ERDC/CERL TR-20-13

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Legacy Resource Management Program

Nationwide Context and Evaluation Methodology for Farmstead and Ranch Historic Sites and Historic Archaeological Sites on DoD Property

Carey L. Baxter, Susan I. Enscore, Ellen R. Hartman,
Benjamin C. Mertens, and Dawn A. Morrison

March 2021



Construction Engineering Research Laboratory

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Final Technical Report (TR)

Approved for public release; distribution is unlimited.

Prepared for Legacy Resource Management Program
Arlington, VA 22202

Under Project Number 468415, “Legacy –FY17 Nationwide Context”

Abstract

The Army is tasked with managing the cultural resources on its lands. For installations that contain large numbers of historic farmsteads, meeting these requirements through traditional archaeological approaches entails large investments of personnel, time and organization capital. Through two previous projects, Engineer Research and Development Center, Construction Engineering Research Laboratory (ERDC-CERL) cultural resource management personnel developed a methodology for efficiently identifying the best examples of historic farmstead sites, and also those sites that are least likely to be deemed eligible for listing on the National Register of Historic Places. This report details testing the applicability of the methodology to regions across the country. Regional historic contexts were created to assist in the determination of "typical" farmsteads. The *Farmstead/Ranch Eligibility Evaluation Form* created by ERDC-CERL researchers was revised to reflect the broader geographic scope and the inclusion of ranches as a property type. The form was then used to test 29 sites at five military installations. The results of the fieldwork show this approach is applicable nationwide, and it can be used to quickly identify basic information about historic farmstead sites that can expedite determinations of eligibility to the National Register.

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Preface

This study was conducted for the Legacy Resource Management Program under Project Number 468415, "Legacy – FY17 Nationwide Context." The technical monitor was Elizabeth Galli-Noble, Legacy Resource Management Program.

The work was performed by the Land and Heritage Conservation Branch of the Installations Division, U.S. Army Engineer Research and Development Center, Construction Engineering Research Laboratory (ERDC-CERL). At the time of publication, Mr. Jed Alvey was Acting Chief of the Land and Heritage Conservation Branch and Ms. Michelle Hanson was Chief of the Installations Division. The Acting Deputy Director of was ERDC-CERL was Ms. Michelle Hanson and the Acting Director was Dr. Kirankumar Topudurti.

The Commander of ERDC was COL Teresa A. Schlosser and the Director was Dr. David W. Pittman.

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1 Introduction

1.1 Background

The National Historic Preservation Act of 1966 (NHPA), as amended, defines responsibilities that federal agencies have to historic properties under their oversight. Section 106 of the NHPA stipulates that federal agencies must take effects on historic properties into consideration when planning and completing undertakings that it regulates, funds, or that occur on its lands. It defines "historic properties" as those listed or considered eligible for listing on the National Register of Historic Places (NRHP). Additionally, Section 110 of the NHPA requires cultural resource managers (CRMs) to develop preservation programs to identify, evaluate, protect, and nominate historic properties to the NRHP.

There are Army-specific mandates regarding historic properties that supplement and support Section 106 and Section 110. Army Regulation (AR) 200-1 requires installations to develop Integrated Cultural Resource Management Plans (ICRMPs), grounded in a landscape approach, to identify and manage historic properties on Army lands. Installation land managers must now determine how best to manage their former homesteads consistent with federal legal requirements. Key among these is the legal requirement to evaluate sites more than 50 years old for eligibility to be listed on the NRHP.

Military acquisition of vast amounts of land for new and expanded training installations during both World War I and World War II naturally included inhabited lands. Most of this habitation was in the form of individual farmsteads and ranches. As a result, installations across the country contain numerous historical archaeological sites that are the remains of these farmsteads and ranches. The occupants of all these sites once belonged to communities connected by kinship and social institutions, and they were displaced by the founding of multiple military installations. The impact of these farmsteads and ranches on the landscape remains visible on installation rangelands and buffer zones, although the occupants are long gone.

The presence of such large numbers of historic farmsteads and ranches did not impact military training for many decades. It was not until 1990 that farms abandoned in 1940 aged into the authority of the NHPA. Farmstead and ranch sites that had been open to training now have to be trained

around until the sites can be officially evaluated for the NRHP. Very little guidance exists, however, on how to manage these sites. This problem goes back decades in cultural resource management, exemplified by a 1990 article in *Historical Archaeology Journal* (Wilson 1990) titled "We've Got Thousands of These: What Makes a Historic Farmstead Significant?" During the intervening years, the lack of specific guidance and evaluation criteria for making management decisions remained largely unaddressed. The sheer numbers of these farmstead sites make the evaluation process laborious and very expensive. A method for grouping like farmsteads in regional associations and creating a standardized approach for making determinations of eligibility would greatly reduce the cost of evaluating them individually.

This project follows on from Legacy #12-508, which produced a regional method that evaluates common site characteristics as a property type, enables standardized evaluation through identification both of sites not likely to add to existing knowledge of artifacts or historic context and sites that are exemplary examples, allows regional variations, utilizes a landscape approach, and can be applied to current sites and future discoveries. The methodology was originated and first tested at Fort Leonard Wood, Missouri in 2005 (ERDC-CERL SR-05-33). Legacy 12-508 tested a revised methodology in the Southeast region of the U.S. at Fort Bragg, NC. A historic context was developed for the region (defined for that study as North Carolina, South Carolina, and Georgia). After the success of Legacy 12-508, Engineer Research and Development Center, Construction Engineering Research Laboratory (ERDC-CERL) researchers proposed to beta test the methodology nationwide and to include ranch sites as site types to be considered. The result of that effort is presented in this report.

1.2 Objective

The objective of this project is the expansion of the existing context and methodology for NRHP evaluation of farmstead archaeological and historic sites for the southeastern United States to be nationwide and to include ranch sites. If successful, this Farmstead/Ranch Methodology will benefit the military mission by providing a standardized and nationally applicable methodology for determining eligibility of sites to the NRHP. DoD has thousands of potentially eligible sites that may impact training lands. A 2013 survey of 12 installations found 390 farmstead sites on average, with two in-

stallations each reporting over 2,000 sites. Implementation of the Farmstead/Ranch Methodology would greatly reduce the need for additional intensive site survey and would ideally result in expanded training areas.

1.3 Approach

The work further develops the new landscape archaeology methodology successfully tested regionally through Legacy Project 12-508, and determines its applicability on a nationwide level as well as including ranch archaeological sites as another property type. The Farmstead/Ranch Methodology was further refined with guidance on how the approach can be modified within each geographical and cultural region of the United States for determining the sites that are not representative enough or unique enough to warrant a traditional intensive survey to determine NRHP eligibility.

To apply the methodology across the country, the nation was divided into 12 regions that contained broad similarities in geography, agriculture, climate and settlement history variables. Five installations in regions other than the Ozarks and the Southeast (tested in previous studies) were examined to determine fit of the methodology and its utility in a variety of conditions. Six historic sites that had already been evaluated for the NRHP were selected on each installation by the installation CRM. CERL researchers visited each site to conduct the field documentation portion of the beta testing. The CERL archaeologist tasked with documenting and evaluating the sites was not provided any information on the findings or results of any subsurface testing or NRHP evaluation results. The sites were then evaluated using the Farmstead/Ranch Eligibility Evaluation Form that is part of the proposed methodology. Once the evaluation had been completed, the results of the evaluation was compared to the traditional NRHP evaluation conducted previously. A full explanation of the methodology and the approach for applying the historic farmstead/ranch eligibility methodology is found in Chapter 2.

1.4 Site visits

The research team visited five installations in 2019 to beta test the methodology, with each trip taking 1 week. Fort Riley, KS was visited from 31 March – 4 April, and the team worked at Barry M. Goldwater Range (Luke Air Force Base [AFB], AZ) from 17-22 May. Beta testing work was done at Fort McCoy, WI the week of 17-21 June, and at Piñon Canyon Maneuver

Site (PCMS, at Fort Carson, CO) from 2-7 September. The final beta testing took place at Fort Hunter Liggett, CA (FHL) from 4-9 November.

Site visits consisted of first meeting with the cultural resources manager to gather any missing prior site evaluations and historic contexts. After review and incorporation of any new material, the testing sites were finalized. The remainder of the visit involved field work at the various test sites.

1.5 Acknowledgments

The authors wish to acknowledge the assistance provided to this project by the Legacy Resource Management Program current and former staff, specifically Kathryn Plimpton, Kelly Hallett, and Elizabeth Galli-Noble, and Michelle Volkema.

Thanks are due to the staff at the five installations where the field work was conducted. They provided large amounts of their time gathering materials and accompanying the CERL researchers to the archaeological sites.

- Fort Riley, KS: Fiona Price, Archaeologist/Collections Manager
- Fort McCoy, WI: Kira Kaufmann, Archaeologist and Tyler Olsen, Archaeologist, CEMML
- Barry M. Goldwater Range, AZ: Adrianne Rankin, Archaeologist, 56th Range Management Office, Luke Air Force Base, Arizona
- PCMS: Jennifer Kolise, Fort Carson Cultural Resource Manager and Craig Dengel, Archaeologist
- FHL: Lisa Cipolla, Cultural Resource Manager; Mitch Evans, Lauren Mirasol, and Susanna Seidensticker, Archaeologists, CEMML.

The authors would like to acknowledge Dr. Richard Edging (retired) and Ms. Stephanie Nutt of Fort Leonard Wood, MO. Dr. Edging was the impetus for the development of the methodology, and Ms. Nutt was a coauthor of the first iteration of the methodology. Dr. Linda Carnes-McNaughton was our Point of Contact at Fort Bragg for the second iteration, and Megan Tooker (CERL) assisted with field work for that project. At ERDC-CERL, the authors were assisted by Catalina Flores, Student Research Assistant, Arizona State University.

2 Project Methodology

This project tested the application of the Farmstead/Ranch Methodology for an expanded Phase I archaeological survey of historic farmstead and ranch sites to assist installation CRMs in determining NRHP eligibility and reducing the number of potentially eligible sites waiting for Phase II surveys. The principle components of the Phase I expansion are evaluating and mapping the farmstead or ranch as an entire compound, evaluating the farmstead place in the cultural landscape of the region, examining the historic documentation of the site, examining the Phase I artifact assemblage to determine site age and usage, and the application of the *Farmstead/Ranch Eligibility Evaluation Form*. Elements of the Phase II survey that were not performed as part of this methodology were subsurface testing and large scale artifact recovery, which are the largest of the man power requirements for a Phase II survey. The goal was to see if the expanded Phase I survey could match the Phase II results in terms of eligibility determinations, as this would provide an efficient alternative to intensive Phase II investigations at many sites.

2.1 Traditional NRHP Evaluation Methodology: Phase I and Phase II surveys

A generally accepted evaluation methodology specific to historic farmstead and ranch sites does not exist. As a result, installation CRM's tend to evaluate these sites in the same way that prehistoric Native American sites and other historic sites are evaluated. The first part of the processes is called a Phase I survey. During a Phase I, the archaeologists investigate a large area of land to determine if any archaeological sites are present. If sites are observed they are mapped with a quick sketch map and the site location is mapped through GPS or on a U.S. Geological Survey (USGS) quadrangle map. Surface artifacts are collected to help determine the age and nature of the site. Artifact type categories, such as kitchen group or architectural group artifacts, can provide some rough insight into the function of the site. In practice, most Phase I surveys focus on identifying the location and approximate age of the site but do not attempt to fully document all of the site's features. The understanding is that a later Phase II survey will accomplish that task more effectively. Sites then receive preliminary assessments of condition and levels of site integrity. Sites are either classified as *Not Eligible* or *Potentially Eligible* for listing in the NRHP. Ineligible sites require no mitigation or preservation. Under current Army regulations,

potentially eligible sites must be preserved as if they were eligible until a definitive determination of NRHP eligibility is made in a Phase II survey.

The Phase II survey consists of intensive investigation to locate all features in the site and the systematic field mapping of cultural and topographic features. Site disturbances are also documented and mapped. Subsurface testing in the form of systematic shovel tests and/or test unit excavations are conducted to determine the site stratigraphy and potential for subsurface features or deposits. Occasionally controlled surface artifact collection is conducted. All artifacts recovered from the surface or excavations must be cleaned, cataloged and curated in perpetuity. Archival research on historic sites is conducted to include (when documents are available) chain-of-title searches, census records, agricultural census records, historic map records, property tax records and oral and local histories. A Phase II survey typically consists of field crew of 3-6 people on site for several days, and accompanying lab work. The information collected during the field work would then be applied to NRHP evaluation criteria to determine if the site were Eligible or Not Eligible for the NRHP.

2.2 National Register eligibility

NRHP eligibility is determined by investigating whether a property possesses historic significance and sufficient integrity to represent that significance.

2.2.1 Significance

Significance is defined as the meaning or value ascribed to a cultural landscape based on the NRHP criteria for evaluation. There are four eligibility criteria against which site significance is evaluated for the NRHP. These four criteria are described in National Park Service Bulletin No. 15, *How to Apply the National Register Criteria for Evaluation* (NPS 1997:11).

- Criterion A applies to properties associated with events that have made significant contributions to the broad patterns of history.
- Criterion B applies to properties associated with the lives of persons significant in our past.
- Criterion C applies to properties embodying the distinctive characteristics of a type, period, or method of construction; possessing high artistic values; or representing a significant and distinguishable entity whose components may lack individual distinction.

- Criterion D applies to properties that have yielded or are likely to yield, information important to prehistory or history.

2.2.2 Integrity

Integrity is defined as the authenticity of a property's identity, evinced by the survival of the site's physical characteristics and the "ability of a property to convey its significance" (Little et al. 2000:35). The integrity of a site or property is evaluated on seven aspects. These aspects of integrity are listed in NPS bulletin 36 (Little et al. 2000) and summarized below:

- **Location**: the place where the item was constructed/manufactured or a historic event occurred;
- **Design**: the elements that constitute the form, plan, space, structure, and style of a property;
- **Setting**: the physical environment of a property;
- **Materials**: the physical elements or parts that were combined or deposited in a pattern or manner to form an archaeological property;
- **Workmanship**: the evidence of the labor and skill of a culture or people;
- **Feeling**: the expression of the aesthetic or historic sense of a particular period of the past; and
- **Association**: the direct link between an important historic event or person and a historic property. (Under Criterion D, the link is measured in the strength of association between data and important research questions.)

Determination of integrity is somewhat subjective and in-depth guidance for how to evaluate a site's integrity is can be found in NPS Bulletin 15 *How to Apply the National Register Criteria for Evaluations* (NPS 1997). The site must first be assessed for significance and the essential qualities of the site that make it significant are determined. These qualities of the site are then evaluated against the seven aspects of integrity to determine "which aspects of integrity are vital to the property being nominated and whether they are present" in sufficient quantity and quality to convey the significance (Little et al. 2000:36). To be considered eligible for the National Register a property will possess several, usually most, of the aspects of integrity. It is not necessary, however, for a property to be completely intact, unaltered or undamaged for it to retain sufficient integrity to be considered eligible for the National Register.

Assessment of integrity at archaeological sites is complicated by the fact that much of the site is not visible at the time of evaluation. Archaeological integrity describes the quality of information and level of preservation for an archaeological site, district, or assemblage. The archaeological record, however, is complex and archaeological sites "do not exist today exactly as they were formed. There are always cultural and natural processes that alter the deposited materials and their spatial relationships" (NPS 1997:46). Any determination of integrity must be made within the historical and modern contexts of the property and can vary from property to property.

In general, archaeological integrity may be demonstrated by the presence of (Little et. al. 2000:37):

- Spatial patterning of surface artifacts or features that represent differential uses or activities;
- Spatial Patterning of subsurface artifacts or features;
- Lack of serious disturbance to the property's archaeological deposits.

Archaeological sites that are determined eligible for the National Register are usually considered under Criterion D – the ability to convey information important to history or prehistory. Under this Criterion the integrity determination is made based on the site's ability to provide information towards answering the research questions defined in the archaeologist's research design.

2.3 Landscape approach

Preservationists have long recognized the value of using a holistic approach to researching cultural resources. A holistic approach considers the relationships between a region's history and its infrastructure, landscape architecture, planning, and archaeology.

The American landscape is largely shaped by human activity and land-use decisions. It serves as the setting for events in the nation's history, and as such it is modified as a result of social trends as well as the more localized actions of groups or individuals. Change can occur suddenly and dramatically, as when a courthouse is razed or a community is constructed. It can also occur gradually and subtly, as in the vanishing of windmills from farms or the replacement of wooden barns with metal pole barns. Over time, the landscape becomes a record of individual and group

decisions, both economic and political, in terms of what to build and what to raze, what to maintain and what to neglect, what to preserve and what to replace. The decisions are guided by cultural values, whether pre-industrial or modern, local, or national. The landscape reflects those decisions and the cultural values that drove them.

As history plays out on the land, it leaves its mark. Sometimes the land remains relatively unchanged from generation to generation, but more often changes accumulate in layers. In areas of extensive human activity, the landscape often appears as a patchwork, with elements of older layers "poking through" newer layers and surviving side by side with the elements of the newer layers.

The value of reading the landscape comes through recognition of relationships among the components that make up that landscape. Identifying and recognizing these patterns is akin to aboveground archaeology. In archaeology, an individual projectile point or pottery shard may be important for its form and design, but greater significance is revealed when its context and origin are understood. An understanding of the relationship of the object to other objects at the site, to the soil layer in which it was found, and to the site in general gives the object greater meaning and clarifies its relative significance. In a similar way, an individual building, structure, or open space in the landscape may have significance, but an understanding of its relationship to other landscape components and its general surroundings clarifies its relative significance.

A landscape approach provides a framework for understanding the relationships between a region's history and its infrastructure, landscape architecture, planning, and archaeology. Recent National Register nominations of historic districts on military installations reflect this expanded approach with discussions of the overall plan of the installation and the interrelationships among the component parts. The evaluation of military installations as singular entities with unique cultural traditions and distinctive physical resources is the key to an integrated investigation encompassing all of the historic resources of a military installation.

2.4 The Farmstead/Ranch Methodology: expanded Phase I survey to determine eligibility

It is the opinion of the authors, gained through experience at Fort Leonard Wood and at Fort Bragg, that an expanded Phase I survey of a historic

farmstead can provide sufficient information to make a definitive NRHP evaluation determination at many of these sites. Instead of simply identifying the site, the expanded Phase I described and used in this report looks at how the site is positioned in relation to nearby sites and other significant landscape features, such as crossroads and river crossings. More effort is taken to identify the remains of architectural elements at the site (including chimney falls, cellars, secondary structures, and fence lines) and to distinguish between subtle feature remains and the effects of later, military-related disturbances. The identification of property owners through a chain-of-title search and/or census or agricultural census records as well as the identification of any oral history available for the site will help situate the site in the regional social landscape. The expanded Phase I approach is based on the assumption that a farmstead site that contains multiple secondary structures or one that is tied to the regional community (through kinship, social, economic, or physical relationships) will likely have more information on site activity and be able to answer a wider variety of research questions (and therefore be more likely to be Eligible for the NRHP) than a small, single-structure site. The Farmstead/Ranch Methodology can be implemented when a site is first discovered, or applied to sites that have already been identified in Phase I and are waiting evaluation in Phase II.

This technique involves a more systematic approach to mapping the site plan than is typically seen in Phase I survey. In a Phase I the maps are often not-to-scale sketch maps that focus on structure remains and the site limits. The main purpose of these maps is to help researchers relocate the site, distinguish it from other sites in the area and to estimate the level of effort needed for a Phase II. In our methodology the site should be mapped to scale in its entirety with GPS or another surveying method. Features to be mapped include, but are not limited to: foundations (including all foundation details, interior walls and construction material and techniques), building footers, chimney falls and foundations, depressions, berms, architectural debris scatter, artifact scatters, diagnostic artifacts, sources of water, fences and fenceposts, walls, roads, paths, level areas, and vegetation variations throughout the site. Disturbances to the site should also be mapped and described. These disturbances include plowing scars, erosion, modern roads, grading, heavy vehicle tracks, modern artifacts, and excavations such as fighting positions. This level of mapping is typically seen in Phase II surveys and can be done in 1 day by one or two

people. If the site was completely and accurately mapped as part of a previously conducted Phase I survey, that map can be used and the mapping effort does not need to be repeated.

Surface artifacts should be observed and documented. Collection of the artifacts is at the discretion of the installation CRM in accordance with the procedures outlined in the ICRMP. If artifacts are collected they should be cleaned, cataloged and curated in perpetuity. If artifacts are not collected then a sample of the artifacts should be photographed in the field. Significant, diagnostic or isolated artifacts should be mapped as well as artifact clusters or concentrations. The distribution of artifact types across sites should also be noted. For example, if the artifacts around one foundation consist primarily of nails, pieces of wire and metal, the building was most likely used for agricultural, mechanical or storage activities. If a concentration of food storage or serving vessels are found (such as cans, bottles, plates, bowls, canning jars) that portion of the site can be assumed as the likely residential portion of the site and nearby buildings were likely residential structures. Special note should be given to temporally diagnostic artifacts. Site notes should include the types of ceramics and ceramic decorations, bottle glass types, food can types, can opening mechanisms and nail types. If artifacts were collected as part of a previously conducted Phase I survey, these should be used in the analysis.

Archival research should also be conducted for the site and project area. Archival research is typically done as part of the Phase II survey. The historical documents, maps and oral histories can provide information about the site to help inform on the length of site occupation, the range of agricultural and non-agricultural activities at the site and the connection of the site to the wider community. Historic maps should be consulted to note the site occupation range, the proximity to historic transportation networks, historic site names or ownership and proximity, and relationship to other sites on the historic landscapes. Chain-of-Title searches will inform on the property ownership while census data and tax records will document site occupation to determine if a person of significance is associated with the site. Agricultural census and tax records will document on the types of crops grown, the wealth or poverty of the site occupants, and any cottage industry or atypical economic activity at the site. Finally, when possible, military installation records should be consulted to determine if the site was demolished, used as a training location or allowed to decay naturally.

Systematic subsurface testing is typically conducted as part of Phase II surveys. The Farmstead/Ranch Methodology described in this report does not use this technique. Excavation and documentation of shovel test, test units and the artifacts they produce is the most labor and cost intensive portion of a Phase II. The patterns, or lack of, artifact types across the site, vegetation variations and the presence of landscape features such as paths or gardens can provide sufficient evidence for the likelihood of site disturbance or the potential of subsurface features. If necessary, soil probes can be used to determine site stratigraphy, soil depths and composition.

Military training has occurred near or within some of the sites considered for this project. Infantry training can include earth-disturbing activities, primarily the excavation of infantry fighting positions or foxholes. These earthworks often take the form of shallow depressions that can accommodate one or two men in a prone or crouched position. These depressions can appear very similar to the shallow depressions that indicate smaller farmstead secondary structures. The principle method of distinguishing between the two was the analysis of backdirt berms. Farmstead structure depressions may be caused not by excavation but instead by soil compression due to the weight of the structure, deliberate tamping, soil compression to form earthen floors, and/or inadvertent tamping due to increased and focused foot traffic. For structures where the depression was the result of deliberate excavation, the excess soil was frequently removed from the immediate vicinity of the structure for aesthetic reasons or to prevent the pooling of mud and water near the foundations of the structures. Farmstead compounds are older than the subsequent military training activities, so any earth-disturbance activities related to the farmstead have been subjected to erosion processes for a longer period of time than military-related earth-moving activities. As a result, depressions associated with historic farmstead structures typically have minimal or no corresponding backdirt piles. Infantry fighting positions, however, have corresponding backdirt piles closely associated with the depressions. These piles provide extra cover to the personnel seeking shelter within the feature. In addition to the mere presence of such piles, the backdirt forms predictable patterns. The backdirt in fighting positions is almost always located on only one side of the depressions. When the fighting position is on a hill, the backdirt is always on the downslope side of the excavation. When there are collections of fighting positions, the excavations usually align with the backdirt piles located on the same side of each depression or the positions are organized

in a circle pattern with the backdirt on the outside of the circle. These patterns correspond to training activities where soldiers are protecting themselves from a simulated enemy.

One key element of the Farmstead/Ranch Methodology is the necessity to be able to see the site features and surface artifacts. If the site visibility is obscured by vegetation, subtle features such as paths, yards, gardens, etc., evidence of site disturbance or artifact types may not be identified by researchers and not be included in the evaluation. It is recommended that the expanded Phase I is best deployed during times when the vegetation has died back or has been removed (for example after a controlled burn).

2.5 Eligibility components and development of a typical farmstead/ranch

The second key aspect of the Farmstead/Ranch Methodology is the determination of what is a typical or atypical farmstead/ranch site. The goal of this methodology is to systematically identify atypical, and the most complete and best preserved typical sites. Atypical sites should be further investigated with a traditional Phase II. The most complete typical sites can be determined "Eligible" for the NRHP and protected, as long as they meet significance and integrity requirements. Poorly preserved typical sites can be determined "Not Eligible" for the NRHP and opened for training, as they are not expected to provide additional information.

The determination of what a typical farmstead/ranch site is should be based upon the regional characteristics of the installation. This is not a one-size fits all solution. The *Farmstead/Ranch Eligibility Evaluation Form* (described in the next section) can and should be modified to fit a particular installation. For example, an 1820s farmstead with a log cabin dwelling and wooden frame outbuildings could be typical at Fort Bragg, NC where timber was abundant and EuroAmerican settlement began in the 18th century. The same site would be atypical at Fort Riley, KS where timber was scarcer and EuroAmerican settlement did not begin until the 1850s.

Based on time periods and major themes from the installation's ICRMP, installation historic contexts and regional histories, patterns should be sought between and among sites that reflected these historical and/or typological themes. Areas of the regional variations to examine are:

- Periods of EuroAmerican farm establishment. Different portions of the country were settled by farmers at different time periods. Sites that predate the first EuroAmerican settlement period should be considered atypical.
- Local vernacular architecture styles and layout. This will include the sizes and shapes of houses (including the number and layout of interior rooms) as well as agricultural buildings such as barns.
- Local construction techniques. This closely ties to vernacular architecture and includes building materials as well as methods not only of structures but also of landscape features such as fences, roads and water management features.
- Common agricultural and livestock production. This variable is tied to cultural preferences, environment and larger economic trends. Different agricultural production types will require a different range of outbuildings, water management, planting and harvesting equipment and livestock housing or management systems.
- Common cottage industries. Many small farms supplemented their income with additional small-scale industries. At Fort Bragg, NC, for example, tar and turpentine production was not uncommon. Other examples could be charcoal production, small-scale mining, ceramic or brick production, timber harvesting, fur trapping, etc. These activities varied over regions based upon raw material availability and economic potential and may have required the construction or use of specialized structures or landscape features.

Using the significance indicators developed from the regional typical farm or ranch sites, the *Farmstead/Ranch Eligibility Evaluation Form* can be filled out to help indicate the sites that are atypical and require subsurface investigations to effectively evaluate their National Register eligibility. Indications of significance arise when there is correspondence between site features and the salient characteristics of the property. Significance can be assigned by analyzing information from the current archaeological inventory forms held by installation CRMs without incurring expensive onsite subsurface investigation.

2.6 Eligibility Evaluation Form.

One of the goals of this project was to expand the use of the methodology from historic farmsteads to also include historic ranches. It was determined that a single form could not address both site types. As a result two forms were generated – one for farmsteads and one for ranches.

The forms consist of a series of Yes/No questions about the site. Each form is divided into three sections. The first is the Preliminary Questions that are designed to distinguish atypical from typical site types. If the answer to any of the Preliminary Questions is "Yes" the site is atypical and flagged for a traditional Phase II survey with subsurface testing. The next section, Level I, focuses on the significance of a particular site. Any single "Yes" indicates that the site has the potential to be significant. If no Level I question can be answered with a "Yes" the site can be determined not significant, and therefore Not Eligible for NRHP and the evaluation does not need to be continued. The final section, Level II, determines the level of variety of features and the integrity of the site. If four or more "Yes" answers result in Level II, then the site is Eligible for the NRHP. The value of the *Farmstead/Ranch Eligibility Evaluation Form* is in its standardization of the evaluation process so the same number of "Yes" answers must be used for all sites on the installation.

In addition to the Yes/No answer, it is also possible to answer "Unknown" to a question. If this is the case the question is considered null. If a majority of the questions in any section are answered "Unknown" then there is insufficient information and more data collection is needed. This answer is typically used when the CRM is attempting to complete the form based on an existing Phase I survey without conducting additional data collection. Another situation that may result in an "Unknown" answer is when the site is investigated in sub-optimal conditions, particularly due to poor visibility. If it is unlikely that additional research will produce a Yes/No answer then the answer should be "No." Level II Question 9, for example, asks if a historical, regional or locally significant person occupied the site. Chain-of-title, census, maps and/or property tax records can be consulted to answer that question. If historic research has not been conducted the answer should be "Unknown." If, however, the repositories for that information have been searched and there is no record of that property then technically the answer to the question is still "Unknown" but it should be answered as "No" because further research is unlikely to provide additional information to answer the question.

2.6.1 Farmstead Eligibility Evaluation Form

Preliminary Questions

In this section **one** *yes* answer means that the site has a high probability of being atypical for the region. A *yes* answer in this section precludes the site for evaluation using this matrix. The site should be evaluated using a traditional Phase II investigation and NRHP evaluation.

1. Is there evidence of historic occupation of the site prior to (enter date of period of 1st sustained EuroAmerican settlement here)?
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region?
3. Does the site contain a feature type, form or method of construction that is unique or very rare (less than 10 occurrences) at known sites in the region?

Level I questions

In this section, **one** *yes* answer means that the site has a probability of being significant and Eligible for the National Register. A *yes* answer requires additional site survey and potentially further research. At the end of Level I questions, please proceed to Level II unless there were zero *yes* answers.

The following questions should be answered in conjunction with a site form, archaeological report, maps, and/or a site visit.

1. Is the site less than 25% disturbed and therefore possesses high site integrity?
    a. If YES: move to Question 2
    b. If NO: Is the site 75% or more disturbed?
        (1) If YES: Site has altered integrity and therefore is NOT significant.
        (2) If NO: Site disturbance is between 25-75%, move to Question 2.
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a farmstead?
    a. If YES: Site may be eligible due to the low density of non-agricultural structures.
    b. If NO: Move to Question 3.
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents?
    a. If YES: Provide timeframe of the historic documents as the site is potentially significant.
    b. If NO: Move to Question 4.

4. Is there potential for intact buried deposits based on subsurface testing and/or evidence of ground disturbance or erosion?
    a. If YES: Site has potential for further research and is potentially eligible.
    b. If UNK: Site has potential for further research.
    c. If NO: Site has altered integrity and therefore is NOT significant.
5. Does the site possess structural features, such as intact in-ground or aboveground architecture?
    a. If YES: Site has potential for further research and is potentially eligible.
    b. If NO: Move to Question 6.
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period?
    a. If YES: Site has potential for further research and is potentially eligible.
    b. If NO: Move to Level II evaluation.

Level II questions

In this section, **four** or more *yes* answers to the questions below means the site has a high probability of being significant and Eligible for the National Register. Three or fewer *yes* answers indicates that the site is likely Not Eligible. These are recommended numbers and will be applicable to most sites; in rare circumstances the number of *yes* answers for the threshold may depart from this based on in depth knowledge of the archaeological record and the historic context for the installation.

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district?
    a. If YES: Site and associated sites have potential eligibility as a district and require further investigation.
    b. If NO: Move to Question 2.
2. Does this site possess multiple architectural features?
    a. If YES: The site is potentially significant.
    b. If NO: Move to Question 3.
3. Is there a foundation larger than 10 x 10 ft and less than 30 x 30 ft on the site? Structures of this size are the most likely to be residential structures as they are usually too large for single function out-buildings (such as a smoke house, outhouse, chicken coop, etc.) but too small for a barn that may have housed large animals, farm equipment and/or feed and grain stores. Particular attention should be paid to the presence of chimneys or fire boxes as residential structures are the most likely to have been heated.
    a. If YES: Site has potential for further research and is potentially eligible.
    b. If NO: Move to Question 4.

4. Is there evidence of small (wells, privy, shed, crib, etc.) architectural features?
    a. If YES: Site has potential for further research and is potentially eligible.
    b. If NO: Move to Question 5.
5. Is there evidence of large (barn, stable, storehouse) architectural features?
    a. If YES: Site has potential for further research and is potentially eligible.
    b. If NO: Move to Question 6.
6. Is there evidence of fence construction? Fence construction often signals long-term tenure and can assist in determining activity areas and the extent of the property boundaries.
    a. If YES: Site has potential for further research and is potentially eligible.
    b. If NO: Move to Question 7
7. Is there evidence of a cottage industry typical to the region at the site? Additional economic activity at the site signals a wider range of production and connections to the regional or national economy.
    a. If YES: Site has potential for further research and is potentially eligible.
    b. If NO: Move to Question 8
8. Is there evidence of landscape features (such as roads, paths, gardens, leveled areas) at the site? Non-architectural landscape features provide significant information about site activity patterns, layout and usage.
    a. If YES: Site has potential for further research and is potentially eligible.
    b. If NO: Move to Question 9
9. Was the site occupied by a person of historical, regional, or local significance?
    a. If YES: Site has potential for further research and is potentially eligible.
    b. If NO: Questionnaire is complete.

2.6.2 Ranch Eligibility Evaluation Form

Preliminary Questions

In this section **one** *yes* answer means that the site has a high probability of being atypical for the region. A *yes* answer in this section precludes the site for evaluation using this matrix. The site should be evaluated using a traditional Phase II investigation and NRHP evaluation.

1. Is there evidence of historic occupation of the site prior to (enter date of period of 1st sustained EuroAmerican settlement here)?
2. Is there evidence of activity/production/industry at the site that is not related to ranching or the common forms of cottage industry for the region?
3. Does the site contain a feature type, form or method of construction that is unique or very rare (less than 10 occurrences) at known sites in the region?

Level I questions

In this section, **one** *yes* answer means that the site has a high probability of being significant and Eligible for the National Register. A *yes* answer requires additional site survey and potentially further research. At the end of Level I questions, please proceed to Level II unless there were zero *yes* answers.

The following questions should be answered in conjunction with a site form, archaeological report, maps, and/or a site visit.

1. Is the site less than 25% disturbed and therefore possesses high site integrity?
   a. If YES: move to Question 2
   b. If NO: Is the site 75% or more disturbed?
      (1) If YES: Site has altered integrity and therefore is NOT significant.
      (2) If NO: Site disturbance is between 25-75%, move to Question 2.
2. Did the site have a function other than a ranching property? Is the property listed on deed records, maps, or other historical documents as something other than a ranch?
   a. If YES: Site may be eligible due to the low density of non-agricultural structures.
   b. If NO: Move to Question 3.
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents?
   a. If YES: Provide timeframe of the historic documents as the site is potentially significant.
   b. If NO: Move to Question 4.
4. Is there potential for intact buried deposits based on subsurface testing and/or evidence of ground disturbance or erosion?
   a. If YES: Site has potential for further research and is potentially eligible.
   b. If UNK: Site has potential for further research.
   c. If NO: Site has altered integrity and therefore is NOT significant.
5. Does the site possess structural features, such as intact in-ground or aboveground architecture?
   a. If YES: Site has potential for further research and is potentially eligible.
   b. If NO: Move to Question 6.
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period?
   a. If YES: Site has potential for further research and is potentially eligible.
   b. If NO: Move to Level II evaluation.

Level II questions

In this section, **four** or more *yes* answers to the questions below means the site has a high probability of being significant and Eligible for the National Register. Fewer than three *yes* answers indicates that the site is likely Not Eligible. Three is a suggested number and will be applicable to most sites; in rare circumstances the number of *yes* answers for the threshold may depart from this based on in depth knowledge of the archaeological record and the historic context for the installation.

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district?
    a. If YES: Site and associated sites have potential eligibility as a district and require further investigation.
    b. If NO: Move to Question 2.
2. Does this site possess a source of water (dam ponds, well, cistern, stock tank, spring, etc.)?
    a. If YES: The site is potentially significant.
    b. If NO: Move to Question 3.
3. Is there a foundation larger than 10 x 10 ft. and less than 30 x 30 ft. on the site? Structures of this size are the most likely to be residential structures as they are usually too large for single function out-buildings (such as a smoke house, outhouse, chicken coop, etc.) but too small for a barn that may have housed large animals, farm equipment and/or feed and grain stores. Particular attention should be paid to the presence of chimneys or fire boxes as residential structures are the most likely to have been heated.
    a. If YES: Site has potential for further research and is potentially eligible.
    b. If NO: Move to Question 4.
4. Is there evidence of small (wells, privy, shed, corncrib, silo etc.) or large (stables, barns, bunk houses) architectural features?
    a. If YES: Site has potential for further research and is potentially eligible.
    b. If NO: Move to Question 5.
5. Is there evidence of corrals, stock chutes and/or stock dip ponds?
    a. If YES: Site has potential for further research and is potentially eligible.
    b. If NO: Move to Question 6.
6. Is there evidence of fence construction? Fence construction often signals long-term tenure and can assist in determining activity areas and the extent of the property boundaries.
    a. If YES: Site has potential for further research and is potentially eligible.
    b. If NO: Move to Question 7

7. Is there evidence of a cottage industry typical to the region at the site? Additional economic activity at the site signals a wider range of production and connections to the regional or national economy.
   a. If YES: Site has potential for further research and is potentially eligible.
   b. If NO: Move to Question 8
8. Is there evidence of landscape features (such as roads, paths, gardens, regular shaped depressions, berms, etc.) at the site? Non-architectural landscape features provide significant information about site activity patterns, layout and usage.
   a. If YES: Site has potential for further research and is potentially eligible.
   b. If NO: Move to Question 9
9. Was the site occupied by a person of historical, regional, or local significance?
   a. If YES: Site has potential for further research and is potentially eligible.
   b. If NO: Questionnaire is complete.

2.7 Methodology application at test sites

This project tested the application of a methodology for an expanded Phase I archaeological survey of historic farmstead and ranch sites to assist installation CRMs in determining NRHP eligibility and reducing the number of Potentially Eligible sites waiting for Phase II surveys. The principle components of the Phase I expansion are evaluating the farmstead as an entire compound, evaluating the site's place in the cultural landscape of the region, examining the Phase I artifact assemblage and historic documentation to determine site age and usage, and the application of the *Farmstead/Ranch Eligibility Evaluation Form*. The goal was to see if the expanded Phase I survey could match the Phase II results in terms of eligibility determinations, as this would provide an efficient alternative to intensive Phase II investigations at many sites.

2.7.1 Selecting beta test sites, Legacy Farmstead and Ranch Project

Six sites were to be evaluated at six different installations resulting in a total of 36 test sites.[1] To ensure that existing NRHP classification would not bias the ERDC-CERL researchers who were deploying the methodology in the field, the six sites that were evaluated for this project were selected by the installation CRM staff. To reduce the time and cost of this study, existing Phase I and the historic/archival research from Phase II evaluations

[1] Six sites were planned to be evaluated at Fort Riley, KS but due to a variety of environmental reasons only five sites were investigated before the scheduled amount of time elapsed.

were relied upon as it was not possible for CERL researchers to conduct archival research for 30 sites in five different states.

Installation CRMs were instructed to use the following criteria when selecting sites for beta testing:

1. Phase I and Phase II reports of each site selected within each installation with documentation. CERL archaeologist will not see the Phase II results until after our tests have been completed.
2. For each installation, the sites selected should be a mix of sites considered Eligible for the NRHP and sites determined Not Eligible for the NRHP.
3. Existing historic contexts for the installations selected for testing. Context needs to cover the historic period through World War II.
4. Artifacts or the artifact analysis from each of the sites' Phase I investigations at each installation need to be accessible by CERL.
5. The sites selected have to be accessible without risk to CERL researchers.
6. The sites selected need to have archival documents/background material available to CERL researchers (historic maps and plats, community history, etc.) if this material is supplemental to the existing historic context for the sites.
7. Installation(s) with ranch sites selected for testing can be either five ranch sites or a mix of ranch and farmstead sites depending on the installation(s) selected.

The list of criteria was emailed to installation CRMs by Office of the Secretary of Defense (OSD) and installations were asked if they had a sufficient number of sites that met the criteria and were they interested and available to participate in the study. When all responses had been received CERL researchers and OSD selected the installations to be included in this study. Effort was made to select installations to represent a wide range of site types, environmental conditions and service branches. No positive responses, however, were received from U.S. Navy or U.S. Marine Corps bases. As the methodology had already been tested at Fort Leonard Wood, MO and Fort Bragg, NC, installations were not selected in those regions.

The final installation selection included: Fort Riley, KS, Fort McCoy, WI, Barry M. Goldwater Missile Range, AZ, Pinion Canyon Maneuver Site (Fort Carson), CO, Fort Hunter Liggett, CA, and Fort Dix, NJ. The imple-

mentation of travel restrictions due to the outbreak of Covid-19 prematurely ended the field work and Fort Dix, NJ was scrapped as a test location. The total number of sites tested was 29, at five installations.

2.7.2 Field methods used to test expanded Phase I approach

The principle field investigator and the person implementing the *Farmstead/Ranch Eligibility Evaluation Form* was Carey Baxter, the project archaeologist. To ensure that existing NRHP classification information would not bias the CERL results, all communication with installation CRMs was done by Project Manager and Historian, Susan Enscore. During the field work, installation CRMs were requested not to speak out loud about the eligibility status of any site.

All site documentation, including state site forms, Phase I and Phase II reports were sent by the installation to Susan Enscore. After examining the documents and excerpting relevant pages, Dr. Enscore provide a hardcopy of the initial site form (when available), the Phase I report and historic/archival research information from the Phase II report for the site to Ms. Baxter. All mention of site eligibility recommendations or descriptions of subsurface testing that occurred in the Phase I reports was redacted. Additionally the researchers had access to installation historic contexts and regional contexts to help determine the typical site characteristics. After the field work and site write-up was completed and the *Farmstead/Ranch Eligibility Evaluation Form* filled out for each site, the state site revisit forms, unredacted versions of the Phase I report and complete Phase II reports (including NRHP eligibility recommendations) were provided to Ms. Baxter so that the findings could be compared to the CERL results.

ERDC-CERL researchers' site revisits focused on verifying the locations of features mapped during the Phase I survey as well as identifying and mapping surface features that were indicative of secondary structures and landscape features, as well as carefully documenting any apparent disturbances to the site. On a farmstead complex, the main residential structure (house or cabin) is considered the primary structure of the site and is typically identified by chimney foundations or falls, cellars, and/or stone and cement foundation structures. The farmstead complex would have contained many secondary structures such as barns, chicken coops, silos or corncribs, sties, root cellars, well houses, outhouses, etc. These secondary structures are typically represented on the surface of archaeological sites by regular shaped depressions that are located a short distance from the

main structure. At ranch sites additional features types that did not always appear on Phase I survey were corrals, stock chutes, barbed wire fences, stock tanks, water management features, outdoor cooking or camping areas, etc. Site mapping was done using a decimeter accuracy Trimble GeoXH 6000 with external Zephyr antenna. The site features and significant artifacts at each site were digitally photographed.

To protect the site locations, site coordinates will not be included in this report. Site locations will be displayed overlaid on portions of USGS 7.5 minute quadrangle maps to demonstrate the topography at the site and in the near vicinity. Quadrangle map names, however, are not included and any identifying place names on the maps have been blocked out. Existing topographic maps, including USGS quad maps, were used to demonstrate general site topography. When producing the site maps for this report it was observed that the addition of the topographic information made the site maps difficult to read in a printed form. For that reason, each site map is presented without topographic information but focuses on the site and layout of features across the site.

Artifact collection was not performed at any site. Since there was the certainty that at least some of the sites examined had been determined Eligible for the NRHP, additional artifact collection would not only have further disturbed the archaeological record but also would have required site revisit forms to be generated and filed with the various State Historic Preservation Offices and permanent curation space for any recovered artifacts to be obtained by the installation CRMs. This requirement was seen as causing unnecessary additional burdens to the installation CRM staff.

Efforts were made to schedule field work during the optimal period for each installation. For example, Fort Riley was visited in the early spring after the snow had melted but vegetated cover had not begun to regrow. Due to the large number of field sites to visit this scheduling was not always possible. At two installations, Fort McCoy, WI and FHL visibility due to vegetation at many of the sites was particularly poor. CERL researchers were reliant on the historic and archival research conducted as part of Phase I and Phase II reports (some of these done decades previously) and could not be certain how complete these document searches had been. As a result, the number of “Unknown” responses seen in the *Farm-*

stead/Ranch Eligibility Evaluation Form are higher than would be expected if the installation CRMs had conducted the research or if the sites could have been revisited in better conditions.

3 Regional Divisions and Historic Contexts

A systematic means of ensuring the beta tests would sample areas with differing physical, environmental, and social characteristics was required. To produce this result, the continental United States was divided into regions. These regions were designed to be very general in scope and content, existing only to provide a means of ensuring the six beta test sites would provide a varied set of criteria. The boundaries between regions are only a suggestion, and the area within regions may have varying characteristics, however, the area within a region differs significantly on the whole from the other regions.

A historic context was created for each region to determine the types of criteria generic to that region. Those criteria would then be used to modify the matrix questions applied to the observations made at the beta test sites. The context for each region includes information on the natural environment, the general settlement history, cottage industries often employed by farmers or ranchers, and typical farmstead/ranch components and layout.

For the project as a whole, the time periods under consideration range from the Colonial Era through the interwar period of the 20th century. Due to the general patterns of European settlement of the United States, the longest timelines are found on the East Coast, and the contexts generally have shorter timelines the farther west the region is located.

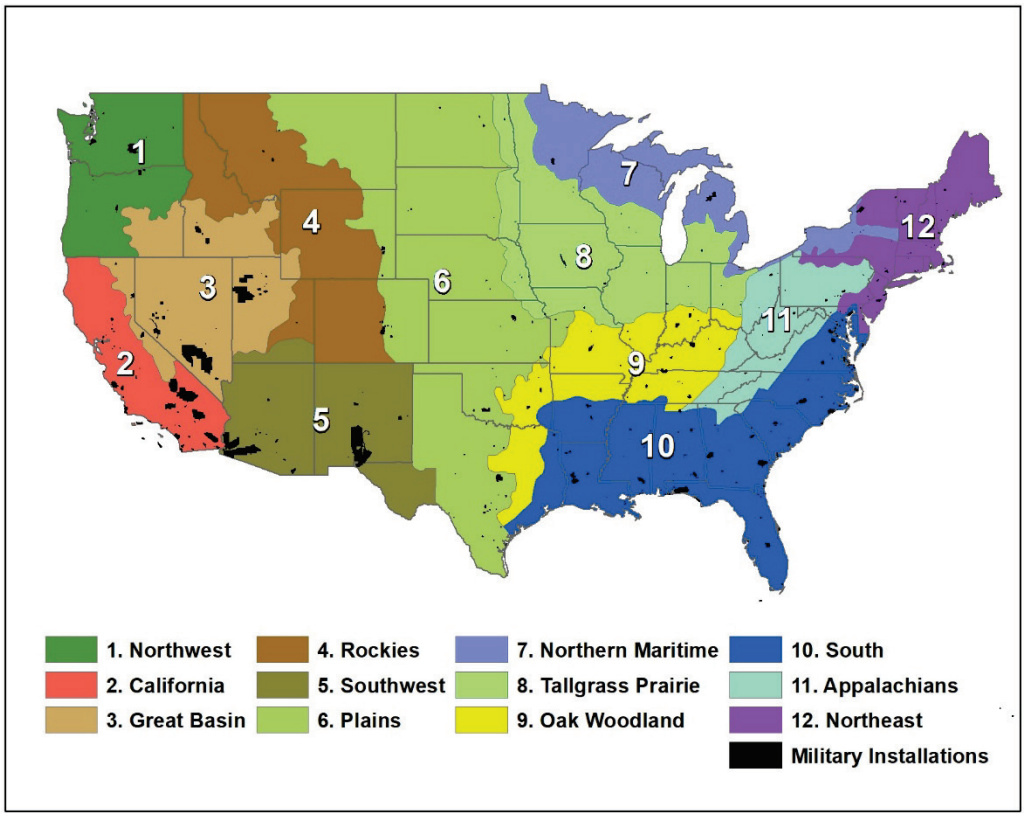
The contexts are meant to serve as a broad overview, and to provide the criteria for the beta tests. If this methodology is used by installations other than the beta test sites, the installation cultural resources office will need to use a much more detailed and localized historic context, either existing or created, for the necessary site evaluations.

3.1 Delineation of regions

The United States has been divided into many regions, zones, and areas depending on how the territory is being described. There are physical and cultural divisions that represent the rough patterns of how humans have appropriated the natural resources and settled the country. Twelve regions were defined for use in this project. These regions were determined based on physiographic, ecological, environmental, and societal characteristics that would influence the spatial organization, types of production activities, and materials

used to construct farms and ranches in those areas. The map below (Figure 1) is overlaid with the locations of current DoD property to broadly indicate what types of farms or ranches could be found at a particular installation.

Figure 1. Regional Divisions for Beta Tests.



Source: ERDC-CERL 2018.

3.2 Region 1: Northwest

3.2.1 Geography

The Northwest Region covers all of Washington, and the western and northeastern portions of Oregon. The region is known for its "spectacular natural setting—the stunning juxtaposition of mountains and water that characterize its coastline and Columbia River gorge; the vastness of its interior, a land of sagebrush plains and empty spaces" (Schwantes 1989:5). The Northwest Region is dominated by mountains with three very long, parallel ranges that stretch northeast to southwest, including the Coast Range on the east, the Cascade Range (which runs roughly down the middle of Washington and Oregon), and the Rocky Mountains on the east (McKnight 1992:449). The general elevation of these mountain complexes ranges from 1000 ft in elevation up to the highest peak, Mt. Rainier, at

14,411 ft (McKnight 1992:450, Schwantes 1989:9). Located in the troughs between the mountain ranges are protected lowlands, valleys, and plateaus.

There are two subregions in Northwest Region: the western half of Washington and Oregon is called the Pacific Coast Range area, extending no more than 200 miles inland to the Cascade Mountains, and includes the Puget Lowland and Willamette Valley. The eastern half of Oregon and most of the eastern part of Washington are part of the northern Intermontane West area, and includes the Columbia Plateau and Blue Mountains, located between the Rocky Mountains on the east and the Cascade Mountains on the west (McKnight 1992:360-362). The far northeast quarter of Washington includes parts of the Northern Rockies. The overwhelming majority of settlement into the Pacific Northwest Region occurred either in the Puget Lowland/Willamette Valley in the Pacific Coast Range area or the Columbia Plateau area of the Intermontane West (Schwantes 1989:8).

3.2.1.1 Pacific Coast Range area

The Pacific Coast Range area includes the Coast Ranges and the Cascade Mountains. Lying between the two mountain ranges can be found the broad alluvial plains of the Puget Sound lowland in Washington, and the Willamette Valley in Oregon averaging an elevation of 445 ft and reaching in some places up to 4,203 ft (Floberg et.al. 2004:15-16). The mountain ranges shielded the valleys and acted as barriers from the "severe precipitation—rain on the coast and snow in the mountainous areas, heavy forestation or rocky terrain, and harsh climatic conditions—extreme temperatures and air pressures" that plagued the rest of the Pacific Coast Range area (Morrison 1989:14). The tempering effects of the mountains result in Mediterranean-type to mid-latitude maritime climates with warm, relatively dry summers and relatively mild winters for most of the region with minimal snow fall and lots of clouds (Wiken et al. 2011:53-55). Precipitation occurs up in the mountains, which can receive an annual precipitation of 120 to 140 in., causing "a veritable evergreen jungle of moss-festooned forest giants like the Sitka spruce and Douglas fir" (Schwantes 1989:10). The Puget Sound-Willamette lowlands received an average annual rainfall of 30 to 50 in., with an average of 150 days of rainfall each year. "Wet winters and relatively dry summers characterizes much of the Pacific Northwest, just the reverse of the weather pattern of the Great Plains and Rocky Mountains" (Schwantes 1989:11, Howard and Taylor 2011:2).

While average temperatures in the mountains can ranges between 44 and 57 °F, with 100 to 280 frost-free days, the lowland and valley areas average 55 °F with 150 to 220 frost-free days annually (Wiken et al. 2011:53-55). The moderate to steeply sloping mountain ranges are covered with sedimentary rocks and volcanic basalts, heavily forested, and have a high density of streams and some coastal lakes, bays and estuaries. The Puget Lowland is mostly broad, rolling plains with Inceptisols, Spodosols, and Andisols soils, numerous streams and some large lakes, and historically was covered with mixed stands of Douglas fir and western hemlock (Wiken et al. 2011:53-54). Indeed, throughout the Willamette Valley and Puget Sound lowland there are over 10,000 miles of streams and rivers, including several major rivers, including the Columbia River, whose headwaters begin in the surrounding mountains (Floberg et.al. 2004:15-16). The Willamette Valley offered bottom land savannahs and native prairies amid rolling hills with rich, deep and productive alluvium Mollisols and Alfisols soils suitable for a variety of agricultural products, and large rivers and numerous streams (Morrison 1989:14, Wiken et al. 2011:54-55).

The Willamette Valley and Puget Sound area with their temperate climate and long growing seasons easily supported fruit orchards and highly productive crop lands" (Howard and Taylor 2011:4). Vegetables, fruits, nut orchards, nursery products, and grass seed production were common, along with vineyards and Christmas tree farms in the foothills (Wiken et al. 2011:54-55). In addition to growing most of the fruit, berry, vegetable, and grain crops of the Pacific Northwest Region, the Willamette Valley also had significant dairy farming (McKnight 1992:463-64).

3.2.1.2 Intermontane West

In contrast to the fertile valleys and lowlands in the Pacific Coast Range area, the northern Intermontane West region in the eastern portion of Oregon and Washington is sparsely populated, except for pocketed islands in the Columbia Valley. The subregion has a vast extent of arid and semiarid land with rugged, varied and isolated terrain, little precipitation, and a "paucity of freshwater" (McKnight 1992:362). The Columbia Plateau has a mid-latitude desert and steppe climate with more precipitation and less evaporation on the upland slopes due to cool summer temperatures; winters are long and cold while summers are short, hot and dry (Wiken et al. 2011:87). Precipitation averages 13 in. or less mainly occurring in the summer, and there are between 150 and 190 frost-free days, and average temperatures are between 44 to 53 °F (McKnight 1992:366, Schwantes

1989:12). The limited amount of precipitation and perennial streams in the region, combined with thin soils, supports grasslands of sagebrush and bunchgrass, which support livestock grazing (Wiken et al. 2011:87). Warping and faulting in the area created elevation changes that range from a few hundred feet above sea level to 10,000 ft, and in central Washington glaciation caused steep-sided, flat-floored, streamless canyons known as the channeled scablands (McKnight 1992:363).

The Palouse country area of central eastern Washington was the exception in the Intermontane West subregion possessing fertile soils and relatively flat land. The rolling Palouse hill country of eastern Washington was an agricultural haven and one of the most productive winter wheat-growing regions in the United States (Schwantes 1989:12). Elsewhere in the Intermontane West subregion, dryland farming and irrigation techniques allowed limited agriculture where the land was level. Crops grown in this region included barley, winter wheat, alfalfa, potatoes, mint, onions, garlic, hops, lentils, grass seed, and dry peas, along with fruit orchards and vineyards in some areas (Wiken et al. 2011:45-46,87).

3.2.2 Settlement history

The first nonnative Americans into the Northwest Region included explorers from Spain, Great Britain and the United States. Spaniard Juan Perez explored the coast in 1774, followed by English Captain James cook in 1778, and a New England trading vessel reached the mouth of the Columbia River in 1792. Meriwether Lewis and William Clark explored the region in 1804–06. European and American fur trappers and traders followed the explorers, setting up trading posts throughout the area in the late 1700s and early 1800s (Augustyn, Chopra, and Rodriguez 2020, McKnight 1992:456-457). Competition between the leading fur companies, including Hudson's Bay Company, Astor's Pacific Fur Company, and the North West Company, resulted in over-trapping and the spread of disease that decimated the local Native Americans, reducing their populations by 80% (92% in the lower Columbia region and Willamette Valley) by 1860 (Hessburg and Agee 2003:35). Competition also occurred between Great Britain, the United States and Russia for territorial rights in the region. Agreements signed in 1824 and 1825 with Great Britain and the United States restricted Russian settlement north of the 54th parallel, while the U.S. and Great Britain eventually agreed in 1846 that the land south of the 49th parallel, except for Vancouver Island, belonged to the United States (McKnight 1992:457).

"Until the early 1840s, there were literally no more than forty Americans in the entire territory, which covered everything on the Pacific between the forty-second parallel north of San Francisco to Alaska" (Carter 2013:10). Early Catholic and Protestant missionaries moved into the area in the 1830s, settling primarily in the Willamette Valley and Puget Lowlands Riegel and Athearn 1971:336,534). Beginning in the early 1840s, however, thousands of settlers from eastern and central United States, including New York, Pennsylvania, Virginia, Iowa and Missouri, made the "often-grueling 2,000-mile, months-long journey" over the Oregon Trail, "enticed by the promise of free land, better health, or simply a new start" (Carter 2013:2, Howard and Taylor 2011:6). The early wagon trains also included settlers from Germany, England, France and the Netherlands. Initially, settlers bypassed the arid and semiarid lands of the Intermontane West area, seeking out the fertile soils of the Puget Lowlands and Willamette Valley, but by 1850 began also settling in the eastern areas of the Northwest Region (Howard and Taylor 2011:6). Some estimates hold that more than 300,000 American and European settlers arrived in the Northwest Region between 1840 and 1860 (Hessburg and Agee 2003:36).

The first wave of settlers to the Northwest Region in the mid-19th century engaged predominantly in subsistence farming and ranching. The remote ruggedness of the region meant that initial pioneers only had available what they were able to bring with them on the overland journey, or what they could afford to have shipped from back east via steamboat and transported to their farms (Howard and Taylor 2011:7). As a result, these first settlers tended to "husband the familiar" relying upon farming equipment and techniques used in the eastern United States and Europe, such as single blade plows pulled by horse or oxen and other hand-held implements (Strong 1936:403, Howard and Taylor 2011:7). They also brought with them a "profusion of nonnative plant and animal species such as sheep, goats, cattle, and pigs, wheat, barley, rye, and corn" that successively supplanted the native species (Hessburg and Agee 2003:36).

The Federal Government, under the policy of "Manifest Destiny" encouraged settlement in the region by enacting the Donation Land Act of 1850 wherein American citizens could obtain title to a maximum of 320 acres of land by occupying and improving the land for 4 consecutive years (Riegel and Athearn 1971:525). Under this Act, the government ultimately issued approximately 7,000 title deeds in Oregon, with around 4,600 deeds is-

sued to settlers in the Willamette Valley, where the majority of early pioneers settled (Carter 2013:15). In the Washington Territory, according to the 1880 census, the Act led to a population increase from 11,994 in 1860 to 75,116 in 1880, and an increase in the number of farms from 1,330 to 6,530, mostly clustered in the Puget Lowlands (Howard and Taylor 2011:9). Farming equipment also advanced during the 1850s, with the arrival of reapers and mowing machines in the Northwest Region followed by the horse-drawn McCormick reaper and grain thresher in 1861 (Howard and Taylor 2011:10). Livestock ranching gained in prominence throughout the area from 1860 to 1890, particularly in the Intermontane West region where the lack of adequate water and poor irrigation techniques made the land ill-suited to agriculture (Hessburg and Agee 2003:39). Initially, cattle raising predominated in the area, but ranchers soon learned that sheep were better suited to the environment as they required less water and were more adaptable to the existing rangeland forage. As a result there was a sheep boom in the mid to late 1880s and "eventually sheep numbers outstripped cattle" (Hessburg and Agee 2003:39).

From 1880 to 1920, the Northwest Region experienced exponential growth, due in part to the arrival of the Northern Pacific Railroad in 1883, connecting the Pacific Northwest with the eastern United States. The railroad connected the local, highly productive agricultural areas of the Willamette Valley and Puget Lowlands with a national market that led to increased prosperity. By 1890, just after Washington was admitted as the 42nd state (Oregon was admitted in 1859 as the 33rd state), its population increased to 357,232 (Howard and Taylor 2011:11). Outside of the valleys and lowland areas, however, population remained sparse, and despite government encouragement for increased settlement into the Northwest Region, by the 1890s there were on average less than two people per square mile (Riegel and Athearn 1971:530). The Klondike Gold Rush in 1897 brought further settlement but mainly in the Puget Lowland area and Seattle in particular (McKnight 1992:457). To encourage further settlement of the areas outside of the valleys and lowland areas, the government passed the Enlarged Homestead Act of 1909, which promised up to 320 acres of the less attractive farmlands that required irrigation and/or dryland farming techniques (Chappel 1992:30).

By the early 1900s, agricultural patterns in the Northwest Region had been set. The forested coastal and mountainous areas had very little agriculture

but supported a large and significant timber and lumber industry. The inland valleys and lowlands, where most of the population concentrated, engaged in mixed farming, including livestock raising, a strong dairy-farming presence, and crop growing including both feed crops such as hay and oats, and a wide variety of fruits and vegetables (Strong 1936:403-404, Howard and Taylor 2011:4, McKnight 1992:463). Specialty crops including cranberries were grown in the region as well. Much of the agricultural land was also set aside for pasture to support the dairy-farming and livestock growing activities (McKnight 1992:463). On the eastern side of the Cascade Mountains, in the central area of the Northwest Region, agricultural activity focused on orchards and livestock, including growing feed crops such as hay, alfalfa, field corn and grain (Howard and Taylor 2011:4). The arid and semiarid conditions of the Intermontane West region were best suited to livestock grazing and dryland farming of wheat, barley, rye and alfalfa; as a result, farms and ranches in this subregion tended to be larger than in other areas of the Northwest Region, mirroring more closely the ranches found on the northern Great Plains (Howard and Taylor 2011:5, Riegel and Athearn 1971:526-527).

From 1920 to 1940, "few new areas were settled, and relatively few new farms were established," in the Northwest Region, except for a "proliferation" of small poultry ranches and berry farms "in the western Cascade foothills, where former timber lands were subdivided and sold, often to urban residents with idealistic notions of farm life" (Howard and Taylor 2011:21-22). There was significant mechanization of farming during this period, following trends established in the rest of the country. The timber and lumber industry throughout the Northwest Region also grew tremendously during the interwar years, providing lumber to markets throughout the United States and the world (Hessburg and Agee 2003:41). The Great Depression curtailed agricultural growth in the region, with only a few farmers able to maintain their commercial production, while many farmers scaled back to subsistence level farming (Howard and Taylor 2011:21-22).

3.2.3 Cottage industries

Fruit growing and market gardening were a significant cottage industry in the Puget Lowlands and Willamette Valley from the early settlement period of subsistence farming. "Puget Sound area farmers who had surplus produce, dairy products and meat or livestock to sell found ready markets in the region's growing mining towns, particularly on the western slopes of

the Cascade Mountains" (Howard and Taylor 2011:9). Supplying fruit, vegetables and dairy products to local towns and urban centers throughout the Northwest Region continued to grow as an important farming activity even as technology, developed in the Pacific Northwest, advanced to allow excess produce to be canned and packed for shipment to distant markets (Strong 1936:403, McKnight 1992:463-64). Market gardening was done in conjunction with other farming activities, and likely shared the same infrastructure in place for overall farming activities, such as granaries, fruit driers, and packing houses.

3.2.4 Typical farmstead components

Food and shelter were the top priorities for pioneers arriving in the Northwest Region. The first settlers erected temporary or semi-permanent housing including dugouts excavated into a nearby bank or hillside and later used for storage, and log cabins and frame shacks made from whip-sawed lumber (Beckham 1978:4). "Some of the earliest dwellings were simple single-cell sheds, erected quickly to serve only as long as required to build the more substantial but still rustic cabin" (Carter 2013:18). As with farming methods and techniques, settlers relied upon the knowledge and skills they brought with them to build their initial shelters, and as a result the early dwellings often reflected the building practices and styles familiar in the eastern United States. The ready availability of wood made it the preferred building material, and some of the earliest settlers erected sawmills in the region as early as 1836 to supply lumber for new arrivals (Carter 2013:10). "Round and hewn log, hewn frame, balloon and box (or plank) construction technologies were used throughout the settlement period. Apart from log building, all other methods were at least partially dependent on sawn lumber" (Carter 2013:19).

The temporary nature of these first wooden structures meant they did not last long. Indeed, throughout the region it was common for settlers to build a series of farmhouses and structures on a single claim, each successive structure being more permanent and elaborate than the last (Attebury 1976:40, Beckham 1978:2). A typical claim included three successive homes built over a roughly 6-year period. The first home, erected hastily upon arrival, was a small single room shelter using rails or round logs. The second home was more substantial and carefully built using hewn, squared-off, logs or timber frame construction. The second home had multiple rooms including a sleeping loft, and "glazed sash windows, doors, a fireplace, a staircase and one or two porches" (Dole 1974:82, Carter

2013:21). The final "Western Farmhouse" built between 1875 and 1900 typically employed box or balloon frame construction on a stone or brick foundation, which enabled larger structures and allowed settlers to emulate the building styles popular back east, such as southern vernacular, Colonial Revival, Greek Revival, Classical Revival, Gothic or Italianate styles (Dole 1964:205-206, Beckham 1978:6, Moore 1984:185). With each new structure, the prior buildings were either dismantled and recycled, or relocated on the farmstead and repurposed for storage or other agricultural purposes (Carter 2013:18-19).

Development and improvement of the farmstead also followed a predictable pattern in the Northwest Region. Survival, not to mention the requirements of the Donation Land Act of 1850, meant settlers invested significant amounts of time and effort to clearing and planting agricultural fields, and fencing in their property once permanent shelters were erected. Miscellaneous outbuildings, such as sheds, cellars, springhouses, chicken house and privies, were built as materials and time were available, first using hewn logs and then balloon frame construction once it became available (Carter 2013:31, Dole 1964:205-206). Settlers made more extensive use of stone in eastern Washington and Oregon than in the more heavily forested areas to the west (Beckham 1978:18). Sturdy barns were important structures on the farmstead, but required significant labor and resources to build and therefore hewn frame barns often did not appear until 2 to 3 years after settlement, but often before the hewn lumber house (Dole 1974:86, Howard and Taylor 2011:10-11). In the meantime, temporary buildings were used to store hay and grain, and livestock were allowed to free-range (Carter 2013:31-32). Most structures on the farmstead were made from wood or lumber, using balloon frame or box construction, with more rustic styling of logs, shakes or natural materials indicating older structures, except for the cellar or "coolroom" used to store milk and perishable foods, which were made from stone or dug into a hillside or the ground, and often used double-wall construction to allow for insulation (Dole 1964:205-206, Beckham 1978:20). Roof and gable-end treatments for the outbuildings and farmstead structures often matched the style of the main farmhouse (Beckham 1978:21).

The most typical farm layouts found in the Northwest Region arranged the house, barn and outbuildings in a parallel and perpendicular pattern set back from the main road (Chappel 1992:40). A less common arrangement had the house and domestic buildings separated from the barn and working

area by a road (Carter 2013:32-33). "Pioneer farms were in a seemingly constant state of evolution, with early structures being built, altered, moved, deconstructed and repurposed as settlement progressed. While their arrangement may appear haphazard, placement of outbuildings was determined not only by the family's origins and the type of farm layout to which they were accustomed, but also with thought to location and protection of the domestic water source, avoidance of farm odors and fire danger, and relative location and distance from the main house" (Carter 2013:31).

Most farms had two distinct areas—the farmhouse often located near the water source and surrounded by several outbuildings that supported food processing, storage and water acquisition, and a working area that included the barn, fields and pastures along with associated functional outbuildings (Carter 2013:31) (Figure 1). Farmhouses were usually situated on elevated ground to allow for good drainage, but also below the crest of a hill to provide wind protection (Moore 1984:182). The T-shaped floor plan with a kitchen located in the vertical section of the T was most common, although square, L-shaped and unconventional vernacular floor plans also occurred (Moore 1984:183). Brick chimneys were common, and farmhouses also had numerous porches and outside doors, and rooflines were predominantly gable with wood shingles (Moore 1984:185, Dole 1964:207-208). The support buildings for the household area were often located within 40 to 50 ft of the house to provide ease of access. A typical household would have a springhouse or pump house covering a well or water source to protect it from pollution, a wash house, woodshed, summer kitchen, garden, orchard, outhouse or privy and a root cellar or coolroom, usually placed near the back door of the house (Beckham 1978:21). Henhouses were located near the house with southern exposure for warmth; woodsheds were small and placed near the back door (Moore 1984:191). Residences also had decorative elements in their landscapes such as gates, fences, arbors, stairways, fountains, garden houses, ponds, paths and plantings (Beckham 1978:22).

Smokehouses for curing meat, blacksmith shops, sheds, brooder houses sometimes with "dovecotes along the gable-end for pigeons," and older dwelling units were usually located on the outer edge of the household buildings in order to provide ease of access to, but far enough away to minimize the risk of fire and odor reaching the main house (Beckham 1978:22). The working area of the farmstead was located roughly 150 to

200 ft away from the house (Carter 2013:31-32). Outbuildings and structures that supported the agricultural business often included granaries, machine sheds, packing houses, fruit driers, hog pens, rectangular silos, and assorted smaller storage barns (Chase 1917:36, Carter 2013:31-32). The smaller storage barns commonly included feeder barns that were rectangular with low-pitched roofs and gable doors, potato barns that were low and half-sunken to provide long-term cool storage, and hop barns, which were two-part structures with a kiln or drying house on one side and a processing and storage space on the other. The kilns were typically square, two-story frame buildings with a cupola mounted on a steep pitched hipped roof (Noble and Cleek 1995:124-125). Farms that engaged in dairying would have a milk house located near to but clearly separate from the dairy barn, and that was usually small, rectangular with a gable roof, very well insulated, and made of stone or brick where available (Noble and Cleek 1995:198). Occasionally, a second well was dug near the barn for the livestock. Domestic tankhouses or water towers, and windmills were important features on farmsteads. The tankhouse typically was a four-sided wooden structure, often roofed or enclosed, with a large wooden tank elevated 30 to 40 ft on a study platform to leverage gravity for waterflow (Beckham 1978:20, Noble and Cleek 1995:198). In the ranching areas of the Intermontane West, the farmstead might also include a cabin or house for herders, horse stable, and corrals for branding stock. The larger farmstead might also include enclosed meadows or pastures specifically set aside to provide hay for the horses (Oliphant 1947:228).

Barns in the Northwest Region began as small, simple general purpose structures made from logs or hewn lumber intended to stable a small number of livestock and provide storage for equipment and grain. More permanent structures were built beginning in 1850 that included general purpose barns that were large enough to shelter harvesting equipment and the horse team required to pull it. Dairy cows were housed in separate smaller barns and sheds. Barns were made from braced construction with plank lumber or logs and foundations were minimal, often using large boulders (Howard and Taylor 2011:7-11, Moore 1984:189). In the late 1800s and early 1900s, barns were usually built of wood, hewn logs, stone and shakes over a pole frame with shiplap, vertical boards and battens, and wood shingled roof (Beckham 1978:27-28). Balloon frame and stud construction, “competitive shipping rates among railroads eager to serve

rural residents, and the United States Postal Service's establishment of rural free delivery in 1896, which facilitated inexpensive and timely distribution of catalogs" resulted in standardized and homogenized new barn construction beginning around 1900 (Howard and Taylor 2011:19). The Transverse Frame Barn with wagon doors on one or both gabled ends, hay hood, and very similar to the four-crib barn was pervasive in the region (Noble and Cleek 1995:72). Barns were usually larger in the Intermontane West region than found elsewhere, in order to shelter through the winter livestock and the large work teams of horses required to pull farm equipment (Moore 1984:189). The barn could be up to 60 ft long and 50 to 70 ft wide, with a high simple gable or gambrel roof that could accommodate the use of a hay fork mechanism (Moore 1984:189). However, the arid high desert conditions of the Intermontane West region allowed farmers to leave hay piled in the field, instead of using hay barns (Chappel 1992:37). Many barns in the region were updated or renovated during the 1920s and 1940s to include concrete floors, new sanitation equipment, expanded entry doors or new shed additions (Howard and Taylor 2011:23).

Fencing was also commonly found on farmsteads in the Northwest Region, both around the household area, and the pastures and corals near the barn. In the 1890s, as ranches and livestock herds were growing in size, the more successful ranches began using fencing more extensively across their operation (Oliphant 1947:229). Fencing materials included split rails, peeled poles, vertical posts, brush, adzed beams, boards, stones, pickets, barbed wire, and wire mesh (Beckham 1978:30). In the Intermontane West area, the Russell fence in particular was popular as it did not require digging postholes and made good use of the limited timber supplies in the area. Russell fences were similar to the stake-and-rider fence, with four posts, two at a high angle and two at a more oblique angle, secured by strong wire, and with a top rail secured in the crossing of the two sets of posts. The remaining rails were suspended by wire secured from the post junction or from a higher rail (Noble and Cleek 1995:171-172).

3.3 Region 2: California

3.3.1 Geography

California, with it being the third largest state in the Union, unsurprisingly contains wide variety in its geographical characteristics as well as biological diversity. While these varying geographic subregions of the state are many, they can largely be simplified to four main ecological subregion. The

largest of these are the Mountains Subregion, which consist of much of the north and western portions of the state, in addition encircling the Central Valley subregion, which covers much of central California. The Coastal subregion that spans California's Pacific Coast, contains wide range of diversity within itself, markedly the difference between northern and southern portions of coastline, which have similar but still widely ranging geographical and ecological features. Much of the southwestern portion of the regions is occupied by the Deserts subregion, which includes the Mojave and Sonoran deserts.

3.3.1.1 Coastal Subregion

California's Coastal subregion spans the 800 mile length of the state's coast along the Pacific Ocean, with the subregion's characteristics extending farther inland such as in the northern and southern coastal region while the central coastal region is confined to areas closer to the coast due to the proximity of the Mountains subregion. The northern portion of the Coastal subregion has coastal cliffs with low mountains, coastal headlands, and sand dunes while the southern portion has coastal and alluvial plains as well as some low hills, with elevations ranging from sea level to nearly 4000 ft. To the north of the subregion, there is a large number of perennial streams, as well as some coastal lakes, while in the southern portion, most streams are ephemeral with few flowing throughout the year, in addition to an absence of natural lakes. The geological makeup of the subregion is quite diverse with the northern portion containing Tertiary and Mesozoic sedimentary rocks and Tertiary volcanic basalts while the southern portion has large amounts of Cenozoic sedimentary rocks and Mesozoic granite rocks. The Alfisol soil type is present throughout the region with Entisols and Mollisols being found in the northern portion while Inceptisols and Andisols are found in the southern portion of the subregion. The vegetation varies as well, with the northern portion consisting of largely coniferous forest with some areas of coastal redwood forests, while the southern portion largely consists of coastal sage scrub such as chamise, white sage, and California buckwheat, and chaparral vegetation in the hills including buckeye, manzanita, scrub oak and mountain mahogany. The southern portion was best suited to grazing agriculture prior to more intensive irrigation while the northern portion has many valleys along perennial streams that were more suitable to cropland agriculture from an earlier date. The climate of the subregion ranges from a Mediterranean-like climate in the southern portion, with hot, dry summers and mild winters,

while the northern regions have warm summers with mild and wet winters. The mean annual temperature is roughly 52 °F in the north and 64 °F in the south, with mean annual precipitation in the north of 84.5 in. and 21.5 in. in the south (Commission for Economic Cooperation 2011:54,95, USEPA 2013:1,17).

3.3.1.2 Central Valley subregion

The Central Valley subregion covers the central region of the state, being surrounded by the Mountains subregion and includes the Sacramento River valley in the north and the San Joaquin River Valley in the south. The terrain consists mostly of flat fluvial plains and terraces, with some low hills and altitudes ranging from sea level to roughly 700 ft above sea level. Water in the region consists of two large rivers, the Sacramento and San Joaquin, which form "an extensive delta" where the two rivers converge and flow into the San Francisco Bay, as well as many low gradient perennial and intermittent streams and some wetland and marshes (Commission for Economic Cooperation 2011:96). The geology contains largely sedimentary deposits of clays, sands, silts and gravels, with a wide range of soil types, including Alfisols, Aridisols, Entisols, Mollisols, and Vertisols, typically being "deep well drained, and loamy or clayey" (Commission for Economic Cooperation 2011:96). The natural vegetation of the region includes grasslands and prairies with a variety of perennial and annual grasses, although much of the natural vegetation has been replaced by cropland, as the region is easily irrigable and is highly conducive to cropland agriculture, orchards and other agricultural ventures such as dairy farming. The subregion has a mild to desert, mid-latitude climate with hot, dry summers, and mildly wet winters. The mean annual temperature in the region ranges from 59 °F to 66 °F while the mean annual precipitation ranges from 5 in. in the south and 30 in. in the north (Commission for Economic Cooperation 2011:95-96, USEPA 2013:2).

3.3.1.3 Mountains Subregion

The Mountains Subregion of California is the state's largest subregion, including the coastal mountain ranges running north/south in between the Coastal and Central Valley subregions, the Klamath Mountains in the north central portion of the state, the Cascade Mountains in the northeast portion of the state, the Sierra Nevada Mountains that run north/south on the eastern edge of the Great Valley subregion, and finally the east/west running mountains of Southern California that includes the San Gabriel

and San Bernardino Mountain Ranges. These mountains span the entirety of the state and therefore have widely varying characteristics, with many in the north and east being highly dissected with steep slopes while those in immediately surrounding the Central Valley subregion and those in southern California are lower with less steep inclines. Elevations vary in California's mountainous regions, with some areas being below 400 ft above sea level while simultaneously, the state is home to the highest peak in the continental United States at Mount Whitney in the southern Sierra Nevada's, with a peak of 14,505 ft above sea level. Hydrology is equally variable, with the mountains of western and southern California featuring lower-gradient and often ephemeral flowing water with little to no standing water, while the northern and eastern mountains have a high degree of perennial and non-perennial running water with a large amount of alpine lakes. The latter mountains provide the source of the vast majority of California's flowing water. Geological makeup follows this trend of diversity, with the Sierra Nevada Mountains consisting mostly of granite, the Klamath Mountains being mostly sedimentary rock, and the Cascades being made up of largely volcanic rock, in addition to containing several dormant and active volcanoes. Soils in these mountainous regions are commonly Alfisols and Inceptisols are the most common soils although Andisols, Entisols, Mollisols, and Ultisols are also found in California's mountains. Vegetation if vastly different in different mountain ranges as well as at different elevations, but commonly at the higher elevations feature coniferous forests, with lower elevations being usually being mixed forests although largely dominated by conifers, with common trees being Douglass firs, sugar pines, ponderosa pines, mountain junipers, incense cedars, California oaks, and sequoias. Due to the rugged terrain, they are poorly suited to agricultural activity other than grazing in certain areas. The climate ranges from mild, mid-latitude, Mediterranean climates with hot summers and mild winters, with average annual temperatures as high as 63 °F in the mountains of southwest California, to severe mid-latitude climates with average annual temperatures reaching as low as 27 °F at some of the higher peaks of the Sierra Nevada Mountains. The Cascades have the highest mean annual precipitation at 72 in., with the Klamath Mountains averaging 57 in. annually, the Sierra Nevada Mountains averaging 42 in. annually, and the mountains of southwestern California averaging only 20 in. annually (Commission for Economic Cooperation 2011:44-48,96, USEPA 2013:1-3,15).

3.3.1.4 Deserts subregion

The California Deserts subregion covers most of the southeastern portion of the state, bordering the Sierra Nevada Mountains and Southern California Mountains to the west, and including the Mojave Desert in the north and the Sonoran Desert in the South. The Deserts subregion features broad basins with scattered, low mountains, with elevations ranging from nearly 10,000 ft at the highest peaks to 279 ft below sea level in Death Valley in the Mojave Desert, the lowest elevation in the United States. Water in the region is scarce, with the few streams flowing intermittently and a small number of natural ponds and springs. The Colorado River is the largest source of water in the subregion and finds it origins in distant mountains far removed from the area. The geological makeup contains Precambrian to Mesozoic igneous and metamorphic rocks, as well as deposits of newer, Tertiary igneous and sedimentary rock, with Aridisols and Entisols being the most common soil types. The Mojave Desert in the north features mostly creosotebush, along with white bursage, Joshua-tree, and blackbrush, while the Sonoran Desert in the South contains palo verde-cactus shrub, giant saguaro cactus, and ocotillo, along with white bursage and blackbrush as well. Due to the arid nature of the region, it is little suited to agriculture without intensive irrigation, except for some grazing. The subregion has a dry subtropical desert climate with hot summers and warm winters. Mean annual temperatures range from 41 °F to 75 °F and mean annual precipitation is roughly 7 in. across the subregion (Commission for Economic Cooperation 2011:91-92, USEPA 2013:4,16).

3.3.2 Settlement history

The first European presence in California came in the mid-16th century in the form of naval expeditions exploring California's coast, the first being the Spanish expedition under Juan Rodriguez Cabrillo in 1542 who explored the San Diego Bay, San Pedro Bay, Santa Monica Bay, and Monterey Bay for Spain. It would not be until the 18th century that permanent Spanish settlement took hold in California, with the first permanent settlement in the region coming in 1769 with the establishment of a presidio, or fort, as well as a mission in San Diego. By 1776, the Spanish first discovered San Francisco Bay and establish a presidio and a mission in the area, leading to much of the following settlement of the region taking place along the El Camino Real or "the King's Highway," which was a road that ran parallel to the coast from San Diego to San Francisco with asistencias

or way stations all along the route (Graler 1994:56). The Missions of California relied heavily upon Native Americans through the Mexican period, first converting them and then using them as labor to tend the variety of crops introduced to the region by the Spanish, including wheat, small fruit orchards, olive groves, and vineyards, in addition to various other crops including vegetables. Many Spanish settlers also engaged in ranching, with "enormous" land grants from the Spanish crown providing ample land for the grazing Mexican longhorn cattle, which were descended from Iberian stock (Hart 1998:137). Following Mexican independence from Spain, secured through blood and powder in 1821, the missions were to be secularized and converted to private ownership, although it would take until 1834 for this to come into effect in California. By this time, Spanish and Mexican settlement of California was largely limited to areas surrounding San Francisco Bay, Monterey Bay, Santa Barbara, and the Los Angeles Basin, as well as "a scattering around Sacramento," with the capital of Alta California being Monterey (Hart 1998:137). The region was only lightly populated however, with "a few hundred Mexicans [controlling] vast tracts of land" making the region ripe for the taking by the United States during the Mexican-American War from 1846-1848, which resulted in Mexico officially ceding California at the conclusion of the war in the Treaty of Guadalupe Hidalgo (CALTRANS 2007:12,67,113; Graler 1994:56-57; Hart 1998:135-137; Melnick 1994:115).

It was during the first years of the United States rule over California that the region saw its first large scale wave of settlement, ironically for the same reason that drew the earliest Spanish Conquistadors to the New World - gold. Gold was not a new phenomenon, having been mined in the San Gabriel Mountains under Spanish and Mexican control. However once gold was discovered in January of 1848 at Sutter's Mill on the South Fork of the American River in the foothills of the Sierra Nevada, the Gold Rush era would see a massive influx of new settlers hoping to get rich quick that would last into the mid to late 1850s. The most common form of mining during this period was placer mining, which focused on already exposed gold as opposed to lode mining, which requires finding the vein and removing the ore from the rock in the ground. Placer mining during this early period was done through river mining, which used the simple panning method for smaller operations, while the larger operations used sluices redirecting flowing water to wash away the lighter materials while leaving the

heavier gold nuggets or flakes. The regions that saw the largest gold production during the Gold Rush were the Mother Lode region and Klamath and Trinity River Basins (CALTRANS 2008:10-12,38; Rohe 1994:122).

These gold fields were not populated with prospectors overnight, as California was on the other side of the continent from the main population centers of the United States on the East Coast, as well as being even farther away from the European immigrants fleeing political unrest at home, namely the several failed revolutions that swept across the continent in 1848, known as the Springtime of the Peoples. The first to arrive in the gold fields were largely Americans already in the region, including many from the recently concluded Mexican-American War, along with Sonorans, Chileans, Hawaiians, and Peruvians that were in close enough proximity to mobilize and reach the region first. These were in relatively small numbers, especially compared to later migration, with "less than ten thousand people" migrating to the goldfields during 1848 (Rohe 1994:125). This initial phase was quickly followed by French, British, Australian, Chinese, Croatian, Italian, Cornish, German, Jewish (from various countries), African-American (free and enslaved), and Chinese settlers, with additional Hispanics and Americans coming in large numbers, although native-born Americans made up the largest majority. Between 1849 and 1850, the number new migrants "probably approached 250,000," with the 1850 census showing a foreign-born population of 24% (Rohe 1994:125). While making up a relatively small number (335) of initial immigrants from 1849-1850, by 1852 immigration had increased to "fifteen thousand to twenty thousand a year," largely a result of those seeking refuge from the Taipei Rebellion, which had begun in 1850 and lasted through 1864 (CALTRANS 2008:63-66, Rohe 1994:125-133).

Many of these initial settlers congregated in mining settlements, with roughly 500 such settlements forming from 1848 to 1860 near lucrative placer deposits. In typical 19th century form, racism and xenophobia played a significant factor in the Gold Rush, with the result that Hispanic, Chinese, French, and African-American miners often choosing to migrate to cities. San Francisco had become the largest West Coast port, serving as a distribution hub, sending supplies up the Sacramento and San Joaquin Rivers into the Central Valley, with Sacramento, Stockton, and Maryville becoming "the principal interior distribution centers for the mines" (Rohe 1994:129). As the gold rush began to subside by the mid-1850s, many for-

eign-born miners returned to their countries of origin, although many remained. By 1869 "as many as half" of the roughly five hundred mining settlements had been abandoned, leaving behind ghost towns, in addition to increasing settlement in urban areas like San Francisco and Sacramento (CALTRANS 2008:63-66, Rohe 1994:125-133, Schlebecker 1975:85).

While the main draw for settlement was gold, it was hardly the only economic activity during this initial period of American settlement. The influx of miners had quickly "outstripped the food on hand, driving the prices upward" with the only outside food coming in via ship, which was expensive and limited the kinds of food that could be transported (CALTRANS 2007:14). This created a boom in the agriculture industry of California, with many failed miners trying agriculture, making "their fortunes by selling goods to their mining colleagues," usually at exorbitant prices (Schlebecker 1975:85). Wheat was a major product of these early farmers, soon becoming a "principal crop…during much of the nineteenth century," with production mainly focused in the Central Valley (CALTRANS 2007:49). California starting by importing 740,000 bags of grain in 1853, being self-sufficient by 1855, and by 1856 having a "surplus of about 70,000 sacks and barrels of grain and flour," which in this year was exported largely to Peru (Shannon 1945:28). Also grown by early farmers in the 1850s were "grapes, apples, strawberries, walnuts, pears, figs, potatoes, eggplant, buckwheat, barley, squash, chili peppers, turnips, beets, onions, pumpkins, Indian corn, and oats" (CALTRANS 2007:15). In this earlier period, a large amount of the food that was being shipped to market would spoil, leading to much of it being preserved or used to create a product that would be easier to ship, such as turning grapes into alcohol, which by 1872, the state was doing on a massive scale, producing 10 million gallons of wine and two million gallons of grape brandy each year. Grazing also saw a precipitous increase in production during his period, with the number of cattle being "probably a little over a quarter of a million head" by 1850 and reaching "over two million" by 1860, before a bad drought in 1862-1864 ended open-range cattle grazing, leading to smaller numbers, while sheep grazing increased. Sheep had been around since Spanish times but large numbers were brought overland into the region in the 1850s, including a herd driven by Kit Carson from 1853-1854. The industry took off in the 1860s and 1870s before land became scarce as farmers and ranchers took up more land, resulting in many sheep grazers moving to Arizona (CALTRANS 2007:14,82,46-49; Schlebecker 1975:85; Shannon 1945:28,208-214,262-263).

While the quest for gold caused a massive population surge from the late 1840s through the late 1850s, the population continued to grow at a steady rate of roughly 50% every decade through the turn of the 20th century, where it briefly dipped. Many of these new residents were immigrant laborers, who became a mainstay of the California economy in this period. The first of these immigrant workers were the Chinese, however following the Page Act of 1875, which banned the immigration of Chinese women, and the Exclusion Act of 1882, which banned all Chinese immigrants, combined with a hostile attitude towards the Chinese, many Chinese moved to urban areas where they lived in enclaves and declined as the major group of migrant laborers. The migrant workforce, however, was quickly supplemented by an increase in Japanese immigration, which occurred roughly the same time as a result of lack of economic opportunity in Meiji Japan. Japanese immigrants continued to come in large numbers through the beginning of the 20th century, before they lost their majority role in the 1910s through the 1930s as Japanese immigration began to decline and "a large influx of Mexican laborers appeared," as a result of instability south of the border as Mexico descended into a particularly bloody revolution that lasted from 1910-1920 (CALTRANS 2007:55). These Mexican immigrants, similar to the Chinese and Japanese before them, largely settled in their own communities, some of which were swallowed up by urban sprawl later in the 20th century, becoming the modern day Hispanic barrios or neighborhoods (CALTRANS 2007:55-56, Schlebecker 1975:172).

