

# Camp Bonneville

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## Camp Bonneville – RAU 3

### Remedial Investigation and Feasibility Study

Public Meeting September 8, 2005

# Presentation Overview

## Camp Bonneville

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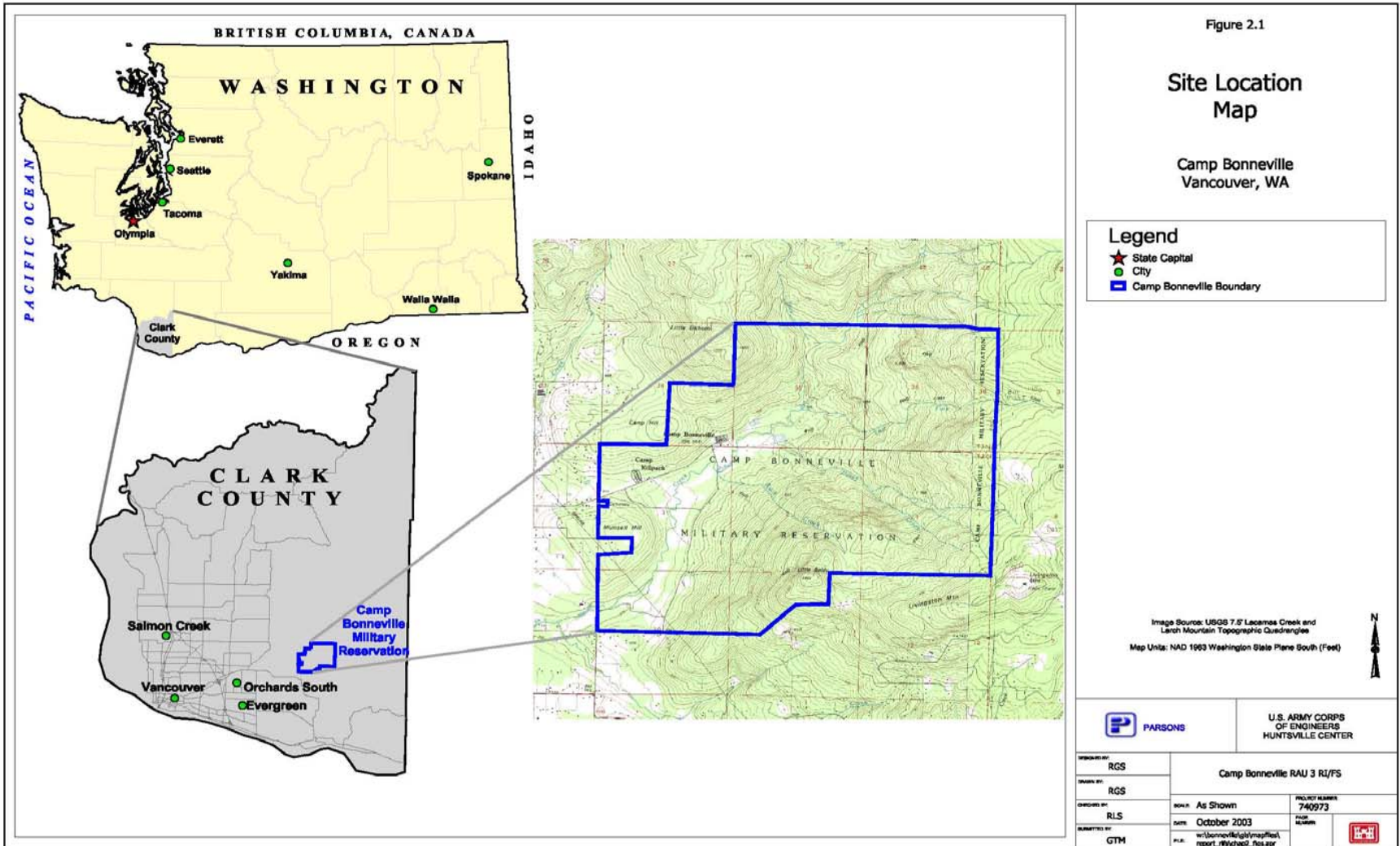
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- Site Background
- Remedial Action or Cleanup Units
- Site Investigation at RAU 3
- Cleanup Alternatives
- Army's Proposed Cleanup Alternative
- Comment Period

# Camp Bonneville - ~4000 Acres Active Use 1909 - 1995

## Camp Bonneville



# Remedial Action Units (RAU) – Cleanup Units

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- RAU 1
  - 20 areas identified with hazardous substance releases
- RAU 2
  - 2A: 21 Small Arms Ranges
  - 2B: Demolition Areas 2 and 3
  - 2C: Demolition Area 1 / Landfill4
- **RAU 3**
  - **Site-wide Unexploded Ordnance, ordnance, munitions**



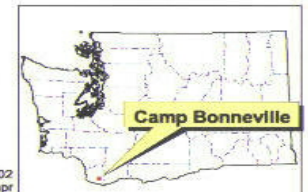
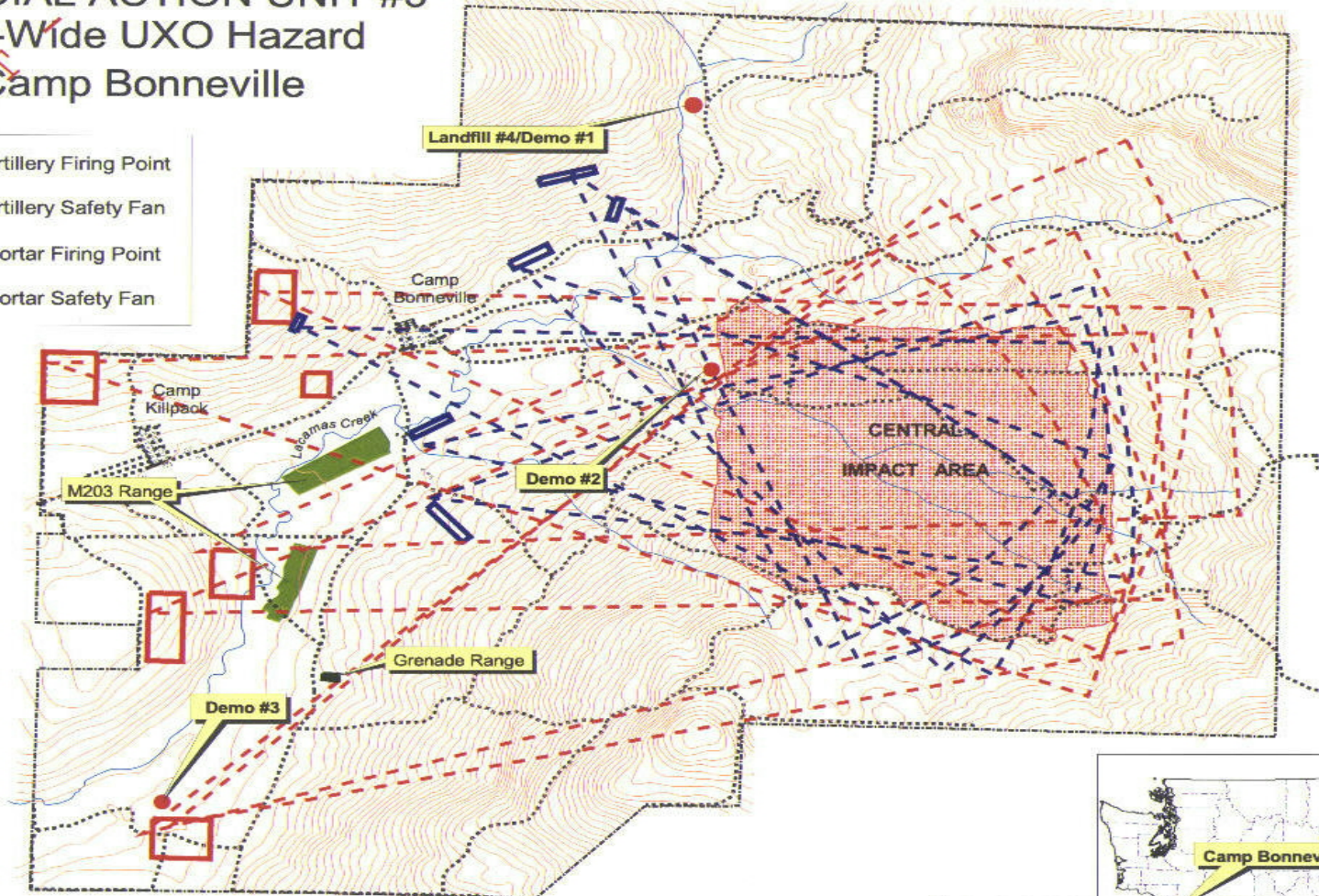
# Site-Wide UXO Hazard (RAU-3)

## Camp Bonneville



### REMEDIAL ACTION UNIT #3 Site-Wide UXO Hazard Camp Bonneville

- DRAFT**
- Artillery Firing Point
  - Artillery Safety Fan
  - Mortar Firing Point
  - Mortar Safety Fan



# Site Investigations – RAU 3

## Camp Bonneville

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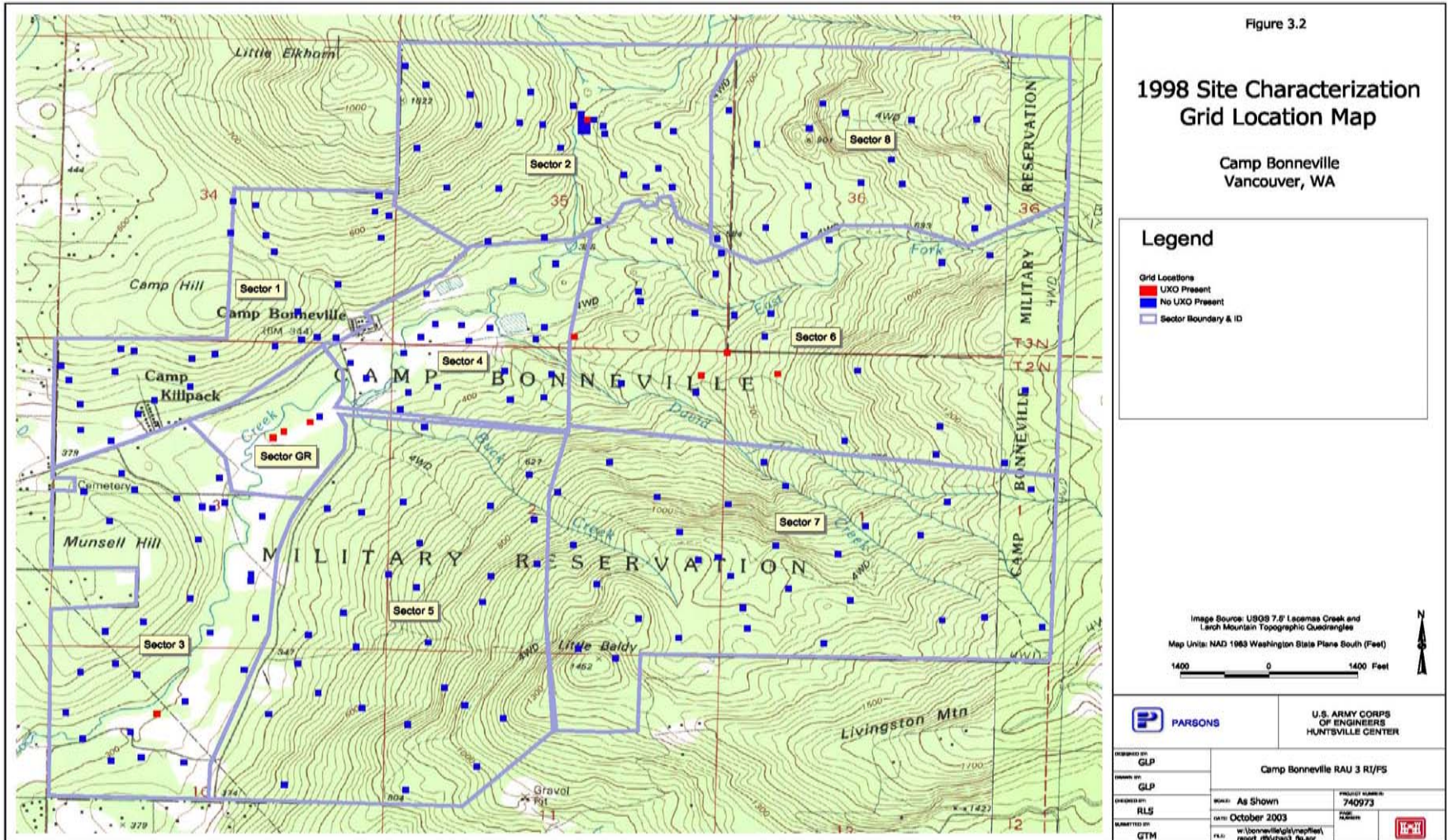
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- 1997 Archives Search Report (ASR)
- 1998 Statistical Investigation
- 2000 Aerial Photograph Examination
- 2001 Field Reconnaissance
- 2002 Comprehensive MEC Conceptual Site Model
- 2002 Field Reconnaissance



