

2026

Montana Department of Military Affairs Regional Community Resilience & Vulnerability Assessment

Fort Harrison and Limestone Hills Training Areas
and Compatible Use Buffer

Table of Contents

Introduction	6
<i>Priority Findings and Recommendations</i>	9
<i>Assessment Organization</i>	12
Assessment Methodology	12
<i>Local, State, and Federal Plans</i>	13
<i>Stakeholders</i>	16
Missions	19
Background	19
<i>Importance of Resilience</i>	22
Regional Overview	24
<i>Geographic Scope</i>	27
<i>Critical Infrastructure</i>	34
Power	34
Water Resource	37
Communications	40
Transportation	40
Stormwater and Erosion	42
Emergency Services	44
Aviation	47
<i>Planning Frameworks and Policies</i>	49
<i>Hazard and Vulnerability Summary</i>	55
Findings and Recommendations	57
1. <i>Escalating Wildfire Hazards Disrupt Military Operations and Regional Readiness</i>	58
2. <i>Aging and Hazard-Prone Infrastructure Threatens Emergency Response and Training Continuity</i>	80
3. <i>Insecure Funding and Expiring Local Programs Jeopardize Land Protection and Resilience</i>	92
4. <i>Fragmented Utility Systems Undermine Installation Resilience and Lifeline Redundancy</i>	103
5. <i>Degraded Watershed Health and Erosion Hazards Undermine Water Security and Infrastructure Stability</i>	111
6. <i>Disconnected and Redundant Planning Frameworks Undermine Regional Coordination</i>	120
7. <i>Flooding poses consequence impacts to transportation and access, as well as culverts and low-lying assessment areas.</i>	125
8. <i>Multi-year drought conditions in Montana present a persistent and compounding hazard that reduces water availability, increases wildfire probability, and imposes restrictions on training activities.</i>	142
9. <i>Landslide/Erosion Finding: Steep slopes, channel migration, and post-fire terrain instability around LHTA leave MTARNG facilities and access routes vulnerable, with limited enforceable land-use controls currently in place.</i>	148

10. Governance and Policy Translation Gaps Perpetuate Hazard Exposure -----	156
11. Data, Mapping, and Situational Awareness Deficiencies Limit Readiness -----	176
Annex A: Stakeholder Engagement and Coordination Framework -----	189
Annex B: Wildfire Risk Assessment and Fuel Model Analysis-----	194
Annex C: Transportation, Access and Evacuation System Analysis -----	226
Annex D: Watershed Health and Drought Analysis-----	232
Annex E: Flood Risk and Hydrologic Analysis-----	253
Annex F: Land-Use Compatibility, WUI Standards, and Enforcement Analysis-----	278
Annex G: Weather Projection Analysis -----	283
Annex H: Planning & Governance Analysis-----	288
Annex I: Critical Infrastructure, Utilities and Energy System Analysis -----	315
Annex J: Community Preparedness and Response Capacity Analysis -----	326
Annex K: Water Supply, Storage and Distribution Infrastructure Analysis -----	330
Annex L: Mission Assurance Analysis-----	333
Annex M: Funding and Grant Resource Analysis-----	344
Acronyms -----	348
References-----	352

Table of Tables

Table 1. Priority Findings and Recommendations	10
Table 2. Local, State, and Federal Integrated Plans, Studies, and Frameworks.....	13
Table 3. Stakeholders	17
Table 4. Resilience Benefits	23
Table 5. Existing Plans, Frameworks; Assessment Use	49
Table 6. Fuel Management Finding and Recommendations	65
Table 7. Stakeholders and Their Roles.....	189
Table 8. Engagement Timeline and Meeting Summary	190
Table 9. Summary of Input Themes	191
Table 10. Stakeholder Interview Questions	193
Table 11. FHTA and LHTA Wildfire History.	199
Table 12. Jurisdictional Wildfire Risk Levels.	222
Table 13. Mitigation Priority Areas (2025–2030).....	224
Table 14. Wildfire Response Assets by Jurisdiction (2025).....	225
Table 15. FHTA and LHTA Assessment Area Water Storage and Reservoir Capacity.	238
Table 16. Historical Drought Years, Events, and Impacts.....	241
Table 17. Drought Dynamics and System Impacts.	242
Table 18. Topographic Drought Impacts by Jurisdiction.	245

Table 19. Development Trend Drought Implications by Jurisdiction	247
Table 20. Drought Cascading and Long-Term Impacts by Jurisdiction.....	249
Table 21. Drought Risk Outlook by Jurisdiction	251
Table 22. Significant Regional Historical Flood Events.....	271
Table 23. Jurisdictional Exposure Vulnerabilities and Risks Floods	275
Table 24. Flood and Hydrologic Statistics – Lewis & Clark and Broadwater Counties (2010–2024).....	277
Table 25. Incompatible Land Use and Encroachment Impact Summary	281
Table 26. Projected Weather Conditions by Decade.....	285
Table 27. Future Risk Scenarios.....	287
Table 28. Military and Installation-Level Plans	288
Table 29. State-Level Plans.....	289
Table 30. Regional and Interjurisdictional Plans	289
Table 31. County-Level Plans and Regulations	289
Table 32. Municipal and Corridor Plans	290
Table 33. Community and Partner Plans.....	290
Table 34. Infrastructure and Utility Plans	290
Table 35. Summary of Integration Deficiencies	311
Table 36. Critical Infrastructure and Key Resources Impact Assessment.	316
Table 37. Utility Infrastructure, Vulnerabilities, and Gaps.	323
Table 38. Fire & Wildland Response	326
Table 39. Emergency Medical Services (EMS) & Medical Surge.....	327
Table 40. Infrastructure Vulnerabilities.....	331
Table 41. FHTA and LHTA Assessment Area Planning Document Integration Gaps	342
Table 42. Federal Programs Relevant to DMA/Regional Projects	344
Table 43. State and Regional Funding Opportunities	346

Table of Figures

Figure 1. FHTA Assessment Area	7
Figure 2. LHTA Assessment Area.....	8
Figure 3. Area Topography Map	25
Figure 4. Area Land Ownership Map.....	27
Figure 5. Regional Elevation Map	28
Figure 6. Regional Watershed Map.....	29
Figure 7. Population and Growth Trends Data Broadwater & Lewis and Clark Counties	31
Figure 8. FHTA Development by Year Map	32
Figure 9. LHTA Area Development by Year Map	33
Figure 10. Power Lines and Communication Lines Map FHTA Area	35
Figure 11. Power Lines and Communication Lines Map LHTA Area.....	36
Figure 12. FHTA Water Resource Map.....	38
Figure 13. LHTA Water Resource Map.....	39
Figure 14. FHTA Road Map.....	41
Figure 15. LHTA Road Map	42
Figure 16. Watershed Exposure Index Map	43
Figure 17. LHTA Erosion and Debris Flow Map	44
Figure 18. Rural Fire Districts for Emergency Services FHTA Map.....	45
Figure 19. Rural Fire Districts for Emergency Services LHTA Map.....	46
Figure 20. FHTA Aviation Infrastructure and Air Operations Network Map	48
Figure 21. LHTA Aviation Infrastructure and Air Operations Network Map	49
Figure 22. FHTA Assessment Area High Risk Corridor.....	62
Figure 23. LHTA Assessment Area High Risk Corridor.....	63
Figure 24. Zone 1 FHTA South Perimeter	66
Figure 25. Zone 2 Tenmile Ridge Prescribed Burn.....	67
Figure 26. Zone 3 10-Mile Creek Park / PPLT	68

Figure 27. Zone 4 Canyon Ferry North Corridor	69
Figure 28. Zone 5 LHTA Perimeter Fuel-Break Zone	70
Figure 29. Zone 6 South Hills–Helena WUI Townsend / Indian Creek WUI.....	71
Figure 30. Zone 7 Tenmile & Sevenmile Creek Riparian Corridors	72
Figure 31. Slope for FHTA and LHTA Assessment Areas	152
Figure 32. Wildfire Hazard Potential Map.....	195
Figure 33. CIKR Wildfire Risk Map FHTA.....	196
Figure 34. CIKR Wildfire Risk Map LHTA	197
Figure 35. Rate of Spread Map	198
Figure 36. Wildfire History FHTA.....	201
Figure 37. Wildfire History LHTA.....	202
Figure 38. FHTA Assessment Area WUI Map.....	203
Figure 39. LHTA Assessment Area WUI Map.....	204
Figure 40. Vegetation and Fuel Map FHTA	207
Figure 41. Vegetation and Fuel Map LHTA.....	209
Figure 42. Regional Elevation Map	213
Figure 43. Regional Slope Map	214
Figure 44. Wildfire Exposure and Transmission Map	217
Figure 45. FHTA Assessment Area Access Map.....	228
Figure 46. LHTA Assessment Area Access Map	230
Figure 47. FHTA and LHTA Assessment Area Drought Categories.....	233
Figure 48. FHTA and LHTA Assessment Area Drought Historical Severity.....	235
Figure 49. FHTA and LHTA Assessment Area Watershed and Sub-Watershed Maps.....	236
Figure 50. FHTA and LHTA Assessment Area Ground Water Vulnerability.....	237
Figure 51. FHTA and LHTA Assessment Area Drought Probability	250
Figure 52. Waterways Overview Map.....	253
Figure 53. Watershed and Drainage Basins.	255
Figure 54. FHTA Assessment Area Flood Map.	257
Figure 55. LHTA Assessment Area Flood Map.	259
Figure 56. FHTA Assessment Area Roadway Flooding.....	261
Figure 57. LHTA Assessment Area Roadway Flooding.	262
Figure 58. Dam and Reservoir Inundation Areas.....	264
Figure 59. Hydrologic Soil Group	266
Figure 60. Flash Flood Risk Zone.....	268
Figure 61. Snowmelt and Spring Runoff Risk Areas.	269
Figure 62. LHTA Grazing Map	279
Figure 63. FHTA CIKR Assessment Area.....	315
Figure 64. LHTA CIKR Assessment Area	316
Figure 65. FHTA Access Map	318
Figure 66. LHTA Access Map.....	319
Figure 67. FHTA Utilities Map.	320
Figure 68. LHTA Utilities Map.....	321

Introduction

The Fort Harrison Training Area (FHTA) and Limestone Hills Training Area (LHTA) are integral components of the broader community landscape and are situated within areas exposed to multiple, overlapping hazards. Their location in complex terrain with continuous fine fuels, shared transportation corridors, and close proximity to residential development increases vulnerability not only for military operations but also for surrounding communities, infrastructure, and emergency response systems. These areas span multiple jurisdictions, including Lewis & Clark and Broadwater counties, state lands managed by the Montana Department of Natural Resources and Conservation (DNRC), and adjacent federal lands administered by the U.S. Forest Service (USFS) and Bureau of Land Management (BLM). As a result, disruptions affecting the training areas, such as wildfire, flooding, drought, or access constraints, can cascade across jurisdictional boundaries, highlighting the need for coordinated, cross-jurisdictional resilience planning that strengthens both community safety and regional capacity to withstand and recover from hazard events.

The nearby communities of Helena and Townsend function as military defense communities, providing essential support to MTARNG missions through housing, medical services, utilities, transportation networks, workforce availability, and emergency response capacity. Wildfire impacts affecting these communities, such as evacuations, infrastructure disruptions, or access restrictions, have direct consequences for installation operations, force readiness, and continuity of training missions at both FHTA and LHTA.

This Resilience Vulnerability Assessment (“assessment”) focuses on the areas surrounding FHTA and LHTA including adjacent communities within Lewis & Clark and Broadwater Counties in West-Central Montana. This Assessment also analyzes FHTA and LHTA themselves to the extent analyses of the surrounding areas affect the installations or activities and management on the installations affect the surrounding areas. These areas represent critical operational corridors, infrastructure systems, and shared resources that sustain both military readiness and community stability. The FHTA installation, its surrounding three-mile Compatible Use Buffer (CUB) area, and associated Wildland-Urban Interface (WUI) will be referred to as the “FHTA assessment area” throughout this assessment (Figure 1). The LHTA installation, its surrounding three-mile CUB area, and associated WUI will be referred to as the “LHTA assessment area” throughout this assessment (Figure 2). This effort establishes a strategic framework to identify, evaluate, and mitigate risks that may affect military operations, critical infrastructure, surrounding landscapes, and adjacent communities. This assessment identifies shared responsibilities, targeted investment, and cooperative planning among military and civilian stakeholders, and identifies gaps and opportunities to sustain mission readiness, protect compatible land uses, and strengthen regional resilience.

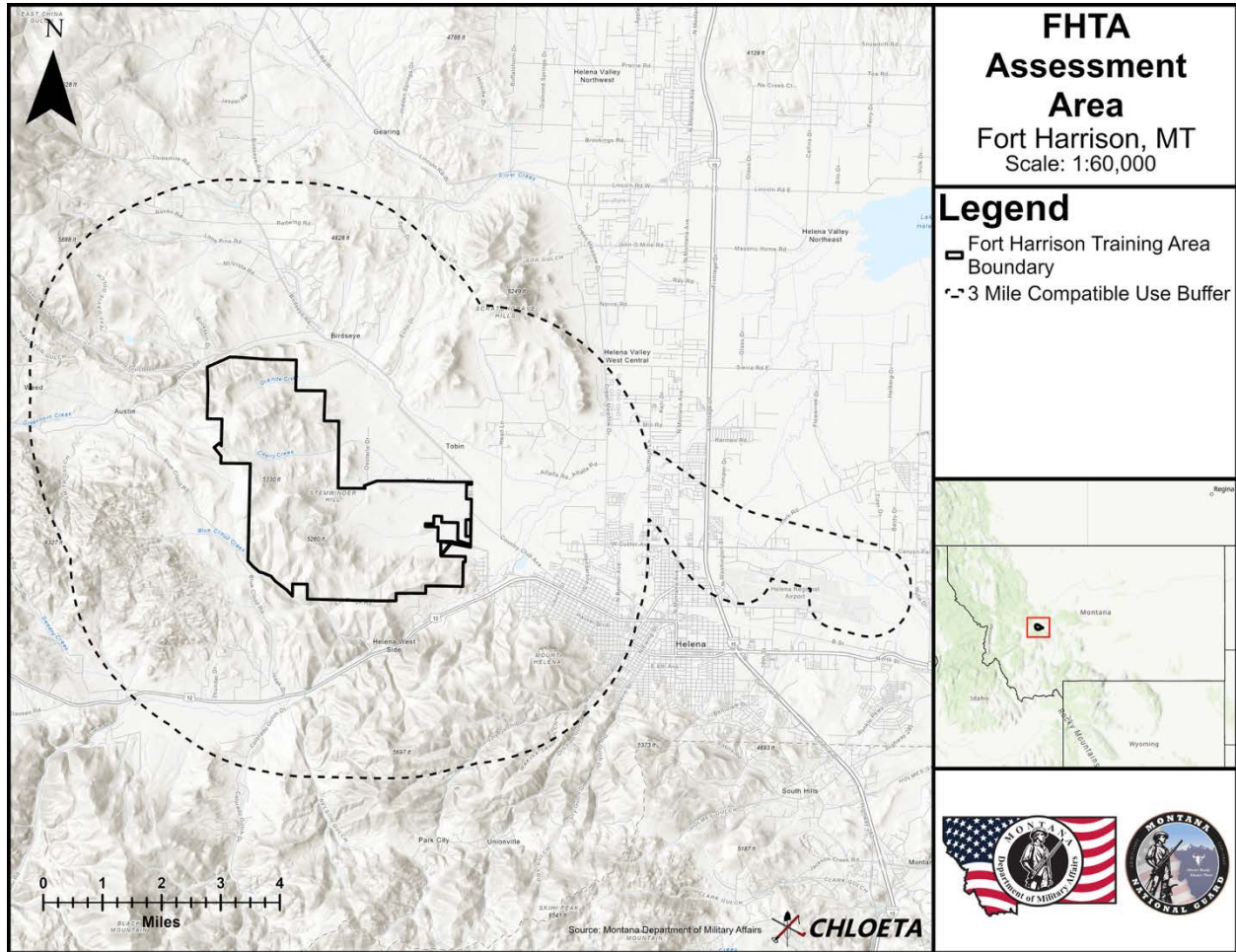


Figure 1. FHTA Assessment Area

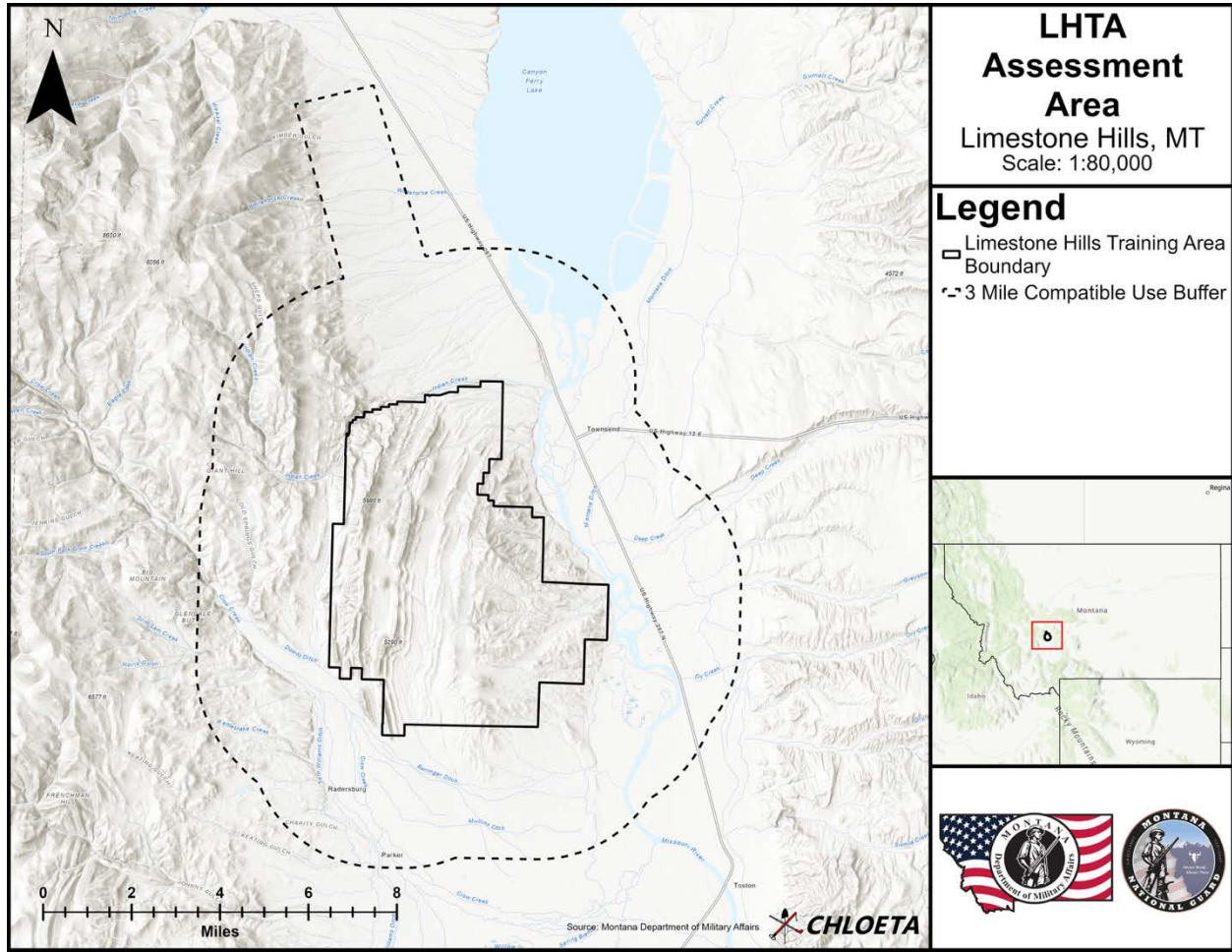


Figure 2. LHTA Assessment Area

The methodology integrates regional datasets, geographic information system (GIS) analysis, existing planning documents, stakeholder interviews, and cross-sector evaluations to identify vulnerabilities across five key domains: transportation and access infrastructure, utilities and energy systems, watershed health, land use and development trends, and interagency coordination and response capacity. This systems-based approach evaluates how regional hazards intersect with military and civilian systems and quantifies exposure through spatial and infrastructure analysis.

Findings are prioritized by their impact on mission assurance, community safety, and implementation feasibility, resulting in a set of actionable strategies that directly support installation sustainment and regional resilience. These strategies link vulnerabilities to mitigation actions, responsible entities, and potential funding sources. The results will inform local hazard mitigation plans (HMPs), growth management strategies, and installation resilience planning, furthering OLDCC's mission to preserve defense capabilities, ensure land-use compatibility, and strengthen installation-community collaboration.

The scope of this Assessment includes the following objectives:

- Identify and quantify vulnerabilities that threaten mission assurance, infrastructure continuity, and regional resilience.
- Evaluate cross-sector dependencies between military installations, local governments, utilities, and emergency management systems.
- Assess land-use compatibility and development pressures that influence access, safety, and operational capacity near installation boundaries.
- Integrate hazard and infrastructure data into a unified framework to support joint mitigation, adaptation, and investment strategies.
- Develop actionable, prioritized recommendations to guide coordinated prevention, mitigation, and recovery efforts across military and civilian partners.

This Assessment is a foundation for sustained collaboration among the Montana Department of Military Affairs (DMA), MTARNG, and local, state, and federal stakeholders. The results are intended to inform resilience-based decision-making, strengthen joint planning mechanisms, and ensure long-term compatibility between defense operations and regional growth.

This Assessment applies a multi-layered methodology to evaluate how physical, operational, and institutional systems contribute to risk across the FHTA and LHTA assessment areas. Consistent with FEMA, DoW, and weather-resilience planning doctrine, hazards are defined as potentially damaging events or trends, exposure as the presence of assets or people within those hazard areas, vulnerability as the susceptibility of those assets to harm, and risk as the combined function of hazard likelihood, exposure, and vulnerability. Using this structure allows planners to see not only where hazards exist, but which systems are most at risk, why vulnerability occurs, and where mitigation yields the greatest benefit to mission assurance and community resilience.

Indicators were selected based on relevance to regional threats and planning objectives. Physical indicators focused on the siting and condition of critical infrastructure—including roads, utilities, and facilities, the presence or absence of redundancy, and proximity to ignition-prone or flood-susceptible areas. Operational indicators assessed emergency response capacity, the redundancy of lifeline utilities such as water and power, and the presence of evacuation bottlenecks or logistical constraints that could impair incident operations. Institutional indicators examined jurisdictional authorities, interagency coordination, the maturity of preparedness programs, and alignment of existing plans and funding mechanisms.

Each indicator was evaluated using geospatial data, infrastructure records, and stakeholder input, and spatially mapped, when possible, to identify patterns of concentrated vulnerability and inform targeted mitigation strategies.

Priority Findings and Recommendations

This Assessment prioritizes findings and recommendations that directly address the most significant vulnerabilities impacting FHTA and LHTA assessment areas. Findings were derived from detailed field assessments, stakeholder interviews, data analysis, and review of existing planning efforts. They focus on critical gaps in prevention, mitigation, coordination, and land use management. The recommendations that follow each finding are designed to be specific, feasible, and actionable. They identify responsible entities, geographic focus areas, and potential funding sources and outline strategies for integrating military resilience priorities into local and regional planning efforts. Table 1 summarizes the priority findings, associated high-level recommendations,

and provides related appendices and data sources.

Table 1. Priority Findings and Recommendations

Finding	High-Level Recommendation	Related Appendices/Supporting Data
<u>1. Escalating Wildfire Hazards Disrupt Military Operations and Regional Readiness</u>	Develop and maintain shaded fuel breaks, expand prescribed fire and mechanical thinning, update subdivision WUI codes, enhance evacuation planning, and increase volunteer fire department (VFD) capacity and cross-jurisdiction coordination.	<u>Annex B</u> : Wildfire Risk & Fuel Models; <u>Annex F</u> : Land-Use
<u>2. Aging & Hazard-Prone Infrastructure Threatens Emergency Response and Training Continuity</u>	Harden lifeline roads and culverts, construct alternate access corridors, reinforce utility corridors, align capital improvement planning with hazard mitigation, and secure redundant water supply.	<u>Annex C</u> : Transportation; <u>Annex I</u> : Critical Infrastructure and Key Resources (CIKR); <u>Annex F</u> : Land Use; <u>Annex K</u> : Water Supply; <u>Annex H</u> : Planning & Governance
<u>3. Insecure Funding and Expiring Local Programs Jeopardize Land Protection and Resilience</u>	Establish permanent CUB funds in both counties, secure multi-year REPI and OLDCC commitments, integrate conservation easements into HMPs, and legislate sustained match capacity.	<u>Annex M</u> : Funding & Grant Inventory; <u>Annex H</u> : Planning & Governance
<u>4. Fragmented Utility Systems Undermine Installation Resilience and Lifeline Redundancy</u>	Harden and bury single-feed power lines, deploy microgrids and backup generators, construct redundant water storage, expand broadband/FirstNet coverage, and build a shared utility Continuity of Operations Plan (COOP) framework.	<u>Annex I</u> : CIKR
<u>5. Degraded Watershed Health and Erosion Hazards Undermine Water Security and Infrastructure Stability</u>	Implement post-fire stabilization, riparian restoration, backup reservoirs, erosion-resilient culverts, and integrated real-	<u>Annex D</u> : Watershed Health and Drought Analysis

Finding	High-Level Recommendation	Related Appendices/Supporting Data
	time watershed monitoring and conservation easements.	
6. Disconnected and Redundant Planning Frameworks Undermine Regional Coordination	Establish a Regional Resilience Data Hub, align plan cycles/models, institutionalize DMA participation in local land-use review, and form a permanent multi-jurisdictional resilience council.	Annex H : Planning and Governance
7. Flooding Poses Consequence Impacts to Transportation and Access, as well as Culverts and Low-lying Assessment Areas	Upgrade flood-exposed roads and culverts, build detention/drainage systems, develop redundant water supply, integrate unified flood response plans, and expand GIS flood monitoring.	Annex E : Flood and Hydrologic Analysis; Annex C : Transportation
8. Multi-year drought conditions in Montana present a persistent and compounding hazard that reduces water availability, increases wildfire probability, and imposes restrictions on training activities.	Construct redundant supply & storage, enforce subdivision water-adequacy standards, expand conservation programs, install drought monitoring networks, and integrate drought resilience into land management.	Annex D : Drought; Annex I : CIKR
9. Landslide/Erosion Finding: Steep slopes, channel migration, and post-fire terrain instability around LHTA leave MTARNG facilities and access routes vulnerable, with limited enforceable land-use controls currently in place.	Conduct geotechnical surveys, install engineered slope stabilization, apply post-fire erosion controls, deploy real-time slope monitoring, and adopt slope-hazard zoning overlays.	Annex E : Flood Analysis; Annex C : Transportation
10. Governance and Policy Translation Gaps Perpetuate Hazard Exposure	Adopt enforceable WUI and floodplain codes, institute mitigation-fee programs, codify joint land-use review near MTARNG facilities, and formalize intergovernmental agreements.	Annex H : Planning and Governance

Finding	High-Level Recommendation	Related Appendices/Supporting Data
11. Data, Mapping, and Situational Awareness Deficiencies Limit Readiness	Build a regional hazard + lifeline GIS portal, conduct utility audits, create data-sharing memoranda of understanding (MOU), deploy real-time hazard sensors, and integrate monitoring into county emergency operations centers (EOCs).	Annex H : Planning and Governance

Assessment Organization

This Assessment provides a concise, actionable evaluation of vulnerabilities that threaten mission assurance in the FHTA and LHTA assessment areas. It is organized around clearly defined hazard and resilience categories, derived from stakeholder engagement, technical analysis, field observations, and review of existing studies. Each category, Hazard Exposure, Critical Infrastructure and Access, Emergency Response Capacity, Land Compatibility, and Institutional Planning and Governance describes the geographic scope, responsible entities, operational and community impacts, and existing management conditions. These categories provide the analytical foundation for the Findings in Table 1, which identify significant vulnerabilities based on feasibility of mitigation and potential consequences for military mission assurance, infrastructure resilience, and community safety. This structure ensures that vulnerabilities are directly linked to actionable recommendations that strengthen resilience across both military and civilian systems.

The Findings and Recommendations section builds directly from this Assessment core categories of Hazard Exposure, Critical Infrastructure and Access, Emergency Response Capacity, Land Compatibility, and Institutional Planning and Governance, each detailed in its applicable appendices. Each Finding highlights a priority vulnerability that emerged from technical analysis, stakeholder engagement, and review of existing data. Findings emphasize where risks have the greatest potential to disrupt mission assurance, degrade infrastructure performance, or compromise public safety. For each Finding, this Assessment provides a corresponding set of [Recommendations](#) that are actionable, location-specific, and implemented through coordinated civilian–military efforts. Recommendations identify potential funding mechanisms, integration points with existing local and state planning frameworks, and opportunities to leverage cross-jurisdictional partnerships. Together, these Findings and Recommendations provide a roadmap for resilience investments that reduce shared vulnerabilities, enhance operational continuity, and strengthen long-term regional stability.

Assessment Methodology

This Assessment employed a multi-tiered methodology designed to integrate local operational knowledge, regional planning frameworks, and geospatial hazard modeling to produce actionable and specific recommendations. The process began with a comprehensive review of existing local,

state, and federal plans to align this Assessment with current hazard mitigation strategies, land use policies, and mission-critical military planning documents. These sources provided the background for the policy and planning context currently in place for FHTA and LHTA, assessment areas.

Parallel to this document review, the project team conducted in-depth stakeholder interviews with over 30 agency representatives, including military range managers, county planners, emergency managers, conservation staff, and utility and fire officials. These interviews provided direct insight into real-world operational gaps, response challenges, interagency coordination barriers, and mitigation needs that may not be captured in existing plans.

To evaluate vulnerability across the FHTA and LHTA assessment areas, the team implemented a GIS –based spatial analysis framework integrating current vegetation and fuels data (LANDFIRE 2022), terrain and elevation characteristics (USGS Digital Elevation Models), and weather and environmental stress indicators derived from related climate, weather and fire behavior data. Critical infrastructure nodes, mission-essential facilities, transportation corridors, water supply systems, communication dependencies, ignition-prone landscapes, and adjacent community development patterns were overlaid to identify exposure pathways and operational constraints affecting military readiness and regional resilience. This dual approach, rooted in both policy analysis and technical modeling, enabled the identification of measurable and actionable vulnerabilities while providing a foundation for prioritizing cross-jurisdictional mitigation investments.

Local, State, and Federal Plans

This Assessment utilized a robust set of existing local, regional, and federal planning documents to identify current land use policy, mission assurance priorities, and mitigation frameworks. While these documents provide a strong foundation, gaps remain in enforceable land use standards, pre-disaster evacuation planning, and integrated mitigation funding strategies. This Assessment bridges those gaps by identifying practical, location-specific recommendations that align with current plans while strengthening operational coordination and fundability across jurisdictions. Table 2 summarizes local, state, and federal plans, studies, and frameworks with additional detail developed in [Annex H: Planning & Governance Analysis](#).

Table 2. Local, State, and Federal Integrated Plans, Studies, and Frameworks

Plan, Study, Source	Data Type	Use in Assessment	Reference Document/Year
USFS (Region 1), DNRC, Local Fire Departments	Historical fire perimeters, ignition points, suppression records, Red Flag data	Identified wildfire frequency, severity trends, and mutual aid capacity for FHTA/LHTA and adjacent communities	USFS Region 1 Fire History (2023); DNRC Fire Reports (2018–2024); Local fire department (FD) incident logs (2015–2024)

Plan, Study, Source	Data Type	Use in Assessment	Reference Document/Year
Montana Legislature – MCA 76-13-145	Statewide WUI Code/Statutory Requirement	Establishes regulatory framework governing development, defensible space, and building standards within WUI areas; used to evaluate compliance, vulnerability, and hazard exposure in assessment area	WUI Code – First Adopted 2009/MCA 76-13-145
County HMPs	Multi-hazard risk data, mitigation actions, vulnerability profiles	Provided baseline hazard data, existing mitigation actions, and jurisdictional context	Lewis & Clark HMP Draft (2022); Broadwater HMP (2017, Update in Progress 2025)
CWPP	WUI boundaries, fuels treatment priorities, response gaps, wildfire risk maps,	Used to map wildfire exposure areas, defensible space standards, and fuels projects	Tri-County Regional CWPP (2020)
Growth Policies & Zoning Ordinances	Land use regulations, development trends	Assessed subdivision regulation adequacy, WUI expansion, and compatibility with MTARNG training areas	City of Helena Growth Policy (2021); Lewis & Clark County Growth Policy (2020); Broadwater Growth Policy (2018)
Joint Land Use Study (JLUS) & CUB Plans	Encroachment, buffer zone, and compatibility studies	Measured land use conflicts and identified conservation priorities near installations	FHTA JLUS (2014); CUB Conservation Easement Records (2019–2024)
GIS Datasets (County, State, Federal)	Topography, slope, vegetation, fuels, infrastructure, demographics	Conducted spatial hazard overlays, WUI analysis, and critical infrastructure mapping	County GIS (2024); Montana State Library GIS Clearinghouse (2024); U.S. Geographical Survey (USGS) National Map (2023)
LANDFIRE Vegetation & Fuels Layers	Fuel models and fire behavior data	Modeled wildfire spread potential around FHTA and LHTA	LANDFIRE 2.2.0 (2022 Release)

Plan, Study, Source	Data Type	Use in Assessment	Reference Document/Year
FEMA Flood Insurance Risk Maps (FIRMs) & USGS NHD	Floodplain mapping, drainage data	Identified flood hazard areas, culvert vulnerabilities, and lifeline exposure	FEMA Flood Insurance Rate Maps (2022); USGS National Hydrography Dataset (2023)
USGS Seismic Hazard Maps & Quaternary Fault Data	Earthquake hazard probability and ground shaking models	Assessed seismic exposure of critical facilities and assessment areas	USGS National Seismic Hazard Model (2023); Quaternary Fault Database (2022)
National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI), Montana Climate Office, State Weather Assessment	Historical climate data, projections, severe weather records	Evaluated drought, storm, and temperature trends for long-term risk assessment	NOAA NCEI Climate Data (1950–2024); Montana Climate Assessment (2017, 2021 Update)
U.S. Drought Monitor, DNRC Reports, NRCS Snow Telemetry (SNOTEL)	Drought status, snowpack, and hydrologic data	Measured drought severity, water supply vulnerability, and wildfire triggers	USDM Weekly Maps (2020–2024); NRCS SNOTEL Stations MT-214, MT-327 (2020–2024); DNRC Drought Reports (2021–2024)
NRCS & USFS Watershed Models, Tenmile Collaborative	Hydrologic and erosion models	Assessed watershed health, post-fire erosion, and Helena/FHTA water supply security	Tenmile Collaborative Watershed Reports (2019–2023); NRCS Hydrologic Reports (2022)
DMA Installation Data (FHTA, LHTA)	Training range maps, access roads, utilities, after-action reports	Provided installation-specific exposure data and documented training disruptions	MTARNG Range Complex Data (2023); DMA Infrastructure Reports (2022–2024)
Utility Providers (NorthWestern Energy, Vigilante Electric, Helena Utilities)	Power lines, substations, water treatment, communications networks	Identified lifeline dependency and redundancy gaps	NorthWestern Energy Wildfire Mitigation Plan (2022); Helena Utilities Annual Report (2023)
Stakeholder Workshops & Public Input	Local knowledge, community	Validated hazard exposure, confirmed	DMA Stakeholder Workshops (2023–2024); Public Surveys

Plan, Study, Source	Data Type	Use in Assessment	Reference Document/Year
	priorities, planning feedback	capability gaps, informed findings	(Lewis & Clark/Broadwater 2023)
Conservation Partners (PPLT, Rocky Mountain Elk Foundation [RMEF], BLM, USFS)	Easement records, open space bonds, fuels projects	Documented conservation buffers, funding sources, and program gaps	PPLT Easement Records (2018–2024); RMEF Project Files (2020–2024)
FEMA Planning Guidance	Federal planning standards	Ensured HMP compliance and alignment with FEMA policy	FEMA Local Mitigation Planning Handbook (2023); CPG-101 v3 (2022)
DoW Installation Plans	Installation resilience standards	Linked DMA mission assurance to federal resilience requirements	INRMP (2021); DoD Climate Resilience Directive (2022); Energy/Water Security Plans (2023)
U.S. Army Corps of Engineers (USACE) Flood & Watershed Studies	Hydrology, flood control infrastructure	Informed flood hazard modeling and infrastructure vulnerabilities	USACE Canyon Ferry Lake Operations Report (2020); Missouri River Tributaries Study (2019)

Together, these sources provided a comprehensive base to assess both historical context and current/future risk factors, ensuring that hazard profiles and vulnerability findings were evidence-driven and directly linked to mission assurance requirements.

Stakeholders

Effective resilience planning for FHTA and LHTA required coordinated input from a network of stakeholders spanning military operations, emergency management, land use planning, infrastructure management, and environmental stewardship. These partners contribute essential expertise, resources, and jurisdictional authority to support hazard mitigation, infrastructure continuity, and mission assurance. The engagement process was designed to gather qualitative insights, validate technical data, and ensure alignment with existing and future planning efforts. Table 3 identifies key stakeholders engaged in this Assessment process and summarizes their roles in supporting the resilience and operational sustainability of MTARNG’s training mission

Key elements of the process included the following:

- A kickoff meeting with core project partners to establish goals, timeline, and engagement structure.

- Interviews with personnel from the DMA, MTARNG, the DNRC, the USFS, the City of Helena, Lewis & Clark and Broadwater county governments, emergency managers, utility providers, and land conservation organizations.
- Field visits and windshield surveys with installation and agency personnel to ground-truth asset conditions and hazards.
- Stakeholder workshops to review findings, identify data gaps, and prioritize recommendations.
- Public engagement through targeted outreach, including surveys and community meetings (where applicable).

Table 3. Stakeholders

Organization	Role in Resilience and Vulnerability Assessment
Baxendale VFD and Broadwater Rural Fire District	Provides mutual aid near rural assessment areas; supports access preservation and interface response.
BLM – Butte Field Office	Oversees public lands adjacent to installations; supports access route planning and fuels management. Oversees fuels, fire response, and land stewardship on BLM parcels near assessment areas.
Broadwater Conservation District	Advises on post-fire recovery and land conservation priorities for wildfire-impacted lands.
Broadwater County DES	Facilitates multi-jurisdictional hazard response near LHTA; manages local EOC operations and continuity planning.
Broadwater County Planning	Oversees development growth and infrastructure planning in areas impacting LHTA access and compatibility. Oversees rural development; integrates wildfire considerations in county growth management.
Broadwater County Rural Fire	Responds to fire incidents near LHTA; coordinates with mutual aid districts and volunteers.
Burlington Northern Santa Fe (BNSF) Railway	Maintains regional freight corridors with known fire and flood exposure; coordinates with MTARNG on risk mitigation along rail-adjacent areas.
City of Helena – Grants Office	Coordinates funding applications for mitigation, resilience, and infrastructure projects.
City of Helena – Open Lands Division	Manages urban-adjacent recreation lands; maintains public access and fuels management programs.
City of Helena Emergency Services	Supports regional emergency response, evacuation planning, and continuity of public safety operations.
City of Townsend	Coordinates local government services, public works, and hazard mitigation policies relevant to LHTA corridors.
Department of Veteran Affairs (VA) – FHTA Campus	Operates co-located VA hospital and critical services; requires coordinated access and continuity during hazard events.

Organization	Role in Resilience and Vulnerability Assessment
DNRC Helena Unit – Fire Management Officer	Oversees wildfire operations in support of local and interagency suppression near DMA lands.
DNRC Helena Unit – Fire Supervisor	Coordinates regional wildfire operations and resource deployment.
Helena Fire Department	Responds to municipal and WUI fire incidents; supports interagency suppression near FHTA.
Helena Regional Airport Authority (HARC)	Manages dual-use aviation infrastructure; supports emergency air operations and MTARNG logistics.
Lewis & Clark Conservation District	Promotes soil, water, and vegetation conservation practices in WUI and agriculture interfaces.
Lewis & Clark County Emergency Management	Leads county-level all-hazards emergency planning, incident command coordination, and response asset deployment. Coordinates emergency planning and incident response including mutual aid.
Lewis & Clark County Planning	Guides land use decisions, subdivision review, and zoning regulations that affect hazard exposure and access near the FHTA. Guides local zoning and subdivision regulation; promotes wildfire-adapted community development.
Lewis & Clark Rural Fire Council	Aligns strategies across fire districts; promotes ICS-based training and suppression coordination.
Montana DMA	Oversees strategic planning, infrastructure investment, and intergovernmental coordination for FHTA and LHTA; leads on mission assurance and state-military partnerships.
Montana Department of Transportation (MDT)	Maintains state roads and bridges; supports resilience upgrades to installation access routes and post-disaster clearance.
Montana Economic Assistance Counsel	Coordinates funding strategies for resilience investments aligned with compatible growth, infrastructure modernization, and hazard mitigation.
DES – State Hazard Mitigation Officer	Guides state-level mitigation planning and supports local resilience alignment and funding. Provides state guidance and alignment on FEMA and OLDCC mitigation goals; helps integrate installation needs into broader planning.
MTARNG Range Operations	Directs training operations, site access, logistics, and emergency response protocols; coordinates with civil authorities for continuity planning.
Northwestern Energy	Operates energy infrastructure that supports the FHTA, East Helena, and Townsend; coordinates public safety power shutoffs and hardening measures.
Prickly Pear Land Trust (PPLT)	Leads conservation and buffer zone land stewardship; manages easements, fuels treatments and flood mitigation.

Organization	Role in Resilience and Vulnerability Assessment
Tri-County FireSafe Working Group	Local non-profit coordinates community wildfire education, mitigation strategies, grant planning, and WUI risk communication. Supports pre-disaster planning and fuel mitigation programs.
USDA Natural Resources Conservation Service (NRCS)	Provides conservation and fuels management assistance to landowners in risk areas. Technical assistance for erosion control, post-fire restoration, and watershed resilience impacting shared infrastructure.
USFS – Helena-Lewis & Clark National Forest	Manages high-elevation lands near training routes and drainage corridors; supports interagency hazard response and forest health.
Veterans Administration Fire Dept. at Ft. Harrison	Protects VA facilities and assists with on-base fire response.
Vigilante Electric Cooperative	Provides local utility service; manages infrastructure exposure to wildfire near WUI areas.

Missions

The federal mission of the MTARNG, which includes both FHTA and LHTA, is:

To provide trained, equipped, and ready units, prepared to mobilize, under the authority of the President and Department of Defense, in response to national interests on the homeland or overseas for missions including contingency operations, national emergencies, and humanitarian efforts.

The DMA is the central agency responsible for directing and supporting the state's military, emergency management, and veteran service programs. Administered by The Adjutant General, the DMA oversees the operations of the MTARNG and the Disaster and Emergency Services Division (DES) and provides administrative support to the Montana Veterans Affairs Division. The DMA manages a joint federal-state program that supports MTARNG. In addition to its defense responsibilities, the DMA coordinates statewide disaster response under Title 10, Chapter 3, Montana Code Annotated, administers environmental compliance programs for the MTARNG, and cooperates with state and federal agencies to deliver essential services to discharged veterans and their families.

MTARNG operates under the authority of both the Governor of Montana and the President of the United States, maintaining a dual federal–state mission that supports national defense objectives and state emergency operations. MTARNG provides trained, ready, and equipped forces capable of rapid mobilization in support of both domestic and overseas contingencies. Its Soldiers serve as a vital component of Montana's emergency response system, bridging defense readiness, disaster assistance, and community resilience.

Background

Fort William Henry Harrison is the statewide headquarters and logistical hub for MTARNG. It

sustains administrative functions, personnel support, and facility operations year-round while providing ranges and infrastructure designed to accommodate individual and collective training. FHTA is a Level IV Training Center. It services training requirements for all branches of military forces, with support capability for federal, state and local law enforcement as well. FHTA contains about 130 permanent buildings (primarily in the cantonment area), 8 live-fire ranges, 12 training ranges, and one unimproved runway. FHTA is home of the Montana National Guard's Joint Forces Headquarters, 95th Troop Command, 208th Regional Training Institute, Training Center Headquarters, 190th Chemical Reconnaissance Detachment – Special Forces, the 83rd Civil Support Team, I CO of the 145th Brigade Support Battalion, the Montana State Veteran's Cemetery, and the Montana Military Museum. Aviation maneuver training occurs between the FHTA runway and the Helena Regional Airport less than three (3) miles to the east.

LHTA is a live-fire and maneuver range. Its austere terrain supports helicopter gunnery, demolitions, and weapons training from small arms to infantry squad vehicles, replicating real-world conditions for complex field exercises. LHTA has supported the military mission of the MTARNG since the 1950s. LHTA provides a challenging, realistic training environment and provides world-class training at both the individual and unit level to train soldiers of the MTARNG and other units. LHTA is a larger training area than FHTA providing 17 designated live-fire training ranges and a dismounted training area for mechanized infantry, aviation, and cavalry units. Live-fire training at LHTA has included helicopter, tank, artillery, mortar, and Bradley infantry fighting vehicle gunneries. The Federal Aviation Administration approved LHTA for restricted airspace in 2025, opening new training opportunities.

Together, the FHTA and LHTA anchor the MTARNG's operational readiness, enabling mobilization exercises, annual training rotations, and rapid-response deployments both statewide and nationally. The FHTA directly supports military and civilian personnel, including soldiers, VA hospital staff, and full-time technicians, with seasonal surges during monthly, annual and periodic training events. Both installations also provide mutual aid during civilian emergencies, to include wildfire suppression through aerial bucket drops and coordinated responses to floods or evacuations in partnership with the DNRC, county emergency managers, and local law enforcement.

FHTA is comprised of approximately 6,553.6 acres owned mostly by the U.S. Department of the Army, interspersed with ownership by the DMA, Montana Department of Natural Resources and Conservation (DNRC), and U.S. Bureau of Land Management (BLM). It is located less than two miles to the west of Helena city limits, the State Capital, in Lewis & Clark County. The County's population is 73,832 and Helena's population is 33,885. This area is growing 4-8 times faster than the national average population growth rate, and the County's population is expected to increase 30% by 2060, mostly in the Helena metropolitan area. Steady population growth has driven residential and mixed-use expansion within a two-mile radius of the installation boundary. This growth, coupled with shifts in agricultural landownership and increased recreation use, continues to alter the character of the assessment areas.

Elevations at FHTA range from 3,900 to 5,288 feet. The land generally slopes downward toward the northeast. The Helena valley, in which FHTA sits on its west end, has a semiarid climate due to its location on the eastern side of the continental divide. The average relative humidity is 57%, and the average annual precipitation is 11.37 inches, falling primarily from April through July. Average annual snow accumulation is 48 inches.

The 21,295-acre LHTA is located two miles from the City of Townsend in Broadwater County and 41 miles southeast of FHTA. The BLM owns most of LHTA, with significant acreage in the western portion having been withdrawn from the public domain for use by the military. The DMA, DNRC and one private owner comprise remaining ownership. Public recreation occurs on the east side of Old Woman's Grave Road, grazing occurs across the installation (except Graymont mine) managed by BLM, and private mining operations (Graymont Indian Creek Plant, an active limestone quarry) occur in the northwest portion of LHTA. The County's population is 7,793 and Townsend's population is 2,071. These numbers are expected to double in 12 years and triple in 20 years. Broadwater County contains Montana's fastest growing population. Townsend is between two rapidly growing urban centers, Helena and Bozeman, accounting for the current and projected fast-paced growth. Lands surrounding LHTA are seeing increased residential development in the form of both new subdivisions and individual ranchettes, grazing conversion, and recreational access along the Missouri River corridor and Canyon Ferry Basin, particularly between the Helena Regional Airport and Townsend and continuing south of Townsend near and around LHTA, contributing to changing landscape dynamics and access considerations for training.

LHTA is located in the Middle Rocky Mountain physiographic province. The area varies in elevation from about 3,800 feet along the Missouri River to about 5,900 feet at the highest point of the Limestone Hills. The area has a semi-arid climate characterized by low annual rain and snowfall averaging 10.65 and 23.3 inches respectively, moderate to low humidity, and wide temperature variations annually.

Both installations are positioned within the upper Missouri watershed, characterized by steep terrain, high wildfire fuel loads, and variable hydrologic conditions. These environmental features provide valuable training realism but also contribute to management complexity, especially as longer fire seasons, drought cycles, and severe weather events increasingly affect range conditions and infrastructure reliability.

The primary threats to installation resilience around both FHTA and LHTA are wildfire, drought and flooding. The primary encroachment threat is residential development. These risks are inter-related. In 2021, a prairie grass fire adjacent to FHTA further pressed the importance of addressing the need for wildfire mitigation. The WUI continues to change and develop as the population density increases in the localities surrounding the installations. The WUI refers to areas where homes, businesses, and infrastructure meet or intermingle with undeveloped wildland vegetation, creating areas of elevated wildfire risk to people and property. Additional details on WUI characteristics and mapped exposure areas are provided in [Annex B](#).

The demand to convert agricultural lands and wildlands into residential and commercial developments is increasing at a high rate. The ever-growing needs of the community and the MTARNG require a high level of coordination and cooperation to ensure a long-term solution to land constraints and resiliency challenges.

The evolving development and environmental conditions surrounding FHTA and LHTA illustrate the interconnected nature of land use, infrastructure, and hazard exposure across the assessment area. As population growth, recreation demand or increasing public use of nearby public lands, trail systems, waterways, campgrounds, and access roads for hiking, OHV use, hunting, fishing, and seasonal tourism, has expanded human presence in high-risk wildfire areas and along limited

access corridors, and weather extremes continue to shape these landscapes, maintaining compatible use buffers and effective regional coordination is becoming increasingly important to sustain training continuity and community safety.

Importance of Resilience

Resilience is a core strategic priority for the FHTA, LHTA, and the communities that surround them. Military readiness, public safety, including the safety of the soldiers and staff who live and work in these areas, and the reliability of shared infrastructure systems are deeply interdependent. These installations function as critical operational nodes for MTARNG, supporting both state and federal missions, while simultaneously depending on and contributing to the resilience of the surrounding civilian systems that sustain their daily operations. Three interrelated factors define the resilience landscape for these installations and their host communities in West-Central Montana:

1. *Mission Assurance and National Defense Readiness*

FHTA and LHTA are vital to maintaining DMA's ability to mobilize, train, and respond to emergencies, providing range and aviation training offered nowhere else in Montana:

- FHTA is the state's primary training and headquarters complex, hosting year-round operations, logistics coordination, and emergency response functions for MTARNG, joint forces, and surrounding communities.
- LHTA provides specialized live-fire and maneuver training essential for combat readiness.

Both installations face interconnected risks from wildfire, drought, flooding, and utility or infrastructure disruptions – both on-installation and off-installation -- that directly affect mission assurance and training continuity. Severe weather and hydrologic events can temporarily close access corridors, erode unpaved maneuver trails, and damage range infrastructure, while prolonged drought amplifies dust and fuel-dryness hazards. Although local wildfires pose ignition and safety risks, the majority of smoke intrusions affecting FHTA and LHTA originate from regional or out-of-state events across western Montana, Idaho, Washington, and Canada. These external smoke events have repeatedly forced temporary suspension of training activities, particularly during Red Flag conditions. Resilience for MTARNG operations depends on actionable, locally controlled measures. These investments improve sustained training tempo, protect personnel health and access, and preserve operational readiness under evolving hazard conditions (Annexes B through L and 2023 Montana HMP).

2. *Shared Civil–Military Infrastructure and Interdependencies*

The infrastructure systems that sustain both installations, transportation corridors, power distribution, water supply, and emergency communication networks, are jointly used by military and civilian populations.

- Transportation: U.S. Highway 12, Interstate 15, and county roads serve as dual-use corridors for both logistics and civilian evacuation. Flooding along Tenmile Creek and storm damage in Helena's South Hills have previously disrupted access to FHTA ([Annex C](#)).

- Utilities: FHTA relies on Helena’s municipal utilities for power and water, while surrounding neighborhoods benefit from mutual-aid firefighting and emergency coordination agreements under DNRC ([Annex I](#)).
- Emergency Services: MTARNG provides limited fire suppression assistance under mutual-aid agreements but does not serve as a primary fire response agency ([Annex J](#)).

Because these systems cross jurisdictional boundaries and are interdependent, disruptions, prolonged drought affecting water supply, and wildfires damaging above-ground power infrastructure can cascade rapidly across sectors. Coordinated resilience investments, to include distributed power generation, redundant communications systems, and pre-identified evacuation corridors, are therefore critical to maintaining continuity for both installations and local communities (Annexes B through L, Lewis & Clark County HMP 2021; NorthWestern Energy Wildfire Mitigation Plan 2022).

3. *Extreme Weather and Rural Capacity Gaps*

The assessment area is experiencing measurable weather shifts, including hotter summers, more variable precipitation, and longer fire seasons.

- Wildfire: The Tri-County area has seen an increase in large fires over the past two decades, including the Canyon Creek Fire (1988, 204,600 acres), Woods Creek Fire (2021, 55,000 acres), and Horse Gulch Fire (2024, approx. 5,000 acres), each demonstrating challenges in interagency coordination, limited egress routes, and post-fire flooding. See [Annex B](#) for additional historical fires and analysis.
- Drought: U.S. Drought Monitor data show that both Lewis & Clark and Broadwater Counties experienced moderate to severe drought conditions in nine of the past ten years, affecting reservoir levels and training-area vegetation management. See [Annex D](#) for addition drought vulnerability analysis.
- Flooding: Spring runoff events have caused repetitive damage along Tenmile Creek and the Canyon Ferry drainages, including culvert failures and roadway closures impacting military and civilian access routes. See [Annex E](#) for additional flooding information and analysis.

These hazards are amplified in rural areas where emergency response capacity is constrained by staffing, aging infrastructure, and limited equipment availability. Strategic resilience planning through multi-agency coordination, prioritized infrastructure hardening, and watershed restoration remains essential to protect both mission operations and the broader population (Annexes B thru L; 2023 State MHMP; DNRC Fire and Drought Reports 2022–2024).

Investing in resilience provides tangible, compounding benefits across military and civilian sectors:

Table 4. Resilience Benefits

Benefit	Description (Specific to FHTA/LHTA Assessment Area)
Operational Continuity	Ensures training and mobilization proceed despite hazard disruptions, reducing downtime for MTARNG operations.
Infrastructure Protection	Hardens shared lifelines—transportation corridors, utilities, and communication systems—against fire, flood, and outage risk.

Benefit	Description (Specific to FHTA/LHTA Assessment Area)
Public Health and Safety	Protects nearby communities from secondary disaster effects to include water contamination, power loss, and road isolation.
Fiscal Efficiency	Reduces disaster recovery and repair costs through proactive mitigation, lowering the financial burden on local governments and Department of War (DoW).
Cross-Sector Collaboration	Strengthens coordination among DMA, DNRC, USFS, BLM, counties, and utilities to manage fuels, zoning, and emergency planning as shared responsibilities.

Resilience here is not an abstract concept; it is the foundation for maintaining continuity of training, supporting statewide emergency readiness, and safeguarding West-Central Montana communities which depend on shared infrastructure and resources.

Regional Overview

FHTA and LHTA occupy a shared regional setting in West-Central Montana that links defense operations with nearby communities, transportation corridors, and natural resource systems. The area encompasses portions of Lewis & Clark and Broadwater Counties and is defined by a patchwork of federal, state, and private lands (Figure 3).

Regional resilience around the FHTA and LHTA depends on the ability of surrounding communities, ecosystems, and infrastructure systems to withstand and recover from increasingly frequent and severe wildfire, drought, and flooding events. These trends are consistent with trend data and modeled projections indicating that West-Central Montana is experiencing higher annual temperatures, extended wildfire seasons, and more variable precipitation patterns that stress both built and natural systems (Montana Climate Assessment 2021).

Unlike other parts of the state, the West-Central Montana region combines mountain-valley hydrology, semi-arid grasslands, and high-elevation forested corridors, resulting in rapid runoff, steep-slope erosion, and increased ignition potential where grass fuels transition to timber. Roads, utilities, and water systems serving both military installations and civilian populations are functionally interdependent. For example, FHTA water supply and access routes are tied to the City of Helena's municipal infrastructure and Lewis & Clark County's emergency management network. This shared dependency amplifies the consequences of hazard impacts to include wildfire-induced power outages, road closures, and flood-damaged culverts that restrict emergency access.

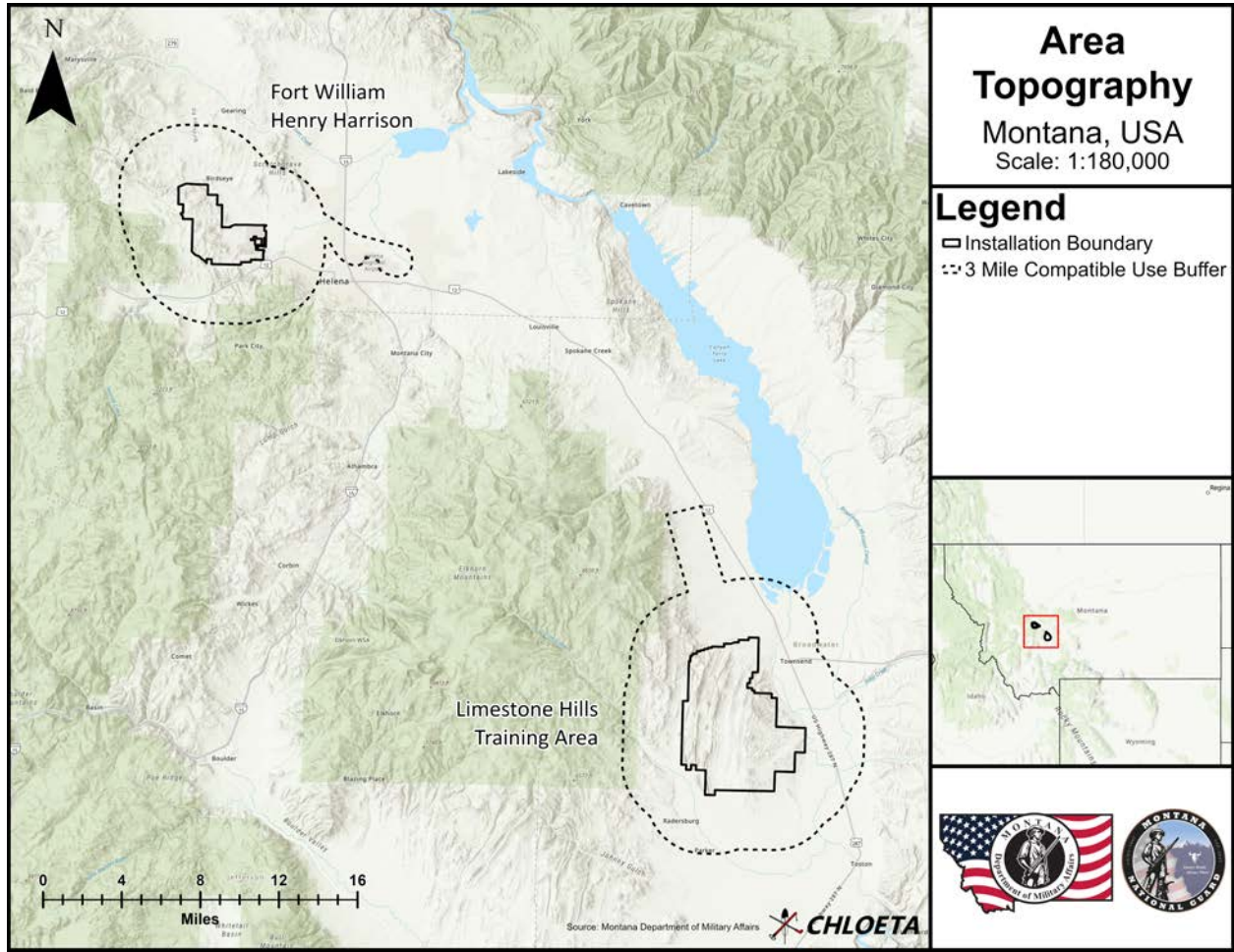


Figure 3. Area Topography Map

The complex land ownership mosaic of West-Central Montana further complicates resilience planning. Within a 20-mile radius of FHTA and LHTA, federal forested lands, state trust parcels, private land, and rapidly expanding developments converge, creating overlapping regulatory and response boundaries. This spatial fragmentation, illustrated in (

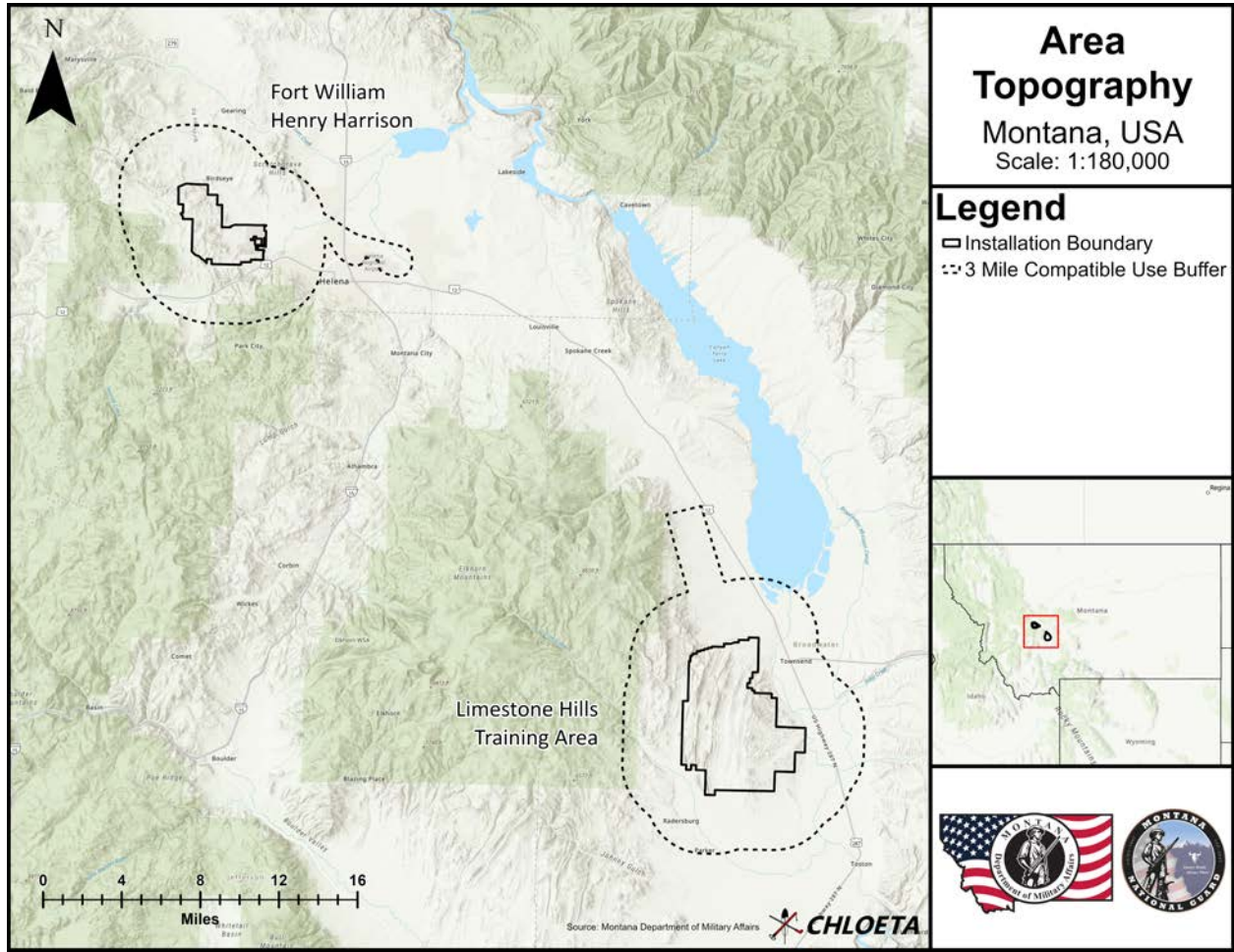


Figure 3), increases the difficulty of implementing consistent fuels management, zoning, and emergency coordination measures. For example, zoning ordinances in Lewis & Clark County and Broadwater County differ in their treatment of WUI setbacks, subdivision review, building approval, and building materials, limiting the effectiveness of regional defensible-space enforcement ([Annex B](#) and [Annex H](#)).

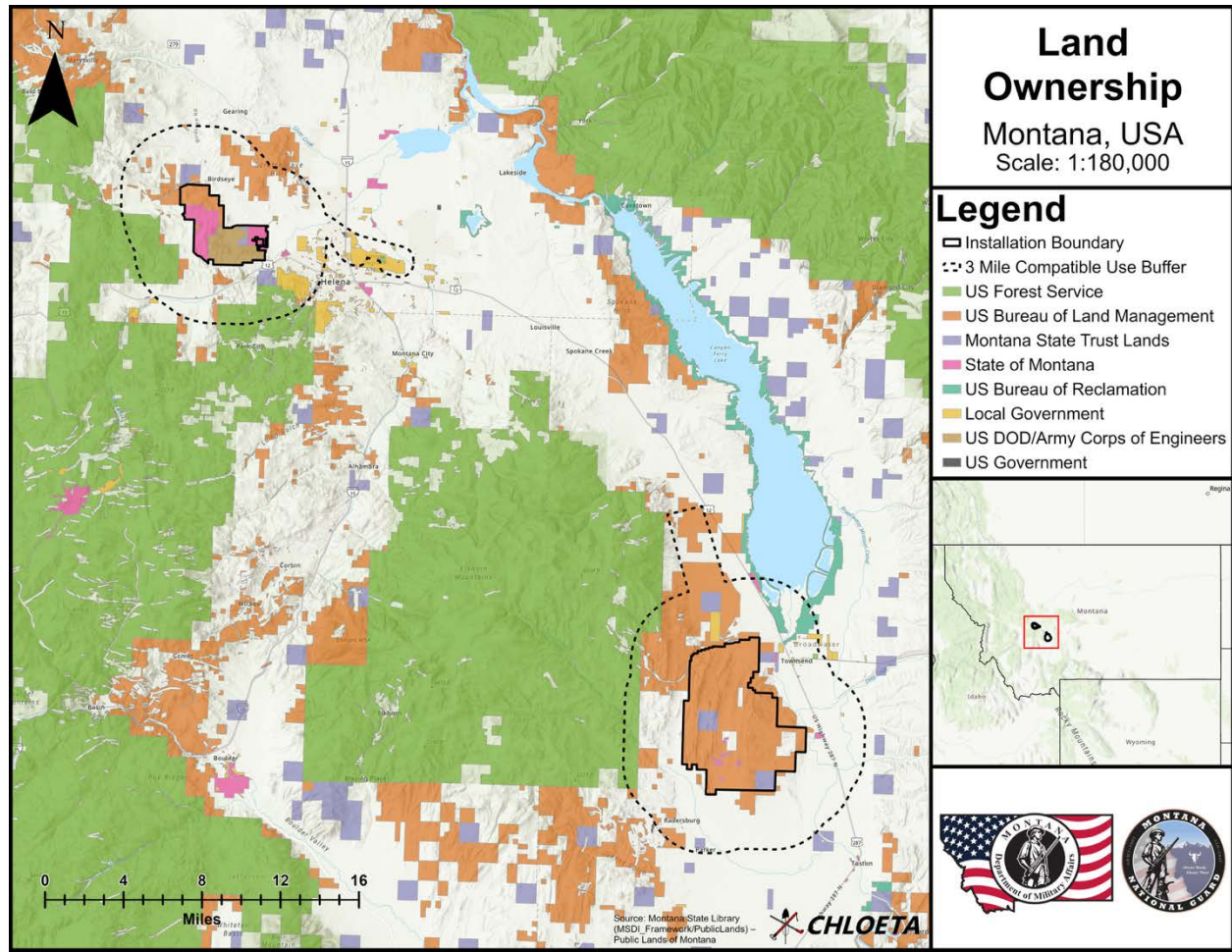


Figure 4. Area Land Ownership Map

Geographic Scope

This assessment area is defined by rugged terrain, limited transportation corridors, complex drainage systems, and a mix of rangeland, forest, and developed lands that influence wildfire behavior, flood potential, drought exposure, and access reliability. The area's physical geography underpins both the vulnerability and resilience of military operations and surrounding communities.

The northern Intermountain region is characterized by steep elevation gradients (Figure 5. Regional Elevation ranging from approximately 3,500 feet in the Helena Valley to over 8,000 feet along the Continental Divide to the west. These gradients shape weather and wind behavior: prevailing westerly and southwesterly winds accelerate downslope through confined valleys, producing natural wind corridors along Tenmile Canyon, Austin Canyon, and the Missouri River–Canyon Ferry corridor. These wind corridors directly affect wildfire behavior and smoke dispersion near both assessment areas, often driving erratic fire spread during late summer months. Elevated slopes also increase erosion and debris-flow risk following high-intensity storms or post-fire events.

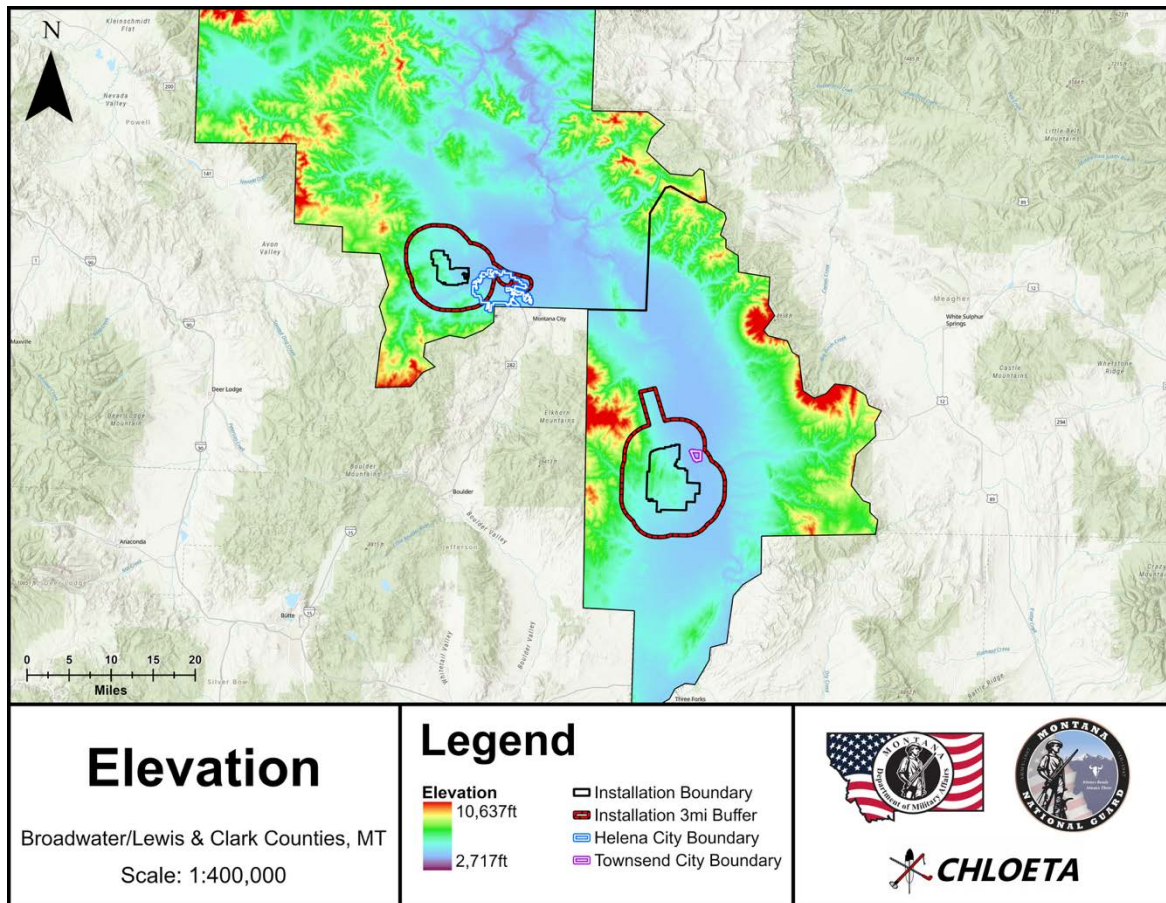


Figure 5. Regional Elevation Map

Regional drainage is constrained by narrow valleys and alluvial basins that create limited drainage outlets and localized flood hazards. The Tenmile and Sevenmile Creek basins drain eastward into Prickly Pear Creek, which flows through Helena to the Missouri River, while LHTA drainage system flows northeast into the Canyon Ferry Lake, administered by the U.S. Bureau of Reclamation. These watersheds supply drinking water to the City of Helena and to FHTA, while also providing critical water availability for fire suppression. However, steep gradients and thin soils amplify sedimentation, runoff velocity, and flash flood potential during spring melt or rain-on-snow events.

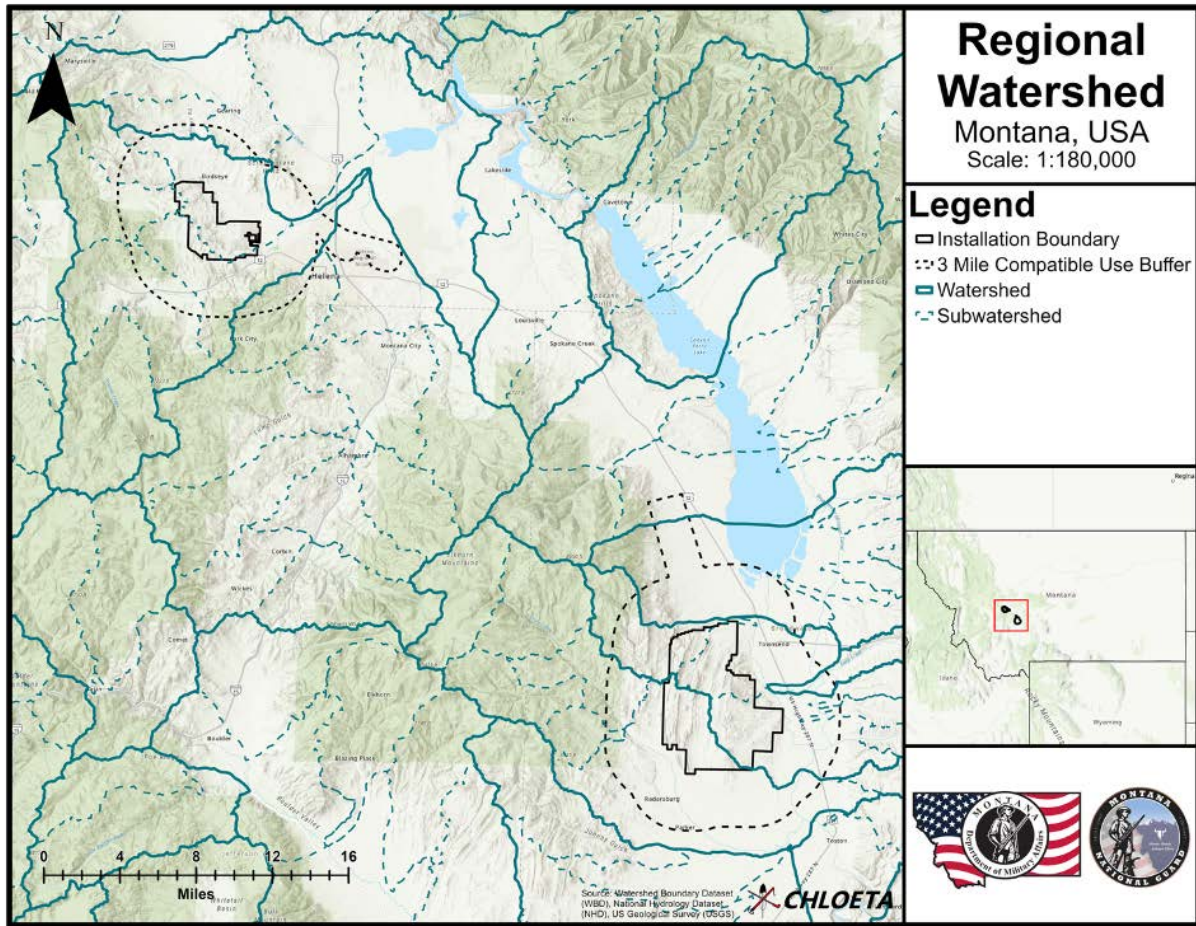


Figure 6. Regional Watershed Map

Ecosystems in West-Central Montana transition from mixed conifer forests (ponderosa pine, Douglas fir, lodgepole pine) on the upper slopes to sagebrush steppe and grassland ecosystems in lower elevations and valley floors. These landscapes support diverse wildlife and ecological functions but also contribute to wildfire and erosion risk:

- Forested areas accumulate dense understory and ladder fuels due to decades of suppression and limited thinning.
- Rangelands dominated by invasive vegetation, leafy spurge, and spotted knapweed exhibit increased fine-fuel continuity, creating fast-moving grassfires that can breach installation perimeters within minutes.
- Riparian areas along Tenmile Creek and the Missouri River provide flood attenuation and critical habitat but are vulnerable to post-fire sedimentation and water quality degradation.
- Noxious weeds have proliferated along transportation and utility corridors, particularly in the FHTA buffer and around Canyon Ferry Lake, further heightening ignition potential and reducing native grass resilience.

Supporting detailed mapping, demonstrating fuel loads, vegetation, and invasive species distribution data are presented in [Annex B](#).

Intact ecosystems and environmental assets are equally critical. Key watersheds (Figure 6) support riparian habitats, moderate floods, and sustain ecological function. These basins are highly sensitive to wildfire, erosion, and land-use conversion, making coordinated watershed management essential.

In the FHTA area, mixed conifer and ponderosa pine forests intermingle with grassland foothills, creating a diverse ecosystem that supports both training operations and native species. FHTA proximity to the Helena urban interface increases the complexity of land management, requiring close coordination among local fire districts, the Montana DNRC, and the USFS. Hydrologically, the Tenmile Creek watershed, vital to Helena's municipal water supply but prone to periodic flooding, runs adjacent to the installation, further emphasizing the need for integrated wildfire, watershed, and land-use management across jurisdictional boundaries.

Blue Cloud Road and Barrett Road represent the most immediate and consequential growth-driven wildfire exposure in the FHTA assessment area. Both corridors continue to build out under single-lot approvals without subdivision review, a building approval process, defensible-space requirements, or evacuation capacity planning, resulting in residential expansion directly against high-fuel interfaces on a single access/egress spine. Blue Cloud Road transitions from pavement to dirt and ultimately to two-track near the installation boundary, offering no engineered turnouts and no alternate evacuation route. Under Red Flag conditions, this corridor would rapidly fail, evacuation traffic would bottleneck as suppression resources attempt to move in, creating a credible entrapment scenario for residents. Barrett Road exhibits the same one-way-in/one-way-out geometry, compounding risk with every new housing unit. Without enforced WUI construction standards under MCA 76-13-145, secondary access development, or REPI-aligned easement protection to prevent further choke-point densification, this area will continue to escalate in hazard severity year over year.

In the LHTA area, expansive grasslands and limestone outcroppings support native prairie and shrub ecosystems. They also harbor vegetation prone to rapid fire spread during dry, windy periods. LHTA proximity to the Missouri River and Canyon Ferry Lake introduces additional hydrologic complexity due to multi-agency jurisdictions (the Bureau of Reclamation, BLM, and USFS share oversight of adjacent lands).

The Helena Valley supports approximately 83,000 residents, with population centers concentrated near the City of Helena and East Helena. The Town of Townsend (population ~2,200) is the primary community near LHTA. East Helena sits between Helena and Townsend. These communities rely on shared infrastructure, utilities, and transportation networks that also serve MTARNG installations. Growth trends show increasing development, encroaching into the FHTA and LHTA assessment areas (Figure 8 and Figure 9).

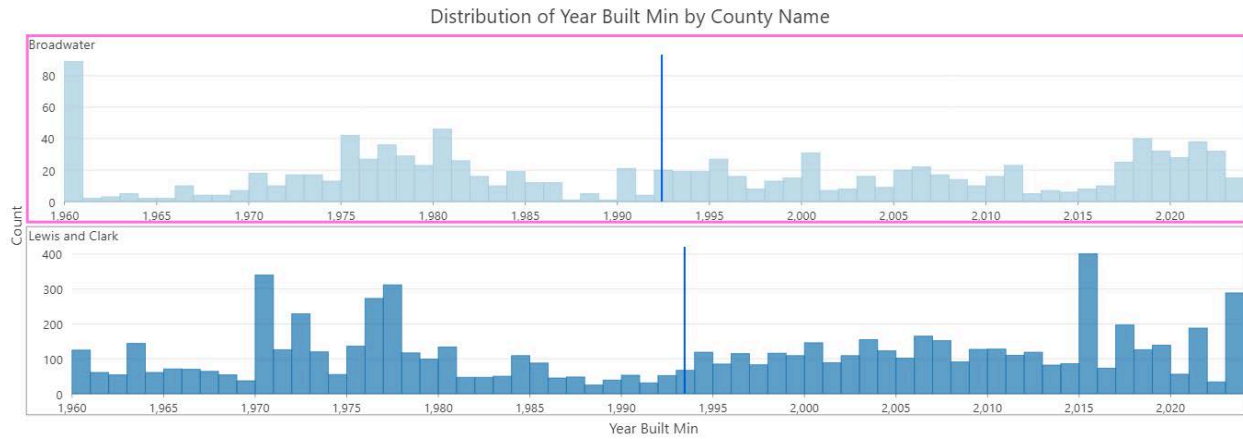


Figure 7. Population and Growth Trends Data Broadwater & Lewis and Clark Counties



Fort Harrison Development by Year

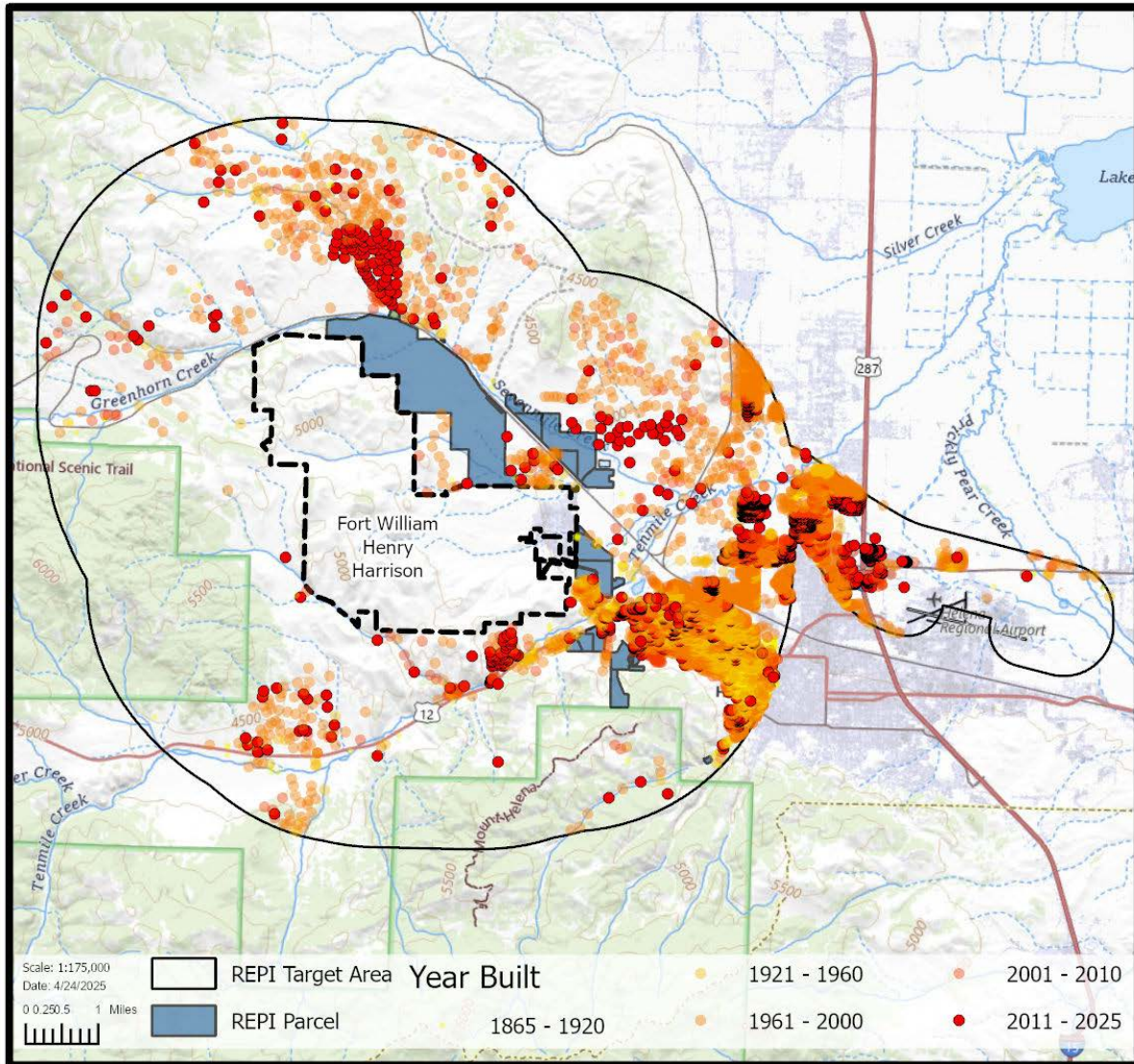


Figure 8. FHTA Development by Year Map



Limestone Hills Development by Year

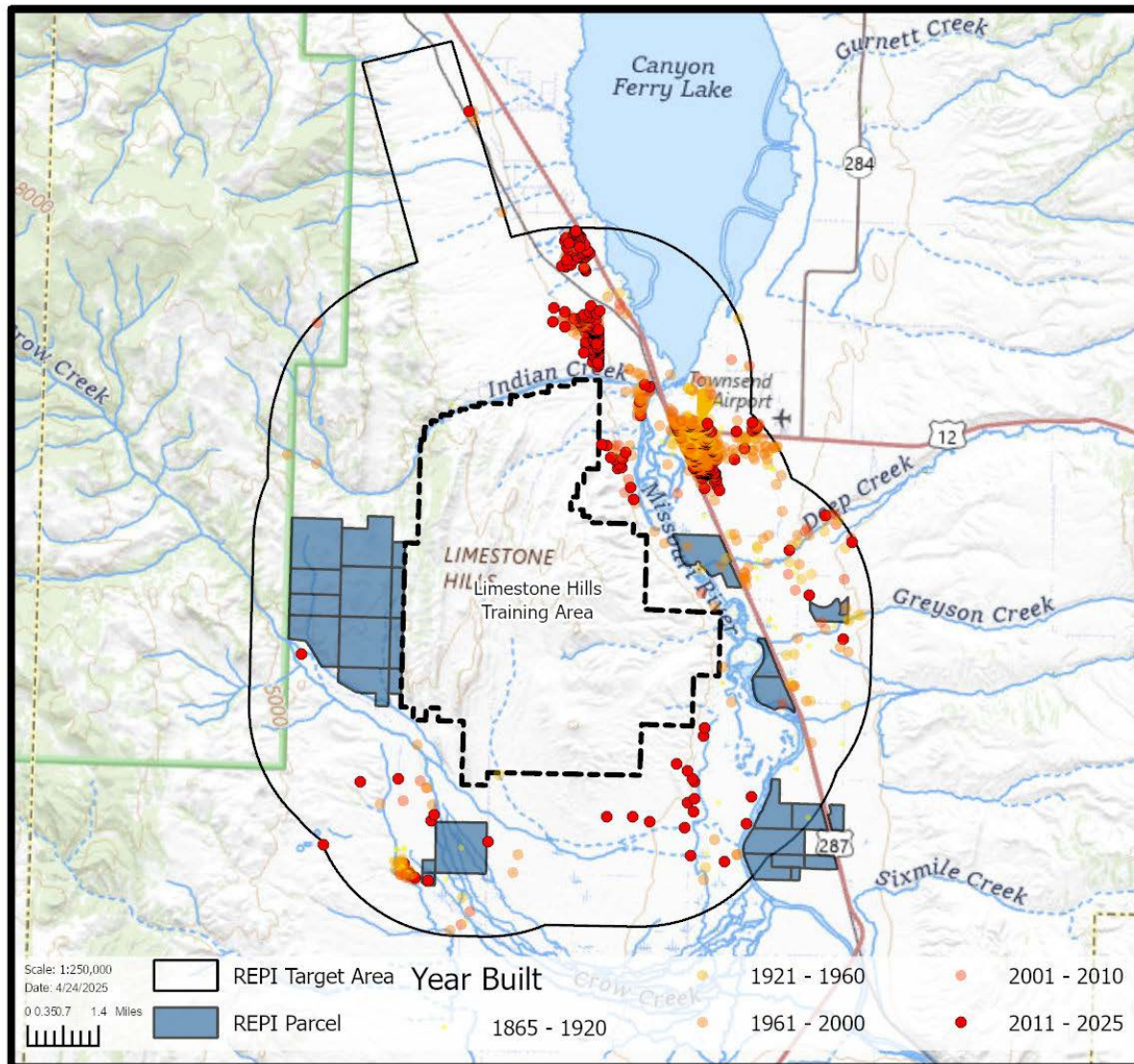


Figure 9. LHTA Area Development by Year Map

FHTA supports a standing full-time workforce of roughly 150–250 personnel, with statewide Guard strength just over 3,200 assigned. LHTA operates primarily as a training site staffed by Range Operations and rotating unit detachments during field training periods. With statewide MTARNG operations headquarters, logistics, and emergency coordination located at FHTA, management of the surrounding lands for compatible uses and for fire and flood resiliency is vital to the nearby community and the entire state but is complicated by the mosaic of ownership and differing management priorities.

Critical Infrastructure

Critical infrastructure supporting FHTA, LHTA, and surrounding jurisdictions forms the backbone of operational readiness and community resilience. Power, water, wastewater, communications, transportation, and emergency services are deeply interconnected, meaning that failure in one system can cascade through others, threatening both mission assurance and public safety. The additional analysis details for critical infrastructure is located in [Annex I](#).

Power

Electrical infrastructure is a critical component of operational resilience for the assessment areas yet both remain vulnerable to single-point failures and environmental hazards. FHTA power supply is delivered through an overhead corridor that enters from the west and traverses vegetated terrain prone to high winds, ice accumulation, and wildfire exposure. The corridor serves not only FHTA but also adjacent residential and utility-dependent areas, making it a shared vulnerability for both military and civilian systems. Power reliability is particularly vital for mission continuity, command, control, and community emergency response operations which rely on uninterrupted service to sustain communication systems, facility heating and cooling, and medical functions. Prolonged power loss would disrupt training schedules, delay mobilization, and impair regional emergency coordination with state partners.

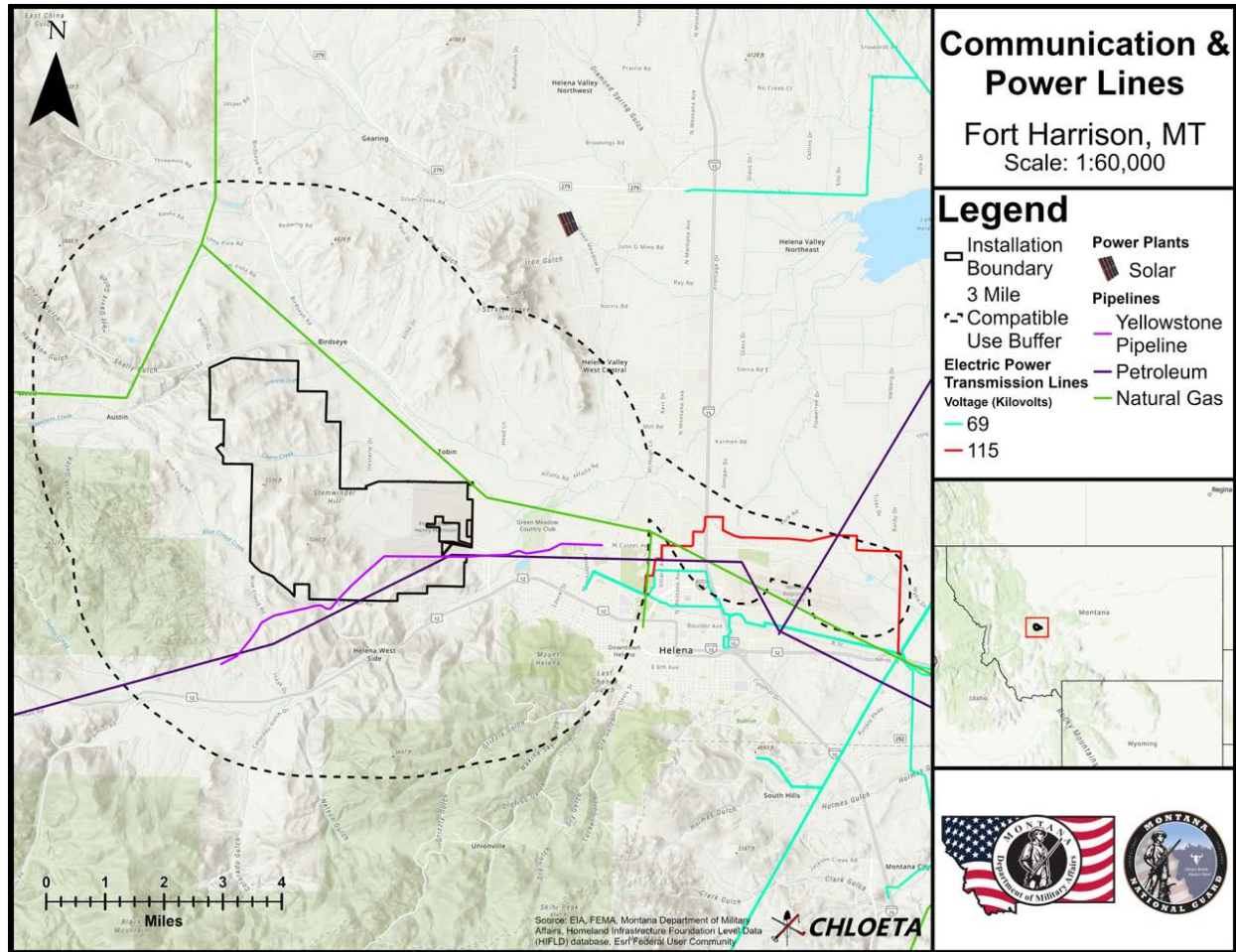


Figure 10. Power Lines and Communication Lines Map FHTA Area

Within LHTA assessment area, electrical service is carried by a single rural distribution line that traverses steep, fire-prone terrain and multiple erosion-affected drainages, creating a shared vulnerability for both the installation and surrounding ranchlands, recreational users, and emergency responders. Outages along this corridor routinely require lengthy field repairs because of limited access, and fire-weather conditions can delay re-energization for safety reasons. Although LHTA uses mobile generators to support training periods, the broader issue is that any loss of the single-feed line disrupts regional communications, hampers emergency vehicle access, and constrains the MTARNG's ability to support county-level incident response during wildfire or all-hazards events.

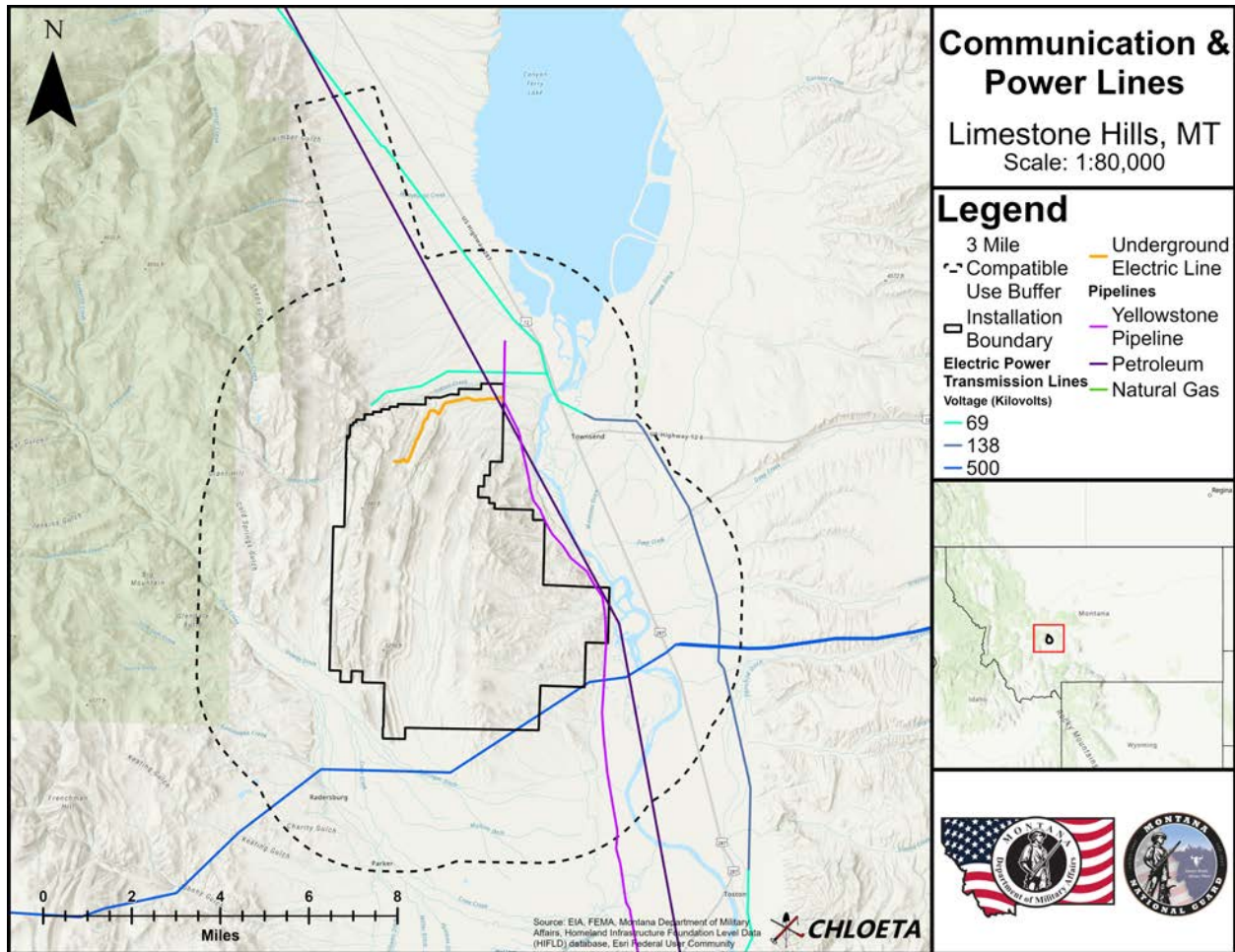


Figure 11. Power Lines and Communication Lines Map LHTA Area

Regionally, both installations operate within a single-service utility framework in which major distribution feeders serve mixed military and civilian loads without redundancy. This means that any failure along key utility corridors, whether from wildfire, wind, ice, or equipment malfunction, cascades simultaneously across residential neighborhoods within the assessment areas, critical community facilities, and the installations themselves. Communities surrounding FHTA and LHTA, including the Helena Valley, East Helena, and the US-287/Canyon Ferry corridor, are already susceptible to extended outages during high-risk weather periods. These same neighborhoods house a substantial portion of MTARNG soldiers, technicians, and emergency responders, meaning a regional outage directly reduces individual soldier readiness, limits staff reporting capability, and constrains the ability to mobilize forces during emergencies. Within the assessment areas, residential areas and key access roads lack alternative feeds, making them equally vulnerable to grid failure and complicating re-establishment of safe ingress/egress to support military missions. Failure in these shared corridors therefore becomes a dual-impact hazard, simultaneously degrading community safety and military operational continuity.

Water Resource

FHTA relies entirely on the City of Helena's Tenmile and Sevenmile Creek watersheds, resources that also supply drinking water, fire suppression water, and public health services to the surrounding communities within the FHTA assessment area (

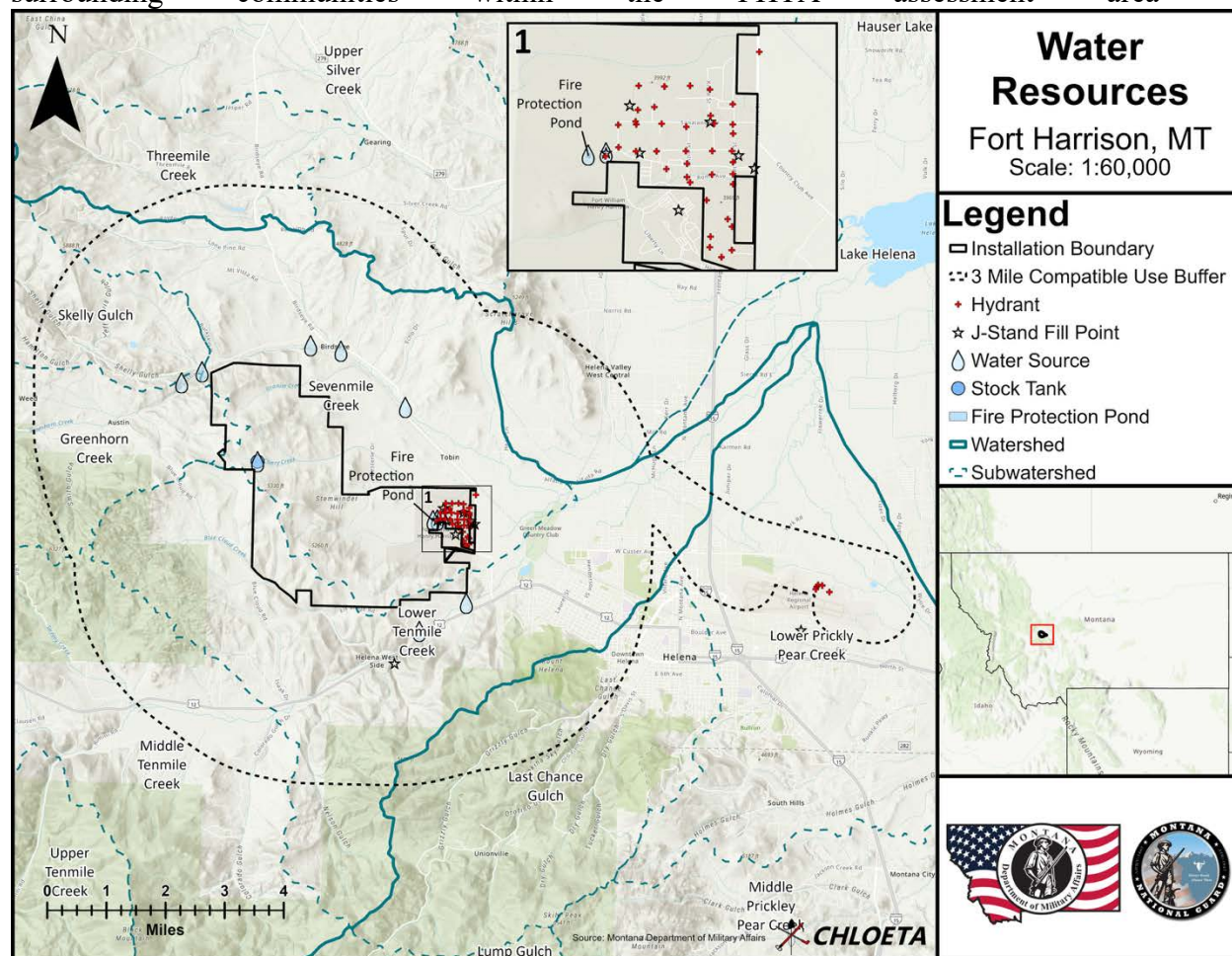


Figure 12). These assessment area neighborhoods, including residential areas west of Helena and north of Birdseye, share the same single-source municipal system, meaning any disruption caused by post-fire sedimentation, debris flows, or turbidity events affects both civilian households and the installation simultaneously. Wildfire burn scars within the upper Tenmile basin continue to elevate sediment loads during storm events, creating treatment plant strain and increasing the risk of temporary water restrictions. Communities within the assessment area have limited storage capacity or are reliant on shallow wells fed by the same hydrologic system.

These interdependencies directly influence regional emergency management readiness. Many MTARNG soldiers and civilian responders live in the surrounding assessment area neighborhoods; if municipal water service degrades during an emergency, their households may be simultaneously affected, limiting availability for mobilization or sustained operations. Similarly, water supply interruptions during wildfire or flood events constrain the ability of the counties and MTARNG to maintain firefighting capability, shelter operations, or EOC sustainment. As the local governments

prepare for future BRIC, HMGP, and watershed grants, it is in their direct interest to address these shared vulnerabilities, protecting municipal supply, improving redundancy, and ensuring that disruptions do not impede soldier availability, regional response, or continuity of public services.

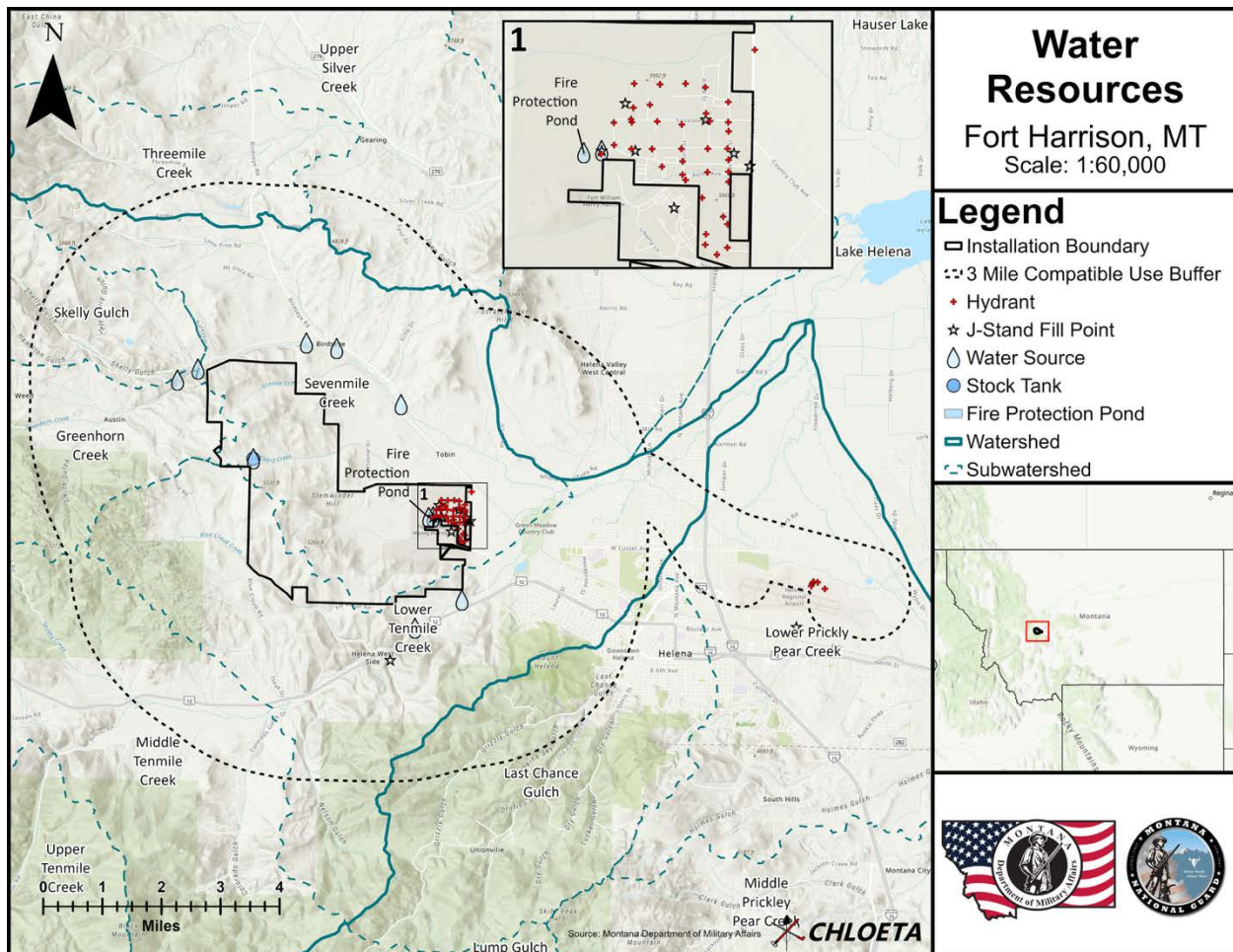


Figure 12. FHTA Water Resource Map

In contrast, LHTA operates with minimal fixed water infrastructure, relying primarily on a single on-site “J-Tank” system that draws groundwater from a shallow well near the communications tower (Figure 13). While this system provides an essential local source for fire suppression, dust control, and training sustainment, its operational capacity is extremely limited. Once the tank is depleted, the well requires approximately 24 hours to naturally recharge before refilling can resume, creating an inherent bottleneck during high-demand periods. This constraint affects not only installation operations but also surrounding assessment area, which depend on LHTA capacity to prevent training-related ignitions from escaping into adjacent grazing lands, residential properties, and transportation corridors. During extended training cycles, prescribed burns designed to reduce assessment area wildfire exposure, or regional firefighting surges, the J-Tank must be supplemented with trucked-in water from Townsend and Broadwater County, as well as portable bladders and mobile distribution units staged along gravel access roads. These temporary logistics are highly sensitive to drought, mechanical failure, and haul-route disruption, which can

delay suppression operations that protect assessment area residents and critical access corridors used by Soldiers who live in nearby communities.

Because the LHTA is located within the Canyon Ferry watershed, managed by the Bureau of Reclamation (BOR), the surrounding communities, agricultural operators, and recreation areas share the same hydrologic constraints that affect installation readiness. Although nearby reservoirs could serve as emergency draw points for wildfire suppression or drought-driven shortages.

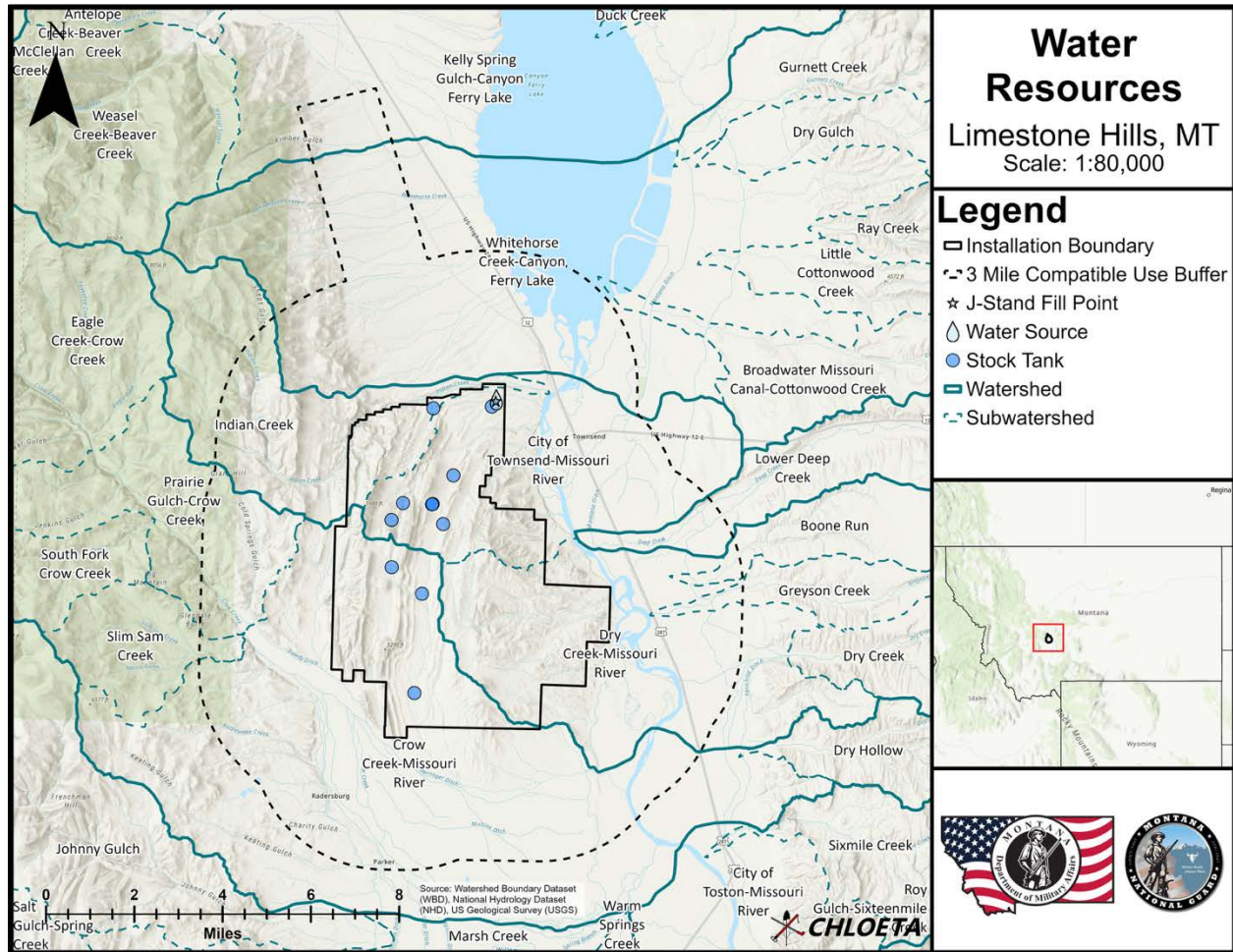


Figure 13. LHTA Water Resource Map

Regionally, both LHTA and FHTA assessment areas operate within aging, low-redundancy water systems that create shared vulnerabilities for military operations and the surrounding communities within the assessment areas. Much of the municipal and rural water infrastructure serving the Helena Valley, East Helena, Canyon Ferry corridor, and the Townsend outskirts relies on older mains, single-feed segments, and drought-sensitive surface supplies that offer little protection against cascading failures during wildfire, post-fire sedimentation events, or system outages. These conditions directly impact soldiers and military families living in the assessment areas, many of whom rely on the same municipal systems for domestic use, emergency fire flows, and potable water needed during evacuations or shelter operations.

Communications

Communications infrastructure supporting operations at both the FHTA, LHTA and the surrounding assessment areas, is essential for command, control, and coordinated emergency response but remains highly susceptible to single-point failures, interoperability limitations, and terrain-driven coverage gaps. At FHTA, MTARNG relies on a mix of statewide trunked radio, buried and aerial fiber, and microwave relay links tied into the MTARNG's communications network to support the Joint Operations Center (JOC), Emergency Operations Center (EOC), and Range Control. However, segments of this fiber and aerial routing run through assessment area lands and adjacent residential corridors where combustible vegetation, unarmored road edges, and single-access utility paths create exposure to wildfire, post-fire erosion, and severe weather. These same vulnerabilities extend to assessment area communities, where residents, including MTARNG personnel who live off-installation, depend on the same single-feed fiber and radio infrastructure for 911 access, evacuation alerts, WEA/Integrated Public Alert and Warning System (IPAWS) notifications, and cellular backhaul. Coverage gaps along the western Helena foothills and in the Canyon Ferry–Townsend corridor further degrade handheld and mobile radio performance during wildfire, search-and-rescue, and evacuation operations, limiting situational awareness for local responders and MTARNG units assisting in civilian incidents.

LHTA operates under limited communication infrastructure, relying heavily on mobile repeaters, radio-over-satellite links, and portable command posts established only during training periods. The surrounding assessment area reflects similar constraints—remote, rugged terrain composed of rolling grasslands, basalt ridges, and steep coulees that consistently generate signal shadow areas capable of isolating responding units and slowing emergency coordination. These shortfalls extend across the entire assessment area, where civilian and military resources share suppression responsibility during wildfire response, prescribed burning, and multi-agency exercises. Large portions of the landscape lack permanent cellular coverage, hardened repeater support, or fiber-backhauled radio infrastructure. When incidents escalate, responders often revert to simplex radio traffic or manually relayed communications, slowing tactical decision-making, degrading real-time situational awareness, and increasing risk during fast-moving fire behavior or extreme weather conditions. Limited connectivity also constrains evacuation warning capability for residents, recreationists, and personnel operating beyond the immediate installation footprint.

The MTARNG depends on shared civil–military communication frameworks, including FirstNet interoperability, county emergency channels, and mutual aid radio frequencies. However, existing plans and standard operating procedures (SOPs) do not fully integrate cross-agency communication protocols for incident management, especially across jurisdictional boundaries during large-scale wildfire or flood incidents.

Transportation

Transportation and access routes serving both the FHTA and LHTA assessment areas are critical lifelines for MTARNG mission readiness, community evacuation, and regional emergency management. Within the FHTA assessment area, the Williams Street bridge remains the most significant structural bottleneck: its weight restrictions prevent heavy military vehicles and equipment from crossing, forcing reroutes during mobilization and delaying emergency access. Country Club Road, temporarily improved after recent surface failures, continues to experience freeze–thaw degradation, inadequate pavement depth for heavy axle weights, and runoff-driven

shoulder erosion (Figure 14). Both corridors also serve dense residential areas and public utilities within the assessment area, creating civilian–military traffic conflicts that reduce evacuation throughput and complicate rapid ingress for fire, EMS, and mutual aid.

In the LHTA assessment area, primary access is provided via Old Woman’s Grave Road, Barrett Road, and River Road, narrow, unpaved transportation lifelines that traverse high-slope, fire-prone terrain across Broadwater County (Figure 15). These routes sustain recurring washouts, culvert overtopping, and slope failures, including the 2023 event that closed Old Woman’s Grave Road for five days and delayed troop redeployment. During Red Flag conditions, roadside vegetation and unmanaged fuels elevate ignition risk and restrict sight distance, transforming these corridors into choke points for both military and civilian evacuation. The lack of hardened shoulders, load-rated turnouts, or engineered drainage further limits the ability of emergency vehicles and heavy tactical equipment to safely operate.