One major economic developments that occurred towards the latter quarter of the 19th century was the trend towards "more specialized crops" away from the previous modus operandi of "expansive grain fields and grazing lands" with smaller scale specialized agriculture, largely contained to regions near major cities (CALTRANS 2007:8). Railroad advancements and later automobiles, which reduced the transportation burden, combined with increasing urban populations and a large supply of cheap migrant labor all contributed to the boom in specialized agriculture of the late 19th and early 20th centuries. Hops and barley were two early specialized crops that grew in popularity in the late 19th century, with California leading the nation in production of both at the turn of the century, before losing supremacy to other regions. Fruits and vegetable production was the main beneficiary of growth throughout this period, as especially orchards, but vegetable fields as well, required more intensive labor and thus benefited greatly from the surplus of cheap migrant laborers. By 1910, California had become the "world's principal grower of grapes, citrus, and a wide variety of other

fruits," including "persimmons, raisins, apricots, nectarines, quinces, and pomegranates," with citrus soon becoming the state's principal agricultural product by the 1930s and the industry peaking during WWII (CALTRANS 2007:55-56). Similarly, vegetable production in California was leading the nation "by the late 1910s," with the most popular vegetables grown during the early part of the 20th century being "asparagus, cabbage, cantaloupes, carrots, cauliflower, celery, cucumbers, lettuce, peppers, spinach, tomatoes, turnips, sugar beets, and watermelons" (CALTRANS 2007:67). The only vegetables that California did not lead the nation in production during this time were potatoes and sweet potatoes (CALTRANS 2007:8,55-57,67,79; Schlebecker 1975:172; Shannon 1945:164).

Assisting in the state rise to dominance in specialized agriculture was the expansion of agricultural activities in areas that were previously unconducive to agriculture. One method of doing this was the development of dry farming techniques that became prevalent at the close of the 19th century and the beginning of the 20th century [for more info of dry farming see Southwest region]. The other method of expansion of cultivatable land was through intensive irrigation, with many arid regions of California being irrigated in the late 19th and early 20th century. These irrigation projects required massive capital investments, meaning that in practice, the largest and best funded farms were able to "rapidly consolidate huge agricultural holdings" (CALTRANS 2007:18). This was part of larger trend throughout the state, as well as the country throughout the latter half of the 19th century in which the laissez faire economic policies that allowed those with capital investment to take advantage or manipulate existing laws (such as the Desert Land Act of 1877) to their benefits, as well as exploiting its labor, which was in plentiful supply in California during the period, keeping wages low. These large agricultural operations also had the effect of stifling smaller farmers who did not have the capital to engage in large scale irrigation, and in some cases had their water supplies diverted to these larger, capital backed operations. This trend can be seen in the rapid increase in number of farms in California over 1000 acres, with the state having only 262 farms of that size in 1860, 713 by 1870, 2,531 in 1880, and 4,753 farms over 1000 acres by 1900 (Shannon 1945:155-157, CALTRANS 2007:14-18, Schlebecker 1975:144-145).

Perhaps the most major developments of the Industrial Revolution and modernization in California were those that increased transportation for goods to market. One of the first of these innovation, and one of the most

impactful, was the creation of transcontinental railroad lines. The first was completed in Utah in 1869, with four more major transcontinental railroads being completed in the next decade and a half, with the competition making freight rates more affordable and opening up more of the country as a potential market for California goods. Further extending the reach of California's produce was the development of refrigeration technology. The first shipment of refrigerated bananas departed from California to Chicago in 1869, with the same thing being done with fruits and vegetables. It would not be until the 1880 however that domestically manufactured refrigerated railroad cars were available. Advancements in canning and preservation reduced spoilage, maximizing profits for fruit and vegetable growers. The massive industrial project of the Panama Canal now allowed goods to be shipped to lucrative foreign markets faster from the West Coast. California's modern highway system, which began in 1909, combined with the advent of diesel trucks, had the effect of providing greater access for small farmers to market, with many now being able to grow special agricultural products farther away from urban customers, and also further increasing profits by allowing more control and less chance of exploitation in the transportation of goods that (CALTRANS 2007:100, Schlebecker 1975:171-172, Shannon 1945:264).

California was greatly affected by the Great Depression. Several positive things came from this time of great economic desperation and uncertainty, such as the many irrigation projects in the Central Valley constructed by the Civilian Conservation Corps (CCC) and Works Progress Administration (WPA). These groups also did much work with rural power development, electrification, and the irrigation of rural farms and communities in California. Several large scale government interventions allowed the successful maintenance of many family farms in California through farm subsidies, which remains in place today. Unfortunately, there were many negative side effects for the state. First, as a result of the lack of jobs available for Americans, many migrant workers were deported to allow Americans to fill these low paying manual labor jobs. Americans flocked to California in large numbers seeking work, especially as many farms were ruined in the Great Plains by the catastrophic Dust Bowl. Much like the depiction in John Steinbeck's *Grapes of Wrath*, these migrant workers were often exposed to "graft, corruption, and exploitation" in this era (CALTRANS 2007:44). One unexpected side effect of the Great Depression was the resurgence in small-scale gold mining when the price of gold spiked in 1934, "resulting in a flurry of speculation" in California (CALTRANS 2008:10).

Thousands of unemployed migrated out of urban areas to try to get rich in small-scale placer mines throughout California (CALTRANS 2008:10). Many of these small-scale placer mines used similar techniques as the early placer miners of California's Gold Rush, often even setting up operations near abandoned gold rush mining camps (CALTRANS 2007:21-22,44, CALTRANS 2008:10-12).

3.3.3 Cottage industries

From the onset of U.S. presence in California, the extraction the state's mineral resources was a major economic driver in the region, with gold being the most prized and earliest exploited of these minerals. Gold mining was conducted all across the state, in the Sierra Nevada, Cascades, Siskiyous, Tehachapi, San Gabriels, mountains east of San Diego, and in Mojave region, as well as in "deposits or placers found in alluvial areas at the edge of the Great Central Valley, or along the northern Coast of California in the form of black sands" (CALTRANS 2008:18). Other than the initial phase of prospecting and the final phase during the Great Depression, there were very few small-timer mining operations, with wealthy urban populations funding gold mining operations, with large scale industrial mining being made possible by advancements in technology such as advancements in geology allowing for the location of rich veins and dynamite to reach these veins with less effort. These advancements made lode mining more popular and allowed for huge, semi-permanent mining camps. The initial phase of small-scale mining was conducted largely by males who would sometimes prospect in addition to farming in an attempt to profit off of the need for locally grown food. Commonly miners or farmers near regions with large amounts of forests would log timber to either be processed at sawmills into building materials for newly arriving settlers, or later for railroad ties. In the latter period of small-scale mining, both men and women worked the pans and sluices (CALTRANS 2008:10,18,41,103).

The other main industry throughout the latter half of the 19th and first half of the 20th centuries were related to fruit and vegetable agriculture. These specialty agricultural products required far more intensive labor than other types of agriculture, especially orchard or citrus related endeavors that required laborers to handle "killing frosts, maintenance of irrigation systems, picking fruit, and pruning" (CALTRANS 2007:57). This need for intensive labor was sustained by the series of mass migrations, first from China in the 1850s to 1880s, then from Japan, which began in the 1870s through the 1910s, and finally from Mexico, which again brought large

numbers of immigrants from the 1910s through the 1930. These migrant workers were not limited to the adults, male or female, but also often included children laborers. Related industries such as canning, or other preservation methods such as drying, were often done by these same migrant laborers (CALTRANS 2007:16,55-57, Schlebecker 1975:172).

The impact these industries had on the areas local economy and community was extreme, due to the fact that in many cases, the migrant workers employed in various industries would be a new community and economy created all on their own. Especially in larger operations that used migrant labor for agriculture or mining work, the company or owners of the site would typically provide accommodations. These could be as basic as "several tents, a rock shelter or a rudimentary log cabin" with hastily rigged outdoor showers and privies or could be as complex as stick-frame or masonry housing with "indoor showers, baths, running water, and toilet" (CALTRANS 2013:135). Some of the more complex work camps included central offices, dining halls, and communal spaces to create their own little community, with many having general stores run by the proprietor of the industry who paid employees in credits to the company store (CALTRANS 2008:103, CALTRANS 2013:135).

3.3.4 Typical farmstead components

The construction material for residential and other types of structures varied greatly throughout California based on factors such as cultural or ethnic identity combined with locale and availability of resources or proximity to other groups. The earliest farms and ranches in California, built from the 1840s through the 1860s "relied upon local materials, such as adobe, fieldstones, and wood aspects of construction" (CALTRANS 2007:145). Adobe was used in some of the earliest structures in California, tracing its origin to Spanish colonization, leading to the practice being used extensively by early Hispanic residents of California. They typically were constructed on fieldstone foundations. Adobe bricks fell out of popularity in the early 1850s although saw a period of "resurgence in use in the beginning of the 1930s," largely for its cost effectiveness compared to the manufactured housing of the period (CALTRANS 2007:147). Stone and log construction were less frequent and largely were a result of the location of the structure, with mountainous regions producing plentiful quantities of these building materials resulting in most log buildings being located in those areas. Log construction was largely favored by certain immigrant groups such as the German, Scandinavian, or American frontiersman who

had already acquired log-building skills from previous generations of immigrants. Fieldstone construction was similarly used largely in mountainous regions with these structures generally being associated with immigrants from Italy or the British Isles, but was commonly used as foundations in all types of structures, serving as piers of log cabins as well as wooden frame houses, or being used to construct cellars or basements out of stacked or mortared fieldstones. Fieldstone only structures were common in the 1850s into the 1870s when the practice started to decline, although exterior stone cladding gained popularity in Southern California during the early 20th century. Milled lumber was "by far" the most common building material used from the 1850s through World War II. Wooden residential structures commonly used "milled boards balloon-framed or lock-framed" construction starting in the late 1850s as lumber mills became operational in large numbers, making the materials produced more affordable. Chimneys on these wood frame structures were typically mortared stone or brick (CALTRANS 2007:145-149, CALTRANS 2008:42).

Similar to building material, residential structures of California take a wide variety of designs and layouts, ranging based on cultural affinity as well as by socioeconomic class and location in retaliation to others. Adobe structures in the region were often used in ranch buildings and farmsteads featuring the Spanish tradition. They often featured a central courtyard surrounded by four walls or open on one, forming a u-shape. Adobe designs were adapted by arrivals to the region, with the Monterey Colonial style developing as a two-story adobe structure with a gable roof and a second story porch that wraps around the entire structure. This vernacular style featured far more wooden building materials than were found in traditional adobe structures and had a great deal of variety based on wealth of the owner. One of the more common styles was the "typical side-gables, stick-frame vernacular style farm residence," which featured two gabled ends, one on each side wall, with a door centered along the main front wall and a front porch, with the structure and the porch being supported by posts or fieldstones. The residential structures of those with more means, or those closer to finished milled lumber and other building materials were likely to build styles ranging from "Greek Revival, Gothic Revival, Italianate, Second Empire, and Queene Anne style homes" as well as simpler hybrids of vernacular construction and design (CALTRANS 2007:148-150, CALTRANS 2008:41 CALTRANS 2013:135, Graler 1994:60, Rohe 1994:130-131).

Farmsteads and ranches in California also have varying relationships with their landscape, as well as a multitude of building orientations and layout. The form of agriculture practiced on a certain farmstead or ranch is most indicative of the building layout and relationship with the landscape. Ranch buildings were usually spread out, and dispersed in relationship to each other, with buildings located at various ranch areas like pastures and certain areas of domestic focus. Farm buildings were usually clustered in a central location, often surrounding the farmhouse. However in regions that were "marginally suited for agriculture" in the late 19th century, they often operated as hybrids between ranches, orchards, agricultural properties, or a combination of the three, leading to some parts of the built structures on the property being clustered or spread out based on its function (CALTRANS 2007:146). Orchards in particular required more sustained labor and thus were likely to have more permanent rather than ephemeral worker housing, which was usually near the orchards where the migrant labor worked; other satellite features away from the main complex included "pens at railroad sidings, corrals, water troughs, and salt or mineral licks" (CALTRANS 2007:154). Farms and ranch properties were typically marked by the use of fences, especially important on farms that needed to keep range animals out to avoid losing produce. The earliest fences were fieldstone piers with wood or brush piled up on the low fieldstone walls to "delineate property boundaries and restrain livestock," with these stone piers often being used as foundations for barbed wire fences. Other fences found in California include the rail fence, which similarly uses stone piers, but this time with split wood instead of brush stacked on top of it, now at a 120 degree angle to form a zig-zag pattern, as well as the Jacal Fence, Woven Wire Fence and Electric Fence [For more information on these fences, please see Southwest Context] (CALTRANS 2007:57,146,154; Noble and Cleek 1995:170-177).

Outbuilding types in this region are widely varied due to the diverse nature of California's agricultural production. The most characteristically Californian outbuilding is perhaps the domestic tankhouse, which is a simple structure with a large wooden tank that is elevated roughly 30 to 40 ft above ground and rests upon an "open study wooden frame to ensure gravity flow," with this portion sometimes being closed in to create a room beneath (Noble and Cleek 1995:141). In some instances throughout California, the domestic tankhouse was incorporated into the main residence itself. Other water related outbuildings include wells and windmills, which

were used to raise well water. Hop Barns are also commonly found in California, which typically consist of two structures, one being a kiln or drying house and the other being a processing and storage building, with later forms being built as a singular structure. These were often two-story square buildings surrounded by a cupola at the top of a steeply pitched, hipped roof. Other barns in the region are largely imported from other regions, such as the Transverse Frame Barn [see Appalachia Section] and the feeder barn [see Great Plains Region]. Other barn outbuildings include "long rectangular poultry sheds," slaughterhouses, blacksmith shops, cold storage or ice houses (crucial for fruit or vegetable farming), smokehouses, summer kitchens, and bake ovens [see southwest section for Spanish-American Bake Ovens] (CALTRANS 2007:146-154, Noble and Cleek 1995:125-140).

3.4 Region 3: Great Basin

3.4.1 Geography

The Great Basin covers all of Nevada, the western half of Utah, the southeastern quarter of Oregon and the southern half of Idaho. It is bounded by the Wasatch Mountains on the east, the Cascade and Sierra Nevada Mountains on the west, the Snake River and Blue Mountains on the north, and the Colorado River and Mojave Desert on the south. The Great Basin is located within the Intermontane West area and comprises the northern, most elevated third of the greater Basin and Range section that stretches from southern Oregon and Idaho to western Texas and Sonora, Mexico. The entire Basin and Range section is defined by vast areas of desert and semi-desert lands, dominated by isolated mountains and valleys that repeat "in succession across the region like great waves cast in time" (McKnight 1992:365, Utah State University Extension 2020). There are over 100 narrow mountain ranges oriented in a north-south direction and elevations range from 282 ft below sea level in the southern valleys to above 10,000 ft in the mountains (Kitchen and Carlson 2008:1). The most defining feature of the Great Basin is "its internal drainage system, in which precipitation falling on the surface leads eventually to closed valleys and does not reach the sea" (Rafferty 2020). This results in numerous alkali flats, salt pans and salt lakes in the region—without exterior or fresh drainage, the salt contained in the water becomes more concentrated as the water evaporates (McKnight 1992:365).

Climate in the Great Basin ranges from extremely arid climate in the southern portion with mild winters, hot summers, and irregular and episodic rainfall averaging less than 5 in. per year, to more moderate, semi-arid climate in the northern portion with cold winters, warm summers and periodic, but fairly regular precipitation averaging around 9 in. per year (McKnight 1992:366, Kitchen and Carlson 2008:1). Temperatures average from 41 to 50 °F in the northern areas to 57 °F in the central areas, and up to 75 °F in the desert areas in the south (Commission for Economic Cooperation 2011:87-92). Water is extremely scarce throughout the Great Basin. The High Sierras block rain coming off the Pacific Ocean and the Rocky Mountains block weather systems coming from the east. Most of the precipitation occurs on the mountain slopes bordering the Great Basin in the form of snow, which feeds the few permanent streams that exist. When rainfall does occur in the Basin areas, evaporation tends to exceed precipitation (McKnight 1992:363, Bogardus 1930:322).

Vegetation in the region includes conifers and woodlands in the mountain elevations while drought-resistant sagebrush and grassland can be found in the basin areas. Soil composition commonly includes a great variety of volcanic rock, consisting of Aridisols, Entisols, and some Mollisols that wash down from the mountains, stream valley sediments, and shore deposits from ancient lakes (Bogardus 1930:325, Commission for Economic Cooperation 2011:88-89). Most of the soils, however, are rendered useless due to the high salt content. Sand dunes and desert sand are also common in the Great Basin (Utah State University Extension. 2020, Kitchen and Carlson 2008:1). The only exception is found in the northern basin area around the Snake River Plain, where the lower and more gently sloping terrain consists of alluvial valleys (Commission for Economic Cooperation 2011:90-91).

Given the inhospitable environmental conditions found throughout most of the Great Basin, agriculture in the region is limited. Great swaths of the land are held as federal lands, public rangelands, national parks, and military reservations. Mineral resources, including gold and silver, exist throughout the region, and have supported mining activity throughout the area's history. Ranching and livestock raising occurs mainly in the northern to central Basin area where there is enough precipitation and/or irrigation to support grazing. Dry land and irrigated farming, along with ranching and dairy farming, occur in the northern basin and Snake River Plain areas where there is more water resources available and better soils;

sugar beets, potatoes, alfalfa, small grains, and vegetables are the principal crops (Commission for Economic Cooperation 2011:87-88, 90-91).

3.4.2 Settlement history

The Great Basin was first explored by EuroAmericans in the late 18th century during the last phases of Spanish exploration in North America. Spanish explorers and friars explored several eastern and western approaches through the southern portion of the Great Basin between Santa Fe to Los Angeles through modern day Las Vegas, referred to collectively by later explorers as the "Old Spanish Trail" (Nicoletta 2000:10). During the early decades of the 19th century, the region was more fully explored by a series of trappers in the northern portion and explorers in the south including Jedediah Smith who was the first American to cross the region in the 1820s and John C. Freemont, who led a U.S. Army Surveying team in the surveying the eastern portion of the region in 1846. In the 1840s, Americans began to start crossing the region in large numbers towards the Pacific Northwest along the Oregon Trail, which ran through southern Idaho following the Snake River. The first wave of permanent settlement by EuroAmericans came in the later 1840s, with the migrations of Mormons to the region beginning with an expedition led by Brigham Young, which established Salt Lake City in 1847. Mormons poured into the Great Basin in large numbers, expanding their population from 11,354 in 1850 to "an estimated 25,000 in the next three years" (Shannon 1945:30). The Mormons established settlements focused in the Salt Lake Basin of northwestern Utah but soon "rapidly settled most of the eastern Great Basin" (Baumhoff 1957:2). The western Great Basin was initially settled in this period by the Mormons, who expanded north and west into the region of the Upper Snake River in Idaho. In the south and east, they used portions of the "Old Spanish Trail" in southern Utah to migrate into Nevada to the extent that it "became known as the Mormon Trail or the Spanish-Mormon trail" (Nicoletta 2000:10). There are many communities being established along this road, one being established near modern day downtown Las Vegas in 1855, and even settling as far west as San Bernardino, California. The further westward expansion of this budding Great Basin theocracy was stunted in 1857 when Brigham Young called all farflung Mormon settlers back to Salt Lake City for he though was impending war with federal forces, although the brief conflict deescalated when a new governor was appointed for the Utah Territory. The Mormons left lands in the western Great Basin long enough for mineral deposits to be discovered in the re-

gion, which soon resulted in a massive influx of population. This new migration started in 1859 when the Comstock Lode was discovered consisting of some gold and mostly silver, which spawned new boom towns such as Virginia City and Carson City in Nevada, this economic model of expansion soon continued to the north with discovery of gold in the southwestern Idaho in the early 1860s, with Boise being found in 1863 as a result (Baumhoff 1957:2, Nicoletta 2000:10, Rafferty 2020, Rohe 1994:129, Shannon 1945:30).

The migration of Mormon settlers to the Great Basin was primarily based on religious reasons, largely to flee eastern persecution for their unorthodox beliefs, which put them at odds with other Christians, as well as to found a region of "religious integrity" away from the so-called "gentiles" (McKnight 1992:369). The main economic activity of Mormon settlers was agriculture, which was accomplished through methodical exploration and settlement of valleys and oases that were best suited to irrigation agriculture that took the form of mainly of communal "canals and ditches" in spread out farming villages (Nicoletta 2000:24). Mormon settlers were encouraged "to bring all sorts of seeds, small trees, and shrubs;" Brigham Young even dispatched "parties to California to collect seeds and stock" (Riegel and Athearn 1971:364-65). As a result, the cropping pattern was quite diverse, although the highest acreage being devoted to hay and grains, especially wheat. Other important crops included sugar beets and fruits, mainly apples, peaches, and cherries, with potatoes having important on the northern reaches of Mormon territory in southeast Idaho. In addition to crops, livestock played a significant role in Mormon agriculture, as evidence by the large portion hay played in their farming activities. In the initial phase of migration, "each migrating family brought a few head of cattle" (Nicoletta 2000:24). This was soon supplemented from neighboring regions with sheep and chickens being raised in significant numbers as well (McKnight 1992:362-369,384-386, Nicoletta 2000:24, Riegel and Athearn 1971:364-65).

The other main economic activity occurring in the Great Basin during this first phase of settlement was mining. Mining was conducted in the region beginning in the early 1850s, as some miners on their way to California decided to stay in Nevada and search for gold in the rivers and streams of the eastern slopes of the Sierra Nevada Mountains. Mining did not become a major industry in the Great Basin until 1859, when mineral deposits of

gold and mostly silver were discovered at the Comstock Lode in southwestern Nevada, making it the nation's first major silver district. By 1860, Nevada had become its own territory and saw such a massive influx of population and capital that it would only take 4 years to transition to statehood in 1864. While the source of new population came from east and west, domestic and international, the influx of capital was largely from powerful mining companies that had established themselves in California during its' mining boom a decade earlier. During this same period in the 1860s, gold strikes were occurring to the north in Idaho, which were largely being funded and supplied out of Portland, Oregon rather than California. This form of lode mining was vastly different logistically from other forms of placer mining typically conducted initially throughout the west. This form required physically removing the ore from the ground by tunneling down to the lode that would be extracted and require processing, which included hammering the raw ore in mills before the two materials were separated through various chemical processes, with mercury being a common element in the process. A combination of supports for mine shafts, lumber for new buildings, and fuel for industrial works, wood was in high demand in the western Great Basin during much of the latter half of the 19th century and becoming a major industry on the peripheries of the Great Basin where were was lumber to exploit. This process began in the 1850s prior to extensive mining in the region, with wood being exported from the "new logging operations in the mountains around Lake Tahoe" (Nicoletta 2000:10). With Lake Tahoe being the nearest source of large tress, it was the first and one of the more extensive areas of logging during the period that saw the mountains completely deforested by the turn of the century. So great was the amount of wood required by lode as opposed to placer mining can be seen in an 1862 estimate that "the Ophir Mine along contained more timber within its subterranean depths than all the buildings in Virginia City," which was well on its way to becoming the major metropolitan area in the region (Rohe 1994:139). The region was so consistently under supplied with wood that it would need to be floated in along the Carson River from wood-bearing regions farther to the south than Lake Tahoe. During this period it was estimated that "more than 150,000 cords of wood were floated down the Carson in a typical season" (Rohe 1994:139, Nicoletta 2000:10-11).

After the first settlement by the Mormons in the Great Salt Lake region and their subsequent expansion, which continued through the second half of the 19th and early 20th centuries, much of the Great Basin was populated

through a series of economic booms that brought massive populations into the region, with many departing after the economic conditions subsided. The first booms to occur in the region in the 1860s and 1870s, at the Comstock Lode in the southwest and the gold strikes in Idaho and eastern Oregon in the northwest. These new migrants to the region came from all over the country as well as all over the world. The first to take advantage of the Comstock Lode were miners from California, whose proximity and mining experience gave them a headstart against other American and foreign protectors who entered the region in large numbers in the years after. This trend further accelerated with the building of the first transcontinental railroad through the Great Basin in the late 1860s, with Chinese labor being particularly widespread. As evidence of this, the foreign-born population of Nevada by 1870 was "over 44 percent" with the largest ethnic groups being Irish, Chinese, and Cornish, in addition to large numbers of German, Canadian, Italian, Basque, Greek, Slav, Japanese and French immigrants (Nicoletta 2000:11). Most of these immigrants worked wage labor jobs in the mines, building railroads, or serving as ranch hands, although certain ethnic groups were generally associated with a particular type of work. For example, the Cornish were known for their mining experience and largely worked those jobs, while Basque immigrants became associated with ranching, particularly sheep ranching. The Chinese were associated with railroad work, while also engaging in mining and ranch labor throughout the second half of the 19th century until most left around the turn of the century as a result of racial/ethnic persecution (Nicoletta 2000:11,45-47).

As previously mentioned, one of the defining trends in the Great Basin, especially in the western portion, was the boom and bust nature of its economy. The first boom period, ushered in by the Comstock Lode, reached its peak in the mid-1870s, with Gold Hill and Virginia City reaching a combined population of about 25,000 people and became a "metropolis, sprawling across the slopes of Mt. Davidson" (Nicoletta 2000:11). By the late 1870s however, the first big boom/bust cycle was coming to a close as the Comstock Lode became "played out" resulting in the abandonment of mining towns across the region, with Nevada alone having "more than four hundred ghost towns" from this period (Nicoletta 2000:16). Although the Comstock region would not be completely abandoned, thanks to a few strikes that kept mining in the area into the 20th century, the area had decreased in population to the point that it had "fewer than a thousand people by the 1940s" (Nicoletta 2000:11). After the end of the first boom cycle

at the end of the 1870s, the region fell into a "severe depression" as shown by Nevada's drop in population from 62,266 in 1880 to 42,335 in 1900 (Nicoletta 2000:16). The early 1900s saw many new strikes in the western Great Basin that resulted in another influx of prospectors, with silver and copper being the major ores extracted (Nicoletta 2000:11-16).

The mining industry and the introduction of railroads in the 1860s "boosted farming and ranching" (Nicoletta 2000:24). Livestock production was one of the most important industries in the region. Cattle and sheep production were the most important livestock raised. However, horses, swine, and chickens were also produced in great quantities. Due to climatic and topographical factors presented earlier, much of the state was never suitable for most forms of agriculture thus livestock production became the primary focus. The region provided excellent opportunities for ranching. Cattle and sheep ranching thrived "because the Great Basin provides excellent forage in white sage, Great Basin wild rye, and wild grasses" (Nicoletta 2000:24-25). Ranching was controlled "almost entirely by a few large corporations, several dozen families, and the Federal Government" (Nicoletta 2000:25).

Irrigation in this region has always been an issue of great concern. Initial government efforts were focused on harnessing private industry. The Carey Act of 1894 allowed for private companies to come in and lease water to residents, who paid "in ten yearly installments, after which the [irrigation] works were transferred to associations of users" (Shannon 1945:216). Soon, the Federal Government took direct action in stimulating irrigation in the region with the passage of the National Reclamation Act of 1902. The first major federal project undertaken was the Truckee-Carson Irrigation Project of 1902, which "consisted of dams, canals, and hundreds of irrigation ditches," that "transformed a part of Nevada's desert into rich and productive agricultural land" (Nicoletta 2000:31).

Dry land farming began in the Great Basin shortly after 1910 with the influx of prospective farmers as a result of the Enlarged Homestead Act of 1909. Dry land farming was defined by Schlebecker (1975) as "allowing half the land to lie fallow each year to accumulate moisture" (142). Largely due to railroad efforts the Bureau of Dry Land Agriculture was established by the U.S. Department of Agriculture in 1906. As a result of less stringent homesteading requirements, hopeful farmers migrated into arid regions of

the Great Basin in the hopes of becoming successful dry land farmers. Unfortunately, due to repeated crop failures, these newcomers were largely forced to abandon their agricultural claims within a few years. By 1920, the vast majority of optimistic dry land farmers, who had once flocked into the area had now abandoned the great basin (Bowen 1998,).

The Industrial Revolution had wide-reaching and lasting effects on the Great Basin. The construction of the railroads throughout the region greatly transformed the region through the creation of new towns and the easier transportation of goods. The nation's first transcontinental railroad crossed the Great Basin from 1868 to 1869, with the final spike being driven at Promontory Summit, Utah on May 10th, 1869. The new railroad allowed for towns to develop in regions where this would have previously been unfeasible through the ease with which outside food and supplies could be brought in. In Nevada for example, many of the towns established by railroad companies have been "among the most stable and prosperous" in the state, including Reno, Sparks, Winnemucca, Elko and Las Vegas (Nicoletta 2000:22). While much of the initial burst of railroad construction in the Great Basin occurred in Utah and Nevada, the railroad spread steadily throughout the region in the late 19th and early 20th centuries. From 1880-1893 there was a significant "flurry" of railroad construction in southeastern Oregon and southern Idaho that would not fully subside until World War I (Schwantes 1994:65). The railroad also contributed to the regions high demand for wood, which was initially a result of the mining industry. Wood was consumed by the railroad as fuel for engines as well as railway ties. Industrialization also increased the fuel required for the mining industry, as the introduction of stamp mills and smelters into the region to process lode minerals required large amount of fuel. In arid regions where wood was not available, sagebrush was used although large amounts were required due to it burning hot and fast (Nicoletta 2000:22, Rohe 1994:139, Schwantes 1994:65).

The Great Depression saw a large investment in the Great Basin by the Federal Government. New Deal agencies such as the Public Works Administration, the WPA, the National Youth Administration, and the CCC funded or provided labor to build a variety of structures to improve life and increase settlement in the Great Basin. The largest of these public works was the Hoover Dam, constructed from 1931-1936 in southeastern Nevada to provide the region with a more stable water supply as well as

generating electricity. It also had the unintended effect of helping transform Las Vegas "from a small railroad town into a burgeoning city and tourist destination" (Nicoletta 2000:32). The Great Depression also devastated independent ranchers throughout the Great Basin, resulting in the near complete takeover in the industry. The form of ranching was also altered by the Great Depression, with the decline in sheep stock being so great in the region that it never fully recovered and cattle ranching became the dominant form of livestock raising (Nicoletta 2000:26-32).

3.4.3 Cottage industries

The mostly arid and inhospitable regions of the Great Basin made cottage industry a difficult endeavor. The earliest attempts at this were conducted by early Mormon settlers who grew large numbers of sugar beets but had difficulty in their refinement. A more successfully cottage industry of these early Mormon settlers was the production of homespun wool from the sheep, of which "nearly every farmer possessed a few head" (McKnight 1992:372). Another industry undertaken for extra income by settlers in the Great Basin was logging in regions where wood was plentiful or the gathering of local sagebrush to fill the regions industrial needs, which grew throughout the latter half of the 19th century. By the turn of the 20th century, a new cottage industry had developed among ranchers to earn additional income – the rounding up of wild horses. At the time there were "more than a million" feral horses in the Great Basin, and they were transported to other regions, largely California, to be turned into chicken feed, cat or dog food, and as meat for European markets (McKnight 1992:370). Many of the regions industries relied on external processing and sale of the goods produced. This applied to "the greater part of the feeding and slaughtering of livestock, refining of ores, and marketing of both" (McKnight 1992:362). In the southern Great Basin, this meant exporting goods to California for processing, while the northern part of the region had stronger ties to Portland, Oregon (McKnight 1992:362-372, Riegel and Athearn 1971:529).

3.4.4 Typical farmstead components

A wide variety of construction materials were used in the Great Basin and largely depended on the local resources available combined with the degree with which outside materials could be transported. In the earliest periods of settlement, prior to the advent of the railroad, which allowed the

large scale transportation of construction materials, construction materials were entirely dependent on local availability. In the peripheral areas of the Great Basin, where wood was more plentiful, log construction techniques were employed. In southern Idaho, the log construction "continued to be important almost until World War II" (Noble 1984:159). Elsewhere in more dry and arid regions, adobe brick or locally quarried stone were the only locally available building materials. Adobe was used extensively by early Mormon settlers of the Great Basin, and was "the standard building material throughout most of the Mormon area until well into the 20th century" (Noble 1984:159). Stone buildings were largely found in areas throughout the Great Basin, which contained local quarries or bed rock deposits as well as the presence of stonemasons, who were largely European immigrants. When used in house construction, it usually resulted in walls "frequently between 16 and 22 inches thick." Once the railroad connected the region with the larger national economy, building materials like milled lumber and nails were more available in the region resulting in their increased use. The railroad also brought the large amount of cheap fuel required to allow local production of brick, with the first brick kilns being built in Utah in the 1860s. Brick soon became immensely popular in Mormon settlements, where it was frequently used as a facade for earlier adobe structures. Wood was used in a similar manner, with clapboard and weatherboard siding being applied to earlier adobe structures. Wood frame construction saw an increase following the advent of the railroad with "virtually none" being constructed in Mormon territory prior to the 1880s, as railroads began to be built more extensively throughout the region (Nicoletta 2000:43, Noble 1984:159-160).

In areas of Mormon settlement, which consist of a large portion of the Great Basin, there were several basic housing layout variations that evolved over time. The earliest form of housing constructed were largely one-room dwellings. The most rudimentary of these one-room dwellings were dugouts, which were dug roughly 3 or 4 ft below the surface in "nearly square rooms measuring somewhere between 12 and 18 ft" (Noble 1984:159). The upper walls were typically logs laid on top of the ground with a roof "composed of layers of light poles, willow branches and dirt" (Noble 1984:159). These early dugouts were built as temporary structures and would often be abandoned within a year or two of construction. Log cabins were typically one-room structures and were "similar in form" to eastern designs except for the use of dirt roofs in many instances. Except for regions with large amounts of wood, log cabins were not popular

among Mormons, who largely viewed them as "crude, rough and socially inferior" (Noble 1984:159). More permanent dwellings constructed by Mormon settlers used brick, adobe, stone, and lumber, and came in a variety of forms. The single room Mormon house was most commonly constructed out of brick or adobe and had typical dimensions of either 14x16 ft, of 15x17 ft. They had an inside gable chimney, often had a rear lean-to addition and had one ore one-and-a-half-story elevations. The most common form of vernacular housing used by the Mormons was the two-room house, which came in a wide variety. Allen G. Noble identified five distinct subtypes of the Mormon two-room house. Subtype one featured a one story elevation with a rectangular floor plan consisting of "two equal or nearly equal rooms, interior gable chimneys, one or two front doors, windows in the front wall but not elsewhere, and a general absence of decoration" (Noble 1984:161). This subtype was typically built in brick or adobe and were concentrated in the central and southern parts of Mormon territory. Subtype two was also a one story structure but unlike subtype one, had rooms of unequal size, with a central chimney and a centered front door. This subtype was common in central and northern Mormon regions and was built out of stone, brick or lumber, with many lumber versions of this subtype featuring a front porch covering the front facade. Subtype three was different from earlier subtypes in that they universally featured one-and-a-half-story elevations with "a straight flight of stairs" separating two rooms of equal size (Noble 1984:161). These were commonly built out of brick and had chimneys at each gabled end. Subtype four of the Mormon two-bedroom house was similar to subtype three except that they featured a row of half windows on the second half-story and were commonly constructed out of lumber frame of stone. This subtype was largely limited to northern areas of Mormon settlement. Subtype five was similar to subtype four except that this variation featured full sized windows that interrupted the eave line with "Dixie dormers," with brick and stone bin the most common construction medium used. In the later decades of the 19th century, building practices began to change as many new structures were constructed with two rooms, and two full stories, known as the I-houses [For more information on I-houses, see Ozark and Northeast Sections] (Noble 1984:159-162).

Housing varied based on economic level as well as from urban to rural settlement. In areas of Mormon settlement, brick was the most desired building material but depending on the location and wealth of the community,

adobe was often used well into the 20th century, although "it was abandoned in favor of kiln-dried brick as soon as it became economically possible" (Jackson 1980:91). Buildings within Mormon communities were also varied based on economic factors, with those of more means choosing to decorate their houses using the Greek Revival architectural style. This style was popular in the eastern United States from 1820 to 1860 but saw persistent use in Mormon regions until the end of the 19th century. The majority of the urban settlements in the Great Basin were the result of an industrial boom, whether it be mining or railroad construction. The earliest phase of these settlements featured temporary structures such as tents or hastily erected wooden buildings arranged in "haphazard street layouts" (Nicoletta 2000:12). As these towns became more established, they began to be organized on grid layouts, and buildings were mostly constructed out of wooden frame, often with false fronts to give the appearance of a larger structure (Nicoletta 2000:12, Jackson 1980:87-91).

Mormon settlement featured a variety of specific outbuildings that became typical of Mormon settlement throughout the Great Basin. The Mormon Thatched-Roof Cowshed was used throughout the Great Basin and featured four to eight posts and connecting beams that supported a roof of either flat or low pitch, which was covered in 1 to 1-4 ft of threshed loose straw. Often times these structures had open sides or were built along a board fence that provided shelter on one side. Occasionally logs, planks or railroad ties were used as side walls. Large log barns were also common throughout the Great Basin, consisting of both transverse and side-entry barns, with some resembling English barns of eastern North America. They were typically constructed with unhewn logs with both the roof and the gables being covered by vertically laid planks. These barns were primarily for feed storage however could also have "stabling space, calving pens, grain bins, and harness and implement rooms" (Noble 1984:163). Perhaps the outbuilding associated most with Mormon settlement were hay derricks. These were large structures, often with a pyramidal base and a boon, which allowed for hay to be raised and stacked using a system of rope and pulleys combined with horsepower. This came as alfalfa production increased during the latter 19th century and compact hay bales came into use, which required stacking to avoid spoilage. Mormons were also known for their crude form of fencing, which used scrap lumber or random bits of lumber, with some fences even incorporation "an old wagon wheel or hay rake" (Noble 1984:131). This practice is similar to the use of railroad ties as siding on Mormon Thatched-Roof cowsheds, showing the

utilitarian nature of much Mormon construction (Noble 1984:110-112,131,162-163, Noble and Cleek 1995:114-115,162).

Most of the settlement locations within the Great Basin were chosen based on the sited relationship with surrounding landscapes. For Mormon settlement, this meant choosing locations that were near running water that allowed for irrigation. Mormons settled in small but spread out agricultural communities rather than individual, isolated settlements that provided less protection against Native American attacks and less religious cohesion. They chose sites in valleys along rivers, near oases, or near natural springs. These Mormon agricultural communities were centered around a "village common or green" much like early New England settlements from which many early Mormons left (Schlebecker 1975:146). These settlements included large lots, "extraordinarily wide" streets, a network of irrigation canals running along the streets, and barns and outbuildings located within the settlement (McKnight 1992:374). Other settlement patterns similarly were based on environmental factors, like the Mormon agricultural communities. Mining towns were often located as close as possible to mines. Due to ledges of ore being mostly discovered and mined along mountainsides, mining towns "often grew up nearby along steep inclines of narrow valleys" (Nicoletta 2000:13). As a result roads often had steep grades, as terrain played little role in the application of grid layouts for 19th and early 20th century mining towns (McKnight 1992:369-374, Nicoletta 2000:13,24, Noble 1984:157-158, Schlebecker 1975:146).

3.5 Region 4: Rocky Mountains

3.5.1 Geography

The Rocky Mountain Region encompasses the extent of the Rocky Mountain range stretching from the Yukon Territory in Canada southward to northern New Mexico. In the United States, the Rocky Mountains cover the northern half of Idaho, the western half of Montana, Wyoming and Colorado, and the far eastern half of Utah. The mountains rise abruptly as they extend north from the flatlands of New Mexico, and are marked by steep slopes and high elevations, with the tallest peak located in Colorado reaching 14,440 ft (McKnight 1992:335). To the east of the Rocky Mountain Region lies the Great Plains Region, the Intermontane region lies to the southwest and the North Pacific Coast region lies to the west. Despite its name, the Rocky Mountain Region is not entirely mountainous; there

are many valleys, plateaus and basins, sometimes referred to as "parks" located within the region that are relatively flat and provide the region's agricultural and ranching base (Wilson 1984:15-18, McKnight 1992:335).

Except for the parks and basins, the Rocky Mountain Region is forested with predominantly coniferous trees. The parks and basins are largely treeless, except for riparian hardwoods growing along streams and rivers, and are typically covered with sagebrush and grass. Many of the mountains in the region will have a double tree line, one at a lower elevation that marks the line below which trees do not grow due to aridity, and "one at a higher elevation, above which trees cannot survive because of low temperatures, high wind, and short growing season." (McKnight 1992:342). Vertical zonation is common in the vegetation patterns in the Rocky Mountains resulting in significant variations within short horizontal distances due to changes in altitude (McKnight 1992:341). Soils throughout the Rocky Mountains are shallow and there are extensive areas of bare rock; there is a considerable amount of mineral wealth located throughout the region (Wilson 1984:15-18).

The Rocky Mountain Region experiences semiarid, dry summers with abundant sunshine and only brief rainfall that is quickly evaporated by wind and low humidity. In the high elevations, the western slopes may experience considerable rainfall in the summer, but it evaporates before it reaches the parks and basins down below, resulting in an "almost desert like condition" (McKnight 1992:341). The winters have low temperatures and are relatively humid due to snow fall, with snowpack covering much of the area, particularly at higher elevations, for an extended winter season. Again, the western facing slopes tend to receive more snow than the eastern facing slopes. The southern facing slopes tend to receive more sunlight than the northern facing slopes, which results in faster evaporation of any moisture that does occur (McKnight 1992:341-342). The deep snowpack and snowy slopes feed many major streams in North America, and with the headwaters of major streams such as the Rio Grande, Pecos, Arkansas, Platt, Yellowstone, Missouri, Columbia, Snake, Green and Colorado located in the Rocky Mountains, it is sometimes referred to as the "mother of rivers" (McKnight 1992:350-351).

The Rocky Mountain Region is not entirely homogenous, however, and does experience variation in climate, vegetation, and topography throughout its several subregions. These subregions include the Southern Rockies,

the Colorado Plateau, the Middle Rockies, the Wyoming Basin, and the Northern Rockies, and are briefly described below:

3.5.1.1 Southern Rockies

The Southern Rockies extend from north central New Mexico up through central Colorado into southern Wyoming. The highest point in the Rocky Mountains is located within the Southern Rockies with elevations reaching over 14,000 ft and this area has long been described as a barrier to transportation due to the sharp, steep ranges. The historic record notes that "pioneers studiously circumnavigated the massive Southern Rockies: the Oregon Trail went around the north end while the Santa Fe Trail passed around the south" (Trimble 1990:19). The region has a "severe, mid-latitude, humid continental climate" with warm to cool summers, severe winters, no dry season, and experiences frost from 215 to 340 days each year (Wiken et al. 2011:49-50). The average annual rainfall is 23.14 in., with most precipitation falling in the high elevations, and the annual temperature ranges from 24.8 °F in higher elevations to 51.8 °F in the lower elevations. Coniferous forests are predominant in the Southern Rockies, along with streams, rivers, alpine lakes and reservoirs. The soil is not conducive to farming, but mining, ranching and livestock grazing do occur in the area (Wiken et al. 2011:49-50).

3.5.1.2 Colorado Plateaus

The Colorado Plateaus are located just west of the Southern Rockies and span western Colorado and eastern Utah, east of the Wasatch Mountains. The area has a rugged tableland topography with side walls that range from 300 to 600 meters in vertical relief, and elevations ranging from 2,953 ft to 9,843 ft. The area has a dry, mid-latitude steppe climate with hot, low humidity summers, and cool to cold dry winters. The average temperature ranges from 41 to 51 °F, with an average rainfall of 11.73 in., mostly in the high elevations, and 50 to 220 days without frost annually (Wiken et al. 2011:89-90). Various grasses grow throughout the Colorado Plateaus both in the low and higher elevations, with trees also growing in the higher elevations, which supports ranching and livestock grazing. There are limited streams and very few lakes in the area, which support limited irrigated agriculture growing pinto beans, hay, alfalfa, winter wheat and fruit orchards (Wiken et al. 2011:89-90).

3.5.1.3 Middle Rockies

The Middle Rockies span a north-south line from south-central Utah north to the Montana-Wyoming-Idaho border region, covering areas of eastern Idaho, western Wyoming, and southwestern Montana. The Middle Rockies is made up of several high alpine glaciated mountains, plateaus, and basins and contains some of the most rugged terrain in the Rocky Mountains, characterized by steep slopes and high relief. It has a severe, mid-latitude, humid continental climate, with subarctic conditions in the higher elevations, and has warm to cool summers and severe winters. Annual temperature varies by elevation and ranges from an average of 23 °F to 46.4 °F, with annual rainfall around 24.5 in., annual snowfall exceeding 20 ft, and 25 to 140 frost-free days (Wilson 1984:15-18, Wiken et al. 2011:46-47). Coniferous trees are widespread with alpine grasslands and meadows located throughout the area, and streams, rivers, and lakes are abundant. "The Middle Rockies has the greatest extent of population of all the Rockies," with ranching, summer livestock grazing and minor cropland in the valleys (mostly hay, alfalfa and barley for winter livestock feed) (Wilson 1984:15-18, Wiken et al. 2011:46-47).

3.5.1.4 Wyoming Basin

The Wyoming Basin occupies most of central and west Wyoming, between the Middle and Southern Rockies, and is the most "extensive non-mountainous area" in the Rocky Mountains (McKnight 1992:335). The Wyoming Basin is essentially an extension of the Great Plains with dry, mid-latitude steppe and desert climates that provide warm to hot summers and cold winters, an annual temperature range of 32 °F to 46.4 °F, 11.7 in. of annual rainfall, and a growing season ranging from 30 to 130 days (McKnight 1992:335). The area is dominated by grasslands and shrub lands and has intermittent streams that support limited livestock grazing and small areas of irrigated agriculture growing hay, alfalfa, barley and wheat (Wiken et al. 2011:88).

3.5.1.5 Northern Rockies

The Northern Rockies span western Montana and central and northern Idaho, reaching up into Canada, and are referred to as the "Broad Valley Rockies" due to the spacious intermontane valleys that occur throughout the ridge and valley topography (McKnight 1992:339). The mountains are rugged and not easily traversed, although their elevation is lower than the

Middle and Southern Rockies. The area has a severe, mid-latitude, slightly continental climate with dry, warm summers and cold, snowy winters; average annual temperatures range from 28 °F to 48 °F, average annual rainfall ranges from 34.8 to 47.2 in., with more precipitation occurring in higher elevations, and the frost-free period ranges from 30 to 160 days (Wiken et al. 2011:42-43,49-50). Coniferous trees predominate in the area, with shrubs and grasses growing in deep valleys, and streams, rivers and lakes occurring throughout the region. Localized agriculture and livestock ranching are limited with forestry, logging, and mining being more predominant land uses (Wiken et al. 2011:42-43,49-50).

3.5.2 Settlement history

Characterized by few resources and harsh climates, the Rocky Mountain Region was viewed as inhospitable by Native Americans and early European Americans alike. The Spaniards were the first Europeans to reach the Rocky Mountains, moving into the extreme southern parts of the mountains in the late 16th century, followed by French fur traders and government sponsored explorers who moved into the region in the 1700s (McKnight 1992:343). The most famous expedition into the area was by Lewis and Clark in 1803-04, who crossed the Northern Rockies on the way to Oregon. The abundant supply of furs throughout the Rocky Mountains attracted fur traders throughout the 1800s, but did not lead to permanent settlements except for a few scattered forts and trading posts. Initial settlers passed through the Rocky Mountains to get to the gold rush in California in 1849, or the fertile farming valleys in Oregon. It was not until 1858 and 1859 when gold was discovered along the base of the Southern Rockies that settlers began flocking to the region.

The mining boom that ensued in the Rocky Mountains brought large numbers of men to the area, with an estimated 100,000 prospectors rushing into Colorado in the Central Rockies in 1859 (Riegel and Athearn 1971:390-392). From 1858 to the early 1870s, “more people had settled in the mountain country than in all its previous history,” and “practically every part of the region was prospected” with most of the valuable mineral deposits being located in the Southern Rockies (McKnight 1992:344-345). Gold and silver discoveries throughout the Rocky Mountain Region led to “boom towns” scattered throughout the area to support each new mineral find. Many of the mining booms were short lived as mines were tapped out and depleted, and many boom towns turned to ghost towns. The mining boom did, however, pave the way for permanent settlement in the Rocky Mountains as the

"merchants, farmers, ranchers and lumbermen [who] rushed to fill the needs of miners" stayed behind after the miners moved on (Rueth et al. 2002:85). Likewise, many of the prospectors who came to the area switched to farming and ranching when mining did not pan out.

While the mining boom led to a transient population, homesteading stabilized the population (Attebury 1976:37). "Survey parties mapped the interior of the Rockies in detail during the 1860s and 1870s as a prelude to homesteading," which the U.S. and Canadian governments encouraged in the Rocky Mountains (Travis, Theobold, and Fagre 2002:5). The first land office in the region was opened in 1869 in Utah, and in combination with the first railroad and telegraph through the area, "brought a mad rush of settlers" and an increase in the population moving into the Rocky Mountains in the later 1800s (Riegel and Athearn 1971:524-525). Even though the railroad and the telegraph helped open up the Rocky Mountains to further and expanded settlement, the rugged terrain of the Rockies meant that many areas were better connected back to the East Coast than they were with each other (Meinig 1972:172-173). It also meant that most emigration to the area was focused around urban centers. For those settlers who took advantage of the Homestead Act of 1862 to procure land in the mountain parks and valleys for farming and ranching, the inadequate rainfall and environmental conditions resulted in roughly two-thirds of homesteaders abandoning their claims before title could be awarded (Wilson 1984:26-27). Irrigation agriculture was strongly promoted and used to grow fruit orchards, beet sugar fields, and hay as the predominant crops (Meinig 1972:165-166, Strong 1936:407).

Crop growing was limited in the Rocky Mountains due to a short growing season and poor terrain. Subsistence farm plots primarily provided feed for livestock during the winter months. Ranching and livestock were common with beef and sheep ranching scattered throughout the region (McKnight 1992:348-349). Cattle grazing was popular early on to supply the mining boom towns, but overgrazing combined with severe weather in the 1880s saw the collapse of the "cow bonanza" and cattle were replaced by sheep, which were better suited to the terrain and hard grasses (Wilson 1984:28). Sheep farming became popular in the Rocky Mountains and involved herding flocks to good pastures, protecting them from the elements and wild animals, dipping and shearing, with wool as the product. By the end of the 19th century, there were more sheep than cattle in Wyoming, Montana, Colorado, Utah, California, New Mexico, and Texas. "Wyoming, the traditional

home of the little doggie, discovered that although it could boast in 1886 that cattle outnumbered sheep 3 to 1, in 1900 sheep outnumbered cattle by an impressive ratio of 8 to 1" (Riegel and Athearn 1971:489).

Timber was also a significant industry in the Rocky Mountains, with large scale commercial forestry taking hold in the Middle and Northern Rockies and continuing into the early decades of the 1900s (McKnight 1992:348). Establishment of railroad and feeder lines throughout many areas of the Rockies supported the growth of the timber industry and by the early 1900s, 20% to 25% of annual timber production in the United States came from the Rocky Mountain Region (Hessburg and Agee 2003:38). The railroad connections to the East coast also stimulated growth in the mining, farming and cattle industries in the region. Mineral discoveries in the 1890s in Colorado led to another gold rush that lasted until the 1930s, and corporate mining began taking over in Montana and other areas of the Northern Rockies at the turn of the century (Riegel and Athearn 1971:390-392,396-398). There was a "homestead-ranching era" from 1900 through the 1920s in the Northern Rockies, built largely on the success of sheep farming (Attebury 1976:37). The whole-scale degradation that logging, grazing, mining and farming had on the Rocky Mountains led the U.S. Congress, beginning in the 1890s, to restrict homesteading and reserve more than half the land area of the Rocky Mountains under federal administration. Several national parks were established, including Yellowstone National Park as early as 1872, numerous forest reserves were established in the 1890s, and large additional land designations were made in the early 1900s (Travis, Theobold, and Fagre 2002:5, McKnight 1992:344-345). Tourism to the region was the significant result of preserving the area in national parks and federal lands, and became a major industry as well.

Settlement throughout the Rockies was limited and scattered through much of the 1800s, with Colorado being the last area of the West to be settled. By the 1890s, population density varied between 1 and 5 people per square mile, and the overwhelming majority were men (Riegel and Athearn 1971:532). The earliest European-American settlers to the area were the Mormons who began settling in the Great Salt Lake area in 1847 and spread out into the surrounding mountains as well. Subsequent settlers were primarily European immigrants, although the Chinese who helped to build the transcontinental railroad also settled in the area. Christian missionaries of both Catholic and Protestant faiths were among the

first settlers and established faith communities throughout the region (New World Encyclopedia 2019).

3.5.3 Cottage industries

In the early days of settlement in the Rocky Mountains, homesteaders comprised up to 75% of timber crews as a way to supplement their incomes (Wilson 1984:31). While this practice was widespread, it did not require the farmer to augment their homestead to accommodate the practice.

Many ranchers capitalized on the isolation and grand scenery that is abundant in the Rocky Mountains and supplemented ranch income through the "Dude Ranch." A Dude Ranch was defined as any western ranch that charged guests for room and board, and in exchange, the guests were treated to the western ranch experience (Johnson 2012:441). The first Dude Ranch was started in the late 1880s in North Dakota, and the concept began to take off in the Rocky Mountain Region in the 1910s and 1920s; by 1935, there were 356 Dude Ranches visited by thousands of "Dudes" annually (Johnson 2012:438). "World War I, the Great Depression, and the rapid pace of urban growth in the East all contributed to the symbolic value of the dude ranch as geographically remote, old-fashioned, and distinctly western" (Johnson 2012:442-443). Faced with financial hardship from faltering markets, extreme weather, and other forces such as World Wars, western ranchers turned to Dude Ranches as an opportunity to leverage the growing tourism industry and romantic conceptualizations of the rugged west and American cowboy ideal. Established Dude Ranches would often construct separate cabins and support structures such as privies, additional horse pens, stables, and riding arenas, and camp grounds/entertainment areas to host the visitors (Dude Ranch Foundation 2020, Dude Rancher's Association 2020).

3.5.4 Typical farmstead components

The first structures built by farming and ranching settlers in the Rocky Mountains were typically temporary log cabins put in place until a larger, more permanent house could be built (Wilson 1984:28). Gardens and chicken houses often accompanied the early farms (Riegel and Athearn 1971:532). Not to be confused with the mining cabins that were erected in the region during the settlement period and intended to house one or more men, homestead cabins were typically larger than mining cabins, as

they were intended to house families. Early homestead cabins would often have loft sleeping areas, and outbuildings to support subsistence farming activities such as animal shelters and hay storage. The cabins were made of log timbers cut from local lodgepole pine, Douglas fir and quaking aspen strands. Stone and lumber were rarely found and sawed lumber was used only in roofing.

Log construction during this time period often used chinking and daubing of roughhewn logs (exterior daubs of mud, or cement or mortar daub, with interior chinking of poles quartered into wedges and nailed in place) (Attebury 1976:39). Local materials were often used in the first buildings, such as "wooden pegs instead of iron nails, leather instead of metal door hinges, and an absence of window glass," (Wilson 1984:28-29). Roofing was commonly from poles, lumber and corrugated iron with dirt layers, tarpaper and shingles to cover and insulate. Some roofs had two layers with a dirt insulating layer in between. Mostly, roofs had shallow roof angles, "generally from five to twenty-five degrees" (Attebury 1976:39). Dwellings were relatively small ranging from 12x10 ft to 32x15 ft, square or rectangular, with no fireplaces or chimneys as stoves were imported by earliest settlers (Attebury 1976:40). A "metal drum or even rolled sheets of metal propped upon bricks, a 'Queen Anne stove,' was used as a substitute for a manufactured iron stove in some areas" (Wilson 1984:28-29). This traditional style of log construction was usually a "first generation effort" and was later replaced; but the early log cabins were kept and used for storage or animal shelters once the family built a more permanent structure (Wilson 1984:28, Attebury 1976:40).

By the end of the late 1800s, a uniquely western type of log cabin emerged in the Rocky Mountains, commonly referred to as the Rocky Mountain Cabin. The Rocky Mountain Cabin had front facing gables that allowed easier access to the cabin door during periods of heavy snowfall and protected against snow drifting against or sliding off the roof (Wilson 1984:34). Roof lines were lower to allow snow to remain on the roof for insulation. The cabin would not have a chimney or fireplace, but settlers continued to use iron stoves instead, and therefore the door was located off-center to allow for the iron stove to be near the door for easy access to the woodpile. Some cabins were partially dug out of the terrain, which allowed for insulation and used the uneven terrain. The most distinguishing feature of the Rocky Mountain Cabin, however, was the elongated roof extension, which extended an average of 50%, and sometimes up to 100% beyond the front of

the cabin and required vertical post support structures at the end of it (Wilson 1984:34). Archaeological evidence suggested that this space was used as a living space where people would sleep in summer, and store wood and materials in winter (Wilson 1984:36-37). "This exterior room was in most cases fully floored and on the same level as the inner room (there are examples where both had dirt floors). Additional space for the outer room could be made by adding onto it a tent extension" (Wilson 1984:37).

Later variations on log cabin building in the Rocky Mountains included building two-room dwellings divided by a partition in the middle. "One door and one window gave outside access to each room, both front and rear, giving a symmetrical facade with two doors, two windows, and a simple gable running the full length of the house" (Attebury 1976:43). The architecture of the Rocky Mountain Cabin and dwelling remained fairly consistent through the early decades of the 20th century, although building materials may have varied slightly between different areas. For example, log structures in Wyoming were found to have round logs chinked with split poles, notched tenon joints, mud daubing and purlin gable roofs (Attebury 1976:43). By the 1930s, according to the 1934 U.S. Department of Agriculture, Bureau of Home Economics farm house survey, log construction began to give way to frame construction as the standard construction method for farmhouses in the Rocky Mountains. However, the Rocky Mountains still had the highest concentration of log construction in the country, a trend that continued almost until World War II (Noble 2000:66-67, Noble 1983:57).

The layout of the Rocky Mountain ranch farmstead tended toward minimalism. Access to water was a critical factor in site selection for the homestead. Livestock farms would only have buildings necessary for sheltering animals during a cold snap, would store feedstock in the open, and used simple storage bins for grain (Chase 1917:36). The main residence and support structures such as barns/animal shelters, and storehouses were grouped together, and even in some cases followed the New England style of being connected to allow for the homesteader to reach and care for the animals during winter blizzards (Strong 1936:407). Ranch farmsteads often had orchards, gardens, and assorted support structures such as chicken houses, well house, corrals and/or bunk houses if ranch hands were needed. Toward the end of the 1800s, windmills and irrigation systems started to appear on farmsteads to support both irrigated agriculture and livestock.

Like the architectural style of the Rocky Mountain Cabin, ranch farmstead layouts also remained relatively consistent over time. Into the early decades of the 1900s, ranches retained the compact grouping of a central complex of buildings although additional support buildings might be added. The complex might include a main residence, bunk house, cook house, barns for livestock, calving and horses, corrals, fenced pastures, feedlots, blacksmith and/or machine shops, storage structures for feed, irrigation infrastructure, gardens, orchards, and cellars or milk houses (Ward 1993). After tick infestations became a problem in the 1880s, many ranches also constructed "dipping vats" for treating cattle and killing ticks. Dipping vats were constructed out of either wood or concrete, could hold up to 2,088 gallons of solution, and had wooden chutes to guide the cattle into the vat, and a concrete pad slanted back toward the vat for the cattle to exit onto. Small drainage ponds might also be placed near the vats for the solution to be disposed of away from other water sources to avoid contamination (Pasquill 2012:25). As dipping techniques expanded to handle other applications for insecticide and medicine, the dipping vats were altered to accommodate other animals such as sheep and hogs (Pasquill 2012:369).

The compact layout of the range livestock farmstead continued into the 1940s even though the size of the ranch grew immensely to include large grazing lands that could feed and accommodate large livestock herds. The farmhouse continued to be modest, usually one-story with no basement. The farmstead would often have one or more garages, an orchard, a distinct house yard and a distinct cattle yard (Trewartha 1948:215). Farmsteads were typically set back from the roadway or public highway, and had numerous small-sized outbuildings, including granaries, windmills, cattle yards, horse barns, and crib barns (Trewartha 1948:215, Noble and Cleek 1995:193-200). While machine sheds, corncribs and silos are uncommon in the area, hay stackers, hay derricks, log-and-choke fences, and jack fences are common throughout the Rocky Mountains (Trewartha 1948:215, Noble and Cleek 1995:193-200). Also common, particularly in the Northern Rockies, was the Mountain Horse Barn—a rectangular structure about 28 by 40 ft, traditionally made of round log construction (sometimes with hewn log and framed wood) and with a gable or gambrel wooden roof. The main door of the Mountain Horse Barn was centered in the gabled end under a large hay door with a hay pole or hay hood, and typically had 2 to 5 small windows in the eave wall (Noble and Cleek 1995:122-124).

3.6 Region 5: Southwest

3.6.1 Geography

The Southwest is a largely arid region that encompasses all of Arizona and New Mexico, as well a southern Utah and western Texas. The region is a mixture of ecological regions with deserts, plains, and mountains being the typical land forms. Water is usually scarce in this region except in close proximity to some of the larger rivers that cross through the region such as the Colorado River in the north and west and the Rio Grande in the east and south.

3.6.1.1 Plateau subregion

The Plateau Subregion of the Southwest encompasses the northern half of Arizona, the southern third of Utah and the northwestern quadrant of New Mexico, forming the area between the Southern Rockies subregion to the northeast and Upper Gila Mountains subregion to the south. The terrain in this subregion includes plateaus and mesas, cliffs, deep canyons and some irregular plains with elevations ranging from 3,000 ft to over 10,000 ft above sea level and local relief ranging from a few feet in the plains to nearly 1,000 ft in other areas. Water is scarce in this subregion with perennial steams originating in adjacent mountain regions, but these streams are "mostly ephemeral and intermittent" (Commission for Economic Cooperation 2011:90). There are several larger rivers that cross the subregion, however, including the Colorado River, the San Juan River and the Rio Grande. The geological makeup is quite diverse, with examples from "the Earth's entire geological timespan," although the predominant rock type being of the sedimentary variety and including sandstone, shale, mudstone and dolomite, in addition to large amounts of volcanic rock including basalt and andesite (Commission for Economic Cooperation 2011:90). The soils are mostly Entisols and Aridisols with largely mesic and frigid soil temperature regimes and aridic and ustic soil moisture regimes. The vegetation found in the Plateau Subregion varies depending on the elevation, with lower, arid elevations having shadescale, fourwing saltbush, greasewood, galleta grass, and blue and black gramas. The higher elevations receive more moisture, which allows the growth of pinyon-juniper woodlands, with the northeast of this subregion containing big sagebrush, rabbitbrush, winterfat, western wheatgrass and blue grama. Due to the arid nature of this subregion, it is not suitable to any agricultural ventures without the use of intensive irrigation except for livestock ranching and

grazing. The Plateaus subregion has "dry, mid-latitude steppe, and desert climates," leading to dry hot summers and dry cool winters with mean annual temperatures of 52 °F. The mean annual precipitation is 11.5 in. annually but ranges between 5 and 15 in. depending on the elevation, with the higher areas receiving more rainfall (Commission for Economic Cooperation 2011:89-90, USEPA 2013:5).

3.6.1.2 Southern Rockies subregion

The Southern Rockies only extend slightly into the Southwest region, with the southern reaches extending into north-central New Mexico from Colorado in two parts on either side of the Rio Grande southward as far as Santa Fe. The subregion is known for its high incline, and high elevation mountains that range from 5,000 ft to nearly 14,400 ft above sea level formed in linear ranges as well as complicated masses of peaks. The subregion has many perennial streams and rivers of medium to high gradient, as well as several alpine lakes. The geology of the Southern Rockies has a mixture of Precambrian metasedimentary, metavolcanic, and intrusive rocks, Tertiary and Cretaceous sedimentary rocks, and Tertiary volcanic rocks. The subregion contains Alfisols, Entisols, and Mollisols, with largely frigid and cryic soil temperature regimes and udic and ustic soil moisture regimes. The vegetation of this region "follows a pattern of elevation banding," with different types of plants at different levels (USEPA 2013:5). The lowest elevations are mostly covered in grass or shrubs, including sagebrush, mount mahogany, pinyon pine, juniper, and scattered Gambel oak woodlands. The low to middle elevation is covered with juniper-oak woodlands, ponderosa pines, Douglas firs, and aspen trees. The middle to high elevations are mostly forests of Englemann spruce, subalpine fir, and aspen with the highest elevations having only shrubs, cushion plants, sedges and krummholz vegetation of stunted trees. Due to the subregion's mountainous terrain, agriculture is largely unsuitable to this region with the exception of livestock grazing at lower elevations. The Southern Rockies has a "severe, mid-latitude, humid continental climate" with some areas of high elevations reaching a "subarctic climate" (Commission for Economic Cooperation 2011:49). The summers are warm to cool and winters are severe, with mean annual temperatures being roughly 25 °F in the areas with higher elevation and roughly 52 °F in lower regions. The mean annual rainfall in the subregion is 23 in. annually but ranges from 10 to 69 in. annually in regions of lower and higher elevations (Commission for Economic Cooperation 2011:49, USEPA 2013:5).

3.6.1.3 Upper Gila Mountains subregion

The main portion of the Upper Gila Mountains subregion extends from northeastern Arizona, southeast through the middle of the state and into New Mexico, although pockets of the subregion are present to the north in the Plateaus subregion and to the east in the Basin and Range Subregion. The terrain is comprised of mostly steep foothills and mountains with some deeply dissected plateaus. Elevations range from 4,250 ft above sea level to over 12,500 ft. The Upper Gila Mountains subregion has a high density of stream, with many being ephemeral and intermittent although there are some perennial streams with a moderate to high gradient found. There are several lakes and small ponds although not as many as in the Southern Rockies. The geology of the region is diverse, with Paleozoic sedimentary rocks of sandstone, shale, and limestone, Tertiary volcanic rocks, and Precambrian igneous and metamorphic rocks all being common. Mollisols, Alfisols, Aridisols, and Inceptisols are all common, with soil temperature regimes mostly being mesic and frigid and soil regimes being largely ustic and aridic. The vegetation differs by elevation, like that of the Southern Rockies, with chaparral being commonly found at lower elevations, pinyon-juniper and oak woodlands at lower and middle elevations, and ponderosa pine forests of varying density with Douglas fir, southwestern white pine, white fir, and aspen at higher elevations. As the region is largely forested, it is not suitable to agricultural activity with the exception of livestock ranching and grazing. The climate is variable in this region depending on the elevation, with higher altitudes having severe alpine climates while lower altitudes being closer to mid-latitude steppe or desert climates. In general, the subregion has warm to hot summers and mild winters, with mean annual temperatures being roughly 37 °F at higher altitudes and 66 °F in lower lying valleys. The mean annual precipitation is roughly 19 in. per year, ranging from as low as 10 and nearly 40 in. on some summits, with more than half of the yearly precipitation falling between July and September (Commission for Economic Cooperation 2011:100-101, USEPA 2013:6).

3.6.1.4 Southwestern Great Plains subregion

The Southwestern Great Plains Subregion covers the eastern third of the state of New Mexico and borders the Southern Rockies subregion and the Southwest Basin and Range subregion. The terrain in this region features "elevated tablelands with red-hued canyons, mesas, badlands, gorges, and dissected river breaks" on a mostly broad rolling plain, with elevations

ranging from 1200 ft above sea level to 6600 ft (Commission for Economic Cooperation 2011:82). Water is scarce in this region, with mostly intermittent and ephemeral streams, although there several perennial rivers that run through the region that originate from the Southern Rockies, like the Arkansas, Canadian, and Pecos Rivers. The geological makeup of the subregion features mostly Tertiary and Cretaceous sandstones, siltstones, claystones, and caliche layers. The soils include Alfisols, Entisols, Aridisols, and Mollisols, with a mesic soil temperature regime in the north and a thermic regime in the south, and mostly ustic and aridic soil moisture regimes. The natural vegetation in this subregion features "grama-buffalo grass, with some mesquite buffalo grass in the southeast, and juniper-scrub oak-midgrass savanna on escarpment bluffs and shinnery (midgrass prairie with open low shrubs) along the Canadian River" (USEPA 2013:6). Much of the subregion is suited to only livestock ranching or grazing, but some portions are suited for cropland, with hay, alfalfa, corn, grain sorghum and wheat being currently cultivated in the region. The Southwest Great Plains subregion has a dry mid-latitude steppe climate resulting in hot summers and cool winters, with the average mean temperature ranging from 48 to 59 °F. The mean annual precipitation is roughly 17.5 in. per year, ranging from 10 to 28 in. (Commission for Economic Cooperation 2011:80-82, USEPA 2013:6).

3.6.1.5 Southwestern Basin and Range subregion

The Southwestern Basin and Range Subregion is located south of the Upper Gila Mountains subregion southwest of the Southwestern Great Plains Subregion, covering the bottom thirds of Arizona and New Mexico as well portions of Texas west of the Pecos River. The terrain of this region contains fault-block mountain ranges, scattered low mountains, isolated mesas, alluvial fans and alluvial valleys, with "a pattern of alternating mountains and valleys" that gets less pronounced towards the eastern end of the subregion. Elevations range from sea level to over 4,600 ft above sea level. There are few surface water sources in the region with most streams being intermittent and ephemeral, with several large rivers such as the Colorado River, Rio Grande, and the Pecos Rivers, which originate in other regions. The geological makeup of the region features Paleozoic sedimentary layers, some Precambrian plutonic granite, and some Tertiary volcanic rocks. The soils of this subregion are largely Aridisols and Entisols with hyperthermic soil temperatures and very aridic soil moisture regimes. The natural vegetation in this subregion is largely desert grassland and arid shrubland, in-

cluding plants like creostebush, mesquite, acacia, yuccas, agave, and various cactuses. At higher elevations, along the ridges, there are islands of oak, juniper and pinyon pine woodland. Areas of agricultural production are found along rivers or in well irrigated regions and includes the production of alfalfa, hay, onions, chili peppers, cotton, pecans, melons, grain sorghum, and citrus fruits. The Southwest Basin and Range subregion has a dry, subtropical desert climate with hot summers and mild winters, with mean annual temperatures ranging from 63 to 77 °F. The mean annual rainfall for the subregion is 12.5 in. annually, with the driest areas having a mean as low as 4 in. (Commission for Economic Cooperation 2011:92-97, USEPA 2013:6,16).

3.6.2 Settlement history

Once the Spanish Empire established a foothold on mainland North America with the conquest of Mexico by Hernan Cortez from 1519-1521, European contact with the Southwest became inevitable. Some of the earliest documented Europeans in the Southwest were likely the survivors of the ill-fated expedition led by Panfilo de Narváez in 1527. With the initial goals of establishing settlements in Florida and conquest of the natives, the expedition soon stalled and the members made for Mexico, but ended up stranded near modern day Galveston, Texas before four surviving members made it to Mexico City in 1536. Along with them came stories of cities of gold in the land to the north of Mexico. This generated interest in the region, and in 1540, Francisco Vasquez de Coronado led an expedition of 300 Spaniards and over 1,000 native allies from Mexico in search of the apocryphal "Seven Cities of Cibola" (Collins 1996:8). The main expedition traveled north through the Sonoran desert into the southeastern corner of modern day Arizona before turning eastward at the Zuni River, past the present day sites of Albuquerque and Santa Fe, before heading further northeast, possibly reaching as far as central Kansas. Smaller expeditions were sent west in the region of the modern Mexico-Arizona border to the site of present day Yuma on the Colorado River, northwest through Arizona to the Grand Canyon, and south along the Rio Grande in New Mexico (Collins 1996:8, Cordell 1978:111-112, Heilen and Vanderpot 2013:218).

Spain saw the Coronado Expedition less as a successful exploration of their northern frontier colonial lands, and more as a fruitless treasure hunt, leading to a period of disinterest in the far northern extremes. This period of Spanish apathy towards the Southwest came to an end at the turn of the 17th century, when Juan de Oñate, an early Criollo (someone of

pure Spanish descent born in the New World), led the successful conquest of New Mexico from 1598-1599. He traveled northward through the desert and reached the Rio Grande at modern day El Paso and continued northward along the river, subjugating the Pueblo villages along the way. Oñate became the first Governor of Nuevo Mexico and established the newly created province's first capital in 1598 at San Gabriel Yunque, on the upper Rio Grande near modern day Ohkay Owingeh Pueblo, New Mexico. The second governor, Don Pedro de Peralta made the decision to relocate the capital to the new city of Santa Fe, established in 1610. Throughout the early to mid-1600s, settlement in the Southwest was mostly limited to the region north of Santa Fe and was limited to large land holdings or haciendas located close to Native American settlements for use as labor in the Spanish Colonial Encomienda System. By 1680, Santa Fe was the only actual Spanish community, and the whole Upper Rio Grande Basin had only approximately 3,000 residents who were "culturally Spanish" (Cordell 1978:115). While large-scale settlement was limited, there were many missions founded during this period in an attempt to convert the local peoples, with missions spreading into northeast Arizona by 1629 (Collins 1996:8, Cordell 1978:111-115 Gilpin 1998:1-3).

In 1680, the Native Americans of Nuevo Mexico revolted against both the Encomienda system as well as the forced conversion to Catholicism, and the Spanish settlers were forced to flee southward, with the small village of El Paso serving as the temporary capital of the Nuevo Mexico through the remainder of the Pueblo Revolt. It would take a full 12 years until the Southwest was brought back under the control of the Spanish, by Diego de Vargas in 1692. Following reconquest, settlement and mission work resumed almost immediately, with the first missions being established in southern Arizona along the Gila River. Arizona saw its first non-missionary settlers at the beginning of the 1700s, although it was mostly in the Santa Cruz River Valley. In New Mexico, resettlement of the lands vacated was the first priority, more settlers led to new settlements, such as the "Villa de Albuquerque," which was founded in 1706 along the Rio Grande, two miles from the site of modern day Albuquerque (Dodge 2012:3). This period of settlement differed from the pre-revolt era of settlement in that no encomiendas were resumed, and there was a general trend "away from larger haciendas in favor of smaller land holdings," which usually resulted in dispersed communities, sometimes centered around a focal point like a plaza or church but most often simply scattered ranchos (Cordell

1978:118). These early Spanish settlers in the Southwest were either Mestizos (meaning a mix of Spanish and Native ancestry) or Hispanicized Indians, both from Mexico, while most officials or those with large haciendas were usually Criollos instead of Peninsulares who were born in Spain. In the latter half of the 18th century, this new way of settlement became threatened by increased raids by the Comanche, who now posed a far greater risk being mounted on horseback, a result of horses freed during the Pueblo Revolt. Raiding caused settlers to form closer and more defensible settlements, usually meaning a central defensive plaza. Several presidios or military outposts were founded in the region during this time to shore up defense of the frontier, such as founding of Presidio San Augustin del Tucson in 1776, soon leading to a settlement springing up near the site that would grow to become the modern city of Tucson, Arizona. As Spain's imperial power was waning globally, this decline was strongly felt in its frontier regions of the Southwest, which were under increasing assault. Spanish rule in the region, however, would not be toppled by Native American raiding, but instead by the Mexicans themselves, who revolted in 1810 and finally gained independence in 1821 following the Treaty of Cordova. Soon however, the newly independent nation was struggling with a depression and internal strife. As a result, the Southwest region, now under Mexican sovereignty, saw the further deterioration of military control of the frontier, with Native Americans raids becoming even more frequent, often raiding with impunity. The raiding was substantial enough that it "forced the abandonment of numerous communities and the consolidation of some settlements." (Cordell 1978:119). More recently settled areas often were less entrenched and more likely to abandon their settlement and return to Mexico in the face of Indian raids, as was the case throughout most of Arizona (Cordell 1978:111-119, Dodge 2012:3, Gilpin 1998:1-3, Heilen and Vanderpot 2013:218-225).

European exploration and settlement of the Southwest region occurred for a wide variety of reasons, and these settlements supported themselves in varying ways as well. The two most important drivers of Spanish actions in the Southwest were "religion and defense: to convert the infidels or to keep hostile groups from occupying areas claimed by Spain" (Hart 1998:113). This can be seen in the large emphasis on the founding of missions, which served both religious and defensive purposes. The earliest settlers, from the period of 1600 to 1680, were established either at or near missions for protection, with this settlement being encouraged by Spain, who sought to occupy land and create buffers keeping hostile forces out of the region. This idea worked

better in theory than in practice, as can be seen by the frequent Native American raids in the region, especially towards the latter half of the 18th century. The third reason for development of the Southwest was purely material - the search for precious metals. After the conquest of the region at the turn of the 16th century, the Spanish began immediately enslaving the indigenous populations and put them to work in the mines. In fact, the first haciendas started off as royal land grants for mining activity. Prior to the Pueblo Revolt of 1680, the Spanish were mining gold, silver and copper in the Taos country of the Southern Rockies subregion, silver and gold from the Ortiz mountains south of Santa Fe, and gold as well as maybe copper in the Tijeras Canyon. Salt was also mined in the Salinas of Estancia. Mining resumed after the Pueblo Revolt and smelters were constructed at Tijeras Canyon. Mica was also mined, probably in the Taos country, and used "extensively" for windows panes in Santa Fe. Some mining was done during the Mexican period of rule in the Southwest but not as significant as earlier Spanish endeavors (Collins 1996:9, Cordell 1978:121, Hart 1998:113-114).

While mining was prevalent in the eras of Spanish and Mexican rule, ranching was the major economic activity in the Southwest. The herds of livestock were left to roam wild and graze, reproducing as well as fending for themselves, with ranchers on horseback rounding them up occasionally to cull the herd. This practice of ranching dates back to the Iberian Peninsula, with the Castilians developing the practice in the mid-13th century. The practice was transplanted to the Americas soon after Spain began its conquest of the New World. The first cattle were introduced to Mexico in 1521 and by the 1540s, there were already wild herds as far north as the Rio Grande. In fact, Coronado's expedition set off with 5,000 sheep and 150 cattle, some of which were lost en route with the result that "tens of thousands (of cattle) in northern Mexico could trace their descent from these wandering strays from Coronado" (Collins 1996:8). Cattle ranching was initially brought into the mining haciendas under the Encomienda system, with cattle and sheep being used "to supply the miners with food, clothing, and work animals," but cattle and especially sheep grazing would soon become a "mainstay of the hacienda economy" (Collins 1996:9). Ranching was preferred by many hacienda owners because it required very little manpower, as well as providing defensive advantages of being more dispersed and harder to attack. After the reconquest of 1692 following the Pueblo Revolt, a general trend began away from haciendas towards smaller land holdings began the practice of "colonization based on farming villages or pueblos, in irrigable valleys" (Hart 1998:114). These dispersed

communities in northeast of New Mexico lacked the tools to clear the river edges, so instead they used "long narrow strips" of agricultural land next to irrigation ditches, referred to as "acequias" (Cordell 1978:118). Along with access to water, these farming villages or "pueblos" also had communal pasture land for livestock grazing near the Puebla (Collins 1996:6-9, Cordell 1978:115-118, Hart 1998:114).

The population makeup of the of the Southwest began to change in the first half of the 19th century with the arrival of settlers from the United States, which was quickly expanding following its independence. This was spurred by the Louisiana Purchase of 1803, leading to the first American presence the Southwest in the form of illegal traders moving "textiles, hardware and tools, exchanging them for Mexican silver, blankets, hides and mules" before the trade became legalized with Mexican independence in 1821 (Duran 1984:2). Slowly more "Anglo merchants, ranchers and other settlers" came into the region permanently, largely in New Mexico but also initially in southern Arizona. The year 1821 marks the first year that American trader William Becknell opened the Santa Fe Trail, which ran from Independence, Missouri eastward to Colorado along the Arkansas River and then south into New Mexico, ending at Santa Fe. This route became the main road into the Southwest prior to the arrival of the railroad, although a shortcut was opened the following year, with the Cimarron cutoff running south of the earlier mountainous route. As increasing numbers of permanent settlers began to arrive in the region, there was increasing conflict among the Anglo and Mexican settlers over land grants, with violence often erupting. The largest of these conflicts erupted when settlers from the United States living in Texas declared independence from Mexico and secured that independence after General Santa Anna was defeated at the Battle of San Jacinto in 1836. The new Texan republic claimed all of the land east of the Rio Grande, putting Mexican settlements in New Mexico into an ambiguous area, as the Mexican government never ratified the treaty and the region would remain disputed until the Mexican-American War (Cordell 1978:112-119, Duran 1984:2-10).

A full scale military conflict between the United States and Mexico erupted in 1846 as a result of American annexation of Texas the year prior. This conflict "produced easy victories" for the United States, even if these campaigns were difficult due to "general confusion and incompetence of American forces as well as problems of deserts and mountain supply" (Schlebecker 1975:69). Santa Fe was quickly taken without a fight in 1846

by Colonel Stephen Watts Kearny, who then departed New Mexico to California with the Mormon Battalion under Colonel Philip St. George Cooke "cutting and marking a wagon road from Santa Fe, New Mexico to San Diego, California" (Collins et al. 1993:10). The war was concluded in 1848 with the Treaty of Guadalupe Hidalgo, with Mexico ceding claims to Texas, California, and the land of the Southwest region. The U.S. began establishing a presence, mostly along major trade routes, with Fort Union being built in 1851 along the Santa Fe Trail, as well as Fort Yuma that same year along the banks of the Colorado River in Arizona. A wagon road also sprang up through the northern Southwest into California, which served as a major route for 49ers seeking to capitalize on the gold rush occurring in California. With an eye on transportation, the U.S. secured the Gadsden Purchase of 1854 from Mexico, securing a southern route for a potential transcontinental railroad line, which would be put on hold as tensions rose between North and South. When the Civil War broke out in 1861, the Southwest remained largely supportive of the Union, with local Mexican residents seeing the Confederates as a continuation of the Texans attempt to gain control of the region. Both sides saw the strategic value of New Mexico and the region was briefly contested in 1862 with a Confederate incursion north, meeting at the major battles of Valverde and Glorieta Pass and ending with a Confederate defeat and retreat (Collins et al. 1993:10-15, Cordell 1978:121, Duran 1984:16-25, Heilen and Vanderpot 2013:226, Schlebecker 1975:69).

Following the end of the Civil War through the early 20th century, settlement increased rapidly in the Southwest. Economic draws like mining and ranching brought in new residents from all over the United States as well as some international migration. Land was claimed in the Southwest using a series of federal laws including the Homestead Act of 1862, the Forest Homestead Act of 1906, the Enlarged Homestead Act of 1909, and the Stock Raising Homestead Act of 1916, which granted land to U.S. citizens who were productive on the land. These laws slowly evolved to allow larger claims, shorter residency requirements and gave residents more time to prove their claim, which made homesteading "increasingly feasible on marginally productive lands of the West" (Stein 1990:4). It would take some time before many of these homesteads could be viable; Arizona did not have its first successful claim, meaning the homesteader had established residence, cultivated the land and met the other legislative requirements, until 1878. Also spurring this influx of settlers in the region was the

U.S. Government's systematic removal or subjugation of the Native American population of the Southwest. This began as early as the Civil War, with Union forces removing the Ute, Apache, and Navajo tribes to internment camps at Fort Sumner, New Mexico in 1863. From 1865 through the 1880s, the U.S. military had a massive presence in the Southwest, with many new forts being constructed. These forts provided security that encouraged additional settlement as well as providing valuable infrastructure like roads and telegraph lines. This intensive military presence decreased in the 1880s and 1890s following the surrender of Geronimo in September 1886, marking the end of hostility between the U.S. Army and Native Americans in the Southwest (Collins et al. 1993:23, Cordell 1978:121, Duran 1984:25, Stein 1990:3-8).

The arrival of many new settlers from elsewhere in the United States led to increased conflict with the Mexican-Americans living in the region. One reason for the conflict was due to religious differences, as the new settlers were predominantly Protestant while the local residents were Catholics. Racial hostility also played a role in the tension, especially in northeast New Mexico in the late-1870s, which was the scene of "battling Tejano 'outlaw gangs' and cattlemen for land and water" (Duran 1984:27). Land was perhaps the greatest reason for conflict as new settlers encroached on locals. Many Hispanic communities lost their communal grazing land during this time due to "U.S. misunderstanding of traditional Mexican and Spanish law and boundary disputes involving overlapping land grant claims" (Cordell 1978:121). Those Hispanic residents who had lost their land attempted to fight to regain it in the 1890s under the White Caps movement, made up of the heirs of land grants (Cordell 1978:121, Dodge 2012:13-14, Duran 1984:27).

With the arrival of many new settlers from the United States, the economy of the Southwest was drastically altered from an agrarian society to an economy focused on capitalist production, largely due to the trade of U.S. goods in the region, which caused the "disintegration of the Mexican subsistence economy" (Duran 1984:2). The U.S. military presence in the region also had the effect of stimulating this shift toward a capitalist economy. The U.S. forts through the region resulted in the injection of cash into the economy through lucrative contracts with local residents for hay, fresh meat, or building materials, as well as providing a need for laborers, suppliers and merchants around the forts. As early as the 1850s, the U.S. was spending roughly 3 million dollars annually defending the Southwest

as "just below ten percent of all the money in circulation in New Mexico came from military spending" (Lyon 2000:26). There were periods of inactivity, but for the most part, this intensive military activity in the Southwest, as well as the economic implications of this activity persist to the present (Duran 1984:2, Lyon 2000:26, Hoagland 1994:48).

Ranching in the Southwest increased rapidly following the Civil War, with the smaller community grazing lands being replaced by large-scale open-range ranching. The demand for meat from the forts contributed to this increase in livestock grazing, with sheep being particularly popular. The animals had the added benefit of providing wool as well as meat, which made it even more lucrative in this new capitalistic economy. Cattle ranching was also becoming more popular during this period, as the U.S. began to consume more beef following the Civil War and the increasing economic integration of the Southwest and the rest of the country only further stimulated cattle production. Cattle ranching was different from sheep ranching in that it saw considerable outside investment, with "100 plus new cattle corporations in New Mexico" between 1882 and 1886 alone (Lyon 2000:31). This system of open-range livestock grazing meant that cattle or sheep roamed free for much of the year before being rounded up once a year and brought to market. This system began to shift to more fixed location livestock raising due largely to the advent of barbed wire in 1874, which allowed for the fencing of large areas and reduced the open range available. Several harsh winters in the 1880s resulted in many ranches beginning to diversify their operations by producing some agricultural goods to provide feed for their more localized herd. Both sheep and cattle ranching remained popular in the region until well into the 20th century (Cordell 1978:121, Collins 1996:2, Lyon 2000:31, Shannon 1945:209).

Ranchers were aided in their transition to fixed-place operations in the late 19th and early 20th centuries by advancements in farming techniques that allowed more extensive cropland agriculture in the arid region and leading to homesteading becoming more viable. The Desert Land Act of 1877 allowed for settlers to claim up to 640 acres provided they could irrigate the land within 3 years of filing the claim. This spurred some new homesteading in the region but the primary benefit went to the large cattle ranchers with the necessary capital to fund expensive irrigation work for agriculture, who acquired large portions of the region's land and water. In areas close to running water, where farming had been done on a small-

scale dating back to Spanish times, increasing areas of farmland were cultivated, with some farmers branching out to cash crops like cotton and tobacco. In areas where large scale irrigation was more difficult, a technique was developed in the early 20th century called "dry farming," which allowed crop cultivation by allowing a field to go fallow or uncultivated for a year in between crops to allow the soil to regain its moisture. The success of this method contributed to the region's "biggest upsurge in homesteading" from 1910 through the mid-1920s (Schlebecker 1975:220). Drought in the 1920s resulted in the abandonment of many of these homesteads (Dodge 2012:4-5, Heilen and Vanderpot 2013:229, Schlebecker 1975:142-145,220-221, Shannon 1945:215, Stein 1990:5-8).