## Camp Bonneville





# 2001 Field Reconnaissance - Waypoints

## Camp Bonneville



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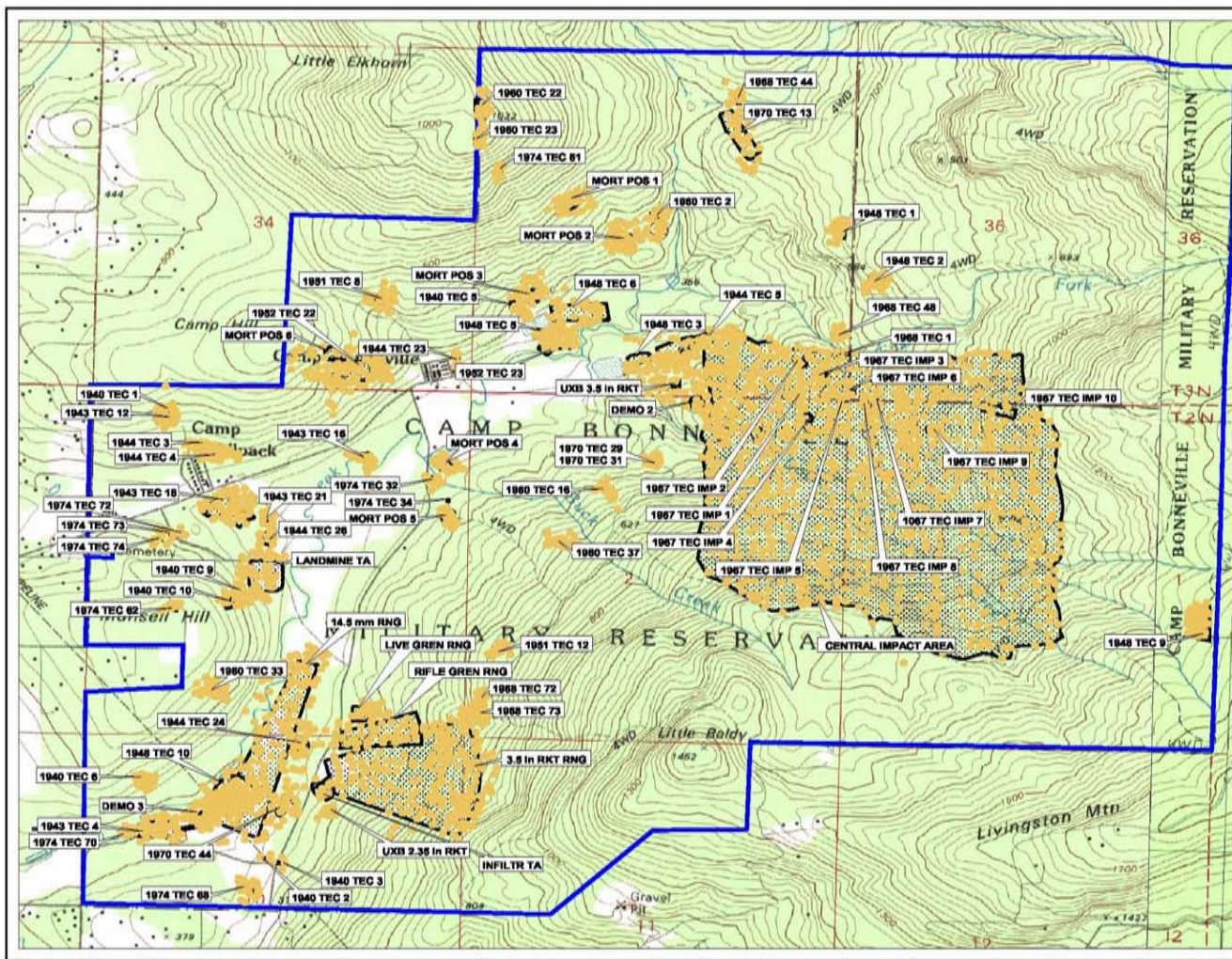


Figure 3.6

### AOC/AOPC Locations & 2001 Reconnaissance Waypoints

Camp Bonneville  
Vancouver, WA

#### Legend

- 2001 Recon Waypoint Locations
- 1943 TEC 18 Location and Source of AOPC. Year Refers to Year of Aerial Photo and TEC 18 Refers to Feature Number Identified on Aerial Photo.
- MORT POS 1 Location and Description of AOC
- AOC/AOPC Boundaries
- Camp Bonneville Boundary

Image Source: USGS 7.5' Leconte Creek and Larch Mountain Topographic Quadrangles  
Map Units: NAD 1983 Washington State Plane South (Feet)  
1400 0 1400 Feet

|                            |   |   |  |
|----------------------------|---|---|--|
|                            | PARSONS   | U.S. ARMY CORPS OF ENGINEERS<br>HUNTSVILLE CENTER |  |
| PREPARED BY:<br>GLP        | DATE:<br>October 2003   | Camp Bonneville RAU 3 RI/F5                       |  |
| DRAWN BY:<br>GLP           | PROJECT NUMBER:<br>740973                                     | DATE:   |  |
| REVIEWED BY:<br>RLS        | FILE:<br>w:\bonneville\glp\mapfiles\report_rlb\hchp1_fig3.apr | DATE:   |  |
| QUALITY CONTROL BY:<br>GTM |   |   |  |



# Identified AOCs/AOPCs – MEC Source Areas

## Camp Bonneville

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- Target Areas
- Open Burn/Open Demolition Areas
- Firing Point
- Range Safety Fans
- Storage Magazines/Transfer Points
- Maneuver Areas
- Training Areas

# 2002 Conceptual Site Model

## Camp Bonneville

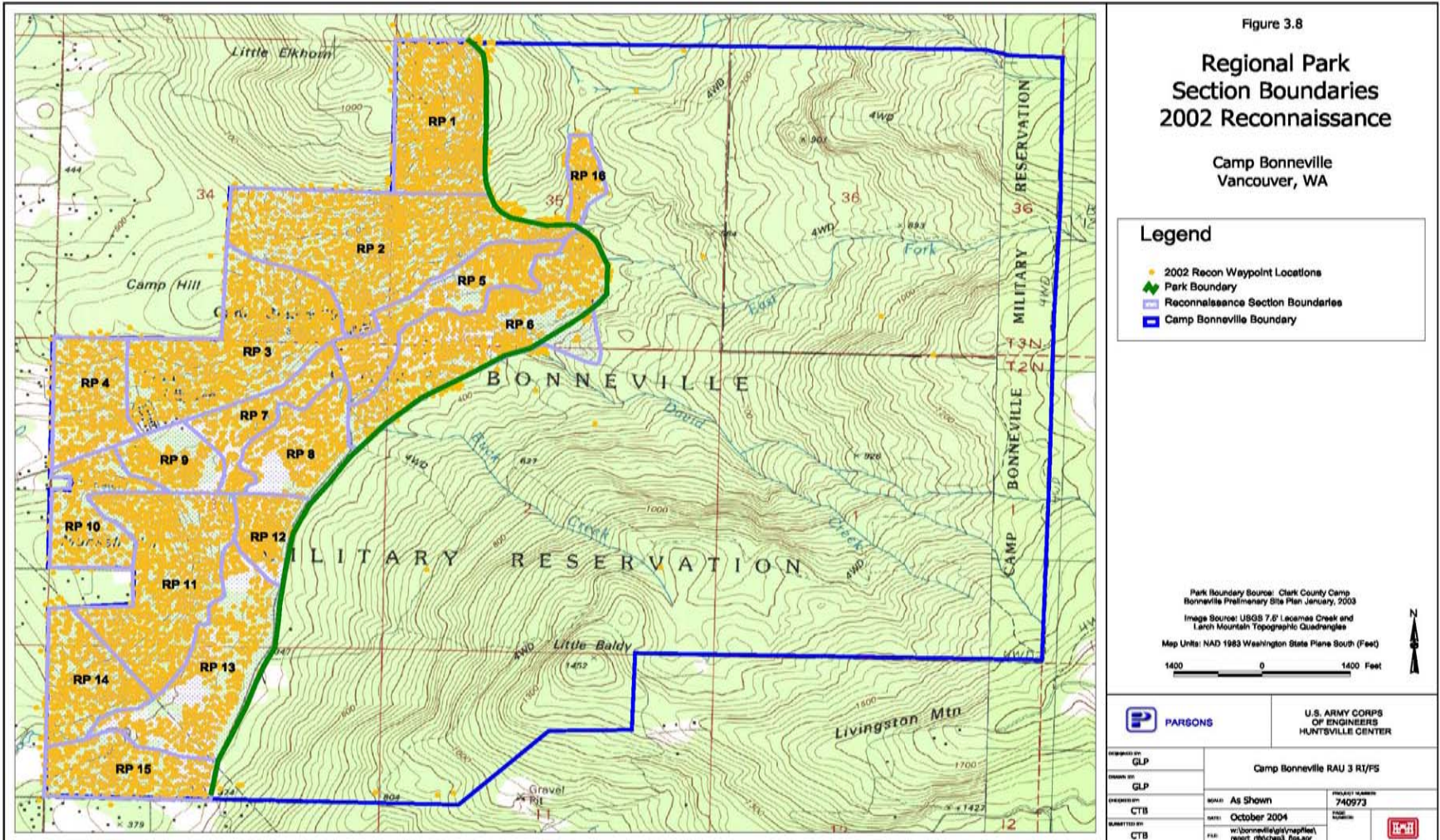


Assigns relative Explosive Risk ranking at an AOC/AOPC based on:

- Likelihood of MEC contamination for the historical MEC-related activity
- MEC source for that MEC-related activity
- MEC release mechanism of that MEC-related activity
- Nature of MEC contamination