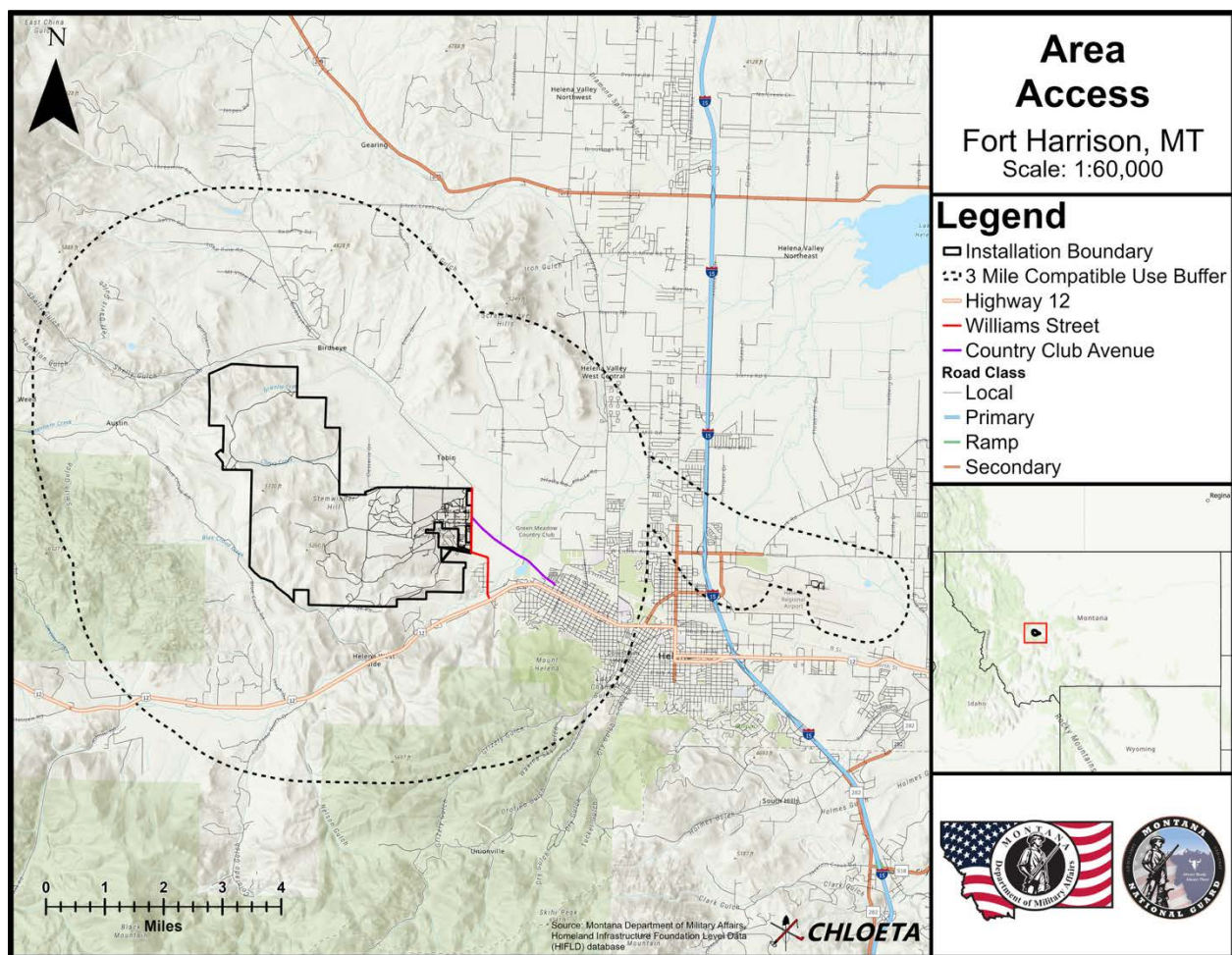


Figure 14. FHTA Road Map

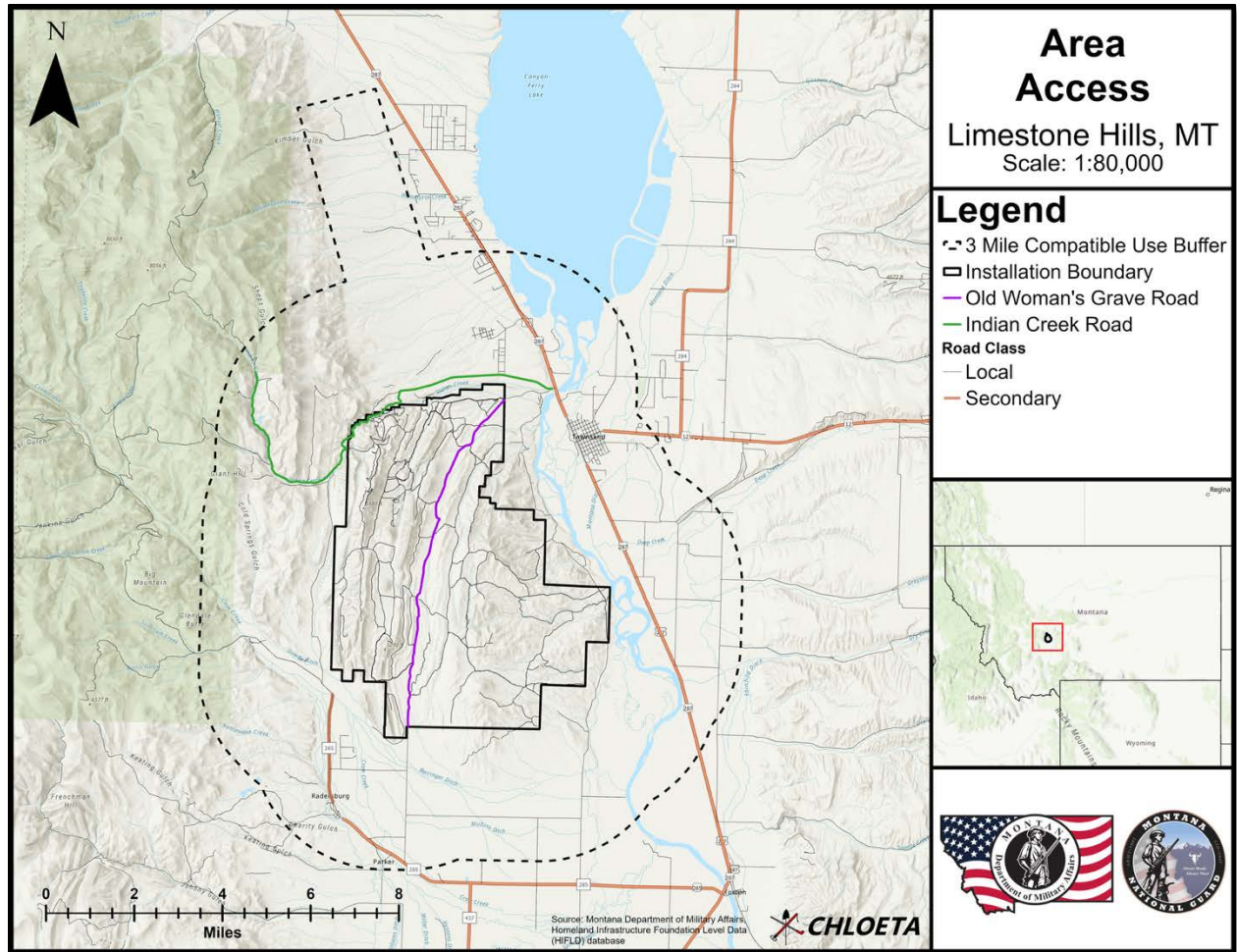


Figure 15. LHTA Road Map

Both training areas lack designated redundant access routes, creating single-point vulnerabilities that could critically delay evacuation or hinder mutual aid during wildfire or flood emergencies. See [Annex C](#) for additional specifics.

Stormwater and Erosion

Stormwater and Erosion Control systems (Figure 16) affecting the assessment areas and access to FHTA and LHTA are limited in capacity and increasingly stressed by changing precipitation patterns, aging drainage infrastructure, and post-fire runoff hazards. Steep slopes, shallow soils, and highly erodible terrain throughout the Upper Tenmile watershed (FHTA) and the Canyon Ferry drainage (LHTA) accelerate runoff volumes and sediment transport, particularly following wildfire. These conditions routinely threaten critical access routes, including Country Club Road, Williams Street, Barrett Road, and Old Woman's Grave Road, by overtopping culverts, washing out shoulders, and creating debris-flow hazards that can isolate both installations and nearby residential areas within the assessment area. Downstream impacts are significant: sediment-laden runoff from Tenmile Creek flows directly into Helena's municipal water system, affecting 30,000+ residents and soldiers who live in the Helena Valley; runoff from the LHTA corridor drains toward

the Missouri River and Canyon Ferry Lake, affecting Townsend, rural subdivisions along US-287, agricultural users, and recreational communities. These stormwater vulnerabilities degrade water quality, increase treatment costs, undermine public infrastructure, and compromise the ability of MTARNG and local jurisdictions to maintain emergency access, conduct evacuations, and sustain coordinated wildfire response operations.

Stormwater management within the FHTA assessment area ultimately flows into the Tenmile and Sevenmile Creeks, Helena's primary municipal drinking water sources. Post-fire scar areas in the upper watershed have increased runoff velocity and sediment loading, placing both the installation and downstream neighborhoods at higher risk of turbidity spikes, culvert blockages, and localized flooding. Several drainage features along Williams Street, Country Club Road, and adjacent slopes show active scouring, inadequate armoring, and insufficient capacity to convey high-intensity rainfall or rapid snowmelt. These deficiencies threaten access routes relied upon by MTARNG personnel, emergency managers, and residents within the assessment areas.

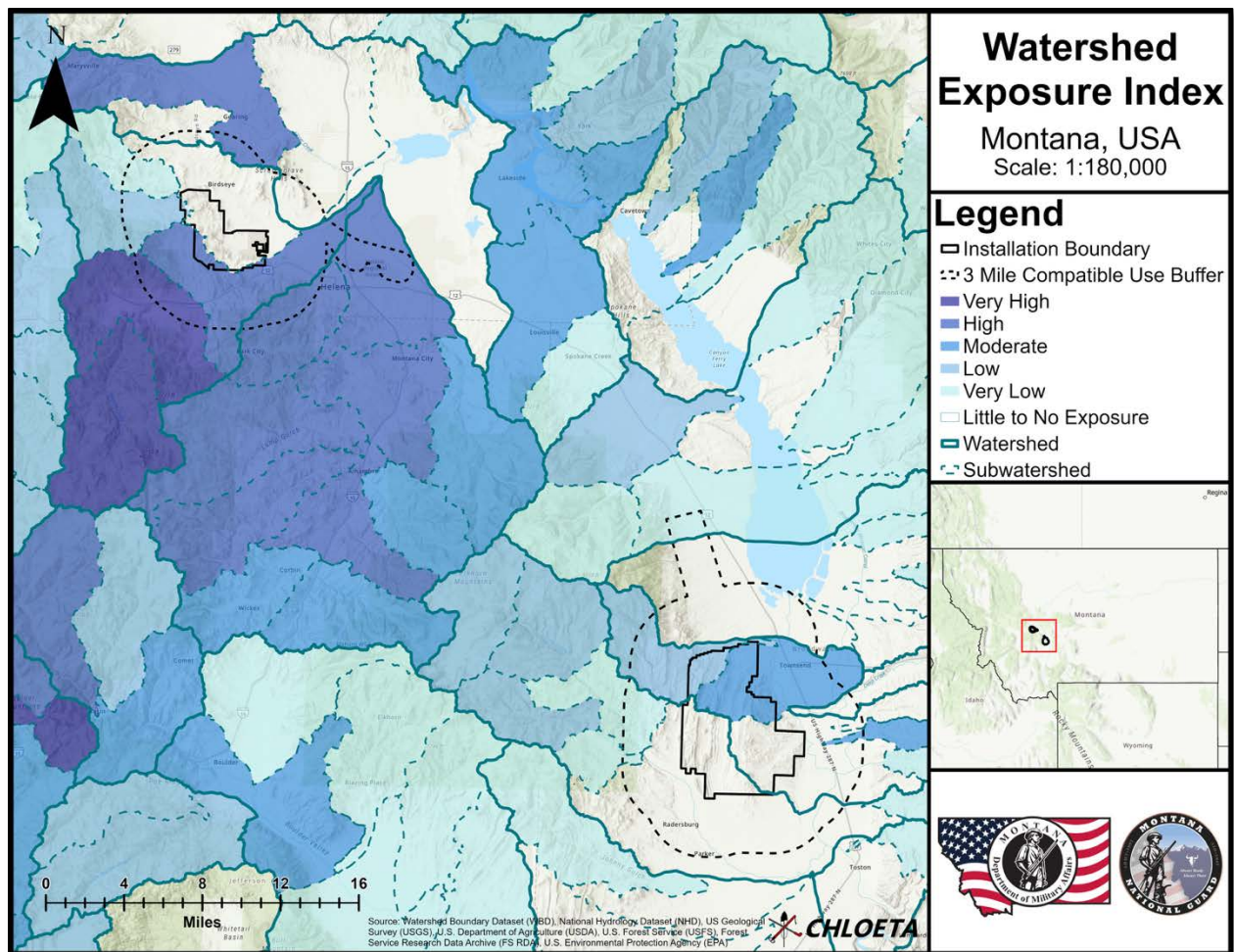


Figure 16. Watershed Exposure Index Map

The LHTA assessment area faces more severe erosion and stormwater challenges (Figure 17) than FHTA assessment area because of its semi-arid soils, sparse vegetation, and steep, rocky uplands.

Surface runoff from the areas ridgelines drains rapidly into the Missouri River watershed and the Canyon Ferry Lake basin, both downstream systems that serve agricultural users, recreation areas, Broadwater County communities, and infrastructure within the LHTA assessment area. Post-fire ash, sediment, and debris mobilize quickly during high-intensity storms, elevating turbidity and accelerating infill of drainage ditches, culverts, and low crossings along River Road and other assessment area access routes (Figure 17). The lack of engineered drainage or stabilized channels across maneuver corridors allows unchecked sheet flow to erode tank trails, undercut target berms, and damage unpaved roads that are shared by MTARNG personnel, local ranchers, emergency responders, and recreationists. These failures restrict ingress/egress for both the installation and surrounding assessment area residents, delaying wildfire response and complicating evacuation during large storm events.

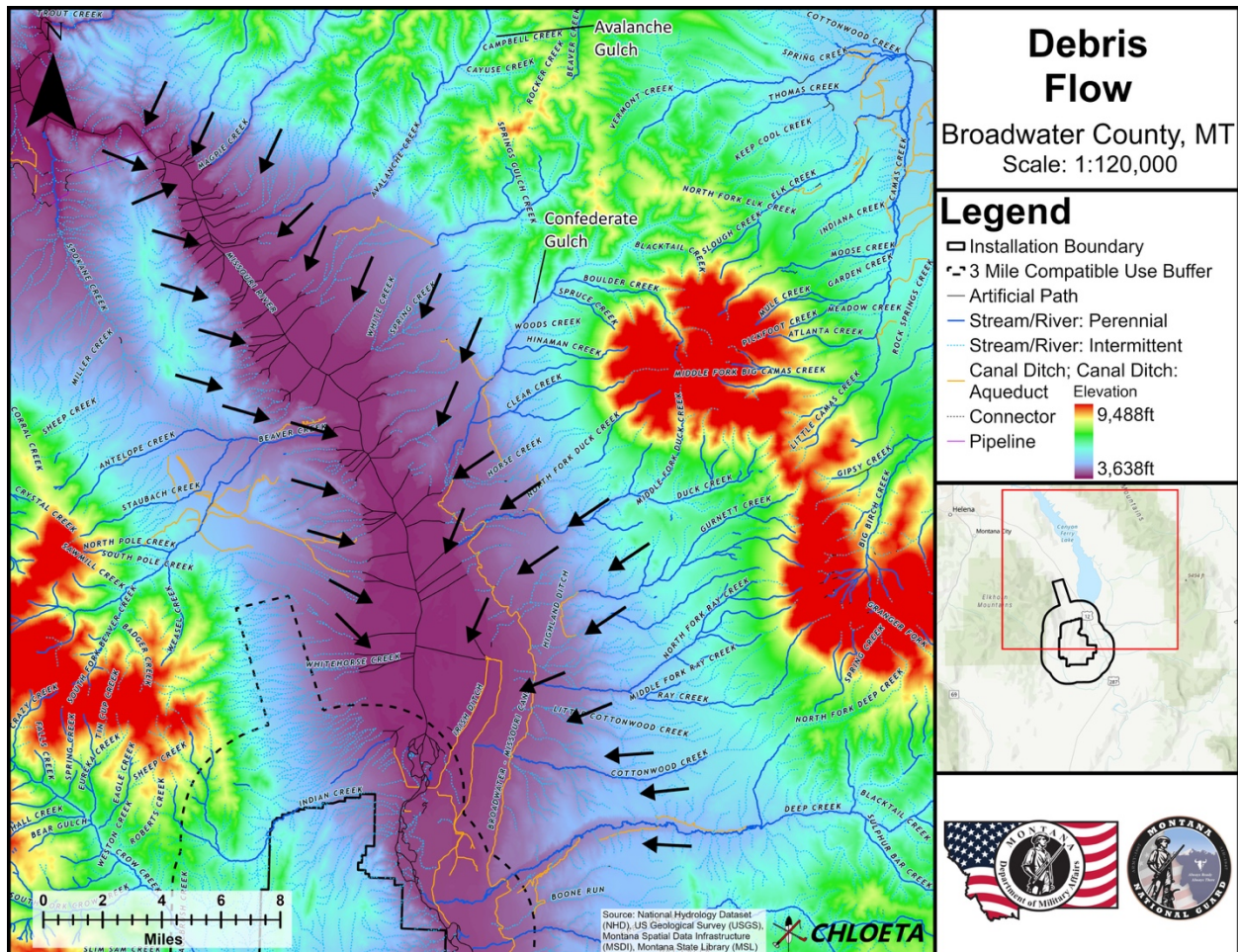


Figure 17. LHTA Erosion and Debris Flow Map

Emergency Services

Emergency services supporting FHTA and LHTA are jointly provided through a network of local, state, and federal partners including MTARNG, Lewis & Clark County Emergency Management, Broadwater County DES, local fire districts, and DNRC. While this shared model strengthens surge capacity during major incidents, it also introduces coordination challenges due to

jurisdictional overlaps, inconsistent mutual aid coverage, and communication interoperability limitations across agencies. For additional analysis of Emergency Services see [Annex J](#).

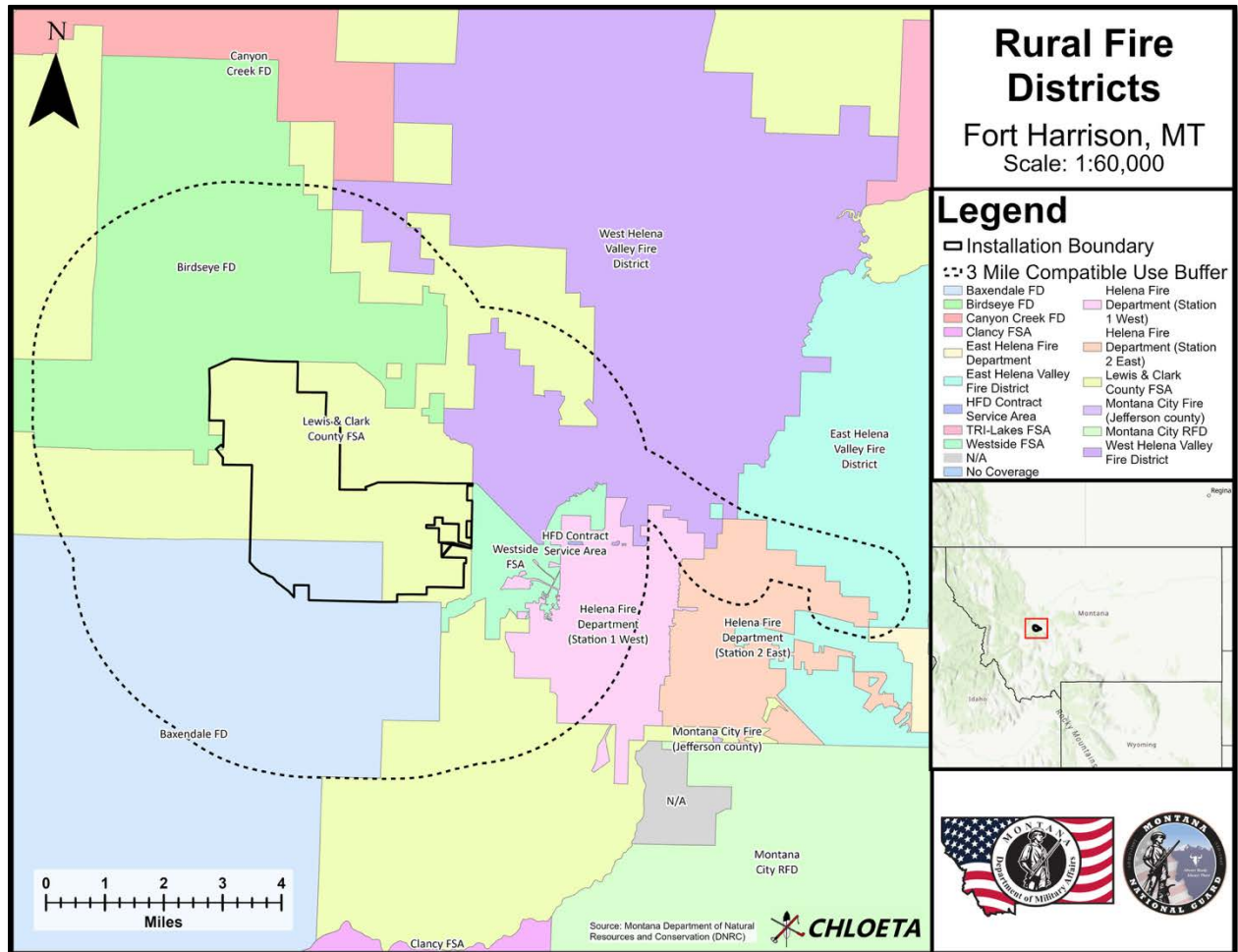


Figure 18. Rural Fire Districts for Emergency Services FHTA Map

At FHTA (Figure 18), emergency response is led by Fort Harrison Fire & Emergency Services (FHFES), which provides primary fire suppression, medical first response, and rescue support for incidents on-post and within pre-established mutual-aid areas extending into the surrounding assessment areas. These neighborhoods rely on the same response corridor as the installation, meaning road congestion, winter icing, or vehicle restrictions along Williams Street or Country Club Road can delay assistance for both military personnel and residents located in the interface zone. FHFES maintains brush engines, a structural engine, and a light rescue unit capable of initial attack and medical stabilization; however, the fleet is not sized for long-duration wildfire operations or simultaneous structure and range-related incidents affecting both installation property and adjacent communities. EMS transport remains dependent on St. Peter's Health, which must move through shared residential roadways during high-impact events, increasing response time for civilian and military casualties alike

LHTA, unlike FHTA, has no permanent fire station, EMS hub, or full-time emergency services

presence. Wildfire and incident response within and around the LHTA assessment area is primarily dependent on DNRC and USFS resources, supported by BLM and local VFD response capacity when available. During training rotations, MTARNG Range Operations provides the only immediate suppression capability, fielding Type-6 engines, tenders, and prescribed burn equipment capable of knockdown but not sustained control during wind-driven fire behavior. When escalation exceeds on-site capacity, mutual aid must route through DNRC Helena dispatch, resulting in average mobilization delays of 30–45 minutes—delays that affect not only the range but also nearby residents, ranchlands, and recreational areas bordering Canyon Ferry. Medical capability is limited to stabilization and rapid extraction, with transport reliant on Broadwater County EMS ground response through single-access gravel approaches or air evacuation when visibility and aviation de-confliction allow. These constraints create shared risk for both the training mission and the surrounding assessment area community footprint, where delayed suppression increases ignition spread potential and prolonged EMS arrival directly affects survivability outcomes.

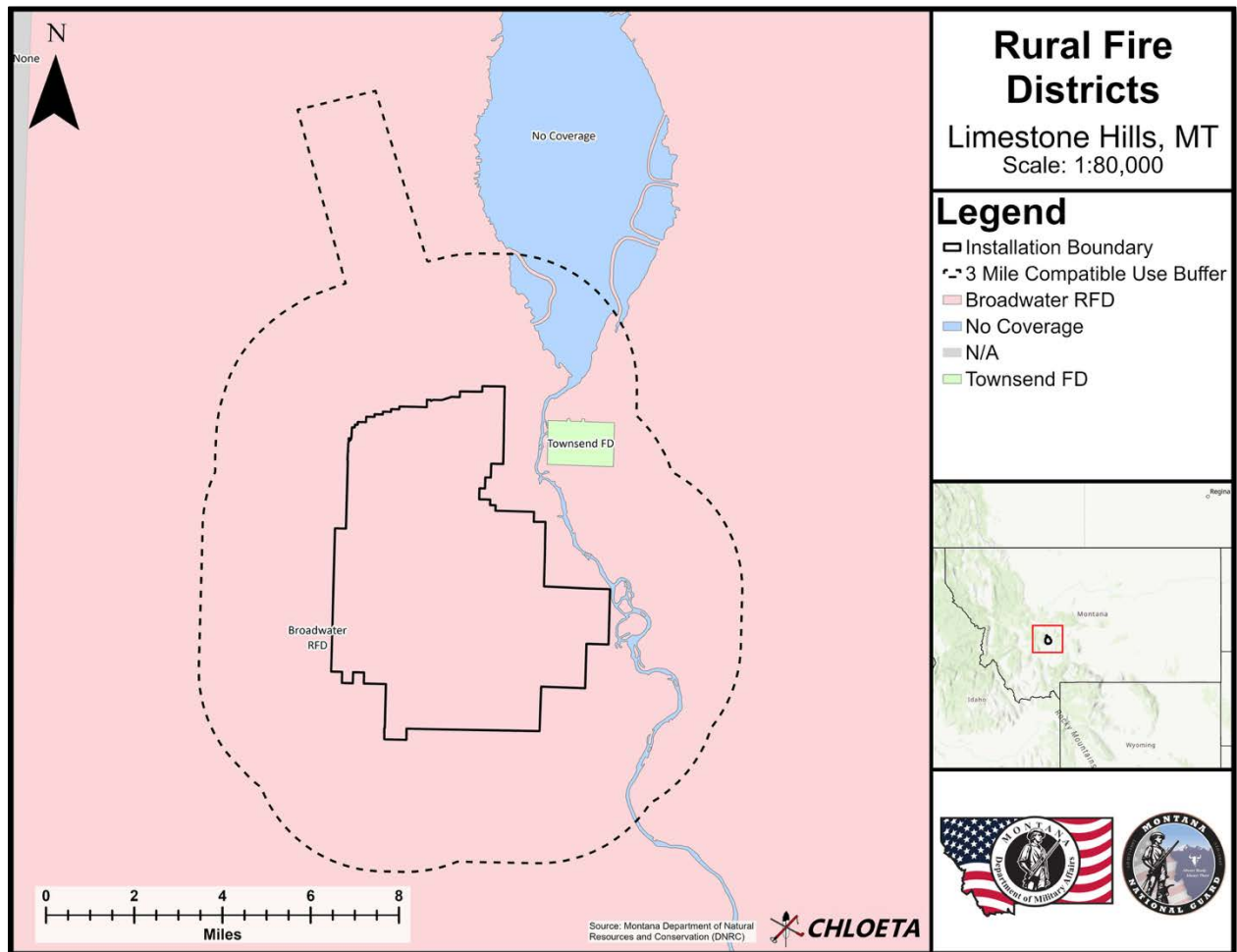


Figure 19. Rural Fire Districts for Emergency Services LHTA Map

Aviation

Aviation access is a critical component of operational readiness and regional emergency response. The Helena Regional Airport (HLN) located less than five miles east of FHTA (Figure 20), is the principal aviation hub for both civilian and military operations in West-Central Montana. The airport accommodates MTARNG rotary- and fixed-wing training, cargo transport, and emergency logistics, as well as mutual aid aviation assets for wildfire suppression and disaster response. This dual-use facility is integral to sustaining continuity of operations, medical evacuation (MEDEVAC), and personnel transport during emergencies across these communities.

Aviation access extends beyond HLN, with the Broadwater County Airport functioning as an increasingly relevant factor in LHTA operations. Although not a primary military hub, Broadwater supports general aviation traffic directly beneath the HLN–LHTA training corridor, where MTARNG helicopters historically shared uncontrolled airspace with private aircraft, a conflict identified in the REPI 5-year proposal and raised during IPR engagements as a persistent pilot-safety hazard. Recent FAA approval of restricted airspace over LHTA directly mitigates part of that exposure by reducing uncontrolled crossing traffic and establishing a defined military operations envelope for training, range surveillance, and emergency extraction. However, competition for approach paths between Helena and LHTA continues at the corridor margins, where civilian departures and arrivals into Broadwater can intersect military flight lanes during high-tempo wildfire seasons or multi-agency operations. HLN is relied on as the single aviation supply and MEDEVAC lifeline located close to the corridor and topographic wind shear through Canyon Ferry Basin.

Flight operations are supported through established coordination between MTARNG Army Aviation Support Facility (AASF) and the Helena Regional Airport Authority. The AASF complex maintains UH-60 Black Hawk and CH-47 Chinook aircraft for statewide missions, including wildfire reconnaissance, troop movement, and airlift support to isolated areas during floods or severe storms. However, reliance on shared airspace, aging hangar infrastructure, and limited refueling capacity creates potential bottlenecks during multi-agency response operations. Runway 9/27, the airport's main operational strip, remains vulnerable to closure from crosswinds, icing, or smoke conditions.

The LHTA area, while lacking a dedicated airfield, depends on aerial logistics for range oversight, emergency extraction, and wildfire response. The rugged topography and wind-prone canyon corridors east of the installation complicate helicopter ingress and egress, particularly during extreme weather or heavy smoke events. Pre-designated rotary-wing landing zones exist (Figure 21) but require reinforcement and clear demarcation for safe year-round use. Coordination with DNRC and USFS aviation units, which operate suppression aircraft and reconnaissance flights across the Canyon Ferry Basin and Missouri River corridor, remains critical to both range safety and regional incident management.

The LHTA assessment area, while lacking a dedicated airfield, depends on aerial logistics for range oversight, emergency extraction, and wildfire response. Current coordination with DNRC and USFS aviation units is functioning effectively, with established communication channels supporting suppression aircraft, reconnaissance flights, and shared response across the Canyon Ferry Basin and Missouri River corridor. However, rugged topography and wind-prone canyon corridors east of the installation continue to complicate helicopter ingress and egress during

extreme weather or heavy smoke, reinforcing the need for durable, year-round rotary-wing landing zones. Pre-designated sites exist and are actively used, but require reinforcement, surface improvement, and permanent marking to maintain operational safety as flight tempo increases under restricted airspace and wildfire-response conditions.

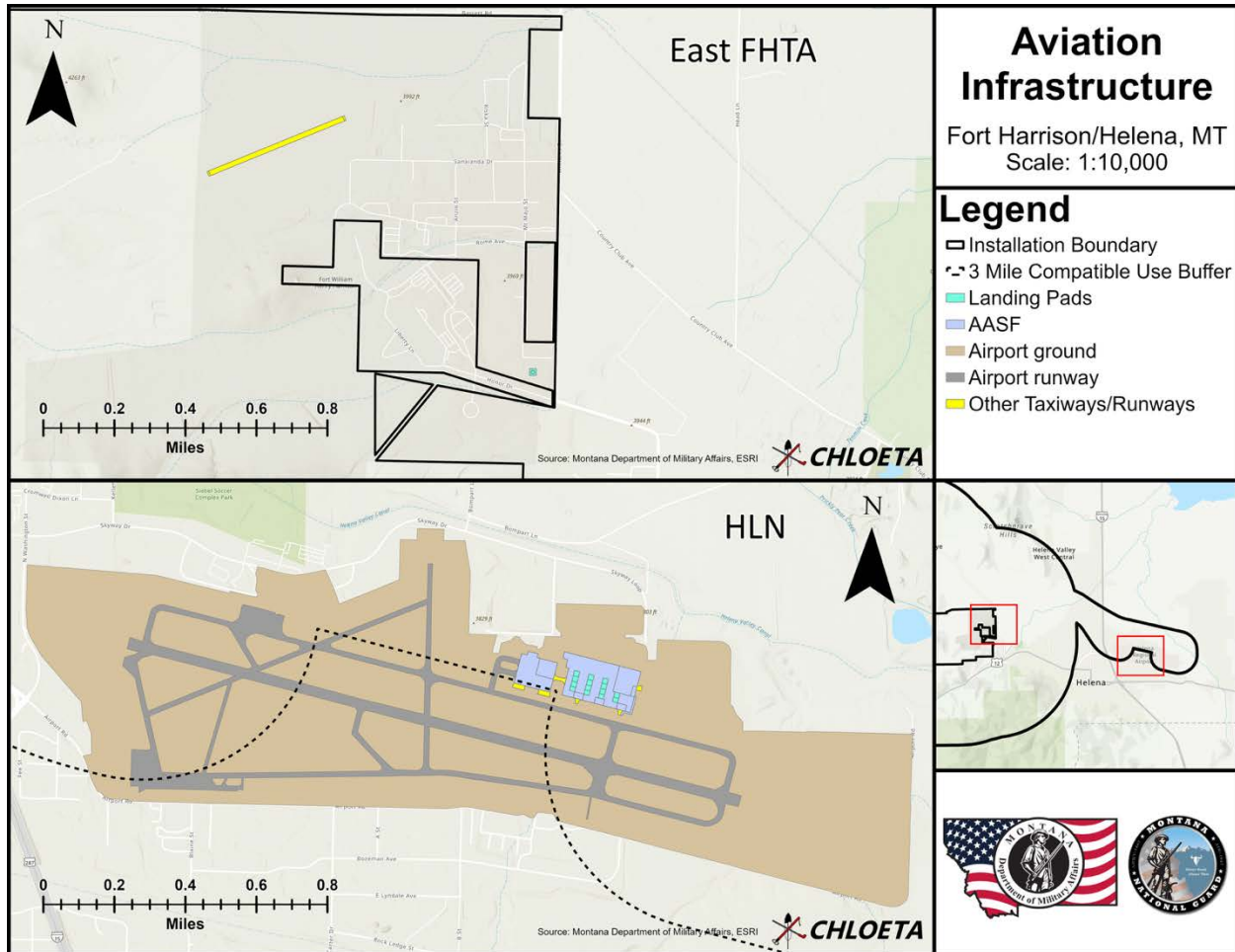


Figure 20. FHTA Aviation Infrastructure and Air Operations Network Map

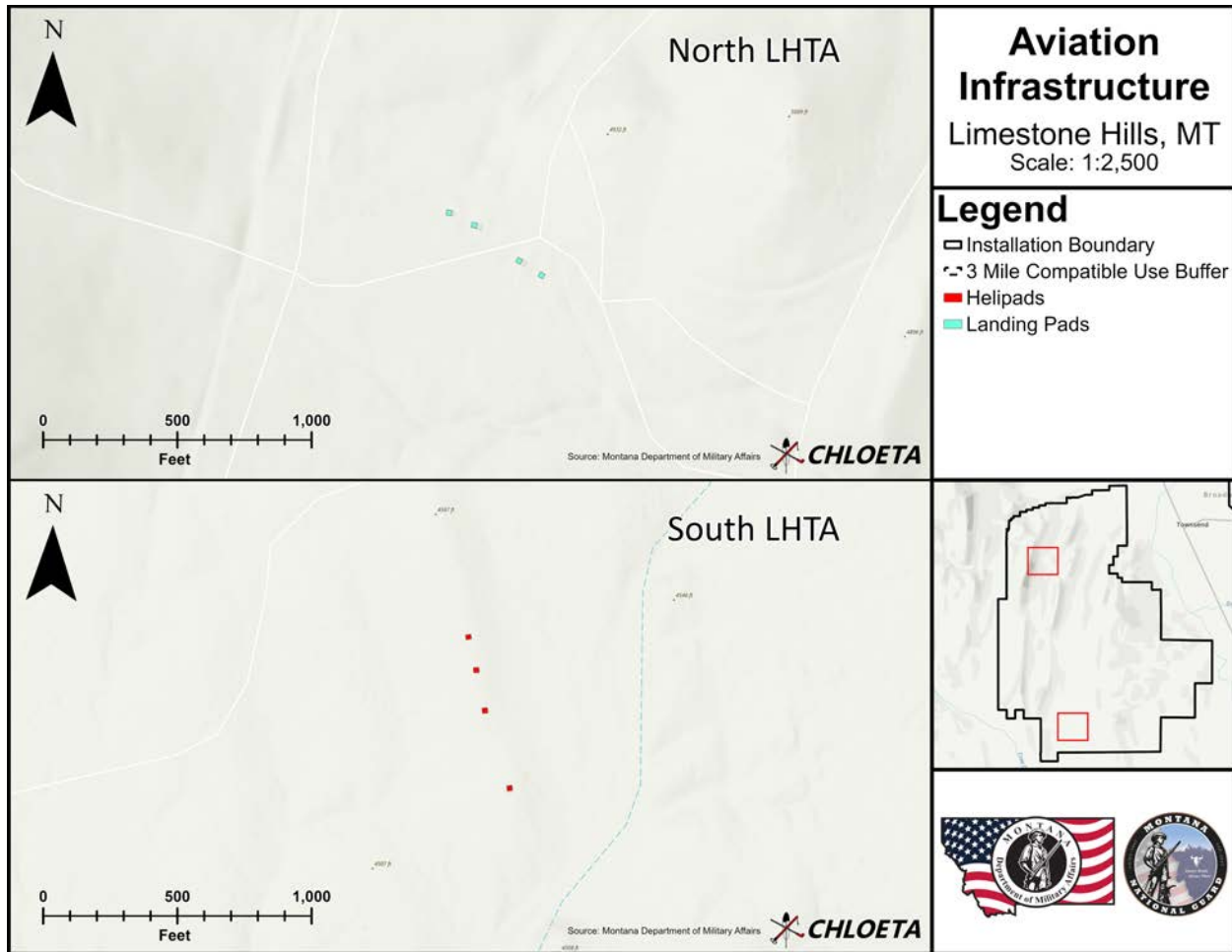


Figure 21. LHTA Aviation Infrastructure and Air Operations Network Map

Planning Frameworks and Policies

A number of existing plans and frameworks inform and support the recommendations in this assessment, including those in the following table:

Table 5. Existing Plans, Frameworks; Assessment Use

Plan/Study	Use in Assessment	Responsible Entity
Montana Western Region HMP (Lewis & Clark County Annex) (2024)	Identifies wildfire, flooding, and infrastructure vulnerabilities as priority hazards. Supports defensible space and WUI mitigation within the South Hills, Tenmile watershed, and areas adjacent to FHTA. Provides foundational local mitigation context but lacks enforceable wildfire zoning or coordination mechanisms for installation-adjacent risks.	Lewis & Clark County DES; Planning Department

Plan/Study	Use in Assessment	Responsible Entity
Broadwater County HMP (2022)	Highlights wildfire exposure near Townsend and Canyon Ferry Lake, referencing coordination needs near LHTA. Notes limited fire district resources and gaps in interagency mutual aid. Does not include zoning-based wildfire development standards.	Broadwater County DES; Planning Department
Tri-County Community Wildfire Protection Plan (CWPP) (2020)	Establishes shared fuel-treatment areas and regional WUI priorities for Lewis & Clark, Broadwater, and Jefferson Counties. Aligns closely with REPI boundaries and CWPP-priority areas overlapping FHTA western perimeter. Lacks defined maintenance schedules or implementation metrics.	DNRC Forestry Division; Tri-County Firesafe Working Group; Local Fire Districts
Montana Western Regional HMP (2021)	Provides a regional hazard analysis and interagency collaboration framework supporting both military and civilian infrastructure. Used to identify cross-county vulnerabilities and reinforce consistency across DMA/MTARNG and local mitigation planning.	MT DES; FEMA Region 8
Montana Western Region HMP (2024)	Establishes statewide hazard trends, particularly wildfire expansion, drought recurrence, and flood risks in the Missouri Headwaters Basin. Informs statewide hazard alignment and provides policy context for OLDCC resilience integration.	MT DES; FEMA
Montana DNRC Forestry Division Strategic Plan & Fire Response Framework (2022)	Outlines statewide wildfire suppression, fuels management, and cooperative fire response protocols. Defines DNRC's jurisdictional fire areas and resource-sharing arrangements with local districts, USFS, and BLM. Used to clarify command authority and coordination near FHTA and LHTA.	DNRC
USFS Helena–Lewis and Clark National Forest Plan (2021)	Identifies fire-prone forested areas west of FHTA and near Canyon Ferry Lake. Provides fuel break areas, watershed protection goals, and vegetation management guidance aligned with REPI and INRMP objectives.	USFS, Region 1
BLM–USFS Cooperative Fire Protection Agreement (2020)	Establishes USFS as the primary suppression authority on BLM-managed lands in Broadwater and Lewis & Clark Counties. Supports unified response strategies near LHTA and integrates BLM wildfire	USFS; BLM

Plan/Study	Use in Assessment	Responsible Entity
	responsibilities into local response frameworks.	
NorthWestern Energy Wildfire Mitigation Plan (2022)	Assesses ignition risks along power corridors near Helena’s South Hills and Townsend’s WUI. Informs utility-hardening priorities, vegetation clearance standards, and recommendations for undergrounding lines near installation boundaries.	NorthWestern Energy; Montana Public Service Commission
REPI Program and Conservation Project Documentation (FY24–FY26)	Defines CUBs consistent with WUI and CWPP risk areas. Establishes priorities for conservation easements, wildfire mitigation corridors, and fuel management to prevent encroachment and safeguard mission assurance.	DoW REPI Program Office; MTARNG; PPLT
Lewis & Clark County Zoning Regulations (2022)	Provides development controls near FHTA but lacks enforceable wildfire-resilient design standards. Used to assess compatibility with WUI overlays and REPI conservation areas.	Lewis & Clark County Planning Department
Lewis & Clark County Growth Policy (2025)	Addresses rapid expansion in Helena’s westside and Tenmile watershed. Promotes conservation in high-risk slopes and watershed areas but omits detailed wildfire overlay zoning or subdivision defensible-space mandates.	Lewis & Clark County Planning Department
Broadwater County Growth Policy Addendum (2024)	Highlights airport districts and conservation corridors near LHTA. Encourages conservation easements and open space preservation to reduce encroachment but lacks zoning mechanisms for long-term enforcement.	Broadwater County Planning Department
FHTA and LHTA Real Property Master Plans (2023)	Identifies training ranges, infrastructure systems, and hazard-adjacent assets. Used to map critical facilities and assess overlap with WUI, flood areas, and encroachment corridors.	MTARNG; DMA CFMO
INRMPs (2023)	Outline habitat management, prescribed fire programs, and erosion control within and around installations. Inform alignment between REPI projects, CWPP actions, and DMA fuel reduction priorities.	MTARNG Environmental Office; U.S. Fish & Wildlife Service
FHTA JLUS (2014)	Identifies historic compatibility challenges, including encroachment, transportation bottlenecks, and noise conflicts. Recommended coordination and project	MTARNG; Lewis & Clark County; City of Helena

Plan/Study	Use in Assessment	Responsible Entity
	review policies that remain partially unimplemented serving as a benchmark for this assessment’s recommendations.	
Local Evacuation and Emergency Operations Plans (EOPs) (2021–2023)	Provide limited coverage of military installations; highlight reliance on county DES and volunteer fire departments. Used to assess coordination shortfalls during complex wildfire or flood events.	Lewis & Clark and Broadwater County DES; Local Fire Districts
DoD Issuance (DoDI) 6055.17 – Installation Emergency Management Program	Defines minimum emergency preparedness, coordination, and continuity requirements for military installations. Used to evaluate DMA’s emergency coordination posture and compliance alignment with civilian emergency operations frameworks.	Department of War (DoW); Montana DMA
Department of Homeland Security (DHS) Mission Assurance and Infrastructure Guidance (2021)	Reinforces infrastructure resilience, redundancy, and mission assurance requirements for defense-supporting facilities. Used to align FHTA/LHTA continuity objectives with federal critical infrastructure protection standards.	DHS; DoW Mission Assurance Program
MT DES State Preparedness Report (2023)	Evaluates statewide emergency response shortfalls, including rural resource constraints and limited volunteer fire capacity—critical to understanding vulnerabilities around LHTA.	MT DES; FEMA

These plans, policies, and assessments collectively are the foundation for reducing natural and human-caused threats across West-Central Montana. They establish the framework through which state, regional, and local agencies identify hazards, guide development, and implement mitigation actions that protect lives, property, critical infrastructure, and mission-essential operations.

MTARNG Integrated Wildland Fire Management Plan (IWFMP, 2024)

- Reduces wildfire threats through comprehensive prevention, suppression, and prescribed-burn procedures specific to FHTA and LHTA.
- Defines Fuel Management Units (FMUs), firebreaks, and annual training to minimize ignition potential during military operations.
- Coordinates with federal and local firefighting partners under mutual-aid agreements.

Montana Multi-Hazard Mitigation Plan (MHMP, 2023)

- Reduces statewide hazard impacts by prioritizing wildfire, flood, and drought mitigation actions across jurisdictions.
- Promotes integration of mitigation into local planning mechanisms and guides eligibility for FEMA BRIC/HMGP funding.
- Establishes risk-based project ranking criteria that counties and state agencies can adopt for capital improvement and resilience planning.

Western Montana Regional Hazard Mitigation Plan (2024–2029)

- Provides a unified regional framework for reducing hazard vulnerabilities across 17 counties, including Lewis & Clark and Broadwater.
- Identifies wildfire, drought, severe weather, and flooding as priority hazards and details multi-county mitigation strategies.
- Promotes adoption of hazard-based development standards and inclusion of mitigation objectives into other regional and local plans.

Lewis & Clark County Growth Policy (Draft 2025)

- Reduces risk by directing higher-density development away from wildfire, flood, and geologic hazard areas.
- Encourages use of zoning overlays and clustered development to maintain open space buffers near FHTA.
- Incorporates hazard maps and infrastructure planning to support resilience-oriented land-use decisions.

Broadwater County Growth Policy Addendum (2024)

- Promotes sustainable growth patterns that maintain agricultural lands, open space, and defensible space near hazard-prone corridors.
- Encourages coordination of infrastructure improvements and subdivision design to reduce fire and flood exposure.
- Provides a foundation for integrating wildfire and land-use compatibility policies in future updates.
- Establishes an innovative Airport Safety Special Area to limit incompatible development near flight paths and wildfire-response corridors, offering a transferable model for similar overlay designations in the high-growth LHTA assessment area.

Lewis & Clark County Zoning Regulations (2022)

- Implements land-use controls that limit high-density development in the FHTA Urban and Rural Growth Areas.
- Provides the statutory framework for future wildfire overlay adoption and defensible-space standards.
- Supports long-term mitigation by regulating siting, structure type, and land subdivision consistent with hazard maps.

City of Townsend Growth Policy (Draft 2025)

- Guides community expansion and infrastructure development using hazard-informed planning principles.
- Encourages collaboration with Broadwater County on emergency access, utilities, and land-use near LHTA.
- Reduces risk by promoting orderly growth and limiting uncoordinated expansion into high-hazard areas.

Tri-County CWPP (2020)

- Reduces wildfire risk through coordinated fuel treatments, defensible-space programs, and public education campaigns.
- Promotes cross-boundary collaboration among Lewis & Clark, Broadwater, and Jefferson Counties.
- Supports hazard reduction through prioritized fuel-treatment areas and community outreach initiatives.

NorthWestern Energy Wildfire Mitigation Plan (2025)

- Reduces ignition risk from utility infrastructure through vegetation management and grid hardening.
- Introduces Public Safety Power Shutoff (PSPS) protocols to prevent equipment-caused wildfires.
- Enhances regional resilience through coordination with emergency management agencies during fire weather events.

A review of these existing plans indicates that while each contributes elements supporting resilience, none fully integrate the priorities of military mission assurance or coordinated, cross-jurisdictional hazard management. Collectively they do not holistically or comprehensively address drought, wildfire, and flooding in a unified or actionable manner.

Montana Multi-Hazard Mitigation Plan (2023)

- FHTA and LHTA not included in hazard or infrastructure inventories.
- No DMA or MTARNG representation on the state mitigation planning team.
- Hazard profiles omit mission-assurance and installation-critical facilities data.
- No integration pathway for installation projects in BRIC or HMGP prioritization.

Western Montana Regional HMP (2024–2029)

- MTARNG not listed as a participating jurisdiction or data contributor.
- Wildfire and infrastructure datasets exclude IWFMP fuel and suppression areas.
- Regional mitigation actions omit FHTA and LHTA.
- No interagency process linking DMA annexes to regional maintenance cycles.

Lewis & Clark County Growth Policy (2025)

- Does not adopt statewide WUI Code.
- No coordination clause referencing MTARNG or FHTA.
- Wildfire hazard overlays rely on DNRC data only.
- Fort Harrison Urban Growth Area (FHUGA)/Fort Harrison Rural Growth Area (FHRGA) buffer areas not operationalized or referenced.
- Implementation framework lacks military compatibility standards.

Broadwater County Growth Policy Addendum (2024)

- Does not adopt statewide WUI Code.
- LHTA not referenced in land use or hazard context.
- No coordination with DMA in subdivision or infrastructure review.
- Wildfire strategies drawn only from CWPP data, not IWFMP.

- Evacuation, ingress/egress, and suppression coordination absent from policy.
- Zoning is absent countywide, particularly to direct incompatible growth away from military training boundaries.

Lewis & Clark County Zoning Regulations (2022)

- FHUGA/FHRGA districts outdated; no wildfire or mission-compatibility overlay.
- No standards for defensible space, access, or wildfire-resistant construction.
- MTARNG not included in zoning or development review notifications.
- Regulations lack hazard-based enforcement mechanisms linked to IWFMP.

City of Townsend Growth Policy (Draft 2025)

- No mention of LHTA or MTARNG facilities within planning boundaries.
- No wildfire evacuation or PSPS coordination elements.
- No provisions for joint planning of infrastructure near LHTA corridors.
- Annexation and land-use expansion not reviewed for military compatibility.

Tri-County Community Wildfire Protection Plan (2020)

- Does not include IWFMP fuel breaks, water points, or suppression corridors.
- Lacks formal coordination process with MTARNG Range Control or DMA.
- Outdated relative to new wildfire risk data and growth patterns near FHTA/LHTA.
- Public education and resource-sharing initiatives not aligned with installation needs.

Collective or Systemic Gaps Across All Plans

- No unified interagency governance body for resilience and land-use synchronization.
- Disconnected update cycles (annual for IWFMP, 5-year for HMPs and Growth Policies).
- Absence of shared geospatial datasets for hazard and infrastructure risk mapping.
- Lack of mission-assurance integration in civilian planning documents.
- No adoption of statewide WUI Code.
- No binding interlocal MOU or codified coordination protocol among DMA, MT DES, and local governments.

A full analysis of the plans, including responsible entities and corrective actions, is provided in [Annex H](#).

Hazard and Vulnerability Summary

Both FHTA and LHTA operate within hazard environments defined not only by conditions on the installations but also by the surrounding assessment areas and regional lifelines that support both military readiness and civilian continuity. Power, water, transportation, and communications networks serving these areas are largely shared, linear, and geographically constrained, linking installation operations with adjacent communities and response agencies. Electric distribution, municipal and rural water supply, roadway access, and communications coverage extend across jurisdictional boundaries and serve mixed military and civilian users, including soldiers and military families residing within the assessment areas. Risks in these areas are interlinked including utility outages (Fragmented Utility Systems Undermine Installation Resilience and

Lifeline Redundancy Power), wildfire spread (Escalating Wildfire Hazards Disrupt Military Operations and Regional Readiness), watershed degradation (Degraded Watershed Health and Erosion Hazards Undermine Water Security and Infrastructure Stability), and access route failures (Aging & Hazard-Prone Infrastructure Threatens Emergency Response and Training Continuity) in the assessment areas directly affect installation operations, just as installation disruptions can impact surrounding residential populations, responders, and regional evacuation capacity. While both areas face increasing pressure from wildfire, drought, stormwater erosion, and aging infrastructure systems, the degree of civilian interface differs: the FHTA assessment area is embedded within a densely developed urban interface that relies on shared municipal lifelines, whereas the LHTA assessment area is characterized by more dispersed development served by fewer, longer, and more infrastructure-limited corridors where distance, terrain, and access constraints shape response and consequence.

In the FHTA assessment area, the most acute hazards arise from its proximity to Helena's expanding South Hills, where development continues to push into high-fuel WUI areas. The mixture of residential growth, limited ingress/egress corridors, and reliance on municipal utilities creates a compounded exposure to wildfire, drought, and post-fire flooding. High winds through Tenmile and Sevenmile drainages exacerbate ignition spread, while steep slopes and thin soils accelerate runoff following major storms. The FHTA assessment area's hazard exposure is intensified by its single-source water and power dependencies, both of which have limited redundancy. A prolonged power failure or sediment-related water disruption could simultaneously affect the installation, the VA Medical Center, and Helena's municipal network. Additionally, aging stormwater infrastructure has failed to keep pace with changing precipitation patterns, contributing to localized flooding during spring melt and convective summer storms.

Severe weather events have also increased in intensity, with high-wind events frequently downing trees and power lines along Williams Street and Country Club Road, temporarily isolating the installation. These disruptions affect not only MTARNG operations and training schedules but also surrounding communities within the assessment area, where emergency coordination, residential evacuation, and public service continuity rely on the same lifeline infrastructure.

The FHTA assessment area shares these same hazard pressures but face additional urban-wildland interface risks from infill development, vegetation encroachment, and limited evacuation capacity. The West Valley, Birdseye, and Austin communities experience recurring seasonal flooding and flash flood events along unchanneled drainages that connect directly to the Tenmile watershed. Infrastructure limitations, especially single-lane bridges, unpaved roads, and insufficient culvert sizing, compound emergency response delays. Helena's aging utility systems, combined with the interdependence of civilian and military infrastructure, increase cascading failure potential during large-scale events.

In contrast, the LHTA assessment area's primary hazards stem from its semi-arid grassland environment, geographic isolation, minimal infrastructure, and the presence of unexploded ordnance (UXO) from historical training activities. The area is highly susceptible to lightning-induced range fires, with fire behavior intensified by wind corridors funneled through surrounding ridgelines and coulees. Sparse vegetation cover and degraded rangelands allow fires to spread rapidly with limited opportunities for containment, particularly when dry, windy conditions coincide with training or range operations. The presence of UXO further constrains suppression options by limiting off-road access and restricting ground-based firefighting tactics, increasing

reliance on aerial resources and complicating emergency response. Fires can readily cross from BLM-managed lands into training areas or private holdings, introducing jurisdictional complexity among DNRC, USFS, and Broadwater County responders and elevating overall vulnerability across the landscape.

In addition to wildfire, flash flooding and erosion following intense convective storms represent recurring threats. The absence of engineered drainage systems leaves tank trails and low-lying access roads vulnerable to washouts. Seasonal runoff from high ridgelines channels sediment into the Missouri River tributaries and Canyon Ferry Reservoir Lake, contributing to water quality degradation and access disruption. Drought conditions further exacerbate erosion and reduce vegetative cover needed for slope stabilization, magnifying downstream sedimentation and flood potential.

Compounding these natural hazards are limited communication coverage and constrained emergency response capacity, which delay incident notification and coordination with outside agencies. Long travel distances from Townsend and Helena, combined with unpaved and seasonally impassable roads, increase response times for fire suppression, medical evacuation, and hazardous materials incidents.

The assessment areas, Townsend, Canton, and Canyon Ferry adjacent to and near LHTA face combined risks from wildfire, drought, and hydrologic extremes. Canyon Ferry's reservoir basin experiences strong diurnal winds that accelerate fire spread across grasslands and complicate air operations. The rural road network, especially Old Woman's Grave Road and Indian Creek Road, provides limited redundancy and becomes impassable after heavy precipitation. Agricultural operations in the assessment area face additional drought-related challenges, including reduced water rights availability and increased irrigation demand, which can limit local suppression resources during extended fire seasons.

Findings and Recommendations

This section defines the interconnected vulnerabilities that weaken resilience across the FHTA and LHTA assessment areas and outlines clear, actionable strategies for mitigation. Drawing on stakeholder interviews, hazard data, and planning document review, it translates complex regional risks into a foundation for decision-making that supports both military readiness and civilian safety.

The assessment area's resilience is increasingly challenged by the more severe and longer wildfire, drought, and flooding events, intensified by development pressure and aging infrastructure. Expanding settlement into the WUI, combined with reliance on single-feed utility and transportation systems, amplifies disruption potential. Projected weather trends indicate warmer, drier summers and more extreme precipitation events, further stressing interconnected systems that sustain military training, community function, and lifeline operations.

Topographic complexity, including steep canyons, confined valleys, and limited drainage basins, magnifies local hazard behavior and complicates access for emergency response. Rural areas around LHTA and western Broadwater County lack evacuation redundancy and enforceable WUI building standards, leaving populations and critical infrastructure exposed to both ignition and post-fire flooding.

Hazard analysis conducted through DMA's regional resilience assessment identifies the following primary threat areas:

- [Wildfire risk](#), intensified by fuel buildup, ignition sources, and WUI expansion and the absence of county-level adoption of statewide WUI construction and defensible-space standards under MCA 76-13-145.
- [Drought](#) and water scarcity, impacting watershed stability and training sustainment.
- [Flooding](#) and erosion, driven by burn scars, intense storms, and undersized stormwater systems.
- [Land use incompatibility](#), where unmanaged growth near training boundaries threatens mission assurance and limits hazard mitigation options.

These hazards directly affect access to FHTA and LHTA and their assessment areas, water supply reliability in the Tenmile and Sevenmile watersheds, and evacuation capacity for Helena, Townsend, and unincorporated communities.

This assessment consolidates the multi-jurisdictional hazard and vulnerability assessment results for DMA, Lewis & Clark and Broadwater Counties, and nearby municipalities. It documents shared and location-specific risks, identifies cross-agency coordination gaps, and highlights existing advantages to include conservation easements, mutual-aid frameworks, and land management partnerships. Each finding is linked to recommended mitigation actions, responsible entities, and funding pathways including FEMA HMGP, DoW REPI, and OLDCC programs.

The findings and recommendations that follow establish a roadmap for resilience:

- Align DMA mission assurance with regional and local hazard mitigation priorities.
- Identify shared vulnerabilities and joint investment opportunities.
- Integrate fragmented planning processes into a unified, multi-jurisdictional framework.
- Prioritize near-term mitigation and infrastructure projects for competitive grant funding.

Together, these findings provide a concise and actionable framework for strengthening operational continuity, community safety, and long-term resilience across the FHTA–LHTA assessment areas.

1. Escalating Wildfire Hazards Disrupt Military Operations and Regional Readiness

Findings:

Across the FHTA and LHTA area, wildfire activity, drought, and land-use expansion within the WUI are eroding operational reliability and community safety. Residential sprawl into high-fuel-load landscapes, especially within the FHTA assessment area and along the Canyon Ferry, Upper Tenmile, and Spokane Creek corridors, has intensified ignition potential from utilities, recreation, and residential activity. These conditions place both installations and surrounding communities within the same wildfire exposure footprint, where ignition, smoke, and access impacts affect civilian populations, emergency services, and military operations simultaneously. The wildfire analysis and mapping to detail these findings are located in [Annex B](#), while WUI interface and Land Use analysis can be found in [Annex F](#).

The 2014 JLUS and subsequent Lewis & Clark Growth Policy Addendum (2024, Sec. 3.2) confirm that low-density “ranchette” development northeast of FHTA has fragmented fuel management areas. Parcels average 5–20 acres, preventing the implementation of prescribed burns and continuity of defensible space. The PPLT Annual Report (2025) further documents increasing heavy fine fuels and noxious-weed proliferation across unmanaged acreage in the assessment area, escalating fine-fuel volatility and increasing the likelihood of rapid fire spread under wind-driven conditions ([Annex F](#)).

Montana maintains a statewide WUI code framework that incorporates the International Wildland–Urban Interface Code (IWUIC) by reference and is administered through Montana Code Annotated § 76-13-145 and implementing rules adopted by the DNRC. The statewide WUI code establishes a uniform, risk-based approach for managing development in wildfire-prone areas by authorizing local governments to apply ignition-resistant construction standards, defensible-space requirements, vegetation management plans, and fire-access design criteria within designated WUI areas. Key provisions of the code and DNRC rules address roofing and exterior materials, ember intrusion, road width and turnaround requirements for fire apparatus, and enforceable fuel-management zones tied to site-specific fire hazard severity.

Despite the existence of this legislatively adopted framework, both Lewis & Clark and Broadwater Counties lack locally adopted WUI construction or defensible-space ordinances that implement the state code at the subdivision and building-permit level. As noted in the Lewis & Clark Growth Policy Update (2025), subdivision approvals continue within mapped high-hazard polygons without enforceable mitigation standards. While Montana maintains a statewide WUI code (adopted in 2009 and implemented through DNRC rules), neither county has operationalized these provisions through zoning, subdivision regulations, or inspection authority, leaving wildfire risk mitigation largely advisory rather than enforceable.

This policy gap allows combustible roofing materials, single-access subdivisions, and substandard driveway and road widths to persist in high-risk WUI areas, amplifying ignition risk and complicating evacuation, fire response, and military training continuity for residents, responders, and MTARNG personnel alike ([Annex F](#) and [H](#)).

Critical access corridors to both FHTA and LHTA, including Country Club Road, Williams Street and its bridge crossing, Barrett Road, Blue Cloud Road, Old Woman’s Grave Road, and River Road, remain erosion-prone, single-lane routes identified by Lewis & Clark DES (2024) as the assessment areas’ primary chokepoints ([Annex I](#)). The Williams Street Bridge is specifically highlighted due to its load-bearing limitations, which restrict passage of heavy response apparatus, fuel tenders, and military transport vehicles during evacuation or surge-response operations. Its inclusion here reflects the need for further structural assessment and hardening to ensure it can support the weight and frequency of emergency traffic required during multi-hazard incidents. Slope failures and undersized culverts have repeatedly isolated training areas and adjacent neighborhoods; a 2023 washout on Old Woman’s Grave Road suspended a scheduled readiness exercise for five days. These access constraints directly limit mobilization, evacuation, and mutual-aid effectiveness during wildfire and multi-hazard events ([Annex C](#)).

FHTA proximity to Helena’s South Hills further compounds wildfire risk, as dense vegetation and above-ground utility infrastructure form continuous ignition corridors linking residential neighborhoods, access routes, and installation boundaries. In contrast, LHTA relative isolation amplifies consequence rather than exposure; extended response times, limited communications

coverage, and dependence on a small number of access routes increase the likelihood that wildfire events will disrupt training operations, restrict emergency coordination, and delay recovery across the broader assessment area ([Annex I](#)).

What Has Worked (and Why It Mattered)

- PPLT and REPI Acquisitions: Since 2018, more than 4,000 acres of buffer land have been secured through REPI county, Open Space Bond funding and landowner donations in the adjacent and within FHTA and LHTA assessment areas, removing high-risk parcels from development pressure and enabling long term fuel management.
- Military Zoning Districts (Lewis & Clark County): Military zoning is a land-use compatibility tool adopted by local governments to reduce conflicts between civilian development and military operations. Established following the 2014 Joint Land Use Study, these districts guide development near military training areas by discouraging incompatible uses and promoting disclosure of military activity impacts. These districts represent the first step toward land-use compatibility, though participation by landowners remains voluntary.
- Prescribed Burns (2018–2021): Joint DNRC-USFS-DMA burns reduced ladder fuels across 1,500 acres in the Upper Tenmile watershed, demonstrating measurable decreases in flame length and rate of spread (USFS 2022 post-treatment report).
- Mutual Aid Protocols: Standing (Interagency Agreements) IAA agreements with USFS and DNRC have provided surge suppression capacity during isolated high-intensity events, preventing potential losses to mission-critical infrastructure.

Quantified Vulnerabilities

- 24 Red Flag Days (2024) recorded at LHTA, approximately 40 percent above the 10-year baseline (NIDIS 2024).
- 30–40 percent suppression capacity shortfall during concurrent regional fire events (MT DES Wildfire Brief 2023).
- More than 25 percent of new subdivisions since 2015 located within high-risk WUI areas (Lewis & Clark Growth Policy 2025).
- Broadwater County development near LHTA has increased sharply since ~2010, with most new construction occurring within 1–3 miles of the training area as single-parcel WUI growth rather than formal subdivisions (Limestone Hills Development by Year & Broadwater Year-Built Distribution Map, 2025 based on Data provided by Montana Department of Commerce).
- Single-lane evacuation exposure: More than 2,500 residents within 3 miles of FHTA and more than 1,000 residents near LHTA reliant on non-redundant egress routes.
- Fine-fuel expansion: Fine-fuel loads have increased 60 percent since 2018 across assessment area lands lacking grazing or mechanical treatment (REPI Five-Year Proposal 2025).

Mission Assurance Gaps (MTARNG)

- **Training Disruptions:** Wildfire smoke, largely from western Montana, Northwestern US and Canada, has repeatedly reduced air-quality indices below training thresholds, limiting live-fire and aviation operations.
- **Ingress/Egress Risks:** Unhardened access routes (Williams Bridge, Country Club Rd, Old Woman's Grave Rd) risk isolation of units during mobilization or evacuation.
- **Reliance on External Response:** MTARNG lacks organic wildfire suppression capability; civilian VFD dependence introduces vulnerability when regional surge demand exceeds mutual-aid capacity.
- **Operational Constraints:** Mission-Essential Task List (METL) objectives are increasingly compressed into shorter seasonal windows due to Red Flag restrictions and regional smoke intrusions.

Planning and Governance Gaps (Annex H)

Despite extensive hazard awareness, governance mechanisms across Lewis & Clark and Broadwater Counties remain fragmented. The JLUS (2014) and REPI Proposal (2025) outline compatible-use frameworks, yet integration into local land-use ordinances is incomplete.

Neither county has adopted the statewide WUI Code, which would require dual egress, fire-resistant materials, or defensible space leaving subdivision review and building approval processes reactive and inconsistent.

Conservation acquisitions under REPI and the Lewis & Clark Open Space Bond (2018–2025) protect roughly 30 percent of eligible assessment area acreage, but funding sunsets and willing-seller limitations constrain strategic continuity. Also, acquisitions in the fastest-growing portions in the FHTA assessment areas total much less than 30 percent.

Coordination between the DMA, counties, and DNRC occurs mainly post-incident; no standing Joint Resilience Working Group or unified capital-improvement planning process exists to coordinate federal funding opportunities like Defense Community Infrastructure Pilot (DCIP), and FEMA BRIC investments.

This governance gap translates directly to operational vulnerability: community growth continues into unmanaged WUI areas, buffer areas are inconsistently maintained, and interagency readiness investments lack synchronization.

Recommendations

1. Establish Military-Compatible Wildfire Buffer Areas

Description: Construct and maintain strategic, variable-width shaded fuel buffers (approximately 50–300 feet) along MTARNG installation boundaries and immediately adjacent civilian–military interface corridors where the risk area maps indicate direct wildfire transmission pathways into the FHTA and LHTA assessment areas. In the FHTA assessment area, Phase 1 implementation will concentrate along the southern and southwestern installation boundary where steep, continuous fuels in the South Hills interface align with prevailing winds and slope-driven fire behavior, and

where primary access routes, utilities, and nearby residential development west and south of Helena intersect the installation perimeter (Figure 22). Treatments will also anchor along existing road and utility corridors crossing the interface to improve suppression access and limit fire spread toward installation lands. In the LHTA assessment area, Phase 1 treatments will focus along the perimeter adjacent to U.S. Highway 12, the Yellowstone Pipeline corridor, and major electric transmission lines, where mapped infrastructure corridors and adjacent development increase ignition likelihood and constrain response options (Figure 23). Phase 1 will establish approximately 350 acres of shaded fuel treatments on MTARNG-controlled and adjacent public lands using mechanical thinning, ladder-fuel removal, and targeted surface fuel reduction, including prescribed fire where feasible. Phase 2 will expand treatments by an additional 200–300 acres into contiguous private parcels directly influencing fire spread toward installation boundaries, gates, access roads, and critical infrastructure, through voluntary participation supported by defensible space assistance and cost-share programs. Phase 3 will address long-term maintenance and selective infill, with treated corridors re-entered on a 3–7-year cycle to sustain reduced ladder and surface fuel continuity. This phased, corridor-based approach reflects the spatial risk patterns shown on the Risk Area Maps (Figure 22 and Figure 23) focuses mitigation where it most effectively interrupts wildfire spread into FHTA and LHTA.

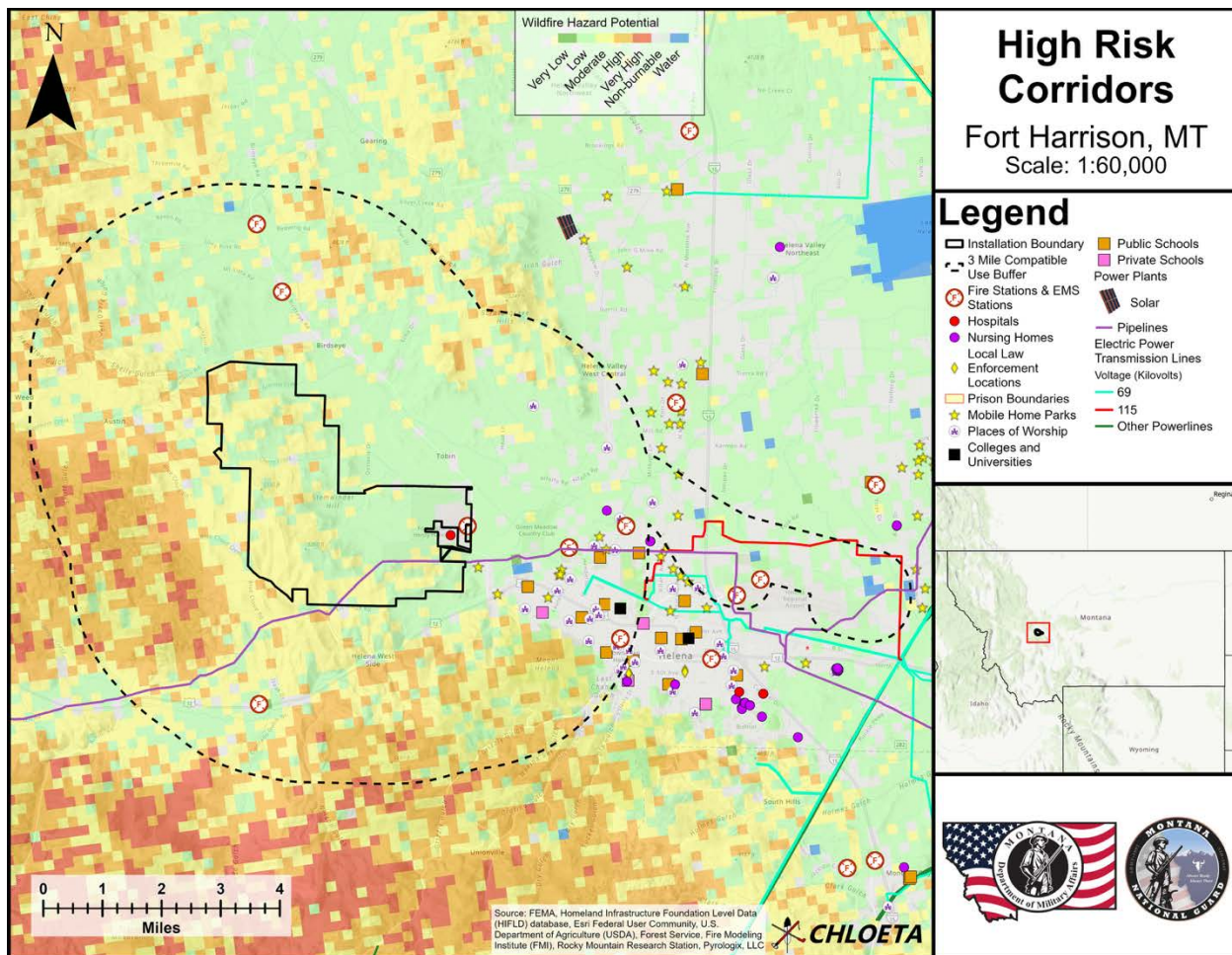


Figure 22. FHTA Assessment Area High Risk Corridor

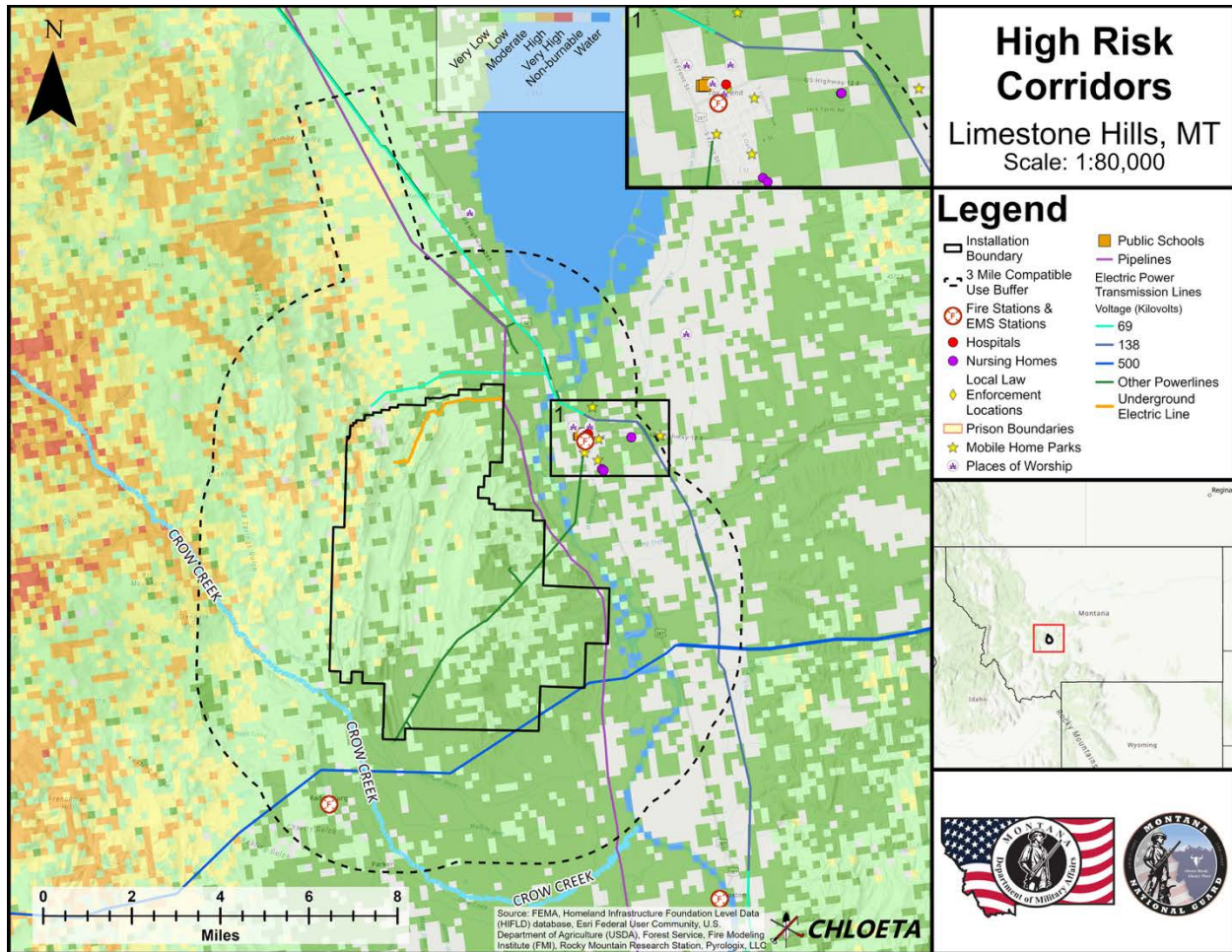


Figure 23. LHTA Assessment Area High Risk Corridor

Lead/Partners: MTARNG/DMA, DNRC, USFS Helena–Lewis & Clark National Forest, Lewis & Clark and Broadwater Counties, Tri-County FireSafe Working Group, PPLT.

Supporting Facts:

- 24 Red Flag Days in 2024 forced range shutdowns at both installations.
- Residential encroachment within 0.5 mi of FHTA has doubled since 2015 (Lewis & Clark County Growth Policy Update, 2025).
- PPLT/REPI parcels now protect less than 45% of the designated Compatible Use Buffer (REPI 5-Year Plan, 2025).

Cost Estimate: \$250,000–\$400,000 for 10 miles of treatment.

Potential Funding: FEMA BRIC; DoW REPI; U.S. Department of Agriculture (USDA) Community Wildfire Defense Grant (CWDG); USFS State Fire Assistance (SFA); DNRC Hazard Mitigation

Mission & Community Benefit: This action reduces wildfire risk for residents living adjacent to FHTA and LHTA, protects shared evacuation routes and utilities, and improves firefighter safety

by creating defensible space in the most fire-prone interface zones. For communities, shaded fuel buffers lower the likelihood of fast-moving crown fires entering neighborhoods, reduce suppression complexity, and support safer, more effective evacuation and structure protection during Red Flag conditions.

For MTARNG, the buffers help maintain reliable year-round training access, reduce ignition and smoke impacts that disrupt operations, and protect installation infrastructure critical to emergency response and mutual aid. By functioning as shared civilian–military mitigation infrastructure, these buffers strengthen regional wildfire resilience, align community and installation safety objectives, and reduce long-term suppression and recovery costs across the assessment area.

2. *Expand Prescribed Fire and Fuel Management Operations*

Description: Implement a coordinated, five-year interagency prescribed fire and mechanical fuel management program to reduce wildfire risk across the Upper Tenmile Watershed, Helena South Hills, and Canyon Ferry corridor, where hazardous fuel conditions directly threaten nearby neighborhoods, shared evacuation routes, municipal water supplies, and areas influencing FHTA and LHTA assessment areas. The program will treat a minimum of 2,500 acres annually through a combination of prescribed fire, mechanical thinning, and invasive species management to restore more fire-resilient landscape conditions.

Fuel treatment strategies will be tailored to documented, location-specific risk drivers, including overstocked conifer stands and ladder fuels that increase crown-fire potential; continuous fine fuels associated with grass that elevate ignition probability; and steep terrain aligned with prevailing wind corridors that accelerate fire spread. Treatments will include mechanical thinning, pile burning, and prescribed fire to reduce ladder fuels and canopy density; fine fuel control, targeted grazing, herbicide application, and reseeding to disrupt fine-fuel continuity; and construction of strategic fuel breaks and improved access routes to support safe and effective suppression operations along installation perimeters and key corridors.

In areas where expanding WUI development increases exposure, the program will be coordinated with WUI code implementation, Firewise programs, and defensible-space outreach to reduce structural vulnerability. Where critical infrastructure and municipal water intakes are at risk from post-fire flooding and erosion, fuel treatments will be integrated with riparian stabilization and sediment control measures to reduce downstream impacts. Collectively, these actions align fuel management treatments with the specific wildfire behavior, infrastructure exposure, and access constraints identified across the assessment area, ensuring that annual treatment investments directly address the highest-risk conditions affecting both civilian communities and MTARNG operations.

Table 6 summarizes the key wildfire-related findings identified through the assessment and links each finding to specific mitigation recommendations and priority geographic focus areas. The table provides a structured crosswalk between observed fuel conditions, fire behavior drivers, and recommended management actions, illustrating how proposed mitigation measures are directly targeted to the locations and risk mechanisms they are intended to address. This framework ensures that prescribed fire, mechanical treatments, WUI mitigation, and infrastructure protection efforts are aligned with documented hazards affecting both civilian communities and Montana Army National Guard training areas.

Table 6. Fuel Management Finding and Recommendations

Finding	Linked Mitigation Recommendation(s)	Mapped Zone / Area
1. Overstocked Conifer and Ladder Fuels Increase Crown-Fire Potential	Mechanical thinning, pile burns, and prescribed burns to reduce ladder fuels and canopy bulk density.	Zone 1 (FHTA South Perimeter) Zone 2 (Tenmile Ridge Prescribed Burn)
2. Flashy Fuel Continuity that Elevates Ignition Probability	Fine fuel control, grazing, herbicide, and reseeding programs.	Zone 3 (10-Mile Creek Park / PPLT) Zone 4 (Canyon Ferry North Corridor)
3. Steep Topography and Aligned Wind Corridors Accelerate Fire Spread	Construct permanent containment/fuel breaks; improve access routes for suppression.	Zone 5 (LHTA Perimeter Fuel-Break Zone)
4. Expanding WUI and Parcelization Increase Exposure	Implement WUI codes, Firewise programs, and defensible-space outreach.	Zone 6 South Hills–Helena WUI Townsend / Indian Creek WUI
5. Critical Infrastructure and Water Intakes Are Exposed to Post-Fire Flood/Erosion	Retrofit water-intake sediment barriers and stabilize riparian corridors.	Zone 7 Tenmile & Sevenmile Creek Riparian Corridors

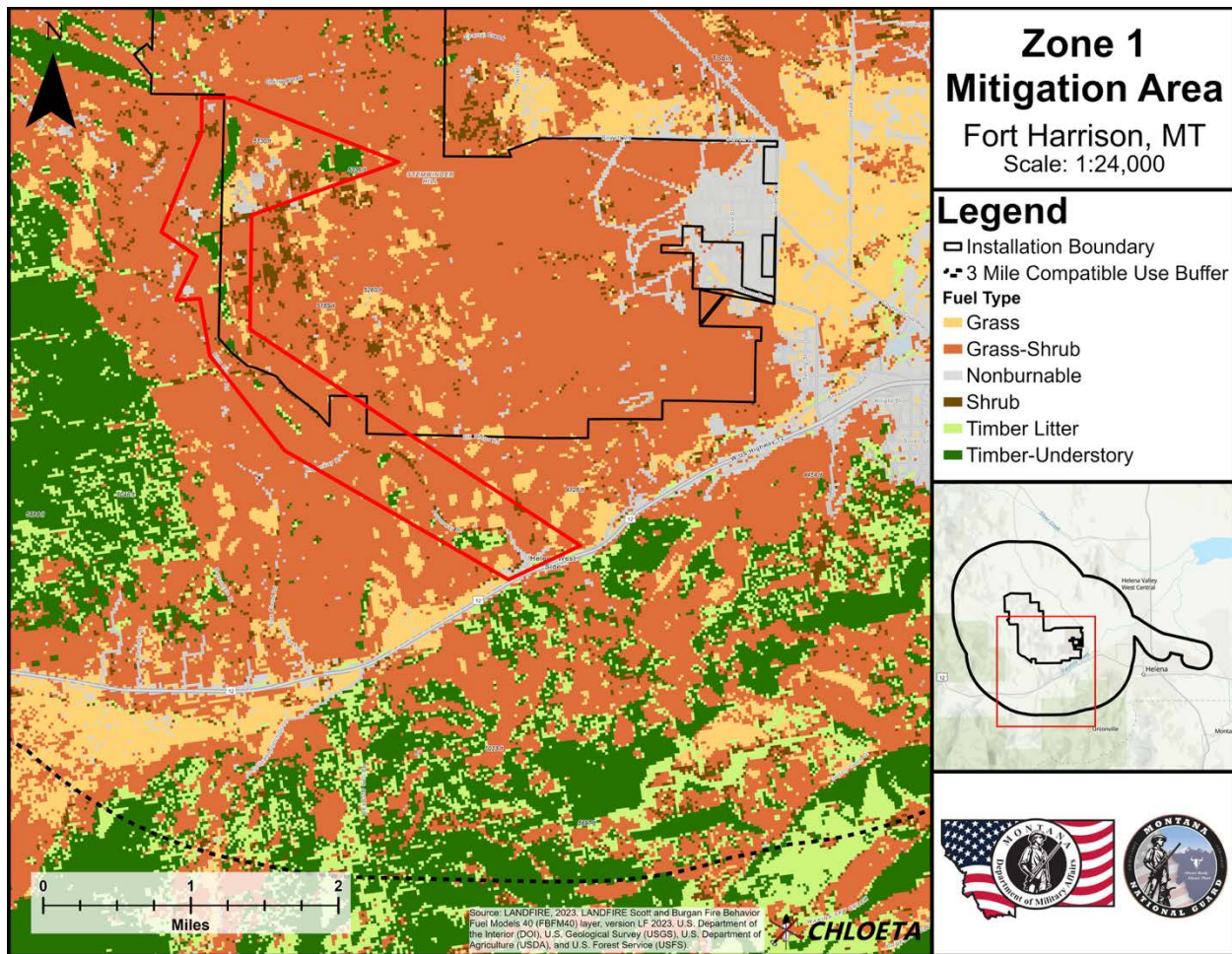


Figure 24. Zone 1 FHTA South Perimeter

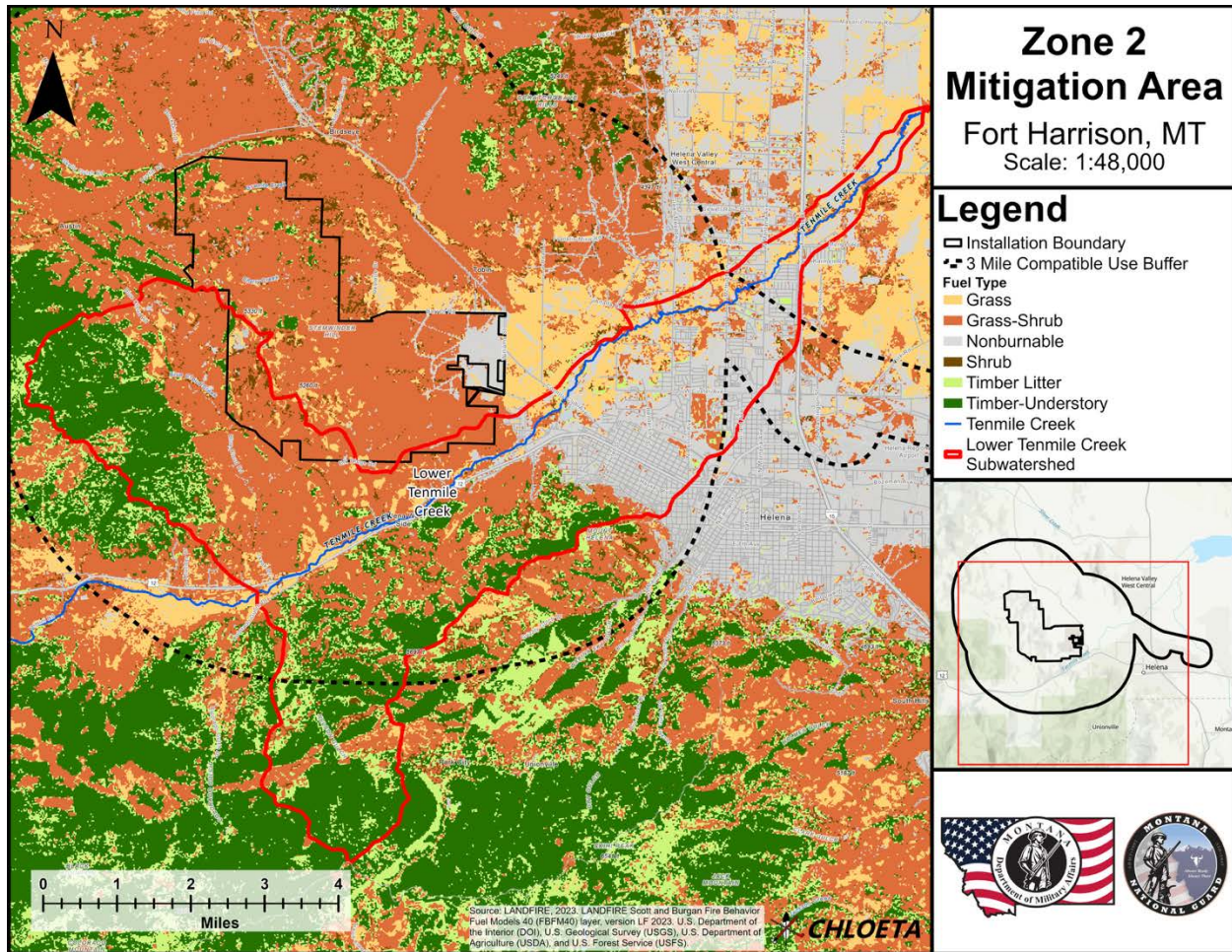


Figure 25. Zone 2 Tenmile Ridge Prescribed Burn

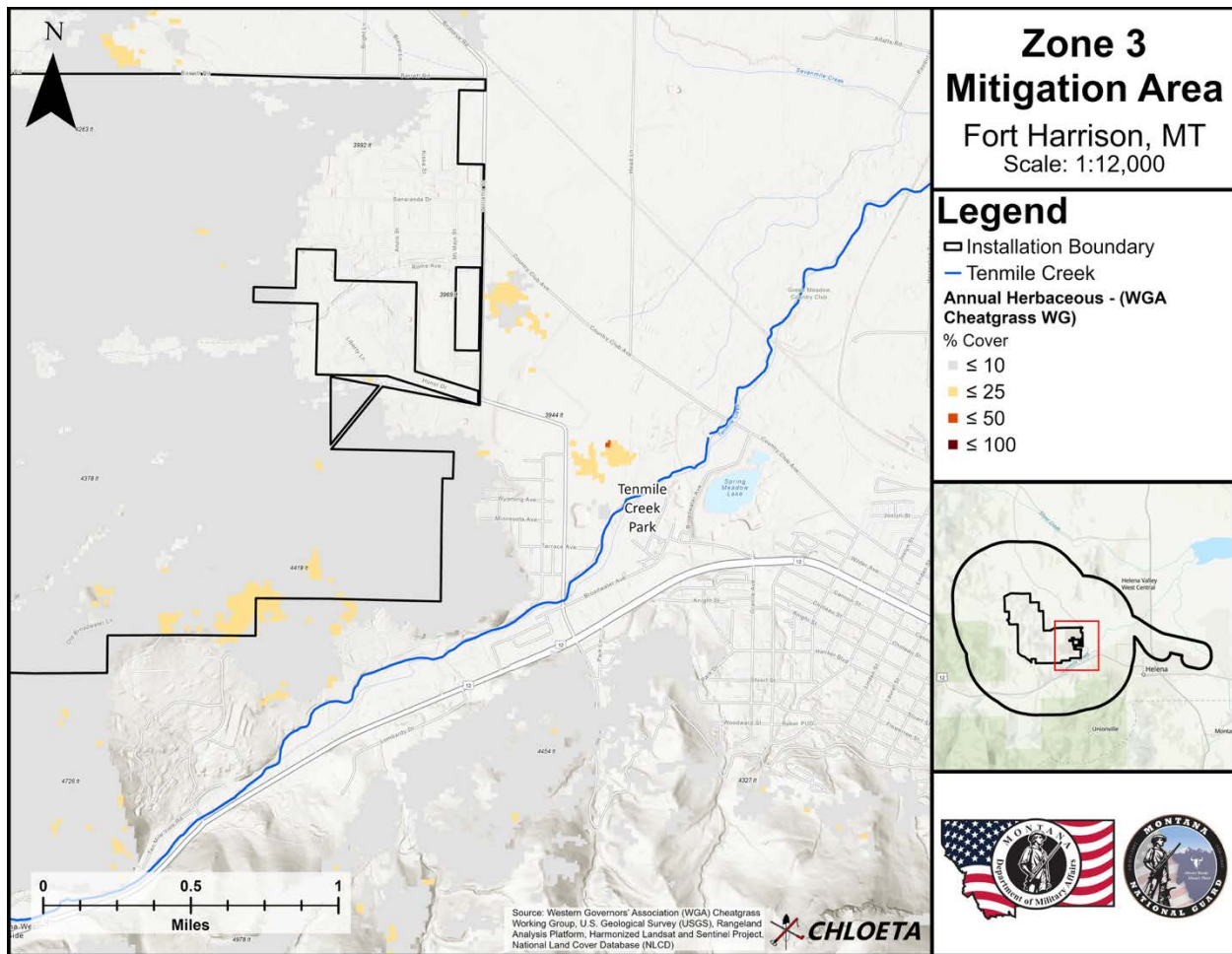


Figure 26. Zone 3 10-Mile Creek Park / PPLT

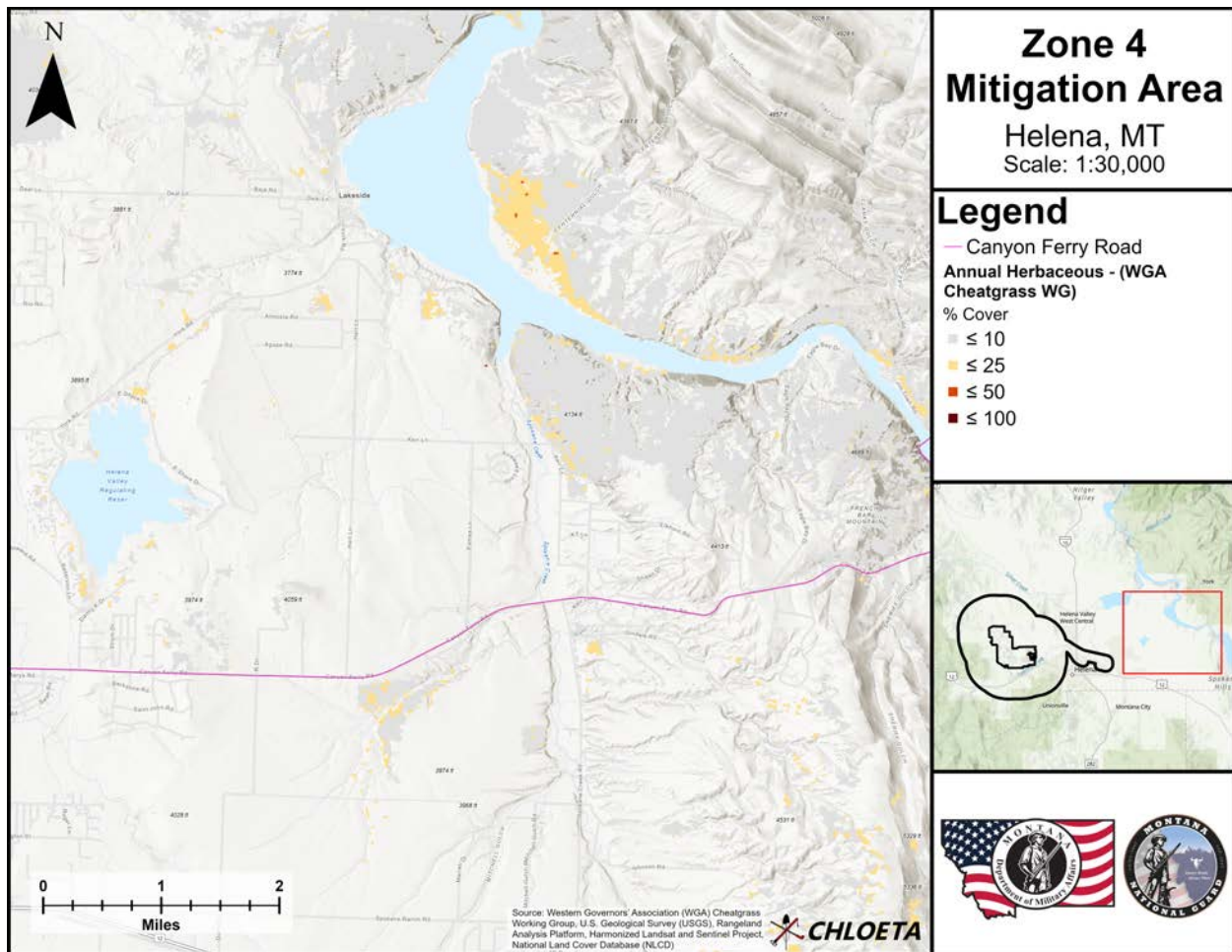


Figure 27. Zone 4 Canyon Ferry North Corridor

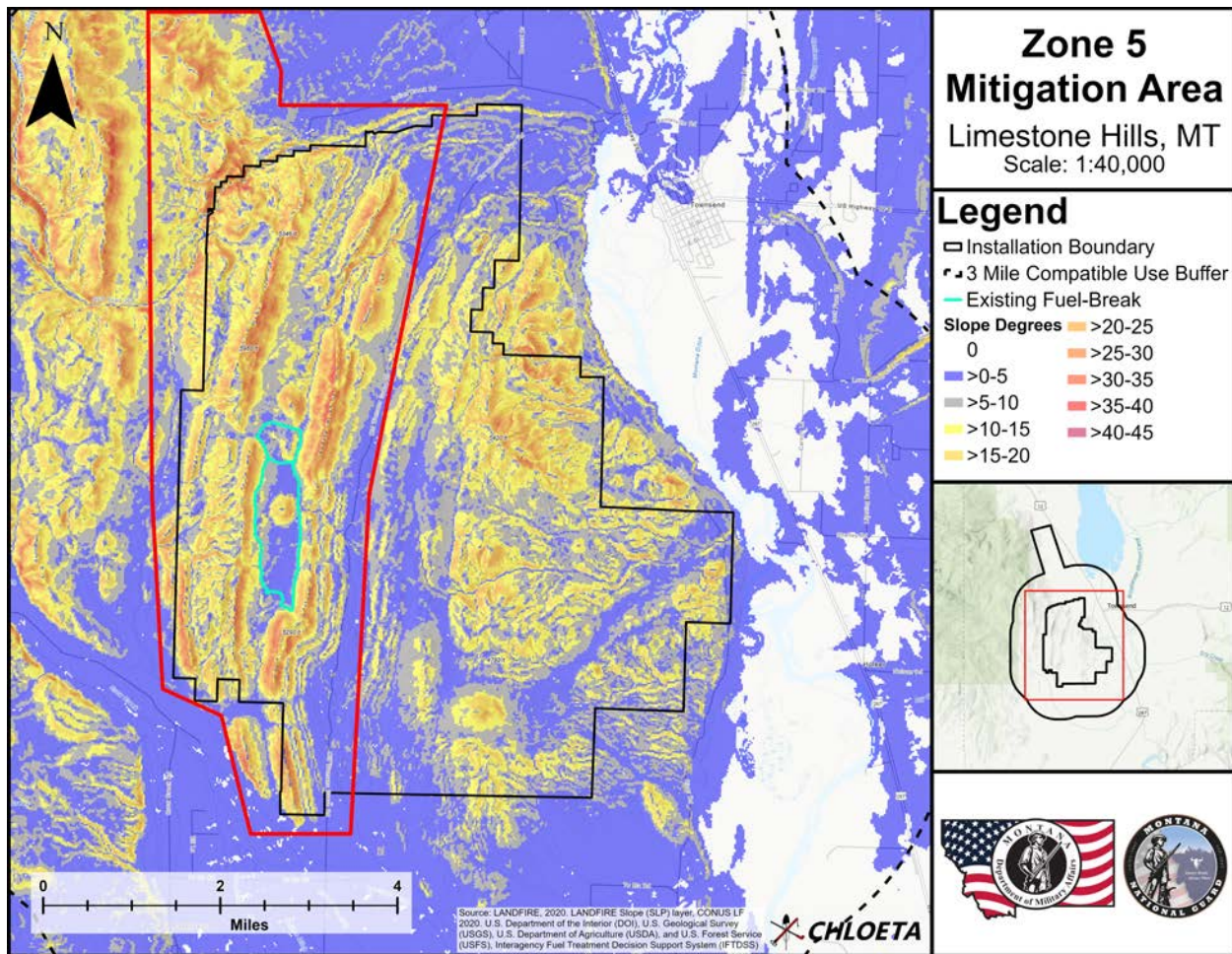


Figure 28. Zone 5 LHTA Perimeter Fuel-Break Zone

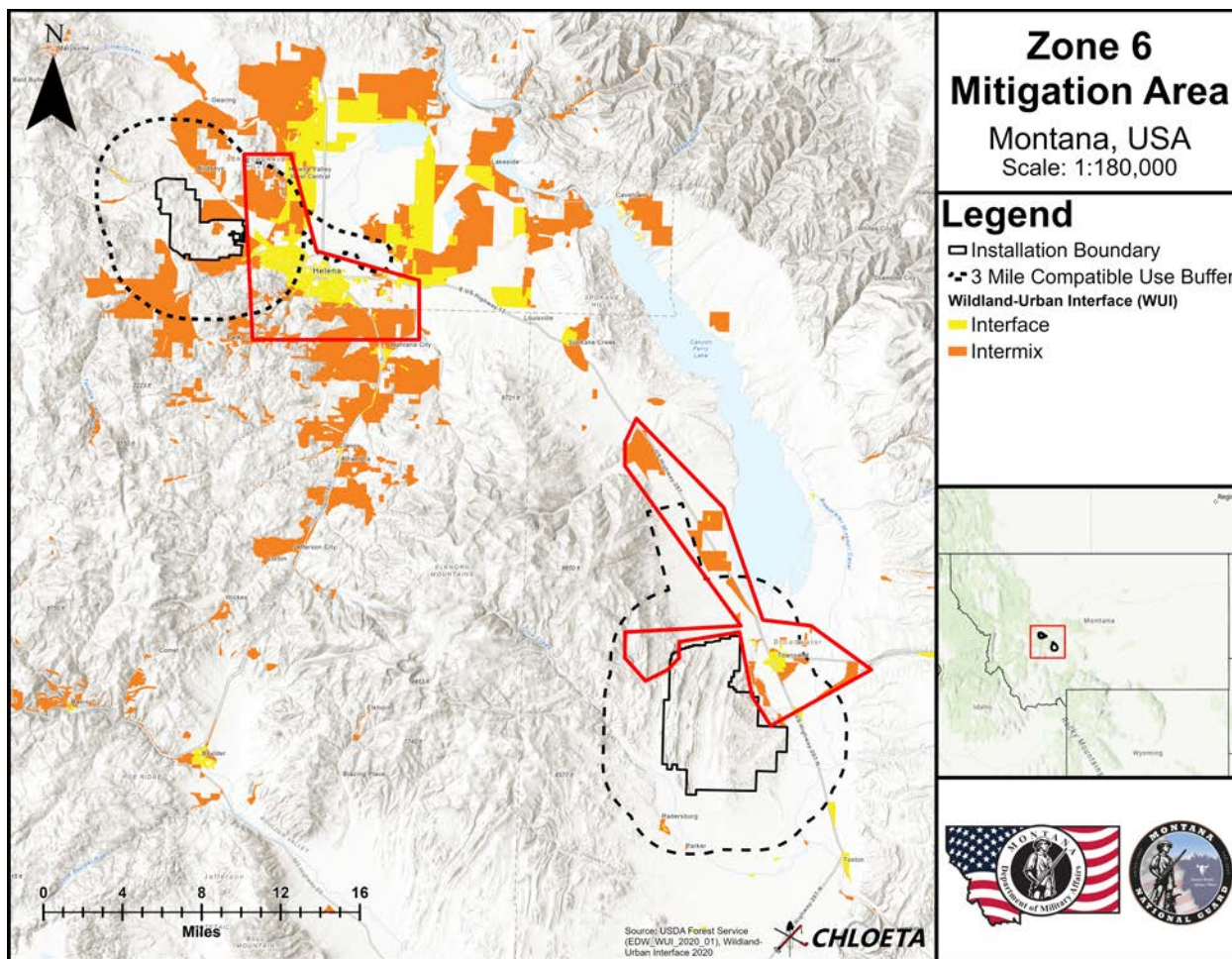


Figure 29. Zone 6 South Hills–Helena WUI Townsend / Indian Creek WUI

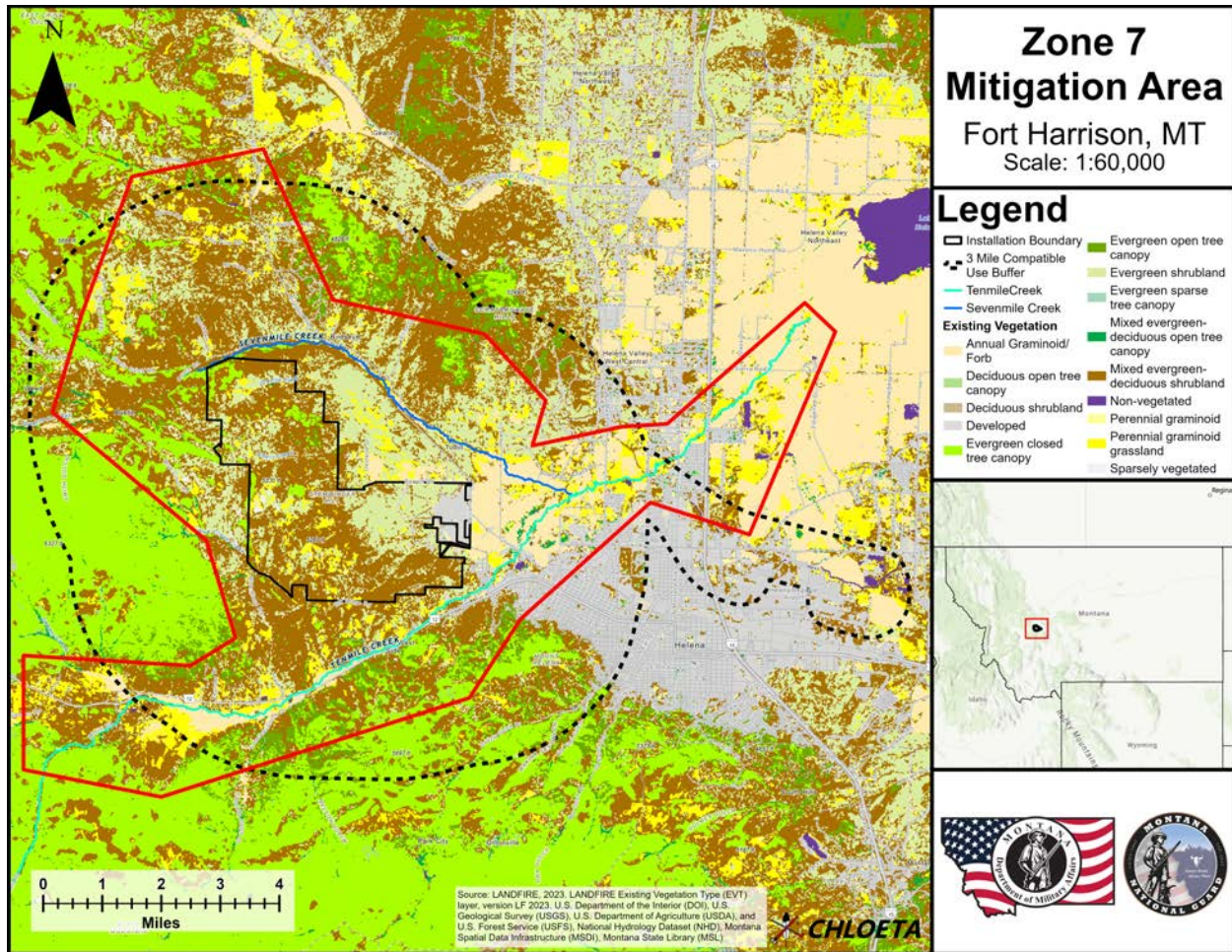


Figure 30. Zone 7 Tenmile & Sevenmile Creek Riparian Corridors

Primary treatment areas will be located on lands where implementation authority already exists, including USFS managed lands within the Helena–Lewis and Clark National Forest, DNRC, and MTARNG-controlled lands within and immediately adjacent to FHTA. Where appropriate and voluntary, treatments may also be coordinated on conservation easement and open-space properties managed by the PPLT to improve landscape-scale fuel continuity and defensible space. Private lands will be included only through voluntary participation, supported by cooperative burn agreements, FireSafe programs, and cost-share incentives; no mandatory private land treatments are assumed.

Fuel treatments will focus on reducing ladder fuels, breaking up continuous fine fuels, and suppressing flashy fuel beds that increase ignition probability, accelerate fire spread, and shorten fire-return intervals. Operations will be designed to moderate fire behavior under Red Flag conditions, lower flame lengths near residential areas and infrastructure, and improve firefighter access and safety along shared civilian–military response corridors.

Treatment areas will be prioritized using wildfire behavior modeling, watershed sensitivity, and proximity to communities, water infrastructure, evacuation routes, and transportation corridors serving the FHTA assessment area. Prescribed fire operations will be coordinated with county

CWPP priorities, FireSafe councils, and public outreach efforts to ensure smoke management, seasonal timing, and community notification are fully integrated into project planning and execution.

Lead/Partners: DNRC, USFS, MTARNG, Tri-County FireSafe Working Group, PPLT, Lewis & Clark County.

Supporting Facts:

- Fine fuel infestation in the FHTA assessment area has increased more than 60% since 2016 (REPI 5-Year Plan, 2025).
- Last prescribed burns (Ongoing) reduced fine fuels by approximately 40% and lowered ignition potential for 3–5 years (DNRC Report, 2022).
- Upper Tenmile’s steep alluvial-fan slopes and aggrading channel create persistent erosion and overbank-flooding hazards, with post-fire conditions expected to further increase sediment delivery and debris-flow potential into the Helena Valley (Tenmile Creek Flooding Summary and Geomorphic Condition, 2017; USGS Post-Fire Debris-Flow Hazard Assessments, 2024).

Cost Estimate: \$1.5 million–\$2.5 million for 5,000 acres (2025–2030 cycle).

Potential Funding: REPI, FEMA HMGP; USFS SFA; DoW REPI; USDA EQIP and DNRC Fuels Reduction.

Mission & Community Benefit: This action reduces wildfire risk for communities surrounding the Upper Tenmile Watershed, Helena South Hills, and Canyon Ferry corridor by lowering ignition probability, slowing fire spread, and moderating fire intensity near homes, evacuation routes, and critical infrastructure. By restoring more fire-adapted conditions and reducing fine fuel driven continuity, the program improves public safety, enhances firefighter effectiveness, and lowers the likelihood of large, fast-moving wildfires that threaten neighborhoods and water supplies.

For the region as a whole, expanded prescribed fire and fuel management reduces long-term suppression and recovery costs, supports watershed protection by limiting post-fire erosion and sediment delivery, and improves air quality outcomes by replacing uncontrolled wildfire smoke with carefully managed prescribed fire under favorable conditions.

For MTARNG, the program supports training continuity and mission readiness by reducing wildfire disruptions, limiting smoke impacts during key training periods, and protecting shared access corridors and infrastructure used for emergency response and mutual aid. As a shared civilian–military mitigation investment, expanded prescribed fire operations strengthen regional wildfire resilience while aligning community safety goals with defense mission assurance across the FHTA and LHTA assessment area.

3. *Adopt Statewide WUI Code; Update Subdivision and WUI Development Standards*

Description: Adopt and operationalize Montana’s statewide WUI code (MCA 76-13-145) through coordinated updates to county subdivision, zoning, and building regulations in Lewis & Clark and Broadwater Counties, initiating supporting actions in 2026. Administered by the DNRC, the WUI

code establishes minimum standards for ignition-resistant construction, defensible space, emergency access, and subdivision design in wildfire-prone areas where residential development increasingly overlaps with hazardous fuels. County implementation will focus on applying these standards within WUI areas, high-risk wildfire corridors, and development influencing the FHTA and LHTA assessment areas. Regulatory updates initiated in 2026 will include model ordinance development, overlay mapping, and staff justification, followed by stakeholder coordination and public review in late 2026, with formal adoption targeted for early 2027 and an effective date within 30–60 days of adoption. Requirements will include dual egress where feasible, minimum road width and turnaround standards, 30- to 100-foot defensible space, and ignition-resistant building materials to improve evacuation reliability, firefighter access, and life safety during wildfire events. To address shared civilian–military risk, counties will integrate and strengthen military compatibility overlay provisions, converting key elements from voluntary guidance into enforceable minimum standards for subdivision layout, density, access configuration, and disclosure near MTARNG installations, while retaining incentive-based options to encourage broader participation. Interim measures, including a WUI development review checklist and mandatory agency referral to fire authorities, OEM, DNRC, and MTARNG/DMA, will be implemented in 2026 to avoid delays while ordinances proceed. Implementation will be led by county planning departments, with technical support from fire marshals, DNRC, and MTARNG, and aligned with adopted Growth Policies, CWPP priorities, and public outreach requirements to ensure transparency and consistency.

Lead/Partners: County Planning and Building Departments, County Commissions, DNRC, DMA, and Local Fire Marshals.

Supporting Facts:

- 25% of new subdivisions (2015–2024) are within mapped high-risk WUI assessment areas (Lewis & Clark County Planning Department, 2025).
- No current defensible space or WUI code enforcement countywide.
- FHTA zoning overlay districts (FHRGA and FHUGA) were adopted in 2019, publicly available records contain no evidence of widespread parcel reclassification, indicating limited take-up under the new regulatory structure (Lewis & Clark County Zoning Regulations, 2019/2022).

Cost Estimate: \$50,000–\$75,000 (staff/legal review and adoption).

Potential Funding: DNRC Assistance, FEMA Planning Grants; MT DES; State Fire Marshal Technical Assistance and OLDCC Compatible Use Planning.

Mission & Community Benefit: Adopting and enforcing WUI and military-compatible development standards improves life safety for residents, strengthens evacuation reliability, and reduces wildfire losses in rapidly developing interface areas. By ensuring new subdivisions are designed with defensible space, safe road standards, and multiple evacuation options, communities reduce the likelihood of residents being trapped during fast-moving wildfires and improve firefighter access and effectiveness.

For counties, consistent WUI standards lower long-term suppression and recovery costs, reduce future regulatory conflicts, and create predictable development expectations in high-risk areas. For MTARNG, compatible land-use and access standards reduce encroachment-related ignition risk,

limit evacuation conflicts along shared corridors, and protect installation access and training continuity. As a shared civilian–military mitigation strategy, WUI code implementation aligns community growth with wildfire resilience and mission assurance across the FHTA and LHTA assessment areas.

4. Enhance VFD and Interagency Fire Capacity

Description: Strengthen local wildfire initial-attack capability and interagency coordination by investing in modern firefighting equipment, standardized wildland training, and joint operational procedures for the VFDs that provide first-line wildfire response in the civilian–military interface within the FHTA and LHTA assessment areas. This action focuses on the Birdseye Volunteer Fire Department, Canyon Creek Volunteer Fire Department, Winston Volunteer Fire Department, Townsend Volunteer Fire Department, and South Hills Volunteer Fire Departments, which collectively protect rural communities, evacuation corridors, utilities, and MTARNG training areas across the Helena South Hills, Canyon Ferry corridor, and adjacent foothill landscapes.

This action will provide five new Type-6 engines and two water tenders and establish a joint military–civilian wildland training program to strengthen initial-attack capability for VFDs serving Birdseye, Canyon Creek, Winston, Townsend, and the South Hills. Equipment investments will be paired with a five-year training and capacity-building effort to support a target of at least 10 certified wildland firefighters per department, achieved through volunteer recruitment, cross-training, and interagency participation rather than full-time staffing expansion. This action addresses equipment gaps that limit rapid initial attack, water delivery, and sustained suppression capability during wildfire incidents. Equipment selection will prioritize interoperability with state and federal wildland resources, off-road mobility, and performance in steep, fuel-dense terrain typical of the South Hills and Canyon Ferry interface. Investments will support more effective response along shared civilian–military access routes, infrastructure corridors, and training area boundaries where early containment is critical.

To ensure equipment investments translate into operational effectiveness, the program will establish annual joint wildland fire training and exercise activities coordinated among local VFDs, DNRC, federal partners, and MTARNG. Exercises will be aligned with HSEEP principles and emphasize unified command, mutual-aid integration, standardized communications and dispatch protocols, aerial operations coordination, helibase and dip-site management, and firefighter safety. Training will reinforce coordinated decision-making during fast-moving wildfire and Red Flag conditions, improving early containment outcomes while strengthening interagency readiness across jurisdictional boundaries.

This mitigation action prioritizes enhancing existing response capacity and interoperability, recognizing the critical role of volunteer fire departments as the initial line of defense for both surrounding communities and MTARNG operations in the FHTA and LHTA assessment areas, without requiring the establishment of new stations or expansion of response jurisdictions.

Lead/Partners: MT DES, DNRC, USFS, County Fire Councils, DMA, FEMA Assistance to Firefighters Grant (AFG) Program, Broadwater & Lewis & Clark DES and Local VFDs.

Supporting Facts:

- VFDs currently operate with less than 50% of NFPA-recommended staffing levels (MT DES Fire Capacity Report, 2023).

- MTARNG relies on the same VFDs for all initial response in the FHTA and LHTA fire perimeters (Mutual Aid Agreement, 2023).

Cost Estimate: \$2.5 million (apparatus acquisition, equipment, training, and exercises).

Potential Funding: FEMA AFG; USDA CWDG; State Fire Capacity Grants; DoW REPI (mutual-aid compatible).

Mission & Community Benefit: This action improves life safety for residents by ensuring faster, better-equipped initial wildfire response in rural and WUI communities where response time and water availability are critical to preventing structure loss. Strengthening VFD capacity reduces the likelihood that small ignitions escalate into large, high-impact fires that threaten neighborhoods, evacuation routes, watersheds, and power and water infrastructure.

For communities, enhanced initial-attack capability lowers suppression costs, reduces reliance on delayed out-of-area resources, and improves firefighter safety through standardized training and interoperable equipment. Joint exercises strengthen trust, communication, and coordination across agencies before emergencies occur.

For MTARNG, this investment protects training continuity and installation access by ensuring reliable first response during military operations and Red Flag periods. By strengthening the same VFDs that protect surrounding communities, this action creates shared civilian–military response capacity that improves regional wildfire resilience, mutual-aid effectiveness, and mission assurance across the FHTA and LHTA assessment area.

5. *Strengthen Conservation Easement and Fee-Title Acquisitions*

Description: Expand fire-resilient open space and compatible land use across the FHTA and LHTA assessment areas through the protection of approximately 5,000 additional acres by 2030, led by the PPLT in partnership with local, state, and federal agencies. Protection will be achieved through a strategic combination of conservation easements and fee-title acquisitions that reduce wildfire risk, preserve evacuation and response corridors, and limit incompatible development in high-hazard areas.

Acquisitions will prioritize wind-aligned fire corridors, ridgelines, drainage corridors, evacuation routes, and buffer zones adjacent to FHTA and LHTA assessment areas, where unmanaged development would increase ignition risk, constrain access, and complicate evacuation and firefighting operations. Protected lands will maintain space for fuel treatments, prescribed fire operations, smoke dispersion, and emergency access, while supporting agriculture, recreation, and conservation values compatible with surrounding communities.

This action also includes advocacy for the renewal of a local Open Space Bond by 2028, which has historically provided critical local match for REPI and DCIP investments. Sustaining local match capacity is essential to leveraging federal funds and ensuring long-term stewardship of conserved lands. All acquisitions will be coordinated with county growth policies, CWPP priorities, and military compatibility objectives to ensure alignment with community planning and wildfire mitigation goals.

Lead Partners: PPLT, DMA/MTARNG, Lewis & Clark and Broadwater Counties, TPL, DoW REPI, NGB, NRCS, USFS.

Supporting Facts:

- REPI and conservation acquisitions currently protect only approximately 42% of the targeted assessment area acreage, leaving large gaps where development pressure intersects with wildfire-prone landscapes (*REPI 5-Year Proposal, 2025*).
- Lewis & Clark Open Space Bond (\$20M since 2018) expired in FY25; loss of match jeopardizes \$4-6 Million annual REPI leverage.
- Broadwater County Resolution 2024-17 supports expansion of conservation buffers near LHTA.

Cost Estimate: \$15–\$20 million (acquisition, easements, and long-term stewardship).

Potential Funding: DoW REPI; FEMA BRIC/HMGP; OLDCC DCIP; County Open Space Bonds; USDA CWDG.

Mission & Community Benefit: Expanding fire-resilient open space protects residents, evacuation routes, and critical infrastructure by limiting high-risk development in wildfire-prone corridors and maintaining defensible landscapes around communities. Conserved lands provide room for fuel treatments, prescribed fire, and safe firefighting operations, reducing the likelihood that fast-moving wildfires threaten homes or isolate neighborhoods during Red Flag conditions.

For local governments, permanent open space buffers reduce long-term wildfire suppression and recovery costs, support predictable growth patterns, and preserve the rural and natural character valued by residents. These lands also enhance watershed protection, recreational access, and agricultural viability while maintaining flexibility for future mitigation investments.

For MTARNG, expanded conservation buffers secure compatible land use, protect installation access and training infrastructure, and preserve operational flexibility by preventing encroachment that increases wildfire risk and evacuation conflicts. As a shared civilian–military resilience strategy, this action strengthens regional wildfire mitigation, supports REPI and DCIP objectives, and delivers durable public safety and mission assurance benefits across the FHTA and LHTA assessment area.

6. Comprehensive Hardening of Lifeline Roads and Critical Access Corridors

Description: Upgrade and harden critical lifeline road corridors serving the FHTA and LHTA assessment areas (Figure 14 and Figure 15) to ensure reliable ingress, egress, evacuation, and emergency response under wildfire, flood, post-fire runoff, and heavy-vehicle surge conditions. This action consolidates road, culvert, drainage, and slope-stabilization improvements into a coordinated, multi-hazard infrastructure hardening program focused on corridors that function as single points of access for civilian neighborhoods and military operations.

Priority corridors include Country Club Road, Williams Street (including the Williams Street Bridge), Old Woman’s Grave Road, and River Road. Engineering measures will include slope armoring, drainage redesign, 100-year flood–rated culvert replacement, debris-flow conveyance improvements, shoulder stabilization, and hardened all-weather surfacing capable of supporting mutual-aid engines, tenders, low-boy transports, and military vehicles during surge operations.

At FHTA, improvements will focus on Country Club Road and Williams Street to restore

dependable all-weather access to the main gate and reduce chronic erosion and washouts that repeatedly threaten operational continuity. Reinforcement or replacement of the Williams Street Bridge is a critical element of this effort, as the existing structure presents a load-bearing constraint for Type-3+ apparatus and military transport vehicles, limiting evacuation throughput and delaying resource arrival during wildfire or flood emergencies.

At LHTA, stabilization of Old Woman’s Grave Road and River Road is essential to preventing assessment-area isolation and ensuring uninterrupted wildfire suppression, aviation support, and emergency access. These corridors are highly vulnerable to post-storm washouts, debris accumulation, and culvert failures driven by steep terrain, post-fire runoff, and undersized drainage infrastructure. Improvements will prioritize culvert upsizing, armored drainage features, and hardened surfacing to maintain access during concurrent wildfire and flood conditions.

All corridor improvements will be designed to accommodate post-fire hydrology, extreme precipitation, and heavy vehicle loading rather than historic design assumptions. The program will be coordinated across county road departments, MDT, and DMA/MTARNG to ensure infrastructure standards support both civilian evacuation and military mission requirements.

Lead Partners: Lewis & Clark County Road Department, Broadwater County Road Department, MDT, City of Helena Utilities, MT DES, • MTARNG/DMA

Supporting Facts:

- Closure of Old Woman’s Grave Road in 2023 halted training operations for five days, demonstrating the corridor’s role as a single-access lifeline for LHTA (*DMA Range Operations Report, 2024*).
- Slope stabilization and road hardening costs have increased by approximately 30% since 2018, increasing long-term financial exposure if infrastructure vulnerabilities are not addressed proactively [*Lewis & Clark County Capital Improvement Plan (CIP), 2024*].
- Tri-County CWPP identifies Country Club Road, Williams Street, Old Woman’s Grave Road, and River Road as choke points for mutual-aid response, evacuation, and fire suppression access (*Tri-County CWPP, 2020*).
- Post-fire runoff, debris flows, and culvert failures along these corridors increase the likelihood of simultaneous wildfire, flood, and access disruption, compounding life-safety and mission-assurance risks.

Cost Estimate: \$5 million – \$8 million across the four priority corridors (Final costs dependent on culvert sizing, bridge reinforcement scope, and drainage redesign requirements)

Potential Funding: FEMA BRIC, DCIP, FEMA HMGP, MDT Transportation Alternatives Program

Mission & Community Benefit: Hardening lifeline roads preserves reliable evacuation routes, emergency response access, and infrastructure connectivity for residents, responders, and military operations under increasingly frequent wildfire and flood conditions. For surrounding communities, these upgrades reduce isolation risk, response delays, and infrastructure repair costs. For MTARNG, they ensure uninterrupted training access, rapid mobilization, and sustained mutual-aid capability—directly supporting mission readiness while strengthening regional resilience through shared civilian–military infrastructure investment.

7. Institutionalize Wildfire Risk Forecasting and Coordination

Description: Institutionalize a coordinated, annual wildfire risk forecasting and planning process to improve preparedness across communities, emergency responders, and MTARNG installations within the FHTA and LHTA assessment areas. This action formalizes the use of seasonal and short-term fire-risk intelligence to guide mitigation priorities, operational readiness, and resource alignment before peak fire conditions occur.