Along with ranching and farming, the other main economic activity was the extraction of the region's valuable natural resources through mining. There was mining dating back to the Spanish period, however U.S. arrival and the transition of the region into a capitalist economy resulted in mining being pressed with a renewed vigor. The first major strikes in the region during the U.S. period occurred in the late 1850s and early 1860s at several locations throughout northern central and western Arizona, resulting in the creation of the territory in 1863, separating it from New Mexico. The population of Arizona doubled between 1860 and 1864, and then doubled again by 1870 with silver being the major mining product of Arizona early on, losing its supremacy to copper post-1880. The first major mining boom in New Mexico occurred in 1867, when gold was discovered in the Moreno Valley. These gold mines in New Mexico required water intensive mining techniques resulting in the building of the "Big Ditch" in 1868 to funnel water from the mountainous regions to three artificial lakes thus allowing mining year-round. Boom towns were common near major strike locations (Cordell 1978:128). For example Elizabethtown was founded near the "Big Ditch" in 1867, reaching a population of 7,000 by 1868. However, by the 1880s the population was fewer than 400 residents. Similarly in Arizona, the largest towns at the time of statehood, after the mercantile and agricultural towns of Tucson and Phoenix, were "the copper mining towns of Clifton/Morenci, Bisbee/Douglass, Globe/Miami, and Jerome" (Keane and Rogge 1992:2). Mining continued into the 20th century with copper, gold, and silver being the main products of the region (Collins et al. 1993:18, Cordell 1978:128, Keane and Rogge 1992:2).

The Industrial Revolution had drastic effects on the Southwest region, namely the sweeping change brought along with the railroad when it came

through the region. Plans for a transcontinental railroad through the Southwest region date back to the 1840s and the Gadsden Purchase was made in 1854 for the "specific purpose of securing a preferred railroad route," which ran from Texas, through El Paso to Yuma and then northwest to Los Angeles (Garrison et al. 1989:3). The Civil War put the chances of a southern transcontinental on hold, with the first transcontinental route being completed in Utah in May 1869. It was not until a decade after that work on the southern route began, entering Arizona through Yuma in summer of 1878 and reaching Texas in late 1881. Simultaneously, a northern route was being constructed to California through the southwest, beginning from Albuquerque and running roughly along the 32nd parallel across New Mexico and Arizona and into California through the Mohave Desert. This route was started in 1880 from Albuquerque and finished in 1883. These railroads had the joint effect of firmly tying the region's economy with that of the rest of the United States, leading to an influx of eastern goods along with eastern capital and corporate entities into the local livestock and mining industries, with these large companies soon growing to dominate the region in typical Gilded Age fashion. The railroad also brought settlement to the region, most prominently in the series of boom towns that sprung up along the newly constructed rail lines. Railroad companies played a large role in encouraging settlement in the region, especially on lands along track that were owned by the particular railroad company. The companies appealed the public, through slightly misleading advertisements or "propaganda" about the region's potential (Heilen and Vanderpot 2013:229). In addition, the government was lobbied, with the Bureau of Dry Land Agriculture being established in 1906 "largely due to railroad efforts" (Schlebecker 1975:142). Tucson is one such boom town that quickly grew to become the "most important railroad center between Los Angeles and El Paso" along the southern line through the region (Garrison et al. 1989:9). Albuquerque was another, with New Albuquerque being founded along the tracks in 1880, several miles away from the older Albuquerque founded by the Spanish (Garrison et al. 1989:3-18, Cordell 1978:121, Dodge 2012:3-5, Duran 1984:3, Heilen and Vanderpot 2013:229, Schlebecker 1975:142).

Modernization brought about many changes in the Southwest, one of them being the increased ownership of automobiles, which required roads and infrastructure. In New Mexico, there were "only 470 cars or trucks registered" by 1910, with this number jumping to more than 17,000 by 1920, and jumping to almost 84,000 by 1930. Many roads were constructed in

the Southwest to accommodate automobiles starting in the 1910s through the 1930s (Dodge 2012:17). Another effect of modernization was the introduction of new technologies that assisted agricultural work, the most important to the Southwest being the introduction of gasoline and electric powered pumps to bring water out of wells, contributing to the increase in settlement (Dodge 2012:16-17, Heilen and Vanderpot 2013:229).

Unfortunately for farmers and ranchers of the Southwest, the first years of the Great Depression coincided with a terrible drought throughout the region. As a result, Congress excused absences from homesteads through the years of 1929-1932, as many people had to leave the area during this time and it would have made them ineligible for claiming the land under the residency requirements. Absences were then excused from 1932-1936 as the effects of the Great Depression began to be more tangible in the region. In 1934, the Taylor Grazing Act was passed during the Great Depression and would greatly affect livestock raising in the Southwest. It was designed to limit soil erosion as a result of overgrazing through the creation of grazing districts under federal supervision to limit the number of animals grazing as well as charging for use, ending officially the era of open-range grazing that began its decline toward the end of the 19th century (Schlebecker 1975:221-222, Stein 1990:3-7)

3.6.3 Cottage Industries

Early Spanish settlers in the Southwest region largely practiced subsistence farming as well as some livestock grazing, operating largely on the barter system throughout the local economy to supplement those goods that could be grown or raised. The early Southwest was an isolated region from the rest of the Spanish colonies, leading to local production of many goods, including pottery, which was similar to indigenous pottery in the region as well as some handcraft copper goods. The main cottage industry however was related to the processing of livestock related goods, which included dairying, hide preparation for cattle ranchers, and wool for sheepherders. This would involve either the transportation of these raw goods to somewhere to be processed, such as turning the wool into yarn or even some textile manufacturing. By the 1870s and 1880s, with the arrival of the railroad, wool and hide processing had largely moved out of the household due to the increased use of technologies that made it far cheaper and more efficient to transport the raw materials to mechanized processing facilities. For example, around this time Albuquerque became "a regional commercial center for hides, wool, and livestock," with roughly

one million sheep being driven through Albuquerque per year between 1883 and 1885 (Dodge 2012:5). Raw materials (unprocessed wool) or herds of livestock were transported to Albuquerque in horse-drawn wagons for the wool or as a livestock drive from both nearby ranches and as far away as eastern Arizona. Another cottage industry that became popular in farmsteads of the Southwest, especially in Arizona, was beekeeping, which not only pollinated plants but provided honey that could be sold or bartered for supplemental income. The majority of these cottage industries used labor from within the family unit, although some of the larger ranches had many cowboys and ranch hands in their employ to process the livestock related goods (Cordell 1978:115, Dodge 2012:5, Stein 1990:13).

3.6.4 Typical farmstead components

Spanish settlers in the Southwest built housing largely out of adobe brick or jacal, which is post construction with mud added. Poorer settlers used jacal construction and often lived in one-room rectangular structures called jacales, which were constructed using four corner posts with forked ends called "harcones," which would support the horizontal poles called "vigas" that supported the roof. Some of these had flat roofs but others had two additional harcones to create a central ridgeline. For the walls, smaller posts were driven several in. into the ground and horizontal sticks were fastened across them. The walls were then plastered inside and out using mud and occasionally lime plaster for those with more means. The roof was commonly constructed out of a framework of sticks bound together and covered with smaller brush like grass, ocotillo cactuses, or yucca stalks, and then covered by 3-4 in. of adobe, although some jacales had thatched roofs. The adobe and thatch required periodic reapplication and maintenance depending on the amount of rainfall. The floors were packed dirt and occasionally were located below ground level. These were often one-room structures but some had "as many as four or more rooms" (Graham 2010). An analysis of jacales in the Big Bend area of West Texas between 1979 and 1984 found that they averaged "15 feet long, 13 feet wide and about seven feet high" and were still common housing throughout the region well into the 20th century (Graham 2010). Adobe brick construction used bricks of sun-dried mud as its essential building block and provided excellent insulation. Typical adobe houses were one- or two-room structures with a flat roof supported by rafters also called vigas. Due to the availability of materials, they were often expanded with additional rooms. One-room structures usually measured roughly 12x14 ft and had a single

door, usually on the south or sometimes east wall so as to avoid the afternoon sun heating the interior. Expansion patterns were typically either linear, with additions added end to end, or expanding first in a three-room L shape, with two front doors opening onto a patio, with many of these having later addition filling in the square footprint. Larger wealthier houses built of adobe would often be square structures with an internal courtyard or "plazuelas," which provided increased security (Cordell 1978:118). The thickness of the bricks provided substantial resistance against Native American raids (Cordell 1978:115-118, Graham 2010, Hart 1998:114).

Spanish settlement patterns, especially in the period after the reconquest of the Southwest following the Pueblo Revolt of 1680 when large haciendas run on indigenous slave labor fell out of fashion, consisted of smaller land holdings grouped into dispersed farming villages. This type of settlement became common and would persist throughout the Spanish and Mexican periods of the southwest. Farming villages were typically located in "irrigable valleys" (Hart 1998:114). These small communities would sometimes have a central focal point of a church or a plaza but most were scattered. In communities with a plaza, the wealthier population would live closest to the plaza while poorer settlers would be removed from the plaza near corrals or their cropland. Corrals were often built with a technique similar to jacal construction that used light materials such as small branches of mesquite or ocotillo cactuses stacked horizontally between spit vertical posts fastened together to form palisades. Farming used "long narrow strips" of cultivated land called "porciónes" that were watered by a stream or an irrigation ditch, which were also known as "acequias" (Cordell 1978:118). Occasionally this irrigation would need to span drops in terrain in which wooden flumes were constructed called "canoas" to transport the water. Those raising livestock would sometimes construct dams of compressed earth across dry creek beds or "arroyos," which would occasionally flood. Sometimes spillways were crated to keep the dams from washing away and constructed out of locally found caliche blocks, referred to as "sillares" (Cordell 1978:118, Noble and Cleek 1995:174).

As settlers from the United States entered the Southwest, many copied the local architectural practices while others introduced new styles to the region. Adobe was used widely during the period of U.S. settlement with some communities of the Southwest still having "more than 90 percent adobe homes" (Graham 2010). Some adopted Spanish design along with the adobe technique like Johnny Ward's ranch, which was built south of

Tucson near the Mexican border soon after the area was purchased by the United States in 1854 and was a linear, flat roofed adobe structure. Other structures blended adobe building methods with new designs, with many adobe houses having plans designed around a central hallway, outward-opening facades with symmetrical fenestration, and some with two stories or a gabled roof, with these features "now identified with the Territorial Style" (Hoagland 1994:48). New building materials became available with the arrival of the railroad in the 1880s and were integrated with adobe construction, such as the "Northern New Mexican or Southwestern Vernacular style houses, featuring pitched metal roofs and tall narrow windows" (Dodge 2012:11). Some ranchers also chose to emulate Spanish design by creating dugouts similar to some jacales with earthen floors and rock or masonry walls. There were also many houses built used imported architectural methods including "log cabins, dog-trot style buildings, and board-and-batten wood frame cottages" (Stein 1990:19). Some wealthy settlers even had Victorian style structures (Carter 1994:35-46, Dodge 2012:11, Graham 2010, Hoagland 1994:48, Stein 1990:19).

The economic activity of many early settlers during the U.S. Territorial period was based on livestock raising, with ranches being built largely in the same layout as Spanish ranches with a main residence, surrounded by barns and bunkhouses for herders along with corrals for breeding cows and horses. As ranching became more fixed in location, fields located near the main house were soon cultivated for feed, along with accompanying farm buildings and irrigation infrastructure. One result of the end of open-range ranching was the rise in fenced-in pastures and feedlots from late 1880s to the early 1900s. These fences were constructed out of a variety of materials and techniques, with some of them being of wood construction such as the Irish fence, which was popular in northern Arizona and was also known as the "Shanghai fence, the swede fence, the buck fence, and the reindeer fence" (Noble and Cleek 1995:172). It was constructed with two crossed posts with one end of a pole resting on the crotch and the other end resting on the ground. Many fences in the late 19th and 20th centuries were out of wire construction as they were cheaper and less labor intensive. Invented in 1874, barbed wire was quickly and extensively used as fencing throughout the Southwest. Woven wire fences were introduced in the early 1880s and were adopted throughout the Southwest. They were especially favored by sheep ranchers because unlike barbed wire, woven fences could keep out coyotes and wolves who could not fit through the wire mesh, which had a standard size of 6 in.. For additional security,

barbed wire could be added either to the top of the fence or several strands could be woven through it, with the singular wire at the top of the fence frequently being used as a telephone line. Electric fences were introduced in the late 1800s but were not widely adopted throughout the west until the early 1930s. They were usually a single strand of wire, sometimes more with white porcelain insulators on older fences. Electric fences were mostly used to restrain cattle (Noble and Cleek 1995:177).

Barns and outbuildings of the Southwest are quite diverse, especially during the period of U.S. settlement where building types and designs had influences from across the nation. Several regionally specific outbuildings were constructed in the Southwest under Spanish and Mexican rule, with these structures also being used by the Hispanic American population after the region came under U.S. control. Tasoleras were roughly built barns used for livestock and/or hay storage. These structures came in a wide variety of designs but most had a low, "gently sloping" roof (Noble and Cleek 1995:105). These were also known as "Cabballerisas, Fuerstes, or Tejavanas" (Noble and Cleek 1995:105). Tapeistas were structures used for drying cornstalks or hay by placing them on a platform of jacal construction raised on four posts. Late versions featured walls of either horizontal logs forming a "crude crib" or vertical sections of jacal construction. Another regionally specific barn was the Hispanic Twin-Crib Barn. This structure featured two gable-roofed cribs of roughly the same size separated by a roofed breezeway, which resembled the double-crib barns of the Southwest but developed independently. Some earlier versions were built as single-crib structures and added onto later. Other regionally specific outbuildings include the Spanish-American Bakeoven, which was constructed out of adobe or stone plastered in adobe in a "beehive shape" (Noble and Cleek 1995:150). They were commonly built in groups and were rarely larger than 4 ft in diameter. These ovens were also used to fire pottery. Another food processing-related outbuilding specific to the Southwest were ramadas. These were open walled structures used for cooking and were often situated near the garden or small animal pens (Noble and Cleek 1995:105-107,150).

Many built structures in the Southwest relate to the acquisition and storage of water, such as the "noria con buque" or hand-dug well. The hole was dug either circular or rectangular and were lined with hand-quarried caliche blocks, or sillares. Two walls were built up to support a horizontal mesquite log, over which a rope and bucket could be hung and pulled by

draft animals to raise water. Often there were large holding tanks constructed near the wells usually being made of sillares covered in plaster. Later water acquisition and storage structures include windmills, which raised water from wells and domestic tank houses, which were large wooden tanks, usually raised 30-40 ft in the air on an open wooden frame "to ensure gravity flow" (Noble and Cleek 1995:141, Stein 1990:13).

3.7 Region 6: Great Plains

3.7.1 Geography

Once considered part of "The Great American Desert," the Great Plains extend from Mexico in the south into Canada in the north, and from the edge of the Tallgrass Prairie on the east to the foothills of the Rocky Mountains on the west (Mather 1972:237). The Great Plains have extraordinary geographic diversity including "mountains, plateaus, hills, and plains; forest, prairie, steppe, and desert shrub; hardy wheat and barley to subtropical cotton and peanuts; and population varying from enormous empty stretches to dense rural population and lines of towns" (Mather 1972:245). In the western Great Plains along the edge of the Rockies, the elevation ranges from 3,000 to almost 6,000 ft above sea level in some places. The Great Plains then gently slope down to about 1,500 to 2,000 ft above sea level on the eastern edge where the plains meet the central lowland and Tallgrass Prairie. The average slope is about 10 ft per mile (Trimble 1990:19, McKnight 1992:303-304). The topography throughout the region is "an extensive plains area" with an underlying structure of broad geosyncline composed of several basins separated by gentle arches, and gently dipping Cretaceous and Tertiary age sedimentary strata making up the surface bedrock. "There are great aprons of alluvial deposits near the Rocky Mountain front and along the major river valleys, and glacial deposits thinly cover the surface north and east of the Missouri River" (McKnight 1992:303-304).

The Great Plains are drained by the Missouri River and its tributaries, the Yellowstone, Cheyenne, Platte, Republican and Kansas Rivers, and the eastward-flowing Red, Rio Grande, Cimarron, Canadian, Pecos, and Arkansas rivers that flow from the Rockies in broad, steep-sided, shallow valleys (Robinson and Dietz 2019, Trimble 1990:19). Within the Great Plains, there are several subregions.

3.7.1.1 Missouri Plateau

The Missouri Plateau subregion includes both glaciated and unglaciated regions. The glaciated Missouri Plateau section covers the area north and east of the Missouri River in the Dakotas. It is marked by glacial features such as moraines and ponds. The unglaciated Missouri Plateau covers the western half of the Great Plains north of Nebraska. It has topographic variety including the badlands area and isolated outlying ranges of the Rocky Mountains including the Black Hills in South Dakota and several smaller mountainous areas scattered throughout the center of Montana.

3.7.1.2 Colorado Piedmont

The Colorado Piedmont subregion extends from the Rocky Mountains throughout eastern Colorado, from the Arkansas Valley to the Platte Valley. The Tertiary alluvium in this area has been eroded, which makes the area lower in elevation than the High Plains to the east. Streams strongly control the topography of this area (McKnight 1992:304).

3.7.1.3 High Plains

The High Plains subregion of the Great Plains covers southeastern Wyoming, eastern Colorado, southwestern South Dakota, western Nebraska, western Kansas, western Oklahoma, and northwestern Texas. Except for where the area is crossed by one of the major eastward-flowing rivers, the area is "extraordinarily flat" as a result of two geological formations: a concentration of carbonates in a "cap rock" layer that is resistant to erosion, and sandy and highly porous surface formations (McKnight 1992:304). The High Plains includes the Llano Estacado or Staked Plains, which have roughly 30,000 square miles of almost perfect flatness unmarked by stream erosion (McKnight 1992:304). They also include the Nebraska Sand Hills, which cover most of the central and western area of Nebraska and is marked by sand dunes that can rise several hundred feet in height separated by numerous small basins.

3.7.1.4 Plains Border

The Plains Border subregion covers much of southern Nebraska, central Kansas and northern Oklahoma, and is a more dissected continuation of the High Plains area (Blum 2011). It contains a number of eastward-flowing rivers (Republican, Solomon, Saline, Smoky Hill, Arkansas, Cimarron,

North Canadian) that cut broad valleys into the Tertiary cover. The dissection has also created a series of north-south oriented "relatively featureless" plains (Blum 2011). "In addition to the dissected and scarped terrain, other notable features include the Arbuckle Mountains and Wichita Mountains of south-central Oklahoma, where ancient sedimentary and crystalline rocks were uplifted long ago and still remain at elevations 650 to 1,000 feet higher than the surrounding plains" (Blum 2011).

3.7.1.5 Southern Plains Central Texas Hill Country

The Southern Plains subregion includes all of central Texas, including the Rio Grande Plain, the Central Texas Hill Country, and the Edwards Plateau. The Rio Grande Plain is a flat area along the Rio Grande marked by river valleys. The Central Texas Hill Country is an area characterized by low but steep-sided hills, an eroded dome of Precambrian rocks, and several "large fault-line springs that discharge around the edge of the hills" (McKnight 1992:304). The Edwards Plateau in south-central Texas, extends from the topographically similar Llano Estacado or Staked Plains, to the southeast and is an area of flat land.

The Great Plains have a continental climate that follows a north-south temperature gradient ranging from a daily average temperature of 46 °F in the north to 66 °F in the south, with locally extreme ranges that can reach an annual temperature range of 140 °F (Sohl et al. 2019, Rosenberg 1987:23). North Dakota can range from -50 °F in the winter to 121 °F in the summer, and the northern Great Plains are known to have the coldest winters in the lower United States, while the southern Great Plains are as hot as the southeast United States in summer (Rosenberg 1987:23). Throughout most of the Great Plains, winters are cold, summers are warm, and the temperature can change suddenly; there is a lot of wind, and low precipitation and humidity. "The growing season averages 240 days in Texas and 120 days at the U.S.-Canadian boundary. A distinctive winter phenomenon of the western Great Plains is the chinook, a warm, dry wind that blows down the eastern slope of the Rocky Mountains and can raise temperatures by as much as 30 to 40 °F (17 to 22 °C) in a short period" (Robinson and Dietz 2019).

Precipitation in the Great Plains follows an east-west gradient with an annual average of roughly 30 in. of precipitation in the east to less than 11 in. in the far west (Sohl et al. 2019). Further, with the Gulf of Mexico as the major source of moisture, precipitation amounts also decrease moving

north and west away from the Gulf. “The southern Plains have 15 to 25 in. (380 to 640 mm) of rain annually, the northern Plains 12 to 15 in., the eastern margin in Nebraska 25 in., and the western margin in Montana less than 15 in.” (Robinson and Dietz 2019, Rosenberg 1987:25). The northern plains experience snow in the winter, while the southern Plains do not, and more rain occurs in the summer than in the winter (Rosenberg 1987:26, Robinson and Dietz 2019, McKnight 1992:306). The weather can be very turbulent in this region: “cold fronts, warm fronts, tornadoes, thunderstorms, blizzards, heat waves, hail storms, and duststorms are all part of the annual pageant of weather in this region” (McKnight 1992:307). Droughts are also recurring in this region (Rosenberg 1987:29).

The soils of the Great Plains are among the best and most productive for agriculture in the United States. Deep, dark-colored Mollisols, containing a considerable amount of organic matter and lime, are widespread in the northern plains, while dry “clayey” or sandy Entisols and Aridisols, containing little organic matter, are more common in the drier locations of eastern Colorado, Wyoming, western Nebraska and Montana (McKnight 1992:302,307). “The precipitation gradient strongly influences agricultural land use” with dryland wheat found throughout most of the plains, and dryland corn, cotton and soybeans grown in the eastern area (Sohl et al. 2019:80). Most of the Great Plains are open grassland and shrub land, and contain a diverse array of vegetation, dominated by grasses and forbs, with short grass being the most dominant natural vegetation, and a general absence of trees and shrubs (Trimble 1990:19, Shaffer and DeLong 2019:1). The grasslands and shrub lands are naturally suited to ranching and livestock, particularly in the western, central and southern areas of the Great Plains (Sohl et al. 2019:81). Despite having optimum soil, topography and summer sunshine conducive to agricultural production, agriculture on the Great Plains has a history of periods of failure due to the erratic climate of the Great Plains combined with “sometimes ill-advised farming practices” that accelerated soil erosion (McKnight 1992:302).

3.7.2 Settlement history

Spanish explorer Francisco Vázquez de Coronado first explored the Great Plains Region in 1539-41. This led to early but sparse settlement of the southern Great Plains by Spanish colonists from Mexico beginning in the 1500s. It was not until the Louisiana Purchase in 1803 and the subsequent Lewis and Clark Expedition in 1804-06 that Americans began in earnest to explore the region. Zebulon Pike explored the Arkansas and Red Rivers

from 1805 to 1807, and Stephen Long explored the Platte and Arkansas River basins in 1820, and based on their characterizations, the Great Plains Region became known as the "Great American Desert" (Robinson and Dietz 2019). After the explorers came the fur trappers, followed by settlers on the wagon trains, who passed through the area heading west in the early and mid-1800s.

The first settlement by Americans and Europeans in the Great Plains occurred in the 1850s in eastern Kansas, but it would not be until after the Civil War that a settlement boom began throughout the Great Plains (Riegel and Athearn 1971:510). The "greatest single influence in the settlement" of the Great Plains was the railroad, which had "fits and starts" beginning in the 1850s, but "the peak occurred from 1878-1888" (Riegel and Athearn 1971:493). As a result, the 1870s and 1880s saw the largest settlement activity across all of the Great Plains. Several years of good rainfall in the early 1880s lured plains pioneers emigrating from nearby states as "free land" became scarcer in the Prairie region and along the eastern front of the Great Plains, and Europeans responded to publicity agents and land promoters who promised good farmland (Conrat and Conrat 1977:66, Riegel and Athearn 1971:510, Fite 1977:245). The Homestead Act of 1862, which allowed a settler, for a small fee, to acquire as much as 160 acres of land by living on and improving the land for 5 years, brought roughly half a million families to the Great Plains in the 40 years after its passage. The Homestead Act granted farms to thousands of immigrants from the Oklahoma border north through Kansas and Nebraska to the Dakota and Montana territories (Luebke 1977:409). "Yet, five times that many families *purchased* their land from the railroads, land companies, or the states" (Kennedy et al. 1993:380). The settlement boom went bust by the late 1880s and 1890s following several years of drought - causing crop failures that drove almost half the population of western Kansas, and almost all of the population in large areas in Nebraska and Colorado to move out (Conrat and Conrat 1977:66). Despite this exodus, the Great Plains were largely settled by the end of the 19th Century, and the only remaining uninhabited parts(western part of the Dakotas, and eastern parts of Montana and Wyoming), were rapidly settled before World War I (Luebke 1977:429).

Early settlement in the plains involved livestock ranching, with herds of cattle replacing the bison by the 1860s (Robinson and Dietz 2019, Shaffer and DeLong 2019:7). Cattle were important in frontier areas as they could eat surplus grain and move to market under their own power (Riegel and

Athearn 1971:476-477). Cattle ranching, and the iconic "cowboy" moved up from Mexico and Texas into the southern Great Plains, with the historic cattle drives that moved vast herds each spring from Texas north to Kansas beginning in the 1860s (Mather 1972:245). "Conservative estimates held that some 6 million animals were driven north during the twenty years following the Civil War" (Riegel and Athearn 1971:480). By the 1870s, roughly three-quarters of the cattle being driven north each spring out of Texas ended up stocking cattle ranches that began permeating the northern plains (Riegel and Athearn 1971:486-488). During the late 1800s and early 1900s, this cattle boom resulted in huge corporate farms with cattle companies began buying up millions of acres of land in Nebraska, Wyoming, Montana and Kansas (Mather 1972:254, Riegel and Athearn 1971:486-488). The introduction of barbed wire in the 1870s led ranchers to begin fencing their land to keep cattle safe from railroads and out of farm fields.

Beginning in the 1880s and 1890s, crop farming began to "crowd out" the ranches in many areas of the Great Plains, and wheat replaced cattle (Robinson and Dietz 2019). Grain farming extended throughout the Great Plains becoming more concentrated in the northern areas, while the southern Great Plains saw a mix of cotton and grain crops from settlers migrating from the southeast (Hudson 1990:179-180). Technological advancements in farming equipment and the adoption of laborsaving machinery after the Civil War - the steel sod buster and improved irrigation techniques in particular—allowed settlers to convert much of the Great Plains to agriculture by the late 1800s (Kennedy et al. 1993:380, Conrat and Conrat 1977:98-99).

Many of the farmers migrating to the Great Plains relied upon the farming practices they had used back east, and focused on growing corn. "There was little realization during those boom years that successful farming on the Great Plains would require major changes and adjustments in conventional farming; and that the climate would place definite requirements on profitable operations" (Fite 1977:246). A lack of water proved a significant problem for the Great Plains farmer. Settlers learned the hard way that corn was not drought-tolerant and following the droughts and poor markets of the early 1890s that decimated many farms, farmers switched to growing more drought-tolerant crops such as wheat and grain sorghums; they also expanded their livestock operations (Fite 1977:248).

Settlers from New York, Norwegians and Germans migrated into the northern plains in the late 1800s, bringing with them their knowledge of wheat growing, and European wheat varieties that "enabled North Dakota and Montana to become stable, long-term zones of spring wheat production" (Hudson 1990:177). By 1910, nearly half the population of Montana, North Dakota, South Dakota, Wyoming, Nebraska, and Kansas were foreign-born immigrants and their children, originating primarily from Scandinavia, Britain, and Germany (including Russian-born Germans) (Robinson and Dietz 2019). The wheat-growing New Yorkers of the northern plains also moved into Kansas and Nebraska at the end of the 19th century and early 20th century, where they encountered Missouri-born farmers who had immigrated into Kansas in the 1890s. Further south in the Great Plains starting along an Omaha to Chicago line, Germans and Scotch-Irish settlers originating from southeastern Pennsylvania "dominated" the prairies (Hudson 1990:177). Germans were by far the most numerous ethnic group to settle on the Great Plains (Luebke 1977:411-412). Immigrant groups were highly religious and brought their practices and beliefs with them. The northern plains were dominated by Lutherans, the central plains by Methodists, and the southern Plains by Baptists (Mather 1972:256, Robinson and Dietz 2019).

In the 1890s, the practice of dryland farming where farmers sow alternate, parallel strips of land in alternate years to conserve soil moisture, replaced previous practices and became predominant in the northern plains (Hudson 1990:180-181). Advancing technology and the vast open plains supported the development of large-scale farming, particularly in the Red River Valley of the Dakotas; the farms became known for having absentee, or "suitcase" farmers, that hired unskilled labor to work the farm (Riegel and Athearn 1971:515-517). The agricultural demands of World War I resulted in even more conversion of pastureland and grassland to agricultural expansion on the Great Plains. Unfortunately, this over-farming combined with drought conditions, duststorms and the Great Depression of the 1930s, led to the Dust Bowl, which caused massive devastation across the region and resulted in many farmers losing their farms and leaving the area by the end of the 1930s (Fite 1977:249, Conrat and Conrat 1977:124). Farmers who were able to persevere through the Great Depression years, "built up the size of their holdings, saved against hard times, and added livestock to grain farming" (Robinson and Dietz 2019).

3.7.3 Cottage industries

Sorghum syrup was one type of cottage industry found on farms in the Great Plains Region. Some farmers on the Great Plains harvested sorghum to produce sorghum syrup. Some farmers dedicated significant acreage to sorghum to support local industrial mills, but individual farmers could also produce sorghum syrup using a simple crushing apparatus and an evaporator (Noble 1984:99). Similar to maple syrup production in the Tallgrass Prairie region, localized production might potentially include a small building with a single room containing a firebox, a chimney, and an evaporator pan (Noble 1984:99).

Crop farmers in the northern Great Plains Region often subsidized or diversified their farming operation by including or expanding their livestock production to guard against drought years with poor crop production. Livestock could be used to provide food for the farm or be sold locally. Part of the farmstead would be dedicated to livestock with similar built environment features as are found in other livestock farming areas: livestock barn, fenced paddocks or pastures, and silos or cribs for storage of grain and stock feed.

As is typical among farmers in all areas, the farmer's wife often engaged in activities that could bring economic benefits to the family. In the Dakota prairies, some farming families made "delicate cheeses," or "sausages of superior quality," or fruit preserves that they would sell to local markets (Smalley 1893). Farm families would use existing kitchens to support this side business.

The wholesale slaughter of the buffalo between 1870 and 1883 left the plains littered with buffalo bones. Children and adults would collect these bones to sell to bone dealers to be turned into fertilizer, buttons and other domestic items, and used in sugar refineries. Farmers often used this money to subsidize family expenses, or bartered the bones for goods. The price for bones in the 1870s ranged from $4 to $9 per ton, with an average wagon load earning around $5 (Klepeis 2014). While an important way of bringing in extra money for many farm families, bone collecting did not require any additional infrastructure on the farm as bones were typically taken directly to the bone dealer.

3.7.4 Typical farmstead components

The open prairie with its vast grasslands, while suited to ranching and adapted to farming, provided little in the way of building materials to early

settlers. The lack of forests ruled out frame and log construction (except for in the Missouri Plateau area around the Black Hills in the Dakotas), and brick and stone were also scarce. Early pioneers often made their first homes in a cave in a nearby hillside or a "rough board shack covered with tar paper" (Riegel and Athearn 1971:517). What was plentiful on the Great Plains though, was sod, and many pioneer houses were built from it, often backed into a hill (Trimble 1990:19). Pioneers cut rectangular pieces of sod and stacked them like "oversize bricks", using wood only for rafters, doors and window cases. Settlers were not thrilled about "dirt" houses and the problems that came with them and "as soon as possible they replaced them" (Riegel and Athearn 1971:518). When railroads arrived, they brought access to lumber and other building supplies, but most farmers were too poor to afford much materials, and so two, three, or four room frame tarpaper shacks became popular (Smalley 1893). In the late 1800s, barns were often nondescript and also made of sod and straw. The lack of lumber and funds meant that the farmsteads lacked enclosures, and barbed wire was used to secure the barnyard (Smalley 1893, Noble 1984:127-127).

With water being such a critical resource on the Great Plains, springs and access to water were important determinants in choosing a farm site. Many farms had spring houses that were erected at the source of the water to protect the spring from pollution. Brick and stone were preferred building materials, but other materials were also used; the spring house was usually located nearby to the house and built into a hill at the source of the spring. Windmills and wells were another source of water for farmsteads, which included a round or square wellhead structure roughly 3 ft high covering the well to prevent accidental entry, but low enough to allow for access to the well. Windmills appeared on the landscape in the 19th century to help draw water out of the well, as well as to generate electricity (Noble 1984:82-83). Most farmsteads also included a woodshed, privy and an ice house. Most of these structures were freestanding and of simple, non-descript design, made from local materials before the railroad was established, and from wood frame after the railroad made imported lumber readily available. The privy was often located away from the house, but close enough for convenience's sake (Noble 1984:85-87). Excavated cellars were also common for food storage and as a storm shelter (Noble 1984:88).

During settlement of the Great Plains, pioneers dispersed from the very beginning resulting in isolated farmsteads. General advice given at the time was that the most appropriate site for the farmhouse was in a central location, away from the roadside, and farmers should consider traffic patterns between the house, field, water and woodlot (McMurry 1988:63). The farmer was encouraged to have orderly storage of farm implements in a separate toolshed or fully equipped workshop (McMurry 1988:64). However, as wheat farming became highly mechanized, farmers increasingly relied upon the dry climate to keep machinery from rusting and did not build extra, designated machine tool and machine sheds. Indeed, crop agriculture farmsteads were modest, including a farmhouse, horse barn with a small hayloft, a small, "squat and unpainted" combination machine shed and workshop, a windmill, grain bins, and a windbreak of "scrawny conifers" to provide shelter from the winds (Hart 1975:147-148).

A 1934 U.S. Department of Agriculture, Bureau of Home Economics farm house survey indicated that frame construction was the overwhelming material used for farmhouses across the country and in the Great Plains: 93.2% of farmhouses across the U.S. were made of wood frame construction, 3.7% were log, 1.8% were brick, 0.5% were stone, 0.4% were earth, and 0.4% were concrete construction (Noble 2000:65). Regional variations existed in construction material based on climate and ethnicity, with earth construction still having a presence on the Great Plains in the 1930s due to the lack of forest and predominance of sod (Noble 2000:72). There was very little brick or log construction found on the Great Plains at this time.

By World War II, farmsteads engaged in cash-grain agriculture (throughout the northern and central plains) had become predominantly large, averaging over 600 acres, and with usually square or rectangular farmsteads. The majority of farmsteads (60-65%) were set back from the road or highway, and typically had 5 to 8 separate buildings. By this time, farmhouses, although still modest, were typically two-story frame houses with eight rooms, a basement, and one or more garages. Most farmsteads had a distinct house yard, a home garden, one or more cattle yards, and a few (12%) had orchards. The barns averaged between 1,000 and 3,000 sq ft, were entirely above ground, and were also used to store hay. Many farmsteads had chicken houses, some had hog houses and only a few had sheep sheds; many had windmills, and granaries were common. Farms in the northern part of the Great Plains typically had windbreaks (Trewartha 1948:204).

In the southern Great Plains where ranching was more common, farmsteads that specialized in livestock typically had very small farmstead areas compared to the large areas of grazing and grassland. Farmsteads were also set back from the road. The farm or ranch house was usually small, one-story and without a basement. There were several separate, small but numerous farm buildings such as a coal house, bunk house for farm labor, hen, sheep and turkey houses, calf shed, horse barn, workshop, gas and oil house and other associated support buildings. Barns were also small. While machine sheds, corncribs and silos were infrequent, granaries, windmills and cattle yards were relatively numerous (Trewartha 1948:215).

Architectural styles common across the Great Plains included hanging gables, feeder barns, windmills, domestic tankhouses (large wooden water tanks elevated about 30 to 40 ft on an open wooden frame to ensure gravity flow; often with roofs), storm cellars, horizontal silos, and hay stackers (structures used to stack hay) (Noble and Cleek 1995:193-200). Limestone barns and fenceposts were common in the Flint Hill and Smokey Hill section of Kansas, and the Edwards Plateau region of Texas where you could also find stacked stone walls. Windmills were common in Kansas, Nebraska, and South Dakota. Hay stackers were common throughout Montana and Wyoming. Stone-arch Forebay barns (where the gable-end wall was extended to create an overhand area along the side of the barn that was supported by a series of stone arches) were common in southeastern Nebraska while Czech barns (noted for their use of Czech masonry techniques such as stone jack arches, tapered window openings and use of stone masonry for load-bearing walls) were common in southeastern South Dakota (Noble and Cleek 1995:193-200, USDOI 1987:2).

3.8 Region 7: Northern Maritime

3.8.1 Geography

The Northern Maritime region includes much of the American land adjacent to the Great Lakes. This includes eastern Minnesota, northern Wisconsin, and all of Michigan excluding the south central portion. Historically, the region was largely forested, with some transitional regions approaching the plains and prairies to the south. The terrain is heavily glaciated, excluding the Driftless Area subregion in the southwest.

3.8.1.1 Northern lakes and forests

The Northern Lakes and Forests region extends from north-central Minnesota, across northern Wisconsin covering the entirety of Michigan's Upper Peninsula, as well as the top half of the Lower Peninsula as far south as Saginaw Bay, while excluding the northwestern coast of the Lower Peninsula on Lake Michigan, which is occupied by North Central Hardwood Forests. This North Central Hardwood Forest region continues on the other side of Lake Michigan into both Wisconsin and Minnesota, covering the area south of the Northern Lakes and Forest region, whereas the area to the north of the region is occupied by the Upper Great Lakes of Superior, Huron, and Michigan. The region is part of the Podzol group, which consists of sandy and loamy glacial drift and is characterized by its grayish, ash-like properties. These "relatively nutrient-poor glacial soils" make it less suitable to crops than surrounding regions (USEPA 2013:10). Further hampering crop viability is the region's harsh winters, with a mean annual temperature that ranges from approximately 35 to 43 °F. Mean annual precipitation in the region is 768 mm, ranging from 500 to 960 mm. Due to these reasons, there is lower agricultural production in this region compared to areas to the south, with products in this region mostly being hay, grain crops and dairy cattle. In addition to the soil, there are other typical markers of glacial activity including moraine hills, till plains and washout plains full of glacial sediment. The region contains many water features, including wetlands, lakes, and moderate to low gradient perennial streams. The forests native to this region are coniferous and hardwood and due to the challenge posed to agriculture, these forests make up "the predominant land use/land cover" in the region (USEPA 2013:10). Prior to disturbances by modern development, the Boreal Forest occupied much of northern half of this region, although now is confined to the northernmost portions of Minnesota, and consists of white spruce and balsam fir, much of which has been replaced by post-logging second growth of aspen and white birch. Much of the region is occupied by Northern Mesic Forest with "mixed conifer and hardwood forest, which includes hemlock, yellow birch, aspen, sugar maple, beech and red oak" (Benchley et al. 1997:19). The majority of the region has average elevations between 200-400 meters above sea level, although there are regions of higher elevations ranging up to 700 meters above sea level, especially in northern Minnesota, northern Wisconsin, and Michigan's Upper Peninsula (Commission for Economic Cooperation 2011:33-34, Shannon 1944:12, USEPA 2013:10).

3.8.1.2 Northern central hardwood forests

The Northern Central Hardwood Forests region extends from Central Minnesota eastward across the center portion of Wisconsin to the northwestern edge of Michigan's Lower Peninsula. This region is bordered to the north by the Northern Lakes and Forests region and to the south by a variety of eco-regions, including temperate prairies to the Southwest, the Driftless Area along the southern portion of the Minnesota-Wisconsin border, and glaciated features such as the southeastern Wisconsin Till Plains and the Huron/Erie Lake Plains, which is located along the southeastern portion of Michigan's Lower Peninsula. The region's soil is largely of the Podzol group, which has grayish, ash-like properties, however unlike the Northern Lakes and Forests region, the soil is more arable and fertile. Typical landforms in this region are "nearly level to rolling till plains, lacustrine basins, outwash plains, and rolling to hilly moraines," while water features include perennial streams, wetlands, and lakes at a lower density than in the Northern Lakes and Forests region, but with more nutrients (Commission for Economic Cooperation 2011:57). The better soil combined with longer and warmer growing seasons in this region compared to the Northern Lakes and Forest region contribute to more cropland agriculture, pasture and dairy operations. The mean annual temperature is between roughly 41 and 45 °F, with mean annual rainfall ranging between 600 to 890 mm. This regions natural vegetation largely consists of northern hardwoods of maple, beech and birch, but maple-basswood forests, oak-hickory forests and oak savanna can be found in this region as well (Commission for Economic Cooperation 2011:57, Shannon 1945:12, USEPA 2013:10).

3.8.1.3 Driftless area

The Driftless Area is a region on both sides of the Mississippi River, beginning in the very northwestern edge of Illinois and extending into northeastern Iowa, southwestern Wisconsin and southeastern Minnesota. This region is characterized by its hilly uplands, which are atypical for the region. Plateaus with sloping summits are dissected by steeper valley walls and bluffs. Rock outcroppings are common in the Driftless Area with shale, sandstone, dolomite, and limestone being the most common. The soil in the Driftless Area varies with the topography, with the valleys containing sandy outwash left by the melting glaciers and windblown loess, while upland areas have Podzol soils, which have grayish, ash-like proper-

ties. The region has many perennial streams but few natural lakes. The climate is characterized by warm summers and harsh winters, with mean annual temperatures ranging from 44 to 48 °F and with yearly precipitation ranging from 30 to 38 in. annually. Trees in the region are typically bur and white oak, while sugar maple, basswood, red oak, elm river birch, silver maple and ash are also common. Some flatter uplands are suitable for crop agriculture, including corn, soybeans, feed grains, and hay (Hart and Ziegler 2008:54, Shannon 1945:12, Commission for Economic Cooperation 2011:57-58).

3.8.2 Settlement history

The Northern Maritime region's first contact with Europeans came in the 17th century, when French explorers first penetrated into the Great Lakes in the 1620s. Early settlements of this region were located on waterways that served as the major mode of transportation. These settlements were largely for trading purposes through the construction of military outposts, with fur being the prized commodity, as well as missionary activity. Fort Pontchartrain d'troit was established in 1701, at the present day site of Detroit, and quickly grew in size, becoming the largest French settlement between Montreal and New Orleans by 1765 with a population of 800. After the conclusion of the Seven Years War in 1763, France transferred control of all territory east of the Mississippi to Britain, which included most of the Northern Maritime region. Most French settlers chose to remain while Britain banned the settlement of its own colonists in the region. The main impact of the territorial transfer was the large British military presence that entered the region, with similar goals as the French, protecting the highly lucrative fur trade. The British mostly reoccupied French forts, with Fort Mackinac serving as Britain's center of trade and administration for the remainder of the British rule. This rule continued after the territory was officially ceded following the American Revolution, with the United States not attaining control of the region until after the conclusion of the War of 1812 (Magnaghi 2016:7-12, Benchley et al. 1997:94-97,210).

American presence in the Northern Maritime region was initially largely focused on protecting the fur trade, with American forces occupying existing British forts and constructing new ones throughout the region. The fur trade remained a main industry of the region until the mid-19th century. Another industry that fostered settlement in the region was lead mining in the Driftless region of southeastern Minnesota and southwestern Wiscon-

sin. Starting in the 1820s and continuing until the mid-19th century, mining brought settlers from Missouri and the mid-south, as well as the British Isles, most notably Cornwall. Another resource of this region was the lumber available in pine and hardwood forests. Logging was a major industry throughout the region beginning in the 1840s, with logging mostly taking place along waterways, as rivers were used to transport the freshly felled logs to lumber mills that used moving water for their power. The completion of the Erie Canal in 1824 allowed transportation from New York City to the Great Lakes region and greatly increased westward migration and settlement. These settlers were from New England and New York, as well as some from Germany and Scandinavia. Many were farmers who commonly chose to settle in the margins of woodland and prairie, where it was easier to clear farmland but also have pastures for livestock. They were mainly subsistence farmers but also grew wheat as a cash crop. In the decades following the Civil War, settlement in the region increased rapidly, due to increased immigration from Germany and Scandinavia, with most of the Scandinavians coming from Sweden and Norway. Other groups of immigrants during this period were British, Irish, Belgian, Swiss, Belgian, Polish and Eastern European. Many of these settlers chose to establish family farms in rural regions, usually clustering in ethnic enclaves (Hart 1998:83, Shannon 1945:33,48, Benchley et al. 1997:197-198, Schlebecker 1975:89-90).

Industrialization mainly manifested itself in the Northern Maritime region this region through the railroad, which had a great impact on industry and settlement. First, it allowed lumber companies to exploit forests farther inland, where previous logging was kept mostly close to waterways for transportation. This led to the virtual depletion of the first growth forests of the region by the first decade of the 20th century. Railroads also opened up for settlement areas previously difficult to access. The more intensive logging of this period encouraged by railroad development created vast areas of recently cleared forest that was now open to farming. This led to the settlement of lands in Michigan north of the forty-fourth parallel and lands in Wisconsin and Minnesota north of the forty-fifth parallel, which had an “almost total lack of population” prior to 1860 (Shannon 1945:26). Industrialization also greatly increased sawmill capabilities as well as removing the need for placement along waterways (Hart 1998:83, Benchley et al. 1997:312).

A major trend throughout this region was the gradual shift away from subsistence and wheat cash-crop farming towards dairy farming in the latter

half of the 19th century. This occurred for a variety of reasons, one being that over time, wheat will reduce the quality of the soil making it an unsustainable long-term crop without inventions not available at the time. Farmers in Wisconsin and Minnesota especially began to turn to livestock raising when wheat became less profitable. Many regions of the state were unable to produce the good feed crops required for fattening hogs or beef cattle, but were able to produce the roughage that was conducive to raising dairy cows.[2] An added benefit of dairy farming was the large amount of manure produced that could then be used as fertilizer and even sold if there was a surplus. Technological advancements aided this shift to dairy farming, such as new breeds of dairy cows like the shorthorn, which were introduced in the middle of the 19th century and were good milkers as well as providing higher quality beef. Another technological innovation that aided this region's ascendency in dairy production was the refrigerated train car, first used in 1872. This allowed milk and other goods dairy goods like butter and cheese to be sold at greater distances. By the 1890s, dairy farming had become a significant industry in Wisconsin and Minnesota. According to the 1920 census, Wisconsin had become the leading diary producing state in the nation (Hart 1972:266,269; Schlebecker 1975:182; Shannon 1945:255-257).

3.8.3 Cottage industries

The major cottage industries in this region are those related to dairy farming. Many farmsteads produced their own butter using either vertical churns in which a pole was moved through the lid of the churn or horizontal churns that were operated by a crank. Those who did not produce butter directly on their farm often pulled their resources together with other nearby dairy farmers to form neighborhood cooperative creameries. By 1900, about 1,000 of Wisconsin's roughly 1,600 creameries and 450 of Minnesota's 650 creameries were cooperatives. Cheese, the other main good produced for market with milk, was occasionally manufactured in the home but was mostly confined to larger factory style operations that where pioneered in New York but introduced to Wisconsin as early as 1864 (Shannon 1945:256-259,335-336).

Prior to advancements in refrigeration technology, most butter produced in the region was kept and sold locally either directly from the farmer or

[2] Roughage is food that cows eat grazing pasture land, as well as harvested hay or corn silage, which is entire corn plant harvested while still green and chopped up to be stored for feed later.

through village stores. There was usually difference in quality from farm to farm, leading to the practice of many local buyers asking for butter by the name of the maker. This inconsistency in the quality of butter became a problem when the region became more integrated into the national market with the advent of the railroad and later refrigerated cars. The butter of the region was pejoratively referred to as "western grease" by eastern markets leading to various statewide organizations to form in the 1870s to spread best practices and ensure quality control. By the 1880s, the reputation of the regions dairy products was greatly improved in the eyes of eastern buyers (Shannon 1945:256-257).

Other cottage industries in the region include the production of quicklime in household kilns, especially in the Driftless Area or in other less glaciated areas. In Wisconsin, tobacco became a popular cash crop in the latter half of the 19th century (Benchley et al. 1997:199, Shannon 1945:118).

3.8.4 Typical farmstead components

Houses on farmsteads in this region were built with a variety of construction methods. Earlier settlers built houses out of log construction, a style imported directly into the Great Lakes from settlers from Scandinavia and Germany who brought log-building skills from their home countries. In some instances, no foundation was needed, while other log structures frequently used limestone and sandstone in the foundations, either under the corners and spaced out along the wall [For different log cabin layouts, see Typical Farmstead components section for the Ozarks]. The other main construction method of houses within the Northern Maritime region was frame construction, which became more common as logging and sawmill activity increased, especially after the initial period of settlement. Frame houses were usually constructed with similar foundations as log cabins, either pier or continuous fieldstone or sandstone, although during the late 19th and early 20th century, as concrete became widely available it was also used in foundations. In a 1948 survey of farmsteads in the Driftless Area, it was found that most houses had between 7 and 10 rooms, with the three most common typologies identified as: a T-shaped footprint, with three gabled ends being the most common; an L-shaped house with two gabled ends; and the asymmetrical cross type, which consists of four gabled ends and usually features a large front porch with heavy pillars. The main distinction between economic classes was in the form of construction used, with those in framed houses being seen as wealthier than those with log

structures. Often log structures had the corner notches trimmed and siding applied to conceal the logs and give the appearance of more wealth (Noble and Cleek 1995:4-5, Trewartha 1948:180).

The basic layout of the farmsteads in the Northern Maritime region varied depending on the terrain in which the farm was situated. For early settlers of this region, farmsteads were kept close to waterways as it was the primary means of transporting goods, as well as choosing transition zones between woodland and prairie as it was easy to clear for farmland and provided easy access to pastures and meadows for livestock. As the woodland was gradually pushed back by logging and new avenues were opened up by rail and road, settlement continued in a similar pattern, with common farmstead sites being in the newly created transition areas. Farm houses were either established close to the road, with 70% of farm houses in a 1948 survey of the Driftless Area being located near the road, with the remainder being positioned in the midst of other farm structures. One notable difference in this region is the layout of farms once the region began to specialize in dairy farming. In these farms, the dairy barn is typically the center structure rather than the farm house, with other structures, as well as fenced-in yards, surrounding the dairy barn in a circular pattern and the house located somewhat removed from the main nucleus. These fenced-in areas were created using a variety of fencing techniques. Somewhat unique to the Northern Maritime region was the stump fence, which was constructed by piling together tree stumps left behind by logging activity and leaves little trace today. More lasting fences that were popular in this region include the rail fence, the post and rail fence, and the barbed wire fence. The post fence was the most popular pre-barbed wire fence and consisted of field stones bases upon which split rails were stacked against each other at 120 degree angles to form a zig-zag shaped fence. The post and rail fence was formed by two or three split rails inserted into vertical timber posts, while the barbed wire fence only required posts and wire, making it the most popular fence after it introduction in the late-19th century. Farm features common in this region include gardens and orchards, which were found in 79% and 50%, respectively, of farmsteads in 1948 (Noble and Cleek 1995:170-174, Shannon 1945:33, Trewartha 1948:180-185).

Barns in the Northern Maritime region varied greatly depending on the era of construction, the purpose of the barn and even potentially the ethnic group of the settlers. In general, the size of barns greatly increased as the region began specializing in dairy production, with more barns having

dual hay storage/livestock purposes. The earliest and most simple form of barns used in this region were crib barns, which were of log construction erected on log or stone piers and were likely introduced directly into the region by Finnish and Scandinavian settlers. One variation of these is identified as the Swedish Barn, which features an elongated rectangular design, typically 27-28 ft wide and 60-62 ft long, with half of the barn being constructed of tightly fit hewn logs for cows while the other half is made of timber frame with vertical wooden side boards for hay storage. While identified by many as Swedish in origin, a recent study of ethnic barns in the northeast of Michigan's Lower Peninsula indicates that Polish and Finnish barns of this type are "virtually identical" to Swedish types, leading to a broader classification of "Baltic Cow-Hay barns" (McLennan 2006:11, Noble and Cleek 1995:62,72,110-111, Trewartha 1948:183-185).

The evolution in this region from barns with singular purposes towards dual hay-storage and livestock barns came in the evolution of several large barn types. The earliest of these was the three-bay threshing barn. Of English origin, this post and beam barn featured a central runway with bays of equal size on either side, with a hayloft for storage under a gabled roof. The foundation of these barns consisted of either a low stone foundation or individual rocks at the corners. In Wisconsin, these barns were commonly constructed with unhewn (or unshaped) log gables for air circulation or with a shed running along the side of the barn (Noble and Cleek 1995:77-78).

The raised barn and the foundation barn were two iterations of the basic English barn raised on a stone, or later concrete, windowless foundation in order to achieve two stories. The raised barn was commonly 30-50 ft wide by 600-100 ft long and was either built into a hillside, with the second story being accessible from the hill, or with an earthen ramp leading up to the second floor side wall. The foundation barn is very similar to the raised barn, except that the second floor of the foundation barn is usually completely inaccessible from the outside, with the only entrance usually being on the first floor. The foundation barn is particularly common in central Wisconsin (Nobel and Cleek 1995:81-82).

The Wisconsin Dairy Barn marks the culmination of the transition in farm construction towards highly specialized construction. These barns were typically 36 ft by 100 ft or larger, with gambrel or occasionally round roofs, and featured a second floor hayloft, rows of small windows and gable-end-doors. This type of barn was first prevalent around the turn of the century,

when it was actively promoted by the Wisconsin School of Agriculture for its ample light and ventilation compared to other barn types (Nobel and Cleek 1995:25,122).

Aside from specific barn types, several dairy-farming specific outbuildings became increasingly popular as the region transitioned towards dairy production at the latter-portion of the 19th century. The staple of practically every North American dairy farm was the silo, which was used to store silage as feed for winter months. The first solos were pit silos built in the early 1880s and were often dug in the interior of the barn itself. The first upright or tower silos appeared at the end of the 1880s, and by the late 1890s, the round silo became the trend, as the circular shape reduced air space, which could lead to spoilage. The earlier round silos were made out of a variety of materials. Wood silos used either the wooden hoop method, which involved boards being soaked and shaped to achieve the curve, or wooden-stave, which used vertical wooden boards secured by iron bands, which were used from 1894 onwards. Fieldstone silos are common where these stones were prevalent on the surface. Silos were also frequently constructed out of concrete block, which was common around WWI. Concrete was also used to make poured concrete silos, beginning in the early 20th century, made of stacked concrete rings. The cement stave silo, which used vertical cast concrete members surrounded by metal rings was "perfected by cement companies around 1906" (Noble and Cleek 1995:157-161).

Another dairy specific outbuilding was the milk house. This structure was typically a small rectangular gabled roof structure where the cows would be taken to be milked and where the milk was processed. These structures were usually located close to the barn but were sometimes attached to it, although this practice was unsanitary and later avoided (Noble and Cleek 1995:140).

Other typical outbuildings that can be found on farmsteads in the Northern Maritime region include springhouses, which were small stone structures built around a source of spring water to keep perishables cold. Summer Kitchens were small rectangular buildings with a large fireplace and chimney used for cooking during the summer months. Later versions featured a stove and pipe and were typically located near the main house and associated with Belgian, German and Finnish immigrants. Granaries were small rectangular gabled roofed structures used to store wheat barley, and oats. To protect the contents, these structures were usually double walled and placed on wooden,

stone, or concrete piers. They are generally associated with German and Scandinavian settlements. Corncribs, which were used to dry corn, were built with a variety of methods, with the earliest being small diameter unhewn logs, stacked together, while later corncribs were made out of lumber with slats for the drying process. These structures were usually built on log or stone piers and were typically built near the field, away from the main farm complex. Finally, the sugarhouse was a type of outbuilding commonly found in this region. These too were usually located away from the farm, near a grove of maple trees. Its main feature was a chimney and stovepipe, which was commonly built on a slope to allow for gravity to feed the syrup into the evaporator (Noble and Cleek 1995:140-155).

3.9 Region 8: Tallgrass Prairie

3.9.1 Geography

The Tallgrass Prairie region encompasses most of what is commonly referred to as the Midwest or Heartland. It covers the western half of Ohio, the northern two-thirds of Indiana and Illinois, the northern part of Arkansas where it meets the Ozarks region, the bottom halves of Michigan and Wisconsin, all of Iowa, the bottom and western half of Minnesota, and a small section of the eastern portions of the Dakotas, Nebraska and northeast Kansas where the Tallgrass Prairie meets the Great Plans. Most of the region occupies the central lowland of North America where the land has little topographic relief and is mostly flat with gently undulating terrain, and limited steeper slopes. The topology and geology of the region is greatly influenced by the glacial action of the last Ice Age (Pleistocene era), which resulted in the gently undulating terrain and productive soils (McKnight 1992:264). The glacial action significantly defined the drainage system of this area, with the northern part of the region widely covered in lakes, swamps and other water bodies, while the southern part experiences better drainage and thus less water features (Patterson 1989:11). The region comprises three subregions: the Great Lakes, the Till Plain, and the Dissected Till Plain (the Driftless Area is covered under the Northern Maritime region).

3.9.1.1 Great Lakes

The Great Lakes subregion covers the bottom half of Michigan, the southeastern section of Wisconsin and a small portion of northeast Illinois and northern Indiana and Ohio. The area is dominated by large and small

lakes scattered across the landscape, resulting from the glacial action during the last Ice Age. The landscape is marked by drumlins, eskers, outwash plains, and "the long irregular ridges of terminal moraines" (McKnight 1992:264).

3.9.1.2 Till Plain

The Till Plain subregion covers the western half of Ohio, the northern two-thirds of Indiana and Illinois, except for those parts contained in the Great Lakes subregion and Driftless Area subregion. In this subregion, at least three ice ages shaped the terrain into extremely flat and gently rolling as a result of glacial deposits. There are fewer lakes and water bodies in this area due to better drainage (McKnight 1992:265).

3.9.1.3 Dissected Till Plain

The Dissected Till Plain subregion covers the northern half of Missouri, Iowa, and the southern half of Minnesota. This area is covered with till from prior ice age glacial deposits, but has a greater degree of dissection from stream erosion that has modified the surface and resulted in a lack of lakes and moraines (McKnight 1992:265).

The Tallgrass Prairie region experiences a humid continental climate that can change abruptly and is characterized by distinct wet and dry seasons, with warm to hot summers and severe winters. Temperatures can range from -31 °F to 113 °F (Wiken et al. 2011). The lack of topographical relief results in weather throughout the region where "temperature and length of growing season increase more or less uniformly from north to south and precipitation generally decreases from east to west" (McKnight 1992:266). The area averages from 19.5 in. in the northwest to 39 in. in the southeast of rainfall and flooding is a common hazard in this area. The average growing season lasts 270 days (World Rangeland Learning Experience 2020).

The original vegetation in this area consisted of forests and grasslands. The oak-hickory southern hardwood forest extended across Ohio, Indiana, southern Illinois, southern Michigan, and southern Wisconsin. The forest gave way to prairie grass on the western portion of this region in southern Minnesota, Iowa, central Illinois, northern Missouri, and eastern Nebraska and Kansas. The prairie grass ranged in height from 1 to 3 ft, but

could grow as tall as 6 to 8 ft. Cottonwoods, oaks, elms and occasional sycamores and walnut trees were known to grow along streams in the prairie grass region (McKnight 1992:266).

The Tallgrass Prairie region is known for its rich, fertile soils, which combined with plentiful precipitation result in superior agricultural conditions. The Corn Belt, which extends across Indiana, Illinois and Iowa, into Nebraska and Kansas, has dominated corn production in the United States since the 1850s (Bada 2019). The area is also known as a top producer of livestock (beef, swine and dairy cattle), and agricultural production of winter wheat, soybeans, oats, and alfalfa and other hay crops. Commercial fruit growing also occurs in proximity to the Great Lakes (McKnight 1992:275). The region is dominated by Alfisols (mainly in the eastern portion), which are gray-brown in color, usually moist and have subsurface clay accumulations, and Mollisols (mainly in the western portion), which are rich in organic matter and bases, and black, chestnut brown or brown in color (McKnight 1992:267, Patterson 1989:33).

3.9.2 Settlement history

French fur traders were the first Europeans to explore and enter the Tallgrass Prairie during the 17th century and early part of the 18th century. The early fur traders explored and mapped the major waterways in this area and eventually established settlements for trading posts, forts or missions along waterways that connect the Great Lakes with the Mississippi and Ohio Rivers (Hart 1972:259). Settlements were established in Cahokia and Kaskaskia, in Illinois in 1699; in Vincennes on the Wabash River in 1701; a French Fort was built in what is now Detroit in 1701; and St. Louis was founded in 1764 as a French trading post (McKnight 1992:267-268). In 1785 and 1787, the first U.S. Congress set up ordinances to provide for the systemic survey and disposition of lands in this area. “A grid system, based on principal meridians and baseline parallels, was staked out to divide the entire area into a township and range pattern, a township to consist of 36 sections of 640 acres (one square mile) each” (McKnight 1992:268). This enabled land prospecting where European settlers from the east could purchase land sight-unseen. This surveying system is still evident in the landscape of the Tallgrass Prairie region to this day.

The Ohio River system was a major conduit for settlement into the area, with major cities being established along the way including Louisville in 1779, and Cincinnati in 1789. Major settlement did not occur until after

1794 when the local Native Americans were driven out of the area (McKnight 1992:269). Settlement in the Tallgrass Prairie region originated from three major entryways: Scotch-Irish frontiersmen from the Upland South who came over the Cumberland Gap; Europeans from the mid-Atlantic states traveled both by boat and along the National, or Cumberland Road through Pennsylvania to Ohio; and New Englanders and New Yorkers, including Puritans and immigrants from Germany and Scandinavia, who traveled the Erie Canal and Great Lakes (Hart 1972:260). Settlement in Indiana and Illinois expanded rapidly following the War of 1812, with settlers following the major river valleys and ports on the Great Lakes, such as Chicago founded in 1816 and Toledo in 1817 (Hart 1972:261-262, McKnight 1992:270). Land away from the waterways was settled more slowly as settlers viewed these areas as less attractive either because they were too flat and thus difficult to drain, or not flat enough for farming (Hart 1972:261-262).

Settlers initially tended to prefer land that was forested or adjacent to forest land as this indicated good soil conditions. Early settlers found it difficult to farm the heavy soil of the prairie, until John Deere invented the steel plow in 1837, which allowed farmers to farm the deep prairie soil resulting more easily in excellent crop yields (Meinig 1993:229). As a result, Illinois, Missouri, southern Wisconsin and southern Iowa were almost completely settled by 1850 (McKnight 1992:270). By the time the Homestead Act was passed in 1863, most of the Tallgrass Prairie had been settled by people of northern and western European descent, who farmed corn, small grains, hay and raised livestock. Only Minnesota had any significant amount of homesteading (Hart 1972:258). Agricultural development in the area began as “cash-grain” farming where farmers sold their corn and oats instead of using it as feedstock (Patterson 1989:271). Good agricultural land was used for crops and non-ideal areas, such as hills, low-lying wet areas or near streams were used for livestock.

The Civil War resulted in significant advancements in farming technology in the north as farmers needed laborsaving devices to replace the men who went off to fight. After the Civil War, machinery grew more important to northern agriculture with regular improvements and advancements in technology that allowed the scale of agriculture to increase immensely. “By 1880, a self-binding reaper had been perfected…Threshing machines were also being improved and enlarged, and after 1870 they were increasingly powered by steam engines, rather than by horse” (Conrat and Conrat

1977:98-99). The dark side of mechanization was that many farmers had to literally "mortgage the farm" in order to purchase the equipment needed to keep up with farming trends. By the end of the 1920s, "a large percentage of the nation's farmers no longer owned the land they worked. Tenancy rates were exceptionally high in the specialized cash-crop areas of the country….in the wheat and corn belts, approximately two-fifths" of farmers were tenants (Conrat and Conrat 1977:124).

European settlement really picked up in the 1880s, and continued through the 1920s. One-sixth of settlers were foreign-born and generally came from eastern and southern Europe and thus were significantly different from prior generations of emigrants. Settlers during this period generally settled in urban areas (McKnight 1992:270, Hart 1972:263-264). The Great Depression of the 1930s in combination with drought and duststorms in the plains, hit farmers hard and by the end of the 1930s, "half a million farm families, mostly tenants, had been forced off the land. A million more were barely hanging on—many living in hopeless poverty" (Conrat and Conrat 1977:124).

Although not the leading economy in the region, the Tallgrass Prairie was the leader in crop production in the United States, and had the greatest concentration of agricultural counties in the United States (McKnight 1992:270-271). The rectangular system of land survey, or the grid system, greatly influenced the size of family farms in the Tallgrass Prairie region with minimal acreage purchase requirements (160 acres in 1804, 80 acres in 1820, and 40 acres in 1832) by the Land Office. Farms were typically family-owned and operated, of modest size (a few hundred acres), highly mechanized beginning after the Civil War, productive and engaged in mixed commodities of both crops and livestock. Corn was the dominant crop in the region, with much of the output used as feedstock for livestock (McKnight 1992:271, Hart 1972:264-265). Mixed farming often used fences to keep livestock out of crop fields, but as livestock farming decreased, so too did the use of fences. The size and boundaries of farm ownership units remained "remarkably stable" from the time of sale until the start of World War II (Hart 1972:264-265). Livestock farming was more predominant in the western half of the region, particularly in Iowa, although Indiana had a strong swine-based livestock economy, and Wisconsin was known for its dairy farms (McKnight 1992:277-278).

Even though agriculture consumed most of the land in the Tallgrass Prairie region, manufacturing was the primary economy in the region beginning in the late 1800s. The Midwest was the "preeminent industrial region" in the United States for many decades (McKnight 1992:281). The American "Manufacturing Belt" occupied most of the Tallgrass Prairie region (and extended to the Atlantic seaboard), with the automotive industry located in southern Michigan, the iron and steel industries of Chicago, Northern Indiana and Milwaukee, meatpacking industries in Chicago, flour milling in Minneapolis and Kansas City, and farm machinery in Illinois, Iowa, and Minnesota (McKnight 1992:287-88).

3.9.3 Cottage industries

Ceramic production was one of the early cottage industries in Illinois and Indiana due to the abundant supply of quality clay throughout t that area. Illinois became a major ceramic-producing state by the middle to late 19th century (Mansberger 2001:46). Early potters during the 1810s and 1820s produced redware utilitarian ceramics. "These early redware workshops were organized around skilled craftsmen as well as the seasonal agricultural cycle" with early potters often "considered farmers and secondarily as potters" (Mansberger 2001:46). These family operated ceramic workshops were often incorporated into the working farmstead and a "small frame or log workshop and associated kiln were often located within the farmyard" (Mansberger 2001:46). Redware pottery gave way to stoneware in the later 1800s and production became primarily industrialized by the 1900s (Mansberger 2001:46).

Some farmers located near the Great Lakes also engaged in fruit production, primarily apples but also other fruits. The eastern shore of Lake Michigan, in particular was a "highly specialized fruit farming subregion" within the Midwest (Hart 1975:150). Orchards of varying sizes were not uncommon on farmsteads. Settlers from New England who migrated to the Tallgrass Prairie in the early part of the 19th century also supplemented their income by producing maple syrup. Production would include a sugar house—a small house about 10 by 18 ft with a single room containing a firebox, a chimney, and an evaporator pan (Noble 1984:99).

Within the dairy belt area of the Midwest, in Wisconsin and part of Michigan, farmers supplemented their income by selling dairy products such as cheese and butter. Small crossroad cheese factories began appearing in Wisconsin in the 1860s and soon evolved into a network of cheese factories such

that any farmer was within two to three miles of a factory (Patterson 1989:276-77). Cheese factories and creameries were common in the small rural service centers scattered throughout farming areas (Hart 1972:269-271). Farming families often used their existing kitchens to produce cheese.

In the early to mid-1800s, "a substantial part of the farmer's cash income comes from his own herds of hogs" (Walters 1999:29-30). Hog sheds and chicken houses were built for shelter of these animals and may be present on early farmsteads. Crop and livestock farming were common in the eastern portion of the Tallgrass Prairie region, but gave way to cash-grain farming as farm machinery made it easier to access the rich soils of the prairie for crop farming in the second half of the 19th century.

3.9.4 Typical farmstead components

Three main types of farms were associated with the predominant type of farming found throughout the Tallgrass Prairie region: combined crop and livestock farming in the eastern part, which gave way to cash-grain farming throughout most of the south and west portion of the region, and dairy farming found throughout the northwest part of the region in Wisconsin and Minnesota. Crop-livestock farmsteads in the eastern section were typically small, averaging 80 to 100 acres, and simple, with a house, one large general purpose barn, corncribs, fallowing sheds and other small support buildings. Fields were typically fenced to keep livestock out of the garden and crop fields, and the farmstead may have had a rectangular woodlot left over from the forest that covered the area when settled (Hart 1972:269-271). As settlers moved west, crop-livestock farmsteads grew larger, averaging around 160 acres per farm, and more complex with multiple buildings for shelter and storage of corn, oats, hay, cattle, hogs and farm machinery. Most farmsteads included an old horse barn that had been converted for general storage and a steer barn that opened into a fenced feedlot; there were a wide variety of other buildings on the farmstead including a large corncrib, granary, machine shed, and repair shop. Many farmsteads typically had windbreaks to shelter them from fierce north and west winds (Hart 1972:269-271).

Cash-grain farmsteads were the second type of farmstead found in the region and were primarily located in the western part of the region, averaged the most acreage (around 200 acres) but had the smallest and simplest farmsteads. Land was reserved for growing crops rather than infrastructure and these farmsteads often had wooden corncribs, or granaries, for storing

corn and soybeans, but no large barns or machine sheds. With no livestock on the farm, fields were unfenced and the use of windbreaks were common (Hart 1972:269-271). Crop-livestock and cash-grain farmsteads in the Tallgrass Prairie region tended to favor English barns, which had a "central floor area or runway with two spaces of roughly equal size on either side," and sometimes, a hayloft above the bays (Noble 1984:16). English barns served as single function barns, which made them highly suitable for the single-crop agriculture and minimal livestock farming of the Corn Belt area (Noble 1984:57). Additionally, they did not require a dugout foundation for a basement, which made them ideally suited to the often poor drainage conditions found in the Tallgrass Prairie region. They were commonly constructed with a stone foundation, wood walls, and a wood roof.

Dairy farms were the third type of farmsteads found in the Tallgrass Prairie region. These farmsteads averaged about 120 acres and were marked with large, "imposing" barns (typically 36 ft wide and often 100 ft or more long) that had large lofts for hay storage and "sturdy masonry ground floors with numerous windows to admit light and air" where cattle were tied to stanchions for milking, and fed from cylindrical silos that tower at one end of the barn (Hart 1972:269-271, Noble 1984:45-46). Originating around the end of WWI, the Wisconsin Dairy Barn was designed to accommodate livestock and store crops, and was more prevalent in northern Illinois, Wisconsin and parts of Minnesota (Noble 1984:61). In some instances, an earthen drive ramp was constructed to allow access to the loft for direct loading or machine storage (Noble 1984:45-46). Fields in these areas were fenced to contain the livestock. The predominant type of fencing in the region during the latter half of the 19th century was a worm fence, with board fence also popular in Illinois, Wisconsin, and Iowa (Department of Agriculture 1871:507).

Farmsteads evolved over time as well. The typical Tallgrass Prairie farmstead of the 1840s was located on prairie close to the forest line, with the house sited in the area of highest elevation, typically a low hill. The house was made of log, sometimes frame construction, and intended only for temporary occupation until a more permanent house could be built. A small three-bay barn, made of local hardwood, was built between the house and road, a garden and crop fields were fenced with horizontal planks, split-rail fencing and/or Osage Orange hedgerows, a keyhole type cellar for food storage (probably unlined) was dug nearby, and the farmer "encouraged the extension of woodland by planting black locust saplings

near the edge of the timber and protecting them with a ditch from prairie fire" (Walters 1999:29-30). Missing from the farmstead in the 1840s were privies and permanent corncribs. "Both the house, barn, and field lines are shown with an approximately ordinal orientation…and, other than field lines, building orientation may have been largely determined by topography" (Walters 1999:29-30).

Typical Tallgrass Prairie farmsteads changed significantly, and began to function as a status indicator reflecting greater available income with substantial capital investments in structures and fences by 1880. The original log cabin was often moved to the rear of the new wood framed "I-house" built on a foundation of Oolitic limestone brought in by rail from quarries in the Illinois River Valley, or locally-burned brick. The house contained a kitchen, parlor, dining room, and central hall on the first floor with family bed chambers on the second floor. The log cabin served as a dwelling for hired help (Walters 1999:31-32). The original small barn was moved to the rear of the farmstead to allow for a clearly defined barnyard and a large multipurpose structure, or "horse barn," for equipment storage, grain and hay storage, and livestock. Crops were stored in a large, barn-sized central-passage corn and, if needed, in temporary rail fenced cribs. Domestic functions of the household were becoming separated from the agricultural functions indicated by additional buildings located onsite including a separate summer kitchen, dome-roofed brick cellar (one of many possible cellar designs), privy and other small support buildings. Changes in fencing laws meant livestock pens were now fenced and fields were open, although many farms still retained their field fences. Railroads provided access to regional lumberyards making fencing material readily and easily available, and in turn made tree groves on the farm redundant. Gardens were still present on the farmstead. New to the farmstead landscape by 1880 were orchards, straightened, hedge-lined walkways to the house, separate access for the house and barnyard, and locally manufactured draintile (Walters 1999:32).

By 1920, the farmstead reflected greater prosperity with a new house—a "Cornbelt Cube or American Foursquare" made of concrete blocks and brick or wood veneer. The house was centrally heated "and identical in form and function to urban houses built at the same time," with indoor plumbing (Walters 1999:33). The old privy was kept for use by farmhands. Concrete was used widely on the farm: in the house construction, locally-formed fenceposts, paved driveways, barnyard, and new concrete floors in barns. Support structures were still present, including Osage Orange hedgerows,

cellar, and existing outbuildings, although many were extensively rebuilt, and new additions included a windmill for pumping water (Walters 1999:33, Noble 1984). Through World War II, farmsteads in the Corn Belt region continued to reflect the general prosperity of the region, typically defined by two-story, average-sized houses with basements, average-sized barns without hay storage, and numerous outbuildings including hog houses, poultry houses, corncribs, machine sheds, and garages. Farmsteads in the Dairy region of the Tallgrass Prairie were similar to the Corn Belt region except they typically had larger houses, their barns had storage for hay, and silos and granaries were more common (Trewartha 1948:220).

3.10 Region 9: Oak Woodlands/Ozarks[3]

3.10.1 Geography

The Oak Woodlands/Ozark region occupies much of southern Missouri, the northern portion of Arkansas, the western half of Tennessee and Kentucky, southern Indiana and Illinois, and extends into eastern Oklahoma and Texas. Much of the region is rugged and mountainous, with elevations ranging from 80 to 560 meters above sea level. Large portions are covered by forests, where pine dominates valleys and hillsides as well as along rivers, while oak was more predominant in the uplands. Other tree types in the region include black walnut, cherry, and sassafras. Due to vast wooded areas, wild game was abundant in the region prior to deforestation. Several rivers run through the Ozarks, with the largest being the Missouri River, which runs along the northeastern edge of the region, with another major river being the White River runs through the southern portion. The region as a whole has only marginal agricultural soil, with the uplands and river bottomlands possessing higher quality agricultural soil while the hillsides had poorer, thin, and stony soils. Especially on these hillsides but prevalent throughout the Ozarks region is the abundance of sandstone found on the surface. The Ozarks have hot summer and mild to severe winters with the mean annual temperature in the region ranging from approximately 54 °F to 59 °F. Rainfall in the region ranges from 40 in. to 48 in. annually (Enscore et al. 2005, Commission for Environmental Cooperation 2011).

[3] A more detailed context for this region can be found in Enscore, Susan, Suzanne Keith Loechl, Megan Weaver Tooker and Stephanie L. Nutt. *A Landscape Approach to Determining Significance of 19th and 20th Century Farmsteads and Rural Communities, Fort Leonard Wood, Missouri*. ERDC-CERL SR-05-33, Champaign, IL: ERDC-CERL, 2005.

3.10.2 Settlement history

The earliest settlement of the Oak Woodlands/Ozark region by EuroAmericans began in late 18th and early 19th centuries and was mainly focused along the Missouri River. This first wave of settlement in the region was mainly comprised of settlers of Scots-Irish descent who migrated west from Tennessee and Kentucky. These early settlers were largely hunter/gatherers or lumberman but subsistence farming soon began in the area. Farmsteads were initially settled in valleys or hollows or along river bottoms. Also located close to the rivers were grain and saw mills, the first industry in the area (Enscore et al. 2005).

The Civil War had drastic effects on the Oak Woodlands/Ozark region. Conflict in the region was general characterized by the use of guerrilla tactics and the eventual occupation by Union forces. This method of warfare saw the desolation of much of the landscape, including the pillaging and destruction of houses, crops, and livestock. The harsh nature of the conflict led to many of the remaining families in the area to abandon homesteads in favor of larger settlements, which afforded more protection. Many also chose to simply leave the area and move to northern states to escape the violence (Enscore et al. 2005).

Following the Civil War, many chose not to return to the Ozarks and rebuild from the destruction of the war. The area was soon repopulated, this time with new settlers from southern Indiana and Illinois, which were predominantly white, much like the earlier settler population. It was during the latter half of the 19th century that the upland prairies in the Oak Woodlands/Ozarks were fully settled. The clearing of wooded areas in the Ozarks during the latter half of the 19th century and early 20th century served the dual purpose of creating new farmland as well as use as railroad ties, with tie-hacking becoming a major industry during this period and into the early 20th century (Enscore et al. 2005).

Greatly contributing to this increased settlement of the uplands were advancements in agricultural practices, such as new farm machinery. These advancements also contributed to a general switch away from subsistence to cash-crop farming. This was further helped along by periods of increase demand, for example, cultivation of wheat and corn increased during WWI to fulfill the greater needs. Cattle farming also grew in prominence during this period, requiring many farms to be fenced in to allow grazing, with the most common fences being of wooden post and wire construction (Enscore et al. 2005).

3.10.3 Cottage industries

The earliest industry present in the Oak Woodlands/Ozarks region came towards the beginning of the EuroAmerican settlement of the region in the early 1800s, with the creation of gristmills and sawmills to process and refine raw materials to be used or traded. These mills were located along running water, which they used as their primary source of power. Mills were present in the area as early as 1820 and use persisted throughout the region into the 1920s (Enscore et al. 2005).

As railroad construction in the region increased following the Civil War, many farmers began to turn to tie-hacking as a source of supplementary income. Trees would be felled and processed into railroad ties during free time not devoted to subsistence farming. The clearing of wooded areas was also driven by a need for more farming land as new farming technology in the late 1800s allowed for increased agricultural production, with the profits produced by railroad ties being an added bonus. Non-farmer tie-hacking operations were also present in the area. The most common method of transportation of railroad ties were along waterways, with log-slides sometimes being employed. Tie-hacking and other lumber harvesting activities were the major cottage industry in the Oak Woodlands/Ozarks until the 1920s. Tie-hacking as an industry in the region began to die out by the 1920s, but damage to the environment in the Ozarks region was quite severe. Large deforested areas resulted in uncontrolled erosion, which further deteriorated the already marginal soil of the region. So dire was the environmental damage to the region that large portions of the Ozarks were purchased by the National Forest Service for conservation purposes in the 1930s (Enscore et al. 2005).

3.10.4 Typical farmstead components

Construction methods in the Oak Woodlands/Ozark region featured a combination of both English and German material culture, absorbed by the Scotch-Irish who first picked these traits up in the Mid-Atlantic from previous settlers before taking these practices westward, first into the rugged wooded regions of Appalachia before moving farther into the Ozarks region. This blend of material culture featured English dwellings, mainly the standard 16-ft-square module, with German construction methods, such as the use of roughhewn logs with flat interiors for houses, with unhewn logs for barns and outhouses. Logs were the main building material for much of the construction within the Oak Woodlands/Ozark region,

with pine and oak being the most used wood due to their abundance, straight grains, durability, and workability. Fieldstones were another common building material used in many structures. These pieces of sandstone found on the surface throughout the Oak Woodlands/Ozark region were used frequently in foundations, in the form of either piers at each corner or a continuous stone foundation running the perimeter of the structure. Log barns often used continuous foundations, which would usually be 2-3 ft thick, 18 in. below the frost line, and extend 1 or 2 ft above ground level. Other uses of stone were in exterior chimneys, fireboxes, doorsteps, wells, well covers and fruit cellars. Concrete was also used as foundations; however, it was more expensive than the plentiful fieldstones and was only available in the area beginning from 1910-1920 (Enscore et al. 2005).

The typical form of housing in the Oak Woodlands/Ozark region was one-story log cabins made with roughhewn or square logs. The simplest of these was the single-pen house, which featured the near universal dimensions of 16 or 17 ft on a side. These structures featured a gabled roof, with the fieldstone chimney being built along one of the gabled sides and the doors being placed on a non-gabled side. These single-pen log cabins were usually the initial structure built on a site and were thus commonly added upon, either being reconfigured into another cabin type or featuring shed additions placed along the exterior of the structure (Enscore et al. 2005).

The double-pen house was another common structure in the region that used log construction. It was a single story with a gabled roof covering two similar-sized rooms, each with an exterior door, chimney at the end gables, and an interior door joining the two rooms. The double-pen house could be created by adding an additional room to a single-pen house; however, in most cases the entire structure was built simultaneously (Enscore et al. 2005).

The saddlebag house resembled the double-pen house, in that it consisted of two rooms of similar size placed adjacent to each other. However, the saddlebag house featured only one chimney, which was located in between the two rooms. The central location of the chimney created a gap between the two rooms, which was often covered with boards to provide better insulation. The saddlebag was frequently made by the addition of another room to a single-pen house (Enscore et al. 2005).

The dogtrot house was the most common type of log house constructed in the region. It featured a single gabled roof that spanned two unconnected,

equally sized pens, each with a chimney at the gabled end. This created a centrally located roofed area in between the two pens that could be used during the hot summers. For this reason, the dogtrot house was a very popular method of expanding a single-pen log cabins in the region (Enscore et al. 2005).

Varying levels of wealth were often displayed in the housing practices of the region. For log cabins, this was mostly seen in the use of wood siding, which the more affluent residents could acquire from local sawmills, beginning in the latter half of the 1800s. The most easily identifiable distinction of wealth came in the method of construction. The I-house was a form of housing popular with affluent farmers that was built using frame construction rather than the log cabin method. These structures were usually two stories tall, one room deep and two rooms wide, with chimneys on one or both ends of the gabled roof. The one-room depth provided good cross-ventilation, which kept the house cooler in the summers, helping to make it the most common folk house type throughout the Upland South in the nineteenth and into the 20th century. The I-house was also favored by wealthy residence for its wide front façade, which gave the appearance of a far larger structure. Most had additions added to the back of the structure (Enscore et al. 2005).

The basic layout of farmsteads in the Oak Woodlands/Ozark region largely depended on geographical location. Those farms settled close to running water or in hollows, which was common in the early phase of settlement, usually were in a linear layout with the house being closest to the water or in the lowest point, with barns, followed by other outbuildings being placed farther up the slope. In many cases these linear farmsteads were formed adjacent to one another. Near headwaters, linear farmsteads were often arranged in a fan-shaped pattern, with the houses being grouped closer together at the bottom and fanning out as the farmsteads continued uphill. Upland areas, which were usually settled later, featured circular or semicircular farmstead layouts. At the center of these farms was the farmhouse, surrounded by an inner ring of multifunctional sheds, such as chicken houses, smokehouses, and also wells and vegetable gardens. The outer ring featured outbuildings like barns, animal pens, corncribs, and root cellars (Enscore et al. 2005).

Outbuildings in this region varied greatly in size and construction method over time. Barns were typically the largest structures on a farmstead, however during the initial period of settlement these structures were typically smaller and often had multiple purposes such as storing hay or grain in addition to housing livestock. The single-crib barn was one of the earlier barns used in the region. It was constructed out of logs with a dirt floor and size varied from 16 to 40 ft long. Often the central log structure housed hay or grain and was frequently surrounded by sheds of frame construction that would house livestock. The double-crib barn was also built with log construction and resembled a dogtrot house, with one gabled roof covering the two separate cribs, which usually ranged from 16x16 ft to 9x16 ft. The opening between cribs was usually about 10 ft wide and often served as a threshing floor. In early years of settlement, one crib would house hay or grain while the other would be used to house animals. Similar to the single-crib barn, additions of frame construction were frequently added to the exterior (Enscore et al. 2005).

As farming practices shifted from subsistence to cash crops in the latter half of the 19th century, larger barns were needed, with a popular variety in the region being the transverse. These barns were mostly built with a timber frame, however as timber became scarce, plank lumber was also used beginning in the late 19th and early 20th century. These barns featured a gabled roof and a long central passageway that ran through the barn, which allowed wagons or trucks to enter. Around this passageway were stables or storage area for hay or crops. Like the other barn types, framed shed additions were commonly added along the sides of the barn (Enscore et al. 2005).

Barns were not the only outbuildings found on farmsteads in the Oak Woodlands/Ozark region. Corncribs were built by the first settlers using the single-crib design, featuring a small rectangular design and was built with logs. These structures were usually built on the outskirts of the farmstead, closer to the fields. As agriculture increased in the region towards the latter half of the 19th century, so too did the size and variety of corncribs. Smokehouses were another form of outbuildings common in the Ozarks. Salt was the favored method of curing meat as opposed to smoke so many of these structures were built close to the house for easy access and were commonly used as a pantry as well. Smokehouses were frequently built out of logs with a rectangular floor plan, the average size being 12 by 14 ft. Pig farming originally started as sustenance farming, however also developed into a cash crop, with excess pigs being driven to rivers to be processed and shipped to

population centers. Springhouses or well houses were another typical outbuilding in the Ozarks. They were constructed out of log or stone and provided a cool, sanitary area to store perishable goods. In general, outhouses were built with poorer construction methods and materials, creating the need for frequent replacement (Enscore et al. 2005).

3.11 Region 10: South[4]

3.11.1 Geography

The South encompasses much of the southeastern United States including large portions of Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, southern Arkansas, and eastern Texas. The terrain is low and mild compared to the adjacent Appalachian Region to the north and west. The climate is subtropical and there are a high degree of perennial rivers and streams, which increases the region's agricultural potential.

3.11.1.1 Piedmont

The Piedmont subregion runs northeast by southwest and covers central Maryland, central Virginia east to Richmond, central North Carolina, western South Carolina, northern Georgia and portions of east central Alabama. It is a transitional zone from the mountainous Appalachians to the relatively flat coastal plains, consisting of mostly low hills with irregular plains and moderately dissected irregular plains at elevations ranging between 350 to 1,000 ft above sea level. There is a high degree of flowing water in the Piedmont with many perennial streams and several large rivers that flow through it. The geography in the subregion in diverse, including Precambrian and Paleozoic metamorphic and igneous rocks with some sedimentary rocks in Maryland and parts of Virginia. The soil composition is mostly Ultisols and are of a finer, more claylike consistency compared to the sandy coastal soils. The subregion was once largely cultivated, but in some areas has now reverted to Appalachian oak forests in Maryland and parts of Virginia and forests of oak, hickory and pine throughout the rest of the subregion. In areas where erosion has not taken a toll, the subregion has suitable agricultural land for a variety of crops, the most common historically being cotton, corn, tobacco, and wheat. The Piedmont has hot, humid summers

[4] A more detailed context for North Carolina, South Carolina, and Georgia is in Enscore, Susan I, Carey L. Baxter, George W. Calfas, and Megan W. Tooker. *Regional analysis of historic farmstead archeological site characteristics on DoD installations*. ERDC-CERL TR-14-11. Champaign, IL: ERDC-CERL, 2014.

and mild winters with little snow and average mean annual temperatures of 55 °F in the north and 63 °F in the south. The annual precipitation is 51 in., distributed evenly throughout the year (Commission for Economic Cooperation 2011, USEPA 2013).

3.11.1.2 Southeastern Plains

The Southeastern Plains extends from southern Maryland east of the Chesapeake in a southwestern arc between the Piedmont and Coastal Plains subregions of Virginia, North Carolina, South Carolina, Georgia, and including the northern panhandle area of Florida, the southwestern half of Alabama, and the eastern half of Mississippi. The terrain consists of dissected, rolling to smooth plains with elevations less than in the Piedmont while greater than the Coastal Plains. Natural lakes are uncommon although there is a large amount of perennial streams and rivers. The regions geological makeup consists of mostly Cretaceous or Tertiary-age sands, silts, and clays. The natural vegetation was mainly longleaf pine with some forests of oak, hickory, and pine, while in the southern portions some mixed forest of beech, sweetgum, southern magnolia, and laurel and live oaks. Agricultural crops raised in the region include corn, cotton, soybeans, peanuts, onions, sweat potatoes, melons, tobacco, poultry, and hogs. The climate is subtropical with hot summers, mild winters, and average annual temperatures of 54 °F in the north and 66 °F in the south. The average annual rainfall is 53.5 in., distributed evenly throughout the year (Commission for Economic Cooperation 2011, USEPA 2013).

