / Conditions as of 1 January 1988; DWG. No. 15455-A.

Naval Ordnance Station, Stump Neck Area / Conditions as of 1 January 1990; DWG. No. 15455-A.

Naval Ordnance Station, Stump Neck Area / Conditions as of 1 January 1992; DWG. No. 15455-A.

*Indian Head Utilities Data.* 2003 GIS data, Prepared by: IHDIV-NSWC.

*Hunting Map 2003-2004,* Natural Resources Office, 26 September 2003.

### **Interviews**

Jim Hersey, UXO Program Director, NAVEODTECHDIV, NWS, Indian Head, Maryland. Interviewed on October 16, 2003 by Hien Dinh.

**FINAL PRELIMINARY ASSESSMENT**

Shawn Jorgensen, Environmental Office, NWS, Indian Head, Maryland. Interviewed on November 17, 2003 by Shelly Kolb.

Heidi Morgan, Environmental Office, NDW, Indian Head. Interviewed on November 17, 2003 by Shelly Kolb, Denise Tegtmeyer, and Rhonda Stone.

## The Valley Impact Area

### Reports

*1890 Naval Proving Ground Naval Powder Factory Naval Propellant Plant People and Events from the Past.* Indian Head: U.S. Naval Propellant Plant, 1961.

Bureau of Ordnance at the Secretary of the Navy. Annual Report for Naval Proving Ground and Smokless Powder Factory, pgs. 20-22. Washington, DC: Washington Government Printing Office, 1891.

Bureau of Ordnance at the Secretary of the Navy. Annual Report for Naval Ordnance Proving Ground, pgs. 223-224, 267-275,. Washington, DC: Washington Government Printing Office, 1892.

Bureau of Ordnance at the Secretary of the Navy. Annual Report for Naval Ordnance Proving Ground, pgs. 311-324, 332-335, 396-409. Washington, DC: Washington Government Printing Office, 1894.

Bureau of Ordnance at the Secretary of the Navy. Annual Report for Naval Proving Ground, pg. 233. Washington, DC: Washington Government Printing Office, 1896.

Bureau of Ordnance at the Secretary of the Navy. Annual Report for Naval Proving Ground, pgs. 21-22, 54-66. Washington, DC: Washington Government Printing Office, 1897.

Bureau of Ordnance at the Secretary of the Navy. Annual Report for Naval Proving Ground at Indian Head, pgs. 23, 57-58. Washington, DC: Washington Government Printing Office, 1898.

Bureau of Ordnance at the Secretary of the Navy. Annual Report for Naval Proving Ground, pgs. 25-28, 60-64. Washington, DC: Washington Government Printing Office, 1899.

## FINAL PRELIMINARY ASSESSMENT

Bureau of Ordnance at the Secretary of the Navy. Annual Report for Naval Proving Ground, pgs. 18-19, 65-68, 566, 582-583, 629-632. Washington, DC: Washington Government Printing Office, 1900.

Bureau of Ordnance at the Secretary of the Navy. Annual Report for Naval Proving Ground at Indian Head, pgs. 72-81. Washington, DC: Washington Government Printing Office, 1901.

Bureau of Ordnance at the Secretary of the Navy. Annual Report for Naval Proving Ground at Indian Head, pg. 598-599. Washington, DC: Washington Government Printing Office, 1902.

Bureau of Ordnance. Annual Report from the Naval Proving Ground, June 30, 1911.

Bureau of Ordnance at the Secretary of the Navy. Annual Report for Naval Proving Ground pgs. 177, 182-183, 209, 216-217. Washington, DC: Washington Government Printing Office, 1912.

Bureau of Ordnance at the Secretary of the Navy. Annual Report for Naval Proving Ground pgs. 101, 106, 175. Washington, DC: Washington Government Printing Office, 1913.

Bureau of Ordnance at the Secretary of the Navy. Annual Report for Naval Proving Ground pgs. 231, 241. Washington, DC: Washington Government Printing Office, 1914.

Bureau of Ordnance at the Secretary of the Navy. Annual Report for Naval Proving Ground. Washington, DC: Washington Government Printing Office, 1917.