# 2002 Field Reconnaissance - Regional Park Waypoints

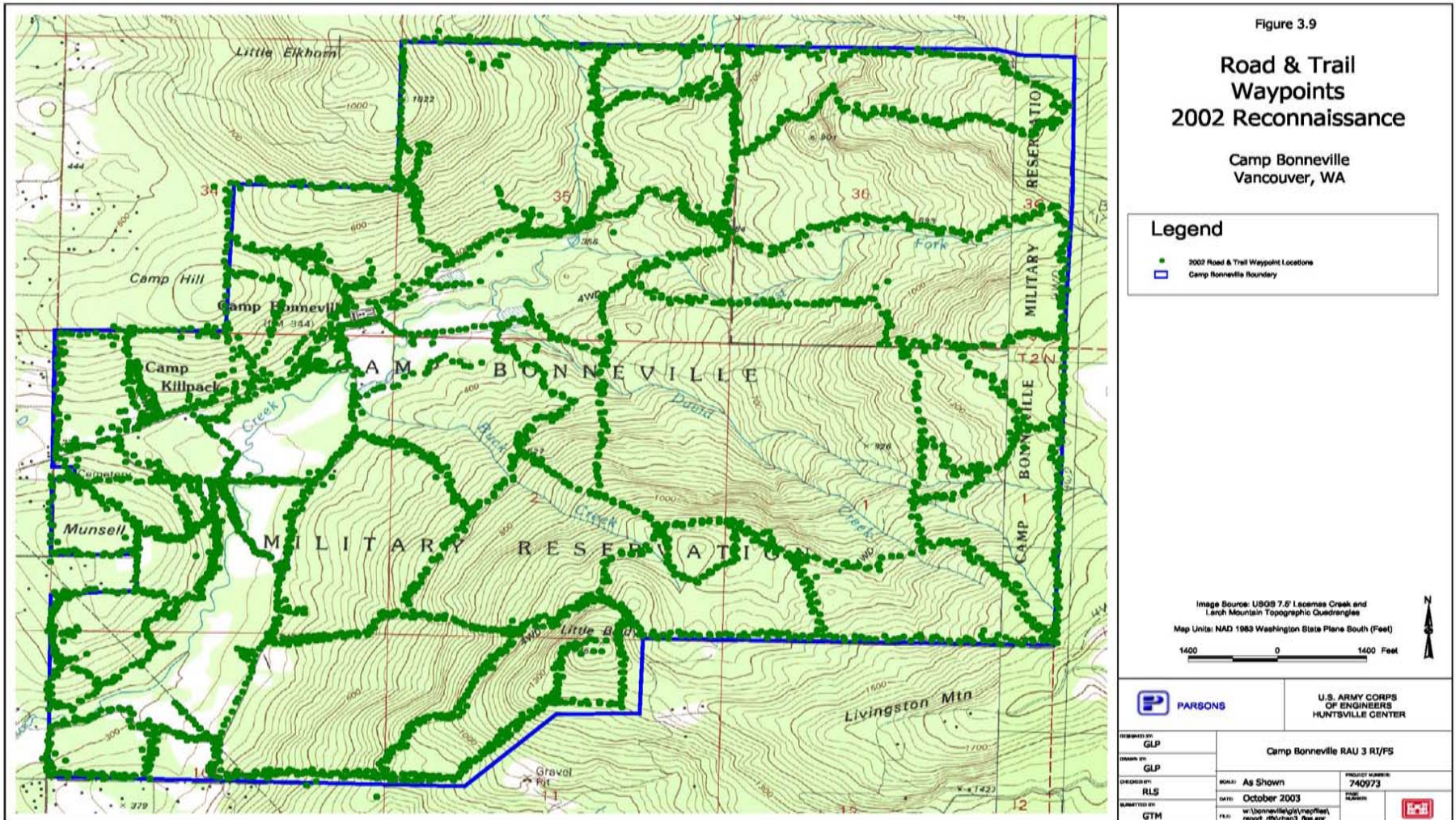
## Camp Bonneville





# 2002 Field Reconnaissance - Roads and Trails Waypoints

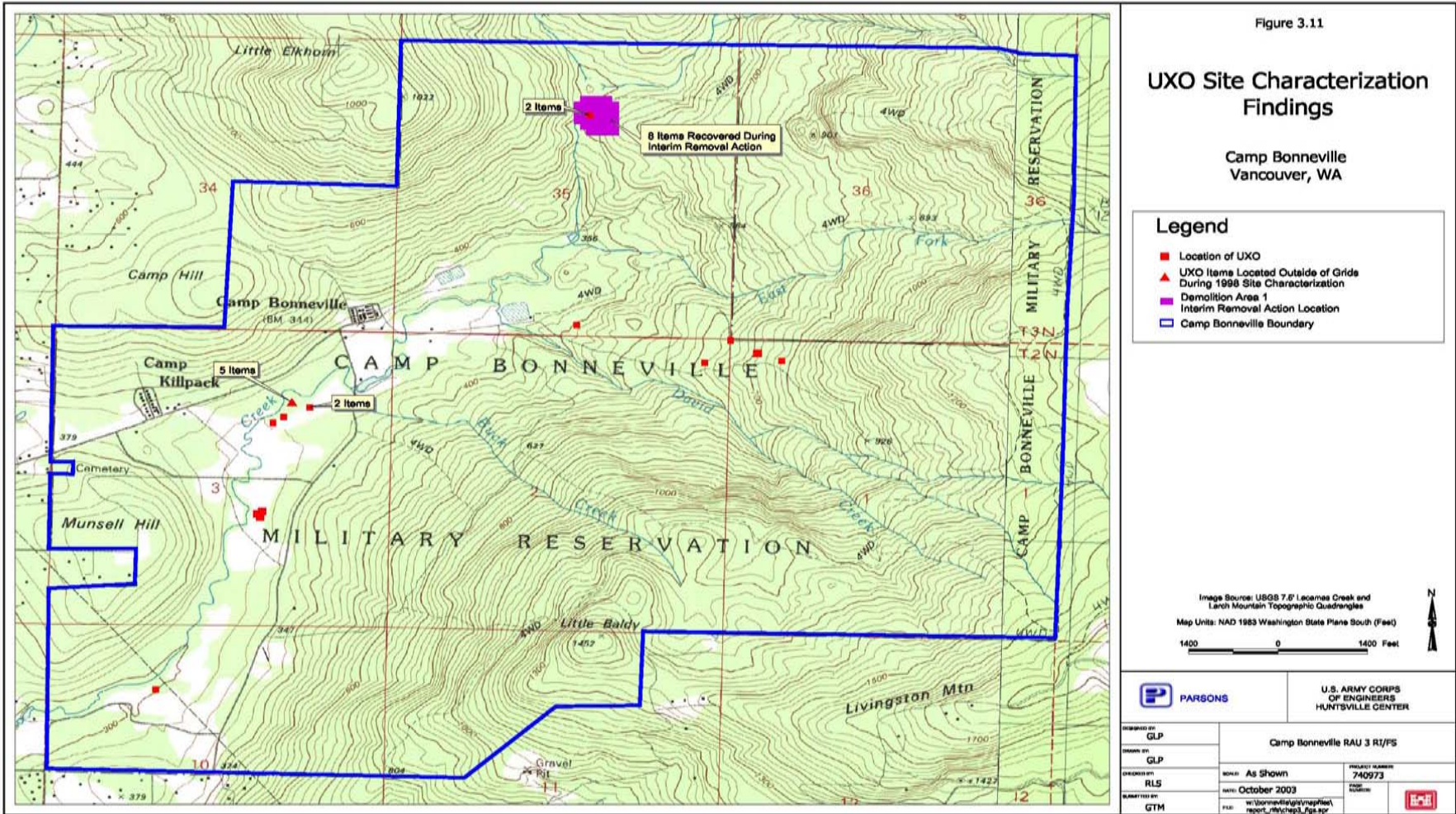
## Camp Bonneville





# MEC Investigation Findings

## Camp Bonneville



# Summary Results of UXO Investigations

## Camp Bonneville

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- Over 2400 of the 3980 acres of the site, including the proposed future regional park areas, has been investigated for MEC-related activities
- All MEC source areas identified in the aerial photographs have been confirmed
- About 1% of the site has been investigated for the presence of subsurface MEC
- MEC source for munition fragments at western portion of site has not been identified
- Investigation adequate for developing and evaluating cleanup alternatives



# Risk Evaluation

## Camp Bonneville

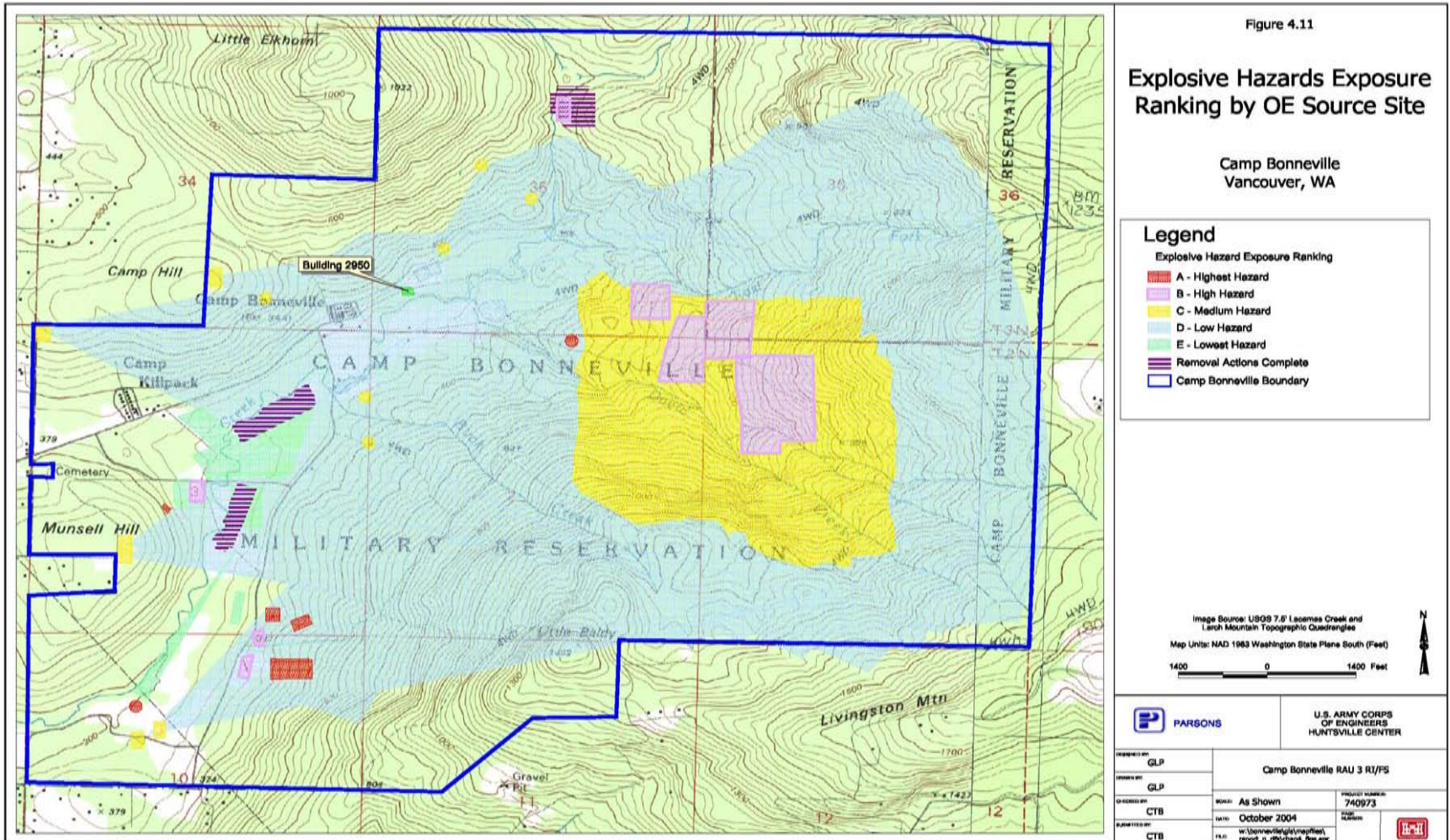


# Qualitative Risk Exposure Evaluation Factors

- Relative Explosive Risk Ranking (CSM)
- Land Use Factors - Proposed Reuse Plan
  - Accessibility – Slope of Terrain and vegetation density
  - Intensity of Future Land Use
  - Depth of Future Land Use activity – Surface or Subsurface