3.11.1.3 Southeastern Coastal Plains

The Southeastern Coastal Plains spans from Maryland to the southeastern tip of Louisiana and includes the entirety of Florida except for the Southeastern Plains in the northern half of the panhandle. The region consists of flat plains of low elevations, with many low gradient streams and rivers, lakes, swamps, marshes, and estuaries. The soils of the region are Ultisols, Spodosols, Entisols, and Histosols, which are typically coarse, although areas of finer textured soils appear in the north of the subregion. The natural vegetation was once mostly longleaf pine in the north and longleaf-slash pine forests in the south. Agricultural crops produced in the region include wheat corn, soybeans, potatoes, cotton, blueberries, peanuts, chicken, turkey, and hogs in the northern portion with beef cattle and citrus produced in the southern part. The climate is subtropical with hot humid summers

and warm to mild winters, with annual mean temperatures and mean annual temperatures of 57 °F in the north and up to 72 °F in the south. The mean annual precipitation of 51 in. (Commission for Economic Cooperation 2011, USEPA 2013).

3.11.1.4 Mississippi River Valley

The Mississippi River Valley subregion contains the area on both sides of the Mississippi River including eastern Louisiana, southeastern Arkansas, and the western half of Mississippi. The subregion has broad alluvial plains to the west with some gently rolling hills and bluffs along the Mississippi in eastern parts. The Mississippi River is the dominant hydrological feature although there are also many smaller perennial streams and some lakes. The geological makeup consists of thick deposits of Tertiary sand, silt, and clay in the east while Quarternary deposits of sandy to clay alluvium are found in the west. Soils are commonly Alfisols, Vertisols, Inceptisols, Entisols and Ultisols, of a thermic temperature regime and udic and aquic moisture regimes. The natural vegetation was bottomland deciduous forests in the west and forests of oak, hickory, loblolly pine, and shortleaf pine. Crops grown in the region include soybeans, cotton, wheat, hay, and rice. The climate is subtropical with mild winters and hot, humid summers, yielding a mean annual temperature between 63 °F and 70 °F. The mean annual rainfall is roughly 55 in. (Commission for Economic Cooperation 2011, USEPA 2013).

3.11.1.5 The South Central and Coastal Plains

The South Central and Coastal Plains subregion includes the South Central Plains of eastern Texas, southeastern Oklahoma, southwestern Arkansas, and western Louisiana and the Western Gulf Coastal Plains along the coasts of Texas and Louisiana. The coastal plains are flat with plain topography while the South Central Plains to the north are more irregular with some rolling plains. There is a large number of perennial streams with some intermittent streams and lagoons being found in coastal areas. The subregion's geology consists mostly of Holocene and Pleistocene sedimentary material with soils containing acidic sandy loams, silt loams, sands and sandy clay loams. The natural vegetation of the region was largely grassland and savannah-type vegetation with forests in the northern part of the subregion once consisting of a mix of pine and hardwood, while now are mostly loblolly and shortleaf pine plantations. Crops grown in the region include corn, cotton,

soybeans, rice, sugarcane, grain sorghum, and wheat. The climate is subtropical with hot summers and mild winters. The mean annual temperature is between 63 °F in the north and as high as 77 °F in the south. The mean annual precipitation is roughly 47 in. (Commission for Economic Cooperation 2011, USEPA 2013).

3.11.2 Settlement history

European exploration and settlement of the South was conducted by all three of the major North American colonial powers, France, England, and Spain. Ponce de Leon was first European to explore parts of the South, landing in Florida in 1513. A major expedition by Hernando de Soto in 1539 explored inland in the southern portion of the region. In 1565, St. Augustine was founded on Florida's Atlantic coast, which would become Spain's most significant settlement in the region as well as the oldest continuously inhabited European settlement in the United States. While Atlantic coastal regions north of Florida had been explored as early as the 1524 voyage of Giovani da Verrazzano, later Spanish expeditions would better explore the coastal regions and the Chesapeake Bay in the mid-16th century. Spanish colonial efforts in the South lost enthusiasm by the 17th century, with England and France playing more important roles in the early settlement of the region. The first permanent English colony was established at Jamestown, Virginia in 1607. English settlement continued along the Chesapeake, with Maryland being established as a colony in 1632. French colonial efforts in the South were focused on the western portion, with René-Robert Cavelier, sieur de La Salle being the first European to navigate down the Mississippi River in 1682, naming the region he encountered Louisiana and claiming it for France. The first permanent French settlement in the South was at Fort Maurepas on Biloxi Bay in 1699. New Orleans was founded in 1718 and soon became the capital of Louisiana in 1722. By the end of the 17th century, English settlements had appeared on the Carolina coast to the south, moving down from south-eastern Virginia. Further south on the coast, 150 British colonists had arrived in 1670 at Albemarle Point on the Ashley River (now Charleston). British traders also settled in Georgia seeking partnerships with native peoples to strengthen trade relations and further ease the process of land acquisition. During the later decades of the 17th century, the British were successful in this endeavor to the detriment of the Spanish settlers, and the colony of Georgia was established in 1732 (Campanella 2008, Enscore et al. 2014).

The earliest phase of European farmers in the Southeast engaged in subsistence agriculture growing corn, beans, peas, and root vegetables, with limited livestock. By 1674, subsistence agriculture had become so successful that a surplus of materials was being produced to support the expanding population. As settlements grew too large for the surrounding farmers, other towns were established at points along the coast. This also served to increase the colonial footprint and lay claim to the land. Abundant pine forests nourished the growth of the naval stores industry based on ready supplies of tar and pitch. Due to proximity to the eastern border of the Atlantic Ocean, fishing was becoming an important occupation. Milling was also an important manufacturing industry (Enscore et al. 2014, CCPL 2019, Colonial Williamsburg Foundation 2020).

Within a decade after the founding of Jamestown, agriculture among settlers would diversify from subsistence to include commercial agriculture. In 1612, John Rolfe introduced tobacco to Virginia of the "famous Orinoco variety from Venezuela" which was more appealing to European markets than the local tobacco smoked by Native Americans in the area (Schlebecker 1975:37). Rolfe then developed a method for curing the tobacco for cross-Atlantic shipment in 1617, which created a boom in tobacco production in Virginia and Maryland. Cross-Atlantic shipments rose precipitously, starting at 20,000 lb exported in 1618 compared to 500, 000 lb in 1627 and 28 million lb in the 1680s (Hart 1967). Production soon spread to the Carolinas where it was also commonly grown. Tobacco growing initially required small plots of cultivation to be profitable, with the average plot being about two acres in the early days. The price of tobacco on the world market was highly volatile however, and by the 1660s, the price began to decrease on a consistent basis. To compensate, larger areas needed to be cultivated. Tobacco quickly depleted soils, so every few years the farmer would have to clear a new plot, with the old one sometimes used for corn. More often, the farmer would just move on to new land and continue the process, creating a transient landscape. This pattern of construction-removal or abandonment-construction for southeast farmers continued through the antebellum period and pushed farmers farther west (Enscore et al. 2014, Davis et al. 2006, Hart 1967, Schlebecker 1975).

Larger acreages resulted in increasing demand for farm labor, contributing to the more widespread practice of slavery. The importation of enslaved Africans to the region began in 1619 when approximately 20 African slaves arrived at Jamestown. The practice grew in scale throughout Maryland

and Virginia, beginning in the 1670s as more acres were being cultivated to compensate for decreasing prices of the crop. The influx of slave labor drove many small farmers out of the tobacco business in this period. Almost simultaneously, rice began to be grown in the southern Atlantic coastal regions of the Carolinas and Georgia. Cultivation of rice flourished by the late 1690s with African slaves being imported in large numbers to work the plantations, which tended to cultivate the crop on approximately 100 acres, with other land used for various crops. Quite often, an additional crop was indigo, grown for export to the British textile industry. Indigo became a popular crop in the 1740s and both it and rice would become major exports in the region throughout the 18th century. The market for indigo declined after the American Revolution and ended in the late 1790s, but rice cultivation in the South persisted to the present day. Slaves were imported to the South from 1619 through 1808 when the slave trade was legally restricted to domestic sources. Over that time, the South had become a society inextricable built on slavery with slaves making up 50% of the population of Virginia and 66% of the population in South Carolina (Conrat and Conrat 1977, "African Americans at Jamestown" 2019, Schlebecker 1975, Clifton 1981, Butler 2019, Enscore et al. 2014, CCPL 2019, Colonial Williamsburg Foundation 2020).

As more colonists settled in the south, the population pressures combined with removal of Native Americans to shift settlement westward into the piedmont and Appalachian foothills in the mid-18th century. The newly acquired ceded lands brought farmers from the colonies of Virginia and Carolina into Georgia prior to the beginning of the Revolutionary War. Although the southeast coastal lands were largely populated by British settlers, the westward settlements were primarily dominated by people of Scots and Scots-Irish descent, with some English. German Protestants and Quakers settled in the piedmont and mountains in the early to mid-1700s. Irish migration to the southeast increased in the early 1800s, primarily in Georgia (Enscore et al. 2014, Smith 2009).

The land being settled was primarily small subsistence farms located along waterways where the soils were more fertile and there was access to bountiful timber. The waterways were also established travel routes, which afforded some protection from local native groups. While interior settlers were inclined to settle an area along with other people, each farm was a self-sufficient single-family location. Typically, these farmers focused on subsistence

agriculture growing corn, wheat, rye, and other seasonal fruits and vegetables. Corn was one of the more flexible commodities that farmers could cultivate since it could be used to feed the family or livestock and also could be exchanged between neighbors or at trading posts (Enscore et al. 2014).

In the late 18th and early 19th centuries, settlements began to increase to the southern and western regions of the South. The major driver of this mass movement of people westward was the boom in cotton production. In the early 1800s, cotton was already being cultivated in the uplands of South Carolina and Georgia before the practice expanded into Alabama and to the lower Mississippi River region of Louisiana and Mississippi by the 1820s and 1830s, and further westward in the 1840s and 1850s to parts of eastern Texas and southeastern Arkansas. Large slaveholders always monopolized the best areas of farmland and left the less desirable areas for the smaller farmers. There were non-cotton related factors driving this wave of expansion as well, such as the Louisiana Purchase of 1803, which ceded New Orleans to the United States, after which the city received an influx of settlers in the years after the end of the War of 1812. Many of those migrating westward during this time were natives of South Carolina or Georgia, the wealthy among them transplanting slavery to new regions in the pursuit of King Cotton. The coastal planter elites were largely of English or Scottish descent and were Presbyterian or Anglican in religious affiliation (Conrat and Conrat 1977, Drake 2001, Schlebecker 1975).

In the end of the 18th and early 19th century, England's demand for cotton skyrocketed after "innovations in the manufacture of textiles and the growth of cotton mills" which were soon duplicated in the United States (Conrat and Conrat 1977). The cotton gin, invented by Eli Whitney in 1793, replaced the grueling task of deseeding cotton with a mechanized process, allowing for cotton to be grown on a large scale. These advancements in the processing of cotton made it increasingly valuable and easer to produce. The rise of cotton as an export crop resulted in a large increase in the number of slaves required by planters to produce the crop, so much so that the spread and entrenchment of cotton in southern society in the first half of the 1800s is synonymous with the spread and entrenchment of slavery. In fact, in "old tobacco regions" of Virginia, Maryland, and parts of North Carolina, where profits from tobacco continued to decline, many in the region "[found] a new and important source of income in the flourishing traffic of slaves" in which there was a large market for such internal sale,

provided by western expansion and the ending of importation of enslaved Africans after 1808. While exploiting slave labor, cotton planters in this period also exploited the soil by growing repeated crops of cotton before they would "remove to the west, buy new land, and settle down once more to growing as much cotton a physically possible" (Conrat and Conrat 1977:37). Cotton was produced so heavily, and was so valuable a product, that it represented 57% of all export sales in the country by 1860. Other economic developments of the antebellum South include the boom in sugar production in the region around New Orleans and the rise in truck farming and orchards in Virginia, the Carolinas, Georgia, and Florida in the 1840s and 1850s (Conrat and Conrat 1977, Enscore et al. 2014, Schlebecker 1975, Shannon 1945, Tuten 2012, Mohr 2012).

The U.S. Civil War had a significant impact on the South's economy, more than simply through the destruction of property and livestock that were common throughout the region, with as many as half of the livestock in Georgia being lost. The Civil War did not, however, greatly alter the state of the recently freed slave population of the South, who made some ground in the brief reconstruction era before being again subjugated as "the basic elements of the plantation economy remained largely intact" in the new system of sharecropping (Conrat and Conrat 1977). This soon became the dominant system used by Black farmers throughout the south, before including farmers of all races and ethnicities by the beginning of the 20th century. Plantations were subdivided into small, rentable parcels of land. Many former slaves remained on land in which they were once held captive and started a new lifestyle as tenant farmers, as did the non-landholding white population, working soils in exchange for wages and rations. Cotton was still the crop in demand for much of the 19th century, with production expanding in the latter decades of the century in east Texas. Further leverage was gained over sharecroppers by the Crop-Lien Credit System in which grocers or often the owners of estates, would extend credit at exorbitant rates against sharecroppers' yearly production in exchange for supplies and food. This kept sharecroppers in extreme poverty, often yielding no income at the end of the year. Sharecroppers were further discouraged from growing their own food, as it was seen as taking money away from those who would profit from high loans. If tenants wished to have a fertile spot to plant a garden, they were often charged extra, or in some cases, if sharecroppers grew corn or raised hogs, the cropper would "quickly be warned that he was lowering his credit" (Shannon 1945:92). The system became so pervasive in the south that by the 1920s 40% of all

tenants were sharecroppers" (Conrat and Conrat 1977, Hart 1967, Enscore et al. 2014, Shannon 1945).

Subsistence farming on small holdings continued mostly unchanged through the 19th century, with farmsteads constructed along the road networks for market access. They were typically located in less attractive agricultural land and "largely because of their greater economic freedom, flourished in comparison" to sharecroppers (Shannon 1945:96). To support this style of agriculture, the farmer often owned a horse(s), a yoke of oxen, a milk cow, rock sledge, and a wagon. Timber, cotton, and tobacco were the main cash crops, with a significant rice crop also continuing along the coast from southern North Carolina to Northern Virginia (Enscore et al. 2014, Shannon 1945, Tuten 2012, Mohr 2012).

The industrial revolution and modernization played a hugely significant role in the settlement of the South. The industrial revolution in England and the early development of the cotton gin played a major role in the development of cotton as the dominant crop of the South as well as spawning the settlement of the southern and western portions of the subregion where cotton production was the main focus. Concurrent with the agricultural expansion was the manufacturing aspect, with cotton looms and later textile mills becoming commonplace across the landscape, usually located along the transportation routes from the piedmont to the coastal ports (Enscore et al. 2014,Tuten 2012, Mohr 2012).

The area's booming timber industry spurred the popularity of framed wooden structures during the middle of the 19th century. This building technology was popular among both farmsteads and plantations since fewer materials were required for wall and frame construction. While there were mill costs associated with framed buildings, the decrease in materials required allowed for easier and faster construction of single-family and multi-level structures (Enscore et al. 2014).

Cotton was originally transported to market via wagon carts before being shipped out of one of the South's major ports including New Orleans and Charleston. As railroads were built up extensively in the region leading to new commercial hubs which played key roles in the processing and distribution of agricultural goods, mostly tobacco and cotton. Major railroad hubs that developed in the latter part of the 19th century included Charlotte (known for cotton) and Durham (known for tobacco) in North Carolina, Columbia, South

Carolina, Atlanta, Georgia, Birmingham, Alabama, and Houston, Texas. New railroads constructed from the 1880s to 1900 allowed for trade to reorient to southern ports away from northern ones (Shannon 1945).

The Great Depression in the 1930s saw the exodus of many tenants and sharecroppers for a variety of reasons. One was that advancements in tractors and the mechanization of farm work caused many farmers to replace sharecroppers and tenants with machinery. On the large cotton plantations of the Mississippi Delta Region, tenants farmed roughly 12-20 acres, although it was said a new tractor could replace "at least six or eight families" (Conrat and Conrat 1977:128). During the Depression, the Agricultural Adjustment Act of 1933 was aimed at reducing overproduction of certain crops to allow the prices to increase, with cotton production being reduced by approximately one third. Although against the law, many southern landlords simply evicted a "great number of their sharecroppers and tenants" while production was kept low by the government (Conrat and Conrat 1977:126). Many black tenants and sharecroppers evicted during this time would join the multitude of what would later be known as the Great Migration, in moving northward to escape the lack of economic opportunity as well as the increase of Jim Crow laws (Conrat and Conrat 1977).

3.11.3 Cottage industries

In addition to traditional agriculture pursuits, colonists often focused on materials that could be exported and exchanged in England and other European nations. For this reason, animal hides, forest products, and salt stores were established as cottage industries in many towns and outlying farmsteads. As English and later American shipbuilding increased, colonists further expanded their cottage industries by taking part in the acquisition of raw materials for the tar and pitch industry. The southeast had vast tracks of pine forests that were ideal for the collection of turpentine, tar, and pitch. By 1714, South Carolina farmers and colonists were producing in excess of 11,500 barrels of tar and pitch for export. During the 1800s, the tar and pitch market expanded beyond sealants to lamp fuels and solvents. On farmsteads, tar kilns were built approximately 30 ft in diameter and located away from the main house activity area (Enscore et al. 2014).

Throughout the history of the South, the major crops produced were cash crops, largely cotton, sugar, and tobacco. Cotton was largely processed after it had left the farm in regional cotton mills. Tobacco needed preparation on the farmstead prior to sale, which in earlier periods included sun drying and

curing tobacco over the fire, while later methods involved hanging it in special tobacco barns with ventilators. Sugar, which was grown in the Mississippi Delta and southern Florida, required processing prior to distribution, usually into molasses. Sugarcane was crushed and pressed to extract the liquid, after which it was placed in an evaporator until it reduced to molasses and could be sold for a higher profit in addition to requiring easier transportation to market (Noble 1984, Schlebecker 1975).

3.11.4 Typical farmstead components

The typical farmstead included a house constructed from one of the following architectural designs: single-pen, double-pen, saddlebag, dogtrot, hall-and-parlor, or I-house. A modest farmhouse would typically begin as a single-pen structure but often expanded into a double-pen, saddlebag, or dogtrot house as material or financial resources allowed. The square or rectangular structure had a hearth at one end, and often a loft to provide more living area. Due to the abundance of timber in the southeast, the primary building material was wood, first as rough log cabins, then later as milled lumber. The dogtrot style of log cabins developed in Appalachia but diffused widely through the south, “as far west as Texas” (Kniffin 1965:565). It featured two log rooms under a single roof with a breezeway in between. Foundations for cabin structures progressed from stone piers to concrete, and roofs were initially shingled with split wood or shingles. Covered porches and sheds were often added to the structures. With the advent of milled lumber and frame construction techniques, the 2-story I-house became more common on farmsteads. These I-houses developed in the mid-Atlantic based on English vernacular architecture, spreading west through the north and the south. In the South, the I-House became idealized as economic attainment and many people converted their early log cabins into I-Houses by adding a second floor of milled lumber and completely covering the outside in weatherboard (Kniffin 1965). The dwelling closest to the popular concept of elegant antebellum homes was the two-story structure with front columns and a double chimney. This style of architecture is given the title of plantation plain and was essentially an expanded I-house with an elaborate full-width front porch and one-story rear shed rooms. On a plantation, the slave quarters were usually constructed closely together, and were one-room log cabins, sometimes with wood siding, or occasionally built of brick (Enscore et al. 2014).

On the farmstead, the spatial layout between the house and associated outbuildings were often based on local geography, proximity to roads, and access to flowing waterways. The main house structure was most often built facing a trail or road that would connect the farm to neighboring farmsteads or formal settlements for reasons of security and communication. A 1948 survey of farmsteads in cotton growing regions of North Carolina, Alabama, Louisiana, Arkansas, Oklahoma and Texas showed the importance of roads in building location, with almost half being located facing a public road while an additional two-fifths were connected to public roads by private lane passing through fields and woods (Trewartha 1948). The most common outbuildings or structures were barns, pens, and wells. Southern farms had a low amount of built structures compared to farms of other regions. The same 1948 study found 33% of farms had four buildings or under, while 50% had five to eight buildings (Trewartha 1948). These structures were most often constructed on the back side of the home and aided in keeping unwanted visitors (people or animals) from gaining access to these facilities. Fences were also typically constructed on farmsteads to secure outbuildings, family gardens, and crops from these unwanted visitors (Enscore et al. 2014, Trewartha 1948).

While cabins were the residential space for the family, a farm could not function without numerous other structures that often held livestock, chickens, and other farm animals. Additional work spaces provided a location in which daily activities took place. These structures were often constructed with the same techniques and materials that comprised the main farm house (Enscore et al. 2014).

Barn structures were often built on a basic box shape with square corners. The length and width of any barn varied from location to location, often due to access to available raw materials. The single-crib barn was the simplest, one room with a wide door at one end. There were typically one or two stalls for material or livestock, and a lean-to roof providing a covered area on the outside for sheltering wagons or work activities. The double-crib barn (two single-crib barns with a shared roof) provided the farmer more covered space. The two single-crib barns were set approximately 10 ft away from one another with a dirt floor in the middle that served as shelter for activities and access for livestock. Above the stalls, a loft was often included in which hay could be stored to feed the housed livestock. Lean-to roofs were often also constructed along the exterior of double-crib barns to provide additional working space (Enscore et al. 2014).

The larger four-crib barn was more typical when activity extended beyond subsistence farming. Four single-crib barns formed the corners with a cross-shaped passageway converging at the center of the structure. Within the four-crib barn, the farmer was able to house livestock, farming implements, and perhaps an indoor workshop. One large roof covered the entire structure and provided a loft space which could be used to store hay and other materials. One common type of specialized barn was used to cure tobacco. These were usually square, "some 16 to 20 feet on aside and 20 feet high … of clay-chinked logs, cinderblock, or frame sheathed in green or black tarpaper" (Hart 1967:47). Air-cured tobacco barns had openings on the upper part of the walls that allowed circulation and could be closed in bad weather. Flue-cured tobacco barns had a hearth or furnace to raise the temperature in the closed structure to dry the tobacco (Enscore et al. 2014, Hart 1967).

In areas of Cajun settlement in eastern Texas and Louisiana, farmstead buildings incorporate a unique French influence into their vernacular architecture. Cajun Barns are commonly constructed in these areas, and are frame barns that are almost always 30 ft square. They have an 8 to 12-ft front opening centered on the gable end that is recessed 6 to 8 ft into the barn. These barns had gable roofs prior to 1900, after which they were commonly constructed with monitor roofs before being replaced by gambrel roofs in the 1930s. The other main farm structure associated with Cajun settlement in the South is the Cajun Cistern. This structure was a raised rainwater storage tank, often made of wood but occasionally in brick. Masonry or brick was used in the construction of the piers which raised the tank, allowing for a fire to be built underneath. These structures are often located at the rear corner of the house, situated such that it will most optimally collect rainwater (Noble and Cleek 1995).

Farmers also built structures to house pigs and chickens. Hogs were held within hog pens that were constructed from logs, with a log hog house inside that provided protection and night-time shelter. These structures were built large enough to house the potential number of hogs the farmer might possess at any given moment. The chicken house was constructed with the intent to protect the birds from wild animals. Chicken houses were smaller chinked log structures with tightly constructed walls to prevent entry by predators. A chicken house consisted of a pole roost, egg and hatching nest, and a feeding trough. A pole roost was likely a wooden structure set on an angle from the center of the floor to the side wall so that chickens could gather and rest (Enscore et al. 2014).

Fences along the frontier and farmstead properties tended to follow the natural topography of the local area. These fences established a detailed outline of the property and provided delineation between daily and agricultural activities. Fences often encompassed farmhouses, outlying lots, barns, and workshops, while providing separation from agricultural spaces and animal pens. Additionally, these fences provided protection for the farmer and their livestock from the wild environment and from unwanted human or animal visitors. Farmers taming the frontier lands or creating agricultural lands from wooded areas could use small trees and saplings in the construction of fences, with the preferred types being red cedar, yellow and black locust, black walnut, white oak, and chestnut. These small timbers were built into snake or zigzag fences (split rails stacked alternatively) around the workspace or agricultural fields. Over time, fences became more permanent and more solid, such as post and rail (rails inserted into notches on posts), pole fences (poles laid diagonally supported by two posts), and vertical paling fences (split wood laid vertically side by side). Paling fences were most often around the front or back yards of the main house (Enscore et al. 2014).

On farmsteads in the South, there tended to be fewer buildings and a less structured arrangement. Even so, there was often an organized division of space. Where possible, structures that accommodated activities with high workflows were located closest to the farmhouse, and less intensive activities and the associated structures were often constructed further away from the main house. Thus, the larger barn or corn crib would likely be situated farthest from the house since materials stored in these structures were often intended for field use and not for home use, while the wells, storage sheds, privies, and chicken houses were nearer the farmhouse. There was often an open yard near the house that served as a workspace for various domestic activities such as laundry. Exterior and interior spaces tended to be multi-functional. Trees were often retained or planted at the farmhouse for shade, with orchards nearby (Enscore et al. 2014).

3.12 Region 11: Appalachians

3.12.1 Geography

The Appalachians are marked by mountainous terrain. The region covers portions of 11 states, running from northern Georgia and northeastern Alabama northeast to Pennsylvania and Ohio. The mountains of this region

generally run in the northeast to southwest direction, yielding many isolated parallel valleys. The region has four distinct subregions, two of which are narrow and long compared to the others, with the Blue Ridge Mountains and the Ridge and Valley Subregions running along the eastern portion of the region. To the north and west are the Central Appalachians and the Allegheny Plateau subregions.

3.12.1.1 Blue Ridge subregion

The Blue Ridge subregion is a long and narrow subregion that extends from Southern Pennsylvania, south to northern Georgia, and is adjacent to the piedmont to the east and the Ridge and Valley Subregion to the west. Terrain in this subregion varies from narrow ridges to hilly plateaus, as well as some larger mountains with peaks reaching over 5,900 ft above sea level, although much of the subregion region is between 1,000 and 4,900 ft above sea level. There is a large amount of perennial, high-gradient streams but with little to no lakes in the area. The geological makeup of the region consists of primarily metamorphic bedrock, largely gneiss, schist, and quartzite, as well as minor areas of igneous and sedimentary rock. The typical soils of the region are Inceptisols and Ultisols, with mesic soil temperatures and udic soil moisture regimes. Much of the subregion is forested, with the majority of forests being Appalachian oak forests. The makeup of these forests vary slightly be elevation, with lower areas typically having tulip poplar, chestnut oak, white oak, black locust, red maple and pine species, with higher elevations have northern hardwoods of beech, yellow birch, yellow buckeye, and maples, and the highest elevations having southeastern spruce-fir forests of Frasier fir, red spruce, yellow birch and rhododendron. Due to the forested nature of the subregion, it was not particularly suitable for agriculture other than in some small areas of pasture or hay production and apple orchards. The subregion has "severe, mid-latitude, humid continental climate in the north, and mild, mid-latitude, humid subtropical climate in the south" (Commission for Economic Cooperation 2011:70). Mean annual temperatures are roughly 45 °F in the higher elevations and around 57 °F in the areas of lower elevation to the south in this subregion. Precipitation is variable as well, with mean annual precipitation ranging from over 100 in. to as low as 40 in. in some of the dryer basins (Commission for Economic Cooperation 2011:70, USEPA 2013:13).

3.12.1.2 Ridge and Valley subregion

The Ridge and Valley Subregion is located directly to the west of the Blue Ridge subregion and directly east of the Central Appalachian Subregion. It is less narrow than the Blue Ridge subregion and runs roughly northeast to southwest and includes northeastern and central Pennsylvania, western Maryland, areas on both sides of the Virginia/West Virginia border, eastern Tennessee, and small portions of northwestern Georgia and northeastern Alabama. The terrain is comprised of a series of parallel ridges running a general northeast to southwest direction that vary in height, with some being as high as 4900 ft above sea level. Similar variability is found in the widths and elevations of the valleys running between the many ridges. Most water in this subregion flows in a "trellised pattern" with water originating in smaller, higher gradient streams that run perpendicular to the ridgelines and meet at the bottom of the valley in a right angle with larger, lower-gradient streams that run roughly parallel to the ridgelines (Commission for Economic Cooperation 2011:68). The geology is "a result of extreme folding and faulting events," which leaves many springs and caves as well as varying geologic materials including limestone, dolomite, shale, siltstone, sandstone, chert, mudstone and marble (USEPA 2013:13). The soils are mostly ultisols and inceptisols with mesic to thermic soil temperature regimes and udic soil moisture regimes. Much of the subregion is wooded, with Appalachian oak forests being present in the north and oak-hickory-pine forest stands in the south. Some areas are cleared for farmland predominantly for hay, pasture, and grain for feed, although other crops like corn soybeans, tobacco, and cotton are grown in some of the southern areas. This is partly due to the variety of the subregion's climate, with a mild, mid-latitude continental climate to the south and a severe mid-latitude continental climate in the north. The summers are hot and humid while the winters are mild in the south but colder in the northern portion. The mean annual temperatures vary from roughly 46 °F in the north to 61 °F in the south, with a mean annual precipitation across the subregion of 45 in. that ranges between 35 and 53 in. by year (Commission for Economic Cooperation 2011:68, USEPA 2013:13).

3.12.1.3 Central Appalachians subregion

The Central Appalachians Subregion is adjacent to the west of the Ridges and Valleys Subregion and to the southeast of the Allegheny Plateau Subregion, encompassing central Pennsylvania, the western edge of Maryland, eastern and southeastern West Virginia, the northern portion of western

Virginia, southeastern Kentucky and northeastern Tennessee. The subregion's rugged terrain features low mountains and high hills ranging from 1000 to 2000 ft above sea level, with steep and narrow ridges and winding valleys. There is a lack of standing water in the subregion, but it does have a large number of perennial streams of moderate to high gradient that flow on bedrock or bolder substrates. The geological makeup of the subregion includes Pennsylvanian-age sandstone, shale conglomerate, and coal. The soils are mostly Inceptisols and Ultisols, with mesic soil temperature regimes and udic soil moisture regimes. Much of the region is forested, with the most common type being mixed mesophytic forests with some areas of Appalachian oak and northern hardwood forests. As a result of the infertile soils and high degree of forestation, agriculture is limited to "some small areas of pasture, livestock, or dairy operation" (Commission for Economic Cooperation 2011:69). The Central Appalachians has a "severe midlatitude humid continental climate" characterized by warm to hot summers and cold winters (Commission for Economic Cooperation 2011:69). The mean annual temperatures are around 45 °F in the north and 55 °F in the south at lower elevations. The mean annual precipitation is 46 in., fluctuating by year between 39 and 59 in. (Commission for Economic Cooperation 2011:68-69, USEPA 2013:14).

3.12.1.4 Allegheny Plateau subregion

The Allegheny Plateau is located to the northwest of the Central Appalachians and south of Lake Erie, covering western Pennsylvania, eastern Ohio, northwestern West Virginia, and portions of northeastern Kentucky. The northeastern portion of this subregion, encompassing northeastern Ohio and northwestern Pennsylvania, is glaciated, with rounded hills, ridges and broad valleys and elevations ranging from 650 to 1000 ft above sea level, while the southeastern, unglaciated portion has high hills, sharp ridges, and narrow valleys, with elevations varying from 650 to 1300 ft. These narrow valleys in the south are populated by a large number of perennial streams of moderate to high gradient that generally flow into the Ohio River, which is the subregion's largest river and which flows southwest through the center of the unglaciated southeastern portion. The northeastern, glaciated portion has perennial and intermittent steams of low to moderate gradients as well as "numerous wetlands, sphagnums bogs, and lakes in some areas" (Commission for Economic Cooperation 2011:60). The geology of the region also varies between the glaciated and unglaciated portions, with the northeastern portion featuring Paleozoic sandstone and shale and the southeastern unglaciated portion containing

horizontally bedded, often carboniferous, sedimentary rock including sandstone, siltstone, shale, limestone and coal. The dominant soil in the subregion is alfisols of mesic soil temperature regimes and udic soil moisture regimes, although the glacial outwash and till in the glaciated portion produces a more aquic moisture regime and ultisols and inceptisols are found in the unglaciated portion. The vegetation of the region is mostly mixed mesophytic forests with areas of Appalachian oak forests as well as some elm-ash swamp forests in the northeastern glaciated region. The better soils and less rugged terrain of the glaciated portion of the Allegheny Plateau makes it more suitable to agricultural production, which is largely focused on feed and forage crops related to diary production, while the mostly forested unglaciated portion contains poor soils that allow for only for scant agricultural activity, which is similar in type although smaller in scale compared to that of the glaciated portion. The Allegheny Plateau has a severe mid-latitude humid continental climate, with cold winters and hot summers in the unglaciated portion and more mild summers in the glaciated portion closer to Lake Erie. The mean annual temperature is approximately 46 °F in the north and 55 °F in the south. Mean annual precipitation is roughly 41 in. throughout the subregion, ranging from 35 to 45 in., with the glaciated region typically having dryer winters and the unglaciated region having dryer summers (Commission for Economic Cooperation 2011:60,69-70, USEPA 2013:12,14).

3.12.2 Settlement history

The first documented exploration of the Appalachians region by Europeans was in 1539, when Hernando De Soto departed the Tampa Bay area with at least 70 Spanish conquistadores on horseback. He traveled north through central Georgia and the Carolinas and then southwest through eastern Tennessee, northwestern Georgia and into Alabama. A later Spanish expedition lead by Juan Pardo in 1566 established a military camp for several months in the eastern slopes of the Blue Ridge Mountains in the Carolinas and explored eastern Tennessee. In the latter half of the 17th century the majority of the Appalachian Region south of the Ohio River was explored by traders primarily from New York, Virginia and South Carolina, who hoped to find lucrative markets in the interior where they could trade for furs. By the early 18th century, British colonists had developed a firm trading relationship with tribes throughout the Appalachian Region including the Mingo, Miami, Shawnee in the north and the Cherokee and Creeks in the south, exchanging ironware, cutlery, guns, and alcohol for mostly deer skins (Drake 2001:25-30).

The first large-scale wave of Euro-America settlement began in the 1720s as a result of overcrowding that pushed excess populations of the eastern coastal regions west, mainly into the Shenandoah Valley of West Virginia and Virginia and the Cumberland Valley of Pennsylvania and Maryland. The largest source of early settlers into Appalachia came from southeastern Pennsylvania, due to the influx of European immigration from three main groups, English Quakers, Germans and the Scotch-Irish. The majority of these immigrants entered the region through the port of Philadelphia, with the English Quakers arriving in the last decades of the 17th century and the German and Scotch-Irish Protestants beginning to arrive around the turn of the 18th century. By the 1720s, population pressures in southeastern Pennsylvania caused settlement to expand into the Cumberland Valley, reaching the Potomac River to the south in 1727, at which time the areas of Fredrick, Maryland and Shepherdstown, West Virginia were settled, which allowed further expansion across the Potomac and southwest throughout the Shenandoah Valley "with little topographic obstruction" (Salstrom 1994:2). As the German and Scotch-Irish populations intermingled more, the latter group "provided the language norm for Appalachia" as the Germans lost their language while retaining other traits such as religious and building practices. In 1729, Winchester, Virginia was settled and by 1732, Staunton, Virginia was settled on the southwestern end of the Shenandoah Valley, although it was not until the mid-1750s before the Shenandoah and Cumberland Valleys were thoroughly populated (Barnes 2011:675, Drake 2001:29-37, Enscore et al. 2014:28, Salstrom 1994:2).

One of the major motivators for the first wave of settlement was the search for new farmland as a result of overpopulation in the previously settled lands to the east. In addition to the German, Scotch-Irish, and English-Quaker settlers from southeastern Pennsylvania, other settlers identified as "vaguely English" were migrating from overpopulated low-lying regions of English-settled Virginia, Maryland, and Pennsylvania. These English settlers comprised one-third of new arrivals on the Appalachian frontier during the 18th century (Drake 2001:37). Whether of German, Scotch-Irish, or English stock, these settlers established farms throughout the Cumberland and Shenandoah Valley. The larger farms, especially in the Shenandoah Valley, were located towards the center of the valley and focused on wheat production due to the better agricultural potential, while the smaller farms located in the fringe areas of the mountains were largely subsistence. These subsistence farms used small acreage fields cleared within the forest to produced crops for their own consumption while also

raising livestock for extra income. By the mid-1750s, towards the end of the first wave of settlement in the Shenandoah Valley, the region was already becoming well known for its cattle production (Drake 2001:32-37, Hart 1998:217, Salstrom 1994:5).

While the middle decades of the 18th century were notable in Appalachia for marking the beginning of the shift "towards a predominantly yeoman-farmer economy," the main economic activity during the period was still related to the fur trade (Drake 2001:30). The economic potential of this trade was great enough to draw both British and French imperial interests, largely focused on northern Appalachia, which became "fiercely contested" by the two powers (Drake 2001:41). In 1749, Celoron de Blainville led a French expedition from Canada down the Ohio River and claimed the area north of the river for France. The following year in 1750, a British royal grant funded an expedition led by Dr. Thomas Walker through the Cumberland Gap into eastern Kentucky to spur settlement and increase British claim to the region. The forests of Appalachia soon became one of the major tensions between Britain and France, and by 1754 both sides were protecting territory through the construction of fortifications in modern day Pennsylvania. An attempt that summer led by Colonel George Washington to reestablish British control over the region resulted in both the outbreak of open hostility, in what would later be known as the French and Indian War. Britain further fortified their Appalachian frontier in the fall of 1754 with the construction of Fort Cumberland, which became a staging ground for a larger invasion of British regulars and colonial forces of the Upper Appalachian Region to reestablish British control. The 1755 invasion led by Major General Edward Braddock ended in complete defeat and it was not until 1758 that a push from Philadelphia forced the French out of the region. British quickly asserted rule over the entirety of Appalachia, which was then confirmed in the peace treaty between France and Britain in 1763 (Drake 2001:30-44, McBride 1996:186).

The French and Indian War had been costly for the Appalachian Region, with much life and property being destroyed, yet had decisively secured the rich fur trade of the region for the British Empire. By the mid-1750s, however, game was starting to become scarce in eastern areas, forcing intensive fur trade activity westward into eastern regions of Kentucky, Ohio and Tennessee. Due to fur traders exploring and establishing trails, they paved the way for later settlement of the Western Appalachian Region. While fur trading would continue in the region through the 1830s, it was

largely as supplemental income by yeoman farmers (Drake 2001:37-48, McBride 1996:187, Salstrom 1994:4).

Settlement of the Shenandoah was largely completed by the 1760s and as a result, new settlers began to push further southwest into eastern Tennessee, as well as expanding into parallel running valleys northeast of the Shenandoah into southeastern West Virginia. The area of settlement in eastern Tennessee and western Virginia as well as the Blue Ridge Mountains of North Carolina, were collectively known as the Watauga Settlements. Excess German, Scotch-Irish, and English populations also moved further into northern Appalachia during this time, settling Pittsburgh at the Forks of the Ohio and the surrounding region from 1763 onward. This westward settlement was a point of contention between the colonists and the British Empire and "played a major part in the estrangement that ultimately led to the American Revolution" (Drake 2001:46). By the outbreak of hostilities between the colonies and the British Empire in the mid-1770s, the Pittsburgh Area and the Watauga Settlements were largely settled. The American Revolution was a violent period in the Appalachian Region with many frontier attacks by British and Native American Allies such as the unsuccessful siege of American held Fort Henry at modern day Wheeling, West Virginia. Many settlements were abandoned in this period, especially in the more remote, less populated areas of Appalachia (Drake 2001:34-55, McBride 1996:183-189, Salstrom 1994:2).

Settlement boomed after the conclusion of the American Revolution in 1783. Settlers of still mostly German, Scotch-Irish and English ancestry moved into Appalachia in great numbers in this period, mostly settling the Ridge and Valley region but also beginning to move into the forested highlands of the western Blue Ridge Mountains and the Central Appalachians. Settlers from the piedmont in North Carolina and Virginia pushed westward through the Cumberland Gap and settled in eastern Kentucky and Tennessee while settlers from Pennsylvania, western Maryland, and western Virginia entered the northwestern portions of Appalachia mostly via the Ohio River. By 1839, the indigenous tribes had been removed from the region through a series of military campaigns and forced marches westward, resulting in increased settlement, especially in the mountainous areas, which were isolated and therefore had an increased threat of attack. By 1830, roughly 80% of Appalachia's population resided in the Ridge and Valley Subregion of West Virginia, Virginia and Tennessee, while the other 20% resided in the Blue Ridge Mountains or the Central Appalachians. In

the late 18th and early 19th centuries, a new cultural identity began to develop among the residents of Appalachia who began calling themselves "Cohees," contrasting themselves with the "Tuckahoes" of the coastal planter elites (Drake 2001:68). This Cohee identity of the backwoods applied mainly to yeoman farmers living on isolated farmsteads, with county seats or neighborhood churches and school houses serving as community centers. The Scotch-Irish were largely Presbyterian, although following the Second Great Awakening from 1790-1820, significant numbers became Methodists and Baptists. The Germans as they moved beyond the Shenandoah Valley lost their Lutheran or Calvinist religion in favor of Methodist and Baptist faiths as well. The most defining characteristic of the Cohee identity that developed in the early 19th century was the agricultural system they used. This involved "patch farming" of cleared portions of the forest devoted crops like corn, oats, or wheat to be used or traded locally (Drake 2001:69). Cattle, sheep or hogs were allowed to range freely in the forests to be sold seasonally during long drives to southern cities as the main source of supplemental income. This type of farming reached its peak "symbolically with 1828 election of Jackson and declined after that" (Drake 2001:69). By the 1860s the Cohee identity and way of life was no more (Drake 2001:55-81, McBride 1996:187-189, Salstrom 1994:3-4).

The Appalachian Region is rich in natural resources, which began to be exploited on a large scale by American settlers in the beginning of the 19th century. Salt was mined in the Kanawha Valley of modern day Charleston, West Virginia, and in Saltville, Virginia in the western edge of the state. Niter or saltpeter was extracted and processed in eastern Kentucky, which was the largest producer of niter during the War of 1812 and was still a major producer during the Civil War. Gold was mined in Appalachia first in western North Carolina in 1799 in which "several thousand men ultimately produces some $9 million in gold" and later in 1828 when gold was found along the Yahoola Creek in Northern Georgia and yielded "some $40 million worth of gold" extracted over several years of mining (Drake 2001:131-132). Iron was both mined and refined in ironworks located in parts of Maryland, Virginia and Pennsylvania for their proximity to the ore as well as fuel to refine the ore. Pre-1840, these ironworks were typically small forges using charcoal as the main fuel, which required large amounts of wood on hand making an Appalachian location ideal. Post-1840, coal began to be used more frequently in iron production. Coal began being extracted early in Pennsylvania and then in Appalachian Maryland, Virginia and Kentucky by 1850 (Drake 2001:70-71,131-132; McBride 1996:201).

By 1830, the Cohee economic model of substance, yeoman farming supplemented by some surplus goods that could be sold at market like corn or cattle, was beginning to decline as a result of "large families [putting] pressure on land availability" (Drake 2001:70). This decline coincided with the rise of the plantation owning class of Appalachia. While slaves had been brought into Appalachia from the earlier periods of settlement, it did not become "a significant form of labor" until the early 19th century, as slaves began to be brought into the region in larger numbers (Barnes 2011:676). The 1820s through 1840s saw the region become more economically integrated with the rest of the country, largely through new or improved roads connecting county seats to each other, which stimulated commercialized agriculture in the region and made the importation of slaves more economically beneficial. These county seats became hubs in the slave trade, which was further stimulated by the construction of the first railroads in the region during the 1850s, transplanting more coastal elites into Appalachia along with their slaves. Most of the slaves in Appalachia during this time were on larger plantations in the more fertile valley areas, producing mainly tobacco and cotton but also hemp and livestock. In other areas slaves were used to work in more industrial settings at tanning works, salt mines, iron foundries, and brick mills. By 1860, "nearly one-third of the region's farm owners held slaves" (Barnes 2011:676). Slavery remained a divisive issue, however, and many settlers in the mountainous regions of Appalachia developed antislavery views (Drake 2001:70-86) (Barnes 2011:676-677).

This tension between the planter elite and the yeoman farmers of the mountains came to a head with the outbreak of the Civil War, anti-secessionist sentiment being the strongest "in East Tennessee, Northwestern Virginia, Western Maryland, and Southeastern Kentucky" (Barnes 2011:678). The Civil War had devastating effects on the economy of Appalachia, as it was a major theatre throughout the duration of the war. Union and Confederate armies both engaged in foraging activities, which involved stealing crops and livestock, and destroying property. Some areas were able to rebuild following the war, such as the Shenandoah Valley, where a "significant number" of extant barns in the region were secondary constructions built on the foundations of barns destroyed during the Civil War (Noble and Cleek 1995:30). Other regions had more difficulty rebounding, especially in the more remote mountainous regions. The wartime theft or destruction of livestock prompted many mountain farmers to move livestock production farther west. Similarly the physical destruction of community areas like schools, churches, and towns led to a revival in

the importance of the family unit, as well as contributing to increased isolation in many parts of Appalachia. Many former slaves stayed in the region either as tenant farmers or in some cases as independent farmers, a practice that was more common in Appalachia than elsewhere. For example, in East Tennessee 18.1% of African-Americans owned farmland by 1880, while that number was only 7.9% throughout the South in general (Drake 2001:114). Other African-Americans chose to leave the region, departing in greater numbers beginning in the late 19th and early 20th centuries (Barnes 2011:678, Drake 2001:111-114, Noble 1995:30).

The Industrial Revolution greatly altered the economy of Appalachia, primarily after the Civil War. More railroads began to be built throughout the region, except for the more mountainous areas of southern Appalachia, which grew more isolated as a result. The postwar industrial boom was strongest felt at the northern and southern extremes of Appalachia. In northern Appalachia, by 1890, Pittsburg had become "the chief steel center in the United States," leading to the rise of industrial satellite cities throughout the surrounding area (Drake 2001:133). Areas of southern Appalachia with railroad access, such as Knoxville and Chattanooga in Tennessee and Huntsville in Alabama, which had become supply hubs for the Union and saw much railroad development during an in the aftermath of the Civil War, soon developed significant industry as well towards the end of the 19th century. Prior to 1880, much of the railroad construction was limited to the ridges and Valley subregion, however this began to change as by 1890, much of Appalachia was connected and thus integrated with the wider country (Drake 2001:108-134).

The impetus for this integration through railroads was directly related to the booming industrialized production of the region. While some of this involved the refinement and production of goods, such as the steel production at the northern and southern extremes of Appalachia or the ceramics and glass industry that arose in the Allegheny Plateau region of West Virginia and Ohio, the majority of Appalachian industrial activity involved the extraction of natural resources. Iron was one natural resource extensively exploited throughout the region, with its discovery in southern Appalachia at the end of the 19th century helping to create the steel production centers such as Chattanooga. Coal, however, was king, contributing to the steel industry as well as providing fuel for the railroads throughout the nation. While coal was extracted in Appalachia prior to 1870s, mostly in western Pennsylvania, Maryland, and Virginia, the scale and magnitude increased

rapidly in the decades following, with production moving into West Virginia, as well as into eastern parts of Kentucky, Tennessee and Ohio. The workforce in these coal mines was diverse in both age and ethnicity. Child labor was rampant and workers included African-American labor in varying degrees, with the southern regions employing exclusively African-Americans in the mines, the central regions using an integrated group of African-Americans and local or European immigrant white workers, and Northern Appalachia excluding blacks in favor of the latter two groups. Timber was yet another resource that was extensively exploited in this period, with sawmill technology entering the region after the Civil War, helping cause the industry to boom from the 1880s through the 1910s. As local and out-of-state corporations began to grow larger and more powerful in the 1890s, logging increased in magnitude and in resulting devastation of the land. By 1920, however, the industry began to level off and exploitation reached more sustainable levels. The world's first commercial oil well was created in the region in 1859 near Titusville, Pennsylvania, and "Appalachia would become the world's major producer of oil and gas before 1902" (Drake 2001:139). While other areas rose in prominence in the oil and gas industry, production in Appalachia continued and even increased during and after World War I, with Charleston, West Virginia becoming one of the major centers of this industry (Barnes 2011:698, Drake 2001:134-143, McBride 1996:208, Salstrom 1994:60).

Together, this increased industrial activity in the region created the rise of wage labor, which used both local residents as well as drawing new migration to the area, often settling in new boom towns near industrial sites along railroad lines. It was during this period that much of the Allegheny Plateau subregion was settled, and the previously isolated region was integrated with the rest of the country. These boom towns were often owned and operated by the company in control of the resources, chiefly timber and coal, and this corporate control often led to exploitive conditions for their workers. These boom towns also had the effect of reducing the areas self-sufficiency in agricultural production, as food was imported cheaply from more productive agricultural regions of the country, leading to a hybrid industry with farmers growing goods for personal consumption while also working part of the year as wage laborers. This relationship went both ways, with many wage labors in engaging in subsistence agriculture. For example, as late as 1924 "more than 50 percent of West Virginia's miners raised gardens as well as kept cows, hogs, or poultry" (Salstrom 1994:61).

This agricultural activity was conducted by all groups involved in the settlement boom in the region, including native-born whites, European immigrants, and black residents (Barnes 2011:698, Drake 2001:143-147, McBride 1996:xiii,185; Salstrom 1994:61-62).

The Great Depression had lasting effects on the Appalachian Region. The trend of land being purchased for conservation and recreation purposes by local, state, and federal entities, while present prior to 1929, increased drastically in the years of the Great Depression. Local industries such as logging and coal mining, which began to falter during this period, were "provided relief on a massive scale" to keep these industries afloat and keep residents employed, although many that were not lucky enough to keep their jobs left the region (Salstrom 1994, xiii). Federal programs created during this time such as the CCC and the Tennessee Valley Authority were highly active in the region, with the main goal of the latter organization being more sustainable agricultural production in the region. The Tennessee Valley Authority pushed phosphate fertilizer and the growth of "grasses and legumes for livestock grazing" as opposed to row crops like corn and tobacco, which were "soil abusing" and less sustainable (Salstrom 1994:109). This effort was largely abandoned by the eve of the Second World War, with much of the Tennessee Valley returning to row crops, although hay growth was conducted far more widely in the region than prior to the Great Depression (Barnes 2011:698, Salstrom 1994:xiii,109).

3.12.3 Cottage industries

The most common industries found in Appalachia from its early days were the extraction and processing of the region's raw materials. Timber was cut and sold commercially in Appalachia for the entirety of the 19th century and the beginning half of the 20th century, first being mostly supplemental income for mountain farmers and later growing into an independent, fulltime industry in the region in the latter decades of the 19th century. The extraction of subterranean natural and mineral resources was conducted throughout the region's history and included a wide range of materials, such as gold, niter, iron, coal, clay [for brick and pottery making], oil, and natural gasses. The labor force varied across industry and time periods with slaves making up a large portion of industrial labor prior to the Civil War. Later this workforce grew to including local, European immigrant, and free black labor, with child labor becoming more prominent towards the end of the 19th century (Barnes 2011:676-677, Drake 2001:82-86, McBride 1996:185,205).

Many of the industries in the region required means of external shipping as well as places for local processing. The earliest processing facilities in Appalachia were grist mills, which were used to process the agricultural production of the region into usable flour and corn meal, although this was mostly for local trade, as the region was never a significant agricultural exporter. After the Civil War, there was an increase in the number of sawmills to process the increasing amount of timber being harvested. Both grist and sawmills were mainly on waterways, which served as a power source as well as a method of transportation, necessary prior to the railroads in the decades following the Civil War. Mountain farmers practiced subsistence agriculture, with livestock the main product for external sale, being transported along roads to eastern markets prior to the collapse of the industry during the Civil War. Other agricultural goods were simply not feasible for external shipment from more mountainous, isolated regions where transportation took more time and could lead to spoilage. A popular remedy was to supplement subsistence farming with the distillation of corn, as alcohol (known as moonshine) was far easier to transport and far more valuable than the unprocessed grain. The stills were usually in secluded areas away from the main farm, as unregistered stills were illegal beginning in the second half of the 19th century. Production of moonshine spiked during Prohibition from 1920-1933, with corn becoming the dominant crop in the region during this time, largely a result of these illicit activities (McBride 1996:185-195, Drake 2001:81, Barnes 2011:677).

3.12.4 Typical farmstead components

A variety of construction materials were employed in the Appalachian Region, differing based on location, time period, and wealth of the builder. The most common building material in areas of first settlement were logs. The earliest center of concentrated log construction in North America was in south-central Pennsylvania by German and other central and northern European immigrants familiar with European log construction. The practice soon spread south and west into Appalachia, quickly being adopted by Scotch-Irish and English frontiersmen with no prior log-building tradition. Log structures were typically built on “large corner stones” used to keep the logs from resting directly on the ground and preventing rot (Noble and Cleek 1995:33). Log construction was used not only by the first settlers in the region, as it was often the method of construction of slave quarters. Later construction featured a wider variety of building materials, such as milled wood, stone, brick and concrete block, which came into use

around the turn of the 20th century. Brick and stone construction were typically signs of wealthier residences, as were larger sized houses of wooden frame. Eastern portions of the Appalachian Region are unique in that brick and stone were often used for the entire structure of barns. Brick barns were common south-central Pennsylvania and north-central Maryland, while all-stone barns, typically of limestone, were common in the eastern portion of the ridges and Valley subregion from the Shenandoah Valley northward into Pennsylvania (Noble and Cleek 1995:4-33).

In keeping with the variety of construction methods used in Appalachia, there is equal diversity in housing types constructed in the region, with different forms similarly being based on location, time period, and wealth of the builder. Log housing was typically used by early settlers and often began as simple one-room cabins that were added upon as needed. The saddlebag design was developed in the Shenandoah Valley, featuring a central fireplace with two single room log structures on either side. Both sides were typically constructed simultaneously, although expanding a single room cabin into a saddlebag was not unheard of. Saddlebag log cabins were commonly distributed in West Virginia and Kentucky but are still found elsewhere in Appalachia. The dogtrot was another cabin variation, featuring two log rooms separated by a breezeway under one gabled roof. This style was developed in southeastern Tennessee and did not diffuse eastward, but moved west and north with new settlement into Kentucky and southern Ohio. The later log slave quarters were typically located in the rear of the main house and were usually rectangular (for more detailed information on log dwellings, see Oak Woodlands/Ozarks Section) (Drake 2001:83-84, Kniffin 1965:561).

Other early vernacular housing included the hall-and-parlor house and the German three-room or Quaker house. The hall-and-parlor house was built with mortise and tenon techniques and featured a main square room known as the hall that was entered directly from the outside and had a fireplace at the end wall, with an adjacent smaller parlor room where the family typically slept. The German three-room or Quaker house was similar to the hall-and-parlor house except the parlor was split into two square rooms, with a chimney at both gabled ends. These were typically mortise and tenon construction but brick and stone versions of this form were also common. The most popular wooden frame house constructed in Appalachia was the I-house, which originated in the Mid-Atlantic and moved southward as well north through Pennsylvania into Ohio. As the I-house

entered Appalachia it became "symbolic of economic attainment by agriculturalists" and was often built by those of more means throughout the region, as it required processed lumber (Kniffin 1965:555). Less wealthy homeowners would often convert dogtrot or other cabins into I-houses by adding boards over the log exterior to provide the look of a frame structure (For more information on I-houses, see Oak Woodlands/Ozark and Northeast Sections) (Enscore et al. 2014:37-66, Kniffin 1965:549,555).

The Appalachian Region is remarkable in the amount of variety in barns and other outbuildings that were used and often developed in the region, largely a result of the dissected nature of the topography and its varying agricultural potential. Appalachian barns can be separated into three main categories, ethnic barns, crib barns, and crib-derived barns. The ethnic barns found in Appalachia are mostly found in valleys that were among the first settled, and are largely of English or German origin. The typical English ethnic barns in western Pennsylvania and eastern Ohio include the three-bay threshing barn as well as the English Bank Barn and its similar variation the raised barn (for more info on these English barns see the Northeast Section). The majority of ethnic barns throughout the region, mostly in northern and central Appalachia, were of German origin, with three main types being the Grundscheier or "ground barn," the Schweizerscheuer or "Swiss barn" and the Standard Pennsylvania Barn (Hart 1998 2013, Noble and Cleek 1995:85). Grundscheier barns were some of the first barns built in North America with the purpose of housing both livestock and grain. Grunscheier barns varied in size but were often built into the side of hills with entrances on the ground level, which housed the livestock as well as an entrance on the second level where the crops were typically stored. The Schweizerscheuer or Swiss Barn was exclusively built into the sides of hills, with a door on the higher level into the central threshing floor that extended out over the edge of the barn in a forebay, as well as a door into the stone first floor, which was used to house the animals. The second story was built from a variety of materials including log, timber frame, brick or stone. These were different from Grunscheiers in that they were typically larger, measuring from 80-100 ft long by 50-60 ft wide, with eaves nearly 50 ft tall. Log versions of the Sweizerscheuer barn were often smaller, measuring only roughly 60 by 30 ft and were popular in the Shenandoah Valley and westward into Ohio. The standard Pennsylvania Barns came in many varieties, but their main characteristic was a forebay built into the framing of the barn, unlike the Sweizerscheuer barns. There

were popular variations of this type of barn known as Extended Pennsylvania barns, which featured a very large forebay with a differently pitched roof. The most common form of Extended Pennsylvania Barns was the Up-Country Posted-Forebay Barn, which was found throughout Central Maryland, the Shenandoah Valley, and eastern Ohio. These timber framed barns had a pronounced forebay that projected 9-12 ft over the end and were supported by posts of stone in the earlier examples and wood in later variation (Hart 1998:213, Noble and Cleek 1995:77-96)

Crib barns were common through Appalachia due to German immigrants who brought log-building techniques from Europe, as well as the plentiful wood found in the region. The simplest crib barns were the single and double-crib barns, which had one or two rooms, each typically being square and measuring roughly 8-12 ft on each side (For more info on these refer to the Oak Woodlands/Ozarks section). As crib barns spread, they became increasingly popular in central and southern Appalachia. One popular variation of these barns was the Cantilevered Double-Crib Barn that was popular as far north as West Virginia. This barn featured two cribs with cantilever supported overhangs over the front and back of the barns, with four-sided overhangs also being common. The second story was used as hay storage and was made of either log or frame construction. Other variations were designed with the second story overhang extending just on one side and being supported by posts, such as the Front Drive and Side-Drive Cribs. The largest of the crib barns were the Four-Crib Barns, which measured roughly 24 by 40 ft and featured four 8 to 16 ft square cribs at each corner, with a single gabled roof overtop the structure. The sides were often enclosed with wooden planks. Several barn types developed out of crib barns are known collectively as “crib-derived barns” (Noble and Cleek 1995:71). The most common of these crib-derived barns was the Transverse Frame Barn, which was of all frame construction and had a central passage that opened on the front and rear of the barn. The front and rear walls typically measured 24 to 30 ft wide while the side walls were 28 to 36 ft wide. The interior of these barns was often open with no loft, leading to frequent use as a tobacco drying barn (Hart 1998:217-221, Noble and Cleek 1995:62-72).

Other outbuildings were equally as diverse in Appalachia, perhaps best exemplified by the many varieties of smokehouses found in the region. In northern Appalachia, the Pennsylvania German Smokehouse was commonly used. These were typically frame structures with board and batten although some

were built of brick or stone construction, in a square or rectangular shape that measured roughly 6 to 8 ft on each side. Found throughout Appalachia, but in smaller numbers was the Cantilevered-Roof smokehouse, which was derived of the Pennsylvania German Smokehouse but was larger, measuring 12 to 14 ft on a side and often being rectangular. The cantilevered roof extended over the front with a gable to shelter the door, with the eaves measuring 8 ft off the ground. The earlier versions were constructed out of log while later ones were frame buildings. The Upland South Smokehouse was found throughout central and southern Appalachia and was an outgrowth of English and German smokehouses "with strong Scotch-Irish influences" (Noble and Cleek 1995:148). The first were made out of log construction with later versions being of box or frame construction. They were commonly rectangular or square, measure 6 to 10 ft per wall and were often built over root cellars. From Virginia southward in Appalachia, the Two-Story Smokehouse is commonly found. Being derived from the English Tidewater smokehouse, these structures were often up to 16 ft tall, typically with a pyramid roof. While occasionally being built of log, most used either lumber, brick, or stone. Other common outbuildings in Appalachia include springhouses, summer kitchens (often an earlier residence on the farm), and corncribs, which were single-crib structures with open sides to allow air circulation to dry the corn (Noble and Cleek 1995:147-155).

While fencing was common in the valley regions of Appalachia, in the more mountainous areas, fencing was used sporadically due to the rough topography. The only areas fenced were typically the hillside meadows where livestock grazed from May-November. Common fences included the rail fence, the stake-and-rider fence, the Irish fence, and the omnipresent Barbed Wire Fence. The rail fence used field stones at the base to support stacks of split rails intersecting at 120 degree angles to form a zig-zag shape. Stake-and-Rider Fences used a series of pairs of stakes angled towards each other with a "rider rail" laid in the crotch formed by the two posts, sometimes with a rock placed on top to keep these rails in place. The Irish Fence was similar to the Stake-and-Rider but only had one rider rail on each set of posts, with the other end of the rail resting on the ground. Barbed wire, once invented in the 1870s, became common through the Appalachian Region and simply required posts in the ground for support.

Farmsteads often had a somewhat acrimonious relationship with the landscape. Other than the best "bottomland" in valleys near rivers or streams, much of the agricultural land was on less desirable hillsides, which often

had to be cleared (Hart 1998:188). This led to the development of a land use pattern that was somewhat unique to Appalachia, in which land was rotated between cropland, pasture and woodland over several decades and often generations. The only continuously cultivated land was the patch of best soil in the area that was called the "infield" and was where the main farmstead was located (Hart 1977:151). Often the placement of the farmstead was also influenced by locations of roads, with many being along main roads "due to social convention" (Enscore et al. 2014:59). The rest of the farm was rough "outfield," with different areas being cultivated each year with the same crop, most often corn, which only required "a few acres … to support a family and its livestock" (Hart 1977:151). Often the corncribs were located on the edge of the farmstead closer to the outfields. After an area was cleared of trees and planted with row crops for several years, the topsoil typically washed away, leaving the field to be abandoned for pasture land as other areas were cleared for row crops. After time, these pastures grew saplings and became forested, allowing for re-clearing and cultivation after roughly a generation (Enscore et al. 2014:59-60, Hart 1977:150-151, Hart 1998:188).

3.13 Region 12: Northeast

3.13.1 Geography

The Northeast region runs from Delaware and Southeastern Pennsylvania in the south all the way to Maine, encompassing all or part of eleven states. The region includes a variety of terrain features, with much of the coastal areas being largely flat with some small hills, while more interior and northern areas of the region feature more mountainous terrain. The region is one of the oldest and most densely populated areas of the country.

3.13.1.1 Acadian Plains and Hills

The Acadian Plains and Hills subregion covers the eastern half of Maine, beginning in the south just north of Portland. The region features hilly uplands, plains with hills and rolling lowlands, with many stony moraines and bedrock outcrops. The elevation ranges from 650 to 1650 ft above sea level. Water in this region is found in a large amount of glacial lakes as well as some perennial streams of low to moderate gradient in addition to a few larger rivers. The subregion features a complex geology including "metamorphosed pelites and sandstones, some igneous intrusives and vol-

canics and a few areas of limestone and dolostone" (Commission for Economic Cooperation 2011:59). The soils are largely frigid Spodosols with some Inceptisols. The upland areas of this subregion are mostly covered with dense, mixed wood forests of sugar maple, beech, and yellow birch while the valleys are predominantly covered with eastern hemlock, balsam fir, eastern white pine, and white spruce, and the drier region in the north is dominated by forests of white, red and jack pines, spruce and fir. Agriculture in the subregion is difficult due to the short growing season with hay being the most suitable agricultural crop, but large amounts of potatoes are being grown as well. The climate in the Acadian Plains and Hills is marked by warm moist summers and snowy, cold winters with mean annual temperatures ranging from 45-50 °F. The precipitation in this subregion ranges from 36 to 50 in. annually with the mean annual precipitation being 43 in. (Commission for Economic Cooperation 2011:59, USEPA 2013:16).

3.13.1.2 The Northeastern Highlands

The Northeastern Highlands subregion covers the mountainous regions of New England, which includes western Maine, New Hampshire excluding the coastal regions, Vermont, western Massachusetts, and the Adirondacks and Catskill Mountains of New York. The area is characterized by narrow valleys that run between hills and mountains, whose elevations can be as high as 3,100 ft above sea level, with these maximum heights being found in Vermont. Many glacial lakes of varying size are found in the subregion. The flowing water is typically in the form of many perennial, high-gradient streams, although there are larger rivers as well but fewer in number. Most of the subregion was glaciated, with the most common rock types being metamorphic and igneous, although there are parts of this subregion where sedimentary rocks are more common. The soils of the subregion are typically shallow and nutrient poor. The most common types are Podzols and Inceptisols. Most of the subregion is forested and includes mixed hardwood forests featuring sugar maple, beech, and yellow birch; mixed forests of hardwoods, hemlock and white pine; and spruce-fir forests that include balsam fir, red spruce, and birch. Agricultural crops in the subregion are limited due to the poor soil and high degree of forest cover, however potatoes, blueberries and apples are produced here. The climate of the Northeastern Highlands is characterized by warm summers, with a mean temperature of 58 °F, and cold, snowy winters, with a mean temperature of 26 °F. Precipitation in this subregion averages 47 in. annually but

ranges from to 33.5 to 79 in. (Commission for Economic Cooperation 2011:35-36, USEPA 2013:11-12).

3.13.1.3 Northern Allegheny Plateau

The Northern Allegheny Plateau is the subregion encompassing the northern most portion of Pennsylvania and the Southern half of New York, excluding the Hudson River Valley and the Catskill Mountains. This subregion has rolling hills, open valleys and low mountains, a sign of its glaciated past, with elevations typically ranging from 650 to 1800 ft above sea level. There are low to moderate gradient perennial streams in this subregion, along with a few small glacial lakes. The geological makeup of the subregion consists of horizontally bedded rock of the Devonian Age, including erodible shales and siltstones, as well as more resistant sandstones. The soil is largely Inceptisoils, with mesic and frigid soil temperature regimes. The vegetation in this subregion is largely Appalachian oak-hickory forests, comprised of white, black and red oaks, hickories, as well as some white pine, maples, beech and birches. The most suitable agricultural crops in the subregion are hay and grain for dairy cattle. The subregion has warm summers but severe winters, with mean annual temperatures of roughly 45 °F and mean annual precipitation of roughly 38 in. (Commission for Economic Cooperation 2011:56-57, USEPA 2013:12).

3.13.1.4 Northeastern Coastal Zone

The Northeastern Coastal Zone includes the southern coastal portion of New England, extending to the western tip of Long Island in the south and to the Casco Bay in Maine to the north, excluding Cape Cod and the eastern portion of Long Island. The landforms in this subregion includes irregular plains, plains with low to high hills, and open hills, with elevations ranging from sea level to nearly 1000 ft above sea level. There are a large amount of lakes, ponds, and wetlands in this subregion. Similarly, there is a high number of perennial streams, which typically have a moderate to low gradient. The bedrock in the subregion is diverse, although most of the bedrock is igneous and metamorphic, with some areas of sedimentary rock. The subregion has nutrient-poor soils that are largely Inceptisols with some Entisols and Histosols. Oak forests and northeastern oak-pine forests are the predominant vegetation, including white oak, red oak, hickories, and white pine. The subregion's poor soil makes it unsuitable to large scale agriculture. Summers in the Northeastern Coastal Zone are warm while the winters are severe, with the mean annual temperature

ranging from 46 to 50 °F. The mean annual precipitation is 46.5 in., which is usually spread relatively evenly throughout the year (Commission for Economic Cooperation 2011:58-59, USEPA 2013:12).

3.13.1.5 Atlantic Coastal Pine Barrens

The Atlantic Coastal Pine Barrens is a subregion that includes the southern half of New Jersey, the eastern portion of long island, and Cape Cod. The region is relatively flat with elevations ranging between sea level and 200 ft above sea level and the most typical landforms are sandy beaches, dunes, wooded areas, and marshes. There are a few perennial streams, several lakes, especially on Cape Cod, and several other water features towards the south such as swamps, bogs, and salt or freshwater marshes. The bedrock is mostly Quaternary and Tertiary sediments with "some Cretaceous geology in the inner coastal plain of New Jersey" in addition to deep deposits of gravel, sand, silt and clay, which are common in this subregion (Commission for Economic Cooperation 2011:76). The sandy soils of the subregion are typically Entisols with Ultisols being common as well, both having mesic soil temperatures and udic soil moisture regimes. Vegetation in this subregion is very diverse, with the most common being pine-oak forests consisting of pitch pine, scarlet oak, black oak, shortleaf pine and chestnut oak. The subregion also has some Atlantic white cedar swamps as well as dune woodlands consisting of American holly, black cherry, red cedar, red maple, pitch pine, hackberry and sassafras. Traditional agriculture is more difficult here due to sandy, nutrient-poor soil, however cranberries and high-bush blueberries do well in this subregion and are grown, especially in New Jersey. The subregion's climate is somewhat moderated by maritime influence, leading to hot summer and cold winters, with a mean annual temperature of 52 °F. The mean annual precipitation is roughly 45 in. spread evenly throughout the year (Commission for Economic Cooperation 2011:75-76, USEPA 2013:16-17).

3.13.2 Settlement history

The Northeast Region had its first contact with Europeans when explorers sailed the coast of the region in the 1500s. More in depth exploration came in 1609 when the Englishman Henry Hudson, on behalf of the Dutch East India Company, became the first European to explore the modern day site of New York City and venture up the Hudson River. The first permanent settlement in the region was founded in 1620 when a group of Puritans seeking religious freedom in the New World established Plymouth, in what

would become Massachusetts. In 1630, an expedition of Puritans established the City of Boston, which would grow to become one of the largest cities of colonial America. In this same period but further south, the Netherlands and Sweden also attempted to get a foothold in the New World, with the Dutch founding New Amsterdam in 1623, followed by settlements up the Hudson River, while the Swedish established settlements along the Delaware River beginning in 1638 in what is present day Delaware and New Jersey. Both of these colonies came under English domain in 1664, who renamed New Amsterdam as New York, as well as spurring increased settlement in the region. It was not until 1681 that Pennsylvania was settled, with Philadelphia being founded further up the Delaware River the following year. Settlement in the Colonial period was initially focused on areas with easy access to the coast or a river, with the interior hill country beginning to be settled following the conclusion of the Seven Years' War in 1763 and more extensively following the American Revolution (Hart 1972:308, Schlebecker 1975:4,7,40).

The early English settlers in the region sought "gold, spices, fur and timber," with fur and timber being the only successful enterprises early on (Schlebecker 1975:36). Due to the ample supply of timber and desirable codfishing waters off the coast, "nearly every coastal town had its own shipyard," and their timber was so prized that a 1722 law reserved all White Pines (which were perfect for mainmasts) for the exclusive use of the Royal Navy, although this rule was hardly enforced (Hart 1998:80). Logging began as an activity done to supplement the income of the region's largely subsistence farmers, although commercial logging first developed toward the end of the 18th century in upland areas of New England, New York and Pennsylvania. Sawmills were located on the rivers and logs were first transported over land and later by river as logging activity inevitable moved away from the mill. By 1840 however, the forests of the Northeast were largely depleted and commercial logging activity moved westward to the Great Lakes region. Agriculture in this region was largely subsistence for the early phase of settlement, although during the 18th century, subregions began to start focusing on certain crops, with Middle Colonies like New York, Pennsylvania, New Jersey and Delaware focused on wheat production while New England grew mostly corn, rye, barley, oats, buckwheat and peas. Commercial animal husbandry became popular in New England, where it was especially common in the frontiers of western Massachusetts and New Hampshire with the meat commonly being dried and sold largely to sailors (Hart 1998:80-83, Schlebecker 1975:36).

Following the conclusion of the Revolutionary War, the movement of peoples westward increased and further intensified following the completion of the Erie Canal in 1825, which connected the Hudson River to Lake Erie and greatly improved transportation to the newly settled region that used to make up the Northwest Territory. By the mid-19th century, large numbers of young inhabitants of the Northeast began abandoning farms in favor of better farmland to the west or in favor of urban jobs in the cities, a consequence of the burgeoning Industrial Revolution. These vacated farms were either left abandoned, sold to new immigrants who continued agriculture, or as country homes or early commuter housing, especially around New York City, New Haven, Bridgeport, and Hartford. In either the abandoned farms or in country/commuter homes, often fields were left empty leading to reforestation of farmland throughout the region through the latter half of the 19th century and into the 20th (Foster 1992:753, Schlebecker 1975:89-90, Shannon 1945:248-250).

As the Great Lakes and Midwest was starting to be settled in the early 19th century, its agricultural production began to compete with the Northeast Region, and this competition stiffened after the completion of the Erie Canal, which greatly improved trade routes west, allowing further undercutting of eastern prices. As a result, many Northeasterners had to abandon their traditional practices and adapt to the new economy. In New England, this took the form of "a more commercialized, mixed-farming and home industry system" (Hubka 1986:166). Farmers would still raise livestock and produce small surpluses of grains but only for local sale, as they could not compete with western prices in the larger market. This led to a diversification of farm enterprises, with cottage industries having increased importance to support the farmstead (Hart 1998:207, Hubka 1986:166, Shannon 1945:245).

Throughout the Northeast, there was a general trend towards specialized agriculture, which was previously limited to areas close to cities prior to improvements in transportation, as many of these goods were perishable and required easy transportation to market. For example, in the 1840s and 1850s, new railroads constructed in New York and New Jersey allowed for increased production of specialized agriculture in rural areas farther away from cities, with strawberries being one such product that became more popular in this period. In the latter half of the 19th century, this trend in the Northeast only accelerated, as it became even harder to compete the "single crop agricultural capitalism profitable in other regions" (Hubka

1986:166). Prominent truck crops (or perishable crops that require quick transport) in the Northeast were cabbage, kale, spinach, potatoes, sweet potatoes, eggplants, cucumbers, lettuce, radishes, beets, cauliflower, strawberries, celery and onions. Double cropping became popular in smaller acre farms, where rows of quick growing vegetables like lettuce and radishes could be grown in between rows of wide-planted crops, such as cabbage, which greatly improved output. In areas closer to large markets like New York City or Boston, some farmers even covered their field with glass and grew tomatoes, lettuce, cucumbers and other vegetables during winter months to fulfill demand. During this period orchards also became more popular in the Northeast, especially apples and peaches. In fact, production from specialized agriculture and orchards in the Northeast was so high that it would not be until after 1900 that Texas and California would compete, and even then it was usually just in winter months (Foster 1992:756-758, Hubka 1986:166, Shannon 1945:252-261, Schlebecker 1975:96).

Another adaptation that was made by farmers in the Northeast was a transition towards dairy farming in the region. In many places, this came directly after wheat production, replacing that crop as its production moved west. For example, New York led the nation in wheat production in 1840, but by the 1850s it was largely replaced by dairy farming. New York was famous for its cheese and butter production in the mid-19th century before losing its supremacy to Wisconsin around turn of the 20th century. Dairy farming also became popular in New England during the second half of the 19th and early 20th century, stimulated by the larger cities in the region that encouraged liquid milk production. For example, milk production in Connecticut grew fivefold between 1860 and 1900 (Hart 1998:209-211, Schlebecker 1975:182-185, Shannon 1945:253-255).

The Industrial Revolution had wide-reaching effects on the agriculture of the Northeast. The railroad greatly reduced both time and price of transportation of goods, allowing for production of perishable goods farther away from cities. This distance was made even greater with the development of refrigerated railcars in the 1870s, allowing for liquid milk and truck farming products to be produced in more remote areas. The railroad also allowed for more competitive prices for goods from other regions, where the advancing farm technology favored large tracts of land for single-crop production. Many Northeastern dairy farmers in the late-19th and early 20th century began to stop growing feed and instead bought corn and

other feeds from the Midwest. The Industrial Revolution created larger cities, therefore also creating a larger market for agricultural goods. Most rural families had a garden or a cow that would be used for their personal subsistence, but as more people relocated to cities, less of these goods were being produced individually. The Industrial Revolution also streamlined the production of goods that had previously been cottage industries, including dairy products, which were increasingly mass produced throughout the end of the 19th and into the 20th century (Conrat and Conrat 1977:96-97, Schlebecker 1975:182, Shannon 1945:259).

3.13.3 Cottage industries

Prior to the mid-19th century, Northeastern farmsteads traditionally produced small surpluses of goods to be sold for supplementary income such as dairy products like butter and cheese, especially prevalent in the southern half of the region, or dried meat, either pork or beef, which was popular in the northern half and commonly sold in ports to sailors. As farmers of the Northeast began to struggle with western competition in the mid-19th century, many increased their home production of cottage goods to supplement their income. Some cottage industries of the period include increased cheese and butter production, syrup production, food canning and preserving, spinning and weaving, quilting, soap and candle making, woodworking, leatherworking, and the production of clothes and shoes. The family was the most common labor source during this period, with the raw materials usually produced on the farm (Hart 1998:207-208, Hubka 1986:165, Schlereth 1991:36).

With the rise of commercial farming from the late 19th century into the beginning of the 20th century, many farms switched to more specialized production. In the Northeast, this meant a trend towards truck farming, which became especially popular in New York, New Jersey, Connecticut, and Massachusetts. Many of the common truck farming produce such as beans, peas, tomatoes, blueberries, cranberries, and strawberries required labor intensive planting and harvesting. Seasonal workers began to be brought in from urban centers for several months a year to assist in planting and harvesting. They were commonly housed in separate workers accommodations such as bunkhouses, smaller structures sometimes referred to as “picker shacks,” or tents, sometimes on a platform. This was typically a family affair due to the lax labor laws of the period, which allowed the use of child labor. In addition to immigrants, lower class urban dwellers often performed this seasonal work. For example, as early as the 1890s, nearly 2000 Italians

from Philadelphia made the annual trip to New Jersey to bring in the strawberries just in the region surrounding Hammonton, New Jersey alone (Conrat and Conrat 1977:191-194, Schlereth 1991:42, Shannon 1945:260-261).

3.13.4 Typical farmstead components

Housing throughout the Northeastern region varied greatly by period and geographical location, often with the construction of farmsteads being linked closely with the first period of occupation. Earlier in the settlement of the Mid-Atlantic, including southeastern Pennsylvania, New Jersey and Delaware, the I-house was a popular housing type that was derived from English influence. It gained popularity in the 1700s and would continue to be built through 1900 in the Mid-Atlantic, as well as spreading through the Midwest and Upland South. It featured a gabled roof and was one room deep, two rooms wide, and two stories high, leading to this house type also being referred to as the "two-over-two" house (Schlereth 1995:88). In New York and New England, housing types were less static and evolved noticeably. The popular house type in this region during the early 1700s was a two-room wide, two-story structure with a massive central chimney and gabled ends. By 1750, influence by ideas of "Georgian symmetry" led to the development of a central hall, causing the chimney to be built on both gabled ends of the house. These Georgian houses were popular throughout New England as well as penetrating the frontier especially in Maine, New Hampshire, Vermont, and upstate New York. By the early American period of occupation (roughly 1790s through 1830s), an older housing style again became popular, known as the "one-and-a-half," which featured one story and a steep gabled roof to accommodate the inhabited attic space. Typically these houses had a central chimney, although occasionally featured a central hallway with chimneys on each end, and were prevalent throughout New England and New York. A popular form of housing in the latter half of the 19th and early 20th century throughout the entire Northeast was the Cross-house. This structure had four gabled ends and came together in a usually asymmetric cross shape. It contained roughly six to eight rooms and due to the cross shape, allowed for added porches, which fit in with the Victorian trends of the time. In a 1948 survey of farms in New York, Vermont and New Hampshire, it was found that 12% still had cross-houses, while 27.6% had houses with T-shaped footprints with three gabled ends, 25.5% had L-shaped houses with two gabled ends, and 19% were rectangular with two gabled ends. In this same survey it was found that 89% were two storied (Kniffin 1965:558-561, Schlereth 1995:88, Trewartha 1948:222).

The construction methods for these varying housing types also differed by time and region. Earlier settlement in an area typically resulted in log constriction, which in this region was mostly upstate New York and the western and northern extremes of New England, which were not settled until the late 18th and early 19th century. Houses constructed in regions more economically integrated often used large timber construction methods also known as the "mortise and tenon" method, which was popular into the mid-to-late 19th century (Hubka 1986:166). From the mid-19th century and onward, framing was the most common method of construction for farm housing, with 90% of farm houses using this method by the 1948 survey. The foundations were either stone piers or stone lined cellars. These cellars were increasingly popular in the region during the 19th century, and by the 1948 survey, it was found that 99% of farmhouses surveyed had a cellar or basement. The main difference among houses of different classes was the size of the structure. However due to the region's proximity to large urban areas, changing architectural trends were more prevalent and wealthier farmers could have their simple framed house dressed up to mimic Georgian, Federal, Greek Revival and Gothic styles with an exterior facade (Hubka 1986:166, Kniffin 1965:552-553, Trewartha 1948:222).

Across all levels of Northeastern society (although especially in New England), a trend began in the first half of the 19th century that continued to the beginning of the 20th, of altering the layout of farmsteads to adjust for the shift from a subsistence to a commercial economy. The New England connected farm included farm structures and the main house arranged and attached linearly. Although some farms were built from scratch in a continuous structure, it was more common for existing structures to simply be moved and rearranged to form the connected farm. By the 1850s, a standard arrangement developed, beginning with the farmhouse, with the kitchen being removed from the main house and located in the first building back, followed by a workroom, a wagon house, a wood house and then finally the barn. The rise of cottage industries such as canning or cheese and butter making led to the need for a larger and more accessible kitchen that could accommodate the increased production, resulting in the kitchen receiving its own structure. Below the kitchen it was common for brick cisterns to be constructed to provide water needed for the production of commercial goods. The third building in the connected farm, behind the kitchen was typically a workroom that was often related to the production in the kitchen or some other type of supplemental cottage industry, such as the production of clothes, leatherwork, woodwork or other handicraft

items. The next room was typically the woodhouse, which was used to store firewood. Behind this was sometimes a wagon house, farm workshop, or general storage room. The final building was almost always the barn. Adjacent to the barn but still attached to the end of the connected farm was typically the outhouse. The new layout of farm building also transformed the yard space, with a front yard usually being at the front of the house, a side yard being along kitchen and workrooms extending to the barn, and then the barnyard at the end of the barn (Hart 1998:208-209, Hubka 1986:161-165).

The layout of farmsteads in the Northeast were frequently influenced by their surroundings. Due to the terrain of the region, most farmsteads were established in valleys, which provided flattish or moderately sloping sites that were suitable for farming. In a 1948 survey of farmsteads in the New York and western New England, it was found that over half of the farms were rectangular or square in shape, with 20% of farms being non-contiguous, a sign of the consolidation of farmsteads into larger, more commercialized operations in the late 19th and early 20th century. The built environment also played a role in the location of farms. In the same 1948 survey, it was found that over nine-tenths of all farmsteads were laid out with the house being on a roadside. Due to the location of many farms in valleys, combined with the practice of farm consolidation, about a third of all farms were divided by a public road or highway, with farm structures on both sides. This was not universal however, as 14% of farms were still removed from public roads, only being accessible by smaller private drives. The boundaries of farmsteads were often delineated from each other by fences. In the Northeast region, these fences varied depending on the location and materials available. Throughout the entire region, wooden fences were often used. The most common wooden fence was the rail fence, which used field stones as bases with split rails stacked on them forming roughly 120 degree angles, resembling a zig-zag shape. Post and rail fences were less common but still prevalent in the region. These featured two or three split rails inserted into vertical timber posts. Due to the glacial effects on the terrain in northern half of the region, the abundance of field stones allowed for farmers to create stone fences. While some of these were well built walls, it was more typical for walls to be simply a haphazard pile of stones lining the edge of a field. An 1871 national census of fences found a quarter of a million miles of stone walls in the New York and New England (Hart 1998:182, Noble and Cleek 1995:170-174, Trewartha 1948:221-222, USDA 1872).

The barns of the Northeast are usually influenced by the initial settlers of the region, with some changes later as agricultural practices changed. The most common barn throughout early New England was the three-bay threshing barn. This barn of English origin had a central bay that was used as the threshing floor with large double doors on each side wall and storage bays of equal size on either side of the threshing floor. They were timber framed with post and beam construction and sided with vertical lumber. Three-bay threshing barns were single story structures, usually with a loft for hay storage, and supported by either a low stone foundation or individual rock piers at the corners. Prior to the 19th century, farmers used barns for storage of grains and materials and not livestock. By 1820 however, it was common for farmers in the Northeast to house livestock in one of the side bays of the three-bay barns, with the other side still being dedicated to grain storage. However the larger barns were more optimal for housing animals, and soon the three-bay threshing barn was adapted to serve its new purpose. This did not mean that the three-bay barns fell out of use, as many of these barns were repurposed as workshops or storage areas in the New England Connected Farms of the 19th century (Hart 1998:204-209, Noble and Cleek 1995:77).

One way that the English three-bay threshing barn was adapted for new uses was by elevating it and creating a second floor beneath the barn. One form this adaptation took was the English Bank Barn. Common in Eastern New York and Western New England, the upper structure of this barn was identical to the threshing barn, except it was built into a slope, with the lower section being excavated and used for housing animals. This allowed for access to the second floor from the higher part of the slope with the first floor being accessible from the lower part of the slope. On flatter land, farmers would construct a raised barn. These barns were commonly 30-50 ft wide and 60-100 ft long and like the English Bank Barn, the upper structure was an English threshing barn. With these barns however, instead of being built into the side of a slope, the entire first floor was constructed out of stone or brick (or later concrete) and then an earthen ramp or hillside was used to enter the second floor of the structure. These barns were commonly found in New York and Vermont (Noble and Cleek 1995:79-82).

In regions of Dutch settlement, including New York, New Jersey, and parts of Vermont, the Dutch barn was commonly built. These barns featured a gable roof with a moderately steep roof pitch and were typically square or

slightly wider than long. They had large wagon doors in the center of the gabled front as well as a smaller entry door, usually near one of the corners. In areas of Welsh settlement, largely in western New England and New York, although especially in Vermont, Welsh Gable Entry Bank Barns were common. These were similar to the English Bank Barn in that it was constructed along a slope, however these barns were built with the ridgeline perpendicular to the slope rather than parallel to it, as is the case with the English Bank Barns. These barns had two entrances, one on the gabled end at the top of the slope, and one on the gabled end lower on the slope, with an entrance into the ground floor (Noble and Cleek 1995:84,107-108).

Common outbuildings in the Northeast region vary depending on the type of farming as well as any ethnic influence on the farmer. In regions of Dutch settlement, hay barracks were constructed to store hay and straw. Located close to the fields, these structures used a foundation of either wooden sill resting on the ground or sometime on cornerstones, with vertical corner posts. A pyramid or gabled roof was attached to these four corner posts and could be raised and lowered to accommodate more hay. In regions specializing in dairy farming, which includes much of western New England and New York, milk houses and springhouses were common. Springhouses were small structures, usually made out of stone, built around a source of spring water and used to store milk or other perishable goods. Milk houses were small rectangular, gabled roof structures that were used for milking and were often located close to or attached to the barn. Chicken houses were used throughout the Northeast, with 85% of farms having them in a 1948 survey of New York and western New England, however there was no standard design and are difficult to identify. Sugarhouses are easier to identify, as they were built away from the main farm complex closer to the source of sugar, usually being a grove of maple trees. These building were typically built on a slope, to allow gravity to assist in the feeding of sap in to the evaporator, which was either a stove or fireplace located at one of the building's ends (Noble and Cleek 1995:140, 153, 161-162, Trewartha 1948:224).

As much of the region transitioned to truck farming, new built environment was often required to cater to more specialized agriculture, although this varied greatly depending on the produce being cultivated. In the areas of this region covered by Pine Barrens, farmers grew cranberries in artificial bogs, beginning in Cape Cod around 1820 and in New Jersey beginning in 1835. Artificial bogs were created by clearing the land of vegetation

and adding two to six in. worth of sand to the surface. The bogs would be surrounded by an earthen dam 12 ft wide and 2 ft taller than the maximum water level of the bog, separated into units typically two to four acres each. A gate was placed along the dam in order to maintain water levels as well as flood the bog during winter months to preserve the cranberry vines. Initially, harvesting required large numbers of laborers, usually brought into the farm, with bunk houses usually being located near the bogs. It was not until after World War I that farmers began to flood fields during harvests as well, which, combined with advances in harvesting machinery, greatly reducing the amount of labor required. Another specialty agricultural product that required its own unique built structure was shade-grown tobacco in the Connecticut River Valley of Massachusetts and Connecticut. This variety of tobacco was used only for the outer wrapping of cigars. Nine-foot tall posts were placed all throughout the field and in the spring, metal wire was used to raise cheesecloth over the entire field to increase humidity and reduce evaporation (Hart 1998:255,264-267).