Bureau of Ordnance at the Secretary of the Navy. Annual Report for Naval Proving Ground. Washington, DC: Washington Government Printing Office, 1918.

Bureau of Ordnance at the Secretary of the Navy. Annual Report for Naval Proving Ground, pgs. 522-524. Washington, DC: Washington Government Printing Office, 1919.

Bureau of Ordnance at the Secretary of the Navy. Annual Report for Naval Proving Ground, pgs. 635-637. Washington, DC: Washington Government Printing Office, 1920.

Carlisle, Rodney. *Powder and Propellants- Energetic Materials at Indian Head Maryland 1890-2001*, Denton: University of North Texas Press, First Edition 1990, Second Edition 2002.

*Data Collection Questionnaire*, US Navy CTT Ranges, 2002.

Hall, Richard, Earle Matthews. *Soil Survey of Charles County*. U.S. Department of Agriculture Soil Conservation Service, July 1974.

Hammer, Andrea, ed. *Praising That Bridge That Brought Me Over: One Hundred Years at Indian Head*, Indian Head: Charles County Community College, 1990.

History of Naval Proving Ground pgs. 9-11, 38. 1975.

Magdinec, Elaine. *Inventory Questionnaire*.

*Master Plan Update* Naval Ordnance Station Indian Head, MD. January 1990. Prepared by: Rogers, Golden, and Halpern, Philadelphia, PA, Prepared for: Chesapeake Division, Naval Facilities Engineering Command.

*PDF History II* Naval Ordnance Station Indian Head, MD. Date unknown, source unknown.

*Ranges Located at IHDIVNAVSURFWARCEN April 2002 Closed Ranges and Other Sites*, 2002.

Report of the Bureau of Ordnance at the Secretary of the Navy. Annual Report for Naval Proving Ground and Smokeless Powder Factory, pgs. 20-22. Washington, DC: Washington Government Printing Office, 1891.

## Letters

Commanding Officer. Letter to the Chief of Bureau of Ordnance. January 30, 1946.

## FINAL PRELIMINARY ASSESSMENT

Inspector of Ordnance In Charge. Letter to the Bureau of Ordnance. February 1, 1911.

Inspector of Ordnance In Charge. Letter to the Bureau of Ordnance. August 29, 1917.

Inspector of Ordnance In Charge. Letter to the Bureau of Ordnance. July 31, 1919.

Inspector of Ordnance In Charge. Letter to the Chief of Bureau of Ordnance. July 31, 1920.

Inspector of Ordnance In Charge. Letter to the Chief of Bureau of Ordnance. January 15, 1921.

Inspector of Ordnance In Charge. Letter to the Chief of Bureau of Ordnance. July 28, 1921.

Inspector of Ordnance In Charge. Letter to the Chief of Bureau of Ordnance. August 10, 1922.

### **Memos**

*Investigation Summary*, Map 1995.

*Recreational Fishing Memo*, April 2, 1997.

*Hunting/Trapping Season and Harvest Limits for 2003-2004*, IHDIVNARVSURFWARCEN Notice, 2004.

*Text for Marina Plaque*, Diane Santiago, July 7, 1989.

### **Maps**

*Explosives Hazard Encroachment Areas*, Department of the Navy, Naval Facilities Engineering Command, Naval Ordnance Station, Indian Head, MD., October 10, 1971.

*Hunting Map 2003-2004*, Natural Resources Office, 26 September 2003.

*Indian Head Utilities Data*. 2003 GIS data, Prepared by: IHDIV-NSWC.