# Relative Risk Exposure distribution

## Camp Bonneville



# Cleanup Criteria

## Camp Bonneville



- **Cleanup Goal**

- To minimize the likelihood for physical contact with explosives to a **negligible** level (at surface and at depth)



# Cleanup Action Alternatives

## Camp Bonneville

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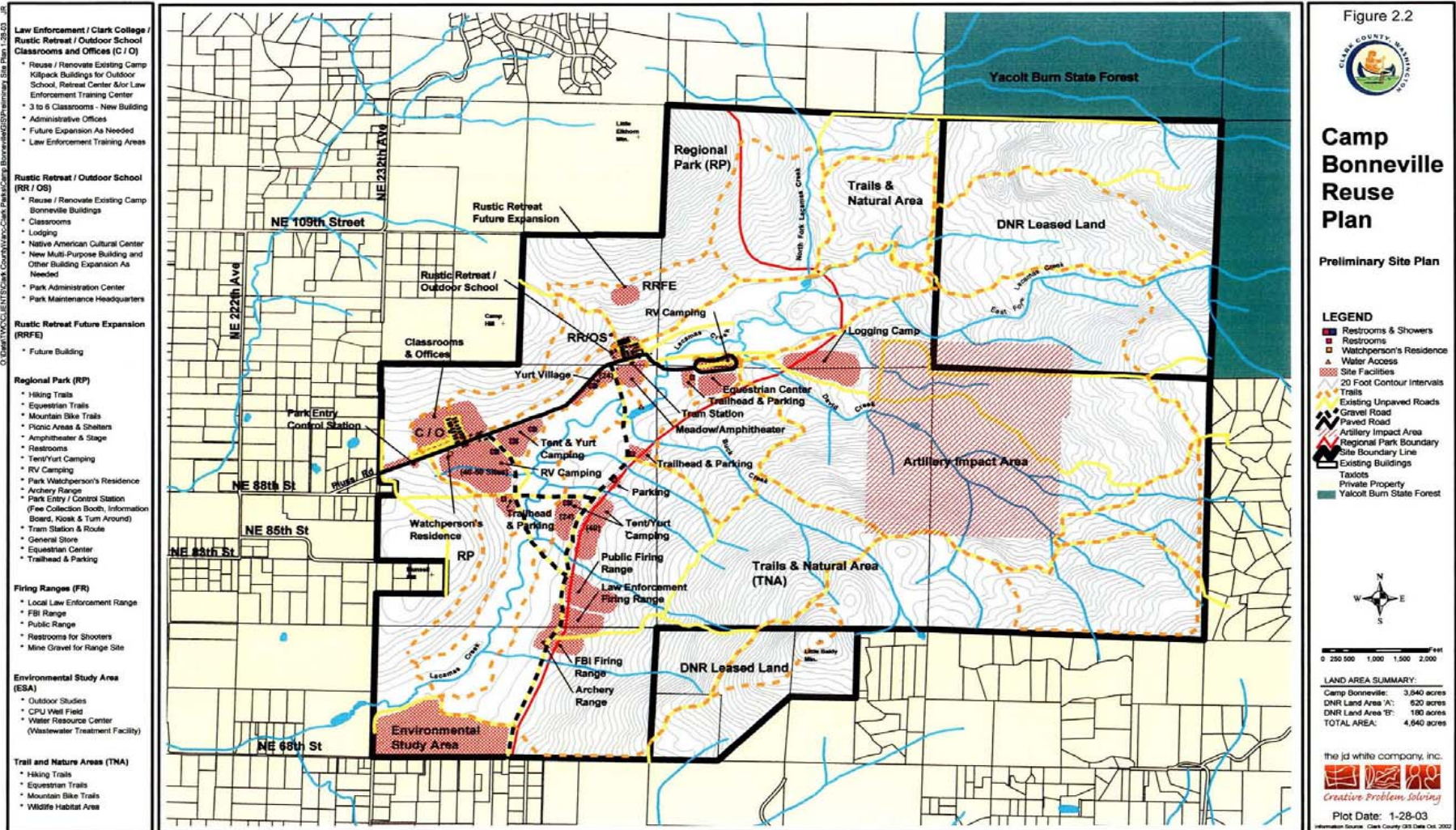
- **No Further Action**
  - No cleanup action is implemented. Baseline
- **Institutional Controls (ICs)**
  - Access control, Safety educational programs
- **Surface Clearance with ICs**
  - Clear MEC and scrap from ground surface
- **Clearance to Frost Depth (14”) with ICs**
  - Clear MEC and scrap from ground surface and within 14” below ground surface
- **Subsurface Clearance with ICs**
  - Clear MEC and scrap from ground surface and to a depth based on projected land use of the Area
- **Excavation and Restoration**
  - Complete excavation of the area and sifting to remove MEC and scrap

# Camp Bonneville Reuse Plan

## Camp Bonneville



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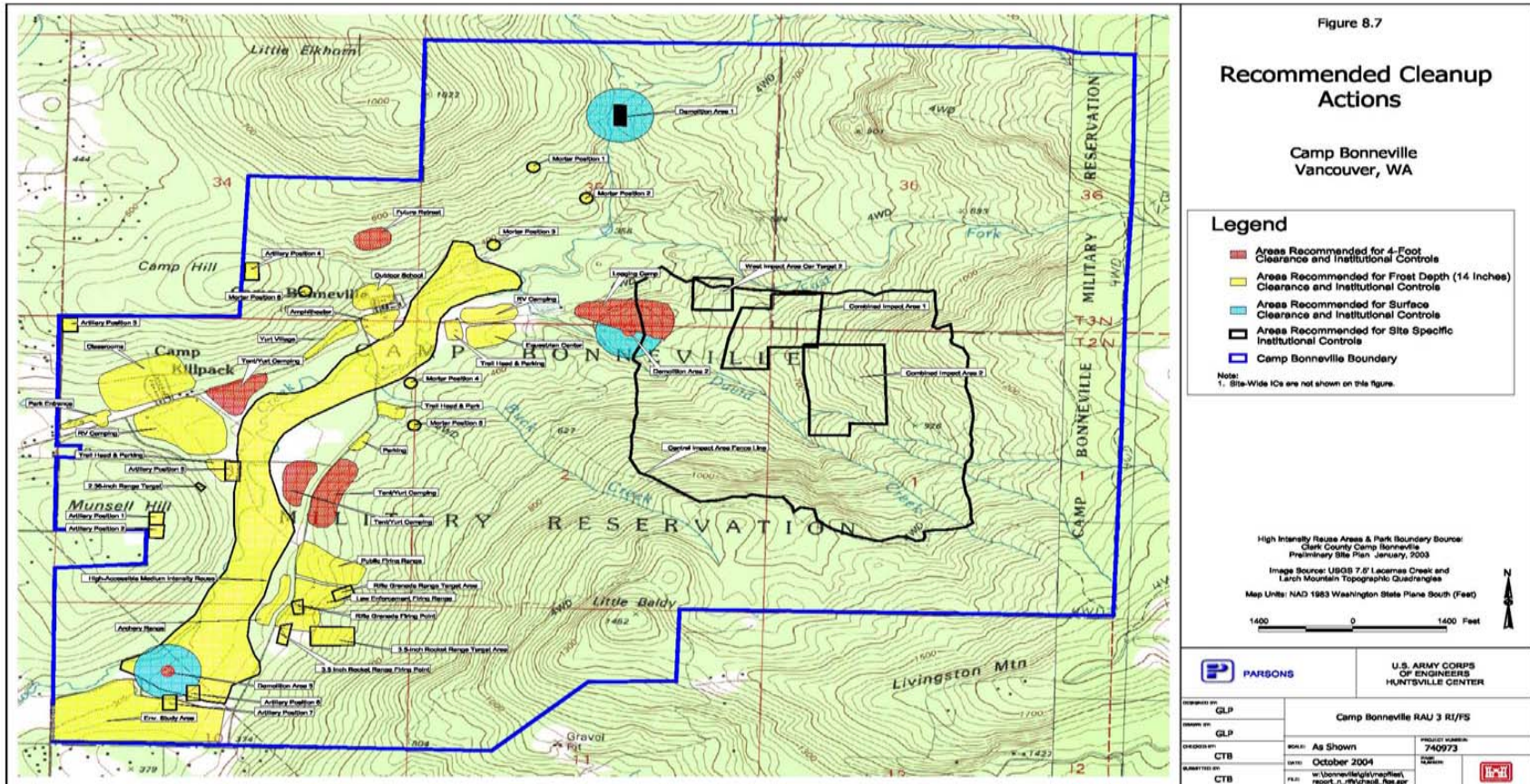
O:\Data\TYACOLENT\Clark County\Camp Bonneville\GIS\MapArea\Site Plan 1-28-03

- Law Enforcement / Clark College / Rustic Retreat / Outdoor School Classrooms and Offices (C/O)**
- Reuse / Renovate Existing Camp Kilpack Buildings for Outdoor School, Retreat Center & Law Enforcement Training Center
  - 3 to 6 Classrooms - New Building
  - Administrative Offices
  - Future Expansion As Needed
  - Law Enforcement Training Areas
- Rustic Retreat / Outdoor School (RR/O)**
- Reuse / Renovate Existing Camp Bonneville Buildings
  - Classrooms
  - Lodging
  - Native American Cultural Center
  - New Multi-Purpose Building and Other Building Expansion As Needed
  - Park Administration Center
  - Park Maintenance Headquarters
- Rustic Retreat Future Expansion (RRFE)**
- Future Building
- Regional Park (RP)**
- Hiking Trails
  - Equestrian Trails
  - Mountain Bike Trails
  - Picnic Areas & Shelters
  - Amphitheater & Stage
  - Restrooms
  - Tent/Yurt Camping
  - RV Camping
  - Park Watchperson's Residence
  - Archery Range
  - Park Entry / Control Station (Free Collection Booth, Information Board, Kiosk & Turn Around)
  - Tram Station & Route
  - General Store
  - Equestrian Center
  - Trailhead & Parking
- Firing Ranges (FR)**
- Local Law Enforcement Range
  - FBI Range
  - Public Range
  - Restrooms for Shooters
  - Mine Gravel for Range Site
- Environmental Study Area (ESA)**
- Outdoor Studies
  - CPU Well Field
  - Water Resource Center (Wastewater Treatment Facility)
- Trail and Nature Areas (TNA)**
- Hiking Trails
  - Equestrian Trails
  - Mountain Bike Trails
  - Wildlife Habitat Area