Developmental History of Ranches in the United States

At its outset, ranching in the United States was more closely related to herding than farming and as a result the physical footprint of a ranch reflected the semi-nomadic nature of the profession with hastily built bunk houses, storage sheds, and corrals constructed from locally available materials. However, as technological advances in the late-1800s made growing cattle more efficient, ranching became more place-permanent and adopted many of the architectural and physical infrastructural features of farms.

The current definition of a ranch is that they are a specific type of farm—one that is uniquely structured for raising grazing livestock for sale. Livestock can include sheep, elk, or bison, but a ranch most commonly produces cattle for meat. There is pastoral farming where livestock is produced, but not necessarily for meat. For example, a cattle ranch differs from a dairy farm in that there are grasslands associated with a ranch where livestock can graze until they are rounded up and sold once a year while dairy farms keep cows closer to the barns so that milk can be harvested on a daily schedule. Mixed farming includes raising livestock and crops. Ranches can be any size and ranching practices occur across the United States. However, Western and Great Plains ranches provide the most archetypical ranch layouts that are characterized by a ranch headquarters and associated buildings with extensive grass and pasture lands for grazing cattle. In the other regions of the United States, ranches might have less land holdings, but the overall building and infrastructural requirements would be similar. Other regional differences that might occur would be in locally available construction materials.

4.1 Origins of ranching in the United States 1590s-1880s

The concept of ranching originated in Spain during the Reconquista between AD 718 and 1492 (McKitterick and Collins 1990). During that time, Spanish nobility were granted large tracts of land that had been conquered from the Moors. To defend and earn revenue from those lands, the nobility developed a system of raising sheep and cattle on the open range. Later, the Spanish translated that idea to the Americas in the 16th century by the Conquistadors and, later, Spanish settlers. Open-range livestock herding moved into from Mexico into what would later become New Mexico and

Texas and eventually California ("Ranching Heritage"). The semiarid environments of Spain were similar to the American Southwest with sparse grass and limited water, which required expansive amounts of land to support livestock grazing. Livestock roamed freely across the landscape with only a few herders to protect the animals and then to round them up and guide them to the final point of sale ("Ranching Heritage"). Although ranching and cattle-raising culture was influenced by Spanish settlers, the Deep Hollow Ranch on Long Island claims to be the oldest cattle ranch in the United States with continuous operations since 1658 (Ross 2000).

In Texas, cattle ranching was introduced in 1749 when José de Escandón moved to the Rio Grande region along the gulf coast. With him were 3,000 settlers and 146 soldiers (Fort and Fort 1994). That settlement ushered in a wave of settlers along the Rio Grande River, where land allotments were laid out in "*porciónes*, long thin strips of land beginning at the river and stretching inland" (Fort and Fort 1994). The layout assured water for the landowners. As the population in the area grew away from the river, large plots of land away were necessary to support cattle grazing in the arid brush.

Access to water was a critical component establishing a ranching operation. A ranch headquarters needed water, either from springs and rivers or from hand-dug wells. To provide water for the herds of cattle, ranchers would construct earthen dams across arroyos so that a pond would form. Water was also stored in below ground cisterns. The dams and hand-dug wells had unique construction techniques:

> To build a presa [earthen dam], workers collected earth from the front of the dam and carried it in rawhide containers to the top, where they emptied the containers. Draft animals walking back and forth packed the earth down to make the dam. A spillway made of *sillares* (caliche blocks) completed the project. This type of dam and reservoir was built at El Randado in Jim Hogg County during the 1830s. More common was the noria con buque [hand-dug well]. Laborers dug the well with tools made by blacksmiths. The noria, which could be either circular or rectangular, was lined with hand-quarried sillares. Two walls were built up on either side to support a mesquite log placed horizontally above the well. A long rope was placed over the log, with one end tied to a rawhide bucket and the other to an ox or mule. The draft animal pulled on the rope to raise the bucket and reversed to lower it. Often a large holding tank, made of sillares and covered with lime plaster, was built adjacent to the well (Fort and Fort 1994).

After access to water, the next important consideration for these ranches was organizing an enclosed community. They were called haciendas and included the social structures that divided labor under the ranch owner.

The ranch owner and family "lived in a large house made of sillar blocks quarried on the property. Most early ranch complexes often were surrounded by stone walls for security or had other defensive fortifications. The casa mayor (main house) had troneras (gunports) built into the walls and served as a fort during the frequent attacks from Comanche and Lipan Apache Indians" (Fort and Fort 1994). The laborers lived in one-room huts called jacales. Those structures were constructed out of "mesquite poles placed upright, supported by forked horcones (corner posts). Limbs were placed horizontally across the poles, and mud or adobe filled the openings between the limbs. Forked poles centered on the end walls supported the ridgepole beneath the thatched roof. Women cooked in a grass or corn stalk ramada (arbor) near the jacal, and the family ate outdoors" (Fort and Fort 1994). Associated with the jacal were small animal pens for a few chickens or goats and a garden for corn, beans, and pumpkins (Fort and Fort 1994).

English-speaking settlers arrived in what would become Texas in 1821 and were spreading west through the rest of the United States around the same time (Haeber 2003). Southwest Louisiana had large herds of cattle. However, because Louisiana had fertile soils and more rain ranchers could raise more cows on less land than in Texas (Vidrine 1991). Ranching practices remained the same through this period and across America. The ranching business was operated from a headquarters—the main grouping of buildings that included the residence, barns, and bunkhouses for the herders, or cowboys. Fenced areas were needed to keep breeding cows were kept near the main ranch complex as well as the horses needed for ranching operations. For most of the year, the cattle were left to roam freely on the open range. Once a year cowboys rode into the range and rounded up the ranches' cattle. Roundups usually occurred in spring. During roundups calves were separated from the herd and branded and bull calves were castrated.

Cattle drives were how ranchers moved their livestock to market. Cattle drives were most prominent between 1856 and 1896 where cattle from Texas were driven to railheads in Kansas for shipment to stockyards in Chicago. Herds driven to market were between 1,500-2,500 head of cattle. Stockyards were also located in Louisiana and further east. To support these long drives, cow towns grew up along the routes of these cattle drives to provide periodic resting points for the riders and animals (Skaggs 1973). After the Civil War, Americans began eating more beef. The increased demand roughly coincided with the expansion of the railroads west, which

made driving cattle from the ranches where they were raised to market easier (Malone 1971).

A personal account of ranches in the west was written by Theodore Roosevelt who described ranch life in his 1888 book *Ranch Life in the Far West*. His ranch was located in North Dakota and he describes the region as "one vast stretch of grazing country, with only here and there spots of farmland, in most places there being nothing more like agriculture than is implied in the cutting of some tons of wild hay or the planting of a garden patch for home use" (Roosevelt 1985). Roosevelt also provides a compelling description of how a cowboy camp was built out into a ranch and the wagon ruts that connected ranches that could be as far as 20-30 miles apart (Figure 2).

> At last, after days of excitement and danger and after months of weary, monotonous toil, the chosen ground is reached and the final camp pitched. The footsore animals are turned loose to shift for themselves, outlying camps of two or three men each being established to hem them in. Meanwhile the primitive ranch-house, out-buildings, and corrals are built, the unhewn cottonwood logs being chinked with moss and mud, while the roofs are of branches covered with dirt, spaces and axes being the only tools needed for the work. Bunks, chairs, and tables are all home-made, and as rough as the houses they are in.
> The small outlying camps are often tents, or mere dugouts in the ground. But at the main ranch there will be a cluster of log buildings, including a separate cabin for the foreman or ranchman; often another in which to cook and eat; a long house for the men to sleep in; stables, sheds, a blacksmith's shop, etc.,--the whole group forming quite a little settlement, with the corrals, the stacks of natural hay, and the patches of fenced land for gardens or horse pastures. This little settlement may be situated right out in the treeless, nearly level open, but much more often is placed in the partly wooded bottom of a creek or river, sheltered by the usual background of somber brown hills (Roosevelt 1985:5).

Figure 2. Elkhorn Ranch, Theodore Roosevelt's main ranch in North Dakota, shown in 1885.



Source: wikicommons.

Through the Civil War and into the 1880s, ranching was the dominant economic driver of the American West. However, the Homestead Act of 1862 brought more farmers west. That created conflict between the ranchers and their open-grazing practices and the farmers who wanted to protect their crops from being grazed. Those conflicts intensified with the invention and widespread application of barbed wire after 1874. The introduction of a cheap fencing material began the slow end of the free-range grazing on the open range (Krell 2002). It was during this time ranches started diversifying their operations by planting more agricultural crops.

By the 1870s ranches were spreading across the Great Plains north through the Dakotas; northwest to Wyoming and Montana, Oregon, and Washington; and west into Colorado. These ranches were established by white settlers and were similar to the farming homesteads also being built during this time. Buildings were made from locally available materials and wood was scarce on the treeless plains. Access to water was still an important consideration on locating the ranch headquarters.

4.1.1 California

Ranching in California follows a slightly different path than ranching in the rest of the United States. Livestock raising was introduced there by the Spanish but developed differently because of the geographic conditions that reduced economic connections with markets on the east coast. Initially, Spanish missions in California had herds of cattle and often trained Native Americans to care for those animals (Iber 2000). The California hide trade engaged cities along the west coast and operated from the early 1820s through the mid-1840s.

4.1.2 Physical elements of ranches 1590s-1880s

This period was dominated by open-range cattle ranching. Cattle were allowed to roam and graze untended throughout much of the year. Animals were branded with the symbol of the ranch to which they belonged and were sorted out when roundups occurred. Ranches established by Spanish settlers in what would later become Texas had distinct land allotments and were located where access to water was available. Main residences and other buildings were often made of stone or adobe and were often designed to be defended. In addition to the main residence these ranches had a water infrastructure, store houses, stone walls, and laborers huts.

Homesteader ranches during this time were similar, but often less elaborate. Access to water was still vitally important. However, main residences and other important structures could be constructed out of logs, sod, or wood. As ranching spread north and west the main footprint of a ranch stayed consistent with a main group of buildings—main house, bunkhouses, storehouses, barns, roundup areas, and horse corrals. Because ranches needed to be mostly self-sufficient, there were usually gardens, orchards, and other support buildings associated with the main residence.

4.2 Ranching in the late 1800s and early 1900s

The late 1880s was a watershed moment for cattle ranching in the United States. Technological advances were changing how cattle were raised, but at the same time there were several severe environmental and disease catastrophes that killed thousands of cattle. Ranchers went bankrupt and an overall effort to modernize practices to protect against livestock losses were enacted. But before all of those lessons were learned, ranchers entered the 1880s continuing raising cattle as they had done for past 100 years. Figure 3 shows the infrastructure needed for a cattle roundup in Colorado. Note the access to water, road, buildings, and fencing.

In the 1870s and 1880s the cattle industry was growing considerably, and ranchers needed to find additional grazing lands. Expansion grew toward the relatively unsettled grasslands of the north and northwest, with Texas cattle operations moving into the Rocky Mountains and Dakotas. Herds were getting larger and the result was extreme overgrazing. Although still in conflict with farmers, ranchers had begun to adopt the use of barbed wire fencing to help control herds of cattle on the range.

Figure 3. Colorado *"Round up" on the Cimarron*, a photochrom print from c. 1898, showing one of the large musters of cattle in the days before barbed wire, fences, and easy access to transport ended the necessity for the practice.



Source: Library of Congress.

Then came the winter of 1886-1887, which was the most severe on record. Cows died by the thousands for two reasons. Because the land was over-grazed, the cattle had no winter forage under the snow (Malone 1971). Barbed wire fencing restricted the cattle from migrating to warmer areas and many herds died at those fence lines. Losses went unnoticed until the spring thaw. The results were catastrophic to ranchers; not only were the majority of herds dead, the few surviving animals were skeletons with frost bite that could barely be sold at market (Mattison 1951). Droughts were also a problem on the arid plains. With larger herds, finding access to water became problematic. Existing water bodies could only support a certain limit of livestock, and during droughts, the number was even less. Those environmental disasters made ranchers introduce agricultural planting of forage and feed crops near the ranch headquarters as well as prioritizing enduring water sources, like windmills and irrigation systems, to reduce the economic impacts of livestock losses.

During the 1880s, tick fever also struck herds in the north, killing cattle. The disease was carried by cattle from Texas and Florida where it would

only make cows sick, but in Kansas, Missouri, Arkansas, and Illinois it devastated herds. By 1884, Kansas had enacted laws forbidding the Texas steers from crossing into the state except in December, January, and February. Other states followed with their own legislation on the matter and by 1886, the free transport of cattle from Texas northward was more or less impossible (Schlebecker 1963).

The quarantines lasted for more than a decade and by 1906 ran along the 35th Parallel (Pasquill 2012). Discovering that ticks carried the disease that was killing cattle took nearly 10 years. After that discovery, it took another decade to develop an effective solution for eradicating the ticks. At first, pasture rotations were used, which kept infected pastures empty until they were deemed free of the ticks. A more effective strategy was needed. By 1907, tick eradication methods included pasture rotation, dipping animals, and spraying or hand dressing them with oil and oil emulsion (Pasquill 2012). Dipping became the most efficient way to apply treatment to large herds of cattle (Figure 4). In response, H.W. Graybill who worked in the Bureau of Animal Industry, published research in 1909 that proposed an arsenical solution was the most effective dip. The U.S. Department of Agriculture (USDA) reported in 1917, that the first dipping vat with the arsenical solution was used by a Federal inspector in Alabama in 1909 (Pasquill 2012).

Graybill also outlined specifications for constructing dipping vats out of either wood or concrete. These vats could hold 2,088 gallons of solution when filled to 5 ft. Wooden chutes guided cattle into the vat where they were totally submerged except for their heads. After a brief swim, they exited the vat onto a concrete pad that was slanted with a curb to direct the highly toxic liquid back into the vat. After the dipping was done, the solution was drained into a shallow pond so that it could percolate into the soil. The ponds needed to be far from other water sources to avoid contamination. Dipping stations were constructed across the southern and western United States. Dipping stations could be public or private. In Louisiana in 1907, parish authorities voted to build one vat in each ward and private vat owners agreed to make their vats available for use if the ward paid for the maintenance and solution (Pasquill 2012).

Figure 4. Dipping cattle at Spade Ranch in Nebraska, 1910.



Source: wikicommons.

By the mid-1910s, ticks were being eradicated and the quarantines lifted (Pasquill 2012). Dipping livestock became a popular method of maintenance, not just for ticks, but for many applications of insecticide or medicine that needed to cover the whole animal. Cattle dipping station construction remained consistent, but the design was modified slightly to accommodate shorter-legged animals like sheep and hogs. In addition to a shallower dipping vat, those stations also had holding pens alongside to corral the animals (Pasquill 2012). Dipping vats were used well in to the 20th century and were public or privately owned.

Expanded road and railroad networks and the construction of meat packing plants closer to ranching centers meant that the long-distance cattle drives were over. Cattle could be shipped to market faster and people were demanding higher quality meat. Cattle breeding began to select for quality meats with fewer inputs. The quality of stock was also controlled by fencing in pastures where cows could stay and graze. Grazing was rotated among several pastures and grasses could be reseeded (Schlebecker 1963).

Because of those factors, ranchers began slowly incorporating practices that would eventually reduce the need for extensive lands while ensuring

livestock survivability. Increasing numbers of ranchers began growing forage crops and mowing hayfields to have livestock food in case of a severe winter or drought. The storage of silage meant that ranchers built silos and in Texas, the King Ranch prominently adopted the trench silo (Schlebecker 1963). Although not widespread, small irrigation systems were built to ensure reliable sources of water and included windmills, troughs, dams, and ponds, and sometimes canals (Schlebecker 1963).

The evolution of cattle ranching throughout the late 1880s and early 1900s was most impacted by five factors: expanded and improved transportation facilities, tick fever was contained, feeding livestock supplemented open-range grazing, planting forage crops supplemented grasslands, and open-grazing on the range decreased (Schlebecker 1963). Those factors allowed ranchers to produce higher quality beef on less land all while reducing the risks involved. The open-ranges were closed and ranchers now had to graze cattle on large pieces of fenced land.

During this time ranches still consisted of a central complex of buildings that could include the main residence/headquarters, workers' bunkhouses, a cookhouse, barns, horse barns, and corrals, but also fenced pastures, feedlots, dipping vats, livestock scales, calving barns, blacksmith shop, machine shop, storage structures, and irrigation infrastructure. Other physical elements that supported ranches were gardens and orchards, cellars or milk houses, corncribs, and machine sheds (Ward 1993).

4.3 Ranching in the 20th century

The groundwork for modernizing ranching was initiated in the late 1880s, but it was in the 1910s that those early practices began spreading. The cultural shift occurred both in farming and ranching and brought a scientific approach to production that was to maximize the efficiency of daily operations. Crop species, crop rotation, irrigation, fertilizers, and not overgrazing also became standard practices. Ranches were still major operations with vast land holdings, but the risks with raising livestock were being reduced. However, the World Wars, economic factors, and environmental disasters affected ranching with landholding consolidations, workforce reductions, reducing or eliminating the production of livestock.

A 1919 description of the Burnam home in Oak Creek, Texas near the Chisos Basin includes the features of a self-sustaining ranch of that time:

> The Burnam home, which was situated in a beautiful oasis place called Oak Creek in the middle of Oak Canyon, was a Sears and Roebuck mail order house that had been shipped by rail to Marathon by its previous owner, who originally assembled the house at his ranch north of Study Butte. He later disassembled the house and moved it to Oak Creek on his new ranch, where it was reassembled. The two-story frame house, which was probably the nicest one in the Big Bend area, stood on a terrace formed by a three-foot wall that was shaded by several tall willow trees. It was located one mile below the "Window", a natural opening that framed the cliffs of Casa Grande on the west side of the Chisos Basin in the high mountain areas of the northern Chihuahua Desert. Their ranch was comprised of 50 square miles of mesas, desert grasslands and distant lowlands. Water from springs in Oak Canyon were routed through an irrigation canal that provided adequate water for the willows, a fig tree, a salt cedar tree, blackberries, vegetables, flowers, and eventually a fruit tree orchard, allowing them to flourish at Oak Creek in what would otherwise be very arid land. Cattail Falls, located about a mile south of Oak Creek, poured clear water over a 70-foot cliff to a lovely pool fed by a stream lined with yellow columbine and ferns (Heinsohn n.d.).

The general reduction in grazing as the primary method of fattening cows continued well into the 1900s. Other major shifts in ranching practices were precipitated by the World Wars. The First World War created a demand for beef and ranchers reacted by increasing their herds. However, throughout the 1920s and 1930s the shaky economy and environment caused an economic backlash. To counter the effects of those decades, the Federal Government implemented a program that paid ranchers to cull their herds. Nevertheless, ranching operations remained consistent until World War II.

World War II brought labor shortages as men joined the military and after when those men found higher paying jobs in oil fields or elsewhere. Ranchers adapted by eliminating horses and began using machines and trucks to accomplish the work of cowboys. Additionally, overall pasture sizes were reduced (Kelton 2018). Other technological innovations that were adopted by ranchers after the war were "crossbreeding, artificial insemination, and computerization" (Kelton 2018).

Along with the shift toward mechanization, in the 1950s stock farming became popular. Stock farmers diversified operations by keeping small cattle herds as well as planting agricultural crops (Richardson and Hinton 2019).

In the 1960s, fattening cows for market grew in popularity. To do that, cows were taken to feedlots where grain was provided to quickly grow cows that

would sell for higher prices on the market. Even with that shift in production 20th century ranches kept improving with “miles of fencing, water supplies accessible to grazing land, permanent corrals, and loading chutes” (Richardson and Hinton 2019). After these shifts in ranch operations, the ranch complex has changed to reflect them. In the ranch complex, there might be a headquarters building but it might not be a residence. Likewise, there might be a residence for a ranch manager or for the few ranch hands that run the daily operations. In general, other buildings in a ranch complex would be barns, machine sheds, and storage structures like silos.

5 Field Test Results: Fort Riley, KS

Field work was conducted in April 2019 by Carey Baxter and Susan Enscore of ERDC-CERL. Principle support at Fort Riley was provided by Fiona Price, Archaeologist/Collections Manager, Fort Riley KS.

Five sites were tested in this effort at Fort Riley. These are 14GE170, 14RY2117, 14RY2136, 14RY2138, and 14RY2140. Testing was attempted at three other sites but was prevented due to environmental reasons. Site 14RY2135 contained a large, occupied skunk den, site 14RY2139 was inaccessible due to flooding and site 14RY2144 could not be relocated.

5.1 Determination of typical site features

Fort Riley is situated within Region 6 – the Great Plains. Historic contexts specific to the Fort Riley region can be found in Ryan et. al. (2016), Morrison and Zeigler (2005), and Halpin and Babson (1997).

Several general trends can be gleaned from these, and other reports that inform on what is a typical farmstead for the region. Farmstead settlement began in the region in the 1850s. Due to the abundance of limestone rock and a lack of trees, much of the early construction is dominated by stone structures until the establishment of railroad lines in the 1880s allowed for timber to be brought into the area. Poured concrete became widely available in the first quarter of the 20th century and became the dominant form of foundation construction. Stone walls are more typical types of fencing than wood, particularly for farms dating from the mid to late 18th century when the construction of stone walls was encouraged by the State legislature (Halpin and Babson 1997). Barbed wire fencing was introduced into the area in the 1880s.

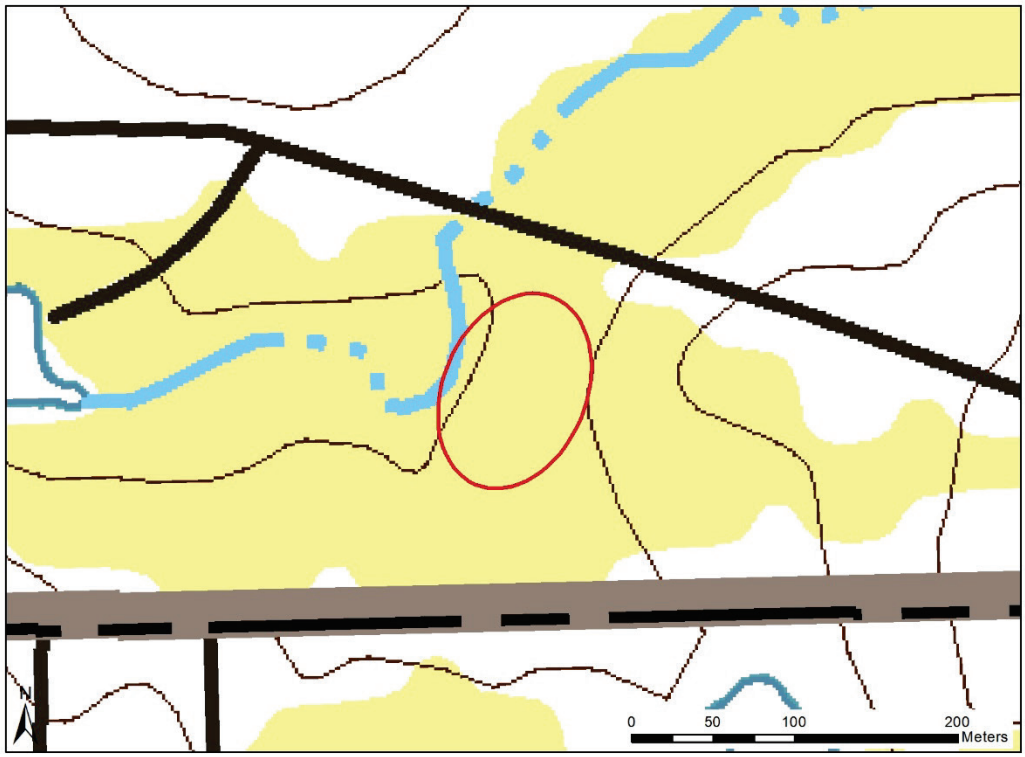
The primary crop type for the region was cash-crop grain production, with wheat and corn the most common grain type. We would expect to see features for grain storage as well as barns that could accommodate drought animals, small tractors and plowing or threshing equipment. The last quarter of the 19th century saw an increase in the production of feed cattle and the early 20th century saw an increase in dairy production. These trends may result in features such as feed and silage silos and earthen dams for stock ponds. In the early 20th century the agricultural economy in the region experienced a boom. The resulting prosperity led to farmstead enlargement or the abandonment of smaller farms due to farm consolidation.

Based on this summery we do not expect to see widespread evidence of a non-agricultural cottage industry at farmstead sites at Fort Riley. Site size, particularly for sites with a 20th century occupation, may be significantly larger than farmsteads seen in other parts of the county. Foundations made of stone or concrete are expected. Stone walls and barbed wire fencing should be the dominant forms of fencing.

5.2 Site 14GE0170 field test

Site 14GE0170 was originally reported in 1978 and documented in 1992, 1993, and 2004 (Morrison and Rowe 2004). The site sits on a slope with the high ground on the eastern portion of the site (Figure 5). A natural creek is on the western side of the site.

Figure 5. Site 14GE0170 on 2018 USGS 7.5 quadrangle map.



Source: https://ngmdb.usgs.gov

5.2.1 Original Phase I results

The site was first recorded in 1978 by Kevin Cooprider (1978) in a survey that did not include subsurface testing. The state site form does not include a map. Cooprider describes the site as representative of late 19th century farmsteads and lists 10 features including two buildings described as

dwellings with stone and concrete foundations, six other buildings with concrete foundations, a wooden structure with no foundations and one well cap. One of the dwelling structures was marked by a large flower garden south of the structure. Many structures had wooden superstructure remains still present, but all were collapsed.

The site was revisited in 1992 (McDowell et al. 1993). This report also did not include a map. It described that all aboveground structural remains had been removed. This project a sample of 29 artifacts removed from the site that included whiteware ceramics, bottle and window glass fragments.

5.2.2 Historic documentation

Historical documentation was conducted by Morrison and Rowe (2004) as part of their NRHP eligibility assessment of the site. The site first appears on historic maps in 1879 and is described as the property of D. Jones. Daniel Jones acquired the patent for the property in 1885. The 1895 agricultural census describes the farm as 80 acres under fence with 60 of those acres under cultivation in various types of grain. Livestock on the farm are listed as three horses, 2 mules, two milk cows, 7 swine, and an unknown number of poultry. An orchard of 150 apple trees is also described in the census.

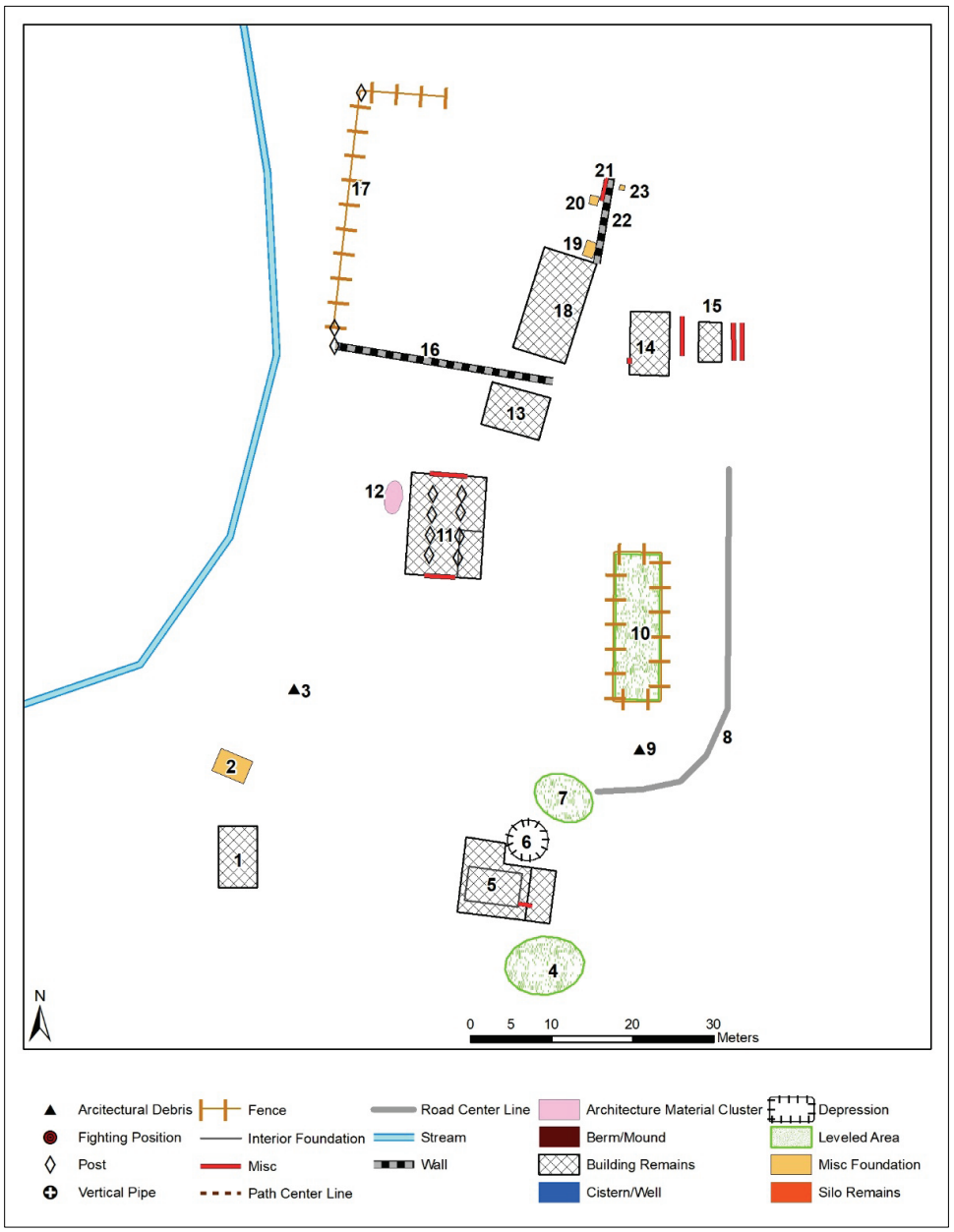
Between 1897 and 1903 the property passed through the ownership of the William Deering and Company of Chicago and Theodore Moritz to Berthold and Antonia Moritz. The 1905 agricultural census describes the farm as 120 acres under fence with four adults and two children in residence. The primary products continued to be grain but additional income was generated from the sale of hay, eggs, poultry and butter. Livestock on the farm are described as three horses, 3 milk cows, 18 cattle, 18 swine, one stand of bees and an unknown number of poultry.

In 1915 the property had reduced back down to 80 acres with four adults and three children in residence. Hay production had increased 1300% and butter production had increased 500% over the 1905 levels. Livestock on the farm are listed as seven horses, 4 milk cows, 5 cattle, 20 swine and one stand of bees. Other improvements on the farm included the acquisition of a cream separator and a mill driven well for water. Berthold and Antonia Moritz sold the 80 acre farm to the government in 1965.

5.2.3 ERDC-CERL site visit

ERDC-CERL researchers identified 23 features at the site (Figure 6). Very few artifacts were observed on the site and most of these were pieces of metal debris. No evidence of the wooden structures or structure remains described by Cooprider (1979) could be found. There was no significant evidence of military activity or other recent ground disturbance within the site boundaries. Push piles and heave equipment tracts were present immediately northeast and east of the site.

Figure 6. Site 14GE0170 site map.



Source: ERDC-CERL (2020).

The site feature descriptions are:

1. Building Remains. Concrete foundation remnants with embedded anchor bolts. No discernible floor material
2. Misc. Foundation. Square stone area with no discernible walls. Appears manmade but may be natural.
3. Architectural Debris. Tight scatter of concrete slab fragments. Most pieces are 10-20 cm in size.
4. Leveled area. Greener then surrounding areas. No trees or underbrush.
5. Building Remains. The exterior wall of this L-shaped structure consists of a low limestone foundation with no discernible floor material. Bricks are present on the northern wall, indicating a potential fireplace/chimney. The central rectangular element is a one story deep stone lined cellar with concrete stair on SE corner. The eastern addition consists of a poured concrete foundation and floor slab.
6. Depression. Deep circular sunken area.
7. Leveled area. Greener then surrounding area, no trees or underbrush.
8. Path. This is very subtle path. May have been vehicular or pedestrian.
9. Architectural Debris. Tight grouping of five pieces of large stone and concrete blocks.
10. Leveled Area. Leveled area with no trees or underbrush. Completely surrounded with wire mesh fence and wooden fenceposts. Heavy brush on eastern side of the area.
11. Building Remains. Poured concrete foundation with anchor bolts. On the east side of the structure the foundation is 30-60cm above the ground surface. On the west side of the house the foundation is 120-150cm above the ground surface. No discernible floor surface but the interior ground layer is level and higher than the sloping exterior ground. The interior has eight concrete footers approximately 30cm high with embedded rebar that likely served as the bases for wooden posts. An interior room is indicated in the SE corner through the presence of a low poured concrete interior foundation walls. Large entranceways are indicated on the north and south walls by a section of the foundation that is 10-20 cm lower than the rest of the foundation.
12. Architectural Material Cluster. Pile of rock and concrete rubble.
13. Building Remains. Stone foundation with concrete mortar and some concrete floor slabs. Floor surface is level despite the slope of surrounding area with western foundations walls 60-90 cm taller than the eastern walls.
14. Building Remains. Poured concrete foundation with embedded anchor bolts. No discernible floor surface. Small stoop on western wall near southwestern corner.

15. Building Remains. Poured concrete foundation. No discernible floor surface. On west and east of this feature there are north/south oriented parallel lines of poured concrete. There are no corresponding east/west oriented lines. These resemble concrete curbs. It is possible these are foundations for support walls or posts for large roof overhangs.
16. Wall. Dry stone wall made of large stones.
17. Fence. Wire mesh fence. Wooden posts are periodically located along fence line only end and corner posts were mapped.
18. Building Remains. Concrete foundation walls and floor. Built into side of slope with west side foundations 90-120 cm taller than east side. Large portions of the foundation are breaking apart and may tumble down the slope.
19. Misc. Foundation. Concrete slab. No discernible foundation walls.
20. Misc. Foundation. Concrete slab. No discernible foundation walls.
21. Misc. Line. Concrete trough.
22. Wall. Concrete retaining wall with wire mesh fence atop.
23. Misc. Foundation. Concrete slab with center hole and embedded metal rods at hole.

Seven features (1, 5, 11, 13, 14, 15, and 18) were clearly the remains of structures with one, Feature 2, as an additional possible structure. Feature 5 is the only structure that is clearly a dwelling structure (Figure 7). Feature 11 has a high probability of being a barn due to the presence of support pads for large internal posts and large door openings on the short sides of the structure (Figure 8). Feature 18 also has a high probability of being a barn due to its size, narrow shape and proximity to the trough (Feature 21) and the walls and fencing (Features 16, 17 and 22). Feature 23 is most likely the mill driven well described in the 1915 agricultural census (Figure 9). Feature 4 is interpreted as the remains of the flower garden described by Cooprider (1979).

Figure 7. 11GE0170 Feature 5. View from SE toward WNW.



Source: ERDC-CERL (2019).

Figure 8. 14GE0170 Feature 11. View from NE to SW.



Source: ERDC-CERL (2019)

Figure 9. 14GE0170 Feature 23. View from W to E.



Source: ERDC-CERL (2019).

5.2.4 Farmstead Eligibility Evaluation Form

Based on the information above the evaluation form is as follows:

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to 1850? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **YES**
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a farmstead? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **YES**
4. Is there potential for intact buried deposits based on subsurface testing and/or evidence of ground disturbance or erosion? **YES**
5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **YES**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **UNKNOWN**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **NO**
2. Does this site possess multiple architectural features? **YES**
3. Is there a foundation larger than 10 x 10 ft and less than 30 x 30 ft on the site? **YES**
4. Is there evidence of small (wells, privy, shed, crib, etc.) architectural features? **YES**
5. Is there evidence of large (barn, stable, storehouse) architectural features? **YES**
6. Is there evidence of fence construction? **YES**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**
8. Is there evidence of landscape features (such as roads, paths, gardens, leveled areas) at the site? **YES**
9. Was the site occupied by a person of historical, regional, or local significance? **NO**

Based on the results of the eligibility evaluation form, site 14GE0170 is **Eligible** for inclusion on the NRHP. With four "Yes" answers in Level I and six "Yes" answers in Level II this site has integrity, a wide variety of feature sizes and types and a clear site layout where activity patterns may be discerned.

5.2.5 NRHP evaluation results

The NRHP eligibility assessment was conducted in 2003 and reported in Morrison and Rowe (2004). It should be noted that the map orientation in the 2004 report differs significantly from the one recorded by ERDC-CERL in 2019. The 2004 report shows a predominantly E-W orientation to the site while ERDC-CERL noted an N-S orientation. GPS data recording, topographic features on the USGS quadrangle, compass readings at the site and aerial photographs support the N-S orientation. The authors will here adjust all directional information in the 2004 report to align with the 2019 observed site layout.

There were some differences in the number and condition of the features recorded. In the 2004 report a feature consisted of a concrete pad near the location of Feature 9 (stone and concrete rubble cluster) was described. In 2004 Feature 1 was described as having a linoleum floor and in 2019 no floor material could be observed. Feature 13 was described as having small piers within the foundation, probably to support a raised floor. The speculation was that this may have been the location of the cream separator noted in the census information. In 2019, these piers were not observed. Finally, two features were located more than 90 meters east of the main portion of the site. These consisted of one large (10x8m) and one small depression (3x6m) in size. A test unit excavation within this feature found a number of military artifacts, bottle and window glass, cut and wire nails and earthenware top 5 cm of soil. It was determined that this was a later military construction not related to the site. These features were not relocated in 2019 but the area east of the site was disturbed by heavy vehicle tracks.

In addition to site mapping and artifact collection the 2004 investigation conducted 68 shovel tests and 4 1x1 meter test units. They recorded a lack of surface artifacts but a considerable number of artifacts from subsurface deposits across the site. The excavations recovered 773 artifacts consisted of domestic, architectural, personal and military artifact types. The most common artifact type, making up more than 2/3 of the assemblages were wire nails, cut nails and miscellaneous metal. Diagnostic artifacts date primarily from the 1880s through the 1950s. Most of the positive shovel test pits were located within the central portion of the site and it was determined that the artifact distribution probably represented the original activity and discard patterns of the site. Some evidence of soil disturbance was noted in shovel tests, particularly those within or in close proximity of

structures and it was theorized that this was a result of military destruction of the site structures. The rest of the site was noted for the small degree of mechanical disturbance. No intact subsurface features were located in test unit or shovel test excavations

The 2004 report of this site found that the site was not specifically associated with important events that have made significant contributions to the broad pattern of history. The site is also not associated with a person of historical significance. Not enough of the site structures remain to provide an example of distinctive characteristics of a construction, architectural or artistic type. The 2004 authors also conclude that due to the structure demolition activities, the failure to locate with test excavations or shovel tests an intact subsurface feature or cultural deposits of temporally discrete artifacts the site does not have the potential to yield additional historic information. As a result the site was determined **Not Eligible** for the NRHP under Criterion A-D.

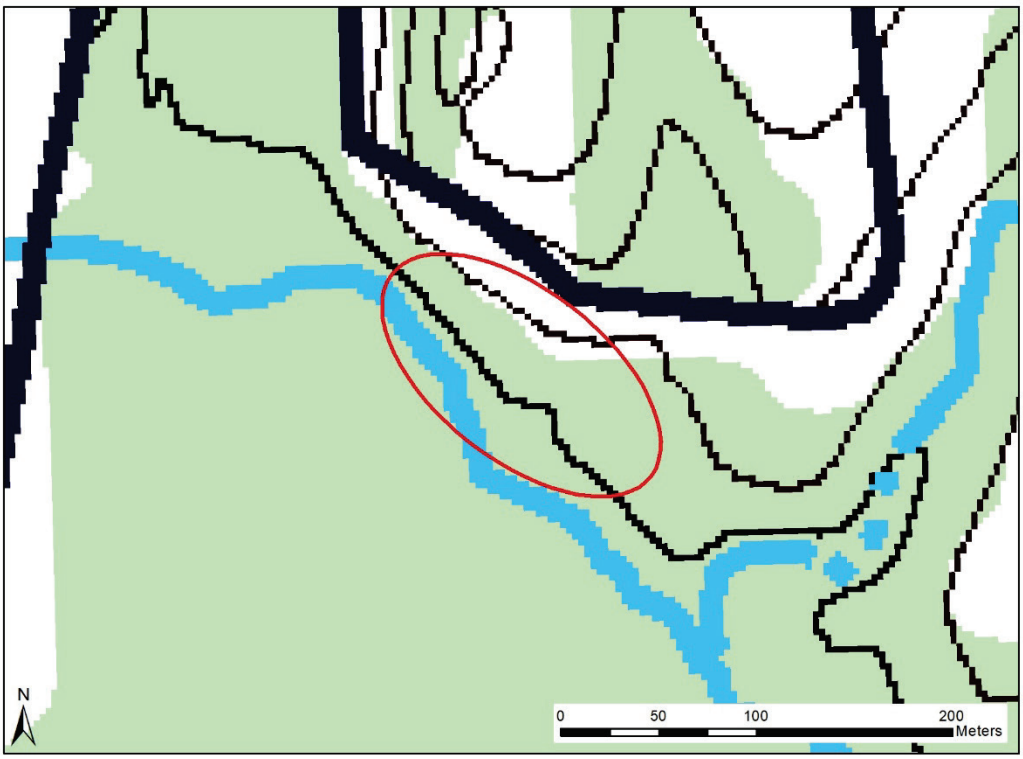
5.3 Site 14RY2117 field test

Site 14RY2177 is a small farmstead that was first reported in 1978 (Cooprider 1978). It was further documented in 1993 and 2013 (McLean et al. 2013). The site sits on a relatively steep slope with the high ground on the northeastern side of the site (Figure 10). The site is situated on the lower slope of south of two old quarry's. One gravel is immediately across an active vehicle track that forms the north side of the site. The second was a stone quarry approximately 30-40m north of the western side of the site. A natural creek is located at the bottom of the slope on the southwestern portion of the site. A deep flat-bottomed ravine is cut into the slope on the south western side of the site with the bottom of the ravine level with the creek.

5.3.1 Original Phase I

The original survey of the site was conducted in 1978 (Cooprider 1979). The report does not include any maps and the survey did not include subsurface testing. The survey reported one 3.6 x 4.4 meter foundation of course limestone with a scatter of glass and other debris scattered down the slope into the ravine SW of the site. He notes that an active vehicle trail passed 3 meters north of the structure foundation. In the report he described the abandoned stone quarry.

Figure 10. Site 14RY2117 on 2018 USGS 7.5 quadrangle map.



Source: https://ngmdb.usgs.gov.

The site was revisited in 1993 by David Babson (McClean et al. 2013). Babson did not relocate the structure described by Cooprider but did locate a 12.5 x 15 m foundation of large stone and poured concrete approximately 3 m. south of the vehicle track. Two meters east of the foundation was a 2m diameter shallow depression. A pile of red ceramic block was noted at the bottom of the ravine and was described as the potential remains of a silo. Babson also described military training activities (including foxholes and emplacements, slope erosion on the eastern side of the site and disturbances along the north side of the site due to track maintenance and grading). Babson noted the presence of a quarry but he identified the smaller gravel quarry immediately NE of the site and suggested that it was gravel quarry used by the military.

5.3.2 Historic documentation

Archival research on site 14RY2117 was conducted by Morrison and Zeigler (2005) and is summarized here. Ownership of the property was first granted in 1855 to Jesse Lambert who probably never occupied the site. The first occupation of the site was in the late 1850s by Pierce Kane, a farmer of Manhattan Kansas. Cooprider (1979) lists only nine farmsteads

in Riley County from 1860-1865, making this site one of the oldest farmsteads in the county.

Kane sold the property to Theodore Weichselbaum, a prominent Ogden merchant, in 1860 or 1861. In 1857 Weichselbaum opened a store in a log cabin in Ogden, building a stone building for the store 2 years later. In 1860 he was joined in Ogden by three adult brothers, an adult sister and brother-in-law and in 1862 married and eventually had eight children. It is unclear if Theodore Weichselbaum personally occupied 14RY2177 or if the site was occupied by one of his family members or tenants. In 1869 Weichselbaum opened a brewery in Ogden and began real-estate speculation in the region.

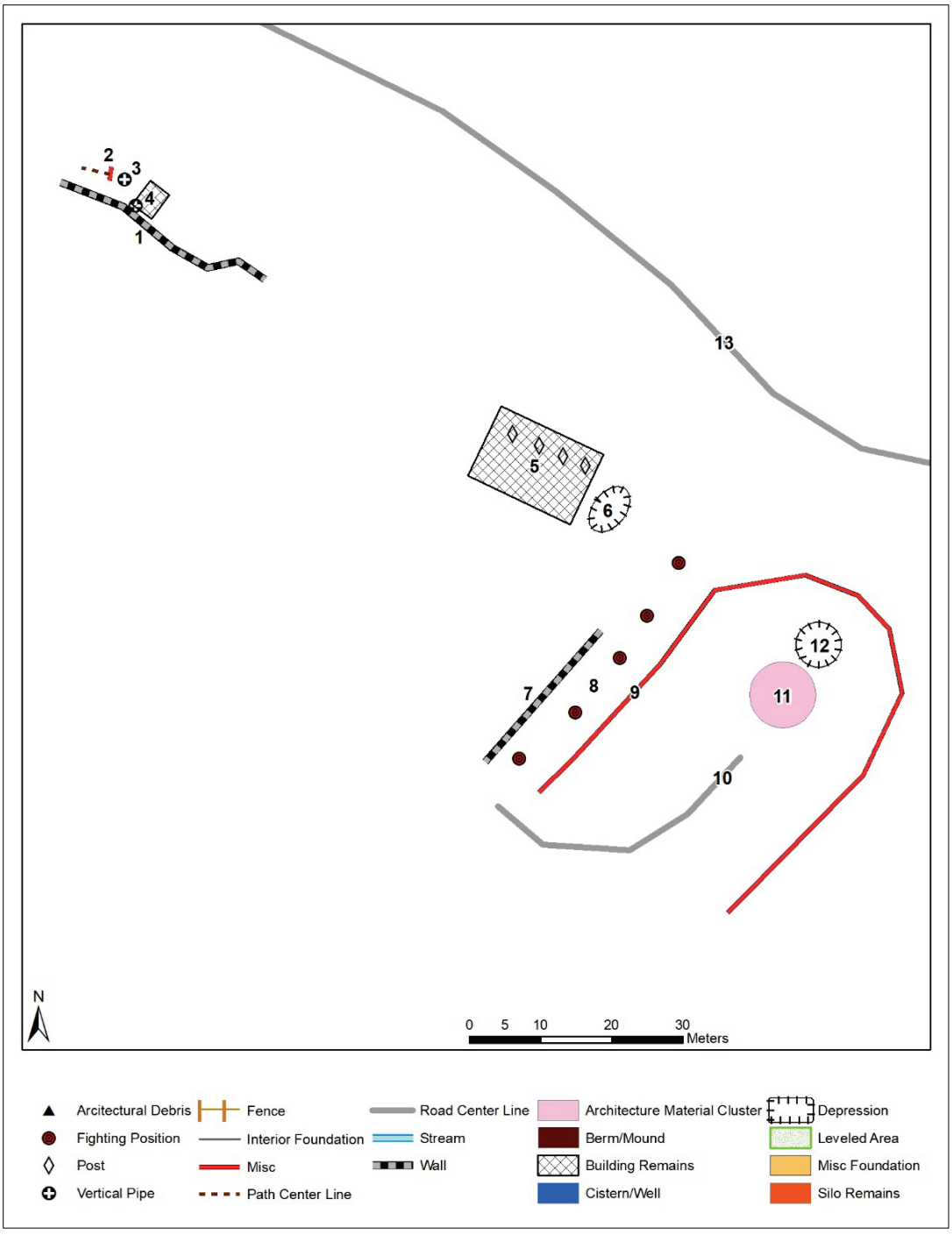
In 1871 Weichselbaum sold the property containing site 14RY2117 to John McDermott who sold it 1 year later to Charles Mulhern. In McDermotts's brief tenure as owner the property doubled in sale and taxable value indicating potentially significant improvements to the property. Mulhern used the property for crop production until 1883. During his ownership, the farm was below average for production in the region and the tax value also declined. The 1881 Plat map of Riley Kansas with Mulhern as the owner is the first time the site appears on map records.

In 1881 or 1883 the property was purchased by John Kemnitz, whose descendants owned the property until it was sold to the government in 1941. The property was described as a house built into a hill with a rock lined cave connected to the house. An underground ice house and spring house with a spring inside were also described on the property. Agricultural census records indicate that the Kemnitz family agricultural production was focused on raising livestock. The property, buildings, equipment, and income were below average for the region for a farm of that size.

5.3.3 ERDC-CERL site visit

ERDC-CERL researchers identified 10 features at the site (Figure 11). Very few artifacts were observed on the site but modern trash including plastic bottles were observed. Feature 4 corresponds in size to the structure described by Cooprider (1979). All features described by Babson in 1993 (McClean et al. 2013) were located. Additionally, the remains of the cave and spring house described in the archival record were located. There is evidence of military activity including ground disturbance within the site boundaries. The gravel road north of the site remains active and maintained.

Figure 11. Site 11RY2117 site map.



Source: ERDC-CERL (2020).

The site feature descriptions are:

1. Wall. Large stone retaining wall. Ground surface is 90-120 cm higher on northern side of wall than southern side of wall.
2. Misc. Line. This is the entrances to a subterranean feature dug into the side of the hill. Feature has at least one chamber and indication of a second that has been filled or silted in. The chamber and entrance are lined with small stones. The entrance way is arched and the chamber is barrel vaulted. A small path approaches the feature from the west with an unsupported soil cut banks on the north side. This cut bank has partially collapsed, obscuring much of the entrance.
3. Vertical Pipe. Clay pipe. May be ventilation for Feature 2
4. Building Remains. Stone foundation with no discernible floor surface. Vertical metal pipe embedded in the foundation wall in southwestern wall.
5. Building Remains. Northern wall consists of a bottom course of stone topped with a 40-50 cm high poured concrete wall that also acts as a retaining wall. The southern wall is large stone that has been toppled over. There are several large square stones positioned near the northern wall that are likely the supports of building posts.
6. Depression. Large depression in the soil. Unclear if this is associated with the site occupation or a later disturbance.
7. Wall. Line of very large and spaced out stones. This does not form a solid wall. A person can walk between the stones but this would provide an effective barrier for a vehicle. Not clear if this feature dates to the site or is a later disturbance related to Feature 8
8. Fighting Positions. This is a series of military fighting positions. There are additional smaller depressions along this line that were not mapped because it was not certain that they were fighting positions.
9. Misc. Line. This is the approximate edge of a large gully that cuts into the slope. At the northeastern side, this gully is 2-3 stories deep and the side wall is nearly vertical. The floor of the gully is flat. It is unclear if this feature is completely natural or has been augmented by humans.
10. Road. This is the access road to the base of the gully. There is a thin layer of gravel embedded in the soil that indicates that this was a gravel road that is no longer maintained. It is unclear if this dates to historic occupation or military use of the site.
11. Architecture Material. This is a circular feature that is constructed of loose red ceramic hollow blocks that are identical to the ceramic blocks seen in better preserved silos in other portions of Fort Riley. There is no evidence of subsurface foundations to this feature. There is scattered metal debris

including sheets and straps mixed in with the blocks. It is unclear if this is an in-situ collapsed silo, a historic dumping site or a result of military activity at the site.

12. Depression. Circular depression. No evidence of constructed elements to this feature.
13. Road. This is a gravel road that is currently maintained and used by Fort Riley. The road is upslope from the site.

Textural records indicate that the house should be located in proximity to Feature 2. Feature 2 (Figures 12 and 13), a stone lined cave, is an extremely unusual feature for the region. It is unclear if this structure is entirely manmade or a natural feature that has been augmented. It is also unclear why this site was not identified or described in the 1979 or 1993 surveys. It is possible that the entrance to the feature was obscured by soil that has since been cleared by natural or human events. Feature 4 (Figure 14) with the vertical pipe may have been the dwelling although textural records described the house as being built into the slope of the hill and this feature does not correspond to that description. It is also possible that this feature is the spring house described in the textual records and that the vertical pipe is associated with the tapping of the spring. Feature 5 is believed to be the structure described by Babson (1993) and is the size and configuration one would expect for a barn. Feature 6, the depression east of Feature 5 is possibly the location of the underground ice house described in the historic record.

Figure 12. 14RY2117 Feature 2 Entrance. View from W toward E.



Source: ERDC-CERL (2019).

Figure 13. 14RY2117 Feature 2 Interior.



Source: ERDC-CERL (2019).

Figure 14. 14RY2117 Feature 4. View from SW toward NE. Gray vertical pipe is visible in the upper left ¼ of the picture.



Source: ERDC-CERL (2019).

Figure 15. 14RY2117 Feature 5. From interior of feature toward north.



Source: ERDC-CERL (2019).

5.3.4 Farmstead Eligibility Evaluation Form

Based on the information above the evaluation form is as follows:

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to 1850? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **YES**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **UNKNOWN**
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a farmstead? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **YES**
4. Is there potential for intact buried deposits based on subsurface testing and/or evidence of ground disturbance or erosion? **UNKNOWN**
5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **YES**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **UNKNOWN**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **NO**
2. Does this site possess multiple architectural features? **YES**
3. Is there a foundation larger than 10 x 10 ft and less than 30 x 30 ft on the site? **YES**
4. Is there evidence of small (wells, privy, shed, crib, etc.) architectural features? **NO**
5. Is there evidence of large (barn, stable, storehouse) architectural features? **YES**
6. Is there evidence of fence construction? **UNKNOWN**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**

8. Is there evidence of landscape features (such as roads, paths, gardens, leveled areas) at the site? **NO**
9. Was the site occupied by a person of historical, regional, or local significance? **UNKNOWN**

Site 14Ry2117 meets the minimum number of "Yes" answers for Level I and just meets the minimum number of "Yes" answers for Level II questions. Features of multiple sizes and configurations were located at the site. The amount of military activity at the site is concerning but is concentrated at the eastern side of the site, on the opposite side of the site from where the residential area most likely was. For Question 8, it is unclear if Weichselbaum, a significant individual in local history, occupied the site himself or provided it to a family member or rented it out and the sites most associated with his contributions to the region would be his store and brewery in Ogden, not site 14RY2117.

As a result of this analysis and under these criteria of the evaluation form the site would be considered eligible for inclusion on the National Register. However, the site did record one "Yes" answer in the preliminary questions – is there a feature type that is very unusual for the region. In this site it is the barrel-vaulted underground feature (Feature 2). As a result, it is determined that this site is **Atypical** and should not be evaluated with this methodology. A traditional Phase II survey including artifact collection and subsurface testing would be recommended to effectively evaluate this site.

5.3.5 NRHP survey results

Site 14RY2117 was evaluated for the NRHP by Goodwin and Associates, Inc. in 2013 (McLean et al. 2013). In addition to pedestrian reconnaissance, controlled surface study collections were undertaken and 50 shovel tests and three test units were excavated. The features documented correspond to what the ERDC-CERL investigators mapped in 2019.

Controlled surface collection was conducted in a 2x2 meter square located in an artifact scatter down slope from Feature 4. 61 artifacts were collected from this unit. The material represented an in-situ dumping area dating to the historic occupation of the site. All the material was domestic in nature with the exception of three pieces of architectural artifacts (2 pieces of window glass and one iron hinge). There were no personal items in the collection. Ceramics included ironstone, porcelain, and whiteware. Glass was in the form of bottle glass, lamp glass, canning jars and window glass.

Most artifacts date from the late 19th and early 20th century. Five pieces of vaseline glass were recovered. This artifact type dates from 1840 to 1940 so could have derived from any period of the site occupation.

50 shovel tests were excavated with the majority of positive shovel test located in proximity to the retaining wall (Feature 1) the barn (Feature 5). 65 artifacts were recovered including glass, metal, ceramic and organic material. Artifacts types had date ranges from 1815 to the present with most artifacts originating from the late 19th and early 20th centuries. Artifact types such as machine cut nails (1815-1890) ironstone (1815-present) and whiteware (1820-present) could have originated at any time during the site's occupation and do not necessarily indicate an early occupation.

One test unit was excavated in proximity to features 1 and 4. It produced 102 artifacts that were similar in nature to the controlled surface collection and test units – primarily domestic debris that could have dated from any time during the sites occupation. Two pieces of personal items (a clothing clasp and a snap fragment) were recovered from the unit. A second test unit was excavated half way between Features 4 and 5. It produced 101 historic period artifacts that included domestic glass and ceramics (including one bisque doll or figurine arm). There was nearly eight times more metal in this unit than in test unit 1. Metal artifact types included nails, bolts, screws, staples, wire, door latch and four brass centerfire cartridges or cartridge fragment. A third test unit was excavated south of Feature 11. It produced 22 historic artifacts, all of which were metal and included artifact types such as nails, barbed wire and can fragments.

All excavations indicate minimal post occupational disturbances on the western portion of the site. This is further evidenced by the presence of high densities of artifacts recovered in the controlled surface collection. Disturbance of the eastern portion of the site during the military use period is more evident including fox holes excavation.

McLean et al. (2013) described Feature 4 as the probable location of the dwelling structure. The proximity of so much domestic debris to this house would support that conclusion. Feature 5 was described as a probably barn. Feature 11 was described as a possible silo based on the presence of the hollow clay tile blocks. However it was noted that the location of the silo, some distance from and below the barn was not usual for silos. It was suggested that the silo may have been elsewhere on the site and was

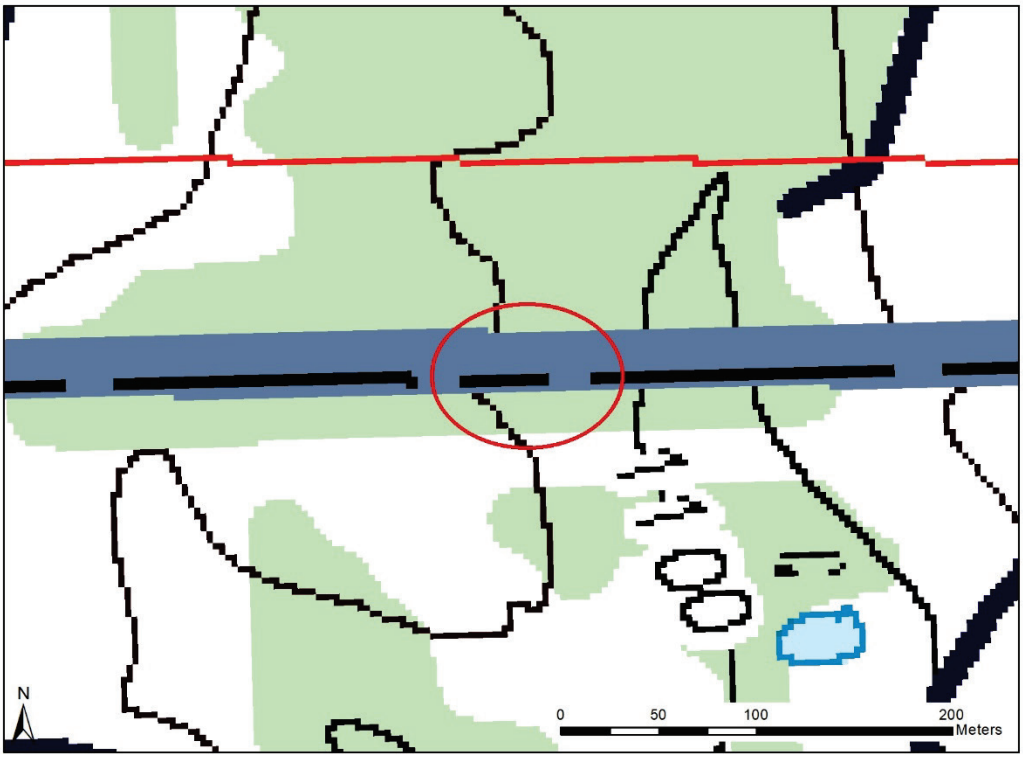
pushed or fell into the ravine. Another hypothesis is the topography of the ravine may indicate the location of the spring and that the structure may have been the spring house.

It was determined by McLean et al. (2013) that the site did not meet the standards of NRHP eligibility under Criterion A or B since the site was not directly related to Weichselbaum's contribution to the region's history and not enough of the aboveground structures survived for the site to be considered under Criterion C. It was determined that the site did maintain depositional integrity and contained an unusual feature type and was therefore **Eligible** for listing in the NRHP under Criterion D.

5.4 Site 14RY2136 field test

Site 14RY2136 is a small farmstead that was first identified in 1979 (Cooprider 1979). The site was revisited in 1997 (Halpin and Babson 1997) and 2000 (Hall 2005). It is located on a gentle slope with the high ground located on the west side of the site (Figure 16). There is no natural surface water in close proximity to the site.

Figure 16. Site 14RY2136 on 2018 USGS 7.5 quadrangle map.



Source: https://ngmdb.usgs.gov

5.4.1 Original Phase I

Site 14Ry2136 was originally documented in 1979 by Cooprider. The report does not include any maps and the survey did not include subsurface testing. Cooprider described an abandoned road, one building remains with concrete floor and foundation, one building with concrete foundation only, one large building remains with concrete floor and foundation, one silo foundation and one building with limestone basement walls with two flower beds located south of that structure.

The 1997 site inventory by Halpin and Babson only described the site as in excellent condition and did not detail features within the site.

5.4.2 Historic documentation

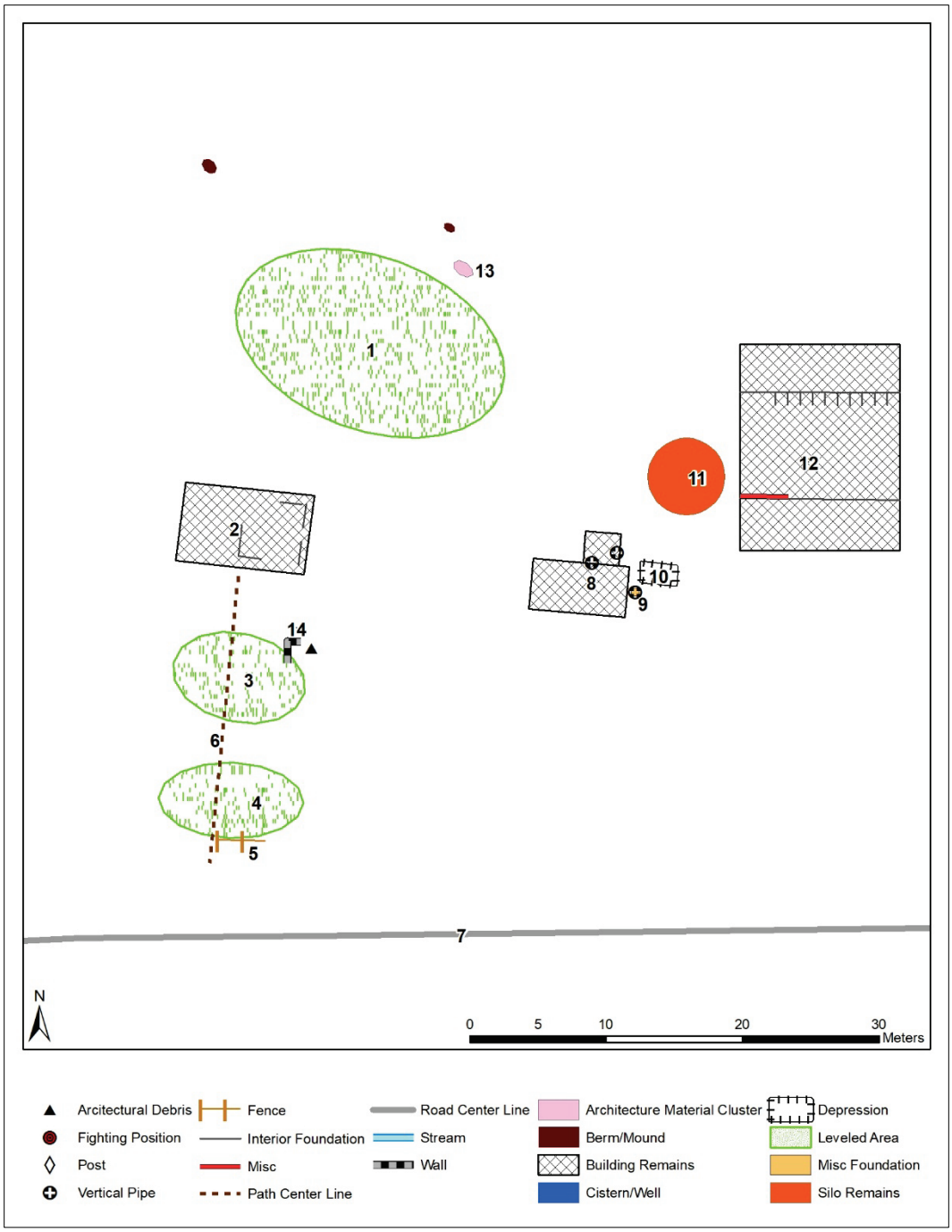
Archival research of the site was conducted and reported by Morrison and Zeigler (2005). The property was first deeded to Thomas Leonard under the Military Bounty Land Act. It is unclear of Leonard ever occupied the site. In 1863 he assigned the land to Henry Ingham but Ingham appears on the tax rolls for the site in 1861 demonstrating his occupancy prior to his legal title to the land. In 1870 the property was sold to Francis Chapmen who then sold it to Laura White in 1871. At the time the farm consisted of 80 acres. The property remained in the hands of various members of the White family until 1899. In many cases it appears that the legal owner was absentee but that Laura White was the principle resident. Buildings on the site first appears on a map on the 1881 plat map of Riley County.

Between 1899 and military purchase of the land in 1941 the site passed through four different owners (Hinz, Mallon, Kemnitz and Vick). Agricultural census records indicate that the site was part of a larger farm ranging from 240 to 560 acres at various times. At all times, the farm was larger and had higher value of buildings and equipment than the county average. While livestock was present (3-5 horses, 4-8 milk cows, 9-24 cattle, 2-15 swine) the number and type of animals was average for the region. The majority of production was focused on grain, particularly wheat and corn.

5.4.3 ERDC-CERL site visit

ERDC-CERL researchers locate 14 features at the site. Only three structures were located, as compared to Cooprider's four buildings that were documented in 1979.

Figure 17. Site 14RY2136 site map.



Source: ERDC-CERL (2020).

Feature descriptions are as follows:

1. Leveled Area. No trees and much less brush and undergrowth than surrounding areas.
2. Building Remains. Feature consists of a deep basin that is probably a cellar. Foundation wall on south side that extends to the center of the feature is constructed of limestone rock. Foundations on the east side and north east corner are poured concrete. There appears to be a ramp or slope entrance into the basin in the gap in the concrete wall on the east side of the basin.
3. Leveled Area. No trees or under brush. Grass cover here is much denser and greener than surrounding areas.
4. Leveled Area. No trees or under brush. Grass cover here is much denser and greener than surrounding areas.
5. Fence. Barbed wire. Two wooden posts are present.
6. Path. Very subtle between Feature 2 and road.
7. Road. This road follows the section/township line immediately to the south of the site. The road is very clear and sunken nearly 1m below the site elevation but does not appear to be actively maintained.
8. Building Remains. Poured concrete foundation and floor with addition on the north side. Addition also has poured concrete foundation and floor. Two vertical pipes are located in this addition. The eastern most one is clay and the western one is metal.
9. Misc. Foundation. Small 2ft square concrete subsurface basin. Vertical ceramic pipe in center of basin.
10. Depression. Rectangular depression. Some concrete rubble present but no discernible foundation walls or floor.
11. Silo Remains. All remains are below surrounding ground level. Walls of silo consist of red ceramic blocks that are square in shape with hollow interiors. Multiple courses of these blocks are in place. Floor construction appears concrete but could not be examined closely due to depth of feature.
12. Building Remains. The building is divided into three sub-areas on an east/west axis. The center half has no evidence of flooring. The north and southern quarters have poured concrete floors. The walls remnants consist of low poured concrete foundations with bolt anchors embedded into the concrete at regular intervals. The northern east/west interior wall has multiple low (circa 10 cm in height) concrete dividers that are semicircular in profile and are separated from each other by 3 ft. The southern interior wall has a concrete trough (marked by a misc. line) at the western end that is in proximity to and points to the silo remains.

13. Architecture Material Cluster. Scatter of concrete debris.
14. Wall. Small concrete foundation. Does not appear to be part of a structure but may be a portion of a small wall or landscape feature.

Feature 2 (Figure 18) is most likely the dwelling structure at the house with a stone line basement evident. Features 3 and 4 (Figure 19) are likely the gardens described by Cooprider. Feature 9 (Figure 21) is likely the remains of a well since surface water is not in close proximity to the site. Feature 10 may be the 4th structure that Cooprider described that has deteriorated to no longer be evident as a building remains.

Feature 12 is certainly a barn (Figure 23). The trough most likely allowed feed to be easily moved from the silo into the barn. The low concrete dividers on the northern interior wall may represent milking or feeding stations or may be permanent chocks to secure equipment.

It is unclear if the berms located north of Feature 1 are associated with the historic site occupation or later military activity. The presence, however, of three areas that demonstrate artificial leveling and differing vegetation patterns from the surrounding areas strongly indicate that the site has minimal or no significant post occupation ground disturbance. Very few artifacts were observed at the site. There was a plastic child's chair in the bottom of the silo indicating some modern access to the site (Figure 22).

The entire site conforms to a classic farmstead pattern with the road associated with a township line (Figure 20), the buildings oriented facing the road, fencing to separate the property from the road, outbuildings located between the house and barn, a silo in close association to the barn and a gentle slope to the site that would direct any runoff from the outbuildings or barn away from the house.

Figure 18. 14RY2136 Feature 2. View from NE to SW.



Source: ERDC-CERL (2019).

Figure 19. 14RY2136 Features 4 and 5. View from W to E.



Source: ERDC-CERL (2019).

Figure 20. 14RY2136 Feature 7. View from E to W.



Source: ERDC-CERL (2019).

Figure 21. 14RY2136 Features 8 and 9. View from E to W.



Source: ERDC-CERL (2019).

Figure 22. 14RY2136 Feature 11. View from E to W.



Source: ERDC-CERL (2019).

Figure 23. 14RY2136 Feature 12. View from W to E. Concrete trough is visible starting at red ceramic block left of the center of the picture.



Source: ERDC-CERL (2019).

5.4.4 Farmstead Eligibility Evaluation Form

Based on the information above the evaluation form is as follows:

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to 1850? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **YES**
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a farmstead? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **YES**
4. Is there potential for intact buried deposits based on subsurface testing and/or evidence of ground disturbance or erosion? **YES**
5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **YES**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **UNKNOWN**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **NO**
2. Does this site possess multiple architectural features? **YES**
3. Is there a foundation larger than 10 x 10 ft and less than 30 x 30 ft on the site? **YES**
4. Is there evidence of small (wells, privy, shed, crib, etc.) architectural features? **YES**
5. Is there evidence of large (barn, stable, storehouse) architectural features? **YES**
6. Is there evidence of fence construction? **YES**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**

8. Is there evidence of landscape features (such as roads, paths, gardens, leveled areas) at the site? **YES**
9. Was the site occupied by a person of historical, regional, or local significance? **NO**

With four "yes" answers for Level I and six "yes" answers for level two this site represents a well preserved example of a typical historic farmstead for the region. As a result of this analysis this site would be recommended as **Eligible** for inclusion in the NRHP. Additionally, if a sampling strategy were applied to farmsteads at Fort Riley to only preserve very good examples of typical farmsteads, this site would be a candidate for that sample selection.

5.4.5 NRHP evaluation results

The NRHP evaluation was conducted in 2000 by Fort Riley CRM staff (Hall 2005). In addition to pedestrian reconnaissance and site mapping 107 shovel tests and two test units were excavated. The results of their findings are summarized here.

The 2000 survey found the remains of five structures at the site including a house foundation that showed evidence of deliberate demolition (Feature 2), a concrete floored barn (Feature 12), a red tile silo base (Feature 11) and a poured concrete structure that they described as a probable dairy (Feature 8). One small rectangular structure consisting of a partial concrete foundation with no floor described as a shed or other small outbuilding was mapped south of Feature 12 near the road. This feature was not located by the CERL team in 2019 and is possibly the final structure described by Cooprider (1979). Additionally, a north-south line of three fenceposts extended from the SW corner of the barn indicating the possible location of a barn yard. These posts were not present during the CERL investigation.

A total of 67 of the 107 excavated shovel tests produced artifacts. The positive shovel tests were located around the structures and in the areas between Features 2 and 12 and south of Feature 12. A 1x2 meter test unit was excavated 5 meters east of Feature 8 and a 1x1 meter test unit was excavated 5 meters south of Feature 12. Soil profiles of the test units and shovel tests were not described; however the findings did state that with the exception of the demolition of Feature 2 there was no sign of post occupation site disturbance.

The most common type of artifact recovered at the site were several hundred fragments of clear bottle glass. Enough shape and decorative and/or lettering survived on these fragments to identify these as 1 quart and 1 pint machine blown wide mouth milk bottle fragments. Maker's marks and painted on milk bottle labels dated the bottle fragments from the 1932-1942. 68 nails were collected with 65 of these being wire-drawn with one machine cut and two large handwrought spikes also recovered. The rest of the artifact assemblage was described as concrete, widow glass and red tile from the silo. No domestic or personal artifacts were described in the report.

Based on the findings at the site as well as the information in the historic documentation the site was described by Hall as a dairy farm. The historic context for the region indicates that the majority of cattle production in the region was focused on feed cattle making the activity at 14RY2136 an uncommon product regime. The site contained extensive foundations, intact soil layers, and datable artifacts related to its product. Based on the 2000 survey findings, Hall determined that site 14RY2136 was **Eligible** for listing on the NRHP under Criterion D.

5.5 Site 14RY2138 field test

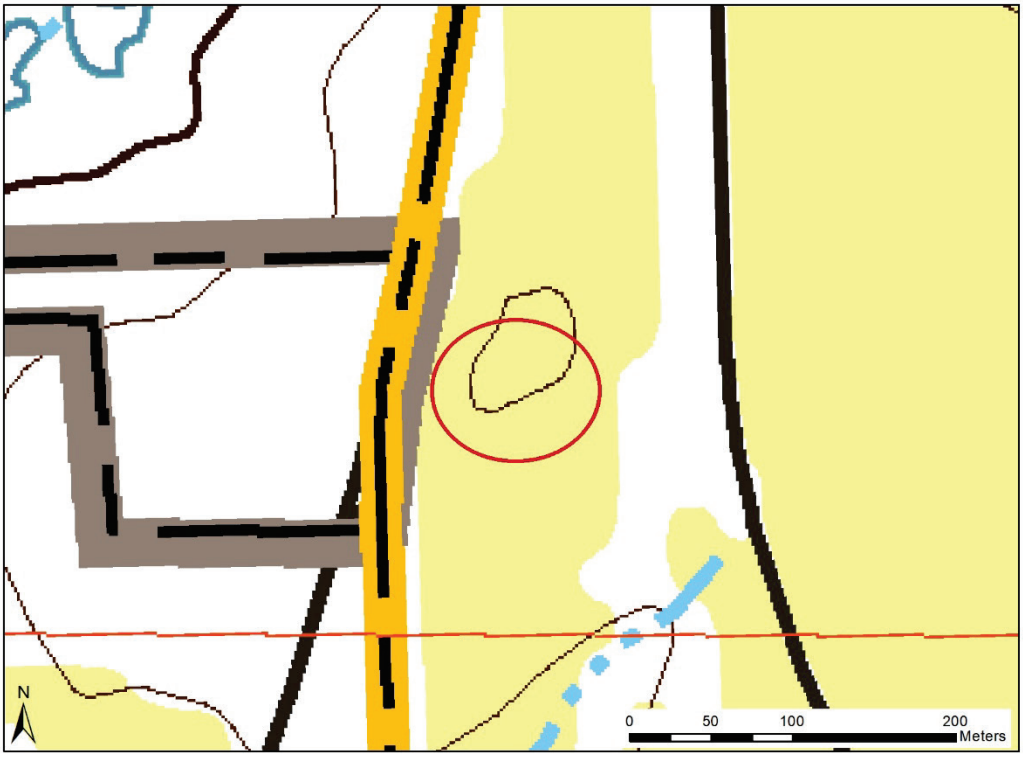
Site 14RY2138 was first described in 1979 (Cooprider 1979) and was further documented by David Babson in 1993 (McClean et al. 2013) and 2008 (Walz et al. 2012).[5] The site sits on a level area near the installation boundary (Figure 24). There is a surface creek approximately 100m southeast of the site. The area was waterlogged with many large puddles in and around the site.

5.5.1 Original Phase I

The site was first reported in 1979 by Kevin Cooprider (Cooprider 1979). The report does not include any maps and the survey did not include subsurface testing. At that time, the site had already potentially been impacted by a firebreak immediately east of the site. Cooprider describes one building (2.3 x 4.4 m) that consisted of a small amount of limestone rubble around a concrete pad supported by a limestone foundation. This element was described as a porch. A second building (3.7 x 4.3 m) consisted only of a concrete foundation with no visible floor.

[5] Babson 1993 field notes on file at Fort Riley CRM office.

Figure 24. Site 14RY2138 on 2018 USGS 7.5 quadrangle map.



Source: https://ngmdb.usgs.gov

Also at the site was a 1.8 m diameter well with a displaced concrete cap nearby. A depression filled with stone ruble was 3 m northwest of the well and was suspected to be a cistern. A toppled wooden latrine was overgrown by vegetation south of the site. Cooprider suspected that this site was not a farmstead but instead a country house due to the lack of secondary structures on the site

The site was revisited by Babson in 1993 (McClean et al. 2013). Babson did draw a sketch map of the site and confirmed Cooprider's findings. The only change of note was that the area was more heavily wooded. No artifacts were observed in this site visit. No subsurface testing was conducted.

5.5.2 Historic documentation

Archival research for this site was conducted by Morrison and Zeigler (2005). Their findings are summarized here. The parcel of land 14RY2138 sits upon land was originally 160 acres and patented to a member of the Creek Tribe, Oklke Satark Ker in return for his service in the Seminole War and was held in trust for his orphan children. Sometime prior to 1861 the land was transferred to its first occupant, Thomas Osbourne. Osbourne

appears on the tax rolls for the property in 1861 but in on the voter rolls for 1859 so the earliest occupation date is unknown. In 1861 Osbourne sold the southern half of the land to Daniel Chandler but Osbourne continued to pay taxes on the entire 160 acres raising the possibility that Osbourne continued to occupy the entire 160 acres.

Daniel Chandler was born in New Hampshire in 1814, served in the Massachusetts State legislature from 1852-1854. In 1856 he entered Kansas territory as part of a movement to flood the territory with antislavery settlers. He became one of the four founders of Ogden in 1857. Chandler was a delegate at multiple state constitutional conventions, was elected a member of the Territorial legislature in 1858 and 1859 and was listed as a magistrate in Ogden in 1859. During the Civil War he served in the 10th Kansas Infantry and the 3rd Cherokee Regiment of the Indian Territory. During this time he was trained as a surgeon and doctor. After the war he returned to Ogden where he continued to practice medicine, took part in local and regional politics and became a prominent landowner.

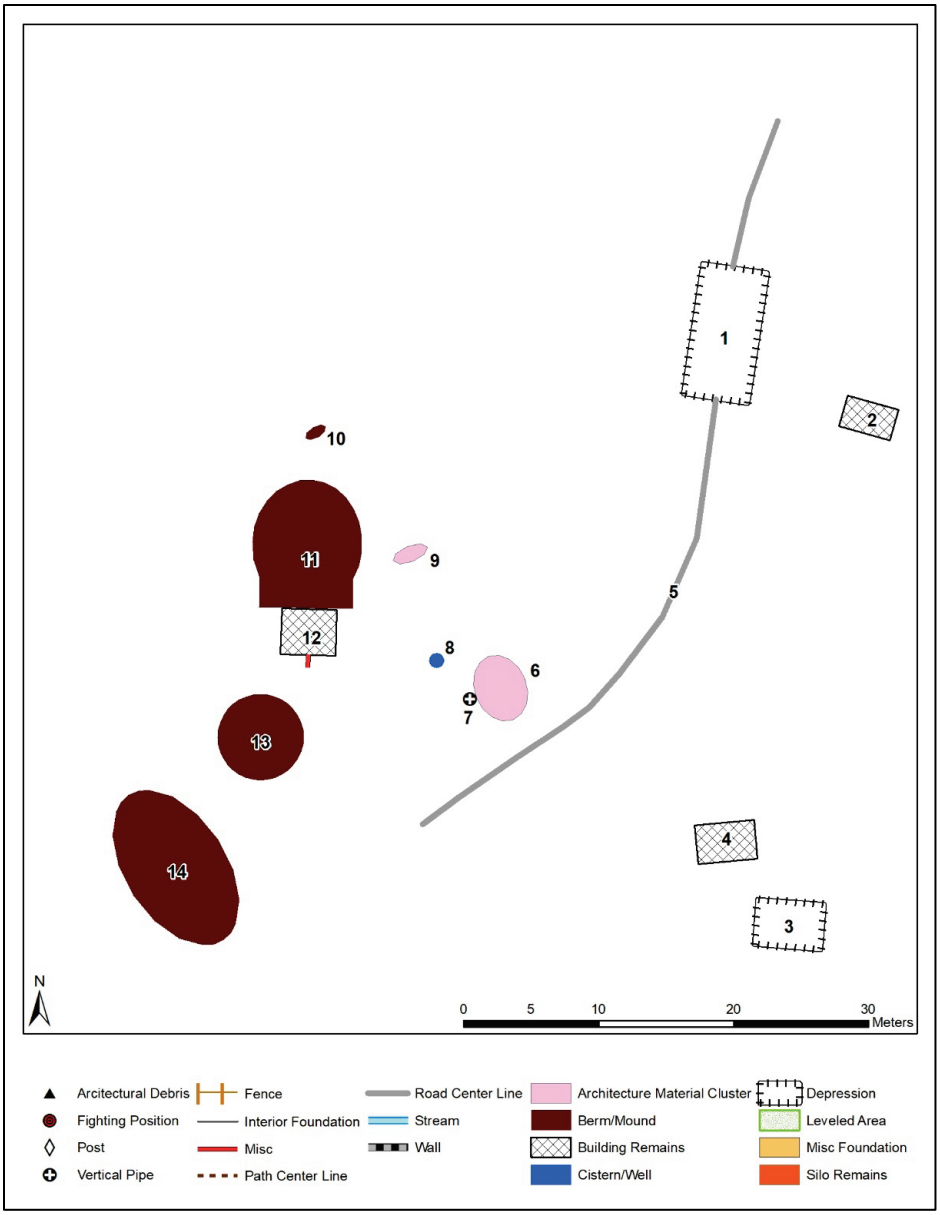
In 1866 Chandler sold the title back to Osbourne, who sold it on to Adolph Brockart in 1870. In was sold again in 1877 to William Cutter who transferred it to Charles Cutter in 1883. The site first appears on the 1881 map with buildings present (but not in the same location as the current site). Over time the property had slowly increased in value. During Charles Cutter's tenure, the farm at 160 acres was about ¾ the size of the average farm. Despite this the property had a value and produced an income that was above average for the region. Production was split between grains, an apple orchard of up to 800 trees and a large number of horses and swine. Cattle was not significant part of this farmstead's activity. In 1895 a windmill driven well is described on the property.

In 1905, the property (less 6 acres that had been deeded elsewhere) was sold to Lemuel and Elizabeth Ferguson who remained there until the military purchased the land in 1941. Production was focused on swine and grain crop production with the orchard not appearing on the 1905 and later censuses.

5.5.3 ERDC-CERL site visit

ERDC-CERL researchers located 14 features at 14RY2138 (Figure 25). Not all of these features relate to the historic occupation of the site. Two building remains, one partial building remains, a well and multiple berms and depressions were identified.

Figure 25. Site 14RY2138 site map.



Source: ERDC-CERL (2020).

Feature descriptions are as follows:

1. Depression. Large rectangular depression. Water filled at time of survey. Unclear if this feature is associated with the site occupation or later disturbance.
2. Building Remains. Poured concrete foundation. No discernible floor material.
3. Depression. Rectangular depression. No stone or concrete present.

4. Building Remains. Poured concrete foundation. No discernible floor material.
5. Road. Road has a slightly higher center line then edges creating a "wagon rut" appearance. Some portions of the road are very indistinct.
6. Architecture Material. This is a pile of architectural rubble consisting of concrete slabs and pipe.
7. Vertical Pipe. Large buried ceramic vertical pipe.
8. Cistern/Well. Feature is perfectly circular and 1 meter in diameter. Walls are brick and stone lined.
9. Architecture Material. Debris pile consisting of brick, window glass and scattered pieces of white ware ceramic.
10. Berm/Mound. Pile of soil. Appears to be a bulldozer push pile.
11. Berm/Mound. Soil and timber push pile. Appears to conform to approximate location of a structure.
12. Building Remains. Stone foundation with poured concrete floor approximately 50-60cm above ground surface. Foundation stones have been partially dressed and are cleanly pointed with mortar. There is a single concrete step on the south side to access the feature.
13. Berm/Mound. Large bulldozer push pile with large amounts of tree truck and branches mixed in with the soil
14. Berm/Mound. Large bulldozer push pile with large amounts of tree truck and branches mixed in with the soil.

Site 14RY2138 is a highly disturbed site with multiple large modern tree and soil debris piles on the site (Figure 26). One pile (Feature 11) obscures what was most likely the house foundation. The only portion of this structure that is visible is Feature 12, which is the porch (Figure 27). Two smaller poured concrete foundations with no floor were also found but no large structure that could be interpreted as barn was found. Feature 1 was filled with water at the time of the survey and this may represent a barn feature or some other landscape modification (Figure 28). Considering the focus on swine rearing it is possible that any barns or animal sheds/pens were located at a greater distance from the house than would normally be seen in this region. Feature 5 is described as a road in this survey but this may actually be the firebreak that was described by Cooprider (1979).

Figure 26. 14RY2138 Feature 13. View from E to W.



Source: ERDC-CERL (2019).

Figure 27. 14RY2138 Feature 12 in front 11 in back. View from S to N.



Source: ERDC-CERL (2019).

Figure 28. 14RY2138 Feature 1 and 5. View from S to N.



Source: ERDC-CERL (2019).

5.5.4 Farmstead Eligibility Evaluation Form

Based on the information above the evaluation form is as follows:

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to 1850? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **NO**
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a farmstead? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **YES**

4. Is there potential for intact buried deposits based on subsurface testing and/or evidence of ground disturbance or erosion? **NO**
5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **YES**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **UNKNOWN**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **NO**
2. Does this site possess multiple architectural features? **YES**
3. Is there a foundation larger than 10 x 10 ft and less than 30 x 30 ft on the site? **NO**
4. Is there evidence of small (wells, privy, shed, crib, etc.) architectural features? **YES**
5. Is there evidence or large (barn, stable, storehouse) architectural features? **UNKNOWN**
6. Is there evidence of fence construction? **NO**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**
8. Is there evidence of landscape features (such as roads, paths, gardens, leveled areas) at the site? **UNKNOWN**
9. Was the site occupied by a person of historical, regional, or local significance? **NO**

With two "yes" answers in Level I and two "yes" answers in Level II questions this site does not meet the requirements for eligibility in this methodology. The site has been significantly impacted by earth-moving and tree felling activities. The structure most likely to be the house is mostly buried under this debris. The only Feature (Feature 1) that may be a large architectural structure is so ephemeral that it unclear if it is a structure at all. Finally the only landscape feature, the potential road, may actually be a firebreak constructed by the military. The site was briefly owned (1861-1866) by a prominent local citizen but tax records and his Civil War service would indicate that it is unlikely that he resided on the site. This site is determined to be **Not Eligible** for inclusion in the National Register.

5.5.5 NRHP evaluation survey results

The NRHP evaluation of site 14RY2138 was conducted in 2008 (Walz et al. 2012). The survey consisted on pedestrian reconnaissance, feature and

landform mapping and the excavation of shovel tests and test units. The findings of that survey are summarized below.