*Map of the Reservation, Indian Head, Maryland, 1936.*

*Map of the Reservation, May 30, 1942, revised June 1942.*

*Map of Naval Powder Factory, Indian Head, MD, June 30, 1947.*

*Naval Proving Ground, Indian Head, MD. Conduits to New Bomb Proofs, September 23, 1904.*

*Naval Proving Ground and Smokeless Powder Factory Indian Head RANGES, May 16, 1916  
revised November 24, 1916 and June 19, 1917.*

*Naval Proving Ground and Smokeless Powder Factory Indian Head, MD., July 1, 1916.*

*Naval Proving Ground and Smokeless Powder Factory Indian Head, MD. Second Firing Battery,  
July 25, 1917.*

*Plan Showing Naval Proving Ground, July 1, 1913.*

*Plan Showing Naval Proving Ground, July 1, 1914.*

*United States Naval Powder Factory, Indian Head, Maryland Map of the Reservation, Suspected  
1952.*

*United States Naval Powder Factory, Indian Head, Maryland Map of the Reservation, October  
31, 1952.*

### **Aerial Photographs**

IHDIV, NSWC Main Installation (Naval Powder Factory), April 20, 1932, source unknown.

IHDIV, NSWC Main Peninsula, August 29, 1961, Aerial Photographic Analysis Indian Head  
Naval Surface Warfare Center.

IHDIV, NSWC The Valley Old Dock Area, 1967, source unknown.

The Valley Area (6 photographs), date unknown, source unknown.

IHDIV, NSWC Main Peninsula, March 29, 1982 Aerial Photographic Analysis Indian Head Naval Surface Warfare Center.

IHDIV, NSWC Main Peninsula, April 10, 1987 Aerial Photographic Analysis Indian Head Naval Surface Warfare Center.

**Interviews**

Bode, Dave. IHDIV, NSWC Safety Department. Interviewed on October 29, 2003 by Shelly Kolb.

Bossart, Jeff. IHDIV, NSWC Natural Resources. Interviewed on November 17, 2003 by Hien Dinh and Grant Heslin.

Cox, Tom. IHDIV, NSWC Director of Facilities. Interviewed on November 18, 2003 by Rhonda Stone.

Dalton, Bruce. Retired from Safety Department IHDIV, NSWC. Interviewed on November 25, 2003 by Denise Tegtmeyer.

Davis, Chester. IHDIV, NSWC Safety Department. Interviewed on October 29, 2003 by Shelly Kolb.

Fleck, Betty. IHDIV, NSWC Public Works. Interviewed on October 1, 2003 by Julie Grim.

Frey, Kathy. Well Data IHDIV, NSWC. Interviewed on November 18, 2003 by Hien Dinh and Grant Heslin.

James, Frank. IHDIV, NSWC Safety Department/EOD. Interviewed on November 21, 2003 by Hien Dinh and Grant Heslin.

## FINAL PRELIMINARY ASSESSMENT

McDevitt, John. Retired Chemical Engineer from IHDIV, NSWC. Interviewed on December 5, 2003 by Denise Tegtmeier.

Morgan, Heidi. POC IHDIV, NSWC. Interviewed on November 17, 2003 by Shelly Kolb, Denise Tegtmeier and Rhonda Stone.

Pero, Wes. IHDIV, NSWC Safety Department. Interviewed on November 18, 2003 by Hien Dinh and Grant Heslin.

Porter, Lieutenant. EOD Mobile Unit 2 Detachment Dahlgren. Interviewed on November 18, 2003 by Rhonda Stone.

Rose, Diane. Water Team Leader IHDIV, NSWC. Interviewed on November 18, 2003 by Denise Tegtmeier and Doug Sawyers.

Stacy, Jonathon. IHDIV, NSWC Cultural Resources. Interviewed on November 20, 2003 by Rhonda Stone and Denise Tegtmeier.

Stuart, Dave. IHDIV, NSWC Public Works/Utilities. Interviewed on November 18, 2003 by Hien Dinh and Grant Heslin.

### **Field Notes**

Field Notes from The Valley, 2003.

### **Images**

Various photographs of activities occurring at The Valley, early 1900s.