# Areas Recommended for Active Cleanup Actions by the Army

## Camp Bonneville

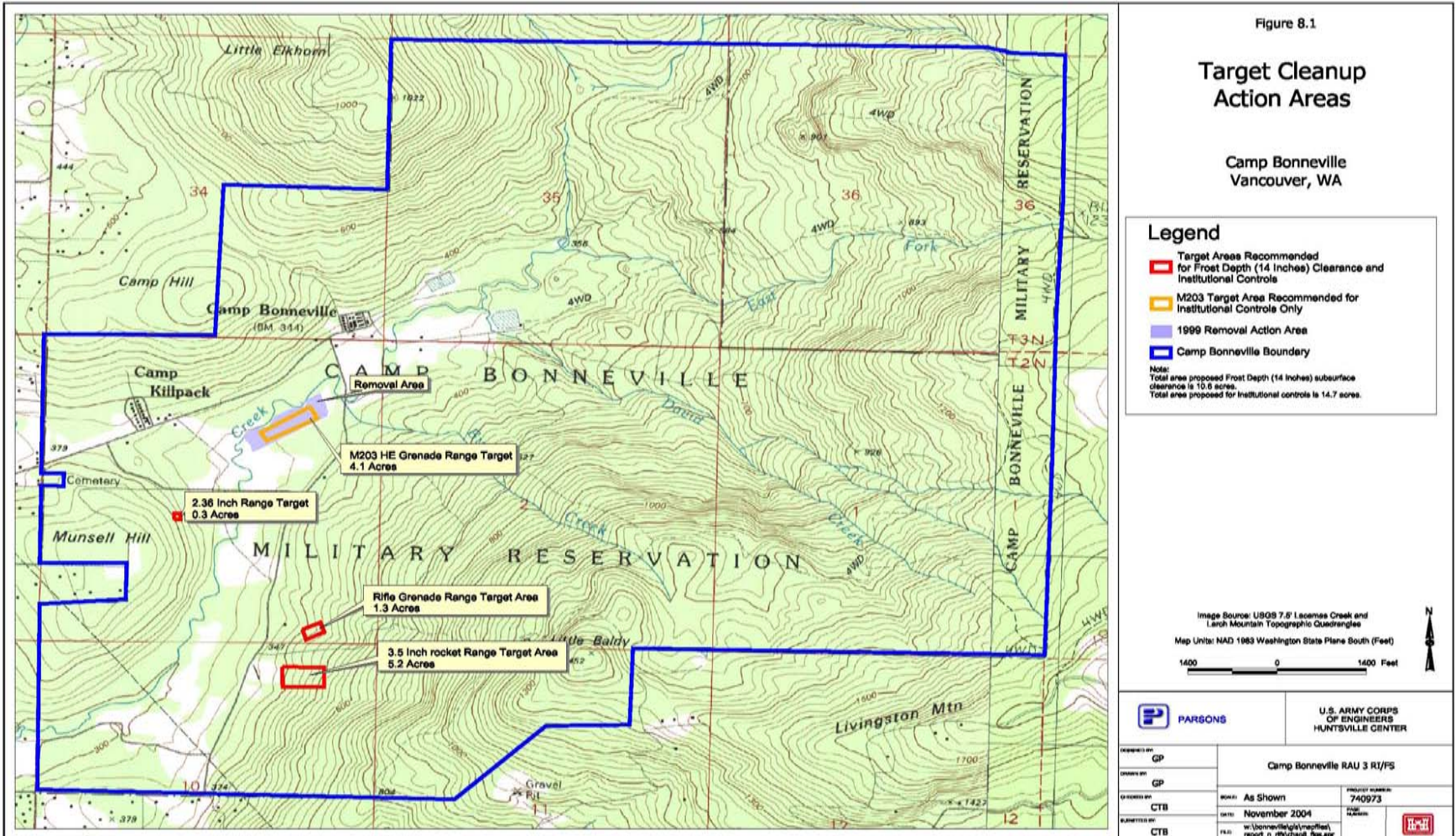


- Color-shaded areas are proposed for removal actions. Estimated cost for implementation, including ICs, is **\$16,774,000**



# Target Areas

## Camp Bonneville



# Explosive Hazard Exposure Rank and Recommended Cleanup Alternative

## Camp Bonneville



| <i>Target Areas</i> | <i>MEC Source/<br/>Explosive Ranking</i> | <i>Accessibility</i> | <i>Future Land Reuse Intensity</i> | <i>Activity/<br/>Depth</i> | <i>Explosive Hazard Exposure Rank</i> |
|---------------------|--|----------------------|------------------------------------|----------------------------|---------------------------------------|
| 3.5" Rocket Range   | 1  | Limited              | High                               | Surface                    | A                                     |
| Rifle Grenade       | 1  | Limited              | High                               | Surface                    | A                                     |
| Hand Grenade        | 1  | Accessible           | High                               | Surface                    | A                                     |
| 2.36" Rocket        | 1  | Accessible           | Medium                             |                            | A                                     |

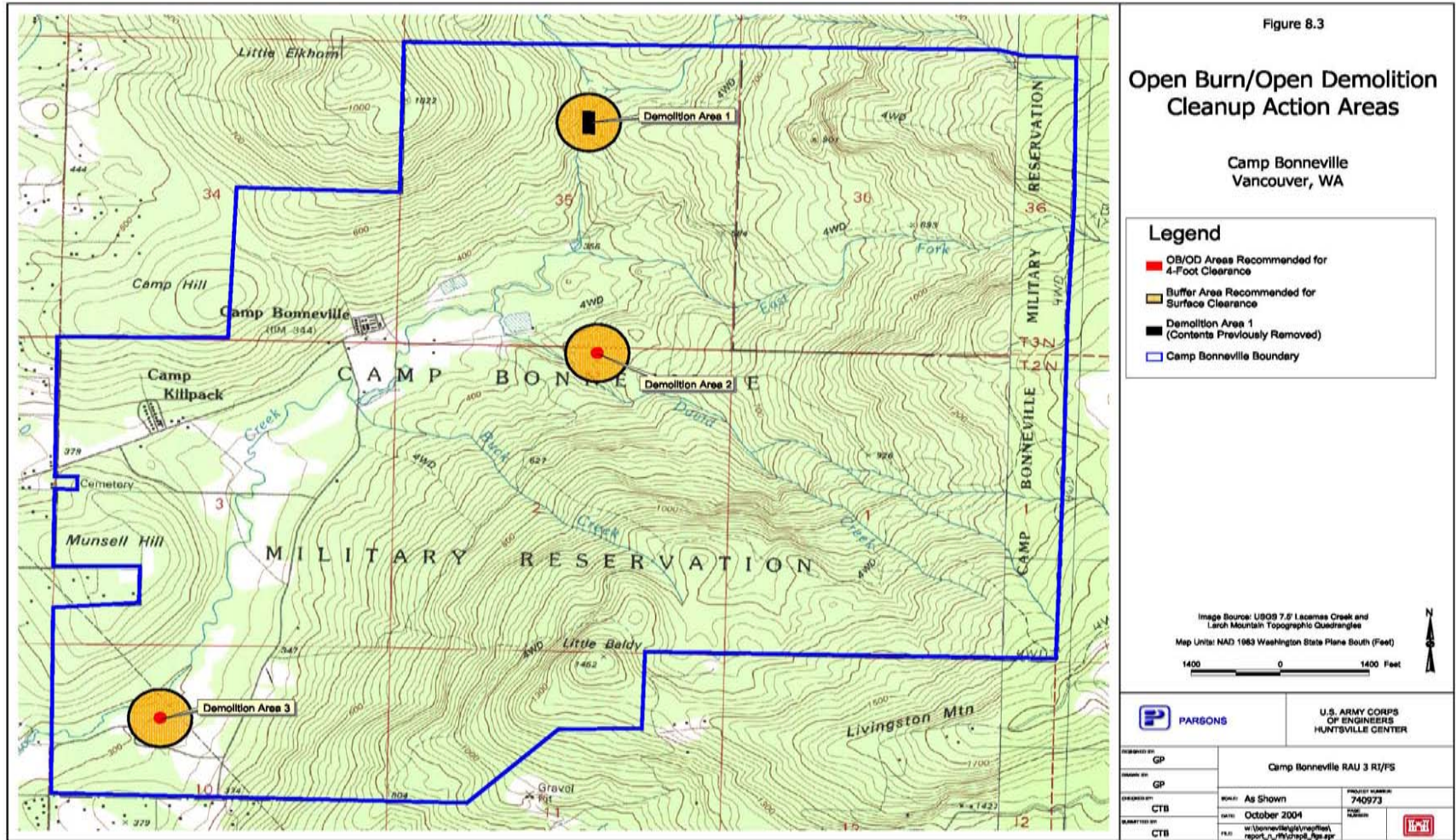
### Army Recommended Cleanup Alternative

- Frost depth clearance with ICs
- Estimated Cost of \$279,000



# Open Burn/Open Demolition Areas

## Camp Bonneville





# Explosive Hazard Exposure Rank and Recommended Cleanup Alternative

## Camp Bonneville



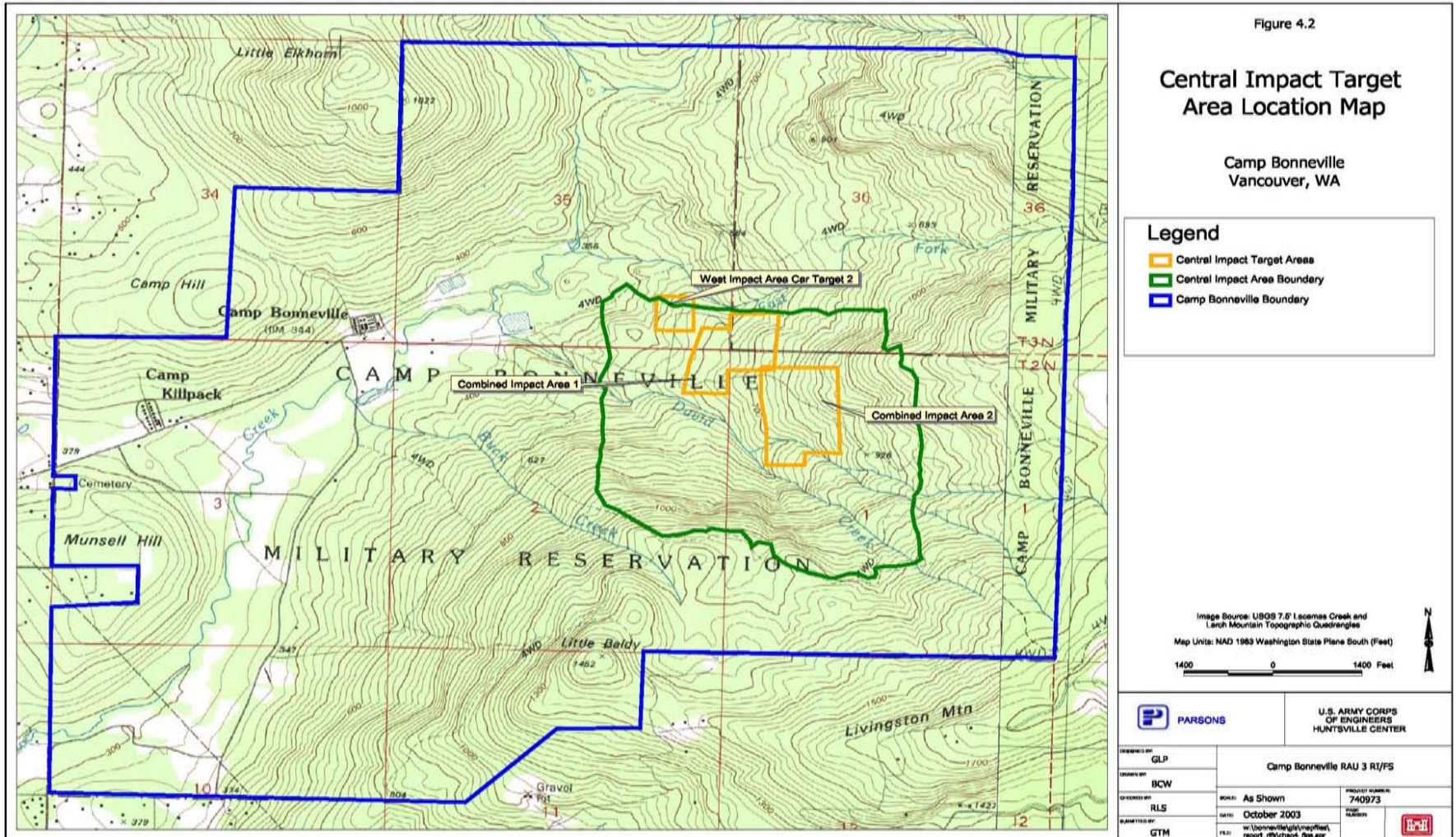
| <i>Area<br/>OB/OD<br/>Areas</i> | <i>MEC<br/>Source/<br/>Explosive<br/>Ranking</i> | <i>Accessibility</i> | <i>Future<br/>Land<br/>Reuse<br/>Intensity</i> | <i>Activity/<br/>Depth</i> | <i>Explosive<br/>Hazard<br/>Exposure<br/>Rank</i> |
|---------------------------------|--|----------------------|--|----------------------------|---|
| 1                               | 2  | Accessible           | Low  | NA/Wildlife<br>Mgt Area    | B   |
| 2                               | 2  | Accessible           | High   | Subsurface                 | A   |
| 3                               | 2  | Accessible           | Medium   | NA                         | A   |