The 2008 survey identified five features. These included a house, a well and two outbuildings and a road. The site also contained several spoil piles and recent signs of vehicular traffic. The principle structure on the site was identified as a house consisted only of a 7 x 6 meter depression with part of a concrete poach. This corresponds to CERL's Feature 11 and 12 but at the time of the 2019 survey the depression was covered with tree debris and could not be seen. One poured concrete foundation outbuilding was mapped on the southeast portion of the site (Feature 4). Walz et al. (2012) described an asphalt covered area in the proximity of Feature 4 but did not map the location. It is possible that this corresponds to Feature 3 although CERL researchers did not see any asphalt remains. A 3 x 4 meter concrete pad was described at the location of Feature 1. Because this area was covered in water at the time of CERL's visit it is unclear if the concrete is still present.

The 2008 survey excavated 27 shovel tests. Two positive shovel test were located north of the well, 5 positive tests were located west of Feature 12 and one was located within the Feature 11 house basin. Twenty-seven artifacts were recovered from the shovel tests with artifacts types consisting of ceramics, glass, metal fragments and brick fragments. All artifacts were recovered in the first 20 cm below the surface and no evidence of subsurface features were recovered.

Three test units were excavated at the site. Test unit 1 was located on the western portion of the site and contained 385 historic artifacts, most of which was architectural debris including window glass, machine and wire-drawn nails, metal, slate and brick fragments. Non-architectural artifacts included stoneware, iron ware, whiteware, clear and aqua container glass, metal buckles, a shell button, graphite rods, a ceramic dolls head and shotgun shell bases. Test unit two was excavated in the center of the site, along the road south of Feature 1. 36 artifacts were collected from this unit including Bristol stoneware, iron stone, mold decorated whiteware, container glass (aqua, green, and clear) machine cut and wire-drawn nails, and metal fragments. Test unit 3 was located north of Feature 12. This unit contained 36 artifacts including iron stone, clear and milk glass, machine cut and wire-drawn nails, plastic and metal buttons and a bullet cartridge of unknown caliber. All artifacts in the test units were found in the top 20 cm of the

units. None of the excavated units demonstrated evidence of intact subsurface features or deposits. The artifact assemblage from 14RY2138 indicate site occupation from the late 19th into the middle of the 20th century.

Walz et al. (2012) determined that the site did not retain significant evidence of site use, or activity areas and could not inform on the regional pattern of Kansas farmsteads. The site also demonstrated evidence of recent site disturbance including vehicle tracts and debris piles. No intact discrete artifact deposits or subsurface features were identified and the artifact assemblage did not contain types that could be identified to a narrow time range. Based these findings, Walz et al. (2012) concluded that site 14RY2138 was **Not Eligible** for the NRHP.

5.6 Site 14RY2140 field test

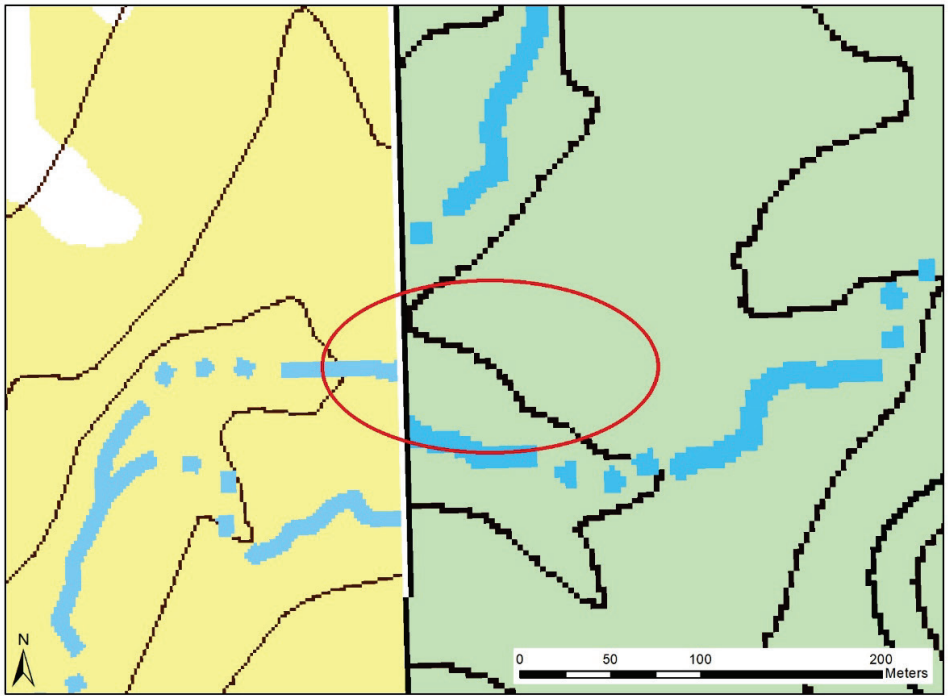
Site 14RY2140 was first described in 1979 (Cooprider 1979) and was further documented by David Babson in 1997 (Halpin and Babson 1997) and 2004 (Kreisa and Morrison 2004). The site sits on a sloping area that straddles the area covered by USGS quad maps (Figure 29). There is a surface creek north and south of site. The site is crossed by a dirt road that appears to be sporadically used by the military. A low water crossing point is on the northwest edge of the site. The site is heavily wooded with a mix of deciduous and coniferous trees. The site is on a slope with the high ground located near the principle dwelling structure. There is also a steep slope on the north side of the site going down to the creek and some site features have been cut into this slope.

5.6.1 Original Phase I

The site was first recorded by Kevin Cooprider (1979). The site report does not contain a map and no subsurface testing was conducted. Cooprider described an 8.4 x 10.25 meter building of coursed limestone with a two-story superstructure shell and basement walls. The walls were covered with a concrete plaster with an impressed block patter and a concrete sidewalk was on the western side of the house. Hand-hewn timbers were observed on door and window cases. A 1.5 m diameter cistern was listed but its location was not provided. A second structure of 13.5 x 4.6 m with partial coursed limestone walls around a partial concrete floor was noted. This feature was positioned against the middle of a 24m long stone wall. A third structure of 7.5 m x 17.6 m with an indistinct coursed limestone foundation was described coincident with a stone wall on the north side of the

structure. This wall is described as transecting the site. Finally a 2.9 x 4.7 m concrete foundation around a sunken floor was listed.

Figure 29. 14RY2140 on 2018 USGS 7.5 quadrangle map.



Source: ERDC-CERL (2019).

In 1997 the site was revisited by and listed in the Halpin and Babson 1997 Inventory as going in excellent condition. All of the structures features noted in 1979 were relocated with the exception of the cistern. Most of the walls in the two-story structure had collapsed with only the south west corner remaining.

5.6.2 Historic documentation

Archival research was conducted as part of the 2004 NRHP evaluation of the site by Kriesa and Morrison (2004). Their findings are summarized here. The land was first granted by the U.S. Government to Charles Ogburn in 1860. In the same year Ogburn sold the property to William and Eliza Powell. In 1861 William Powell sold the land to Henry Hill of Virginia. Hill sold the property back to Powell in 1876 under an indenture agreement signed between them at the time of the 1861 sale. The 1865 Agricultural Census lists 30 acres as improved with the livestock consisting of three horses, 4 milk cow, one other cow and one pig. The farm's principle production was corn and butter with small amounts of potatoes, hay and molasses. The farm was significantly below average for cash value for land,

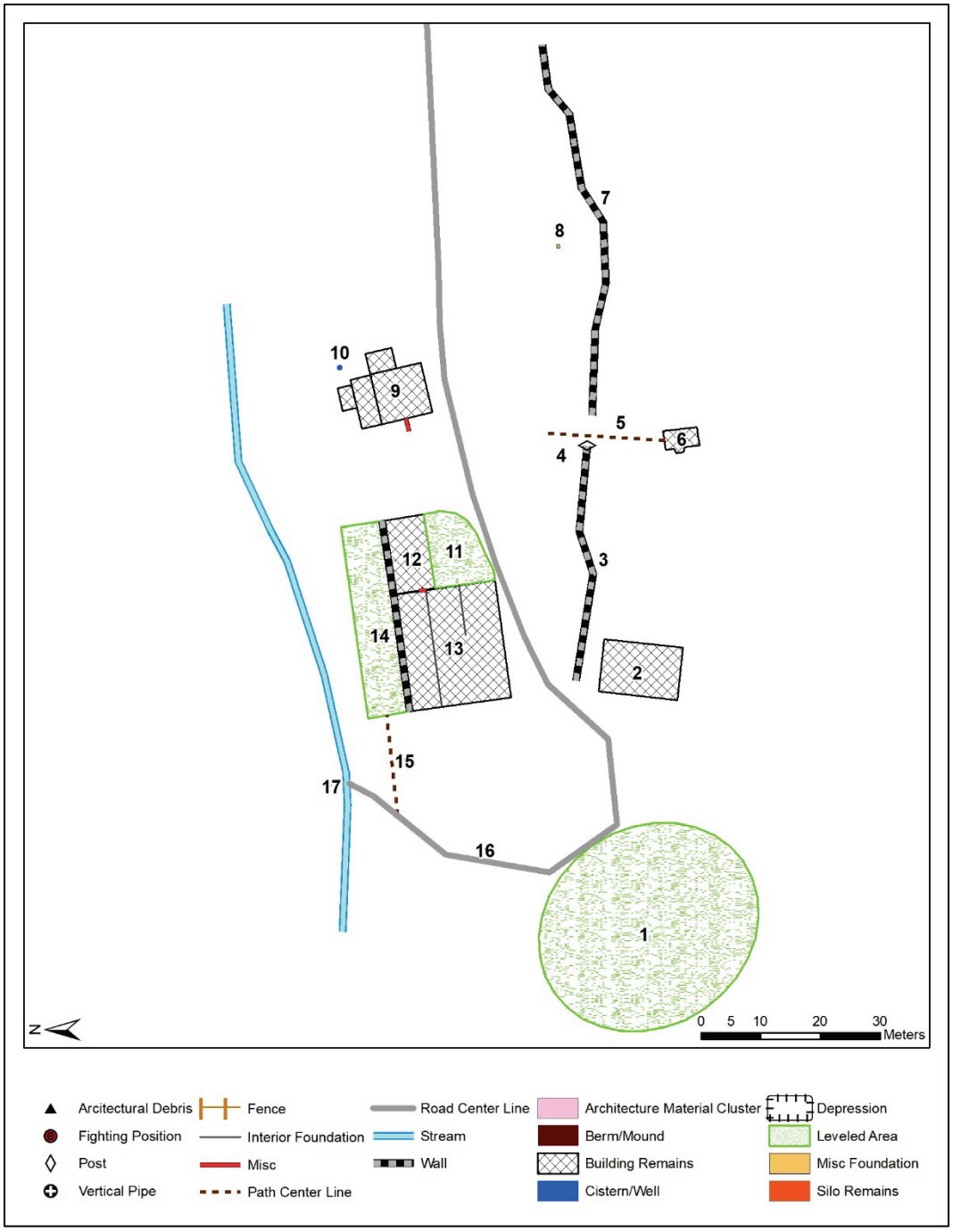
equipment and animals for Ogden Township. The 1875 Agricultural Census shows 40 acres improved with 26 acres sown or planted in a variety of crop including winter wheat, corn, oats, rye, spring wheat and potatoes. The livestock included three horses, 6 milk cows and 10 other cows. The farm was still below but closer to the average land value for Ogden Township. In terms of the value of equipment the farm was well below average having $10 cash value compared to the $70 average for the township.

In 1880 the Powells sold the land to F. A. and Mary Schermerhorn and the farm quickly increased levels of production and value. In 1885 66.5 acres were cultivated in crop with an additional 40 acres cultivated for hay. An orchard of 892 trees had been planted, of which 230 were already bearing fruit. Livestock included four horses, 30 milk cows, 24 cattle and 22 swine. The farm was now an average valued farm for the township. By the 1895 census the farm had increased to 225 acres (average was 293 acres) but was nearly double the average value for farms in the township. The principle increase was an increase in the orchard to 2050 bearing trees. The farm remained in the hands of the Schermerhorn family until 1916. It passed through the hands of five different owners until it was sold to the U.S government in 1941.

5.6.3 ERDC-CERL site visit

ERDC-CERL researchers located 17 features at 14RY2140 (Figure 30Figure 25). All of these features, with perhaps the exception of the low water crossing, appear to relate to the historic occupation of the site. Five building remains, three walls, five landscape features and a well or cistern were identified.

Figure 30. 11RY2140 Site Map. (Please note map has been rotated 90 degrees to fit page).



Source: ERDC-CERL (2020).

Feature descriptions are as follows:

1. Leveled Area. Large leveled area at the bend of the road. No trees or underbrush. No sign of pavement or gravel.
2. Building Remains. Stone and concrete foundation walls. Some portions of interior have concrete flooring. West, south and east walls are clear. North wall is indistinct. Building may extend to stone wall (Feature 3).
3. Wall. Rock wall with multiple courses of stone. Some concrete is present. Stones are unfinished.
4. Post. Concrete and stone post. This post is in a wide gap in the stone wall and appears to be an anchor to the wall. There is a hole for a large pipe horizontally through the post.
5. Path. Subtle path from Feature 6 through the wall and toward the road
6. Building Remains. Poured concrete wall remains. Some of these walls are 0.5m tall. Small protuberance on western side. No discernible floor. Floor level was below the surrounding ground surface.
7. Wall. Rock wall. Less concrete in this portion of the wall than was seen in Feature 3. Along the eastern portion of the wall there is evidence of disturbance with some of the rock removed and formed into square features along the wall. This appears to be military training activity with these alterations appearing to be fighting positions.
8. Misc. Foundation. Poured concrete foundation with vertical rebar anchors embedded in the concrete.
9. Building Remains. This is the primary house on the site. The main portion of the structure has a stone lined full basement. The west wall and western portions of the north and south walls are still standing, consisting of stone covered in a concrete or stucco surface treatment. These walls demonstrate that the building was two stories tall. A below ground door and exterior stairway (marked by a misc. line) provide direct access to the cellar from the exterior of the house. The first addition on the north side is the same width as the main portion of the house and consists of a concrete slab floor. The second smaller addition to the north is a mixed concrete and stone foundation wall. The small addition to the east is a stone floor with no discernible wall remnants. There is some soldier graffiti paint on the standing portion of the southern wall.
10. Cistern/Well. This is a cistern or well that is covered with a large stone circular cap with a small circular hole cut in the center for access. A smaller stone that may be a stoop is on the south side of the feature with the joint between the stone filled with concrete.

11. Leveled Area. This leveled area has no trees or undergrowth. No sign of pavement or gravel.
12. Building Remains. This building consists of poured concrete wall foundations. There is no evidence of flooring. The southern wall of the structure could not be located and the structure may have been three sided.
13. Building Remains. This building consists of large rough stone foundation with areas of stone slab flooring. The two interior walls are of the same construction as the exterior walls. A single stone step is in the eastern wall, connecting Feature 12 and 13 marked on the map by a misc. line.
14. Leveled Area. This area is located on the slope from the main portion of the site down to the stream. The ground at this level is 1-1.25m below the floor surface of features 12 and 13. The stone foundation of features 12 and 13 continues down to the leveled area to form a retaining wall for the cut bank. There is no visible foundation or walls on the west, north or east side of the feature but the slope cut on the eastern side of the feature ends abruptly creating a partial earthen wall at the east side. There is no tree or underbrush in this area.
15. Path. This is a cleared path that leads from Feature 16 to Feature 14.
16. Road. This road is clearly defined and extends well off the site boundaries to the east and north. The road is higher along the center line then the sides of the road creating a definite "wagon rut" appearance. As there is evidence of continued military use of this road it is unclear how much of this was the original appearance of the road or an artifact of military vehicle usage. The road is relatively level on the eastern portion of the site but sloped downward as you pass Feature 13 and continues downslope to Feature 17.
17. Low Water Crossing. This is a gravel ford of the stream with the road continuing on to the north. It shows signs of military use and maintenance.

This is a well preserved large farmstead with multiple structures and landscape features. The principle structure is Feature 9, the remains of a multistory dwelling structure with a full stone lined basement (Figure 31). A cistern or well (Feature 10) is located off the northeast corner of the house (Figure 32). Feature 13 is interpreted as being barn. Feature 12 may have been only three sided and could have functioned as an equipment shed or an animal shelter. The entire site is divide by a large low retaining wall made up of large, partially dressed limestone blocks (Feature 3 and 7) (Figure 33). Towards the eastern side of the site portions of this wall appear to have been altered and used in military training activities. A break in the wall and a subtle path provide easy access to Feature 6 from the road and Feature 9. The floor of Feature 6 could not be located and this

structure may have originally be semi-subterranean (Figure 34). A few artifacts were observed on the road near Feature 9. These consisted of undecorated white ware, clear bottle glass and milk glass fragments. Very few artifacts were observed elsewhere in the site.

Figure 31. 14RY2140 Feature 9. View from SE to NW.



Source: ERDC-CERL (2019).

Figure 32. 14RY2140 Feature 10. View from SE to NW.



Source: ERDC-CERL (2019).

Figure 33. 14RY2140 Feature 16 and 3. View from SW to NE.



Source: ERDC-CERL (2019).

Figure 34. 14RY2140 Feature 6. View from N to S.



Source: ERDC-CERL (2019).

5.6.4 Farmstead Eligibility Evaluation Form

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to 1850? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **YES**
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a farmstead? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **YES**
4. Is there potential for intact buried deposits based on subsurface testing and/or evidence of ground disturbance or erosion? **YES**
5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **YES**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **UNKNOWN**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **NO**
2. Does this site possess multiple architectural features? **YES**
3. Is there a foundation larger than 10 x 10 ft and less than 30 x 30 ft on the site? **YES**
4. Is there evidence of small (wells, privy, shed, crib, etc.) architectural features? **YES**
5. Is there evidence of large (barn, stable, storehouse) architectural features? **YES**
6. Is there evidence of fence construction? **YES**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**
8. Is there evidence of landscape features (such as roads, paths, gardens, leveled areas) at the site? **YES**
9. Was the site occupied by a person of historical, regional, or local significance? **NO**

This site is a well preserved example of a prosperous 19th and 20th century farmstead. Multiple structures of various construction techniques, size and shape are located on the site. Clear landscape features including stone walls, retaining walls, leveled areas, paths and roads are visible. These features not only provide insight activities and pattern of the farmstead but also demonstrate minimal impaction by ground disturbing activities. With the exception of spray paint graffiti on Feature 9, the only evidence of military training at the site was the alterations to Feature 7, which was located away from the central portions of the site.

The evaluation questionnaire resulted in four "yes" answers for Level I questions and six "yes" answers for Level II. As a result site 14RY2140 is determined **Eligible** for inclusion on the NRHP. Additionally, if a sampling strategy were applied to farmsteads at Fort Riley to only preserve very good examples of typical farmsteads, this site would be a candidate for that sample selection.

5.6.5 NRHP survey results

The NRHP evaluation survey was conducted and reported in 2004 (Kriesa and Morrison 2004). Their findings are summarized here.

Testing of this site included 50 shovel tests and three 1x1 m test units. Testing focused on the area around features 9 and 13 as well as two N-S rows of shovel test from the road to east of Feature 6. Twenty shovel tests north of the road were positive while only one south of the road was. Most artifacts recovered from the shovel tests were found in the first 10cm below ground surface. However in two shovel tests east of Feature 9 artifacts were found up to 30 cm below the surface and three shovel test pits within Feature 11 had artifacts 20cm below the surface. This indicates the potential for subsurface features. Artifacts recovered from the shovel tests consisted of kitchen, architectural and personal artifact types.

Three test units were excavated. The first was located between Feature 9 and 12. This unit contained 27% of all artifacts found in test units, consisting predominantly of kitchen (37%) and architectural (37%) artifact types. 83% of the artifacts were located between 10 and 40 cm below surface. This area was interpreted as being used for plaster production and then associated with generalized domestic debris disposal. Test Unit 2 was located within Feature 11. It contained 3.5% of artifacts from all test units with just

over half classified as architectural debris and 29% kitchen debris. All material was found in the top 20 cm below surface. Test Unit 3 was located east of Feature 10. 65% of the artifacts from the entire site were found here with nearly all found in the first 20 cm below surface. 55% of artifacts were kitchen debris, with 31% architectural debris but also included clothing and personal items. This unit was interpreted as being a domestic disposal midden. None of the test units indicate post occupation soil disturbance.

1077 historic artifacts were recovered from 14Ry2140. 536 of these were assigned to the kitchen artifact type. This included unrefined stoneware, ironstone and semiporcelain ceramics. Some decorative types, including salt glazed, salt/Albany glazed, plain ironstone, hand painted floral decorated ironstone, blue sponge/spatter decorated iron stone and black, brown and blue transfer print decorations date to the 19th century. Some examples of gilt decorated ceramics were found indicating more prestigious ceramic types were present at the farmstead. Glass objects included bottle, jar and table glass items. One item of note was an early to mid-19th century scroll flask fragment. Architectural debris consisted primarily of window glass, wire-drawn and machine cut nails and spikes. Personal artifacts included two bullet casings, a metal thimble, metal buttons, hook and eye clasp, one piece of silver jewelry (unidentified pin or ring fragment with a central area that once contained a stone or inlay, decorative style is similar to art nouveau), 1 ribbon pin, and various miscellaneous types.

The field work identified a total of seven structures. These include the house with cellar (Feature 9), a cistern (Feature 10), a small concrete outbuilding south of the road (Feature 6), and a large concrete pad south of the road (Feature 2). Two small out buildings were identified within the space that ERDC-CERL investigators identified as Feature 13. The 2004 survey was conducted in September and the report notes difficulty with visibility due to vegetation. It is possible that the overall patter of Feature 13 could not be seen during the 2004 survey. Finally, a freestanding cellar was identified 30 meters north of Feature 9 near the stream. This feature was not relocated by ERDC-CERL in 2019.

Kreisa and Morrison (2004) concluded that the site contains intact deposits with discrete temporal depositional patterns. Structural remains and the artifact assemblage document the increased prosperity experienced in the region in the late 19th century. These site characteristics are associated with but not contributing to a regional and trend or pattern. Additionally

the site is not associated with a significant person or event and insufficient architectural elements remain that embody a distinctive architectural or artistic style. The site therefore does not qualify for the NRHP under Criterion A, B or C. The site integrity, the potential for subsurface features, the intact and discrete pattern of artifact deposition demonstrate that the site is **Eligible** for inclusion in the NRHP under Criterion D.

5.7 Summary of field tests, Fort Riley, KS

Five sites at Fort Riley were evaluated by CERL for this report. Site evaluations were conducted blind with the researcher unaware of the original NRHP evaluation determinations. After the site evaluation was complete the results were compared to the original determinations (Table 1).

Table 1. Summary of NRHP Eligibility Findings for Fort Riley, Kansas.

Site	NRHP determination based on traditional methodology	NRHP determination based upon CERL methodology
14GE0170	Not Eligible	Eligible
14RY2117	Eligible	Atypical/Eligible
14RY2136	Eligible	Eligible
14RY2138	Not Eligible	Not Eligible
14RY2140	Eligible	Eligible

Of the five sites evaluated there is agreement on the findings for three of the sites. One site, 14RY2117, was described as Eligible in the original NRHP evaluation but Atypical/Eligible in the CERL methodology. When the entire site evaluation checklist was completed for 14RY2117, the site met with the minimal number of "yes" answers to be considered Eligible. The site contained an extremely unusual feature type in the form of a vaulted rock lined cave. The presence of this feature moved the site from Eligible to Atypical. If the site evaluation checklist were used to select the best preserved typical sites by increasing the number of "yes" answers a site needs to have to be considered for preservation, it is possible that this site would not meet that higher standard. Its atypical nature, however, precludes this site from that kind of sampling strategy.

Site 14GE170 was determined to be Not Eligible by the traditional NRHP evaluation but Eligible by the CERL methodology. The original NRHP evaluation, however, did not differ significantly in the findings of feature

types and site conditions from the CERL evaluation. The original evaluation included the statement that "further investigations would likely yield only redundant information" (Morrison and Rowe 2004:127). This indicates that to some degree the evaluation of this site was in reference to other farmstead sites in the region. However the report is not clear as to the criteria they used to determine one site's redundancy over other sites.

Finally, all of the sites at Fort Riley were notable for the lack of surface artifacts. The majority of artifacts that were observed during CERL's site visit were miscellaneous metal debris and architectural debris such as concrete and brick fragments. Very few pieces of domestic and no personal items were observed at any of the sites. With the exception of site 14RY2117, all of the previous site reports indicated that the vast majority of artifacts recovered were from shovel tests and test units. It is unclear why there were so few surface artifacts at these sites. It is possible that this is a result of cultural practices of the civilian inhabitants of the sites, the result of clearing/demolition practices of the military upon site occupation. The lack of surface artifacts meant that the CERL researchers had less information than the original NRHP evaluators as to the occupational time periods of the site.

6 Field Test Results: Fort McCoy, WI

Field work was conducted in June 2019 by Carey Baxter and Benjamin Mertens of ERDC-CERL. Principle support at Fort McCoy was provided by Kira Kaufmann, Archaeologist, Fort McCoy WI and Tyler Olsen CEMML.

Six sites were tested in this effort at Fort McCoy. These are 47MO286, 47MO465, 47MO704, 47MO848, 47MO897, and 47MO903. Many of the visited sites were heavily overgrown with vegetation to the extent visibility of building remains was mostly obscured. As a result, site photographs were not possible at every site that was visited. Conversations with the CRM staff indicate that visibility is not noticeably better at any time of year and when the sites were not obscured by vegetation they were covered with snow.

6.1 Determination of typical site features

Fort McCoy is situated within Region 7 – the Northern Maritime. Historic contexts specific to the Fort McCoy region can be found in Bartholomew (1990), Penny et al. (1996), and Sewell (2000) vol. 1.

Several general trends can be gleaned from these, and other reports that inform on what is a typical farmstead for the region. Farmstead settlement began in the region in the mid 1850s with the early settlement consisting primarily of New Englanders. Early construction is dominated by log cabins resting on stone foundations (Sewell 2000 vol. 1). In-ground cellars below the house were common. The principle crop of the period was wheat with fruits, hops and tobacco also being grown. Many farmers of this period supplemented their income through timber harvesting, particularly white pine; saw and grist mills were the focus of small scattered communities (Bartholomew 1990 and Penny et al. 1996).

Farming patterns changed dramatically during the last quarter of the 19th century. Central and northern Europe became the dominant source of new settlers. A pattern of land consolidation began with small farmers becoming tenants to larger landowners (Bartholomew 1990, Sewell 2000 vol. 1). Small wheat farms were no longer economically viable and production became focused on dairy. Portland cement was introduced to the area in the mid 1870s and cement foundations become more common. The number of outbuildings proliferate with silos and livestock barns constructed into the sides of hills being key features to the farmsteads of the period.

Based on this summary we do not expect to see widespread evidence of a non-agricultural cottage industry at farmstead sites at Fort McCoy. Timber harvesting would occur away from the farm sites and short term timber storage would not require specialized structures. Evidence of site features should include depressions from cellars, stone footers and concrete foundations. Despite the consolidation of land ownership towards the end of the 19th century, single-family tenant farms and not industrial sized farms were the dominant farmstead type. Outbuildings associated with dairy farming, including feed silos, livestock barns built into the sides of hills and creamery structures are likely to be found at many sites.

6.2 Site 47M0286 field test

Site 47MO286 is located on the east side of an active road (Figure 35). The site is wooded with heavy undergrowth that completely obscures the ground surface. The site is situated on a gentle slope with the high elevation located on the west side of the site, along the road. There was no permanent surface water observed in proximity to the site. The site was originally reported in Penny et al. (1996) with Phase II testing reported in Sewell (2000) Vol II and Kaehler (2003).

6.2.1 Original Phase I results

The original Phase I survey was reported in Penny et al. (1996). Four structures were identified. The southernmost was a dressed sandstone foundation and cellar measuring 20 x 29 ft. with a concrete slab on the northeastern portion. In the middle of the site two poured concrete foundations measuring 11.5 x 16.5 ft. and 27.25 x 12.1 ft. were located. On the eastern side of the site was a large 29.5 x 20.3 ft sandstone foundation with a large concrete slab on the west side of the foundation. Only a small number of artifacts were recovered and the only one described was a seam can.

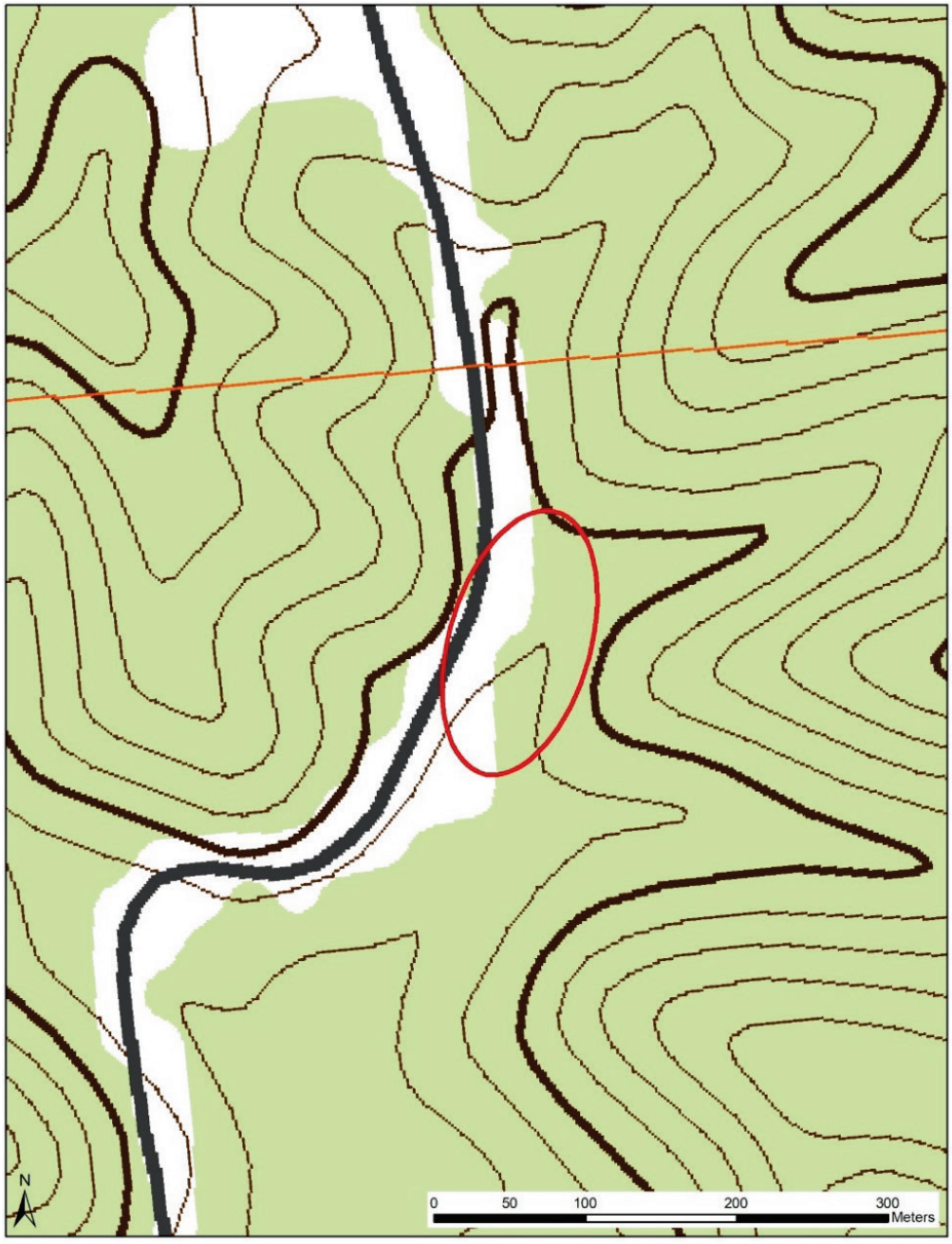
6.2.2 Historic documentation

Historical documentation of the site was conducted as part of the Phase II evaluation and is reported in Sewell (2000) Vol II and is summarized here.

The land this site sits upon was acquired by the Wisconsin Railroad Farm Mortgage Land Company from the State of Wisconsin in 1868. The property was sold to Adolph Koehn in 1880 who sold it to Gustave and Anna Stahnke in 1896. Anna Stahnke and her children sold the land to the U.S

Government in 1941. The property 1st appears on the Monroe County plat maps in 1877 with the fist structure appearing on the 1897 map.

Figure 35. Site 47MO286 on 2018 USGS 7.5 quadrangle map.



Source: https://ngmdb.usgs.gov.

Historic tax records indicate that in 1873 the property was valued at $40. In 1884, under the ownership of Koehn the property was valued at $170.

The Stahnke family appears to have made significant improvements or enlargements to the property in the first decade of the 20th century as the property value increased from $145 to $1450 in that time frame.

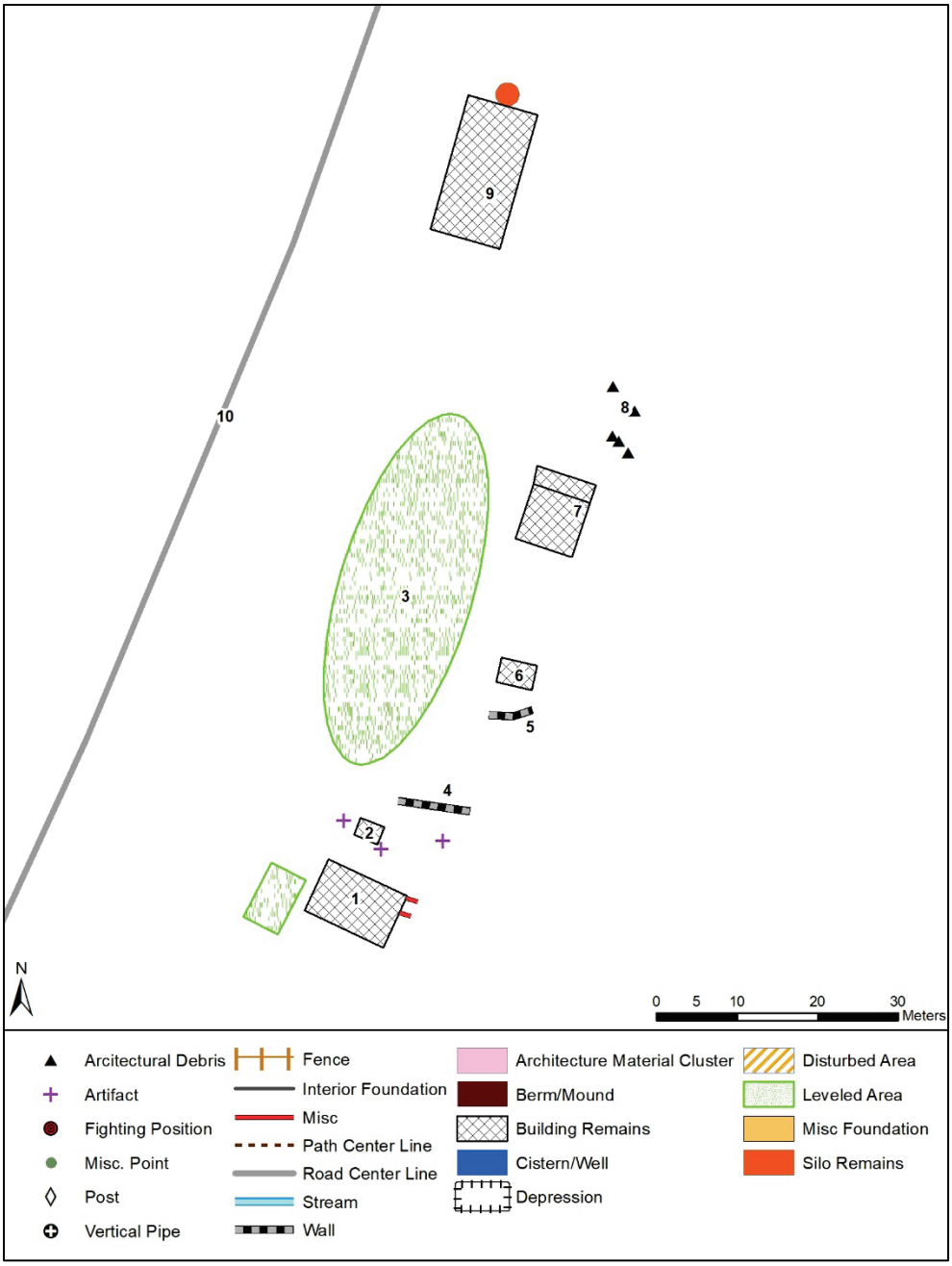
In 1945, the U.S. Army surveyed and mapped the site. This survey recorded 16 structures on the site including:

- A 1.5 story wood frame house with the eastern portion consisting partially of log construction.
- A single story wood framed summer kitchen.
- A stone walled smokehouse.
- A single story wood framed chicken house.
- A two-story wood frame granary/machine shed.
- A wood frame hog house on the eastern portion of the site.
- A wood framed well house with dirt floor.
- A log frame shed.
- A two storied gambrel roofed barn with a concrete floor and masonry walls, a 30-ft tall concrete block silo and a small shed attached to the north east corner.
- A concrete reservoir.
- A wood frame garage.
- A wood frame shed.
- A privy.
- A corncrib.
- A wood frame machine shed located across the road from the rest of the site.

6.2.3 ERDC-CERL site visit

ERDC-CERL researchers identified 10 features at the site (Figure 36). Very few artifacts were observed on the site and most of these were large pieces of metal debris. There was no significant evidence of military activity or other recent ground disturbance within the site boundaries. The site was significantly overgrown with dense underbrush and foliage, including large areas of lilies, completely obscuring the ground surface. In many cases building remains and foundations were only discovered when the researchers stepped or tripped over them. The larger structure identified during the Phase I survey on the eastern portion of the site was not located.

Figure 36. Site 47M0286 site map.



Source: ERDC-CERL (2020).

The site feature descriptions are:

1. Building Remains. Cellar lined with partially dressed stones. Cellar is approximately 1.5 meters deep. Entrance is on north east corner marked by misc. lines. On the west side of the feature is a square area completely overgrown with lily plants
2. Building Remains. Poured concrete foundation. No discernible floor. A metal barrel is located on SE corner of building. A rusted car bench seat is located west of the structure.
3. Leveled Area. Large relatively flat area completely overgrown with lily plants.
4. Wall. Low poured concrete wall or foundation. This may be portions of a building but other sides of the structure (if they exist) could not be found.
5. Wall. Low poured concrete wall or foundation. This may be portions of a building but other sides of the structure (if they exist) could not be found.
6. Building Remains. Poured concrete foundation. No discernible floor.
7. Building Remains. Stone foundation. The building is on a slope and the SE wall was 50-70 cm in height. The NW wall was less than 10 cm in height.
8. Architectural Debris. Cluster flat-topped stones 20-30 cm in size. May be remains of footers or wall remains.
9. Building Remains. Rectangular depression with rough stone foundation on the southern side. Northern wall has concrete foundation. On north side there is a circular block silo foundation that abuts the rectangular structure. Some portions of the wall are 1.5 -2.0 m tall. Portions of the stone foundation/walls have remnants of concrete covering or dressing on the walls. One vertical clay pipe was located within the western wall of the structure.
10. Road. Active road.

Only two structures identified at the site could be viewed in enough detail to interpret their function. Feature 1 is most likely the dwelling structure due to the presence of the cellar. The dense growth of lilies in close proximity to the house may be the remains of a yard or garden. Feature 9 is clearly the remains of a barn with the attached silo on the north side. Features 4, 5 and 8 may be the remains of other buildings but were too obscured to interpret. The historical record indicates that presence of a summer kitchen, which would most likely be Feature 2 or 4 based on the proximity to Feature 1. The large Feature 3 may be the remains of a barn yard or property line. It was not uncommon for decorative plants to be placed along fence lines and then spread after the site has been abandoned. No evidence of fenceposts, rails or wires were seen.

6.2.4 Farmstead Eligibility Evaluation Form

Based on the information above the evaluation form is as follows.

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to 1850? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **YES**
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a farmstead? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **YES**
4. Is there potential for intact buried deposits based on subsurface testing and/or evidence of ground disturbance or erosion? **YES**
5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **YES**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **UNKNOWN**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **NO**
2. Does this site possess multiple architectural features? **YES**
3. Is there a foundation larger than 10 x 10 ft and less than 30 x 30 ft on the site? **YES**
4. Is there evidence of small (wells, privy, shed, crib, etc.) architectural features? **YES**
5. Is there evidence of large (barn, stable, storehouse) architectural features? **YES**
6. Is there evidence of fence construction? **NO**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**

8. Is there evidence of landscape features (such as roads, paths, gardens, leveled areas) at the site? **YES**
9. Was the site occupied by a person of historical, regional, or local significance? **NO**

Based on the results of the eligibility evaluation form, site 47MO286 is **Eligible** for inclusion on the NRHP. With four "Yes" answers in Level I and 5 "Yes" answers in Level II this site has integrity, a wide variety of feature sizes and types and a clear site layout where activity patterns may be discerned. The site demonstrates a clear layout pattern with structure laid out along a road with the barn located on the opposite side of the site from the house. Although the ground could not be seen, the presence of two areas of decorative plants indicate the survival of garden or yard features, which would be unlikely if the site were highly disturbed. Stone and concrete structure foundations indicate a variety of construction methods that may inform of variations in building use or variations over time. The lack of observable artifacts is most likely due to the lack of visibility and does not necessarily point to widespread looting or site disturbance.

6.2.5 NRHP evaluation results

The site underwent a Phase II survey in 1999 with the results reported in Sewell (2000) Vol II. The survey identified nine structures, two tiger lily beds and a sparse artifact scatter. There is no description of any shovel tests or test unit excavations being conducted as part of the investigations. The results of their findings are summarized here.

CERL's Feature 1 and 2 were documented as a single structure. A stone foundation was identified on the eastern side of Feature 1 that connected to a concrete pad, the western portion this pad being CERL's Feature 2. Artifacts associated with this structure include wire nails, whiteware, window glass, tin cans beer cans, white enameled kitchen ware, bricks and sheet metal. A vertical pipe embedded in the ground was located 10m east of this feature and may be the location of the well. This pipe was not observed by CERL.

A structure was identified at the location of Feature 4. This was described as a poured concrete 3.6 x 5.5 m building with a concrete floor. A small hearth bad was located on the eastern wall and a brick scatter (potential chimney fall) was found down slope from that feature. This feature was interpreted as the summer kitchen described in the 1945 Army survey.

CERL's Feature 5 was documented as a 3.6 x 2.9 m stone foundation with cast iron stove parts within the foundation. This feature was interpreted as the smokehouse. Feature 6 was described as a 9.3 x 3.9 m building with fieldstone foundations foundation and a raised floor on the north side of the structure with a poured concrete foundation on the southern 2/3 of the building. The southern side of the structure had no foundation. CERL's Feature 7 was documented as two separate structures, the northern one being 3.4 m square and the southern one was 4.4 m square. Both structures had a stone foundation and berm. Feature 9 was described similarly to CERL's findings with the exception that wooden remains of a doorframe and window frames were observed. Glass bottle bases were found near the structure. This feature was the farmstead barn. CERL's Feature 8 was not noted in the NRHP evaluation survey.

In addition to the features CERL documented the 1999 survey found a concentration of scattered building stones on the west side of Feature 3 that may have been a building that was impacted by road improvements. The survey also located the large structure on the east side of the site that was not observed during CERL's investigations. This structure (9.25 x 9 m) consisted of large stones in a concrete matrix with a raised concrete floor. Three ramps led up to the raised floor on the west side of the structure and two iron pipes were set in the western wall between the ramps. A 15cm square stone lined pit was near the southwest corner of the structure. This was interpreted as the hog house described in 1945.

The site was described as a large farmstead typical of the late 19th and early 20th centuries with a high degree of site integrity. Subsurface testing was recommended to determine if subsurface deposits existed before final NRHP eligibility could be determined.

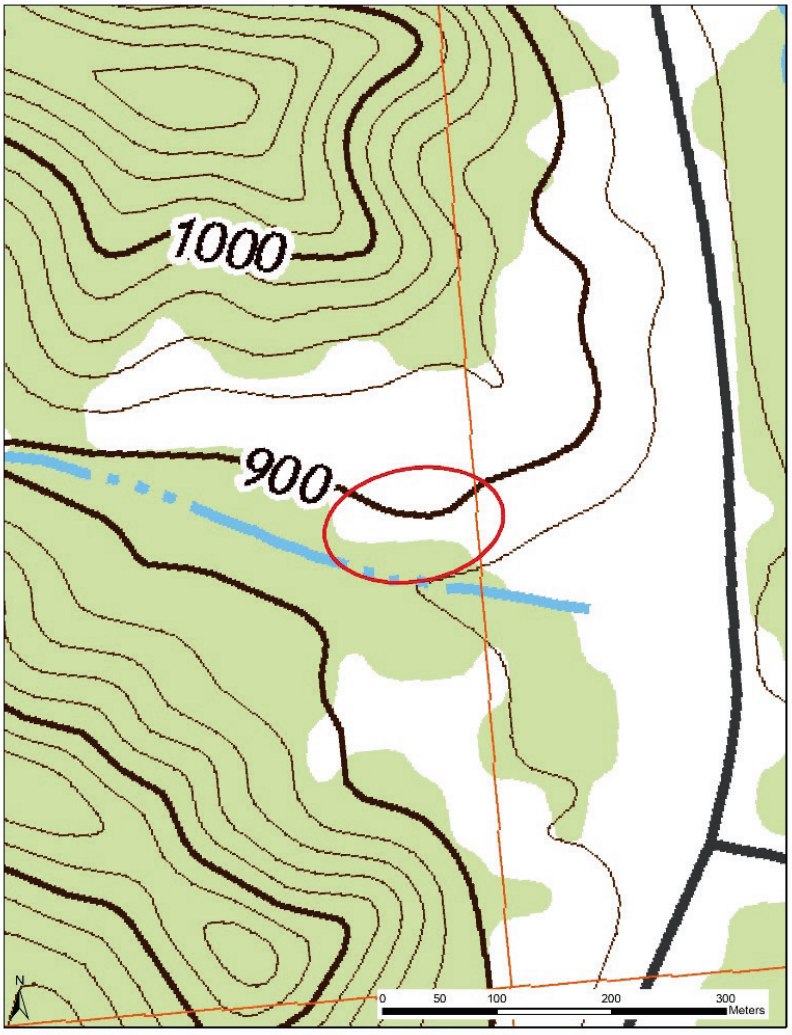
Subsurface testing occurred in 2002 (Kaehler 2003) and consisted of nine test units excavated in proximity of the recorded structures and 47 shovel tests dug on a 10 m grid across the entire site. Most of the artifacts recovered consisted of architectural debris including wire and machine cut nails window glass, fencing wire and staples and miscellaneous metal fragments as well as bottle glass fragments. Units near Feature 1 produced lamp chimney glass, whiteware, yellowware, porcelain and ironware ceramics. One test unit near Feature 1 had evidence of a builder's trench and another demonstrated stratified deposition with wire nails in the top 40 cm and machine cut nails found below 40 cm below surface.

The site was described with intact subsurface deposits and minimal military impaction. A high degree of integrity was present in the farm layout and surviving features including landscape features. The association with only German immigrant owners would allow the examination of a specific ethnic styles and patterns. Based on these findings, Site 47MO286 was determined **Eligible** for the NRHP.

6.3 Site 47MO465 field test

Site 47MO465 was initially identified in 1997 (Caldwell and Greek 1998) and revisited in 1999 (Sewell 2000 Vol III), 2002 (Kaehler 2003) and 2009 (Dahlen and Wagner 2010). The site sits on a gentle north/south slope with an intermittent creek located on the southern side of the site (Figure 37).

Figure 37. Site 47MO465 on 2018 USGS 7.5 quadrangle map.



Source: https://ngmdb.usgs.gov.

6.3.1 Original Phase I results

The site was originally identified in a 1997 field survey and reported in Caldwell and Greek 1998. The site was described as consisting of a house foundation, a double barn with an addition and attached silo and a well. All structure was constructed of stone. Two depressions that were potential features were also observed. Twelve artifacts were collected from the site and included pharmaceutical, lamp chimney and unidentified glass fragments as well as whiteware ceramics.

6.3.2 Historic documentation

The U.S. Government granted the land that site 47MO465 sits upon to John M. Finn in 1859 (Kaehler 2003). In the same year, the land was purchased from Finn by Bernard Mulrenin, an Irish immigrant, for $100. Four years later Bernard sold the land to his 20-year-old son Thomas for $300. Thomas Mulrenin died in 1919 and his children sold their shares of the property to one of their brothers, Bernard. The property was valued at this time at $4225. In 1942 Bernard Mulrenin sold the property to the U.S. Government for $7100 in 1942. Tax records indicate a significant improvement of $1100 to the property in 1911. This demonstrates that the property was prosperous at a time when many of the farms in the region were struggling (Kaehler 2003).

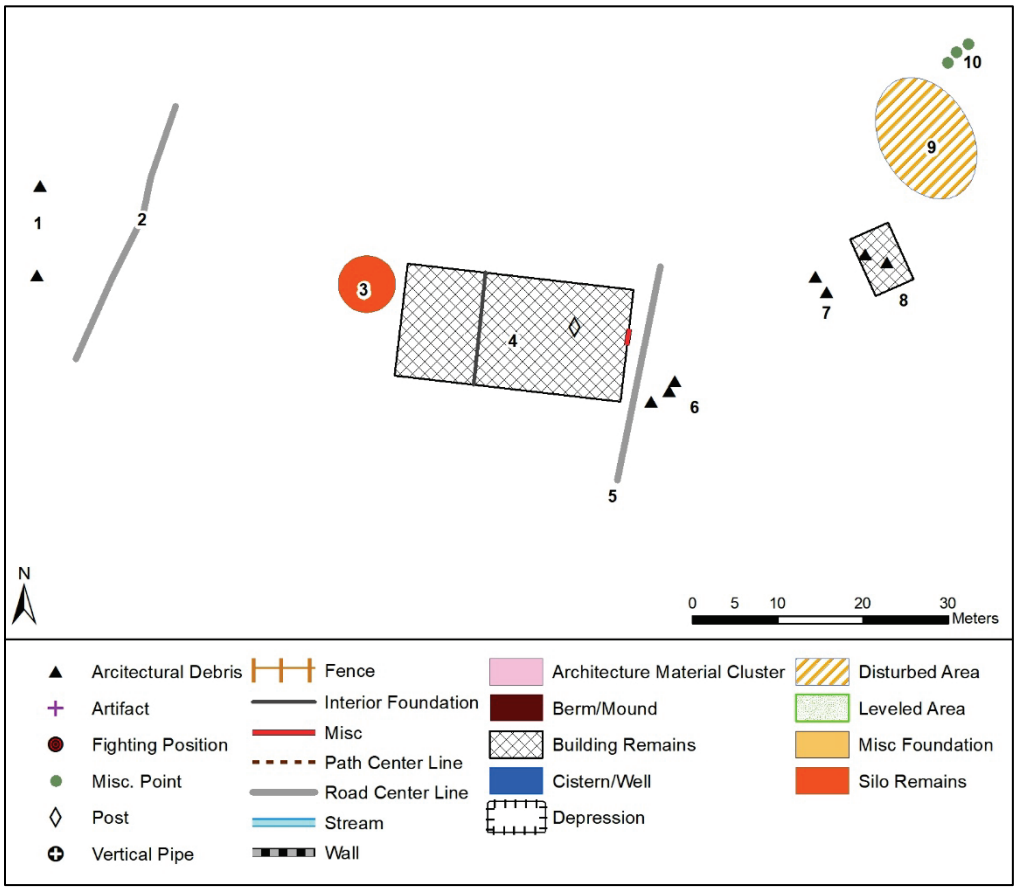
Aerial photographs of the site taken in 1939 show four structures at the site with small fields and pastures immediately adjacent (Sewell 2000 Vol III). Aerial photographs from 1946 show that there were significant impacts to the site due to vehicular traffic. The barn foundation is visible in aerial photographs of 1957 and 1965. Monroe County play maps document the Mulrenin ownership and the presence of a building in the 1877, 1897, 1903, and 1915 maps (Sewell 2000 Vol III)

The Army Farm Survey conducted in 1945 documents a T plan house, a barn and silo, a granary and a hog house. All structures were wooden frame in construction. The site was sketched as being roughly north-south in orientation with a road on the east side of the site and a drive on the southern portion of the site (Sewell 2000 Vol III).

6.3.3 ERDC-CERL site visit

CERL researchers identified eight features at the site that dated to the historical occupation and two features that were modern (Figure 38). The central and southern portions of the site were overgrown with dense undergrowth that made movement and exploration of the site very difficult. Immediately south of the site was a flat level area with no trees that is likely the location of the intermittent streambed seen on the USGS quad map. South of this feature was an east/west tree line where the vegetation become even denser.

Figure 38. Site 47M0465 site map.



Source: ERDC-CERL (2020).

The site feature descriptions are:

1. Architectural debris. Flat-topped rock 20-30 cm in size.
2. Road. Very faint traces of a possible road.
3. Silo Remains. Stone foundation that stands 0.7 – 1.0 m tall.
4. Building Remains. Stone foundation structure with two rooms. Building is built into the side of the hill. Western room has no visible doorway. One

door is visible on east wall. In the eastern room there is a stone pillar that probably was the footer for a large post.

5. Road. Probable road. Much more clearly defined than Feature 2.
6. Architectural debris. Vertical rock posts or pillars. Up to 60cm high. It is possible that these were part of a fence or wall.
7. Architectural debris. Flat-topped rock 20-30 cm in size.
8. Building Remains. Stone foundation cut into the side of the hill with no discernible floor material. In the center of the feature is a rock pile and towards the northwest corner is a single dressed stone.
9. Disturbed Area. Area showing evidence of disturbance with rutting caused by heavy vehicles.
10. Misc. Points. Rows of sandbags. This is recent construction (within 10 years of CERL site visit). It is unclear if this were to control erosion or if they are constructed fighting positions related to training in the nearby range area.

The only artifact identified on the surface was a metal pail located between Features 4 and 5. Feature 4 was identified as a barn with attached silo. This feature was excavated partially into the side of the hill as is typical for livestock barns in this region (Figure 39). Feature 8 is most likely a farm outbuilding and not a dwelling structure based upon the size. It is unclear if Feature 7 represents a separate structure, debris from Feature 8 or deliberately placed footers for some form of porch or awning attached to Feature 8. The nature of Feature 6 is also no clear (Figure 40). These stones could be part of a fencing or gate system, footers for a structure or debris from either features or 8. No feature that could be identified as a dwelling structure was observed.

North of the site there was an active dirt road associated with military training. The other side of the road was a training area completely denuded of vegetation. Evidence of military impaction could be seen in features 9 and 10.

Figure 39. 47MO465 Feature 4. View from south toward north. Interior wall is visible on right side of the picture.



Source: ERDC-CERL (2019).

Figure 40. 47MO465 Feature 6. View from west toward east.



Source: ERDC-CERL (2019).

6.3.4 Farmstead Eligibility Evaluation form

Based on the information above the evaluation form is as follows.

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to 1850? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **NO**
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a farmstead? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **YES**
4. Is there potential for intact buried deposits based on subsurface testing and/or evidence of ground disturbance or erosion? **UNKNOWN**
5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **YES**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **UNKNOWN**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **NO**
2. Does this site possess multiple architectural features? **YES**
3. Is there a foundation larger than 10 x 10 ft and less than 30 x 30 ft on the site? **NO**
4. Is there evidence of small (wells, privy, shed, crib, etc.) architectural features? **YES**
5. Is there evidence of large (barn, stable, storehouse) architectural features? **YES**
6. Is there evidence of fence construction? **UNKNOWN**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**

8. Is there evidence of landscape features (such as roads, paths, gardens, leveled areas) at the site? **YES**
9. Was the site occupied by a person of historical, regional, or local significance? **NO**

Based on the results of the eligibility evaluation form, site 47MO465 is **Eligible** for inclusion on the NRHP. With two "Yes" answers in Level I and four "Yes" answers in Level II this site has sufficient integrity, a variety of feature sizes and types and a discernible site layout where activity patterns may be discerned. It should be noted, however that the site only barely meets the selection criteria and shows evidence of military impaction to the site. The failure to locate a dwelling structure and the uncertain nature of several of the site features is problematic. It is likely that if any further site disturbance occurs the site may no longer be Eligible for the NRHP.

6.3.5 NRHP evaluation results

Phase II investigations were conducted at 47MO465 in 1999 (Sewell 2000 Vol III) with follow-on investigations in 2002 (Kaehler 2003) and 2009 (Dahlen and Wagner 2010).

The 1999 survey identified five structural features and two features that were indeterminate in nature. Feature 8 was identified but described as a larger two-room structure with a concrete floor on the eastern portion of the structure. It is likely that the portion seen by CERL was only half of the structure described in 1999. This structure was interpreted as the hog house. The description of Feature 4 is very similar to CERL's observations. This feature is clearly the barn.

There were three structures noted in 1999 that were not observed by CERL. It is unclear if these structures no longer exist or could not be seen due to the vegetation. The first of these structures was located 15 south of the SE corner of Feature 4 and consisted of a small pile of blocks (2 x 1.6 m) around a meter deep pit with a windmill leg bracket nearby. This feature was a well. The second structure was located 8 meters north of Feature 4 and consisted of a mostly buried stone foundation 5.6 x 3.1 m in size. The third structure was a mostly buried and heavily overgrown stone foundation 22 meters south east of Feature 4. This feature measured 5.4 x 8.9 m. This feature was interpreted as a granary foundation or part of the house foundation. One of the indeterminate features was a scatter of stone and concrete in a blown out area 15 meters south of Feature 8. This feature was not observed by CERL in 2019. The final noted feature in the 1999

survey was a gully and semi-dressed sandstone block that are similar in description and location to CERL's features 1 and 2. Artifacts associated with this feature included mortar, an asphalt shingle with wire nail, window glass, whiteware, molded whiteware and a can lid.

The conclusion of the 2000 report was that this site was potentially Eligible for the NRHP and required subsurface testing to make a final determination. The key elements of interest were the continued occupation by one family and the apparent undisturbed nature of the center portion of the site.

Subsurface testing occurred in 2002 and was reported in Kaehler (2003). Six test units were excavated. The structure north of Feature 4 could not be relocated. The windmill leg was also not found at the site. The excavations within Feature 4 recovered evidence of a stone and concrete floor with a possible wooden floor constructed over the top. Recovered artifacts included a halter clip, curry comb fragments, wagon parts and a fitted lid for a Bag Balm udder treatment container. This demonstrates that the barn was used for both cattle and horses. The debris field south of Feature 8 was determined to be military feature not associated with the site. The test unit located near the feature 22m south of Feature 4 (possible granary or house) recovered artifacts including window glass, bottle glass, amethyst glass, lamp glass, wire nails, a spring loaded mouse trap, and blue and white transfer print whiteware. This is a strong indication that this feature was the site of the house and not the granary. A test unit excavated between the house and well recovered household artifacts including porcelain, ironstone, tin can fragments, spice tins, tobacco tins, bottle glass and one subsurface feature consisting of a 40 x 20 cm area of burnt earth and sandstone. A glass bottle embossed with "Sparta Bottling Works" could be dated from 1910-1920.

The 2003 report concluded that the site integrity was impacted by ongoing military activity not only on the northern portion of the site but in the area south of Feature 8. Additionally, the author stated that Irish immigrants tended to acculturate much faster than other ethnic groups and the sit would therefore not have ethnically distinct features (Kaehler 2003). The final conclusion of the survey was that the site was **Not Eligible** for the NRHP.

During a large surface survey in 2009, site 47MO465 was reexamined (Dahlen and Wagner 2010). An additional structure was discovered 52 meters southeast of the well (approximately 70 meters south of Feature 4).

This structure consisted of a stone lined cellar foundation with two surface foundations to the north and south of the cellar that were interpreted as extensions to the original structure. This feature was determined to be one T-shaped structure. The area was heavily overgrown and obstructed by fallen trees including some that damaged the feature when they fell. Six test units were excavated. Artifacts recovered included wire nails, cut nails, window glass, bottle glass (clear, brown, light and dark green, amber, cobalt and aqua), porcelain whiteware, stoneware, yelloware, metal fragments, bottle caps, a plastic comb, 53 shoe parts, metal canning jar lids, two flask shaped metal cans, a 1929 license plate, a plastic tooth brush and spent cartridges. Various bottles and bottle fragments could be dated due to embossing with most examples dating from the late 19th through the early 20th centuries. Some evidence of disturbance of this portion of the site included some military era items located beneath artifacts dating to the occupation period of the site.

The 2010 report concluded that this structure was the house associated with 47MO465. The site was described as the farmstead of a successful Irish family from the 1860s through 1942. Due to the level of investigation already conducted and the evidence of damage to the site integrity in all areas of the site, 47MO465 was confirmed **Not Eligible** for the NRHP.

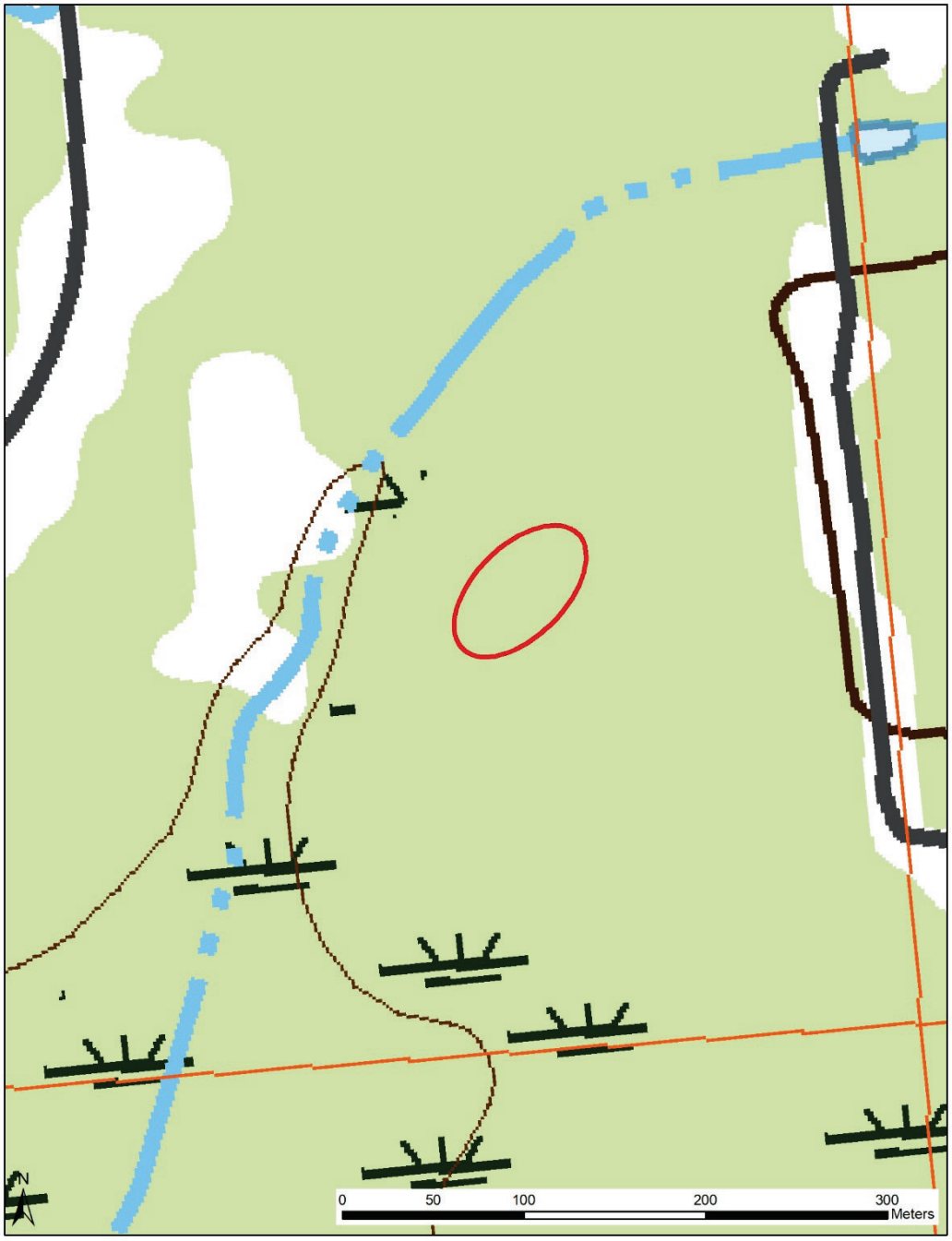
6.4 Site 47MO704 field test

Site 47MO704 was initially identified in 2007 (Wagner and Dahlen 2008) and revisited in 2012 (Dahlen and Wagner 2013). The site is wooded and sits on level ground with an intermittent creek located to the west of the site and marshland to the south (Figure 41).

6.4.1 Original Phase I results

The site was originally identified in 2007 (Wagner and Dahlen 2008). The site is described as a foundation/cellar with no stone associated with it. A mortared stone round well was also located. Twenty meters north of the well was a collection of metal and glass debris. A raised road was located near the site. A shovel test south of the site produced a glass cup, metal cans and whiteware ceramics.

Figure 41. 47MO704 on 2018 USGS 7.5 quadrangle map.



Source: https://ngmdb.usgs.gov.

6.4.2 Historic documentation

The ownership record for the land for this site dates back to 1863 with 11 changes of ownership between railroad corporations and the county and no evidence of occupation until 1887. Tax and plat maps indicate that the first individual ownership of the site was in 1887. Orlow Bennettt was the owner from 1887-1898. Other owners include Clarance A. Turner (1899-1918), F.K. Sparling (1919), Mrs. Marion Johnson (1920-1926), and O.C Thomson (1927-1942). Based on a lack of records of improvements, it is possible that the property was not occupied until the 1920s. Tax records indicate that the property was never highly valued with the highest value of the entire property listed as $600 (1925). Five years later the property was only valued at $200 (Dahlen and Wagner 2013).

The 1945 Army farm survey map describes a demolished barn measuring 24 x 48 ft and a removed house (dimensions not provided) (Dahlen and Wagner 2013). The structures can be seen in the 1939 aerial photographs but not in subsequent ones confirming the removal of the sites. The wording of the survey indicates that the structures were removed by the civilian owners prior to the Army acquisition of the land.

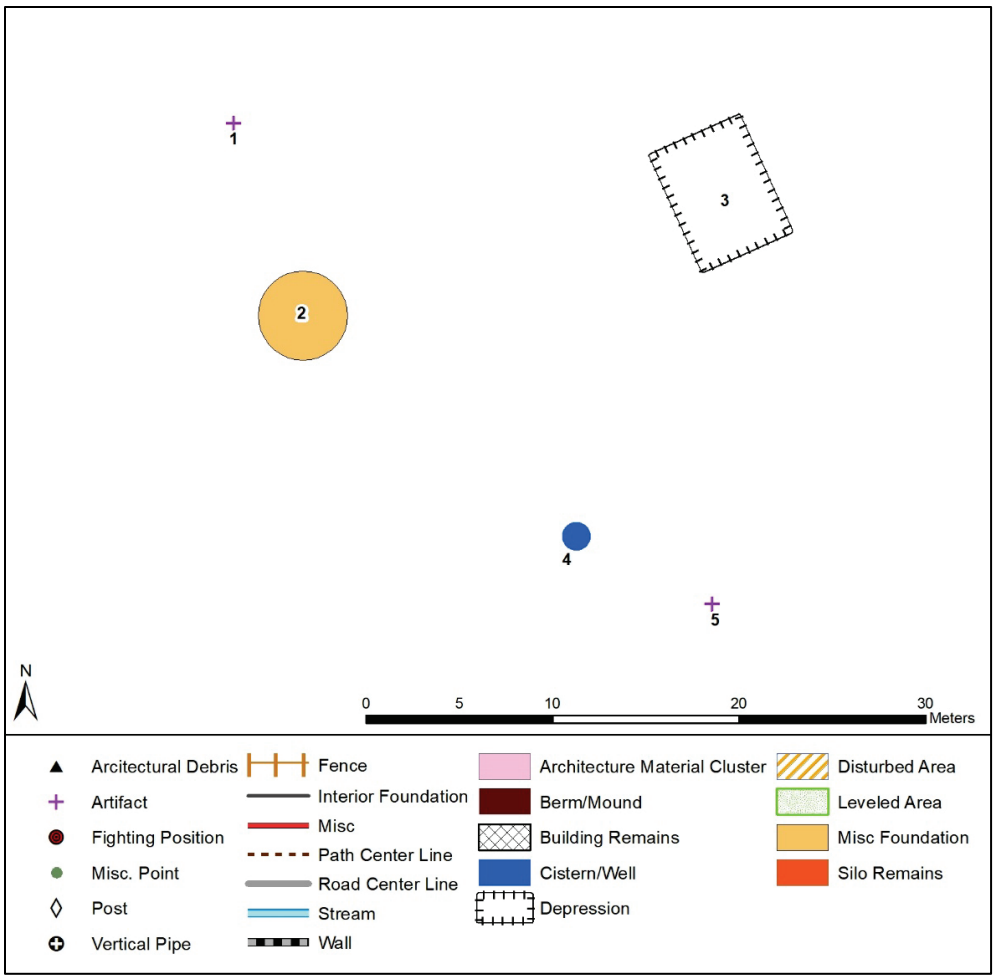
6.4.3 ERDC-CERL site visit

ERDC-CERL located 5 features including one possible structure, a well, two large artifacts and a debris cluster (Figure 42). The only significant difference between CERL's observations and the Phase 1 survey is that the debris cluster was observed northwest of the well instead of north of it.

The site feature descriptions are:

1. Artifact. Metal gas can
2. Misc. Feature. A cluster of debris/artifacts including pails, gas canister, glass fragments
3. Depression. 0.6 – 0.8 m below surrounding ground level. No foundation visible.
4. Well. Lined by stone. 5 courses of stone were visible below the ground surface.
5. Artifact. Metal washbasin.

Figure 42. Site 47MO704 site map.



Source: ERDC-CERL (2020).

6.4.4 Farmstead Eligibility Evaluation Form

Based on the information above the evaluation form is as follows.

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to 1850? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **UNKNOWN**
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a farmstead? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **YES**
4. Is there potential for intact buried deposits based on subsurface testing and/or evidence of ground disturbance or erosion? **UNKNOWN**
5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **YES**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **NO**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **NO**
2. Does this site possess multiple architectural features? **YES**
3. Is there a foundation larger than 10 x 10 ft and less than 30 x 30 ft on the site? **NO**
4. Is there evidence of small (wells, privy, shed, crib, etc.) architectural features? **YES**
5. Is there evidence of large (barn, stable, storehouse) architectural features? **NO**
6. Is there evidence of fence construction? **NO**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**
8. Is there evidence of landscape features (such as roads, paths, gardens, leveled areas) at the site? **NO**
9. Was the site occupied by a person of historical, regional, or local significance? **NO**

Based on the results of the eligibility evaluation form, site 47MO704 is **Not Eligible** for inclusion on the NRHP. With two "Yes" answers in Level I and two "Yes" answers in Level II this site does not meet the minimum requirements for inclusion. The only feature that has any architectural structure is the stone lined well. The rectangular depression is most likely the remains of a structure but with no structural elements or any other structure at the site, it is impossible to determine the function of the feature. Site layout and use patterns cannot be determined.

6.4.5 NRHP evaluation results

Field work was conducted in 2012 and reported in Dahlen and Wagner (2013). Twelve 1 x 2 m and one 1 x 1 m test units were excavated including inside the depression. The site map corresponds to the features mapped by CERL in 2019. One test unit located east of Feature 3 encountered a gravel layer immediately below the surface and was interpreted as a driveway. No evidence of the demolished barn was found at the site. The soil profiles in the test units did not indicate any significant site disturbance after abandonment.

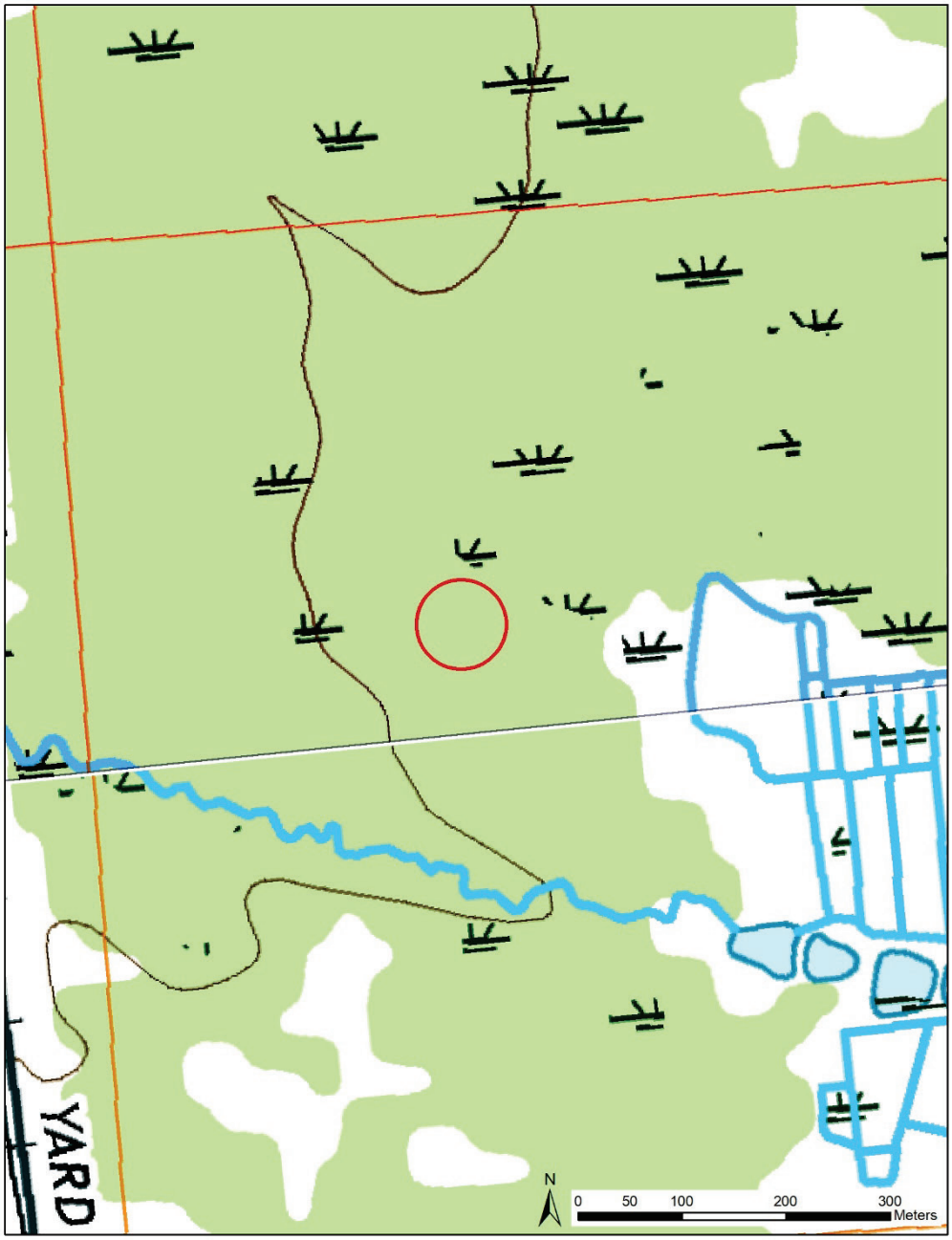
The artifact assemblage recovered from the site indicate a site occupation during the 1920s and 1930s. Artifact types include a wide variety of kitchen debris including seven types of glass, canning artifacts, porcelain and white ware shards and a decorative spoon. Architectural types include cut and wire nails, nuts, bolts, staples and window glass. Four clay marbles and one doll sized dish were also collected. Other artifacts include miscellaneous metal items, shot gun shell fragments, a metal end of a pencil, a silver pen clip, and some clothing fragments.

The 2013 report concluded that the site has excellent potential to inform on rural family life during the interwar period. This is due to the unblended nature of the artifacts due to the short period of occupation. The removal of the structures did not appear to have impacted the dense artifact assemblage. Site 47MO704 was determined **Eligible** for inclusion in the National Register.

6.5 Site 47MO848 field test

Site 47MO848 was first documented in 2012 (Dahlen and Wagner 2013) with the Phase II conducted in 2013 (Wagner et al. 2014 Vol II). The site sits in wet marshland a stream is located south of the site and cranberry bogs are to the east.

Figure 43. 47MO848 on 2018 USGS 7.5 quadrangle map.



Source: https://ngmdb.usgs.gov.

6.5.1 Original Phase I results

The site was originally described as consisting of a single depression (Dahlen and Wagner 2013). Five positive shovel test produced 29 bone fragments, 16 clear glass pieces, one bottle glass fragment, two pieces of brown glass, one porcelain fragment, one wire nail, one brick fragment and seven pieces of metal.

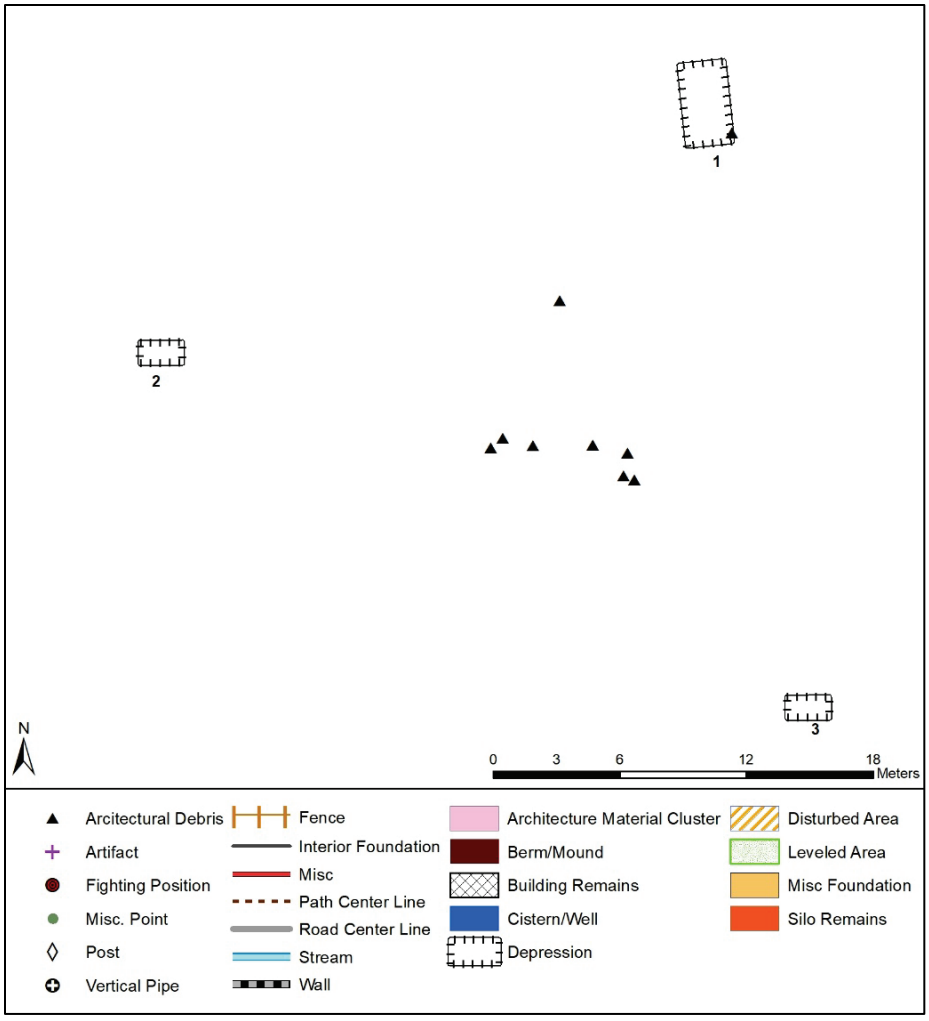
6.5.2 Historic documentation

Neither the Phase I nor the Phase II surveys included historic documentation of the site (Dahlen and Wagner 2013, Wagner et al. 2014 Vol II). The NRHP evaluation stated that historic deed and land records indicated that there were no known historic farmsteads in the site area (Wagner et al. 2014 Vol II).

6.5.3 ERDC-CERL site visit

The site was extremely overgrown with vegetation. The researchers were unable to see each other when separated by only 1-2 meters. Apart from Feature 1 the only evidence of the site was a scatter of brick and mortar pieces in the central portion of the site (Figure 44).

Figure 44. Site 47MO848 site map.



Source: ERDC-CERL (2020).

The site feature descriptions are:

1. Depression. Rectangular depression with some surviving brick walls. Depression is flooded with established water plants indicating that the water is a frequent or constant occurrence.
2. Depression. 2 x 1 m test unit. Marked with pin flags.
3. Depression. 2 x 1 m test unit. Marked with pin flags.

The site showed evidence of disturbance due to military activity. At least six fighting positions were observed within the site. There were a few small foot paths through the site demonstrating continued access to the region.

6.5.4 Farmstead Eligibility Evaluation Form

Based on the information above the evaluation form is as follows.

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to 1850? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **UNKNOWN**
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a farmstead? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **NO**
4. Is there potential for intact buried deposits based on subsurface testing and/or evidence of ground disturbance or erosion? **UNKNOWN**
5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **YES**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **NO**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **NO**
2. Does this site possess multiple architectural features? **NO**
3. Is there a foundation larger than 10 x 10 ft and less than 30 x 30 ft on the site? **NO**
4. Is there evidence of small (wells, privy, shed, crib, etc.) architectural features? **NO**
5. Is there evidence of large (barn, stable, storehouse) architectural features? **NO**
6. Is there evidence of fence construction? **NO**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**
8. Is there evidence of landscape features (such as roads, paths, gardens, leveled areas) at the site? **NO**
9. Was the site occupied by a person of historical, regional, or local significance? **NO**

Based on the results of the eligibility evaluation form, site 47MO848 is **Not Eligible** for inclusion on the NRHP. With one "Yes" answers in Level I and zero "Yes" answers in Level II this site does not meet the minimum requirements for inclusion. The only feature that is not associated with archaeological investigations is a single depression. There is the possibility that other features might be at the site but cannot be located due to the dense vegetation at the site.

6.5.5 NRHP evaluation results

The NRHP evaluation of 47MO848 was conducted in 2013 and reported in Wagner et al. 2014 vol. II. Aerial photographs and site descriptions indicate that there was much less vegetation and more visibility at the site during the 2013 survey. Their findings are summarized in this section.

Eight 1 x 2 meter test units were excavated across the site. Excavations revealed two circular brick features, one 5 m in diameter and the second was 6 x 4 m in diameter. Each brick feature surrounded a depression of 0.75 – 1 m in depth. Large amounts of historic debris were located surrounding and inside the features. Both features displayed evidence of burning. A third feature was located in proximity to the first brick circle. This feature was determined to be a latrine/privy dating to 1910.

Material recovered from the test units were dominated by military artifact types. These include:

- 58 0.30 caliber rifle cartridges including 21 that had a manufacture date between 1904 and 1908.
- 10.30-03/.30-06 caliber rifle cartridge stripper clips for the 1903 Springfield rifle.
- 68 military uniform and equipment buckles and clasps were found, all of which predated the M1910 design.
- 1 bronze cap insignia from the 28th Infantry Regiment dated to 1896.
- 1 bronze 1902 field uniform button were also found.
- 3 intact gun oil bottles that were manufactured between 1905 and 1910.
- 20 metal grommets from canvas tarps/tents or Pattern 1907 web gear and ammunition belts.
- 17 bone, metal and milk glass buttons.
- 125 bottle caps.
- 3035 bottle glass fragments.
- 6 intact bottles, possibly for alcohol.
- 1 intact medicine bottle.
- 134 can or can fragments.
- 4238 unidentified metal fragments.
- 169 whiteware, 40 stoneware and one earthenware ceramic sherds.
- 3715 cattle bone fragments. Butcher marks and bone type indicated that the remains represent sides of beef.

The site was described as moderately disturbed by military training. Soil profiles and surface damage indicate WWII era tank training may have damaged portions of the WWI features and created large ruts and push piles across the site. More recent fighting positions were also noted but not mapped in the 2013 report.

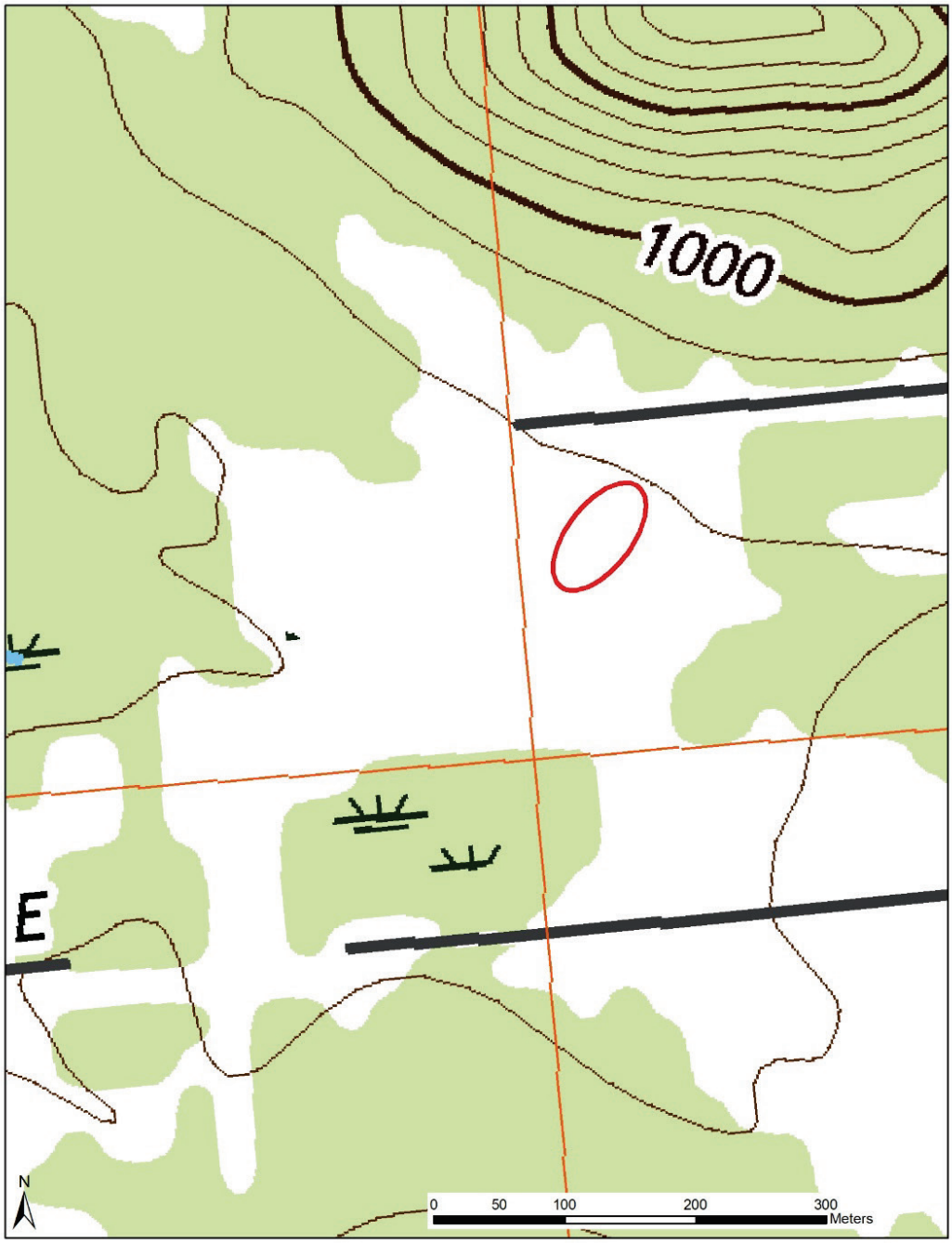
Site 47MO848 was believed to have been a farmstead but this conclusion demonstrated that it is a rare example of a pre-WWI military training location. The site maintained subsurface features despite the disturbance of later military training. This site was recommended **Eligible** for the NRHP under both criteria A and D.

6.6 Site 47MO897 field test

Site 47MO897 was first documented in 2013 (Dahlen and Wagner 2014) with the Phase II conducted in 2014 (Wagner et al. 2014 Vol II). The site

sits on level ground on the south side of a hill. Marshland was located southwest of the site (Figure 45).

Figure 45. 47MO897 on 2018 USGS 7.5 quadrangle map.



Source: https://ngmdb.usgs.gov.

6.6.1 Original Phase I results

The site was first identified in 2013 and reported in Dahlen and Wagner (2014). Identified features included a stone two-room foundation measuring 11 x 5 m, a depression that was described as a possible privy, a patch of lilacs, eight metal buckets, a metal can, and an enamelware pot. Twenty positive shovel tests were excavated and produced wire nails, fence staples, bolts, brick fragments, can fragments, whiteware, yellowware, stoneware, porcelain, milk glass, clear and green bottle glass and window glass.