The process will integrate NOAA seasonal climate and fire-weather outlooks, Montana DNRC fire-risk projections, and Resilience Analysis and Planning Tool (RAPT) datasets into CWPP updates, county preparedness activities, and MTARNG training and operational planning. By using the same forecast inputs and risk indicators, civilian and military partners will operate from a shared understanding of evolving wildfire conditions, fuel loading, and compound hazard potential.

Annual regional wildfire and resilience coordination meetings will be convened prior to the fire season to review forecast conditions, update risk assumptions, and align mitigation investments and operational plans across counties, state agencies, and MTARNG. These meetings will support coordinated decision-making related to fuel treatments, prescribed fire timing, training schedules, resource staging, public outreach, and contingency planning for wildfire, smoke, drought, and post-fire flooding.

RAPT and related datasets will be refreshed following major wildfire or flood events to capture post-disturbance fuel and vegetation changes, ensuring that future planning reflects current on-the-ground conditions rather than outdated assumptions. This institutionalized process moves wildfire risk coordination from informal, ad hoc information sharing to a predictable, repeatable planning function.

Lead/Partners: DMA Resilience Office • NOAA • DNRC • Lewis & Clark DES • Broadwater DES

Funding: FEMA BRIC Planning • EMPG • OLDCC Technical Assistance

Mission & Community Benefit: Institutionalizing wildfire risk forecasting improves public safety and community preparedness by ensuring that residents, responders, and decision-makers are informed by the same, up-to-date risk intelligence before wildfire conditions escalate. Early alignment of forecasts with CWPP and local planning enables communities to prioritize fuel treatments, preparedness actions, and public messaging during the highest-risk periods, reducing the likelihood of surprise, delayed response, or conflicting decisions.

For local and state agencies, this approach improves coordination across jurisdictions, supports more efficient use of limited mitigation and response resources, and strengthens readiness for longer and more volatile fire seasons and convergent hazards such as drought, smoke, and post-fire flooding.

For MTARNG, shared wildfire risk forecasting supports training continuity, operational planning, and force protection by aligning schedules and activities with anticipated fire conditions. By operating from a common risk picture, civilian and military partners reduce conflict, improve mutual-aid effectiveness, and strengthen regional resilience—delivering durable preparedness benefits across the FHTA and LHTA assessment areas.

2. Aging and Hazard-Prone Infrastructure Threatens Emergency Response and Training Continuity

Findings:

Lifeline Road Vulnerability. Critical transportation corridors supporting FHTA and LHTA, including Country Club Road, Williams Street bridge (a structurally constrained single-span crossing), Old Woman's Grave Road, and River Road, remain narrow, erosion-prone, and structurally insufficient for sustained military and emergency operations. These routes function as shared civilian–military lifelines, carrying daily commuter traffic, evacuation flows, emergency response, and MTARNG mobilization on the same limited roadway network. In 2023, Old Woman's Grave Road was closed for five consecutive days following slope destabilization, halting MTARNG training and delaying redeployment during a readiness cycle. Both Williams Street and Country Club Road in Helena Valley require near-annual slope stabilization due to wildfire-related erosion, with maintenance costs rising over 30% since 2018 (Lewis & Clark County CIP, 2024). These roads, repeatedly flagged in Tri-county CWPP and MT DES mutual-aid plans, lack hard shoulders, dual lanes, and culvert capacity to handle flash flooding. The absence of parallel routes or engineered redundancy means that a single slope failure, washout, or debris-flow event can simultaneously restrict civilian evacuation, emergency response access, and military movement. River Road, intersecting flood-prone areas along the Missouri River and Canyon Ferry drainage, is periodically impassable after spring runoff, constraining fire apparatus and troop access to the LHTA perimeter (Broadwater County Growth Policy Addendum, 2024).

Utility Corridors at Risk. The FHTA electrical supply, routed through the Tenmile Substation and maintained by NorthWestern Energy, remains above-ground and non-hardened, vulnerable to wildfire, snow load, or storm events (Figure 10). Power redundancy is limited; a single-line failure can impact both training operations and the adjacent VA Medical Center. At LHTA, the situation is more acute as the site depends on a single overhead power line extending from the Townsend corridor, maintained by Vigilante Electric Cooperative (Figure 11). This line traverses steep, high-fuel terrain without secondary routing or underground protection, creating a single point of failure that has caused multiple outages during recent fire seasons (NorthWestern Energy Grid Reliability Report, 2024).

Limited Water and Communications Redundancy. At FHTA, drinking water is supplied from the Tenmile Creek watershed, which provides 70–80% of Helena's municipal water. This source has repeatedly suffered post-fire sedimentation and low-flow impacts following wildfire events to include the Park Creek Fire (2017) and Meriwether Fire (2007), reducing treatment plant capacity by 40% for several weeks (City of Helena Water Quality Reports, 2023; DNRC Renewable Resource Program Data).

At LHTA, no permanent utilities exist. Power (Figure 11) is supplied through the single rural feed. Water is drawn from a low-yield well located near the communications tower, which requires over 24 hours to recharge after full drawdown. This well supports limited training and emergency use but cannot sustain suppression or field operations. When depleted, water must be trucked from Townsend or Canyon Ferry, creating delays and cost burdens. The absence of hardened on-site storage or interconnection with county water systems leaves the range exposed during drought or wildfire response ([Annex D](#)).

Communications infrastructure across the LHTA assessment area is equally deficient. The existing tower's line-of-sight is obstructed by terrain, resulting in unreliable signal propagation and frequent dead areas across training blocks. Field personnel report intermittent VHF radio and cellular coverage, forcing reliance on portable repeaters and satellite systems. These limitations hinder coordination during regional and local emergencies and delay response times (JLUS 2014; NorthWestern Energy Broadband Initiative, 2024).

Erosion and Post-Fire Instability. Slope failures and sediment runoff following wildfire have repeatedly damaged roadways and drainage infrastructure. Fine fuel proliferation on denuded slopes accelerates erosion, compounding the maintenance burden on both counties. Between 2018 and 2023, cumulative repair costs for slope stabilization along Williams Street and Country Club Road increased by 28%, with average post-fire clearance delays of 24–48 hours per incident (Lewis & Clark County CIP, 2024; DNRC Watershed Division Data).

What Has Worked (and Why It Mattered)

- Incremental stabilization projects on Williams Street reduced road closure durations by 20% between 2020 and 2023, demonstrating that localized engineering improvements yield measurable continuity benefits.
- Temporary generator deployments during the 2022 Helena substation outage sustained FHTA and VA operations for 72 hours, validating short-term backup capacity.
- DES-led post-flood road clearance drills (2020) improved clearance times by 12 hours relative to 2016 events, proving the value of coordinated pre-disaster exercises (Lewis & Clark DES, 2021).

Quantified Vulnerabilities

- Three to five hazard-driven road closures annually (2018–2023).
- 70% of water sourced from a single, post-fire-sensitive watershed.
- 25–30% cost escalation for slope and culvert stabilization in five (5) years
- Zero redundant utilities at LHTA; well recharge greater than 24 hours.

Mission Assurance Implications (DMA)

Aging and hazard-prone infrastructure directly undermines the MTARNG's mission assurance. Corridor closures impede mobilization, single-line power and low-yield water systems create cascading dependencies, and communication shortfalls compromise coordination during emergency support to civil authorities. Without engineered redundancy, operational continuity at both installations remains contingent on reactive recovery rather than resilience.

Planning and Governance Gaps

Neither Lewis & Clark nor Broadwater County maintains a hazard-resilient CIP aligned with DMA mission priorities. TIPs emphasize urban growth corridors rather than high-risk lifelines, while alternate access routes remain unmapped and unclassified for emergency mobilization. County EOPs and DMA Continuity of Operations Plan (COOP) annexes lack road reclassification or

staging protocols for sustained response operations. Furthermore, utilities and DMA coordination occur post-event rather than through integrated pre-disaster investment planning (MDT STIP, 2023; MT DES Infrastructure Report, 2024).

Recommendations:

8. *Alternate Access and Road Reclassification Protocols*

Description: Develop and institutionalize pre-designated alternate access and evacuation corridors for communities and MTARNG facilities affected by wildfire, flooding, debris flows, and infrastructure failure. This action focuses on ensuring that residents, responders, and military units are not dependent on a single access route during emergencies that compromise primary roads serving the FHTA and LHTA assessment areas.

The effort will identify, map, and improve secondary gravel roads, agricultural spurs, and low-volume connectors that can serve as alternate access routes when primary corridors are closed or restricted. Improvements will include GIS-based route mapping, targeted widening of single-lane choke points, surface stabilization where needed, and installation of permanent emergency access signage to support rapid, safe use under emergency conditions.

To support consistent decision-making during evolving incidents, road reclassification and access control procedures will be codified within county EOPs and DMA Continuity of Operations annexes. These protocols will define triggers, authorities, and communication processes for changing road status, prioritizing emergency access, and coordinating closures or restrictions across jurisdictions.

The action will also establish joint county–MTARNG staging areas along key corridors to support rapid mobilization of emergency response, evacuation support, and mutual-aid resources when road access is constrained. Planning and implementation will be coordinated with county emergency management, MDT, and MT DES to ensure compatibility with transportation standards and emergency management doctrine.

Lead/Partners: DMA/MTARNG, Lewis & Clark & Broadwater County EMAs, MDT, MT DES.

Supporting Facts:

- No formally designated alternate access routes are currently identified in existing County CIPs or HMPs for areas surrounding FHTA and LHTA.
- Range and training operations at both installations depend on a single primary ingress route, creating vulnerability to isolation during wildfire, flood, or debris-flow events.

Cost Estimate: \$500,000 – \$750,000 (planning, GIS mapping, targeted road improvements, signage, and staging area identification)

Potential Funding: FEMA Emergency Management Performance Grant (EMPG); BRIC Capability & Capacity Building; OLDCC Technical Assistance.

Mission & Community Benefit: Establishing alternate access corridors and clear road reclassification protocols improves life safety for residents by ensuring reliable evacuation and emergency access when primary roads are compromised. Pre-identified routes and standardized access control procedures reduce confusion during emergencies, shorten decision timelines, and

support coordinated use of limited transportation infrastructure under wildfire, flood, or debris-flow conditions.

For communities and responders, this action strengthens resilience by reducing isolation risk, improving emergency response mobility, and enabling faster restoration of access following incidents. Clear signage and shared mapping improve situational awareness for both local responders and the public.

For MTARNG, alternate access planning protects training continuity, emergency response capability, and mission assurance by reducing reliance on single-access routes and improving coordination with county partners during road closures. As a shared civilian–military mitigation investment, this action enhances regional access resilience and supports safe, coordinated operations across the FHTA and LHTA assessment areas.

9. **Utility Corridor Reinforcement and Redundancy**

Description: Strengthen the resilience of shared electric and communications infrastructure serving FHTA and LHTA assessment area facilities by eliminating single-point failures and hardening utility corridors exposed to wildfire, flooding, and extreme weather. This action focuses on ensuring reliable power and communications for residents, healthcare facilities, emergency responders, and military operations within the FHTA and LHTA assessment areas.

In the FHTA assessment area, improvements will include undergrounding critical overhead power lines originating from the Tenmile Substation, elevating transformers and electrical components above mapped flood thresholds, and installing redundant fiber-optic connections to support continuity of operations, emergency communications, and coordination with county and state partners during incidents.

In the FHTA assessment area, where utility service is more limited and vulnerable, actions will include upgrading the single overhead power feed from Vigilante Electric Cooperative, installing localized microgrid or backup generation capacity, and replacing temporary or provisional hookups with hardened electrical infrastructure designed to withstand wildfire exposure, smoke impacts, and extended outage conditions.

Utility reinforcement will be coordinated with NorthWestern Energy, Vigilante Electric, Helena Utilities, county emergency management, and DMA to ensure improvements align with broader grid resilience strategies, critical facility protection priorities, and community emergency power needs. Design and phasing will prioritize facilities and corridors that support emergency response, evacuation coordination, water and wastewater systems, and healthcare operations.

Lead/Partners: NorthWestern Energy, Vigilante Electric Cooperative, Helena Utilities, DMA.

Supporting Facts:

- 70% of municipal power to FHTA relies on non-redundant overhead feeds (*NorthWestern Energy Reliability Report, 2024*).
- 2022 Helena substation failure forced 72-hour generator reliance at FHTA and VA Medical Center.
- LHTA line outages disrupted range power for 18 hours during 2023 fire activity.

Cost Estimate: \$12–\$15 million (utility undergrounding, redundancy, microgrid installation, and

hardened infrastructure).

Potential Funding: Department of Energy (DOE) Grid Resilience Grants; FEMA BRIC; USDA CWDG; Utility Cost-Share.

Mission & Community Benefit: Reinforcing utility corridors improves community safety and continuity by reducing the likelihood of extended power and communications outages during wildfire, flood, or extreme weather events. Reliable utility service supports residents, healthcare facilities, water and wastewater systems, and emergency responders when outages would otherwise compound life-safety risks and delay recovery.

For local governments and utilities, eliminating single-point failures reduces emergency repair costs, shortens outage duration, and strengthens system reliability in high-risk corridors. Hardened infrastructure also reduces ignition risk from overhead lines and improves coordination during public safety power shutoffs and restoration activities.

For MTARNG, utility redundancy and hardening protect continuity of operations, training readiness, and emergency response capability, ensuring installations can support both military missions and civilian mutual-aid operations during prolonged incidents. As a shared civilian–military infrastructure investment, this action strengthens regional resilience, safeguards critical services, and delivers long-term reliability benefits across the FHTA and LHTA assessment area.

10. *Water Supply and Storage Resilience*

Description: Develop and implement a comprehensive regional water supply redundancy and storage resilience program to eliminate single-source dependency and protect potable, firefighting, and mission-critical water supplies serving the FHTA and LHTA, the City of Helena, and surrounding communities. The program will address vulnerabilities caused by post-fire sediment loading, drought-driven baseflow reductions, infrastructure failures, and transportation disruptions that threaten shared civilian–military water systems.

The program will combine hardened storage, alternate source development, emergency interties, and mobile treatment and pumping capacity to ensure continuity of operations under wildfire, post-fire runoff, flood, drought, and extended power or access outages. For FHTA assessment area, the effort will focus on reducing reliance on Tenmile Creek by expanding off-channel storage, developing secondary surface-water or groundwater sources, and establishing emergency interties capable of maintaining minimum operational supply when primary intakes are compromised by turbidity or damage. Storage facilities will be designed to withstand wildfire exposure, seismic shaking, and prolonged outage conditions.

For LHTA assessment area, where no permanent potable or firefighting water infrastructure currently exists, the program will establish fixed and deployable water systems, including supplemental groundwater wells, hardened storage tanks, refill and pumping stations, and distribution points that reduce dependence on hauled water vulnerable to road closures and fuel disruptions. Mobile treatment and pumping units will be incorporated across the assessment area to support field operations, firefighting, and temporary base-camp needs during multi-day incidents or regional infrastructure failures.

All components will be planned and implemented as shared civilian–military infrastructure, coordinated with Helena Utilities, county emergency management, DNRC, and MTARNG to

ensure compatibility with emergency response, evacuation operations, and long-term capital improvement planning. The program will be structured to support phased implementation and grant eligibility under federal resilience and defense-community infrastructure programs.

Lead/Partners: Helena Utilities, DNRC, Lewis & Clark and Broadwater County DES, DMA/MTARNG, U.S. Bureau of Reclamation, Local Fire Districts

Supporting Facts:

- Approximately 90% of the City of Helena’s municipal water supply is derived from surface water, primarily Tenmile Creek, making the system highly vulnerable to post-fire sediment loading, turbidity spikes, and drought-related baseflow reductions (*City of Helena, 2023 Water System Master Plan*).
- Post-fire sediment events have reduced water-treatment production by 30–40%, particularly following wildfire and high-intensity precipitation events in the Tenmile watershed, constraining potable water availability during peak summer demand periods (*City of Helena Utilities operational data; Meriwether Fire post-fire assessments, 2007; Park Creek Fire impacts, 2017*).
- FHTA has no independent or alternate water source and is fully dependent on the Tenmile system; loss of that supply would directly affect training operations, firefighting capability, and emergency response readiness (*Montana Department of Military Affairs internal assessments; JLUS findings, 2014; DMA resilience analyses, 2023–2024*).
- LHTA lacks permanent potable or firefighting water infrastructure and relies entirely on hauled water, which is highly vulnerable to wildfire-related road closures, flooding, fuel shortages, and extended response times (*DMA/MTARNG training area infrastructure inventories; county emergency management interviews, 2023–2024*).
- Groundwater drawdown of 10–15 feet has been documented in portions of the Helena Valley aquifer system during recent drought years, indicating increasing stress on supplemental groundwater supplies during prolonged dry conditions (*U.S. Geological Survey groundwater monitoring data, 2021–2022*).
- Federal resilience guidance identifies single-source water dependency and lack of redundant storage as critical vulnerabilities for wildfire- and drought-prone communities, particularly where military installations rely on civilian systems (*FEMA BRIC Notice of Funding Opportunity, 2023; U.S. Bureau of Reclamation WaterSMART Program guidance*).

Cost Estimate:

- FHTA/Helena: \$5 million – \$7 million
- LHTA: \$1 million – \$2 million
- Costs vary based on storage capacity, well development, and intertie configuration

Potential Funding: FEMA BRIC , FEMA HMGP U.S. Bureau of Reclamation WaterSMART Drought Resiliency Program, DNRC Renewable Resource Grant and Loan Program, DoW REPI, OLDCC DCIP

Mission & Community Benefit: This consolidated program strengthens water reliability for residents, emergency services, and military operations by ensuring redundant, resilient supply and

storage under increasingly volatile wildfire, flood, and drought conditions. By eliminating single-source dependencies and reducing reliance on emergency hauling, the program lowers response costs, protects public health, preserves evacuation and firefighting capacity, and safeguards MTARNG training and mission readiness. The shared-infrastructure approach enhances civilian–military coordination while creating a durable foundation for long-term watershed and resilience investments.

11. Communications and Tower Hardening

Description: Improve the reliability and redundancy of public safety and emergency communications serving surrounding communities and MTARNG facilities by hardening communications infrastructure and extending broadband connectivity to the FHTA and LHTA assessment areas. This action addresses persistent coverage gaps that limit emergency coordination, responder safety, and situational awareness during wildfire, flood, and other large-scale incidents.

In the LHTA assessment area, rugged terrain and line-of-sight constraints create significant radio and cellular blind areas across training blocks and adjacent response corridors. The project will construct an additional line-of-sight relay tower, upgrade the existing mountaintop repeater, and install redundant power systems with battery storage to ensure continuous operation during utility outages and wildfire-related disruptions. These improvements will stabilize voice and data communications for responders, dispatch centers, and mutual-aid partners operating in and around the training area.

In the FHTA assessment area, the project will extend fiber-optic connectivity to improve bandwidth, redundancy, and interoperability with county and state emergency communications systems. Fiber expansion will support FirstNet-enabled services, real-time data sharing, and coordination between local agencies, state partners, and MTARNG during emergencies.

All infrastructure improvements will be coordinated with state broadband planning, utility providers, and public safety partners to ensure compatibility with existing systems and maximize shared community benefit.

Lead/Partners: DMA, FirstNet Authority, Montana Department of Administration Broadband Program, NorthWestern Energy.

Supporting Facts:

- Existing LHTA tower provides intermittent coverage due to line-of-sight obstruction (*JLUS 2014*).
- Fiber expansion west of Helena (2024) has not yet reached training corridors (*MT Broadband Office, 2025*).

Cost Estimate: \$1.5 million – \$2 million (tower construction, repeater upgrades, fiber extension, and backup power systems).

Potential Funding: FEMA Capability and Capacity Building (C&CB); BEAD Broadband Program; DHS Regional Catastrophic Preparedness Grant Program (RCPGP); DCIP (Critical Communications).

Mission & Community Benefit: Hardened communications infrastructure improves life safety and emergency response effectiveness by ensuring that residents, responders, and dispatch centers can communicate reliably during wildfire, flood, and power outage conditions. Closing coverage gaps reduces responder risk, improves evacuation coordination, and supports faster, more coordinated response across jurisdictions.

For communities, expanded broadband and resilient communications support not only emergency operations but also long-term connectivity, economic resilience, and access to services in rural areas. Reliable communications infrastructure strengthens coordination among fire districts, law enforcement, EMS, utilities, and emergency managers before, during, and after disasters.

For MTARNG, improved communications and redundancy support training safety, command and control, and continuity of operations, ensuring installations can operate effectively during emergencies and support civilian mutual-aid missions. As shared civilian–military infrastructure, hardened towers and fiber connectivity strengthen regional resilience and provide durable public safety benefits across the FHTA and LHTA assessment areas.

12. *Joint Integrated Capital Improvement and Mitigation Framework*

Description: Establish a Joint Capital Investment Working Group to align hazard mitigation, transportation, utility, and land-use investments across MTARNG, state agencies, counties, and utility providers serving the FHTA and LHTA assessment areas. The purpose of the program is to ensure that future capital investments reduce disaster risk, strengthen shared infrastructure, and support safe community growth—rather than reacting to damage after disasters occur.

The working group will include representatives from MTARNG, MDT, county governments, emergency management, and utility providers, and will operate as a standing coordination body rather than an ad hoc committee. The group will integrate hazard-resilient project criteria into county Growth Policies, zoning updates, and CIPs, ensuring that transportation and utility projects account for wildfire, flooding, post-fire runoff, access reliability, and evacuation needs.

Through coordinated planning, the working group will identify priority corridors, utilities, and facilities where investments can deliver shared benefits for residents, emergency responders, and military operations. This framework will improve sequencing of projects, reduce duplication, and position counties to leverage federal funding—including FEMA BRIC, Defense Community Infrastructure Program (DCIP), and DoW REPI—by demonstrating integrated planning, readiness, and cross-jurisdictional coordination.

Lead/Partners: DMA/MTARNG, MDT, Lewis & Clark County, Broadwater County, MT DES, NorthWestern Energy.

Supporting Facts:

- Existing county and utility capital plans do not systematically integrate military readiness or hazard-resilience criteria, limiting opportunities for coordinated risk reduction and grant leverage.
- MT DES reports that many road and utility investments occur after disaster damage, rather than through proactive mitigation planning, increasing long-term costs and recovery time (MT DES Report, 2024).

Cost Estimate: \$250,000 – \$400,000 (working group facilitation, technical analysis, policy

integration, and capital planning support).

Potential Funding: OLDCC Technical Assistance; FEMA Capability & Capacity Building; DHS RCPGP.

Mission & Community Benefit: This action improves community safety and infrastructure reliability by ensuring that roads, utilities, and growth decisions are designed to withstand known hazards rather than repaired repeatedly after disasters. For residents, integrated capital planning reduces evacuation bottlenecks, service outages, and access failures during wildfire, flood, and extreme weather events—while supporting safer, more predictable development patterns.

For local governments and utilities, the program reduces long-term costs by prioritizing pre-disaster mitigation, improving coordination across agencies, and strengthening eligibility for competitive federal funding. Clear resilience criteria also increase transparency and accountability in capital investment decisions.

For MTARNG, aligning civilian capital planning with military mission needs protects installation access, training continuity, and emergency response capability without shifting risk onto surrounding communities. As a shared civilian–military planning framework, the Joint Capital Investment Working Group delivers durable resilience benefits that strengthen regional infrastructure, reduce disaster losses, and support mission assurance across the FHTA and LHTA assessment areas.

13. *Transportation Buffer and Easement Preservation*

Description: Utilize Readiness and Environmental Protection Integration (REPI) easement funds to establish permanent buffer areas that protect critical emergency-access corridors, evacuation routes, and training range perimeters serving surrounding communities and Montana Army National Guard (MTARNG) installations. These buffers are intended to preserve safe mobility during wildfire and other emergency responses while limiting incompatible development in high-risk interface areas.

Priority will be given to corridors experiencing increasing residential encroachment, including Country Club Road, Barrett Road, and other primary access routes serving the FHTA and LHTA assessment areas. Easements will secure land adjacent to these routes to maintain open sightlines, access widths, and defensible space needed for fire apparatus movement, evacuation traffic, and responder staging during incidents.

Within protected corridors, easement terms will support wildfire fuel reduction, rights-of-way clearing, and ongoing vegetation management to reduce ignition risk and improve firefighter safety. Development restrictions will limit subdivision density, structural placement, and access configurations that increase evacuation constraints or interfere with emergency operations. Easements will be structured to allow compatible uses such as agriculture, grazing, recreation, and conservation, consistent with county growth policies and community values.

All acquisitions will be coordinated with county planning departments, CWPP priorities, and conservation partners to ensure buffers align with long-term land-use planning, wildfire mitigation goals, and civilian–military compatibility objectives.

Lead/Partners: DMA/MTARNG, Prickly Pear Land Trust (PPLT), Broadwater, Lewis & Clark County Planning Departments, and local Fire Districts.

Supporting Facts:

- Residential growth along Country Club Road and Barrett Road has increased wildfire ignition risk and reduced effective access width for fire apparatus, constraining response and evacuation operations during incidents.
- REPI-funded CUBs have already preserved more than 1,500 acres near FHTA, demonstrating the effectiveness of easements in limiting encroachment and protecting shared access corridors (*REPI Annual Report, 2024*).

Cost Estimate: \$3 million – \$5 million per easement corridor (5–10 miles , including acquisition and initial stewardship).

Potential Funding: DoW REPI; USDA Forest Legacy; OLDCC DCIP Resilience Integration.

Mission & Community Benefit: Establishing permanent emergency-access buffer corridors improves community safety and evacuation reliability by preserving open, defensible land along roads that residents and responders depend on during wildfire and other emergencies. By preventing high-risk development and supporting fuel management along these corridors, communities reduce ignition probability, improve firefighter access, and maintain safer evacuation conditions during fast-moving events.

For counties, REPI easements provide a voluntary, cost-effective tool to manage growth in hazardous areas, reduce long-term wildfire suppression and recovery costs, and maintain rural character while respecting private property rights.

For MTARNG, protected buffer corridors safeguard installation access, training range perimeters, and emergency response mobility, reducing encroachment conflicts and ensuring that civilian development does not compromise mission readiness. As shared civilian–military mitigation infrastructure, REPI-funded easements deliver durable, landscape-scale resilience benefits that strengthen public safety, land-use compatibility, and mission assurance across the FHTA and LHTA assessment area.

14. Interlocal MOUs for Route Maintenance and Emergency Access

Description: Establish and formalize interlocal MOUs under the MERF to clearly define responsibilities for debris clearance, snow removal, emergency road repair, and route prioritization during wildfire, flood, winter storm, and multi-hazard incidents affecting communities and MTARNG installations. This action ensures that residents, responders, and critical services can rely on consistent access when primary transportation routes are disrupted.

The MOUs will clarify roles, authorities, and coordination procedures among MTARNG, the MDT, and local governments in Lewis & Clark and Broadwater Counties, reducing delays and confusion during rapidly evolving incidents. Agreements will address how routes are prioritized for clearance, how resources are requested and deployed, and how costs and liabilities are managed when multiple agencies operate on the same corridors.

A joint “Route Readiness Table” will be established and reviewed semiannually to identify priority evacuation routes, emergency access corridors, utility service roads, and installation access points. The table will document current conditions, maintenance responsibilities, seasonal vulnerabilities, and trigger thresholds for emergency action. Integration with GIS routing and emergency management platforms will ensure shared situational awareness before and during incidents.

By codifying expectations and procedures in advance, these MOUs replace ad hoc coordination with a predictable, interoperable framework that supports faster access restoration and safer emergency operations across shared civilian–military transportation networks.

Lead/Partners: DMA/MTARNG; MDT; Lewis & Clark and Broadwater County DES.

Supporting Facts:

- After-Action Reports (2021–2023) document inconsistent debris clearance and maintenance coordination during concurrent wildfire and flood events, contributing to delayed access restoration and response challenges.
- Integration under the Montana Emergency Response Framework (MERF) provides established mechanisms for cost-sharing, mutual aid, and liability protection when agencies support one another during emergencies.

Cost Estimate: \$75,000 – \$150,000 (legal drafting, interagency coordination workshops, GIS route integration, and maintenance of the Route Readiness Table).

Potential Funding: FEMA BRIC C&CB; DHS RCPGP; State MERF Cooperative Agreements.

Mission & Community Benefit: Formalizing interlocal MOUs for route maintenance and emergency access improves life safety and evacuation reliability by ensuring that debris removal, snow clearance, and emergency repairs occur quickly and predictably on the routes residents and responders depend on. Clear roles and priorities reduce delays during emergencies, helping communities regain access to homes, healthcare, utilities, and employment more rapidly after disasters.

For local governments and transportation agencies, predefined agreements reduce administrative friction, improve cost recovery, and strengthen coordination across jurisdictional boundaries—particularly during complex, multi-hazard events.

For MTARNG, standardized access and maintenance protocols protect installation access, training continuity, and emergency response capability, ensuring military resources can support civilian mutual aid without access constraints. As shared civilian–military infrastructure agreements, these MOUs strengthen regional resilience, improve recovery timelines, and deliver durable benefits across the FHTA and LHTA assessment area.

15. *Regional Resilience Portal – Evacuation and Slope Monitoring Integration*

Description: Integrate real-time evacuation mapping, road condition status, and slope-failure monitoring into the Regional Resilience Portal to provide a shared, continuously updated situational awareness tool for communities, emergency responders, and MTARNG installations within the FHTA and LHTA assessment areas. This action focuses on improving decision-making during rapidly evolving wildfire, flood, debris-flow, and infrastructure-failure events that affect shared evacuation routes and access corridors.

The portal will consolidate evacuation zones, road closures, access restrictions, and alternate route status into a single, GIS-enabled dashboard accessible to DMA, county and EOCs, MDT, and dispatch centers. Data feeds will be synchronized from MDT road sensors, traffic and maintenance

systems, USGS stream and slope monitoring gauges, and county GIS layers, ensuring all partners operate from the same real-time information during emergencies.

Slope and ground-movement alerts will be integrated to identify landslide-prone hillslopes, post-fire debris-flow risks, and infrastructure-adjacent slope failures that can rapidly compromise roads and evacuation routes. The system will support pre-event monitoring, active incident management, and post-event assessment, allowing agencies to proactively reclassify routes, issue evacuation guidance, and stage resources before conditions become life-threatening.

Role-based access controls will allow detailed operational views for emergency managers and responders, while public-facing map products can be generated to support consistent evacuation messaging without exposing sensitive infrastructure or military data. Integration will be coordinated with existing Regional Resilience Portal governance to ensure data standards, update protocols, and long-term sustainability.

Lead/Partners: DMA/MTARNG, MT DES, MDT, County EMs, County GIS Divisions and USGS.

Supporting Facts:

- An April 2024 PSAP outage and a 2023 slope failure affecting regional access routes highlighted the absence of a unified, real-time situational awareness platform for evacuation and access decision-making. (*Lewis & Clark County Emergency Communications incident reports, April 2024; MDT incident logs, 2023; County After-Action Reviews, 2023–2024*).
- Current evacuation, road condition, and slope monitoring data are distributed across multiple systems, requiring manual coordination during emergencies and increasing the risk of delayed or conflicting decisions. (*Montana Disaster & Emergency Services interoperability assessments; MDT Transportation Systems Management and Operations documentation; County Emergency Operations Plan reviews, 2023–2024*).
- FEMA BRIC C&CB guidance emphasizes integrated data platforms, real-time monitoring, and shared dashboards as core performance indicators for regional resilience investments. (*FEMA, Building Resilient Infrastructure and Communities (BRIC) Notice of Funding Opportunity, Capability & Capacity Building section, FY 2023–2024; FEMA Hazard Mitigation Assistance Guidance*).

Cost Estimate: \$400,000 (system design, data integration, dashboard development); \$50,000 – \$75,000 annually (maintenance, data feeds, updates, and user support).

Potential Funding: FEMA BRIC C&CB; DHS RCPGP; USGS Hazards Program.

Mission & Community Benefit: Integrating evacuation and slope monitoring into the Regional Resilience Portal improves life safety and evacuation reliability by giving communities and responders real-time visibility into road conditions, emerging slope failures, and access constraints before routes become impassable. Faster, better-informed decisions reduce the risk of residents being directed into unsafe corridors and support timely evacuation and sheltering actions.

For emergency managers and transportation agencies, a unified dashboard reduces information gaps, improves coordination across jurisdictions, and supports proactive route reclassification and

resource staging during complex, multi-hazard incidents.

For MTARNG, shared situational awareness strengthens installation access, emergency response coordination, and continuity of operations during wildfire, flood, and debris-flow events. As a shared civilian–military capability, the integrated portal enhances regional resilience, improves operational clarity under stress, and delivers durable preparedness benefits across the FHTA and LHTA assessment areas.

3. Insecure Funding and Expiring Local Programs Jeopardize Land Protection and Resilience

Findings

Dependence on Limited and Expiring Local Match: Lewis & Clark County’s progress in securing land in assessment areas, wildfire fuel breaks, and watershed protections has relied heavily on a complex blend of federal, state, and local programs, including REPI, FEMA HMGP, CWDG, and the Lewis & Clark County Open Space Bond. Collectively, these streams have enabled the protection of more than 5,000 acres of buffer lands near FHTA and LHTA assessment areas (PPLT Annual Report, 2025). These funding mechanisms function as a shared civilian–military resilience backbone, supporting land-use compatibility, access protection, and defensible space critical to both community safety and MTARNG mission assurance.

However, these sources are not permanent. The Open Space Bond sunsets in 2025, removing the assessment areas’ only local match fund. Furthermore, the FY26 REPI guidance projects lower growth and higher competition for DoW conservation partnerships (REPI Annual Report, 2024). Broadwater County has no equivalent local bond, resulting in lost opportunities to secure federal match and safeguard high-risk areas along the US-287, Canyon Ferry, and River Road corridors. The absence of a stable local match structure exposes both counties to funding discontinuities that directly affect readiness-related land protection timelines.

Funding Cliff and Pipeline Risk. Loss of local match funding may strand millions in federal resilience dollars unless new funding sources are found or landowners donate larger land values. The absence of a dedicated county-level fund leaves over 5,000 acres of identified assessment area priority parcels and more than 10 miles of fuel breaks ineligible for rapid acquisition or maintenance. Short federal grant obligation windows (typically 12–24 months) are poorly aligned with appraisal, negotiation, and closing timelines for large or multi-owner parcels, creating a structural mismatch between funding availability and land protection readiness. Without local bridge financing or quick-close mechanisms, assessment area lands risk being sold for residential development, fragmenting defensible space and undermining MTARNG training buffers.

Lewis & Clark Open Space Bond previously supplied the required 10–30% non-federal match for FEMA, REPI, and USDA programs, unlocking \$3–4 in federal funds for every local dollar invested. Its absence will erode leverage, lower BRIC and DCIP competitiveness, and reduce the county’s ability to co-fund re-treatments of shaded fuel breaks, watershed stabilization, and corridor easements. Broadwater County has never utilized a locally dedicated matching fund of this type, limiting its eligibility for competitive federal resilience funding that increasingly prioritizes demonstrated local investment and long-term maintenance capacity.

Operational and Mission Assurance Consequences. The Lewis & Clark County bond has lapsed without replacement, range-adjacent lands near the South Hills could continue to develop and transition to low-density “ranchette” subdivisions, introducing ignition sources, obstructing prescribed burns, and compromising defensible space along FHTA north and northeast perimeters. At LHTA, absence of a dedicated match fund will prevent proactive acquisition of buffer parcels critical to wildfire ingress routes including Old Woman’s Grave Road, the Silos and Canyon Ferry corridor. These funding gaps increase the likelihood of training interruptions, delayed mobilization, reduced evacuation reliability, and expanded civilian exposure within shared assessment-area lifelines.

[Annex M](#) has additional details relevant to expiring funding and programs.

Quantified Consequences

- \$2–3 million annual local match gap could forfeit \$8–12 million in eligible federal resilience funding.
- More than 5,000 acres of high-priority buffer land remain unprotected in Lewis & Clark and Broadwater Counties.
- Fuel break re-treatment lapse (3–5 years) will result in vegetation rebound and erosion along key corridors.
- [Assessment area](#) lands near U.S. Highway 287 and South Hills face rising land values (15–25% annual escalation) and speculative development.

Governance and Structural Gaps

Both counties lack a dedicated resilience finance mechanism aligned with mitigation or growth policies. Lewis & Clark County’s Open Space Bond historically filled this gap by providing local flexibility for acquisitions, stewardship, and O&M costs rarely eligible under FEMA or DoW programs. Broadwater County, however, cannot raise the 25–50% match typically required for acquisitions, making it reliant on federal timing and landowner donation or bargain-sale participation instead of cash match. Because donated value is often financially infeasible for private landowners, these transactions fail to close at a much higher rate. Without new voter-approved or legislative funding, the assessment areas’ capacity to sustain mitigation gains, maintain fuel breaks, or expand defensible buffers will erode within two years of the bond’s expiration.

Recommendations

16. *Establish a Permanent Compatible Use and Resilience Fund*

Description: Establish a permanent Compatible Use and Resilience Fund in Lewis & Clark and Broadwater Counties to support proactive, locally driven investments that reduce wildfire, flood, and watershed risk while preserving safe access, evacuation reliability, and compatible land use around the FHTA and LHTA assessment areas. The fund would provide a flexible, ready source of local capital to advance land acquisition (fee simple or conservation easement), fuels-reduction re-treatments, and watershed protection projects that benefit both residents and critical infrastructure.

The fund would function as a rapid-response local match and bridge mechanism, allowing counties and partners to move quickly when landowners are willing sellers, fuels treatments need re-entry, or watershed protection actions are time-sensitive—without waiting for federal grant award cycles. This approach addresses a recurring challenge where opportunities for risk reduction are lost due to mismatched timelines between federal programs and on-the-ground needs.

Investments would be coordinated with county Growth Policies, CWPP priorities, HMPs, and MTARNG compatibility objectives to ensure projects deliver shared community benefits and align with long-term resilience goals.

Lead/Partners: Lewis & Clark County, Broadwater County, DMA/MTARNG, PPLT, TPL, County Commissions.

Supporting Facts:

- The 2018–2025 Lewis & Clark County Open Space Bond financed protection of more than 4,000 acres, including CUB lands, and enabled approximately \$20 million in leveraged federal resilience and conservation investments (*PPLT Annual Report, 2025*).
- Federal acquisition, fuels, and watershed programs often require local match and rapid commitment, which counties cannot reliably provide without a dedicated funding mechanism, resulting in missed or delayed mitigation opportunities.

Cost Estimate: \$3 million annually (program capitalization and project deployment) plus \$150,000 one-time per county (ballot development, legal review, and bond issuance costs).

Potential Funding: Local bond proceeds, county mill levies, state resilience appropriations, leveraged with federal acquisition programs like REPI, NRCS ACEP-ALE, FEMA BRIC/HMGP, and USDA watershed and wildfire mitigation programs.

Mission & Community Benefit: A permanent Compatible Use and Resilience Fund improves community safety and long-term risk reduction by enabling counties to act quickly on land protection, fuel management, and watershed projects that reduce wildfire spread, protect evacuation routes, and safeguard water resources. For residents, the fund supports safer development patterns, preserves open space and working lands, and reduces the likelihood of repeated disaster losses and costly emergency responses.

For counties, a dedicated fund provides financial flexibility, strengthens grant competitiveness, and reduces reliance on post-disaster funding cycles by prioritizing pre-disaster mitigation. It also improves transparency and accountability by creating a clear, locally controlled mechanism for resilience investment.

For MTARNG, the fund supports compatible land use, access reliability, and mission assurance by preventing encroachment, sustaining fuel treatments, and protecting shared watersheds and infrastructure critical to training and emergency response. As a shared civilian–military investment tool, the fund delivers durable, locally driven resilience benefits that strengthen public safety, environmental stewardship, and operational readiness across the FHTA and LHTA assessment areas.

17. Secure Multi-Year Funding Agreements

Description: Develop a multi-year Cooperative Agreement or Cost-Share Framework to coordinate land acquisition, wildfire fuels treatment, and long-term stewardship priorities across MTARNG, OSD-REPI, Montana DNRC, and county partners serving the FHTA and LHTA assessment areas. The purpose of the framework is to provide stability, predictability, and coordination for resilience investments that protect communities, evacuation routes, watersheds, and compatible land use surrounding military installations.

The framework will establish shared priorities, sequencing, and roles for conservation easements, fee-simple acquisitions, fuels reduction, re-treatments, and stewardship activities across multiple years, rather than relying on one-off project agreements tied to individual grant cycles. This approach mirrors successful REPI partnership models used at Joint Base Lewis-McChord (WA), Camp Ripley (MN), Eglin Air Force Base (FL), and Camp Roberts (CA), where partners align work plans, diversify match sources, and sustain participation even when annual REPI funding levels fluctuate.

Importantly, the agreement will not guarantee future REPI awards, but will pre-position projects, standardize coordination processes, and allow counties and conservation partners to act quickly when funding opportunities arise or landowners are ready to proceed.

Lead/Partners: MTARNG, DoW OSD-REPI, DNRC, Lewis & Clark and Broadwater Counties.

Supporting Facts:

- REPI investments in Montana totaled approximately \$12 million between 2010 and 2022, but national REPI allocations are projected to decline by approximately 6% in FY26, increasing competition and uncertainty for future awards (*REPI Annual Report, 2024*).
- Established REPI partnerships at Joint Base Lewis-McChord, Camp Ripley, and Eglin AFB operate under recurring multi-year cooperative frameworks, which align partner priorities, pre-position projects, and stabilize participation without guaranteeing future funding.
- Multi-year frameworks allow partners to maintain momentum and readiness during funding gaps, rather than restarting coordination with each grant cycle.

Cost Estimate: Approximately \$100,000 for framework development, partner coordination, stewardship and acquisition planning.

Potential Funding: REPI, OLDCC-DCIP, State Resilience Allocations.

Mission & Community Benefit: A multi-year cooperative framework improves community safety and long-term resilience by ensuring that land protection, fuels management, and stewardship projects are coordinated, sustained, and aligned with local priorities rather than driven by short-term funding cycles. For residents, this approach supports predictable wildfire mitigation, protects evacuation routes and watersheds, and preserves open space and working lands that reduce disaster risk over time.

For counties and state agencies, the framework reduces administrative inefficiencies, improves cost-share coordination, and strengthens competitiveness for limited federal funding by demonstrating organized, multi-partner commitment to resilience and compatible land use.

For MTARNG, the agreement supports mission assurance and operational flexibility by stabilizing compatible land use buffers, sustaining fuels treatments, and preventing encroachment that

increases wildfire and access risk. As a shared civilian–military planning mechanism, the framework delivers durable, landscape-scale benefits that strengthen public safety, environmental stewardship, and readiness across the FHTA and LHTA assessment area.

18. *Integrate Conservation Acquisitions into Hazard Mitigation Planning*

Description: Amend county HMPs, CWPP, and Growth Policies to formally recognize fee-title and conservation easement acquisitions as eligible, implementable mitigation actions for wildfire risk reduction, floodplain protection, watershed resilience, and evacuation reliability within the FHTA and LHTA assessment areas.

This action ensures that land conservation is treated not solely as an environmental or open-space strategy, but as a core hazard mitigation tool that reduces exposure, limits future losses, and protects critical access corridors, water supplies, and defensible space. Updated plans will explicitly identify priority acquisition areas based on hazard exposure, post-fire flood and debris-flow risk, wildfire behavior modeling, and proximity to evacuation routes and shared civilian–military infrastructure.

By embedding conservation acquisitions into FEMA-approved planning documents, counties will be able to advance acquisitions through FEMA Hazard Mitigation Assistance programs, including BRIC and HMGP, while aligning those investments with CWPP priorities and long-term land-use planning objectives. Plan updates will clarify how acquisitions reduce risk, define eligibility criteria, and establish implementation pathways that integrate county planning departments, emergency management, conservation partners, and MTARNG compatibility goals.

Lead/Partners: County DES and Planning Departments, DMA/MTARNG, FEMA Region VIII.

Supporting Facts:

- FEMA policy explicitly recognizes conservation easements and fee-title acquisition as eligible hazard mitigation measures when tied to documented hazard exposure and risk reduction outcomes (*FEMA Policy FP-108-024-02, 2021*).
- Conservation acquisitions reduce long-term disaster losses by removing development from high-risk wildfire, floodplain, and post-fire debris-flow areas, while preserving evacuation corridors and defensible space.

Cost Estimate: \$500,000 – \$2 million per project depending on acreage.

Potential Funding: FEMA BRIC, HMGP, USDA CWDG, REPI.

Mission & Community Benefit: Integrating conservation acquisitions into hazard mitigation planning improves community safety and long-term risk reduction by proactively limiting development in the areas most vulnerable to wildfire, flooding, and post-fire watershed impacts. For residents, this approach reduces future disaster losses, preserves safe evacuation routes, and protects water resources and open space that contribute to quality of life and local economies.

For counties, formal recognition of acquisitions as mitigation actions strengthens eligibility for federal funding, improves plan defensibility during FEMA review, and aligns hazard mitigation, land-use planning, and conservation investments under a single, coordinated framework. This reduces reliance on post-disaster funding and supports predictable, pre-disaster risk reduction.

For MTARNG, integrating acquisitions into HMPs and CWPP supports compatible land use, access reliability, and mission assurance by preventing encroachment into high-risk areas surrounding training lands and shared infrastructure. As a shared civilian–military mitigation strategy, this action delivers durable, landscape-scale resilience benefits that strengthen public safety, environmental stewardship, and operational readiness across the FHTA and LHTA assessment area.

19. Strengthen Intergovernmental and Stewardship Agreements

Description: Develop formal, multi-party cooperative and stewardship agreements among the Montana Army National Guard (MTARNG), Prickly Pear Land Trust (PPLT), Montana Department of Natural Resources and Conservation (DNRC), and the U.S. Forest Service (USFS) to better coordinate land acquisition, fuels management, and long-term stewardship activities that reduce wildfire and watershed risk across the FHTA and LHTA assessment areas.

These agreements will move existing collaboration from project-specific or informal coordination to a structured, predictable framework that synchronizes acquisition priorities, stewardship responsibilities, and funding strategies across partners. The framework will clarify roles for post-acquisition land management, including fuels reduction, re-treatment cycles, access maintenance, and monitoring, ensuring that conserved lands continue to function as effective wildfire buffers, evacuation corridors, and watershed protection areas over time.

The agreements will also establish mechanisms for shared funding pools and coordinated match strategies, allowing partners to leverage REPI, REPI Challenge, USDA Forest Legacy, and other federal and state programs more effectively. By aligning timelines, stewardship standards, and reporting requirements, partners can reduce administrative duplication and act more quickly when landowner opportunities or hazard mitigation needs arise.

Coordination under these agreements will be aligned with county Growth Policies, CWPP priorities, HMPs, and MTARNG compatibility objectives to ensure that conservation and stewardship investments deliver tangible public safety and resilience benefits for surrounding communities.

Lead/Partners: MTARNG, PPLT, DNRC, USFS and County Planning and Emergency Management (as coordinating partners).

Supporting Facts:

- More than 4,000 acres of REPI- and PPLT-supported acquisitions have reduced wildfire ignition risk and limited incompatible development near FHTA and LHTA; however, stewardship coordination across ownerships remains largely project-by-project rather than programmatic (*Prickly Pear Land Trust Annual Reports, 2019–2024; U.S. Department of Defense Readiness and Environmental Protection Integration (REPI) Annual Reports, 2019–2024; Lewis & Clark County and Broadwater County planning and land-use compatibility project summaries*).
- Long-term effectiveness of conservation and buffer lands depends on ongoing fuels management, access maintenance, and coordinated stewardship, which are not consistently funded or governed under current arrangements. (*U.S. Forest Service Community Wildfire Protection Plan Guidance; FEMA Hazard Mitigation Assistance Guidance; U.S. Government Accountability Office, Wildland Fire Management: Additional Actions Needed*)

to Strengthen Federal, State, and Local Coordination, GAO-21-818; Montana DNRC Fuels Management and Stewardship Program reviews).

Cost Estimate: \$250,000 (agreement development, partner coordination, stewardship framework design, and annual monitoring protocols) Land acquisition and treatment costs are addressed under separate actions.

Potential Funding: REPI and USDA Forest Legacy.

Mission & Community Benefit: Strengthening intergovernmental and stewardship agreements improves community safety and long-term wildfire resilience by ensuring that conserved lands and buffer areas remain actively managed, accessible, and effective in reducing fire spread, protecting evacuation routes, and safeguarding watersheds. For residents, coordinated stewardship translates into more reliable fuel treatments, reduced ignition risk, and sustained protection of open space that supports public safety and local quality of life.

For counties and conservation partners, formal agreements reduce fragmentation, improve cost-share efficiency, and create a stable framework for long-term land management and funding leverage. This coordinated approach ensures that past and future investments continue to deliver risk-reduction benefits rather than degrading over time due to inconsistent maintenance.

For MTARNG, synchronized acquisition and stewardship agreements protect installation access, training range perimeters, and mission readiness by preventing encroachment and ensuring that surrounding lands function as effective compatible-use buffers. As a shared civilian–military governance mechanism, these agreements deliver durable, landscape-scale resilience benefits that strengthen public safety, environmental stewardship, and operational assurance across the FHTA and LHTA assessment area.

20. Develop a Regional Resilience Finance Strategy

Description: Develop a formal, multi-jurisdictional Regional Resilience Finance Strategy to coordinate, prioritize, and sustain funding for wildfire, flood, watershed, infrastructure, and compatible-use mitigation projects across the FHTA and LHTA assessment area. The strategy will align Lewis & Clark County, Broadwater County, MTARNG/DMA, DNRC, conservation partners, and charitable grants from nonprofit and community organizations under a shared financial framework that supports pre-disaster investment rather than post-disaster recovery.

The strategy will establish annual match and leverage targets, identify eligible local, state, federal, and private funding sources, and define protocols for stacking and braiding funds across programs such as FEMA BRIC/HMGP, DoW REPI, OLDCC DCIP, USDA, and state resilience grants. A standardized tracking system will document dollars invested, match sources used, and federal leverage achieved, improving transparency and competitiveness for future grant applications.

An annual “Regional Resilience Finance Report” will be produced to summarize investments, leveraged funds, unfunded priorities, and upcoming grant opportunities. This report will directly inform county CIPs, CWPP and HMP mitigation strategies, REPI partnership planning, and DMA mission-assurance investments, ensuring financial decisions reinforce shared resilience objectives

Lead/Partners: DMA/MTARNG, Lewis & Clark and Broadwater Counties, DNRC, PPLT, regional foundations.

Supporting Facts:

- The Lewis & Clark County Open Space Bond (2018–2025) financed more than 4,000 acres of compatible-use and conservation acquisitions and enabled approximately \$20 million in leveraged federal and state funding, demonstrating the effectiveness of coordinated local match strategies (*PPLT Annual Reports, 2019–2025*).
- With the expiration of the Open Space Bond, no standing regional finance mechanism currently exists to replace lost match capacity, creating increased risk to REPI, BRIC, and other competitive funding opportunities.
- FEMA BRIC Capability & Capacity Building guidance emphasizes financial planning, match readiness, and documented leverage strategies as indicators of institutional resilience and grant readiness.
- OLDCC and DoW REPI guidance both identify pre-positioned local and regional match as a critical success factor for sustaining long-term defense-community resilience investments.

Cost Estimate: \$300,000 for development, \$100,000 annual staff support.

Potential Funding: FEMA BRIC C&CB, OLDCC Technical Assistance, regional and charitable grants from nonprofit and community organizations.

Mission & Community Benefit: A Regional Resilience Finance Strategy ensures that defense-critical mitigation projects do not stall due to fragmented or reactive funding, while providing counties with a predictable pathway to sustain wildfire, flood, and infrastructure resilience investments. By institutionalizing match readiness and funding coordination, this action increases competitiveness for FEMA, DoW, USDA, and state programs while reducing reliance on post-disaster appropriations.

For MTARNG, the strategy directly supports mission assurance by stabilizing funding for access routes, utilities, buffers, and watershed protections essential to training and response operations. For surrounding communities, it delivers more efficient use of public dollars, greater transparency, and long-term protection of life, property, and natural systems—anchoring resilience as a shared, ongoing investment rather than a one-time project cycle.

21. Adopt Statewide WUI and Codify WUI Funding Requirements in Subdivision Regulations

Description: Amend county subdivision regulations in Lewis & Clark County and Broadwater County to formally implement Montana’s statewide WUI framework and codify enforceable funding requirements for wildfire mitigation in mapped WUI areas. Initiate ordinance development in 2026, concurrent with release of this assessment, including preparation of model code language, legal review, and mapping of applicable WUI and interface areas. Conduct stakeholder coordination, Planning Board work sessions, and public outreach in late 2026, followed by formal hearings and adoption actions in early 2027, with an effective date 30–60 days after adoption.

Regulations will require new subdivisions and major developments to contribute to a dedicated Wildfire Mitigation Fund through one or more approved mechanisms, including per-lot mitigation fees, in-kind fuels treatments, construction of secondary egress, firefighting water supply improvements (such as cisterns or hydrants), or permanent land set-asides or conservation easements. Funding requirements will be scaled based on site-specific wildfire exposure, access

constraints, and evacuation limitations identified in adopted CWPP, HMPs, land use findings, and DMA wildfire-risk mapping.

Collected funds will be restricted for use on defensible-space treatments, shaded fuel breaks, evacuation corridor improvements, and community–military interface mitigation projects that directly offset the incremental wildfire risk created by new development. This phased implementation approach ensures that growth occurring in hazardous WUI areas begins contributing to mitigation costs as early as 2027, operationalizing existing state-recognized wildfire risk policy while avoiding immediate regulatory disruption and preventing long-term suppression, evacuation, and infrastructure burdens from being shifted to counties, residents, or MTARNG.

Lead/Partners: County Planning Departments, County Commissions, DMA.

Supporting Facts:

- Both counties’ zoning codes acknowledge wildfire risk but lack enforceable funding mechanisms (Lewis & Clark Zoning Regs, 2022; Broadwater Growth Addendum, 2024).
- Development continues within moderate-to-high wildfire hazard areas near FHTA, LHTA, and major access corridors, increasing demand on limited firefighting resources without dedicated mitigation revenue.
- FEMA guidance encourages jurisdictions to adopt development-based mitigation financing mechanisms that reduce future disaster costs and improve long-term resilience, particularly in WUI and interface settings.

Cost Estimate: \$50,000 ordinance development.

Potential Funding: FEMA Planning Grants, MT DES Technical Assistance.

Mission & Community Benefit: By requiring development in wildfire-prone WUI areas to directly fund mitigation, this action reduces long-term fire risk, evacuation challenges, and infrastructure strain for both communities and nearby military installations. For MTARNG, codified mitigation contributions help preserve access routes, training continuity, and emergency response capacity without relying on ad-hoc post-fire funding.

For counties and residents, a WUI mitigation funding framework improves public safety, stabilizes insurance and suppression costs, and ensures that growth proceeds responsibly in high-risk landscapes. Overall, this action strengthens eligibility for FEMA BRIC, HMGP, and DoW resilience funding by demonstrating enforceable land-use controls and sustainable local match capacity tied to documented wildfire exposure.

22. *Establish a Statewide Montana Resilience Trust Fund*

Description: Support legislation creating a state-administered resilience trust fund and develop a Regional Resilience Finance Strategy to coordinate how Lewis & Clark County, Broadwater County, the MTARNG, and conservation partners plan, secure, and deploy funding for wildfire, flood, watershed, and infrastructure resilience projects across the FHTA and LHTA assessment areas. The proposed trust fund would be modeled on established state resilience financing programs, including Colorado’s Wildfire Mitigation Capacity Development Fund and Hazard Mitigation Grant Program framework established under Colorado Senate Bill 21-258 (Wildfire

Risk Mitigation), which provides sustained state appropriations for wildfire risk reduction, local capacity building, and mitigation implementation, and California’s voter-approved wildfire and forest resilience funding programs, including Proposition 4 (Safe Drinking Water, Wildfire Prevention, Drought Preparedness, and Clean Air Act) and related state allocations administered through CAL FIRE and state agencies to support multi-year investments in wildfire prevention, forest health, and watershed resilience.

At the regional level, the Regional Resilience Finance Strategy will provide a clear and transparent framework for sustaining long-term resilience investments beyond individual grants or one-time bond measures. The strategy will establish annual local and regional match targets, identify priority state, federal, and charitable funding programs, and define roles for counties, MTARNG, and partner organizations in assembling competitive funding packages. It will also implement a standardized system for tracking leveraged dollars, documenting how local investments unlock additional state, federal, and charitable funding for mitigation and compatible-use projects that reduce shared civilian–military risk. A central component of the strategy will be publication of an annual Regional Resilience Finance Report, summarizing funds invested, grants leveraged, projects delivered, and remaining funding gaps to improve accountability, inform county commissions and the public, and support proactive planning for future grant cycles rather than reactive, post-disaster funding efforts.

Lead/Partners: Legislature, DMA/MTARNG, County Commissions, PPLT, Regional and Community Foundations.

Supporting Facts:

- The Lewis & Clark County Open Space Bond (2018–2023) successfully leveraged approximately \$20 million in federal funding, demonstrating the value of coordinated local match, but no standing successor finance strategy currently exists to sustain this level of leverage.
- Federal resilience programs increasingly prioritize applicants that demonstrate long-term financial planning, diversified match sources, and transparent tracking of leveraged investments.

Cost Estimate:

- \$300,000 (strategy development, financial modeling, partner coordination, and reporting framework)
- \$100,000 annually (staff support, data tracking, and publication of the Resilience Finance Report)

Potential Funding: State appropriations, leveraged with FEMA/REPI/USDA and Regional and Community Philanthropic Funds.

Mission & Community Benefit: A Regional Resilience Finance Strategy improves community safety and long-term risk reduction by ensuring that wildfire mitigation, watershed protection, evacuation reliability, and infrastructure resilience projects are consistently funded and strategically sequenced. For residents, this translates into fewer missed opportunities for mitigation, more stable funding for priority projects, and reduced reliance on post-disaster recovery dollars.

For counties and partners, the strategy strengthens grant competitiveness, financial transparency, and accountability, while reducing duplication of effort and uncertainty around match availability. Clear tracking of leveraged dollars helps decision-makers demonstrate return on investment and justify continued local commitment to resilience.

For MTARNG, coordinated financial planning supports mission assurance and operational readiness by sustaining compatible land use buffers, access improvements, and hazard mitigation projects critical to training and emergency response. As a shared civilian–military finance framework, the strategy delivers durable, region-wide benefits that strengthen public safety, fiscal resilience, and long-term preparedness across the FHTA and LHTA assessment areas.

23. *Expand Eligible Match Sources for Federal Grants*

Description: Develop a standardized, auditable system to formally document and certify eligible in-kind match contributions for federal hazard mitigation, wildfire, and watershed grants, including MTARNG troop labor, training-related land restoration activities, use of military equipment, and local conservation bond proceeds. The system will ensure that locally generated value is fully recognized and credited toward required non-federal cost share for FEMA, USDA, and related resilience programs benefiting the FHTA and LHTA assessment areas.

The framework will establish clear documentation protocols, valuation methodologies, and approval workflows consistent with federal grant requirements. This includes timekeeping standards for troop labor, equipment usage rates, material valuation, and verification of conservation bond expenditures when used as match. County emergency management and finance staff will be trained to apply the system consistently, reducing uncertainty during grant application, award, and audit phases.

Lead/Partners: DMA/MTARNG, County DES, FEMA Region VIII, County Finance Departments

Supporting Facts:

- FEMA allows properly documented in-kind services, including labor, equipment, and materials, to be counted toward required non-federal cost share when valuation and documentation standards are met (FEMA Public Assistance Program and Policy Guide (PAPPG), Version 5, 2023).
- Jurisdictions that lack certified in-kind match systems frequently leave federal funding unused or reduce project scope due to inability to meet cost-share requirements.

Cost Estimate: \$100,000 for system design and documentation framework.

Potential Funding: FEMA Planning, BRIC Capability & Capacity Building.

Mission & Community Benefit: Expanding eligible match sources improves community access to federal resilience funding by allowing locally generated labor, equipment use, and conservation investments to count toward required cost share. For residents, this results in more mitigation projects delivered—such as fuels reduction, watershed restoration, and access improvements—without increasing local tax burdens.

For counties and partners, a standardized in-kind match system increases grant competitiveness, audit confidence, and administrative efficiency, reducing delays and risk during project

implementation. It also ensures that existing investments and contributions are fully leveraged rather than undervalued.

For MTARNG, certifying troop labor and training-related restoration as eligible match strengthens mission readiness and community partnership by aligning training activities with regional resilience goals and unlocking additional federal funding. As a shared civilian–military funding tool, this action delivers durable benefits that enhance public safety, fiscal resilience, and operational preparedness across the FHTA and LHTA assessment area.

4. Fragmented Utility Systems Undermine Installation Resilience and Lifeline Redundancy

Findings:

Single-Threaded Utility Systems Create Cascading Risks. Both FHTA and LHTA assessment areas rely on fragile, single-feed power, water, and communication networks with little redundancy and no unified continuity planning. These lifeline systems serve mixed civilian, emergency service, and military users, creating shared points of failure across jurisdictions. Electricity is provided by multiple entities, NorthWestern Energy for Helena and Vigilante Electric Cooperative for Broadwater County, without shared outage prioritization or hardening standards (Figure 34). The absence of coordinated utility governance increases the likelihood that outages affecting civilian communities simultaneously degrade MTARNG operations and emergency response functions. Additional information and mapping for utilities can be found in [Annex I](#) and Lifelines in [Annex L](#).

In the FHTA assessment area, power and water are supplied through Helena’s municipal network and electrical service routed through the Tenmile/Westside distribution system, both of which cross wildfire-exposed corridors along Rimini Road and Birdseye drainage. These corridors concentrate multiple lifelines within the same hazard-prone geography, increasing exposure to fire, wind, and post-fire erosion impacts. A 2022 outage affecting the VA Medical Center highlighted dependence on municipal power and limited generator capacity for sustained operations. Distribution-level automation and sectionalization are limited, extending outage duration when failures occur.

In the LHTA assessment area, a single overhead feeder line provides electrical service with no redundant grid connection, on-site storage, or hardened communications backbone, increasing outage vulnerability during fire weather or storm events. This single-threaded configuration also constrains emergency restoration, as access limitations and generator refueling delays affect multiple systems simultaneously. Water well output near the LHTA tower is slow to recover after draw-down, reported refilling times exceeding 24 hours, making it insufficient as a primary supply for suppression or training sustainment.

Water Supply Vulnerability. The FHTA assessment area and the City of Helena share reliance on Tenmile Creek municipal supply, historically producing 4–6 MGD depending on season, leaving both the assessment area and the VA Medical Center sensitive to post-fire sedimentation events in the Tenmile watershed. Watershed condition therefore directly affects treatment and pumping capacity, even in the absence of physical damage to infrastructure. Following the Meriwether (2007) and Park Creek (2017) wildfires, turbidity and debris significantly constrained

filtration efficiency and required emergency treatment adjustments for several weeks (Helena Utilities, 2023).

LHTA lacks permanent firefighting or potable supply infrastructure and relies on truck-delivered water and temporary hookups, creating operational vulnerability during road closures or extended outage conditions. The absence of automated refill capability or alternate intake options increases the likelihood of prolonged water unavailability during concurrent wildfire response and training operations.

Communications Fragility. Communications across both assessment areas remain brittle under high-demand or grid-outage conditions. In the FHTA assessment area communications are stronger than at LHTA but remain vulnerable to grid outages, fiber disruption, and cellular congestion during emergency demand surges. The installation relies primarily on Helena-area commercial fiber and cellular networks, with military radio and trunked systems providing operational connectivity but not full redundancy. These systems are not fully isolated from municipal infrastructure, limiting independent operation during extended outages.

During the 2024 regional fiber line disruption, 911 routing and non-LMR communications experienced degraded reliability, demonstrating that FHTA lacks an isolated communication backbone capable of operating independently of municipal infrastructure. Coverage is generally reliable within the cantonment, but terrain shadowing west of Williams Street and toward Birdseye Road creates intermittent radio and LTE performance, particularly under heavy smoke, canopy interference, or peak-user load. While FHTA maintains better bandwidth and infrastructure than LHTA, it does not possess a self-sustaining, hardened, multi-path communications system, and loss of commercial fiber or power could compromise EOC coordination, VA Medical Center integration, and civilian–military interoperability during wildfire or flood response.

Broadband and cellular coverage in the LHTA assessment area is limited by terrain and absence of fixed relay towers; radio and satellite links function but experience intermittent degradation during weather or smoke conditions. Communications assets in the LHTA assessment area depend on generator-supported systems requiring manual restart, creating vulnerability during prolonged or concurrent incidents. The J-Link microwave backbone provides primary command connectivity but requires generator power and manual restart following loss of service, posing constraints during prolonged wildfire or flood operations.

Interconnected Hazards and Mission Impacts. In both assessment areas, hazards do not occur in isolation. Wildfire, drought, power loss, watershed degradation, and access disruption compound one another producing cascading consequences for residents, infrastructure, and mission readiness. A wildfire in the Tenmile or Birdseye corridor can burn transmission routes, cut grid power, and accelerate post-fire erosion that then reduces water quality and treatment capacity. Reduced pumping capacity lowers pressure across the FHTA assessment area, affecting the VA Medical Center, neighborhoods, and hydrant availability simultaneously. If communications towers lose power or fiber routing is disrupted, EOC coordination and evacuation warning lead times degrade at the same moment water reliability is declining. These overlapping dependencies convert localized incidents into regional system failures.

In the LHTA assessment area, hazard interdependence is even more acute. Fire or flood that impairs Old Woman’s Grave Road limits generator refueling, blocks water delivery and isolates radio equipment that depends on manual restart. Water scarcity then slows suppression, enabling

fire spread that further reinforces road closures and communication loss. This loop played out during the 2023 fire–storm sequence, when access failure led directly to loss of power resupply and suspension of both training and civilian mobility in the basin. Here the hazard is not only fire, or flood, or power loss but how quickly one hazard triggers the next.

Structural and Governance Gaps

- No regional utility hardening strategy: NorthWestern Energy, Vigilante Electric, and local telecoms apply inconsistent wildfire-mitigation and undergrounding standards.
- No regional redundancy mapping: Neither DMA nor county planners maintain a shared GIS inventory identifying single-feed power, fiber, or water lines crossing hazard areas.
- No joint COOP or restoration framework: Utility providers and counties lack a pre-established priority restoration agreement for DMA lifelines.
- No alternate draw or storage capacity: FHTA lacks independent reservoir storage; LHTA well system cannot sustain even minimal mission demands.
- No formal framework exists to prioritize restoration of utilities serving emergency services, evacuation infrastructure, and installations during multi-jurisdictional incidents.

The absence of regional coordination or redundancy mechanisms leaves both assessment areas dependent on brittle, civilian-run infrastructure vulnerable to wildfire, flood, and storm-driven outages.

Recommendations

24. *Harden and Bury Priority Power Lines*

Description: Harden and underground priority electric distribution lines that serve surrounding communities and the FHTA and LHTA assessment areas to reduce wildfire ignition risk, improve power reliability, and eliminate single-point failure vulnerabilities affecting shared civilian–military infrastructure. This action focuses on the most exposed and operationally critical segments of the regional power network where outages or ignitions would directly affect public safety, evacuation capability, healthcare facilities, and emergency response.

In the FHTA assessment area, approximately five to eight miles of wildfire-exposed, single-feed overhead distribution lines will be buried or rebuilt using composite or steel poles, prioritizing corridors that also serve nearby residential areas and the VA Medical Center. These improvements will reduce ignition potential from wind-driven line failures and minimize outage duration during Red Flag conditions.

In the LHTA, the project will extend permanent, hardened electrical distribution from Vigilante Electric Cooperative’s Canyon Ferry feeder to the installation’s southern perimeter. This will replace reliance on temporary or non-hardened infrastructure and significantly reduce dependence on portable generators during fire, storm, or utility disruption events.

Design standards will account for wildfire exposure, wind loading, and post-fire conditions, and will be coordinated with fuels reduction, access improvements, and utility corridor protection efforts to maximize risk reduction benefits for both residents and military operations.

Lead/Partners: NorthWestern Energy, Vigilante Electric Cooperative, MTARNG/DMA, DNRC,

FEMA.

Supporting Facts:

- In the FHTA assessment area and the VA Medical Center are served by a single vulnerable power feeder, creating a shared single-point failure risk; a 2022 substation failure resulted in extended outages and generator reliance for critical facilities. (*NorthWestern Energy system reliability and outage reports, 2022–2023; Montana Department of Military Affairs facility continuity and generator use records, 2022*).
- In the LHTA assessment area currently has no hardened or redundant electrical infrastructure, resulting in power disruptions during wildfire activity and increasing operational and safety risks during training and emergency response. (*Vigilante Electric Cooperative service assessments; Montana DNRC wildfire after-action and infrastructure impact reports, 2022–2024*).

Cost Estimate: \$2 million – \$3 million per mile (\$15 million – \$20 million for priority segments).

Potential Funding: FEMA BRIC, HMGP, DoW REPI (resilience/compatibility), OLDCC-DCIP, NorthWestern Wildfire Mitigation Program, and Vigilante Electric Cooperative.

Mission & Community Benefit: Hardening and burying priority power lines improves community safety and infrastructure resilience by reducing wildfire ignition risk, preventing prolonged power outages, and ensuring reliable electricity for residents, healthcare facilities, and emergency services. For surrounding communities, these upgrades support safer evacuations, reduce disruption during Red Flag events, and lower long-term wildfire suppression and recovery costs.

For utilities and local governments, hardened infrastructure reduces maintenance costs, improves system reliability, and aligns with statewide wildfire mitigation and grid resilience goals.

For MTARNG, reliable and redundant power supports installation access, training continuity, emergency response capability, and mission assurance, while reducing dependence on generators during extended incidents. As a shared civilian–military investment, this action delivers durable resilience benefits that strengthen public safety, protect critical services, and improve operational readiness across the FHTA and LHTA assessment area.

25. Develop Microgrids and On-Site Backup Power

Description: Construct a solar-plus-battery microgrid in the FHTA assessment area to provide at least 72 hours of independent, islanded power for essential facilities that support both civilian and military operations, including the VA Medical Center, Tactical Operations Center (TOC), communications infrastructure, and priority training and response facilities. The microgrid will be designed to operate independently during utility outages caused by wildfire, wind, winter storms, or infrastructure failure, while reducing long-term reliance on diesel generation.

In the LHTA assessment area, install permanent, hardened backup generators with seven days of on-site fuel storage, replacing ad hoc or temporary generation solutions. Systems will be installed with microgrid-ready interconnections, allowing future integration of renewable generation and energy storage as funding and technology become available. These improvements will ensure continuity of training, emergency response, and life-safety systems during extended outages.

Design and implementation will be coordinated with utilities, emergency management, and energy partners to ensure compatibility with regional grid resilience strategies, wildfire mitigation objectives, and critical facility protection priorities. Where feasible, systems will reduce emissions, improve fuel efficiency, and support long-term operational cost savings.

Lead/Partners: DMA/MTARNG, DoW Installation Energy, MT DES, DOE.

Supporting Facts:

- A 2022 substation failure forced extended reliance on temporary generators at FHTA-supported facilities, highlighting vulnerability of critical services during grid outages. (*NorthWestern Energy outage and reliability reports, 2022; Montana Department of Military Affairs continuity of operations and emergency power usage records, 2022; U.S. Department of Veterans Affairs facility emergency power continuity documentation; Lewis & Clark County emergency management after-action summaries related to infrastructure outages*).
- Generator resupply delays during 2023 wildfire activity resulted in cancellation of five training days at LHTA, demonstrating the operational and safety impacts of limited backup power capacity (*Montana Army National Guard Range Operations logs and training schedules, 2023; Montana DNRC wildfire incident activity and access impact reports, 2023*).

Cost Estimate: \$10 million – \$15 million (FHTA microgrid); \$2 million – \$4 million (LHTA systems).

Potential Funding: DoW Energy Resilience and Conservation Investment Program (ERCIP), OLDCC-DCIP, FEMA BRIC, USDA Rural Utilities Service.

Mission & Community Benefit: Resilient microgrids and hardened backup power systems improve community safety and continuity of critical services by ensuring that healthcare, emergency coordination, communications, and response operations remain functional during prolonged power outages. For surrounding communities, these systems reduce the risk of service disruptions affecting healthcare access, emergency response, and evacuation coordination during wildfire and other disasters.

For counties and state partners, resilient energy systems reduce dependence on emergency generator deployments, improve fuel security during regional emergencies, and support broader grid resilience and clean-energy objectives.

For MTARNG, reliable on-site power directly supports mission assurance, training continuity, and emergency response capability, while reducing operational disruptions and safety risks during outages. As shared civilian–military resilience infrastructure, microgrids and backup power systems deliver durable benefits that strengthen public safety, energy resilience, and operational readiness across the FHTA and LHTA assessment areas.

26. Expand Broadband and Public Safety Communications

Description: Expand and harden broadband and public safety communications infrastructure serving the FHTA and LHTA assessment areas to ensure reliable 911 access, emergency coordination, and operational continuity during disasters. This action focuses on eliminating single points of failure and closing persistent coverage gaps that affect residents, first responders, and

shared civilian–military operations.

The project will construct a redundant fiber-optic corridor from Helena eastward to FHTA, creating geographic diversity and reducing outage risk from construction damage, wildfire, or weather-related failures. The corridor will support public safety answering points (PSAPs), county networks, healthcare facilities, and emergency operations centers, while also improving broadband resilience for adjacent communities.

In the LHTA assessment area, deploy a hardened FirstNet LTE tower on the southern ridge to eliminate terrain-driven radio and cellular dead zones that currently limit wildfire response coordination, aviation operations, and responder safety. The tower will be designed with hardened power, backhaul redundancy, and fire-resistant construction standards appropriate for high-exposure locations.

To provide tertiary redundancy, satellite-based connectivity (e.g., low-earth-orbit systems) will be installed at both FHTA and LHTA to support command, control, and communications during extended outages or catastrophic fiber failures. All systems will be integrated with county and state public safety communications plans to ensure interoperability and consistent use during emergencies.

Lead/Partners: Rural Telecom Providers, Montana Broadband Office, DMA, FirstNet Authority.

Supporting Facts:

- An April 2024 fiber cut caused a countywide 911 outage affecting more than 70,000 residents, underscoring the vulnerability of single-route communications infrastructure. (*Lewis & Clark County Emergency Communications and PSAP incident reports, April 2024; Montana Department of Administration State Information Technology Services Division outage notifications; County After-Action Reviews related to emergency communications disruptions*).
- LHTA currently lacks stable broadband or LTE coverage, limiting wildfire coordination, responder safety, and real-time situational awareness during incidents affecting the assessment area. (*Montana Army National Guard range operations and communications capability assessments; Montana Department of Natural Resources and Conservation wildfire after-action reports; JLUS (2014) and DMA planning documentation identifying communications coverage gaps in the LHTA*).
- Federal broadband and public safety programs prioritize redundancy, last-mile resilience, and public safety interoperability, particularly in wildfire-prone and rural regions. (National Telecommunications and Information Administration, Broadband Equity, Access, and Deployment Program Notice of Funding Opportunity; FirstNet Authority public safety broadband guidance; USDA Community Connect Program documentation).

Cost Estimate:

- \$1 million – \$2 million per fiber corridor
- \$3 million – \$5 million total (fiber redundancy, LTE tower, satellite backup)

Potential Funding: ConnectMT Broadband, National Telecommunications and Information Administration, Broadband Equity Access and Deployment Program, USDA Community Connect, FirstNet Expansion.

Mission & Community Benefit: Expanding broadband and public safety communications improves life safety and emergency response reliability by ensuring that residents can reach 911, responders can coordinate effectively, and evacuation and incident information can be shared even during infrastructure failures. For communities, redundant communications reduce isolation during disasters, support healthcare access, and strengthen economic resilience in rural areas.

For counties and state agencies, hardened and redundant communications infrastructure reduces outage risk, improves PSAP continuity, and supports interoperable response across jurisdictions during complex, multi-hazard events.

For MTARNG, resilient broadband and FirstNet coverage support training continuity, wildfire response coordination, aviation safety, and command-and-control functions critical to both military readiness and civilian mutual aid. As shared civilian–military infrastructure, these investments deliver durable benefits that strengthen public safety, communications resilience, and operational readiness across the FHTA and LHTA assessment areas.

27. *Create Regional Utility Resilience and Redundancy GIS Hub*

Description: Develop a centralized Regional Utility Resilience and Redundancy GIS Hub to improve shared understanding of how power, water, wastewater, and communications infrastructure intersects with wildfire, flood, debris-flow, and slope-failure hazards across the FHTA and LHTA assessment areas. This regional hub will support proactive planning, faster response, and safer recovery for communities and critical facilities that depend on the same utility corridors.

The GIS Hub will compile and visualize utility corridors, substations, intakes, transmission routes, and communications assets alongside hazard layers such as fire behavior modeling, floodplains, post-fire debris-flow zones, and landslide susceptibility. Key features will include identification of single-feed and single-point-of-failure assets, locations of redundant or alternate corridors, and relationships between utilities and evacuation routes, healthcare facilities, and emergency operations centers.

Role-based access will allow MTARNG, counties, utilities, and state agencies to view detailed operational layers while protecting sensitive infrastructure information. The platform will also integrate outage dashboards and status indicators, enabling emergency managers and utilities to share situational awareness during incidents and coordinate restoration priorities more effectively.

Lead/Partners: DMA/MTARNG, Lewis & Clark and Broadwater Counties, Montana State Library GIS, NorthWestern Energy, USFS (coordination).

Supporting Facts:

- No shared regional GIS platform currently maps utility redundancy, single-feed vulnerabilities, and hazard exposure together, limiting the ability of communities and responders to proactively address infrastructure risk.
- Outage data, utility system information, and hazard layers are currently fragmented across multiple providers and agencies, requiring manual coordination during emergencies and slowing decision-making.
- FEMA and DoW resilience guidance increasingly emphasize integrated data platforms and shared situational awareness to support mitigation investment and response coordination.

Cost Estimate: \$500,000 to design and deploy a secure, role-based regional GIS hub integrating utility and hazard data, plus \$50,000 annually for hosting, data updates, dashboard maintenance, user access management, and interagency coordination (no utility re-surveying or new staffing assumed).

Potential Funding: FEMA BRIC Capability & Capacity Building, OLDCC, MT DES Hazard Mitigation.

Mission & Community Benefit: A Regional Utility Resilience and Redundancy GIS Hub improves community safety and infrastructure reliability by allowing decision-makers to clearly see where power, water, and communications systems are most vulnerable to wildfire, flooding, and slope failure. For residents, this supports faster restoration of essential services, better protection of healthcare and emergency facilities, and more informed evacuation and recovery decisions.

For counties, utilities, and state agencies, a shared GIS platform reduces duplication, improves coordination, and strengthens grant competitiveness and capital planning by clearly documenting infrastructure risk and redundancy gaps.

For MTARNG, integrated visibility into utility vulnerabilities supports mission assurance, installation access reliability, and emergency response coordination, ensuring that training and mutual-aid operations are not disrupted by avoidable infrastructure failures. As a shared civilian–military planning tool, the GIS Hub delivers durable resilience benefits that strengthen public safety, infrastructure investment decisions, and operational readiness across the FHTA and LHTA assessment areas.

28. *Develop Unified Regional Utility COOP and Mutual Aid Framework*

Description: Establish a joint regional COOP and mutual-aid restoration framework among the MTARNG, county governments, utility companies, and emergency management partners to ensure rapid, coordinated restoration of critical lifelines serving both communities and military installations. The framework will define clear restoration priorities, decision authorities, and coordination protocols for essential services affected by wildfire, flood, wind, cyber, or infrastructure failure.

This framework will identify and codify priority lifelines, including power supply to the VA Medical Center at FHTA, water supply from the Tenmile intake, and communications serving the LHTA assessment area. Restoration sequencing will be pre-approved to reduce delays and confusion during incidents, ensuring that utilities and emergency managers operate from a shared understanding of critical service dependencies.

Mutual-aid provisions will clarify how utilities, county public works, and MTARNG resources support one another during extended outages, including access coordination, security, fuel logistics, and workforce support. The framework will also include annual interagency restoration exercises, allowing partners to validate procedures, test communications, and refine coordination before real-world events occur.

Lead/Partners: DMA/MTARNG, NorthWestern Energy, City of Helena Utilities, MT DES, FEMA Region VIII.

Supporting Facts:

- Restoration efforts following the 2022 substation failure and the 2024 regional fiber cut were largely ad hoc, with no codified hierarchy for restoring power, water, and communications serving shared civilian–military lifelines.
- FEMA continuity and infrastructure resilience guidance emphasizes pre-identified restoration priorities and interagency coordination to reduce downtime for critical services during disasters.

Cost Estimate: \$250,000 – \$500,000 (framework and annual exercise).

Potential Funding: FEMA Pre-Disaster Mitigation (PDM) grant, DoW REPI (planning), OLDCC-DCIP, State Homeland Security Grant Program (SHSGP).

Mission & Community Benefit: A joint framework with priority restoration improves community safety and recovery speed by ensuring that power, water, and communications critical to healthcare, emergency response, and evacuation coordination are restored quickly and predictably following disasters. For residents, this reduces prolonged service outages, supports continuity of healthcare and public safety operations, and improves confidence in recovery processes.

For counties and utilities, clearly defined restoration priorities reduce operational conflict, improve workforce safety, and streamline coordination during high-stress incidents. Annual exercises strengthen relationships and identify gaps before emergencies occur, lowering overall recovery costs.

For MTARNG, codified restoration priorities support mission assurance, installation readiness, and mutual-aid capability, ensuring that military resources remain available to support civilian response without prolonged disruption. As a shared civilian–military continuity framework, this action delivers durable benefits that strengthen public safety, infrastructure resilience, and operational readiness across the FHTA and LHTA assessment area.

5. Degraded Watershed Health and Erosion Hazards Undermine Water Security and Infrastructure Stability

Current Conditions

The Tenmile Creek Watershed, which supplies approximately five million gallons per day of drinking water to the City of Helena, the VA Medical Center, and FHTA, remains one of the most vulnerable watersheds in western Montana. The basin has repeatedly experienced severe wildfire and post-fire sedimentation impacts. After the 2007 Meriwether Fire and 2017 Park Creek/Park Avenue Fires, sediment concentrations increased over 300 % above baseline, forcing Helena Utilities to install emergency filtration units and temporarily suspend withdrawals. These impacts occurred without direct damage to treatment infrastructure, underscoring that watershed condition alone can constrain water system operability.

The Prickly Pear Creek and Missouri River tributaries further compound the risk. Seasonal flooding, ice jams, and post-fire debris flows damage low-capacity culverts and rural bridges, isolating lifeline corridors used for MTARNG deployments and wildfire response. In Broadwater County, steep slopes and highly erodible soils surrounding the LHTA have produced multiple

slope failures since 2011. These events periodically close Old Woman's Grave Road and other critical routes, washing sediment into Canyon Ferry Lake and the Missouri tributaries downstream. Sediment mobilization from these events also affects downstream intakes, reservoir operations, and tanker-fill reliability during wildfire response.

Neither installation maintains an independent, hardened water source. FHTA relies entirely on Helena's municipal system without an alternate draw or on-site reservoir. LHTA depends on a shallow well with recharge periods exceeding 24 hours, augmented by hauled water. Neither system is automated for rapid refill or protected against concurrent access disruption, power loss, or watershed contamination. This configuration cannot sustain extended training or firefighting operations and leaves both sites exposed to cascading loss during wildfire, flood, or seismic events. Additional analysis and details for Watersheds can be found in [Annex D](#).

Strategic Implications for Mission Assurance

The dependency on a single, fire-sensitive watershed creates a direct linkage between environmental stability and military readiness. A single post-fire sedimentation event can force the suspension of live-fire ranges, curtail medical and surge operations at FHTA and the VA facility, and reduce interagency water availability during simultaneous civil-support missions. Because water, power, access, and communications are tightly coupled in both assessment areas, watershed failure amplifies system-wide disruption rather than remaining a localized environmental issue.

Erosion-driven access loss in Broadwater County compounds this exposure, blocking resupply, isolating assessment areas, and delaying emergency mobilization. In the LHTA assessment area, road washouts simultaneously impede water delivery, generator refueling, and communications maintenance, accelerating operational stand-down timelines during multi-day incidents. These conditions elevate the risk that environmental degradation—not adversarial action—becomes the limiting factor for sustained training, response, and mobilization capacity.

Quantified Vulnerabilities

- **Turbidity Increases:** Post-fire sedimentation spikes in Tenmile exceed 50 nephelometric turbidity unit (NTU), compared to greater than 5 NTU baseline, reducing treatment capacity by 30–40 % for up to two weeks (Helena Utilities 2024).
- **Infrastructure Costs:** Helena's 2017 filtration retrofits exceeded \$1.2 million; annual Broadwater County road-erosion repairs exceed \$250,000 on Old Woman's Grave and River Road.
- **Training Delays:** The 2023 slope failure caused a five (5)-day training suspension and deferred troop redeployment from LHTA.
- **Water Dependence:** 100% of FHTA potable and firefighting supply relies on Tenmile; LHTA maintains no redundant capacity.

Systemic Gaps

- No watershed-scale erosion management program unifying DNRC, USFS, NRCS, county, and DMA efforts.

- Fuel treatments and watershed stabilization remain uncoordinated with sediment-sensitivity mapping.
- Post-fire recovery is reactive, dependent on emergency or short-term funding.
- DMA is not a formal stakeholder in Helena's long-range water-resource planning, despite total dependency on that system.

Mission Assurance Consequences

- A 30–40 % reduction in Tenmile output for one week would suspend live-fire operations, delay METL attainment, and limit medical surge capacity at the VA Medical Center.
- Slope failure or culvert loss at LHTA instantly terminates firefighting water access, halting training and endangering personnel.
- Loss of Tenmile or Prickly Pear Creek viability would necessitate hauling from Canyon Ferry or Missouri sources at triple the cost, eroding operational efficiency.

Recommendations

29. *Integrated Watershed, Flood, Slope, and Drought Monitoring & Early Warning System*

Description: Develop and deploy a comprehensive, integrated monitoring and early warning system across the FHTA and LHTA assessment area watersheds to provide real-time situational awareness of hydrologic, slope stability, sediment, and drought conditions affecting shared civilian–military infrastructure and communities. The system will consolidate previously separate monitoring concepts into a single, interoperable platform with modular monitoring layers that address flood and runoff hazards, post-fire erosion and slope failure, and drought-driven water-supply stress.

The system will consist of strategically placed field sensors—including rainfall intensity, stream stage, turbidity, soil moisture, groundwater levels, and slope-movement instrumentation—located upstream of municipal water intakes, road crossings, evacuation corridors, installation access routes, and known debris-flow or landslide-prone areas. Sensor placement will prioritize post-fire burn scars, steep headwater drainages, and infrastructure bottlenecks where short-warning-time events pose the greatest risk to life safety, access, and water reliability.

Data from all monitoring layers will feed into a centralized, GIS-enabled dashboard accessible to county EOCs, DMA/MTARNG operations, Helena Utilities, Broadwater County DES, DNRC, MDT, and other partners. The platform will support real-time visualization, trend analysis, and historical data archiving to inform both operational decision-making during incidents and long-term mitigation planning.

Automated alert thresholds will be established for each monitoring layer to trigger graduated warnings and predefined response actions. These alerts will support early intake protection or shutdown decisions, pre-emptive road and bridge monitoring, evacuation readiness, resource staging, and drought contingency activation. By integrating hydrologic, slope, and groundwater data into a single system, agencies can anticipate cascading failures—such as post-fire runoff triggering debris flows that compromise access and water supply—rather than responding after impacts occur.

The system will be designed as shared civilian–military infrastructure, with governance, maintenance responsibilities, and data-sharing protocols established through interagency agreements to ensure long-term functionality and continuity across plan cycles.

Modular Monitoring Layers:

- **Hydrologic Monitoring:** Real-time rainfall, stream stage, and turbidity sensors to detect flash flooding, post-fire runoff, and sediment threats to water intakes and downstream infrastructure.
- **Slope and Erosion Monitoring:** Ground movement, soil moisture, and debris-flow indicators to provide early warning of landslides, slope failures, and channelized debris impacting roads and access routes.
- **Drought and Groundwater Monitoring:** Groundwater level tracking, baseflow trend analysis, and seasonal drought indicators to support water-supply contingency planning and long-term resilience decisions.

Lead/Partners: DMA/MTARNG, Lewis & Clark County DES, Broadwater County DES, City of Helena Utilities, DNRC, USGS, MDT, Local Fire Districts, and USGS.

Supporting Facts:

- Post-fire runoff and sediment events in the Tenmile watershed have caused abrupt water-treatment disruptions and access challenges with little advance warning, particularly following wildfire and short-duration, high-intensity precipitation events (*City of Helena Utilities operational reports; Meriwether Fire post-fire assessments, 2007; Park Creek Fire impact summaries, 2017; U.S. Forest Service Burned Area Emergency Response [BAER] reports*).
- Steep terrain, aligned drainages, and wildfire burn scars in the South Hills, Tenmile headwaters, and Limestone Hills create rapid-onset flood and debris-flow conditions that exceed traditional emergency response timelines and overwhelm legacy drainage infrastructure (*U.S. Geological Survey debris-flow hazard assessments; DNRC post-fire watershed analyses; FEMA Flood Mitigation Assistance and BRIC technical guidance*).
- Groundwater monitoring data indicate increasing aquifer stress during recent drought years, elevating the risk of concurrent surface-water shortages and groundwater supply constraints during peak demand periods (*U.S. Geological Survey Helena Valley aquifer monitoring data, 2021–2022; Montana Bureau of Mines and Geology groundwater reports*).
- Civilian communities and MTARNG installations depend on the same limited water, transportation, and access infrastructure, creating cascading risk when flood, slope failure, or sediment impacts occur simultaneously (*Montana Department of Military Affairs resilience assessments; Joint Land Use Study findings; Lewis & Clark and Broadwater County Emergency Operations Plans*).
- Existing environmental and infrastructure monitoring efforts are fragmented by agency and hazard type, limiting shared situational awareness and delaying coordinated pre-emptive actions such as intake protection, road closures, evacuation readiness, and resource staging (*FEMA BRIC Notice of Funding Opportunity, 2023; GAO reports on interagency data integration for disaster resilience; State of Montana HMP*).

Cost Estimate: \$1 million – \$2 million (system design, sensors, communications, GIS integration,

training, and initial operations)

Potential Funding: FEMA BRIC, FEMA HMGP, DHS Regional Catastrophic Preparedness Grant Program, DNRC Watershed Grants, EPA Water Security Grants, OLDCC DCIP (Resilience Integration)

Mission & Community Benefit: This integrated monitoring and early warning system reduces surprise impacts from floods, debris flows, slope failures, and drought by providing shared, real-time awareness to civilian and military decision-makers. The system enhances public safety, protects municipal water reliability, preserves evacuation and emergency access, and strengthens MTARNG mission assurance by enabling proactive, coordinated action before cascading infrastructure failures occur.

30. Develop an Integrated Watershed and Source-Water Resilience Plan

Description: Develop a comprehensive, multi-jurisdictional Watershed and Source-Water Resilience Plan that integrates the Tenmile Creek, Sevenmile Creek, and Canyon Ferry sub-basins with the FHTA and LHTA assessment areas. The plan will provide a unified framework for protecting drinking water reliability, flood resilience, and post-fire watershed stability for communities and shared civilian–military infrastructure that depend on the same surface water sources.

The plan will use advanced hydrologic and hydraulic modeling, post-fire sediment transport forecasting, and climate-adjusted runoff scenarios to identify vulnerabilities that threaten water treatment operations, intake structures, access roads, and downstream communities during wildfire, extreme precipitation, rapid snowmelt, and prolonged drought. Special emphasis will be placed on high-turbidity events that disrupt treatment capacity and on reduced baseflow conditions that strain supply during peak demand.

Key elements will include evaluation of reservoir storage optimization, intake protection and bypass strategies, sediment management options, and contingency interties or operational adjustments that improve system flexibility when primary supplies are compromised. The plan will also assess how watershed conditions affect transportation corridors, emergency access, and utility infrastructure, recognizing the close linkage between water systems and broader community resilience.

Lead/Partners: City of Helena Utilities, DNRC Water Resources, US Bureau of Reclamation, DMA/MTARNG, USGS, and County Emergency Management and Planning (coordination).

Supporting Facts:

- The Tenmile watershed supplies drinking water to approximately 30,000 residents and FHTA, making it a single, shared source of critical importance to both communities and military operations (*City of Helena Utilities, Tenmile Water Treatment Facility operational summaries; City of Helena Water System Master Plan, 2023; Montana Department of Environmental Quality public water system records; Montana Department of Military Affairs facility water supply documentation*).
- Post-fire sediment spikes following the 2018 burn events exceeded 200 NTU, reducing water-treatment throughput by approximately 40 percent and demonstrating the system's vulnerability to wildfire-driven watershed impacts (*City of Helena Utilities turbidity*

monitoring and treatment performance reports, 2018–2019; U.S. Geological Survey post-fire watershed response studies; Montana DNRC post-fire hydrologic impact assessments).

- Helena’s 2023 Water System Master Plan identifies no integrated drought-contingency planning with military users, highlighting a coordination gap affecting shared water reliability during prolonged dry periods (*City of Helena Water System Master Plan, 2023; Montana DNRC drought planning guidance; FEMA Hazard Mitigation Assistance Guidance regarding interdependent critical facilities*).

Cost Estimate: \$600,000 – \$900,000 (hydrologic modeling, plan development, stakeholder coordination).

Potential Funding: FEMA BRIC Planning Grants; USBR WaterSMART Drought Resiliency; DNRC Renewable Resource Grant Program (RRGL); OLDCC DCIP Resilience Integration.

Mission & Community Benefit: An integrated watershed and source-water resilience plan improves community water security and public safety by proactively addressing the wildfire, flood, and drought risks that threaten drinking water supplies, treatment systems, and access corridors. For residents, this planning reduces the likelihood of boil-water advisories, service interruptions, emergency hauling, and costly post-disaster infrastructure repairs.

For utilities and local governments, the plan provides a defensible, science-based framework to prioritize capital investments, coordinate emergency operations, and strengthen eligibility for state and federal resilience funding. By aligning watershed protection, treatment system upgrades, and land-use decisions, communities reduce long-term operating costs and disaster recovery burdens.

For MTARNG, integrating military water demands into civilian watershed planning supports mission assurance, training continuity, and emergency response readiness, ensuring that water supply disruptions do not compromise operations or mutual-aid support during regional emergencies. As a shared civilian–military planning effort, the plan delivers durable, basin-scale resilience benefits that strengthen water reliability, infrastructure protection, and coordinated decision-making across the FHTA and LHTA assessment areas.

31. Conservation Acquisitions for Watershed Protection

Description: Pursue fee-simple acquisitions and conservation easements in the Upper Tenmile and Prickly Pear headwaters to protect drinking water sources, reduce post-fire sediment delivery, and limit future development in high-risk watershed areas that directly affect downstream communities and shared civilian–military infrastructure. These acquisitions will preserve forest cover, stabilize erosion-prone slopes, and maintain natural hydrologic functions critical to water quality and flood attenuation.

Priority parcels will be identified based on proximity to municipal intakes, steep or highly erodible terrain, wildfire exposure, and connectivity to existing protected lands. Acquisitions will focus on headwater areas where land-use changes have a disproportionate impact on sediment transport, peak runoff, and treatment system vulnerability during wildfire and extreme precipitation events.

Protected lands will support long-term watershed stewardship, including fuels management, erosion control, and access maintenance, ensuring that conservation investments continue to function as active risk-reduction measures rather than passive open space. All acquisitions will be coordinated with county Growth Policies, CWPP, HMPs and MTARNG compatibility objectives

to maximize shared benefits.

Lead/Partners: PPLT, County Governments, USFS Forest Legacy, DMA/MTARNG.

Supporting Facts:

- More than 4,000 acres of REPI- and PPLT-supported lands surrounding FHTA currently reduce wildfire spread and sediment risk, demonstrating the effectiveness of conservation acquisitions as a hazard mitigation tool. (*PPLT Annual Reports and stewardship summaries, 2019–2024; REPI Annual Reports, 2019–2024; Lewis & Clark County land-use compatibility and mitigation project documentation; Montana DNRC wildfire mitigation and fuels reduction assessments associated with conserved lands*).
- Upper watershed protection provides outsized benefits by reducing erosion, sediment loading, and post-fire runoff before impacts reach downstream water intakes, treatment facilities, and communities. (*USFS, Post-Fire Watershed Stabilization and Rehabilitation Technical Guides; USGS post-fire debris-flow and watershed response studies; EPA Source Water Protection Guidance; FEMA HMPG on nature-based and land-use mitigation measures*).

Cost Estimate: \$10 million – \$15 million (approximately 5,000 acres depending on parcel size, location, and easement structure).

Potential Funding: DoW REPI/REPI Challenge, NRCS, USDA Forest Legacy Program.

Mission & Community Benefit: Conservation acquisitions in headwater watersheds improve community water security and public safety by reducing the likelihood of post-fire sediment surges, water treatment disruptions, and flood impacts affecting downstream neighborhoods and critical facilities. For residents, this translates into more reliable drinking water, fewer emergency service interruptions, and lower long-term infrastructure and recovery costs.

For counties and utilities, protecting upstream lands is a cost-effective, permanent mitigation strategy that reduces treatment burdens, supports regulatory compliance, and strengthens eligibility for state and federal resilience funding. Coordinated acquisitions also help guide growth away from the most hazardous areas while preserving open space and working landscapes valued by the community.

For MTARNG, expanded watershed protection supports mission assurance and operational continuity by safeguarding the water supplies and access corridors that support training, emergency response, and mutual aid. As a shared civilian–military investment, conservation acquisitions deliver durable, basin-scale resilience benefits that strengthen water reliability, wildfire risk reduction, and coordinated land stewardship across the FHTA and LHTA assessment areas.

32. Integrate Watershed Health and Drought Risk into Land-Use and Capital Planning

Description: Require county and local planning departments to formally integrate watershed health, hydrologic risk, and drought resilience criteria into Growth Policies, CIPs, zoning and subdivision reviews, and infrastructure investment decisions within the FHTA and LHTA assessment areas. This action ensures that future development and public investments do not exacerbate water scarcity, post-fire runoff, or long-term infrastructure stress affecting communities

and shared civilian–military systems.

Planning updates will incorporate water availability, watershed condition, and drought vulnerability as explicit decision factors alongside transportation, utilities, and public safety. Counties will adopt or update ordinances supporting water-efficient landscaping, low-impact development, stormwater reuse, infiltration practices, and drought-adaptive infrastructure design, particularly in areas dependent on stressed surface water and groundwater supplies.

CIPs will be aligned with watershed and drought risk assessments to prioritize investments that reduce long-term water demand, protect recharge areas, and improve system resilience, such as reuse systems, storage optimization, and infrastructure designed for variable hydrologic conditions. Development review processes will be updated to ensure that new growth demonstrates consistency with available water supply, emergency access, and watershed protection objectives.

Lead/Partners: Lewis & Clark County Planning Department; Broadwater County Planning Board; DMA/MTARNG; MT DES.

Supporting Facts:

- Neither Lewis & Clark County nor Broadwater County currently has enforceable water-efficiency or drought-mitigation development codes, leaving future growth disconnected from long-term water availability and watershed capacity.
- Projected population growth exceeding 15 percent in Broadwater County by 2035 will increase demand on aquifers and surface water supplies, heightening the risk of conflicts between municipal needs, emergency response, and military training operations if not proactively managed.
- FEMA BRIC guidance identifies integration of hydrologic risk and drought considerations into land-use and capital planning as a priority criterion for competitive resilience investments (*FEMA BRIC Notice of Funding Opportunity, 2023*).

Cost Estimate: \$300,000 – \$450,000 (policy development, ordinance drafting, staff training, and implementation support).

Potential Funding: FEMA BRIC Planning; EPA Water Infrastructure Finance and Innovation Act (WIFIA); State Resilience Block Grants.

Mission & Community Benefit: Integrating watershed health and drought risk into land-use and capital planning improves community water security and long-term public safety by ensuring that growth and infrastructure investments are aligned with realistic water availability and watershed conditions. For residents, this reduces the likelihood of future water shortages, emergency restrictions, and costly retrofits driven by unmanaged growth.

For counties, proactive integration strengthens fiscal resilience and grant competitiveness by reducing long-term infrastructure liabilities, improving compliance with state and federal resilience priorities, and guiding capital investments toward projects that deliver durable risk reduction benefits.

For MTARNG, water-aware land-use and capital planning supports mission assurance and operational continuity by reducing competition for limited water resources, protecting shared watersheds, and ensuring that surrounding development does not compromise training, emergency

response, or mutual-aid capacity. As a shared civilian–military planning approach, this action delivers durable benefits that strengthen water reliability, land-use compatibility, and coordinated resilience across the FHTA and LHTA assessment areas.

33. *Establish Joint Watershed Response and Maintenance Agreements*

Description: Establish formal, multi-jurisdictional watershed response and maintenance agreements among the MTARNG, Lewis & Clark County, Broadwater County, and the City of Helena to coordinate shared responsibilities for drainage infrastructure maintenance, fuel-reduction corridors, and water-quality monitoring within installation-adjacent watersheds affecting the Tenmile–Canyon Ferry system.

The agreements will clearly define roles, authorities, and cost-sharing mechanisms for routine maintenance and emergency response actions, including debris and sediment removal, culvert and channel repair, post-storm damage assessment, and access restoration following wildfire, flooding, or severe weather. Standardized protocols will reduce delays caused by jurisdictional uncertainty and enable faster mobilization of equipment, personnel, and technical expertise.

The framework will also establish priority water-allocation and protection protocols during emergencies, ensuring that municipal drinking water systems, emergency response needs, and MTARNG operational requirements are coordinated rather than competing during drought, high-turbidity events, or infrastructure disruptions. Shared maintenance schedules and monitoring responsibilities will help detect emerging issues early, reducing downstream impacts to communities, roadways, and treatment facilities.

Lead/Partners: DMA/MTARNG, City of Helena Utilities, Lewis & Clark County, Broadwater County DNRC, and County Public Works.

Supporting Facts:

- Cross-jurisdictional maintenance responsibilities are currently ad hoc; 2022 storm debris cleanup near Canyon Ferry took more than 3 weeks due to lack of MOUs and equipment sharing agreements.
- Storm debris cleanup near Canyon Ferry following a 2022 event exceeded three weeks, largely due to the absence of formal MOUs, shared equipment agreements, and predefined restoration priorities.

Cost Estimate: \$150,000 (initial coordination and legal framework).

Potential Funding: FEMA C&CB; DoW REPI; State Resilience Cooperative Agreements.

Mission & Community Benefit: Joint watershed response and maintenance agreements improve community safety, water reliability, and recovery speed by ensuring that drainage systems, fuel-reduction corridors, and monitoring points are maintained consistently and restored quickly following storms, wildfire, or infrastructure failure. For residents, this reduces flood risk, protects drinking water quality, and shortens disruptions to roads and essential services.

For counties and utilities, clearly defined responsibilities and shared protocols reduce administrative friction, improve cost recovery, and allow resources to be deployed where they are most needed without jurisdictional delay. Proactive maintenance also lowers long-term repair costs and emergency response demands.

For MTARNG, coordinated watershed maintenance and response supports mission assurance and operational continuity by protecting access routes, water supplies, and training infrastructure that depend on stable watershed conditions. As a shared civilian–military framework, these agreements strengthen long-term resilience in the Tenmile–Canyon Ferry area by aligning hydrologic management, infrastructure protection, and interagency coordination with both community safety and defense readiness objectives.

6. Disconnected and Redundant Planning Frameworks Undermine Regional Coordination

Findings:

Regional resilience planning across Lewis & Clark and Broadwater Counties remains fragmented, duplicative, and poorly synchronized across federal, state, and local levels. Each jurisdiction maintains separate HMPs (2020–2025 cycles), CWPP, Growth Policies (2020 and 2024 addendum), and emergency operations frameworks, while the DMA and MTARNG operate under distinct DoD-driven plans including the JLUS (2014), Integrated Natural Resource Management Plan (INRMP, 2021), Installation Complex Master Plans, and Range Operations Manuals. Each document uses different hazard datasets, update timelines, and investment priorities, with limited crosswalk or mutual incorporation. As a result, wildfire risk, lifeline vulnerability, and access constraints affecting the same geographic areas are assessed and prioritized differently depending on the planning framework used. See [Annex H](#) for a specific detailed breakdown and analysis of gaps associated areas plans.

The absence of alignment has produced operational blind spots that reduce grant competitiveness, delay mitigation implementation, and hinder mission assurance for MTARNG facilities. Key statewide policy tools—such as Montana’s adopted WUI code and associated implementing rules—are referenced inconsistently or omitted entirely across local and installation-level plans, limiting their practical application in land-use decisions and subdivision review. Funding cycles mirror the fragmentation as counties apply independently to FEMA’s BRIC or HMGP programs, while DMA and MTARNG pursue DoW REPI or OLDCC funding. Without synchronized scopes, timelines, or shared project pipelines, opportunities to bundle civilian and military priorities into competitive, multi-benefit applications are routinely missed.

This disjointed approach results in duplicated outreach, inconsistent hazard modeling, and fragmented stakeholder engagement. Agencies and landowners are repeatedly consulted under separate planning efforts, creating fatigue and reducing long-term participation in mitigation initiatives. The resulting inefficiency not only consumes limited planning and grant-administration capacity but also undermines operational readiness at FHTA and LHTA by delaying land-use compatibility actions, infrastructure hardening, and access protection projects that require coordinated execution across jurisdictions.

Why This Matters for [Resilience and Mission Assurance](#):

Military–civilian interdependence in this assessment areas is absolute as DMA installations rely on shared lifelines for transportation, power, water, and fire suppression, yet the systems protecting those lifelines are governed by separate and often conflicting planning frameworks. When

installations are omitted from local HMP hazard analyses, they lose eligibility for FEMA mitigation funding that could support critical hardening projects. Meanwhile, land-use policies, including the Lewis & Clark Growth Policy's open space incentives and Broadwater's conservation priorities, remain uncoordinated with MTARNG access and evacuation needs. This fragmentation introduces incompatible land use near assessment areas, weakens wildfire resilience, and impairs mutual aid during mobilizations or emergencies.

Quantified Vulnerabilities:

- **Planning Misalignment:** Neither county's HMP explicitly analyzes risks to FHTA or LHTA, precluding direct FEMA eligibility for mitigation funding that benefits installations.
- **Cycle Mismatch:** Major planning updates (Lewis & Clark HMP 2025; Broadwater Growth Policy 2024; DMA INRMP 2021) operate on asynchronous three (3)–five (5)-year cycles, maintaining a persistent two-year lag between civilian and defense updates.

Grant Fragmentation Risk: From 2020–2023, wildfire and flood mitigation proposals were submitted separately by counties and state partners, with limited alignment to a shared multi-installation resilience framework. The current OLDCC application represents the first coordinated regional approach and offers an opportunity to unify FEMA, REPI, DNRC, and county projects under a common strategy.

Structural Gaps:

- No standing regional body to synchronize county, municipal, and military planning updates.
- Disparate hazard data systems: wildfire models differ across CWPP, DNRC, and county HMPs; flood data uses mismatched FEMA (2011) and DNRC (2017) baselines.
- No formal compatibility review for subdivision or zoning changes within 5 miles of FHTA or LHTA boundaries, despite known ignition and access constraints.

Mission Assurance Risks:

- Loss of FEMA funding eligibility for DMA-adjacent mitigation projects.
- Increased wildfire ignition and encroachment risk from uncoordinated development near access roads.
- Conflicting assumptions for evacuation, staging, and hazard areas during exercises or incidents.

Fragmented and redundant planning structures degrade both community and military resilience. Without a coordinated governance mechanism that aligns update cycles, data systems, and funding strategies, the assessment areas will continue to lose efficiency, competitiveness, and readiness. Establishing unified data hubs, synchronized timelines, and standing interagency councils is essential to close these planning gaps and protect shared lifelines supporting MTARNG mission assurance.

Recommendations:

34. *Align Planning Cycles and Hazard Models*

Description: Establish a coordinated, region-wide approach to align planning cycles, update schedules, and hazard modeling methodologies across all major plans affecting the FHTA and LHTA assessment areas, including county HMPs, CWPP, Growth Policies, DMA INRMPs, and Range Complex Master Plans. This action ensures that communities, utilities, and military partners are using consistent risk data and working toward unified mitigation priorities.

A five-year Regional Planning Calendar will be developed and adopted to synchronize plan update milestones, public engagement periods, and funding application windows. Alignment will allow counties, MTARNG, and partner agencies to pursue joint mitigation projects and shared grant applications—particularly under FEMA BRIC and HMGP—without timing conflicts or data inconsistencies.

The effort will also standardize the hazard models and datasets used across plans, including wildfire behavior, flood risk, post-fire debris-flow potential, and drought indicators. Where multiple models are available (e.g., DNRC fire modeling versus third-party flood risk datasets), agencies will agree on baseline datasets, assumptions, and update protocols to avoid conflicting risk maps that confuse decision-makers and weaken grant competitiveness.

Coordination will be facilitated at the regional level, with state and federal partners supporting consistency with FEMA guidance and state resilience priorities. By aligning when and how plans are updated, this action replaces fragmented, sequential planning with a predictable, integrated planning cycle that supports better investment decisions and long-term risk reduction.

Lead/Partners: MT DES (state coordination), DMA Planning & Facilities Directorate, county planning departments, FEMA Region VIII.

Supporting Facts:

- Key regional plans currently operate on disjointed update timelines, including the Lewis & Clark County Growth Policy (2020), Broadwater County Growth Policy (2021), and DMA INRMP (2021), creating two- to three-year gaps in shared data and priorities.
- Unsynchronized planning cycles and inconsistent hazard models reduce competitiveness for joint FEMA BRIC and HMGP applications and result in conflicting identification of high-risk areas (e.g., differences between DNRC fire behavior modeling and third-party flood risk datasets).
- FEMA mitigation guidance emphasizes consistency, currency, and cross-plan alignment as critical factors in evaluating planning quality and funding eligibility.

Cost Estimate: \$200,000 – \$400,000 (facilitated coordination and model standardization).

Potential Funding: FEMA BRIC Planning Grants, OLDCC-DCIP, State Resilience Block Grants.

Mission & Community Benefit: Aligning planning cycles and hazard models improves community safety and fiscal efficiency by ensuring that land-use decisions, infrastructure investments, and mitigation projects are based on the same, up-to-date understanding of risk. For residents, this reduces confusion over hazard zones, improves transparency, and supports more consistent protection of homes, evacuation routes, and water resources.

For counties and partner agencies, synchronized planning reduces duplication, lowers administrative costs, and strengthens eligibility for state and federal funding by enabling

coordinated, multi-jurisdictional grant applications supported by consistent data.

For MTARNG, aligned planning cycles support mission assurance and long-term operational readiness by ensuring that civilian growth policies, hazard mitigation actions, and military planning documents reflect the same risk environment and compatible-use priorities. As a shared civilian–military planning improvement, this action delivers durable benefits that strengthen resilience, funding competitiveness, and coordinated decision-making across the FHTA and LHTA assessment areas.

35. Institutionalize Military Participation in Local Land-Use Review

Description: Formalize and require MTARNG participation in subdivision, zoning, and development review processes for projects proposed within five (5) miles of the FHTA and LHTA. This action ensures that new development does not inadvertently increase wildfire risk, strain evacuation routes, or compromise shared transportation and utility infrastructure relied upon by both communities and emergency responders.

A standardized compatibility review procedure will be established and embedded in county and municipal development review workflows. The procedure will evaluate proposed developments for fire apparatus access, dual egress, defensible space, road standards, water supply, utility redundancy, and evacuation capacity, with specific attention to how new growth interacts with adjacent training lands, fuel corridors, and emergency access routes.

MTARNG participation will be advisory in nature and focused on risk identification and coordination, not land-use control. Reviews will provide planning staff, elected officials, and applicants with early, actionable input to avoid costly redesigns, reduce future emergency response challenges, and ensure development patterns are compatible with wildfire mitigation and infrastructure capacity objectives.

This process will complement existing Growth Policies, CWPP, HMP, and REPI priorities, creating a predictable, transparent mechanism for addressing civilian–military interface risks before they become entrenched.

Lead/Partners: County Planning Departments, DMA/MTARNG, City of Helena, Broadwater and Lewis & Clark County Commissioners. Tri-County Fire Safe Working Group.

Supporting Facts:

- Recent subdivisions near the South Hills and Canyon Ferry areas were approved without adequate fire access, secondary egress, or defensible space standards, increasing wildfire and evacuation risk in areas adjacent to training lands and fuel corridors (*Lewis & Clark County subdivision review files; Broadwater County Planning Board meeting minutes; CWPP identifying access and egress deficiencies in WUI development; Montana DNRC wildfire risk and WUI assessments*).
- DMA/MTARNG was not formally consulted during these approvals, despite the proximity of developments to active training areas, shared access routes, and wildfire-prone interface zones (*DMA/MTARNG land-use compatibility coordination records; JLUS implementation reviews noting inconsistent military consultation during local development approvals*).
- FEMA, state wildfire agencies, and DoW compatibility guidance consistently identify early coordination during land-use review as a best practice for reducing long-term wildfire risk

and infrastructure conflicts. (*FEMA Local Mitigation Planning Policy Guide; FEMA BRIC Notice of Funding Opportunity—planning and land-use integration criteria; Montana DNRC WUI and CWPP planning guidance*).

Cost Estimate: greater than \$50,000 annually for administrative and coordination costs.

Potential Funding: Local planning budgets, DoW REPI (staff integration and compatibility planning).

Mission & Community Benefit: Institutionalizing military participation in local land-use review improves community safety and wildfire resilience by ensuring that new development incorporates adequate access, defensible space, and infrastructure capacity from the outset. For residents, this reduces evacuation bottlenecks, improves emergency response capability, and lowers long-term wildfire suppression and recovery costs.

For counties and municipalities, early compatibility review reduces future liabilities, minimizes costly retrofits, and supports consistent application of CWPP, HMP, and Growth Policy objectives. Transparent, standardized procedures also improve predictability for developers and decision-makers.

For MTARNG, formal participation supports mission assurance and operational safety by preventing encroachment patterns that restrict training access, increase ignition risk, or strain shared lifelines. As a collaborative civilian–military planning measure, this action delivers durable benefits by aligning land-use decisions with wildfire mitigation, infrastructure resilience, and long-term community safety in FHTA and LHTA assessment areas.

36. *Develop a Unified Stakeholder Engagement and Outreach Strategy*

Description: Create a coordinated, cross-plan public and stakeholder engagement framework that aligns outreach efforts across CWPP, HMPs, and MTARNG planning initiatives within the FHTA and LHTA assessment areas. The goal is to reduce stakeholder fatigue, improve data quality, and ensure consistent, accessible public education on wildfire risk, flooding, evacuation, and resilience actions.

The framework will standardize public surveys, stakeholder interviews, workshops, and notification methods, allowing information to be collected once and applied across multiple planning documents and funding applications. Engagement activities will be scheduled and sequenced intentionally to avoid repeated requests to the same residents, landowners, agencies, and organizations for similar input on overlapping hazards.

Messaging and materials will be coordinated to present a clear, consistent narrative about regional hazards, evacuation expectations, mitigation priorities, and shared civilian–military resilience goals. The framework will also incorporate inclusive engagement practices to reach rural residents, seasonal populations, underserved communities, and landowners in high-risk interface areas.

Lead/Partners: County DES offices, DMA, City of Helena, Lewis & Clark /Broadwater Counties, PPLT and regional conservation partners.

Supporting Facts:

- Between 2020 and 2024, stakeholders were contacted for at least five separate planning cycles addressing the same hazards, resulting in repetitive outreach, inconsistent datasets, and reduced participation over time. (*Western Montana HMP (2025); Tri-County CWPP (2020) and HMP public outreach; DMA/MTARNG planning engagement summaries; County DES public meeting notices and stakeholder contact lists, 2020–2024*).
- Consolidating engagement improves data consistency, participation rates, and public trust, while reducing duplicative outreach costs and staff burden across planning efforts. (*FEMA Local Mitigation Planning Policy Guide; FEMA BRIC Notice of Funding Opportunity—planning integration and public participation criteria; International Association for Public Participation (IAP2) Spectrum of Public Participation; U.S. Government Accountability Office, Managing for Results: Practices That Can Help Improve Stakeholder Engagement, GAO-15-24*).

Cost Estimate: \$75,000-\$150,000 per cycle.

Potential Funding: FEMA BRIC Planning, OLDCC-DCIP (Resilience Coordination), State Hazard Mitigation Grants.

Mission & Community Benefit: A coordinated public and stakeholder engagement framework improves community preparedness and confidence by delivering clear, consistent information about hazards, evacuation expectations, and mitigation actions. For residents, this reduces confusion, increases trust in planning processes, and ensures that their input directly informs decisions that affect safety, access, and quality of life.

For counties and partner agencies, consolidated engagement lowers administrative costs, improves data quality, and strengthens planning defensibility and grant competitiveness by demonstrating meaningful, efficient public participation across multiple planning requirements.

For MTARNG, coordinated engagement supports mission assurance and community relations by aligning military planning with civilian expectations and reducing misunderstandings at the civilian–military interface. As a shared engagement approach, this framework delivers durable benefits by strengthening transparency, collaboration, and long-term resilience across the FHTA and LHTA assessment areas.

7. Flooding poses consequence impacts to transportation and access, as well as culverts and low-lying assessment areas.

Findings

Recurrent flooding from spring snowmelt, intense convective storms, and post-fire runoff continues to damage lifeline roads, bridges, and drainage infrastructure across Lewis & Clark and Broadwater Counties. These systems directly support access and readiness for FHTA and LHTA assessment areas. Because many of these corridors also carry power, communications, and water infrastructure, flood impacts frequently cascade beyond transportation alone. A full flood and hydrologic analysis can be found in [Annex E](#).

- Historical flood patterns: Major flood events in 1975, 1981, 1996, 2011, and 2018 disrupted county road networks, with the 1981 Prickly Pear Creek flood setting record flows that

destroyed bridges and isolated sections of the Helena Valley. Several of these events predate current development patterns, indicating that present-day consequences would be substantially higher.

- LHTA assessment area access: In 2023, Old Woman’s Grave Road was closed for five days following slope destabilization caused by runoff and culvert failure, delaying troop redeployment and field training schedules. River Road remains subject to seasonal washouts during spring high flows. These closures also impede water delivery, generator refueling, and communications maintenance within the LHTA assessment area.
- FHTA assessment area access: Country Club Road and Williams Street, which connect to the northern training gate, experience chronic erosion and culvert clogging exacerbated by post-fire sedimentation. Both routes are listed as “high-risk” in Lewis & Clark County’s 2022 transportation infrastructure assessment. Load limits and narrow shoulders further restrict emergency apparatus movement during flood response or evacuation.
- Watershed degradation: Burn scars in the Tenmile, Sevenmile, and Canyon Creek drainages increase sediment loads that reduce culvert capacity and flood conveyance efficiency. Sediment transport from these watersheds also degrades Helena’s municipal water supply, the same system that support and sustain the FHTA assessment area. Flood-driven sedimentation therefore directly affects both access and potable water reliability.

Why This Matters for Resilience and MTARNG Mission Assurance

Flooding directly threatens the operational continuity of MTARNG installations by severing lifeline routes, disrupting water supplies, and eroding infrastructure essential for mobilization and training. These impacts are magnified where flooding intersects with wildfire burn scars and aging infrastructure.

- Access continuity risk: Flood-related closures delay troop movements and resupply, forcing reliance on longer, unpaved detours. During the 2023 LHTA incident, mobilization delays exceeded 72 hours. Repeated closures also reduce predictability for training schedules and emergency staging.
- Utility exposure: Single-feed power and water lines cross flood-prone areas near Tenmile Creek and Canyon Ferry. Sediment-laden runoff events have historically required Helena Utilities to shut down intakes or implement emergency treatment surges. Utility outages during flood events compound access constraints and strain civilian–military response coordination.
- Compound hazard exposure: Flood events often coincide with Red Flag wildfire periods, creating dual threats that divide resources, delay training schedules, and degrade public–military emergency coordination. In these conditions, flood damage can prevent access needed for wildfire suppression, accelerating overall system failure.

Quantified Vulnerabilities

- Road exposure: Approximately 20 miles of DMA lifeline routes (Country Club Rd, Williams St, Old Woman’s Grave Rd, River Rd) are flood- or erosion-prone, and approximately 40% of associated culverts do not meet modern stormwater design standards (DNRC/MDT, 2022).

- Hydrologic stress: The Tenmile watershed provides approximately 5 million gallons/day to Helena and the FHTA assessment area. Post-fire sedimentation events (e.g., 2018) produced over 200% increases in turbidity, triggering multi-day treatment interruptions.
- Infrastructure losses: The 2011 flood caused approximately \$5 million in county-level public infrastructure damage (FEMA PA records).
- Downtime: 2023 closures of Old Woman's Grave Road and Canyon Ferry spurs resulted in over 120 combined hours of restricted access to training lands.