## **Torpedo Burial Site**

### **Reports**

*Soil Survey of Charles County*, Submitted by: U.S. Department of Agriculture Soil Conservation Service, July 1974, Prepared by: Richard Hall and Earle Matthews, Soil Conservation Service

*Master Plan Update*, Naval Ordnance Station Indian Head, Maryland, January 1990, Prepared by: Chesapeake Division, Naval Facilities Engineering Command

*Fact Sheet for Hazardous Waste Management Facility Permit*, Stump Neck Annex, Indian Head, MD, December 1990

*RCRA Facility Investigation Work Plan*, NAVEOTECHDIV- Stump Neck Annex, Indian Head, Maryland, October 1995, Prepared by: EnSafe/Allen & Hoshall

*RCRA Facility Assessment for Stump Neck Annex*, IHD NSWC, Maryland, Submitted by: Brown and Root Environmental, January 1998, Prepared by: Leeann Sinagoga, Brown and Root Environmental

*The Geohydrology and Water-Supply Potential of the Lower Patapsco Aquifer and Patuxent Aquifers in the Indian Head-Bryans Road Area, Charles County, Maryland, Report of Investigations No. 69*, Submitted by: Department of Natural Resources, Resource Assessment Service, 1999, Prepared by: David Andreasen

*Hunting and Trapping Operating Procedures*, Indian Head Division NSWC, IHDIVNAVSURFWARCENINST 5512.7B Code 04

### **Maps**

NSWCIH Stump Neck Annex Hunting Map, 2002-2003, IHD NSWC Indian Head, Maryland

### **Interviews**

**FINAL PRELIMINARY ASSESSMENT**

Heidi Morgan, Environmental Office, NDW, Indian Head. Interviewed on November 17, 2003  
by Shelly Kolb, Denise Tegtmeier, and Rhonda Stone.

## **Torpedo Casing Disposal Area**

### **Reports**

*Soil Survey of Charles County*, Submitted by: U.S. Department of Agriculture Soil Conservation Service, July 1974, Prepared by: Richard Hall and Earle Matthews, Soil Conservation Service

*Master Plan Update*, Naval Ordnance Station Indian Head, Maryland, January 1990, Prepared by: Chesapeake Division, Naval Facilities Engineering Command

*The Geohydrology and Water-Supply Potential of the Lower Patapsco Aquifer and Patuxent Aquifers in the Indian Head-Bryans Road Area*, Charles County, Maryland, Report of Investigations No. 69, Submitted by: Department of Natural Resources, Resource Assessment Service, 1999, Prepared by: David Andreasen

*Hunting and Trapping Operating Procedures*, Indian Head Division NSWC, IHDIVNAVSURFWARCENINST 5512.7B Code 04

*Water System Improvements* Naval Surface Warfare Center Indian Head, Maryland. April 11, 2003. Prepared by: ADTEK Engineers, Inc., Prepared for: EFA Chesapeake.

### **Maps**

*NSWC IH Stump Neck Annex Hunting Map*, 2002-2003, IHD NSWC Indian Head, Maryland

*Indian Head Utilities Data*. 2003 GIS data, Prepared by: IHDIV-NSWC.

### **Interviews**

Jim Hersey, UXO Program Director, NAVEODTECHDIV. Interviewed on October 16, 2003 by Hien Dinh.

Andy Pederson, Senior Engineer, NAVEODTECHDIV. Interviewed on September 25, 2003 by Hien Dinh.

**FINAL PRELIMINARY ASSESSMENT**

Jack Meyers, Retired employee, IHDIV-NSWC. Interviewed on September 25, 2003 by Jennifer Buckels.

Heidi Morgan, Environmental Office, NDW, Indian Head. Interviewed on November 17, 2003 by Shelly Kolb, Denise Tegtmeyer, and Rhonda Stone.

## **Appendix B: Project Source Data – General**

Electronic copies of reference materials for Appendix B are provided on the CD-ROM in folder:

CD\_2\_Source\_Data\Appendix\_B&C\Shared Deliverable

## **Appendix C: Project Source Data – Site Specific**

Electronic copies of reference materials for Appendix C are provided on the CD-ROM in folder:

CD2\_Source\_Data\Appendix\_B&C\Stump Neck Deliverable\RangeName

## **Appendix D: Ordnance Technical Data Sheets**

Electronic copies of reference materials for Appendix D are provided on the CD-ROM in folder:

CD2\_Source\_Data\Appendix\_D