A 14-ft tall, 12 sided conical metal structure on a concrete base was also observed. This structure had gas or electrical lines at the top and a hatch on the south side. It was hypothesized that this feature was related to decontamination studies that were conducted on the installation in the 1960s.

6.6.2 Historic documentation

Archival research for site 47MO897 was included in the NRHP evaluation report and is summarized here (Woods et al. 2015b).

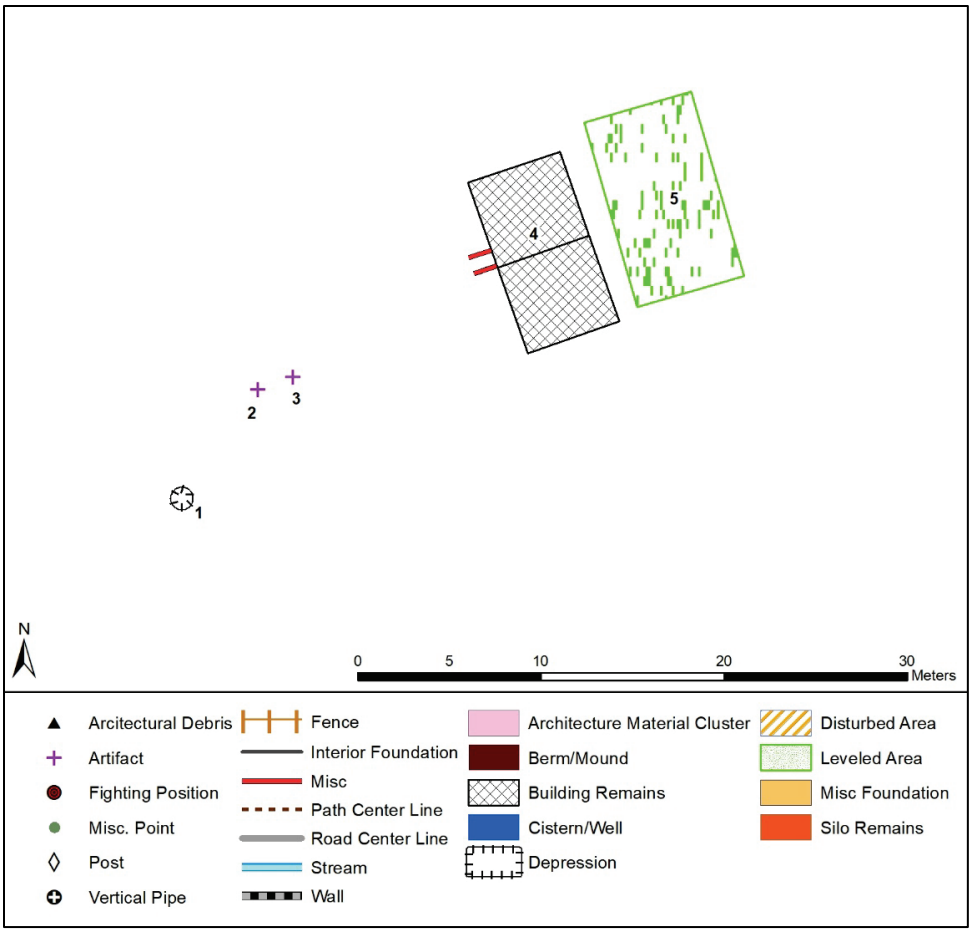
The land that 47MO897 sits upon first passed into private hands in 1856 when it was granted through a Military Land Bounty to May Williams who assigned it to Patrick and Thomas Brennan. The list of purchasers for the property include John Perkins (1863), Adaline Perkins (1865), Henry Clark (1865), Monroe County to L. Johnson (1873), S.D. Hollister (1874), Monroe County (1882), Goerge C. Woolsey (1891), Albert Laxton (1897), Monroe County to Russell Vancil (1947), Jane Vancil (1961), Erva Vancil (1962) and the U.S. Army (1964).

The first improvement to the property recorded in the tax records occurred in 1901 when the property value increased from $50 to $175. Another large improvement period occurred in 1920 when the improvement valuation increased from $150 to $500. By 1935, however, the value of the property had decreased to $90.00 and no improvements were noted, which may indicate that the structure built on the site in 1901 was no longer there. Plat maps do not note the presence of buildings at the site at any time.

6.6.3 ERDC-CERL site visit

The site was heavily overgrown with vegetation and there was ground visibility (Figure 46). No artifacts other than large items were observed due to the lack of visibility.

Figure 46. Site 47M0897 site map.



Source: ERDC-CERL (2020).

The site feature descriptions are:

1. Depression. Less than 0.5m in depth.
2. Artifact. Coiled barbed wire.
3. Artifact. Wooden pallet or frame made of small logs.
4. Building Remains. Southern half of the structure consists of a soil berm with some rough stones of the foundation protruding from the soil. The northern half of the structure is a stone lined cellar 1.5 – 2 m deep. The stairs to access the cellar are exterior to the foundation marked on the map by misc. lines.
5. Leveled area. Large leveled area with no trees and little underbrush.

Feature 4 matched the description of the structure observed in the Phase I report (Dahlen and Wagner 2014 Vol II) (Figure 47). Feature 3 may represent the remains of a small log structure or be the collapsed remains of a movable item (Figure 48). The conical structure described in the Phase I survey was not relocated. The Feature 1 depression had no visible stone or concrete elements. The nature of this feature is unknown but could possibly be a privy, a filled in well or cistern, a collapsed cellar, or the remains of a small structure. Due to the uncertain nature of features 1 and 3, the only verifiable structure on the site is Feature 4.

Figure 47. 47MO897 Feature 4. View from northeast to southwest.



Source: ERDC-CERL (2019).

Figure 48. 47MO897 Feature 3. View from east towards the west.



Source: ERDC-CERL (2019).

6.6.4 Farmstead Eligibility Evaluation Form

Based on the information above the evaluation form is as follows.

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to 1850? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **YES**
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a farmstead? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **YES**
4. Is there potential for intact buried deposits based on subsurface testing and/or evidence of ground disturbance or erosion? **YES**
5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **YES**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **NO**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **NO**
2. Does this site possess multiple architectural features? **UNKNOWN**.
3. Is there a foundation larger than 10 x 10 ft and less than 30 x 30 ft on the site? **YES**
4. Is there evidence of small (wells, privy, shed, crib, etc.) architectural features? **UNKNOWN**
5. Is there evidence of large (barn, stable, storehouse) architectural features? **NO**
6. Is there evidence of fence construction? **NO**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**
8. Is there evidence of landscape features (such as roads, paths, gardens, leveled areas) at the site? **YES**
9. Was the site occupied by a person of historical, regional, or local significance? **NO**

Based on the results of the eligibility evaluation form, site 47MO848 is **Not Eligible** for inclusion on the NRHP. With four "Yes" answers in Level I and two "Yes" answers in Level II this site does not meet the minimum requirements for inclusion. The presence of a leveled area with discernibly different vegetation as well as a log frame or pallet at the site would indicate that portions of the site east and west of the main feature (4) are not significantly undisturbed. The absence of a large conical metal structure, however, indicates that there has been some site disturbance since the Phase I report. The indeterminate nature of features 1 and 3 mean that only one structure could be identified at the site. As a result the information on construction and land use patterns is very limited.

6.6.5 NRHP evaluation results

Field work was conducted in 2014 and reported in Woods et al. (2015b). The findings in that report are summarized here.

Fourteen 1 x 2 m test units were excavated at the site. Artifacts were recovered from all units with the majority of artifacts (86.8%) recovered from two units dug within Feature 4. A total of 619 pieces of ceramic were recovered including Albany slip stoneware, Bristol slip stoneware, salt glazed stoneware, terracotta, flow blue decorated whiteware, transfer print white-

ware, and undecorated whiteware. 723 glass shards were recovered including bottle glass (clear, amethyst, aqua, brown, pale green and olive green), milk glass, canning jars, lamp chimney glass and pharmaceutical bottle fragments. A total of 1914 architectural artifacts were collected including bolts and nuts, brick and mortar fragments, washers, window glass, cut nails and wire nails. The ratio of cut to wire nails was 1:863. Clothing items were 121 in number and consisted of metal and glass buttons, eyelets, a buckle, a snap, a suspender clip and 109 pieces of shoe leather. Miscellaneous artifact types included a kaolin pipe bowl and stem fragments, clay and glass marbles, .22 and .38 cartridges, safety pins, and more than 1377 pieces of metal debris that could be associated with farming, building or household activities. Dateable artifacts, including a Ford Model T part, were associated with the first 2 decades of the 20th century. The artifact types indicated typical framing and residential activities at the site.

No subsurface features were uncovered in the test units. Evidence from the units excavated within Feature 4 indicates to the structure having bunt down but it is unclear when the fire occurred. Plow marks were visible in a few of the units and a set of vehicle ruts were observed on the east side of the site. No other evidence of significant site disturbance was seen.

The site was interpreted as being a historic farmstead that dated to the beginning of the 20th century and may have only been occupied for a couple of decades. It is probable that the site occupation represents only one or possibly two family occupations. The site was determined as **Not Eligible** for the NRHP.

6.7 Site 47MO903 field test

Site 47MO903 was first identified in 2013 (Dahlen and Wagner 2014) and evaluated for the NRHP in 2015 (Dahlen and Wagner 2014 Vol I). An active paved road is on the south side of the site and wetlands are located immediately to the north of the site (Figure 49). The site sits on flat ground on the eastern side of a small lake. This lake is artificial, dating to the late 1950s. The banks of the lake were mowed but the site area was covered in very dense vegetation. Researchers could not see each other when standing only 2 meters apart. As a result of poor visibility photographs were not taken at this site.

Figure 49. 47MO903 on 2018 USGS 7.5 quadrangle map.



Source: https://ngmdb.usgs.gov.

6.7.1 Original Phase I results

The site was first identified in 2013 and reported in Dahlen and Wagner (2014). Two circular depressions, 7 m and 1.5 m in diameter, were ob-

served. Nineteen positive shovel tests produced a total of 76 artifacts including window glass, clear and brown bottle glass, whiteware, brick, wire and cut nails, rubber and metal wire.

6.7.2 Historic documentation

Archival research into the site property was conducted as part of the NRHP evaluation (Woods et al. 2015a). The findings are summarized here.

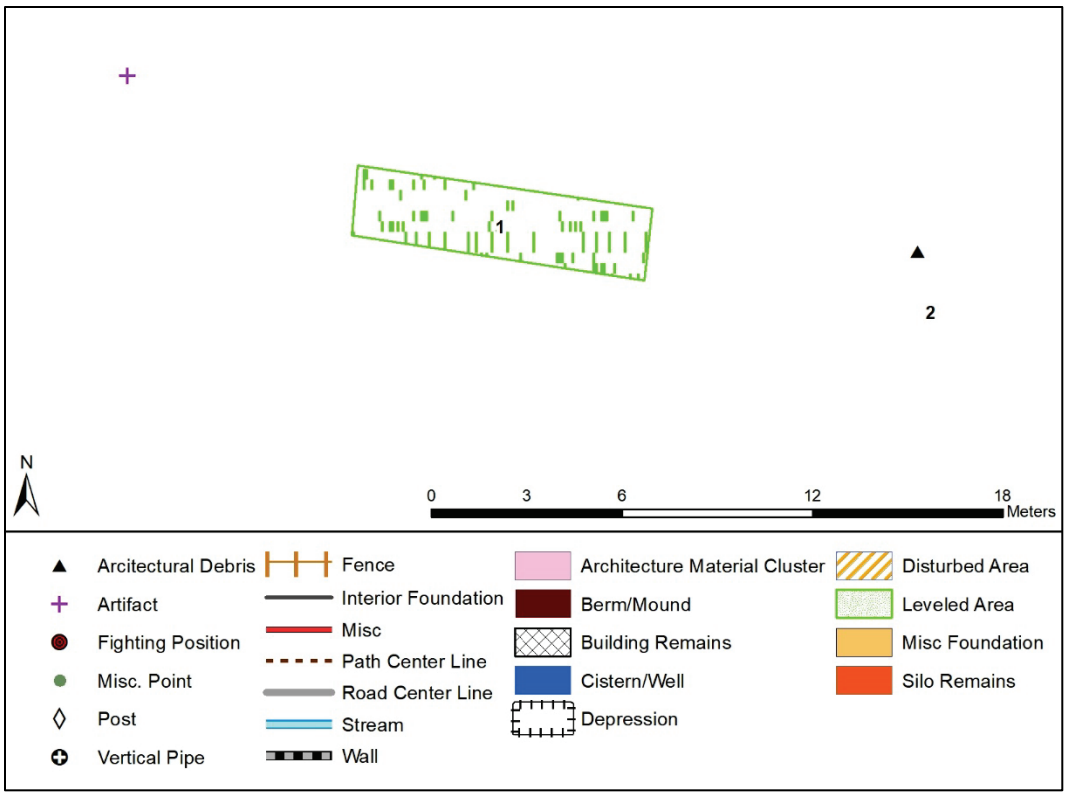
Tax and deed records for the site date back to 1854. The first recorded owner was Amzi Babbitt who purchased the land in 1854 from the government for $200. Two years later he sold the property to T. A. Whiting for $800 who then sold it to A. M. Whiting for $1000 in 1857. Such a significant increase in value over so short a period of time indicates that the property was being improved. The county seized the property for tax delinquency in 1871 and promptly sold it to E. R. Jones. In 1878 Jones sold the portion of the land that contains the site to John Smith who then sold it to H.H Riley in 1898. Tax records show addition improvements to the property from 1908-1910. The site was sold to Edward Hatch in 1917.

Tax records from 1915-1920 report that the site was being improved upon by a man named Ransom Bass. Edward Hatches' will, which conferred ownership of the site to his daughter Maude Heilway in 1927, referred to the site as the "Bass Farm." This indicates that the farm was being rented or leased by a tenant farmer, a common practice in the region. Ransom Bass's father was multiracial (African-American and Eastern Cherokee) and an original settler of one of the rural 19th century African-American communities in Cheyenne Valley. Ranson Bass's married a white woman, Myrtle Post, in 1898 before moving to Monroe County sometime between 1910 and 1915. Maude Heilway sold the site to the government in 1936. It is unclear when the Bass tenancy ended.

6.7.3 ERDC-CERL site visit

Site exploration and mapping was significantly hampered by dense vegetation. Only two landscape features could be identified (Figure 50).

Figure 50. Site 47M0903.



Source: ERDC-CERL (2020).

The site feature descriptions are:

1. Leveled Area. Rectangular leveled area with no trees.
2. Architecture Debris. Pile of concrete rubble. Vegetation growth prevents complete examination or determination of size.

The level area (Feature 1) had no visible architectural elements. As the site was relatively flat the key element of this feature was the lack of any undergrowth or trees in an otherwise densely vegetated site. The nature of the concrete rubble (Feature 2) could not be fully discerned due to the presence of vegetation, which impeded access. Some of the concrete was light brown with large amounts of course aggregate. Other pieces were gray with a smoothed face. It was mapped as a point and not a polygon because it was not possible to access more than one side of the pile for accurate mapping. It is unclear if these features are related to the farmstead documented at the site or if these are disturbances related to the construction of the lake. The mapped artifacts represent a very small concentration of clear glass bottle and can fragments including a rectangular tobacco tin and a Pabst Blue Ribbon beer can with a pull tab opening.

6.7.4 Farmstead Eligibility Evaluation Form

Based on the information above the evaluation form is as follows.

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to 1850? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **UNKNOWN**
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a farmstead? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **YES**
4. Is there potential for intact buried deposits based on subsurface testing and/or evidence of ground disturbance or erosion? **UNKNOWN**
5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **NO**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **NO**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **NO**
2. Does this site possess multiple architectural features? **NO**
3. Is there a foundation larger than 10 x 10 ft and less than 30 x 30 ft on the site? **NO**
4. Is there evidence of small (wells, privy, shed, crib, etc.) architectural features? **NO**
5. Is there evidence of large (barn, stable, storehouse) architectural features? **NO**
6. Is there evidence of fence construction? **NO**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**
8. Is there evidence of landscape features (such as roads, paths, gardens, leveled areas) at the site? **NO**

9. Was the site occupied by a person of historical, regional, or local significance? **NO**

Based on the results of the eligibility evaluation form, site 47MO848 is **Not Eligible** for inclusion on the NRHP. With one "Yes" answers in Level I and zero "Yes" answers in Level II this site does not meet the minimum requirements for inclusion. The survey of the site was hampered by the abundance of vegetation and it is possible that additional features could be located if the site were cleared. There are, however, no surviving architectural elements that could be found and a strong probability that the site was impacted by the construction of the nearby lake.

6.7.5 NRHP evaluation results

Site 47MO903 was evaluated for the NRHP in 2015 (Woods et al. 2015a). The findings of that report are summarized here.

Twelve 1 x 2 m test units were excavated at the site. One unit showed evidence of disturbance that was interpreted as related to the installation of a communication cable nearby. Two units had subsurface features in them. One feature was identified at a depth of 90 cmbd by the presence of a pig mandible at the top of the subsoil layer. After 10 more centimeters was excavated the feature was terminated. The second feature was located at the base of one of the unit walls and was excavated to a depth of 110 cmbd and resulted in the discovery of articulated vertebrae of a large draft horse. The feature was interpreted as a horse burial. The majority of the burial was located outside of the test unit and left in-situ.

Three hundred and ninety-three artifacts were recovered from the test units. A total of 50 ceramic pieces were found including ironstone, Albany and Bristol slipped stoneware, salt glazed stoneware, whiteware, hand painted polychrome whiteware, and transfer print whiteware. One hundred glass shards were recovered including amethyst, aqua, brown, blue, milk and clear glass bottle fragments. Other kitchen items include a cast iron stove part, a metal fork, a metal serving spoon and a blue speckled enamelware bowl. Architectural debris totaled 64 items and included window glass, wire and cut nails, a metal barn door brace, washers, bolts, nuts, mortar and brick fragments. Other items of note include a .22 caliber rim fire cartridge dated to 1910-1927, a horse-drawn buggy axle, a large horse bit, a 1945 penny, a 1961 penny and one metal steam shovel pocket watch fob with leather strap and metal bucket. This fob was embossed

with a steam shovel, dump truck and the words “Bucyrus Erie”. The Bucyrus Erie company name was in use between 1927 and 1996 with watch fobs of this style popular prior to WWII. The dateable artifacts indicate a site occupation in the early 20th century.

Prehistoric artifacts were also recovered from the excavations that indicate Late Woodland and Oneota occupation. These findings will not be discussed here.

The two depressions identified in the Phase I survey were relocated. Architectural remains were not found but architectural debris was located in units placed in one of the depressions. Several military grenade timers were recovered from one of those units with a dark stain under the timers indicating that the grenades were detonated in the center of one of the mapped depressions. A recently excavated irrigation trench was noted 25 meters northwest of the site and artifacts were noted in the trench backdirt. One of these artifacts was a Colgate tin dating to between 1917 and 1927.

Despite the significant amount of disturbance and the lack of architectural remains the site was determined **Eligible** for the NRHP. The race of Ransom Bass and his family were considered highly significant in this determination as well as the presence of two prehistoric components.

6.8 Summary of field tests, Fort McCoy, WI

Six sites at Fort McCoy were evaluated by CERL for this report. Site evaluations were conducted blind with the researcher unaware of the original NRHP evaluation determinations. After the site evaluation was complete the results were compared to the original determinations (Table 1).

Table 2. Summary of NRHP Eligibility Findings for Fort McCoy, Wisconsin.

Site	NRHP determination based on traditional methodology	NRHP determination based upon CERL methodology
47M0286	Eligible	Eligible
47M0465	Not Eligible	Eligible
47M0704	Eligible	Not Eligible
47M0848	Eligible	Not Eligible
47M0897	Not Eligible	Not Eligible
47M0903	Eligible	Not Eligible

Of the six sites evaluated there is agreement on the findings for only two of the sites. Two sites, however, are problematic for consideration. The first is site 47MO848. The Phase I survey identified this as a possible farmstead site but this site instead was not a farm but a WWI military site. The site had no historic documentation that would indicate that a farmstead was located in that area. In a region where such documentation is common, that fact should have indicated that the application of the farmstead methodology may not be appropriate to that site. This example highlights that the farmstead methodology is applicable ONLY to farmsteads and not to other historic site types.

The second problematic site is 47MO903. This site had no surviving features that could be identified as structures. The site also had evidence of multiple site disturbance events. The site, however, was not only a farmstead site but also had two prehistoric components. In the site evaluation the presence of these components figures significantly into the determination. The only historic site element that was listed in the NRHP determination was the racial makeup of one of the historic occupants of the site. It is unclear how the site would have been evaluated if the historic component were the only one present.

The field testing of the farmstead methodology at Fort McCoy highlighted a key issue in the deployment of this method. CERL investigations of the sites was significantly impeded by the vegetation. This methodology is highly dependent on being able to see and map all surface and landscape features at the sites as well as evidence of site disturbance. The CERL researchers frequently found architectural remains at the McCoy sites by tripping over them. At most sites features that were reported in the Phase I survey could not be relocated. Conversations with the archaeologists at Fort McCoy indicate that most sites were discovered though systematic shovel testing and not pedestrian survey. At other installations, the visibility issues could be solved by conducing the surveys in late fall, winter or early spring when the undergrowth is not present but the ground is clear of snow. In Wisconsin, however, this is not a viable option due to the extremely small window between snow pack and rapid vegetation growth.

A second issue that was highlighted was the importance at Fort McCoy of the racial or ethnic background of farmstead occupants in the determination of eligibility of the site. It was repeatedly mentioned for three sites (47MO286, 47MO465 and 47MO903) and was considered a key factor in

the determination of eligibility of 47MO465 and a principle factor for site 47MO903. For installations where the ethnicity or race of the owners or occupants is so significant it would be useful to add a question to the Level II questions to highlight that aspect of site evaluation.

Finally, two sites stand out as illustrations of why the farmstead methodology presented here is so useful for site evaluation and that relates to the issue of the lack of standardization of NRHP evaluation results. These sites were 47Mo704 and 47MO897. Both sites had evidence of only one building – 47MO704 was a depression with no surviving foundation while 47MO897 had a stone lined cellar. At both sites these were interpreted as dwelling structures. 47MO704 had a well and 47MO897 had a depression that could have been a filled in well or privy. Both had artifact assemblages and historic documentation indicating a brief period of occupation in the early 20th century. The sites were evaluated 2 years apart by two different archaeologists. 47MO704 was deemed Eligible due to the short occupation period and 47MO897 was deemed Not Eligible due to the short occupation period. This highlights the subjectivity of the traditional NRHP evaluation method.

7 Field Test Results: Barry M Goldwater Range, AZ

Field work was conducted in June 2019 by Carey Baxter and Susan Enscore of ERDC-CERL. Principle support at Barry M. Goldwater Range (BMGR) was provided by Adrianne Rankin, Archaeologist, 56th Range Management Office, Luke Air Force Base, Arizona.

Six sites were tested in this effort at BMGR. These are AZ Y:6:24, AZ Y:8:196, AZ Z:5:10, AZ Z:6:81, AZ Z:6:197 and BMGR-00-B-09. Visibility was excellent with a high number of visible artifacts on the surface. Mapping efforts were focused on discrete artifact clusters, intact artifacts and diagnostic artifacts. Artifacts related to military training (such as bullet casings) were not mapped as they were ejected from airplanes and did not inform onsite disturbance activities. Based upon the regional context information (see summary below), it was determined that the Ranching Site Evaluation form was the appropriate evaluation form to be used at this installation.

7.1 Determination of typical site features

BMGR is situated within Region 5 – the Southwest. Historic contexts specific to BMGR can be found in Lyon (2000), Tagg and Blake (2012), and Thompson (2019).

Several general trends can be gleaned from these, and other reports that inform on what is a typical ranche for the region. The first documented account of cattle husbandry was in 1690 in the area south of Tucson (Thompson 2019) and for the next 160 years stayed primarily in that part of the region. Ranching in the immediate area of BMGR during this period was small in scale and dominated by the Tohono O'odham peoples. These ranches, however, are rare and would be considered atypical site types under the CERL methodology. The 1854 Gadsden Purchase transferred control of the region to the United States. Open-range ranching practices dominated the region. This consisted of ranchers acquiring patented lander under the 1862 Homestead Act, the 1877 Desert Land Act and the 1916 Stock Raising Homestead Act. These land grants would include a reliable water source and generally become the headquarters of the ranching operations. The herds would then be allowed to forage freely, untended, on surrounding open-range lands and rounded up only for branding and

shipping mature cattle to market. The intensity of ranching activities increased drastically after 1880 with the arrival of the Southern Pacific Railroad, including a station at Gila Bend. By 1893, however, overgrazing and 3 years of severe drought had damaged the rangelands to the extent that this model was no longer possible. Instead ranching practices changed to focusing on breeding superior varieties of cattle and shipping out young cattle to feedlots for fattening. The 1934 Taylor Grazing Act closed the open-range era by halting the sale of public domain lands and instituting a process of regulation of range lands through the issuing of grazing permits and fees. Ranching activities were temporarily halted during WWII while the area was used as a gunnery range.

The key features at ranching sites in BMGR is water sources or water management features. This includes wells for drawing underground water to the surface or stock tanks (concrete or metal tanks or earthen reservoirs) that would collect and hold the sporadic rain runoff. Troughs, often of concrete, were used as drinking stations but could also be used for supplemental feeding during drought. Corrals, stock pens, stock gates and chutes were used to contain and move the cattle during branding (in the summer) and for transportation of yearlings to the market in the fall. These cattle management systems were located at water sources since the cattle would naturally congregate at these locations and the water was needed for the cow ponies and cowboys who would occupy the site for a few weeks at a time for the roundup. As they were not intended for permanent occupation, line camps often include very primitive structures and were often constructed using local or salvaged materials. Fencing is also common with barbed wire fencing occurring throughout the range. Corrals at roundup sites were often completely wood in construction to withstand the rough treatment from confined cattle trying to break out. Roundup sites would also require access to transportation networks to facilitate the movement of stock to market.

Copper mining began in the Ajo hills (immediately south of BMGR) in 1854 with the first shipments of ore being sent out by 1855 (Thompson 2019). Ores were typically moved by wagon, significantly depleted the profit margin making small mines unlikely. The establishment of the railroads insured that the mining operations in the vicinity could continue. Mining continued in the regions, through periods of economic prosperity and recession/depression until the mines permanently closed in 1984.

There is no evidence of silver or gold mining in the region of BMGR. Features we would expect to see associated with sites that had mining activities include water sources (excluding stock tanks), mine shafts, easy access to transportation networks, waste piles, mining equipment, and residential structures or camps.

BMGR is located in a portion of the western Sonoran Desert with excellent ground surface visibility and extremely hard desert pavement soil. Personal communication with Adrianne Rankin indicates that any digging, even with mechanized equipment such as backhoes is extremely difficult. No subsurface testing was conducted as part of the original NRHP evaluations and sites are determined by Arizona State Museum criteria including at least one of the following (Tagg and Blake 2012, Thurtle 2001, Vanderpot et al. 2004):

- 30 or more artifacts from a single material class within a 15 m radius (does not include multiple items from a single broken artifact),
- 20 or more artifacts from at least two material classes within a 15 m radius,
- 1 or more archaeological features in association with artifacts,
- 2 or more associated features without artifacts.

Level I Question 4 typically asks for the potential for subsurface features. As this is not a site evaluation criteria at BMGR the question has been changed to inquire into 15m radius artifact clusters.

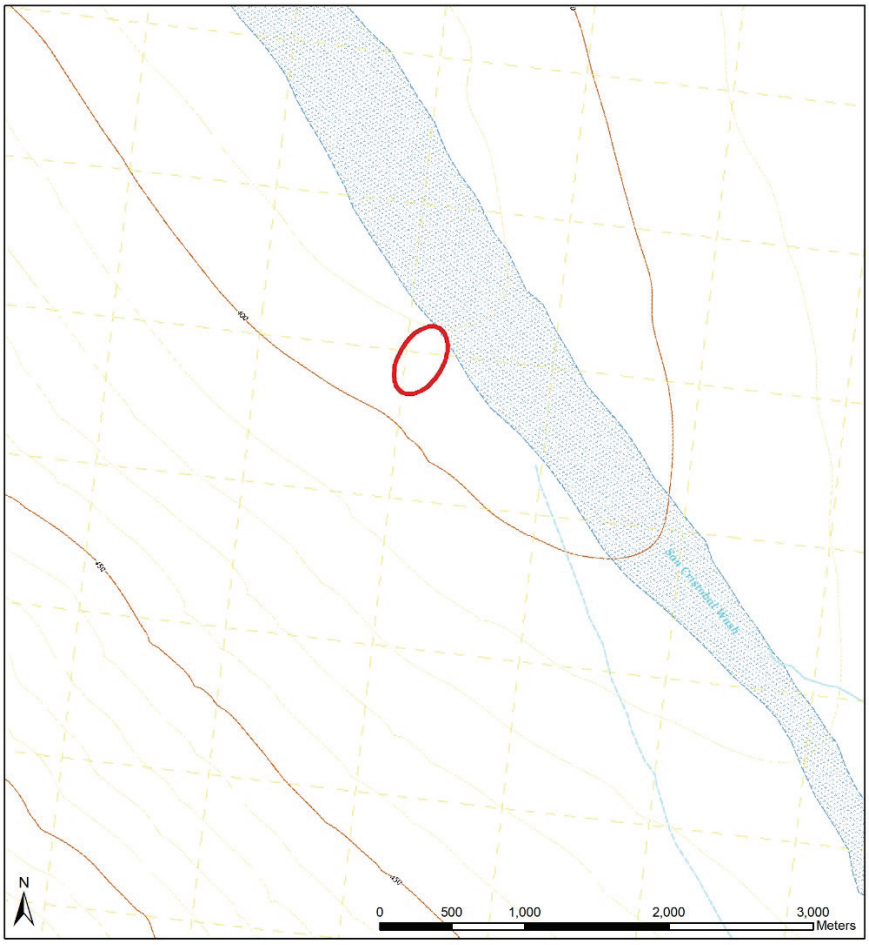
7.2 Site AZ Y:6:24 field test

Site AZ Y:6:24 sits on relatively flat ground (Figure 51). An active NW-SE oriented military road is on the south west portion of the site. The site is cut through the middle by a drainage wash that is also NW-SE oriented. The site was originally reported by Tetra Tech (1986) and Slaughter et. al. (2000).

7.2.1 Original Phase I results

The original survey, conducted in 1986 by Tetra Tech (1986) found tow artifact concentrations separated by approximately 200 ft. The southwestern concentration contained the remains of a well on a concrete pad and the remains of a fencing that was interpreted as a coral. The northeastern concentration contained the remains of a tent platform and domestic debris.

Figure 51. Site AZ Y:6:24 on 2018 USGS 7.5 quadrangle map.



Source: https://ngmdb.usgs.gov.

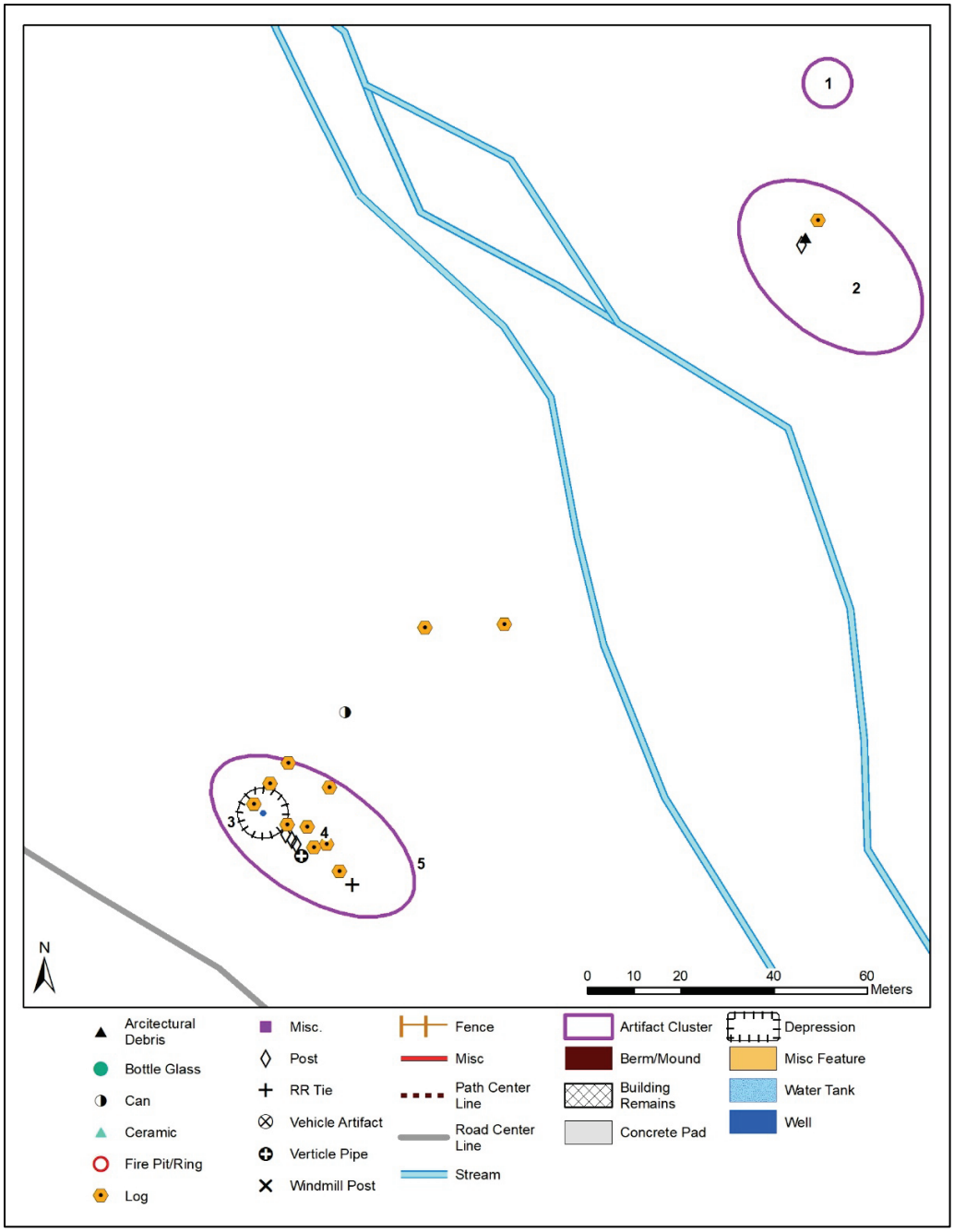
7.2.2 Historic documentation

Historic documentation was reported as part of the 2000 NRHP evaluation (Slaughter et. al. 2000). The well was first recorded on the USGS maps of the region in 1927. A federal geological water supply survey conducted in 1917 described the well as being 47 ft deep, in the process of being deepened and using a windmill for power.

7.2.3 ERDC-CERL site visit

ERDC-CERL researchers identified three distinct artifact scatters on the site, a well and significant amount of timber logs on the ground and a small number of standing posts (Figure 52).

Figure 52. Site map of AZ Y:6:24



Source: ERDC-CERL (2020).

The site feature descriptions are:

1. Artifact Cluster. Tight cluster of small rectangular cans. These cans may be tobacco tins.
2. Artifact Cluster. Large cluster of artifacts that include glass, white ware, cans, stove parts and a long section of threaded pipe approximately 1" in diameter. A large log halfway buried in the ground as well bricks indicate the possibility of a small structure.
3. Well and Depression. This is the remains of a filled in well in the center of a 10m diameter depression. A large log near the center of the depression indicated that there may have been some structure associated with the well.
4. Logs. A series of logs and posts most of the logs on the ground are natural in shape and a variety of sizes. Standing posts are square shaped
5. Artifact Cluster. The scatter of artifact in this area is dominated by nails, barbed wire fragments, cans and a large number of brass shell casing.

The site is clearly divided into two parts and the lack of any significant artifact scatter between the two areas indicate that this was a function of the site's original usage and not due to disturbance from the drainage wash that crosses the site. The northern artifact clusters are dominated by architectural and domestic debris indicate that this portion of the site was used as a line camp (Figure 53, Figure 54). Cans at the site were primarily tin or steel and were opened with can openers or church keys. A small number of cans were pull tab openings. The wash is very shallow (less than 10 cm in depth). The southern area is interpreted as a stock corral or pen and well (Figure 55). There was no evidence of a windmill that was mentioned in the historical accounts and it appears that the well has either been silted in or filled in. The timber present at the site is sufficient for post uprights but the horizontal elements were likely of barbed wire (Figure 56). It is unclear if the brass shell casings were associated with the historic site occupation or later military training.

Figure 53. Site AZ Y:6:24 Feature 1. View from south to north.



Source: ERDC-CERL (2019).

Figure 54. Site AZ Y:6:24 Feature 2. View from west to east.



Source: ERDC-CERL (2019).

Figure 55. AZ Y:6:24 Feature 4. View from west to east.



Source: ERDC-CERL (2019).

Figure 56. AZ Y:6:24 Feature 4 in front, Feature 3 behind and to the right. View from SE towards NW.



Source: ERDC-CERL (2019).

7.2.4 Ranch Eligibility Evaluation Form

Based on the information above the evaluation form is as follows.

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to the 1850s? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **YES**
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a ranch? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **YES**
4. Are there multiple 15 m. radius artifact clusters located on the site? **YES**
5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **NO**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **NO**.

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **NO**
2. Does this site possess a source of water (dam ponds, well, cistern, stock tank, spring, etc.)? **YES**
3. Is there a foundation larger than 10 x 10 ft. and less than 30 x 30 ft. on the site? (Note: structures that fall outside of these ranges are likely outbuildings.) **NO**
4. Is there evidence of small (wells, privy, shed, etc.) or large (stables, barns, bunk houses) architectural features? **NO**
5. Is there evidence of corrals, stock chutes and/or stock dip ponds? **YES**
6. Is there evidence of camping (firepits or rings, tent platforms, discrete clusters of food containers or personal items)? **YES**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**

8. Is there evidence of landscape features (such as roads, paths, gardens, regular shaped depressions, berms, etc.) at the site? Non-architectural landscape features provide significant information about site activity patterns, layout and usage. **NO**
9. Was the site occupied by a person of historical, regional, or local significance? **NO**

Based on the results of the eligibility evaluation form, site AZ Y:6:24 is **Not Eligible** for inclusion on the NRHP. With three "Yes" answers in Level I and three "Yes" answers in Level II this site does not have the capability to provide a wide range of information about ranching activities in the region. The only landscape feature at the site was a single depression around the remains of a well. The windmill that was document historically has been removed and it is unclear if the depression was part of the function of the well or a result of the dismantling of the well apparatus. There is clear evidence of distinct site activity areas but each area is ephemeral that its exact nature cannot be determined. We cannot tell if the camp area was tents or small buildings and the nature or layout of the corral is also unclear.

7.2.5 NRHP evaluation results

The original NRHP evaluation was conducted in 2000 and reported the same year (Slaughter et. al. 2000). The findings of their survey are very similar to the ERDC-CERL results with the principle difference that an additional feature was located in CERL's Feature 2. This consisted of two parallel horizontal beams forming a slightly raised rectangular area that was interpreted as a tent platform.

Two 25 x 25 meter controlled surface observation areas were documented. The first was at CERL's Feature 2. Documented artifacts include cans (sanitary, soldered meat, milk, tobacco, sardine and rectangular), machine-finished bottles (clear glass, aqua glass, 1 7-up bottle, and one medicine bottle), barrel hops stove parts, wire nails and miscellaneous metal. The second surface observation area documented artifacts that consisted of pieces of wire, nails, posts, lumber, milled lumber and a small number of beverage cans.

The artifact assemblage indicates a possible date range for the site of 1915-1930 but the site was interpreted as being occupied only for a few years due to the lack of structures or structural remains at the site. The 2000 evaluation also suggested that the site had been dismantled and that many of the artifact were recycled elsewhere.

The site was recommended **Eligible** for the NRHP under criteria A because the site was associated with ranching, which was a brad pattern of the regional history. It was also recommended under criteria D as being able to inform on 20th century ranching specifically concerning patterns related to technology and economics.

7.3 Site AZ Y:8:196 field test

Site AZ Y:8:196 sits on flat land with no surface water or washes nearby (Figure 57). One hundred meters to the east of the site is an active military road. Passing through the southern portion of the site is a small track that shows signs of continued but very sporadic or light usage. Approximately 550 m. west of the site are a series of small hills or prominences, at least one of which show signs of having been used by the military as a target zone. The NRHP evaluation was reported in Lyon (2000).

7.3.1 Original Phase I results

No documentation of a Phase I survey was provided by BMGR and the NRHP evaluation does not reference any previous work at the site (Lyon 2000).

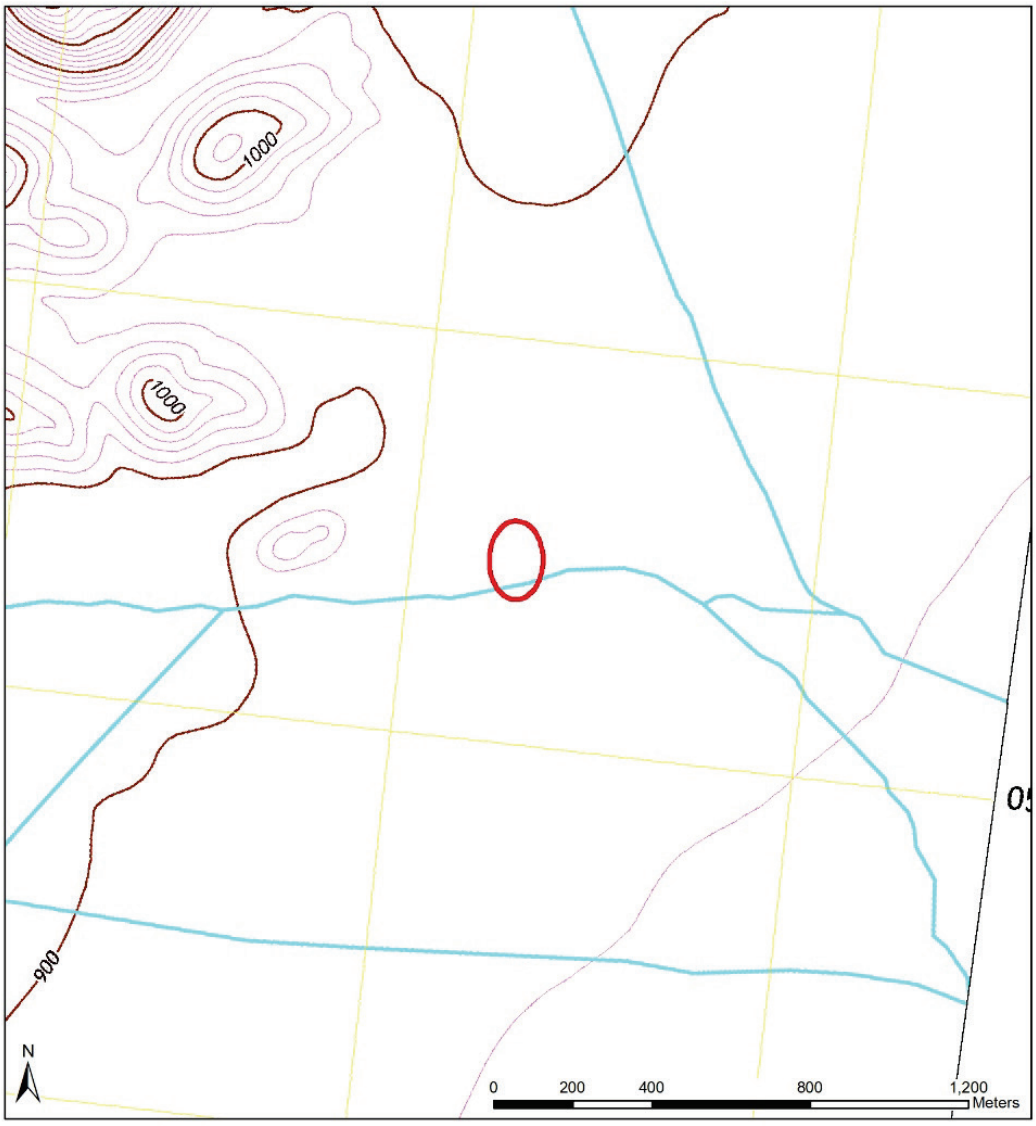
7.3.2 Historic documentation

The only historic documentation of the site noted in the NRHP evaluation is that the site is listed as present in a 1917 federal geological water supply survey (Lyon 2000).

7.3.3 ERDC-CERL site visit

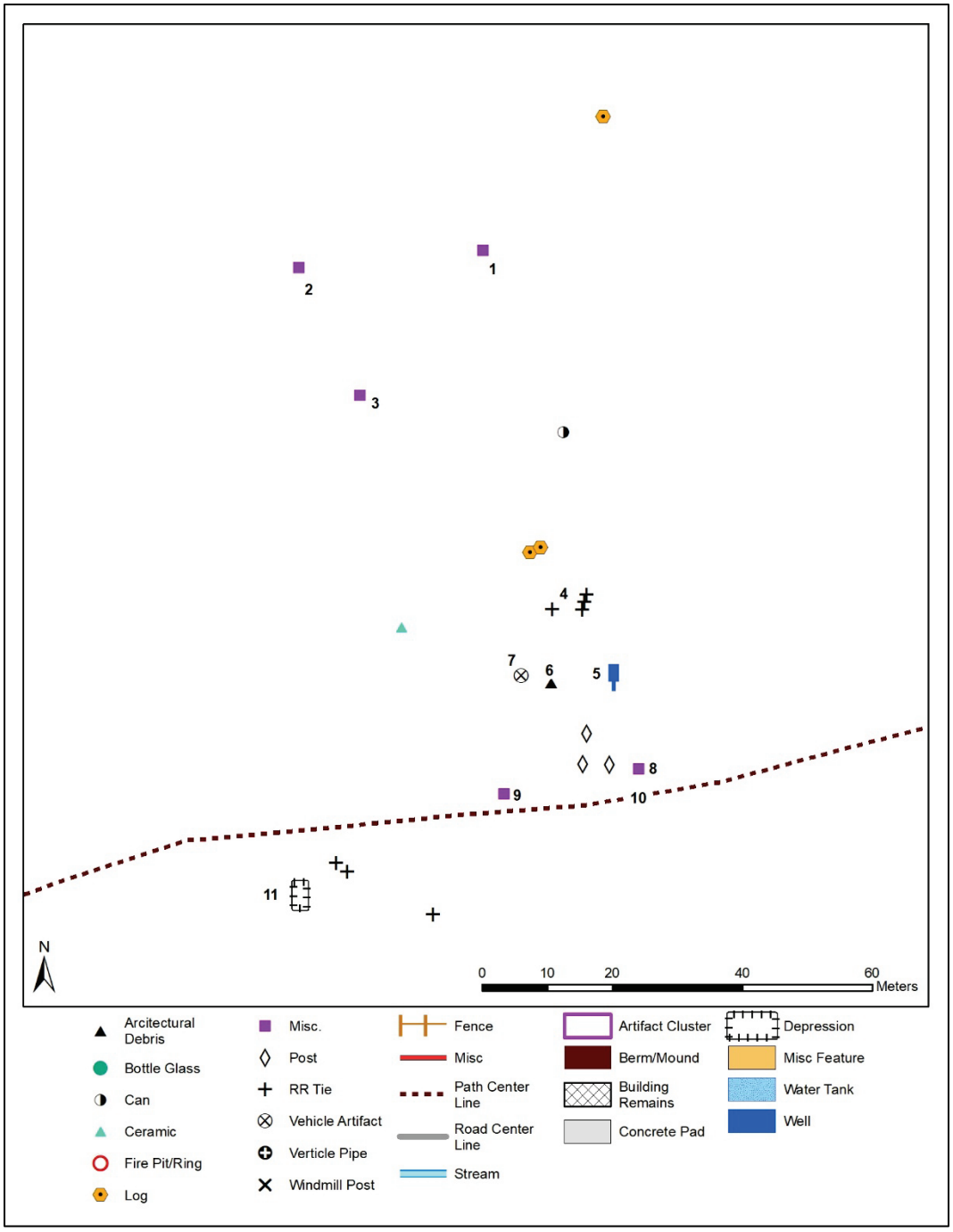
ERDC-CERL researchers documented a site with 11 features or artifacts of note (Figure 58). There was a general scatter of artifacts across the entire site but no discernible clusters that would indicate activity areas.

Figure 57. Site AZ Y:8:196 on 2018 USGS 7.5 quadrangle map.



Source: https://ngmdb.usgs.gov.

Figure 58. Site AZ Y:8:196 site map.



Source: ERDC-CERL (2020).

The site feature descriptions are:

1. Misc. Military cartridge box
2. Misc. Wooden slats held together with wire, possibly a crate fragment.
3. Misc. Wooden slats held together with wire, possibly a crate fragment.
4. Railroad Ties. Railroad ties lying on the ground surface
5. Well. Capped pipe sticking out from a key hole shaped concrete pad.
6. Architectural debris. Brick fragment
7. Vehicle artifact. Burnt remains of a truck rubber tire.
8. Misc. Metal grate.
9. Misc. Metal 55 gallon drum with a circular cap on the side, a square portion cut out of one side and some bullet holes present.
10. Path. Path that shows some signs of sporadic use. It is unclear if this is a foot path or small vehicle trail. Also unclear if it dates to the historic site or more modern military usage.
11. Depression. Rectangular depression approximately 30 cm deep. Soil surface indicates recent water evaporation.

Site AZ Y:8:196 consists of a dismantled well, 3 upright posts, one rectangular depression and a general scatter of artifacts. There were no artifact clusters that would indicate discrete activity areas. Many of the artifacts, including military cartridge boxes, slat crates, truck tires and pull tab cans (Figure 59) indicate that the site has been used by military personnel. The only ceramic artifact observed at the site was an undecorated whiteware sherd (Figure 60). The presence of a scattering of metal cans, the upright posts and the well indicate that the site does have a pre-military use period. The well consists of a keyhole shaped concrete pad with a capped wellhead and three bolts protruding from the slab (Figure 61). There is no indication of any structure or superstructure associated with the well. The three upright posts indicate the possibility of some form of fencing or ranch features such as a corral but if such a ranch element existed, not enough of it remains to interpret its extent or configuration. The nails embedded in the posts are wire ones.

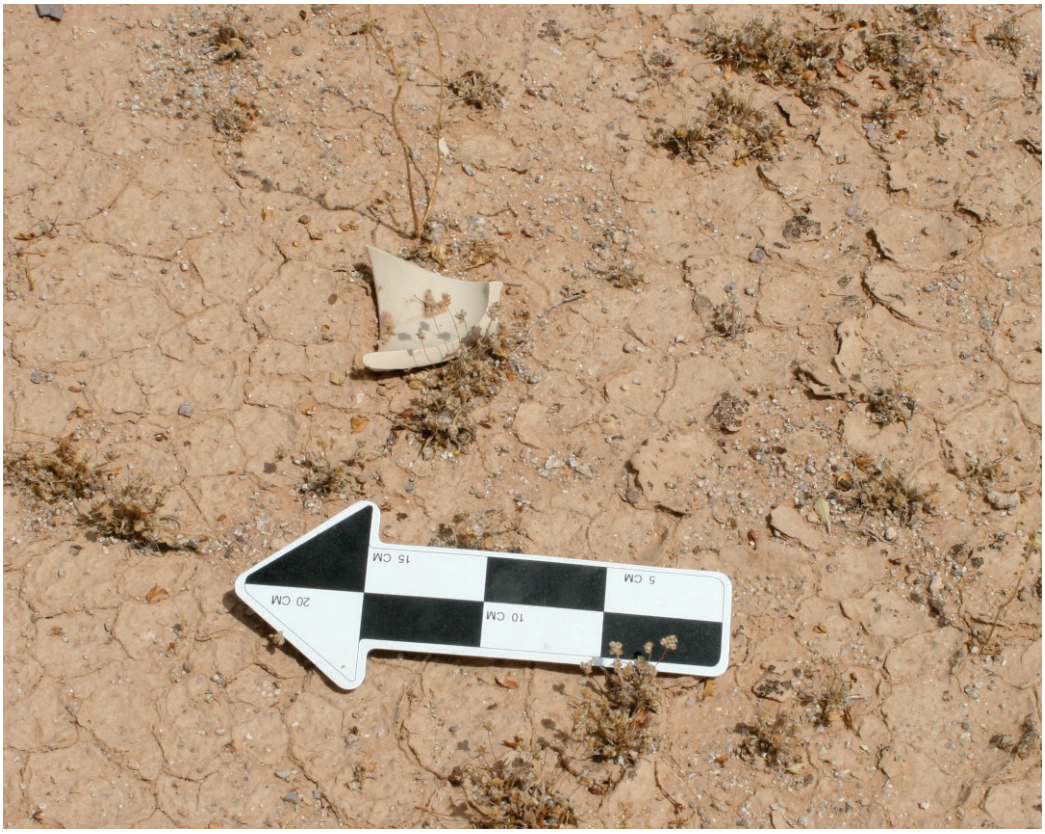
There are only two landscape features at the site. Feature 10 is a small track or path. It is unclear if this is associated with the historic use of the site. The path heads in the direction of a military target area to the west of the site. There are no artifacts associated with the depression (Feature 11) to indicate this feature's age or use.

Figure 59. Site AZ Y:8:196 Aluminum can with pull tab opening.



Source: ERDC-CERL (2019).

Figure 60. Site AZ Y:8:196. Whiteware ceramic sherd.



Source: ERDC-CERL (2019).

Figure 61. Site AZ Y:8: 196 Feature 5 with upright posts in background. View from north to south.



Source: ERDC-CERL (2019).

7.3.4 Ranch Eligibility Evaluation Form

Based on the information above the evaluation form is as follows.

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to the 1850s? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **NO**
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a ranch? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **YES**
4. Are there multiple 15 m. radius artifact clusters located on the site? **NO**
5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **NO**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **NO**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **NO**
2. Does this site possess a source of water (dam ponds, well, cistern, stock tank, spring, etc.)? **YES**
3. Is there a foundation larger than 10 x 10 ft. and less than 30 x 30 ft. on the site? (Note: structures that fall outside of these ranges are likely outbuildings.) **NO**
4. Is there evidence of small (wells, privy, shed, etc.) or large (stables, barns, bunk houses) architectural features? **NO**
5. Is there evidence of corrals, stock chutes and/or stock dip ponds? **NO**
6. Is there evidence of camping (firepits or rings, tent platforms, discrete clusters of food containers or personal items)? **NO**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**

8. Is there evidence of landscape features (such as roads, paths, gardens, regular shaped depressions, berms, etc.) at the site? **NO**
9. Was the site occupied by a person of historical, regional, or local significance? **NO**

Based on the results of the eligibility evaluation form, site AZ Y:8:196 is **Not Eligible** for inclusion on the NRHP. With one "Yes" answers in Level I and 1 "Yes" answers in Level II this site does not have sufficient integrity of likelihood to provide additional information about ranching activity in the region. There is no discernible structures or activity areas on the site and the only landscape features may or may not be related to the historic use of the site. There is clear evidence in the surface artifact assemblage that military personnel have visited this site and a significant portion of the assemblage dates to the military period.

7.3.5 NRHP evaluation results

The NRHP evaluation was reported in Lyon (2000). The findings are summarized here. The site has a prehistoric component consisting of an artifact scatter. These elements were not documented or considered as part of CERL's analysis.

Lyon (2000) reported multiple features at the site. One was the wellhead (Feature 5) that consisted of a concrete pad, wellhead and two concrete masses that were likely the footers for a well superstructure. These footers were not present at CERL's visit. South of the well was three upright posts that correspond to the ones CERL mapped. Lyon reported three different road segments cutting across the site on an E-W alignment. Only the southern most of these roads was noted by CERL. On the southern portion of the site were two depressions (one circular 6 ft. in diameter and one rectangular 19 x 11 ft.) and one 17 ft., diameter 22 in. tall backdirt pile. On the very northwestern portion of the site was a large earthen stock tank measuring 60 x 36 x 2 ft. with a 6 ft. berm surrounding the tank. This feature was not present at CERL's visit. The artifacts were reported as low density with a 20th century temporal distribution that included the ranching and military period. No evidence of a structure was noted. The historic component of the site was determined to be potentially eligible.

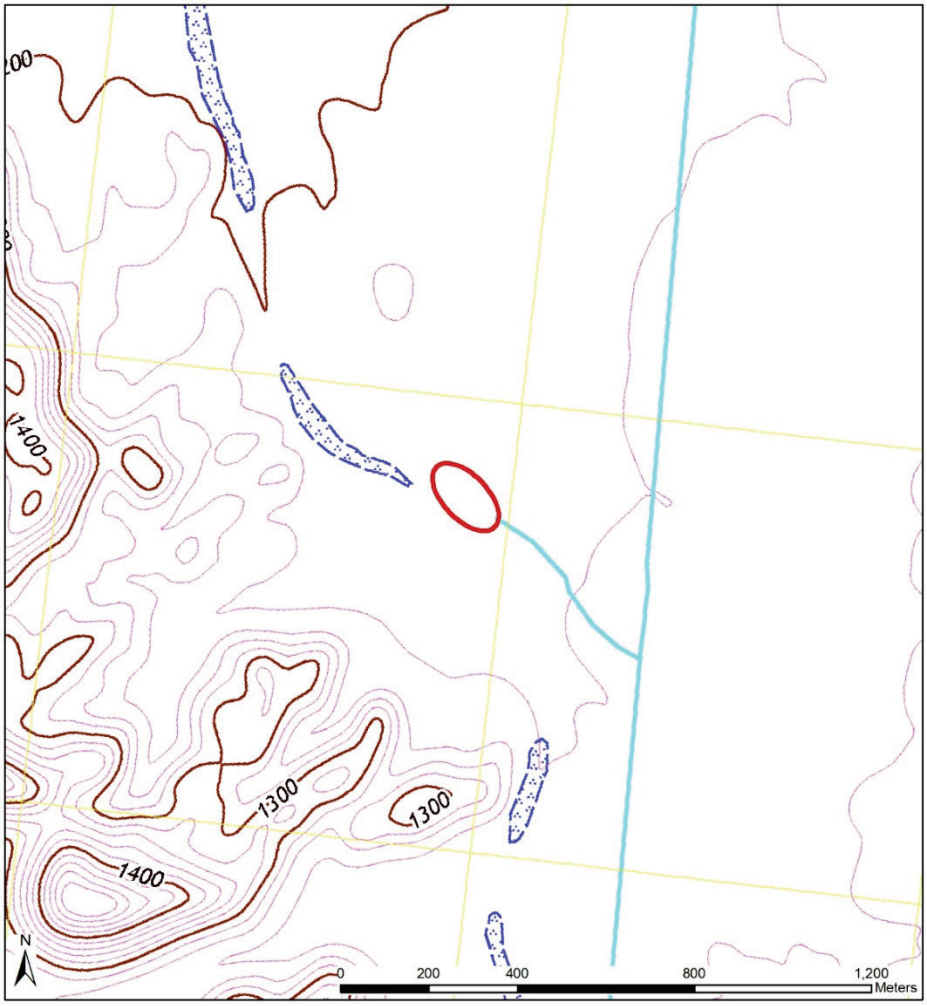
After the NRHP evaluation was examined and it was realized that the document did not contain a definitive determination of the NRHP eligibility of the historic component of the site, CERL researchers communicated with

the installation CRM for information concerning the final determination. The findings were that the site was Not Eligible on its own. Historic documentation, however, that was not provided to CERL indicated that the site was part of a much larger ranching operation called the Drift Fence Ranch, which was operated by the dominant ranching dynasty in the region (the Childs family). As a result the installation manages the historic component of the site as a contributing element to the NRHP Eligible Drift Fence Ranch (Personal communication with Adrianna Rankin, May 2020).

7.4 Site AZ Z:5:10 field test

Site AZ Z:5:10 is located on level ground to the east of a series of low hills. A wash passes immediately to the southwest of the site (Figure 62). The NRHP evaluation was reported by Tagg and Blake (2012).

Figure 62. Site AZ Z:5:10 on 2018 USGS 7.5 quadrangle map.



Source: https://ngmdb.usgs.gov.

7.4.1 Original Phase I results

The site was first recorded in 1991. The original report was not provided to CERL by BMGR but Tagg and Blake (2012) report that the feature descriptions are nearly identical to the ones in the 2012 report. These will be described in section in section 7.4.5below.

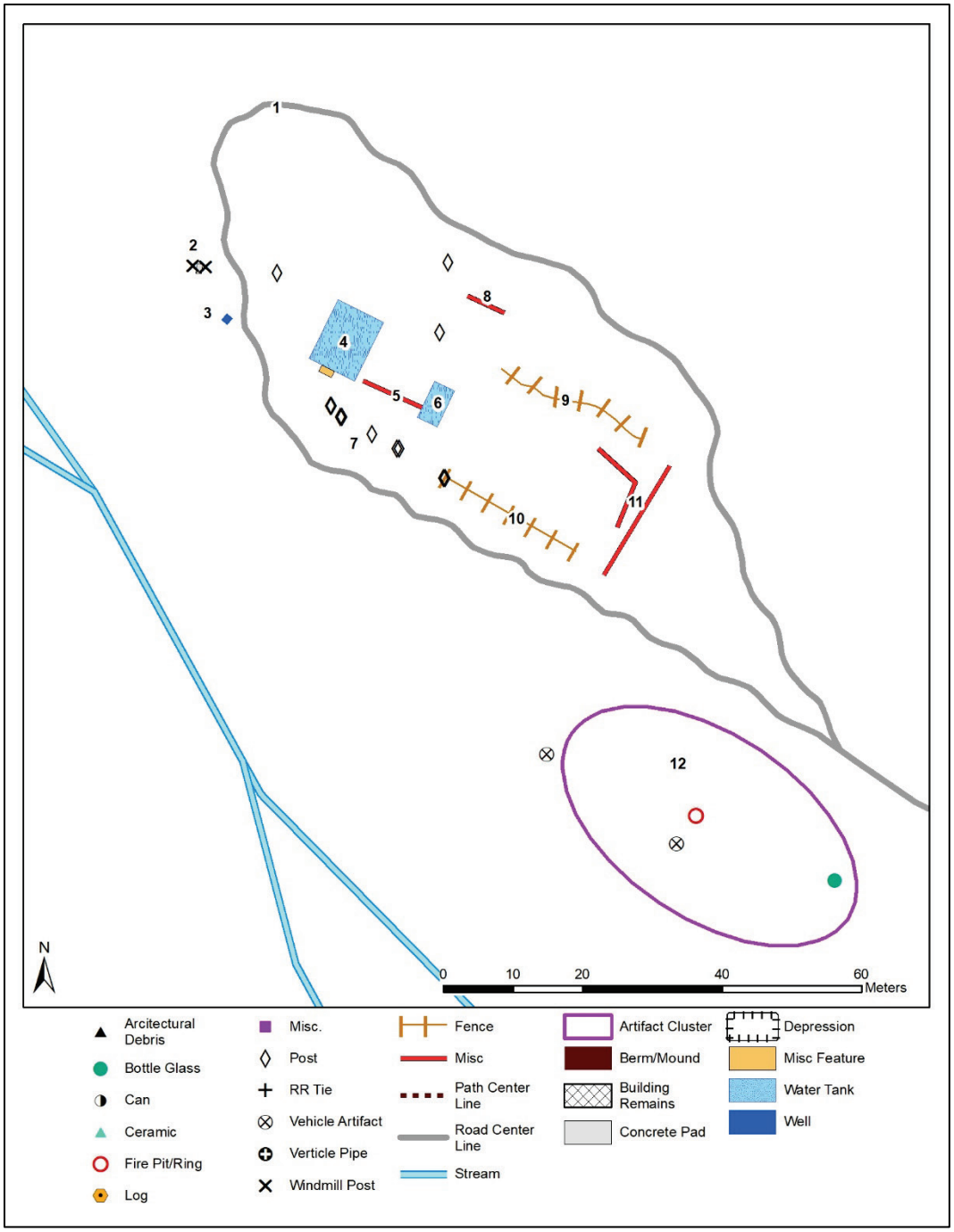
7.4.2 Historic documentation

A 1917 federal geological water supply survey does not describe this site (Tagg and Blake 2012). The site is documented on a 1942 U.S. quadrangle map. It is also described in 1948 as consisting of a 40 ft hand-dug well with a concrete storage trough. This survey was conducted as part of the lease and suspension agreements between the U.S. Government and Thomas Childs Jr (Tagg and Blake 2012)

7.4.3 ERDC-CERL site visit

Site AZ Z:5:10 is ranch with 12 features surrounded by a circular road (Figure 63). The site has two wells including one with a superstructure still intact. Also at the site was a large concrete water tank and a smaller concrete cattle trough.

Figure 63. Site AZ Z:5:10 site map.



Source: ERDC-CERL (2020).

The site feature descriptions are:

1. Road. Dirt and gravel road.
2. Well. Concrete foundation approximately 60cm tall with circular hole in the top and a metal windmill frame intact. “L Nesbitt Buckeye 64” was written into the concrete when wet.

3. Well. Concrete pad approximately 20 cm tall with a circular hole and rebar bolts protruding from the top.
4. Water tank. Large poured cement water tank over 2.5 m. tall. The impressions of the wooden forms used during the pour are clearly visible and rocks were placed on the top of the tank walls to create a rough surface. On the southwest side of the tank was a smaller square foundation approximately 1.5 m tall. This foundation could not be inspected closely due the presence of an active beehive.
5. Misc. Pipe on the ground connecting Feature 4 with Feature 6.
6. Water tank. Low concrete tank that was either a second storage tank or a watering trough. Writing was put into the wet concrete all the way around the trough. Much of this writing appears to be names – some have been damaged due to the deterioration of the concrete but one inscription appears to be "MHR (or MARY) …. May 21 1945" A series of wooden beams with iron bolts in them are laying in and over the top of this tank indicating that there was possibly a cover or building over this feature.
7. Posts. A row of posts some of them double or quadruple posts indicate the presence of some form a gate system.
8. Misc. large pipe lying on the ground.
9. Fence. Wire fence on the ground.
10. Fence. Wire fence.
11. Misc. Multiple large pipes lying on the ground.
12. Artifact Cluster. This area is a large, dispersed artifact scatter with a stone firepit in the center. Artifacts include bottle glass, a car panel, a metal convertible car top frame, a metal caster wheel, a broken green glazed ceramic cup or mug, can and can fragments including one can with a twist-key still attached.

This site is a large, well preserved ranching site with no significant evidence of military training. The road surrounding the site show evidence of recent use and there is a general scattering of modern trash across the site. The site does have larger trees that provide some shade on the northwest portion of the site and may be attractive as a break site for people working on this portion of the installations. The site has multiple wells including one with superstructure elements still present and evidence that the concrete was last modified in 1964. This would indicate that the site was in use after ranching activities were halted at other portions of BMGR. The large water tank (Figure 64) clearly shows construction methodology and the smaller tank includes evidence of a wooden roof or cap (Figure 65). The concrete around the smaller tank was likely worked upon in 1945, which

would indicate construction by the Childs ranching operation (Figure 66). The large amount of pipes on the ground may indicated that there were additional tanks that have been removed or that the site was used for storage of drilling equipment (Figure 67). The artifact assemblage (Feature 12) indicates domestic activity on the southern portion of the site although there is no evidence of structures in that portion of the site (Figure 68).

Figure 64. Site AZ Z:5:10 Feature 4. View from SW towards NE.



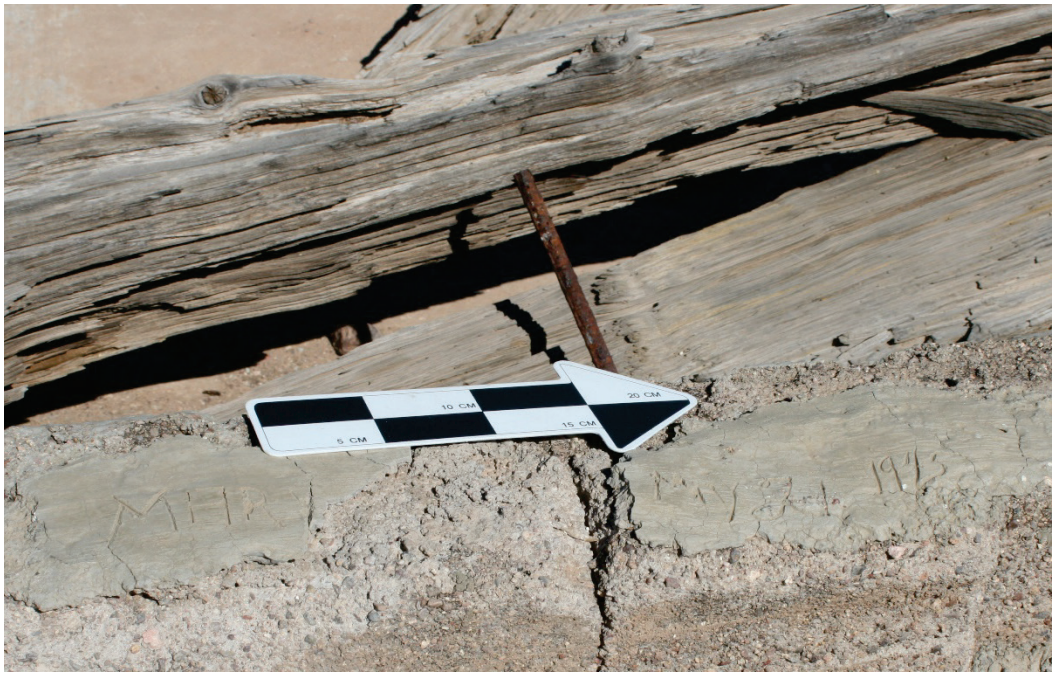
Source: ERDC-CERL (2019).

Figure 65. Site AZ Z:5:10 Feature 5 and 6. View from SW towards NE.



Source: ERDC-CERL (2019).

Figure 66. Site AZ Z:5:10 Feature 6 detail.



Source: ERDC-CERL (2019).

Figure 67. Site AZ Z:5:10 Feature 11. View from NW towards SE.



Source: ERDC-CERL (2019).

Figure 68. Site AZ Z:5:10 Feature 12 fire ring. View from W towards E.



Source: ERDC-CERL (2019).

7.4.4 Ranch Eligibility Evaluation Form

Based on the information above the evaluation form is as follows.

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to the 1850s? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **YES**
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a ranch? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **YES**
4. Are there multiple 15 m. radius artifact clusters located on the site? **NO**

5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **YES**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **NO**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **NO**
2. Does this site possess a source of water (dam ponds, well, cistern, stock tank, spring, etc.)? **YES**
3. Is there a foundation larger than 10 x 10 ft. and less than 30 x 30 ft. on the site? **NO**
4. Is there evidence of small (wells, privy, shed, etc.) or large (stables, barns, bunk houses) architectural features? **YES**
5. Is there evidence of corrals, stock chutes and/or stock dip ponds? **YES**
6. Is there evidence of camping (firepits or rings, tent platforms, discrete clusters of food containers or personal items)? **YES**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**
8. Is there evidence of landscape features (such as roads, paths, gardens, regular shaped depressions, berms, etc.) at the site? **YES**
9. Was the site occupied by a person of historical, regional, or local significance? **NO**

Based on the results of the eligibility evaluation form, site AZ Z:5:10 is **Eligible** for inclusion on the NRHP. With three "Yes" answers in Level I and 5 "Yes" answers in Level II this site has sufficient diversity in feature types to allow for interpretations of activities and activity areas. An area of domestic activity can be differentiated from other areas of the site. Multiple features with dates inscribed into the concrete demonstrate that water management activities at this site continued in multiple stages over a span of 20 years.

7.4.5 NRHP evaluation results

Site AZ Z:5:10 was surveyed by Statistical Research, Inc. (SRI) in 2009 with the results reported in Tagg and Blake (2012). Their findings are summarized here.

The site consisted of one well constructed in the 1940s (Feature 3) and a second well with steel pipe windmill frame constructed in 1964 (Feature 2), a large water tank (Feature 4), a secondary water tank (Feature 6), a

cattle trough (small concrete foundation on the southwest side of Feature 4) and a corral (features 7, 9, and 10). The inscriptions on Feature 6 were in better condition and could be read more completely. The inscriptions include “40,” “Daniel Childs,” “May 21, 1945,” Loy G m Hernadez,” and Mary C May 21. 1945.”

Three artifact clusters were identified. The first was located at CERL’s Feature 11 and consisted of pipes, bailing and barbed wire, barrel straps, nails, bolts and screws. The second and third artifact clusters are located at CERL’s Feature 12. The artifacts recovered from these clusters include glazed earthenware plates and cups, a transfer print cup and vase, beer and medicine bottles, condiment jars, food and tobacco cans, barrel hoops and straps, a pipe, an egg beater, a shoe sole, and a dust pan. Datable artifact types would indicate a site occupation to the middle half of the 20th century.

Based on their findings Tagg and Blake (2012) concluded that the site was established in the 1940s by the Childs family with an additional well dug in 1964. The amount of the surviving architectural features allows for a greater understanding of 20th century ranching. The inscriptions on multiple features in the site allow for the identification of specific users as well as their cultural and ethnic identities. As a result this site was considered **Eligible** for the NRHP under Criteria A and D.

7.5 Site AZ Z:6:81 field test

Site AZ Z:6:81 is located on level ground approximately 600 meters west of a large drainage wash (Figure 69). A smaller wash cuts through the site and is incorporated into site features. Active military roads are located immediately east and south of the site. Military training sites, including target sites are located approximately 550m. southwest and 1200m. southeast of the site. The site is documented in Lyon (2000).

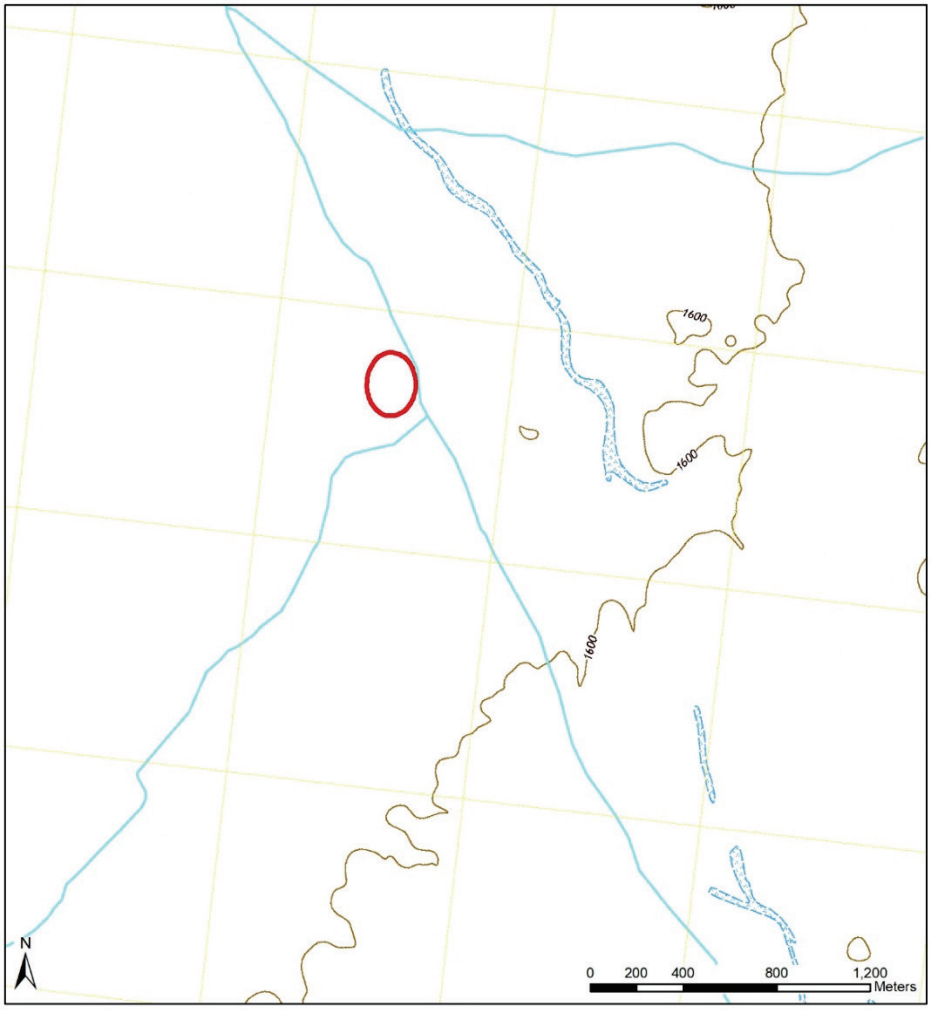
7.5.1 Original Phase I results

Lyon (2000) does not record any previous research on the site.

7.5.2 Historic documentation

No historic documentation on the site was provided or included in the Lyon (2000) report.

Figure 69. Site AZ Z:6:81 on 2018 USGS 7.5 quadrangle map.

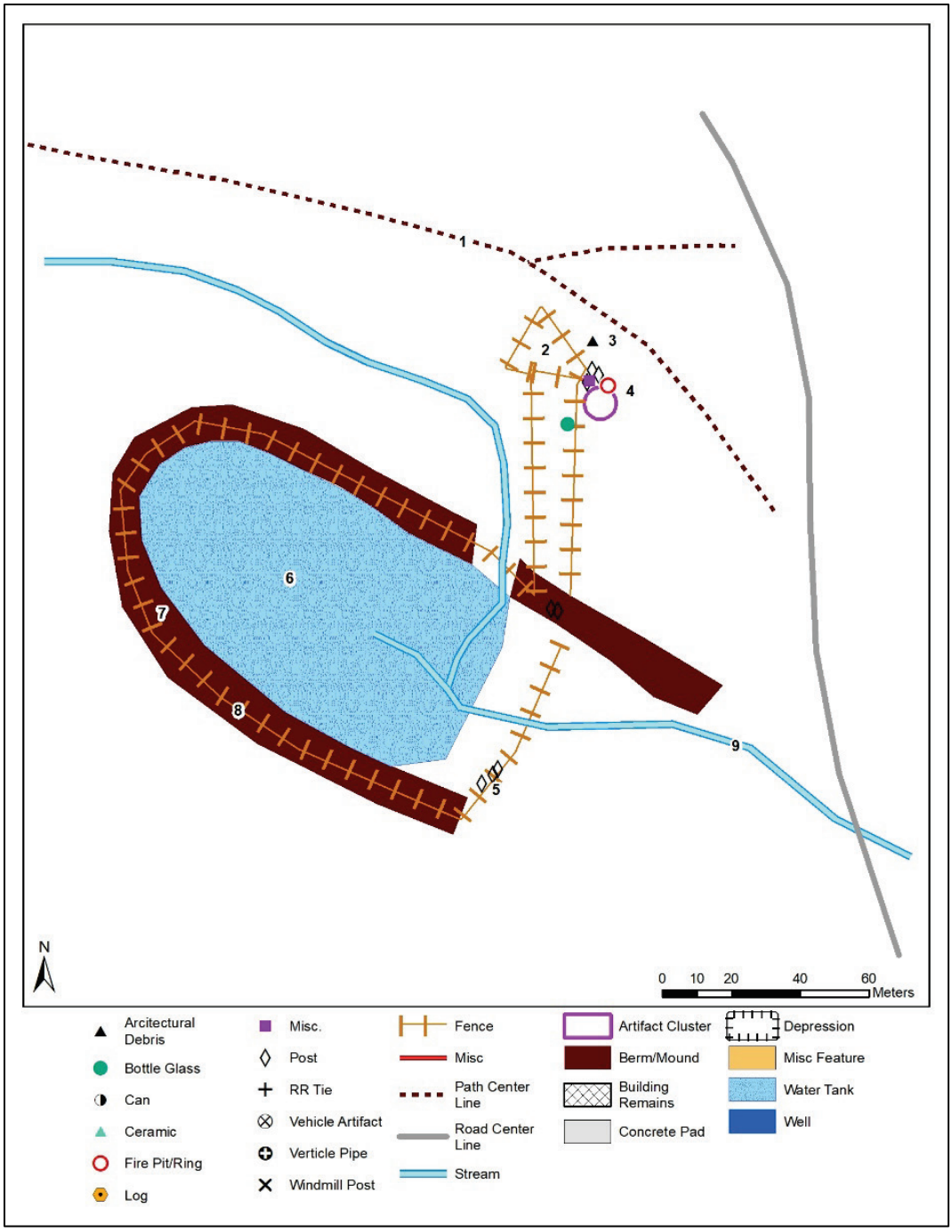


Source: https://ngmdb.usgs.gov.

7.5.3 ERDC-CERL site visit

CERL researchers identified nine features or artifacts of note at the site including artifact scatters, fence lines and significant landscape modification (Figure 70).

Figure 70. Site AZ Z:6:81 site map.



Source: ERDC-CERL (2020).

The site feature descriptions are:

1. Path. Small path or vehicle track. Clear evidence for continued use and maintenance is present.
2. Fence. Barbed wire fencing creating a two small corrals, one triangular and a second rectangular. Fenceposts are spaced approximately 5m. apart. The

corral on the north side has a combination of large square posts (similar to railroad ties) and smaller natural logs as posts. The rectangular corral to the south uses all the larger square posts. Fenceposts average 2.5 m tall. The southern end of the corral slopes steeply upward to the top of the berm.

3. Architectural Debris. Tight concentration of rusted nuts and bolts.
4. Artifact Cluster. Cluster of artifacts include undecorated whiteware, bottle glass, cans with pull top openings, steel and tin cans and lids, a small pressurized gas canister with bullet dents in it, wire and nails. A firepit is associated with debris scatter. Within the pit are two metal straps bent into rectangles that may have been the basis of cooking grates or racks. There is a large amount of charcoal present.
5. Fenceposts. These fenceposts located on the SE corner of the stock tank are significantly larger (4m tall) than other posts at the site and may indicate the location of a gate.
6. Water Tank. This feature is a large stock tank formed by a surrounding horse shoe shaped berm, open on the SE side. The ground surface is 0.5-1 m. lower than the surrounding ground. This area would have collected water from the nearby wash. At the time of the site visit there was no standing water but the vegetation (including grasses and reeds) was significantly denser and greener than the surrounding regions.
7. Berm. This is an earthen berm averaging approximately 3-4 m. higher than the surrounding region. It encloses the stock tank on three sides. A drainage wash cuts across and has washed away the berm immediately west of the chute. Fenceposts suspended by barbed wire over the washed out area indicates that this was not part of the berm design.
8. Fence. Barbed wire fence that sits atop the berm. It completely surrounds Feature 6 including on the open SE side. Fenceposts are spaced between 10 and 15 m. apart.
9. Stream or Wash. This wash is most likely the original water source for the stock tank.

This site consists primarily of a large artificially constructed water feature that would retain runoff from a natural river wash. Associated with the stock tank is a small corrals that would feed cattle into the stock tank (Figure 71). Considering the hardness of soil and the difficulty with excavation (as described by the installation CRM) this feature would have been a significant endeavor to construct.

Figure 71. Site AZ Z:6:81 Feature 2 stock corral and chute from the top of Feature 7. View from S to N.



Source: ERDC-CERL (2019).

Apart from the fence and posts the majority of artifacts on the site are concentrated near Feature 4. The artifacts here include items that clearly relate to recent military activity but also include a scattering of artifacts that could date to the early 20th century. Without historic documentation it is not possible to identify construction or use period other than 20th century. The firepit located near Feature 4 has been used recently (Figure 72). The roads surrounding the site are actively maintained and used. There are multiple military activity areas within 1 km of the site. Despite the evidence of modern activity in the site the berm, water tank and fencing do not appear do not appear to be impacted by any of these activities. The principle damage to the site is the wash that cut from west of the corral through the eastern portion of the tank and berm.

Figure 72. Site AZ Z:6:81 Feature 4 (center of picture) and Feature 2 (background of picture). Firepit located in foreground. View from E to W.



Source: ERDC-CERL (2019).

7.5.4 Ranch Eligibility Evaluation Form

Based on the information above the evaluation form is as follows.

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to the 1850s? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **YES**
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a ranch? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **UNKNOWN**
4. Are there multiple 15 m. radius artifact clusters located on the site? **YES**

5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **NO**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **NO**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **NO**
2. Does this site possess a source of water (dam ponds, well, cistern, stock tank, spring, etc.)? **YES**
3. Is there a foundation larger than 10 x 10 ft. and less than 30 x 30 ft. on the site? (Note: structures that fall outside of these ranges are likely outbuildings.) **NO**
4. Is there evidence of small (wells, privy, shed, etc.) or large (stables, barns, bunk houses) architectural features? **NO**
5. Is there evidence of corrals, stock chutes and/or stock dip ponds? **YES**
6. Is there evidence of camping (firepits or rings, tent platforms, discrete clusters of food containers or personal items)? **YES**
7. Is there evidence of a cottage industry typical to the region at the site? Additional economic activity at the site signals a wider range of production and connections to the regional or national economy. **NO**
8. Is there evidence of landscape features (such as roads, paths, gardens, regular shaped depressions, berms, etc.) at the site? Non-architectural landscape features provide significant information about site activity patterns, layout and usage. **YES**
9. Was the site occupied by a person of historical, regional, or local significance? **UNKNOWN**

Based on the results of the eligibility evaluation form, site AZ Z:6:81 is **Eligible** for inclusion on the NRHP. With two "Yes" answers in Level I and four "Yes" answers in Level II this site represents a large landscape modification to store natural surface water runoff. The lack of any architecture indicates that the site was only occupied for brief periods of time. Two artifact clusters are present, including a tight concentration of large nuts and bolts that probably date to the site's historic usage and a more spaced out cluster of domestic, ranching and military items. Despite the evidence of recent activity at the site, the principle features of the tank, berm and corrals are well preserved. Interpretation of the site is hindered by the lack of historic documentation. If information could be found as to the construction date of the site or the likely ranch operation associated with the site it

is possible that the argument supporting NRHP eligibility could be strengthen further.

7.5.5 NRHP evaluation results

The NRHP evaluation was conducted and reported in Lyon (2000). The findings in that report are summarized below.

The site was described as consisting of an earthen U-shaped dam and associated corral and loading chute. The corral and chute and connected to the tank by a narrow area enclosed by barbed wire fence with wooden fenceposts. The main gate to the reservoir is located in the south east corner. The earthen dam is approximately 20 m. wide at the base and stands about 4 m. above the surrounding region. The dam was positioned to collect water from the wash. The corral and loading chute are constructed by large posts that may be recycled railroad ties. The report states that no artifacts were found in the vicinity of the tank or corral. The firepit documented by CERL is not recorded but the maps of the site indicate that the firepit is most likely not historic but instead represents the burning of the loading chute since the Lyon (2000) survey.

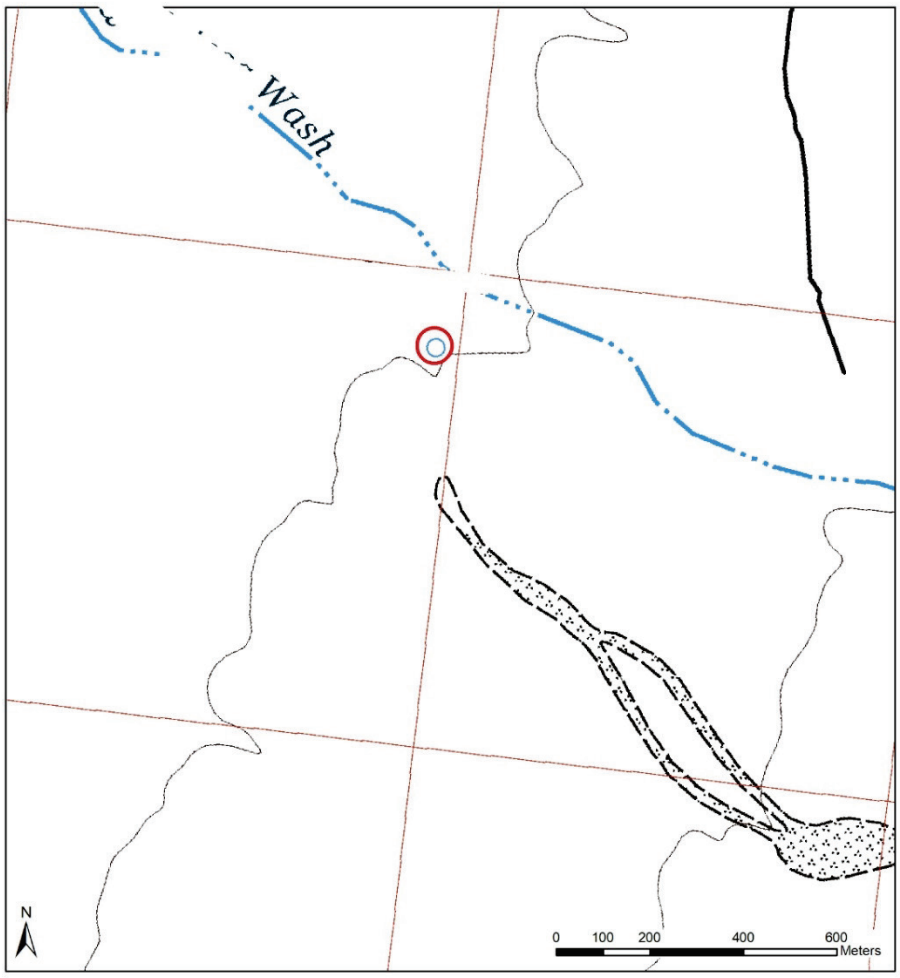
Lyon recommended the site **Eligible** under multiple criteria:

- Criteria A – as a ranching site it is associated with early 20th century ranching,
- Criteria C – the features may embody the characteristics of a type, period and method of construction,
- Criteria D – the features are likely to provide information on water extraction, storage and irrigation technologies.