Structural Gaps

- No hazard-resilient CIP exists that prioritizes military readiness or identifies lifeline road upgrades as pre-disaster mitigation.
- Broadwater County lacks enforceable floodplain zoning: setbacks are advisory only, allowing residential development within flood-exposed corridors.
- No alternate routing or pre-designated detour plan exists for troop mobilization or evacuation during access failures.
- Watershed-scale projects remain reactive, funded only after events via FEMA Public Assistance or Emergency Recovery programs rather than preemptive BRIC/HMGP investments.

Mission Assurance Risks

- FHTA assessment area: Power or water interruptions caused by sedimentation or flood-damaged lines could halt training and impede VA Medical Center operations within 48 hours.
- LHTA assessment area: Road and slope failures directly suspend training activities and isolate assets during storm events.
- Regional operations: Lack of redundancy across utilities and transportation lifelines undermines the assessment areas' capacity for joint response during concurrent wildfire–flood incidents.

Flooding presents a chronic, compounding threat to the mission assurance, access, and resilience of both installations. Without coordinated investment in hardening infrastructure, modernizing stormwater systems, and enforcing land-use controls, both installations will remain exposed to predictable and preventable disruptions that undermine readiness and community safety.

Recommendations

37. Unified Flood Response and Evacuation Planning

Description: Develop and implement a unified, multi-jurisdictional flood response and evacuation planning framework for the FHTA and LHTA assessment areas to address flood, post-fire runoff, debris-flow, and infrastructure-failure hazards that threaten shared transportation corridors, utilities, and access routes. This action consolidates civilian and military evacuation planning into a coordinated approach embedded within county emergency operations planning and aligned with MTARNG installation emergency management procedures.

The planning effort will update and align Lewis & Clark County and Broadwater County EOPs flood and evacuation annexes, evacuation procedures, and flood response protocols to explicitly incorporate MTARNG installations, training areas, and access constraints. The unified framework establishes common flood and debris-flow triggers, evacuation decision authorities, route clearance thresholds, and coordination protocols when flooding or post-fire runoff compromises roads, bridges, culverts, water systems, or utilities serving both civilian communities and military facilities.

Particular emphasis placed on corridors that function as single-access or limited-egress lifelines, including Country Club Road, Williams Street, Old Woman's Grave Road, River Road, and the Birdseye–Tenmile corridor, where flooding, washouts, or debris accumulation can rapidly isolate neighborhoods or training areas. The framework will define pre-identified evacuation routes, alternate access corridors, traffic control points, joint staging areas, and route reclassification procedures to support rapid, coordinated decision-making under time-critical conditions.

The unified planning framework will also address civilian–military movement sequencing to prevent conflicts between evacuation traffic, emergency response operations, and MTARNG mobilization or training activities during flood events. Communication protocols and roles will be clearly defined across county emergency management, law enforcement, public works, fire districts, utilities, and MTARNG Range Control and command staff.

Lead/Partners: Lewis & Clark County DES, Broadwater County DES, DMA/MTARNG, County Sheriff's Offices, MDT, County Public Works Departments, City of Helena Utilities, Local Fire Districts

Supporting Facts:

- Flooding, post-fire runoff, and debris-flow events repeatedly affect access routes serving both civilian communities and MTARNG installations, creating competing demands for limited evacuation and response corridors during time-critical incidents (*Lewis & Clark County Emergency Operations Plan; Broadwater County Emergency Operations Plan; Montana Department of Military Affairs [DMA] resilience assessments*).
- Many roads serving FHTA and LHTA function as single-access or limited-egress routes, increasing the risk of isolation, delayed evacuation, and constrained emergency response when flooding, washouts, or debris accumulation occur (*Community Wildfire Protection Plans; MDT roadway functional classification data; DMA Range Operations reports*).
- Post-fire hydrologic conditions significantly increase runoff velocity, debris-flow potential, and culvert failure risk, particularly in steep headwater drainages affecting the Tenmile and Sevenmile watersheds (*U.S. Geological Survey debris-flow hazard assessments; U.S. Forest Service Burned Area Emergency Response [BAER] reports; DNRC post-fire watershed analyses*).
- Existing flood response and evacuation procedures are largely jurisdiction-specific and do not fully integrate civilian–military coordination, resulting in ad hoc decision-making and unclear authority during compound wildfire–flood events (*Lewis & Clark County and Broadwater County DES Interviews; Joint Land Use Study findings; DMA planning gap analyses*).
- Shared dependence on the same transportation, water, and utility infrastructure creates cascading risk, where flooding or debris-flow impacts to one system can simultaneously

disrupt evacuation, emergency response, and military operations (*State of Montana HMP; FEMA BRIC Notice of Funding Opportunity, 2023; GAO reports on interdependent infrastructure resilience*).

- Federal resilience guidance identifies pre-incident evacuation planning, route reclassification, and interagency coordination as critical mitigation actions for flood- and debris-flow-prone communities, particularly where military installations rely on civilian infrastructure (*FEMA Hazard Mitigation Assistance Guidance; FEMA BRIC Program Guidance; DHS National Preparedness Goal*).

Cost Estimate: \$300,000 – \$500,000 (annex development, GIS updates, interagency workshops, tabletop exercises, and plan maintenance)

Potential Funding: FEMA BRIC, FEMA EMPG, DHS Regional Catastrophic Preparedness Grant Program, OLDCC DCIP

Mission & Community Benefit: Unified flood response and evacuation planning improves life safety for residents in flood-prone corridors while preserving access for emergency services and MTARNG operations during increasingly frequent flood and post-fire runoff events. By coordinating evacuation, access control, and route prioritization across civilian and military partners, this effort reduces confusion, minimizes evacuation delays, protects shared infrastructure, and strengthens both community resilience and military mission assurance across the FHTA and LHTA assessment area.

38. Stormwater and Drainage System Modernization

Description: Public works for Broadwater and Lewis & Clark Counties, conduct current watershed-scale stormwater and drainage study across the Tenmile Creek, Prickly Pear Creek, and Canyon Ferry corridors to identify runoff concentration points, sediment sources, undersized culverts, and flood-prone infrastructure affecting the FHTA and LHTA assessment areas. Based on study findings modernize stormwater and drainage systems across the Tenmile Creek, Prickly Pear Creek, and Canyon Ferry watershed corridors to reduce flooding, erosion, and sediment risks affecting the FHTA and LHTA assessment areas. This action focuses on addressing chronic and emerging runoff hazards that threaten neighborhoods, transportation routes, water infrastructure, and emergency access corridors shared by civilian and military users.

Projects will install engineered detention basins, sediment traps, armored diversions, and overflow relief channels at upstream and mid-basin locations where runoff concentrates and accelerates during high-intensity storm events. Improvements will be strategically sited to intercept flows before they reach vulnerable residential areas, road crossings, culverts, and municipal systems, reducing downstream damage and long-term maintenance burdens.

Design standards will explicitly account for post-fire hydrology and drought-stressed soils, which have increased runoff velocity, peak flows, and sediment yield during short-duration storms. Stormwater controls will be sized to manage elevated post-fire runoff conditions rather than relying solely on pre-disturbance assumptions, improving performance during the most hazardous events.

Stormwater modernization efforts will be coordinated with county floodplain management programs, City of Helena municipal stormwater initiatives, and MTARNG installation drainage planning to ensure systems function as integrated, shared civilian–military infrastructure rather

than isolated projects. Where feasible, projects will incorporate nature-based solutions, including vegetated forebays, infiltration swales, floodplain reconnection, and riparian stabilization, to enhance water quality, attenuate peak flows, and improve long-term resilience.

Lead/Partners: Lewis & Clark County, City of Helena Utilities, DMA, NRCS and MDT.

Supporting Facts:

- The 1981 flood destroyed multiple bridges along Prickly Pear Creek, demonstrating the corridor's long-standing flood vulnerability. (*MDT historical flood damage records; Lewis & Clark County Public Works and bridge replacement documentation; U.S. Army Corps of Engineers regional flood history summaries*).
- Subsequent storm events, including in 2018, overwhelmed drainage systems in the Tenmile watershed, highlighting persistent capacity and sediment management limitations under current conditions. (*City of Helena Utilities stormwater and drainage incident reports, 2018–2019; Montana DNRC post-fire and flood impact assessments; U.S. Geological Survey watershed response and post-fire sediment transport studies; FEMA Hazard Mitigation Assistance supporting data for Tenmile Creek flooding events*).

Cost Estimate: \$2–5 million per basin for design, permitting, and construction of large-scale detention or diversion facilities, and \$500,000–\$1 million per sediment trap or debris-control structure, with final costs varying by basin size, sediment load, land acquisition needs, and post-fire design criteria.

Funding: FEMA HMGP, NRCS EWP, DNRC Renewable Resource Grants, DoW REPI.

Mission & Community Benefit: Stormwater and drainage system modernization improves community safety and flood resilience by reducing the frequency and severity of flash flooding, erosion, and sediment impacts that threaten homes, roads, and utilities in the FHTA and LHTA assessment areas. For residents, these improvements lower the risk of roadway washouts, property damage, and emergency access disruptions during increasingly intense storm events.

For counties and municipalities, modernized drainage systems reduce long-term maintenance costs, improve regulatory compliance, and support proactive floodplain management. Coordinated, basin-scale investments also strengthen eligibility for state and federal mitigation funding by demonstrating integrated watershed planning.

For MTARNG, resilient stormwater infrastructure protects installation access, training areas, and utility systems from flood and sediment damage, supporting mission assurance and emergency response readiness. As shared civilian–military infrastructure, these projects deliver durable benefits that enhance public safety, watershed stability, and coordinated resilience across the Tenmile–Prickly Pear–Canyon Ferry system.

39. Unified Flood Response and Evacuation Planning

Description: Develop and implement a multi-jurisdictional flood response and evacuation framework that integrates military and civilian movement, access control, and rapid route reclassification across the assessment area. This effort will align county EOPs, evacuation annexes, and MTARNG installation emergency plans to ensure coordinated decision-making when flooding, post-fire runoff, or infrastructure failure affects shared transportation and lifeline corridors.

The plan will define pre-identified alternate routes, trigger thresholds, and clearance authorities for roads serving both communities and training areas, including procedures for rapid designation of washed-out or compromised corridors and activation of secondary egress options. Emphasis placed on routes serving residential neighborhoods, VA Medical Center access, emergency services, and military mobilization, recognizing that these populations rely on the same limited network during flood events.

Unified planning will establish joint traffic control points, staging areas, and evacuation sequencing protocols to prevent civilian evacuation flows from conflicting with emergency response or military movements. The framework will also clarify coordination roles under the MERF, ensuring seamless integration among county DES offices, law enforcement, public works, fire districts, utilities, and MTARNG Range Control and command staff.

Lead/Partners: County DES, DMA, MDT, FEMA Region VIII.

Supporting Facts:

- Neither Lewis & Clark County nor Broadwater County currently has pre-designated alternate mobilization or evacuation corridors that account for simultaneous civilian evacuation and military movement during flood events (*Lewis & Clark County DES; Broadwater County DES; County HMPs and Transportation CIP crosswalks; Montana DES planning coordination summaries*).
- Flood and access disruptions during 2023 events delayed LHTA redeployments by approximately 72 hours, demonstrating the operational and public-safety consequences of uncoordinated route management and reclassification. (*Montana Army National Guard Range Control, 2023; MDT road closure and flood impact reports, 2023; County DES situation reports 2023*).

Cost Estimate: \$250,000 – \$500,000 (planning, training, and exercises).

Funding: FEMA BRIC Planning, OLDCC-DCIP, State DES Mitigation Grants.

Mission & Community Benefit: Unified flood response and evacuation planning improves community safety and evacuation reliability by ensuring that residents, responders, and critical facilities are not competing for the same limited routes during flood and post-fire runoff emergencies. For residents, this reduces evacuation delays, improves access to healthcare and emergency services, and lowers the risk of isolation in rural and interface areas.

For counties and partner agencies, coordinated planning strengthens operational clarity, reduces on-the-fly decision-making under stress, and improves compliance with FEMA and state emergency management best practices. Training and exercises further reduce response time and improve interagency coordination during real events.

For MTARNG, integrated evacuation and access planning supports mission assurance, safe redeployment, and mutual-aid capability, ensuring that military movements do not conflict with civilian evacuation or emergency response needs. As a shared civilian–military planning effort, this action delivers durable benefits that strengthen life safety, transportation resilience, and operational continuity across the FHTA and LHTA assessment area.

40. GIS Flood Hazard Mapping and Monitoring Integration

Description: Develop a unified, high-resolution flood and erosion risk platform that integrates hydrologic and hydraulic modeling with real-time monitoring and GIS visualization to support infrastructure hardening, evacuation planning, and operational continuity across the FHTA and LHTA assessment areas. The platform will provide communities, utilities, emergency managers, and MTARNG with a shared, science-based understanding of how flood and erosion hazards affect roads, bridges, culverts, utilities, and access routes relied upon by both civilians and military operations.

The effort will consolidate Tenmile Creek, Sevenmile Creek, and Canyon Ferry inflows into a single regional H&H model that reflects current watershed conditions, post-fire hydrology, and changing precipitation patterns. Model outputs will be linked to a live, role-based GIS dashboard displaying road status, culvert and bridge vulnerability, utility exposure, and access-route reliability during storm, flood, and post-fire runoff events.

The platform will integrate updated FEMA floodplain data, USGS stream gauges, DNRC LiDAR, MDT culvert inventories, county drainage assets, and DMA infrastructure overlays to identify:

- Post-fire runoff pathways and debris-flow exposure
- Culvert exceedance and overtopping risk
- Bridge and roadway failure thresholds
- Single-access and limited-egress route vulnerabilities

Outputs will directly inform corridor hardening projects, evacuation route designation, emergency access planning, and grant-ready mitigation design, replacing fragmented datasets with a single, defensible regional risk picture. The system will be designed for both pre-disaster planning and real-time decision support, improving situational awareness during rapidly evolving flood events.

Lead/Partners: USGS, County GIS Departments, DMA, MT DES, DNRC, MDT, Lewis & Clark County, Broadwater County, DMA, County GIS Departments, County DES.

Supporting Facts:

- FEMA Flood Insurance Rate Maps (FIRMs, 2011) underrepresent 10–25-year floodplains and do not reflect recent watershed changes, post-fire hydrology, or updated modeling.
- Post-fire runoff in the Tenmile watershed (2021–2023) exceeded pre-fire design flows by 40–60% (DNRC/USGS).
- MDT identifies culvert under sizing in 18 of 42 crossings along lifeline corridors serving FHTA and LHTA.
- No current GIS product overlays flood risk with military access routes, evacuation corridors, or training infrastructure.
- While DNRC has developed more recent floodplain and hydrologic datasets (2023) suitable for planning and mitigation analysis, these datasets are not regulatory and have not been integrated into FEMA-adopted floodplain overlays or military lifeline and training corridor mapping.

Cost Estimate:

- \$750,000 – \$1.25 million (model development, GIS integration, sensor linkage)
- \$50,000 annually (data maintenance and updates)

Funding: FEMA BRIC (Capability & Capacity Building), USGS Cooperative Water Program, DoW REPI, NRCS EWP.

Mission & Community Benefit: A unified flood and erosion risk platform improves community safety and infrastructure reliability by providing clear, real-time insight into where roads, bridges, utilities, and evacuation routes are most likely to fail during flood and post-fire runoff events. For residents, this supports safer evacuations, faster access restoration, and better protection of homes and critical services.

For counties and state agencies, integrated modeling and visualization strengthen capital planning, grant competitiveness, and emergency coordination, enabling mitigation investments to be targeted where they will most effectively reduce risk and long-term maintenance costs.

For MTARNG, high-resolution flood and erosion intelligence supports mission assurance, training continuity, and emergency response readiness by protecting installation access, mobilization routes, and shared lifelines. As a shared civilian–military decision-support capability, this platform delivers durable resilience benefits by aligning watershed science, infrastructure protection, and operational planning across the FHTA and LHTA assessment areas.

41. Post-Fire Sediment Management, Flood Detention, and Riparian Stabilization Program.

Description: Implement a comprehensive, watershed-scale sediment management and flood attenuation program to protect municipal water supplies, transportation infrastructure, emergency access routes, and military operations across the FHTA and LHTA assessment areas. The program addresses the recurring problem of post-fire erosion, sediment transport, and debris flows overwhelming shared civilian–military lifelines by combining immediate post-fire stabilization actions with permanent, engineered flood detention and sediment control infrastructure across the Tenmile, Sevenmile, Prickly Pear, and Broadwater headwaters.

Phase 1: Emergency Post-Fire Watershed Stabilization focuses on rapid, time-sensitive stabilization of high-severity burn scars immediately following wildfire to reduce acute erosion, debris flows, and sediment delivery during the first post-fire storm seasons. Treatments prioritized in slopes, channels, and tributaries with direct hydrologic connectivity to municipal water intakes, reservoirs, road crossings, and DMA facilities.

Phase 1 measures include emergency soil stabilization, mulching and hydroseeding, contour felling, wattles and check structures, temporary sediment traps, debris barriers, and localized channel armoring. These actions are intended to reduce immediate life-safety risks and infrastructure disruptions, limit turbidity spikes that force intake shutdowns, and preserve access for emergency response and military operations while longer-term solutions are designed and permitted.

Phase 2: Permanent flood detention, sediment control, and riparian stabilization implements durable, engineered sediment and runoff control infrastructure designed to protect downstream systems from repeated post-fire and extreme-precipitation impacts. Projects focus on priority sub-watersheds of Tenmile Creek and Sevenmile Creek that directly influence Helena’s municipal water system, FHTA and LHTA assessment area access corridors, and downstream residential areas.

Permanent measures include engineered flood detention and sediment control basins with armored inlets and outlets, sediment forebays, debris racks, grade-control and check structures, stabilized overflow pathways, and reinforced conveyance channels. Facilities will be strategically sited upstream of known constriction points, burn-scar drainages, and steep headwater channels that generate disproportionate sediment loads and peak runoff during post-fire and high-intensity storm events.

Design standards explicitly account for post-fire hydrology, including elevated runoff coefficients, debris-flow potential, reduced infiltration capacity, and compound hazard conditions, rather than relying on historic pre-fire assumptions. Detention facilities will be sized to reduce peak flows from 10- to 25-year storm events, extend time-to-peak for downstream infrastructure, and measurably reduce turbidity loads entering Helena's water-treatment system and shared civilian–military lifelines.

Phase 2 projects integrate nature-based and bioengineered solutions, including riparian restoration, floodplain reconnection, and vegetated stabilization features, to improve channel stability, enhance long-term sediment retention, and reduce ongoing maintenance requirements.

Lead/Partners: City of Helena Utilities; DNRC; NRCS; DMA Environmental Branch, USFS, DMA/MTARNG, Lewis & Clark and Broadwater County Conservation Districts

Supporting Facts: Post-fire sediment load increased turbidity at the Helena Water Treatment Plant by at least 35% in 2022; reduced treatment throughput for 72 hours.

Cost Estimate: \$2 million – \$3 million for basin system and sediment forebays.

- Phase 1: Emergency stabilization costs vary by burn severity and acreage
- Phase 2: Capital costs dependent on number, size, and location of detention and stabilization projects
- (Phasing allows rapid activation under BAER/EWP authorities while advancing BRIC- and HMGP-eligible infrastructure)

Potential Funding: NRCS Emergency Watershed Protection (EWP); EPA Clean Water State Revolving Fund; FEMA HMPG, FEMA BRIC, DNRC Watershed Grants,

Mission & Community Benefit: This integrated, two-phase program protects drinking water reliability, transportation access, and emergency response capability for communities surrounding FHTA and LHTA while safeguarding military training continuity and mission assurance. By pairing immediate post-fire stabilization with permanent flood detention and sediment control, the program reduces repeated emergency costs, limits infrastructure damage, and provides a durable, watershed-scale solution to one of the region's most persistent post-wildfire risks.

42. *Integrate Floodplain and Drainage Criteria into County Land-Use Regulations*

Description: Update Lewis & Clark and Broadwater County subdivision and zoning regulations to explicitly integrate floodplain, drainage, and post-fire runoff performance standards in areas influencing FHTA and LHTA assessment area lifelines, evacuation routes, and downstream communities. Code updates will establish enforceable floodplain setbacks, protected drainage corridors, and low-impact development requirements for all new subdivisions and major

redevelopments within mapped flood-prone and post-fire sensitive watersheds.

Revisions will require developers to demonstrate no net increase in peak runoff, sediment load, or downstream flood elevation relative to pre-development conditions, using hydrologic and hydraulic analysis that accounts for post-fire runoff scenarios, steep slopes, and undersized downstream infrastructure. Drainage corridor overlays will protect natural conveyance paths and prevent encroachment into swales, ephemeral channels, and alluvial fans that convey floodwaters toward municipal infrastructure, access roads, and military facilities.

Standards will include minimum setbacks from mapped floodplains and drainage corridors, mandatory on-site detention or infiltration, armored overflow paths, and long-term maintenance requirements to prevent system degradation over time. Where zoning authority is limited or absent, subdivision regulations will be strengthened to ensure flood-risk mitigation applies regardless of zoning status.

Lead/Partners: County Planning Departments; DNRC; DMA; USACE (technical assistance).

Supporting Facts:

- Broadwater County subdivision activity has increased significantly since 2018, intensifying development pressure in flood- and drainage-sensitive watersheds influencing FHTA and LHTA lifelines. (*Broadwater County Planning Department subdivision permit records and annual development summaries, 2018–2024; Broadwater County Growth Policy*).
- Current subdivision and zoning regulations do not require developers to mitigate stormwater runoff, sediment transport, or post-fire hydrologic impacts affecting drainages connected to DMA facilities, access routes, or downstream infrastructure. (*Broadwater County Subdivision Regulations; Lewis & Clark County Subdivision Regulations and floodplain ordinances; Montana DNRC floodplain management coordination summaries*).
- FEMA and state floodplain management guidance emphasize integrating post-fire runoff, drainage corridor protection, and no-net-increase runoff standards into local land-use regulations as a best practice for reducing future flood losses. (*FEMA Local Mitigation Planning Policy Guide; FEMA BRIC Notice of Funding Opportunity—land-use and regulatory mitigation criteria; Montana DNRC Floodplain Management Program guidance; U.S. Army Corps of Engineers low-impact development and watershed-based flood mitigation technical references*).

Cost Estimate: \$150,000 for ordinance development and floodplain mapping updates.

Potential Funding: FEMA BRIC Planning; OLDCC Compatible Use Planning Grants.

Mission & Community Benefit: Integrating floodplain, drainage, and post-fire runoff performance standards into subdivision and zoning regulations directly improves public safety, infrastructure resilience, and long-term watershed stability for the FHTA and LHTA assessment areas. For residents, these standards reduce the likelihood of downstream flooding, road washouts, and emergency access disruptions caused by new development in flood-prone and post-fire sensitive areas. Clear, enforceable requirements also provide predictability for developers and property owners, ensuring growth occurs in a manner that does not transfer risk to existing neighborhoods or public infrastructure.

For counties and partner agencies, embedding flood-aware land-use controls shifts investment

from repeated post-disaster repair toward preventive, watershed-scale risk reduction, lowering long-term maintenance and emergency response costs while improving eligibility for federal mitigation funding. For MTARNG, these regulatory updates protect installation access routes, training areas, and shared lifelines from avoidable development-driven flood and sediment impacts, supporting mission assurance and emergency response readiness. As a coordinated civilian–military mitigation strategy, this action strengthens community resilience while preserving operational continuity across the assessment area.

43. Conduct Annual Flood Response and Debris-Flow Tabletop Exercise

Description: Implement an annual HSEEP-compliant tabletop exercise (TTX) that simulates compound flood, debris-flow, and post-fire runoff events affecting shared civilian–military lifelines serving the FHTA and LHTA assessment areas. The exercise will test early warning, access control, evacuation coordination, debris clearance, and rapid restoration priorities under conditions where roadway failures, culvert blockages, and utility outages occur simultaneously.

Scenarios will include Tenmile and Sevenmile watershed runoff impacts to Helena neighborhoods, Old Woman’s Grave Road and Country Club Road washouts, and restricted access to training areas and medical facilities, requiring coordinated decision-making between county DES, public works, utilities, fire districts, law enforcement, and MTARNG leadership. Particular emphasis will be placed on shared evacuation corridors, load-restricted bridges, single-point access failures, and conflicting civilian–military movement demands.

Lead/Partners: DMA; County DES; USGS; MDT.

Supporting Facts: 2023 debris-flow blocked two egress routes from LHTA; response coordination delayed by over 4 hours.

Cost Estimate: \$75,000 annually.

Potential Funding: EMPG Training; FEMA BRIC C&CB; MT DES Exercise Program.

Mission & Community Benefit: Annual flood and debris-flow tabletop exercises strengthen life safety, evacuation reliability, and infrastructure resilience by ensuring agencies can rapidly coordinate decisions when multiple failures occur across shared civilian–military lifelines. For residents, the exercise improves evacuation timing, access to medical services, and clarity of public information during rapidly evolving flood and post-fire runoff events.

For counties and partner agencies, recurring HSEEP-compliant exercises reduce response delays, clarify roles and authorities, and create a defensible pathway for updating EOPs, annexes, and capital priorities based on tested gaps rather than assumptions. For MTARNG, the exercise supports mission assurance and safe redeployment by validating access, movement sequencing, and restoration priorities that prevent conflicts with civilian evacuation and emergency response. As a shared preparedness investment, this action delivers sustained benefits by converting lessons learned into actionable planning, infrastructure hardening, and funding readiness across the FHTA and LHTA assessment areas.

44. Develop a Post-Flood Infrastructure Recovery and Priority Restoration Protocol

Description: Develop and formalize a post-flood infrastructure recovery and priority restoration

protocol through pre-disaster MOUs among DMA/MTARNG, Lewis & Clark County, Broadwater County, utilities, and transportation partners. The protocol will establish a common, pre-approved framework for damage assessment, clearance authority, repair sequencing, and information sharing following flood, debris-flow, or post-fire runoff events affecting shared civilian–military infrastructure.

The protocol will explicitly designate Tier 1 restoration priorities for shared lifelines serving the FHTA and LHTA assessment areas, FHTA VA Medical Center, evacuation corridors, emergency communications, and mission-critical utilities. Restoration criteria will account for single-access corridors, load-restricted bridges, evacuation routes, utility interdependencies, and cascading failures, ensuring that stabilization decisions are made systematically rather than ad hoc during time-critical recovery operations.

The framework will clarify:

- Who conducts initial infrastructure damage assessments
- Who has authority to restrict, reopen, or reclassify routes
- How repair crews, equipment, and materials are prioritized when multiple failures occur
- How restoration status and priorities are communicated across agencies and EOCs

County public works, MDT, utilities, and MTARNG engineering assets will be aligned under a shared restoration playbook, enabling faster transition from response to recovery while reducing conflicting priorities. The protocol will be embedded into county EOPs, flood and infrastructure annexes, DMA Installation Emergency Management Plans, and continuity of operations annexes, and reinforced through training and exercises.

Lead/Partners: DMA; NorthWestern Energy; MDT; County DES.

Supporting Facts: 2024 fiber outage disrupted 911 and DMA communications for over 6 hours; no codified restoration order currently exists.

Cost Estimate: \$100,000 for planning and legal development.

Potential Funding: FEMA BRIC Planning; DoW DCIP; DHS CISA Infrastructure Resilience.

Mission & Community Benefit: A formal post-flood infrastructure recovery and priority restoration protocol improves life safety, service continuity, and recovery speed by ensuring that roads, utilities, communications, and water systems critical to both communities and military operations are restored in a clear, pre-determined order. For residents, this reduces prolonged isolation, improves access to emergency services and healthcare, and accelerates restoration of essential services following flood and debris-flow events.

For counties and infrastructure providers, a shared restoration framework reduces confusion, limits conflicting work priorities, and improves coordination when multiple systems fail simultaneously. Pre-established roles and priorities also support faster reimbursement, clearer documentation, and stronger alignment with FEMA and state recovery requirements.

For MTARNG, prioritized restoration of access routes, communications, and utilities supports mission assurance, safe redeployment, and continuity of operations, particularly for facilities that share lifelines with civilian populations such as the FHTA VA Medical Center. As a shared civilian–military recovery strategy, this protocol strengthens regional resilience by turning post-

disaster restoration from an improvised process into a coordinated, defensible system.

45. *Expand Riparian and Green Infrastructure Buffers*

Description: Implement targeted riparian restoration and green-infrastructure stabilization measures along erosion-prone stream reaches downstream of FHTA and LHTA assessment areas, focusing on channels that directly influence community infrastructure, road crossings, and municipal water quality. Actions will include willow staking, native riparian revegetation, bioengineered bank stabilization (e.g., coir logs, live fascines, root-wad revetments), and grade-control structures to reduce channel incision, lateral bank failure, and sediment transport during high-flow and post-fire runoff events.

Priority treatment areas will be identified using post-fire erosion models, USGS and DNRC channel migration data, and field-verified bank failure locations near Tenmile Creek, Sevenmile Creek, and lower Missouri River tributaries. Designs will emphasize nature-based solutions that slow velocities, trap sediment upstream of culverts and bridges, and protect adjacent road embankments, utilities, and water intakes serving both civilian communities and MTARNG operations.

Projects will be coordinated with county road departments and utilities to ensure that riparian improvements are co-located with infrastructure protection goals, reducing long-term maintenance costs and improving flood resilience for nearby neighborhoods while preserving training access and mission continuity.

Lead/Partners: DNRC; Prickly Pear Land Trust; DMA; USACE.

Supporting Facts:

- Channel erosion rates along lower Tenmile Creek increased by approximately 15–20 percent between 2021 and 2023, contributing to higher turbidity levels and loss of riparian habitat following wildfire and drought conditions.
- Increased turbidity and bank instability have been documented downstream of FHTA, elevating risks to road crossings, drainage infrastructure, and municipal water-quality management during storm events.

Cost Estimate: \$1 million – \$2 million (design, permitting, construction, and initial monitoring).

Potential Funding: FEMA BRIC Nature-Based Solutions; NRCS RCPP; Army REPI–Conservation Partnerships.

Mission & Community Benefit: Expanded riparian and green infrastructure buffers improve community safety, water quality, and flood resilience by stabilizing streambanks and reducing sediment delivery that threatens roads, utilities, and downstream neighborhoods. For residents, these projects lower the likelihood of roadway washouts, infrastructure damage, and degraded drinking-water quality following storm and post-fire runoff events.

For counties and utilities, nature-based stabilization reduces long-term maintenance and repair costs by addressing erosion at its source rather than repeatedly repairing damaged infrastructure. These investments also strengthen compliance with floodplain management and water-quality objectives while supporting eligibility for federal mitigation and conservation funding.

For MTARNG, stabilized riparian corridors protect installation access routes, training areas, and shared water infrastructure, supporting mission assurance and operational continuity. As a shared civilian–military mitigation strategy, riparian restoration delivers durable, cost-effective resilience benefits that align watershed health, infrastructure protection, and long-term community safety across the FHTA and LHTA assessment areas.

46. Integrate Flood-Related Utility Hardening and Backup Systems

Description: Implement targeted flood-hardening and redundancy upgrades for electric, fuel, water, and communications infrastructure serving the FHTA and LHTA assessment areas, with emphasis on facilities that function as shared civilian–military lifelines. This action addresses documented vulnerabilities where flood, debris-flow, and post-fire runoff events have disrupted essential services and emergency response capability.

Priority upgrades will include:

- Elevation of electrical controls, switchgear, and communications cabinets above projected post-fire flood elevations
- Flood barriers, watertight enclosures, and armored pads for substations, pump stations, fuel transfer points, and repeater sites
- Expanded fixed and mobile generator capacity with hardened connections to sustain operations during extended outages

Design standards will be informed by updated flood and erosion modeling, recent post-fire runoff observations, and utility asset vulnerability assessments, ensuring upgrades reflect realistic failure modes rather than historic flood extents alone.

Utility hardening will focus on shared civilian–military infrastructure, including power distribution corridors, water and wastewater pumping facilities, emergency communications nodes, traffic control systems, and aviation and logistics support functions critical to evacuation, medical access, and MTARNG mission continuity. Where feasible, projects will incorporate redundant feeds, sectionalization, and automated restart capability to reduce outage duration and prevent cascading failures affecting both installations and nearby communities.

Generator installations and hardened systems will prioritize Tier-1 facilities, including emergency communications sites, water supply and wastewater treatment assets, traffic control infrastructure, medical access corridors, and mission-critical MTARNG facilities. Improvements will be coordinated with county EOPs, utility emergency response plans, and DMA continuity annexes to ensure operational integration.

Lead/Partners: NorthWestern Energy; Vigilante Electric Cooperative; MTARNG Facilities; PSC.

Supporting Facts:

- A 2022 flood event at a substation near Birdseye disrupted service to more than 800 customers, including facilities supporting emergency response and training operations. (*NorthWestern Energy outage and incident reports, 2022; Montana Public Service Commission electric reliability filings; Lewis & Clark County DES situation reports;*

MTARNG Facilities and Range Operations after-action summaries related to 2022 flood impacts).

- Several critical facilities serving FHTA and LHTA lack redundant power feeds or hardened controls, increasing outage duration and complicating response and recovery during flood events. (*NorthWestern Energy and Vigilante Electric system reliability and asset condition assessments*).

Cost Estimate: \$2 million – \$4 million.

Potential Funding: DOE Grid Resilience and Innovation Partnerships (GRIP); FEMA BRIC Infrastructure; DoW DCIP Resilience.

Mission & Community Benefit: Flood-hardened utilities and reliable backup power directly enhance life safety, emergency response capability, and service continuity the FHTA and LHTA assessment areas. For residents, these investments reduce the likelihood of prolonged power, water, fuel, and communications outages during flood and post-fire runoff events—maintaining access to healthcare, evacuation routes, and public safety services when they are most needed.

For utilities and counties, proactive hardening lowers long-term repair costs, reduces system downtime, and improves compliance with evolving resilience standards and federal funding requirements. Coordinated upgrades also strengthen interoperability between utility response plans and local emergency operations.

For MTARNG, resilient utility systems support mission assurance, safe training operations, and rapid response capability, ensuring that installations remain functional during regional emergencies and do not compete with surrounding communities for limited resources. As a shared civilian–military resilience investment, this action protects critical lifelines, reduces cascading failures, and strengthens hydrologic and infrastructure resilience across the assessment area.

47. Stormwater and Drainage System Modernization

Description: Implement a coordinated stormwater and drainage system modernization program across the Tenmile Creek, Sevenmile Creek, Prickly Pear Creek, and Canyon Ferry–influenced watershed corridors that directly affect the FHTA and LHTA assessment areas. The program will reduce flood, erosion, and sediment risks that threaten shared civilian–military lifelines, including access roads, evacuation routes, water-supply infrastructure, and training facilities.

Modernization actions will include the design and construction of engineered detention basins, sediment traps, armored diversions, upsized culverts, stabilized drainage channels, and overflow relief structures at upstream and mid-basin locations where runoff concentrates and repeatedly damages roads, bridges, culverts, and downstream neighborhoods. Designs will explicitly account for post-fire hydrology, recognizing that burn scars, drought-stressed soils, and invasive grasses significantly increase runoff velocity, sediment yield, and debris-flow potential during short-duration storm events.

Projects will prioritize drainage features influencing Country Club Road, Williams Street, Old Woman’s Grave Road, River Road, the Birdseye–Tenmile corridor, municipal water intakes, and installation access points, where stormwater failures have historically disrupted emergency response, evacuation, and military operations. Where feasible, the program will integrate nature-based and green-infrastructure elements—such as vegetated forebays, infiltration swales,

floodplain reconnection, and bio-engineered channel stabilization—to improve water quality, slow peak flows, and reduce long-term maintenance costs.

All improvements will be planned and implemented as shared civilian–military infrastructure, coordinated with county floodplain management programs, Helena municipal stormwater planning, MDT roadway standards, and MTARNG installation drainage requirements. This integrated approach ensures stormwater controls function as a unified watershed system rather than isolated, jurisdiction-specific projects.

Lead/Partners: Lewis & Clark County Public Works, Broadwater County Public Works, DMA/MTARNG, City of Helena Utilities, MDT, DNRC, County Floodplain Administrators, USACE (technical support).

Supporting Facts:

- Post-fire runoff following the Park Creek Fire (2017) and subsequent storm events produced elevated sediment loads and roadway washouts, reducing access to FHTA and downstream communities.
- DNRC and USGS post-fire hydrology assessments show that runoff coefficients can double or triple in burned watersheds, overwhelming pre-fire drainage designs.
- Repeated culvert blockages and drainage failures along Old Woman’s Grave Road and the Birdseye–Tenmile corridor have caused multi-day access disruptions, affecting both civilian travel and MTARNG training schedules.
- Existing stormwater infrastructure was largely designed for historic hydrologic conditions and does not account for current wildfire, drought, and extreme precipitation patterns.

Cost Estimate: \$2 million – \$5 million (planning, design, construction, and environmental compliance across priority corridors)

Potential Funding: FEMA BRIC , FEMA HMGP, NRCS Emergency Watershed Protection, DNRC Renewable Resource Grants, Infrastructure Grants, USACE Continuing Authorities Program (CAP)

Mission & Community Benefit: Modernized stormwater and drainage systems reduce flood, and erosion impacts to neighborhoods, roads, and water infrastructure serving the Helena Valley and Broadwater County while preserving reliable access and operational continuity for FHTA and LHTA. By proactively addressing post-fire and extreme-weather runoff, this investment lowers emergency repair costs, improves evacuation reliability, protects water quality, and strengthens both community safety and military mission assurance in an increasingly volatile watershed environment.

8. Multi-year drought conditions in Montana present a persistent and compounding hazard that reduces water availability, increases wildfire probability, and imposes restrictions on training activities.

Findings:

Montana has entered an era of increasingly frequent and prolonged drought cycles, with climate data from the U.S. Drought Monitor (USDM) showing Lewis & Clark and Broadwater Counties classified in Severe (D2) to Extreme (D3) Drought conditions during both 2021 and 2022. These multi-year dry periods have severely reduced surface and groundwater availability for municipal systems, agricultural users, and emergency response operations. These drought cycles now recur with limited hydrologic recovery between years, reducing the resilience of surface water, shallow aquifers, and engineered storage systems. Additional drought analysis can be found in Annex D.

- Helena's municipal supply, which sustains approximately 30,000 residents and the FHTA, depends primarily on surface water from the Tenmile Creek watershed and a small number of backup groundwater wells. During extended droughts, streamflows decline by 40–60%, forcing reliance on limited groundwater reserves that are not sufficient for long-term demand or fire suppression needs. Reduced baseflow also increases water temperature and treatment complexity, further constraining system capacity during peak summer demand.
- Post-fire sedimentation further degrades Tenmile's watershed yield by clogging intakes and reducing infiltration. Historical events to include the Meriwether (2007) and Park Avenue (2017) fires resulted in sediment surges exceeding 300% of baseline, decreasing the efficiency of Helena's Tenmile Water Treatment Plant. Drought conditions intensify these effects by reducing dilution capacity and prolonging recovery timelines following fire events.
- The LHTA lacks any permanent water infrastructure and instead relies on truck-hauled water and temporary shallow wells. These supplies are vulnerable to groundwater drawdown during drought, particularly as subdivision-driven exempt well drilling increases throughout Broadwater County's growth corridors (Canyon Ferry, Toston, and Silos areas). Extended dry periods increase tanker travel distances and refill times, compounding access and logistics constraints during training or wildfire response.
- Regional population expansion has intensified competition for water. Broadwater County is currently Montana's fastest-growing county, with population projections indicating a doubling within 10–12 years (U.S. Census, Department of Commerce, 2024). Concurrently, Helena Valley's steady expansion increases municipal demand and further stresses the adjudicated water rights governing the Tenmile and Prickly Pear watersheds. These trends reduce operational flexibility during drought emergencies by narrowing discretionary supply available for suppression, training, and civil-support missions.

Why this matters for resilience and DMA mission assurance:

Drought impacts are not limited to water shortages—they cascade across operational, ecological, and infrastructure systems critical to DMA mission assurance:

- Operational continuity: Reduced streamflow and degraded water quality can suspend live-fire ranges, restrict training days, and reduce firefighting and suppression capacity across both installations. Drought-driven restrictions increasingly coincide with peak training and fire seasons, narrowing available operational windows.
- Public–military interdependence: FHTA shares its drinking and firefighting supply with the City of Helena; any curtailment affects both civilian and military emergency operations, including the VA Medical Center’s medical surge capacity. This shared dependency elevates the likelihood that civilian demand pressures constrain mission-critical water availability.
- Groundwater competition: Rapid residential development in Broadwater County’s Canyon Ferry and Townsend corridors increases domestic well withdrawals, accelerating aquifer depletion that could undermine LHTA training operations and future well development feasibility. Unlike municipal systems, these cumulative impacts are not centrally managed or coordinated.
- Ecological degradation: Drought accelerates vegetation loss and invasive grass expansion increasing wildfire susceptibility and post-fire erosion, further compromising water quality. These effects reinforce a feedback loop in which drought intensifies wildfire risk, wildfire degrades watersheds, and watershed damage further reduces water reliability.

Quantified Vulnerabilities:

- Water rights: The Montana DNRC adjudication process confirms that exempt wells (used by subdivisions) are proliferating. These wells bypass adequacy testing, creating unregulated groundwater depletion risks that compete with DMA water demand.
- Tenmile watershed: USGS records show summer low flows have declined approximately 20% over the past 30 years, directly reducing municipal system capacity.
- Training disruption: In 2022, drought conditions extended the Red Flag period by over 20 days, directly reducing MTARNG training availability at FHTA.
- Broadwater County population: Grew by 29% between 2010 and 2020, the fastest in Montana. With continued doubling projected by around 2037, this will intensify regional groundwater withdrawals and drought exposure.
- Surface water decline: Average Tenmile Creek flow fell from 38 cubic feet per second (CFS) (20-year mean) to less than 20 CFS in 2021–2022 (USGS Gauge #06062500).
- Helena’s backup wells account for less than 20% of total system capacity and cannot sustain full demand during extended drought (Helena Utilities Annual Report, 2023).
- Infrastructure risk: LHTA temporary wells take at least 24 hours to refill and cannot sustain sustained training or fire suppression during drought emergencies.

Structural Gaps:

- No regional drought contingency plan exists linking DMA, county water districts, and Helena Utilities to coordinate conservation triggers, resource sharing, or alternate supply activation.
- Helena’s backup groundwater network is underdeveloped and lacks distribution redundancy to support military or hospital surge demand.

- Broadwater County lacks enforceable water allocation policies or drought-responsive well permitting limits.
- No joint water-use data sharing occurs between counties, DMA, and watershed partners, limiting proactive management of aquifer drawdown and watershed capacity.

Mission Assurance Risks:

- FHTA: Loss of municipal supply capacity or sediment-related treatment shutdowns could suspend mission-critical training and impair VA healthcare operations within 48 hours.
- LHTA: Groundwater drawdown or delayed well recharge (at least 24 hours) directly limits fire suppression and potable supply during exercises.
- Regional Operations: Prolonged drought exacerbates wildfire spread potential, post-fire debris flows, and secondary flooding, compounding stress on DMA lifelines.

Multi-year droughts represent a chronic and compounding hazard for MTARNG facilities. They restrict potable supply, increase fire hazard, force training cancellations, and intensify competition with civilian growth pressures. Without enforceable subdivision water adequacy standards, pre-positioned backup supply, and integrated watershed conservation, both FHTA and LHTA will face escalating mission assurance risks tied directly to water scarcity.

Recommendations:

48. *Adopt and Enforce Subdivision Water Adequacy Standards*

Description: Adopt and enforce subdivision-level water adequacy standards for exempt wells and new residential developments in Lewis & Clark and Broadwater Counties, with particular attention to growth areas in the FHTA and LHTA assessment areas, Canyon Ferry corridor, and Helena South Hills. This action will require developers to demonstrate long-term groundwater sustainability and reliable water supply before subdivision approval, rather than relying solely on short-term well yield or individual lot-scale analyses.

Standards will require hydrogeologic assessment of cumulative impacts, including projected buildout conditions, drought stress, and interactions with existing municipal, agricultural, and military water demands. Where groundwater availability is constrained, developers will be required to implement mitigation measures such as shared systems, alternative supplies, reduced densities, or phased development tied to verified water availability.

Water adequacy criteria will be embedded into subdivision review processes to ensure consistent application regardless of zoning status. Coordination with Montana DNRC will ensure alignment with basin-level water availability data, drought planning, and exempt well oversight while preserving local land-use authority.

Lead/Partners: Lewis & Clark County Planning Department, Broadwater County Planning Department, Montana DNRC, DMA/MTARNG (mission assurance coordination)

Supporting Facts:

- Neither Lewis & Clark County nor Broadwater County currently enforces subdivision-level limits or cumulative impact standards for exempt wells, allowing incremental development to outpace groundwater recharge in some basins.
- Subdivision growth near Canyon Ferry and Helena's South Hills has increased groundwater competition, heightening drought vulnerability for residents, municipal systems, and installation-related water users.
- The 2023 Montana DNRC Drought Committee report identified exempt well proliferation as a primary driver of localized aquifer stress, particularly during multi-year drought conditions.

Cost Estimate: Less than \$250,000 annually for policy development, review, and enforcement.

Potential Funding: County and municipal planning and public works budgets (Lewis & Clark County, Broadwater County, City of Helena), DNRC state water resources and flood mitigation programs, and FEMA Hazard Mitigation Grant Program (HMGP) and BRIC funding, as available.

Mission & Community Benefit: Subdivision water adequacy standards protect community water security and long-term livability by ensuring that new development does not deplete shared groundwater resources or transfer water-shortage risks to existing residents. For homeowners and rural residents, these standards reduce the likelihood of dry wells, emergency water hauling, and declining water quality during drought periods.

For counties, proactive water adequacy requirements reduce future emergency response costs, infrastructure retrofits, and land-use conflicts, while strengthening eligibility for state and federal resilience funding. Clear standards also provide predictability for developers and improve the defensibility of subdivision decisions.

For MTARNG, safeguarding groundwater sustainability supports mission assurance and training continuity by protecting water sources relied upon for installation operations, emergency response, and mutual aid. As a coordinated civilian–military planning measure, this action strengthens regional drought resilience while balancing growth, water availability, and long-term community safety.

49. *Expand Water Conservation and Efficiency Programs*

Description: Expand and coordinate water conservation and efficiency programs across municipal systems, residential users, and MTARNG installations serving the FHTA and LHTA assessment areas to reduce overall demand and improve drought resilience. Programs will focus on permanent demand reduction rather than short-term emergency restrictions, ensuring that water savings persist through future drought cycles.

Priority actions include low-flow plumbing retrofits, irrigation efficiency upgrades, advanced leak detection, pressure management, and seasonal outdoor watering standards triggered by drought indicators. Programs will be designed to address both indoor and outdoor water use, with incentives and technical assistance targeted to high-use properties and areas experiencing repeated drought stress.

For installation users, conservation measures will be integrated into facility maintenance, housing areas, and training support infrastructure, reducing operational vulnerability during drought restrictions while maintaining mission readiness. Coordination between municipal utilities and

DMA environmental programs will ensure that conservation efforts are aligned, measurable, and reflected in shared drought response planning.

Lead/Partners: City of Helena Utilities, County DES, DMA Environmental Programs Office.

Supporting Facts: Helena's municipal system loses around 12% annually to unaccounted-for water (City Utilities Report, 2021). Drought-driven water restrictions were imposed in 2021, impacting both residents and military training operations. Efficiency retrofits have been shown to reduce system-wide demand by 10–15%.

Cost Estimate: \$1 million – \$2 million over five years for conservation retrofits and incentive programs.

Potential Funding: FEMA BRIC (mitigation retrofits), DNRC Renewable Resource Grants, EPA WaterSense Program, DoW O&M funds.

Mission & Community Benefit: Expanded water conservation and efficiency programs improve community water security and drought resilience by reducing baseline demand on shared municipal and groundwater supplies. For residents, these programs lower utility costs, reduce the likelihood of emergency restrictions, and improve reliability during prolonged dry periods.

For municipalities and counties, permanent demand reduction extends the life of existing infrastructure, defers costly capacity expansions, and improves compliance with state and federal drought resilience priorities. Conservation investments also strengthen eligibility for grant funding by demonstrating proactive, cost-effective mitigation.

For MTARNG, reduced system-wide demand protects mission assurance and training continuity by minimizing the operational impacts of drought restrictions on installation facilities and support functions. As a coordinated civilian–military mitigation strategy, water efficiency programs deliver long-term resilience benefits that balance growth, drought risk, and shared water-supply reliability across the assessment area.

50. *Integrate Drought Resilience into Military and County Land Management*

Description: Integrate drought resilience considerations into military and county land management practices by aligning grazing permits, prescribed fire schedules, vegetation treatments, and restoration activities with seasonal and multi-year drought outlooks affecting the FHTA and LHTA assessment areas. This action recognizes drought as a compounding hazard that increases wildfire risk, accelerates erosion, degrades training lands, and stresses shared ecosystems relied upon by both civilian communities and MTARNG operations.

Land management decisions will be informed by DNRC and NOAA drought outlooks, soil moisture indicators, and vegetation condition monitoring to ensure that grazing intensity, burn timing, and treatment selection reflect current and projected moisture conditions. Adaptive management strategies may include rotational or reduced stocking rates during drought years, deferred grazing following fire or reseeded, and prioritization of drought-tolerant native species in restoration efforts.

Prescribed fire and fuels-management schedules will be adjusted to balance fuel reduction objectives with drought-related stress on vegetation and soils, reducing the likelihood of escape, excessive soil heating, or post-treatment erosion. Where drought limits prescribed fire

opportunities, mechanical or targeted hand treatments will be used to maintain fuel breaks and defensible landscapes around training areas and adjacent communities.

Lead/Partners: DMA Range Management, BLM, DNRC Forestry, County Planning Depts.

Supporting Facts:

- Multi-year drought conditions amplify wildfire hazard and degrade training lands by increasing fine fuel stress, soil exposure, dust generation, erosion, and delayed vegetation recovery following disturbance. (*NOAA National Integrated Drought Information System drought–wildfire synthesis reports; U.S. Forest Service Fire Effects Information System and post-fire recovery studies; NRCS rangeland health and soil stability assessments for drought-affected landscapes*).
- Grazing leases at LHTA add additional pressure to limited forage availability during drought cycles, increasing the risk of vegetation loss and soil exposure if not adaptively managed. (*MTARNG Range Management and grazing lease records; Montana DNRC and NRCS rangeland monitoring guidance; USDA Natural Resources Conservation Service documentation on drought impacts to forage production and carrying capacity*).

Cost Estimate: \$750,000 – \$1.5 million for vegetation treatments, reseeding, and adaptive grazing management.

Potential Funding: USDA EQIP, FEMA HMGP (ecosystem-based mitigation), DoW REPI (landscape management).

Mission & Community Benefit: Integrating drought resilience into land management improves community safety, landscape stability, and wildfire risk reduction by addressing drought as a root driver of ecosystem degradation rather than a short-term anomaly. For nearby residents and landowners, adaptive grazing and vegetation management reduce dust, erosion, and wildfire spread while protecting shared watersheds and open space.

For counties and land managers, drought-informed practices lower long-term restoration costs, reduce emergency response demands, and improve coordination across jurisdictions managing interconnected landscapes. These practices also strengthen eligibility for federal mitigation and conservation funding by demonstrating proactive, ecosystem-based risk reduction.

For MTARNG, resilient land management protects training lands, maneuver areas, and access corridors, ensuring that drought does not progressively degrade mission-critical terrain or increase wildfire restrictions. As a coordinated civilian–military approach, this action balances ecological health, compatible land use, and mission assurance, supporting long-term resilience across the FHTA and LHTA assessment area.

9. Landslide/Erosion Finding: Steep slopes, channel migration, and post-fire terrain instability around LHTA leave MTARNG facilities and access routes vulnerable, with limited enforceable land-use controls currently in place.

Findings

The LHTA is located within semi-arid, steep terrain underlain by highly erodible alluvial and colluvial soils that are geologically predisposed to slope movement, gullying, and debris flow. Elevation differentials exceeding 2,000 feet, combined with thin vegetative cover, fractured rock outcrops, and limited stormwater conveyance, amplify surface runoff during convective storm events ([Annex D](#) and [Annex E](#)). These terrain characteristics intersect directly with primary access routes and utility corridors serving the installation, increasing exposure of mission-critical lifelines to slope failure.

- The Western Regional Montana HMP (2024) identifies Broadwater County canyon corridors, including the Canyon Ferry uplands, Old Woman's Grave Road, and River Road spurs as High Susceptibility areas for landslide and debris flow, where slopes exceed 30 percent and vegetation recovery post-burn remains poor. These same corridors support military ingress, emergency response, and water-delivery functions for the LHTA assessment area.
- Following wildfire events, the absence of root cohesion and vegetation accelerates overland flow, triggering flash flooding, culvert overtopping, and sediment deposition. Post-burn storm events in 2011 and 2018 caused significant washouts near Canyon Ferry and within LHTA access routes, isolating assessment areas for multiple days and forcing emergency regrading by county crews. Repeated disturbance without long-term stabilization has increased the frequency and severity of slope failures over time.
- In 2023, slope destabilization along Old Woman's Grave Road caused a five (5)-day closure during the training rotation period, halting troop movement and resupply operations. This corridor remains one of only two viable ingress routes for heavy military equipment. Loss of this route simultaneously restricts water delivery, generator refueling, and communications maintenance during hazard response.
- Sediment mobilized from unstable slopes drains directly into Missouri River tributaries, elevating turbidity and nutrient loading. USGS monitoring confirms measurable increases in total suspended solids downstream of the 2018 fire scar, degrading riparian buffers and affecting both civilian and DMA water users. Downstream sedimentation also affects tanker-fill reliability and reservoir operations during wildfire response.

Why This Matters for Resilience and DMA Mission Assurance

- Access disruption: Slope failures and washouts on unpaved or minimally engineered roads isolate training ranges, delay emergency medical evacuation, and restrict fire-suppression access. Travel detours increase mobilization times by 30–60 minutes during peak hazard conditions. Repeated closures reduce predictability for training schedules and emergency staging.

- Infrastructure fragility: Culverts, drainage crossings, and bridges along LHTA periphery were designed for pre-fire hydrology and cannot handle modern debris loads. Post-event assessments (FEMA PA, 2011–2018) document over \$1.2 million in county repair costs from erosion-related failures. These costs reflect reactive repair rather than restored resilience, leaving corridors vulnerable to repeated failure.
- Post-fire compounding: Burn scars in the Elkhorn foothills and Missouri drainage act as force multipliers, transforming routine rainfall into debris-flow events that clog culverts, degrade riparian areas, and impact FHTA downstream water quality and Helena’s Tenmile watershed treatment costs. This creates a feedback loop in which wildfire, erosion, and access loss reinforce one another, accelerating operational disruption.

Quantified Vulnerabilities

Category	Observed Data/Impact	Source/Reference
Road closures	5-day closure (Old Woman’s Grave Rd, 2023); 3-day limited access (Canyon Ferry tributary, 2018)	Broadwater County DES; DMA Training Operations Brief (2024)
Repair costs	Avg. \$1.2 million per event (2011–2018 FEMA PA records)	FEMA Public Assistance Database
Slope failure probability	High susceptibility where slopes exceed 30%, sparse vegetation, shallow soils	Western Montana HMP (2023)
Water quality degradation	Sediment loads increased over 250% following 2018 fire scar runoff	USGS Monitoring Data (Station #06061500, 2019 Summary)

Structural Gaps

- No enforceable slope-hazard overlay exist in either Broadwater or Lewis & Clark County subdivision codes, allowing development and infrastructure upgrades in erosion-prone corridors without mandatory geotechnical review.
- No standardized slope stabilization program exists for DMA or county-maintained training access roads; current repairs are reactive and funded post-disaster through FEMA Public Assistance rather than integrated into mitigation plans.
- No alternate route or clearance protocol is pre-established for debris-flow or slope-failure closures, resulting in prolonged isolation of LHTA during hazard events.
- Data fragmentation: Slope hazard mapping, stormwater design standards, and hydrologic modeling differ across agencies (USFS, DNRC, MDT), complicating unified mitigation prioritization.

Mission Assurance Risks

- FHTA: While less directly impacted by slope failures, Tenmile watershed erosion contributes to sediment surges that reduce water-treatment efficiency and compromise the shared water supply.
- LHTA: Highly exposed to washouts, slope failures, and erosion-driven range isolation due to unpaved, narrow access routes and absence of slope stabilization infrastructure.

- DMA overall: Persistent slope instability threatens readiness assurance by severing ingress/egress, delaying mobilization timelines, and eroding transportation resilience during concurrent wildfire and flood events.

Landslide and erosion hazards are chronic, predictable, and under-addressed within the DMA operational area. Steep terrain, unreinforced access roads, and limited vegetation recovery create recurring disruptions that degrade both training throughput and water quality. Without sustained investment in slope stabilization, drainage modernization, and enforceable land-use controls, MTARNG facilities will continue to face multi-day access disruptions, road washouts, and mission degradation during even moderate storm events.

Recommendations:

51. Conduct Geotechnical Assessments of High-Risk Slopes and Access Corridors

Description: Conduct comprehensive geotechnical assessments of high-risk slopes and access corridors serving the LHTA and FHTA assessment areas, with priority focus on Old Woman's Grave Road, River Road, and steep canyon road segments within and adjacent to LHTA assessment area. These corridors function as single-access or limited-egress routes for rural communities, emergency responders, and MTARNG training and mobilization activities.

The assessments will evaluate slope stability, subsurface conditions, drainage pathways, rockfall potential, and post-fire or drought-related failure mechanisms that increase the likelihood of landslides, debris flows, and roadway collapse. Field investigations may include geologic mapping, boreholes, inclinometer installation, LiDAR review, and hydrologic evaluation to identify areas requiring immediate stabilization versus long-term monitoring.

Results will be used to:

- Identify priority stabilization and drainage improvements
- Define load restrictions, seasonal access limitations, and maintenance triggers
- Establish monitoring locations and early-warning thresholds
- Inform capital improvement programming and emergency route reclassification protocols

Geotechnical findings will be integrated into county road maintenance plans, MDT asset management systems, DMA emergency and continuity planning, and regional flood and evacuation frameworks to ensure that slope risk is addressed proactively rather than reactively after failure.

Lead/Partners: MDT, Broadwater & Lewis & Clark County Road Depts., DMA, USGS.

Supporting Facts:

- Old Woman's Grave Road closure in 2023 due to slope destabilization highlights vulnerability.
- USGS slope hazard mapping identifies multiple unstable drainages in Broadwater County.
- No unified risk inventory exists for DMA lifeline routes.

Cost Estimate: \$500,000 – \$1 million (geotechnical investigations, analysis, and monitoring)

installation).

Potential Funding: FEMA BRIC (Capability & Capacity), USGS Landslide Hazard Program, MDT Hazard Resilience Funds.

Mission & Community Benefit: Geotechnical assessment of high-risk slopes improves public safety, access reliability, and emergency response readiness by identifying and addressing failure risks before landslides or debris flows isolate communities or disrupt critical routes. For residents, proactive slope evaluation reduces the likelihood of sudden road closures, evacuation delays, and prolonged isolation during storm or post-fire runoff events.

For counties and MDT, geotechnical intelligence supports cost-effective infrastructure management by targeting stabilization and drainage investments where they will most effectively reduce maintenance costs and emergency repairs. Early identification of failure mechanisms also strengthens eligibility for federal resilience funding by demonstrating data-driven risk reduction.

For MTARNG, stable and predictable access corridors are essential for training continuity, safe mobilization, and mutual-aid response. By addressing slope hazards along lifeline routes serving LHTA and FHTA assessment areas, this action supports mission assurance while delivering shared civilian–military resilience benefits across the assessment area.

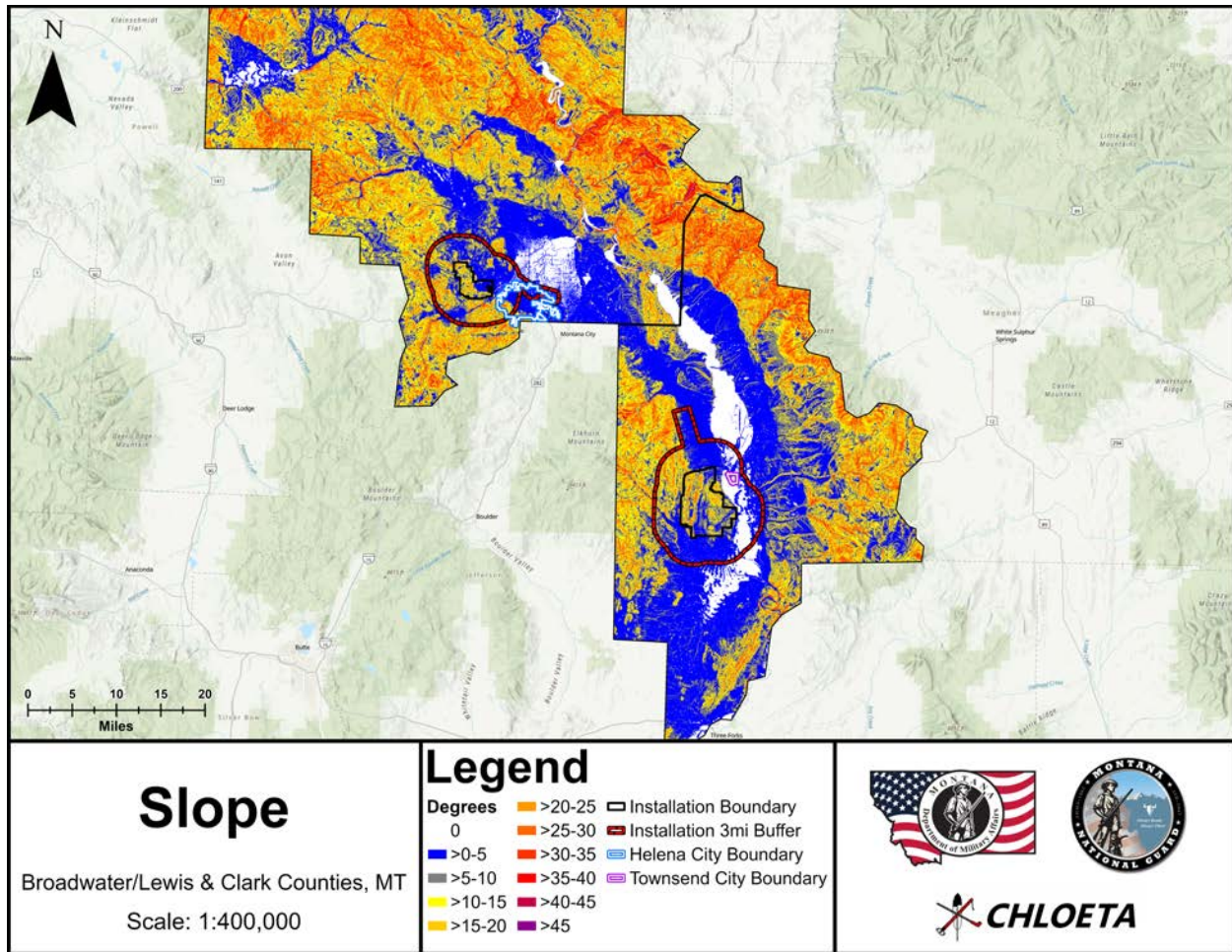


Figure 31. Slope for FHTA and LHTA Assessment Areas

52. Install Slope Stabilization and Erosion Control Structures

Description: Implement engineered slope stabilization measures along lifeline road corridors and DMA facility perimeters where slope failure, erosion, and rockfall threaten access, safety, and operational continuity.

- U.S. Highway 12 along the Canyon Ferry corridor, which provides the primary east–west access serving LHTA assessment area, evacuation routes, and regional utility corridors.
- Canyon Ferry Road, where steep cut slopes, embankments, and shoreline-adjacent sections are susceptible to erosion and rockfall.
- Tenmile Road and connecting access routes within the Tenmile Creek watershed, which serve residential areas, water infrastructure, and response access influencing FHTA assessment area.
- South Hills access roads west and south of Helena, including steep, winding segments that provide single-access or limited-egress routes for neighborhoods adjacent to the southern FHTA assessment boundary.

- Installation-adjacent perimeter roads and access spurs in the FHTA and LHTA assessment areas, where slope instability could restrict training access, emergency response, or evacuation movements.

Targeted treatments will include retaining walls, soil nailing, rockfall netting, slope regrading, drainage improvements, and revegetation designed to address site-specific failure mechanisms identified through geotechnical assessment.

Priority locations will include steep canyon roads, road embankments, and cut slopes adjacent to single-access or limited-egress routes serving the LHTA and FHTA assessment areas. Designs will account for post-fire hydrology, drought-degraded soils, and high-intensity precipitation, ensuring stabilization measures perform under realistic worst-case conditions rather than historic averages.

Stabilization projects will be coordinated with MDT and county road departments to ensure compatibility with roadway design standards, maintenance practices, and long-term asset management. Where slopes abut MTARNG facilities or training areas, treatments will be integrated with installation perimeter protection and access planning, reducing the likelihood that slope failure compromises mobility during emergencies or training operations.

Lead/Partners: MDT, County Road Depts., DMA (mission assurance advocate).

Supporting Facts:

- Post-fire erosion in Broadwater County's canyon systems has repeatedly washed-out gravel road segments, demonstrating the vulnerability of steep, untreated slopes under post-fire runoff conditions. (Broadwater County Road Department maintenance and closure records; MDT post-event damage reports; Montana DNRC post-fire flood and erosion impact summaries; FEMA Hazard Mitigation Assistance supporting documentation for post-fire flood and erosion events in southwest Montana).
- NRCS post-fire watershed studies indicate that engineered slope stabilization and revegetation can reduce sediment delivery by up to 70 percent, protecting downstream roads, culverts, and infrastructure. (USDA Natural Resources Conservation Service, Emergency Watershed Protection Program technical guidance; NRCS post-fire erosion control effectiveness studies; U.S. Forest Service Burned Area Emergency Response treatment performance evaluations documenting sediment-reduction benefits of stabilization and revegetation measures).
- Without permanent stabilization, military and civilian mobility routes remain exposed to recurring slope failures, increasing maintenance costs, emergency response delays, and access uncertainty. (MDT asset management and emergency repair cost summaries; Broadwater and Lewis & Clark County after-action reviews related to storm and post-fire road failures; FEMA mitigation guidance on repetitive damage and cost-avoidance through permanent stabilization; DMA/MTARNG access and range operations impact summaries).

Cost Estimate: \$2 million – \$5 million per corridor (depending on length and slope severity).

Potential Funding: FEMA HMGP, NRCS EWP, Federal Highway Administration Emergency Relief Program, DoW REPI (infrastructure support).

Mission & Community Benefit: Engineered slope stabilization improves public safety,

evacuation reliability, and infrastructure durability by reducing the likelihood of sudden road failures, rockfall hazards, and prolonged access disruptions. For residents, stabilized corridors mean safer travel, more reliable emergency access, and reduced isolation following storms or post-fire runoff events.

For counties and MDT, proactive stabilization lowers long-term maintenance and emergency repair costs by addressing slope failure at its source rather than repeatedly responding to washouts. These investments also improve asset reliability and strengthen eligibility for federal resilience funding.

For MTARNG, stabilized lifeline routes protect training access, mobilization corridors, and perimeter security, ensuring that mission-critical movements are not compromised by predictable slope failures. As a shared civilian–military resilience investment, slope stabilization delivers lasting benefits that support safe access, operational continuity, and regional hazard mitigation.

53. *Implement Post-Fire Erosion and Sediment Controls*

Description: Implement rapid post-fire erosion and sediment control measures in high-burn-severity areas that drain toward DMA access corridors, training routes, and municipal water-supply systems serving the FHTA and LHTA assessment areas. Treatments will be prioritized in watersheds where wildfire has removed vegetative cover and soil stability, increasing the risk of debris flows, slope failures, and sediment delivery during subsequent storm events.

Mitigation actions will include straw or wood-fiber mulching, hydro mulching, contour wattles, silt fencing, check structures, and targeted riparian revegetation to stabilize slopes, slow runoff velocities, and trap sediment before it reaches roads, culverts, bridges, and water intakes. Treatments will be selected based on slope gradient, soil type, burn severity, and downstream exposure, consistent with NRCS Emergency Water Protection (EWP) and USFS Burned Area Emergency Response (BAER) technical guidance.

Projects will be implemented rapidly following wildfire containment to address the highest-risk post-fire period—typically the first one to three wet seasons—when erosion rates and debris-flow probability are greatest. Coordination among USFS, NRCS, county DES, and DMA will ensure treatments are aligned with emergency access protection, infrastructure hardening priorities, and longer-term watershed restoration efforts.

Lead/Partners: USFS, NRCS, County DES, DMA.

Supporting Facts:

- Burn scars from the 2012 Meriwether Fire and 2019 North Hills Fire caused increased runoff and slope destabilization in surrounding watersheds.
- DMA training routes are repeatedly impacted by debris flows.

Cost Estimate: Approximately \$3,000–\$7,000 per acre, with 200–600 acres treated per wildfire event depending on burn severity, slope conditions, and proximity to DMA access routes, transportation corridors, and water-supply infrastructure.

Potential Funding: FEMA HMGP, NRCS EWP, USDA Forest Service Burned Area Emergency Response (BAER).

Mission & Community Benefit: Post-fire erosion and sediment controls improve life safety, water reliability, and access resilience by reducing debris-flow and sediment risks that threaten roads, utilities, and water supplies following wildfire. For nearby residents, these measures lower the likelihood of sudden roadway closures, flooding, and degraded drinking-water quality during post-fire storm events.

For counties and land managers, rapid stabilization reduces long-term maintenance and emergency repair costs by addressing erosion at its source rather than repeatedly repairing damaged infrastructure. These actions also strengthen compliance with watershed protection and hazard mitigation objectives.

For MTARNG, protecting access corridors and training routes from post-fire erosion supports mission assurance, safe mobility, and continuity of operations, ensuring that wildfire impacts do not cascade into prolonged operational disruptions. As a shared civilian–military mitigation strategy, post-fire erosion control delivers cost-effective, near-term resilience benefits that protect communities, infrastructure, and mission-critical terrain.

54. Update Land Use Policies to Restrict Development in High-Risk Areas

Description: Update county land-use policies to restrict or condition development in high-risk slope and erosion areas by establishing slope-stability overlay districts and requiring formal geotechnical review for subdivisions and infrastructure projects proposed on slopes exceeding 15 percent, within mapped erosion-prone areas, or adjacent to known landslide, debris-flow, or channel-migration zones. The overlays will apply to areas influencing DMA mobility corridors, evacuation routes, utilities, and downstream communities within the FHTA and LHTA assessment areas.

Overlay standards will require applicants to demonstrate that proposed development will not increase slope instability, runoff concentration, or downstream sediment impacts, using site-specific geotechnical and hydrologic analyses. Where risk cannot be adequately mitigated, overlays will enable counties to limit density, require setbacks, impose engineering conditions, or prohibit development in the most hazardous locations. Standards will also establish long-term maintenance and monitoring requirements for approved mitigation measures.

Lead/Partners: Lewis & Clark and Broadwater County Planning Departments, DMA (reviewer).

Supporting Facts: Both counties currently rely on advisory subdivision reviews with no enforceable geotechnical standards or building approval process. Development in steep terrain continues (e.g., South Hills Helena, Canyon Ferry). Restrictive overlays could reduce added risk to DMA mobility corridors.

Cost Estimate: Less than \$200,000 annually (planning and enforcement).

Potential Funding: Local planning budgets, FEMA BRIC (planning), OLDCC-DCIP (land-use compatibility).

Mission & Community Benefit: Restricting development in high-risk slope and erosion areas improves public safety, access reliability, and long-term infrastructure resilience by preventing new construction from increasing landslide, debris-flow, and road-failure risks. For residents, enforceable slope standards reduce the likelihood of property damage, evacuation delays, and isolation caused by slope failures affecting roads and utilities.

For counties, slope-stability overlays lower future emergency response and maintenance costs by avoiding predictable failures and strengthening the defensibility of land-use decisions. These policies also improve eligibility for federal mitigation funding by demonstrating proactive, risk-based growth management.

For MTARNG, limiting high-risk development near lifeline corridors protects training access, mobilization routes, and perimeter security, supporting mission assurance and safe emergency response. As a coordinated civilian–military mitigation measure, this action helps ensure that growth does not undermine shared transportation networks or increase long-term hazard exposure across the assessment area.

10. Governance and Policy Translation Gaps Perpetuate Hazard Exposure

Finding

Across Lewis & Clark and Broadwater Counties, hazard awareness is documented in Growth Policies, CWPP, and HMPs, yet these priorities are not consistently translated into enforceable zoning codes or subdivision regulations. For example, the Lewis & Clark County zoning regulations acknowledge wildfire exposure but stop short of requiring defensible space or ignition-resistant construction (2022 update). Similarly, Broadwater County’s Growth Policy highlights flood and WUI risks, but implementation remains largely advisory. This disconnect between hazard identification and regulatory enforcement allows development to proceed without integrating risk-reduction requirements at the parcel or subdivision scale.

As a result, development continues in hazard-prone corridors—including the Helena South Hills, Canyon Ferry shoreline, and Upper Tenmile watershed—without mandatory standards for defensible space, redundant ingress/egress, flood setbacks, or slope-stability considerations. Although Montana has adopted a statewide WUI code with implementing rules, this framework is inconsistently referenced or operationalized at the county level, limiting its practical influence on permitting and subdivision review. This governance gap perpetuates hazard exposure, increases long-term public and military infrastructure costs, and degrades DMA mission assurance by constraining training availability and access reliability at FHTA and LHTA ([Annex H](#)).

The absence of codified requirements also complicates interagency coordination, as emergency managers, utilities, and MTARNG planners lack regulatory mechanisms to ensure that new development does not further burden already constrained evacuation routes, water systems, or response corridors.

What Has Worked (and Why It Mattered)

- Local planning documents now consistently acknowledge hazard exposure and military compatibility, establishing a shared vocabulary across civil and military planning. This recognition has enabled Prickly Pear Land Trust (PPLT) and partners to expand buffer easements near FHTA and LHTA under REPI and Open Space Bond mechanisms. These non-regulatory tools have partially offset the absence of enforceable land-use controls.

- The Growth Policies and CWPP identify high-risk areas adjacent to FHTA and LHTA, laying the groundwork for conditional development standards. These documents have improved public and interagency awareness, helping justify grant applications under FEMA BRIC and OLDCC-DCIP. However, without adoption into zoning or subdivision codes, these plans function primarily as guidance rather than enforceable risk controls.

Quantified Vulnerabilities

- From 2010–2020, Lewis & Clark County’s population grew 10.2%, with much of that growth in WUI corridors lacking enforceable mitigation requirements.
- Broadwater County grew 15.5% in the same period, with subdivisions expanding into the Canyon Ferry floodplain and LHTA access corridors, without mandatory fuel breaks or secondary egress.

Mission Assurance Gaps (DMA)

- Training is increasingly constrained by smoke, road closures, and stand-downs caused by encroaching residential growth.
- Inconsistent enforcement of WUI and flood standards undermines buffers, critical to preventing fire spread or flood washouts into DMA lifelines.
- Without stronger land-use authority, DMA faces reduced maneuver space, more frequent range closures, and escalating costs for mutual aid.

Planning and Governance Gaps

- No countywide WUI code exists in either Lewis & Clark or Broadwater, leaving fire-adapted development standards optional.
- Growth Policies and CWPP provide guidance but lack binding authority. Subdivision approvals continue to move forward without defensible space mandates, secondary access, or dedicated wildfire mitigation fees.
- Enforcement mechanisms (inspections, penalties, or conditional approvals) are absent, resulting in fragmented and inconsistent application of hazard standards across jurisdictions.

Recommendations:

55. *Establish a Regional Interagency Resilience Governance and Master Planning Program*

Description: Establish a standing Regional Interagency Resilience Governance Program to unify hazard mitigation, land-use compatibility, wildfire and flood planning, and defense mission assurance across the FHTA and LHTA assessment areas. The program combines formation of a permanent, multi-jurisdictional governance structure with development of a Unified Regional Mitigation and Resilience Master Plan and a centralized Regional Resilience Data Portal and Performance Dashboard that together serve as the authoritative coordination, planning, and implementation framework for the region.

At the governance level, the program will formalize a permanent interagency working group composed of DMA/MTARNG, county and municipal governments, emergency management, public works, utilities, transportation agencies, state agencies, and relevant federal and land-management partners. This body will be responsible for setting regional resilience priorities, aligning planning cycles, resolving cross-jurisdictional conflicts, and maintaining a shared mitigation and funding pipeline that reflects both civilian risk reduction needs and military mission requirements.

The Unified Regional Mitigation and Resilience Master Plan will synchronize currently fragmented planning efforts, including county HMPs, CWPP, EOPs, REPI priorities, watershed plans, and MTARNG operational and training requirements, into a single, regionally endorsed implementation framework. The Master Plan will translate policy goals and hazard findings into prioritized, sequenced mitigation actions supported by common assumptions, shared datasets, and coordinated funding strategies.

To operationalize governance and planning decisions, the program will develop and maintain a centralized Regional Resilience Data Portal with an integrated Performance Dashboard. The portal will function as the authoritative repository for interagency MOUs, mitigation plans, after-action reports, GIS datasets, modeling outputs, and project documentation, while the dashboard will provide real-time and trend-based visibility into mitigation implementation status, exercise participation, response capabilities, and grant readiness metrics.

The system will include role-based access controls for DMA, county governments, utilities, fire districts, and state agencies, with interoperability links to county WebEOC systems and DMA planning platforms. A public-facing dashboard will provide high-level transparency on regional resilience investments and progress without exposing sensitive military, security, or critical infrastructure data. Governance procedures, data standards, update cycles, and access protocols will be codified to ensure continuity across leadership changes and plan update cycles.

Lead/Partners: DMA; MT DES; Lewis & Clark and Broadwater County Planning County; Montana DNRC; City of Helena, MDT, Tri-County FireSafe Working Group; NorthWestern Energy; PPLT and local utilities and fire districts.

Supporting Facts:

- A 2024 MT DES interoperability assessment found that less than 40% of mitigation, hazard, and resilience data is shared across agencies, resulting in duplicated analyses, inconsistent hazard mapping, and reduced competitiveness for federal resilience funding (*Montana DES, Interoperability and Information Sharing Assessment, 2024*).
- There is currently no regionally adopted system that tracks mitigation project implementation status, interagency exercise outcomes, or FEMA BRIC readiness metrics in a standardized, continuously updated manner across Lewis & Clark County, Broadwater County, and MTARNG partners (*Western Montana HMP reviews; DMA planning gap analyses, 2023–2024*).
- Existing planning documents—including HMPs, CWPP, EOPs, JLUS, REPI initiatives, watershed plans, and MTARNG installation plans—operate on separate data sets and update cycles, creating misalignment in project prioritization and funding timelines (*FEMA Local Mitigation Planning Policy Guide, 2023*).

- Federal resilience programs increasingly require documented performance measurement, outcome tracking, and data transparency as part of competitive grant evaluation, including demonstration of regional coordination and implementation capacity (*FEMA BRIC Notice of Funding Opportunity, 2023–2024; DHS Regional Catastrophic Preparedness Grant Program Guidance*).
- Government Accountability Office (GAO) reviews of disaster resilience programs have identified lack of integrated data systems and governance structures as a recurring barrier to effective interagency coordination and long-term mitigation success (*U.S. Government Accountability Office, Disaster Resilience: Actions Needed to Improve Coordination, GAO-20-100, GAO-23-105*).
- FEMA and DHS guidance identify regional governance bodies and shared data platforms as best practices for managing interdependent infrastructure risks where military installations rely on civilian systems for access, utilities, and emergency response (*FEMA National Mitigation Framework, 3rd Edition; DHS National Preparedness Goal; DoD–DHS Infrastructure Resilience guidance*).

Cost Estimate:

- \$400,000 – \$600,000 initial development (governance framework development, master plan integration, data architecture, GIS integration, cybersecurity controls, and dashboard build)
- \$75,000 annually for maintenance, updates, governance support, and user assistance

Potential Funding: FEMA C&CB; DoD DCIP; DoW REPI Integration Funding; OLDCC Resilience Technical Assistance.

Mission & Community Benefit: This integrated governance and data program reduces administrative burden, eliminates duplicative planning efforts, and improves grant competitiveness by providing decision-makers with a shared, authoritative operating picture. For communities, it accelerates mitigation implementation and improves transparency and accountability for resilience investments. For MTARNG, it strengthens mission assurance by ensuring civilian infrastructure planning, land-use decisions, and mitigation funding are aligned with installation access, training continuity, and operational readiness—creating a durable, data-driven foundation for long-term regional resilience.

56. Codify Interlocal Agreements for Hazard Response and Recovery Governance

Description: Codify formal interlocal MOUs to govern hazard response and recovery operations across jurisdictions serving the FHTA and LHTA assessment areas. These agreements will define operational authority, debris-clearance priorities, post-disaster cost-share mechanisms, and emergency communications protocols among DMA/MTARNG, counties, municipalities, utilities, and transportation partners.

The MOUs will establish clear roles for incident support, access control, debris removal sequencing, utility restoration coordination, and information sharing during floods, debris flows, wildfire aftermath, and infrastructure failures. Agreements will also address financial responsibilities and reimbursement pathways (e.g., FEMA PA/HMGP interfaces), reducing delays

caused by uncertainty over cost eligibility and lead agency authority.

Lead/Partners: DMA; County Attorneys; MT DES; Legal Counsel; DOJ.

Supporting Facts:

- A review of the 2014 Joint Land Use Study (JLUS) and subsequent county records indicates that no formal interlocal agreements governing evacuation, debris removal, or utility restoration have been adopted for the FHTA and LHTA assessment areas. As a result, response coordination continues to rely on informal practices and ad hoc decision-making during hazard events (*JLUS, 2014; Lewis & Clark and Broadwater County records*).
- FEMA, state emergency management agencies, and national after-action reports consistently identify the absence of pre-disaster interlocal agreements as a driver of delayed response, increased liability exposure, and uncertainty in cost recovery, particularly during incidents involving multiple jurisdictions and shared lifelines such as roads, power, and communications infrastructure (*FEMA Local Mitigation Planning Policy Guide; FEMA Public Assistance Program and Policy Guide; NEMA Emergency Management Mutual Aid Best Practices*).

Cost Estimate: \$100,000 (legal drafting, workshops, coordination).

Potential Funding: FEMA HMGP Planning; OLDCC Technical Assistance; DoD DCIP.

Mission & Community Benefit: Codified interlocal agreements improve life safety, response speed, and recovery reliability by ensuring that agencies understand their authorities, priorities, and financial responsibilities before disasters occur. For residents, this translates into faster debris clearance, quicker utility restoration, and clearer public communication during evacuations and recovery.

For counties and municipalities, formal agreements reduce legal ambiguity, streamline reimbursement, and limit duplicative or conflicting actions—lowering administrative burden and post-event disputes. These agreements also strengthen eligibility for federal mitigation and recovery funding by demonstrating pre-disaster coordination and governance capacity.

For MTARNG, legally adopted interlocal agreements support mission assurance, access reliability, and continuity of operations, ensuring that installation needs are integrated into civilian response and restoration priorities. As a shared civilian–military governance tool, this action converts ad hoc coordination into a durable framework that strengthens regional resilience across the assessment area.

57. Train Local Planners and Emergency Managers in Defense Mission Assurance Integration

Description: Provide recurring, standardized training for city, county, and state planners, emergency managers, and public works officials on integrating defense mission assurance, range safety constraints, compatible-use buffers, and military lifeline dependencies into hazard mitigation planning, CWPP development, land-use review, and capital investment decisions. Training will focus on practical application—how to account for military access routes, training schedules, safety arcs, and shared infrastructure when evaluating development proposals, evacuation planning, and mitigation project prioritization.

The program will leverage FEMA Emergency Management Institute curricula, state hazard mitigation guidance, and MTARNG-specific case studies from the FHTA and LHTA assessment areas to ensure consistency across civilian and military planning frameworks.

Lead/Partners: DMA; MT DES Training; FEMA EMI; DNRC.

Supporting Facts:

- In 2023, the Broadwater County Planning Department reported that staff had not received formal training on integrating military installations or mission assurance considerations into FEMA-compliant HMPs or CWPP, despite the proximity of FHTA and LHTA to active development and shared infrastructure corridors (*Broadwater County Planning Department interview notes, 2023*).
- FEMA’s Local Mitigation Planning Policy Guide and DoW compatibility guidance emphasize early integration of defense assets into civilian hazard and land-use planning as a best practice to reduce long-term conflicts, evacuation constraints, and infrastructure vulnerabilities near military installations (*FEMA, 2023; DoD REPI Program Guidance*).
- Lack of planner familiarity with military mission requirements increases the likelihood that subdivisions, road projects, and utility investments are approved without considering range safety, emergency access, or wildfire exposure, creating avoidable risks to both community safety and military readiness (*NEMA–DoD Planning Coordination Guidance*).

Cost Estimate: \$100,000 annually (curriculum development, instruction, and regional workshops).

Potential Funding: FEMA EMI; BRIC C&CB; OLDCC Planning Support Grants.

Mission & Community Benefit: Strengthening planner and emergency manager understanding of defense mission assurance ensures that local land-use, hazard mitigation, and infrastructure decisions do not inadvertently increase wildfire risk, evacuation constraints, or access conflicts in the FHTA and LHTA assessment areas. By institutionalizing military–civilian planning literacy, this action reduces future compatibility conflicts, improves evacuation and response planning, and protects shared lifelines that support residents, emergency services, and MTARNG operations. The result is safer development patterns, more effective mitigation investments, and sustained mission readiness achieved through informed, coordinated decision-making rather than reactive correction.

58. Develop Policy Templates and Mutual-Aid Language for Integration into Local Plans

Description: Develop a standardized suite of ready-to-adopt policy templates and mutual-aid language to support consistent, FEMA-compliant integration of hazard mitigation, emergency response, and resilience actions across local and regional plans. Templates will be designed for direct insertion into HMPs, EOPs, CWPP, Growth Policies, and related annexes, with modular language addressing wildfire, flooding, evacuation coordination, infrastructure protection, and military mission continuity.

The effort will focus on reducing administrative and technical barriers faced by smaller jurisdictions by providing pre-vetted language that aligns with FEMA planning requirements, state

legal frameworks, and defense compatibility considerations. Templates will include guidance for interlocal agreements, shared evacuation corridors, priority restoration protocols, and civilian–military coordination mechanisms, enabling jurisdictions to adopt consistent policies without duplicative legal or planning effort.

Lead/Partners: DMA; MT DES; County Planners; DOJ.

Supporting Facts:

- Local jurisdictions report inconsistent policy formatting, lack of model language, and limited staff capacity as primary barriers to timely FEMA-compliant plan updates. (*MT DES Planning Feedback Survey and technical assistance summaries 2024; county DES and planning staff feedback provided during update coordination meetings*).
- Variability in plan structure, terminology, and annex organization across counties complicates interagency coordination, mutual-aid activation, and preparation of competitive regional grant applications. (*MT DES after-action reviews and regional planning coordination summaries; FEMA Local Mitigation Planning Policy Guide; National Emergency Management Association guidance on regional planning consistency and mutual aid effectiveness*).
- FEMA BRIC Capability & Capacity Building guidance identifies standardized planning frameworks, reusable policy language, and repeatable governance mechanisms as indicators of institutional resilience and administrative capacity. (FEMA BRIC Notice of Funding Opportunity; FEMA C&CB program guidance; FEMA mitigation planning best practices for scalable and transferable governance structures).

Cost Estimate: \$75,000 (template development, legal review, and distribution).

Potential Funding: FEMA C&CB; SHSGP.

Mission & Community Benefit: Standardized policy templates accelerate plan adoption, improve consistency across jurisdictions, and reduce governance fragmentation that undermines coordinated response and mitigation. By embedding mission assurance, evacuation coordination, and mutual-aid roles directly into local plans, this action strengthens operational clarity during emergencies while improving grant competitiveness and long-term resilience. Communities benefit from faster plan updates, clearer authorities, and reduced administrative burden, while MTARNG gains predictable, interoperable planning frameworks that support sustained readiness and defense-community compatibility.

59. Enforce Wildfire-Resilient Construction and Subdivision Standards Through Montana’s Statewide WUI Code

Description: Enforce wildfire-resilient construction and subdivision standards by formally adopting and implementing Montana’s statewide WUI Code, as authorized by the Legislature and administered through DNRC implementing regulations. Counties should operationalize the IWUIC as adopted by reference by the State of Montana (MCA § 76-13-145; ARM Title 24, Chapter 301, Subchapter 181), translating state standards into locally enforceable building, subdivision, and inspection requirements within designated WUI areas. Implementation will focus on applying state-adopted standards, not creating new regulatory frameworks, ensuring counties are exercising existing authority while reducing wildfire risk to communities, shared infrastructure, and military installations.

Priority provisions of the statewide WUI code and DNRC rules that should be enforced include:

- Ignition-Resistant Construction Requirements: Enforce IWUIC ignition-resistant construction standards for roofing, exterior walls, vents, decks, and attachments, including Class A roofing and ember-resistant venting, in moderate-to-high fire hazard severity areas.
- Defensible Space and Vegetation Management: Apply IWUIC [Annex B](#) (Vegetation Management Plans) to require enforceable defensible-space zones, recorded maintenance covenants, and ongoing fuel-modification standards for new development and major remodels.
- Fire Hazard Severity Classification: Utilize IWUIC [Annex B](#) (Fire Hazard Severity Classification) to tailor construction, density, and access requirements to site-specific wildfire risk, rather than applying uniform countywide standards.
- Subdivision and Access Design: Enforce WUI-appropriate subdivision standards, including minimum road widths, grade limits, fire apparatus turnarounds, driveway spacing, and secondary egress, consistent with IWUIC intent and DNRC rule guidance.
- Inspection and Compliance Authority: Integrate DNRC rule language into county inspection and enforcement processes so WUI standards are applied at permit issuance, during construction, and at final occupancy, rather than remaining advisory or discretionary.

This approach directly addresses wildfire exposure along the FHTA perimeter, Canyon Ferry corridor, US-287 corridor, and Helena South Hills, where residential growth intersects with high fire hazard, limited egress, and military access routes.

Lead/Partners: County Planning & Building Departments; County Fire Marshals; Montana DNRC; Montana DMA/MTARNG Safety Office; Local Fire Districts.

Supporting Facts:

- Montana has adopted the IWUIC by reference through statute and DNRC rulemaking, establishing a state-endorsed minimum standard for wildfire-resilient construction and subdivision design. (*Montana Code Annotated § 76-13-145; Administrative Rules of Montana, Title 24, Chapter 301, Subchapter 181; Montana DNRC Fire Protection Bureau guidance*).
- Neither Lewis & Clark County nor Broadwater County has fully implemented the statewide WUI code through enforceable local ordinances, leaving construction and subdivision approvals in high-risk WUI areas largely discretionary. (*County building and subdivision regulations review; DNRC local implementation assessments; county planning department records*).
- Wildfire-related insurance losses in Montana have more than tripled since 2016, and DNRC assessments indicate that approximately 40 percent of new homes constructed in WUI areas lack ignition-resistant features. (*Montana DNRC Fire Protection Bureau reports, 2024; insurance industry wildfire loss summaries; Montana State Auditor and DNRC wildfire impact analyses*).
- Subdivisions adjacent to FHTA and along the Canyon Ferry and US-287 corridors continue to be approved without codified defensible-space, access, or construction standards consistent with state WUI requirements, increasing evacuation and response risk. (*County*

subdivision approval records; CWPP and JLUS (2014) compatibility findings; county fire district access reviews).

Cost Estimate: \$300,000 (local ordinance adoption, code integration, inspector training, and compliance enforcement).

Potential Funding: EMA BRIC; USFS State & Private Forestry; DNRC Fire Adapted Communities; OLDCC Compatible Use Planning.

Mission & Community Benefit: Enforcing Montana’s statewide WUI code improves life safety, evacuation reliability, and wildfire loss reduction by ensuring that new development in high-risk areas is built to withstand ember exposure, radiant heat, and access constraints. For residents, this reduces structure loss, insurance risk, and evacuation bottlenecks while providing clear, predictable construction standards.

For counties, implementation shifts wildfire risk reduction from voluntary guidance to enforceable, state-authorized standards, lowering long-term response costs and strengthening eligibility for FEMA and state mitigation funding. Consistent application also reduces liability and discretionary decision-making in hazardous locations.

For MTARNG, WUI enforcement protects installation perimeters, training access routes, and shared civilian–military lifelines, supporting mission assurance and safe emergency response during wildfire events. As a coordinated civilian–military land-use measure, this action ensures that growth near FHTA and LHTA does not undermine wildfire resilience, evacuation safety, or long-term operational readiness.

60. Adopt Military-Compatible Wildland–Urban Interface (WUI) Overlay Areas

Description: Adopt county-level Military-Compatible WUI Overlay Areas in Lewis & Clark and Broadwater Counties by formally implementing applicable provisions of Montana’s statewide WUI Code (*International WUI Code as adopted by the State of Montana pursuant to MCA § 76-13-145 and ARM Title 24, Chapter 301, Subchapter 181*). The overlay will translate state-adopted WUI standards into locally enforceable zoning, subdivision, and development regulations tailored to wildfire, evacuation, and access conditions in the FHTA and LHTA assessment areas rather than creating a new or duplicative regulatory framework.

The WUI Overlay will function as a land-use compatibility and risk-reduction tool, ensuring that growth near military installations does not increase wildfire ignition potential, constrain evacuation and emergency access, or degrade MTARNG training continuity and response capability.

Priority WUI Overlay provisions include:

- **WUI Boundary Designation:** Establish WUI Overlay boundaries using DMA wildfire risk assessments, CWPP treatment priorities, evacuation and access constraints, and local response capability considerations, consistent with IWUIC Section 302 (Fire Hazard Severity Zones) as adopted by Montana and aligned with NFPA 1144 risk-based WUI evaluation methods.
- **[Annex B](#) – Vegetation Management Plans:** Require enforceable defensible-space and fuel-management zones for new subdivisions and major development within one (1) mile of

FHTA and two (2) miles of LHTA, including long-term maintenance requirements and recorded covenants.

- [Annex B](#) – Fire Hazard Severity Classification: Apply fire hazard severity ratings to guide density limits, road and access standards, and construction requirements in high-risk corridors, rather than relying on uniform countywide standards.
- Ignition-Resistant Construction Standards: Enforce IWUIC Table 503.1 (as amended by Montana) requiring appropriate ignition-resistant ratings (IR1–IR3) for roofing, siding, vents, decks, and exterior attachments in designated hazard areas—particularly along shared civilian–military access and evacuation routes.
- Subdivision and Emergency Access Standards: Integrate dual-egress requirements, minimum road widths, turnaround geometry, grade limits, and driveway spacing for emergency apparatus, consistent with IWUIC intent and DNRC guidance, even where state-level enforcement provisions are discretionary.

Lead/Partners: County Planning Departments; Montana DMA/MTARNG; Montana DNRC; Tri-County FireSafe Working Group; Local Fire Districts; County Road Departments.

Supporting Facts:

- Montana has adopted the IWUIC by reference, establishing a state-endorsed baseline for wildfire-resilient construction and subdivision design (*MCA § 76-13-145; ARM Title 24, Chapter 301, Subchapter 181; Montana DNRC Fire Protection Bureau guidance*).
- Between 2015 and 2024, more than 210 residential building permits were issued within moderate-to-high wildfire hazard polygons adjacent to FHTA and the Canyon Ferry corridor without enforceable WUI construction or access standards, increasing ignition, evacuation, and response risk (*Lewis & Clark County Growth Policy, Draft 2025; county permit records; CWPP risk mapping*).
- Neither Lewis & Clark County nor Broadwater County currently operationalizes the statewide WUI code through zoning or subdivision ordinances, leaving wildfire risk mitigation largely discretionary and inconsistent across jurisdictions (*County subdivision and zoning code review; DNRC local implementation assessments*).

Cost Estimate: \$200,000 (WUI mapping, zoning/subdivision code updates, legal review, and public outreach).

Potential Funding: FEMA BRIC, OLDCC Compatible Use Planning, DNRC Hazard Mitigation Assistance.

Mission & Community Benefit: This action aligns county growth management with existing state wildfire law, reducing ignition risk, preserving evacuation capacity, and protecting shared civilian–military access routes in the FHTA and LHTA assessment areas. Enforceable WUI Overlay standards improve resident safety, reduce future suppression and recovery costs, and provide predictability for developers and permitting agencies.

For MTARNG, the overlay protects training continuity, installation access, and emergency response capability by preventing incompatible density, access constraints, and wildfire exposure in mission-critical corridors. For counties, it strengthens eligibility for FEMA, state, and DoW resilience funding by demonstrating enforceable land-use controls tied to documented hazard

risk—supporting long-term community resilience while safeguarding defense readiness.

61. Develop a Regional Land-Use Compatibility Review Board

Description: Establish a Regional Land-Use Compatibility Review Board to provide structured, interagency review of major subdivision, rezoning, and infrastructure proposals located near the FHTA and LHTA assessment areas. The Board will evaluate proposed development for wildfire exposure, evacuation and access redundancy, infrastructure strain, and potential impacts to MTARNG mission assurance, supplementing—rather than replacing—local land-use decision authority.

The Board will function as a formal advisory body to county commissions and planning boards, issuing written compatibility findings, recommended conditions of approval, and mitigation measures for projects with cross-jurisdictional or cumulative risk implications. Reviews will focus on development proposals affecting shared lifeline corridors, training access routes, aviation safety zones, fuel-management buffers, and evacuation pathways where individual jurisdictional reviews may not capture regional risk.

Annual outputs will include a Regional Compatibility Report and Scorecard summarizing reviewed projects, identified encroachment trends, cumulative hazard exposure, and consistency with CWPP and HMPs recommendations, and adopted WUI overlays. These products will inform county commissions, state agencies, and funding partners, supporting data-driven growth management and grant competitiveness.

Lead/Partners: DMA; Lewis & Clark and Broadwater County Commissions; Tri-County Firesafe Working Group; Helena Regional Airport Authority.

Supporting Facts:

- No standing interagency body currently exists to evaluate cumulative encroachment risk, wildfire exposure, or access constraints across jurisdictional boundaries affecting the FHTA and LHTA assessment areas, despite repeated identification of this gap in regional planning efforts (*Fort Harrison Joint Land Use Study, 2014; County Growth Policy reviews*).
- Subdivision and infrastructure approvals near the South Hills, Canyon Ferry corridor, and training-adjacent access routes are typically reviewed in isolation, limiting consideration of regional evacuation capacity, shared lifelines, and defense mission impacts. (*Lewis & Clark and Broadwater County subdivision processes; CWPP findings*).
- FEMA, DoW REPI, and OLDCC guidance consistently emphasize early, interagency land-use coordination as a best practice for reducing long-term hazard exposure, infrastructure conflicts, and defense-community incompatibility (*FEMA BRIC Capability & Capacity Building guidance; DoW REPI Compatible Use principles; OLDCC DCIP criteria*).

Cost Estimate: \$100,000 annual operating cost (staffing, GIS support, public hearings).

Potential Funding: OLDCC Compatible Use Implementation; DoW REPI Program; FEMA HMGP for governance enhancement.

Mission & Community Benefit: The Regional Land-Use Compatibility Review Board strengthens predictable, defensible growth management by ensuring that new development does not incrementally erode evacuation capacity, emergency response access, or MTARNG

operational readiness. Communities benefit from earlier identification of wildfire and infrastructure risks, clearer expectations for developers, and reduced post-approval conflicts or retrofit costs.

For MTARNG, the Board provides a formal mechanism to address encroachment, wildfire exposure, and access constraints before they become mission-limiting, protecting training continuity and response capability. For counties, it enhances transparency, interagency trust, and eligibility for state, FEMA, and DoW resilience funding by demonstrating proactive, coordinated land-use governance tied to documented hazard risk.

62. Implement a Military-Wildfire Compatibility Incentive Program

Description: Establish a Military–Wildfire Compatibility Incentive Program to encourage voluntary risk-reduction actions by private landowners within designated Military CUB areas surrounding the FHTA and LHTA assessment areas. The program will provide cost-share incentives, technical assistance, and streamlined access to conservation tools for property owners who implement fuel-reduction treatments, ignition-resistant construction upgrades, defensible-space improvements, or conservation easements that align with REPI priorities and local CWPP objectives.

Eligible actions will include shaded fuel breaks, ladder-fuel removal, home hardening measures consistent with the IWUIC, access corridor clearance, and voluntary easements that restrict incompatible development while preserving emergency access and wildfire mitigation capacity. Incentives will be structured to complement—not replace—existing REPI acquisitions, USDA programs, and county mitigation efforts, targeting high-risk parcels that fall outside current public ownership or easement coverage.

Lead/Partners: DMA; Prickly Pear Land Trust (PPLT); DNRC; County Fire Councils; REPI Partners.

Supporting Facts:

- The DoW REPI Program has secured more than 8,200 acres of conservation buffers near FHTA and LHTA, significantly reducing wildfire spread potential and incompatible development pressure; however, approximately 3,500 acres of high-risk privately owned land remain untreated and unenrolled in mitigation or easement programs (*U.S. Army REPI Annual Report, FY2024; DMA REPI parcel inventory*).
- Wildfires originating on private lands adjacent to installations pose disproportionate risk to training continuity, evacuation routes, and shared infrastructure, particularly where fuel conditions and access standards are inconsistent across ownership boundaries (*CWPP risk assessments; DNRC wildfire occurrence data*).
- Incentive-based programs are identified by FEMA, USDA, and DoW as effective mechanisms for accelerating voluntary mitigation, increasing participation in fuel-reduction programs, and extending risk reduction beyond publicly owned lands (*FEMA BRIC Nature-Based Solutions guidance; USDA NRCS Emergency Watershed Protection and conservation program frameworks; DoD REPI Compatible Use best practices*).

Cost Estimate: \$500,000 initial pool; expandable through REPI/NRCS matching.

Potential Funding: DoW REPI; USDA NRCS Emergency Watershed Protection (EWP); FEMA

BRIC Nature-Based Mitigation.

Mission & Community Benefit: The Military–Wildfire Compatibility Incentive Program reduces wildfire risk at the civilian–military interface, where unmanaged private lands can undermine otherwise robust mitigation investments. Communities benefit from reduced fire intensity, improved evacuation safety, and financial support for defensible-space and home-hardening actions that protect lives and property.

For MTARNG, the program helps close remaining buffer gaps without relying solely on fee acquisition, preserving training access, reducing ignition threats, and sustaining mission readiness. By rewarding voluntary stewardship rather than imposing new mandates, the program strengthens trust, accelerates mitigation uptake, and reinforces long-term defense-community compatibility.

63. Create a Shared Enforcement and Inspection Framework

Description: Establish a shared, cross-county enforcement and inspection framework to standardize application, documentation, and enforcement of wildfire-resilient construction standards, WUI codes, and defensible-space requirements across Lewis & Clark and Broadwater Counties. The framework will focus on ensuring consistent implementation of state-adopted WUI provisions and locally adopted overlays affecting the FHTA and LHTA assessment areas.

The initiative will harmonize inspection schedules, checklists, and compliance thresholds across county building departments, fire marshals, and code enforcement staff to eliminate jurisdictional gaps that undermine mitigation effectiveness. A key component will be the development of mobile, GIS-enabled inspection tools, linked to DMA’s Regional Resilience Portal, that allow inspectors to document compliance in the field, geotag deficiencies, track corrective actions, and share real-time status updates across agencies.

The framework will also establish protocols for cross-jurisdictional support, enabling inspectors from one county to assist during surge periods (e.g., post-fire rebuilds, high-volume permit cycles) and ensuring defensible-space and WUI standards are enforced consistently along shared evacuation corridors, access routes, and buffer areas. Standardized reporting will support performance tracking, grant compliance, and continuous improvement of wildfire mitigation outcomes.

Lead/Partners: County Building Departments; Fire Marshals; DMA; DNRC; MT DES.

Supporting Facts:

- Current inspection coverage reaches only approximately 30–40 percent of permitted parcels, leaving significant portions of new development without verified compliance with defensible-space or wildfire-resilient construction standards (*County Code Enforcement Logs and Building Department Reports, 2024*).
- Disparate enforcement practices and documentation standards across counties weaken the effectiveness of WUI and defensible-space requirements, particularly in areas where wildfire risk, evacuation routes, and military access corridors cross jurisdictional boundaries (*County fire marshal interviews; CWPP implementation reviews*).
- FEMA and state wildfire agencies identify consistent enforcement and compliance tracking as critical elements of effective mitigation, noting that adoption of codes without inspection

and follow-through yields limited risk reduction (*FEMA BRIC Capability & Capacity Building guidance; Fire Adapted Communities and IWUIC implementation best practices*).

Cost Estimate: \$250,000 setup; \$75,000 annual maintenance.

Potential Funding: FEMA HMGP; DHS RCPGP; State Fire Marshal Resilience Grants.

Mission & Community Benefit: A shared enforcement and inspection framework ensures that wildfire-resilient standards adopted on paper are consistently applied on the ground, closing the implementation gap that exposes communities and military installations to preventable ignition and evacuation risks. Residents benefit from clearer expectations, fair and uniform enforcement, and reduced wildfire exposure across jurisdictional lines.

For MTARNG, consistent enforcement protects buffer investments, preserves evacuation and response corridors, and prevents incremental erosion of mission readiness caused by noncompliant development. By pairing modern inspection tools with interagency coordination, this action strengthens accountability, improves grant defensibility, and delivers measurable, sustained wildfire-risk reduction for both civilian communities and military operations.

64. Update Growth Policies and Subdivision Regulations with Hazard Disclosure and Buffer Clauses

Description: Revise county Growth Policies and subdivision regulations in Lewis & Clark and Broadwater Counties to explicitly require hazard disclosure, emergency access standards, and buffer dedication for new development located near military installations, high-fuel WUI areas, and shared civilian–military lifeline corridors. Updates will ensure that wildfire, flood, evacuation, and infrastructure risks are identified and mitigated prior to final plat approval, rather than addressed retroactively.

Revisions will require developers to disclose wildfire hazard severity, evacuation constraints, and proximity to military training areas; demonstrate adequate primary and secondary access for emergency response; and dedicate or protect buffers adjacent to fuel corridors, access routes, and installation boundaries where development could increase ignition risk or restrict evacuation. Where appropriate, developers will be required to fund or construct mitigation measures—such as fuel breaks, defensible space, access improvements, or drainage controls—as conditions of approval.

Policy updates will align Growth Policies, subdivision standards, CWPP priorities, and adopted WUI overlays to ensure consistent application across planning documents and jurisdictions. The intent is not to prohibit growth, but to ensure that new development internalizes its risk impacts and does not incrementally erode evacuation capacity, response access, or MTARNG mission assurance.

Lead/Partners: County Planning Departments, DMA, DNRC, County Commissions.

Supporting Facts:

- Neither Lewis & Clark County nor Broadwater County currently requires pre-plat mitigation improvements or buffer dedication in high-fuel WUI corridors, resulting in subdivisions being approved without enforceable defensible space, access upgrades, or fuel-management provisions (*County subdivision regulations and planning staff review, 2024*).

- At least six subdivisions approved near FHTA since 2019 have increased cumulative wildfire exposure and evacuation constraints, with mitigation deferred to individual homeowners or future public investment (*Lewis & Clark County Planning Department development tracking, 2024*).
- FEMA, DNRC, and DoD compatibility guidance emphasize early hazard disclosure and developer-funded mitigation as best practices for reducing long-term public risk, infrastructure strain, and defense-community conflict (*FEMA BRIC Capability & Capacity Building guidance; DNRC Fire Adapted Communities framework; DoD REPI Compatible Use principles*).

Cost Estimate: \$125,000 (policy update, legal review, public workshops).

Potential Funding: FEMA C&CB; OLDCC Compatible Use Planning; DNRC Hazard Mitigation Assistance.

Mission & Community Benefit: Updating Growth Policies and subdivision regulations to require hazard disclosure and mitigation at the time of development shifts risk reduction upstream, preventing avoidable wildfire, evacuation, and infrastructure conflicts before they become public liabilities. Communities benefit from safer neighborhoods, clearer development expectations, and reduced long-term costs for emergency response and retrofits.

For MTARNG, enforceable buffer and access provisions protect training continuity, preserve evacuation and response corridors, and prevent incremental encroachment that undermines mission readiness. By aligning growth management with documented hazard risk and compatibility needs, this action strengthens both community resilience and defense mission assurance while improving eligibility for FEMA, state, and DoW resilience funding.

65. Develop Military-Compatible Land-Use Education and Outreach Campaign

Description: Develop and implement a coordinated, multi-agency education and outreach campaign to improve awareness of military compatibility, wildfire risk, and defensible-space best practices among developers, real-estate professionals, landowners, and residents within the FHTA and LHTA assessment areas. The campaign will focus on translating technical planning and hazard information into practical, accessible guidance that supports safer development decisions and reduces avoidable conflicts at the civilian–military interface.

The program will include in-person workshops, continuing-education modules for real-estate and development professionals, public open houses, and digital outreach products. A core component will be the use of visual, map-based tools—hosted through the Regional Resilience Portal—to clearly illustrate wildfire hazard severity, WUI boundaries, evacuation constraints, military buffer areas, and applicable development standards. Materials will emphasize defensible space, ignition-resistant construction, access and egress requirements, and the long-term benefits of military-compatible land use.

Messaging will be coordinated across CWPP, HMP, Growth Policy, and REPI efforts to ensure consistent terminology and expectations, reducing public confusion caused by fragmented planning processes. The campaign will also provide early-stage guidance for developers and property owners, encouraging mitigation and compatibility measures before formal permitting or subdivision review.

Lead/Partners: DMA; Tri-County Firesafe Working Group; MT DES; DNRC; REALTORS® Associations.

Supporting Facts:

- Public surveys conducted during the 2024 CWPP update found that approximately 63 percent of residents were unaware of existing military compatibility areas, WUI designations, or wildfire risk classifications affecting their properties. (*CWPP Public Engagement Summary, 2024*).
- Lack of early awareness contributes to defensible-space noncompliance, unsafe access design, and late-stage development conflicts, increasing wildfire exposure and administrative burden for counties and fire districts. (*County fire marshal feedback; CWPP implementation reviews*).
- FEMA, DNRC, and DoW REPI guidance identify public education and stakeholder outreach as essential components of effective wildfire mitigation and compatible-use implementation, particularly in rapidly growing WUI areas. (*FEMA BRIC Capability & Capacity Building guidance; DNRC Fire Adapted Communities framework; DoW REPI Compatible Use best practices*).

Cost Estimate: \$80,000 (materials, workshops, media).

Potential Funding: FEMA C&CB; USFS Firewise USA; DoW REPI Outreach Fund.

Mission & Community Benefit: A targeted land-use education and outreach campaign reduces wildfire risk and compatibility conflicts before development occurs, empowering residents and developers to make informed decisions that protect lives, property, and evacuation capacity. Communities benefit from clearer expectations, improved compliance with defensible-space and access standards, and stronger public trust in planning and mitigation processes.

For MTARNG, proactive education helps prevent incremental encroachment, ignition risk, and access constraints that threaten training continuity and response capability. By reinforcing shared responsibility for risk reduction at the civilian–military interface, this action strengthens long-term defense-community compatibility while supporting FEMA- and DoW-eligible mitigation investments.

66. Establish a Subdivision Mitigation Fee Program

Description: Establish a Subdivision Mitigation Fee Program requiring new residential and mixed-use subdivisions located in hazard-prone areas, including WUI, flood-affected watersheds, and military-adjacent buffer areas, to contribute to a dedicated Wildfire and Flood Mitigation Fund. Fees will be assessed at the time of subdivision approval or building permit issuance and structured to reflect proportional impact on emergency response capacity, evacuation infrastructure, and hazard exposure.

Eligible uses of the fund will include fuels-reduction projects, secondary egress improvements, emergency water supply (e.g., firefighting cisterns), drainage and sediment-control measures, defensible-space treatments, and conservation easements adjacent to DMA lands and shared civilian–military lifelines. Fee expenditures will be geographically linked to the areas generating growth to ensure nexus, proportionality, and public accountability.

The program will complement, rather than replace, existing grant funding by providing local match and gap financing for FEMA BRIC, HMGP, and DoW REPI-eligible projects. By internalizing mitigation costs at the point of development, the program shifts the financial burden away from existing residents and emergency agencies while discouraging unsafe growth patterns in high-risk corridors.

Lead/Partners: Lewis & Clark and Broadwater County Commissions; County Planning Departments; DES.

Supporting Facts:

- Neither Lewis & Clark County nor Broadwater County currently has a dedicated, recurring funding mechanism to offset the cumulative wildfire, flood, and evacuation impacts of new development in hazard-prone areas (*County subdivision regulations and capital improvement planning reviews, 2024*).
- Subdivision-driven growth increases long-term demand for emergency response, evacuation infrastructure, and fuels mitigation, yet mitigation costs are often deferred to counties, fire districts, or post-disaster funding sources (*CWPP and HMP implementation findings*).
- Comparable subdivision mitigation fee programs in western Colorado counties (e.g., Jefferson and Boulder Counties) generate approximately \$1 million–\$3 million annually for wildfire mitigation, access improvements, and emergency water supply projects, demonstrating legal feasibility and fiscal effectiveness in WUI contexts (*Colorado County Mitigation Fee Program summaries; Fire Adapted Communities case studies*).
- FEMA encourages locally generated, dedicated funding sources to improve match readiness and competitiveness for BRIC and HMGP grants (*FEMA BRIC Notice of Funding Opportunity; FEMA mitigation planning best practices*).

Cost Estimate: Administrative setup approximately \$75,000; ongoing revenue generation \$1 million–\$2 million/year based on projected growth.

Potential Funding: Local developer fees (primary source); leveraged with FEMA HMGP and BRIC for project match.

Mission & Community Benefit: A subdivision mitigation fee program ensures that new development contributes fairly to the wildfire, flood, and evacuation infrastructure it depends on, reducing long-term fiscal strain on counties and emergency services. Communities benefit from predictable, locally controlled funding for fuels reduction, access improvements, and water-supply protection—implemented before disasters occur rather than after.

For MTARNG, the program helps prevent incremental encroachment and infrastructure degradation near training areas by funding mitigation that preserves evacuation routes, response access, and buffer integrity. By pairing growth with proportional mitigation investment, this action strengthens community safety, improves grant competitiveness, and supports sustained military mission assurance in rapidly developing, hazard-exposed landscapes.

67. Institutionalize Joint Land Use Review for Developments Near DMA Installations

Description: Institutionalize a formal Joint Land-Use Review process requiring structured

consultation with the DMA/MTARNG for proposed subdivisions, rezonings, major site plans, and infrastructure projects located within a three (3)-mile planning buffers of the FHTA and LHTA. The process will ensure that potential impacts to evacuation capacity, wildfire risk, utility resilience, access corridors, and military training compatibility are evaluated early in the development review lifecycle, prior to discretionary approvals.

The joint review will function as a mandatory advisory referral, not a veto authority, preserving county land-use decision-making while ensuring that military mission assurance, public safety, and infrastructure interdependencies are consistently considered. Reviews will assess cumulative impacts to shared evacuation routes, emergency response access, aviation safety considerations, wildfire buffer integrity, and critical utility corridors serving both civilian communities and military facilities.

Lead/Partners: DMA/MTARNG; County Planning Departments; MT DES; PPLT.

Supporting Facts:

- The FHTA JLUS (2014) explicitly recommended stronger, formalized military participation in local land-use decisions, particularly for developments affecting evacuation routes, wildfire exposure, and access corridors; however, implementation remains voluntary and inconsistent .
- Recent subdivision and infrastructure approvals near the South Hills, Canyon Ferry corridor, and training-adjacent access routes have proceeded without standardized military review, increasing cumulative encroachment risk and pressure on buffer areas and lifeline roads (*CWPP and REPI compatibility findings*).
- DoW REPI, OLDCC, and FEMA guidance consistently identify early coordination during land-use review as a best practice for reducing long-term wildfire risk, infrastructure conflicts, and defense-community incompatibility (*DoD REPI Compatible Use principles; OLDCC DCIP evaluation criteria; FEMA BRIC Capability & Capacity Building guidance*).

Cost Estimate: \$100,000 initial planning + \$25,000/year staff time.

Potential Funding: OLDCC-DCIP Technical Assistance; DoW REPI; local county planning budgets.

Mission & Community Benefit: Institutionalizing joint land-use review ensures that growth near FHTA and LHTA does not unintentionally compromise evacuation safety, emergency response access, or MTARNG operational readiness. Communities benefit from earlier identification of wildfire, access, and infrastructure risks, reducing costly retrofits, disputes, and public-safety exposure after approvals are granted.

For MTARNG, the process provides a predictable, transparent mechanism to address encroachment pressures before they become mission-limiting, protecting training continuity and response capability. For counties, it strengthens defensibility of land-use decisions, improves alignment with state and federal funding expectations, and reinforces long-term resilience through coordinated civilian–military planning.

68. Codify Floodplain Setbacks in Subdivision Regulations

Description: Update subdivision and zoning regulations in Lewis & Clark and Broadwater

Counties to mandate enforceable floodplain setbacks and access constraints for new development in flood-prone corridors affecting the FHTA and LHTA assessment areas. Regulations will require a minimum 100-foot horizontal setback from mapped floodplains, including FEMA Special Flood Hazard Areas and locally identified flood- and erosion-prone channels, and will prohibit approval of single-access subdivisions within designated flood corridors.

Priority application areas include the Tenmile Creek, Prickly Pear Creek, and Canyon Ferry corridors, where flooding, post-fire runoff, and debris-flow hazards repeatedly affect transportation routes, utilities, and emergency access serving both civilian communities and military installations. Setbacks will preserve natural flood conveyance, reduce exposure of structures and roads, and protect space for future drainage improvements and riparian buffers.

Subdivision standards will also require developers to demonstrate safe, all-weather emergency access outside flood hazard zones and to avoid placing critical infrastructure, cul-de-sacs, or sole ingress/egress routes within mapped floodplains. Where zoning authority is limited, subdivision regulations will be strengthened to ensure flood-risk controls apply regardless of zoning classification.

Lead/Partners: County Planning Departments; FEMA Region VIII; DNRC Floodplain Program.

Supporting Facts:

- Both Lewis & Clark and Broadwater Counties currently rely largely on advisory floodplain standards, allowing subdivisions and access roads to be approved in flood-prone corridors without enforceable setbacks or access constraints (*County subdivision and zoning code reviews; DNRC Floodplain Program coordination*).
- Repeated washouts and flood-related closures along Old Woman’s Grave Road and River Road demonstrate the consequences of development and access routes located within flood- and erosion-prone areas (*County public works records; post-event damage assessments*).
- FEMA guidance emphasizes land-use setbacks, avoidance of floodplains, and redundant access as cost-effective, long-term mitigation measures that reduce repetitive losses and emergency response isolation (*FEMA Flood Mitigation Assistance (FMA) guidance; FEMA Local Mitigation Planning Policy Guide*).

Cost Estimate: \$50,000 – \$100,000 for regulatory update and mapping integration.

Potential Funding: FEMA Flood Mitigation Assistance (FMA); FEMA C&CB.

Mission & Community Benefit: Codifying floodplain setbacks and prohibiting single-access subdivisions in flood corridors reduces life-safety risk, prevents isolation during flood and post-fire runoff events, and lowers long-term public infrastructure maintenance costs. Communities benefit from safer development patterns, preserved flood conveyance, and more reliable emergency access during increasingly frequent flood events.

For MTARNG, enforceable floodplain setbacks protect critical access routes, evacuation corridors, and utility lifelines serving FHTA and LHTA, reducing disruption to training and response missions. By embedding flood-risk avoidance directly into subdivision regulations, this action shifts counties from reactive road repair toward preventive land-use mitigation—strengthening resilience, improving FEMA funding eligibility, and safeguarding defense-community connectivity.

69. Integrate Range and Airspace Compatibility Maps into County and City Planning Systems

Description: Integrate military range, airspace, safety, and compatibility overlays—including REPI, aviation safety, UXO awareness zones (where applicable), and wildfire-prone ingress/egress corridors—directly into municipal and county GIS, permitting, and development review platforms serving Helena, East Helena, Townsend, and surrounding jurisdictions. The integration will ensure that military compatibility considerations are automatically identified early in the planning and permitting process, rather than addressed informally or late in project review.

GIS layers will be configured to trigger automated flags when proposed subdivisions, rezonings, site plans, or infrastructure projects intersect mapped mission footprint areas, aviation influence zones, training noise contours, or access corridors critical to wildfire response and evacuation. Flagging will prompt standardized referral to DMA/MTARNG and relevant agencies, supporting consistent application of compatibility review requirements established through Growth Policies, subdivision regulations, and joint land-use review procedures.

The system will function as a decision-support and transparency tool, not a regulatory overlay, preserving local land-use authority while ensuring planners, applicants, and decision-makers have clear visibility into compatibility constraints. Integrated mapping will also support public education, defensible-space planning, evacuation routing, and grant justification by providing a single, authoritative spatial reference for civilian–military interface risks.

Lead/Partners: DMA; City/County GIS Departments; MDT; Federal Aviation Administration (FAA); Local Planning Boards.