### Army Recommended Cleanup Alternative

- Subsurface clearance (4 feet) at 2 and 3 in 300' x 300' grid
- Frost depth clearance at 1, 2, & 3 in 500' x 500' grid buffer, and ICs
- Estimated Cost of **\$1,270,000**

# Central Impact Area

## Camp Bonneville



# Explosive Hazard Exposure Rank and Recommended Cleanup Alternative

## Camp Bonneville



| <i>Area<br/>Central<br/>Impact<br/>Area</i> | <i>MEC<br/>Source/<br/>Explosive<br/>Ranking</i> | <i>Accessibility</i> | <i>Future<br/>Land<br/>Reuse<br/>Intensity</i> | <i>Activity/<br/>Depth</i> | <i>Explosive<br/>Hazard<br/>Exposure<br/>Rank</i> |
|---|--|----------------------|--|----------------------------|---|
| Area-wide                                   | 3  | Limited              | Low  | NA                         | C   |
| Target<br>Areas                             | 1  | Limited              | Low  | NA                         | B   |

## Army Recommended Cleanup Alternative

- Site-specific Institutional Controls at Area-wide
- Estimated Cost of \$573,000
- Site-specific Institutional Controls at Target Areas
- Estimated Cost of \$124,000



# Roads and Trails

## Camp Bonneville

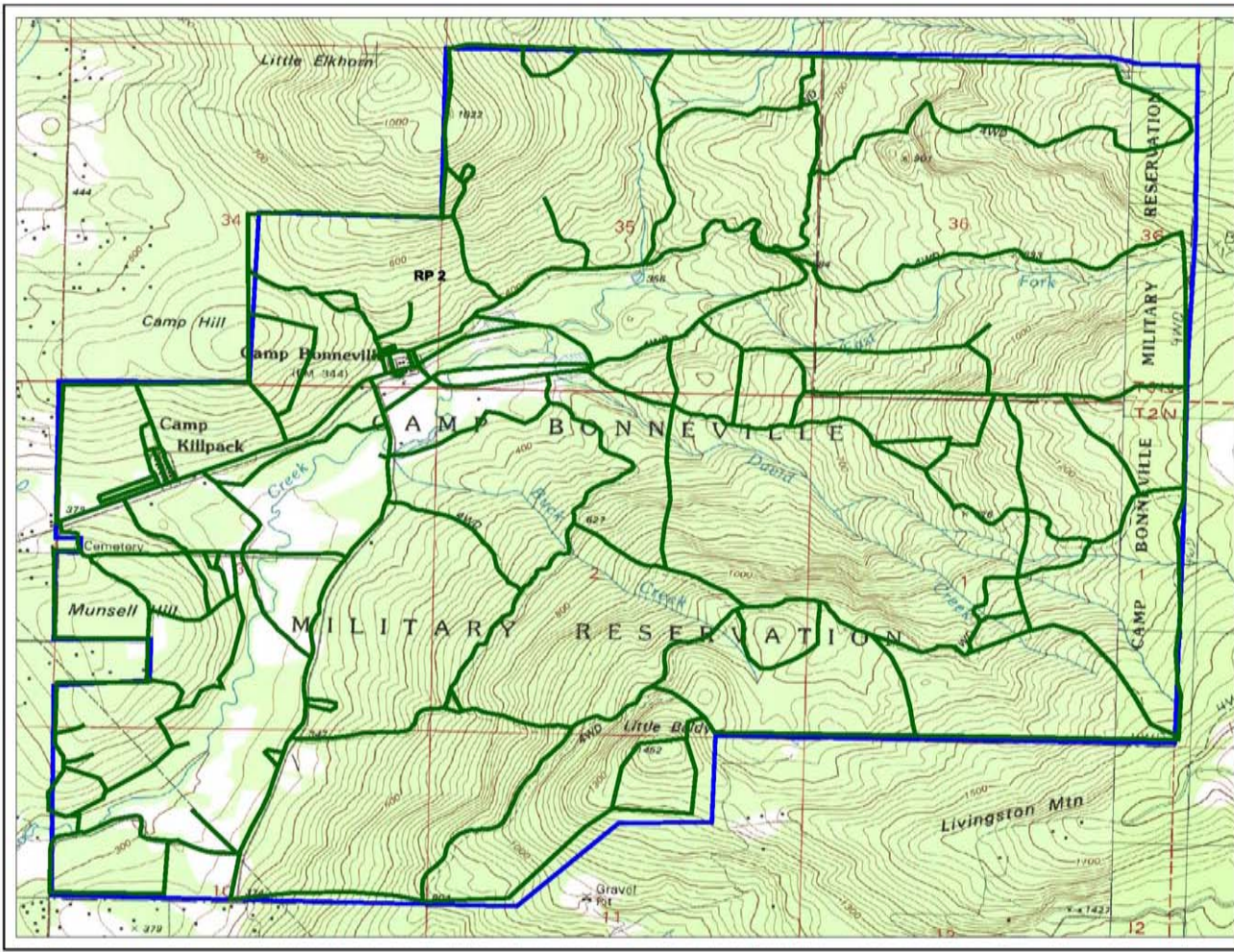


Figure 4.12

### Roads and Trails

Camp Bonneville  
Vancouver, WA

#### Legend

- Roads and Trails
- Camp Bonneville Boundary

Image Source: USGS 7.5' Loomis Creek and Larch Mountain Topographic Quadrangles  
 Map Units: NAD 1983 Washington State Plane South (Feet)  
 1400 0 1400 Feet

|                    |  |   |  |
|--------------------|--|---|--|
|                    |  | U.S. ARMY CORPS OF ENGINEERS<br>HUNTSVILLE CENTER |  |
| PREPARED BY<br>GLP | Camp Bonneville RAU 3 R1/F5                                  |   |  |
| DRAWN BY<br>BCW    | WORK: As Shown   | PROJECT NUMBER:<br>740973                         |  |
| CHECKED BY<br>RLS  | DATE:<br>October 2003  | FILE NUMBER:                                      |  |
| APPROVED BY<br>GTM | FILE:<br>w:\bonneville\glp\mapfiles\report_r1f5\ra3_r1f5.gpr |   |  |

# Explosive Hazard Exposure Rank and Recommended Cleanup Alternative

## Camp Bonneville



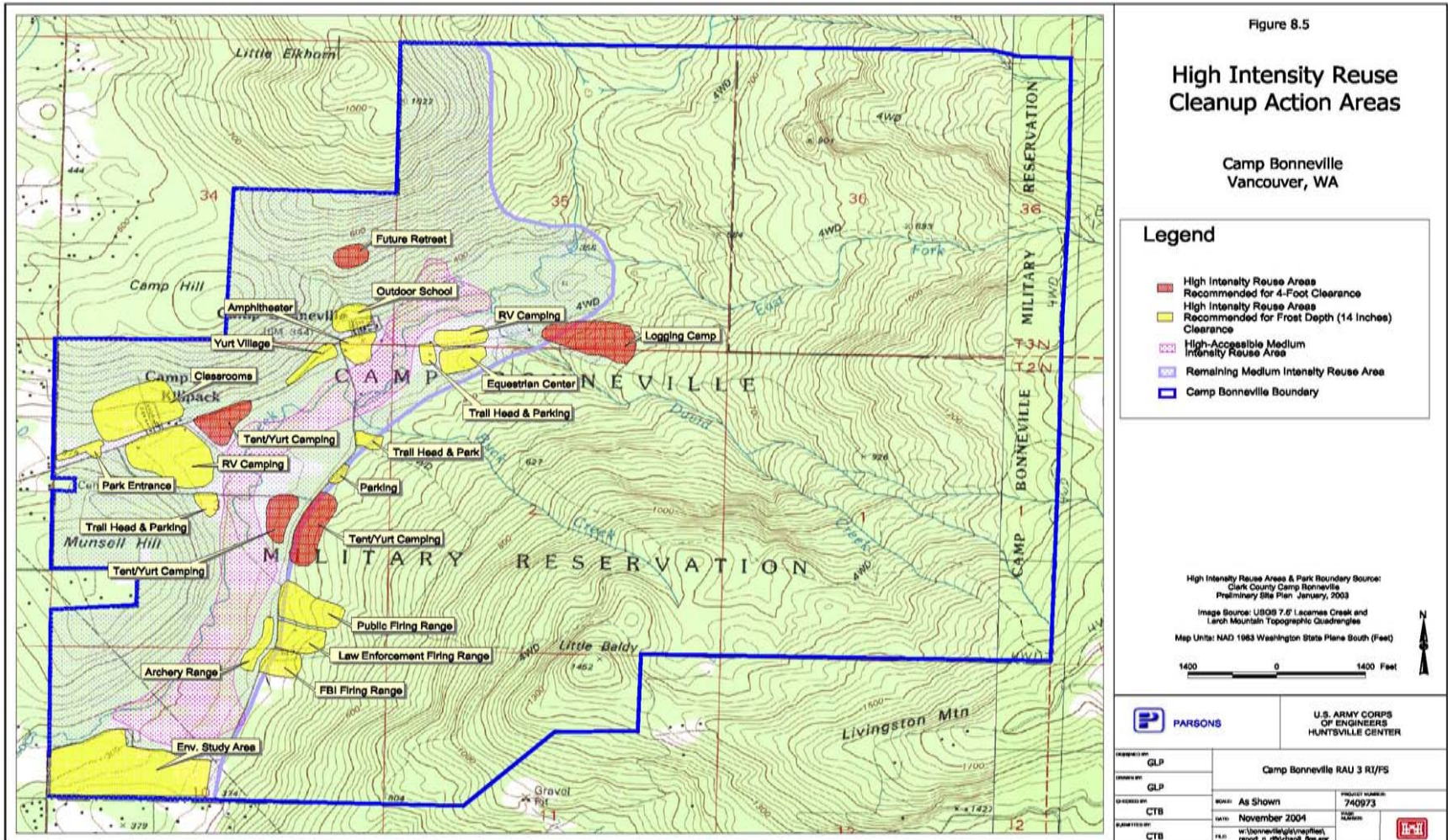
| <i>Area</i>            | <i>MEC Source/<br/>Explosive Ranking</i> | <i>Accessibility</i> | <i>Future Land Reuse Intensity</i> | <i>Activity/<br/>Depth</i> | <i>Explosive Hazard Exposure Rank</i> |
|------------------------|--|----------------------|------------------------------------|----------------------------|---------------------------------------|
| Roads<br>And<br>Trails | Maneuver<br>Areas<br>/6                  | Accessible           | High                               | Surface                    | E                                     |