Supporting Facts:

- The FHTA JLUS (2014) identified approximately 4,600 acres of potential incompatible land uses within active flight paths, aviation safety zones, and small-arms noise influence areas; however, these overlays are not currently embedded in local zoning or permitting systems, limiting their practical application (*FHTA JLUS, 2014; county GIS and zoning reviews*).
- Development proposals near training areas and flight corridors are typically reviewed without automated compatibility screening, relying on staff awareness rather than system-based triggers, increasing the risk of inconsistent review and late-stage conflicts (*County and municipal planning process assessments*).
- DoW REPI, OLDCC, and FAA-compatible land-use guidance emphasize early identification of aviation, safety, and training constraints as a best practice for preventing encroachment, reducing public risk, and maintaining mission readiness (*DoD REPI Compatible Use principles; OLDCC DCIP evaluation criteria; FAA land-use compatibility guidance for aviation safety zones*).

Cost Estimate: \$150,000 (GIS integration, staff training).

Potential Funding: OLDCC Technical Assistance; REPI Planning; DoD DCIP Planning Grants.

Mission & Community Benefit: Integrating range and airspace compatibility maps into everyday planning systems prevents inadvertent encroachment before it occurs, improving public safety, evacuation reliability, and land-use predictability for developers and residents. Communities

benefit from clearer expectations, fewer late-stage project conflicts, and improved transparency in how hazard and compatibility constraints influence development decisions.

For MTARNG, automated compatibility mapping protects flight operations, training safety, and access corridors critical to wildfire response and mission execution. By embedding military compatibility directly into local planning workflows, this action converts REPI findings from static documents into operational tools, strengthening long-term defense-community compatibility and eligibility for DoW and FEMA resilience funding.

11. Data, Mapping, and Situational Awareness Deficiencies Limit Readiness

Finding

Lewis & Clark County, Broadwater County, and the DMA lack a unified, authoritative geospatial data and situational awareness framework that integrates hazards, utilities, and lifelines into a single operating picture. Currently, wildfire risk maps, floodplain layers, utility networks, and critical infrastructure data are fragmented across agencies including DNRC, MDT, USFS, USGS, and local county planning departments. Each maintains its own systems with distinct models, metadata, and update schedules, but no consolidated GIS platform exists to overlay these datasets with DMA lifelines, evacuation corridors, or assessment area easements. This fragmentation obscures how multiple hazards intersect with shared civilian–military infrastructure and limits the ability to anticipate cascading system failures.

This siloed approach limits visibility into infrastructure interdependencies and cascading risks, undermining both civilian emergency management and mission assurance for FHTA and LHTA. Without a shared operating picture, decision-makers must rely on static or incomplete datasets during rapidly evolving incidents, increasing response time and uncertainty.

- In April 2024, a fiber-optic line failure near Helena caused a six (6)-hour, countywide 911 outage, interrupting dispatch and emergency coordination across both counties. Post-incident analysis by NorthWestern Energy and Helena Utilities confirmed that no central dataset existed identifying where fiber, power, and roadway corridors intersect hazard-prone terrain. This prevented rapid identification of alternate routing and priority restoration corridors.
- Similarly, Old Woman’s Grave Road and River Road, identified as critical access corridors in the Tri-County CWPP (2020) and Western Montana Regional HMP (2024–2029), are not included in any regional GIS platform. This absence prevents real-time awareness during washouts, slope failures, or wildland fire closures, conditions that repeatedly delay troop movement and logistical support. These gaps also limit the ability to pre-stage resources or anticipate access loss during forecasted hazard events.
- Hazard data discrepancies further weaken regional competitiveness for FEMA BRIC and OLDCC resilience funding, as flood and fire risk models vary by agency (e.g., DNRC 2022 Wildfire Risk Atlas vs. FEMA FIRM 2011 flood areas), producing inconsistent justifications in grant narratives. This inconsistency reduces confidence in benefit–cost analyses and delays multi-jurisdictional project development.

Both the FHTA and LHTA maintain internal emergency and risk management documentation, specifically the IEMPs, Installation Energy and Water Plans, and Antiterrorism/Force Protection (Vulnerability Assessments. These documents are comprehensive within the DMA framework and meet DoW standards under DoDI 6055.17 (Installation Emergency Management) and DoDI 4170.11 (Installation Energy Management). They provide detailed insight into installation dependencies, operational thresholds, and response triggers that are not reflected in civilian planning datasets.

They address critical functions:

- Incident command activation and continuity of operations (IEMPs)
- Critical infrastructure dependencies and energy redundancy (IEWPs)
- Force protection areas, access control, and blast vulnerability mapping (AT/FP)

However, these plans are not consistently shared with civilian emergency managers or referenced within county-level hazard mitigation and emergency operations plans, including the Lewis & Clark County HMP (2020) and Broadwater County EOP (2019). As a result, the civilian jurisdictions responsible for roads, utilities, and mutual aid response lack visibility into military hazard scenarios that could directly affect them. This limits pre-incident coordination and complicates unified command during joint response operations.

Current interoperability gaps include:

- Fuel or hazardous material fires along military access routes (Country Club Road and Old Woman's Grave Road)
- Munitions transport or training-related detonations near populated or recreation areas
- Airspace violations and training-flight emergencies in low-altitude corridors near Townsend and Canyon Ferry
- Critical utility failures or energy curtailments at FHTA and LHTA that cascade into the civilian grid

These scenarios are not consistently modeled or visualized in regional hazard datasets, leaving responders without a shared baseline during complex incidents. This fragmented data environment limits mutual situational awareness and hinders the integration of installation vulnerabilities into regional hazard modeling, pre-incident planning, and coordinated emergency response ([Annex H](#)).

What Has Worked (and Why It Mattered)

- Targeted datasets including DNRC's Wildfire Risk Portal, FEMA's flood mapping, and the USACE dam inventory provide a strong technical foundation for hazard modeling and have guided county-level planning priorities.
- REPI and assessment area mapping efforts by DMA and PPLT have successfully georeferenced conservation easements protecting FHTA perimeter, serving as early prototypes for cross-agency data integration.
- CWPP and HMPs have generated individual hazard layers that inform mitigation actions, including culvert replacements, slope stabilization, and evacuation corridor identification, but remain siloed and inconsistent across jurisdictions.

- The DMA IEMPs and IEWPs have improved internal readiness through standardized incident response, redundant power planning, and continuity of operations triggers.
- DMA participation in Tri-County Firesafe Working Group meetings (2023–2024) has begun informal knowledge exchange on wildfire and evacuation risks.
- The REPI and OLDCC-DCIP programs provide federally recognized frameworks for joint data integration, offering a foundation for secure data sharing across agencies.

Quantified Vulnerabilities

Metric/Indicator	Observation/Impact	Source/Reference
GIS data overlap between plans	CWPP, HMP, and REPI datasets reference the same corridors (e.g., River Road, South Hills WUI) but lack synchronized project phasing or shared ownership.	Tri-County CWPP (2020); Western HMP Draft (2024); DMA REPI Portfolio (FY25)
Coordination cycle misalignment	DMA IEMP/IEWP updates (three [3]-year DoW cycle) not aligned with HMP/CWPP updates (five [5]-year FEMA cycle), creating recurring data gaps.	DMA Planning Schedule (2024); MT DES HMP Tracker (2024)
Critical lifelines mapped in single-feed corridors	Approximately 60% of FHTA electrical distribution and 100% of LHTA utility services are single-feed systems in hazard-prone terrain (fire, slope, or flood areas).	DMA Infrastructure Assessment (2024)
911 outage duration (April 2024)	Fiber-optic cut disrupted emergency communications for over six (6) hours; estimated \$500,000–\$1 million in restoration and lost operational capacity.	MT DES Post-Incident Summary (2024)
Hazard model inconsistency	Wildfire risk differs by up to 35% between DNRC and First Street Foundation datasets; floodplain maps outdated by at least 10 years.	DNRC Risk Portal (2024); FEMA FIRM (2011)
Infrastructure data completeness	Over 20 miles of DMA-adjacent access roads (Country Club, Old Woman’s Grave, River, and Barrett Roads) lack current stormwater and slope stability modeling data.	MDT Transportation GIS (2023); MTARNG Facilities Data (2024)
Utility redundancy mapping	Backup generator, broadband redundancy, and grid vulnerability data not yet consolidated across NorthWestern Energy, Helena Utilities, and Vigilante Electric datasets.	Utility Coordination Briefs (2024); Public Service Commission (PSC) Grid Reliability Report (2023)

Metric/Indicator	Observation/Impact	Source/Reference
Hazard notification latency	Average interagency notification delay between DMA, counties, and utilities exceeds 45 minutes, surpassing FEMA operational coordination thresholds.	MT DES WebEOC Log Review (2023)
Data-sharing agreements executed	No active MOUs/DSAs between DMA, counties, or utilities for real-time hazard or outage data exchange; absence reduces BRIC and RCPGP competitiveness.	DMA–County Coordination Meeting Notes (2024)
Situational awareness coverage	No unified Common Operating Picture (COP) integrates power, water, communication, and transport dependencies across military and civilian systems.	DMA IEMP/IEWP (2023–2024); MT DES Capability Assessment (2024)
Grant competitiveness reduction	At least three (3) FEMA BRIC applications (2022–2024) were downgraded for lack of consistent hazard and infrastructure mapping across agencies.	MT DES BRIC Review (2024)

Mission Assurance Gaps (DMA)

- Operational blind spots: FHTA and LHTA rely on accurate data to maintain training schedules and coordinate logistics, yet current systems cannot anticipate or visualize outage overlaps across lifelines (power, water, communication).
- Resource misallocation: Without integrated mapping, DMA cannot effectively prioritize infrastructure hardening or defend resilience projects in interagency grant reviews.
- Mission degradation: Recurrent power, road, and communication disruptions reduce training throughput, increase mobilization delays, and compromise incident response synchronization between military and civilian assets.
- Grant risk: Data inconsistency reduces FEMA and OLDCC funding competitiveness by failing to meet “regional collaboration” and “data integration” evaluation criteria.
- DMA lacks a regional Common Operating Picture (COP) integrating power, water, and transport dependencies.
- Installation Emergency Management Plan (IEMP) and Installation Energy and Water Plan (IEWP) data remain classified or unshared, preventing integration into local HMPs and WebEOC systems.
- Hazard alerts (Red Flag, flood, and curtailment triggers) are not synchronized with county emergency protocols.
- No cross-jurisdictional exercises simulate DMA-specific scenarios (munitions, unexploded ordnance [UXO], or critical power loss).
- GIS and modeling systems remain incompatible between DoW, county, and state users, preventing real-time updates.

Planning and Governance Gaps

- No regional data-sharing agreements currently exist between DMA, counties, utilities, and state agencies; hazard, infrastructure, and environmental data remain siloed.
- No dedicated funding mechanism exists to develop or maintain a shared resilience GIS platform.
- Update cycles are asynchronous: CWPP (2020), HMP (2024–2029), JLUS (2014), and DMA INRMP (2021) all operate independently, creating overlap and data drift.
- Stakeholder fatigue and inefficiency: Each planning cycle requests duplicate datasets from the same agencies, leading to inconsistent baselines and weakened continuity across projects.
- Governance vacuum: No entity is tasked with curating, validating, or maintaining a unified hazard and lifeline dataset under standardized metadata or security protocols.
- No formal Data-Sharing Agreements (DSAs) or MOUs exist between DMA, counties, and utility providers.
- The IEMP/IEWP three (3)-year DoW cycle is unsynchronized with the five (5)-year HMP/CWPP cycle, creating recurring data gaps.
- Separate hazard models (LANDFIRE vs FSim vs HAZUS) produce inconsistent wildfire and flood boundaries.
- No unified data governance structure exists to standardize access levels (Public, For Official Use Only [FOUO], Law Enforcement Office [LEO]).
- Lack of regional GIS hub precludes integrated project tracking and joint grant applications.

Recommendations

70. *Develop a Regional Hazard and Lifeline GIS Portal*

Description: Develop a secure, role-based Regional Hazard and Lifeline GIS Portal that integrates wildfire risk, flood hazards, post-fire runoff areas, critical utility infrastructure, evacuation routes, and DMA lifelines into a single, authoritative geospatial platform. The portal will support planning, response, and recovery decision-making across the FHTA and LHTA assessment areas.

The system will consolidate currently fragmented datasets from CWPP, HMPs, utility providers, and military planners into a synchronized environment, enabling users to visualize where hazards intersect with access routes, utilities, and mission-critical facilities. Core layers will include wildfire hazard severity, WUI boundaries, floodplains and erosion zones, evacuation corridors, bridges and culverts, power and communications infrastructure, water systems, and designated DMA lifelines.

The portal will feature role-based access controls to protect sensitive military and infrastructure data while providing appropriate visibility for county emergency managers, utilities, and planners. Interactive dashboards will support emergency operations by displaying real-time or near-real-time status of roads, utilities, and hazard conditions during incidents. Quarterly update protocols will be established to ensure data remains current and consistent across agencies.

The platform will function as both an operational tool for emergency coordination and a planning backbone supporting grant development, mitigation prioritization, capital planning, and

interagency coordination, reducing reliance on static maps and ad hoc data sharing.

Lead/Partners: DMA/MTARNG; County GIS Departments; MT DES; NorthWestern Energy; Helena Utilities; Vigilante Electric Cooperative.

Supporting Facts:

- An April 2024 fiber cut resulted in a six-hour outage affecting emergency communications, and no centralized system existed to visualize where the failure intersected with evacuation routes, utilities, or DMA lifelines (*County and utility after-action reports, 2024*).
- Current CWPP and HMP datasets are incomplete and unsynchronized, with wildfire, flood, utility, and evacuation information maintained in separate systems that require manual coordination during emergencies (*CWPP/HMP crosswalk review; county GIS assessments*).
- FEMA BRIC Capability & Capacity Building guidance emphasizes integrated geospatial platforms and shared situational awareness as core indicators of institutional resilience and emergency management maturity (*FEMA BRIC Notice of Funding Opportunity; C&CB program guidance*).

Cost Estimate: \$400,000 – \$600,000 (initial development); \$50,000 – \$75,000/year maintenance.

Potential Funding: FEMA C&CB; DHS RCPGP; OLDCC Technical Assistance.

Mission & Community Benefit: A Regional Hazard and Lifeline GIS Portal provides shared, real-time situational awareness that improves emergency response coordination, evacuation decision-making, and infrastructure protection for both civilian communities and military installations. Communities benefit from faster, better-informed response actions and clearer understanding of how hazards affect access, utilities, and services.

For MTARNG, the portal protects mission assurance by clearly identifying vulnerabilities affecting training areas, access routes, and critical lifelines before and during incidents. By replacing fragmented, static datasets with a unified operational picture, this action strengthens resilience, improves grant competitiveness, and institutionalizes coordination across defense, emergency management, and utility partners.

71. Conduct Utility and Lifeline Vulnerability Audit

Description: Conduct a comprehensive utility and lifeline vulnerability audit covering electric power, water supply, wastewater, fuel, communications, and associated control systems serving the FHTA and LHTA assessment areas and interconnected networks. The audit will systematically identify single-feed dependencies, exposure to wildfire, flood, and slope hazards, and cascading failure risks affecting shared civilian–military infrastructure.

The effort will include detailed mapping of transmission and distribution corridors, substations, pump stations, intakes, communications nodes, and access dependencies, overlaid with wildfire hazard severity, floodplain and erosion data, post-fire runoff pathways, and evacuation corridors. Particular focus will be placed on single-point-of-failure assets and corridors where loss of service would simultaneously impact military operations, emergency response, medical facilities, and surrounding communities.

Findings will be used to develop a prioritized hardening and redundancy roadmap, identifying candidate projects for undergrounding, sectionalization, rerouting, flood protection, microgrid

integration, and access improvements. The audit will directly inform capital planning, grant applications, and sequencing of resilience investments under FEMA BRIC, DOE GRIP, and DoW programs.

Lead/Partners: NorthWestern Energy; Vigilante Electric; Helena Utilities; DMA Engineers; Public Service Commission.

Supporting Facts:

- Approximately 60 percent of electric distribution serving FHTA relies on non-redundant, single-feed corridors, while LHTA utilities are effectively 100 percent single-feed, creating elevated outage and mission disruption risk during wildfire, flood, or wind events (*Utility system reviews; DMA infrastructure assessments*).
- Past sedimentation events in the Tenmile watershed have reduced municipal water treatment capacity by approximately 30–40 percent, demonstrating how utility vulnerabilities compound across sectors when watershed and infrastructure risks overlap (*City of Helena Utilities; watershed impact summaries*).
- Federal resilience guidance emphasizes systemwide vulnerability audits as a prerequisite for effective hardening and redundancy investments, particularly where civilian and defense lifelines are interdependent (*DOE GRIP program guidance; FEMA BRIC Infrastructure Resilience criteria*).

Cost Estimate: \$1 million–\$1.5 million for regional audit and mapping integration.

Potential Funding: DOE GRIP; FEMA BRIC; State Utility Resilience Program.

Mission & Community Benefit: A regional utility and lifeline vulnerability audit provides the factual foundation needed to move from reactive outage response to proactive resilience investment. Communities benefit from clearer understanding of where service disruptions are most likely to occur and which upgrades will provide the greatest reduction in outage risk and recovery time.

For MTARNG, the audit directly supports mission assurance by identifying infrastructure weaknesses that could disrupt training, mobilization, emergency response, or medical support. By prioritizing redundancy and hardening across shared civilian–military systems, this action reduces cascading failures, improves grant competitiveness, and enables coordinated, cost-effective resilience upgrades that protect both public safety and defense readiness.

72. Establish Data-Sharing Agreements (DSAs) Across Jurisdictions

Description: Establish formal Data-Sharing Agreements (DSAs)—executed through MOUs—among the DMA, county governments, fire departments and districts, utilities, and conservation partners to enable secure, timely sharing of hazard, outage, restoration, and infrastructure status data across the FHTA and LHTA assessment areas. The agreements will define data types, access permissions, security controls, and operational use to support coordinated planning, response, and recovery.

The DSAs will provide the governance backbone for the Regional Hazard and Lifeline GIS Portal, specifying update cadence, authoritative data owners, quality control procedures, and escalation protocols during incidents. Shared datasets will include wildfire risk and perimeter data, flood and

post-fire runoff indicators, utility outage and restoration status, road and bridge conditions, evacuation route availability, and priority lifeline designations affecting civilian and military operations.

Agreements will address cybersecurity, sensitive infrastructure protection, and controlled dissemination of military or utility-specific data, using role-based access and data minimization principles. The framework will enable real-time situational awareness during emergencies while also supporting quarterly planning updates, grant reporting, and performance tracking for FEMA, DoW, and state resilience programs.

Lead/Partners: DMA/MTARNG; MT DES; NorthWestern Energy; USFS; DNRC.

Supporting Facts:

- FEMA BRIC Capability & Capacity Building scoring criteria prioritize formal interagency data-sharing and shared situational awareness, particularly where hazards and lifelines cross jurisdictional boundaries (*FEMA BRIC Notice of Funding Opportunity; C&CB program guidance*).
- No formal data-sharing agreements currently exist between DMA, counties, and utilities in Lewis & Clark or Broadwater Counties, resulting in ad hoc data exchange during emergencies and delays in establishing a COP (*MT DES coordination reviews; utility after-action feedback*).
- Post-incident reviews following recent outages and hazard events identified fragmented data access as a contributor to delayed decision-making, inconsistent public messaging, and inefficient restoration prioritization (*County and utility after-action reports; emergency management coordination summaries*).
- DHS CISA and FEMA guidance emphasize pre-incident governance for data access and sharing as a best practice for infrastructure resilience and interdependency management (*DHS CISA Infrastructure Resilience guidance; FEMA National Preparedness System*).

Cost Estimate: \$150,000 for legal, IT integration, and training.

Potential Funding: FEMA C&CB; DHS CISA Resilience Grants; SHSGP.

Mission & Community Benefit: Formal data-sharing agreements replace ad hoc coordination with predictable, secure, and interoperable information exchange, enabling faster, better-informed decisions during wildfire, flood, and infrastructure disruption events. Communities benefit from improved situational awareness, more coordinated response actions, and clearer restoration priorities across utilities and emergency services.

For MTARNG, DSAs protect mission assurance by ensuring that hazard intelligence, utility status, and access conditions affecting training areas and response routes are visible in real time. By institutionalizing data governance and transparency, this action strengthens interagency trust, improves grant competitiveness, and anchors the Regional Hazard and Lifeline GIS Portal in durable, legally defensible coordination structures.

73. Integrate Installation Data into County HMP and CWPP Updates

Description: Add a dedicated Military Facilities & Operations Annex to the Tri-County HMPs (2020) and update the outdated Tri-County HMP to formally integrate DMA and MTARNG

facilities, operations, and dependencies into countywide hazard mitigation planning.

The annex will document FHTA and LHTA assessment area hazard scenarios, shared lifelines, evacuation routes and access dependencies, and mission-critical continuity thresholds. Content will include hazard exposure profiles, dependency and interdependency maps (power, water, communications, access routes), and mitigation actions aligned with county priorities, CWPP, and state resilience strategies.

The annex will also define continuity triggers and operational constraints—such as thresholds for training suspension, mobilization impacts, and emergency access loss—to ensure county mitigation strategies explicitly account for military readiness and response roles. By embedding these elements within FEMA-approved HMPs, the annex will enable direct eligibility for FEMA BRIC, HMGP, and related funding for projects that protect shared infrastructure benefiting both communities and installations.

The annex will be maintained as a living component of each county HMP, updated on the same cycle and coordinated with DMA planning, GIS systems, and the Regional Hazard and Lifeline Portal to ensure consistency and data currency.

Lead/Partners: DMA (lead); MT DES; County Planning Departments.

Supporting Facts:

- MTARNG facilities and operations are currently absent or minimally referenced in both Lewis & Clark and Broadwater County HMPs, limiting the ability to document risk, prioritize mitigation actions, and pursue FEMA funding for projects benefiting installations and shared lifelines (*County HMP reviews; MT DES mitigation planning coordination*).
- FEMA mitigation policy requires critical facilities and dependencies to be explicitly identified in HMPs for projects to be eligible under BRIC and HMGP, including projects that protect military installations when they support broader community resilience (*FEMA Local Mitigation Planning Policy Guide; FEMA BRIC Notice of Funding Opportunity*).
- Defense-community infrastructure and lifeline systems are highly interdependent, and omission of military facilities from local HMPs creates blind spots in hazard analysis, evacuation planning, and capital investment prioritization (*DoD mission assurance guidance; OLDCC Defense Community Infrastructure Program criteria*).

Cost Estimate: \$250,000 (coordination, annex drafting, GIS integration).

Potential Funding: FEMA BRIC Planning Grants; OLDCC DCIP Planning.

Mission & Community Benefit: A Military Facilities & Operations Annex ensures that defense mission assurance is fully integrated into county hazard mitigation planning, rather than addressed through parallel or informal processes. Communities benefit from a more complete understanding of shared lifelines, evacuation dependencies, and response capacity tied to nearby military facilities.

For MTARNG, formal inclusion in FEMA-approved HMPs enables direct access to mitigation funding, strengthens continuity planning, and ensures that county mitigation priorities support—not inadvertently constrain—training, mobilization, and emergency response missions. By institutionalizing military considerations within county HMPs, this action strengthens defense-

community resilience, improves funding competitiveness, and closes a critical planning gap affecting both public safety and national defense.

74. Standardize Hazard Triggers and Public Messaging Protocols

Description: Standardize hazard trigger thresholds, alerting criteria, and public messaging protocols across the DMA, MT DES, and county DES offices to ensure consistent, timely, and authoritative communication during wildfire, extreme weather, power curtailment, and evacuation events affecting the FHTA and LHTA assessment areas.

This action will align definitions and activation thresholds for Red Flag Warnings, evacuation readiness levels, road and access closures, power shutoffs, and mission-impact notifications, replacing agency-specific trigger criteria with a shared, documented framework. The standardized triggers will be integrated into WebEOC, the IPAWS, and the Regional Hazard and Lifeline GIS Portal, enabling synchronized operational alerts and public-facing messages across jurisdictions.

The effort will establish joint message templates, approval workflows, and release authorities to prevent conflicting or delayed communications. County Public Information Officers (PIOs), DMA leadership, and MT DES will coordinate pre-scripted messages for wildfire escalation, evacuation orders, shelter-in-place advisories, and infrastructure outages, ensuring that civilian populations, responders, and military personnel receive consistent guidance regardless of issuing authority.

Training and tabletop validation will be conducted to confirm interoperability, decision timelines, and message clarity under high-tempo conditions, including simultaneous civilian evacuation and military operational impacts.

Lead/Partners: DMA; MT DES; County DES; County PIOs.

Supporting Facts:

- Alert thresholds and activation criteria currently vary by agency, resulting in inconsistent timing and terminology for Red Flag warnings, evacuation readiness, and infrastructure advisories across jurisdictions (*County DES; MT DES coordination feedback*).
- Delayed and fragmented public communication during the 2023 Red Mountain Fire contributed to public confusion and operational inefficiencies, highlighting the consequences of unsynchronized messaging and trigger thresholds. (*Fire response AARs; county feedback*).
- FEMA and DHS guidance for IPAWS and emergency communications emphasize standardized triggers, unified messaging, and pre-approved templates as best practices for reducing public confusion and improving compliance during rapidly evolving incidents. (*FEMA IPAWS Program Guidance; FEMA Comprehensive Preparedness Guide 101*).

Cost Estimate: \$100,000–\$200,000 (system integration and training).

Potential Funding: DHS RCPGP; FEMA EMPG Supplemental; MT DES Cooperative Agreements.

Mission & Community Benefit: Standardizing hazard triggers and public messaging eliminates ambiguity during time-critical incidents, ensuring that communities, responders, and military personnel receive clear, consistent instructions regardless of issuing agency. This reduces evacuation delays, improves public trust, and minimizes conflicting actions that can compromise

life safety.

For DMA and MTARNG, aligned messaging protects mission assurance by synchronizing civilian alerts with operational decision-making, preventing misaligned evacuations, access restrictions, or infrastructure actions that could disrupt training or response missions. Collectively, this action strengthens regional situational awareness, enhances interagency coordination, and meets federal expectations for interoperable emergency communications, directly supporting FEMA funding competitiveness and defense-community resilience.

75. Develop a Shared “Mutual Situational Awareness” Dashboard

Description: Develop a Shared Mutual Situational Awareness Dashboard that functions as a real-time COP for civilian and military decision-makers during incidents affecting the FHTA and LHTA assessment areas. The dashboard will integrate DMA operational status, power and water outages, transportation closures, evacuation routes, and hazard overlays (wildfire, flood, post-fire runoff, and severe weather) into a single, synchronized interface.

The dashboard will aggregate live data feeds from MT DES and county Emergency Operations Centers (WebEOC), utility outage management systems, transportation status feeds, and DMA operational reporting. Dashboard logic will be tied to Incident/Emergency Action Plan (IEMP/IEWP) triggers, enabling automatic escalation of visibility and alerts when predefined thresholds, such as Red Flag warnings, evacuation orders, utility failures, or access route loss are met.

Role-based access controls will ensure that sensitive military or utility information is protected while providing appropriate visibility to county DES, utilities, and state partners. The dashboard will support operational coordination by displaying restoration priorities, access constraints, and interdependencies among power, water, communications, and transportation systems during response and early recovery.

This COP will not replace WebEOC or existing systems, but will overlay and synthesize key data streams, reducing reliance on manual situation reports, email updates, and disconnected platforms during time-critical events.

Lead/Partners: DMA; MT DES; County DES; NorthWestern Energy; Helena Utilities.

Supporting Facts:

- Hazard, infrastructure, and operational information is currently distributed across unlinked systems (e.g., WebEOC, utility outage dashboards, sitreps, IPAWS), requiring manual synthesis by staff during incidents (*County and MT DES after-action reviews; emergency management coordination assessments*).
- Fragmented situational awareness delays coordinated decision-making, particularly when civilian evacuation, infrastructure outages, and military operational impacts occur simultaneously (*Wildfire and flood response AARs; DMA operational feedback*).
- FEMA BRIC Capability & Capacity Building and DHS RCPGP guidance emphasize development of a shared COP as a core capability for regional resilience, interoperable response, and infrastructure protection (*FEMA BRIC NOFO; DHS Regional Catastrophic Preparedness Program guidance*).

Cost Estimate: \$400,000 – \$600,000 (initial build); \$75,000/year O&M.

Potential Funding: FEMA C&CB; DHS RCPGP; DoW DCIP Resilience.

Mission & Community Benefit: A shared Mutual Situational Awareness Dashboard provides real-time, trusted visibility into how hazards, infrastructure failures, and operational impacts intersect across jurisdictions. Communities benefit from faster, better-coordinated response actions, clearer restoration priorities, and reduced confusion during complex emergencies.

For MTARNG, the dashboard directly supports mission assurance by ensuring that operational status, access constraints, and infrastructure dependencies are visible alongside civilian response actions. By institutionalizing a COP, this action strengthens interagency coordination, improves life-safety outcomes, and meets federal expectations for interoperable, data-driven emergency management—enhancing eligibility for FEMA, DHS, and DoW resilience funding.

76. Conduct Semiannual Multi-Scenario Exercises

Description: Conduct biannual, HSEEP-compliant exercises designed to test coordinated response under concurrent and compounding hazard conditions, including wildfire/fuel fire, flooding and post-fire runoff, cyber disruption, and communications outages affecting shared civilian–military lifelines. Exercises will explicitly evaluate performance in an environment where multiple systems fail simultaneously, and decision-makers must rely on shared situational awareness tools rather than single-hazard playbooks.

Scenarios will be structured to stress-test the Mutual Situational Awareness Dashboard, Regional Hazard and Lifeline GIS Portal, DSAs, and standardized alerting protocols, measuring how effectively data flows across agencies during high-tempo operations. Particular emphasis will be placed on response latency, accuracy of the COP, interagency coordination, and the ability to prioritize restoration and evacuation decisions when utilities, access routes, and communications are degraded.

Exercises will include civilian evacuation demands overlapping with military operational impacts, utility outages requiring coordinated restoration prioritization, and cyber or communications disruptions that limit traditional coordination channels. Each exercise cycle will produce an After-Action Report and Improvement Plan (AAR/IP) tied directly to updates of county EOPs, DMA Installation Emergency Management Plans, and continuity annexes.

Lead/Partners: DMA; MT DES; County DES; Utilities; USFS; MDT.

Supporting Facts:

- No regional exercises conducted since 2018 have incorporated DMA-specific hazard scenarios or tested concurrent civilian–military impacts under multi-hazard conditions (*County and state exercise records; DMA training summaries*).
- Recent investments in GIS integration, shared dashboards, and DSAs require operational validation to ensure systems function as intended during real-world incidents (*Post-incident reviews; FEMA preparedness guidance*).
- HSEEP and DHS guidance emphasize exercising complex, cascading hazard scenarios to identify coordination gaps that single-hazard exercises routinely miss (*HSEEP Doctrine; DHS Regional Catastrophic Preparedness guidance*).

Cost Estimate: \$300,000 per two-year cycle.

Potential Funding: FEMA SHSP; DoW DCIP Exercise Support; DHS RCPGP.

Mission & Community Benefit: Biannual multi-hazard exercises ensure that new coordination structures, data-sharing mechanisms, and situational-awareness tools actually perform under stress, rather than existing only on paper. Communities benefit from faster, more coordinated evacuation decisions, clearer public messaging, and improved restoration prioritization when multiple hazards occur at once.

For MTARNG, these exercises validate mission assurance under degraded conditions, ensuring that training, mobilization, and response operations remain synchronized with civilian emergency actions. By institutionalizing complex, realistic exercise cycles, this action strengthens regional readiness, improves interoperability, and demonstrates compliance with FEMA, DHS, and DoW expectations—directly supporting resilience funding competitiveness and long-term defense-community integration.

Annex A: Stakeholder Engagement and Coordination Framework

1. Overview of Stakeholder Engagement Objectives

The stakeholder engagement process for MTARNG this Assessment was designed to integrate local, regional, and military perspectives into a unified resilience framework. Engagement activities focused on identifying shared vulnerabilities, validating wildfire exposure and hazard data, and developing feasible, cross-jurisdictional mitigation strategies.

Stakeholders were engaged through structured meetings, one-on-one interviews, and field coordination sessions held between March and August 2025. Each interaction sought to:

- Validate modeled wildfire risk and infrastructure vulnerabilities.
- Capture operational and planning gaps in hazard preparedness.
- Identify mutual aid and coordination barriers across county and state boundaries.
- Support integration of resilience strategies into local mitigation, land use, and emergency response plans.

Stakeholder input directly shaped the Findings and Recommendations section of this Assessment and used to inform the development of Tabletop Exercises (TTXs) and the subsequent After-Action Reports (AARs) in early 2026.

2. Participating Agencies and Organizations

Stakeholder participation included federal, state, county, municipal, nonprofit, and utility representatives who play critical roles in resilience, land use, and emergency operations. Table 7 summarizes primary stakeholder groups and their contributions.

Table 7. Stakeholders and Their Roles

Stakeholder	Sector	Role/Input Focus
Montana DMA	State/Military	Oversight of this Assessment; integration with installation planning and OLDCC Military Installation Resilience Review (MIRR) goals
MTARNG	Military	Provided mission assurance context, infrastructure access data, and wildfire exposure inputs
Lewis & Clark County DES/Planning	County	Coordination of emergency management and hazard mitigation planning alignment
Broadwater County DES/Planning	County	WUI development trends, drainage infrastructure needs, and fire coordination
PPLT	NGO/REPI Partner	Provides assessment area management, conservation, and wildfire mitigation coordination input
Tri-County Firesafe Working Group	Regional	Shared community fire adaptation programs and rural fire mitigation initiatives

Stakeholder	Sector	Role/Input Focus
City of Helena/Open Lands/Public Works	Local	Urban-WUI interface management, water system dependencies, and trail fuel management
Town of Townsend	Local	Shared water supply vulnerabilities, evacuation challenges, and growth pressures
Northwestern Energy	Private Utility	Power line hardening priorities, backup generation, and transmission corridor risks
USDA NRCS	Federal	Watershed and post-fire soil stability recommendations
Montana Mitigation Office (DES)	State	Hazard Mitigation Grant and program coordination
Montana Economic Development	State	Funding alignment, growth management, and infrastructure investment opportunities
Graymont Mining	Private Industry	Identified critical supply chain and transportation route dependencies
Range Operations/HARC	Military	Site access, aviation operations, and training safety coordination
Land Protection/Lewis & Clark Conservation District	Local	Land use enforcement challenges and subdivision regulation gaps

3. Engagement Timeline and Meeting Summaries

Stakeholder engagement was conducted through a series of formal meetings, virtual coordination calls, and field visits. Table 8 summarizes the engagement timeline and major outcomes.

Table 8. Engagement Timeline and Meeting Summary

Date	Event	Location/Format	Key Outcomes
27 Mar 2025	Kickoff Stakeholder Meeting	FHTA Auditorium	Introduced project goals, defined stakeholder roles, initiated data gathering
16 Apr 2025	Coordination Meeting	Virtual	Reviewed feedback mechanisms and refined data collection strategy
29 Apr 2025	Progress Update	Virtual	Discussed stakeholder engagement methods, survey development, and public outreach timeline
19 May 2025	Stakeholder Coordination	Virtual	Finalized interview scheduling; discussed survey posting with county partners
10 Jun 2025	Stakeholder Meeting #2	Helena Aviation Readiness Center (HARC)	Conducted breakout roundtables on wildfire risk validation, vulnerability assessment, and funding strategies

Date	Event	Location/Format	Key Outcomes
22 Jan 2026	Stakeholder Review (#3)	Virtual/Digital & Helena Aviation Readiness Center (HARC)	Draft plans and supporting documents were distributed to stakeholders for review through coordinated outreach. Stakeholders received electronic copies in advance of the public briefing, with an open comment period to provide feedback that was formally documented and incorporated into the final revisions.
14 & 15 Jan 2026	Public Engagement	Virtual/	A public briefing was conducted to inform community members and local stakeholders about the ongoing resilience planning efforts. The session provided an overview of project objectives, invited public feedback, and ensured transparency and inclusion in the regional planning process.
21 Jan 2026	Tabletop Exercise	Townsend	The TTX simulated a complex wildfire and infrastructure disruption event impacting both installation operations and community lifelines in Lewis & Clark. The exercise evaluated how effectively current plans, policies, and communication protocols integrate under stress, particularly during simultaneous threats including wildfire ignition near training ranges, power/fiber failures, and limited water availability.
22 Jan 2026	Tabletop Exercise	Helena Aviation Readiness Center (HARC)	The TTX simulated a complex wildfire and infrastructure disruption event impacting both installation operations and community lifelines in Broadwater Counties. The exercise evaluated how effectively current plans, policies, and communication protocols integrate under stress, particularly during simultaneous threats including wildfire ignition near training ranges, power/fiber failures, and limited water availability.

4. Stakeholder Input Themes

Recurring themes from stakeholder interviews and meetings clustered around four core categories: Risk Awareness, Coordination and Planning, Infrastructure and Systems, and Funding and Capacity.

Table 9. Summary of Input Themes

Theme	Summary of Input
Wildfire and Hazard Risk	Participants identified recurring ignition sources including power lines, railroad corridors, and recreational burns. Both counties emphasized expanding fuel breaks, WUI code enforcement, and post-fire flood mitigation.
Coordination and Data Sharing	Agencies reported limited interoperability between planning systems and hazard data platforms. Recommendations included a regional GIS portal and formalized data-sharing agreements.
Infrastructure and Access	Stakeholders cited single-route access constraints, particularly for the LHTA and Helena's South Hills. Utilities discussed prioritizing line burial and generator redundancy for critical facilities.
Funding and Implementation	Participants emphasized inconsistent funding cycles and limited staff capacity. Recommendations included joint BRIC/REPI submissions and establishment of regional resilience grants.

5. Summary of Coordination Challenges Identified

Stakeholders collectively identified several interrelated coordination barriers:

- Inconsistent update cycles between local HMPs, assessment area management plans, and installation planning documents, resulting in missed funding opportunities.
- Fragmented communication between civilian planners and MTARNG Range Operations on development encroachment and fire mitigation priorities.
- Lack of a standing multi-jurisdictional coordination mechanism to maintain interagency situational awareness and project tracking.
- Data silos among counties, utilities, and military systems, limiting shared situational awareness.

These challenges underscore the need for a Regional Resilience Working Group to align planning, share data, and streamline mitigation priorities across jurisdictions.

6. Integration of Stakeholder Input into Findings and Recommendations

Stakeholder insights were instrumental in defining the Findings and shaping the Recommendations presented in the main report. Specifically:

- Wildfire mitigation recommendations, including fuel break establishment, subdivision code amendments, and utility hardening, originated from local and installation stakeholder feedback.
- Coordination recommendations, including multi-jurisdictional planning groups, shared GIS hubs, and the Adjutant General (TAG)-level coordination processes were proposed by county and military participants.
- Funding strategies, including joint BRIC-REPI applications and regional resilience grant proposals, were advanced by state agencies and conservation partners.

7. Stakeholder Interview Questions

Stakeholder interviews were guided by a standardized question set to ensure consistency across agencies and communities. Table 10 lists the key questions posed during interviews.

Table 10. Stakeholder Interview Questions

Topic Area	Sample Questions
Wildfire Risk and Mitigation	What are the primary wildfire risks in your jurisdiction or operational area? Are fuel treatments or defensible space programs in place?
Infrastructure and Access	Which utilities or critical systems are most vulnerable to fire or flooding? Where are there limited evacuation routes or single-access corridors?
Coordination and Capability	How do your agency's plans integrate with local, state, and installation planning? What coordination gaps exist?
Funding and Resource Needs	Which mitigation actions lack funding or staffing support? Are there opportunities for shared grant submissions or cost-sharing?

8. Conclusion

The stakeholder engagement process confirmed strong interagency commitment to resilience collaboration and highlighted specific pathways to strengthen integration between military and civilian systems. Key outcomes include:

- Enhanced situational awareness of wildfire, infrastructure, and flood vulnerabilities.
- Commitment to data-sharing mechanisms and multi-jurisdictional coordination.
- Alignment of mitigation and funding priorities across installations and communities.

This annex is designed as both documentation of engagement and a foundation for continued coordination through implementation of the Findings and Recommendations and future HSEEP-aligned exercises in 2026.

Annex B: Wildfire Risk Assessment and Fuel Model Analysis

The wildfire risk assessment integrated fuel connectivity and ignition potential using authoritative datasets including LANDFIRE 2023, NFDRS 2024, IRWIN Incident Archive (2000–2024), RAPT 2025, and the USFS Tenmile–South Hills Fuels Reduction Project (2024). This data supported advanced fire-behavior modeling in FlamMap 6.3 and WFDSS 2024, incorporating local RAWS wind data from Helena and Townsend. Analytical outputs—rate of spread, flame length, burn probability, and crown-fire potential—identified priority exposure areas and guided the delineation of assessment area and buffer area layers.

Wildfire remains the assessment area’s most consequential hazard, threatening life, infrastructure, ecosystems, and military readiness. Driven by steep terrain, expanding WUI development, and prolonged dry weather cycles, wildfire frequency and intensity have increased, underscoring the need for data-driven mitigation. The resulting Wildfires Area Mitigation Map (Figure 32) translates modeled risk into actionable strategies for resilience, response coordination, and land-use compatibility in the FHTA and LHTA assessment areas. Figure 33 and Figure 34 are increased risk map with critical infrastructure to demonstrate how fire risk impact these areas.

In conjunction with this assessment a full area wildfire risk assessment was conducted as a stand-alone document. Additional findings and assessment data can be obtained in the Montana Department of Military Affairs Regional Community Wildfire Risk Assessment 2026.

Interagency Agreements (IAA)

MTARNG has an IAA with the VAFD for wildfire suppression operations on FHTA and an IAA with the USFS for wildfire suppression operations on LHTA. These agreements were emplaced to provide additional emergency fire services in the event a wildfire escapes a training area boundary or is unable to be suppressed by MTARNG personnel. The Montana Cooperative Wildland Fire Management and Stafford Act Response Agreement is a commitment for the participating agencies to work together to facilitate the coordination and exchange of personnel, equipment, supplies, services, and funds to plan a coordinated response during all wildland fire management activities and Presidential/Stafford Act-declared emergencies or major disasters in Montana.

- Fire and Emergency Response Services for FHTA, MT, IAA and Scope of Services (VAFD located in 2024 MTARNG IWFMP, Annex B).
- LHTA IAA and Wildland Fire Standard Operating Guide (SOG) (USFS, located in 2024 MTARNG IWFMP Annex C).
- Montana Cooperative Wildland Fire Management and Stafford Act Response Agreement (2023-2027, located in 2024 MTARNG IWFMP Annex D)

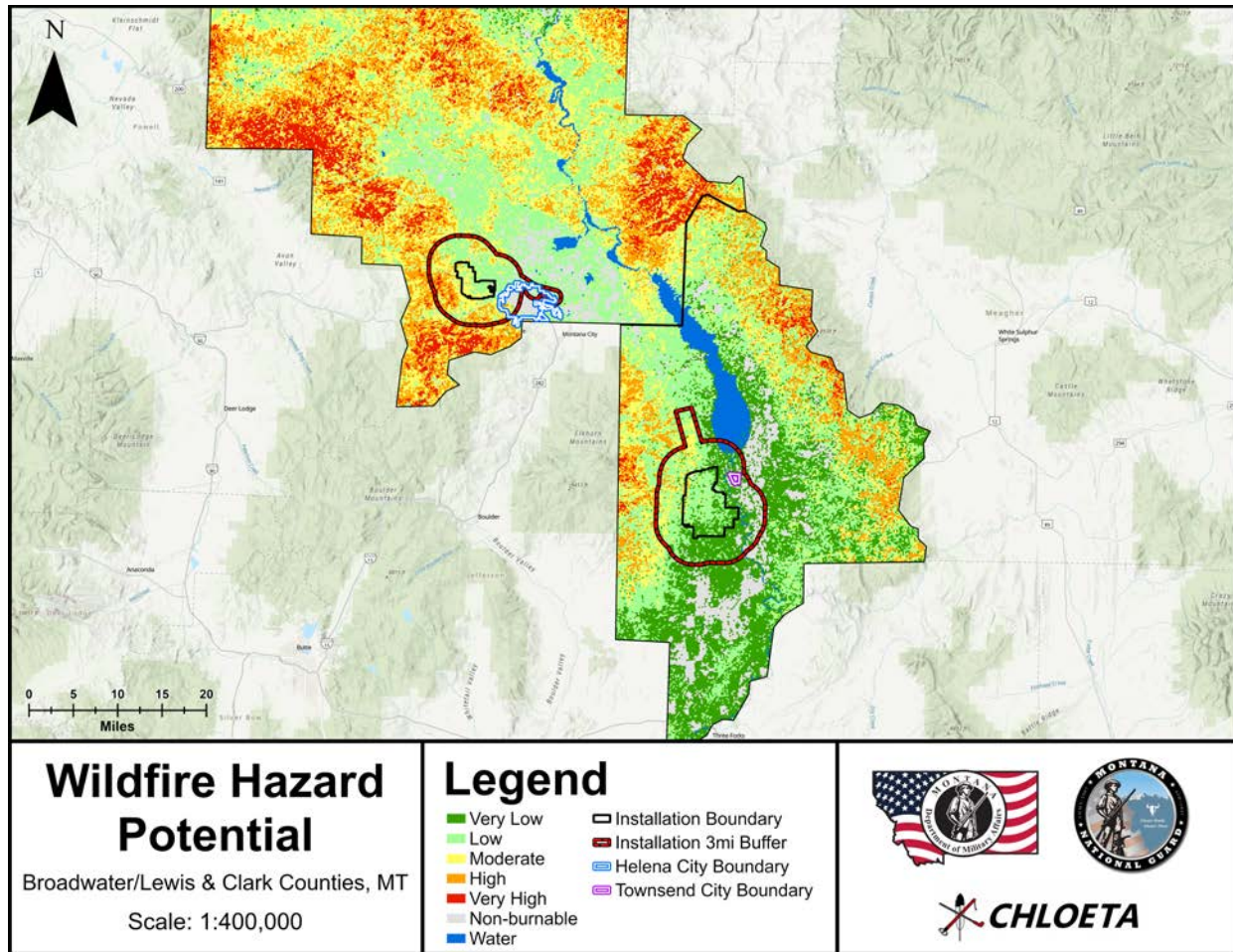


Figure 32. Wildfire Hazard Potential Map.

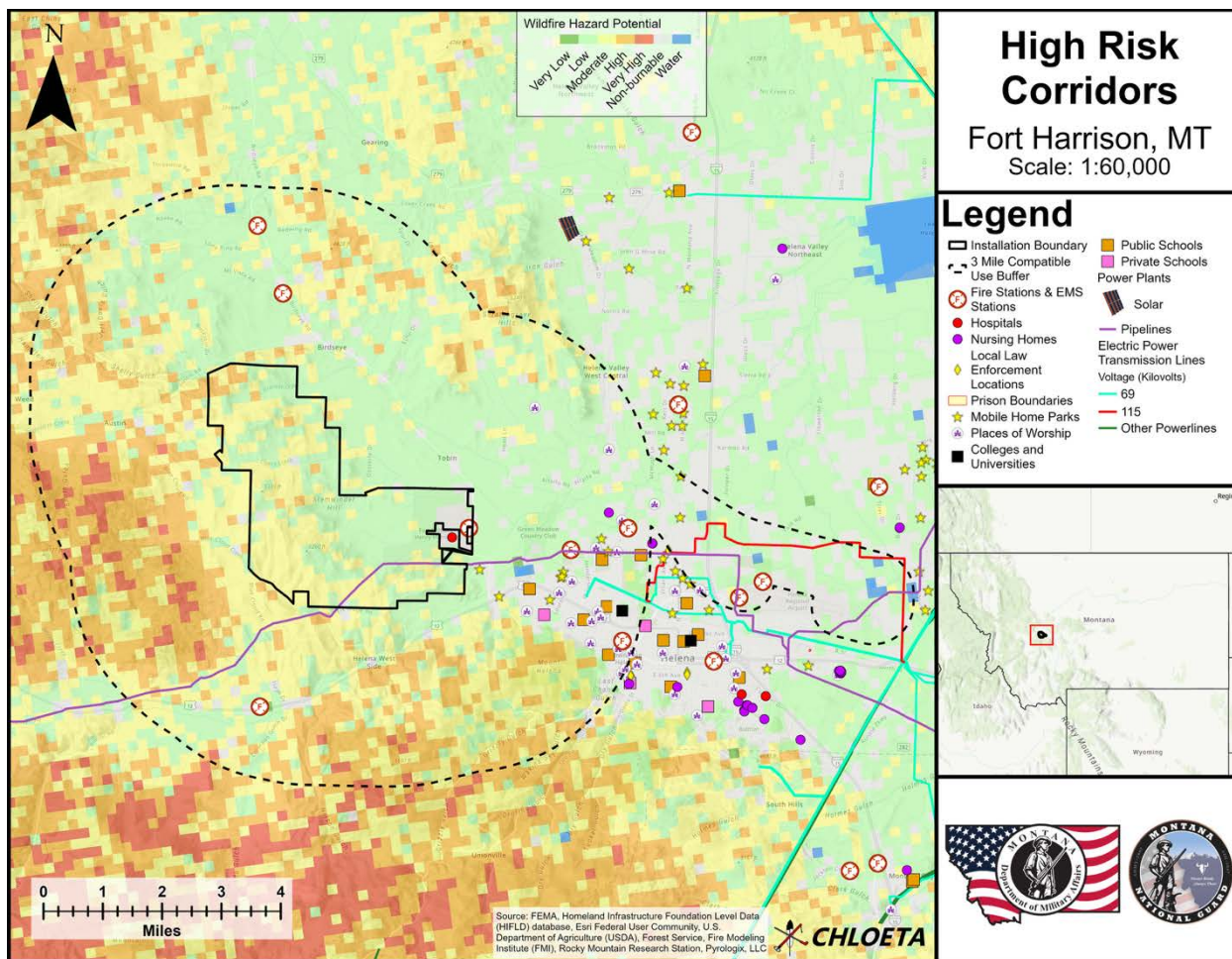


Figure 33. CIKR Wildfire Risk Map FHTA

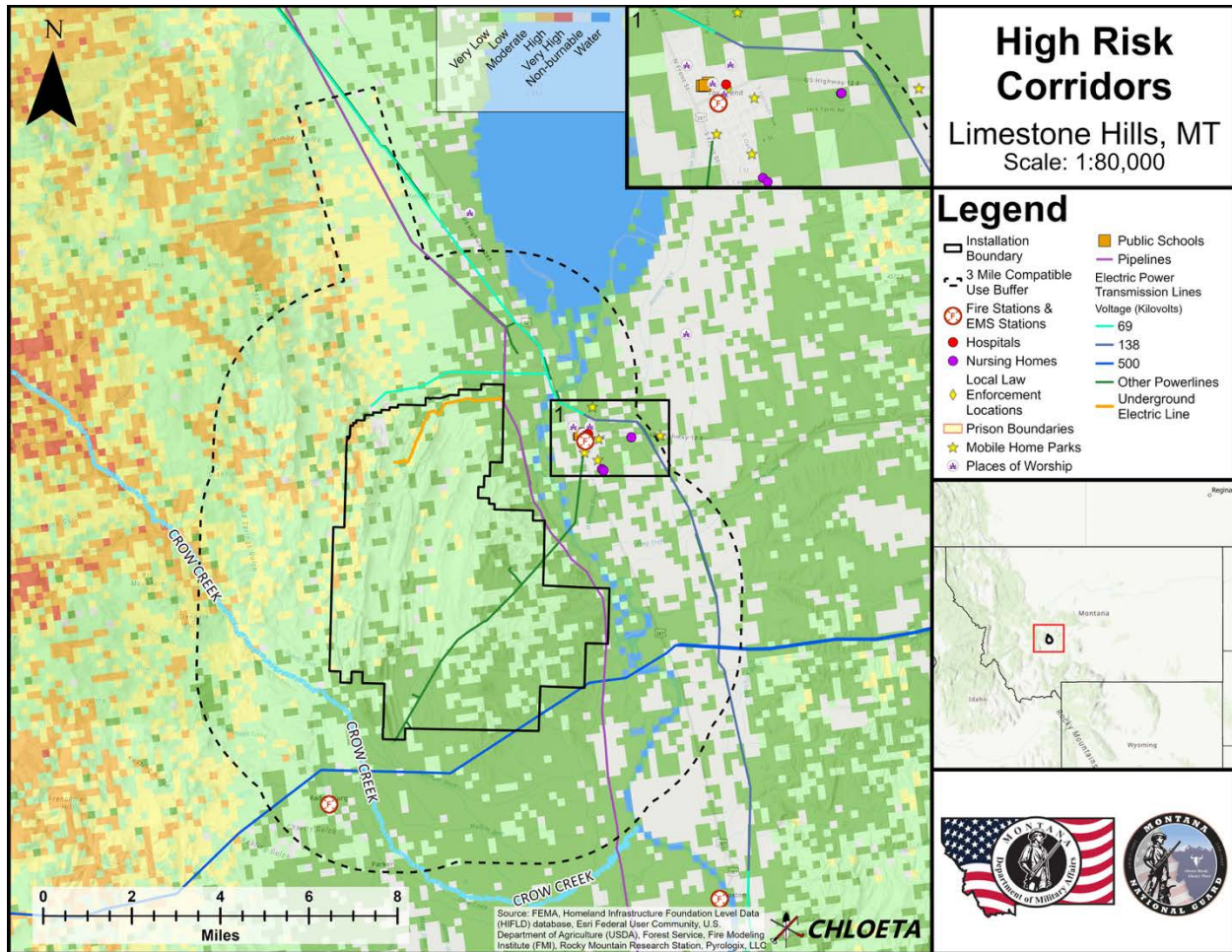


Figure 34. CIKR Wildfire Risk Map LHTA

Rate of Spread Analysis

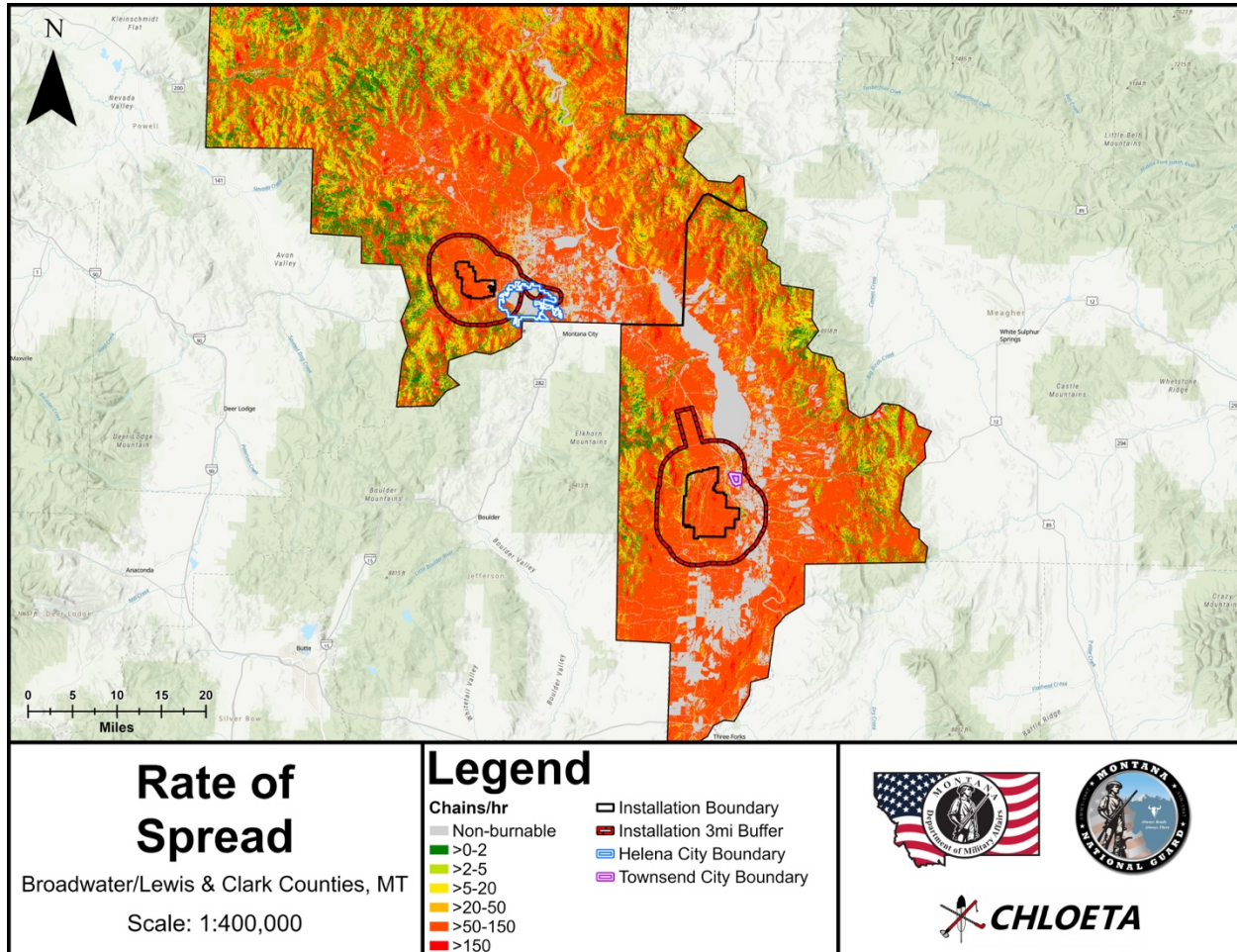


Figure 35. Rate of Spread Map

Figure 35 above shows how quickly a wildfire could move in and around the FHTA near Helena and the LHTA near Townsend, based on vegetation, terrain, and typical high-wind conditions. The darker red and orange areas indicate places where fires are likely to spread the fastest.

Using recent fuel and vegetation data (LANDFIRE 2023) and weather information from Helena and Townsend, fire spread was modeled in chains per hour (one chain equals about 66 feet). In simple terms, red areas show where a wildfire could move very quickly, potentially hundreds of feet per minute, making it harder to control and giving firefighters less time to respond.

- Fastest fire spread (red areas): Found on the steep hills and ridgelines surrounding both FHTA and LHTA. These areas have dense grasses, shrubs, and pine stands that can carry flames rapidly uphill. When wind speeds increase, fires can travel long distances and cross containment lines within minutes.
- High-risk areas (orange areas): Include grasslands and foothills around Helena's west side and the open terrain near Townsend. Fires in these areas burn fast through dry vegetation and can throw embers that start new fires nearby.

- Moderate to low spread (yellow and green areas): Found mostly in valley bottoms, irrigated fields, and areas where vegetation has been thinned or treated. These locations can help firefighters slow down or stop advancing flames.

The map also shows three-mile buffer areas around both installations. These buffers highlight that FHTA and LHTA are surrounded by continuous, fast-burning landscapes where wildfires can quickly move from surrounding hills or public lands into the training areas.

These findings show prioritizing:

- Fuel-break and thinning projects around FHTA and LHTA to slow wildfire movement.
- Targeted grazing and prescribed burns to reduce fine fuels and other fast-burning plants.
- Improved early detection, response coordination, and aerial support to protect both installations and nearby communities.

Together, these actions help protect training missions, infrastructure, and surrounding neighborhoods from rapidly spreading wildfires.

Historical Fire Activity

Recent large-scale incidents including the Canyon Creek Fire (1988, 240,600 acres), Woods Creek Fire (2021, 55,000+ acres), and Horse Gulch Fire (2024, 15,000+ acres) underscore the scale and severity of wildfire risk in both forested and rangeland environments. These fires demonstrated extreme behavior, including spotting, rapid perimeter growth, and suppression difficulty due to steep terrain and wind-funnel canyons. They also impacted training operations, residential evacuations, and regional air quality.

Fire history across the assessment area shows frequent ignitions often requiring interagency coordination. The LHTA assessment area in particular has a high baseline risk due to munitions use, sparse vegetation cover, and its remoteness from suppression resources.

This comprehensive table (Table 11) incorporates major regional wildfire events including those managed by the USFS, the BLM, the DNRC, and local fire agencies. It captures incidents that have directly impacted the assessment area. The compilation includes fires previously identified in historical datasets as well as those recognized as critical to mission assurance and regional vulnerability, ensuring a thorough representation of the wildfire risk landscape across both military and community systems.

Table 11. FHTA and LHTA Wildfire History.

Fire Name	Year	Acres Burned	Agency	Jurisdiction Impacted
Little Hogback	2025	26	Local	Broadwater
Meadowlark	2025	250	Local	Lewis & Clark
Horse Gulch	2024	15,167	DNRC / Local	Lewis & Clark, Broadwater
Hellgate Gulch	2024	108	Local	Lewis & Clark
No Name	2024	2.5	—	FHTA
No Name	2024	23.5	—	LHTA

Fire Name	Year	Acres Burned	Agency	Jurisdiction Impacted
No Name	2023	3.9		LHTA
Matt Staff Road	2022	1,521.47	Local / DNRC / BLM / USFS	Lewis & Clark, Broadwater
Birdseye	2022	3.0	Local / VA / DNRC	Lewis & Clark
No Name	2022	39.7	—	FHTA
Deep Creek Canyon	2021	4,643.03	USFS	Broadwater
American Fork	2021	21,867.00	USFS	Lewis & Clark
Woods Creek	2021	55,882.00	USFS	Broadwater
No Name	2021	0.6	—	FHTA
No Name	2021	65.3	—	LHTA
Eustis Support	2015	8,719.99	US BLM	Broadwater
Meriwether	2007	42,551.89	USFS	Lewis & Clark
Canyon Ferry Complex (Bucksnort)	2000	15,356.83	USFS	Broadwater
Maudlow/Toston	2000	81,755.69	USFS	Broadwater
Canyon Creek	1988	204,600.00	USFS	Lewis & Clark
Canyon Creek East	1988	20,636.00	USFS	Lewis & Clark
Warm Springs Creek	1988	46,900.00	USFS	Lewis & Clark

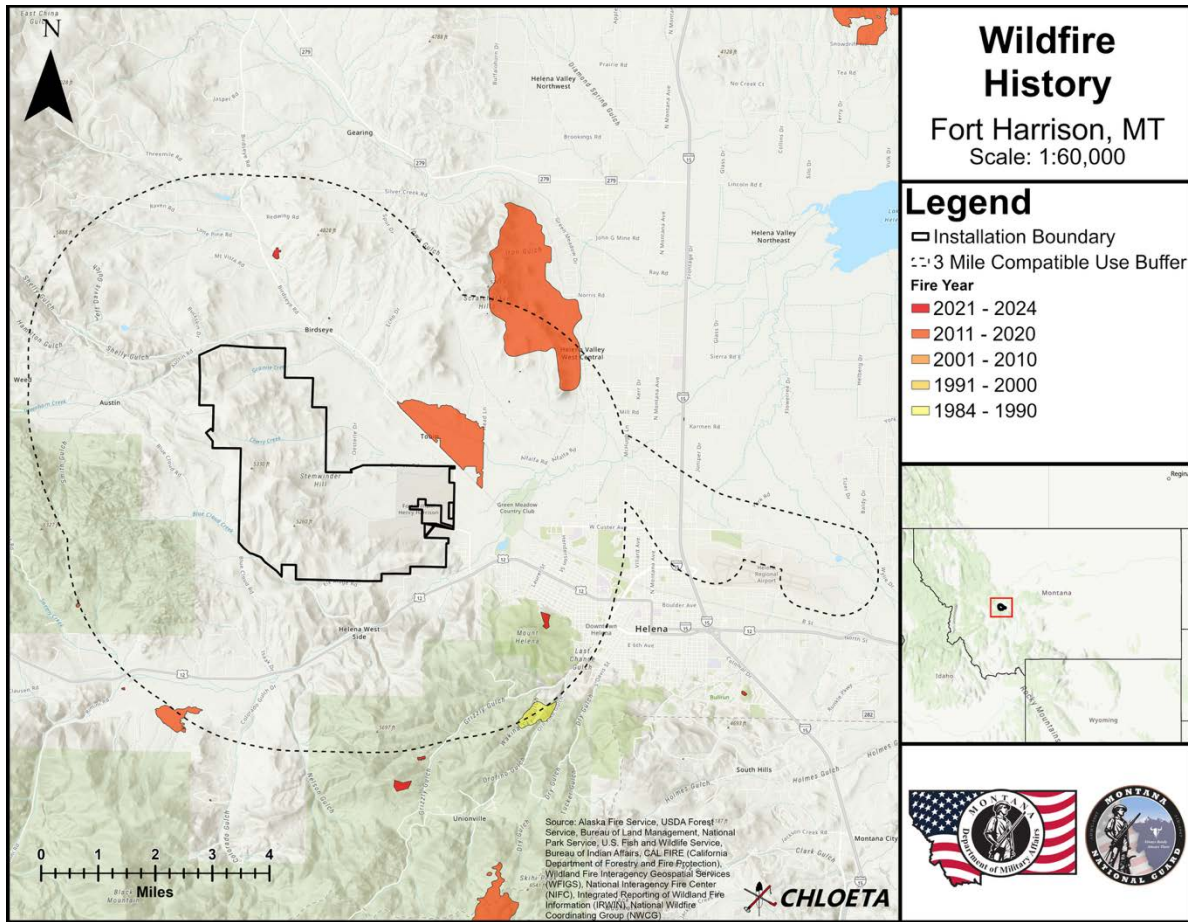


Figure 36. Wildfire History FHTA.

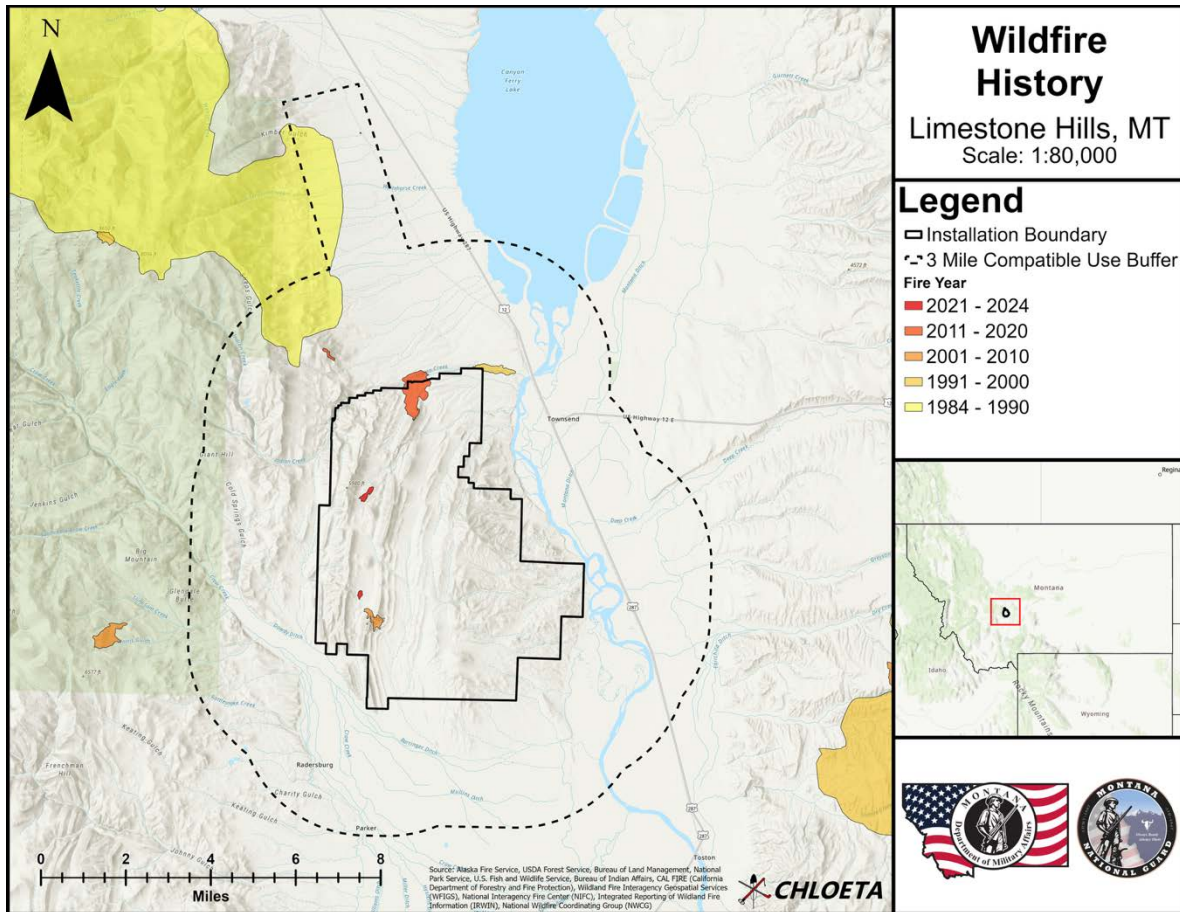


Figure 37. Wildfire History LHTA

Dynamics and System Impact-Fuel and Terrain Characteristics by Jurisdiction

Wildfire behavior and risk across the assessment area are profoundly influenced by the composition of fuels and the complexity of terrain. Together, these elements shape how fires ignite, spread, and challenge suppression operations. Each jurisdiction presents distinct fuel types, topographic features, and exposure profiles that are critical to understanding regional vulnerability.

LANDFIRE 2023 classifies regional fuels as GR2 (short grass), GS3 (grass-shrub mix), TU5 (timber understory), and TL8 (timber litter). Modeling in FlamMap 6.3 under 97th-percentile conditions produced average flame lengths of 6–12 ft and rates of spread exceeding 60 ft/min across grass-dominated polygons. Modeled burn-probability exceeded 0.45 in WUI corridors adjacent to the FHTA and Canyon Ferry Basin, supporting the regional ranking of High to Very High risk (USFS 2024; DNRC 2024).

FHTA: A steadily expanding WUI (Figure 38) of residential and commercial development on Helena's outskirts borders the FHTA. The installation itself is surrounded by open ponderosa pine stands, grasslands, and densely forested draws with considerable ladder fuels. The topography includes gently rolling hills transitioning into more rugged terrain toward the South Hills. These conditions create multiple fuel transition areas, allowing fire to move rapidly between surface and canopy fuels.

Proximity to urban development increases human activity ignition risk while reliance on adjacent municipal utilities makes the base susceptible to service disruptions during fire events. Although no full evacuations have been recorded in recent years, localized closures along Williams Street and nearby access points have occurred during periods of elevated fire danger, however three alternative exits along that corridor can be opened to maintain egress continuity (Lewis & Clark DES 2023).

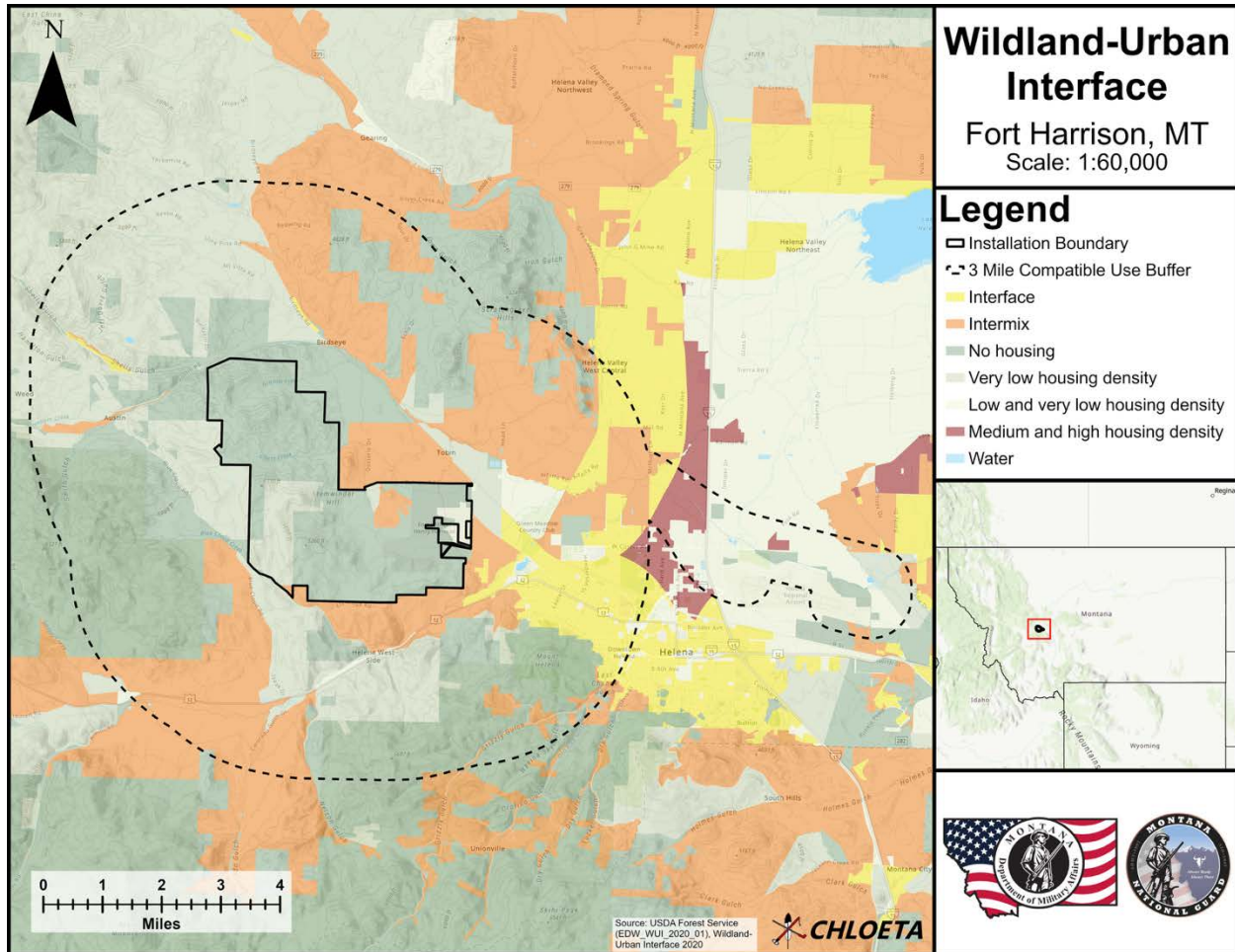


Figure 38. FHTA Assessment Area WUI Map

LHTA: The LHTA assessment area (Figure 39) is situated in steep, rocky terrain with limited road infrastructure and sparse vegetation interspersed with sagebrush, and dry grasses. These light, flashy fuels burn intensely and spread quickly, especially under wind-driven conditions. Topographic features including canyons and ridgelines create upslope fire acceleration areas, commonly referred to as “chimney effects.” The area’s remoteness and its use for live-fire military training, including maneuver training, compound wildfire risk. Fire suppression data from interviews and discussions confirm that the LHTA isolation results in average response times exceeding 45 minutes for external resources, validating limited internal firefighting capacity (DNRC 2024; Broadwater DES 2023). The terrain restricts vehicle access, requiring aerial support or pre-deployment of ground crews during high fire-danger periods. The terrain restricts vehicle access, requiring aerial support or pre-deployment of ground crews during periods of high fire

danger.

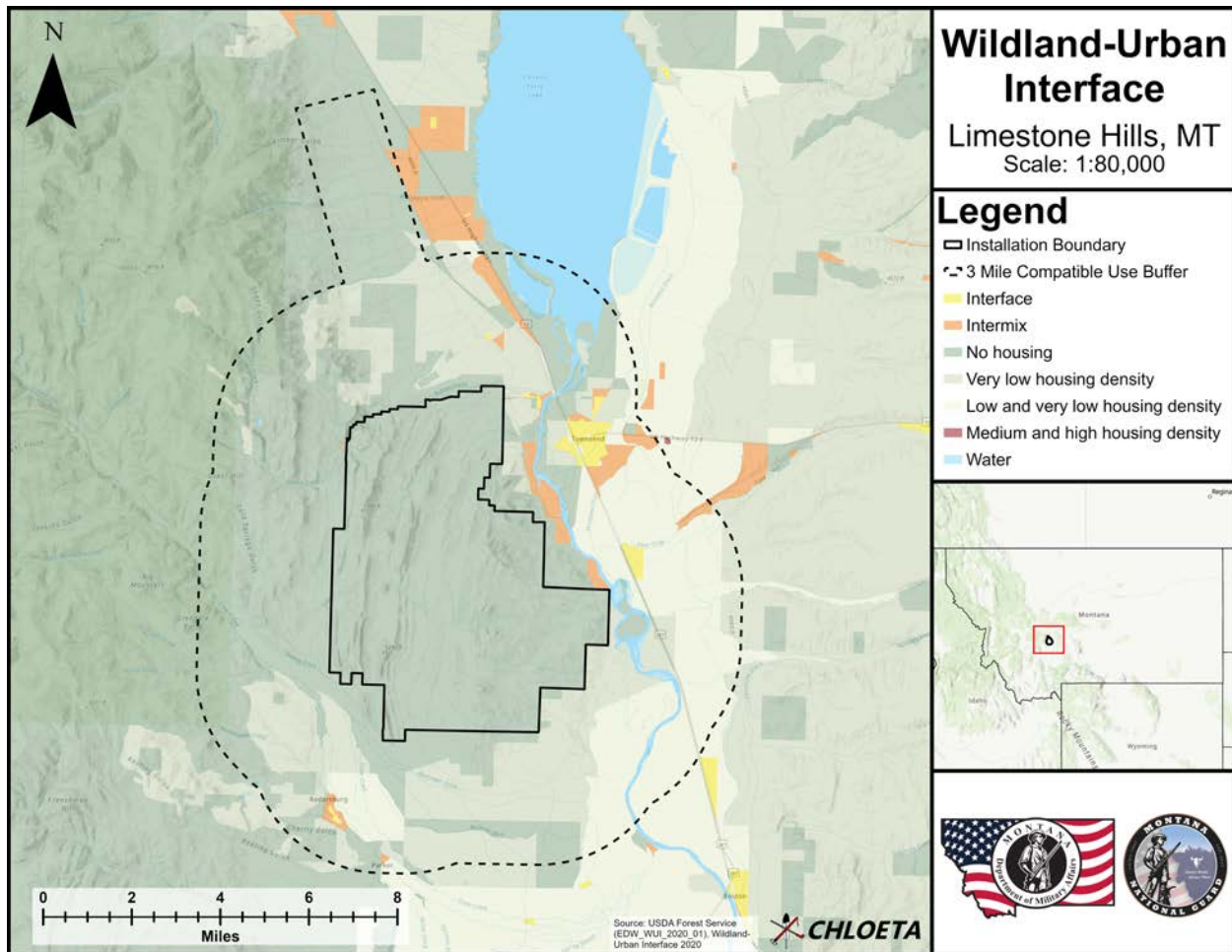


Figure 39. LHTA Assessment Area WUI Map

Lewis & Clark County: Lewis & Clark County encompasses a broad mix of terrain and fuel types, from densely forested highlands in the western portion to open grasslands and riparian corridors in the valleys. Forest areas contain Douglas fir, lodgepole pine, and ponderosa pine, much of it historically overstocked and vulnerable to crown fires. Since 2020, USFS, Helena, Lewis and Clark National Forest has conducted extensive mechanical thinning and prescribed burning within the Tenmile–South Hills Fuels Reduction Project, directly adjacent to FHTA. More than 2,200 acres of forest have been treated to remove ladder fuels and reduce canopy density, creating a strategic buffer between the South Hills residential area and FHTA western boundary (USFS 2024; DNRC 2023). These treatments have measurably reduced crown-fire potential and improved fire-line anchor points for both city and federal suppression operations.

Grass-dominated rangelands with invasive species cover approximately 6 percent of the FHTA footprint and higher percentages eastward across the 10-Mile Creek Park corridor. The PPLT recently conducted haying and applied soil accelerants and herbicides as part of a REPI-supported fuels-reduction project, which has reduced flashy-fuel continuity east of the installation (PPLT 2024).

Historically, aggressive fire suppression in these grasslands has limited natural burns, resulting in heavier fine-fuel accumulation in unmanaged parcels. The county's South Hills area, including FHTA western perimeter, features steep, narrow drainages with dense WUI development. These channels funnel fire uphill, creating dangerous, fast-moving flame fronts that can threaten both residential and military infrastructure during wind-driven events (Lewis & Clark DES 2023; USFS 2024).

Access within unincorporated subdivisions remains constrained, county planning data indicate that over 60 percent of new developments in WUI areas have only a single ingress/egress route (Lewis & Clark County Planning 2023). This limited access elevates evacuation risk and complicates suppression operations. Coordination among city, county, federal, and nonprofit land managers, particularly DNRC, USFS, and PPLT, has increased under REPI however regional CWPP frameworks to align fuels-reduction, access, and response strategies (USFS 2024; PPLT 2024) still requires integration.

Broadwater County: Broadwater County is characterized by wide-open valleys, dry ridgelines, and remote canyons. Vegetation consists largely of sagebrush and mixed grasslands, with intermittent stands of pine and juniper in upland areas. Fine fuel vegetation coverage is estimated at roughly 15–25% of rangeland acreage, primarily concentrated in the southern and central portions of the county near Townsend and Canyon Ferry Lake (DNRC 2023; USFS 2024). These flashy fuels are extremely receptive to ignition and allow fire to move quickly across the landscape, especially under prevailing summer winds. The canyon systems around Canyon Ferry Lake and the northern parts of the county are particularly hazardous due to their terrain-induced airflow patterns, which can intensify fire behavior.

Recent growth patterns show that development is expanding most rapidly in Broadwater County, now among the fastest-growing counties in Montana. New subdivisions are emerging along the U.S. Highway 287 and Canyon Ferry corridors, with lot sizes typically between 0.5 and 2 acres. While large ranchette-style parcels (10+ acres) remain common in outer areas, denser rural subdivisions are increasingly dominant near water bodies and highway access (Broadwater County Planning 2024).

Water supply for firefighting varies by development density. Newer subdivisions often rely on private wells, which provide domestic water but limited capacity for suppression. The county lacks a comprehensive rural water distribution system, and many developments depend on water tenders or mutual aid from Helena-based agencies during major incidents (Broadwater DES 2024).

Firefighting resources are limited, with six volunteer departments and support from DNRC Helena Unit and USFS resources during extended attack operations. Response data indicate that approximately 40% of Broadwater County wildfire events require interagency assistance or Type 3 Incident Management Team mobilization (DNRC 2024).

City of Helena: As Montana's state capital, Helena represents the most urbanized environment in the regional wildfire landscape, yet it remains deeply interconnected with surrounding fire-prone ecosystems. Residential neighborhoods, particularly those extending into the South Hills, Grizzly Gulch, and west toward the FHTA, are bordered by forested slopes, grassy draws, and ornamental vegetation that significantly elevate ignition risk (City of Helena Fire Department 2024).

Steep terrain and narrow, winding roads in hillside subdivisions restrict evacuation options and

complicate emergency response. Although the city maintains full-time fire services and a hydrant network, the expansion of housing into the WUI continues to stress response capacity.

The City of Helena and Lewis & Clark County are part of the Tri-County CWPP, updated in 2020, that identifies critical infrastructure, including the St. Peter's Health campus, water treatment plant, and electrical substations, as high exposure sites. To reduce fuel loads, the city partners with USFS and PPLT under REPI and DNRC Urban Interface Mitigation Grants to thin, overgrown vegetation, clear ornamental debris, and increase defensible-space education for homeowners.

Despite these efforts, Helena's WUI footprint continues to expand. Approximately 1,200 homes are now classified within "High" or "Very High" wildfire hazard areas under the city's Fire Hazard Severity Mapping Program (City of Helena 2024).

City of Townsend: Townsend is a small but regionally significant community located near the southern access corridor to the LHTA. The surrounding landscape consists primarily of open grasslands, sagebrush flats, and scattered riparian corridors along the Missouri River. Fuels in these areas are typically lighter but highly flammable under dry, windy conditions (DNRC 2024).

While the Townsend Volunteer Fire Department provides structural and limited wildland protection, its response resources are modest, consisting of fewer than 20 active volunteers and four engines (Broadwater DES 2024). The city's distance from federal fire bases and regional suppression centers can result in delayed resource arrival during large incidents, reinforcing the importance of mutual aid from Broadwater and Lewis & Clark counties.

Development expansion along U.S. Highway 287 and around Canyon Ferry Lake has increased WUI exposure. New subdivisions and seasonal homes are emerging in historically agricultural areas with minimal fuel breaks or hardened infrastructure. The city's water distribution and fire-flow capacity are limited, relying primarily on municipal wells and a small storage system not designed for sustained wildfire suppression (City of Townsend 2024).

Jurisdictional Exposure and Fuel Types and Vegetation

The assessment area's vegetation reflects a complex mosaic shaped by elevation, land use history, and legacy fire regimes. Fuel types and their spatial distribution vary significantly across assessment area. Each jurisdiction in the assessment area presents unique wildfire behavior characteristics and management challenges.

Spotted knapweed (*Centaurea stoebe*) form contiguous fine-fuel networks linking grasslands between FHTA, 10-Mile Creek Park, and the Canyon Ferry corridor. Mapping from the REPI 5-Year Proposal (2025) and DNRC Invasive Species Survey (2024) indicates approximately 9,800 acres of fine fuels within the regional assessment area. These fuels increase ignition frequency and shorten natural fire-return intervals from 8–15 years to 3–5 years, amplifying erosion risk and post-fire flooding (DNRC 2024; REPI 2025).

FHTA (Figure 40)

- **Dense Conifer Forests:** Approximately 38% of the FHTA is composed of grasslands, while the remaining areas transition into forested ridges supporting mature stands of Douglas fir, lodgepole pine, and ponderosa pine, particularly concentrated along the western and southern perimeter near the South Hills and Tenmile Creek drainages. Many of these stands

exhibit high surface fuel loads and dense ladder fuels that can promote crown fire activity under sustained wind or drought conditions (USFS 2024; DNRC 2023).

- **Riparian and WUI Vegetation:** The installation borders residential neighborhoods and open drainages containing unmanaged grasses and ornamental vegetation, which act as ignition vectors during peak fire season. Years of suppression have contributed to increasing fine-fuel accumulation in these riparian corridors and residential edges. Vegetation management efforts by the FHTA Natural Resources Office and the Prickly PPLT under the REPI Resilience and Challenge Grants have begun targeted mowing, haying, and herbicide applications to reduce fuel continuity east of the base (PPLT 2024; FHTA NRM 2024).
- **Transition Areas:** Mixed pine–grass interfaces surround much of the installation, creating rapid fire-spread potential where native vegetation meets expanding development. These transition areas, particularly along the Williams Street corridor and the 10-Mile Creek Park boundary, represent key locations for defensible-space maintenance and interagency fuel-break planning (Lewis & Clark DES 2023; DNRC 2024).

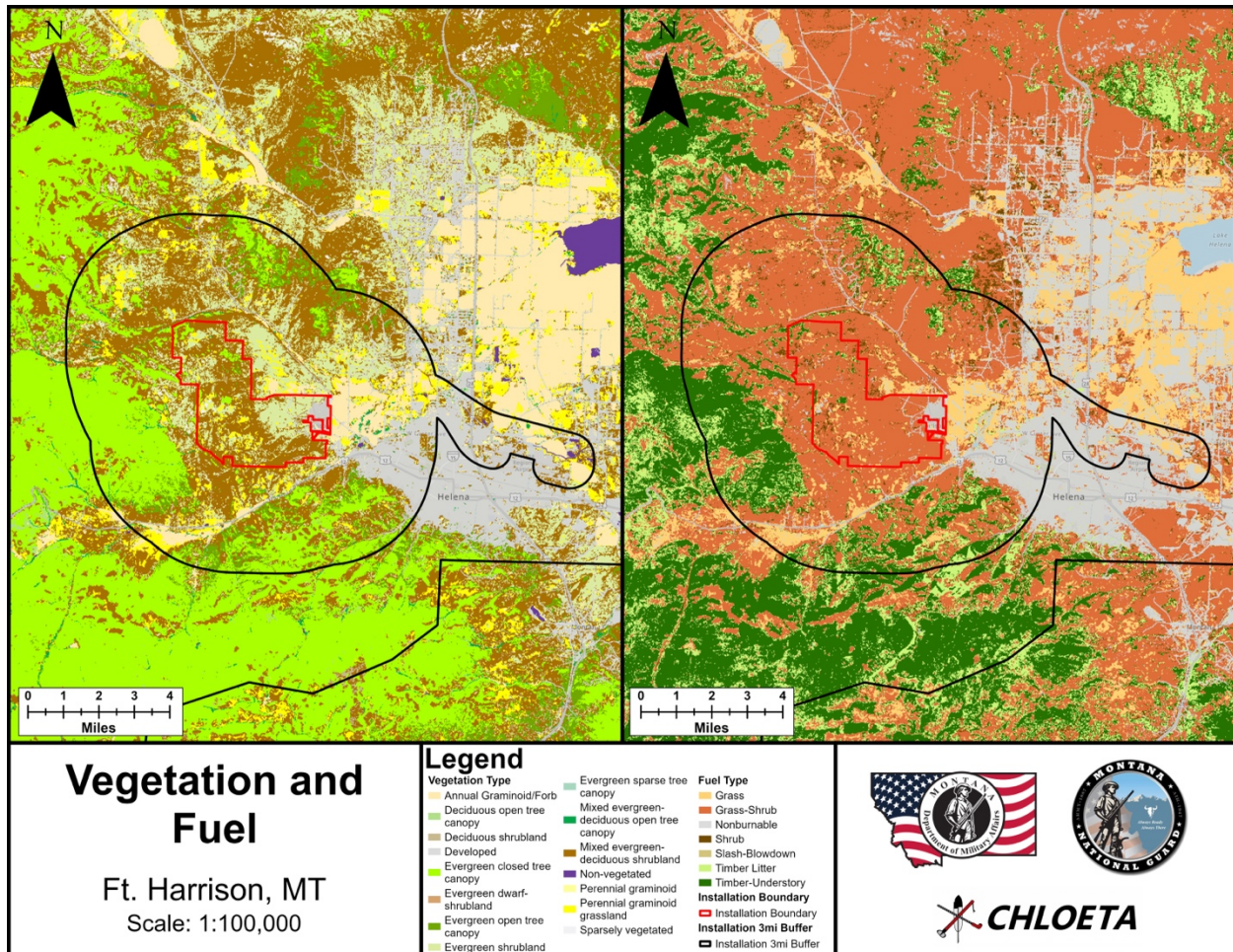


Figure 40. Vegetation and Fuel Map FHTA

LHTA (Figure 41)

- **Sagebrush Rangelands:** The dominant vegetation across the LHTA consists of sagebrush and Bluebunch wheatgrass forming a fine, flashy fuel complex that supports rapid ignition and short-interval fire recurrence. This coverage is estimated at 20–30% across the LHTA central and southern sectors, particularly near canyon slopes and training corridors (DNRC 2024; USFS 2024). These fuels recover quickly post-burn and contribute to recurrent fire cycles that challenge long-term fuel management and erosion control.
- **Mixed Grasslands:** The open training grounds are characterized by native bunchgrasses interspersed with needle-and-thread, western wheatgrass, and Sandberg bluegrass, all of which cure by midsummer and become highly flammable under sustained winds. Vegetation in low-elevation valleys remains discontinuous but can support rapid fire spread during drought or when ignited by live-fire exercises (Broadwater DES 2024; FHTA NRM 2024).
- **Steep Topography and Fuel Connectivity:** Vegetation clings to steep ridgelines and canyon walls, creating natural “chimney effects” that accelerate fire upslope during dry periods. The combination of steep relief, sparse water resources, and limited interior access routes severely constrains suppression operations. The LHTA eastern and southern boundaries are of particular concern due to overlapping recreational and grazing uses that increase ignition probability (USFS 2024; DNRC 2023).

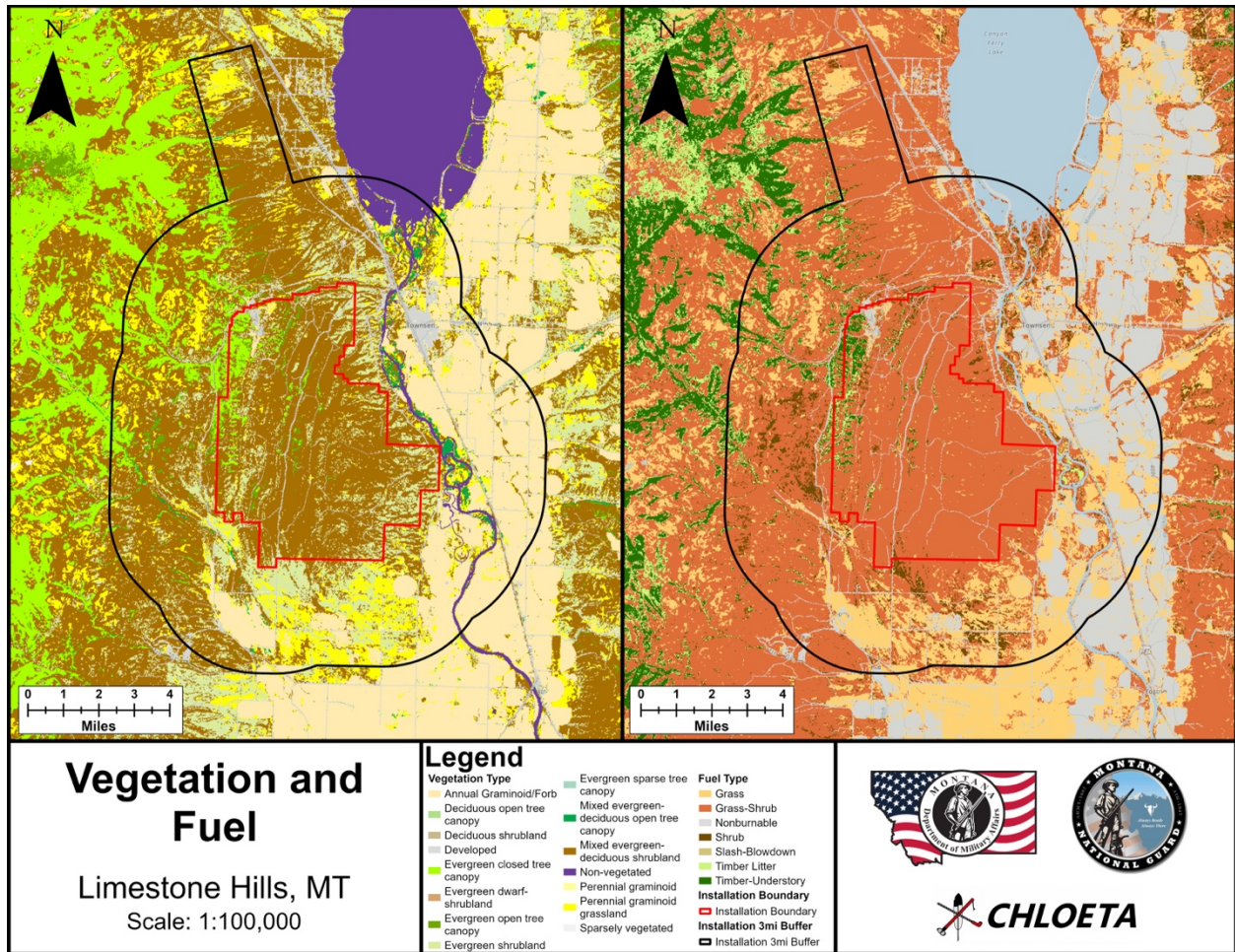


Figure 41. Vegetation and Fuel Map LHTA

City of Helena

- **Dense Conifer Forests and WUI Fuels:** The South Hills and Grizzly Gulch areas of Helena contain dense stands of Douglas fir, ponderosa pine, and lodgepole pine, many of which exhibit moderate to heavy surface fuel loading and significant ladder fuel development. Within Helena's WUI, these conditions increase flame lengths and crown-fire potential during sustained droughts. The USFS' South Hills Fuels Reduction Project, in coordination with the City of Helena Fire Department and Lewis & Clark County has treated more than 3,000 acres through thinning, chipping, and prescribed burns since 2019. These projects have reduced canopy closure, improved defensible space, and created anchor areas for suppression operations (USFS 2024; City of Helena Fire Department 2024).
- **Ornamental Landscaping and Drainages:** Residential developments extending west toward FHTA and south into the hillside neighborhoods include a mixture of ornamental vegetation, unmanaged grasses, and combustible landscaping materials including pine mulch and conifer hedges. Many of these subdivisions also border stormwater and natural drainage corridors, which contain unmanaged vegetation that can act as fire carriers during late summer. The City of Helena's Firewise USA® program, launched in 2022, is

expanding homeowner education and vegetation management across these neighborhoods (City of Helena Fire Department 2024; Lewis & Clark DES 2023).

- **Mixed Woodland–Urban Edge:** The transition zone between Helena’s western city limits and surrounding public lands represents one of the most complex wildfire interfaces in the assessment area. In this area, residential infill development continues to advance into forested parcels with limited secondary egress. While defensible-space compliance has improved under the city’s new Wildfire Mitigation Code (2024), enforcement gaps and uneven vegetation maintenance remain challenges. These edge conditions continue to generate the highest modeled ignition potential within Helena’s municipal boundary (Tri-County CWPP 2020; USFS 2024).

Townsend

- **Sagebrush–Grassland Matrix:** The Townsend valley and its surrounding uplands are dominated by sagebrush, needle-and-thread grass, western wheatgrass, and Bluebunch wheatgrass, forming an open shrub-steppe ecosystem highly susceptible to ignition during extended dry and windy periods. Fine fuels cure rapidly by midsummer, and their continuity across open pastures allows for fast lateral fire spread. Although the vegetation structure provides low canopy density, wind-driven surface fires can move rapidly toward developed areas without fuel breaks (DNRC 2024; Broadwater DES 2024).
- **Riparian Corridors:** The Missouri River and its adjoining tributaries, including Deep Creek and Indian Creek, form narrow riparian corridors containing willow, cottonwood, and overgrown perennial grasses. During late summer and early fall, these corridors can act as continuous fuel pathways when understory vegetation dries. Floodplain haying and grazing have reduced fuel continuity along some stretches, but unmanaged private parcels remain ignition-prone. Targeted mechanical thinning and mowing along these corridors are recommended under the Tri-County CWPP (2020).
- **WUI and Fuel Interfaces:** Townsend’s residential growth, particularly along U.S. Highway 287, Canton Road, and Canyon Ferry Road, has expanded development into areas historically used for grazing. Many of these parcels lack defensible-space buffers or hardened infrastructure. Vegetation near homes often includes ornamental juniper, unmanaged grasses, and wood fencing, which elevate structure ignition potential during wildfire events. Ongoing education efforts led by the Townsend Volunteer Fire Department and DNRC Helena Unit focus on Firewise landscaping and debris management, but consistent maintenance remains a key vulnerability (Broadwater DES 2024; DNRC 2023).

Lewis & Clark County

- **High-Elevation Conifer Forests:** The western portion of Lewis & Clark County contains extensive high-elevation conifer forests composed primarily of Douglas fir, lodgepole pine, and ponderosa pine, with interspersed stands of Engelmann spruce and subalpine fir at higher elevations. Many of these forests remain overstocked and ladder-fuel dense, creating elevated crown-fire potential. Since 2020, the USFS Helena–Lewis & Clark National Forest has completed more than 2,200 acres of mechanical thinning and prescribed burning under the Tenmile–South Hills Fuels Reduction Project, directly improving conditions near FHTA (USFS 2024; DNRC 2023). These treatments have expanded anchor points for suppression crews and reduced canopy bulk density across critical ridgelines.

- **Mid-Elevation Grasslands and Ponderosa Pine:** Mid-slope areas and lower foothills feature ponderosa pine stands, open grasslands, and sagebrush, creating a patchwork of fuel types with high variability in flame length and spread potential. Years of fire suppression have allowed dense grass accumulation in unmanaged parcels, particularly north and east of the Helena Valley. In these areas, fine fuels and unmaintained vegetation within private properties heighten ignition likelihood. County data indicate that over 60 percent of WUI developments have only one ingress/egress route, limiting safe suppression access and evacuation options (Lewis & Clark County Planning 2023).
- **WUI Expansion and Rangeland Fuels:** Development continues to expand eastward toward 10-Mile Creek Park, Lincoln Road, and the Hauser Lake corridor, where grass-dominated rangelands intermix with residential structures. Crested wheatgrass dominates many of these areas, increasing ignition probability and shortening fire-return intervals. PPLT, supported by REPI Challenge Grant funding, has implemented haying, targeted grazing, and herbicide treatments to disrupt fuel continuity around 10-Mile Creek Park and other conservation parcels (PPLT 2024). These projects complement DNRC and USFS landscape-scale mitigation efforts designed to slow eastward fire spread toward urban Helena.

Since 2018, Lewis & Clark County has approved over 450 ranch-lot (5–20 acre) subdivisions north and east of FHTA. This parcelization has reduced contiguous burn units by 40% and restricted prescribed-fire operations due to smoke liability and egress constraints. The resulting mosaic of unmanaged pastures and ornamental vegetation has created a continuous fuel interface linking Helena’s WUI to installation boundaries (Lewis & Clark Planning 2023; DNRC 2024).

Broadwater County

- **Rangelands and Fine Fuel Expansion:** Broadwater County is dominated by sagebrush-steppe and grassland ecosystems, including Bluebunch wheatgrass, western wheatgrass, and Sandberg bluegrass, with scattered juniper and ponderosa pine in upland areas. Fine fuels have become increasingly prevalent, covering an estimated 15–25% of rangeland acreage, particularly in the southern and central county corridors near Canyon Ferry Lake and U.S. Highway 287 (DNRC 2024; USFS 2024). This fine, flashy fuel contributes to rapid fire spread and shorter fire-return intervals, making it a dominant driver of wildfire behavior in the assessment area.
- **Drainages and Canyons:** Deeply incised drainages, especially around Canyon Ferry Lake, Duck Creek, and the Elkhorn Mountains foothills create terrain-aligned airflow patterns that intensify fire spread and limit direct suppression access. Vegetation in these corridors is composed of sagebrush, juniper, mixed grasses, and riparian willows, forming continuous vertical and horizontal fuel layers. Fires originating within these canyons often accelerate upslope and can rapidly transition to crown or wind-driven events, threatening dispersed residential clusters and critical access roads (USFS 2024; Broadwater DES 2024).
- **Development and WUI Interface:** Broadwater County remains one of the fastest-growing counties in Montana, with rural subdivisions proliferating along U.S. Highway 12, U.S. Highway 287, and the Canyon Ferry corridor. While larger ranchette parcels (10–20 acres) still exist, many new developments now include 0.5–2-acre lots within moderate to high wildfire hazard areas. Vegetation surrounding these subdivisions commonly includes unmanaged ornamental juniper, grass, and sagebrush, fuels that are highly receptive to

ignition. Most developments rely on private wells for domestic water, with no dedicated firefighting supply, and depend on mutual aid from Lewis & Clark County and DNRC Helena Unit for extended attack operations (Broadwater County Planning 2024; DNRC 2024).

- Forest and Mixed-Fuel areas: Scattered stands of ponderosa pine and juniper exist across the Elkhorn and Big Belt Mountain foothills, interspersed with fine fuel dominated understory. These mixed-fuel areas produce erratic fire behavior, combining rapid surface spread with intermittent torching. Vegetation management has been implemented on select state and BLM parcels, but private properties remain largely untreated. Countywide mitigation priorities under the Tri-County CWPP (2020) focus on expanding fuel breaks and improving road access for suppression resources across canyon and rangeland areas.

Topographic Influences on Fire Behavior

Topography is one of the most critical determinants of wildfire behavior across the FHTA–LHTA regional landscape (Figure 3), shaping ignition potential (Figure 44), flame intensity, and suppression accessibility. Steep slopes (Figure 43), canyon systems, and variable elevations (Figure 42) influence wind alignment, fuel drying rates and ember transport (Figure 40 and Figure 41) all factors that determine how rapidly fires spread and where suppression operations can be staged. The following subsections describe key topographic influences for each jurisdiction.

Mean slope gradients range from 8 percent in valley floors to 35 percent along the South Hills and LHTA ridges. Prevailing westerly winds average 12–18 mph, with gusts to 40 mph during summer red-flag conditions, producing aligned-wind rates of spread up to 90 ft/min (DMA Terrain and Wind Analysis 2025; USFS 2024).

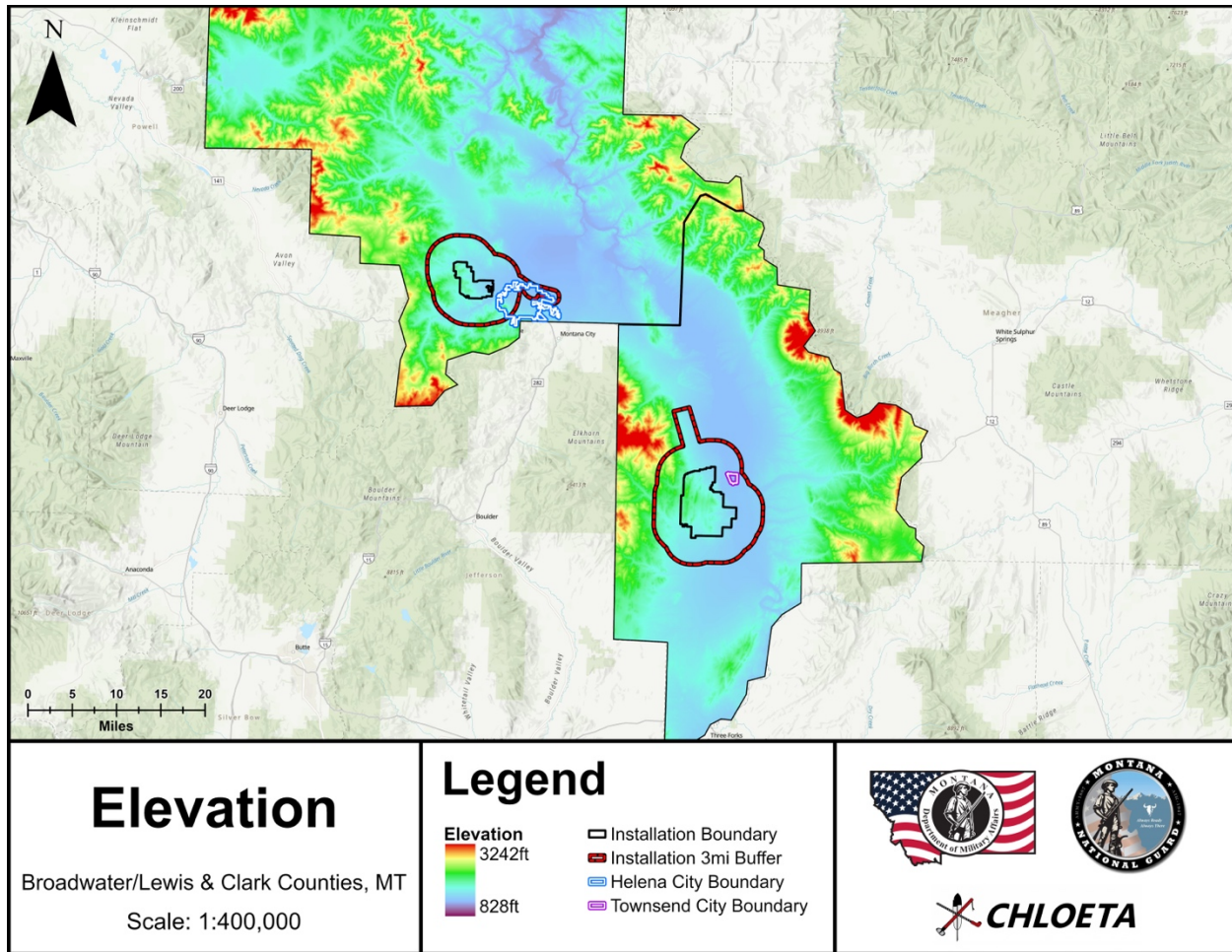


Figure 42. Regional Elevation Map

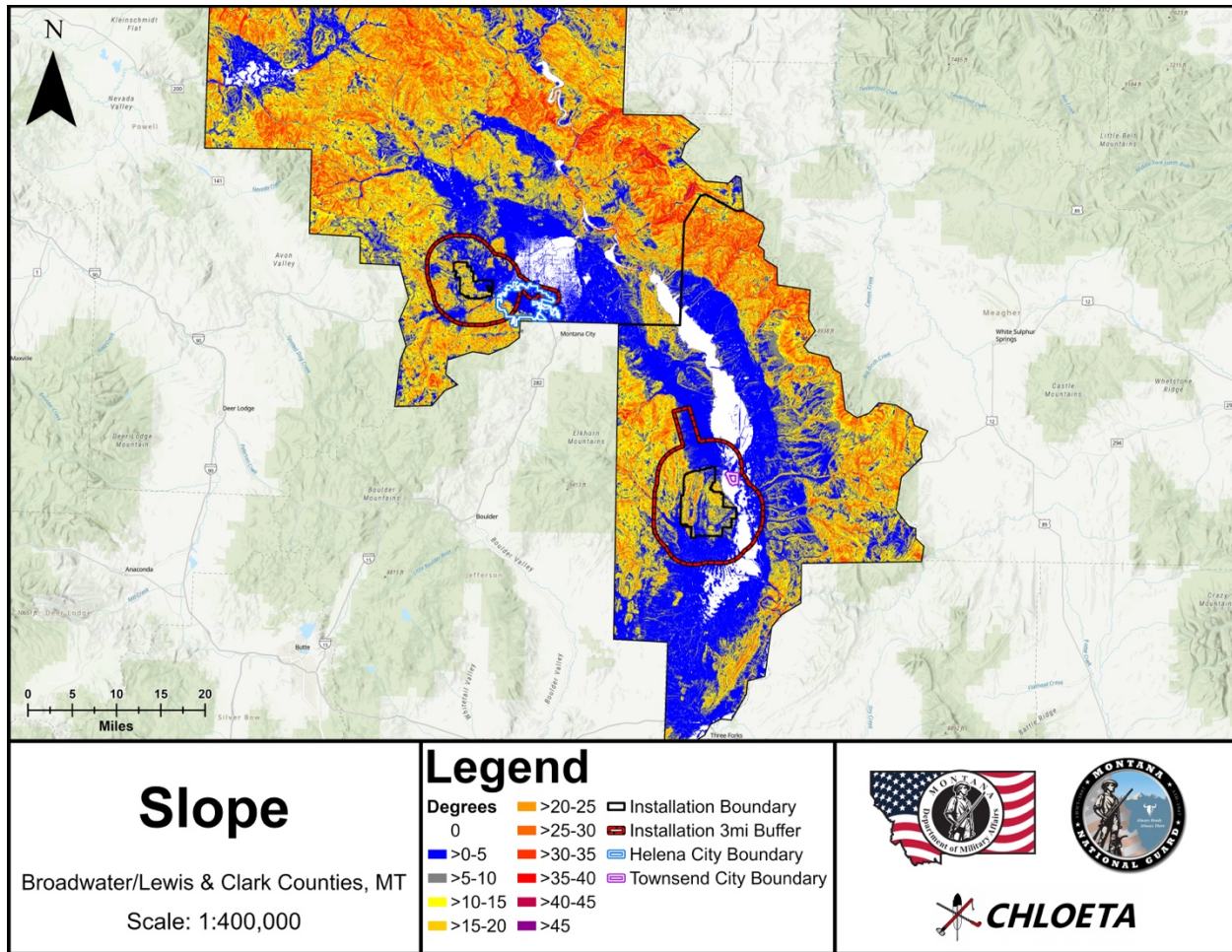


Figure 43. Regional Slope Map

FHTA: The FHTA lies at the base of the Helena foothills, where gently rolling terrain transitions to steep ridgelines and dissected drainages. Slopes west and southwest of the installation, particularly near Tenmile Creek and Birdseye, can channel fire upslope toward the base, aligning with prevailing summer winds. These topographic corridors amplify convection and embers, allowing fire to breach containment lines.

Road infrastructure within the installation is generally strong, but evacuation routes may experience congestion during simultaneous off-base fire activity. Coordination with Helena Fire Department and Lewis & Clark County DES ensures redundant access through Williams Street, Country Club Avenue, and Fort Harrison Avenue, which together provide multiple egress options (Lewis & Clark DES 2023; DNRC 2024).

Topographic complexity near the installation's western perimeter necessitates continued collaboration under the Tenmile–South Hills Fuels Reduction Project, which targets ridgelines as natural fuel breaks (USFS 2024).

LHTA: The LHTA occupies steep, rocky ridges and narrow canyons that form natural “chimney effects,” funneling wind and flame upslope during dry conditions. Elevation changes of more than 1,000 feet across short horizontal distances create localized convection patterns that intensify fire

behavior.

The area's rugged terrain restricts vehicle movement and complicates direct suppression. Interior roads are limited, and many slopes exceed 30% gradient, requiring reliance on aerial suppression, forward staging, or pre-deployed ground crews during periods of elevated fire danger (Broadwater DES 2024; USFS 2024). These same features, however, create potential anchor points along upper ridgelines that could be leveraged for containment when combined with pre-established fuel breaks.

Remoteness and limited water resources amplify these challenges, as most suppression water must be hauled in or staged via portable bladders during operations (DNRC 2023).

City of Helena: Helena's topography includes steep, densely developed residential areas in the South Hills and Grizzly Gulch, where narrow roadways and canyon systems act as natural chimneys. Fires originating in these areas can accelerate uphill within minutes, often exceeding the capacity for structural defense before evacuation routes can be cleared.

Neighborhoods along Grizzly Gulch, Oro Fino Gulch, and Rimini Road exhibit high slope-to-structure exposure ratios, increasing radiant heat and ember intrusion potential. In addition, embers carried by canyon winds can spot over roads and ignite ornamental vegetation within subdivisions. The Helena Fire Department's Wildfire Severity Mapping Program (2024) identifies these slope-adjacent developments as "Very High" hazard areas, reinforcing the need for ongoing defensible-space enforcement (City of Helena Fire Department 2024; Tri-County CWPP 2020).

City of Townsend: Townsend occupies a valley floor but is bordered by steep foothills and canyon systems to the north and east. These natural corridors channel prevailing winds from the Big Belt Mountains, increasing fire intensity and spotting potential during late-summer events.

The town's limited transportation network, particularly along U.S. Highway 287 and Deep Creek Road, could become compromised if a major fire event originates along canyon slopes. Evacuation modeling conducted during the Tri-County CWPP (2020) shows that primary routes may close within one hour of ignition under wind-driven conditions.

Townsend's topography also influences local wind dynamics; evening downslope winds from surrounding ridges can carry embers into lower elevations, complicating containment even for grass-fueled fires (Broadwater DES 2024; DNRC 2024).

Lewis & Clark County: The county's topographic profile includes mountainous western uplands, steep foothills surrounding Helena, and river valley systems extending toward the Missouri River. Areas including Tenmile Creek, Sevenmile Creek, and Birdseye are particularly vulnerable due to steep slopes and funnel-shaped valleys that promote rapid upslope fire movement.

Smoke inversions are frequent during wildfire events, reducing visibility for aerial suppression and contributing to heat entrapment within canyons. Many rural roads are narrow, unpaved, or poorly signed, impeding the movement of heavy apparatus and mutual-aid units (Lewis & Clark DES 2023; USFS 2024). These terrain-related access issues underscore the county's emphasis on pre-identifying staging areas and alternate egress routes for high-risk subdivisions.

Broadwater County: Topographic conditions in Broadwater County range from wide, open rangeland valleys to steep, dissected canyons in the Elkhorn Mountains and Canyon Ferry Basin. Fires ignited in canyon bottoms frequently align with prevailing winds, accelerating upslope and

laterally along ridgelines.

The canyon systems around Duck Creek, Indian Creek, and the southern Canyon Ferry Lake area are of particular concern because they host dense vegetation and scattered housing with minimal defensible space. Single-lane access roads can quickly become impassable during a fire event, isolating residents and hindering responder movement.

Water sources for suppression are limited in upland areas, with most resources dependent on portable tanks, water tenders, or private wells. These topographic and infrastructure constraints make Broadwater County one of the most suppression-challenged areas in this assessment (Tri-County CWPP 2020; DNRC 2024).

Regional Summary: Across all jurisdictions, steep slopes, canyon alignments, and variable elevation create a highly complex fire environment that accelerates flame spread and limits tactical flexibility. Fires often transition from surface to crown rapidly, particularly under strong westerly winds. These topographic realities necessitate proactive mitigation, including fuel-break establishment on ridgelines, slope-stabilization following burns, and expanded pre-fire planning to ensure rapid, coordinated response capabilities (USFS 2024; DNRC 2024).

Exposure and Development Patterns

Population growth and continued residential expansion across the FHTA–LHTA assessment area have steadily increased structural and infrastructure exposure to wildfire hazards. Development trends demonstrate encroachment into high-risk fuel areas, particularly within WUI areas (Figure 38 and Figure 39) that lack redundant access and adequate water supply. The distribution of exposure reflects overlapping civilian, agricultural, and military land uses, underscoring the need for regionally coordinated land-use controls and infrastructure hardening (Lewis & Clark DES 2023; Broadwater DES 2024; USFS 2024).

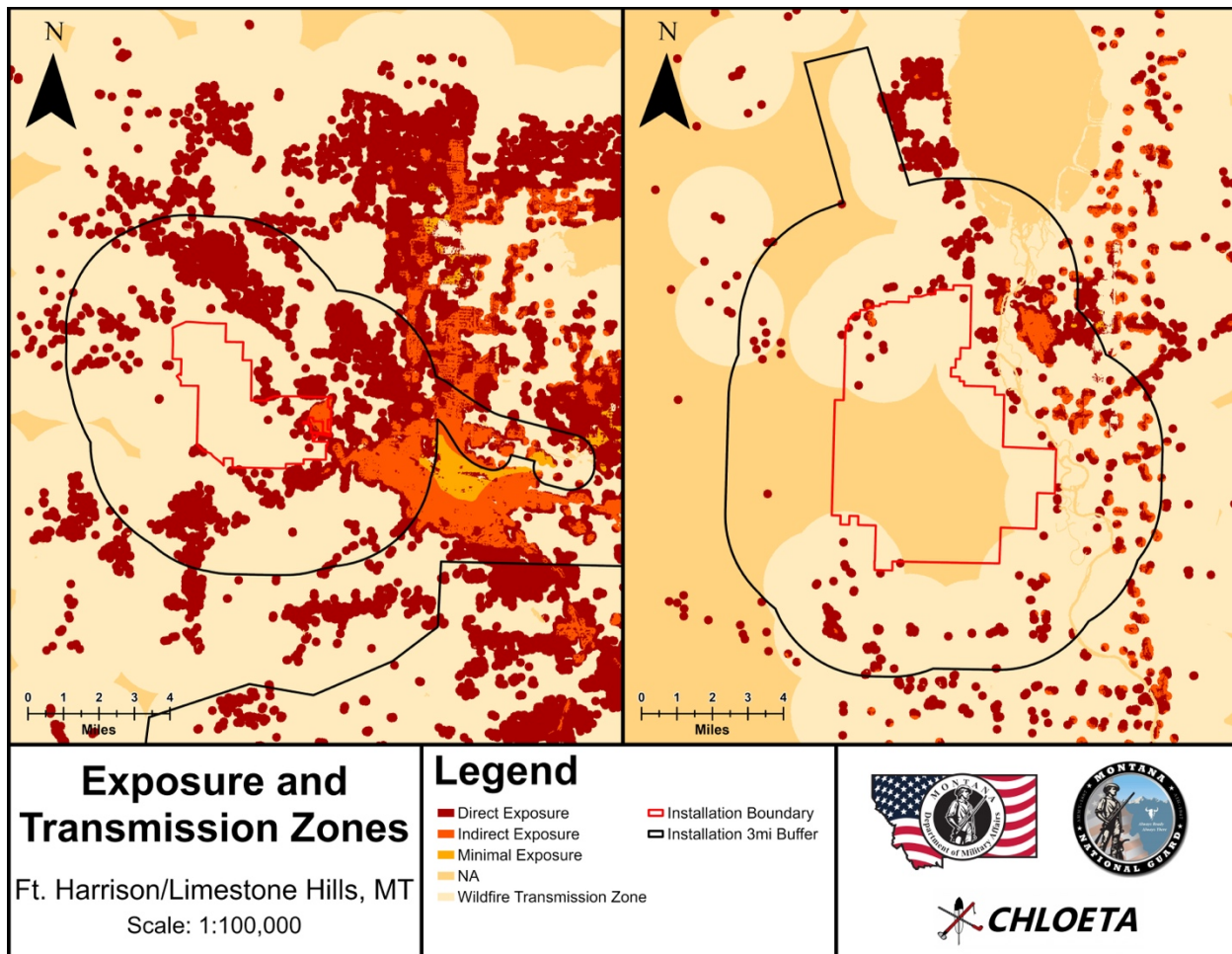


Figure 44. Wildfire Exposure and Transmission Map

FHTA: The FHTA is surrounded on three sides by Helena’s expanding WUI, where suburban and commercial growth have narrowed historic buffer areas between the installation and adjacent forested terrain. New subdivisions along Williams Street, Country Club Avenue, and Tenmile Creek Road have introduced dense housing and ornamental vegetation within 300 feet of the installation boundary distances within ember-throw range during a major fire event (City of Helena Fire Department 2024).

Military operations and readiness at FHTA are directly exposed to off-installation ignition sources and smoke intrusion. Utility interdependence with the City of Helena, including shared water mains, electrical feeders, and road networks, creates functional exposure even when fires occur outside the installation perimeter. Critical structures including the VA Medical Center, DMA Headquarters, and training cantonment areas are within the modeled 95th-percentile plume-exposure zone identified by DNRC (2024) fire-behavior modeling.

These factors make FHTA a dual-risk area: both a potential ignition source due to training operations and a high-value asset vulnerable to external wildfire influence. Continuous coordination with the USFS Tenmile–South Hills Project and PPLT’s REPI-funded fuel management remains central to mitigating encroachment impacts (USFS 2024; PPLT 2024).

LHTA: The LHTA remains geographically isolated yet increasingly exposed to surrounding land-use changes. Growth in southern Broadwater County and the Townsend corridor has extended residential and recreational activity closer to the installation's southern boundary. Although LHTA internal land use is dominated by maneuver and live-fire training, adjacent ranchlands and BLM allotments now function as transitional WUI areas.

Exposure at LHTA is characterized less by structure density and more by infrastructure dependency. The site lacks permanent water distribution, firefighting hydrants, and paved access roads; power is limited to localized generators. These conditions magnify the consequences of even small ignition events. Moreover, prolonged drought and fuel continuity across the fine fuel dominated slopes increase the probability of fire escape from the training area to neighboring private or state lands.

Regional exposure modeling conducted by the DNRC (2024) identifies the LHTA as a Very High wildfire exposure zone, with potential to affect up to 11,000 acres of contiguous mixed-ownership land during wind-driven events.

City of Helena: Helena's westward growth continues to intensify exposure within steep-slope WUI terrain. Residential expansion into the South Hills, Grizzly Gulch, and upper Tenmile Creek corridors has increased the number of structures in "High" and "Very High" hazard classes by more than 40% since 2015 (Tri-County CWPP 2020; City of Helena Interview 2024).

Older neighborhoods within central Helena face cascading exposure through utility interdependencies. Overhead powerlines, substation locations in canyon drainages, and reliance on hillside water tanks elevate vulnerability during wildfire incidents. Smoke, ashfall, and power disruptions pose secondary impacts to critical facilities including St. Peter's Health, the Helena Regional Airport, and the state capitol complex, which depend on limited road and communication redundancy.

Despite active mitigation through Firewise programs, REPI partnerships, and the municipal wildfire code (2024), the rapid rate of urban infill along WUI boundaries continues to outpace infrastructure hardening.

City of Townsend: While Townsend's population remains smaller, its geographic setting along U.S. Highway 287 and proximity to Canyon Ferry Lake expose key residential, commercial, and transportation assets to wildfire. New subdivisions east of town and seasonal housing around the reservoir lack hydrant networks, relying instead on private wells with insufficient flow for sustained suppression (Tri-County CWPP 2020).

The town's municipal water system and power distribution network are linear and co-located along primary corridors, features that increase the likelihood of simultaneous service loss during a single event. Wildfire ignition within adjacent rangeland or riparian corridors could disrupt the town's only north-south evacuation route.

Townsend's role as a regional mutual-aid hub further compounds its exposure; suppression resources stationed there may be committed to incidents in LHTA or rural Broadwater County, leaving the municipality temporarily under-resourced (Broadwater DES 2024; DNRC 2023).

Lewis & Clark County: Exposure within Lewis & Clark County is concentrated along the Helena Valley, where rapid residential growth has expanded into unincorporated foothill areas. Many new

subdivisions are constructed within medium-to-high hazard polygons delineated by the USFS and DNRC Wildfire Hazard Potential Index (2024).

Infrastructure exposure includes critical lifeline systems, electric substations, major transmission lines, and water mains, that traverse undeveloped or partially treated fuels near Tenmile Creek and Hauser Lake. These utilities serve both civilian and military operations, creating cross-jurisdictional dependencies that elevate systemic risk.

Unincorporated communities including Birdseye, Lincoln Road, and North Helena Valley remain particularly exposed due to limited defensible space enforcement and inadequate access redundancy. County mitigation policy currently relies on voluntary adoption of defensible-space standards, resulting in inconsistent compliance across new developments (Lewis & Clark Planning 2023).

Broadwater County: Broadwater County's exposure profile reflects the intersection of rapid population growth, limited suppression infrastructure, and highly flammable rangeland ecosystems. Subdivisions along Canyon Ferry Road, U.S. Highway 12, and U.S. Highway 287 now extend across terrain historically managed for grazing, introducing homes and outbuildings into areas dominated by sagebrush, and juniper.

Most developments depend on private wells and lack community water systems capable of sustained fire-flow delivery. Only three rural fire stations, Townsend, Winston, and Toston, serve the entire county, with response times exceeding 20 minutes for many outlying WUI clusters (Broadwater DES 2024). Road networks within newer subdivisions are frequently single-lane and unpaved, constraining ingress for suppression vehicles and limiting egress during evacuation.

Exposure also extends to regional lifelines. The U.S. Highway 287 and U.S. Highway 12 corridors carry critical freight and serve as evacuation routes for multiple communities. Wildfire closure along either corridor can isolate hundreds of residents and impede mutual-aid response.

Regional Summary: Across the six jurisdictions, exposure is intensifying due to concurrent growth, legacy suppression effects, and insufficient infrastructure redundancy. Nearly all WUI developments within the regional assessment area exhibit at least one of three critical vulnerabilities: limited road access, inadequate water availability, or direct adjacency to unmanaged fuels.

The interdependence of military, municipal, and private systems, including utilities, transportation corridors, and shared emergency resources, creates a networked risk environment in which disruptions in one jurisdiction rapidly cascade into others. Targeted zoning, building code alignment, and pre-fire land-use planning are necessary to stabilize exposure trajectories through 2030 (DNRC 2024; USFS 2024; PPLT 2024).

Cascading and Long-Term Impacts

Wildfire impacts across the FHTA–LHTA assessment area extend far beyond the immediate burn perimeter, producing multi-system cascading effects that compromise infrastructure, public health, economic stability, and military readiness. Because most lifeline systems in the assessment area, transportation, power, water, and communications, are interconnected across jurisdictional boundaries, even localized wildfire events can generate regional disruption. Post-fire effects

include secondary flooding, debris flows, degraded air quality, supply-chain interruption, and sustained erosion that prolong recovery timelines (DNRC 2024; USFS 2024; Lewis & Clark DES 2023).

FHTA: Cascading impacts at the FHTA center on mission interruption and lifeline dependency. Wildfire events—either on- or off-installation—can trigger road closures, power interruptions, or water-supply disruption from shared municipal infrastructure. Smoke and ashfall degrade air quality within training facilities and adjacent medical centers, leading to temporary suspension of field training and administrative operations. Past exercises have shown that extended closures of Williams Street or Country Club Avenue during high-fire activity impede personnel movement and medical access for the VA Medical Center (Lewis & Clark DES 2023).

Post-fire erosion and sediment transport from the Tenmile Creek watershed present chronic risks to the installation’s stormwater system and downstream culverts. Slope stabilization, revegetation, and debris-catch basins remain essential mitigation strategies supported under the REPI Resilience Project (2024). Extended infrastructure repair and readiness degradation can persist for multiple fiscal quarters following a major event (FHTA NRM 2024; DNRC 2024).

LHTA: The LHTA experiences cascading impacts primarily through isolation, terrain instability, and resource diversion. Post-fire conditions frequently generate severe erosion along steep ridgelines, resulting in sediment deposition that damages range roads, culverts, and maneuver corridors. High-intensity burns reduce vegetative cover, leading to increased runoff, slope failure, and localized flooding. Rehabilitation often requires months of restricted access and expensive grading or re-seeding operations (USFS 2024; Broadwater DES 2024).

Training schedules and ammunition-range operations may be suspended for extended periods due to elevated particulate concentrations and residual hot spots. Wildfire-related closures also limit coordination with the Bureau of Land Management (BLM) and delay interagency exercises. The resulting operational backlog strains regional military readiness and shifts training demand to other installations, compounding logistical and cost impacts (FHTA NRM 2024).

City of Helena: Cascading effects in Helena are both urban and systemic. Post-wildfire debris flows from Grizzly Gulch and Tenmile Creek threaten municipal water intakes, forcing boil-water advisories and costly filtration upgrades. Smoke exposure frequently exceeds EPA PM2.5 thresholds, affecting sensitive populations and reducing outdoor labor capacity (City of Helena Fire Department 2024; Tri-County CWPP 2020).

Prolonged power outages disrupt healthcare delivery at St. Peter’s Health, communication infrastructure at state administrative buildings, and financial operations in the downtown corridor. The loss of even a single transmission substation in the South Hills can cascade into regional grid instability affecting both Helena and the FHTA complex (DNRC 2024).

Economic repercussions extend into the tourism and small-business sectors as prolonged smoke events deter visitors, reduce retail activity, and depress sales tax revenue. Recovery requires coordination among city, county, and state agencies to prioritize debris removal, critical-infrastructure repair, and re-entry operations.

City of Townsend: Townsend’s small size and limited redundancy magnify the consequences of cascading wildfire impacts. A single moderate-scale event could simultaneously disrupt transportation, power, and emergency response systems. The town’s water supply—dependent on

wells and a small treatment facility near Indian Creek—is highly susceptible to ash and sediment contamination following upstream burns (Tri-County CWPP 2020; DNRC 2023).

Limited mutual-aid capacity and the need for external suppression resources delay both response and recovery. Economic effects include reduced agricultural productivity, livestock losses, and infrastructure repair costs that outpace the local tax base. Recovery often depends on state or FEMA Public Assistance funding, underscoring the importance of pre-disaster mitigation and resilient infrastructure design (Broadwater DES 2024).

Lewis & Clark County: For Lewis & Clark County, post-fire cascading effects emerge primarily from hydrological and administrative stressors. Severe burns in the Tenmile and Sevenmile watersheds have historically caused debris flows and flash flooding, damaging county roads, bridges, and culverts. Secondary flooding increases sediment loading in the Tenmile municipal watershed, requiring prolonged water-treatment adjustments and emergency intake closures (Lewis & Clark DES 2023; USFS 2024).

Public-health consequences include extended air-quality alerts and increased respiratory-related medical calls. The cumulative workload on emergency-management and public-works departments intensifies as they navigate FEMA reimbursement, hazard-mitigation grant applications, and long-term infrastructure replacement schedules. These administrative burdens can persist for years, diverting personnel and budget from proactive planning.

Broadwater County: Cascading impacts in Broadwater County stem from infrastructure loss, water contamination, and agricultural disruption. Wildfire damage to power lines, fiber conduits, and pump stations frequently isolates rural subdivisions. Post-fire storms generate debris flows into Canyon Ferry Lake, elevating turbidity and reducing storage capacity. Road washouts along U.S. Highway 12 and U.S. Highway 287 delay reconstruction and hinder emergency access for weeks (Tri-County CWPP 2020; DNRC 2024).

Agricultural losses compound recovery challenges. Ash deposition and soil sterilization reduce grazing productivity, while fence and irrigation-system destruction imposes multi-season repair costs. Because much of Broadwater’s economy depends on agriculture and recreation, wildfire recovery requires extended state support for economic stabilization and environmental rehabilitation (Broadwater DES 2024).

Regional Summary: Across all jurisdictions, cascading impacts extend recovery timelines and exacerbate interjurisdictional dependencies. Wildfire damage to one system, transportation or power, can propagate through shared networks, compounding losses across civilian and military sectors. Long-term effects include soil instability, ecosystem degradation, reduced tourism and agricultural revenue, and sustained emergency-management workload.

Comprehensive resilience planning must therefore integrate multi-hazard post-fire mitigation, including:

- Slope and drainage stabilization,
- Protection of critical lifelines and water intakes,
- Continuity-of-operations planning for shared infrastructure, and
- Investment in cross-jurisdictional fuel management and mutual-aid capacity (DNRC 2024; USFS 2024; Lewis & Clark DES 2023).

Severe wildfires trigger post-burn hydrological changes that elevate flood and erosion hazard across the Tenmile and Sevenmile watersheds. DNRC post-fire hydrology models (2024) indicate sediment yields exceeding 1.2 tons/acre following high-severity events, endangering municipal water intakes and culverts. Vegetation loss and soil hydrophobicity increase debris-flow potential along steep canyons bordering FHTA and Helena’s South Hills. These secondary hazards require integration of erosion-control projects, culvert hardening, and drainage maintenance in future mitigation plans (DNRC 2024; USFS 2024; DMA RAPT 2025).

Risk Outlook

This assessment confirms that wildfire remains the most urgent and pervasive hazard facing the FHTA and LHTA assessment areas. It is a top-tier threat to both mission assurance for MTARNG and the long-term stability of the surrounding communities. Wildfire threatens physical infrastructure, ecological systems, and public safety, while also posing direct and cascading risks to military operations and readiness.

Across all jurisdictions, urban, rural, and military, the convergence of weather change, WUI expansion, and limited response capacity is creating a rapidly escalating risk environment. As fire seasons grow longer and more intense, the probability of fast-moving, high-intensity wildfires increases substantially.

This assessment calls for a decisive shift from reactive suppression to proactive risk reduction. Key priorities include coordinated fuel mitigation, fire-adapted land use planning, hardened utility and transportation systems, strengthened mutual aid frameworks, and institutionalized military-civilian coordination. These measures must be tailored to the specific conditions of each jurisdiction while remaining regionally aligned to address the shared scale and complexity of future wildfire challenges.

Table 12. Jurisdictional Wildfire Risk Levels.

Jurisdiction	Wildfire Risk Level
FHTA	High
LHTA	Very High
City of Helena	High
City of Townsend	Moderate to High
Lewis & Clark County	High
Broadwater County	Very High
Overall Regional Risk	Very High

FHTA: The FHTA is projected to experience sustained High wildfire risk through 2030. Primary drivers include expanding WUI development along its eastern and southern perimeters, high conifer canopy density, and shared municipal utilities that increase indirect exposure to off-site events. Fire behavior modeling by DNRC (2024) identifies the South Hills and Tenmile Creek corridors as critical ignition pathways capable of impacting installation operations within 12 hours of ignition under prevailing winds.

Projected increases in heat days, smoke frequency, and dry lightning events heighten the likelihood

of concurrent regional incidents that could degrade mutual-aid availability. Mission-assurance concerns extend to the VA Medical Center, DMA Headquarters, and training ranges, all of which are within the 95th-percentile exposure zone. Continued REPI-supported fuel reduction, defensible-space coordination, and redundancy planning for shared utilities remain essential to stabilizing risk levels (PPLT 2024; FHTA NRM 2024).

LHTA: The LHTA maintains a Very High wildfire risk classification, reflecting its isolation, steep terrain, and limited access infrastructure. Ignition potential is compounded by live-fire training activities, extensive fine fuel coverage, and prolonged summer drought conditions. With fewer than two primary access routes and no permanent suppression water source, any ignition within the training area poses immediate containment challenges (Broadwater DES 2024; DNRC 2024).

Forecast modeling indicates an upward trend in wind-driven fire spread from the southern and western ridgelines, with potential to affect adjacent BLM and private grazing lands. A single large fire could disrupt regional communication towers and require multi-week rehabilitation of range infrastructure. Sustained investment in perimeter fuel breaks, aerial suppression planning, and coordination with BLM fire units will be critical to mitigating LHTA operational risk through 2030.

City of Helena: Helena's wildfire risk remains High, driven by its continued expansion into steep, forested terrain and persistent ladder-fuel accumulation in the South Hills and Grizzly Gulch areas. The city's Fire Hazard Severity Mapping Program identifies approximately 1,200 structures within "High" or "Very High" hazard areas, with an upward trend in annual smoke days exceeding public-health thresholds (City of Helena Fire Department 2024).

Critical lifelines, including power substations, water intakes, and communication towers, remain exposed to slope-driven fires. The city's mutual-aid responsibilities further elevate system strain during multi-jurisdictional events, as local resources are frequently deployed to support neighboring county and installation responses (Tri-County CWPP 2020). Continued enforcement of the 2024 Wildfire Mitigation Code, expansion of fuel treatments, and modernization of WUI access requirements are necessary to maintain manageable risk levels through 2030.

City of Townsend: The City of Townsend is projected to maintain a Moderate to High wildfire risk rating, primarily influenced by WUI growth along U.S. Highway 287 and canyon drainages near Canyon Ferry Lake. Rangeland fuels and ornamental vegetation adjacent to residential areas increase ignition probability during summer months. With limited firefighting water supply, the city's exposure is largely defined by infrastructure dependency—any power or water outage directly compromises suppression effectiveness (Tri-County CWPP 2020; DNRC 2024).

Risk escalation is anticipated as population growth continues to outpace fire protection capacity. The town's role as a mutual-aid provider to the LHTA and surrounding communities further strains its volunteer resources. Investment in community fuel breaks, expansion of hydrant systems, and Firewise participation will be key mitigation priorities.

Lewis & Clark County: Lewis & Clark County remains classified as High risk, with wildfire frequency and intensity both projected to increase. Ongoing WUI expansion into foothill and canyon terrain continues to elevate structural exposure, while many rural developments remain underserved by emergency access infrastructure. Ignition probability is compounded by recreation, lightning, and increased vehicular activity along unpaved corridors (Lewis & Clark DES 2023;

USFS 2024).

The Tenmile and Sevenmile watersheds, which supply municipal water for Helena and surrounding communities, represent dual ecological and infrastructure vulnerabilities. Post-fire sedimentation, flood risk, and prolonged repair timelines could have cascading impacts on water quality and service continuity. County mitigation strategies must emphasize zoning controls, subdivision review integration, building approval process and strategic enforcement of defensible-space requirements in unincorporated areas.

Broadwater County: Broadwater County continues to exhibit the assessment area’s highest overall wildfire potential, maintaining a Very High-risk classification. Recent large-scale fires like the Woods Creek Fire (2021) demonstrate the volatility of its sagebrush-dominated rangelands. Expanding residential and recreational development in the Canyon Ferry Basin increases ignition probability while stretching volunteer fire resources (DNRC 2024; Broadwater DES 2024).

Infrastructure exposure along U.S. Highway 12 and U.S. Highway 287 further elevates countywide vulnerability, as both corridors function as evacuation and supply routes. Projected temperature increases and reduces relative humidity will extend the fire season by approximately three weeks by 2030 (USFS 2024). To moderate this trajectory, coordinated mitigation must focus on community-scale fuel breaks, enhanced early detection, and mutual-aid training under regional CWPP implementation.

Regional Summary: The regional wildfire outlook indicates persistent, and in some areas accelerating, risk across the entire assessment area. FHTA and LHTA will continue to anchor operational and ecological vulnerability due to their proximity to growth corridors and limited resource redundancy. Helena and Townsend remain pivotal to regional response capability, while Lewis & Clark and Broadwater Counties represent expanding risk frontiers driven by development pressure and ecological stressors.

Without sustained mitigation investment, the cumulative effects of fuel buildup, WUI expansion, and interdependent infrastructure could elevate regional exposure beyond suppression capacity during extreme weather years. Future resilience will depend on:

- Joint fuel-reduction initiatives integrating REPI, CWPP, and FEMA BRIC funding.
- WUI code alignment and subdivision regulation enforcement.
- Multi-agency continuity and resource-sharing frameworks between military and civilian partners; and
- Investment in adaptive infrastructure and redundant lifelines (DNRC 2024; USFS 2024; Lewis & Clark DES 2023; Tri-County CWPP 2020).

Table 13. Mitigation Priority Areas (2025–2030)

Zone	Jurisdiction	Treatment Type	Acreage	Status	Primary Objective
1	FHTA South Perimeter	Mechanical Thinning & Pile Burn	620	Ongoing	Reduce ladder fuels
2	Tenmile Ridge (USFS)	Prescribed Burn	1,200	Planned FY 26	Maintain anchor break

Zone	Jurisdiction	Treatment Type	Acreage	Status	Primary Objective
3	10-Mile Creek Park	Haying/Grazing	400	Completed 2024	Reduce fine fuels
4	Canyon Ferry North	Herbicide/Drill Seed	900	Planned FY 27	Control fine fuels
5	LHTA Perimeter	Fuel Break Construction	350	Planned FY 25	Establish containment line
<i>(Sources: REPI 2025; Tri-County CWPP 2020; USFS 2024.)</i>					

Table 14. Wildfire Response Assets by Jurisdiction (2025)

Jurisdiction	Primary Agency	Engines/Tenders	Staff (FT/PT)	Avg Response Time (min)	Mutual-Aid Partners
FHTA	FHTA Fire/DMA	2 Eng/1 Tender	10 FT	Less than 10	Helena FD,
LHTA	DMA/Broadwater DES	1 Type 6	3 FT	Greater than 45	Townsend VFD
Helena	City FD	7 Eng/2 Tender	52 FT	Less than 8	Lewis & Clark DES, USFS
Townsend	Townsend VFD	4 Eng	18 PT	15–20	Broadwater DES
Lewis & Clark County	DES Coord.	Mutual Aid Only	—	Varies	Helena FD, USFS
Broadwater County	6 VFDs	14 Eng/3 Tender	Around 90 Vol	20–35	DNRC, USFS
<i>(Sources: DNRC 2024; DES Resource Inventories 2025.)</i>					

Annex C: Transportation, Access and Evacuation System Analysis

Transportation infrastructure within the FHTA-LHTA assessment area forms the backbone of mission assurance, ensuring safe mobilization of personnel, protection of critical lifelines, and continuity of operations during wildfire, flood, or slope-failure events across the area. This assessment integrates USGS 2023 slope-stability data, MDT asset records, and LANDFIRE 2023 fuels data to identify vulnerabilities, chokepoints, and funding priorities aligned with REPI and DCIP objectives.

FHTA Assessment Area Resilience and Gap Analysis

The FHTA assessment area depend on a shared, constrained access network—Williams Street, Country Club Road, River Road, and U.S. Highway 12—to support daily military operations, VA Medical Center access, civilian travel, emergency services, and regional mutual-aid response (Figure 45). These corridors function as dual-use lifelines, carrying military convoys, ambulances, fire apparatus, commuter traffic, freight, and evacuation flows between the installation, the VA complex, and the City of Helena. None were designed to accommodate sustained emergency surge, heavy tactical loads, or concurrent civilian evacuation and military mobilization.

Across this network, aging infrastructure and limited redundancy expose both the installation and adjacent neighborhoods to rapid isolation during hazard events. Narrow roadway sections, deteriorating shoulders, freeze–thaw damage, and undersized drainage structures create predictable failure points during wildfire suppression operations, spring runoff, and high-intensity storm events. Smoke, debris, downed power lines, or vehicle incidents can quickly reduce capacity to a single lane or fully sever access, with immediate consequences for community evacuation, EMS response, and military continuity operations.

The risk is compounded by the co-location of the FHTA VA Medical Center, which relies on these same corridors for ambulance access, patient transfer, supply delivery, and potential evacuation during wildfire, flood, or mass-casualty incidents. Any disruption along this network affects civilian residents, VA patients, and MTARNG personnel simultaneously, creating cascading life-safety and mission impacts rather than isolated transportation delays.

Under rapid-onset conditions—wind-driven wildfire, flash flooding, winter storms, or hazardous materials incidents—loss or constriction of a single corridor could delay fire suppression, restrict EMS transport, impede resource staging, and compromise coordinated evacuation for both civilian neighborhoods and military facilities. While the network functions adequately during normal conditions, it lacks the structural resilience, load capacity, and redundancy required for safe, sustained operation during multi-hazard emergencies.

Key access constraints include:

- Williams Street Bridge, which is posted below the load capacity required for military tactical vehicles, fuel tenders, and some heavy fire apparatus, creating a single-point failure on a primary access route serving both the installation and surrounding residential areas.

- Country Club Road, which experienced pavement failure and temporary resurfacing in 2025 but remains vulnerable to subgrade instability, edge collapse, and accelerated deterioration under heavy loads and freeze–thaw cycles.
- River Road, which contains undersized culverts and shallow drainage features that routinely overtop during high-runoff events, intermittently restricting access to training areas, the VA Medical Center, and adjacent neighborhoods.

Evacuation and access operations for FHTA are governed by the DMA Installation Emergency Management Plan and coordinated with the Lewis & Clark County Emergency Operations Plan under the Montana Emergency Response Framework (MERF). Primary evacuation routes—Williams Street, Country Club Road, and U.S. Highway 12—connect directly to Helena’s municipal core and regional lifelines, as identified in the Western Montana Regional HMP. However, existing county plans do not yet fully integrate military coordination requirements, heavy-vehicle constraints, or VA medical evacuation needs into corridor-specific response planning.

These deficiencies undermine both community safety and mission assurance, increasing the likelihood that wildfire, flood, or infrastructure failure could isolate neighborhoods, delay medical transport, and restrict MTARNG mobilization or civil-support operations. Under DCIP eligibility criteria, these corridors qualify as priority lifelines for structural hardening, drainage upgrades, and load-capacity improvements. The 2025 REPI Resilience Partnership Update further identifies them as buffer-adjacent access routes essential to maintaining compatible land use, emergency access, and open-space protection around the FHTA assessment area.

Required redundancy and resilience actions for the FHTA assessment area include:

- Develop and harden a secondary, all-weather emergency corridor linking east–west arterials to Interstate 15 to reduce reliance on a single access spine.
- Upgrade bridge and roadway load capacity, including resolution of Williams Street Bridge weight limitations, to safely accommodate Type 3–5 fire apparatus, military vehicles, fuel tenders, and ambulances.
- Engineer two-lane emergency egress and ingress widths where feasible to support simultaneous evacuation and response operations.
- Integrate staging, turnaround, and traffic-control areas to enable dual-direction flow during wind-driven wildfire and large-scale evacuation events.

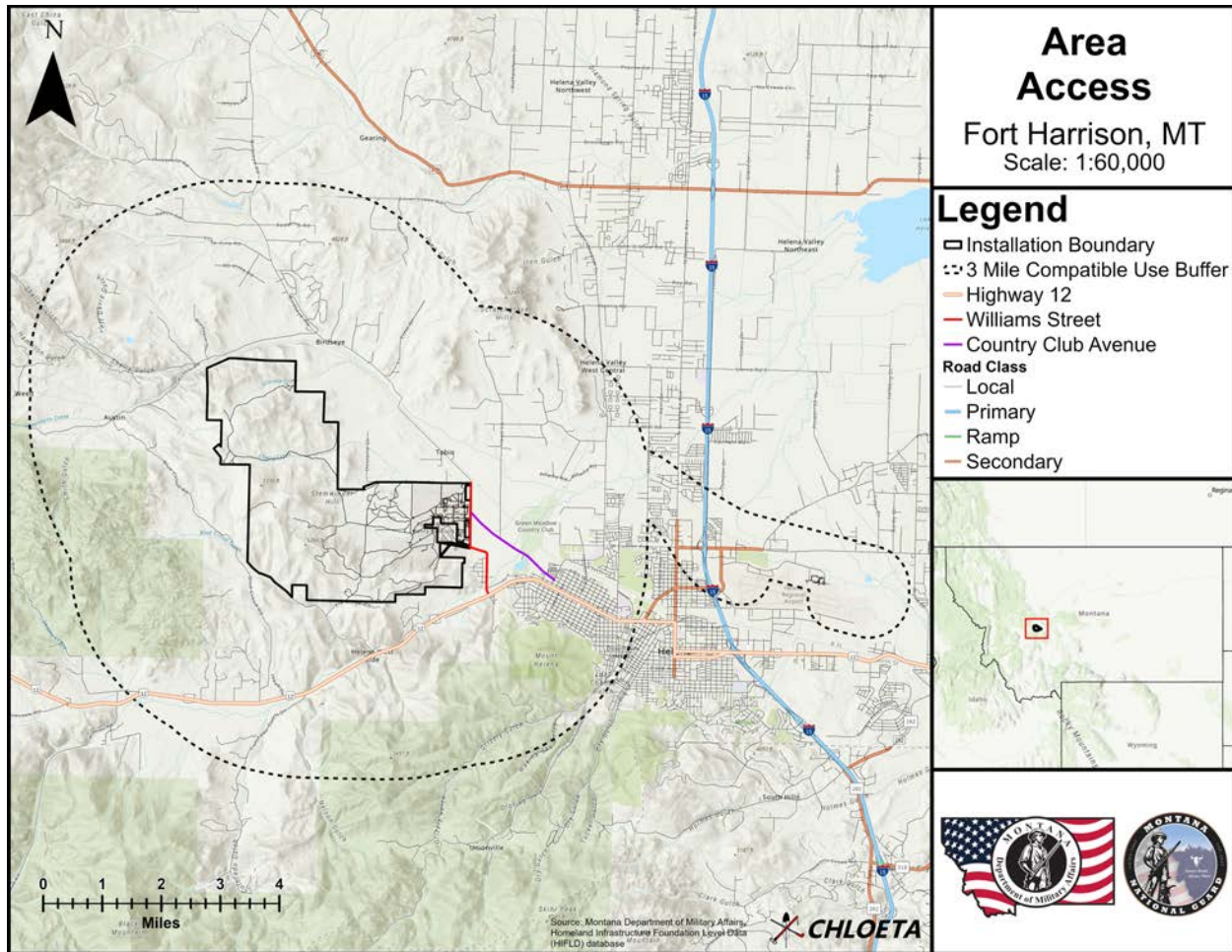


Figure 45. FHTA Assessment Area Access Map

LHTA Assessment Area Resilience and Gap Analysis

The LHTA assessment area depends on a shared, highly constrained access network—anchored by Old Woman’s Grave Road and a limited set of county-maintained ranch connectors—to support military training operations, civilian travel, agricultural activity, wildfire response, and evacuation for surrounding communities including Townsend, Canton, and the Canyon Ferry corridor (Figure 46). These routes function as dual-use lifelines, carrying military convoys, fire apparatus, EMS vehicles, ranch and agricultural traffic, recreation access, and evacuation flows between the training area and regional population centers. None were designed to accommodate sustained emergency surge, heavy tactical loads, or concurrent civilian evacuation and military mobilization.

Across this network, aging infrastructure, steep terrain, and limited redundancy expose both the installation and adjacent communities to rapid isolation during hazard events. Old Woman’s Grave Road traverses erosion-prone drainages, steep grades, and non-engineered subgrades, with undersized culverts, deteriorating shoulders, and restricted turning radii that create predictable failure points during convective storms, post-fire debris flows, freeze–thaw cycles, and winter icing. Smoke, sediment, washouts, or vehicle incidents can quickly reduce capacity to a single lane or sever access entirely, with immediate consequences for wildfire suppression, EMS response,

evacuation, and training continuity.

The risk is compounded by the absence of any engineered alternate ingress or egress route. In 2023, culvert failure and slope washouts along Old Woman's Grave Road resulted in a five-day partial closure, forcing response staging outside the assessment area, delaying suppression activities, and restricting movement of military units, fire resources, and emergency evacuation vehicles. Broadwater County road inspections confirm multiple culverts at or near end-of-life, lacking sufficient diameter, inlet protection, and debris-handling capacity to perform under post-fire runoff conditions.

Under rapid-onset conditions, wind-driven grassland wildfire, flash flooding, winter storms, or hazardous materials incidents, loss or constriction of a single segment of this network could delay initial attack, impede EMS access, prevent timely evacuation of rural residents, and isolate MTARNG training areas simultaneously. Because civilian communities and the installation rely on the same access routes, transportation failure at LHTA produces cascading life-safety and mission impacts rather than isolated delays.

Evacuation and access coordination for LHTA falls under the Broadwater County Emergency Operations Plan, with response support from the Townsend Fire District and the DMA Range Control Office, operating within the Montana Emergency Response Framework (MERF). While the 2020 Pre-Disaster Mitigation Plan and county evacuation planning identify Townsend–Canyon Ferry corridors, they do not formally integrate LHTA-specific access constraints, heavy-vehicle requirements, or coordinated civilian–military staging and evacuation protocols. As a result, current plans do not fully account for the operational realities of shared corridor failure during wildfire or flood events.

These deficiencies undermine both community safety and MTARNG mission assurance, increasing the likelihood that wildfire, storm, or infrastructure failure could isolate rural populations, delay suppression and medical response, and interrupt training or mobilization activities. Under DCIP eligibility criteria, Old Woman's Grave Road and associated access corridors qualify as priority lifelines for structural hardening, drainage upgrades, and redundancy development. The REPI Resilience Partnership framework further identifies these routes as essential to maintaining compatible land use, emergency access, and buffer protection around the LHTA assessment area.

Required redundancy and resilience actions for the LHTA assessment area include:

- Formalize and harden alternate ingress and egress routes from the south and east, coordinated with Broadwater County, BLM, MDT, and adjacent landowners, to reduce reliance on a single access spine.
- Upgrade culverts, subgrades, and drainage structures along Old Woman's Grave Road and connecting corridors to withstand post-fire debris flow, convective storm runoff, and freeze–thaw degradation.
- Engineer two-lane emergency ingress/egress widths and turning radii where feasible to support Type 3–5 fire apparatus, military vehicles, tenders, and ambulances.
- Integrate staging, turnaround, and traffic-control areas to support dual-direction civilian evacuation and military response during fast-moving wildfire or flood events.

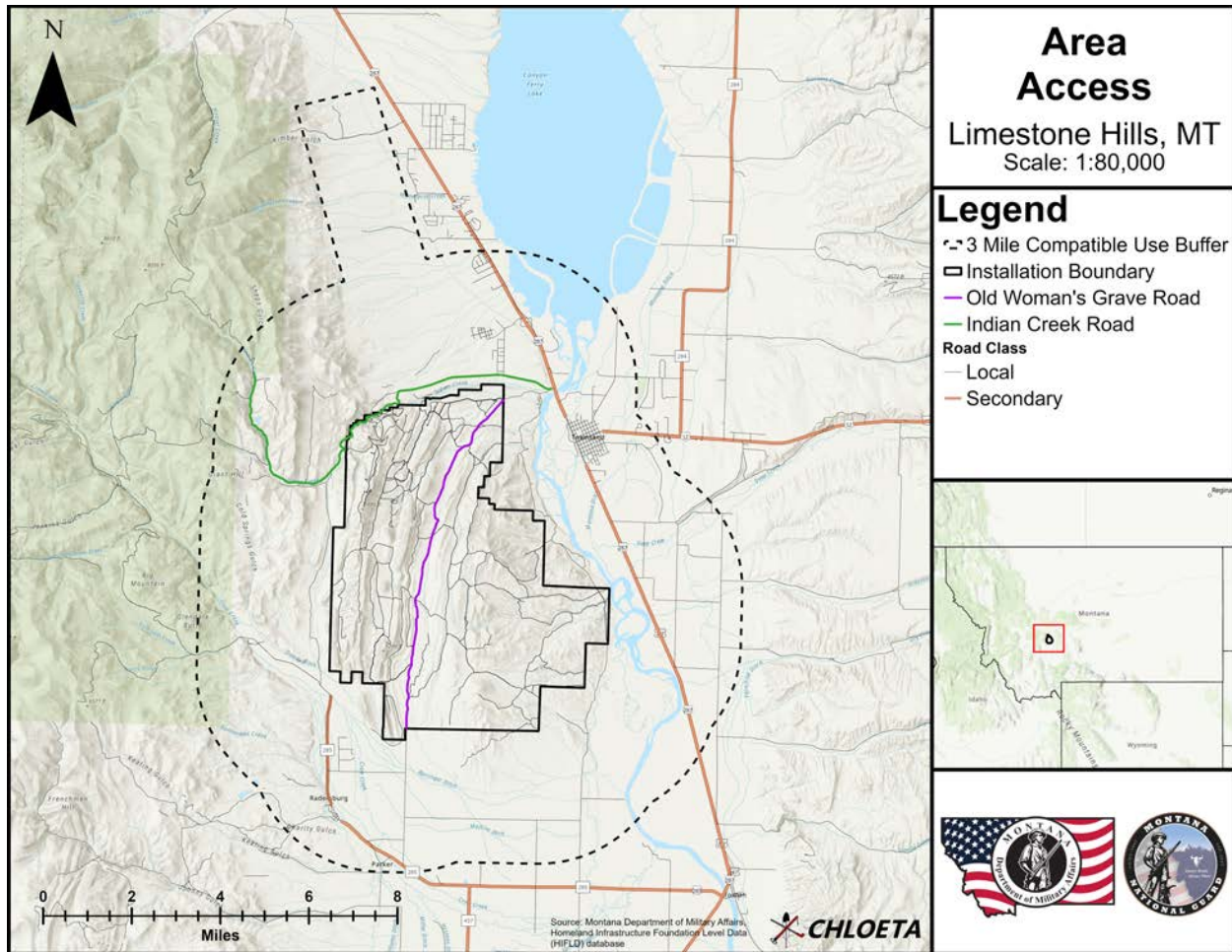


Figure 46. LHTA Assessment Area Access Map

Regional Summary

Both the FHTA and LHTA assessment areas depend on a small number of shared civilian–military transportation corridors, creating a regional lifeline system in which failure at any single point produces immediate and cascading impacts to community safety, emergency response, and military readiness. In Broadwater County, Old Woman’s Grave Road and limited eastern access routes provide the only reliable ingress and egress for the LHTA assessment area, serving military training operations, rural residents, agricultural activity, wildfire response, and evacuation. In Lewis & Clark County, Country Club Road and Williams Street function as the primary—and effectively sole—evacuation and response corridors connecting the FHTA assessment area, adjacent neighborhoods, the FHTA VA Medical Center, and Helena’s municipal road network.

Within this shared system, the Williams Street Bridge represents a critical chokepoint. Its posted load rating does not accommodate military tactical vehicles, heavy fire apparatus, or fully loaded water tenders, creating a structural constraint that can delay or prohibit movement of suppression resources, medical transport, and evacuation traffic. Similar vulnerabilities exist across both assessment areas, where undersized culverts, eroding shoulders, limited turning radii, and slope instability restrict the movement of large-frame engines, ambulances, and low-boy transports.

Under red-flag wind conditions, spring runoff, or post-fire debris flow, these deficiencies can compress traffic to a single lane or sever access entirely.

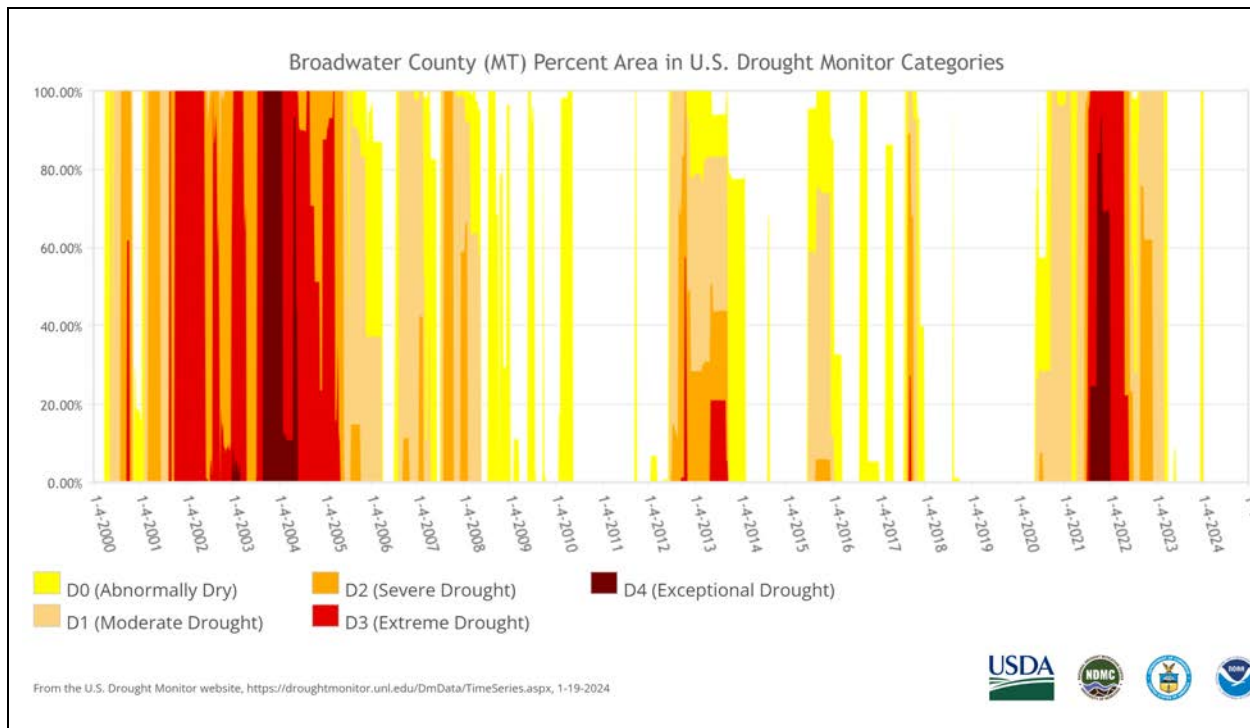
Failure of any one of these corridors would rapidly isolate communities and installations, interrupt evacuation flow, delay fire suppression and EMS access, and limit the arrival of mutual-aid resources during wildfire, flood, or multi-incident events. Because civilian populations, emergency services, and MTARNG operations rely on the same constrained routes, transportation disruption produces simultaneous life-safety and mission-assurance consequences, rather than isolated or sequential impacts.

Current evacuation planning does not adequately address this shared risk. Neither Lewis & Clark nor Broadwater County maintains fully integrated, installation-linked evacuation annexes. Existing county evacuation maps and EOP appendices do not incorporate installation-specific trigger points, heavy-vehicle constraints, coordinated staging areas, or joint clearance protocols. The FHTA assessment area requires evacuation procedures that synchronize the cantonment and VA Medical Center with Helena's municipal evacuation zones, while the LHTA assessment area requires designated all-weather egress routes and pre-approved staging and rally points for both military and civilian responders. Interoperable communications, unified traffic control, and shared evacuation sequencing are essential to support simultaneous civilian evacuation and military response under MERF activation.

Annex D: Watershed Health and Drought Analysis

Analysis of U.S. Drought Monitor category data for Lewis & Clark and Broadwater Counties indicates that drought conditions affecting the FHTA and LHTA assessment areas are not only frequent but increasingly severe and spatially extensive. The percentage-area charts show repeated episodes in which more than half of each county simultaneously experienced Moderate (D1) through Extreme (D3) drought, with several periods reaching near-countywide Severe to Exceptional drought coverage, notably during the early 2000s, mid-2010s, and early 2020s (Figure 47). These events are characterized by abrupt escalation from abnormally dry conditions into higher-severity categories, followed by incomplete or short-lived recovery phases, indicating a pattern of drought stacking rather than discrete, isolated events.

The data further demonstrate that high-severity drought (D2–D3) is no longer confined to peak summer months but increasingly persists across multiple seasons, reducing soil moisture recovery, limiting late-season runoff, and constraining watershed recharge even during nominally wetter years. For the FHTA and LHTA assessment areas, this translates into sustained stress on headwater catchments feeding Tenmile Creek, Sevenmile Creek, and tributaries to the Missouri River system, compounding wildfire susceptibility and diminishing the buffering capacity of riparian corridors prior to post-fire runoff events. The consistency and duration of these category-level drought exposures underscore the need to treat drought as a baseline planning condition for water, wildfire, and flood mitigation strategies rather than a contingent or episodic hazard (USDA/NOAA, 2000–2024).



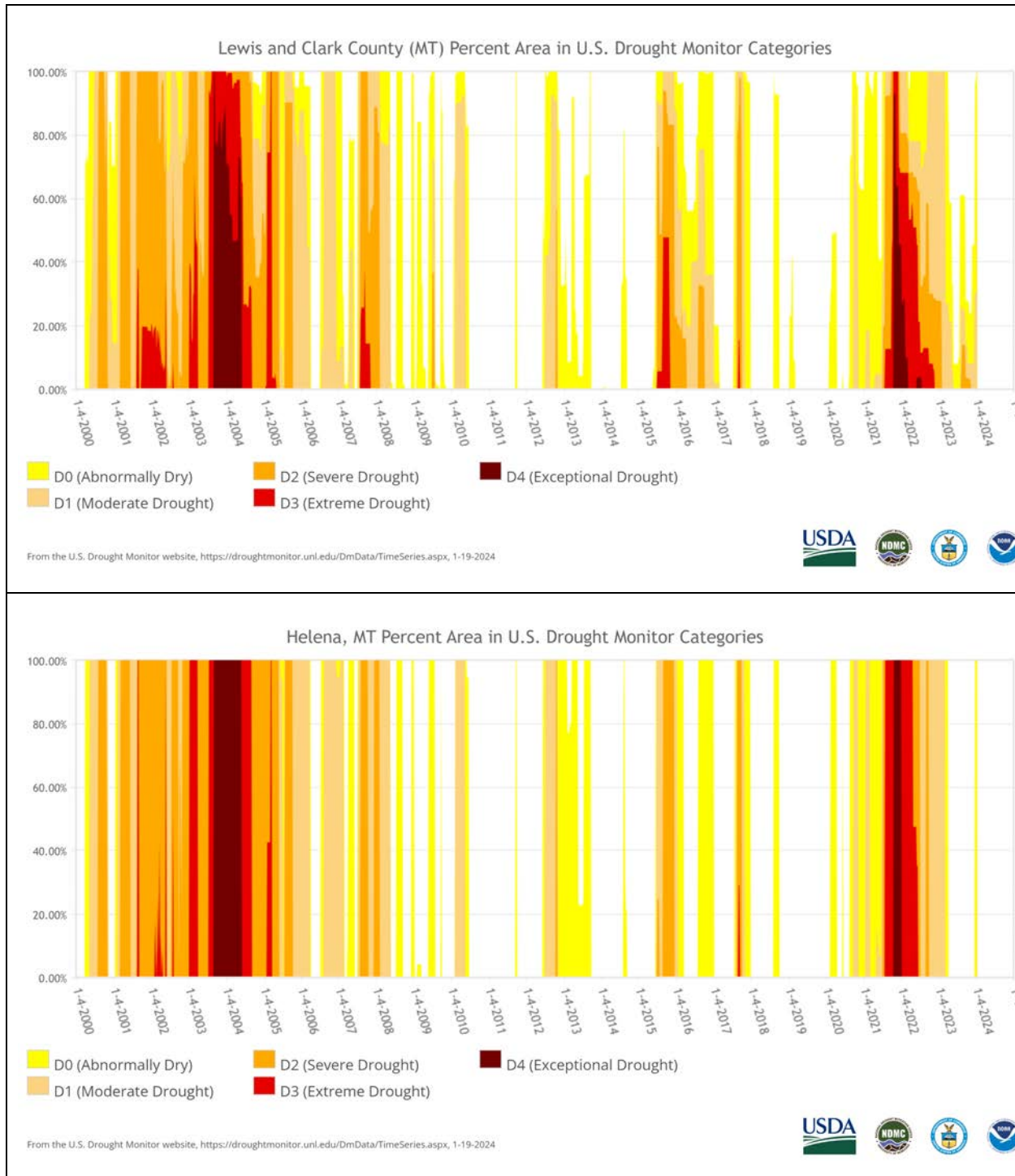
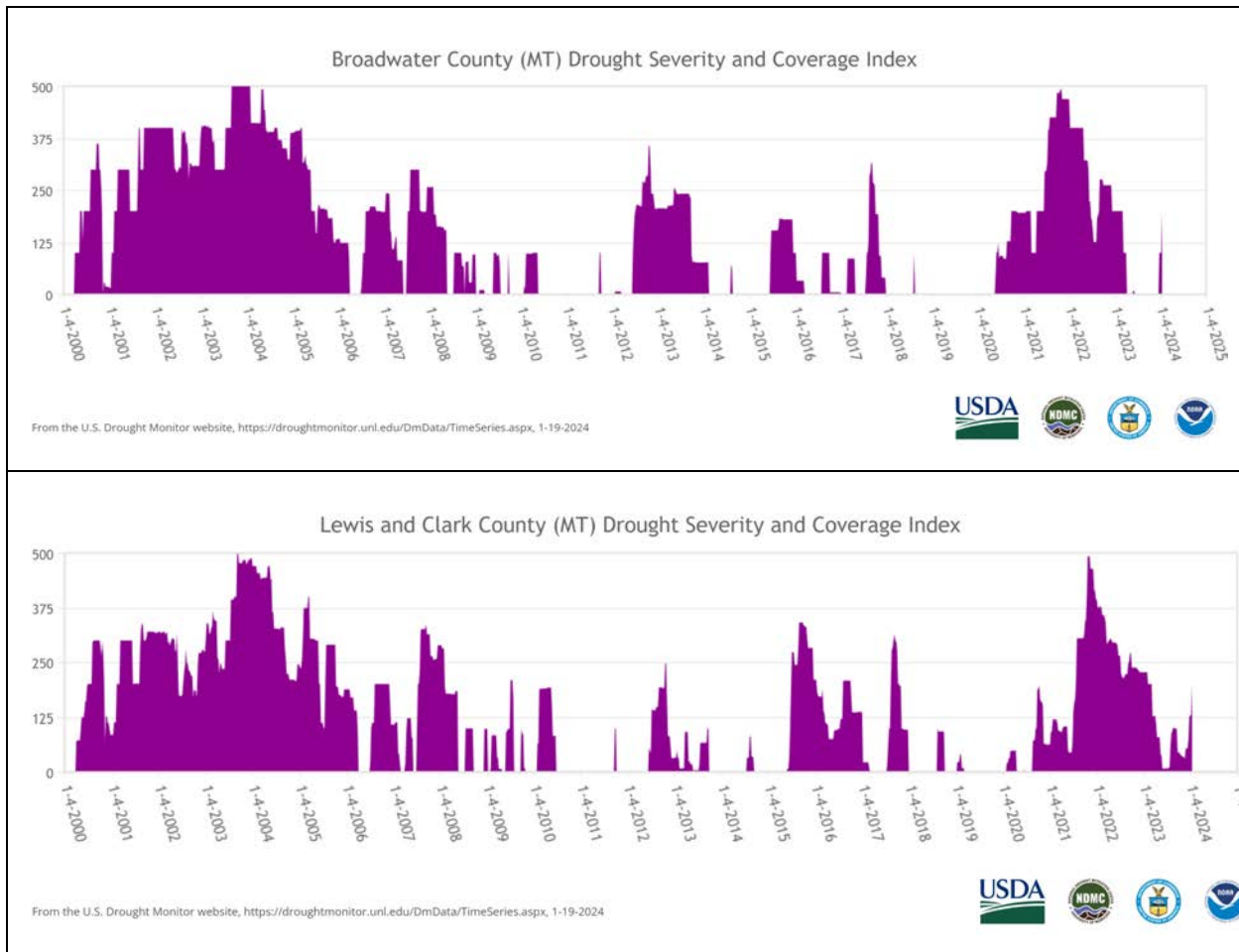


Figure 47. FHTA and LHTA Assessment Area Drought Categories

Hydrologic risk is compounded by fragmented watersheds (Figure 49) and their governance. Canyon Ferry Lake operations are managed by the Bureau of Reclamation, water rights administration and drought response fall under Montana DNRC, and municipal supply and treatment are controlled by the City of Helena and Broadwater County water districts. During

drought and post-fire conditions, this divided authority complicates coordinated responses to reservoir drawdowns, reduced surface flows, and degraded water quality conditions that directly affect municipal supply, fire suppression capacity, and MTARNG operational readiness.

Recent high-severity fires in the Tenmile and Upper Missouri drainages have further increased watershed sensitivity, with post-fire landscapes producing elevated sediment yields during storm and snowmelt events. These conditions raise the risk of turbidity spikes at water intakes, culvert overtopping, road washouts, and localized flooding along critical access corridors. Collectively, drought-driven hydrologic stress and post-fire sediment dynamics represent a compound hazard that threatens civilian water systems, emergency access routes, and mission-critical training and response infrastructure in the FHTA and LHTA assessment areas, underscoring the need for integrated watershed-scale mitigation and coordinated drought response planning.



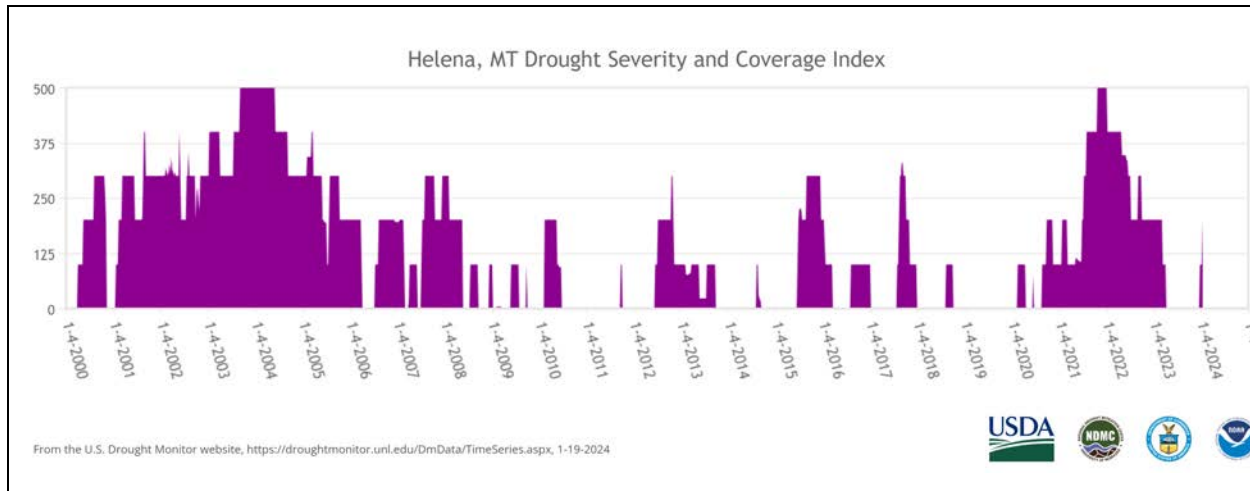


Figure 48. FHTA and LHTA Assessment Area Drought Historical Severity

U.S. Drought Monitor Severity and Coverage Index (Figure 48) data for Lewis & Clark County, Broadwater County, and the City of Helena demonstrate that drought affecting the FHTA and LHTA assessment areas is chronic and recurring, not episodic, with repeated multi-year drought periods since the early 2000s and limited recovery between events (USDA/NOAA, 2000–2024). In the FHTA assessment area, frequent moderate-to-severe drought conditions reduce watershed resilience in the Tenmile and Sevenmile drainages, increase vegetation stress, constrain prescribed fire windows, and elevate post-fire erosion and sediment delivery risks to the municipal water system shared with the City of Helena and the FHTA VA Medical Center. In the LHTA assessment area, longer-duration, high-coverage drought episodes accelerate grassland curing, promote fine fuel expansion, and increase ignition probability and wind-driven fire spread while simultaneously limiting available water for suppression and recovery. The alignment of drought trends across county and municipal datasets confirms that drought is a persistent, system-wide stressor that amplifies wildfire severity, strains shared water and energy lifelines and increases operational risk to both MTARNG installations and surrounding communities (US Drought Monitor, 2024).

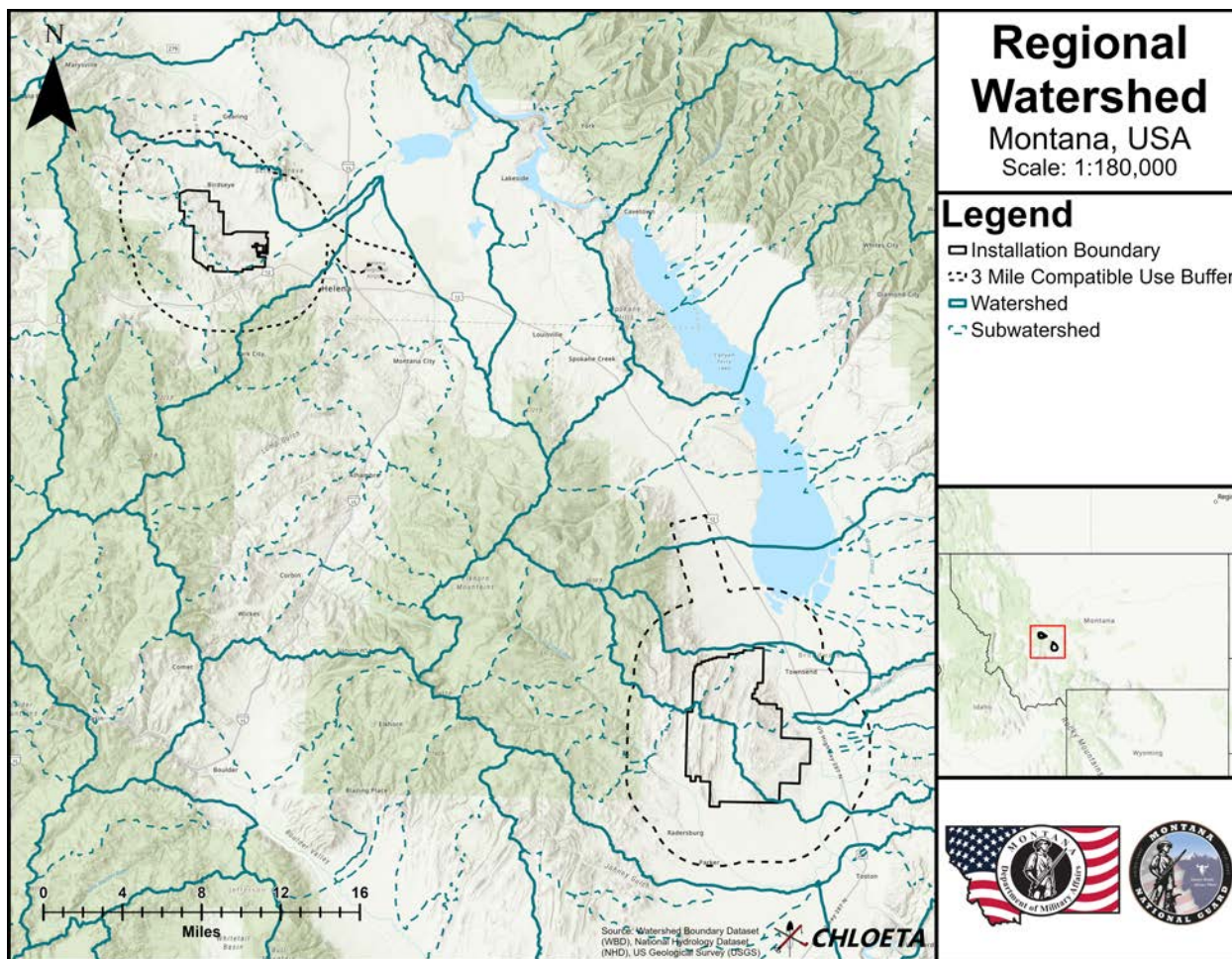


Figure 49. FHTA and LHTA Assessment Area Watershed and Sub-Watershed Maps.

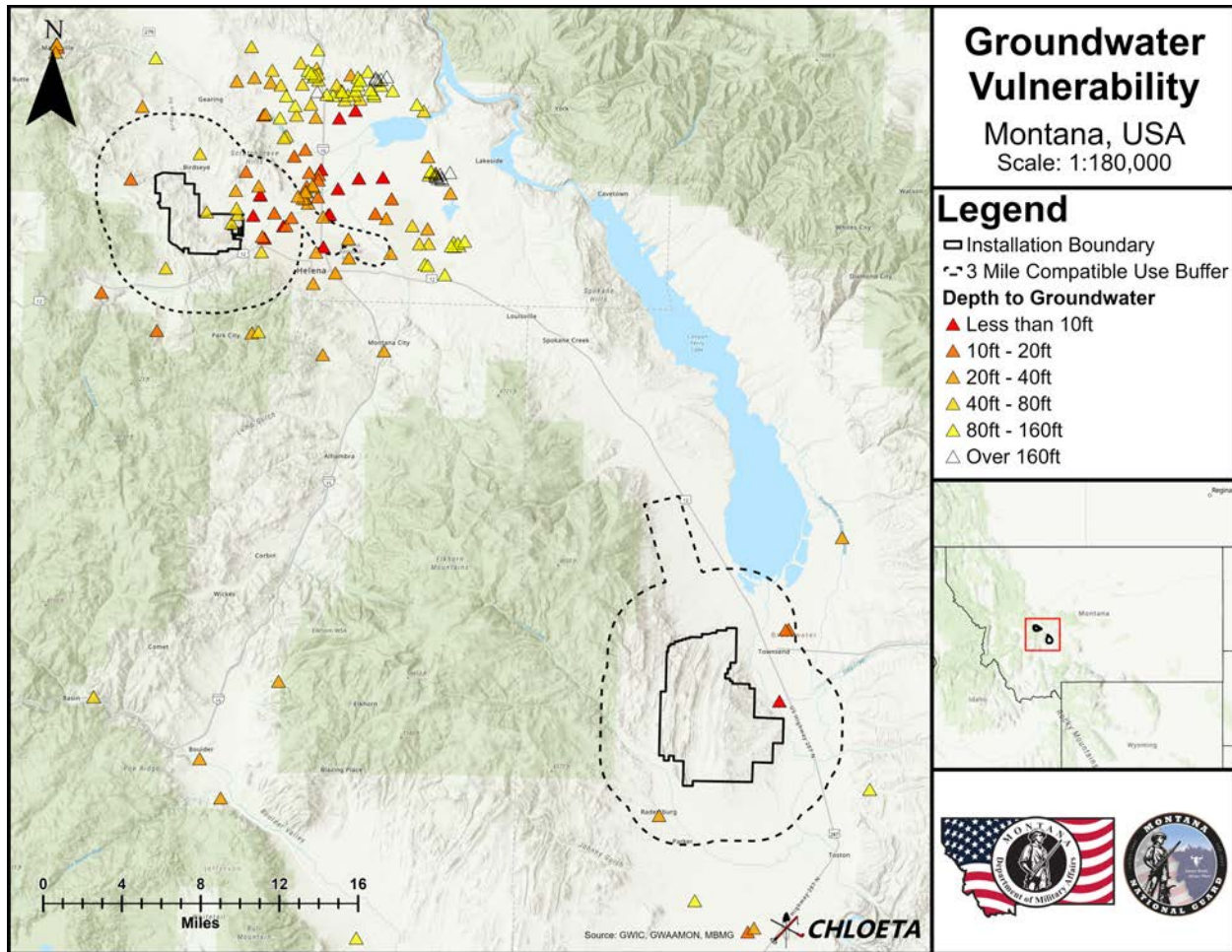


Figure 50. FHTA and LHTA Assessment Area Ground Water Vulnerability.

Figure 50 provides important insight into drought sensitivity and water-supply resilience for the FHTA and LHTA assessment areas by showing depth to groundwater, which is a key indicator of how quickly water systems respond to prolonged dry conditions.

Across much of the Helena Valley and areas surrounding FHTA assessment area, Figure 50 shows a high concentration of shallow groundwater conditions, with many wells indicating depths of less than 10 feet to 40 feet. Shallow groundwater systems typically recharge more quickly during wet periods, but they are also highly vulnerable during drought. When precipitation declines or snowpack is reduced, these aquifers experience rapid drawdown, leading to declining well yields, increased competition between users, and heightened sensitivity to seasonal drought restrictions. The clustering of shallow groundwater near population centers and within the compatible use buffer indicates that municipal, domestic, and installation-adjacent users are drawing from the same stressed groundwater systems, increasing vulnerability during multi-year drought cycles.

In contrast, deeper groundwater conditions, particularly those exceeding 80 to 160 feet or greater than 160 feet, are more common around the LHTA assessment area and in upland or canyon-dominated areas. While deeper aquifers are generally less sensitive to short-term drought, they typically have slower recharge rates and are more costly to access and maintain. During prolonged

drought, these deeper systems can still experience long-term declines, and recovery may lag several years behind the return of normal precipitation. For the LHTA assessment area, reliance on deeper or more isolated groundwater sources suggests greater resilience to short-term drought, but also higher risk of sustained supply degradation if drought conditions persist or groundwater withdrawals increase due to regional growth.

From a drought analysis perspective, Figure 50 highlights that drought impacts will be uneven across the assessment area. Areas with shallow groundwater are likely to experience earlier and more acute drought impacts, including well interference, reduced baseflow to streams, and stress on municipal supply systems. These impacts can directly affect fire suppression capacity, dust control, training operations, and residential water availability. Shallow groundwater is also more susceptible to quality degradation during drought, as lower water tables can concentrate contaminants and increase turbidity or temperature in connected surface waters.

Figure 50 also underscores the cumulative risk created by development and exempt wells, particularly in areas where shallow groundwater coincides with subdivision growth near Canyon Ferry, Helena’s South Hills, and access corridors. Without enforceable water adequacy standards or drought contingency planning, incremental groundwater withdrawals can outpace recharge, accelerating drought vulnerability even in years with near-average precipitation.

Overall, Figure 50 indicates that drought in the assessment area is not solely a surface-water issue but a groundwater-driven risk that affects both civilian communities and MTARNG operations. The spatial distribution of shallow groundwater supports the need for proactive drought mitigation measures, including groundwater monitoring, subdivision water adequacy standards, conservation programs, and integrated civilian–military water planning. Without these actions, drought conditions will increasingly strain shared groundwater resources, compromise training continuity, and heighten conflict between municipal, residential, and mission-critical water demands.

Table 15 summarizes existing surface-water reservoirs, municipal storage, and operational water sources supporting the FHTA and LHTA assessment areas. The table distinguishes between true reservoir storage, treated municipal storage, and operational or episodic supplies, reflecting their fundamentally different roles in drought resilience, wildfire suppression, and mission assurance. Data are drawn from Bureau of Reclamation operational records, City of Helena Utilities system documentation, and Montana Department of Natural Resources and Conservation (DNRC) water management frameworks. This distinction is critical for evaluating duration of service, failure thresholds, and interdependence between civilian and military water systems under prolonged drought, post-fire sedimentation, and concurrent emergency demand.

Table 15. FHTA and LHTA Assessment Area Water Storage and Reservoir Capacity.

Water Source/Facility	Jurisdiction/Owner	Primary Function	Approx. Storage Capacity	Primary Users Supported	Drought & Wildfire Sensitivity	Planning Relevance
Canyon Ferry Lake	Bureau of Reclamation (BOR)	Multipurpose reservoir (irrigation,	~2.0 million acre-feet	Broadwater County agriculture	High – drawdowns during	Primary regional surface-

Water Source/Facility	Jurisdiction/Owner	Primary Function	Approx. Storage Capacity	Primary Users Supported	Drought & Wildfire Sensitivity	Planning Relevance
		hydropower, flood control, recreation)	(active storage)	; regional irrigation districts; downstream Missouri River users	drought reduce available fire-suppression drafting and increase wind-driven exposure	water reserve affecting LHTA fire behavior, access, aviation operations, and downstream water availability
Tenmile Creek Watershed (Surface Diversion – no reservoir)	City of Helena	Municipal water supply diversion	No storage reservoir (run-of-river system with limited buffering)	City of Helena; FHTA; FHTA VA Medical Center	Very High – drought reduces baseflow; post-fire sediment directly impacts treatment capacity	Critical vulnerability: single-watershed dependency with no reservoir buffering for FHTA
Helena Municipal Storage Tanks (system-wide)	City of Helena Utilities	Treated water storage & pressure regulation	~20–25 million gallons total (distributed tanks)	Helena residents; FHTA; VA Medical Center	Moderate – High – storage limited to short-term outages, not extended drought or wildfire demand	Provides hours–days of resilience, not long-duration supply; not a drought solution
Canyon Ferry/Townsend Area Community Systems	Local Water Districts	Domestic & small-system municipal supply	Variable; generally, less than 1–5 million gallons per system	Townsend ; rural Broadwater County	High – shallow intakes and limited storage vulnerable to drought &	Limited redundancy for LHTA support during extended incidents

Water Source/Facility	Jurisdiction/Owner	Primary Function	Approx. Storage Capacity	Primary Users Supported	Drought & Wildfire Sensitivity	Planning Relevance
					power loss	
LHTA On-Site Water (wells, tanks, J-Tank system)	MTARNG/DMA	Training, limited suppression support	Very limited; episodic availability	LHTA operations only	Very High – slow recharge; insufficient for sustained suppression	Not a primary firefighting or drought-resilient source
Agricultural Irrigation Storage (Canals/Returns)	Private/Irrigation Districts	Irrigation conveyance (not storage)	No usable emergency storage	Agriculture only	High – curtailed early during drought	Not reliable for emergency or military use

Assessment area water resilience is structurally constrained by limited reservoir buffering and heavy reliance on run-of-river and short-duration storage systems. Only Canyon Ferry Lake provides large-scale surface-water storage within the assessment area; however, it is managed primarily for irrigation, hydropower, and flood control rather than municipal or emergency supply, limiting its availability for wildfire suppression or contingency operations near LHTA (Bureau of Reclamation). In contrast, FHTA and the City of Helena rely on the Tenmile Creek watershed, a diversion-based system with no reservoir storage, making municipal supply, VA Medical Center operations, and installation functions highly sensitive to drought-driven baseflow reductions and post-fire sediment impacts (City of Helena Utilities; DNRC).

Municipal storage tanks provide only short-term operational buffering and do not mitigate extended drought, sustained wildfire demand, or treatment disruptions. LHTA lacks any comparable storage or hardened supply, relying instead on limited on-site wells and trucked water, which are vulnerable to drawdown, access disruption, and power loss. Collectively, these conditions indicate a systemic regional vulnerability: a single drought or post-fire event can simultaneously degrade civilian water supply, emergency response capacity, and MTARNG operational continuity. This finding reinforces the need for shared, redundant, and emergency-oriented water infrastructure investments aligned with FEMA BRIC, HMGP, and DoW DCIP resilience objectives (DNRC; FEMA).

Historical Drought Events

The assessment area has experienced multiple periods of extreme drought, each exposing systemic vulnerabilities across both civilian and military operations:

Table 16. Historical Drought Years, Events, and Impacts.

Year(s)	Event	Impacts
2000–2004	Prolonged drought in western Montana	Severe water shortages in Helena; agricultural losses in Broadwater County; increased wildfire ignitions.
2012–2013	Statewide drought conditions	Low streamflow in Tenmile watershed; mandatory water conservation; reduced fire suppression capacity.
2017	Flash drought (rapid onset)	Crop stress in Broadwater County; above-average fire danger due to dry fuels in assessment areas.
2021–2022	Multi-year drought with heatwave overlay	Water table decline: Helena issued Stage II drought advisory; extreme fire conditions across FHTA and LHTA.
2024	Early snowmelt and summer dryness	Compromised water storage levels; response delays due to dry vegetation; strain on rural water systems.

Drought Dynamics and Systemic Impact

Drought is a growing and persistent threat across the FHTA and LHTA assessment areas, shaping both ecological conditions and the performance of critical infrastructure. As weather patterns shift, the assessment area is experiencing earlier snowmelt, lower snowpack, hotter summers, and increasingly erratic precipitation. These factors are contributing to longer, more intense drought cycles that reduce streamflow, deplete groundwater, and dry out vegetation, conditions that elevate wildfire risk and strain both urban and rural water systems.

The assessment area’s interconnected water infrastructure, serving military installations, residential communities, and agricultural users, is under increasing pressure. Key watersheds including the Tenmile and Missouri river tributaries are becoming less reliable, especially in late summer months when demand peaks. Reduced flows and increased sedimentation, particularly after wildfire events, challenge water treatment operations and storage systems throughout the area.

Communities and facilities across the assessment area face different expressions of the same fundamental vulnerability. The FHTA and the LHTA rely on municipal or surface water sources that are sensitive to drought-related fluctuations. As pressure drops or water availability declines, training schedules, fire suppression capacity, and cooling systems are compromised. Meanwhile, growing residential development, especially in WUI areas and semi-rural areas, exerts additional demand on already stretched systems, further increasing regional exposure.

In rural parts of Lewis & Clark and Broadwater counties, private wells and small-scale water systems often lack redundancy or emergency storage, leaving households, farms, and livestock operations vulnerable to multi-year drought events. Without coordinated drought contingency planning and long-term investment in water infrastructure, the assessment area faces a compounding risk landscape, one in which ecological degradation, operational disruption, and public health challenges are increasingly intertwined.

FHTA: The FHTA is vulnerable to drought due to its reliance on Helena’s municipal water supply, which is drawn from the increasingly stressed Tenmile watershed. During drought periods, limited

flow and elevated sediment levels can degrade water quality, affecting daily operations including cooling, hygiene, and firefighting. The combination of infrastructure dependence and rising summer temperatures creates an operational bottleneck that threatens training continuity and emergency readiness.

LHTA: The LHTA faces acute drought exposure due to its lack of permanent water infrastructure. The remote terrain is prone to rapid vegetation desiccation, increasing wildfire risk and erosion. Without local water sources, the site depends on trucking water for operations and fire suppression, an expensive and logistically challenging response under extreme drought conditions. These limitations jeopardize both safety and the sustainability of large-scale training exercises.

City of Helena: As the assessment area’s primary water service provider, Helena is directly impacted by declining watershed yields and treatment constraints during droughts. Demand surges in hot months place added strain on aging infrastructure and competing urban–rural needs exacerbate allocation pressure. Prolonged drought may result in rationing, increased utility costs, and constraints on economic and residential development. Helena’s position as both a civilian and military service hub intensifies the regional consequences of water shortfalls.

City of Townsend: Townsend’s water system is small and relies heavily on wells and limited surface flows that are sensitive to extended drought. Infrastructure age and minimal storage capacity amplify vulnerability. In drought years, the town may experience pressure drops, degraded water quality, and regulatory compliance challenges. These systemic weaknesses affect residential use, fire response, and economic stability, especially if growth continues into marginal or high-exposure areas.

Lewis & Clark County: In this mostly rural county, drought impacts are dispersed but significant. Many residents depend on private wells or small community systems with minimal monitoring or redundancy. Agricultural operations face chronic water shortages, and low-income or remote households may lack resources to adapt. Fire protection gaps widen during drought, especially in WUI areas where surface water sources decline or dry completely.

Broadwater County: Broadwater County is particularly drought-sensitive due to its reliance on rangeland and agricultural water use. Recurring droughts have strained grazing operations, dried up stock ponds, and lowered aquifer levels. These effects ripple into the local economy and exacerbate wildfire risk on desiccated landscapes. The lack of comprehensive drought planning and zoning enforcement further complicates coordinated adaptation efforts.

Table 17. Drought Dynamics and System Impacts.

Jurisdiction/Area	Primary Water Source	Key Drought Impacts	Implications for Resilience
FHTA	Helena municipal supply (Tenmile Creek).	Reduced fire suppression capacity; HVAC/cooling stress; water rationing impacts operations.	Requires water redundancy planning, increased defensible space, and emergency water protocols.

Jurisdiction/Area	Primary Water Source	Key Drought Impacts	Implications for Resilience
LHTA	Trucked-in water; no fixed source.	No permanent supply; high vulnerability during training; fuel moisture loss increases ignition risk.	Investment in mobile water support and drought-adapted training schedules needed.
City of Helena	Tenmile watershed; springs.	Pressure on municipal supply; treatment system overload from sedimentation; demand spikes in summer.	Necessitates watershed protection, leak reduction, and staged conservation planning.
City of Townsend	Well fields and small surface systems.	Depleted aquifers; stress on small water treatment systems; limited storage; constraints on growth and service delivery.	Requires infrastructure upgrades, source diversification, and drought contingency protocols.
Lewis & Clark County	Private wells; shared rural systems.	Variable access: some wells dry during summer; rural fire protection water shortages.	Planning for emergency water deliveries, rural water system mapping, and fire-readiness upgrades.
Broadwater County	Private wells; agricultural irrigation.	Crop failures; livestock stress; fire-prone rangelands; groundwater depletion.	Calls for irrigation efficiency, agricultural drought planning, and pasture fire mitigation.

Jurisdictional Exposure

The FHTA-LHTA assessment areas is increasingly exposed to the compounding effects of seasonal and multi-year droughts. Prolonged dry periods, earlier snowmelt, and rising summer temperatures are depleting surface and groundwater resources across the assessment area. The Tenmile and Seven-mile watersheds critical to Helena’s municipal supply and FHTA operations are experiencing lower flows and higher sediment loads, particularly following wildfire events. Agricultural lands across Broadwater and Lewis & Clark counties are similarly impacted, with reduced irrigation water and stressed pastureland. As drought persists, both urban and rural communities face heightened exposure due to limited redundancy in water infrastructure, aging systems, and expanding development into dry, erosion-prone landscapes. Military readiness, public safety, and ecological health are increasingly tied to the assessment area’s capacity to manage and adapt to water scarcity.

FHTA: The FHTA faces moderate to high drought vulnerability due to its dependence on the Tenmile watershed and Helena’s municipal system. A prolonged drought could reduce water availability for both daily operations and fire suppression, especially during wildfire season. Dust suppression, HVAC performance, and hygiene services are also at risk if water quality or quantity degrades.

LHTA: The LHTA drought risk is compounded by its remoteness and lack of on-site water infrastructure. The installation is exposed to dry rangeland fuels that respond rapidly to prolonged aridity. Water deliveries for fire suppression or field support may be delayed during drought-constrained periods, creating cascading operational risks.

City of Helena: Helena's drought exposure is high, as the city depends on a small number of watersheds and aging treatment infrastructure. Weather models project a 10–30% reduction in summer water availability by 2050, with impacts to both residential demand and system resilience. The city's dual role as water supplier and emergency response hub amplifies the regional significance of any water system failure.

City of Townsend: Townsend's small-scale water system and reliance on well fields create acute vulnerability to drought. Extended dry spells may draw down water tables and reduce flow rates while aging infrastructure increases the likelihood of mechanical failures during peak demand. Limited storage and interconnection further constrain emergency adaptability.

Lewis & Clark County and Broadwater County: Rural areas face chronic drought exposure, especially where private wells, limited storage, and livestock operations intersect. Many households and farms lack backup systems or formal drought contingency plans. Public health, fire response, and agricultural viability are increasingly at risk.

Topographic Influences

Topography plays a significant role in shaping how drought affects the FHTA and LHTA assessment areas. Elevation gradients, slope exposure, and terrain complexity influence soil moisture retention, vegetation health, and water availability across jurisdictions. Steep, south-facing slopes, common in areas around Helena, the South Hills, and the LHTA experience accelerated drying due to high solar exposure and limited shade, making these areas especially vulnerable to vegetation desiccation and fire ignition during drought periods. In contrast, north-facing slopes and shaded drainages may retain moisture slightly longer but still face long-term depletion in extended dry cycles.

Canyon systems and shallow basins across Broadwater and Lewis & Clark counties often serve as conduits for runoff, but during droughts, they dry quickly, reducing available surface water and concentrating heat. In low-lying valley areas like Townsend, aquifer recharge can slow significantly, especially when surrounding ridgelines shed water rapidly or no longer produce steady melt flows. Areas with shallow soils and rocky subgrades, particularly in the LHTA exhibit poor infiltration and low water-holding capacity, compounding stress on vegetation and increasing erosion during dry spells.

The assessment area's overall elevation variability from forested highlands to open rangelands creates a patchwork of micro weathers and exposure areas that demand localized drought planning. Terrain also influences infrastructure layout, water delivery, and emergency response logistics, meaning that drought impacts are often intensified by physical access constraints. As a result, topographic characteristics must be factored into drought resilience strategies from watershed protection and slope-stabilized vegetation to road design and rural fire readiness planning.

FHTA: The FHTA is located on a transitional landscape where rolling foothills give way to steeper ridgelines near the South Hills. The area includes a mix of gently sloped training grounds and

adjacent draws with south-facing aspects that dry out rapidly during summer months. These slope exposures contribute to early vegetation stress and limit soil moisture retention. Additionally, terrain features including narrow drainages can concentrate runoff during brief storm events but remain largely dry in drought cycles, offering little recharge benefit.

LHTA: The LHTA is defined by steep, rocky ridges and shallow, erosion-prone soils. The topography, combined with sparse vegetation and high solar exposure, accelerates surface drying and inhibits groundwater infiltration. These features reduce the area’s capacity to buffer against drought, making it highly sensitive to prolonged dry periods. Fire spread is also enhanced by upslope wind funnels and terrain-driven convection patterns, compounding operational risk during training events.

City of Helena: Helena’s expanding residential areas are increasingly built on elevated slopes and canyon edges, particularly in the South Hills and Upper Tenmile watershed. These areas face high sun exposure and limited vegetation cover, which amplify drought stress and reduce cooling through evapotranspiration. Steep slopes accelerate runoff, preventing water from soaking into the soil and contributing to rapid drying of fuels and landscape vegetation. Combined with shallow soils and impermeable surfaces from urban development, topography plays a central role in Helena’s drought vulnerability.

City of Townsend: Situated in a relatively flat valley, Townsend is bordered by upland ridges and canyons that influence local micro weathers. The valley floor accumulates heat during the summer, increasing evapotranspiration and stressing shallow aquifers. Water movement from surrounding terrain is often lost to rapid runoff or evaporates before contributing meaningfully to recharge. The combination of exposed lowlands and limited slope-buffered areas creates high drought sensitivity, particularly for shallow wells and municipal supplies.

Lewis & Clark County: The county encompasses a broad range of elevations, from high mountain forests in the west to open grasslands in the east. Higher elevation areas retain snowpack longer and offer modest drought buffering, while mid-elevation hillsides and rangelands dry quickly in hot weather. In WUI areas, development on slopes with poor soil depth and limited canopy cover heightens the risk of vegetation stress, erosion, and fuel volatility during drought. Rural homesteads on marginal terrain often face challenges accessing stable water sources.

Broadwater County: Broadwater County’s terrain includes wide open rangelands, dry shrub-steppe, and dissected hill systems. The topography is mostly open and exposed, with little natural shading or topographic buffering against heat and wind. Shallow soils and rocky outcrops dominate many areas, reducing infiltration and increasing susceptibility to both drought and erosion. During extended dry periods, pasturelands desiccate rapidly, leaving large swaths of landscape vulnerable to ignition and long-term ecological degradation.

Table 18. Topographic Drought Impacts by Jurisdiction.

Jurisdiction/Area	Topographic Features	Drought-Relevant Impacts
FHTA	Rolling foothills; adjacent draws and south-facing slopes.	Increased sun exposure and runoff limit soil moisture retention; steeper areas dry rapidly during hot months.

Jurisdiction/Area	Topographic Features	Drought-Relevant Impacts
LHTA	Steep ridgelines, rocky terrain, shallow soils.	Minimal water retention; rapid desiccation of vegetation; limited infiltration exacerbates drought cycles.
City of Helena	South Hills ridges and drainages; urban development on elevated slopes.	Slope-driven water runoff reduces recharge; hillside neighborhoods rely on stressed surface supplies.
City of Townsend	Valley setting surrounded by canyons and hills.	Lower elevations may accumulate heat; limited shade and shallow aquifers make the area highly drought prone.
Lewis & Clark County	Mix of high-elevation forest and mid-elevation grasslands.	Forest areas retain moisture longer, but mid- to low-elevation areas dry rapidly and see vegetation stress
Broadwater County	Wide open rangelands, dissected by shallow drainages and rolling hills.	Open terrain and prevailing winds increase evapotranspiration; sparse canopy accelerates fuel drying.

Drought Exposure and Development Patterns

Across the FHTA-LHTA assessment area, development patterns are increasingly intersecting with areas of elevated drought risk. Suburban expansion, rural sprawl, and low-density housing are encroaching on lands that are inherently water-scarce, with limited infrastructure and high solar exposure. Many new developments lack drought-adapted design features including xeriscaping, defensible space, or water-efficient construction standards. As a result, the cumulative burden on water systems, especially in communities reliant on single municipal sources or shallow aquifers, is rising. Without integrated land use planning that accounts for long-term weather stress, development is locking in future vulnerabilities and limiting adaptive capacity across both civilian and military systems.

FHTA: Development around the FHTA is intensifying, particularly in Helena’s expanding fringe areas. Developments near the installation increase water demand on a shared municipal system that draws from the drought-sensitive Tenmile watershed. While the FHTA is not heavily developed, the proximity of WUI growth adds indirect pressure on water availability, firefighting capacity, and infrastructure resilience.

LHTA: Though the LHTA remains largely undeveloped, surrounding rural areas are seeing sporadic residential growth, often on large parcels without formal subdivision planning. These developments increase pressure on already limited water resources, as they rely on private wells or shallow aquifers with no regional-scale supply redundancy. Land fragmentation and poor water infrastructure amplify exposure to drought and wildfire.

City of Helena: Helena’s ongoing urban expansion into the South Hills and Helena Valley places new homes in drought-prone areas with limited natural shade, shallow soils, and high irrigation demand. Many newer developments rely on centralized water distribution and are not designed with drought-tolerant landscaping or low-water infrastructure. These patterns are increasing system-wide demand during the driest part of the year, pushing the city’s water infrastructure

toward its limits.

City of Townsend: Townsend is experiencing outward residential and agricultural development into marginal lands with poor soil moisture retention and limited water access. As shallow aquifers are drawn down by new wells, older systems face an increased risk of failure or contamination. Growth without corresponding infrastructure investment compounds vulnerability during drought periods, particularly for fire suppression and emergency service reliability.

Lewis & Clark County: Scattered rural development in Lewis & Clark County often occurs in drought-sensitive areas with limited infrastructure. Many of these areas lie within the WUI and rely on individual water systems with no formal conservation measures or backup supply. As growth continues beyond city limits, the lack of coordinated planning for water use and drought adaptation creates long-term risks for both residents and emergency responders.

Broadwater County: Broadwater County's development patterns reflect a transition from agricultural land to low-density housing, often without zoning enforcement or drought-resilient infrastructure. Irrigated farmland being converted to residential lots removes active land management that once supported soil moisture retention. The result is an increasingly fragmented landscape with rising fire risk, groundwater stress, and reduced resilience to prolonged dry periods.

Table 19. Development Trend Drought Implications by Jurisdiction.

Jurisdiction/Area	Development Trends	Drought Exposure Implications
FHTA	Bordered by expanding residential areas and WUI areas near Helena.	Increased water demand from nearby growth strains shared municipal supply; greater pressure on fire-readiness.
LHTA	Isolated from major development; surrounded by grazing lands and unmanaged rangeland.	Minimal formal infrastructure: drought exacerbates ignition risk and limits emergency response access.
City of Helena	Expanding subdivisions in the South Hills and West Helena Valley.	New development increases impervious surfaces, runoff, and water demand; heightens stress on Tenmile watershed.
City of Townsend	Outward growth into agricultural and shrub-steppe areas.	Low-density development lacks drought-adapted infrastructure; dependence on stressed aquifers or surface sources.
Lewis & Clark County	Rapid WUI growth; scattered rural homes in fire- and drought-prone terrain.	Uncoordinated expansion into dry areas creates cumulative water stress and limits emergency water infrastructure.
Broadwater County	Rural residential sprawl replacing irrigated farmland; limited zoning enforcement.	Fragmented land use increases fire risk and reduces efficiency of water distribution and drought mitigation.

Cascading and Long-Term Impact

Drought in the FHTA-LHTA assessment area triggers wide-ranging cascading impacts that affect water security, infrastructure reliability, economic productivity, and public safety. As drought conditions persist, the cumulative strain on interconnected systems, including municipal water supplies, rural fire protection networks, and agricultural lands, intensifies. Wildfire risk rises dramatically as vegetation desiccates, placing additional pressure on already limited emergency services and training logistics. Post-fire runoff and sedimentation further degrade water quality, increasing operational costs for treatment facilities and disrupting community access to clean water.

Over time, long-term drought contributes to infrastructure degradation, particularly in systems not designed for prolonged heat and low-flow conditions. Groundwater depletion in rural areas leads to well failures, while aquifer recovery becomes more uncertain due to erratic recharge patterns. For agriculture and rangeland users, recurring drought reduces economic viability and forces shifts in land use, grazing intensity, or abandonment. These environmental and economic stressors ripple into workforce stability, public health, and regional cohesion.

Institutionally, sustained drought reveals gaps in water governance, land use planning, and interagency coordination. Communities that lack coordinated conservation policies or drought contingency strategies face compounding risks and missed funding opportunities. As weather patterns shift further, the assessment area will require a proactive, integrated response to ensure that drought does not compromise its long-term resilience, growth capacity, or mission assurance for military operations.

FHTA: Prolonged drought affects mission continuity through reduced fire suppression capacity and the potential failure of cooling and HVAC systems reliant on municipal water. Cascading impacts include increased maintenance costs, scheduling delays for training, and reduced reliability of on-base operations during emergency conditions. Over time, aging infrastructure stressed by heat and limited water availability will require significant reinvestment to sustain operational readiness.

LHTA: The LHTA is particularly vulnerable to long-term ecological degradation. Repeated drought cycles lead to vegetation loss, exposing soils to erosion and eliminating natural firebreaks. This increases both wildfire frequency and intensity while limiting habitat value and post-fire recovery. Cascading operational impacts include increased reliance on costly water deliveries, constrained training windows due to safety conditions, and the need for more robust contingency planning.

City of Helena: Helena faces growing strain on its water system during multi-year droughts. Treatment facilities are at risk of being overwhelmed by sediment from post-fire runoff, while utility costs rise as water becomes scarce. Cascading effects include water rationing, pressure on public health and equity, and limits to future residential or commercial expansion. Over the long term, the city must contend with the risk of watershed depletion, infrastructure aging, and funding challenges for needed upgrades.

City of Townsend: Townsend's limited water infrastructure creates cascading risk when demand exceeds supply. Shortages can affect emergency response and public services, while persistent aquifer drawdown may reduce well reliability. Over time, the city may face regulatory penalties

for water quality noncompliance, and economic development could slow without improvements in system capacity and drought resilience.

Lewis & Clark County: In rural areas of the county, private wells and small systems face increasing failure rates under long-term drought. These challenges ripple into public safety concerns, especially in WUI areas with poor fire protection, and economic impacts, as agricultural output declines. Without investment in shared systems or drought-adapted infrastructure, the county could see rural depopulation, widening service gaps, and reduced tax revenue.

Broadwater County: Broadwater County experiences deep, multi-sector impacts during drought. Degraded rangeland reduces livestock productivity, while dry fuels increase fire response costs and exposure. Cascading effects include stress on emergency resources, declines in local food systems, and growing tension over land and water use. Over the long term, drought may erode the economic viability of agriculture and limit the county's ability to attract or retain population without major resilience investments.

Table 20. Drought Cascading and Long-Term Impacts by Jurisdiction.

Jurisdiction/Area	Cascading Impacts	Long-Term Consequences
FHTA	Reduced municipal water affects firefighting, HVAC systems, and hygiene; stress on training timelines during dry seasons	Increased maintenance costs, degraded infrastructure performance, mission constraints tied to water scarcity
LHTA	Water scarcity limits fire suppression and field operations; vegetation loss leads to erosion and dust hazards	Loss of natural firebreaks, higher operational costs, and ecological degradation affecting training environments
City of Helena	Overloaded treatment systems; conflict over urban-rural water allocation; increased wildfire risk from dry WUI areas	Pressure on water rates and service equity; constrained growth and public health risks linked to heat and dryness
City of Townsend	Aquifer drawdown impacts domestic and emergency services; small system failures interrupt supply	Regulatory noncompliance, stagnated development, rising costs for emergency water delivery or infrastructure repair
Lewis & Clark County	Rural water shortages reduce fire protection; agricultural decline affects local economy and food systems	Depopulation of remote areas, loss of tax base, ecosystem shifts due to prolonged soil and vegetation stress
Broadwater County	Drought-driven pasture loss increases fire risk and economic strain on ranchers; water conflict with new developments	Rangeland collapse, degraded watershed health, and economic fragility in agricultural and grazing-dependent sectors

Drought Risk Outlook

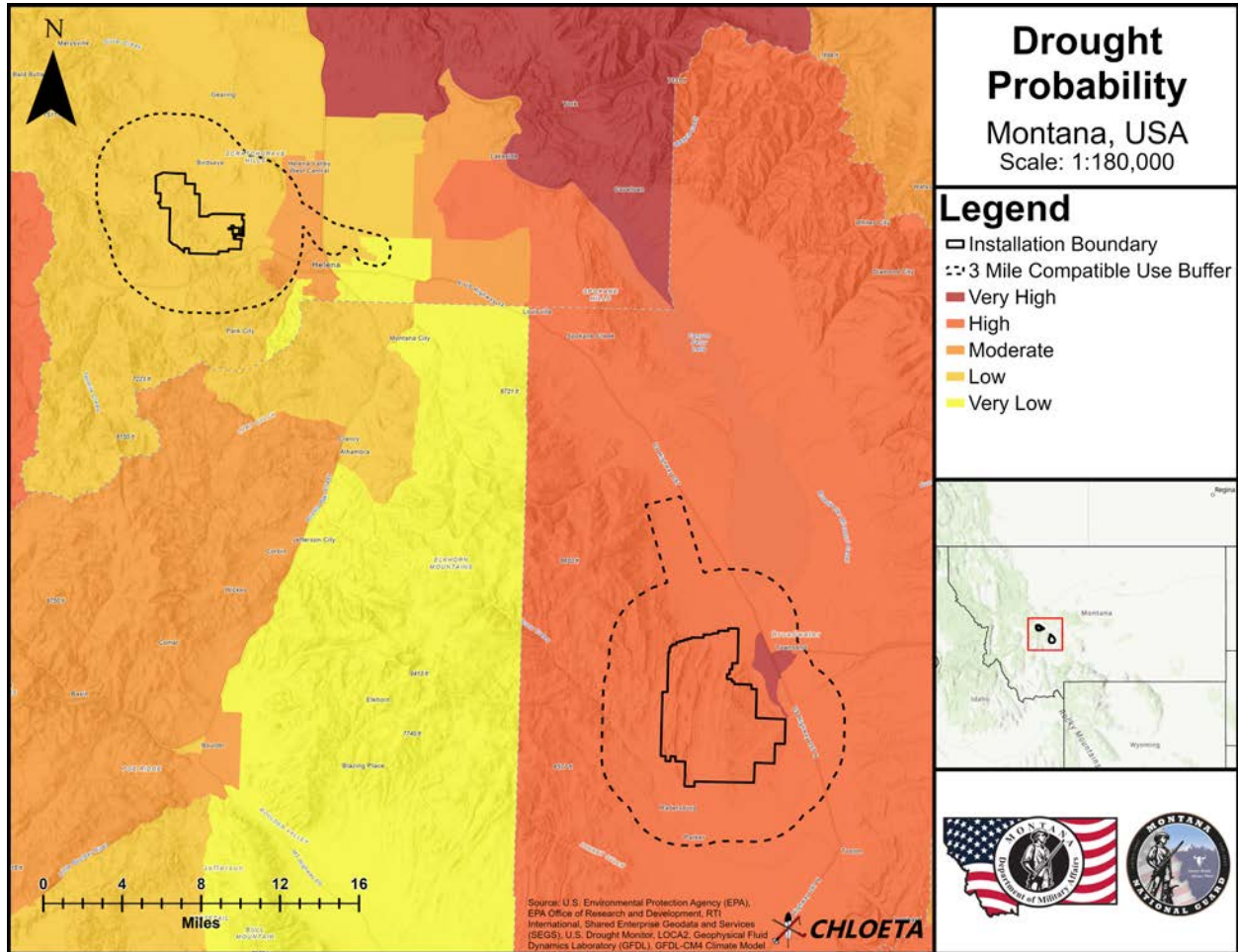


Figure 51. FHTA and LHTA Assessment Area Drought Probability

This Figure 51 illustrates a clear east–west contrast in drought risk across the assessment area, with important implications for water supply reliability, wildfire hazard, and long-term mission assurance.

The LHTA assessment area is located almost entirely within areas classified as “High” to “Very High” drought probability. These zones reflect a persistent tendency toward moisture deficits driven by lower precipitation, higher evapotranspiration rates, and limited groundwater recharge capacity. The dominance of high drought probability in the LHTA assessment area indicates that water scarcity is a chronic condition rather than an episodic risk, increasing vulnerability of training lands, grazing leases, dust control operations, and wildfire suppression resources. Prolonged drought in this area also accelerates vegetation stress and fine-fuel curing, compounding wildfire risk and increasing the likelihood that training restrictions or operational pauses may be required during extended dry periods.

In contrast, the FHTA assessment area lies within a mosaic of “Moderate” to “Low” drought probability zones, with some adjacent areas classified as “Very Low.” This comparatively lower

drought probability reflects the moderating influence of higher elevation, more consistent snowpack contributions to the Tenmile watershed, and greater surface-water connectivity. While the FHTA assessment area is not immune to drought impacts, particularly during multi-year drought events, there is a greater short-term resilience relative to the LHTA assessment area, especially for water supply and vegetation recovery. However, the presence of moderate drought probability surrounding the FHTA assessment area suggests that drought conditions can still develop rapidly when snowpack is reduced or when summer precipitation deficits persist.

At the regional scale, Figure 51 shows a gradient of increasing drought probability moving east and southeast, encompassing much of Broadwater County and the Canyon Ferry corridor. This spatial pattern reinforces the need for location-specific drought planning, as communities, utilities, and installations in higher-probability zones will experience drought impacts earlier and more severely than those to the west. The juxtaposition of high drought probability areas with shared civilian–military lifelines and access corridors underscores the risk of concurrent impacts to water availability, wildfire behavior, and transportation reliability.

Overall, drought is a structural risk to the assessment area, particularly for LHTA and eastern portions of the region. It supports prioritizing drought-adaptive land management, water conservation, groundwater protection, and wildfire mitigation measures in high-probability zones, while ensuring that FHTA assessment area planning accounts for increasing drought frequency and intensity under future conditions. Integrating these spatial drought patterns into hazard mitigation, capital planning, and training schedules will be critical to sustaining both community resilience and MTARNG mission readiness over the long term.

Table 21 provides a comparative outlook on drought exposure across jurisdictions within the FHTA-LHTA assessment area. It summarizes each area's primary water sources, key vulnerabilities, and potential implications for resilience based on current infrastructure, land use, and operational dependencies. This regional snapshot illustrates how prolonged drought conditions interact with local systems, ranging from military installations and urban centers to rural counties, highlighting where risk is most concentrated and where targeted mitigation strategies may be needed.

Table 21. Drought Risk Outlook by Jurisdiction

Jurisdiction/Area	Drought Exposure	Primary Vulnerabilities	Cascading/Strategic Risks
FHTA	Moderate to High	Dependence on Helena's water supply; limited onsite storage; HVAC/fire suppression systems.	Reduced training readiness; heat-related infrastructure degradation; constrained emergency operations.
LHTA	High	No permanent water infrastructure; dry, erosion-prone terrain; limited access during high fire risk.	Fire ignition and response delays; long-term range degradation and increased operational costs.

Jurisdiction/Area	Drought Exposure	Primary Vulnerabilities	Cascading/Strategic Risks
City of Helena	High	Reliance on Tenmile watershed; high urban demand; aging treatment infrastructure.	Water rationing; service equity issues; growth limitations; utility and fire suppression constraints.
City of Townsend	Moderate to High	Small-scale system; aquifer sensitivity; limited backup capacity.	Infrastructure failures; development delays; emergency response limitations.
Lewis & Clark County	Moderate	Dispersed wells; lack of rural system redundancy; WUI expansion into dry areas.	Rural fire suppression gaps; reduced agricultural viability; economic risk to small communities.
Broadwater County	High	Rangeland desiccation; shallow water supplies; lack of zoning enforcement in growing rural areas.	Grazing and ag sector losses; increased wildfire exposure; pressure on emergency and planning resources.

Drought is not a stand-alone hazard; it magnifies fire risk, destabilizes watersheds, and limits both civilian and military operational flexibility. As warming intensifies, regional water systems must adapt to lower flows, competing demands, and more frequent scarcity. Coordinated planning, infrastructure investment, and interagency drought contingency frameworks are essential to sustaining long-term resilience.

Annex E: Flood Risk and Hydrologic Analysis

Flooding remains a persistent and multifaceted hazard affecting the FHTA and LHTA assessment areas. The area's steep topography, snowmelt-fed tributaries, and aging drainage infrastructure create conditions for both seasonal and flash flooding. Critical waterways include the Missouri River, Tenmile Creek, and Prickly Pear Creek, each of which plays a central role in shaping hydrologic risk across the assessment areas.

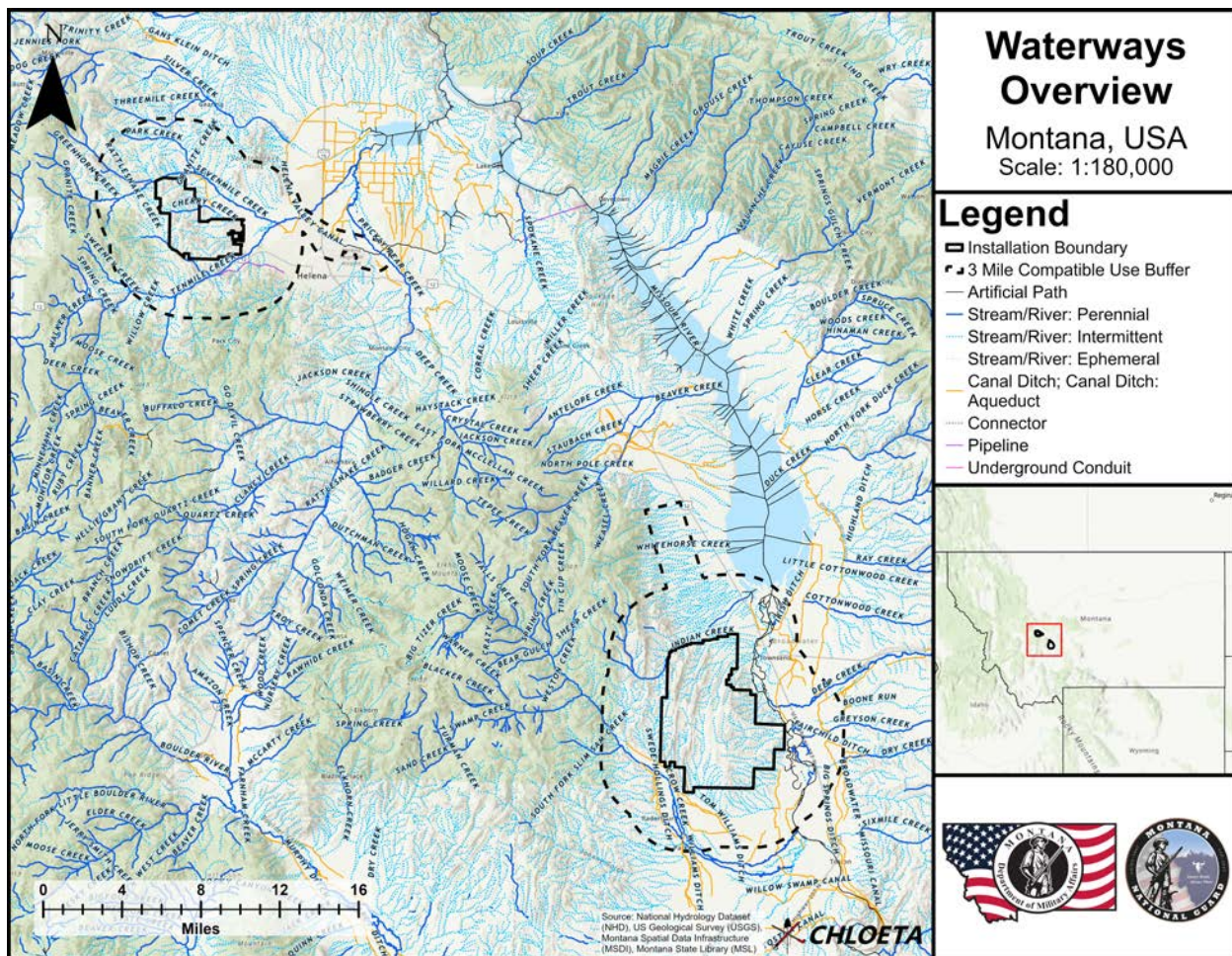


Figure 52. Waterways Overview Map.

Figure 52 illustrates the dense and interconnected surface-water network that shapes flood behavior, water availability, and infrastructure vulnerability across the FHTA and LHTA assessment areas. This network includes perennial streams, intermittent and ephemeral drainages, irrigation ditches, and engineered conveyances that collectively govern how precipitation, snowmelt, and post-fire runoff move through surrounding communities and shared civilian–military corridors.

In the FHTA assessment area, the hydrologic system is dominated by the Tenmile Creek watershed and its numerous tributaries, including a high density of intermittent and ephemeral channels draining the South Hills. These drainages respond rapidly to storm events and snowmelt,

concentrating flows toward Helena's urban core, municipal water infrastructure, and primary access routes serving both civilian neighborhoods and the installation. During high-intensity rainfall or post-fire conditions, ephemeral channels that are dry for much of the year become active flow paths, overtopping culverts, eroding roadbeds, and transporting sediment into downstream canals and treatment systems. This behavior increases localized flooding risk in developed areas that were not historically designed to accommodate concentrated runoff.

The LHTA assessment area is characterized by long, narrow drainages feeding into the Missouri River and Canyon Ferry Lake system. While many of these waterways are intermittent or ephemeral, their catchments are large and sparsely vegetated, allowing runoff to accelerate quickly during convective storms or rapid snowmelt. These flows intersect rural access routes, irrigation ditches, and low-lying crossings that serve residents, agricultural operations, and emergency responders. Because drainage density is high and channel gradients are steep, even short-duration storm events can generate debris-laden flows capable of washing out roads, damaging culverts, and isolating communities near Townsend, Canyon Ferry, and the LHTA boundary.

From a community perspective, the map highlights that hydrologic risk is not limited to mapped floodplains along major rivers. Instead, it is driven by the cumulative behavior of hundreds of small tributaries and artificial conveyances that intersect transportation, utilities, and developed areas. Canals, ditches, and pipelines shown on Figure 52 further complicate flood dynamics by redirecting flows, constraining natural drainage, or creating failure points when debris blocks intakes or crossings. These features are often unmanaged across jurisdictional boundaries, increasing the likelihood of cascading impacts during flood or post-fire runoff events.

The waterways network also reinforces the shared nature of risk between civilian communities and military facilities. Drainages that originate outside installation boundaries routinely pass through residential areas, agricultural lands, and public rights-of-way before reaching FHTA or LHTA infrastructure. As a result, upstream land use, vegetation condition, and post-fire recovery directly influence downstream flooding, sedimentation, and access reliability for both communities and installations. Without coordinated watershed-scale management, localized mitigation efforts remain vulnerable to upstream conditions beyond local control.

Overall community flood risk, evacuation reliability, water-system performance, and emergency access around FHTA and LHTA are governed by an integrated surface-water system that transcends jurisdictional boundaries. Effective mitigation therefore depends on protecting drainage corridors, maintaining conveyance capacity, and coordinating management of natural and artificial waterways to reduce flood impacts, preserve access routes, and safeguard both civilian life safety and mission assurance during multi-hazard events.

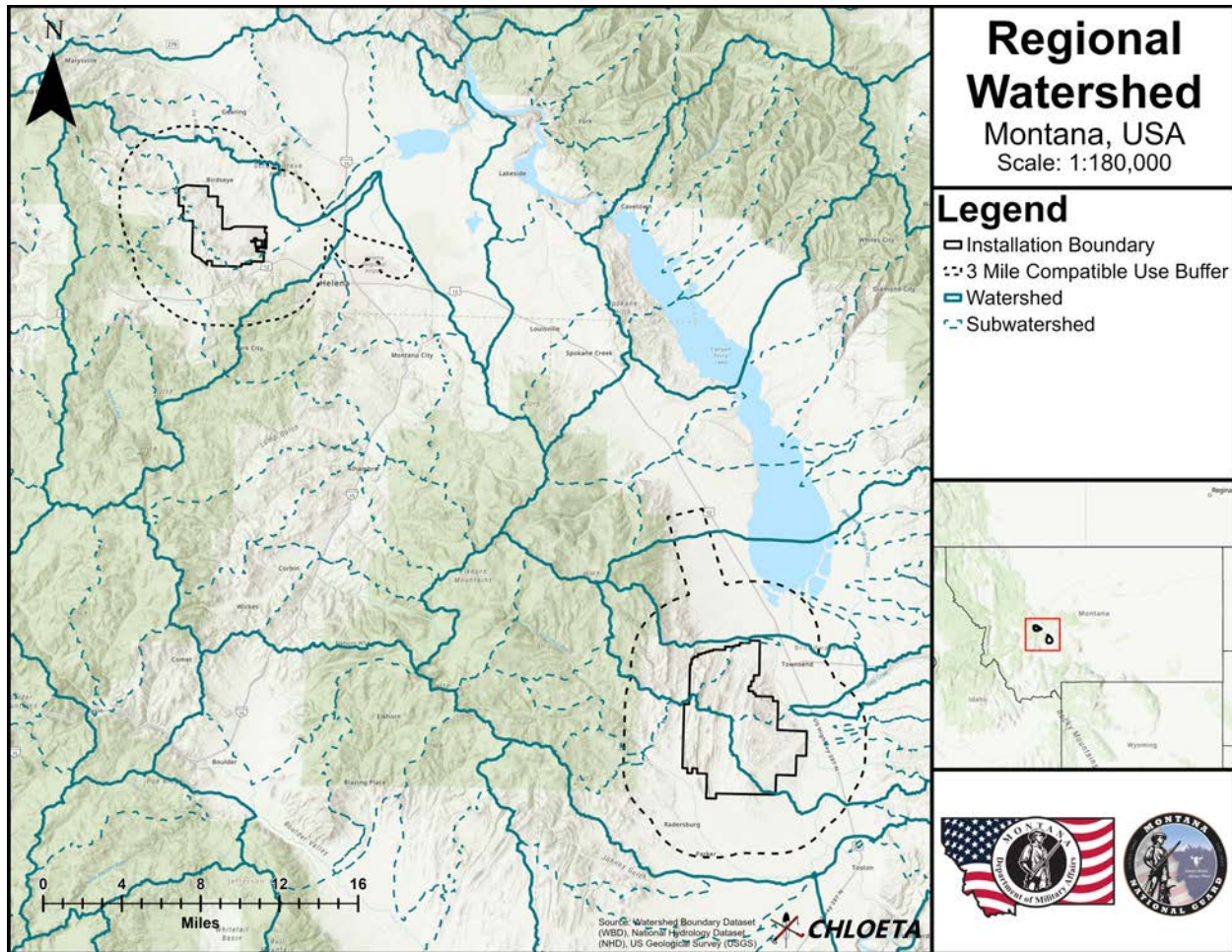


Figure 53. Watershed and Drainage Basins.

The FHTA and LHTA are embedded within a complex, interconnected watershed network that directly shapes flood risk, water availability, sediment transport, and downstream community vulnerability across Lewis & Clark and Broadwater Counties. As shown in Figure 53, both installations sit within multi-jurisdictional watershed systems that drain toward the Missouri River and Canyon Ferry Lake, linking military lands, municipal infrastructure, agricultural areas, and residential communities through shared hydrologic pathways.

The FHTA assessment area is primarily influenced by the Tenmile Creek and Prickly Pear Creek sub watersheds, which originate in steep, forested terrain west and south of Helena before converging near populated valley floors. These sub watersheds function as rapid runoff conduits during spring snowmelt, intense convective storms, and post-fire precipitation events. Because upstream land cover includes wildfire-prone forest and WUI development, hydrologic response is increasingly “flashy,” producing short-duration, high-energy flows that overwhelm drainage infrastructure, transport sediment, and concentrate flooding impacts along community access routes, municipal intakes, and evacuation corridors shared with the installation.

The LHTA assessment area lies within a broader Missouri River–Canyon Ferry watershed context, where long, sparsely developed upland drainages funnel runoff toward the reservoir and river

corridor. Sub watersheds draining the Limestone Hills contribute sediment and debris during high-intensity storms, particularly where vegetation cover is reduced by drought, grazing pressure, or wildfire. These flows intersect Old Woman's Grave Road, Indian Creek Road, and other rural lifelines that provide the only access for residents, emergency responders, and MTARNG operations. Because these watersheds span federal, state, county, and private lands, upstream conditions outside the installation boundaries strongly influence downstream impacts within the assessment area.

From a community perspective, the watershed map highlights that flood and erosion risks affecting the assessment areas are not localized problems, but regional processes driven by upstream land use, vegetation condition, and drainage connectivity. Runoff generated miles upstream can degrade roads, culverts, and utilities serving Helena, Townsend, and surrounding rural neighborhoods before reaching installation boundaries. Similarly, sediment generated in burned or overgrazed sub watersheds reduces channel capacity, clogs culverts, and increases flood frequency along shared civilian–military corridors.

The watershed configuration also underscores governance and coordination challenges. Watershed boundaries do not align with county lines, emergency service districts, or installation jurisdictions. Effective mitigation therefore requires coordinated planning across DNRC, county public works, municipal utilities, watershed groups, and MTARNG to address upstream drivers of downstream risk. Without watershed-scale management, localized infrastructure hardening alone will not keep pace with increasing runoff volumes and sediment loads.

Overall, the Regional Watershed map demonstrates that community resilience, evacuation reliability, and mission assurance for FHTA and LHTA depend on managing hydrologic risk at the watershed and sub watershed scale. Integrating watershed health, post-fire recovery, drainage capacity, and land-use controls into a unified regional strategy is essential to reduce flood impacts on downstream communities, protect shared lifelines, and maintain safe, reliable access to both installations during multi-hazard events.

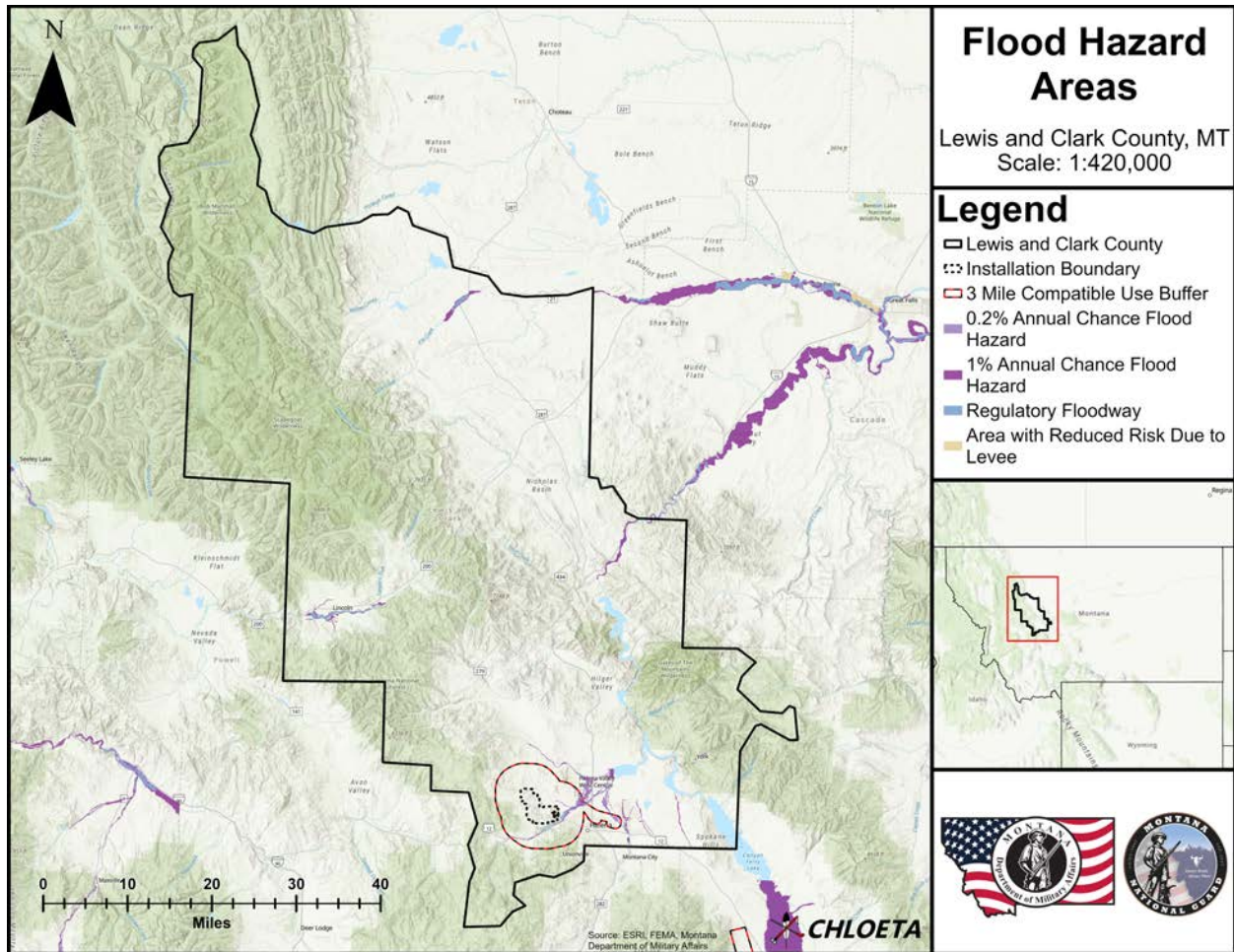


Figure 54. FHTA Assessment Area Flood Map.

From an assessment area perspective, flood risk in the FHTA assessment area (Figure 54) is spatially limited but operationally important due to the area's hydrologic setting and downstream connectivity. FEMA-mapped flood hazard areas, including the 1-percent annual chance floodplain, regulatory floodways, and limited 0.2-percent annual chance flood zones, are primarily concentrated along major river corridors and lower-gradient valleys in the eastern portion of the county. Within the FHTA assessment area, direct overlap with mapped floodplains is minimal and generally confined to narrow riparian corridors and downstream receiving waters rather than broad areas of inundation. As a result, the assessment area exhibits low exposure to traditional riverine flooding, with flood hazards occurring in linear, channelized patterns rather than extensive floodplain environments.

Hydrologically, the FHTA assessment area is dominated by steep terrain, headwater catchments, and upland watersheds that produce rapid runoff responses during intense precipitation or snowmelt events. Flood risk is therefore driven more by short-duration, high-velocity flows than by slow-rise riverine flooding. Flash flooding, channel overtopping, and localized erosion are the primary flood mechanisms of concern, particularly where drainage features intersect roads, access routes, and training areas. Confined valleys and limited natural floodplain storage further increase flow velocities and erosion potential during peak runoff events, even when total flood volumes

remain relatively small.

Post-wildfire conditions significantly elevate flood and hydrologic risk within the assessment area and downstream, despite limited mapped floodplain exposure. High-severity burn scars reduce vegetative cover and soil infiltration, increasing runoff coefficients and peak discharge during storm events. These conditions generate sediment- and debris-laden flows that can overwhelm culverts, crossings, and drainage infrastructure located outside FEMA-mapped flood zones. Such post-fire runoff dynamics increase the likelihood of localized flooding, channel instability, and sediment deposition, particularly during the first several years following wildfire. These risks are not fully captured by static flood hazard maps and represent a critical consideration in assessing true flood vulnerability.

Although direct structural exposure within the assessment area is low, flood risk remains operationally significant due to indirect and cascading impacts. Transportation routes serving FHTA and surrounding areas across multiple ephemeral and perennial drainages that are susceptible to overtopping, washouts, and sediment blockage during peak flow events. Downstream municipal water infrastructure is vulnerable to flood-driven sediment and turbidity increases originating from upstream headwaters, which can reduce treatment capacity and disrupt water supply reliability. Training and operational areas located near drainage corridors may experience temporary access limitations or safety concerns during storm events, even in the absence of mapped floodplain inundation.

Regulatory floodways within Lewis and Clark County are largely located outside the core assessment area, indicating a low probability of direct structural damage from riverine flooding within installation boundaries. Consequently, floodplain development constraints are not a primary limiting factor for activities within the assessment area. However, upstream land conditions and hydrologic responses continue to influence downstream flood behavior, underscoring the importance of watershed-scale mitigation and interagency coordination.

Overall, flood risk within the assessment area is best characterized as low in terms of direct inundation but moderate to high in terms of flash flooding, post-fire hydrologic response, and downstream impacts. Flooding acts as a compounding hazard that amplifies the effects of wildfire, sediment transport, and infrastructure vulnerability rather than as a stand-alone risk. Effective mitigation therefore requires an integrated approach that emphasizes post-fire watershed stabilization, drainage and culvert resilience, sediment management, and coordination with wildfire and water-supply mitigation strategies, rather than reliance on traditional floodplain avoidance alone.

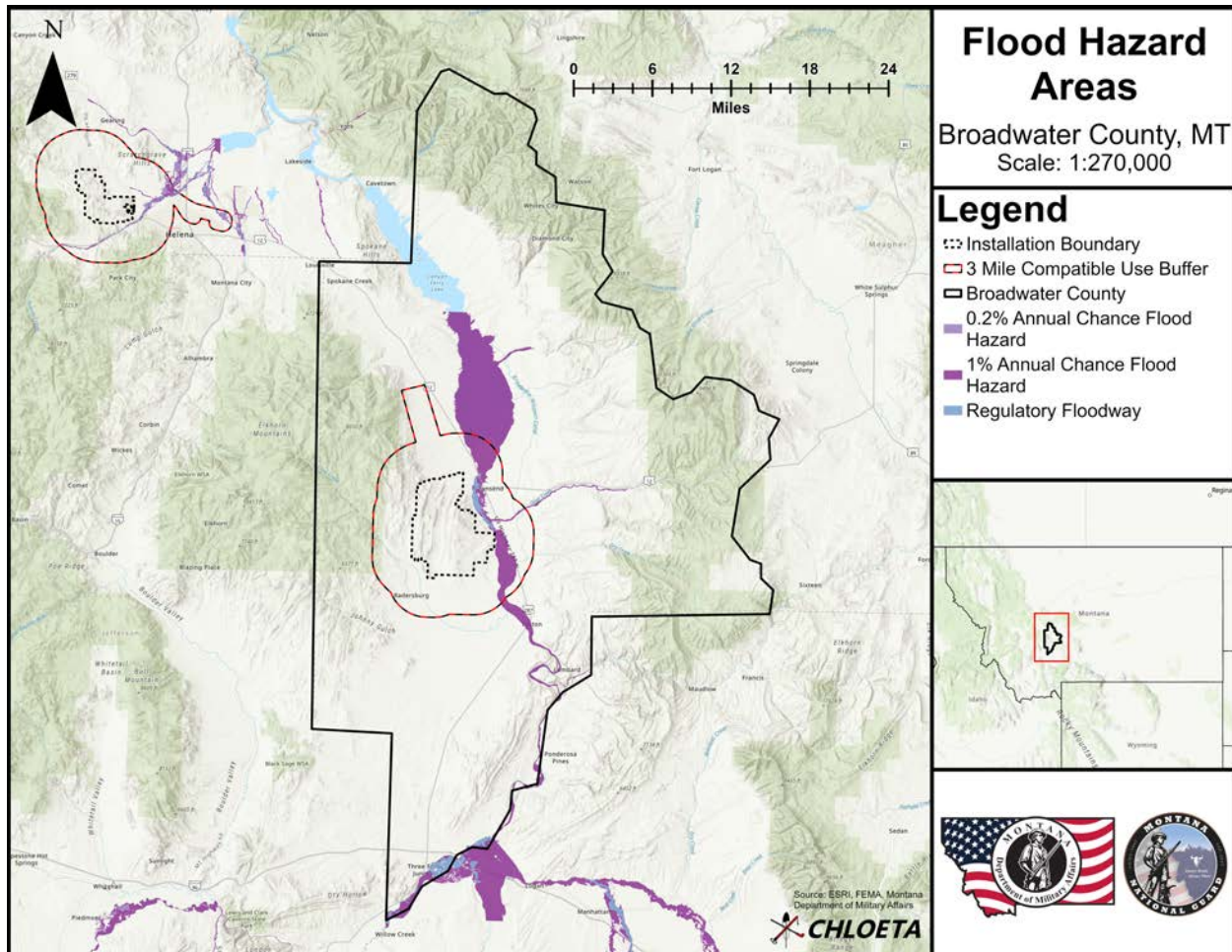


Figure 55. LHTA Assessment Area Flood Map.