### Army Recommended Cleanup Alternative

- Frost depth clearance (14”) with specific Institutional Controls
- Estimated Cost of **\$2,142,000**



# High Intensity Reuse Areas Camp Bonneville





# Explosive Hazard Exposure Rank and Recommended Cleanup Alternative

## Camp Bonneville



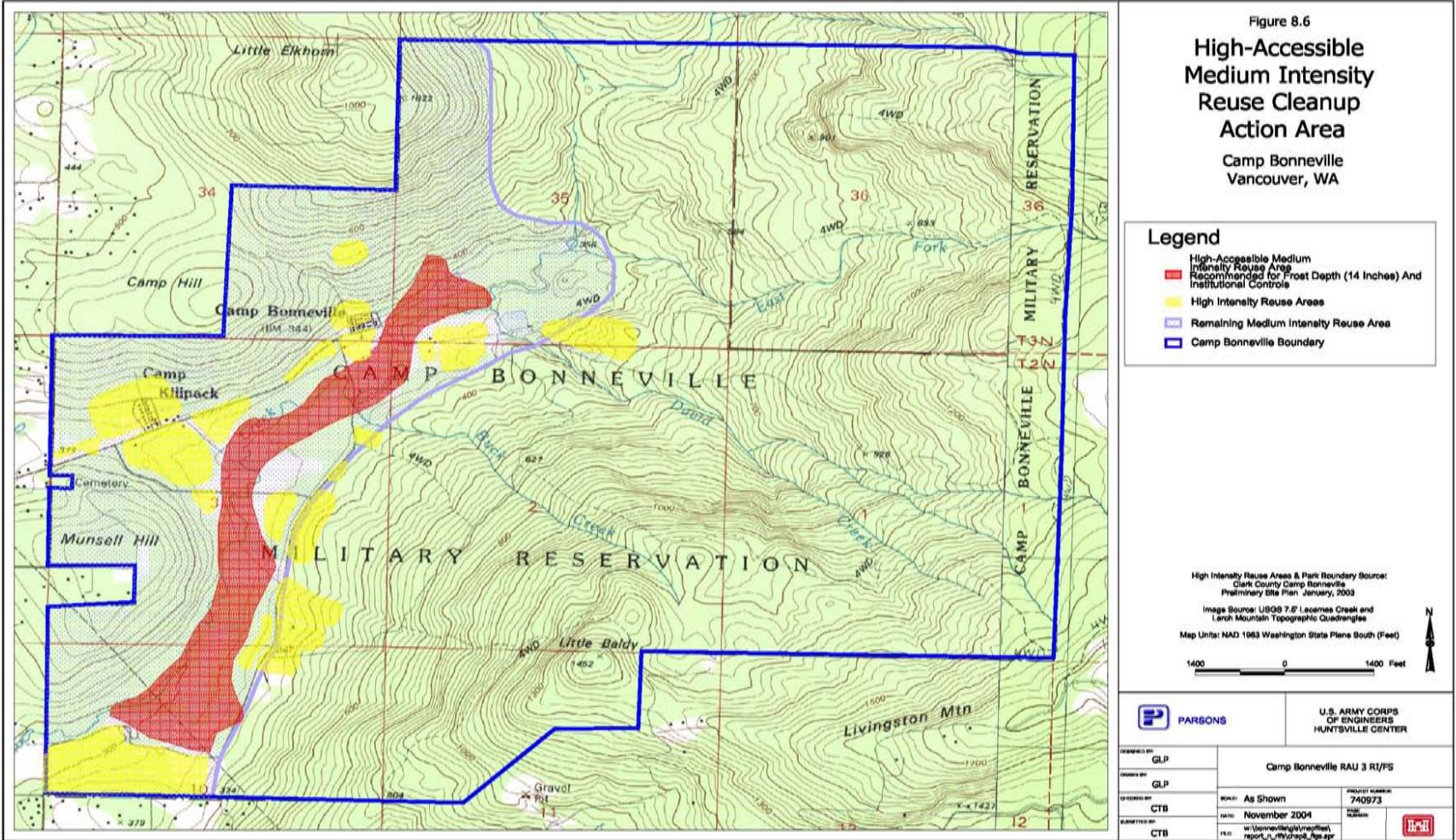
| <i>Area</i>                | <i>MEC Source/<br/>Explosive Ranking</i> | <i>Accessibility</i> | <i>Future Land Reuse Intensity</i> | <i>Activity/<br/>Depth</i> | <i>Explosive Hazard Exposure Rank</i> |
|----------------------------|--|----------------------|------------------------------------|----------------------------|---------------------------------------|
| High Intensity Reuse Areas | Maneuver Areas /6                        | Accessible           | High                               | Surface And Subsurface     | D                                     |

## Army Recommended Cleanup Alternative

- Subsurface clearance (4 feet) at intrusive activity areas
- Frost depth clearance at non-intrusive activity areas, and ICs
- Estimated Cost of **\$7,069,000**

# High-Accessible Medium Intensity Reuse Areas

## Camp Bonneville



# Explosive Hazard Exposure Rank and Recommended Cleanup Alternative

## Camp Bonneville



| <i>Area</i>                                  | <i>MEC Source/<br/>Explosive Ranking</i> | <i>Accessibility</i> | <i>Future Land Reuse Intensity</i> | <i>Activity/<br/>Depth</i> | <i>Explosive Hazard Exposure Rank</i> |
|--|--|----------------------|------------------------------------|----------------------------|---------------------------------------|
| High-Accessible Medium Intensity Reuse Areas | Maneuver Areas /6                        | High Accessible      | Medium                             | Surface Recreation         | D                                     |

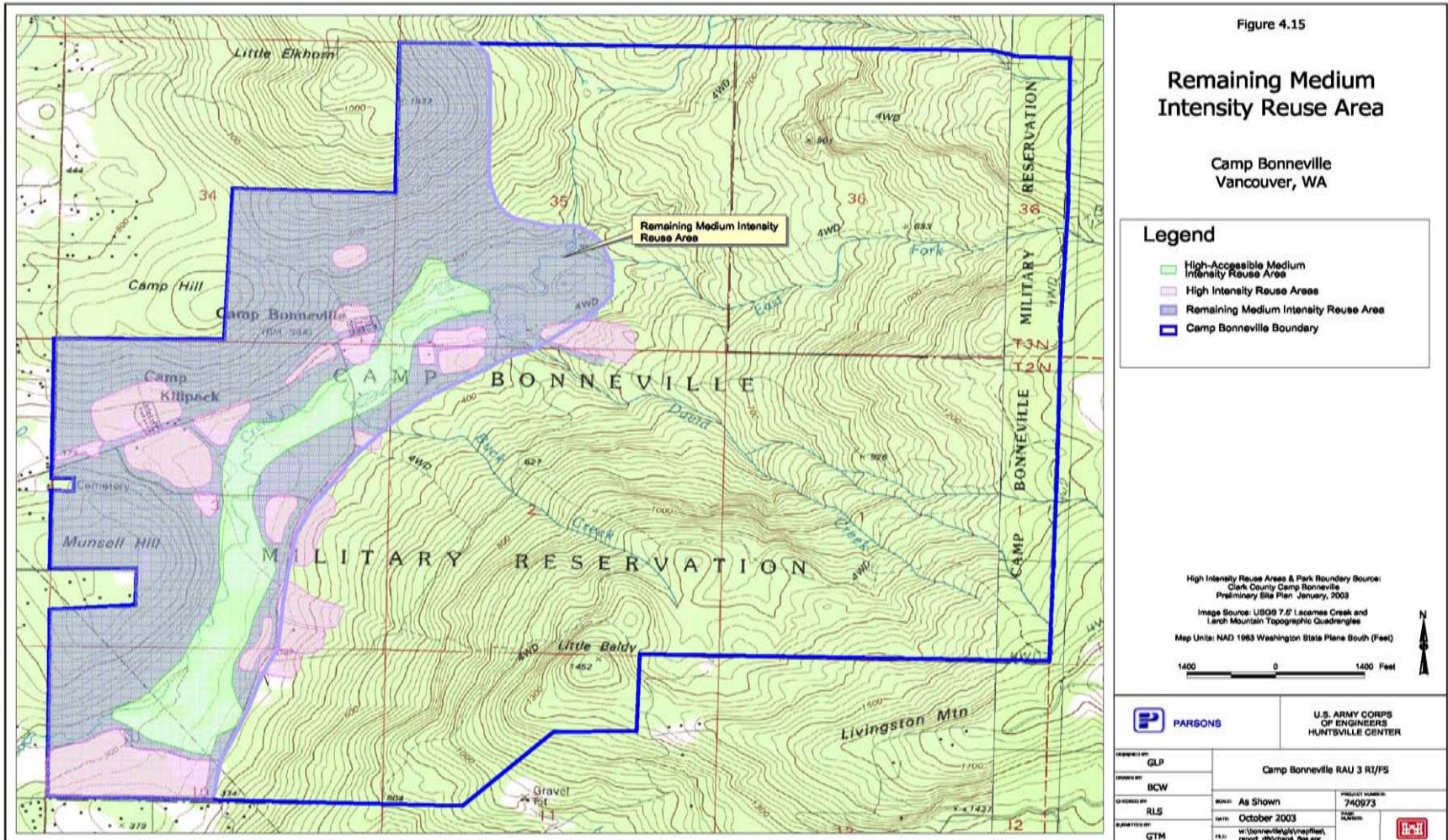
### Army Recommended Cleanup Alternative

- Frost depth clearance (14”) with specific Institutional Controls
- Estimated Cost of **\$4,643,000**