The LHTA assessment area is more pronounced than in the FHTA assessment area but remains spatially concentrated along defined river corridors rather than broadly distributed across the landscape. FEMA-mapped flood hazard areas, including the 1-percent annual chance (100-year) floodplain, regulatory floodway, and limited 0.2-percent annual chance (500-year) floodplain, are predominantly associated with the Missouri River corridor and Canyon Ferry Reservoir (Figure 55). These features represent the dominant flood hazard drivers in the county and account for the majority of mapped flood exposure.

Within the assessment area, portions of the LHTA compatible-use buffer intersect mapped floodplains, particularly along downstream reaches influenced by reservoir operations and river stage fluctuations. While the core installation footprint remains largely outside the highest-risk floodway areas, proximity to the Missouri River system introduces indirect flood risk, especially during high-flow releases, snowmelt-driven inflows, and prolonged wet periods. Flood hazards in this setting are primarily riverine in nature, characterized by inundation of low-lying areas adjacent to the channel rather than the rapid, confined flash flooding more typical of steep headwater environments.

Hydrologically, the LHTA assessment area exhibits a transition from upland tributary systems to

large, regulated river dynamics, with flood behavior strongly influenced by reservoir storage levels, managed releases, and cumulative upstream watershed conditions. Canyon Ferry Lake plays a critical role in moderating downstream flood peaks; however, during periods of high inflow or limited storage capacity, elevated water levels can expand floodplain extents and increase backwater effects along tributaries. As a result, flood risk in the assessment area is shaped not only by local precipitation and snowmelt but also by basin-wide hydrologic conditions extending well beyond county boundaries.

Post-wildfire conditions in upstream watersheds further compound flood risk within the LHTA assessment area. Burned landscapes contribute increased runoff volumes and sediment loads to tributaries feeding the Missouri River and Canyon Ferry Reservoir. These inputs can reduce channel capacity, promote sediment deposition in low-gradient reaches, and increase the frequency and extent of overbank flooding. Although these dynamics may not always shift FEMA-mapped floodplain boundaries in the short term, they elevate functional flood risk, particularly during moderate to high flow events following wildfire.

Infrastructure and operational exposure within the assessment area is driven largely by transportation corridors, access routes, and water-related facilities located near the river system. Roads, crossings, and low-water approaches within the floodplain are susceptible to inundation, erosion, and debris accumulation during flood events, potentially disrupting access to LHTA assessment area. Additionally, floodplain-adjacent lands within the compatible-use buffer may experience temporary access restrictions or land-use limitations during prolonged high-water conditions, affecting training support activities and emergency response coordination.

Regulatory floodways mapped along the Missouri River indicate areas of high flow velocity and conveyance where development constraints are significant. While these floodways generally remain outside LHTA, their presence underscores the importance of maintaining channel capacity and avoiding activities that could exacerbate flood elevations or redirect flows toward critical infrastructure. Coordination with county floodplain management and reservoir operations is therefore a key component of effective risk management.

Overall, flood risk within the LHTA assessment area is best characterized as moderate and location-specific, with primary exposure tied to the Missouri River and Canyon Ferry Lake system rather than widespread inland flooding. Direct structural exposure to flood hazards at the LHTA assessment area is limited, but operational, access-related, and downstream impacts remain relevant, particularly under post-wildfire and high-reservoir conditions. Flooding in this context functions as a secondary and compounding hazard, closely linked to wildfire, sediment transport, and watershed management, and should be addressed through integrated riverine floodplain management, upstream watershed stabilization, and infrastructure resilience measures rather than solely through site-level flood avoidance strategies.

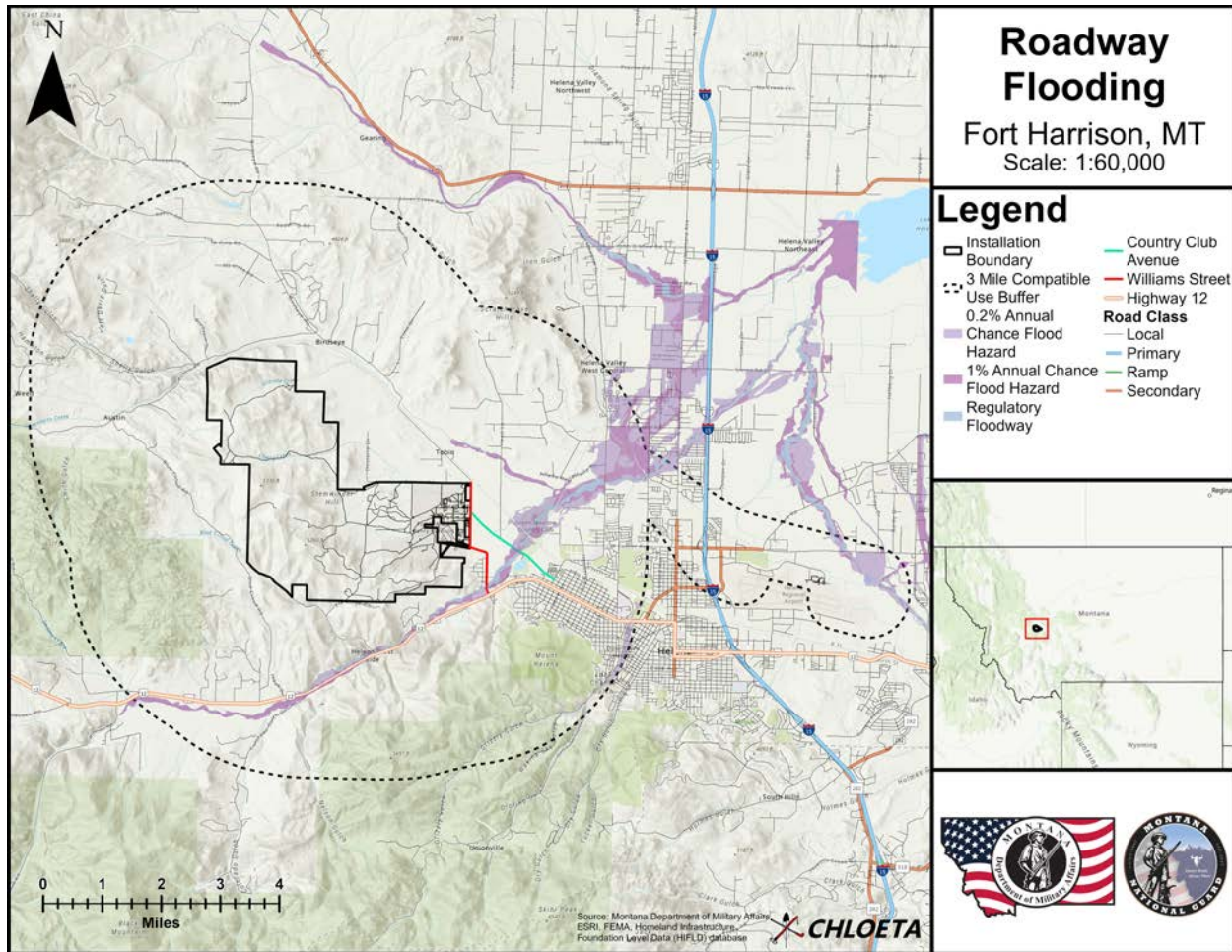


Figure 56. FHTA Assessment Area Roadway Flooding.

Flood risk within the FHTA assessment area is driven by the convergence of constrained transportation corridors, low-gradient valley hydrology, and upstream watershed conditions that amplify runoff during snowmelt, convective storms, and post-fire events. As illustrated in Figure 56, multiple primary and secondary access routes serving both civilian neighborhoods and military facilities intersect mapped 1-percent annual chance floodplains, regulatory floodways, and expanded flood hazard zones associated with Tenmile Creek and its tributaries. These flood-prone reaches directly affect Country Club Road, Williams Street, and segments of U.S. Highway 12, all of which function as shared lifeline corridors for residents, emergency responders, the VA Medical Center, and MTARNG operations.

The spatial extent of mapped flood hazards demonstrates that roadway flooding is not limited to isolated low points but instead reflects broader hydrologic connectivity between upstream watersheds and the Helena Valley floor. During high runoff conditions, overbank flows and backwater effects reduce conveyance capacity at culverts and bridge crossings, increasing the likelihood of overtopping, erosion, and debris accumulation. These impacts are magnified following wildfire or drought periods, when reduced vegetation cover and hydrophobic soils accelerate runoff and sediment transport into drainage systems that were not designed for post-fire flow volumes. As a result, even moderate precipitation events can produce rapid access

degradation, lane closures, or complete route failures within the assessment area.

From a community resilience perspective, the flood exposure of these corridors represents a systemic risk rather than an infrastructure maintenance issue. Flooding along Williams Street and Country Club Road can isolate residential areas west of Helena, delay emergency medical transport to and from the VA Medical Center and restrict ingress and egress for FHTA personnel during concurrent hazard events. Because these routes lack parallel alternatives outside mapped flood hazard zones, their loss compresses evacuation and response traffic onto fewer viable pathways, increasing congestion and life-safety risk during flood-driven evacuations or compound wildfire–flood scenarios.

This analysis underscores the interdependence between municipal stormwater systems, natural floodplains, and military access requirements. Flood hazards extend beyond the installation boundary into developed neighborhoods and commercial areas, reinforcing that mitigation actions must be implemented at the watershed and corridor scale rather than solely within the fence line. Without targeted culvert upsizing, floodplain reconnection, detention capacity, and roadway hardening, recurring flood impacts will continue to degrade access reliability, elevate maintenance costs, and undermine coordinated civilian–military emergency operations within the FHTA assessment area.

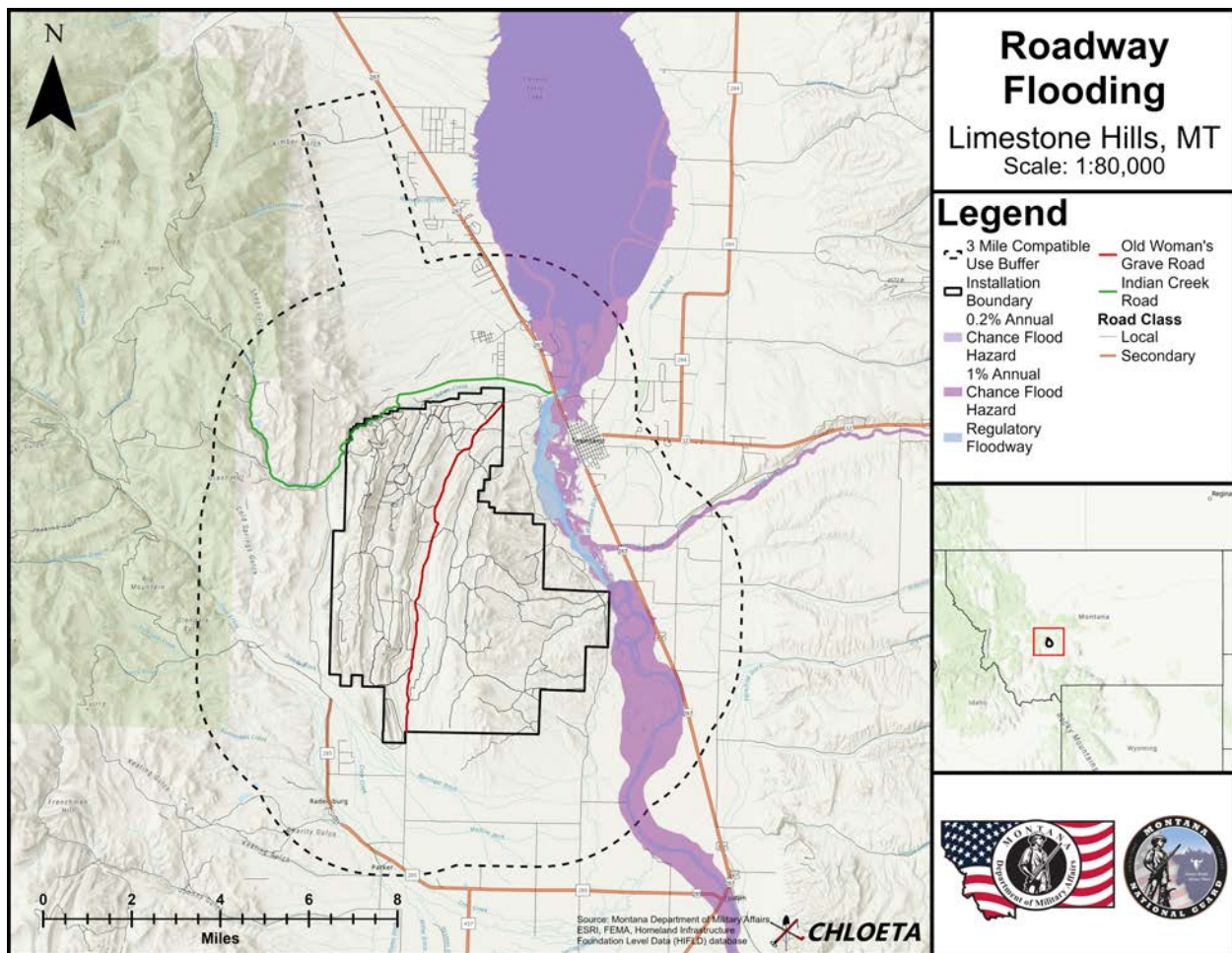


Figure 57. LHTA Assessment Area Roadway Flooding.

Flood risk within the LHTA assessment area is defined by the interaction of steep upland terrain, limited engineered drainage, and reliance on a narrow set of rural road corridors that intersect mapped flood hazard zones along the Missouri River and associated tributary drainages. As shown in the Figure 55. Old Woman's Grave Road, Indian Creek Road, and connecting county routes traverse areas subject to both the 1-percent annual chance floodplain and regulatory floodway influence, particularly where drainage flows concentrate toward the Missouri River corridor and Canyon Ferry Lake. These roadways serve as the primary lifelines for residents, agricultural operations, emergency responders, and MTARNG access to and from the LHTA.

Hydrologic exposure in the LHTA assessment area is driven less by broad overbank flooding and more by rapid runoff, channelized flow, and debris-laden surges originating from steep slopes and sparsely vegetated uplands. During high-intensity convective storms, snowmelt periods, or post-fire conditions, drainage crossings along Old Woman's Grave Road and Indian Creek Road are vulnerable to overtopping, culvert blockage, and road prism failure. The map illustrates that flood hazard zones extend longitudinally along these corridors, confirming that access disruption is likely to occur at multiple points rather than a single isolated crossing.

From a community perspective, the flooding of these corridors presents a critical access and safety concern. Old Woman's Grave Road functions as both an evacuation route and the primary access for fire suppression, medical response, agricultural transport, and military operations. Flood-related closures or load restrictions along this route can isolate rural residents, delay emergency response, and restrict coordinated evacuation or mutual-aid movement during wildfire, flood, or combined hazard events. Because alternative routes are limited, unimproved, or traverse similar hydrologic conditions, loss of a single corridor can sever access for extended periods, as demonstrated during recent storm-driven washouts.

The mapped regulatory floodway along the Missouri River further highlights the downstream dependency of the LHTA assessment area on river corridor stability and reservoir operations. Elevated river stages, backwater effects from Canyon Ferry Lake, or synchronized inflows from tributary drainages can reduce drainage efficiency at roadway crossings and exacerbate erosion along approach embankments. These dynamics increase maintenance burdens for Broadwater County and elevate long-term risk to residents, responders, and military access reliability.

Overall, roadway flooding within the LHTA assessment area is a systemic resilience issue rooted in watershed-scale hydrology and limited infrastructure redundancy. Without targeted culvert replacement, armored drainage crossings, and corridor-level hardening outside of mapped flood hazard zones where feasible, flood impacts will continue to isolate communities, delay emergency response, and constrain MTARNG operations during high-impact events. Effective mitigation must therefore focus on protecting shared lifelines that serve both civilian and military needs, rather than treating roadway flooding as an episodic or localized maintenance problem.

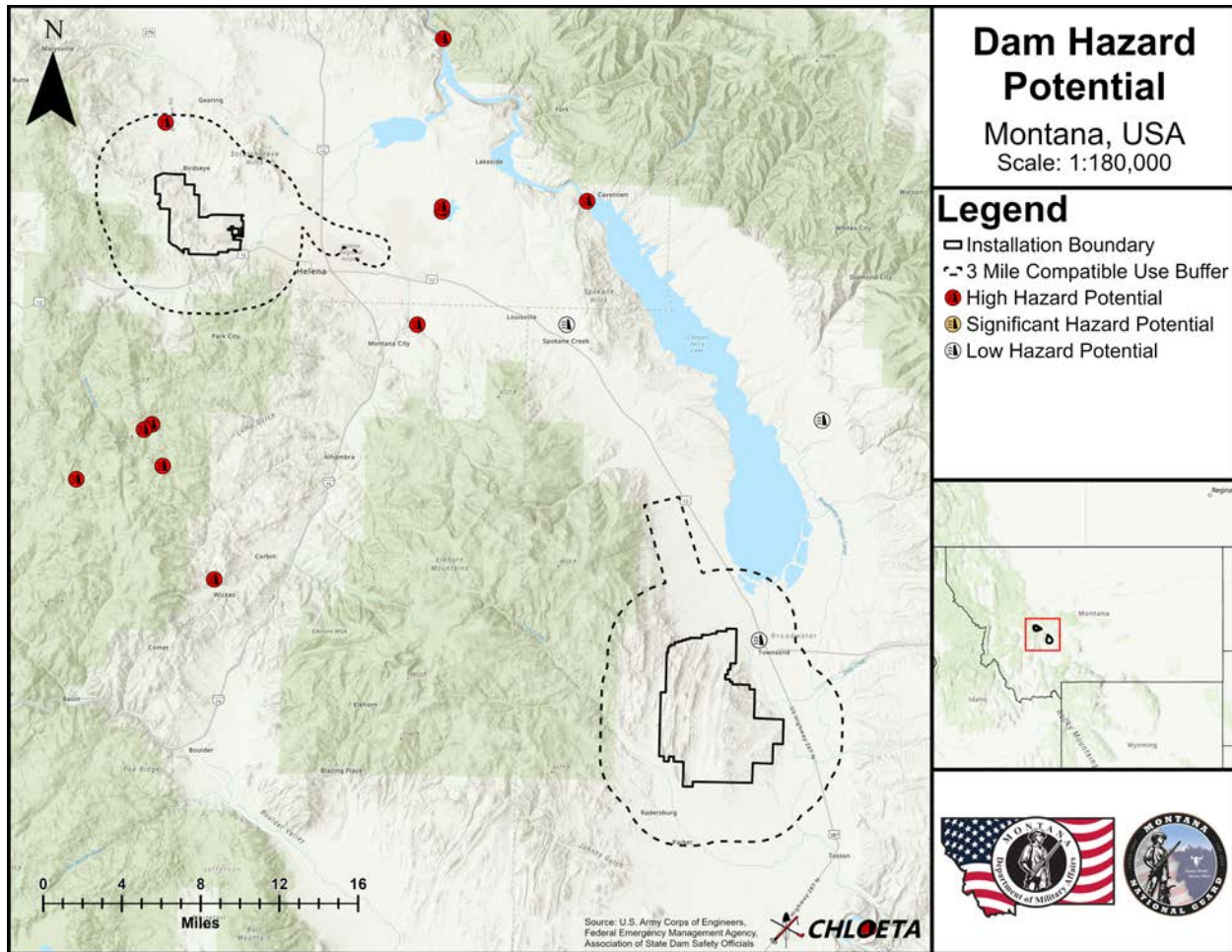


Figure 58. Dam and Reservoir Inundation Areas.

Dam-related hazards affecting the FHTA and LHTA assessment areas are primarily driven by upstream high- and significant-hazard dams located within the broader Missouri River and Canyon Ferry Lake watershed system. As illustrated in Figure 58, multiple high-hazard dams are situated upstream of populated corridors, transportation networks, and critical infrastructure that support both the assessment area. While neither assessment area is located immediately downstream of a dam structure, both are indirectly exposed through shared downstream lifelines, evacuation corridors, and water-dependent systems.

From a community perspective, the most consequential dam-related risk is not sudden structural failure in isolation, but cascading impacts to downstream communities, transportation corridors, and utilities that serve the installations and surrounding populations. A dam release or failure upstream of Helena or along the Canyon Ferry system would propagate rapidly through river corridors that intersect U.S. Highway 12, Interstate 15 approaches, and county road networks used for daily travel, emergency response, agricultural transport, and military mobilization. These same corridors are essential for evacuation, medical access, and mutual-aid response during concurrent hazards such as wildfire or flooding.

The LHTA assessment area is particularly sensitive to downstream dam operations and river stage

fluctuations associated with Canyon Ferry Lake. Elevated releases or emergency drawdowns could inundate low-lying roadway segments, restrict access along Missouri River crossings, and impair evacuation routes serving Townsend, rural residences, and MTARNG access points. Because LHTA relies on a limited number of rural corridors with minimal redundancy, dam-related flooding could isolate communities and delay emergency response even in the absence of a full dam failure scenario.

For the FHTA assessment area, dam hazards intersect with population density, critical facilities, and water-supply dependencies. High-hazard dams upstream of Helena present a downstream risk profile that includes rapid onset flooding, debris transport, and secondary impacts to water treatment, power distribution, and transportation systems. These impacts would affect civilian neighborhoods, the FHTA VA Medical Center, and MTARNG operations simultaneously, amplifying life-safety consequences and complicating coordinated response under the MERF.

Importantly, dam hazard exposure compounds other identified risks in the assessment areas. Post-wildfire watershed conditions increase sediment mobility, which can reduce reservoir storage capacity, affect outlet works, and exacerbate downstream flooding during high-release events. Hydrologic variability further increases operational stress on dam systems, raising the likelihood of emergency releases during periods that already strain local response capacity.

Overall dam hazards represent a regional, system-level risk rather than a site-specific threat confined to installation boundaries. Effective risk reduction therefore depends on coordinated planning between MTARNG, county emergency management, dam operators, and state and federal partners. Integrating dam-failure and high-release scenarios into evacuation planning, transportation hardening priorities, and water-system contingency planning is essential to protect downstream communities, maintain access to FHTA and LHTA, and preserve mission assurance during high-consequence, low-probability events.

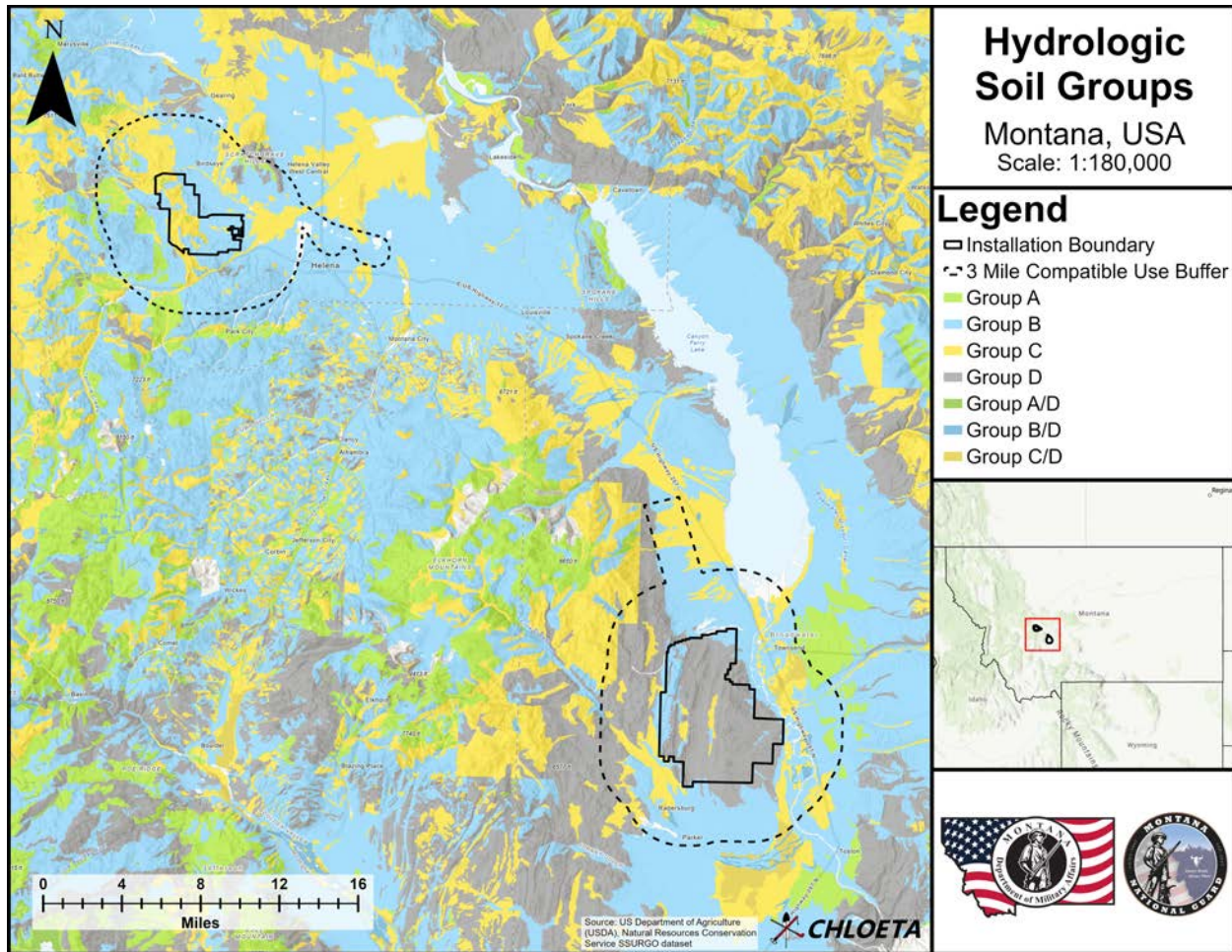


Figure 59. Hydrologic Soil Group

The hydrologic soil groups Figure 59 provides a clear indication of inherent flood and runoff behavior across the FHTA and LHTA assessment areas. Hydrologic Soil Groups classify soils based on infiltration capacity and runoff potential rather than slope or rainfall alone, making them a critical indicator of flood risk, post-fire runoff behavior, and sediment transport. The assessment area is dominated by Hydrologic Soil Groups C, D, and dual-classification soils (C/D and B/D), which collectively indicate moderate to very high runoff potential across much of the landscape. These soil conditions substantially increase the likelihood of flash flooding, debris flows, and downstream sediment impacts when combined with steep terrain, wildfire disturbance, and short-duration, high-intensity precipitation events typical of the region.

Group A soils, which have high infiltration rates and low runoff potential, occur only in limited, isolated pockets, generally within valley bottoms or low-gradient areas. While these soils provide localized groundwater recharge benefits, their limited extent means they do not significantly offset watershed-scale runoff. Group B soils, which have moderate infiltration capacity, are scattered across transitional foothills and lower slopes but become highly vulnerable to increased runoff when compacted by development, training activities, or wildfire. Following disturbance, these soils can rapidly behave more like higher-risk hydrologic groups, contributing to elevated surface flow during storm events.

Hydrologic Soil Group C soils are widespread across upland slopes and interface areas surrounding both installations. These soils have low infiltration capacity and generate high volumes of surface runoff, particularly during intense rainfall. Their prevalence explains the recurring flash-flooding, channel incision, and sediment delivery issues observed in the Tenmile, Sevenmile, and Canyon Ferry drainage corridors. Group D soils, which have very low infiltration due to clay content, shallow bedrock, or high-water tables, are concentrated in steep canyon systems, headwaters, and drainage convergence zones. These soils produce near-total runoff even during moderate precipitation events and are a primary driver of debris flows, culvert failures, and road washouts affecting both civilian and military access routes.

Dual hydrologic soil groups, including A/D, B/D, and C/D classifications, are extensive throughout the assessment area and represent some of the most problematic flood-risk conditions. These soils can function as higher-infiltration groups under dry conditions but rapidly shift to Group D behavior when saturated or compacted. As a result, they are particularly prone to underestimation in flood modeling and infrastructure design, contributing to unexpected exceedance of drainage capacity, roadway overtopping, and infrastructure damage during storm events.

The dominance of high-runoff soils across the assessment area results in short lag times between rainfall and peak flows, high sediment yields, and unstable channel conditions. Post-fire conditions further exacerbate these risks by reducing vegetative cover and soil structure, effectively transforming moderate storm events into high-impact flood scenarios. These hydrologic characteristics directly threaten single-access roads, evacuation corridors, culverts, bridges, and downstream water-supply infrastructure serving both installations and surrounding communities.

From a planning and mitigation perspective, this hydrologic soil distribution demonstrates that flood risk in the assessment area is structural and watershed-driven rather than episodic. Reliance on traditional floodplain mapping alone underrepresents the true extent of risk, particularly under post-fire conditions. The mapped soils support the need for enforceable land-use controls, flood-aware subdivision regulations, upstream detention and sediment control, conservation of upper watershed areas, and hardened access routes. Without these measures, continued development, soil compaction, and wildfire disturbance will compound runoff volumes and sediment transport, increasing downstream flood impacts, infrastructure damage, and operational disruption to both civilian communities and MTARNG installations.

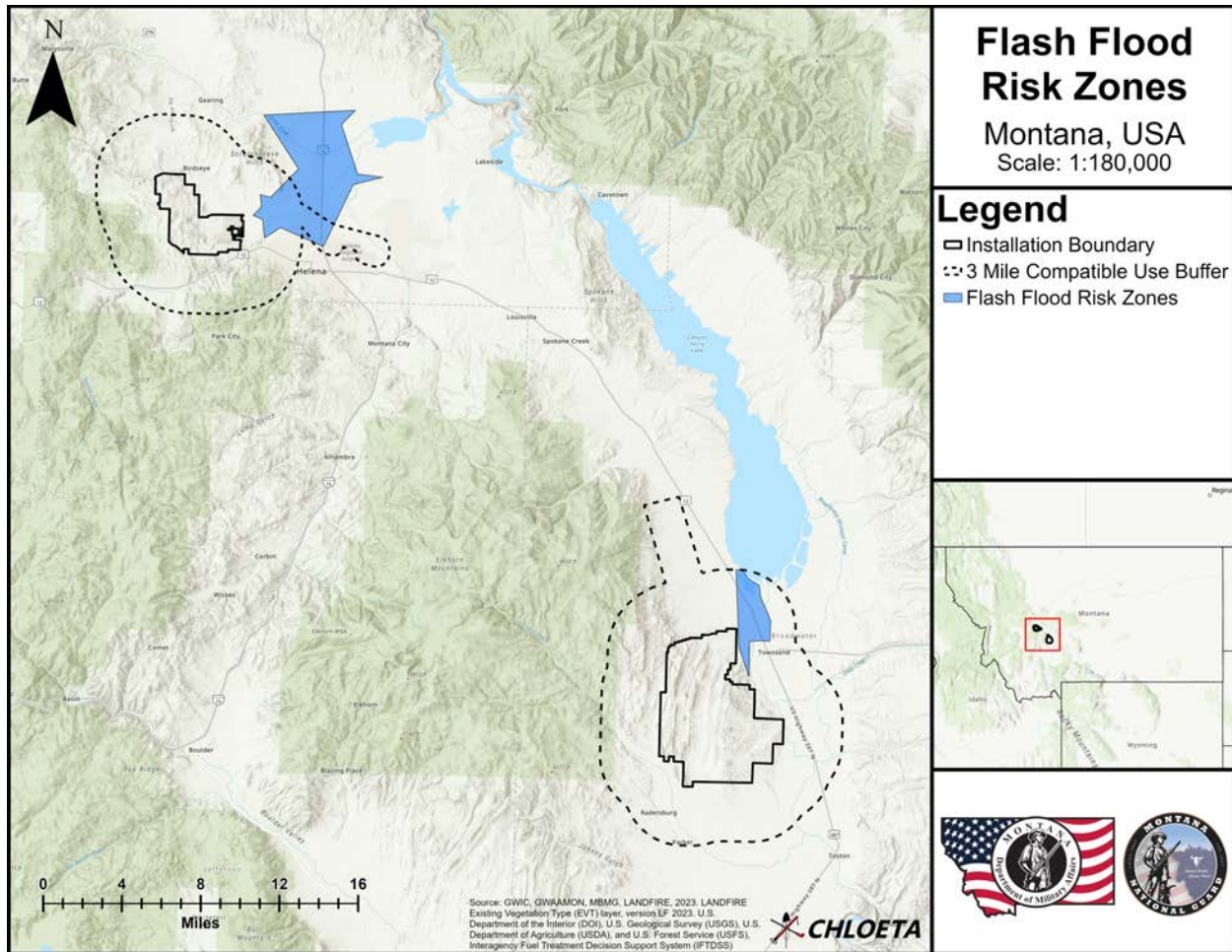


Figure 60. Flash Flood Risk Zone.

Across the FHTA and LHTA assessment area (Figure 60) flash-flood risk is concentrated in steep, confined drainages and downstream alluvial corridors where short-duration, high-intensity precipitation can rapidly generate runoff that exceeds channel and culvert capacity resulting in significant flash flood exposure. Unlike riverine flooding, these areas are vulnerable to rapid onset flooding with limited warning time, creating elevated risk to access routes, training corridors, and adjacent developed areas.

In the FHTA assessment area, flash-flood risk zones are located primarily downslope of the South Hills and upper watershed areas draining toward Helena, where steep slopes, thin soils, and limited floodplain storage accelerate runoff. These areas intersect portions of the installation's eastern and northeastern periphery and overlap with civilian-military interface zones that include transportation corridors and downstream municipal infrastructure. Post-fire conditions in these upland watersheds further increase flash-flood susceptibility by reducing infiltration capacity and increasing sediment transport, amplifying the potential for culvert blockage, roadway overtopping, and localized infrastructure damage during convective storm events.

In the LHTA assessment area, flash-flood risk zones are more narrowly defined but strategically important, occurring along drainages flowing toward the Missouri River and Canyon Ferry

Reservoir. These areas reflect the convergence of steep upland terrain and limited downstream conveyance, where intense rainfall can produce sudden flows that impact installation access routes, training movements, and nearby county road crossings. While the areal extent of mapped risk is smaller than in the FHTA assessment area, the consequences are elevated due to limited alternate access and proximity to shared evacuation and response corridors.

Across both assessment areas, the mapped flash-flood risk zones highlight the importance of upland watershed condition, drainage capacity, and post-disturbance hydrology in shaping flood hazards. The map supports the conclusion that flash-flood risk in the region is highly site-specific, driven by terrain, burn history, and storm intensity rather than broad floodplain inundation. As a result, effective mitigation requires targeted drainage improvements, sediment and debris management, and slope-stabilization measures focused on headwater drainages and infrastructure pinch points, rather than reliance on traditional floodplain controls alone.

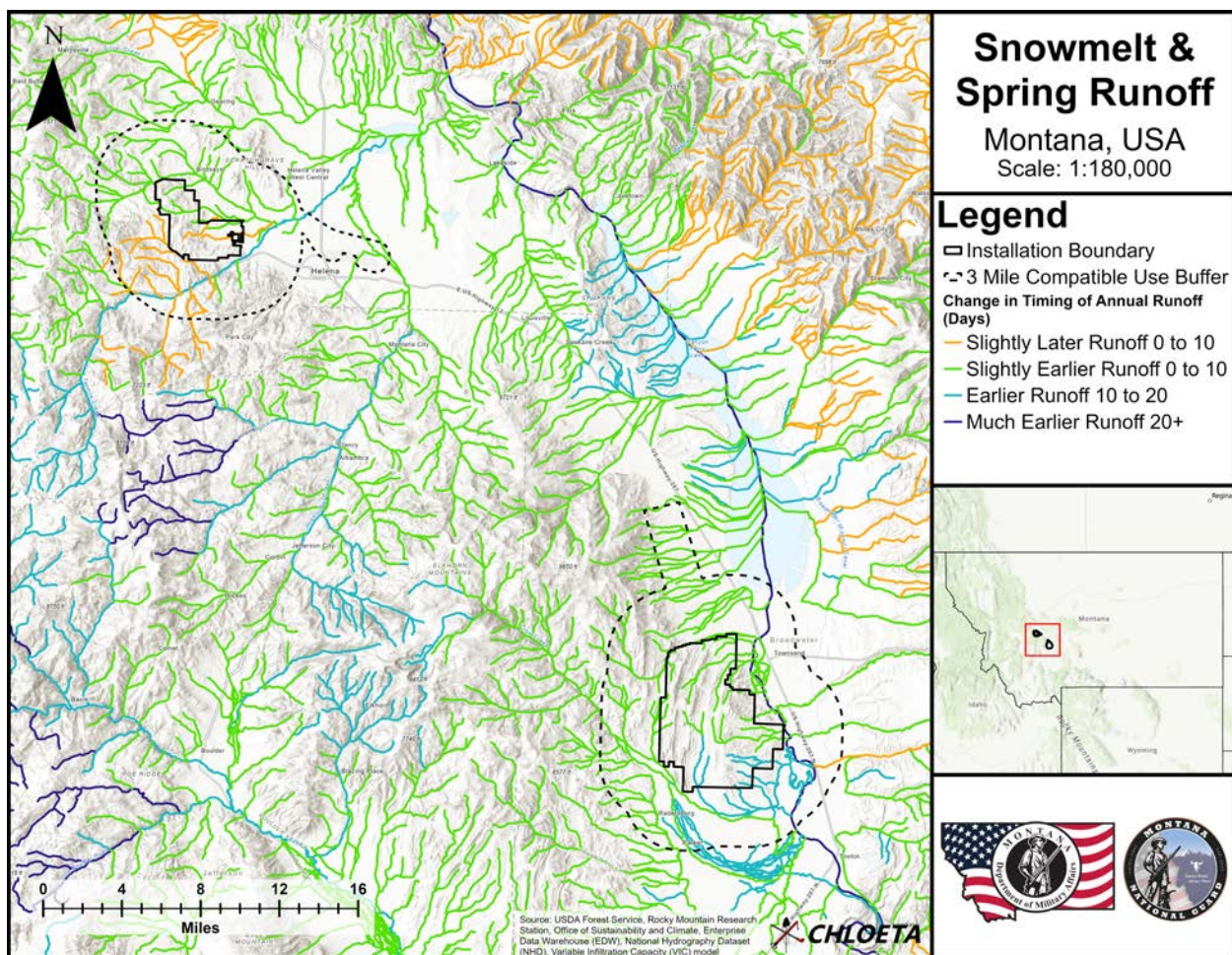


Figure 61. Snowmelt and Spring Runoff Risk Areas.

The snowmelt and spring runoff in the FHTA and LHTA assessment area (Figure 61) has changed across watersheds, clearly shifting toward earlier seasonal runoff in many upland and mid-elevation drainages. These shifts are expressed as runoff occurring 10 to more than 20 days earlier in portions of the surrounding watersheds, particularly in higher-elevation headwaters and steeper

terrain that feed downstream civilian and military infrastructure.

In the FHTA assessment area, earlier runoff is most evident in the South Hills and upper tributaries draining toward Helena, where accelerated snowmelt reduces the natural storage function of seasonal snowpack. Earlier peak flows increase the likelihood that spring runoff coincides with frozen or partially frozen soils, limiting infiltration and increasing overland flow. This timing mismatch elevates the risk of roadway overtopping, culvert exceedance, and localized flooding along access routes, training corridors, and downstream municipal stormwater systems, even in the absence of extreme precipitation events.

Within the LHTA assessment area, earlier snowmelt runoff is concentrated along upland drainages flowing toward the Missouri River and Canyon Ferry Reservoir. Although reservoir regulation moderates large-scale flooding, earlier and more concentrated inflows increase stress on tributary channels, road crossings, and installation access points, particularly where drainage infrastructure was designed for later, more gradual spring melt conditions. These changes can result in higher early-season maintenance demands and reduced reliability of transportation and utility corridors serving the installation.

Across both assessment areas runoff timing shifts are spatially variable, with some lower-elevation or valley-bottom drainages exhibiting little change or slightly later runoff, while upland watersheds show pronounced advances in peak flow timing. This pattern underscores the importance of headwater-driven hydrologic change rather than mainstem river flooding as the primary concern for infrastructure and operational planning.

From a mitigation perspective, earlier snowmelt and spring runoff increase the importance of culvert capacity upgrades, sediment and debris management, slope drainage improvements, and detention or attenuation features that can manage higher early-season flows. Planning and design assumptions based solely on historic runoff timing are no longer sufficient; instead, stormwater and drainage systems supporting both civilian communities and MTARNG installations must be evaluated and designed to perform under earlier, sharper runoff peaks that coincide with vulnerable soil and roadway conditions.

Historical Flood and Hydrological Events

Historical flood and hydrological events, as shown in Table 22, in Lewis & Clark and Broadwater counties, including the FHTA and the LHTA, underscore the recurring nature of water-related hazards. Notable flood-related incidents include the following:

- Seasonal flooding along Prickly Pear Creek impacts FHTA access points.
- Rapid snowmelt events causing inundation in low-lying areas near Helena.
- Flash flooding incidents in steep drainages near the LHTA, damaging access roads and affecting training continuity.

These patterns are expected to worsen due to increased precipitation variability and more intense storm events driven by weather change. The assessment area's vulnerability is further compounded by aging culverts, poorly drained roadways, and development in or near historical floodplains.

Table 22. Significant Regional Historical Flood Events

Year/Date	Location/Waterway	Event Type	Description/Cause	Documented Impacts	Primary Sources
1908	Missouri River/Hauser Dam	Catastrophic Dam Failure	Collapse of original Hauser Dam released surge estimated at 25–30 ft through downstream channel.	Major regional infrastructure loss; widespread inundation through Helena Valley.	USGS Historical Flood Records; DNRC, 2023
1948 (May–June)	Clark Fork & Missouri Basins	Regional Riverine Flooding	Combined rain-on-snow and sustained spring rainfall.	Thousands of acres flooded; bridges and farmland damaged across western Montana.	NCEI; Montana DNRC Archives
1964 (June)	Marias River & Tributaries	Statewide Flood Event	Record-breaking rainfall on snowpack caused extreme discharge levels.	Peak flows exceeded 200-year recurrence; two fatalities; millions in damages.	USGS; Montana Historical Society
1978 (April)	Yellowstone River & Regional Creeks	Spring Runoff Flooding	Rapid snowmelt after heavy snowstorms.	Roads, bridges, and crops damaged; localized washouts in Broadwater County.	NCEI; DNRC Flood Chronology
1981 (May)	Prickly Pear & Tenmile Creeks, Helena Valley	Rain-on-Snow Flooding	Warm rain over late snowpack produced record discharges.	Approximately \$30 million in damages; bridge failures and widespread	USGS Gage 06062500; NCEI 1981 Event Log

Year/Date	Location/Waterway	Event Type	Description/Cause	Documented Impacts	Primary Sources
				inundation in Helena and East Helena.	
1997 (May)	Upper Tenmile Creek	Spring Flooding	Above-normal snowpack and rapid melt.	Road and culvert washouts near Helena; minor flooding at FHTA perimeter.	Lewis & Clark County DES Annual Report
2005 (June)	Prickly Pear Creek & Tributaries	Localized Flash Flooding	Intense convective storm cell.	Flooded road crossings and sediment deposition; temporary road closures.	NCEI Storm Events, 2005
2011 (May–June)	Missouri River Basin	Prolonged Riverine Flooding	Persistent snowmelt and upstream reservoir releases.	Bank erosion near Townsend; access limitations along Highway 12 corridor.	USGS Gage 06066500; FEMA MT-1996-DR Summary
1988 (July–August)	Canyon Creek	Post-Fire Flash Flooding	Precipitation on burn scars following Canyon Creek Fire.	Debris flows blocked culverts; severe erosion on access roads.	DNRC Post-Fire Hydrology Study, 2013
2014 (June)	York Road/Prickly Pear Creek	Localized Flash Flood	2.5 inches of rain in 90 minutes.	Washouts and culvert overtopping; \$400,000 in local road damage.	Lewis & Clark County DES, 2014

Year/Date	Location/Waterway	Event Type	Description/Cause	Documented Impacts	Primary Sources
2017 (May)	Helena Valley/Tenmile Basin	Spring Snowmelt Flooding	Heavy snowpack followed by rapid melt.	Low-lying areas near Helena flooded; minor impacts to FHTA perimeter roads.	NCEI; Lewis & Clark County Office of Emergency Management (OEM) Report
2018 (June)	FHTA	Localized Overland Flow	Saturated soils and convective rainstorms.	Maneuver trail erosion; washouts on Williams Street; training interruptions.	DMA Range Maintenance Logs, 2018
2019 (July)	LHTA	Flash Flooding/Debris Flow	Cloudburst storm over steep canyons.	Washed-out fords on Pipeline and Old Woman's Grave Roads; sediment buildup on training routes.	DMA Range Control Post-Event Survey, 2019
2020 (August)	LHTA Assessment Area (Cave Gulch Fire Burn Scar)	Post-Fire Runoff	Thunderstorms over burned terrain.	Erosion channels and debris deposits; temporary loss of access to assessment areas.	DNRC BAER, 2020
2021 (July)	Canyon Creek Drainage	Flash Flooding	1.5 inches of rain in under one hour.	Severe gully erosion; culvert failure; 48-hour access restriction.	DMA Field Inspection Report, 2021

Year/Date	Location/Waterway	Event Type	Description/Cause	Documented Impacts	Primary Sources
2022 (June)	Tenmile Creek/Helena	Cloudburst & Flash Flooding	1.1 inches of rain in less than one 1 hour on hydrophobic soils.	Road closures; culvert blockages; sediment inflow to Helena stormwater system.	NOAA NCEI, 2022; City of Helena Public Works
2023 (August)	LHTA Access Roads/Missouri Tributaries	Flash Flood/Debris Flow	Convective thunderstorm following dry season.	Debris accumulations over 3 cubic yards per 100 ft; impassable access for 72 hours.	DMA Range Control, 2023
2024 (April–May)	Broadwater County/Deep Creek Basin	Spring Runoff Flooding	Above-normal snowpack melt and April rain-on-snow.	Shallow overland flooding on Indian Creek and Duck Creek corridors; rural access delays.	USGS 2024 Streamflow Summary; Broadwater County DES

Regional Trends

Between 2010 and 2024, 38 flood and flash-flood events were recorded across the two counties, causing \$12.6 million in property and infrastructure damage (NOAA NCEI 2024). More than 40 percent of these incidents followed wildfire activity, confirming a strong relationship between post-fire hydrology and sediment-laden runoff (DNRC 2023). Statewide, localized flash floods account for nearly 70 percent of all flood losses.

Earlier snowmelt, now occurring one to three weeks sooner than the 20th-century baseline, has shifted runoff peaks into late winter and early spring, while extended low-flow summers heighten erosion and sediment transport (Pederson et al., 2011; Whitlock et al., 2017). Post-fire basins including Meriwether and Canyon Creek have exhibited runoff rates five to ten times higher than pre-fire conditions, overwhelming culverts and degrading unpaved roads (Moench et al., 2008).

Localized Impacts

Helena and Urban Watersheds: High-intensity rainfall events are increasing in frequency. The

June 2022 cloudburst produced 1.1 inches of rain in under an hour, exceeding the 10-year design storm and flooding intersections near North Montana Avenue. Drainage channels leading into the Tenmile and Prickly Pear Creek systems experienced sediment surges that stressed the city’s stormwater network.

Rural Corridors: Overland flooding routinely affects York Road, Indian Creek Road east of Townsend, and Duck Creek Road west of Helena, where undersized culverts and erodible slopes concentrate runoff. Annual maintenance costs for flood-related rural road repair exceed \$600,000 across both counties (Lewis & Clark DES 2023; Broadwater County DES 2022).

FHTA: Saturated soils and limited drainage capacity cause recurrent washouts on Williams Street and maneuver-training trails. Inspections after the 2018 and 2022 runoff seasons documented ruts exceeding 18 inches and repeated closures that interrupted training schedules.

LHTA: The installation’s steep canyons and un-engineered drainages make it highly vulnerable to flash flooding and debris flows. Cloudburst events in 2019 and 2023 generated debris accumulations exceeding 3 cubic yards per 100 feet of channel, blocking Pipeline Road and Old Woman’s Grave Road (DMA Range Control 2023).

Across installations and surrounding jurisdictions, these recurring impacts impede emergency access, accelerate infrastructure degradation, and elevate maintenance costs, which have surpassed \$4.3 million since 2015 (Lewis & Clark County Road Department 2024).

Jurisdictional Exposure

Table 23. Jurisdictional Exposure Vulnerabilities and Risks Floods

Jurisdiction/Area	Flood Exposure	Primary Vulnerabilities	Strategic Risks
FHTA	Moderate	Limited drainage; steep contributing slopes; undersized culverts.	Disrupted training and emergency access; localized facility flooding.
LHTA	Moderate	Flash flooding in steep canyons; post-fire erosion.	Washed-out roads; reduced range accessibility; operational delays.
City of Helena	High	Stormwater overload; Tenmile Creek surges.	Urban flooding; infrastructure wear; escalating maintenance costs.
City of Townsend	Moderate	Aging culverts; irrigation backflow.	Road closures; water-quality degradation; emergency access issues.
Lewis & Clark County	Moderate	Burn-scar runoff; rural drainage failures.	Isolation of residents and responders; rural infrastructure loss.

Broadwater County	Moderate	Agricultural drainage and riparian flooding.	Crop loss; road washouts; degraded irrigation systems.

Operational and Strategic Implications

- Post-fire flooding and erosion now pose the greatest near-term threat to transportation continuity across MTARNG operations.
- Aging culvert networks require systematic replacement and upsizing, particularly along access routes shared by civil and military users.
- Stormwater and watershed modeling should integrate updated NOAA Atlas 14 precipitation data and projected snowmelt shifts.
- Targeted mitigation priorities include culvert and bridge retrofits, slope stabilization at LHTA, and hydrologic monitoring of Tenmile Creek and Missouri River sub-basins.

Risk Outlook

The FHTA- LHTA assessment area faces increasing flood and hydrologic vulnerability due to intensified precipitation variability, earlier snowmelt, and expanding land use within steep terrain. While large-scale Missouri River flooding remains infrequent, typically with a 10- to 25-year recurrence interval, localized flash flooding, culvert overtopping, and debris flows have become more common across Lewis & Clark and Broadwater Counties, particularly following wildfire events.

In Montana, localized flash floods now account for nearly 70% of all flood-related damages statewide (DNRC, 2023). Between 2010 and 2024, the National Centers for Environmental Information (NCEI) recorded 38 flood or flash flood events in the two-county assessment area, with combined property losses exceeding \$12.6 million. Approximately 41% of these events occurred within two years of significant wildfires, indicating strong correlation between post-fire runoff and increased sediment transport.

The 2022 Tenmile Creek flood exemplified these dynamics: intense rainfall on hydrophobic soils caused road washouts and culvert blockages that disrupted access to critical facilities west of Helena. Similar events have occurred along the Missouri River corridor near Townsend, where overbank flows and channel migration have damaged rural road networks and irrigation infrastructure.

Earlier snowmelt, now occurring one (1) to three (3) weeks earlier than historical averages across much of western Montana, has increased the frequency of high spring runoff events, while summer low-flow periods have extended longer, reducing infiltration and increasing peak runoff potential during late-season storms (Pederson et al., 2011; Whitlock et al., 2017).

Post-fire basins in the Meriwether and Canyon Creek areas have exhibited runoff rates 5–10 times higher than pre-fire levels, producing sediment loads capable of overwhelming culverts, eroding unpaved access roads, and degrading aquatic habitat (Moench et al., 2008).

These hydrologic shifts, especially within the Tenmile and Missouri River watersheds, are accelerating watershed instability, increasing erosion rates, and straining emergency response

systems that depend on vulnerable transportation and drainage corridors.

Table 24. Flood and Hydrologic Statistics – Lewis & Clark and Broadwater Counties (2010–2024)

Indicator	Statistic/Trend	Source
Total recorded flood or flash flood events	38 events (2010–2024)	NOAA NCEI Storm Events Database, 2024
Estimated total property damage	\$12.6 million	NCEI, 2024
Percent of flood events following wildfire	41% (16 of 38 events)	DNRC Post-Fire Hydrology Reports, 2023
Average snowmelt shift	1–3 weeks earlier vs. 20th-century baseline	Pederson et al., 2011; Whitlock et al., 2017
Post-fire runoff rate increase	5–10 times pre-fire levels	Moench et al., 2008
Areas of highest localized risk	Tenmile Creek, Prickly Pear Creek, Canyon Creek, Missouri River near Townsend	DNRC Floodplain Mapping Program, 2023
FEMA National Flood Insurance Program (NFIP) repetitive loss properties	7 (Lewis & Clark County), 3 (Broadwater County)	FEMA NFIP Data, 2023
Average recurrence interval for major riverine flooding (Missouri River)	10–25 years	USGS Gaging Station 06066500 (Canyon Ferry), 2024

Annex F: Land-Use Compatibility, WUI Standards, and Enforcement Analysis

The FHTA and LHTA face increasing land-use pressures from development, rural sprawl, and commercial expansion that erode operational buffers and heighten exposure to wildfire, flooding, and airspace conflicts. These trends documented in the FHTA JLUS (2014) and reaffirmed in both counties' 2024–2025 growth policy updates, reflect fragmented jurisdictional control over zoning, subdivision review, and hazard overlay enforcement.

Regional Context

Encroachment within the FHTA–LHTA assessment area manifests as development advances into historically low-density, high-risk terrain once functioning as natural buffers. The JLUS (2014) identified incompatible land uses along the western and southern perimeter of FHTA, where urban growth from Helena increasingly overlaps the High Noise (greater than 65 dB DNL) and Accident Potential Zones (APZs) established under DoDI 4165.57 (AICUZ Program). Similarly, at LHTA, the JLUS (2014) found that rural parcelization and unregulated grazing expansion (

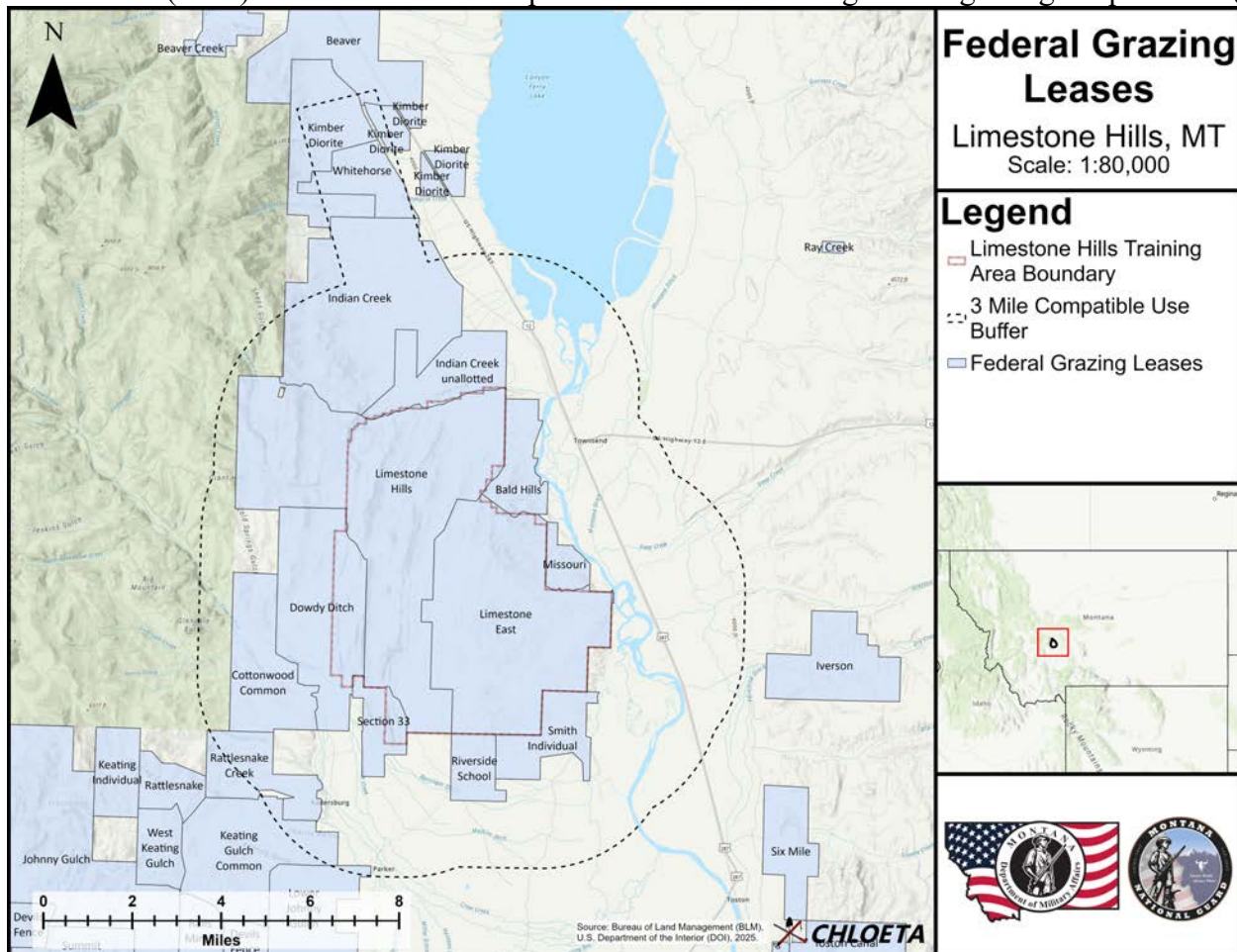


Figure 62) has incrementally reduced range safety buffers and increased the probability of unauthorized access.

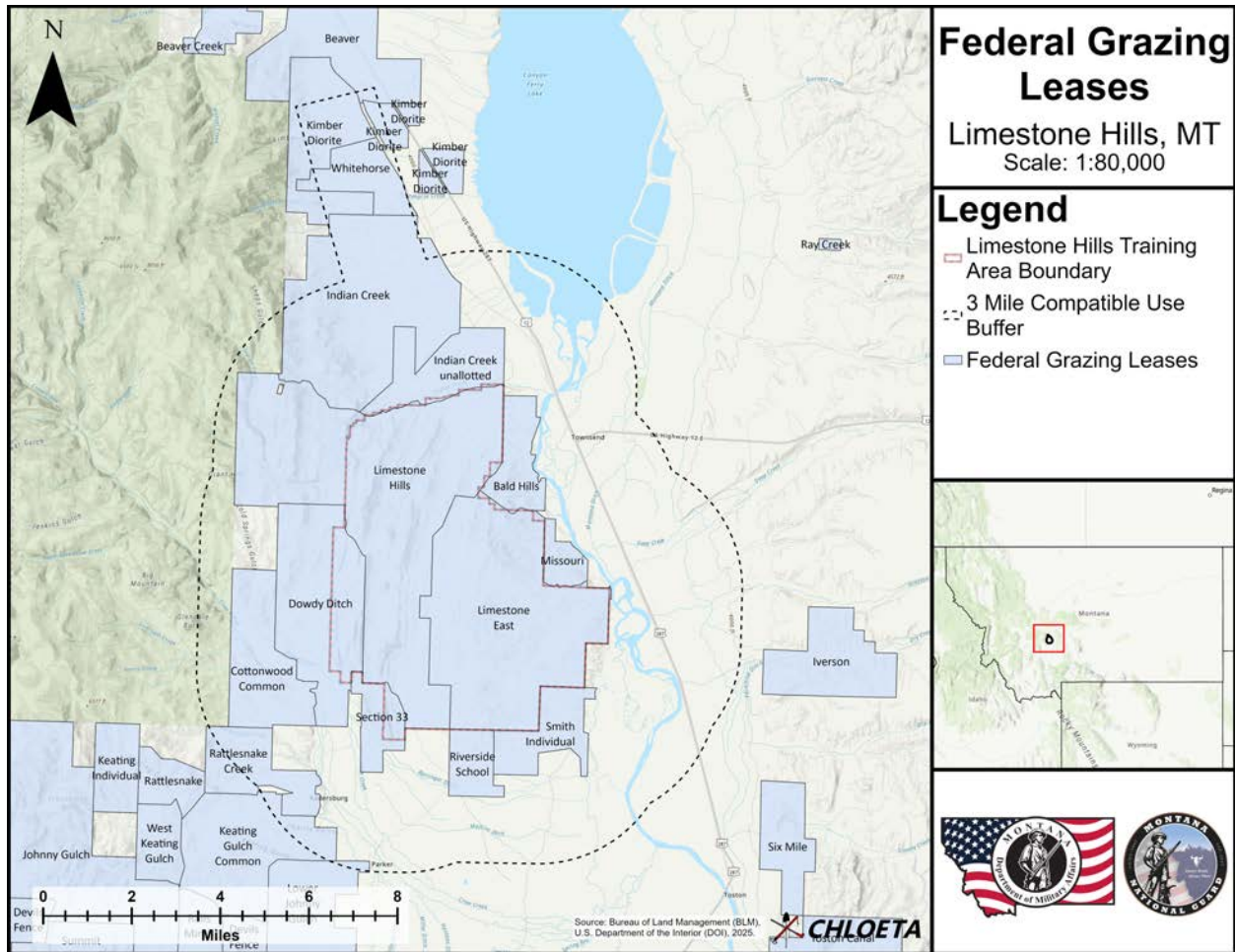


Figure 62. LHTA Grazing Map

The REPI Program further reinforces these findings by identifying more than 120,000 acres of land surrounding the FHTA and LHTA as priority areas for conservation and compatible land use. These priority areas include REPI Priority Areas 1–3 around FHTA (approximately 51,000 acres) and REPI Priority Areas 4–6 around LHTA (approximately 69,000 acres), reflecting locations where land conversion pressures pose the greatest risk to training access, operational flexibility, and long-term mission sustainability.

Defensible Space and Enforcement

In both counties, “defensible space” is defined as the managed zone extending 0–100 feet around a structure that reduces flame length, radiant heat, and ember exposure during wildfire events. Requirements mirror Montana Code Annotated § 76-13-145 and NFPA 1144/1140 provisions:

- Zone 0 (0–5 ft): Noncombustible materials only (gravel or concrete).
- Zone 1 (5–30 ft): Remove ladder fuels; limb trees over 10 ft above grade.
- Zone 2 (30–100 ft): Thin vegetation, maintain egress, and ensure water access clearance.

Enforcement authority lies with the local fire code official or fire marshal, supported by county

planning departments and DES for subdivision approvals. The Helena City Code §11-22, Lewis & Clark County Zoning §10-6-101, and Broadwater County Growth Policy Addendum (2024, §5.3.4) all require defensible-space implementation as a subdivision condition but differ in ongoing maintenance enforcement, creating enforcement gaps within high-risk WUI areas near FHTA and LHTA.

Planning and Zoning Integration

Despite adoption of modernized codes, land-use harmonization across jurisdictions remains incomplete:

- City of Helena’s Unified Development Code integrates hazard overlays and stormwater standards but lacks a comprehensive WUI defensible-space maintenance program (Helena Zoning Regulations, 2019).
- Lewis & Clark County Zoning Regulations (2022, §10-7) contain hillside and WUI provisions but limited coordination with military buffer objectives.
- Broadwater County Growth Policy Addendum (2024, §3.5) notes that most residential development along US 287 between Townsend and LHTA occurs outside enforceable zoning districts, leaving large tracts unreviewed for compatibility with REPI priority areas or flight paths.

This inconsistent regulatory environment permits incremental encroachment into high-decibel or wildfire-prone areas, weakening the military–civilian interface undermining Unified Facility Criteria (UFC 3-600-01) wildfire and access standards for adjacent properties.

Installation-Specific Findings

FHTA: Growth on Helena’s western and southern perimeter has produced subdivision encroachment into both Noise Zone II (60–65 dB) and the primary mutual-aid access corridor along Williams Street and Country Club Road. The JLUS (2014) recommended a half-mile Military Compatibility Overlay Zone (MCOZ) around FHTA, but this has not been formally adopted. Subdivisions including Silver Creek Estates and Birdseye View have expanded into former agricultural buffers, reducing defensible-space continuity and increasing ignition potential.

LHTA: Although largely rural, Broadwater County’s lack of zoning, subdivision review and building approval process enables fragmented 20- to 40-acre parcel sales near the range perimeter. The JLUS (2014) identified Old Woman’s Grave Road and Pipeline Road as critical encroachment vectors due to unrestricted access and grazing leases. The FY26 REPI Mapping shows 36,944 acres designated for acquisition or easement to protect training integrity; however, informal fencing, water withdrawals, and access roads continue to erode range boundaries.

City of Helena and Townsend: Urban expansion from Helena and low-density sprawl from Townsend have introduced mixed-use and agricultural subdivisions into high-risk corridors. Both cities’ growth areas intersect flood-prone basins and wildfire hazard overlays (Lewis & Clark Growth Policy 2025, §6.4; Broadwater Addendum 2024, §5.2), yet enforcement of WUI setbacks and defensible-space standards remains inconsistent. These developments constrain DMA logistics routes and emergency ingress during wildfire or flood events.

Strategic Coordination and Mitigation Priorities

The 2014 JLUS and 2025 PPLT Annual Report recommend an intergovernmental Compatible Use Implementation Memorandum of Understanding (MOU) between DMA, City of Helena, Lewis & Clark County, and Broadwater County to ensure military notification during subdivision review, building approval, buffer enforcement conservation, and alignment of defensible-space enforcement with CWPP and REPI implementation priorities.

Priority mitigation measures include:

- Adoption of Military Compatibility Overlay Zones (MCOZs) around both installations, aligning zoning and subdivision standards with REPI boundaries.
- Standardized defensible-space enforcement across jurisdictions, requiring annual inspections and recorded maintenance covenants.
- Formal interagency plat review by DMA and PPLT for developments within REPI identified Priority Areas.
- Integration of hazard overlays (flood, slope, and fire) into zoning and comprehensive plans to prevent cumulative exposure along DMA access corridors.

Table 25. Incompatible Land Use and Encroachment Impact Summary

Jurisdiction/Area	Encroachment Patterns	Key Conflicts	Strategic Implications
FHTA	Residential expansion from Helena’s western edge; pressure on noise and fire buffers.	Noise complaints; access constraints; shared utility demand.	Training disruptions; reduced readiness flexibility; erosion of buffer areas (JLUS 2014; REPI FY25).
LHTA	Informal rural lot sales and grazing near perimeter.	Unauthorized access; water withdrawals; fencing conflicts.	Loss of range safety buffer; reduced maneuver flexibility (JLUS 2014; REPI FY25).
City of Helena	Mixed-use and fringe WUI development near floodplains.	Stormwater overload; limited defensible space; fire access issues.	Increased infrastructure stress; heightened response complexity (Helena Zoning 2019; Growth Policy 2025).
City of Townsend	Expansion into irrigated and flood-vulnerable areas.	Flood risk; fire access constraints; limited coordination.	Elevated response time; infrastructure strain (Broadwater Addendum 2024).
Lewis & Clark County	Rapid WUI growth near FHTA perimeters.	Narrow roads; noncompliant setbacks; limited oversight.	Increased ignition risk; delayed emergency access (Lewis & Clark Zoning 2022).

Jurisdiction/Area	Encroachment Patterns	Key Conflicts	Strategic Implications
Broadwater County	Scattered housing near utility corridors and LHTA flight paths.	Noise and airspace conflicts; absent hazard overlays.	Airspace interference; loss of rural character; mission conflict (JLUS 2014; REPI FY25).

Annex G: Weather Projection Analysis

Weather-driven stressors across the FHTA and LHTA assessment area are projected to increasingly affect mission assurance, training reliability, and infrastructure operations through mid-century. According to the DoD Climate Risk Analysis (2021) and U.S. Army Climate Strategy (2022), the Northern Rockies are expected to experience sustained warming, heightened drought severity, and greater wildfire activity. Application of the Defense Climate Assessment Tool (DCAT) confirms that these evolving conditions, more frequent heatwaves, prolonged fire seasons, and intensified post-burn flood events, pose direct threats to operational continuity. Coordinated planning that integrates weather-informed scenarios into infrastructure upgrades, land-use decisions, and emergency response coordination is essential to ensure long-term resilience.

Temperature Trends

Communities surrounding the FHTA and LHTA are experiencing steadily intensifying heat conditions that are reshaping everyday living, emergency response demands, and land-management risk. Average annual temperatures across the Helena Valley, Broadwater Valley, and adjacent foothill communities are projected to rise substantially by mid-century, with the most pronounced warming occurring during the summer months. In lower-elevation population centers and travel corridors that serve both installations, the frequency of days exceeding 90°F is demonstrates a clear upward trend, increasing heat exposure for residents, outdoor workers, first responders, and military personnel alike. Higher temperatures drive greater household and institutional cooling demand, place added stress on electrical systems, and accelerate drying of soils, grasses, and forest fuels across shared landscapes.

These warming trends are occurring alongside a documented increase in weather conditions conducive to rapid wildfire ignition and spread. Periods combining high temperatures, low relative humidity, and strong winds, conditions associated with Red Flag Warnings, are becoming more frequent and longer-lasting across both counties. For communities adjacent to FHTA and LHTA, this translates into heightened wildfire risk near homes, roads, utilities, and evacuation corridors that also support military access and response. Extended fire-weather windows increase the likelihood that a single ignition could escalate into a multi-day event affecting civilian neighborhoods, ranchlands, and installation operations simultaneously.

Population growth and dispersed rural development near the LHTA and along flight-training and access corridors further compound this risk. New residences, recreational use, and seasonal activities introduce additional ignition sources in areas with limited fire protection coverage and long response times. Fire starts associated with debris burning, equipment use, or recreation increasingly occur in proximity to public lands and shared response zones, underscoring the interconnected nature of civilian and military wildfire exposure and the need for coordinated prevention and outreach.

Rising nighttime temperatures also reduce natural recovery during heat events, placing sustained stress on people, livestock, and infrastructure. Historically reliable snowpack in the Elkhorn Mountains and Big Belt Range has supported the headwaters that supply Tenmile Creek, Deep Creek, and the Missouri River system, resources essential to municipal water supply, irrigation,

and emergency response. Earlier snowmelt and diminished late-season runoff now limit water availability during peak summer demand, constraining firefighting capacity and increasing competition among municipal, agricultural, and emergency uses. These conditions directly affect community resilience around FHTA and LHTA, reinforcing the need for integrated planning that addresses heat, wildfire, and water reliability as interrelated risks across shared landscapes.

Precipitation Patterns

Total annual precipitation across the FHTA and LHTA assessment areas is projected to remain relatively stable; however, the seasonal timing, form, and hydrologic response of that precipitation are changing in ways that increase community and infrastructure risk. Regional climate and hydrology analyses consistently indicate a shift toward a higher proportion of winter and early spring precipitation falling as rain rather than snow at elevations below approximately 6,000 feet, including much of the Helena Valley, Broadwater Valley, and lower foothill drainages surrounding both installations (NOAA NIDIS; USGS; Montana Climate Office). This transition is driving earlier peak runoff, typically two to four weeks earlier than historical norms, reducing late-summer baseflows during periods of highest municipal, agricultural, and wildfire suppression demand.

Increased winter and spring rainfall occurring on frozen or saturated soils further elevates flash-flood and debris-flow risk, particularly in steep canyon drainages, burned watersheds, and areas with thin soils and limited infiltration capacity. These conditions heighten flood exposure along transportation corridors, culvert crossings, and low-water fords that serve both civilian communities and military access routes near FHTA and LHTA assessment area. In Helena and Townsend, urban creeks and low-lying neighborhoods face compounded flooding challenges as altered runoff timing intersects with aging stormwater systems originally designed for snowmelt-dominated hydrology (FEMA FIRMs; Montana DNRC Floodplain Management Program).

Collectively, these shifts increase the likelihood that moderate precipitation events will produce outsized runoff, infrastructure damage, and access disruptions, particularly when compounded by post-fire watershed conditions. The resulting mismatch between runoff timing and water availability underscores the need for integrated watershed, stormwater, and access-corridor planning across civilian and military jurisdictions to maintain life safety, water reliability, and mission continuity.

Extreme Events

Extreme weather events affecting the FHTA and LHTA assessment areas are projected to increase in intensity, duration, and operational impact across all seasons, with compounding effects on community safety, infrastructure reliability, and MTARNG mission readiness (NOAA; Montana DNRC; USFS).

- **Wildfire Season:** The regional wildfire season is projected to lengthen by approximately 30–60 days, driven by earlier snowmelt, warmer spring temperatures, and prolonged late-summer dryness. The greatest exposure is concentrated around LHTA and WUI-adjacent areas of Lewis & Clark County, where fine-fuel continuity, wind-aligned drainages, and expanding development increase ignition probability and suppression complexity (USFS Fire Season Trend Analysis; DNRC Fire Weather Program, 2024).

- **Drought:** Drought recurrence intervals are shortening, shifting from historical one-in-five-year patterns toward one-in-two-year conditions, with a higher likelihood of multi-year drought sequences. These trends intensify fuel desiccation, reduce surface-water reliability, and elevate post-fire runoff and erosion risk across the Tenmile, Sevenmile, and Upper Missouri River watersheds (USDA U.S. Drought Monitor; NOAA NIDIS; Montana Climate Office).
- **Convective Storms:** High-intensity convective storms—including strong straight-line winds, hail, and microburst events—are becoming more frequent and severe during late spring and summer. These storms pose increasing risks to field training operations, aviation assets, communications infrastructure, and exposed utility systems, while also driving localized flash flooding and debris movement in steep terrain (NOAA Storm Prediction Center; USGS Post-Fire Hydrology Studies).
- **Winter Storms:** While the overall number of winter storm events may decline, remaining storms are projected to produce more intense snowfall, ice accumulation, and rain-on-snow conditions, increasing the likelihood of transportation disruptions, power outages, and access limitations affecting both civilian communities and military installations (NOAA Climate Normals; MDT Winter Resilience Assessments).

Resilience Planning Implications

Projected changes demand proactive, integrated resilience measures:

- Water systems must expand storage, reuse, and conservation to offset reduced summer flows.
- Infrastructure should be hardened against increased freeze-thaw cycles, heat stress, and high-wind loads.
- Emergency operations must anticipate compound hazards including wildfire-to-flood sequences and drought-constrained suppression capability.
- Collaborative planning between military, local, and state partners is essential to sustain mission readiness and community safety under future weather regimes.

The assessment areas' interdependent systems, transportation, water, energy, public health, and defense, must be modeled on projected rather than historical baselines.

Table 26. Projected Weather Conditions by Decade.

Weather Variable	2020s Projection	2030s Projection	2050s Projection
Average Annual Temperature	+1.5 °F to +2.5 °F	+2 °F to +4 °F	+3 °F to +6 °F
Days over 90 °F per Year	10 – 20 days	20 – 35 days	35 – 60 + days
Annual Precipitation (Total)	Stable to +5%	± 5% variation	Highly variable; seasonal extremes
Snowpack Accumulation	Moderate decline at low elevations	Substantial decline below 6,000 ft	Major reduction across elevations

Weather Variable	2020s Projection	2030s Projection	2050s Projection
Spring Runoff Timing	1 – 2 weeks earlier	2 – 3 weeks earlier	3 – 5 weeks earlier
Drought Frequency	Increasing (approx. 1-in-5 years)	Frequent (approx. 1-in-3 years)	Common (approx. 1-in-2 years)
Wildfire Season Length	+15 – 30 days	+30 – 45 days	+45 – 60 + days
Extreme Weather Events	Occasional; rising trend	More frequent and damaging	Frequent, high-intensity storms

Future Risk Scenarios

By the 2040s, the FHTA and LHTA assessment areas are projected to experience compound hazard sequencing, where prolonged drought and extended wildfire seasons increasingly overlap with late-spring flooding driven by earlier snowmelt and high-intensity precipitation. These rapid transitions, from flood response to wildfire suppression within the same year, place sustained strain on emergency services, transportation corridors, and water treatment systems that were not designed for repeated, multi-hazard stress cycles (NOAA; USGS; Montana DNRC). Such conditions elevate the risk of roadway washouts, sediment-laden runoff, and utility disruptions during periods when suppression resources and mutual-aid capacity are already constrained.

By the 2050s, baseline surface-water availability during peak summer demand is projected to decline by as much as 25–30%, with the most acute impacts expected in the Tenmile Creek watershed, which directly supports Helena’s municipal supply and FHTA operations. Earlier runoff timing reduced late-season baseflows, and increased evapotranspiration are expected to coincide with continued urban growth in the Helena Valley, intensifying competition among municipal, firefighting, agricultural, and operational users (USGS; Montana Climate Office; Bureau of Reclamation). These pressures increase the likelihood of seasonal water restrictions, inter-jurisdictional allocation conflicts, and reduced operational reliability for both civilian infrastructure and military training activities.

At the same time, more frequent and severe convective storms, including hail, downbursts, and microburst-driven wind events, are projected to increase damage to exposed power, communications, aviation, and transportation assets, particularly in rural portions of Broadwater and Lewis & Clark Counties with limited redundancy and response capacity (NOAA Storm Prediction Center; MDT). Smaller jurisdictions surrounding LHTA are especially vulnerable to prolonged outages and access disruptions, increasing reliance on external assistance during concurrent regional emergencies.

Absent early, coordinated mitigation investments, these converging trends will progressively erode both mission assurance and community stability. The interaction of wildfire, drought, flood, and development pressures disproportionately affects populations with limited infrastructure access, constrained evacuation options, and fewer institutional resources. Long-term resilience for the assessment area therefore depends on proactive, integrated planning that strengthens lifelines, diversifies water supply, reduces fuel and runoff hazards, and aligns military and civilian adaptation strategies before compound events become the norm.

Table 27. Future Risk Scenarios.

Time Horizon	Drought & Water Scarcity	Wildfire Risk
2030s	Seasonal droughts increase; stress on private wells and rural supplies.	Fire seasons extend; WUI expansion elevates ignition sources.
2040s	Approximately 30% decline in late-summer streamflow; pressure on Tenmile watershed and municipal systems.	More severe fire behavior due to fuel desiccation; overlap with drought periods.
2050s	Widespread rationing and aquifer depletion; reduced reliability for mission-critical and public-safety operations.	Annual high-severity fires probable; extensive rangeland and ecosystem loss.

Representative Compound Scenarios

- Fast-moving fire near Helena’s urban edge overloading evacuation routes and threatening utility corridors.
- Multi-year drought constraining water supply for communities and training operations.
- Post-wildfire storm causing sediment-laden flooding in the Tenmile watershed, disrupting access and water quality.
- Encroachment-related restrictions limiting live-fire windows or creating civil–military land-use conflicts.

Each underscores the need for pre-emptive mitigation, cross-jurisdictional coordination, and planning that explicitly addresses multi-hazard convergence.

Annex H: Planning & Governance Analysis

This Annex establishes a unified framework for identifying gaps between jurisdictional planning documents and operational policies that influence resilience across FHTA and LHTA assessment areas. It serves both as a gap inventory and a synchronization roadmap, supporting community resilience by aligning growth management, land use regulation, hazard mitigation, and critical infrastructure protection. The framework integrates military installation priorities with regional civilian planning mechanisms to ensure consistency in hazard reduction, land-use compatibility, and mission assurance.

Comprehensive Planning Integration Framework

The FHTA and LHTA assessment areas operate within an interconnected system of planning instruments spanning federal, state, regional, and local jurisdictions. These documents collectively guide wildfire management, hazard mitigation, emergency coordination, and land development. Together, they form the baseline for aligning operational readiness with regional resilience.

Table 28. Military and Installation-Level Plans

Plan	Lead/Authority	Integration Focus	Relevance
MTARNG Integrated Wildland Fire Management Plan (IWFMP, 2024)	Montana Army National Guard/DMA	Wildfire prevention, suppression, prescribed burns, and interagency response for FHTA and LHTA.	The core operational doctrine for wildfire and fuels management; requires alignment with local CWPP and county DES procedures.
Joint Land Use Study (JLUS, 2014)	Montana Department of Military Affairs; Lewis & Clark County; Broadwater County; City of Helena	Evaluates land-use compatibility, development pressure, and encroachment risks around FHTA and LHTA, with recommendations for buffers, zoning coordination, and intergovernmental planning.	Provides the foundational compatibility framework linking military mission assurance to county land-use decisions; however, the study is outdated and does not reflect post-2014 WUI expansion, wildfire behavior escalation, or current Montana WUI code adoption, underscoring the need for update or functional replacement through current mitigation and resilience planning.

Table 29. State-Level Plans

Plan	Lead/Authority	Integration Focus	Relevance
Montana Multi-HMP (2024)	DES	Establishes statewide hazard mitigation framework and funding eligibility (BRIC/HMGP).	Ensures DMA and MTARNG facilities are included in state risk profiles and project pipelines.
Montana Emergency Response Framework (MERF)	DES	Defines ESF coordination and command hierarchy across state agencies.	Integrates DMA emergency coordination under ESF 4 (Firefighting) and ESF 7 (Logistics).
Montana Wildland–Urban Interface (WUI) Wildfire Code/Standards (2023–2024)	Montana Legislature; Local Jurisdictions (Adoption Authority)	Establishes minimum wildfire-resistant construction, defensible space, access, and water-supply standards for development in mapped WUI areas.	Directly influences development patterns, evacuation feasibility, and ignition risk adjacent to FHTA and LHTA; provides a regulatory tool to reduce exposure, improve responder access, and align civilian land use with military wildfire risk and mission-assurance needs.

Table 30. Regional and Interjurisdictional Plans

Plan	Lead/Authority	Integration Focus	Relevance
Western Montana Regional HMP (2024–2029)	DES and 17 Partner Counties	Regionalized risk assessment and mitigation framework linking county HMPs under FEMA 2023 policy guidance.	Provides the regional coordination structure for integrating DMA wildfire and infrastructure data into cross-county mitigation efforts.

Table 31. County-Level Plans and Regulations

Plan	Lead/Authority	Integration Focus	Relevance
Lewis & Clark County Growth Policy Update (2025)	Lewis & Clark County Commission & Planning Department	Establishes long-range land-use vision, hazard awareness policies, and growth direction in areas adjacent to FHTA.	Influences zoning decisions, subdivision review, and compatibility considerations affecting MTARNG facilities but

Plan	Lead/Authority	Integration Focus	Relevance
			does not itself regulate land use.
Broadwater County Growth Policy Addendum (2024)	Broadwater County Commission, Planning Department	Provides guidance on housing, infrastructure, natural hazards, and development patterns near LHTA and Canyon Ferry Lake.	Establishes a policy framework supporting coordination between county planning decisions and DMA operational and access needs.
Lewis & Clark County Zoning Regulations (2022, as amended)	Lewis & Clark County	Implements enforceable zoning districts, wildfire hazard overlays, and development standards, including fire-risk and access provisions.	Provides regulatory authority directly affecting WUI development, access, and defensible space adjacent to FHTA and associated buffer areas.

Table 32. Municipal and Corridor Plans

Plan	Lead/Authority	Integration Focus	Relevance
Townsend Growth Policy Draft (2025)	City of Townsend	Defines urban expansion boundaries, critical infrastructure planning, and emergency coordination.	Ensures DMA compatibility along the Canyon Ferry corridor and LHTA-adjacent lands.

Table 33. Community and Partner Plans

Plan	Lead/Authority	Integration Focus	Relevance
Tri-County Community Wildfire Protection Plan (CWPP, 2020)	Tri-County FireSafe Working Group (Lewis & Clark, Broadwater, Jefferson)	Collaborative fuel treatment, suppression coordination, and public outreach.	Provides the shared foundation for WUI mitigation and military-civilian coordination.

Table 34. Infrastructure and Utility Plans

Plan	Lead/Authority	Integration Focus	Relevance
NorthWestern Energy Wildfire Mitigation Plan (2025)	NorthWestern Energy	Electric system hardening, vegetation management, and Public Safety Power Shutoff (PSPS) protocols.	Critical for maintaining DMA operational continuity and interagency wildfire communication.

Plan Alignment and Assessment

The resilience of the FHTA and LHTA assessment areas is shaped as much by planning alignment as by physical conditions on the ground. State, regional, and local plans govern land use, infrastructure investment, emergency response, and mitigation priorities that directly affect access routes, evacuation capacity, wildfire exposure, water systems, and long-term mission viability for both installations and surrounding communities. Where these frameworks are coordinated, they reinforce shared resilience outcomes; where they are fragmented or outdated, they create gaps that elevate risk for residents, responders, and MTARNG operations alike.

Review of applicable plans and policies shows that while wildfire, flood, drought, and development pressures are widely recognized across jurisdictions, integration of assessment area specific needs, such as evacuation coordination, access corridor protection, compatible land use, and response staging, remains inconsistent. County growth policies, zoning codes, CWPP, and state hazard mitigation frameworks do not uniformly incorporate assessment areas operational requirements, nor do they consistently account for the dual-use nature of infrastructure serving military and civilian populations. These disconnects limit the effectiveness of mitigation investments, complicate emergency coordination, and weaken mission assurance during high-consequence events.

This assessment identifies clear opportunities to strengthen coordination, data sharing, and policy execution across planning levels. Aligning future updates to HMPs, land-use regulations, and emergency operations frameworks will improve evacuation safety, infrastructure resilience, and wildfire risk reduction for both installations and adjacent communities. Addressing these gaps establishes a practical foundation for integrated mitigation, ensuring that civilian resilience initiatives and military operational readiness advance together rather than in parallel.

Fort Harrison Area Joint Land Use Study (JLUS, 2014)

Scope. The FHTA JLUS (2014) was developed to address land-use compatibility, encroachment risks, and long-term coordination between FHTA and LHTA, surrounding jurisdictions, and regional stakeholders. The JLUS (2014) evaluated growth patterns, transportation networks, environmental constraints, and military operations to identify areas where civilian development could conflict with training, access, safety, and mission requirements. The study was intended to function as a strategic coordination framework rather than a regulatory document, providing recommendations to guide local planning, zoning, and infrastructure decisions near the installation.

Mission and Objectives. The mission of the JLUS (2014) was to preserve military operational capability while supporting compatible community growth in the FHTA and LHTA assessment areas. Core objectives included reducing land-use conflicts, protecting key access corridors and safety buffers, improving coordination between military and civilian planners, and ensuring that future development did not impair training, mobilization, or emergency response functions. The study emphasized proactive planning to avoid reactive mitigation once incompatible development had already occurred.

Roles and Authorities. The JLUS (2014) was sponsored by the Department of Defense Office of Economic Adjustment (now OLDCC) in partnership with Lewis & Clark County, the City of Helena, and DMA. While the JLUS (2014) itself carries no regulatory authority, its

recommendations were intended to be implemented through local growth policies, zoning ordinances, subdivision regulations, and capital improvement planning. Adoption and execution of JLUS (2014) recommendations rest with local governments, with DMA serving as a technical and coordination partner.

Strengths. The JLUS (2014) established a shared understanding of the FHTA and LHTA assessment areas as a coupled civilian–military system rather than isolated installations. It clearly identified compatibility concerns related to land use, transportation access, noise, safety zones, and infrastructure capacity. The study created a durable planning foundation for intergovernmental dialogue and provided a defensible rationale for incorporating military considerations into civilian land-use decisions. Its recognition of access corridors, buffer areas, and growth pressures remains directly relevant to current wildfire, evacuation, and infrastructure resilience challenges.

Gaps/Risks. The JLUS has not been updated since 2014 and does not reflect the substantial changes that have occurred in the intervening decade. WUI expansion, wildfire behavior, drought intensity, flood risk, and infrastructure vulnerability have all increased beyond the conditions assumed in the original analysis. The JLUS (2014) does not address contemporary wildfire mitigation standards, evacuation modeling, climate-driven hazards, or the cumulative effects of parcelization near FHTA and LHTA assessment areas. Most critically, its recommendations were never systematically translated into enforceable zoning, subdivision standards, or hazard overlays. As a result, development has continued without consistent application of compatibility, defensible space, or access protection measures.

DMA Integration Priorities. Existing compatibility planning should be updated and expanded to incorporate current wildfire risk, evacuation and ingress/egress constraints, infrastructure resilience considerations, and climate-driven hazard trends affecting the assessment area. Findings should be implemented through county growth policies, zoning overlays, and subdivision review triggers addressing military compatibility areas, WUI construction standards, and access protection requirements. The updated framework should explicitly integrate MTARNG operational data—including IWFMP fire management units, suppression corridors, and evacuation priorities—to ensure civilian development patterns support both community safety and long-term mission assurance.

Integration Context. The 2014 JLUS is recognized as a historical reference that informed earlier coordination between military operations and local land-use planning. While no longer used as a governing framework or funding mechanism, it provides background context that complements county growth policies, zoning regulations, CWPPs, and Hazard Mitigation Plans by identifying considerations related to training activities, emergency access, and regional response coordination associated with FHTA and LHTA. Current efforts rely on updated risk assessments and locally adopted planning tools rather than integrated regional planning considerations.

Integration Gaps. The 2014 JLUS now functions primarily as a legacy reference and is not used as an active planning instrument. It is not routinely cited in Lewis & Clark County zoning decisions, subdivision review, or hazard-mitigation implementation, and there is no formal mechanism requiring coordination with DMA during development approvals in identified compatibility areas. As a result, current processes lack a consistent framework linking military operational considerations with evolving wildfire risk, evacuation planning, and infrastructure resilience—creating a disconnect between installation realities and civilian land-use outcomes.

Coordination Pathways. Earlier coordination mechanisms associated with the 2014 JLUS included intergovernmental working groups and voluntary integration of compatibility considerations into local plans and ordinances. These mechanisms are no longer active. Reestablishing a coordination structure, linked to county growth policy updates, CWPP revisions, and hazard-mitigation planning cycles, is necessary to restore regular communication and ensure installation–community considerations are addressed through current planning processes rather than through integrated planning mechanisms.

Result. In its historical state, the 2014 JLUS serves as an expired advisory reference rather than an operational integration tool. Military and civilian planning efforts largely proceed on parallel tracks, with hazard-mitigation, land-use, and infrastructure initiatives often stopping at the installation boundary instead of functioning as a coordinated regional system.

Across the combined planning environment:

- **Military plans** (IWFMP, INRMP, RCMP) remain internally integrated but externally disconnected.
- **Civilian plans** (growth policies, zoning codes, CWPP, HMPs) coordinate laterally but omit defense installations.

Resulting Condition. FHTA and LHTA are often treated as planning blind spots within regional processes, which increases long-term risk to both community safety and MTARNG mission assurance. Strengthened compatibility coordination and integration of current risk, land-use, and infrastructure planning mechanisms are needed to close this gap and better align decisions across the shared assessment area. **Montana Statewide Wildland–Urban Interface (WUI) Code (MCA § 76-13-145; adopted 2009)**

Scope. Montana’s Statewide Wildland–Urban Interface (WUI) Code, established under Montana Code Annotated § 76-13-145, provides the statutory authority for wildfire-resilient construction and subdivision standards in areas where development interfaces with fire-prone landscapes. The code authorizes counties to adopt ignition-resistant building requirements, defensible-space standards, and access provisions for new development within designated WUI areas. The intent is to reduce structural ignition, improve firefighter safety, and limit wildfire losses through land-use and construction practices rather than post-event response.

Mission and Objectives. The mission of the Montana WUI Code is to reduce wildfire risk to life, property, and responders by embedding fire-adapted development standards into local land-use and building regulation. Key objectives include limiting structure ignitability, ensuring adequate emergency access and water supply, and reducing hazardous fuel continuity between wildlands and developed areas. For the FHTA and LHTA assessment area, these objectives directly support evacuation safety, suppression effectiveness, and protection of shared civilian–military lifelines.

Roles and Authorities. The Montana Legislature established the WUI Code framework, with the DNRC designated to support implementation through guidance and technical assistance. Counties retain primary authority to adopt, administer, and enforce WUI standards through subdivision regulations, zoning codes, and building permits. The code is enabling rather than self-executing; without local adoption, its provisions do not automatically apply. DMA and MTARNG have no regulatory authority under the code but are critical technical stakeholders where military

installations influence fire behavior, access, and suppression operations.

Strengths. The WUI Code provides a clear legal mechanism for counties to require ignition-resistant construction, defensible space, and safe ingress/egress in fire-prone areas. It aligns with nationally recognized best practices for wildfire risk reduction and supports firefighter safety by addressing access width, turnaround requirements, and water supply considerations at the development stage. In the FHTA and LHTA assessment areas, the code offers a ready-made framework to reduce future exposure along evacuation corridors, buffer areas, and expanding WUI without requiring entirely new statutory authority.

Gaps/Risks. Despite its availability, the Montana WUI Code is unevenly implemented across the state. Neither Lewis & Clark County nor Broadwater County has fully operationalized WUI construction or defensible-space standards at the countywide scale. As a result, development approvals continue within mapped high-hazard areas without enforceable mitigation requirements. The code also predates current wildfire behavior, climate trends, and military operational considerations; it does not explicitly address defense installations, evacuation concurrency, or heavy-apparatus access needs. Without local adoption and modernization, development near FHTA and LHTA continues to increase wildfire exposure and complicate suppression and evacuation.

DMA Integration Priorities. The Montana WUI Code should be formally adopted and tailored by Lewis & Clark and Broadwater Counties with explicit integration of MTARNG operational requirements. This includes incorporating military compatibility overlays, evacuation and ingress/egress standards suitable for heavy apparatus and tactical vehicles, and defensible-space requirements aligned with IWFMP fire management units. DMA technical review should be triggered for subdivisions and major developments within defined FHTA and LHTA influence areas to ensure land-use decisions do not degrade mission assurance or emergency response capacity.

Integration Context. The WUI Code is a critical implementation tool that bridges policy-level hazard planning (HMPs, CWPP) and on-the-ground development outcomes. When integrated with growth policies, zoning ordinances, and subdivision regulations, it operationalizes wildfire mitigation in a way that directly affects future risk. For the FHTA and LHTA assessment areas, the code provides a mechanism to translate regional wildfire findings into enforceable standards at the parcel and subdivision scale.

Integration Gaps. Currently, the WUI Code is largely disconnected from county planning and hazard mitigation efforts in the FHTA and LHTA assessment areas. CWPP identify wildfire risk, and the IWFMP defines suppression and fuel-management priorities, but neither is systematically linked to new development approval processes. There is no requirement to align new development with evacuation capacity, suppression corridors, or military access needs. This disconnect allows land-use decisions to proceed independently of known wildfire and operational constraints.

Coordination Pathways. Statutory authority exists for counties to adopt the WUI Code through subdivision and zoning updates, supported by DNRC technical assistance. Integration pathways include embedding WUI standards into growth policy implementation actions, aligning code adoption with CWPP updates, and establishing formal consultation with DMA during development review in military influence areas.

Result. In its current state, the Montana WUI Code represents an underutilized risk-reduction tool within the FHTA and LHTA assessment areas. The absence of local adoption and military-specific integration perpetuates a pattern where wildfire risk is acknowledged in planning documents but not enforced through development standards.

Across the combined planning environment:

- Wildfire plans (CWPP, IWFMP) identify risk but lack regulatory force.
- Land-use plans (growth policies, zoning) guide development but omit enforceable wildfire standards.

Resulting Condition. Wildfire exposure continues to increase at the WUI edge in the FHTA and LHTA assessment areas, elevating risk to residents, responders, and MTARNG operations. Adoption and operationalization of the Montana WUI Code, integrated with PPP, CWPP, and IWFMP frameworks, is essential to convert wildfire planning into measurable, enforceable risk reduction across the shared civilian–military landscape.

MTARNG Integrated Wildland Fire Management Plan (IWFMP, 2024)

Scope. Governs all aspects of wildland fire management, including prevention, preparedness, response, and recovery for the FHTA and LHTA. It functions as a mission-critical operational document designed to protect personnel, infrastructure, and training continuity while ensuring environmental stewardship and regulatory compliance. The plan directly integrates with other installation-level management documents, including the INRMP, Integrated Cultural Resources Management Plan (ICRMP), and Range Complex Master Plan (RCMP). It is reviewed annually to maintain compliance with Army and National Wildfire Coordinating Group (NWCG) standards, as well as updated IAAs governing mutual-aid firefighting operations.

Mission & Objectives. The primary mission of the IWFMP is to ensure uninterrupted MTARNG training and operations through proactive fire risk reduction, rapid suppression, and recovery measures. Its objectives include:

- Implementing immediate suppression policies to protect life, property, and training readiness.
- Maintaining readiness through annual fire prevention training, prescribed burn approvals, and inspection programs.
- Defining procedures for mutual-aid firefighting support and coordination with federal, state, and local partners.
- Establishing climate and fuel management baselines to inform future resilience and mitigation investments.
- The policy of “total suppression” guides operational priorities, with prescribed fire authorized only for small-scale vegetation management near ranges and facility perimeters.

Roles & Authorities. The TAG is the Agency Administrator with ultimate authority for the plan’s implementation. The Deputy Garrison Commander authorizes prescribed burns, while Range Control manages operational coordination for wildfire suppression and hazard mitigation. The Wildland Fire Program Manager (WFPM), serving under the Range Operations Officer-in-Charge, oversees prevention initiatives, training, and interagency agreements. All firefighting personnel are required to progress toward NWCG certification standards. Coordination occurs through

formal IAAs with the USFS, VAFD and local fire districts for mutual support and resource sharing.

Pre-fire Context. The IWFMP presents detailed analyses for both FHTA and LHTA, including fuel models, vegetation types, historic fire behavior, FMUs, and site-specific risk summaries. It evaluates climatic influences, identifies ignition sources, and maps infrastructure exposures to guide resource allocation and operational readiness.

Strengths. The IWFMP provides a clear and enforceable command structure that ensures accountability from TAG through Range Control. It adheres to Army and DoW fire management directives, incorporates annual reviews and documentation (Memoranda for Record), and defines distinct tactical and administrative protocols for suppression activities near training ranges and cantonment areas. The plan's operational depth, procedural precision, and alignment with federal wildfire doctrine make it a robust installation-level instrument for mission assurance.

Gaps and Risks. Despite its operational rigor, the plan lacks a landscape-scale prescribed fire program and depends heavily on mechanical and chemical fuel treatments to manage vegetation and reduce WUI risk. This limitation constrains ecosystem-level resilience and increases reliance on external partners for off-range wildfire control. The plan also defers long-term strategies for invasive grass management and fails to fully incorporate climate adaptation or regional resource-sharing frameworks.

DMA Integration Priorities.

- Formalize and periodically refresh IAAs with USFS, VAFD, and local VFDs, including NWCG-aligned cross-training and certification pathways.
- Use FMU maps and IWFMP risk summaries to guide local land-use planning, zoning, and subdivision decisions in Lewis & Clark and Broadwater Counties.
- Leverage IWFMP data to inform regional wildfire mitigation and resilience funding proposals (e.g., BRIC, REPI, DCIP).
- Expand coordination with DES and DNRC to ensure IWFMP data and risk assessments feed into county and regional hazard mitigation frameworks.

Integration Context. The IWFMP is an internally focused MTARNG plan structured under DMA authority and consistent with Army installation management policy. It is operationally aligned with other internal plans but primarily addresses mission assurance and immediate fire suppression rather than broader community or intergovernmental coordination.

Integration Gaps. Although the plan references cooperative firefighting agreements with the USFS and VAFD, it lacks direct linkages to county Population Protection Plans (PPPs), HMPs, the Tri-County CWPP, or local Growth Policies. The absence of joint data-sharing frameworks and GIS interoperability prevents synchronization with fire modeling, county wildfire overlays, or zoning-based risk assessments. The plan also omits mechanisms for joint planning or project prioritization with civilian land-use agencies, leaving installation-adjacent WUI growth uncoordinated.

Result. The MTARNG IWFMP is a technically sound, operationally mature document that effectively safeguards military readiness but remains siloed within defense planning channels. While it ensures tactical fire management excellence and regulatory compliance, it does not yet function as a regional coordination tool. Integrating IWFMP data, strategies, and leadership into county and regional resilience frameworks would elevate it from a mission-protection plan to a

cornerstone of regional wildfire and land-use governance in the FHTA–LHTA operational area.

Montana Multi-Hazard Mitigation Plan (MHMP, 2023)

Scope. The MHMP is Montana’s statewide hazard mitigation framework, establishing the risk assessment methodology, prioritization matrix, and policy levers for resilience implementation. It aligns with FEMA’s 44 CFR §201.4 requirements, covering hazard identification, vulnerability assessment, capability evaluation, and mitigation strategies. The plan also emphasizes integration with land-use mechanisms, including WUI codes, zoning, and subdivision standards, ensuring hazard reduction through planning and development policy.

Mission & Objectives. The plan’s mission is to reduce long-term risk to people, property, infrastructure, and critical state functions by institutionalizing hazard mitigation across all levels of government. Its objectives include:

- Maintaining FEMA eligibility under BRIC and HMGP programs.
- Prioritizing investments using a data-driven, risk-based methodology.
- Embedding hazard mitigation principles into statewide and local programs, land-use decisions, and capital planning processes.
- Enhancing cross-jurisdictional coordination to ensure continuity of critical lifelines and community functions.

Roles and Authorities. MT DES (State Hazard Mitigation Officer) leads plan development, maintenance, and grant administration; state agencies provide sector annexes and lifeline data; counties maintain local HMPs and feed projects to the state pipeline; the Governor adopts; FEMA reviews/approves; updates occur on a five-year cycle with annual monitoring by a statewide mitigation team.

Top Hazards & Significance. Based on the 2023 significance matrix, Montana’s top hazards are:

- Wildland/Rangeland Fire (High Significance)
- Flooding (High Significance)
- Drought (Moderate to High Significance)

Each hazard includes detailed exposure, loss estimation, and mitigation measures, providing a consistent basis for state and local project prioritization.

Policy Levers for Locals. The MHMP promotes the use of non-structural tools, WUI codes, zoning ordinances, subdivision standards, and parcel-level risk mapping, to institutionalize mitigation at the local level. These mechanisms are particularly relevant for Lewis & Clark and Broadwater Counties, where hazard exposure intersects with MTARNG installations (FHTA and LHTA).

Strengths. The plan’s clear methodology and statewide coordination framework make it highly transferable. It establishes consistent risk analysis and provides policy justification for integrating mitigation into growth management. The MHMP also emphasizes education and outreach, helping local governments align zoning and development codes with hazard data.

Gaps and Risks. Uneven local implementation of land-use tools (WUI codes, subdivision standards); voluntary guidance not consistently codified; data and GIS layers updated on different cycles; limited linkage to utility PSPS/critical-infrastructure dependencies; funding volatility for

multi-year projects; no explicit provisions for defense installations or mission-assurance lifelines.

DMA Integration Priorities.

- Leverage state guidance to justify FHUGA/FHRGA updates, WUI-oriented subdivision standards, and MTARNG-compatible clustering.
- Add MTARNG/DMA seats to the MHMP monitoring team and planning roster.
- Create a Defense Installation/Mission Assurance annex with FHTA/LHTA assets, lifelines, and risk.
- Incorporate IWFMP fuels, FMUs, and suppression corridors into statewide wildfire layers.
- Include DMA projects in the BRIC/HMGP pipeline with defined match sources and timelines.
- Execute a data-sharing MOU (DES–DMA) with annual GIS refresh and common metrics aligned to Western Region HMP.

Integration Context. The MHMP provides the state’s overarching hazard policy and designates MT DES as the lead agency for hazard mitigation. It offers a natural framework for integrating military installations into statewide resilience initiatives.

Integration Gaps.

- **MTARNG Omission:** The plan does not reference MTARNG installations, INRMPs, or IWFMPs in any hazard profiles or state capability assessments.
- **Data Disconnection:** FHTA and LHTA datasets are absent from state risk layers, which rely on DNRC and FEMA data sources.
- **Planning Isolation:** Despite DES and DMA sharing headquarters at FHTA, the MHMP’s planning team lacks representation from installation or defense officials.

Result. The HMP sets a strong foundation for statewide hazard governance but fails to vertically integrate MTARNG’s mission-assurance priorities. This omission perpetuates a policy gap between defense operations and state-level mitigation strategies. Formal inclusion of MTARNG in future MHMP updates would strengthen statewide resilience and ensure defense-critical infrastructure is fully protected within Montana’s all-hazards framework.

Western Montana Regional Hazard Mitigation Plan (2024–2029)

Scope. Multi-jurisdictional regional plan (includes Lewis & Clark and Broadwater, with annexes), robust hazard profiles and mitigation action tracking.

Mission & Objectives. Provide a coordinated, multi-county framework for hazard mitigation that strengthens local capabilities, reduces repetitive loss, and promotes alignment among county, municipal, and regional partners. The plan’s objectives include maintaining FEMA compliance for all participating jurisdictions, standardizing risk assessment and mitigation methodology across the assessment area and ensuring consistent implementation of high-priority mitigation actions through shared monitoring and evaluation metrics.

Roles and Authority. MT DES is the coordinating agency, with regional OEMs leading jurisdictional annexes. Each county’s emergency management department oversees local annex maintenance and progress tracking. FEMA Region VIII provides plan review and approval authority. Participating jurisdictions commit to adopting the plan to maintain BRIC/HMGP

eligibility and to integrate mitigation measures into local policies, zoning, and capital improvements.

Risk Analysis Depth. The plan features comprehensive, data-driven hazard analyses with detailed wildfire exposure tables quantifying impacts to structures, facilities, and infrastructure within each participating jurisdiction. It includes control effort thresholds, burn probability models, and facility exposure scoring that reflect both historical and modeled event data. Additional hazard sections for flooding, drought, and severe storms include quantified vulnerability indices and mitigation priority tiers, establishing a consistent analytical foundation for local annexes.

Process Transparency. The planning process demonstrates strong procedural documentation, including minutes and records from HMPC meetings. These records show active coordination across counties and municipalities, including discussions to align wildfire risk maps and action items with findings from the 2020 Tri-County CWPP. Public engagement summaries and agency comment logs are incorporated into the appendices, confirming multi-sector participation and transparency throughout the update process.

Strengths. Employs a uniform methodology across all jurisdictions, ensuring consistency in hazard identification, risk scoring, and mitigation action tracking. Its annex structure facilitates clear linkage between county-specific strategies and regional resilience objectives, improving accountability and alignment with FEMA's monitoring and evaluation criteria. The plan's quantitative approach to wildfire exposure and structured action matrix make it well-suited for integration with funding mechanisms including BRIC and HMGP, offering a robust framework for aligning county and regional mitigation priorities with broader resilience goals.

Gaps and Risks. Some wildfire mapping discrepancies versus local CWPP; needs periodic sync with county-level risk layers and MTARNG's mission impacts. Inconsistent integration of wildfire overlays between regional and county-level maps; incomplete alignment between regional mitigation priorities and local comprehensive plans; and limited coordination mechanisms for shared lifeline infrastructure projects. Lack of integration of defense installations and adjacent community risk reduction actions leaves capability gaps near FHTA and LHTA.

DMA Integration Priorities.

- Crosswalk FHTA/LHTA risk & FMUs to the Regional HMP wildfire risk tables and Lewis & Clark/Broadwater annex actions.
- Use the regional mitigation action progress framework to track DMA-adjacent measures annually.
- Establish MTARNG representation on the Hazard Mitigation Planning Committee (HMPC) and within the regional plan update process.
- Add FHTA and LHTA facility and asset data to the regional critical infrastructure inventory.
- Integrate IWFMP data layers, fuel breaks, suppression corridors, and FMUs, into the wildfire risk and mitigation action tables.
- Use the regional tracking matrix to monitor MTARNG-related projects, ensuring inclusion in regional funding applications and annual progress reports.
- Coordinate range access routes and lifelines (e.g., Country Club Rd, River Rd, Old Woman's Grave Rd) as shared regional mitigation priorities.

Integration Context. Regional plan covers Lewis & Clark and Broadwater Counties, providing

detailed annexes and mitigation strategies

Integration Gaps.

- No MTARNG inclusion: The FHTA and LHTA are not listed as participating jurisdictions or contributors in the regional planning process.
- Data omission: Wildfire hazard layers and capability assessments do not incorporate IWFMP or MTARNG fuel management data; DMA infrastructure is excluded from the critical-facilities inventory.
- Planning representation: No documented participation by DMA or Range Control staff in the HMPC.
- Mitigation strategy gap: Regional goals promote “integration of hazard mitigation into other plans” but fail to extend this to federal-state defense installations

Result. The regional plan provides an ideal platform for alignment but currently functions in parallel, MTARNG data and operations are not incorporated into the plan’s jurisdictional annexes or action tables.

Lewis & Clark County Growth Policy Update (2025)

Scope. County vision, policies, and implementation tools; embeds hazards section and lists relevant plans (including Tri-County CWPP, flood studies). Policy 9.5 in the Lewis & Clark County Growth Policy (2025) establishes a clear directive to ensure that all development within and adjacent to the FHUGA and FHRGA remains fully compatible with public safety priorities and military operational needs. The policy mandates the integration of hazard mitigation, land-use compatibility, and formal coordination with the DMA and MTARNG into the County’s zoning, subdivision, and development review processes. It functions as the county’s central mechanism to align civilian planning and infrastructure decisions with the protection of FHTA mission assurance and surrounding community resilience.

Mission and Objectives. Guide sustainable growth and land-use decisions across Lewis & Clark County by balancing community development, hazard mitigation, and natural resource preservation. The policy aims to ensure orderly expansion of residential, commercial, and agricultural uses while reducing exposure to known hazards including wildfire, flooding, and drought. It emphasizes aligning infrastructure investment with safe, hazard-aware growth areas and integrating resilience principles into long-range land management and capital planning.

Roles and Authorities. The Lewis & Clark County Commission adopts and enforces the Growth Policy; the Planning and Community Development Department administers implementation through zoning, subdivision review, and coordinated permitting. The County DES provides hazard data and technical assistance, while the Planning Board reviews amendments for consistency with the Growth Policy. Coordination occurs with municipal governments, special districts, and state agencies on transportation, water, and environmental review matters.

Hazards & Where. The Growth Policy recognizes wildfire, flooding, and drought as the county’s most consequential and recurring hazards, emphasizing their intersection with rapid population growth in the Helena Valley and rural foothill areas. Wildfire risk is particularly acute along the South Hills, Birdseye, and Tenmile corridors, areas with steep terrain, dense vegetation, and expanding development ~~residential subdivisions~~. These locations lie within the WUI and directly influence FHTA operational safety due to shared evacuation and response routes.

Flood hazards are concentrated along Prickly Pear Creek, Tenmile Creek, and Lake Helena, where development pressure continues despite floodplain and drainage constraints. The plan notes aging culverts, undersized bridges, and localized flash flooding as recurrent issues that affect access to both civilian neighborhoods and military lifelines. Drought and water reliability risks are most prominent in the Helena Valley and northern agricultural areas, where groundwater drawdown and limited surface storage create seasonal shortages that impact both community systems and FHTA facilities reliant on the municipal water network.

By mapping these hazard areas and integrating them into policy discussions, the Growth Policy establishes the spatial foundation for hazard-aware land-use decisions, but without direct coordination with MTARNG or the integration of military risk data, these areas remain incomplete relative to FHTA vulnerability footprint.

Key Land-use Levers. The draft Growth Policy introduces several strategic mechanisms to steer development away from high-risk and ecologically sensitive areas. It emphasizes the use of zoning modernization, overlay districts, and growth boundary adjustments to reduce hazard exposure and infrastructure strain. The policy promotes:

- Incentivizing clustered and infill development within existing serviced areas rather than expanding into WUI or flood-prone areas.
- Establishing WUI overlay areas with enforceable defensible-space, egress, and ignition-resistant construction standards.
- Integrating hazard layers (wildfire, flood, drought) into the subdivision and site plan review process to align infrastructure and emergency access with known risk corridors.
- Protecting open space, agricultural lands, and riparian buffers through conservation easements and density-transfer mechanisms coordinated with PPLT and MTARNG (DMA).
- Requiring hazard mitigation considerations in all capital improvement and utility-extension decisions to ensure growth supports resilience objectives.

Collectively, these tools position the County to reduce cumulative hazard exposure and reinforce compatibility between civilian development patterns and the operational needs of FHTA and the surrounding MTARNG footprint.

Strengths. Direct, implementable land-use tools that can reduce FHTA adjacent exposure if applied within FHUGA and FHRGA.

Gaps/Risks. Execution currently depends on discretionary zoning actions and post-policy coordination rather than enforceable standards. While the policy establishes hazard-aware growth principles, the absence of adopted, locally enforceable WUI regulations—specifically the implementation of Montana’s statewide WUI code—means these principles are not consistently applied at the subdivision or building-permit level. Without formal adoption of the state WUI code through county zoning and subdivision ordinances, and without a structured coordination mechanism with MTARNG to integrate FHTA wildfire risk data, development approvals near the FHUGA/FHRGA boundaries may continue to occur without ignition-resistant construction, defensible-space requirements, or access standards, perpetuating wildfire exposure and military–civilian land-use conflict.

DMA Integration Priorities.

- Incorporate FHTA compatibility into zoning updates, building approval and subdivision review criteria under Policy 9.5.
- Explicitly incorporate MTARNG coordination language in Policy 9.5 to ensure compatibility reviews for development within the FHUGA and FHRGA.
- Reference the IWFMP and its FMUs within hazard and land-use maps.
- Identify shared mitigation priorities, defensible-space standards, access/egress requirements, and buffer management, as conditions of subdivision approval.
- Coordinate with MTARNG (DMA) and PPLT to align conservation easements and open-space acquisitions that support both encroachment prevention and wildfire mitigation.

Integration Context. The 2025 update represents a forward-looking revision intended to unify previous Growth Policy elements, integrate hazard data from the Tri-County CWPP and flood studies, and establish a framework for zoning modernization. It directly informs forthcoming updates to zoning and subdivision regulations and will guide future amendments to the County CIP and land-use review process.

Integration Gaps.

- No military coordination mechanism: Although the FHUGA/FHRGA growth areas border FHTA, there is no policy reference to MTARNG, IWFMP, or compatible land use.
- WUI/hazard overlays unlinked: Wildfire hazard data references DNRC and CWPP sources but exclude IWFMP FMUs or MTARNG suppression corridors.
- Implementation Gap: Subdivision regulations cited as “piecemeal” planning tools, no integration path for installation-adjacent zoning or buffer management.

Result. Civilian land-use policy remains uncoordinated with DMA wildfire and encroachment standards, risking incompatible development near FHTA boundaries. The Growth Policy establishes a solid foundation for resilience-based planning but remains functionally disconnected from military compatibility and MTARNG (DMA) operational priorities. Bridging this gap during zoning and subdivision regulation updates will be critical to achieving synchronized hazard mitigation and land-use outcomes adjacent to FHTA.

Lewis & Clark County Zoning Regulations (2022)

Scope. The implementing ordinance set; explicitly recognizes FHUGA and FHRGA as distinct districts governed by prior resolutions.

Mission and Objectives. Provide a comprehensive, enforceable framework to implement the County Growth Policy by regulating land use, density, and development standards in a manner that promotes public safety, protects environmental resources, and preserves the rural character of the county. The regulations aim to direct growth into planned areas, minimize conflicts between land uses, and ensure infrastructure and hazard considerations are addressed at the permitting stage.

Roles and Authorities. Administered by the Lewis & Clark County Planning and Community Development Department under the authority of the County Commission. The Planning Board recommends amendments, variances, and conditional uses; the County Commission adopts or denies zoning changes. Enforcement is carried out by the Planning Department, with coordination from County DES and Building Services on hazard and construction compliance.

Hazards & Where. The regulations reference floodplain and geologic hazard overlays but do not contain specific wildfire or WUI performance standards. The FHUGA and FHRGA are recognized as distinct zoning districts governed by prior resolutions. Hazard-prone development within these areas is currently subject to discretionary review rather than codified mitigation requirements.

Strengths. Provides a clear, enforceable framework that translates the County Growth Policy into development standards. They effectively delineate urban and rural growth boundaries through the FHUGA and FHRGA, establishing a legal basis for density management and infrastructure planning around FHTA. The regulations also maintain procedural rigor through public hearings, conditional use reviews, and Planning Board oversight, ensuring that major developments undergo scrutiny before approval. Additionally, the document references hazard overlays for floodplain and geologic risks, offering a partial model for future wildfire or military compatibility overlays.

Gaps/Risks. Despite its structural soundness, the zoning code lacks enforceable wildfire and WUI performance standards, leaving hazard mitigation to voluntary compliance or separate policy references. The FHUGA and FHRGA resolutions operate outside the core zoning framework, creating procedural inconsistencies and enforcement challenges. No provisions require formal coordination with the MTARNG or notification of development within military-adjacent areas. Without an established Military Area Overlay (MAO) or codified review process, the County risks approving subdivisions or land uses that are incompatible with FHTA and LHTA assessment area operations, emergency access, and wildfire safety standards. This regulatory gap limits the ability to proactively prevent encroachment, protect mission assurance, and align local land-use enforcement with resilience and hazard mitigation objectives.

DMA Integration Priorities.

- Update FHUGA/FHRGA resolutions (or add an overlay) with WUI siting, defensible space, ingress/egress, and disclosure tied to IWFMP risk.
- Update FHUGA/FHRGA resolutions or add a new MAO incorporating WUI siting, ingress/egress standards, and defensible-space requirements based on IWFMP fire behavior data.
- Require disclosure statements in plats and permits for properties within high-risk fire and noise exposure areas adjacent to FHTA.
- Link zoning performance standards to joint mitigation priorities under the IWFMP (e.g., setbacks, hydrant spacing, emergency access).
- Use the zoning amendment process to formalize coordination with MTARNG and PPLT on conservation buffers and compatible-use designations.

Integration Context. The zoning regulations act as the primary legal mechanism to operationalize the Growth Policy. They directly implement land-use goals for density, infrastructure, and compatibility but rely on external plans (CWPP, HMP, and IWFMP) for hazard-specific guidance. FHUGA and FHRGA boundaries provide an administrative basis for coordination with MTARNG but lack embedded wildfire or military compatibility overlays.

Integration Gaps. No codified wildfire or military-compatibility provisions; hazard considerations rely on voluntary or referenced plans. FHUGA/FHRGA resolutions function independently from zoning enforcement, creating procedural gaps in consistency. There is no established review or notification process for MTARNG when development proposals occur within military-adjacent districts.

Result. The zoning framework provides a strong administrative foundation but lacks enforceable hazard and compatibility standards tied to the FHTA and LHTA assessment areas. Without overlay adoption or formal coordination mechanisms, land-use decisions risk increasing exposure and constraining training flexibility.

Broadwater County Growth Policy Addendum (2024)

Scope. An addendum to the 2020 Growth Policy, this update addresses accelerated residential expansion, sub-area growth pressures, and the need for coordinated infrastructure and hazard mitigation. It refines growth management approaches for key corridors, including Townsend, the Silos area, and Canyon Ferry Lake, emphasizing preservation of agricultural lands and open space while accommodating population growth.

Mission and Objectives. Guides future development while maintaining Broadwater County's rural identity, agricultural productivity, and open-space integrity. The policy seeks to balance growth pressures with hazard awareness, ensure infrastructure adequacy, and promote land-use efficiency through clustered and conservation-oriented development.

Roles and Authorities. The County Commission adopts and oversees the policy; the Planning Department manages implementation through subdivision and zoning regulations. Coordination occurs with local fire districts, DES, MDT, and adjoining counties for transportation, hazard mitigation, and emergency response considerations.

Growth Realities & Values. The County faces mounting development pressure along Canyon Ferry Lake and U.S. Highway 287, where rural landscapes and agricultural lands are being subdivided. The Addendum reinforces rural preservation, clustered development, and open-space protection as key values guiding growth management and hazard mitigation.

Strengths. The Addendum provides a clear growth-management framework that supports clustered development and open-space conservation. It establishes policy hooks that, if codified, could direct low-density, WUI-compatible development near LHTA corridors. It also highlights infrastructure alignment and resource protection as foundational to sustainable rural growth.