# Remaining Medium Intensity Reuse Areas

## Camp Bonneville



# Explosive Hazard Exposure Rank and Recommended Cleanup Alternative Camp Bonneville



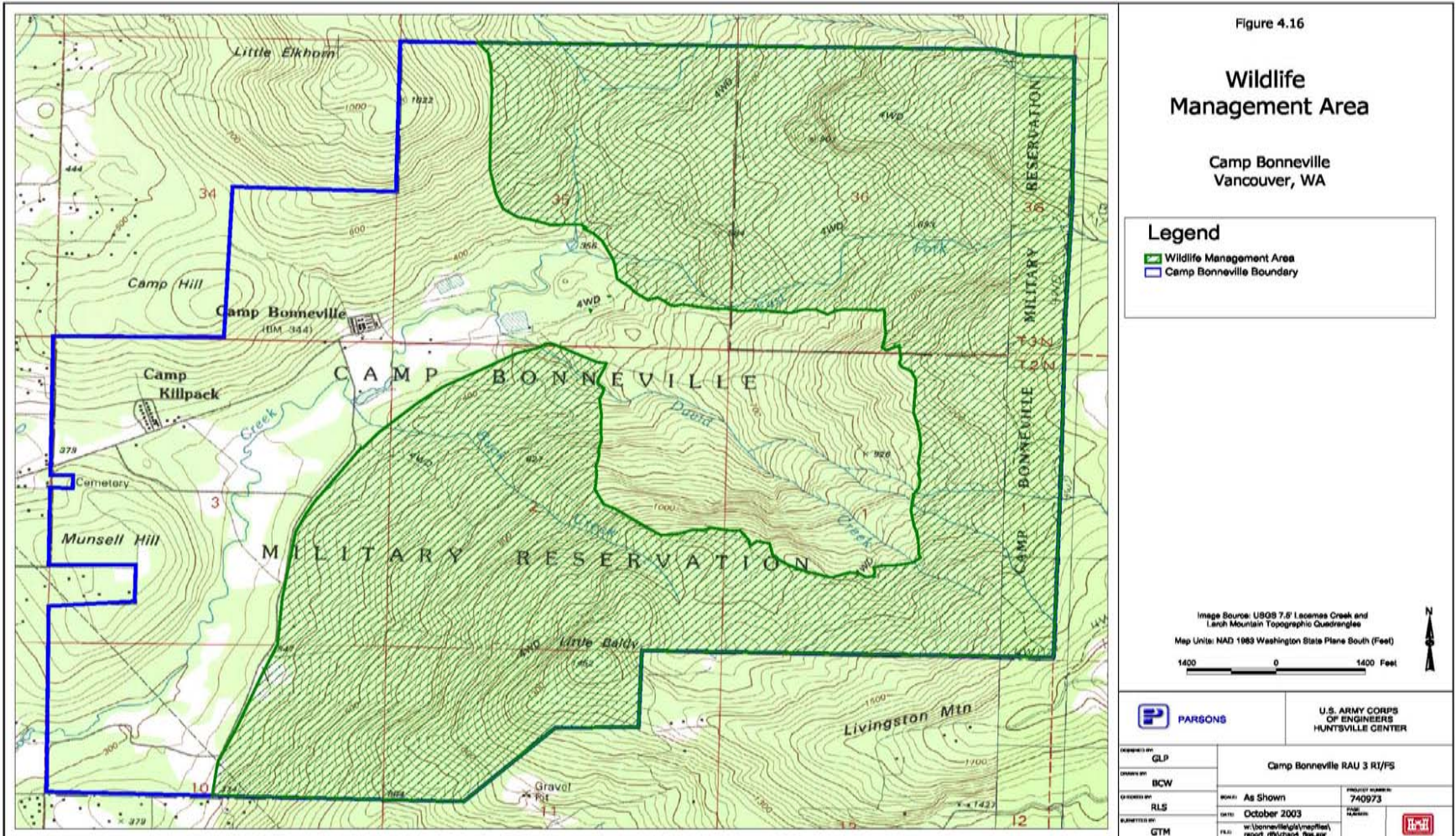
| <i>Area</i>                            | <i>MEC Source/<br/>Explosive Ranking</i> | <i>Accessibility</i> | <i>Future Land Reuse Intensity</i> | <i>Activity/<br/>Depth</i> | <i>Explosive Hazard Exposure Rank</i> |
|--|--|----------------------|------------------------------------|----------------------------|---------------------------------------|
| Remaining Medium Intensity Reuse Areas | Maneuver Areas /6                        | Accessible           | Medium                             | Surface/<br>Short-cut      | E                                     |

**Army Recommended Cleanup Alternative**  
– Site-wide Institutional Controls



# Wildlife Management Area

## Camp Bonneville





# Explosive Hazard Exposure Rank and Recommended Cleanup Alternative

## Camp Bonneville



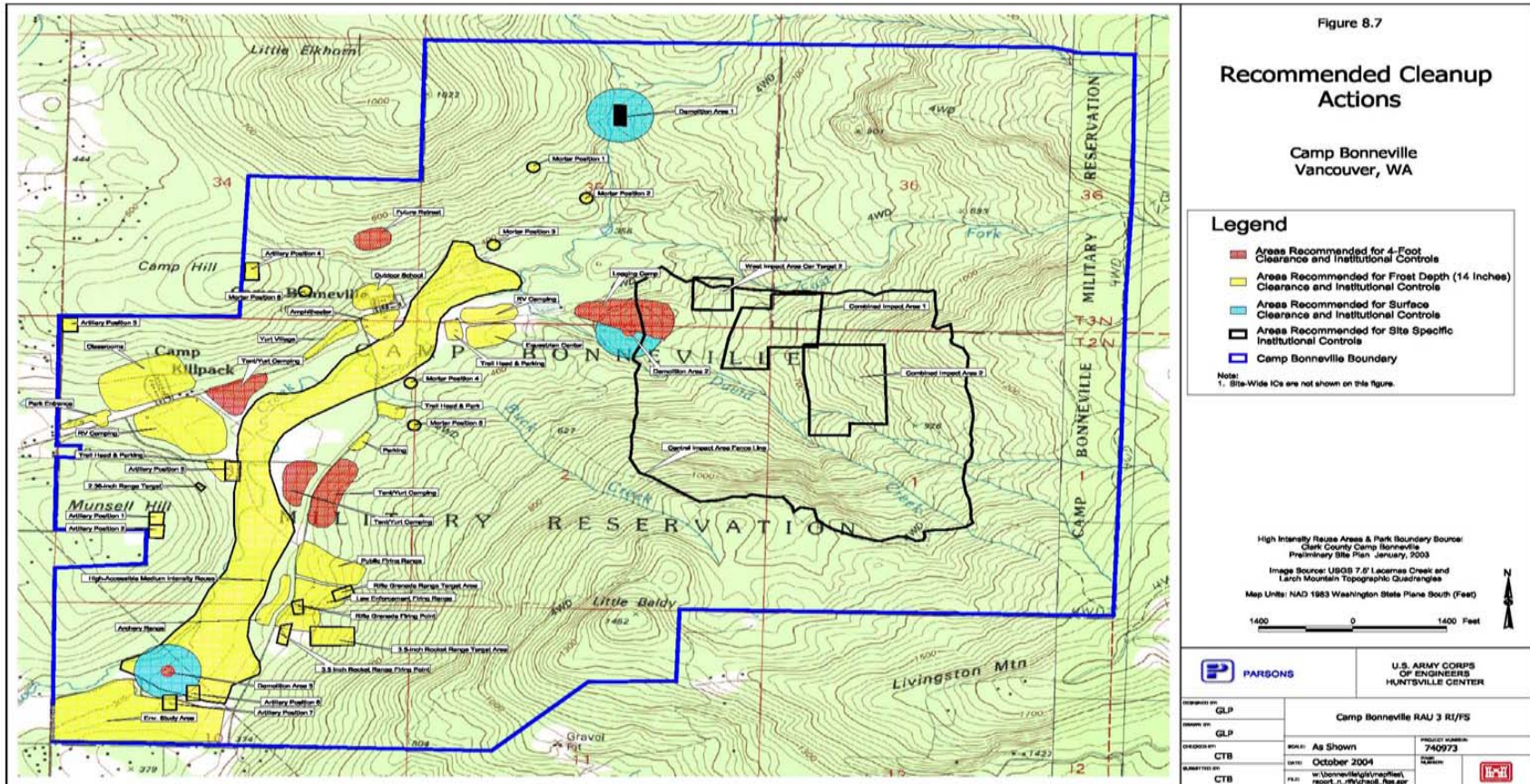
| <i>Area</i>                    | <i>MEC Source/<br/>Explosive<br/>Ranking</i> | <i>Accessibility</i> | <i>Future<br/>Land<br/>Reuse<br/>Intensity</i> | <i>Activity/<br/>Depth</i>                         | <i>Explosive<br/>Hazard<br/>Exposure<br/>Rank</i> |
|--------------------------------|--|----------------------|--|--|---|
| Wildlife<br>Management<br>Area | Range<br>Safety Fan<br>/4                    | Accessible           | Low  | Surface<br>Subsurface<br>Silviculture<br>Short-cut | D   |

## Army Recommended Cleanup Alternative

- Site-wide Institutional Controls

# Areas Recommended for Active Cleanup Actions by the Army

## Camp Bonneville

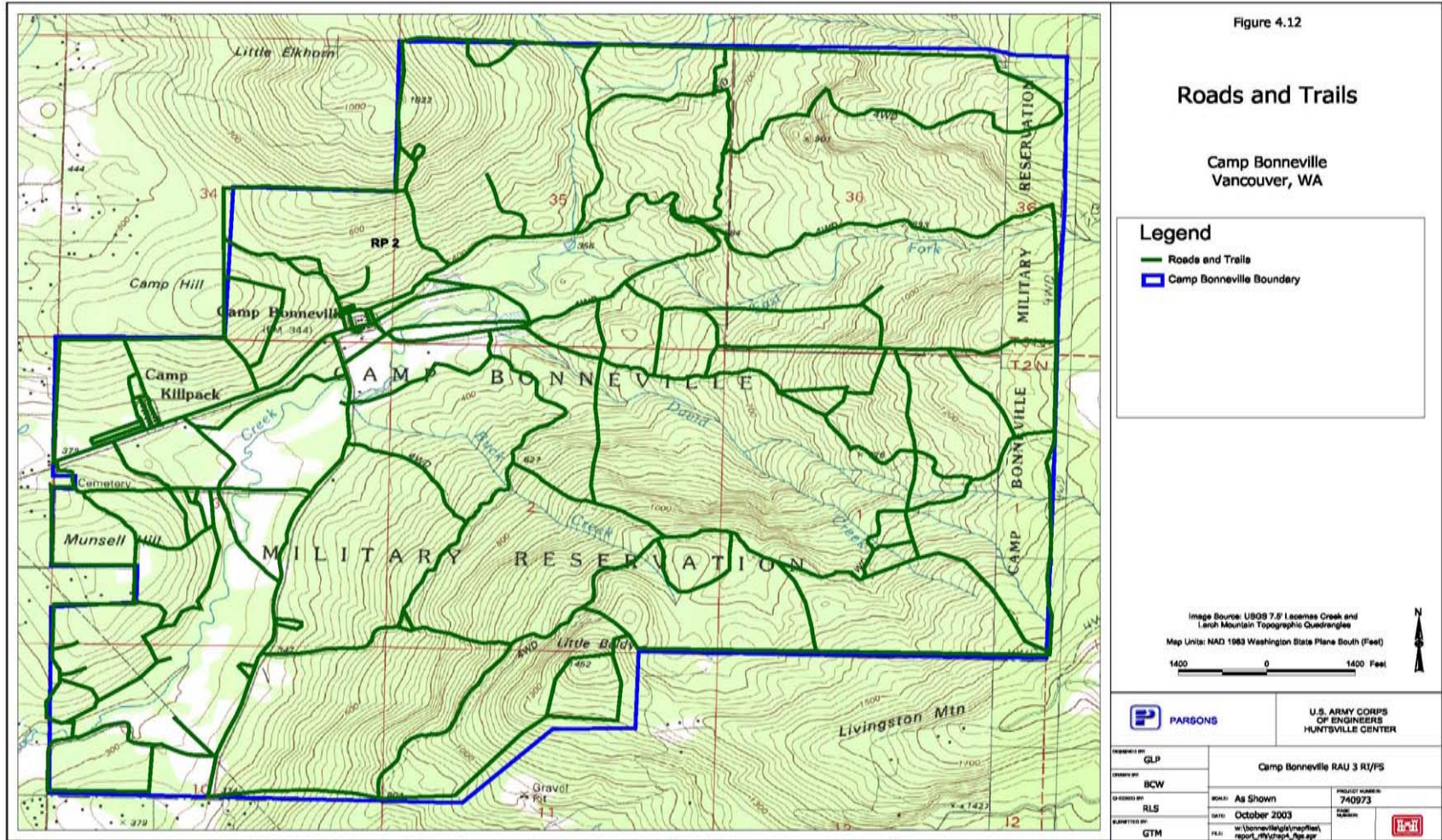


- Color-shaded areas are proposed for removal actions. Estimated cost for implementation, including ICs, is **\$16,774,000**



# Areas Recommended for Active Cleanup Actions by the Army - Roads and Trails

## Camp Bonneville





# Comments Period for RAU 3 RI/FS

## Camp Bonneville

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- Informal Question and Answer
- Comment period ends October 15, 2005
- How will we use your comments?
  - Ecology will consider your comments and respond in writing

# Camp Bonneville

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Written public comments may be submitted this evening or mailed to:

Ben Forson  
Department of Ecology  
P. O. Box 47000  
Olympia, WA 98504-7600