Gaps/Risks. The addendum lacks explicit wildfire and WUI performance standards, leaving clustering and hazard mitigation unenforceable without future zoning or subdivision updates. The addendum lacks explicit wildfire and WUI performance standards and is further constrained by the absence of countywide zoning authority, leaving clustering, density controls, and hazard mitigation measures unenforceable under current conditions. Because Broadwater County does not maintain a zoning ordinance, references to future zoning or subdivision updates represent aspirational actions rather than an executable regulatory pathway. In the absence of zoning, development approvals rely primarily on advisory growth policy language and subdivision review, neither of which provides enforceable authority to require ignition-resistant construction, defensible space, dual egress, or fire-access standards.

The addendum also omits specific reference to military operations or interagency coordination, even in areas directly affected by LHTA training activities and access routes. Without zoning overlays, WUI ordinances, or formally adopted subdivision standards tied to wildfire risk, there is no mechanism to integrate IWFMP fire behavior areas, JLUS (2014) safety zones, or shared evacuation and response corridors into land-use decisions. As a result, hazard management remains reactive, development continues within high-risk areas without enforceable mitigation,

and land-use conflicts affecting LHTA operations, emergency response access, and regional evacuation capacity are likely to persist.

DMA Integration Priorities.

- Translate “cluster and conserve” objectives into subdivision and zoning standards that preserve open space and create defensible buffers near LHTA approach corridors.
- Integrate IWFMP wildfire behavior data and ingress/egress routes into county hazard and transportation maps.
- Establish routine coordination with MTARNG during subdivision reviews and building approval process to ensure compatible development and firefighting water capacity.
- Encourage conservation easements and open-space acquisitions adjacent to LHTA through partnerships with PPLT and REPI-funded programs.

Integration Context: The 2024 Addendum modernizes growth management policies but stops short of incorporating military or hazard-based compatibility planning. Its structure supports future integration with MTARNG and IWFMP data, yet no formal coordination or data-sharing process exists to ensure alignment with defense operations or wildfire management.

Integration Gaps:

- LHTA absent from hazard, infrastructure, or coordination sections.
- CWPP data referenced but not synchronized with IWFMP fire areas or suppression routes.
- Lack of formal MTARNG coordination in review procedures for clustered development or conservation planning.

Result: The Growth Policy Addendum provides a strong conceptual basis for resilient, conservation-oriented rural growth but fails to operationalize coordination with MTARNG or embed defense-related hazard data into its framework. Institutionalizing military coordination and codifying clustered development standards will be critical to preventing encroachment and mitigating wildfire risk near LHTA.

Montana Emergency Response Framework (MERF)

Scope. Montana’s statewide emergency operations and coordination framework, outlining how state, tribal, local, and federal entities organize and deliver response capabilities during disasters and emergencies. It establishes a standardized structure for incident management under the National Incident Management System (NIMS) and defines the activation, coordination, and communication protocols between the State Emergency Coordination Center (SECC), local jurisdictions, and federal partners.

Mission and Objectives. The MERF’s mission is to ensure a unified, efficient, and coordinated response to all hazards across Montana. Its primary objectives include:

- Providing a scalable structure for coordinating resources and operations during incidents of any size or complexity.
- Defining agency roles and responsibilities under Emergency Support Functions (ESFs).
- Enhancing interoperability among state, tribal, local, and federal response agencies.
- Establishing consistent communication, resource management, and situational awareness procedures.

Roles and Authorities. The DMA, through the DES, is the lead coordinating agency for statewide emergency management. DES oversees the SECC and provides leadership across preparedness, response, recovery, and mitigation missions. The MERF assigns Emergency Support Function (ESF) responsibilities to key state departments (MDT, DNRC, DEQ, Department of Public Health and Human Services [DPHHS]) and defines coordination authorities with FEMA Region VIII, the MTARNG, and other federal entities under the Stafford Act framework.

Strengths. The MERF provides a mature, well-defined command and coordination structure that aligns Montana with national response frameworks. It supports rapid SECC activation and clear role delineation among state agencies, ensuring continuity of operations and consistent emergency communication across jurisdictions. The framework also emphasizes integration with tribal and federal partners, which enhances coverage in geographically dispersed and hazard-prone areas.

Gaps and Risks. While strong in procedural design, the MERF is primarily response-oriented and lacks direct integration with resilience, land-use, or mitigation planning frameworks. Its linkages to HMPs, growth policies, and infrastructure planning documents are limited, creating a disconnect between emergency coordination and long-term risk reduction. Additionally, the framework does not explicitly include or reference FHTA or LHTA, which operate as critical lifeline and coordination nodes during regional emergencies.

DMA Integration Priorities.

- Embed FHTA and LHTA into ESF planning, training, and coordination protocols.
- Establish a joint SECC–DMA–MTARNG coordination annex outlining roles during multi-jurisdictional incidents.
- Integrate military support capabilities (e.g., logistics, aviation, engineering) into the statewide resource catalog for rapid deployment during emergencies.
- Crosswalk MERF ESFs with MTARNG COOP, IWFMP, and regional hazard mitigation objectives to ensure continuity of mission assurance.

Integration Context. The MERF is Montana’s highest-level operational coordination document and forms the foundation for incident management statewide. It is the procedural backbone connecting the Governor’s Office, MTARNG, state agencies, and local jurisdictions during activations. Its guidance underpins local and regional EOPs, making it essential for aligning military–civilian coordination frameworks, particularly for emergency logistics, wildfire response, and recovery operations near FHTA and LHTA.

Integration Gaps. The MERF does not yet institutionalize a formal interface between LHTA, FHTA and state emergency coordination functions. Installation EOCs are not listed within SECC operational integration tables. Additionally, there is no protocol for synchronized activation between installation-level EOCs and county or regional coordination centers.

Result. The MERF provides the operational foundation for statewide emergency management but remains incomplete in its integration of military and mission-assurance components. While it establishes strong coordination protocols among civil authorities, the absence of defined MTARNG roles and installation linkages creates operational blind spots during regional incidents. Integrating FHTA and LHTA into the MERF’s ESF structure and SECC coordination mechanisms would close this gap, ensuring seamless civilian–military cooperation during both natural and human-caused emergencies.

Tri-County CWPP (2020)

Scope. The Tri-County CWPP provides a collaborative framework for wildfire prevention, mitigation, and response across Lewis & Clark, Broadwater, and Jefferson Counties. It identifies high-risk areas, prioritizes fuel reduction projects, and outlines community education and emergency coordination strategies. The plan focuses on reducing ignition potential, improving suppression access, and protecting critical infrastructure, homes, and natural resources within the WUI.

Mission and Objectives. The plan's mission is to reduce wildfire risk through shared responsibility and interagency coordination. Objectives include identifying and mapping high-priority treatment areas, increasing public awareness, and aligning fuel management and land-use policies with local and regional wildfire realities. It aims to strengthen partnerships among local fire districts, state and federal agencies, and private landowners, while also supporting eligibility for federal funding under the Healthy Forests Restoration Act (HFRA).

Roles and Authorities. The CWPP is led jointly by county governments and local fire districts, with coordination from the DNRC and USFS. Each county is responsible for maintaining and updating its own annex within the plan, while DNRC provides technical oversight and data. The plan's implementation depends heavily on interagency coordination and community-level action, with counties serving as the bridge between state forestry programs and local suppression resources.

Strengths. The CWPP provides a strong operational framework for identifying priority treatment areas, supporting defensible-space education, and improving suppression readiness. It maps hazardous fuel corridors, outlines high-risk evacuation areas, and identifies infrastructure most vulnerable to wildfire damage. The plan has established a solid baseline for collaboration between counties, fire districts, and state partners, creating shared awareness of regional fire behavior patterns and WUI vulnerabilities.

Gaps and Risks. Despite its regional value, the CWPP lacks integration with military installations and critical infrastructure assets, particularly those managed by the Montana Army National Guard (MTARNG). It does not account for the unique wildfire risks associated with training lands or incorporate data from the Integrated Wildfire Management Framework Plan (IWFMP). In addition, the CWPP does not consistently align with evacuation route analyses or mapping developed for Population Protection Plans, resulting in gaps between wildfire mitigation priorities and life-safety planning. Treatment recommendations are further constrained by funding limitations, fragmented update cycles, and the absence of a unified re-entry or long-term maintenance schedule for completed fuel breaks. The plan's primary focus on residential WUI areas leaves critical gaps in addressing transportation corridors, range perimeters, and shared evacuation routes that are essential to coordinated military and civilian response and community safety.

DMA Integration Priorities. Integrating MTARNG wildfire management priorities and IWFMP data into the CWPP would ensure alignment between military and civilian fire management objectives. Coordination should include the addition FHTA and LHTA as designated planning areas, the incorporation of IWFMP FMUs, and the alignment of treatment corridors with local fire district boundaries. MTARNG's participation in CWPP updates could also enhance interoperability, particularly for mutual-aid protocols, red-flag staffing coordination, and UXO-

area firefighting procedures.

Integration Context. The Tri-County CWPP remains the primary wildfire mitigation plan for the assessment area encompassing both FHTA and LHTA. It informs local HMPs and county growth policies, serving as the link between on-the-ground mitigation projects and higher-level planning frameworks. However, while it recognizes interagency coordination broadly, it lacks specific mechanisms for sustained engagement with defense installations or mission assurance frameworks.

Integration Gaps. The CWPP does not reference FHTA or LHTA as stakeholders or risk areas, nor does it incorporate defense infrastructure, fire behavior data, or training constraints. Coordination with MTARNG is not institutionalized in plan maintenance or project prioritization processes. Additionally, the plan's regional mitigation maps rely solely on DNRC and USFS datasets, which omit installation perimeters and fire control assets. Without these integrations, opportunities for joint funding, resource allocation, and operational coordination are missed.

Result. The Tri-County CWPP successfully establishes a unified, community-based approach to wildfire mitigation but falls short in integrating military, infrastructure, and cross-boundary resilience considerations. Its strengths in regional collaboration and project identification provide an excellent foundation, yet the lack of formal alignment with MTARNG wildfire management plans and installation-specific risks limits its effectiveness for whole-community resilience. Updating the CWPP to include MTARNG representation, IWFMP data, and compatible-use buffer priorities would significantly enhance its operational reach and long-term sustainability.

NorthWestern Energy Wildfire Mitigation Plan (2025)

Scope. The NorthWestern Energy Wildfire Mitigation Plan outlines utility-driven strategies to prevent, detect, and respond to wildfire threats associated with electrical infrastructure across Montana. It applies to all service areas with elevated wildfire potential, including corridors that traverse Lewis & Clark and Broadwater Counties. The plan details operational practices, vegetation management standards, system hardening investments, and emergency response coordination intended to reduce the risk of equipment-caused ignitions and mitigate impacts on power reliability and public safety.

Mission and Objectives. The plan's mission is to enhance public and system safety through proactive wildfire risk reduction and infrastructure resilience. Its objectives include implementing risk-based vegetation management, modernizing grid components to withstand fire and weather stress, integrating PSPS protocols, and improving coordination with local emergency management agencies. The plan also seeks to protect critical facilities, including water treatment plants, hospitals, and defense installations, from wildfire-related service disruptions.

Roles and Authorities. NorthWestern Energy holds primary responsibility for developing and executing the plan, under regulatory oversight from the Montana Public Service Commission (PSC) and in alignment with state and federal reliability standards. Coordination occurs with the DNRC, county DES offices, and local fire districts to align utility wildfire mitigation efforts with community and regional response plans. Internal utility divisions manage risk modeling, asset inspection, and vegetation management, while public safety partnerships facilitate pre-season planning and emergency notifications.

Strengths. Demonstrates strong technical rigor, employing GIS-based wildfire risk modeling to

identify high-priority transmission corridors and substation exposure areas. It institutionalizes vegetation management cycles, equipment inspection schedules, and PSPS activation criteria based on fire weather indices. The plan's integration with state and local emergency management frameworks strengthens situational awareness and promotes consistent messaging during high-risk periods. Importantly, its inclusion of hardening measures, including covered conductors, sectionalizing devices, and microgrid exploration, represents a proactive step toward modernizing utility infrastructure in wildfire-prone areas.

Gaps and Risks. While technically robust, the plan is primarily utility-centric and does not explicitly address interdependencies with military installations or shared critical lifelines serving the FHTA and LHTA assessment area. Coordination with MTARNG, county planners, and land managers on vegetation management near range perimeters remains informal and project-based. The plan's PSPS protocols may affect military and emergency operations without pre-defined contingency support. Additionally, while the plan quantifies system risk, it lacks a mechanism for aligning mitigation investments with broader community hazard mitigation and land-use planning priorities.

DMA Integration Priorities. The plan could be strengthened by formalizing coordination with MTARNG on lifeline protection and emergency response alignment. Priorities include establishing mutual notification procedures for PSPS events affecting the FHTA and LHTA assessment area, integrating power restoration and generator backup coordination into MTARNG COOP planning, and mapping shared lifeline infrastructure in a unified regional GIS platform. Further, collaboration on vegetation management within assessment areas would support both wildfire prevention and encroachment mitigation.

Integration Context. As one of the primary infrastructure resilience tools in the assessment area, the plan complements local CWPP, HMPs, and Growth Policies by targeting ignition reduction and continuity of electrical service. It contributes directly to the operational resilience of both civilian and military facilities by mitigating risks to power transmission and distribution systems that cross wildfire corridors near the FHTA and LHTA assessment areas.

Integration Gaps. Despite its relevance, the plan has not been cross-referenced in county hazard mitigation or military resilience documents. MTARNG is not listed as a coordinating stakeholder, and PSPS communication protocols are not tied to defense readiness or mission assurance frameworks. Additionally, the plan's asset hardening priorities do not account for defense-critical nodes or the cascading impacts of outages on training, communications, or medical systems.

Result. The plan represents a significant advancement in utility wildfire prevention and infrastructure resilience. Its data-driven approach and regulatory accountability make it a cornerstone for regional hazard mitigation. However, without formal integration with MTARNG, county, and regional resilience frameworks, its benefits remain partially siloed. Institutionalizing military utility coordination, incorporating MTARNG priorities into PSPS and restoration protocols, and embedding shared GIS data into planning cycles would transform the plan from a standalone utility document into a fully synchronized regional resilience asset.

Townsend Growth Policy (Draft 2025)

Scope. The Townsend Growth Policy (Draft 2025) defines the city's long-range vision for growth, infrastructure development, and land-use management within its jurisdiction and potential

annexation areas. It establishes five-year review cycles, outlines interagency coordination mechanisms, and provides tools for aligning zoning and subdivision regulations with the city's strategic goals. The plan is the foundation for orderly growth, hazard awareness, and infrastructure planning to accommodate population and economic expansion in balance with environmental and community safety considerations.

Mission and Objectives. The mission of the Growth Policy is to guide sustainable development, protect public safety, and preserve Townsend's small-town character while preparing for anticipated growth along major transportation and utility corridors. Key objectives include maintaining consistency between city and county land-use frameworks, ensuring adequate public facilities and emergency access for new development, and integrating hazard mitigation considerations, especially wildfire and flooding, into long-term planning.

Roles and Authorities. The City Council adopts and enforces the Growth Policy, supported by the Townsend Planning Board and Planning Department, which oversee zoning and subdivision applications. Coordination occurs with Broadwater County, the MDT, and local fire protection districts to ensure that city-level planning complements regional growth and infrastructure investments. Montana law (76-1-601, MCA) requires the plan's periodic review and amendment, ensuring that it remains current and responsive to local and regional needs.

Strengths. The policy includes built-in review triggers and statutory alignment with state planning requirements, which ensure accountability and adaptability over time. Its focus on intergovernmental coordination, infrastructure planning, and phased annexation provides a clear framework for integrating local and regional development priorities. The plan's tools for synchronizing zoning and subdivision updates enhance its potential for compatibility with broader resilience efforts, including those of the MTARNG.

Gaps/Risks. While the Growth Policy establishes the procedural structure for managing growth, it lacks detailed wildfire and hazard-specific provisions. WUI mitigation, defensible-space requirements, and emergency ingress/egress standards are not yet embedded in annexation or development agreements. As a policy-level document, implementation of these measures will depend on future ordinances, subdivision regulations, and developer commitments. Without explicit hazard integration, future growth near LHTA assessment area could inadvertently elevate fire risk or impede emergency operations.

DMA Integration Priorities. The plan should embed WUI siting standards, defensible-space requirements, and wildfire-resilient utility design into annexation and subdivision review and building approval criteria, particularly along the U.S. Highway 287 corridor, which is the primary approach route to LHTA. Coordination mechanisms with MTARNG and local fire districts should be institutionalized to align infrastructure, access, and communication protocols during concurrent fire or training operations. Additionally, integrating LHTA assessment area fire behavior modeling and evacuation planning into the city's hazard and transportation elements would create a direct link between urban planning and regional defense resilience.

Integration Context: The Townsend Growth Policy is the city's primary land-use guide and functions as a complementary document to the Broadwater County Growth Policy. Its coordination statements recognize the need for intergovernmental cooperation on infrastructure efficiency, resource protection, and growth management. These provisions create a natural entry point for integrating DMA wildfire, access, and evacuation considerations within the municipal framework.

Integration Gaps: Although the plan mandates coordination with Broadwater County, it omits references to LHTA or MTARNG activities. There are no provisions for shared hazard data, assessment area interface management, or mutual aid coordination in annexation or capital improvement planning. The plan’s infrastructure elements and transportation networks are not yet aligned with the operational needs or wildfire evacuation corridors identified in the MTARNG IWFMP.

Coordination Pathways. Statutory coordination statement with Broadwater County; specific joint topics include efficient infrastructure, natural resource protection, and sprawl reduction.

Result: Policy operates independently, with no structured mechanism to align MTARNG wildfire or transportation contingencies during concurrent incidents. Across the combined planning environment:

- Military plans (IWFMP, INRMP, RCMP) integrate internally but not externally.
- Civilian plans (MHMP, regional HMPs, growth policies, zoning codes) integrate laterally among counties but exclude defense installations.

Resulting condition: MTARNG facilities are treated as assessment area voids, hazard and land-use systems end at the fence line instead of functioning as part of the regional risk ecosystem.

Table 35. Summary of Integration Deficiencies

Plan	Primary Focus	Integration with MTARNG	Missing Elements	Key Remedy
MTARNG Integrated Wildland Fire Management Plan (IWFMP, 2024)	Wildfire operations, training area fire suppression	Internal only	No county, regional, or state-level linkage; no integration with CWPP/HMP hazard layers	Incorporate FMUs, suppression corridors, and coordination protocols into regional HMP annexes and local CWPP updates
Montana Statewide WUI/Wildfire Code (MCA 76-13-145, adopted 2009)	Minimum wildfire mitigation standards for development in the wildland–urban interface	Statutory only; not operationalized	No automatic local adoption; no enforcement mechanisms; no subdivision- or permit-level triggers; no linkage to MTARNG buffers, access corridors, or evacuation needs	Require county adoption through subdivision and zoning ordinances; embed WUI standards (defensible space, dual access, construction materials) into local codes; align mapped WUI areas with IWFMP fuel zones and MTARNG

Plan	Primary Focus	Integration with MTARNG	Missing Elements	Key Remedy
				coordination requirements
FHTA Area Joint Land Use Study (JLUS, 2014)	Land-use compatibility, encroachment management, and military–community coordination	Outdated and dormant	No update reflecting post-2014 WUI expansion, wildfire severity, access constraints, or climate-driven hazards; recommendations not codified in county policy or zoning	Incorporate current wildfire risk, evacuation and access considerations, and infrastructure-resilience needs into ongoing compatibility planning efforts and translate resulting guidance into implementable local tools such as zoning overlays, subdivision standards, and infrastructure-protection policies aligned with FHTA and LHTA operations.
Montana Multi-Hazard Mitigation Plan (MHMP, 2023)	Statewide hazard strategy	Absent	Installation data, MTARNG participation, and defense infrastructure in capability tables	Add MTARNG/DMA liaison to State Hazard Mitigation Team; create a Defense Installation annex with FHTA/LHTA data
Western Montana Regional HMP (2024–2029)	Regional risk management	Not included	MTARNG facilities, wildfire risk layers, mitigation actions, and representation on HMPC	Develop MTARNG annex; crosswalk IWFMP data to wildfire and infrastructure action tables; add DMA to regional tracking framework
Tri-County CWPP (2020)	Wildfire mitigation and education	Partial (historic coordination only)	No IWFMP data, outdated fuel treatments, no	Update CWPP with MTARNG FMUs, suppression

Plan	Primary Focus	Integration with MTARNG	Missing Elements	Key Remedy
			DMA representation in implementation framework	corridors, and joint mitigation priorities; establish MTARNG role in annual CWPP review
Lewis & Clark County Growth Policy (Draft 2025)	Land use, hazard-informed growth	None	FHUGA/FHRGA wildfire buffer, military coordination clause, and subdivision review triggers	Adopt WUI and military compatibility overlay; require MTARNG review for FHUGA/FHRGA developments under Policy 9.5
Broadwater County Growth Policy Addendum (2024)	Growth, infrastructure, hazard awareness	None	LHTA hazards, ingress/egress linkage, and DMA consultation process	Establish consultation in subdivision and infrastructure review; integrate IWFMP data and REPI buffer coordination
Lewis & Clark County Zoning Regulations (2022)	Hazard Overlay enforcement	Outdated	No wildfire or military compatibility standards; independent FHUGA/FHRGA resolutions	Create MAO with defensible-space, ingress/egress, and disclosure requirements tied to IWFMP data
Townsend Growth Policy (Draft 2025)	Urban growth, corridor infrastructure	None	No LHTA linkage, hazard or evacuation cross-reference, or MTARNG role in annexation agreements	Insert DMA coordination clause; include wildfire and evacuation standards for Hwy 287 and LHTA corridors
NorthWestern Energy Wildfire Mitigation Plan (2025)	Grid reliability, vegetation management, PSPS	None	No military coordination, fire corridor prioritization near training areas, or	Establish data-sharing and joint mitigation framework with DMA; align PSPS areas with IWFMP

Plan	Primary Focus	Integration with MTARNG	Missing Elements	Key Remedy
			crosswalk to IWFMP/FMUs	suppression priorities and CWPP updates

Annex I: Critical Infrastructure, Utilities and Energy System Analysis

This section identifies and assesses vulnerabilities in the physical systems that support both military operations and community life across the FHTA-LHTA assessment areas. It includes critical facilities, access routes, and utilities essential to mission continuity, public safety, and disaster response.

Critical Facilities

Key capital assets in this assessment area include the FHTA itself (with training, medical, and logistical facilities), the VA Medical Center, Helena Regional Airport, emergency operations centers (EOCs), county sheriff and fire stations, public schools, utility infrastructure and water treatment facilities. Many of these are located in or near the WUIs or flood-prone areas (Table 36.) making them vulnerable to access disruptions, smoke impacts from both surrounding jurisdictions and wildfires within the LHTA and the FHTAs, power outages, or direct fire damage.

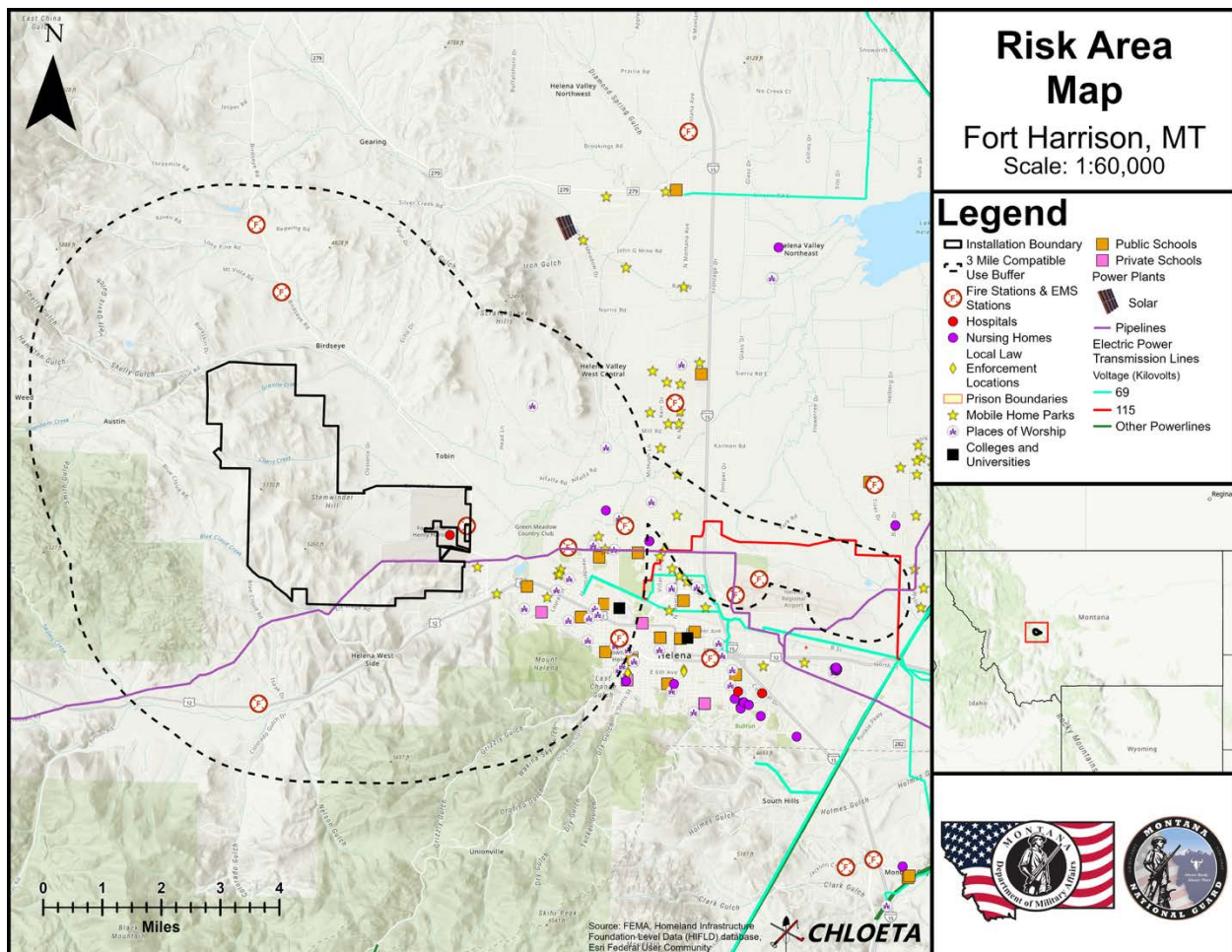


Figure 63. FHTA CIKR Assessment Area

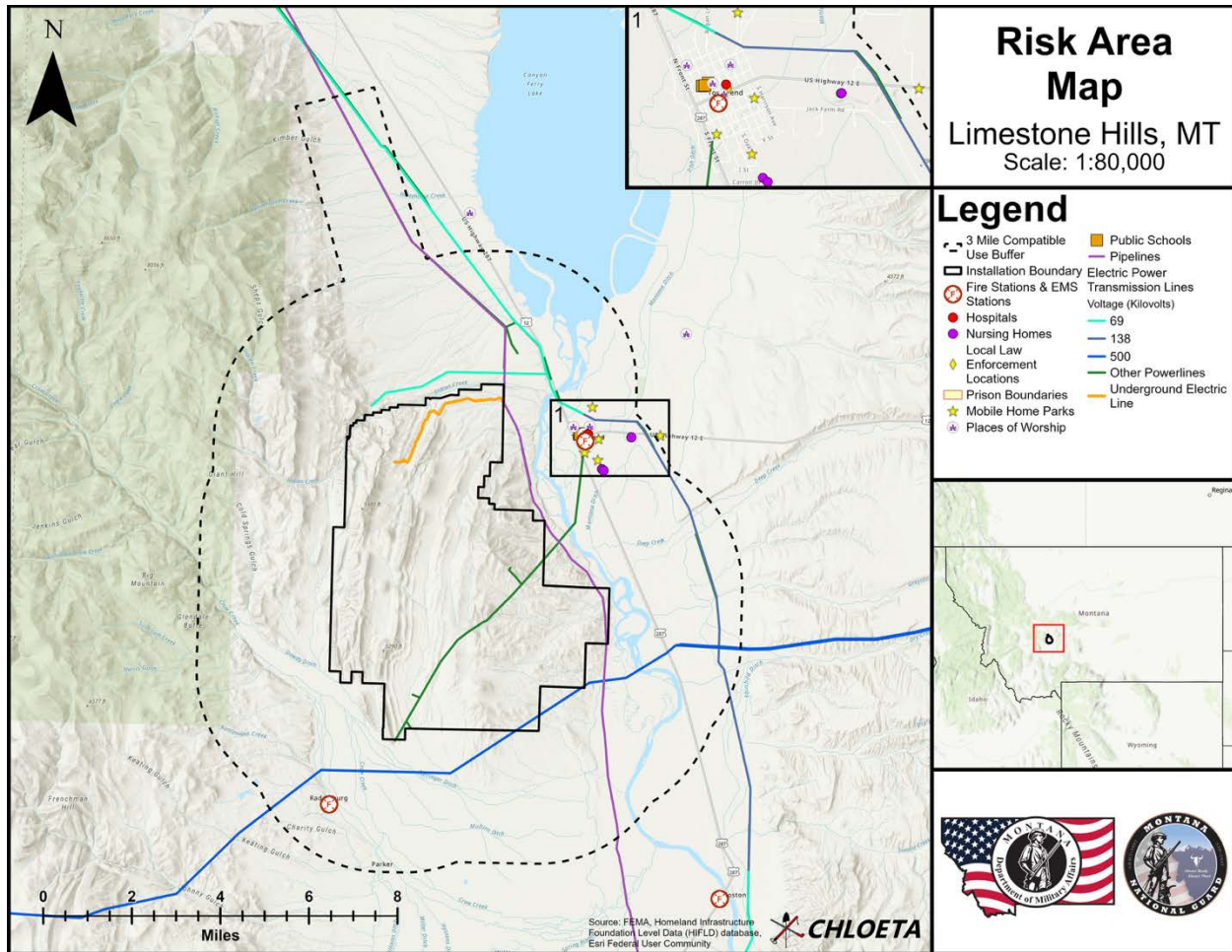


Figure 64. LHTA CIKR Assessment Area .

Table 36. Critical Infrastructure and Key Resources Impact Assessment.

Facility Name	Facility Type	Associated Hazards	Estimated Replacement Cost (\$)
VA Medical Center	Medical Facility	Drought	\$12,000,000
Helena Municipal Water Treatment Plant	Water Treatment Facility	Flooding; Drought.	\$8,500,000
Broadwater County Sheriff's Office	Law Enforcement Facility	Wildfire	\$4,000,000
Townsend Elementary School	School	Flooding; Wildfire	\$18,000,000
Montana Rail Link – Helena Yard	Rail Transportation Hub	Flooding	\$22,000,000

Facility Name	Facility Type	Associated Hazards	Estimated Replacement Cost (\$)
NorthWestern Energy Substation – Helena	Electric Substation	Wildfire	\$9,500,000
FHTA Fire Station	Fire Station	Wildfire; Winter Storm.	\$3,500,000
Lewis & Clark County EOC	EOC	All Hazards.	\$6,000,000

Access Routes

In the FHTA and LHTA operational assessment area, transportation access is directly linked to military readiness, training continuity, and emergency coordination. Limited redundancy and aging road infrastructure threaten not only local public safety but also the ability of the MTARNG to sustain operations under hazard or surge conditions.

FHTA Access Network. The FHTA depends on a small number of key access routes connecting to U.S. Highway 12 and Helena’s arterial road system. Primary ingress and egress routes, Country Club Road, Williams Road (and its undersized bridge), and Barrett Road, form the only consistent logistics corridors for personnel, supply convoys, and emergency responders. The bridge along Williams Road, rated below current MDT load standards, remains a single-point vulnerability; closure or failure would sever direct access between the cantonment area, training ranges, and urban staging areas. Barrett Road and Country Club Road are unpaved or substandard in sections, with recurring erosion and culvert damage during spring runoff events.

Both MT DES and MTARNG have documented repeated flood and frost-heave impacts along these corridors, emphasizing the need for route hardening, bridge replacement, and culvert expansion to maintain uninterrupted training mobility. These infrastructure gaps were flagged in the 2025 REPI Annual Proposal and Defense Community Infrastructure Pilot (DCIP) priority list as directly affecting mobilization timelines and mutual-aid interoperability with Lewis & Clark County responders.

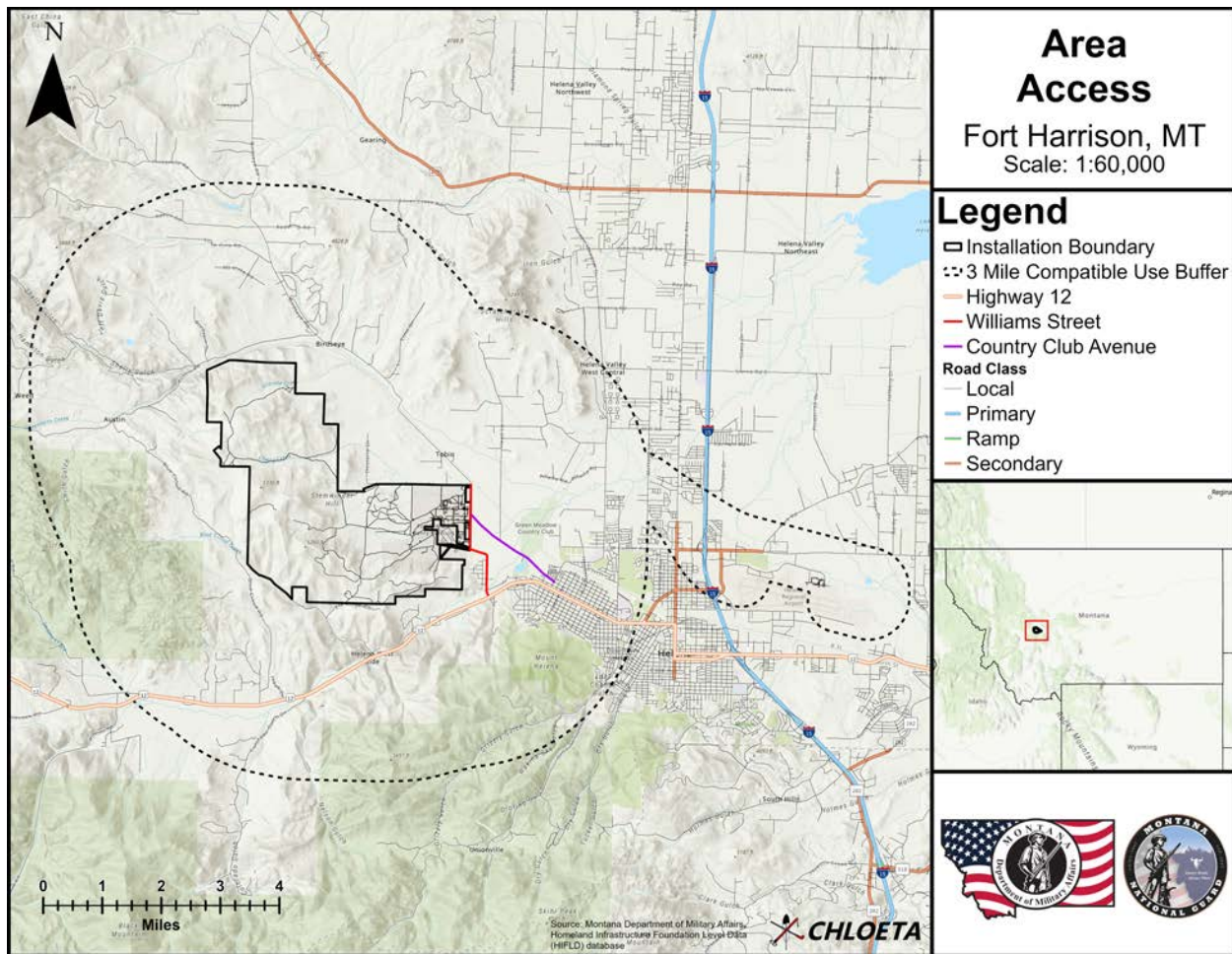


Figure 65. FHTA Access Map.

LHTA Access and Isolation Risks. The LHTA is accessed primarily through Old Woman's Grave Road, Blue Cloud Road, and River Road, all narrow, gravel, or unimproved routes traversing steep slopes and drainages with high post-fire erosion potential. These corridors routinely experience washouts, snow blockage, and slope instability, which can cut off access for training personnel or emergency response vehicles. The 2022 slope failure on Old Woman's Grave Road forced temporary suspension of a MTARNG field exercise when the egress route became impassable, illustrating how even isolated road failures can directly disrupt mission execution and safety protocols. Blue Cloud Road also presents a critical single-access hazard: its proximity to high-fuel-load grasslands and limited line-of-sight turnouts make it vulnerable during wildfire evacuations or smoke-obscured operations.

River Road, connecting Broadwater County's agricultural lands to LHTA eastern perimeter, a key interagency staging and evacuation corridor, yet which lacks engineered drainage or weight-bearing certification for tactical vehicle loads. The Broadwater County Growth Policy Addendum (2024) lists these roads among the highest priorities for state-local coordination through DES and MDT due to dual civilian and defense importance.

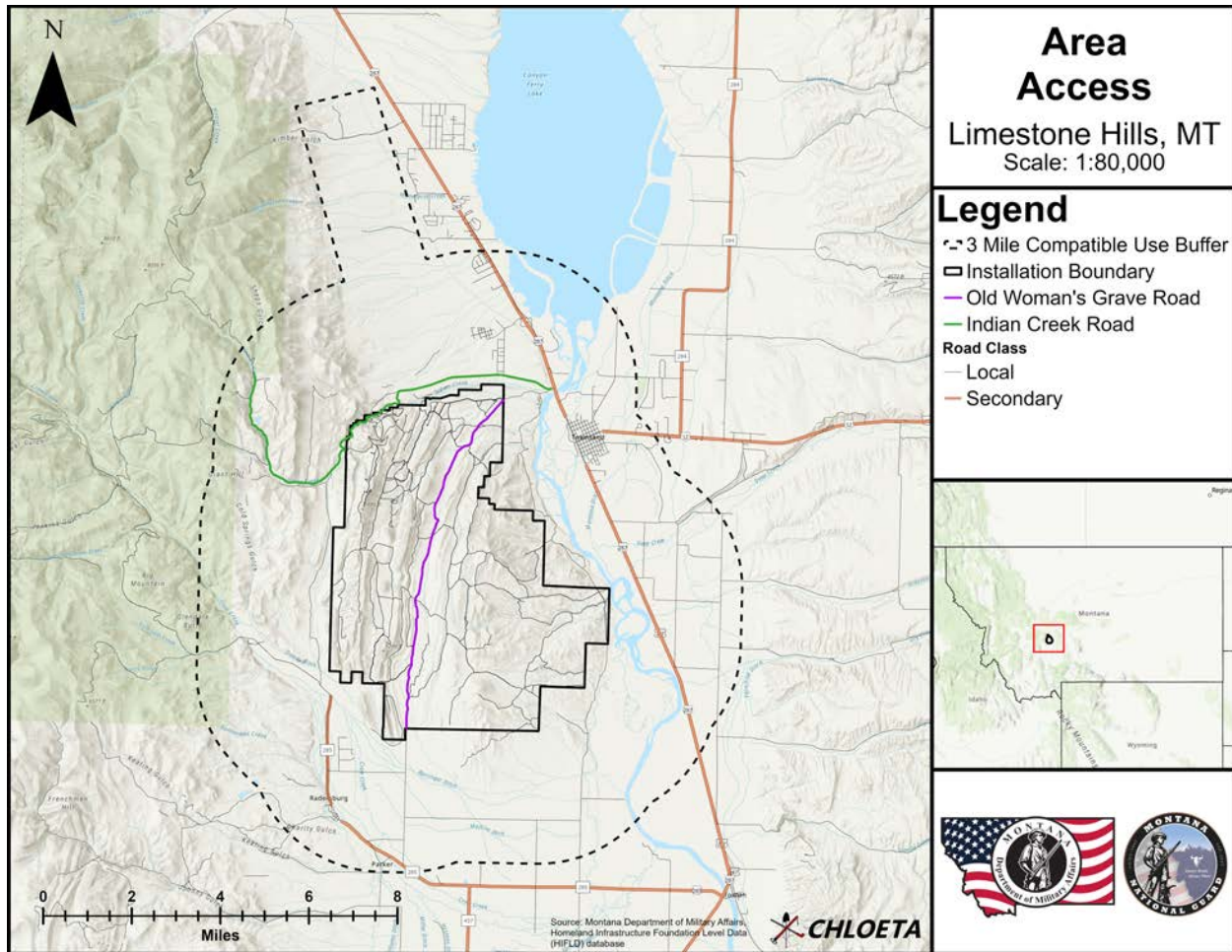


Figure 66. LHTA Access Map.

Residential growth in Helena's South Hills along U.S. Highway 287 between Townsend and Toston continues to expand into single-access subdivisions located within military airspace and mutual-aid response areas. Many of these neighborhoods have only one ingress route, amplifying evacuation delays during wildfire or flood emergencies. This overlap between WUI expansion and military training corridors creates shared vulnerabilities, airspace congestion, delayed convoy movements, and reduced response speed during concurrent civil and military incidents.

State and regional partners, including DES and the Tri-County FireSafe Working Group, have jointly identified transportation hardening and redundant access improvements as shared priorities for wildfire resilience and emergency response. These efforts are being evaluated for implementation through compatible resilience and infrastructure grant mechanisms (e.g., REPI, DCIP, and related programs). Projects under consideration include:

- Bridge replacement and floodproofing along Williams Road and Barrett Road to meet load and clearance standards for dual-use convoys.
- Gravel-to-pavement conversions and culvert enlargements along Country Club Road and Blue Cloud Road to improve all-season reliability.

- Slope stabilization and drainage improvements on Old Woman's Grave Road and River Road to mitigate post-fire runoff and slope collapse risk.
- Enhanced route signage, GIS mapping, and access control to streamline emergency coordination between MTARNG, county DES, and fire districts.

These improvements are not routine maintenance; they are readiness enablers. Reliable ingress and egress routes form the logistical backbone for surge mobilization, interagency mutual aid, and regional hazard response, ensuring that MTARNG units can train, deploy, and respond even under compounded stress conditions from wildfire, flood, or seismic disruption.

Utilities

Reliable access to power, water, and communications systems is fundamental to both regional resilience and mission readiness for the DMA. Across Lewis & Clark and Broadwater Counties, essential lifelines remain unevenly distributed and insufficiently hardened against wildfire, flood, and severe winter hazards. Limited redundancy in these systems exposes both civilian populations and MTARNG training facilities to operational disruptions during extreme weather or concurrent emergencies.

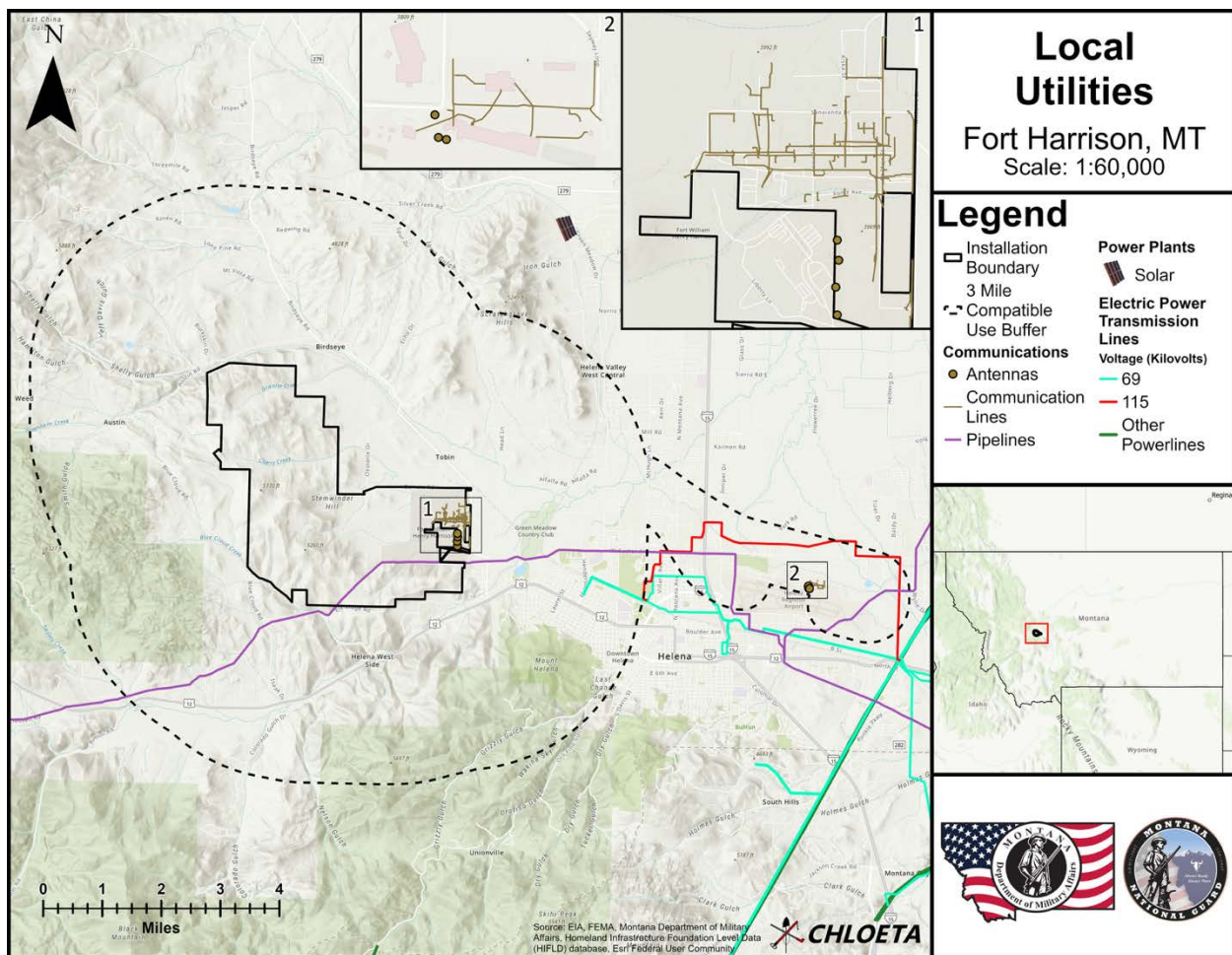


Figure 67. FHTA Utilities Map.

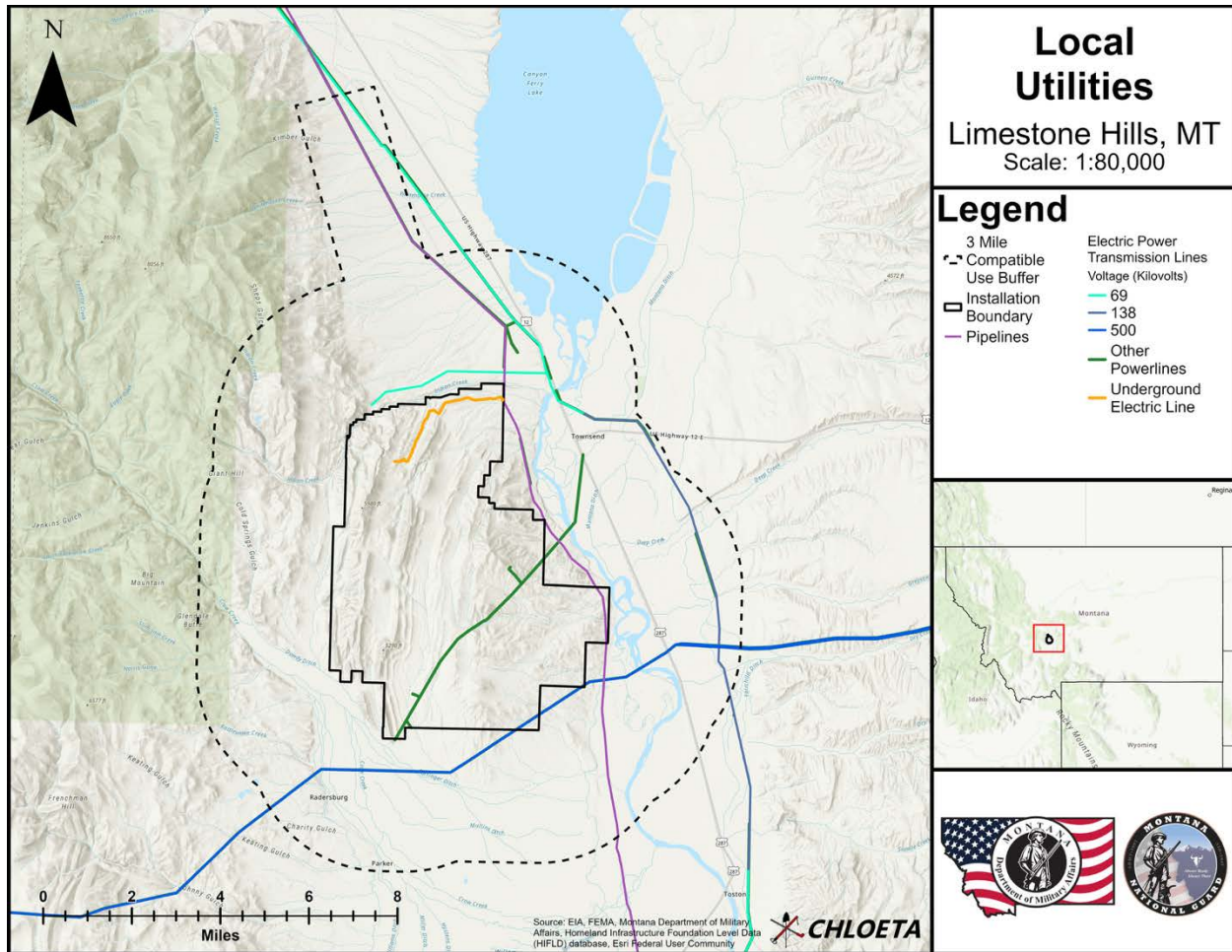


Figure 68. LHTA Utilities Map.

Power Systems and Energy Resilience: The FHTA receives electric service through the Helena municipal grid, supplied by NorthWestern Energy, with primary transmission routed via the Tenmile Substation. This substation and its overhead distribution corridors along the Rimini Road and Birdseye alignments remain unhardened against wildfire and storm hazards, representing a single-point vulnerability for both FHTA and the adjacent VA Medical Center. A wildfire or line failure near the Tenmile corridor could trigger cascading outages affecting mission-critical facilities, including the MTARNG's Mobilization and Training Equipment Site (MATES) and medical operations at the VA campus.

The NorthWestern Energy 2025 Wildfire Mitigation and Resiliency Plan identifies the Helena Valley and South Hills as Tier 1 wildfire-risk areas due to the high density of overhead conductors and historic ignition potential. Planned mitigations include pole replacement with composite fire-resistant materials, undergrounding of rural laterals, and installation of advanced reclosers and sectionalizing devices to improve fault isolation. These actions directly support energy resilience objectives under the DCIP and REPI energy-hardening initiatives.

In Broadwater County, electrical distribution is primarily managed by Vigilante Electric Cooperative, which maintains long, overhead rural lines crossing high-risk wildfire corridors west

of Townsend near U.S. Highway 12 and along Canyon Ferry Road. These exposed lines are susceptible to wind, lightning, and vegetation contact, with service restoration times often exceeding 12–24 hours due to limited access and lack of alternate feeds.

Both Vigilante and NorthWestern are evaluating microgrid expansion and backup generation capacity as part of state energy resilience and BEAD planning, with coordination from the MT DES to prioritize dual-use installations serving both communities and defense operations.

Water Systems and Source Vulnerability: The FHTA and City of Helena depend on the Tenmile Creek watershed for potable water, a resource increasingly strained by post-fire sedimentation, erosion, and reduced flows tied to earlier snowmelt and persistent drought. The 2017 Park Creek Fire, followed by flash flooding, significantly impacted Helena’s Tenmile Water Treatment Plant, demonstrating how rapidly water quality can deteriorate after major wildfires. Prolonged low flows in the Missouri and Tenmile systems have also stressed water supply reliability for both municipal and training operations, as well as for fire suppression capacity across Lewis & Clark County.

To mitigate these risks, the Helena–Lewis & Clark County Consolidated Water District is evaluating new interconnection pipelines and emergency storage to ensure dual-source resilience for FHTA and adjacent urban areas. The DCIP and State Revolving Fund (SRF) programs are supporting feasibility studies to add redundant pumping and water transport capacity to sustain operations during wildfire or flood emergencies. These improvements directly align with DMA’s mission assurance objectives for continuity of operations and mobilization readiness.

The LHTA operates with minimal fixed infrastructure and remains dependent on a single-feed electrical line from Vigilante Electric Cooperative, which provides the only consistent source of grid power to the site. When this line is disrupted by wildfire, wind damage, or maintenance events, all operations revert to diesel generators, significantly increasing fuel demand and emissions during extended training periods. Water supply is provided through the on-site J-Tank system, which draws from a shallow well near the tower; once exhausted, it requires approximately 24 hours to recharge, forcing reliance on trucked water from Townsend or Broadwater County. Communications remain limited to line-of-sight radio and portable satellite systems, as cellular coverage in the surrounding terrain is intermittent and often obstructed by ridgelines. This dependency on a single power feed, recharge-limited well, and mobile communications network heightens operational risk, particularly during simultaneous fire and drought conditions. Establishing redundant power connections, automated water refill systems, and hardened communication towers is a strategic priority under upcoming REPI and DCIP investment cycles, ensuring continuous mission readiness and resilience during regional utility or weather disruptions.

Telecommunications and Digital Connectivity: Telecommunications resilience continues to lag behind other critical utilities, particularly in mountainous and rural areas. While the Helena metropolitan area benefits from high-speed broadband through TDS Telecom and Blackfoot Communications, coverage west of Helena remains inconsistent. Recent expansion toward Birdseye and Lincoln Road has improved service reliability near FHTA, but it does not yet reach remote communities including Canyon Creek, Upper North Hills, or Crow Creek, where communication dead areas persist.

The Montana Department of Administration’s Broadband Program, in coordination with NorthWestern Energy’s Utility Fiber Expansion Project, is extending a multi-strand fiber-optic line west of Helena through the Lincoln Road corridor, integrating with NorthWestern’s Smart

Grid Communications Backbone. This upgrade will enhance:

- Redundant communications capacity for the FHTA
- Low-latency emergency coordination between MTARNG, MT DES, and county EOCs
- Data reliability for early warning systems and emergency alerts.

Despite these improvements, the LHTA remains without permanent cellular or broadband infrastructure. These gaps restrict emergency alerting, interagency coordination, and radio interoperability during incidents. Additional investments under BEAD, REPI, and DCIP are being pursued to support signal towers, microwave relays, and satellite backup tied to MTARNG emergency operations and regional response systems.

Strategic Integration and Grant Relevance. Strengthening the power, water, and communications systems that serve FHTA and LHTA is essential to maintaining mission assurance and regional resilience. Through coordinated partnerships among NorthWestern Energy, Vigilante Electric Cooperative, MT DES, and broadband providers, DMA is positioned to leverage federal and state funding streams to:

- Harden power infrastructure and reduce ignition potential near training facilities.
- Enhance water system redundancy and post-fire watershed stability; and
- Extend broadband and telecom capacity to support operational command, control, and continuity of operations.

Collectively, these efforts advance the objectives of the REPI, DCIP, and BEAD programs by ensuring that critical lifeline systems, energy, water, and communications, remain operational or can be rapidly restored during multi-hazard incidents, safeguarding both civilian continuity and military readiness throughout the FHTA–LHTA assessment area.

Table 37. Utility Infrastructure, Vulnerabilities, and Gaps.

Utility Type	Jurisdiction/ Site	Provider(s)	Hazard Exposure	Vulnerabilities/ Gaps	Notes/Opport unities
Electric Power	FHTA	NorthWestern Energy	Wildfire, wind, ice storms	Primary transmission via Tenmile Substation lacks redundancy; above-ground lines along Rimini Rd and Williams St are ignition risks. Power loss directly affects mission-critical operations and	Coordinate with NorthWestern Energy for microgrid design and backup power integration under REPI and DCIP grants.

Utility Type	Jurisdiction/ Site	Provider(s)	Hazard Exposure	Vulnerabilities/ Gaps	Notes/Opportunities
				VA medical services.	
Electric Power	LHTA Assessment Area	Vigilante Electric Cooperative	Wildfire, lightning, wind damage	Long rural transmission lines along US-12 and Canyon Ferry Rd are susceptible to wind and fire; 12–24-hour restoration times after major storms.	Harden critical spans and add redundant feeds to assessment areas through REPI Resilience Priority Areas 4–6 (Deep Creek, Blue Cloud corridors).
Water Supply	City of Helena/FHT A service area	City of Helena Utilities (Helena Water)	Drought, post-fire sedimentation, flooding	Tenmile Creek watershed source is threatened by erosion and ash deposition after wildfire (Park Creek 2017); aging distribution mains increase loss risk.	Expand watershed protection and storage capacity with joint Helena–DMA projects; reference Tenmile Watershed Management and REPI Challenge Restoration Work (PPLT 2025 Annual Report).
Water Supply/Storage	Broadwater County/LHTA vicinity	Small public districts & private wells	Drought, sediment load, flash flooding	Limited storage and contamination potential from burn-scar runoff; no redundant supply for training support.	Evaluate portable treatment units or shared resilience wells under REPI Challenge and NRCS partnerships.

Utility Type	Jurisdiction/ Site	Provider(s)	Hazard Exposure	Vulnerabilities/ Gaps	Notes/Opportunities
Wastewater/ Stormwater	FHTA/City of Helena	Helena Public Works	Intense precipitation and rapid snowmelt	Aging stormwater system and undersized culverts along Williams St and Country Club Rd cause flooding and training delays.	Integrate stormwater retrofits and permeable surface design into mission- support facilities and road projects.
Wastewater/ Septic	Broadwater County/LHT A	Individual systems	Flash floods, erosion	Rural homes and training support sites use onsite systems vulnerable to overflow or failure after flooding.	Promote advanced onsite treatment and monitoring using county DES guidance and state grant matching.
Telecom/Fiber	Helena Valley/FHTA corridor	TDS Telecom, Blackfoot Communications	Wind, ice, wildfire damage	Fiber expansion west of Helena does not yet reach FHTA; limited redundancy and overhead segments at risk.	Extend fiber through Lincoln Rd corridor via Montana Broadband Equity Access and Deployment (BEAD) Program; support continuity for MTARNG assets.
Comms/Radio and Cellular	LHTA/Crow Creek & Spokane Hills	Private cell carriers; MT DES interoperable network	Wildfire, terrain shadowing	Poor reception and no fixed repeaters limit incident coordination and training oversight.	Pursue satellite backup and microwave relay towers under DCIP and REPI Resilience Priority Areas 4–6.

Annex J: Community Preparedness and Response Capacity Analysis

This Annex demonstrates and evaluates the emergency preparedness and response capacity surrounding the FHTA in Lewis & Clark County and the LHTA in Broadwater County, Montana. Both sites are mission-critical to MTARNG and rely on shared community systems for fire suppression, medical response, communications, evacuation, and sustainment.

The analysis quantifies existing resources, mutual-aid coverage, transportation dependencies, and coordination mechanisms that influence how effectively incidents, including wildland fire, slope failure, hazardous materials release, or dual weather-training disruptions, can be detected, contained, and stabilized.

Capability Inventory (NIMS-Typed Summary)

Table 38. Fire & Wildland Response

Capability	FHTA/Lewis & Clark County	LHTA/Broadwater County	Regional Notes
Structural Fire (Type 5–7 engines)	Helena Fire Dept. (career), West Valley and Baxendale, VFDs: 18 engines; 24/7 coverage.	Townsend/Broadwater VFD: 8 engines; primarily volunteer; coverage gaps 20 mi south of Townsend.	Automatic/mutual-aid agreements active; surge staffing constrained during regional wildland events.
Wildland Fire (Type 3–6 engines, tenders, dozers)	DNRC Helena Unit, USFS Helena–Lewis & Clark NF, DMA Range Ops dozers × 2, tenders × 2.	DNRC Helena South Zone, USFS Townsend District, local contractors.	Regional drawdowns at Preparedness Levels 4–5 delay arrival over 60 min to LHTA.
Incident Management Teams (IMTs)	Type 3 IMT (Tri-County) available; County EOC supports ICS.	Type 3 IMT shared regionally.	Typical mobilization 2–4 hours outside fire season (per AAR 2022).

Observed Gaps:

- LHTA lacks on-site water storage or hydrant systems; tenders must shuttle at least 10 miles.
- Limited staging areas for Type 1/2 helicopters and dozer transport.
- Dozer, tender, and foam cache shortages during concurrent incidents (CWPP 2020; DMA IEMP 2024).

Table 39. Emergency Medical Services (EMS) & Medical Surge

Capability	Helena Valley/FHTA	Broadwater/LHTA	Mission-Relevant Notes
Ground EMS	St. Peter's Health EMS (ALS) + Helena Fire (ALS/BLS) : 6 units. Avg response 8–10 min.	Broadwater EMS (ALS/BLS) : 2 units. Avg response 22 min baseline; +30–50% winter.	LHTA MEDEVAC relies on Broadwater EMS plus DMA Combat Lifesaver assets until transfer.
Air Medical	Life Flight Network, Reach Air rotor/wing based in Helena.	Same regional availability.	Smoke, crosswinds, and training TFRs restrict landing; only 2 pre-surveyed landing zones (LZs) near LHTA.
Hospital Surge	St. Peter's Health (99 beds; 8 ICU), Shodair Children's Hospital, VA FHTA Medical Facility outpatient approximately 25 beds surge.	—	Power/water dependencies critical; Tenmile sedimentation reduces water supply approximately 30% in drought years.

Observed Gaps: Limited LZ mapping; dual-incident (fire and flood) response protocols not standardized; no formal triage/transport integration with DMA IEMP (County EOPs 2019–2023; DMA IEMP 2024).

Law Enforcement, Traffic & Evacuation Control

- Agencies: Lewis & Clark Sheriff's Office (SO), Helena Police Department, Broadwater SO, Montana Highway Patrol, DNRC Law Enforcement, FWP.
- Capabilities: Limited riot-control assets; 2 mobile Command Units (1 Helena, 1 MT DES portable).
- Constraints: Dynamic routing not standardized for bridge loss (Williams St.), road closures (Old Woman's Grave Rd.). Convoy traffic and civilian evacuations can conflict during wildfires or training stand-downs (MDT Logs 2023; County EOP Traffic Annex 2022).

Public Health & Mass Care (ARC/VOAD)

- Shelter Partners: American Red Cross, VOAD faith-based coalition, schools and churches across Helena and Townsend.
- Baseline Capacity: approximately 250 cots Helena Valley; approximately 100 cots Broadwater; feeding capacity approximately 2,000 meals/day.
- Constraints: Potable water dependence on Tenmile; limited generator coverage; ADA/pet sheltering gaps in rural areas (ARC MOUs 2023; MT DES Mass Care Assessment 2022).

Alerting, Communications & EOC Readiness

- Alerting Systems: IPAWS/WEA enabled; Nixle + Everbridge for local opt-ins.
- EOC Connectivity: WebEOC operational in both counties, but no joint COP with DMA.

- Resilience Issue: April 2024 fiber cut disabled 911 for over six (6) hours statewide; no redundant routing to FHTA.
- EOC Activation: Partial within 60–90 minutes; DMA liaison participation ad hoc (MT DES Post-Incident Summary 2024; AARs 2020–2023).

Mutual Aid & Interoperability

- Fire/EMS: Mutual Aid Agreements signed via Tri-County Fire Working Group and DNRC Compacts.
- Utilities: Informal priority restoration coordination (2022 Substation Event) but no codified DMA lifeline priority.
- Airspace/Range Safety: JLUS (2014) and REPI define buffers but not embedded in county zoning maps.
- Data Sharing: No signed DSAs for lifeline/UXO/Surface Danger Zone (SDZ) overlays. (Sources: JLUS 2014; REPI Portfolio 2024; MT DES 2023)

Evacuation, Transportation & Shelter Readiness

Evacuation Triggers & Zone Design

- CWPP-aligned areas exist for South Hills, Upper Tenmile, Canyon Ferry/U.S. Highway 287; LHTA corridors require update.
- DMA-specific triggers (smoke, UXO, training fire breakouts) not yet integrated into county Evacuation Annexes (Tri-County CWPP 2020).

Transportation Constraints

- FHTA access via Country Club Rd/Williams St bridge (5-ton limit; flood susceptible).
- LHTA access via Old Woman's Grave Rd and Barrett Rd (gravel corridors subject to washouts).
- No contraflow or tactical convoy deconfliction plan between DMA and County Public Works (MDT Logs 2023; DMA IEMP 2024).

Mass Care & Reunification

- Primary shelters: schools (Helena Middle, Broadwater High). Variable generator and potable water reliability.
- Functional needs registry exists but incomplete; pet sheltering capacity approximately 40 animals countywide (ARC 2023; County Public Health Reports 2022).

Community Capacity & Mission Assurance

- Access & EMS Coverage: Distance and road quality make LHTA the most response-limited installation in Montana; FHTA is vulnerable to utility and bridge failures.
- Shelter & Public Health: Both counties depend on Tenmile watershed and backup wells subject to drought and sedimentation.
- Alerting & Communications: Fiber redundancy absent; no real-time COP across DMA and county EOCs.

- Data Standardization: Fragmented mapping reduces situational awareness and grant competitiveness
- Mutual Aid: Strong for fire and EMS but informal for utilities and lifeline restoration.
- Training Integration: DMA hazard profiles (UXO, controlled burns, munitions fire) not included in regional exercises.

Annex K: Water Supply, Storage and Distribution Infrastructure Analysis

Reliable water access is fundamental to both community safety and DMA within Lewis & Clark and Broadwater Counties. The FHTA and the LHTA depend on limited and increasingly stressed water systems that are vulnerable to drought, sedimentation, and single-point failures. The analysis below integrates hydrologic data from the USGS, Montana Department of Natural Resources and Conservation (DNRC Water Resources Division), City of Helena Utilities (2024 System Report), and FEMA hazard mitigation datasets (2020–2024 HMP cycles). This assessment quantifies infrastructure gaps, water-supply dependencies, and long-term resilience challenges under multi-hazard conditions (drought, post-fire erosion, and flood impacts).

Current System Configuration

FHTA

- **Primary Supply:** The City of Helena municipal system delivers approximately 5 MGD from the Tenmile Creek Watershed, via the Tenmile Water Treatment Plant and the Chessman and Scott Reservoir system.
- **Infrastructure Dependence:** FHTA connects through a single 12-inch municipal main with no on-site treatment or storage redundancy. The system lacks a looped configuration, relying entirely on City Utilities pressure areas and emergency power.
- **Backup Wells:** Two inactive backup wells (Well #1 and #2 on Williams Street) remain offline due to low yield (less than 20 gpm) and water-quality exceedances for iron and manganese.
- **Storage Capacity:** FHTA retains less than 24 hours of potable and fire-flow water (approximately 250,000 gallons total) distributed across small roof tanks and the Medical Detachment Complex cistern.

LHTA

- **Primary Supply:** No fixed municipal or public system. Water is trucked approximately 26 miles from Townsend or Helena and stored in portable bladders (5,000–10,000 gallons capacity) during training rotations.
- **On-Site Wells:** Four shallow wells (20–60-foot depth) exist near Barrett Road; three yield less than 10 gpm and exhibit seasonal drawdown during summer drought.
- **Infrastructure Exposure:** The single well network and temporary tanks are gravity-fed without pressurization, relying on diesel-powered pumps. Post-fire erosion and slope failures have repeatedly compromised delivery routes (Old Woman's Grave Road, 2023 closure of 5 days).

Hydrologic and Watershed Context

- Tenmile Creek Watershed: Provides over 90% of Helena’s drinking water and sustains approximately 80,000 residents plus FHTA operations. USGS gages (12324590, 12324600) record 2021–2022 drought-year flows less than 40% of the 30-year average.
- Drought Designation: U.S. Drought Monitor (USDM) rated Lewis & Clark and Broadwater Counties D2–D3 (Severe–Extreme) in 2021–2022, reducing watershed yield and forcing Helena Utilities to blend from emergency groundwater wells.
- Groundwater Stress: DNRC Water Rights data (Water Court Basin 41I & 41J) confirm 30% of permitted groundwater rights in the Helena Valley are fully appropriated. Broadwater’s exempt-well drilling continues to expand (about 120 new domestic wells per year since 2018).
- Sedimentation Risk: Post-fire erosion (e.g., Meriwether 2007, Park Avenue 2017) spiked turbidity over 300% above baseline (greater than 50 NTU vs. less than five (5) NTU baseline), forcing treatment shutdowns and temporary drawdowns of reservoir storage.

Infrastructure Vulnerabilities

Table 40. Infrastructure Vulnerabilities

Vulnerability Type	Description/Impact	Quantitative Indicator	Reference Source
Single-Feed Dependency	100% of FHTA and LHTA water supply relies on one un-looped feed or hauled source.	0 redundant intakes or pressure areas serving DMA facilities.	Helena Utilities System Plan (2024); DMA Infra Audit (2024).
Insufficient Storage Redundancy	FHTA stores less than 24 hours of potable/fire-flow water. LHTA stores less than 6 hours during operations.	250,000 gal (FHTA); at most 10,000 gal (LHTA).	DMA Infra Audit (2024).
Groundwater Decline	LHTA well yield decreased by about 20% since 2015 due to regional drawdown.	8–12 ft static-level decline (USGS Well ID 451933112195601).	USGS NWIS 2023.
Sediment Intrusion	Fire scar erosion reduces Tenmile plant efficiency by 30–40%.	Helena 2023 Intake Analysis.	Helena Utilities (2023).
Aging Infrastructure	Primary water mains (over 60 yrs old) along Country Club Rd rated “Fair–Poor” by Helena Public Works.	Condition Index of 2.3/5.	City of Helena CIP 2024.

Mission Assurance Implications

- **Operational Continuity:** Any 24-hour interruption to Helena's Tenmile supply directly halts training and medical operations at FHTA. A 1-week reduction in flow by 40% (as observed post-2017 fire) would require rationing and training suspension.
- **LHTA Operational Limitations:** Hauled supply logistics restrict simultaneous live-fire and support operations. A single route washout delays resupply by 48–72 hours.
- **Interdependency Risk:** FHTA depends on Helena's power grid (NorthWestern Energy) for pump operations and SCADA. Loss of power equals immediate loss of water pressure and firefighting capacity.
- **Regional Impact:** Water scarcity affects civilian healthcare (VA Medical Center and St. Peter's Health surge capacity), highlighting dual-use risk between civilian and military systems.

Planning and Governance Gaps

- **Absence of Unified Watershed Management Program:** No multi-agency erosion control or post-fire sediment plan links Helena Utilities, USFS, DNRC, and DMA assets.
- **Limited Integration with County HMPs:** DMA dependencies on Tenmile and Canyon Ferry systems are not reflected in HMP risk assessments, reducing eligibility for FEMA mitigation funding.
- **Fragmented Data Management:** Utility and watershed data are stored in separate systems without real-time integration (see Annex L Data Governance Findings).
- **Funding Silos:** Municipal and DoW projects pursue different funding streams (FEMA vs REPI/DCIP), limiting combined project leverage.

The FHTA and LHTA face acute vulnerabilities related to drought, single-feed utility supply loss, and post-fire sedimentation within their shared hydrologic systems. Both installations depend on aging infrastructure with limited redundancy, leaving mission-critical operations susceptible to prolonged outages in water, power, and communications. The Tenmile watershed and associated groundwater systems have experienced measurable depletion during multi-year droughts (USDM 2021–2024), while post-fire sedimentation events following burns reduced reservoir and intake efficiency by 30–40% (USGS & City of Helena Utilities, 2023). These conditions directly threaten DMA's mission assurance by constraining water quality and supply reliability for FHTA operations and range sustainment at LHTA. Coordinated watershed management, integrating U.S. Bureau of Reclamation (USBR), DNRC, and municipal stakeholders, along with redundant on-post water storage and hardening of single-feed utilities, represent the highest-value resilience investments. Data integration and interagency alignment remain prerequisites for federal funding competitiveness under FEMA BRIC, DoW REPI, and OLDCC DCIP programs, all of which now require demonstrable regional coordination and shared infrastructure risk data to justify project prioritization.

Annex L: Mission Assurance Analysis

Installation Access and Operational Disruptions

FHTA. Primary ingress/egress occurs via Country Club Road and Williams Street. Mission support areas (barracks, training blocks, Medical Detachment Complex) depend on these corridors. The Williams Street bridge is a posted structure that has been flagged in county/MDT condition reviews for vulnerability under snowpack and high-flow events, creating a credible single-point-of-failure for heavy equipment movements and medical evacuation (County Road Assessments; MDT structures files; DMA Training Ops Brief, 2024).

LHTA. Access is almost entirely by Old Woman's Grave Road, Barrett Road, and limited interior spurs. These unpaved segments are repeatedly affected by slope failures, culvert overtopping, and post-fire debris. In 2023, Old Woman's Grave Road was closed five consecutive days for slope destabilization and drainage failure, delaying troop rotations and range schedules (County DES situation logs; Broadwater Road Dept. maintenance records).

Regional choke points. During the 2021 Deep Creek Fire, closures on U.S. Highway 12 exceeded 48 hours, forcing reroutes onto lower-class roads not rated for armor/heavy trailers, with corresponding training delays and higher wear on county assets (MDT closure reports; DES after-action notes).

Response time impacts. Baseline EMS travel times to LHTA average over 22 minutes under normal conditions and rise 30–50% in winter or during smoke/low-visibility periods, outside Army remote incident response targets in Training and Doctrine (TRADOC) 350-6 for time-sensitive training incidents (County EMS run statistics; TRADOC 350-6).

Roadway operability. River Road and Blue Cloud Road accumulate sediment and experience recurring culvert blockages; Country Club and Williams require repeated slope/shoulder maintenance after runoff and fine-fuel regrowth (DNRC, MT DES maintenance and CWPP treatment logs).

Mission consequence. Access fragility creates recurring risk of range closures, mobilization delays, and degraded joint operations. Engineering upgrades and dual-use lifeline projects identified in DCIP, BRIC, and REPI proposals (fuel-break/ingress corridors) directly support uninterrupted military access and civilian evacuation capacity (JLUS Chapter 7; REPI 5-yr portfolio; Western MT Regional HMP lifeline annex).

Off-Installation Dependencies

Power. FHTA relies on NorthWestern Energy single-feed distribution that traverses fire- and erosion-prone terrain west of Helena; the 2022 substation event forced the VA and FHTA to generator backup. LHTA has no hardened grid connection and depends on diesel generation; any transportation interruption stalls fuel resupply (Utility outage reports; DMA infra-assessment).

Water. FHTA is wholly dependent on City of Helena – Tenmile Creek supply; post-fire sediment spikes (Meriwether 2007; Park Ave 2017) have reduced treatment output 30–40% for weeks, triggering curtailments. LHTA relies on hauled water and a site well plumbed via a J-link to a

nearby tower for distribution; when the well drawdown requires over 24 hours to recover, training water availability is insufficient for suppression/operations (Helena Utilities source files; DMA range support logs).

Communications. April 2024 fiber cut produced an over six (6)-hour 911 outage countywide; cellular/broadband at LHTA is terrain-limited with patchy coverage and unreliable backhaul. A single long-haul route still serves FHTA; redundancy is not in service (County DES after-action; provider notices).

Implication. Cascading lifeline failures (power → pumps/towers → water/comms) jeopardize command-and-control and medical surge, and directly underpin the hardening/microgrid, redundant water, and broadband recommendations (Sections 20–25).

Communication Barriers

No established regional standards are in place for real-time hazard communication among the FHTA, the LHTA, Lewis & Clark County DES, Broadwater County Emergency Services, and key operational partners including the DNRC, the MDT, and the Helena and Townsend FDs. While individual agencies utilize internal alerting systems, including FEMA’s IPAWS, WebEOC, and USFS Situation Reports, no unified mechanism for cross-notification exists, and disruptions to military training schedules are often not communicated in a timely manner to civilian agencies. This limits the ability of local partners to plan around potential hazards or provide alternative routes and resources during emergency events.

This gap in coordination was noted in the Western Montana Regional HMP, which stated that “coordination with military installations is limited to post-event notifications” in most cases and highlighted the need for “shared planning assumptions for high-risk events including wildfire and mass evacuation scenarios” (Lewis & Clark County HMP, 2020, Section 4.4).

One of the most persistent and consequential barriers is the lack of standardized, interagency communication protocols among federal installations, state and county emergency management offices, and local jurisdictions. DMA, Lewis & Clark County, Broadwater County, and the City of Helena each maintain their own EOPs and communication platforms. The absence of a shared situational awareness system including a jointly administered WebEOC dashboard or regional COP has resulted in delayed hazard notifications, inconsistent road closure alerts, and fragmented mutual aid coordination.

These shortcomings were especially evident during the 2022 Red Mountain Fire response and were further underscored in stakeholder interviews conducted as part of the 2021 Broadwater County Study which documented repeated delays in interagency messaging and a lack of clarity in alert authority during multi-jurisdictional wildfire and evacuation scenarios.

Gaps in Jurisdiction or Authority

Jurisdictional fragmentation in the unincorporated WUI areas surrounding FHTA and LHTA presents one of the most significant land use and hazard mitigation challenges in the assessment area. In Broadwater County, where there is no countywide zoning ordinance, residential development continues to expand along critical corridors including U.S. Highway 287 and Barrett Road without regulatory guardrails to prevent encroachment into military buffer areas, high fire

risk areas, or critical infrastructure corridors. Although the County's 2020 Growth Policy and Subdivision Regulations offer general land use guidance, they are non-binding and lack enforcement mechanisms to limit incompatible development. As a result, subdivisions have emerged directly within MTARNG's low-altitude flight corridors, including areas south of Townsend near the Townsend Airport, exacerbating airspace competition and compromising long-term military operational capacity (REPI Proposal Narrative, 2024).

The absence of a regional or land use compatibility policy, including those typically outlined in JLUS (2014), has led to piecemeal development that fails to account for military readiness, cumulative fire risk, or emergency access. For instance, new housing developments along Country Club Road, Old Woman's Grave Road, and Blue Cloud Road near the FHTA fall within areas lacking coordinated zoning, building codes, or defensible space enforcement. These properties are governed by a patchwork of jurisdictional authority involving county governments, state agencies like the DNRC, and federal installations, without a clear lead agency or cross-jurisdictional wildfire mitigation strategy.

Defensible space regulations are also inconsistently applied across jurisdictional boundaries. While some private subdivisions have adopted voluntary fire-wise standards, there is no mandate or enforcement mechanism in unincorporated areas, leaving critical gaps in regional fire suppression efforts. This inconsistent application of mitigation practices weakens the effectiveness of mutual aid responses and limits the scalability of regional fuel break strategies promoted by the REPI Program and supported through DMA's assessment area planning framework.

Without coordinated zoning standards, formal interagency planning assumptions, or enforceable compatibility criteria, development continues to occur in locations that place both civilian populations and mission-critical training operations at increased risk. The 2021 Broadwater County study process specifically highlighted this issue, recommending adoption of compatibility planning overlays, flight path disclosure requirements, and integration of military training schedules into local planning reviews, none of which have been implemented to date.

Gaps in Existing Data and Plans

This assessment identified multiple data and coordination gaps that significantly constrain the ability of installations, counties, and state agencies to assess vulnerability, align planning efforts, and prioritize resilience investments across the FHTA and LHTA operational corridor. These deficiencies span hazard modeling, infrastructure mapping, risk communication, and community-scale social indicators, limiting both pre-disaster mitigation and real-time emergency response.

Installation-Specific Risk Data Integration

Overview of Installation-Level Plans: Both the Installation Emergency Management Plan (IEMP), IEWP, and AT/FP Vulnerability Assessment are core elements of MTARNG's resilience and mission assurance framework.

- The IEMP provides the overarching emergency response structure for all-hazard incidents—addressing fire, flood, severe weather, hazardous materials, and munitions events. It includes response coordination, mutual-aid triggers, and chain-of-command integration with state and local emergency services.

- The IEWP defines the installation's energy, water, and fuel dependencies, identifying primary and backup supply lines, redundancy gaps, and restoration priorities. It informs continuity and recovery phases under COOP/Continuity of Government (COG) protocols.
- The AT/FP Vulnerability Assessment evaluates physical and cyber risks to facilities, training ranges, and utilities—mapping potential exposure areas, UXO safety arcs, and ingress/egress chokepoints critical for evacuation and defense coordination.

Together, these documents provide comprehensive risk intelligence for FHTA and LHTA. However, they are not integrated with civilian emergency management systems, limiting cross-jurisdictional situational awareness and joint hazard planning.

Installation Plans Do Well (Strengths)

- FHTA and LHTA IEMPs identify hazard-specific triggers for activation, including Red Flag thresholds and Tenmile watershed flood alerts, with defined mutual-aid points for the Helena Fire Department and DNRC.
- IEWPs map energy and water dependency tiers (single-feed power via NorthWestern Energy, single-supply water from Tenmile, and generator thresholds), identifying 24–72-hour restoration goals.
- AT/FP Assessments delineate UXO safety arcs, SDZs, and MEDEVAC landing areas, including coordination triggers with civilian agencies for off-site emergencies (e.g., airspace deconfliction with Townsend Airport).
- DMA's integration with REPI and DCIP programs has established a preliminary lifeline dependency matrix identifying which utilities are mission-critical to installation continuity.

Identified Gaps and Fragmented Awareness: Despite the robustness of the individual plans, key operational data is not shared across jurisdictions or incorporated into county-level HMPs, leaving significant awareness gaps:

- Geospatial Gaps: SDZ, UXO, convoy routes, and burn-unit boundaries are not included in county or state GIS hazard overlays, limiting emergency access coordination and hazard modeling accuracy.
- Trigger Synchronization: IEMP “fire danger shutdown” criteria and IEWP “energy curtailment thresholds” are not mirrored in county EOPs or CWPP, leading to unsynchronized alerts between installations and local responders.
- Utility Dependencies: IEWP data on backup generation, fuel capacity, and well recharge time (e.g., LHTA 24-hour refill cycle) are not shared with local utilities or included in county mitigation strategies.
- Information Silos: AT/FP risk data and UXO/flight-path buffers are classified but unreferenced in Growth Policies, land use planning studies, or zoning reviews, resulting in incompatible development near military training areas.
- Incident Coordination: Local EOCs (Helena, Lewis & Clark, Broadwater) have no direct data linkage or situational dashboard (e.g., WebEOC or regional COP) integrating military incident status during concurrent disasters.

Military Scenarios Missing from Regional Planning or Exercises

- Range Fire with Concurrent Power Loss: A wildfire ignition during live-fire training compounded by Tenmile substation failure and water pumping loss.

- UXO Detonation Adjacent to Civilian Roadways leading to temporary road closures and requiring regional evacuation coordination.
- Fiber Cut and 9-1-1 Outage During Mobilization as occurred in April 2024, leaving LHTA and surrounding communities without communication.
- Airspace Conflict or Emergency Landing Zone Interference between military rotary-wing activity and civilian aviation near Townsend or Canyon Ferry.
- Post-Fire Debris Flow Isolation road closures trapping units or civilian responders along Old Woman's Grave Road during concurrent weather events.

Each of these scenarios has occurred or been near-miss events regionally but remains unmodeled and unexercised in local planning frameworks.

MTARNG's IEMP, IEWP, and AT/FP Assessments offer mature, data-driven risk intelligence for internal use but lack institutional mechanisms for external integration. The absence of formal data-sharing protocols between DMA, Lewis & Clark County DES, and Broadwater County DES leaves mutual situational awareness fragmented, resulting in redundant data requests, delayed response coordination, and diminished grant competitiveness for resilience investments.

Foundational data on utility and transportation lifelines across the FHTA and LHTA assessment areas remains fragmented, incomplete, or outdated, undermining the assessment area's ability to conduct accurate hazard modeling, prioritize hardening projects, or justify federal resilience funding.

While individual agencies including MDT, NorthWestern Energy, Vigilante Electric, Blackfoot Communications, and Helena Utilities, maintain partial datasets, there is no unified, verified infrastructure inventory that integrates post-fire erosion exposure, flood risk, or redundancy status across DMA's lifelines. The 2024 Regional Infrastructure Assessment identified at least 19 critical data deficiencies across five lifeline categories: transportation, electric power, water, communications, and fuel.

Key Deficiencies by Lifeline

1. *Transportation Lifelines*

- Culvert and Low-Water Crossing Inventories: The MDT hydrology database (2022) omits multiple post-fire erosion sites within the Tenmile Creek, Birdseye Fire, and Canyon Ferry tributary corridors. Many structures have not been reassessed since 2011, and field verifications are missing for Old Woman's Grave Road, River Road, and Blue Cloud Road, all of which serve DMA access and emergency routes.
- Bridge Weight and Condition Ratings: The Williams Street Bridge and several smaller spans near Country Club Road are rated below HL93 standards, creating risk of closure under heavy vehicle loads during flood events or mobilizations.
- Evacuation Route Vulnerability: County EOPs lack GIS-linked detour models that reflect culvert washouts, ice closure probabilities, or slope failure areas, leaving incomplete evacuation timing estimates for DMA-related emergencies. Jurisdictions including Helena, East Helena, and unincorporated Broadwater County, lack dynamic evacuation models that integrate fire behavior progression and road capacity. Current evacuation plans rely on static assumptions and do not account for closure of primary routes (e.g., Williams Street bridge

or River Road during fire or flood). This limits access to FEMA's HMGP and PDM funding, which increasingly prioritize data-driven evacuation resilience.

2. Electric Power Infrastructure

- **Single-Feed Vulnerability:** Approximately 60% of FHTA power lines and 100% of LHTA electric service rely on single-feed systems traversing wildfire-prone terrain (NorthWestern Energy, 2023 Reliability Report). No redundant transmission circuits exist south of Townsend or north of Birdseye.
- **Transformer and Substation Risk Data:** Substation floodplain exposure and vegetation clearance data near Tenmile and Canyon Ferry remain outdated (last MT PSC audit: 2019).
- **Backup Generation:** FHTA maintains less than 48-hour generator capacity for critical functions; LHTA lacks permanent backup power. Generator fuel data and runtime capacities are not mapped within county HMPs or DMA IEWPs.

3. Water Systems

- **Surface and Groundwater Integration:** Helena Utilities' mapping of Tenmile Creek intake and pipeline alignment does not include post-fire sedimentation areas or flood exposure polygons. LHTA shallow well network lacks documented drawdown rates, recharge areas, and contamination sensitivity.
- **Redundancy Data:** No verified database exists for alternate water conveyance routes or potable storage capacities at either installation. The most recent cross-system audit (Helena Utilities, 2021) did not include DMA dependency layers.

4. Communications Infrastructure

- **Fiber and Broadband Redundancy:** The April 2024 911 fiber outage revealed that no alternate route mapping exists for critical communication corridors serving DMA or county EOCs. Fiber expansion by Blackfoot Communications and CenturyLink/Lumen is ongoing along Birdseye Road and Country Club Road, but these projects lack shared hazard overlay review.
- **Microwave Relay Exposure:** USFS and MT DES tower data show that at least two microwave relays serving the Tenmile basin are within high wind and ice load areas (DNRC GIS Layer, 2023).
- **Emergency Radio Coverage Gaps:** Signal dropouts have been recorded on the Old Woman's Grave corridor, impacting interagency radio interoperability during 2022 Red Mountain Fire mutual aid.

5. Fuel and Logistics Networks

- **Storage and Access Mapping:** DMA bulk fuel storage (over 5,000 gallons) and county emergency fuel points are not digitized within any unified GIS.
- **Hazmat Routing Data:** No shared routing map exists for propane or jet fuel delivery to FHTA, despite repeated convoy disruptions along Williams Street and Canyon Ferry Road during flood closures.
- **Wildfire Behavior Modeling Inputs and Fuel Typing:** Cross-jurisdictional wildfire modeling is hindered by inconsistent fuel classification systems between federal (LANDFIRE), DNRC, and local CWPP. State and local plans (CWPP, HMPs, PPPs) different fuel modeling assumptions, which hampers the effectiveness of shared response

strategies. The LHTA and the FHTA also maintain internal burn zone maps that have not been integrated into the regional Interagency Fire Coordination planning documents, resulting in incomplete ignition probability analysis.

The absence of integrated and current data across these domains not only reduces hazard model accuracy but also weakens the assessment area's ability to justify competitive resilience funding through programs including REPI, DCIP, FEMA BRIC, and USDA-NRCS watershed protection. Improved data standardization, coupled with formalized interagency information-sharing agreements, is necessary to close these gaps and support comprehensive mission assurance for both military and civilian stakeholders.

Redundant or Conflicting Planning Efforts

The assessment area is supported by multiple standalone planning documents—including the Tri-County CWPP (2020), Western Montana Hazard Mitigation Plan (2024), Broadwater County Growth Policy (2020), and the DMA's Integrated Emergency Wildfire Plan (IEWP) and DCAT risk tools—but these efforts remain only loosely coordinated. Cross-referencing between plans is limited, and shared mapping standards for evacuation routes, population protection, and access reliability are inconsistently applied. For example, both the CWPP and HMP identify fuel break priorities along Country Club Road and River Road near the LHTA; however, no joint funding mechanism, implementation schedule, or lead agency designation exists to advance these projects. The absence of coordinated ownership, aligned evacuation mapping, and integrated capital planning continues to delay implementation of mitigation actions critical to both community safety and operational resilience.

Outreach fatigue is another documented issue. Local stakeholders and residents have been engaged separately for each of these plans, often without coordination, leading to mixed messages and reduced trust. The creation of a regional interagency resilience working group to align plan development, community outreach, and project implementation timelines across military, county, state, and utility partners, ensuring consistent priorities, shared data, and coordinated delivery of wildfire mitigation and infrastructure resilience initiatives.

While the assessment area is rich in plans, HMPs, CWPP, wildfire preparedness guides, growth policies, and installation resilience assessments, many of these documents operate in isolation, with limited cross-referencing or joint planning assumptions, bringing about the following situations. A detailed analysis of area plans, and their gaps is located in [Annex H](#).

Overlap in recommended mitigation actions, without coordination on lead agency roles or funding timelines.

1. Fuel breaks & WUI treatments appear in multiple plans with no single owner or clock.

- Tri-County CWPP (2020) calls for shaded fuel breaks and defensible-space campaigns across the Helena South Hills, Upper Tenmile, and the Canyon Ferry/U.S. Highway 287 corridor.
- Central MT Regional HMP (2024) echoes those same treatment polygons as county “high-priority actions.”

- JLUS 2014 and REPI portfolio/Army REPI Map (FY25) identify CUBs in the same places to protect training envelopes and reduce ignitions/smoke conflicts.
- FHTA & LHTA Real Property Master Plan (2023) schedules vegetation management near ranges and along ingress/egress spurs.

Impact: Four (4) plans list the same lineal projects (e.g., South Hills WUI edge, Old Woman's Grave Rd/River Rd spurs) but assign different implementers (USFS, DNRC, County, DMA/PPLT). No shared project sheet, timeline, or match strategy means grants are submitted piecemeal and treatments lapse before retreatment cycles (3–5 years).

2. Road/culvert hardening is recommended by several plans, but scopes and funding windows aren't aligned.

- County flood/H&H work (Lewis & Clark FMMP references; Broadwater drainage studies) + Western MT HMP list culvert upsizing, armoring, and low-water crossing retrofits on Tenmile/Prickly Pear tributaries and Canyon Ferry drainages.
- DMA readiness inputs & JLUS (2014) flag the same segments (Country Club Rd, Williams St, River Rd, Old Woman's Grave Rd) as lifelines for training access/evacuation.

Impact: Transportation fixes show up on separate lists (Public Works CIP, HMP annex, DMA mitigation) with different benefit-cost methods and no unified priority order, so lifeline work gets split into smaller, less competitive asks.

3. Watershed protections are proposed in multiple places again without an integrated sequence.

- Tri-County CWPP (riparian buffers, slope revegetation), NRCS/EWP-style projects in HMPs, and municipal water planning (Helena Utilities Tenmile source documents) all call for upstream detention/riparian work to protect the Tenmile system and downstream crossings.

Impact: Same reaches get studied in parallel, but design/permitting are not packaged to move as one watershed program (good for BRIC/EWP scoring).

Conflicting land use priorities, where local zoning may permit growth in areas that military planners consider incompatible with long-term operations.

1. Regulatory tools are uneven across counties/jurisdictions.

- Lewis & Clark County Zoning Regs (Dec 2022, plus Growth Policy Draft 2025) provide some hazard overlays and review criteria, but do not mandate two-egress in all WUI subdivisions, codified defensible-space, or wildfire-rated construction at scale.
- Broadwater County has no countywide zoning outside Townsend; development proceeds via Growth Policy (2020) + 2024 Addendum and Subdivision Regulations—largely advisory on WUI design and siting.
- FHTA JLUS (2014) defines noise/safety/UXO and mission-footprint compatibility areas; these are not consistently mirrored as binding review criteria in city/county approvals.

Impact: Subdivisions can be approved in high-fuel or training-adjacent corridors (South Hills, Canyon Ferry/U.S. Highway 287, Townsend outskirts) without enforceable defensible space,

turnarounds, or evacuation redundancy—raising ignition risk and compressing training envelopes.

2. *Airport/airspace and range safety overlays don't consistently reach local land-use maps.*

- FHTA VA Final EA map operational noise, safety, and emergency response corridors; local plats rarely carry those overlays as conditions of approval

Impact: Incompatible uses (schools, high-density residential, senior housing) can drift into approach or UXO-adjacent areas, increasing complaints, limiting prescribed burns, and driving training curtailments.

Separate risk models being developed by different agencies without shared methodology or input assumptions, reducing consistency across jurisdictions.

1. *Different wildfire models, different answers.*

- Tri-County CWPP leans on DNRC Wildfire Risk Portal layers (burn probability, flame length, WUI index).
- Regional/State HMPs often use FEMA HAZUS and county-built layers.
- REPI use mission-exposure and buffer suitability scoring.
- USFS uses FSim/WHPM.
- City/County planners sometimes rely on generalized WUI maps in Growth Policy appendices.

Impact: Polygon boundaries and priority ranks don't match. A treatment block rated "High" in the CWPP may not appear as a top BRIC candidate in the HMP annex, and it may be outside the REPI assessment area focus, even when it is the same hillside.

2. *Flood risk references aren't synchronized.*

- County flood mitigation references + H&H study excerpts (local culvert sizing/road overtopping records) vs. FEMA FIRMs/Base Level Engineering (BLE) vs. USGS gages & debris-flow susceptibility after burns.

Impact: Competing "maps of truth" for Tenmile/Prickly Pear/Canyon Ferry tributaries lead to different footprints for setbacks, detention siting, and benefit-cost inputs.

3. *No shared lifeline dependency model.*

- Power (NorthWestern/Vigilante), water (Helena), fiber (multiple carriers), road (County/MDT), and DMA all maintain separate outage, fragility, and dependency datasets.

Impact: Hard to run a single scenario (e.g., post-fire debris flood + fiber cut) and see combined service loss or COOP triggers for FHTA/LHTA and hospitals.

Multiple outreach efforts to the same stakeholders or communities for different planning processes, creating fatigue and inefficiency in engagement.

1. *The same neighborhoods are getting hit with multiple, uncoordinated processes.*

- Tri-County CWPP (2020), MT MHMP (202), Central MT Regional HMP Draft (2024), Broadwater Growth Policy Addendum (2024), Lewis & Clark Growth Policy Draft (2025), and JLUS (2014) materials all conducted outreach often to the same HOAs (South Hills, East/West Helena Valley), Canyon Ferry/Silos, Townsend outskirts, and ag operators.

Impact: Stakeholder fatigue, inconsistent messages (e.g., “prescribed fire is essential” in one meeting; “smoke concerns” dominate another), and lower participation in later phases.

2. **Parallel advisory bodies; no shared calendar.**

- Fire councils, planning boards, DES committees, utility task forces, and DMA working groups meet on different cycles.

Impact: Missed opportunities to queue the same projects across CWPP-HMP-CIP-REPI in the same year with a single match stack.

These redundancies can waste resources and reduce implementation effectiveness. Table 41 below provides a full list of these plans.

Table 41. FHTA and LHTA Assessment Area Planning Document Integration Gaps

Planning Document	Overlap in Mitigation Actions	Conflicting Land Use Priorities	Inconsistent Wildfire Models	Duplicative Stakeholder Engagement
Western Montana Regional HMP (2024)	Yes – duplicate wildfire fuel mitigation priorities with CWPP.	Yes – limited integration with compatibility use areas.	Yes – uses differing assumptions from CWPP.	Yes – separate outreach from CWPP and land use studies.
Broadwater County Emergency Operations Plan (2019)	Limited – lacks hazard-specific actions aligned with CWPP.	N/A – not a land use document.	N/A	Yes – conducted independently from other planning efforts.
Broadwater County Growth Policy (2020)	No – focuses on development goals without mitigation linkage.	Yes – permits growth near LHTA with no flight corridor consideration.	N/A	Yes – isolated public input unrelated to emergency planning.
Tri-County- (Lewis & Clark County Area) CWPP (2020)	Yes – overlaps with HMP, IWFMP and land use on evacuation and fuel breaks.	No – focuses on vegetation and fire, not land use.	Yes – lacks standardization with adjacent counties’ CWPP.	Yes – separate from REPI and HMP engagement.

Planning Document	Overlap in Mitigation Actions	Conflicting Land Use Priorities	Inconsistent Wildfire Models	Duplicative Stakeholder Engagement
Tri-County- (Broadwater County Area) CWPP (2020)	Yes – separate fuel modeling approach from neighboring CWPP.	No – minimal land use overlap.	Yes – outdated LANDFIRE models.	Yes – outreach efforts not coordinated.
DMA Installation Emergency Management Plans (FTHA, LHTA)	Yes – does not align with county evacuation plans or CWPP priorities.	Yes – identifies incompatible development near training areas.	Yes – internal military modeling not shared externally.	No – internal military planning.
FHTA Joint Land Use Study	Yes – recommends land use changes not yet reflected in growth policies.	Yes – identifies need for buffers and zoning updates.	Yes – no unified fuel or behavior assumptions.	Yes – new working groups created without cross-reference.
DNRC Wildfire Preparedness Guidance	Yes – strategy documents not directly cited in HMPs or CWPP.	N/A – not a zoning or land use document.	Yes – uses DNRC-specific modeling not calibrated with counties.	No – guidance, not engagement-focused.

Annex M: Funding and Grant Resource Analysis

This Annex identifies and analyzes the principal federal, state, and regional funding mechanisms available to support implementation of resilience, mitigation, and mission-assurance priorities for the FHTA-LHTA assessment area.

It evaluates each source in relation to project typologies identified in previous findings—including lifeline hardening, wildfire mitigation, communications interoperability, and compatible-use planning—and quantifies annual funding levels, eligibility thresholds, and competitive selection criteria. The analysis draws from FEMA Grants Portal (FY 2024–2025), DHS CISA Infrastructure Protection Grant Summaries, Department of Defense (DoD) REPI/OLDCC/BRIC crosswalks, and DES grant records (2020–2024).

Strategic Funding Environment

Montana’s resilience investment environment remains dominated by four major pipelines:

- FEMA Hazard Mitigation Assistance (HMA) suite-BRIC, HMGP, and FMA programs administered by MT DES.
- DoD OLDCC-DCIP, Military Installation Resilience Program (MIRP), and assessment area (REPI Partnership) funding.
- U.S. Department of Agriculture and USFS programs-targeting watershed restoration, wildfire mitigation, and rural utility hardening.
- Infrastructure Investment and Jobs Act (IIJA) and Inflation Reduction Act (IRA)-expanding resilience allocations through FHWA PROTECT, DOE Grid Resilience, and EPA SRF hazard-hardening set-asides.

Table 42. Federal Programs Relevant to DMA/Regional Projects

Program	Admin Agency	Primary Focus/Eligible Activities	Annual or Typical Award Range	Relevance to DMA/Regional Goals	Recent Example/Reference
FEMA BRIC – Building Resilient Infrastructure & Communities	FEMA/MT DES	Pre-disaster mitigation: lifelines, flood mitigation, wildfire corridors, evacuation modeling, redundant power/communications.	\$1 – \$50 million (national competition); avg. \$2 – \$5 million per state sub-application	Direct alignment with Rec. J-1 to J-4 and K-2 to K-3; supports evacuation modeling, road hardening, and GIS integration.	2023 BRIC State Allocation – MT \$1.2 million (set-aside); competitive \$2 billion nationwide.

Program	Admin Agency	Primary Focus/Eligible Activities	Annual or Typical Award Range	Relevance to DMA/Regional Goals	Recent Example/Reference
FEMA HMGP/Post-Disaster Mitigation	FEMA/MT DES	Projects following presidential disaster declarations: culvert retrofits, slope stabilization, flood control.	Up to 15% of total disaster assistance; typically, \$3 million – \$10 million per incident.	Ideal for post-fire road and culvert repair in Tenmile and Old Woman's Grave corridors.	DR-4708-MT (2022 Floods): \$4.7 million awarded for Lewis & Clark County road armoring.
DoW REPI Program	DoW – Office of the Secretary of Defense (Sustainment)	Acquisition of conservation easements, fuel breaks, and CUBs adjacent to installations.	\$1 million – \$25 million per partner project; 50/50 non-federal match preferred.	Critical for FHTA/LHT A buffer acquisition and wildfire mitigation.	FY 2024 REPI Challenge: \$190 million nationally; FHTA PPLT easement portfolio active since 2018.
DoW DCIP – Defense Community Infrastructure Program	OLDCC/DoW	Resilience, access, and shared infrastructure benefiting military installations and communities.	\$250,000 – \$20 million; average FY 2024 award approx. \$8 million.	Aligns with J-1 (WebEOC), K-2 (Water Storage), and transportation lifelines.	FY 2023 DCIP awards included \$10 million for Camp Lejeune stormwater corridors.
USDA Community Facilities & Rural Development Grants	USDA Rural Development	Fire stations, emergency vehicles, water systems, broadband resilience.	\$50,000 – \$2 million (75% federal share).	Supports VFD equipment and rural water infrastructure serving DMA corridors.	2023 USDA CF Grants – MT \$14.2 million awarded.
FHWA PROTECT Program (IIJA)	U.S. DOT/MDT	Road hardening, slope stabilization, culvert upsizing, and flood-resilient transport.	Formula + competitive; \$7.3 billion FY	Direct tie to Rec. K-1 and K-3; aligns with Canyon	MDT FY 2024 Resilience Plan lists Prickly Pear Corridor

Program	Admin Agency	Primary Focus/Eligible Activities	Annual or Typical Award Range	Relevance to DMA/Regional Goals	Recent Example/Reference
			2022–2026.	Ferry and Williams St. corridors.	eligible segment.
DOE Grid Resilience & Innovation Partnerships (GRIP)	DOE Office of Grid Deployment	Hardening electrical lifelines against wildfire, snowpack, and cyber threats.	\$1 million – \$50 million; 50% cost share.	Applicable to NorthWestern Energy and Vigilante co-ops serving DMA.	DOE FY 2023 GRIP Round 1 – MT received \$10.8 million utility hardening grant.
EPA Clean Water/Drinking Water SRF Resilience Set-Aside	EPA/ DEQ	Water treatment upgrades, storage expansion, and emergency backup systems.	\$100,000 – \$5 million.	Ties to K-2 and K-3 (Helena Utilities Tenmile source stability).	EPA 2024 SRF Report – Helena Water Dept. received \$2.5 million upgrade loan.

Table 43. State and Regional Funding Opportunities

Program/Source	Administering Entity	Key Features	Typical Range	Alignment with DMA/County Needs
MT DES EMPG	MT DES/FEMA	Annual planning and training support for county EM programs.	\$50,000 – \$200,000 per county.	Supports joint DMA–county TTX and EOC integration training.
DNRC Fire Preparedness & Resiliency Grants	DNRC	Fuels mitigation, equipment modernization, and Firewise education.	\$25,000 – \$500,000.	Implements CWPP fuel breaks along DMA corridors.
Department of Transportation Resilience Planning Fund	MDT	County-level transportation resilience planning linked to FHWA PROTECT.	\$100,000 – \$400,000.	Supports evacuation route analysis and road hardening design.

Program/Source	Administering Entity	Key Features	Typical Range	Alignment with DMA/County Needs
Environmental Quality Renewable Energy Resilience Fund	DEQ	Microgrid and renewable backup projects for critical facilities.	\$50,000 – \$2 million.	Enables generator replacement and solar battery integration for EOCs.
Resilience Planning Fund (RPF)	MDT	Supports planning-level analyses to improve transportation system resilience, including evacuation route analysis, access redundancy, vulnerability assessments, and integration of climate and hazard risks into transportation planning.	Planning grants: typically, tens to hundreds of thousands (varies by scope)	Strong alignment with DMA and county mitigation priorities by supporting evacuation route analysis, access reliability, and transportation resilience for wildfire, flooding, and other hazard scenarios affecting communities and critical facilities.

Competitive Factors and Readiness Gaps

- **Data Integration:** Successful BRIC and DCIP applications require GIS-based vulnerability analyses; current datasets remain fragmented (Annex L).
- **Benefit-Cost Analysis (BCA):** FEMA’s 0.75 BCA threshold eliminates approximately 30% of potential county projects; unified lifeline mapping would improve scores.
- **Match Requirements:** Most DoW and FEMA programs require 25–50% non-federal share; counties lack dedicated resilience funds to match awards.
- **Project Coordination:** Redundant applications reduce competitiveness; for example, 2020 CWPP and 2024 HMP each submitted similar fuel-break requests to BRIC and DNRC.

Acronyms

AAR – After Action Report
AASF – Army Aviation Support Facility
AFG – Assistance to Firefighters Grant (FEMA)
APZ – Accident Potential Zone
AT/FP – Antiterrorism/Force Protection
BAER – Burned Area Emergency Response
BCA – Benefit-Cost Analysis (FEMA)
BEAD – Broadband Equity Access and Deployment Program (NTIA)
BLE – Base Level Engineering (FEMA flood mapping)
BLM – Bureau of Land Management
BNSF – Burlington Northern Santa Fe (Railway)
C&CB - Capability and Capacity Building
CESER – Office of Cybersecurity, Energy Security, and Emergency Response
CFR – Code of Federal Regulations
CFS – Cubic Feet Per Second
CIKR – Critical Infrastructure and Key Resources
CIP – Capital Improvement Plan
COG – Continuity of Government
COOP – Continuity-of-Operations
COP – Common Operating Picture
CUBs – Compatible Use Buffers
CWDG – Community Wildfire Defense Grant
CWPP – Community Wildfire Protection Plan
DCAT – Defense Climate Assessment Tool
DCIP – Defense Community Infrastructure Pilot
DES – Disaster and Emergency Services
DEQ – Department of Environmental Quality (Montana)
DHS – Department of Homeland Security
DMA – Department of Military Affairs (Montana)
DNRC – Department of Natural Resources and Conservation (Montana)
DoD – Department of Defense
DoDI – Department of Defense Issuance
DOE – U.S. Department of Energy
DoW – Department of War
DPHHS – Department of Public Health and Human Services
DSA – Data Sharing Agreement
DWSRF – Drinking Water State Revolving Fund
EMPG – Emergency Management Performance Grant (FEMA)
EMS – Emergency Medical Services

EOC – Emergency Operations Center
EOP – Emergency Operations Plan
EPA – Environmental Protection Agency
ER – Emergency Relief
ERCIP – Energy Resilience and Conservation Investment Program
ESF – Emergency Support Function
EWP – Emergency Watershed Protection (NRCS)
FD – Fire Department
FEMA – Federal Emergency Management Agency
FHFES – Fort Harrison Fire and Emergency Services
FHRGA – Fort Harrison Rural Growth Area
FHUGA – Fort Harrison Urban Growth Area
FHTA – Fort Harrison Training Area
FHWA – Federal Highway Administration
FIRM – Flood Insurance Rate Map (FEMA)
FMU – Fire Management Unit
FOUO – For Official Use Only
GIS – Geographic Information System
GRIP – Grid Resilience and Innovation Partnerships
H&H – Hydrology & Hydraulics (studies/analyses)
HARC – Helena Aviation Readiness Center
HFRA – Healthy Forests Restoration Act
HLN – Helena Regional Airport
HMA – Hazard Mitigation Assistance
HMGP – Hazard Mitigation Grant Program
HMP – Hazard Mitigation Plan
HMPC – Hazard Mitigation Planning Committee
HSEEP – Homeland Security Exercise and Evaluation Program
IAA – Interagency Agreement
ICRMP – Integrated Cultural Resource Management Plan
ICS – Incident Command System
IEMP – Installation Emergency Management Plan
IEWP – Installation Energy and Water Plan
IIJA – Infrastructure Investment and Jobs Act
IMT – Incident Management Team
INRMP – Integrated Natural Resources Management Plan
IPAWS – Integrated Public Alert and Warning System
IRA – Inflation Reduction Act
IWFMP – Integrated Wildland Fire Management Plan
IWUIC-International Wildland–Urban Interface Code

JLUS – Joint Land Use Study
JOC – Joint Operations Center
LEO – Law Enforcement Office
LHTA – Limestone Hills Training Area
MAO – Military Area Overlay
MATES – Mobilization and Training Equipment Site
MCA – Montana Code Annotated
MDT – Montana Department of Transportation
MERF – Montana Emergency Response Framework
METL – Mission-Essential Task List
MGD – Million Gallons Per Day
MHMP – Multi-Hazard Mitigation Plan
MIRP – Military Installation Resilience Program
MIRR – Military Installation Resilience Review
MOA – Memorandum of Agreement
MOU – Memoranda of Understanding
MSU – Montana State University
MTARNG – Montana Army National Guard
NCEI – National Centers for Environmental Information
NFIP – National Flood Insurance Program
NIMS – National Incident Management System
NOAA – National Oceanic and Atmospheric Administration
NRCS – Natural Resources Conservation Service
NTIA – National Telecommunications and Information Administration
NTU – Nephelometric Turbidity Unit
NWCG – National Wildfire Coordinating Group
OEM – Office of Emergency Management
OLDCC – Office of Local Defense Community Cooperation
PDM – Pre-Disaster Mitigation
PPLT – Prickly Pear Land Trust
PSC – Montana Public Service Commission
PSPS – Public Safety Power Shutoff
RAPT – Resilience Analysis and Planning Tool (FEMA)
RCMP – Range Control Master Plan
RCPGP – Regional Catastrophic Preparedness Grant Program (DHS/FEMA)
REPI – Readiness and Environmental Protection Integration (Program)
RMEF – Rocky Mountain Elk Foundation
SCADA – Supervisory Control and Data Acquisition
SDZ – Surface Danger Zone
SECC – State Emergency Coordination Center

SFA – State Fire Assistance (USFS)
SHSGP – State Homeland Security Grant Program
SNOTEL – Snow Telemetry
SO – Sheriff’s Office
SOG – Standard Operating Guide
SOP – Standard Operating Procedure
SRF – State Revolving Fund
SWSI – Surface Water Supply Index
TAG – The Adjutant General (State)
TIP – Transportation Improvement Program
TRADOC – Training and Doctrine
TTX – Tabletop Exercise
USACE – U.S. Army Corps of Engineers
USBR – U.S. Bureau of Reclamation
USDA – U.S. Department of Agriculture
USDM – U.S. Drought Monitor
USFS – U.S. Forest Service
USGS – U.S. Geological Survey
UXO – Unexploded Ordnance
VA – Department of Veterans Affairs
VAFD – Veterans Affairs Fire Department
VFD – Volunteer Fire Department
WFPM – Wildland Fire Program Manager
WUI – Wildland-Urban Interface

References

Army Climate Resilience Handbook. (2022). U.S. Army.

Army REPI Map. (2025). Office of the Secretary of Defense – REPI Program.

Broadwater County Emergency Management. (2020). Broadwater County Pre-Disaster Mitigation Plan. Broadwater County DES.

Broadwater County Planning Department. (2024). Broadwater County Growth Policy Addendum 2024.

California Department of Forestry and Fire Protection (CAL FIRE). (2020–2024). Wildfire and forest resilience programs and grant guidance. State of California. <https://www.fire.ca.gov>

City of Helena Fire Department. Divisions and Mutual Aid Framework. Retrieved from helenamt.gov.

City of Helena Utilities Department. (2021). Water Supply and Distribution Overview – Tenmile Watershed and Municipal Wells. Retrieved from helenamt.gov.

Colorado General Assembly. (2021). Senate Bill 21-258: Wildfire risk mitigation. State of Colorado. <https://leg.colorado.gov/bills/sb21-258>

Department of Defense (DoD). (2023). Weather Resilience Toolkit for Installations. Office of the Assistant Secretary of Defense for Energy, Installations, and Environment. Retrieved from <https://weather.defense.gov>.

Federal Emergency Management Agency. (2011). Flood Insurance Rate Maps (FIRMs) and Flood Insurance Study reports [Data set]. U.S. Department of Homeland Security. <https://msc.fema.gov>

Federal Emergency Management Agency. (n.d.). National Flood Hazard Layer (NFHL) [Data set]. U.S. Department of Homeland Security. <https://www.fema.gov/national-flood-hazard-layer-nfhl>

Federal Emergency Management Agency. (2023). Local mitigation planning policy guide. U.S. Department of Homeland Security. <https://www.fema.gov>

Federal Emergency Management Agency. (2023). Building Resilient Infrastructure and Communities (BRIC) program guidance. U.S. Department of Homeland Security. <https://www.fema.gov/bric>

Federal Emergency Management Agency. (2023). Hazard Mitigation Grant Program (HMGP) guidance. U.S. Department of Homeland Security. <https://www.fema.gov/hmcp>

Federal Emergency Management Agency. (2020). Homeland Security Exercise and Evaluation Program (HSEEP). U.S. Department of Homeland Security. <https://www.fema.gov/hseep>

First Street Foundation. (2022). Helena Valley Northeast Fire Risk Assessment. Retrieved from firststreet.org.

Forest History Society. (1949). Mann Gulch Fire. Retrieved from foresthistory.org.

Fort Harrison & Limestone Hills Real Property Master Plan. (2023). Montana Department of

Military Affairs.

Fort Harrison Joint Land Use Study ((2014). Final Report, Background Report, and Executive Summary Brochure.

Fort Harrison VAMC Environmental Assessment. (2014). U.S. Department of Veterans Affairs.

GAO. (2023). Wildfire Resilience: Federal and State Coordination Challenges. U.S. Government Accountability Office.

Helena–Lewis and Clark County Office of Emergency Management. (2021). Multi-Jurisdictional Pre-Disaster Mitigation Plan. Helena–Lewis and Clark County OEM.

Homeland Infrastructure Foundation-Level Data (HIFLD). (2023). Infrastructure data sets [Data set]. <https://hifld-geoplatfrom.opendata.arcgis.com>

Intergovernmental Panel on Climate Change (IPCC). (2023). Sixth Assessment Report: Climate Change 2021–2023. Retrieved from <https://www.ipcc.ch/>.

KTVH. (2023). Cut Lines Cause People to Go Without Internet for Weeks. Retrieved from ktvh.com.

KTVH. (2023). Helena’s History Shaped by Devastating Fires. Retrieved from ktvh.com.

KTVH. (2024). 9-1-1 Services Restored After Outage Caused by Fiber Cut. Retrieved from ktvh.com.

Limestone Hills Training Area Master Plan. (2023). U.S. Army & Montana Army National Guard.

Lewis and Clark County. (2024). Capital improvement plan, FY 2024–2029. Lewis and Clark County, Montana. <https://www.lccountymt.gov>

Lewis & Clark County. (2020). Growth Policy Update and Subdivision Regulations. Retrieved from lccountymt.gov.

Lewis & Clark County. (2022). Flood Mitigation Master Plan. Retrieved from lccountymt.gov.

Lewis & Clark County. (2022). Flood Mitigation Master Plan – Trap Club Detention Project and Culvert/Conveyance Upgrades. Retrieved from lccountymt.gov.

Lewis & Clark County DES. (2024). Western Montana Regional Hazard Mitigation Plan – Lewis & Clark Annex.

Lewis & Clark County Planning Department. (2022). Zoning Regulations (Final).

Montana Department of Administration – Broadband Office. (2023). ConnectMT Broadband Program. Retrieved from broadband.mt.gov.

Montana Department of Environmental Quality. (2022). Montana Integrated Water Quality Report. Retrieved from <https://deq.mt.gov>.

Montana Department of Natural Resources and Conservation (DNRC). (2015). Establishment of Fire Protection – Manual 601. Retrieved from dnrc.mt.gov.

Montana Department of Natural Resources and Conservation (DNRC). (2015). Montana State

Water Plan. Retrieved from <https://dnrc.mt.gov/divisions/water/management/montana-state-water-plan>.

Montana Department of Natural Resources and Conservation. (2023). Statewide floodplain, hydrologic, and watershed modeling [Data set]. State of Montana. <https://dnrc.mt.gov>

Montana Department of Natural Resources and Conservation. (2021). Montana wildland–urban interface code (MCA 76-13-145). State of Montana. <https://dnrc.mt.gov>

Montana Department of Natural Resources and Conservation (DNRC). County Cooperative Fire Protection Program.

Montana Department of Transportation (MDT). (2023). Montana Functional Classification Maps and Infrastructure Reports. Retrieved from <https://www.mdt.mt.gov/publications/maps.shtml>.

Montana Disaster and Emergency Services. (2023). Fire service capacity and response capability report. State of Montana. <https://des.mt.gov>

Montana DES. (2019). Montana Emergency Response Framework (MERF), Version 3.1. Retrieved from des.mt.gov.

Montana Drought and Water Supply Committee. (2023). Montana Drought Status and Outlook. Retrieved from dnrc.mt.gov.

Montana Multi-Hazard Mitigation Plan. (2023). Montana DES.

Montana State Library GIS Clearinghouse. (2023). Floodplain, Watershed, and Infrastructure GIS Data Layers. Retrieved from <https://msl.mt.gov/GIS/>.

Montana Weather Office. Whitlock, C., et al. (2017). Montana Climate Assessment: Water, Forests, and Agriculture. Montana State University & University of Montana. Retrieved from <https://montanaweather.org/montana-weather-assessment>.

Montana Western Region Base Plan. (2024). Montana DES & Regional Partners.

Montana Wildfire Risk Assessment. (2023). Montana DNRC Forestry Division. Montana Wildfire Risk Portal. Retrieved from <https://mtfireinfo.org>.

National Centers for Environmental Information (NCEI). (1935). Helena Earthquake Sequence – Damage Reports. Retrieved from ncei.noaa.gov.

National Centers for Environmental Information (NCEI). (2024). NOAA National Weather Report – Annual 2023. Retrieved from <https://www.ncei.noaa.gov>.

National Interagency Fire Center (NIFC). (2023). Wildfire Response and Incident Data. Retrieved from <https://www.nifc.gov>.

Natural Resources Conservation Service. (2022). Emergency Watershed Protection (EWP) program guidance and technical standards. U.S. Department of Agriculture. <https://www.nrcs.usda.gov>

NorthWestern Energy. (2023). Electric and natural gas infrastructure data (planning-level) [Data set]. <https://www.northwesternenergy.com>

- Prickly Pear Land Trust. (2023). Conservation Easement Projects and Open Space Protection. Retrieved from pricklypearlt.org.
- PRISM Climate Group. (2023). Climate normals and precipitation data. Oregon State University. <https://prism.oregonstate.edu>
- Readiness and Environmental Protection Integration (REPI) Program. (2022). Fort Harrison REPI Buffer Strategy Report. Retrieved from <https://www.repi.mil>.
- Tri-County Regional CWPP. (2020). Community Wildfire Protection Plan – Final Version 2.0.
- U.S. Army Corps of Engineers. (2023). National Inventory of Dams: Montana Data. Retrieved from <https://nid.sec.usace.army.mil>.
- U.S. Census Bureau. (2022). American Community Survey 5-Year Estimates (2020–2022). Retrieved from <https://data.census.gov>.
- U.S. Department of Agriculture Forest Service. (2023). LANDFIRE vegetation, fuels, and disturbance data [Data set]. <https://www.landfire.gov>
- U.S. Department of Agriculture Forest Service. (2023). FlamMap fire behavior modeling outputs [Data set]. <https://www.firelab.org>
- U.S. Department of Agriculture Forest Service. (2021). Burned Area Emergency Response (BAER) technical guidance. <https://www.fs.usda.gov>
- U.S. Drought Monitor. (2023). National Drought Mitigation Center, University of Nebraska-Lincoln. Retrieved from <https://droughtmonitor.unl.edu>.
- U.S. Forest Service. (2022). Wildfire Hazard Potential Map – Helena-Lewis and Clark National Forest. Retrieved from <https://www.fs.usda.gov>.
- U.S. Forest Service. Situation Reports (SitReps). U.S. Forest Service.
- U.S. Forest Service & Montana DNRC. (2021). Cooperative Fire Protection Agreement – UXO Safety Protocols and Mutual Aid. Retrieved from [fs.usda.gov](https://www.fs.usda.gov).
- U.S. Geological Survey (USGS). (2023). Hydrologic Data for the Tenmile and Missouri Watersheds, Montana. Retrieved from <https://waterdata.usgs.gov>.
- U.S. Geological Survey. (2023). LiDAR-derived elevation and terrain data [Data set]. <https://www.usgs.gov>
- U.S. Geological Survey & USDA Rocky Mountain Research Station. (2022). Snowmelt timing and runoff response studies. <https://www.fs.usda.gov/research>
- Utah Seismic Safety Commission. (1935). Helena Earthquake Series. Retrieved from quake.utah.edu.