7.6 Site AZ Z:6:197 field test

Site AZ Z:6:197 is located on flat land south of a significant wash (Figure 73). This wash has sufficient water to allow trees to grow on its margins and scrub brush was present in a much higher frequency at this site than at any other site visit in this survey. At the time of the survey the wash was dry. There were several small hills and ridges visible a few kilometers south of the site. The NRHP evaluation is reported in Lyon and Tucker (2001).

Figure 73. Site AZ Z:6:197 on 2018 USGS 7.5 quadrangle map.



Source: https://ngmdb.usgs.gov.

7.6.1 Original Phase I results

No Phase I reports were provided and the NRHP eligibility evaluation (Lyon and Tucker 2001) did not mention previous research.

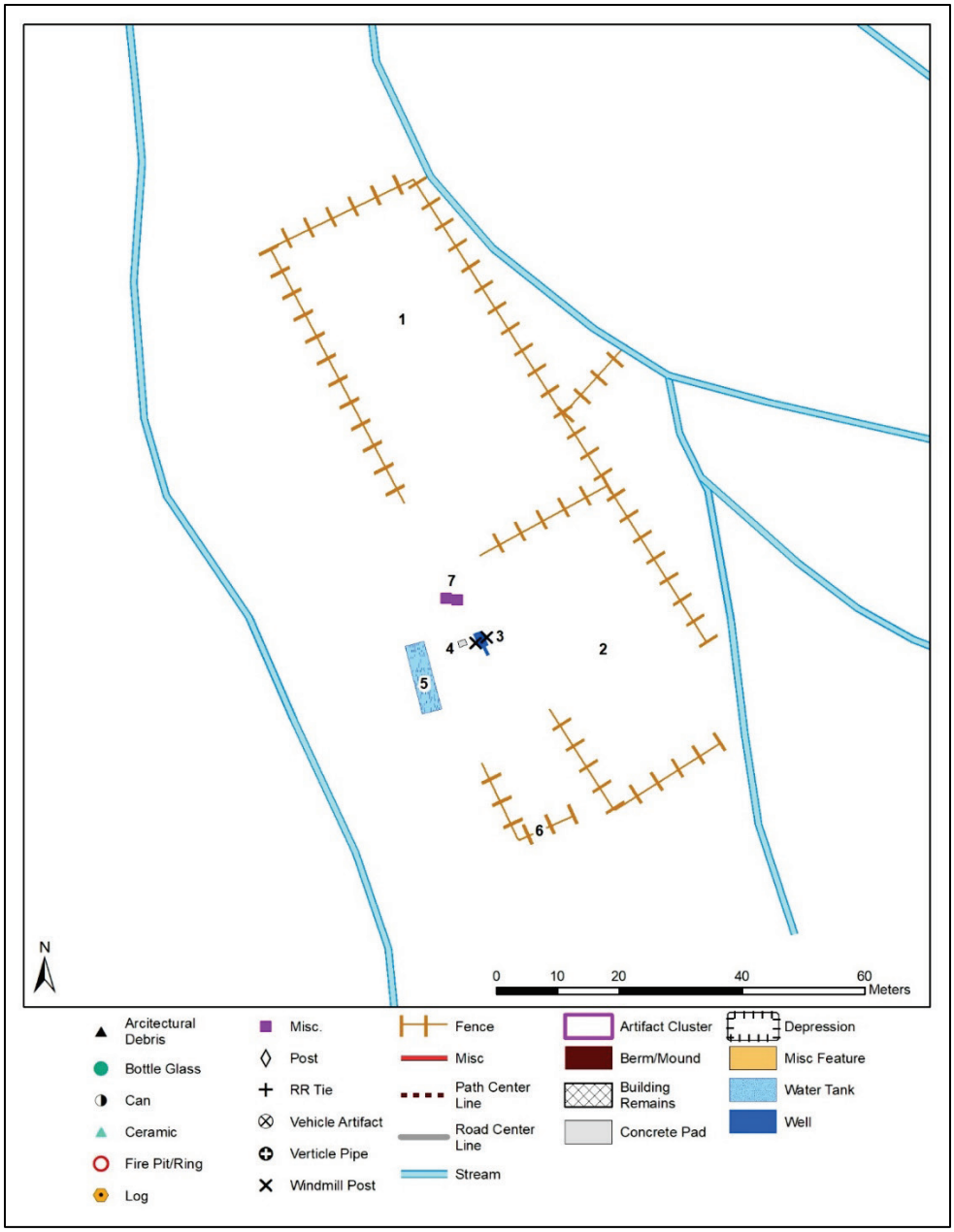
7.6.2 Historic documentation

No historic documentation was provided by BMGR or described in the NRHP eligibility evaluation report. The site appears on USGS quad maps dating from 1958.

7.6.3 ERDC-CERL site visit

ERDC-CERL researchers documented seven features at the site (Figure 74). It was noted that the site was especially clean of artifacts.

Figure 74. Site AZ Z:6:197 site map.



Source: ERDC-CERL (2020).

The site feature descriptions are:

1. Fence. A barbed wire and wire mesh fence enclosing a corral. The posts of the fence were spaced approximately 2 m. apart. The posts are wooden, unfinished in shape but the corner posts and the ones near Feature 3 are large and square and most likely are recycled railroad ties.
2. Fence. A barbed wire and wire mesh fence enclosing a corral. The posts of the fence were spaced approximately 2 m. apart. The posts are wooden, unfinished in shape but the corner posts and the ones near Feature 3 are

large and square and most likely are recycled railroad ties. The south east portion of the feature has been washed away due.

3. Well. The well consists of a concrete keyhole shaped pad with a well pipe located in the center. The metal well cap is sitting on the pad next to the pipe. A metal windmill frame remains intact over the well.
4. Concrete Foundation. A small square concrete foundation 30cm tall made of river stone mortared with very course concrete. There is no base/floor indicating that this is not a trough or water feature.
5. Water Tank. Large metal water tank, approximately 1.3 m tall. Tank walls are punctured by multiple bullet holes.
6. Fence. Barbed wire fence with wooden posts. The posts are metal with the exception of the end and corner posts, which are railroad ties.
7. Misc. two miscellaneous items. The western on is a rock pile of large stones. It is probable that this is a pile of stones removed from elsewhere on the site there is no evidence of regular shape, mortar or cement associated with the stones. The eastern item is a rusted metal 55 gallon drum.

The site consists of two large corrals, a well, and a storage tank situated between two wash channels. A portion of the southeastern corner of the site has been lost to erosion due to one of the washes. The corrals constructed of barbed wire and wire mesh strung between wooden posts with the corner posts consisting of recycled railroad ties (Figure 75). The wire and mesh are attached to the posts with wire nails and staples. The numerous bullet holes in the water tank are the only signs of military activity on the site (Figure 76). The well was capped but the cap has been dislodged and is sitting next to the well pipe (Figure 77). There were no instances of inscribed writing or dates in the concrete. It was not possible to identify the purpose of the concrete foundation but it is located in close proximity to the well. Without any artifacts or historical documents there is no way to determine date ranges for the site but the wire mesh fencing and metal tank strongly indicate a 20th century construction.

Figure 75. AZ Z:6:197 Features 2 and 3 (background). View from E to W.



Source: ERDC-CERL (2019).

Figure 76. AZ Z:6:197 Feature 5. View from E to W.



Source: ERDC-CERL (2019).

Figure 77. AZ Z:6:197 Features 4 and 3 (background). View from W to E.



Source: ERDC-CERL (2019).

7.6.4 Ranch Eligibility Evaluation Form

Based on the information above the evaluation form is as follows.

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to the 1850s? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **YES**
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a ranch? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **YES**
4. Are there multiple 15 m. radius artifact clusters located on the site? **NO**
5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **YES**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **NO**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **NO**
2. Does this site possess a source of water (dam ponds, well, cistern, stock tank, spring, etc.)? **YES**
3. Is there a foundation larger than 10 x 10 ft. and less than 30 x 30 ft. on the site? (Note: structures that fall outside of these ranges are likely outbuildings.) **NO**
4. Is there evidence of small (wells, privy, shed, etc.) or large (stables, barns, bunk houses) architectural features? **YES**
5. Is there evidence of corrals, stock chutes and/or stock dip ponds? **YES**
6. Is there evidence of camping (firepits or rings, tent platforms, discrete clusters of food containers or personal items)? **NO**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**

8. Is there evidence of landscape features (such as roads, paths, gardens, regular shaped depressions, berms, etc.) at the site? **NO**
9. Was the site occupied by a person of historical, regional, or local significance? **NO**

Based on the results of the eligibility evaluation form, site AZ Z:6:197 is **Not Eligible** for inclusion on the NRHP. With three "Yes" answers in Level I and three "Yes" answers in Level II this site has does not exhibit sufficient diversity of feature types to be likely to provide significantly new information about ranching practices in the area. The site has very complete and well preserved ranching feature types but the lack of domestic artifacts or any indication of site habitation is particularly problematic. It is possible that historic documentation of the site might change the answers to the questions II1 or II9.

7.6.5 NRHP evaluation results

NRHP evaluation was reported in Lyon and Tucker (2001). Their findings are summarized here.

The NRHP evaluation identified a large three pen corral (features 1, 2, and 6). Originally the fences were constructed with five rows of barbed water that rectangular wire was later added to. Feature 1 was identified as the main entrance to the corral. The survey noted a large pile of cobbles that was described as a dump (Feature 7). A windmill with concrete foundation and well shaft was also identified along with a rectangular metal water tank. The final feature on the site is a small concrete foundation measuring 37x37x11 in. that was interpreted as a pump house. All of these features were described as located within the third pen of the corral with the exception of the water tank that was sitting on the corral fence. No artifacts were identified.

The site was described as being in poor condition with missing or damaged machinery and some damage resulting from military activity. No independent date could be attributed to the site but the site was assigned to the early 20th century. Lyon and Tucker (2001) recommended the site **Eligible** under multiple criteria:

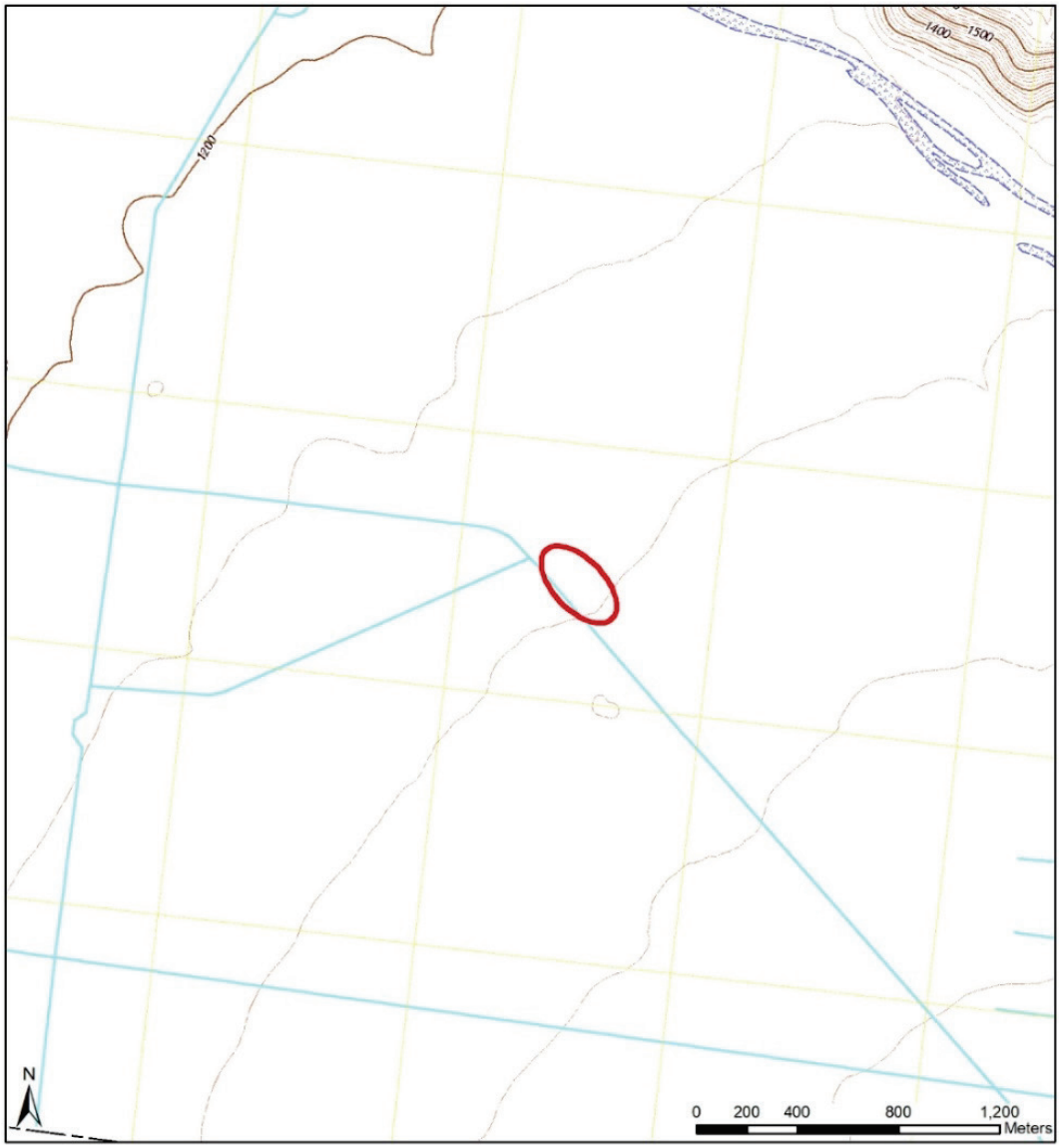
- Criteria A – as a ranching site it is associated with early 20th century ranching,
- Criteria C – the features may embody the characteristics of a type, period and method of construction,

- Criteria D – the features are likely to provide information on water extraction, storage and irrigation technologies.

7.7 Site BMGR-00-B-09 field test

Site BMGR-00-B-09 on very gently sloping terrain with the high ground located on the SE portion of the site (Figure 78). An active military road is located on the southwest side of the site. A line of hills and ridges is approximately 2.5 km north east of the site. The NRHP evaluation was reported in Vanderot and Altschul 2004.

Figure 78. Site BMGR-00-B-09 on 2018 USGS 7.5 quadrangle map.



Source: https://ngmdb.usgs.gov.

7.7.1 Original Phase I results

Vanderot and Altschul (2004) do not report any previous work at the site.

7.7.2 Historic documentation

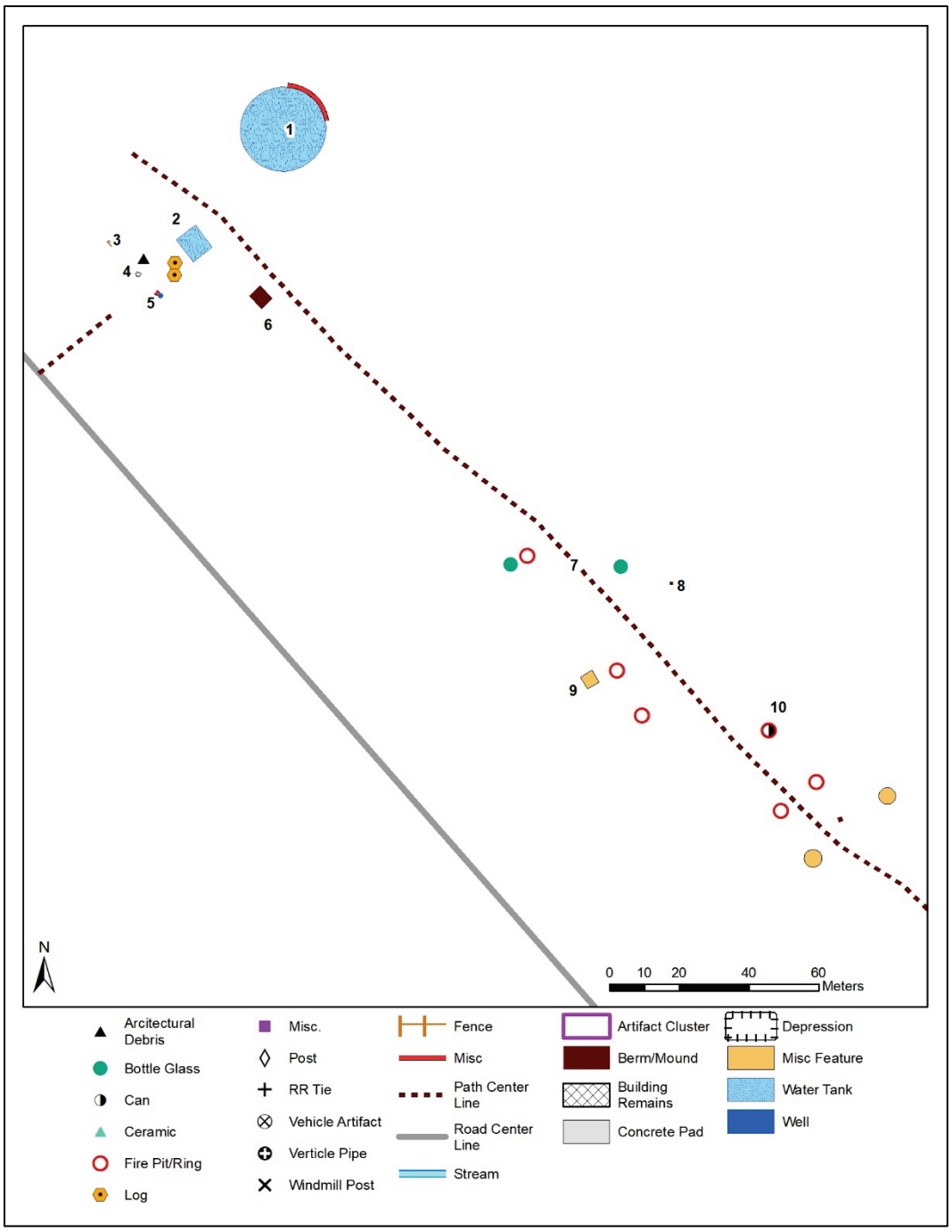
Archival research was conducted as part of the NRHP evaluation (Vanderot and Altschul 2004) and the findings are summarized here.

The site well was dug in 1913 by the New Cornelia Mining Company as part of a series of wells excavated with the aim to pump water 10 miles to the mines at Ajo. The well did not produce enough water to justify a pipeline and was abandoned by the mining company. The ranching operations of Thomas Childs was using the site a cattle-watering station by 1917. In 1920 the well was described as abandoned. In 1931 the New Cornelia Mining Company was purchased by Phelps Dodge Corporation and ownership of the well was transpired to the new owners. The site also sites along the Ajo to Sentinel road where the road turned north the pass through the Crater Range hills. Sentinel was a stop on the Southern Pacific Railroad and Ajo was a key mining location in the region. The road was depicted on maps up through the 1958 USGS quadrangle where it appears as a jeep trail.

7.7.3 ERDC-CERL site visit

ERDC-CERL researchers identified two clusters of features situated along a NW – SE gravel and asphalt road (Figure 79). The northwest cluster contains typical ranching features such as a well, an earthen stock tank, a concrete stock tank and dense clusters of nails. The second cluster located on the south east of the site consists of can and bottle scatters, firepits and circles of fire cracked rock, low flat berms and rings or squares of stones. Immediately north of the site had dense scrub brush that impeded movement and observation of the northern portion of the site.

Figure 79. Site BMGR-00-B-09 site plan.



Source: ERDC-CERL (2020).

The site feature descriptions are:

1. Water Tank. This feature is a circular earthen stock tank consisting of a water catchment within a circular berm. On the northeast side of the feature are two concrete watering troughs with a gap in the middle. The area

is overgrown with scrub brush indicating continued water retention in the feature. Several plastic water containers resembling jerry cans were located at the center of the feature.

2. Water Tank. This is a poured concrete water tank approximately 3 m tall. There are rusted pipes at the base of the tank on each side. There are a significant number of bullet scars in the concrete.
3. Misc. Feature. This is a concrete solid foundation 10-20 cm tall with six vertical rebar poles embedded in the concrete.
4. Concrete Pad. Small concrete bad. Edges are highly eroded.
5. Well. Well pipe housed in a white cylindrical housing with a pitched roof and air vent on the roof. The door has come off and is hanging by a wire attached to the roof interior. There is an active beehive within the metal housing. The door faces north east. On the northwest side is a small concrete trough. This trough lines up exactly with features 3 and 4 indicating that those features may be related to the well trough.
6. Berm. Low gravel berm with a depression in the middle of the feature.
7. Path. Gravel path that is slightly raised above the surrounding ground.
8. Berm. Low rectangular berm 1 x 1 x 0.5 m in dimension
9. Misc. Feature. 4 m leveled square with stone removed from with the square with the exception of a large stone place in the center of the square. Several circles or triangular burnt stone firepits are within 15m of this feature.
10. Firepit. This is a burnt stone fire circle with a tripod set up over the circle. An intact billycan is hanging from the tripod.

The site shows evidence of continued use after the 1950s military takeover of the installation area. This is demonstrated by the remains of asphalt on Feature 7 (Figure 80), the metal housing for Feature 5 (Figure 81) and the intact cooking tripod in Feature 10. The southeast portion of the site is clearly a camping area scattered with tent platforms, tent circles and firepits. Not all the tent platforms and firepits were mapped – the site continued to the southeast. The artifacts scattered around this portion of the site consist primarily of cans and bottle fragments. The existence of multiple firepits, as well as the construction tent circles and tent platforms indicate a more sustained occupation of the camping area then would be expected for the size of the ranching features on the NE portion of the site.

The ranching features consist of two water tanks – one concrete and the other an earthen berm and depression. Feature 1 had overgrown concrete troughs on the northeastern side (Figure 82). No evidence of corrals or fencing were observed at the site. The two concrete features (3 and 4) are

most likely associated with the well (Feature 5) based upon the exact alignment of these features with the trough extending from the well housing (Figure 83). Scattered around this portion of the site are very dense concentrations of wire nails. Logs and a few pieces of milled lumber planks between features 2 and 5 may represent the remains of a wooden structure at the site. No evidence of the historic road mentioned in the historic documents could be located.

Figure 80. Site BMGR-00-B-09 Feature 7 and 2. View from SE to NW.



Source: ERDC-CERL (2019).

Figure 81. Site BMGR-00-B-09 Feature 5. View from NE to SW.



Source: ERDC-CERL (2019).

Figure 82. Site BMGR-00-B-09 Concrete trough on north side of Feature 1. View from E to W.



Source: ERDC-CERL (2019).

Figure 83. Site BMGR-00-B-08 Features 3, 4 and 5. View from NE to SW.



Source: ERDC-CERL (2019).

7.7.4 Ranch Eligibility Evaluation Form

Based on the information above the evaluation form is as follows.

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to the 1850s? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **UNKNOWN**
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a ranch? **YES**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **YES**
4. Are there multiple 15 m. radius artifact clusters located on the site? **YES**
5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **YES**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **NO**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **YES**
2. Does this site possess a source of water (dam ponds, well, cistern, stock tank, spring, etc.)? **YES**
3. Is there a foundation larger than 10 x 10 ft. and less than 30 x 30 ft. on the site? (Note: structures that fall outside of these ranges are likely outbuildings.) **NO**
4. Is there evidence of small (wells, privy, shed, etc.) or large (stables, barns, bunk houses) architectural features? **YES**
5. Is there evidence of corrals, stock chutes and/or stock dip ponds? **NO**
6. Is there evidence of camping (firepits or rings, tent platforms, discrete clusters of food containers or personal items)? **YES**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**
8. Is there evidence of landscape features (such as roads, paths, gardens, regular shaped depressions, berms, etc.) at the site? **YES**
9. Was the site occupied by a person of historical, regional, or local significance? **NO**

Based on the results of the eligibility evaluation form, site BMGR-00-B-09 is **Eligible** for inclusion on the NRHP. With four "Yes" answers in Level I and 5 "Yes" answers in Level II this site has the potential for providing information into both ranching and a pattern of mining practices in the region. Mining activity at the site is indicated in the historical documents

and not in the evidence at the site. More research will be needed to determine if any mining artifact or features remain. The site does not contain any fences or corrals. It is possible that these have been removed or perhaps did not exist. There is evidence of continued military use of the site in the configuration of the well casing and the camping area that is very oversized for the ranching portion of the site. The northwestern portion of the site does not appear to have suffered significant impacts, however, as clusters of nails and milled lumber remain in situ.

7.7.5 NRHP evaluation results

The NRHP evaluation was conducted by Vanderot and Altschul 2004. Their findings are summarized here.

The survey identified three functional areas and two time period occupations. Area A consisted of 100 m radius trash dump consisting of approximately 170 corroded cans and large amounts of bottle glass. The artifacts are concentrated in three clusters within the larger area. The artifact assemblage indicates that the dump dates to the early 20th century. This area was not relocated by CERL but this portion of the site was heavily vegetated with brush.

Area B consists of the well (Feature 5) and associated water containment features including a concrete water tank, an earthen water catchment basement with concrete water troughs on the north east side. The well was covered with a cylindrical metal tower painted white (Feature 5). On the door of the well was painted "Well Level Recorder 3 P.D. Corp. Painted 72" indicating that the feature was maintained as recently as 1972. Two semicircular earthen berms were documented. One was located SE of Feature 5 (Feature 6) and the other was SW of Feature 5 (not observed by CERL) and were interpreted as earthen retention bonds. The final feature was three concrete slabs forming a NW-SE alignment. It was not determined if these features were related.

Area C is located on the southeast portion of the site and consists of a series of rock alignments that would support tents, clusters of fire cracked rocks, a wood storage area, two connecting roads the intersect near the SE side of the site and multiple artifact scatters and concentrations. Artifacts observed include cans, bottles nails, stables, personal hygiene items (such as razor blades and a cosmetic case), military items including cartridge

casings, and rubber boot heels. The artifact assemblage indicates an occupation date in the 1960s and 1970s, which would associate this site with military use of the site.

Site BMGR-00-B-09 was determined to be **Eligible** for inclusion on the NRHP under Criterion B due to the association with the Childs family and Criterion D due to the presence of artifacts and features that may inform on the construction and use of cattle-watering stations and the development of ranching in the region.

7.8 Summary of field tests, BMGR, AZ

Six sites at BMGR were evaluated by CERL for this report. Site evaluations were conducted blind with the researcher unaware of the original NRHP evaluation determinations. After the site evaluation was complete the results were compared to the original determinations (Table 1).

Table 3. Summary of NRHP Eligibility Findings for BMGR, Arizona.

Site	NRHP determination based on traditional methodology	NRHP determination based upon CERL methodology
AZ Y:6:24	Eligible	Not Eligible
AZ Y:8:196	Contributing element to NRHP Eligible site	Not Eligible
AZ Z:5:10	Eligible	Eligible
AZ Z:6:81	Eligible	Eligible
AZ Z:6:197	Eligible	Not Eligible
BMGR-00-B-09	Eligible	Eligible

Of the six sites evaluated there is agreement on the findings for three of the sites. Visibility at the sites was excellent and there no difficulty in identifying architectural or landscape features. Artifacts were found at nearly all the sites and time periods could identified using artifacts. The changes over time for the methods for opening cans proved particularly useful. As a result very few questions in the eligibility evaluation form were marked as “Unknown.”

The lack of historical documentation at the sites proved difficult. In an open-range ranching area the chain of titles and agricultural census data available at other installations were not present here. For two sites the information in the historic record was critical in the evaluation. Site AZ

Y:8:196 was determined by the installation archaeologist to be a contributing element to another NRHP Eligible site based upon the historic documentation of who constructed and used the site. That historic information was not available to CERL and there was nothing at the site to indicate ownership or usage. As a result CERL determined the site Not Eligible. A second site, BMGR-00-B-09, was associated in the historic documents as being associated with the mining industry but no features that were expected at a mining site were present. The historic information was key in answering the questions concerning the regional cottage industry and other economic activities at the site. These examples highlight the need for archival research for all historic sites considered under this methodology.

All of the traditional NRHP site evaluations conducted at BMGR used a much broader interpretation of NRHP eligibility criteria then had ever been encountered by CERL researchers before. All sites except AZ Y:8:196 were evaluated as Eligible under multiple criteria. AZ Y:6:24 and AZ Z:5:10 were eligible under Criteria A and D, AZ Z:6:81 and AZ Z:6:197 were eligible under Criteria A, C and D and BMGR-00-B-09 was eligible under Criteria B and D. Most sites, for example, were determined eligible under Criterion A because they were early 20th century ranching sites and ranching is an event or pattern that has made significant contributions to the broad patterns of history. CERL's interpretation of NRHP eligibility under Criterion A is that the site must play a significant role in the ranching industry or patterns in the region and none of the sites were determined eligible under this criterion.

8 Field Test Results: Piñon Canyon Maneuver Site, Fort Carson, CO

Field work was conducted in August 2019 by Carey Baxter and Susan Enscore of ERDC-CERL. Principle support at PCMS was provided by site archaeologist Craig Dengel. The Fort Carson Cultural Resource Manager is Jennifer Kolise.

Six sites were tested in this effort at PCMS. These are 5LA2320, 5LA3250, 5LA4406, 5LA5820, 5LA5830, and 5LA6104. Ground visibility at the sites was not optimal low scrub brush and dried grasses obscuring the ground surface at many of the sites.

8.1 Determination of typical site features

PCMS is situated on the boundary of Region 4 – the Rockies. Historic contexts specific to PCMS can be found in Haynes and Bastian (1987), Friedman (1985), Clark (2011) and Owens and Baker (2015). Historic documentation indicates that both sheep and cattle ranching as well as farmstead sites are possible within PCMS. Several general trends can be gleaned from these, and other reports that inform on what is a typical ranche for the region.

The first record of ranching or agriculture in the region was the John Hatcher Ranch established in 1846 under a land grant from the Mexican government (Haynes and Bastian 1987). This ranch, immediately south of PCMS, contained an earth and log dam, a 1.5 mile long irrigation ditch and a log cabin. Hatcher planted 60 acres of corn but within a year all of his cattle had been stolen and he was driven off the land by members of the Ute tribe. Hispanic families from New Mexico settled the area and established the town of Trinidad in the 1860s (Haynes and Bastian 1987). These early farmers practiced subsistence farming using irrigation with surplus crops sold to the gold and silver mining boom towns to the north.

In the 1860s, American ranchers began both cattle and sheep ranches within the vicinity of PCMS (Friedman 1985) but sheep ranching was the dominant ranch type. In 1884, the Las Animas County Wool Growers Association was founded (Haynes and Bastian 1987). Sheep ranching continued into the 1940s and 1950s when many of the shepherds converted to cattle ranching. Cattle ranching began when local settlers and farmers purchased

injured and straggling animals from cattle drives that passed through the region. The cattle industry was given a large boost in the 1870s with the arrival of the railroad, which allowed cattle to be shipped instead of driven to market. By the 1880s some ranches had more than 10,000 head. Open-range ranching dominated where the ranch owners owned and controlled water holes and wells and the cattle were allowed to forage freely across public domain grazing land (Haynes and Bastian 1987). By the 1880s, however ranchers were using barbed wire to fence in land, including public domain land, to ensure exclusive use of range lands for their herds.

The end of the 19th and beginning of the 20th century saw an increase in American settlers practicing dry land farming due to high agricultural prices, the development of drought-tolerant corn and wheat varieties and railroad promotion campaigns (Haynes and Bastian 1987). Dry land farming requires much larger farms that allow for portions crop and fallow field rotations. The agricultural boom period ended in the 1930s due to a decline in agriculture prices at the end of WWI and the Great Depression. Many of the farmstead failed and their lands were purchased by the cattle ranchers (Haynes and Bastian 1987.)

The project area has been located along major transportation networks since the early 19th century. The Mountain Branch of the Santa Fe Trail passes through the western portion of PCMS (Haynes and Bastian 1987). This trail not only was a key trading route from the mid-west to New Mexico but also was a key route for mail and stage coach runs. Railroad lines included the Denver and Rio Grande Railroad as well as the Atchison, Topeka and Santa Fe Railroad. The region also supported an industrial and energy production economy through the middle of the 20th century. Coal mining began in earnest in the late 1870s with coal and coke not only used for the railroad but for a steel mill located in Pueblo (Friedman 1985, Haynes and Bastian 1987). Oil and helium wells were also sunk in the PCMS region.

Based on this information we can determine what would be the typical farmstead or ranch at PCMS. Water sources are key to settlement so every ranch or farm should have a well, stock tanks, cisterns and/or irrigation systems. Ranching features should include corrals and loading chutes. These features may be sized either for cattle or sheep. Farm crops include wheat and corn so corncribs and grain silos are also possible. Due to the dry farming practices, farmsteads will be more widely spaced than is seen in the Eastern or Midwestern regions.

Tabular sandstone is commonly available in the region early buildings were dominated by stone or log construction. Milled lumber brought in by the railroads in the later parts of the 19th and early 20th centuries (Clark 2011). Earlier Hispanic dwellings tended to be squarish single room structures with a linear arrangement and corner or exterior fire places. Later Anglo-American houses were designed as multiroom clusters. Dugouts, particularly on hillsides, are also seen in the Anglo-American settlements (Clark 2011). Non-agricultural sources of income in the region include coal and iron ore mining as well as oil and natural gas wells.

8.2 Site 5LA2320 field test

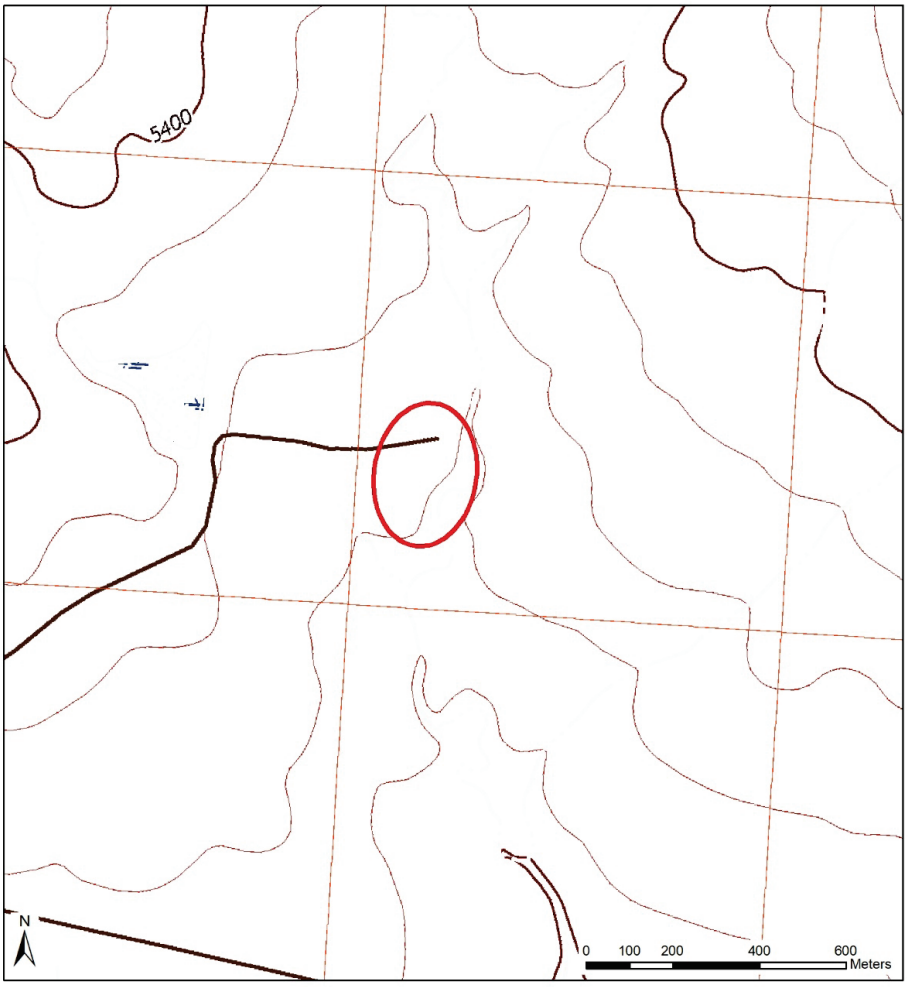
Site 5LA2320 sits on gently sloping land with the high ground located on the north side of the site (Figure 84). A drainage wash closely follows the contour lines on the east side of the site. At the time of the CERL's site visit, the wash was dry. The ground was covered with dry grass and low scrub brush. In some areas, however 100% surface visibility was present. Markers for a gas line run through the site in a N-W direction.

8.2.1 Original Phase I results

The site was first recorded with the Colorado Office of Archaeology and Historic Preservation (OAHP) in 1983 (CO OAHP n.d.) with site revisit forms dating to 1985, 1987, 1994, and 2014. NRHP evaluations were made in 1987 (Haynes and Bastian 1987) and revisited in 2015 (Owens and Baker 2015).

The site was documented as a multicomponent historic and prehistoric site (CO OAHP n.d.). The prehistoric component will not be discussed further in this report. The historic component consisted of three buildings, numerous corrals, a windmill and tank, well and an extensive trash scatter. The site was estimated as being from the 1930s and 1940s but a license plate and calendar dating from the 1920s was documented. Erosion due to farming and grazing and a pipeline was noted. Artifact types described in the site forms include ceramics (stoneware, ironstone, and earthenware) kitchen or serving vessels, wire nails, beds and chairs, horse tack, kitchen utensils, veterinary medicine bottles, wood burning and oil stoves, bottle glass (clear, amber and green glass), canning jars, paint and tobacco cans.

Figure 84. Site 5LA2320 on 2019 USGS 7.5 quadrangle map.



Source: https://ngmdb.usgs.gov.

The researchers went into the house and documented a ground floor bedroom, kitchen, and living or bed room area, an attic and a basement storage room. The house had electricity and electrical parts were also located near the well. A buried electrical cable ran out to the outbuildings. A fire hose was located inside the house and was presumed to be used to pump water from the well to inside the house. The walls were described as in excellent condition with mud mortar. The roof was slightly collapsed. The house was filled with junk including furniture, stoves, papers and old books.

The second structure is an open air barn with shed built within the drip line. The south side of the structure is open and the north side incorporates sheet metal in the construction. The shed is in the northeast corner and has a door on the east side. The presence of a large amount of horse manure indicates that the structure was used in the late 1970s or early 1980s.

The third structure was a small wood framed shack with a trash deposit nearby. This includes cinder blocks, five hot water tanks, rolls of barbed wire, lumber, a sink, a bed, two disc tillers, one planter, a wheeled rake and a number of axels. An additional 30x30 m corral was located 120 north of wooden shed but it was not described in detail. The dirt road documented on the site ran east-west between the barn structure and the shed.

The site was revisited in 1987, 1994, and 2010 (CO OAHP n.d.). The 2010 revisit involved a complete remapping of the site. The principle changes in the site over those years is that the power line described in 1983 was not present by 2010 and there had been some documentation of military training at the site prior to the 1987 revisit The 2010 remapping shows the roads in the current N-S configuration.

8.2.2 Historic documentation

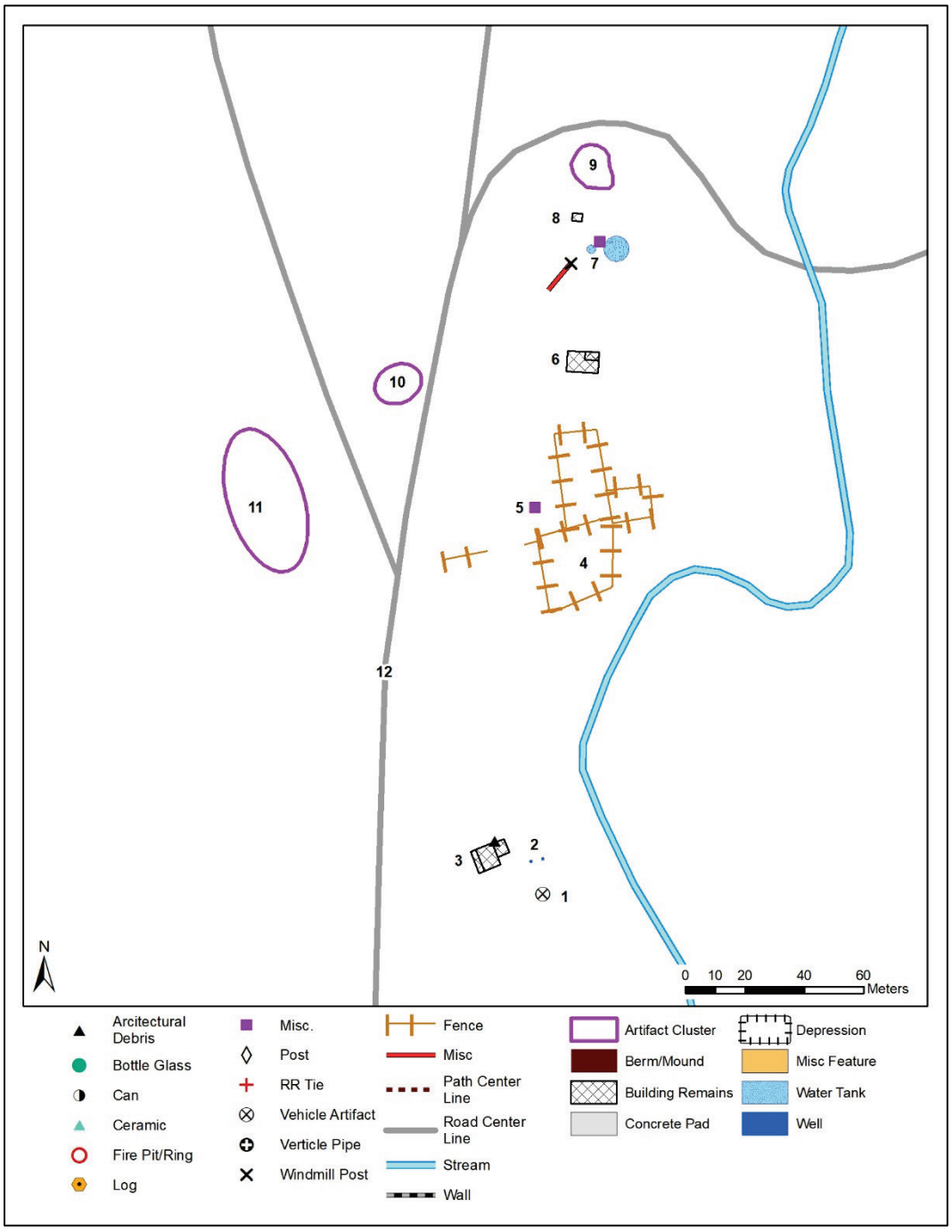
The 1987 NRHP evaluation described the land as being owned by Emil Gagliardi in 1923 and owned by the Denver Joint Land Bank in 1940 (Haynes and Bastian 1987).

Later site history documentation states that the land was first claimed in 1916 by Frank Zabkar who relinquished the land in January 1917 (CO OAHP n.d.). Emil Gagliardi established his residence on the site in February 1917 and filed a claim in March 1917. The listed improvements include a 20x24-ft stone house, chicken coop, two wells and a stable. The land was fenced and the wells were 300 ft deep. Census, military enlistment records and patent records demonstrate that Emil Gagliardi was living in Trinidad through at least 1921. Documentation indicates that by the end of Emil Gagliardi's tenure on the site 40 acres were under plow several tons of hay and a few hundred pounds of beans (Owens and Baker 2015).

The land was assigned by the County Clerk to the Denver Joint State Land Bank in 1932 but Gagliardi continues to pay taxes on the plot through 1935 so the transfer likely represents a mortgage. The land was sold to Frank and Evelyn Inman in 1943 and to the Crowders in 1972. Inman was a prominent citizen of Trinidad, owning a bar, serving as a city alderman, a councilman and president of the Model Water Users Association. There is no evidence that the Inman's ever lived on the site. Oral history refers to the site as a sheep camp.

8.2.3 ERDC-CERL site visit

Figure 85. Site 5LA2320 site Map.



Source: ERDC-CERL (2020).

The site feature descriptions are:

1. Vehicle Artifact. Car hood.
2. Well/Cistern. Two circular cisterns or wells. Stone lined and covered with piles of milled lumber. This may represent collapsed wooden buildings or wood debris that was thrown over the holes to prevent accidents
3. Building Remains. Stone L-shaped house. Wooden gabled roof in extreme disrepair. Wooden window and doorframes still in place. A concrete slab indicates that there was porch on the west side. There is also a raised foundation area in the L corner that may have had a smaller wooden addition. Furniture is still present in the house. Exterior cellar entrance on the east side demonstrates that there is at least a partial cellar. On the north side of the house is a concrete insert in the wall with a square hole that may have been an exhaust
4. Fence. Corral constructed of railroad ties and juniper log posts with barbed wire and horizontal planks. Loading chutes are present on the south side of the corral.
5. Misc. Enameled metal washstand on metal stand with casters.
6. Building Remains. 3 sided structure. The south side is open and north side is clad in metal. Tin sheet roof in very poor condition. On the north east corner there is a small enclosed room of wooden plank construction. Superstructure rests on concrete block foundations. This building is a barn or animal shelter
7. Water tank. Large concrete and smaller plastic stock tank. Plastic tank is modern and is fed by PVC pipe. Concrete tank may date to the site historic occupation. In between the two tanks are modern solar panels. West of the tanks is a collapsed metal windmill.
8. Building Remains. Small frame shed with flat roof. The door is located on the south side and there are windows on all four sides. A pile of metal pipes and lumber is located on the east side. The building is on the verge of collapse. This structure likely a pump or well house.
9. Artifact Cluster. Large cluster of telephone poles (cut into 6-8-ft lengths), broken concrete blocks and coils of barbed wired. This does not represent a collapsed or decaying feature but a pile of supplies or debris.
10. Artifact Cluster. Large cluster of railroad ties and telephone pole sections in a slightly rectangular shape. May represent a collapsed structure or pen but there is no clear sign of foundations or clear wall structure.
11. Artifact Cluster. Cluster of debris including wood, lumber, concrete block and farm equipment. There are farm implements including at least one disc tiller. Multiple hot water heater tanks are present. Some of the lumber debris is in a rough square shape and may be a collapsed building but

foundation and structure is not apparent. It may also represent a dumping episode.

12. Road. Track road. Likely dates to the historic occupation of the site. Shows signs of continued use and maintenance.

The site is a well preserved farmstead with standing domestic and ranching buildings and features. The main dwelling structure has multiple interior rooms whose function can still be determined (Figure 86). There was not a large number of artifacts on the ground but a large number of artifacts and debris inside the house itself. The corral structure was also in good shape but the stock chutes are showing signs of collapse (Figure 87). The large debris scatter on the west side of the site may actually represent additional collapsed structures but there was not sufficient evidence for size, location or shape to make that determination (Figure 88). The presence of some farming equipment indicates that there were likely agricultural practices in addition to ranching. The maintained road as well as the presence of a modern stock tank and solar panels indicate that the site is still used in some capacity to this day but there is very little to no evidence of site disturbance or trash dumping at the site.

The corral described as 150m north of the site was not located. CERL researchers did not go that far north in their exploration but with surrounding visibility if the structure were standing it would have been visible from the main portion of the site and nothing was seen. The earliest site documentation describes erosion due to farming. No evidence of plow marks could be seen. Yellow fiberglass poles marked a presence of a buried gas line between Feature 3 and 12 indicating that some digging on site has occurred. It is unclear if the road realignment between the 1983 and 2010 maps actually represents a new road added to the site or if the N-S road was present but not used at the time of the survey so more ephemeral in its nature. The current alignment of the road is more logical than the original map. There should be a road or access to the main dwelling structure. The 1983 map required a 230m walk from the house, past the barns and livestock pens to the mapped road.

Figure 86. 5LA230 Feature 3. View from NW to SE.



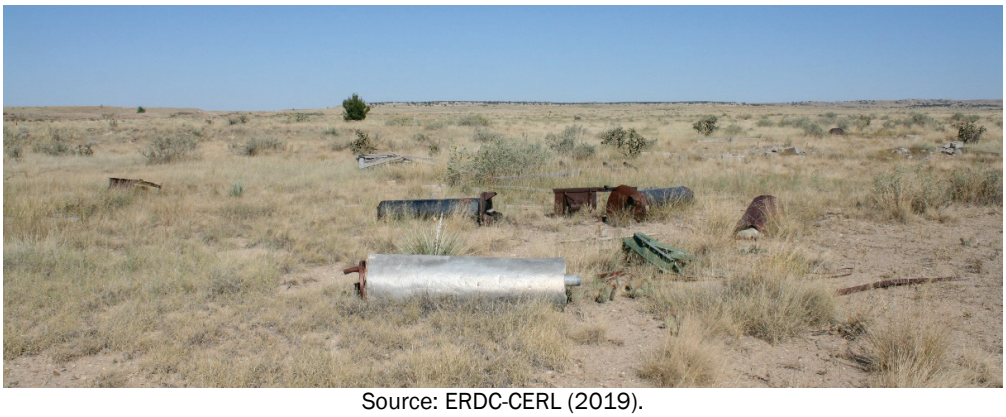
Source: ERDC-CERL (2019).

Figure 87. 5LA2030 Feature 4 with Feature 6 located in back left. View from S to N.



Source: ERDC-CERL (2019).

Figure 88. 5LA2320 Feature 11. View from E to W.



Source: ERDC-CERL (2019).

8.2.4 Ranch Eligibility Evaluation Form

Based on the information above the evaluation form is as follows.

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to the 1870s? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **YES**
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a ranch? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **YES**
4. Is there potential for intact buried deposits based on subsurface testing and/or evidence of ground disturbance or erosion? **YES**
5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **YES**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **NO**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **NO**
2. Does this site possess a source of water (dam ponds, well, cistern, stock tank, spring, etc.)? **YES**
3. Is there a foundation larger than 10 x 10 ft. and less than 30 x 30 ft. on the site? (Note: structures that fall outside of these ranges are likely outbuildings.) **YES**
4. Is there evidence of small (wells, privy, shed, etc.) or large (stables, barns, bunk houses) architectural features? **YES**
5. Is there evidence of corrals, stock chutes and/or stock dip ponds? **YES**
6. Is there evidence of fence construction? **NO**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**

8. Is there evidence of landscape features (such as roads, paths, gardens, regular shaped depressions, berms, etc.) at the site? Non-architectural landscape features provide significant information about site activity patterns, layout and usage. **YES**
9. Was the site occupied by a person of historical, regional, or local significance? **NO**

Based on the results of the eligibility evaluation form, site 5LA2320 is **Eligible** for inclusion on the NRHP. With four "yes" answers in level 1 and 5 "yes" answers in level two this site shows a high level of preservation. Domestic, ranching and other activities on the site are clearly spatially defined providing good information on site activities. The presence of three standing structures, each one with a different site function (dwelling, livestock shelter, water procurement) and construction techniques is extremely interesting and makes the site an excellent case for study. There were very few domestic artifacts on the site, but significant amounts of material were seen within the house. There is some evidence of site disturbance in the form of the gas line and the potential realignment of the road but these disturbances do not seem to impact the major portions of the site.

8.2.5 NRHP evaluation results

The site was first evaluated for the NRHP in 1987 (Haynes and Bastian 1987). Their determination was that the site was Not Eligible. The site was described as in poor condition with dilapidated outbuildings. The site descriptions provided emphasized the 20th century features of the site including poured concrete features around the house and evidence of electrification. It should be noted that at the time of this evaluation the site had not been abandoned long enough to be considered under the NHPA.

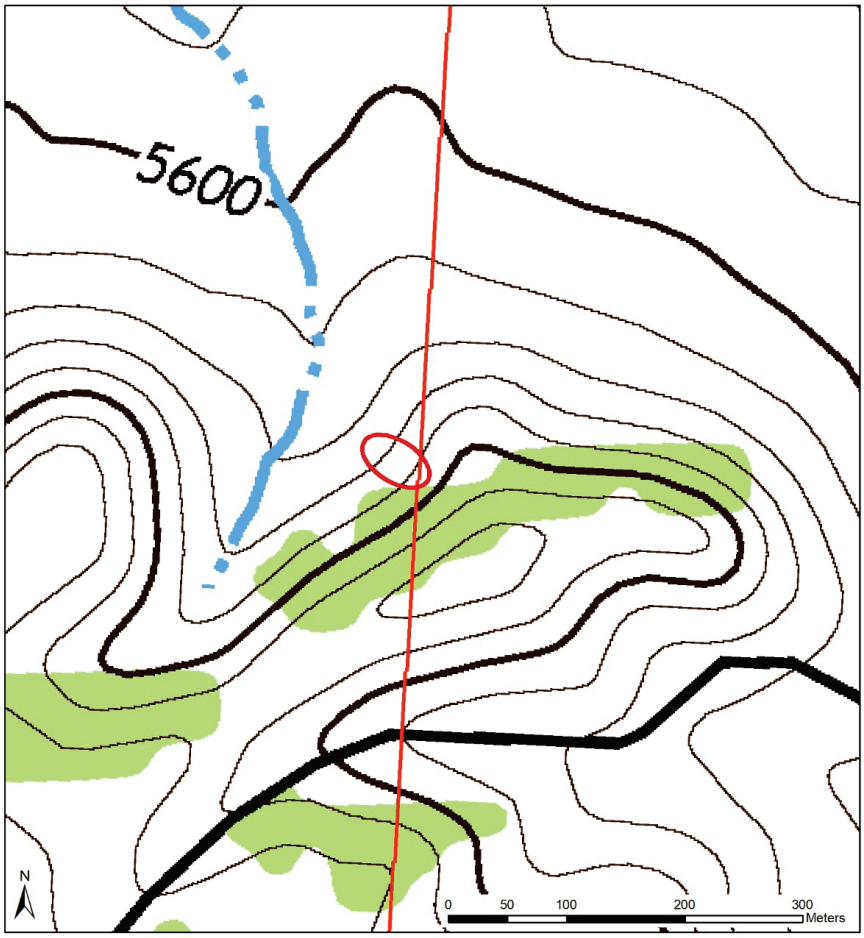
The site was reevaluated in 2014 (Owens and Baker 2015). Descriptions of the features and structures is very close to what CERL encountered at the site and documented at the 2010 revisit (CO OAHP n.d.). Sixteen shovel tests were conducted on the western portion of the site. These shovel tests, however, were focused on the prehistoric component of the site. Only one was positive but had prehistoric and historic artifacts mixed in the top 10cm of the unit. Soil formation was observed in all the probes with carbonate development indicating that the soils has not been disturbed for some time. The historic component of 5LA2302 was determined to be **Eligible** for the NRHP under Criterion C (particularly the main house) as an embodiment of a type, period and method of construction. The site spatial

organization, architectural character and period of significance (1917-1964) also qualify the site under Criterion D. The site was described as having "integrity of location, design, materials, workmanship, feeling and association" (Owens and Baker 2015:6-37).

8.3 Site 5LA3250 field test

Site 5LA3250 is a small site located on a steep slope (Figure 89). The eastern side of the site is highest elevation. Juniper groves are located on the north and south side of the site. There is significant evidence of erosion down the entire slope. The vegetation is dry grass both on the slope and in the valley below the site. An intermittent stream is located approximately 100 m west of the site. The site overlooks that town of Thatcher, located 2.25 km to the north.

Figure 89. Site 5LA3250 on 2019 USGS 7.5 quadrangle map.



Source: https://ngmdb.usgs.gov.

8.3.1 Original Phase I results

The site was originally documented in 1984 with site revisits in 2009 and 2017 (CO OAHP n.d). The site was described as a structure constructed into the hillside out of railroad ties. The structure had collapsed. The entrance could not be located and the roof was assumed to have been dirt or sod. Artifacts recovered included tin food cans, window glass, a glass bottle neck and a suitcase frame. It was postulated that additional artifacts could have been washed down the slope and buried due to water erosion of the site. No subsurface testing was conducted. A detailed map of the structure was completed.

8.3.2 Historic documentation

Archival research was conducted and reported in Ward et. al. (2018) and is summarized here. The original land claim was filed in 1919 by Arthur J. Middleswart of Bridgeport NE. The final grant was issued in 1925. The land the site sits upon was withdrawn for War Department Army training in 1942. At that time, the land was owned by the Bureau of Land Management (BLM). A complete chain of title was not conducted for the property.

Middleswart settled in the region after his service in WWI. The property was described as 5 miles of fencing, a 60 x 60 ft. post corral, an earthen dam built across an arroyo and a 12 x 14 ft. house made of poles and adobe. A barn was never built as Middleswart declared that the terrain provided protection for stock. Patent documents state that the dam had washed away in 1922. Much of the land was leased to the Bloom Cattle Company and Daniel Ahern for a combined leased income of $78-$88 per year. The only livestock he is recorded as owning is two horses.

Middleswart does not appear in local directories or census data as a rancher but worked a variety of jobs including bridge construction for the Santa Fe Railroad, a driver for Floyd Wet Wash Laundry, a repair man for an auto shop, a vulcanizer for the Toller Motor Company and a foreman for a WPA sanitation project. Middleswart married in 1924 in Trinidad and the family frequently appears in the Trinidad City Directory. The family had left the area by 1945 when they appear in the Denver City Directory.

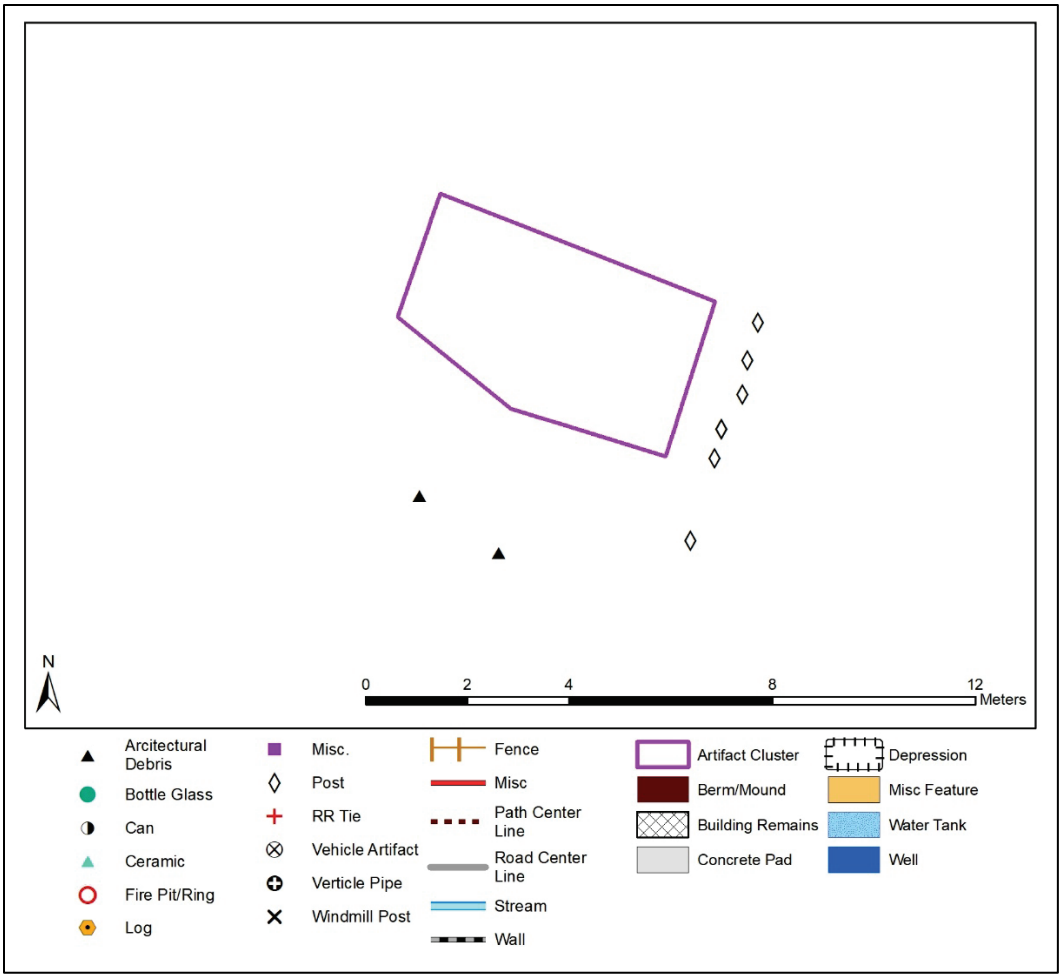
The historic documentation would indicate that Middleswart did not permanently occupy the site and may have abandoned it after the loss of the

dam in 1922. The principle value in the property was the income derived from leasing the land to larger local ranching operations.

8.3.3 ERDC-CERL site visit

CERL researchers identified one feature at the site (Figure 90). This consisted of the remains of a structure, most likely the house made up of railroad ties.

Figure 90. Site 5LA3250 site map.



Source: ERDC-CERL (2020).

The remains of the house consist of a row of vertical railroad ties located on the upslope side of the feature (Figure 91). Down slope from the posts is a scatter of logs and lumber planks (Figure 9 and shown in Figure 90 as an artifact cluster). This represents the collapsed roof. The logs and lumber are oriented perpendicular to the slope. Mixed in with the lumber was a small amount of wire nails and miscellaneous metal fragments including a

piece of metal strapping. On the southern side of the site were two isolated logs, the position of these two logs across the slope from the debris field makes it unlikely that this is debris from collapsed roof. No other artifacts were noted on the site, including areas downslope of the site. No evidence of the corral or dam mentioned in the historic documents could be found. No road or path for site access was seen. The site appears to continue to be affected by water erosion down the slope.

Figure 91. 5LA3251. View from S to NNE.



Source: ERDC-CERL (2019).

Figure 92. 5LA3250. View from N to S.



Source: ERDC-CERL (2019).

8.3.4 Ranch Eligibility Evaluation Form

Based on the information above the evaluation form is as follows.

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to the 1850s? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **NO**
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a ranch? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **YES**

4. Is there potential for intact buried deposits based on subsurface testing and/or evidence of ground disturbance or erosion? **NO**
5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **YES**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **NO**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **NO**
2. Does this site possess a source of water (dam ponds, well, cistern, stock tank, spring, etc.)? **NO**
3. Is there a foundation larger than 10 x 10 ft. and less than 30 x 30 ft. on the site? (Note: structures that fall outside of these ranges are likely outbuildings.) **NO**
4. Is there evidence of small (wells, privy, shed, etc.) or large (stables, barns, bunk houses) architectural features? **NO**
5. Is there evidence of corrals, stock chutes and/or stock dip ponds? **NO**
6. Is there evidence of fence construction? **NO**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**
8. Is there evidence of landscape features (such as roads, paths, gardens, regular shaped depressions, berms, etc.) at the site? Non-architectural landscape features provide significant information about site activity patterns, layout and usage. **NO**
9. Was the site occupied by a person of historical, regional, or local significance? **NO**

Based on the results of the eligibility evaluation form, site 5LA3250 is **Not Eligible** for inclusion on the NRHP. With two "yes" answers in Level 1 and zero "yes" answers in Level 2 the site has little potential to inform on ranching, farming or domestic practices of region. It is possible that additional artifacts may be buried at the bottom of the slope but the historic record indicate that this site represents a temporary occupation and any artifacts recovered are unlikely to provide unique information.

8.3.5 NRHP evaluation results

The site was first evaluated for the NRHP in 1984 (CO OAHP n.d.). The site was determined to be Not Eligible for the NRHP but associations with the Homestead Act of 1909, the Great Depression and the Dust Bowl were noted. In 1995 the site was listed as a potential contributing element to a

proposed EuroAmerican archaeological district for homestead sites. As a result the Colorado State Historic Preservation Office requested additional archival assessment and subsurface testing.

The re-evaluation of the site was conducted in 2017 (Ward et. al. 2018). Site mapping was not redone as the original 1984 map was determined to be adequate and accurate. The dam, corral or fence described in the historic record could not be located. In addition to the historic documentation described above, shovel tests were conducted inside and outside of the structure remains. The shovel test within the structure discovered a top layer of silt and erosion debris overtop a layer of coursed and tilted limestone slabs that were interpreted to be a collapsed wall. Beneath this layer a compacted clay surface believed to be the original dirt floor was discovered. Three military buttons and a metal clasp were recovered from the layer of the collapsed wall. The buttons were first produced in 1902 and remain common to the present day. The shovel test conducted was exterior to the house aligned to the wall of posts on the north side of the house. Stacked limestone slabs were present at the surface adjacent to the testing location. A buried railroad tie or post was located 10cmbs. Artifacts recovered included 16d wire nails, steamer trunk parts, sanitary cans, meat cans, spice and tobacco tins, window glass, rusted metal, lard pails and bailing wire.

The site was determined as **Not Eligible** for the NRHP. The proposed historic district was never finalized so the site is not part of a larger district. It was determined that Middleswart did not improve the property above the bare minimum to establish his claim, did not make a subsistence living through farming or ranching, and likely did not occupy the site for any significant time. The site was also in ruins and many of the remaining elements are scattered downslope and not in their original location. It was determined that the site could not provide any information that would enrich the understanding of the region for the 1920s.

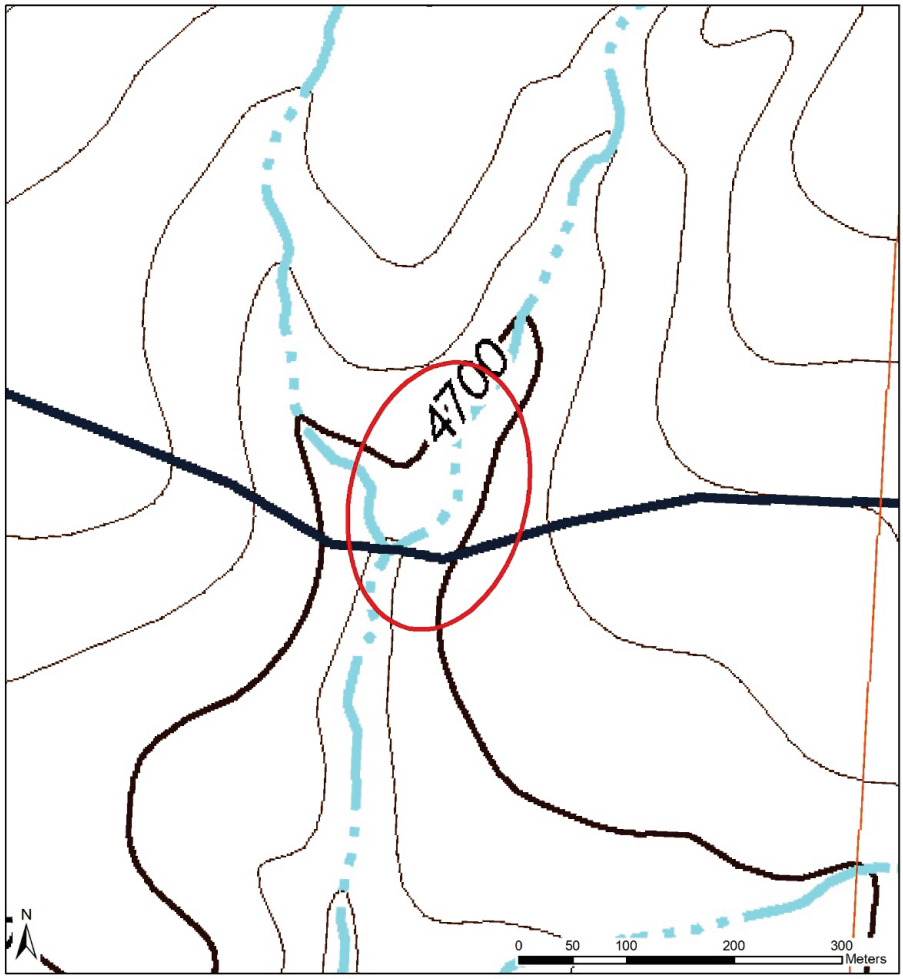
8.4 Site 5LA4406 field test

Site 5LA4406 is located on slightly sloping terrain with the high ground on the north side of the site (Figure 93). The site is divided into three distinct areas by a natural drainage wash and a modern road used and maintained by the military. At the time of the site visit the washes were dry. The vegetation consisted of dry grass with very small amounts of low scrub. The grasses grew in clumps so approximately 50% of the soil surface was visible. Established scrub was growing within the drainage wash.

8.4.1 Original Phase I results

The site was first recorded with the state of Colorado in 1987 with a site revisit in 2014 (CO OAHP n.d.). This survey documented five features. Two features were located on the northern portion of the site, between two intermittent converging streams. One feature was described as a dugout of stone and milled lumber construction with a frame addition. The feature size was 4.7 m square and oriented north-south. West of the features was a scatter of lumber and stone blocks covering an area approximately 5 x 10 m. in size. The second feature was a scatter of sandstone and milled lumber approximately 9 m. in diameter. No clear form or shape could be determined but the feature was interpreted as a structure with tabular sandstone foundation and frame superstructure. There were a small number of juniper fenceposts and barbed wire in the area of these two features indicating they may have been fenced at one time.

Figure 93. Site 5LA4406 on 2019 USGS 7.5 quadrangle map.



Source: https://ngmdb.usgs.gov.

The third feature was east of the stream drainages and is described as a barn made of shaped sandstone blocks with rounded corners and pole and wire fencing encompassing the exterior. This site was interpreted as a barn and it was postulated that the rounded corners may indicate that it was an early construction to the rest of the site. The final feature was located south of the current road and described as a sandstone block and slab foundation for a barn. It was supposed that the superstructure was either removed or was adobe. The final feature was also south of the road and consisted of a water trough of stone and concrete. A two-track road was noted passing through E-W through the site south of Features 1 and 2 but north of Feature 3. Artifacts collected include bottle and jar glass, wire nails, sanitary tin cans, window glass, ceramics, tin and enameled tin pots/pans, a Boyd mason jar lid and a.32 caliber pistol cartridge.

8.4.2 Historic documentation

Archival documentation of the site was conducted and reported in Owens and Baker (2015) and is summarized here. The site is located 1km north-northeast the Bent Canyon Stage Station and the Barlow and Sanderson Stage Road, which was part of the Mountain Branch of the Santa Fe Trail in use from the 1860s through the 1870s (DeVore et. al. 2005). There is no evidence of any use of the site at that early period but the presence of nearby transportation nodes and routes may have made the site enticing for the later settlements.

The land was claimed and relinquished three times between 1916 and 1919. Thomas Carter first claimed the land in 1919 and amended his claim 1924 to include his brother's adjacent abandoned claim. The patent was issued in 1926. The entire homestead was 640 acres in size. Carter petitioned to have the land zoned for grazing to eliminate the cultivation requirements under the Homestead Act. His petition stated that 20 acres could support a mature cow and that a well needed to be dug and would hit water at 50 ft.

At the time of the claim Carter was 45 and married. He was living in a shack house on the site but built another house when the 1st burnt down. Despite the zoning request the Carters planted 4-5 acres in melons, 10-20 acres in feed crop, and an unknown amount dedicated to corn, maize and beans. Carter had between 10 and 20 head of cattle between 1919 and 1922 but the land was also being grazed by 200 head belonging to the Rourke

Ranch. Carter began a process of fencing to enclose the land. The site is located on the transportation network. The current military road follows the path a county road constructed in the early 1920s.

Improvement described in the claim paperwork include a 14 x 18 one-room house with a dug-out basement, a stone chicken house, a well and tank, a plastered stock cistern, a 18 x 24 ft. stone stock barn. Other improvements to the ranch but not located at site 5LA4406 include a 16 x 18 ft. stone granary, four wire stock corrals and a stock well, pump and tank.

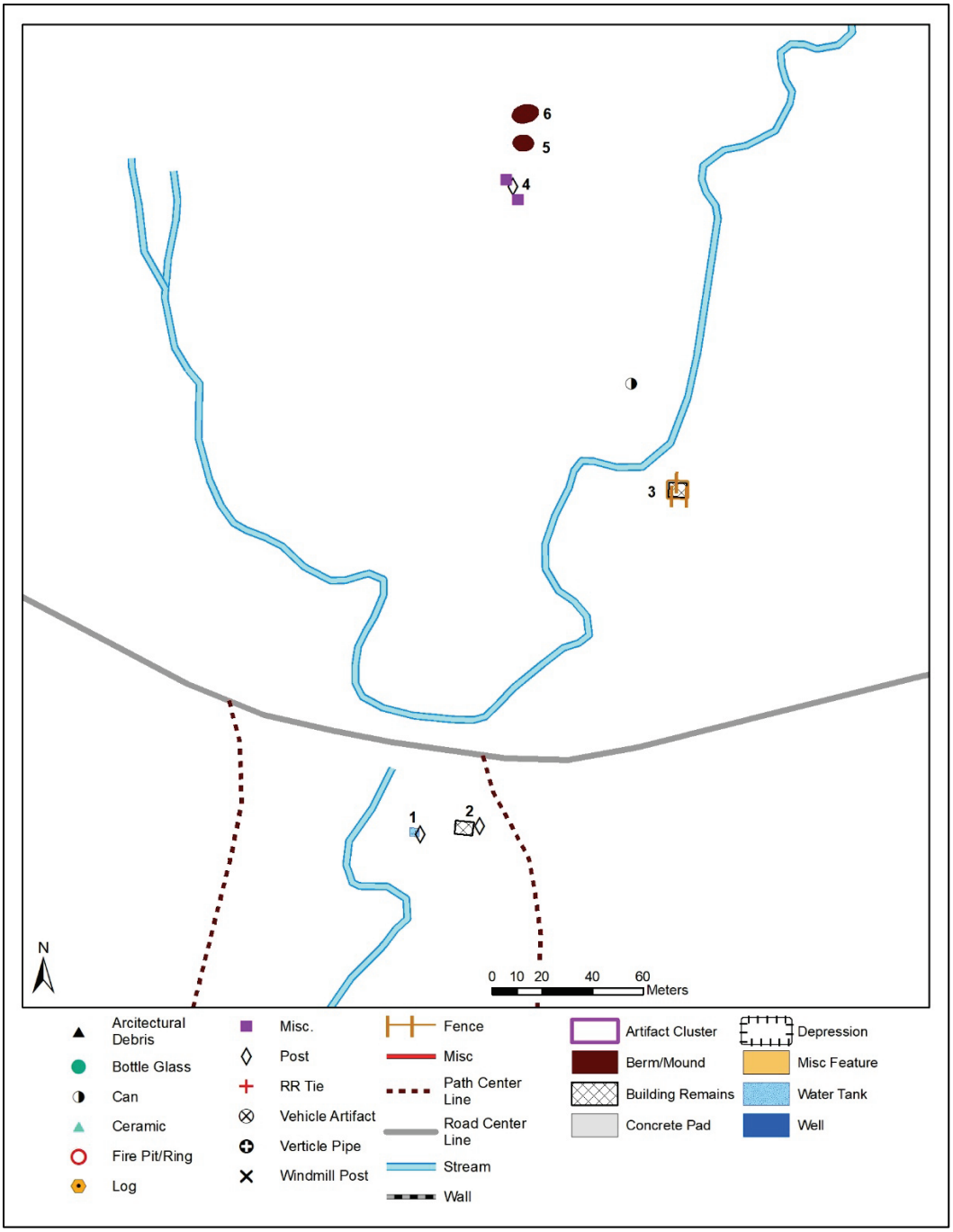
In 1925 a government agent reported on the ranch and noted a well built four room frame house with basement, a shop and meat house with double walls, a 12 x 28 ft. stone chicken house, a cave cellar a 12 x 14 ft. stone hog house, a 18 x 24 ft. granary, corrals, a well and tank. Another farmstead (5LA9766) is located 200m distant from site 5LA4406 on land that still would have been on Carter's property. The historic documentation is not clear if all of the improvements listed are at a single site or might describe features what is now seen as multiple sites.

Tax and census records indicate that Carter paid taxes on the property up until 1944 but resided in La Junta, CO in 1930 and Eureka KS in 1938 and 1941. Carter sold the land to the U.S. Government in 1944 and it was purchased by the Rourke Ranch in 1945.

8.4.3 ERDC-CERL site visit

CERL researchers identified six features located in three clusters across the site (Figure 94).

Figure 94. Site 5LA4406 site map.



Source: ERDC-CERL (2020).

The site feature descriptions are:

1. Water Tank. Concrete lines stone water stock tank. Fenceposts and barbed wire are lying on ground to the east of the tank.
2. Building Remains. Loose stone construction with walls nearly 1m thick. No evidence of mortar, plaster or concrete to anchor walls together. No evidence of roofing. Southern wall is only partially present (on the south western corner). Remaining walls are approximately 0.5m tall. A wooden fencepost was lying on the ground to the east of the site. It is possible that this structure represents a weather break or animal shelter.
3. Building Remains. Loose stone slab construction with walls 0.5m thick. No evidence of mortar, plaster or concrete to anchor walls together. No evidence of roofing. Southern wall is only partially present (on the south western corner). The corners of the structure are slightly rounded. Remaining walls are approximately 2m tall. Structure is surrounded by wooden fencepost and barbed wire and there is sufficient barbed wire and posts on the southern side to close up the gap in the wall to form a secure enclosure.
4. Debris Cluster. This cluster includes (from south to north) a metal plate that may be from a wood burning stove, a wooden post and coiled barbed wire lying on the ground and a small rock pile.
5. Berm/Mound. Small loose cluster of stone slabs. The center of the feature is relatively clear of stone. Slabs are partially buried indicating that they might be footers. Not enough stones remain to determine if the feature is square or round in shape. Soil within the feature is slightly mounded and heavily bioturbated.
6. Berm/Mound. Mound of soil with stone slabs scattered over top. Loose soil with bioturbation. Window glass and wire nails scattered around the mound.

The features that were clearly discernible at this site were associated with ranching activities. These include two structures that may have been barns or stock shelters and a stock tank or cistern. No well was identified. The established vegetation growing in the stream/wash indicate that surface water is not frequently present. A well most likely existed on the southern portion of the site but has been filled in sufficiently to not be noticed. The berms (Features 5 and 6) corresponded in location to the northern features described in 1987. The presence of window glass and nails at Feature 6 would indicate that a building once existed at this location but not enough remains to allow for speculation on the size or nature of this structure. Features 1, 2 and 3 match the 1987 survey in both location and description. Apart from

the architectural artifacts located near Feature 6, there were very few artifacts at the site, including the domestic debris such as food or beverage containers that one would associate with a long-term occupation.

Two N-S oriented two-track paths/roads were clearly evident on the southeast and southwest side of the site. These do not appear on the 1987 survey. The fact that they intersect with the well maintained military road indicate that they are likely not associated with the historic occupation of the site. No trace of the E-W oriented two-track path/road mentioned in the 1987 report could be seen.

Figure 95. 5LA4406 Feature 1. View from SW to NE.



Source: ERDC-CERL (2019).

Figure 96. 5LA4406 Feature 3 showing opening, posts and wire fencing. View from E to W.



Source: ERDC-CERL (2019).

Figure 97. 5LA4406 Feature 6. View from S to N.



Source: ERDC-CERL (2019).

8.4.4 Ranch Eligibility Evaluation Form

Based on the information above the evaluation form is as follows.

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to the 1850s? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **UNKNOWN**
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a ranch? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **NO**
4. Is there potential for intact buried deposits based on subsurface testing and/or evidence of ground disturbance or erosion? **YES**
5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **YES**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **NO**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **UNKNOWN**
2. Does this site possess a source of water (dam ponds, well, cistern, stock tank, spring, etc.)? **YES**
3. Is there a foundation larger than 10 x 10 ft. and less than 30 x 30 ft. on the site? (Note: structures that fall outside of these ranges are likely outbuildings.) **YES**
4. Is there evidence of small (wells, privy, shed, etc.) or large (stables, barns, bunk houses) architectural features? **YES**
5. Is there evidence of corrals, stock chutes and/or stock dip ponds? **NO**
6. Is there evidence of fence construction? **NO**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**
8. Is there evidence of landscape features (such as roads, paths, gardens, regular shaped depressions, berms, etc.) at the site? **NO**
9. Was the site occupied by a person of historical, regional, or local significance? **NO**

Based on the results of the eligibility evaluation form, site 5LA4406 is **Not Eligible** for inclusion on the NRHP. With two "yes" answers in Level I and three "yes" answers in Level II the site does not meet the minimum standard of integrity and feature diversity. There is intact architecture including one structure that is 2m. tall, but the variety of structures is very limited. No portion of the site could be clearly identified as a domestic or living area. Apart from the fencing associated with the two surviving foundations there is no evidence for other fencing that would inform on how livestock was managed on the site. The southern portion of the site has and is being impacted by road use and maintenance.

It is unclear if this site is associated with site 5LA9766. The descriptions of the structures in the later patent documentation does not match what is at the site. In particular there is no evidence of a multiroom house with basement. It is possible that this was the first occupation site of the Carter family and in the mid1920s the homestead relocated to 5LA9766 but maintained use of a few of the livestock features at 5LA4406. If that is the case then this site may be a contributing element to 5LA9766 eligibility but it cannot be considered eligible by itself. Site 5LA9766 was not selected by the installation for this study and CERL researchers did not visit that site.

8.4.5 NRHP evaluation results

The original 1987 survey classified site 5LA4406 as 1 of 85 Homestead Site Type 1 resources with an occupational period between 1916 and 1930 (Owens and Baker 2015). This type represents an early Anglo-American homesteading attempt. The sites are typically functionally simple with rudimentary levels of development or improvement. The 1987 survey recommended, with OAHP concurrence, that the site be classified as Not Eligible for the NRHP. In 1995 5LA4406 was described as 1 of 83 contributing properties to a proposed EuroAmerican archaeological district for homestead sites. This proposed district was never finalized.

In 2014, the site was reevaluated comply with 2007 OAHP documentation standards and to reassess the site with new data. Twelve shovel tests were conducted including one test within the four features described in 1987 (CERL features 2, 3, 5 and 6). Shovel tests outside of these features were all negative. Shovel tests located within the features did not identify buried occupation levels, feature construction or structural elements or diagnostic artifacts. Artifacts that were recovered included wire nails, window glass, sheet metal, milled lumber, bottles, cans, stove and lamp parts, white

glazed earthenware sherds, a metal wire clothes hanger and a wooden broom handle. Bottle glass is aqua or clear in color with only a few pieces of sun-colored purple glass or milk glass. The artifact assemblage is representative of the early decades of the 20th century.

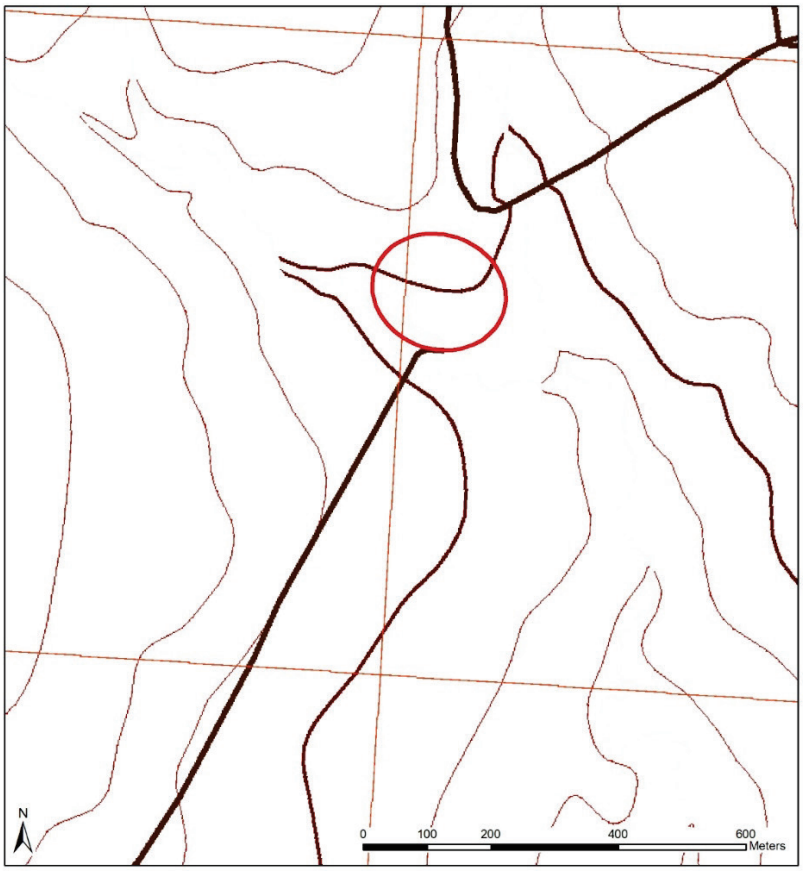
Feature interpretations in 2014 are similar to the 1987 evaluation with the exception of the structure foundations south of the road (CERL Feature 2). The historic documentation of 1925 described a double walled shop and meat house. The walls of this feature are nearly 1 m. in width and its location adjacent to the 1923 county road indicate that this feature is not a barn but instead the shop described in the historic documents.

The 2014 re-evaluation of site 5LA4406 is that the site is **Not Eligible** for the NRHP. Shovel tests did not locate buried cultural material. The architectural features are in ruins with no indication of unique style or construction methods. The artifact assemblage was sparse in quantity and diversity and conformed to the occupation period described in the historic record. The site was determined to have low probability to contribute additional information about the period for the region.

8.5 Site 5LA5820 field test

Site 5LA5820 is located on a moderate slope with the high ground located on the north side of the site (Figure 98). The southern side of the site is bounded by a drainage wash. At the time of the CERL visit to the site the wash was dry and established intermittent scrub brush was growing at the bottom of the wash. The ground surface over the site was covered with dried grasses with surface visibility at 20-30%. A modern driveway is located 70m north of the site and a mid to late 20th century house is 190m northwest of the site.

Figure 98. Site 5LA5820 on 2019 USGS 7.5 quadrangle map.



Source: https://ngmdb.usgs.gov.

8.5.1 Original Phase I results

The site was originally documented in 1985 with site revisits documented in 1987, 2002, 2005, and 2013 (CO OAHP n.d.). The site was described as a modern prefabricated house, a stone dugout with a frame front addition and interior walls covered in wall board, a gable-fronting barn with metal siding over a wooden frame, a frame garage with metal sheeting siding and a side gabled roof, a small board-and-batten shed attached to the garage, and a front gable structure that appeared to be part of a railroad car with mounted on axles and four wheels. Also at the site was a round metal tank with a flat roof that was converted to storage with two doors and a window added. The 1985 site report does not describe any artifacts at the site.

The 1987 site report describes the same features as the 1985 report with multiple additional features added to the inventory. East of the dugout was a cement lined cistern with "Jan. 8, 1940" scratched into a square cement cap. West of the dugout was the remains of a limestone foundation heavily

disturbed by tank tracks. The function of this structure was undetermined. The metal-clad frame barn was estimated to have been of later date and constructed in the 1950s or 1960s. A rectangular corral of milled lumber and juniper was associated with both the metal barn and the garage (which the 1987 report calls a stable). A stone pile suspected of being a privy was described southwest of dugout. This feature had milled lumber scattered downslope of the rock pile that may have been a collapsed superstructure. There were minimal associated artifacts consisting of two concentrations of bottle and jar glass, ceramics, cartridges, wire nails and sanitary tin cans. The location of these concentrations was not described. The metal tank with doors and windows as well as the train car were not listed in the features seen at this site visit. The site was revisited again in 2002. The description is similar to the 1987 report but the disturbed limestone foundation and rock pile/potential privy were not described as present in the site report.

8.5.2 Historic documentation

Some elements of historic documentation appeared periodically throughout the various site reports (CO OAHP n.d.) but was collected in Stell Environmental Enterprises, Inc. (2013). The findings are summarized below.

The land was settled by a Mexican named Marcos Salas (originally Salaz) in the winter of 1915. The property was determined unfit for cultivation due to shale outcroppings. In 1919 the property was described as containing a house, barn, a spring and reservoir, two stock sheds, grazing land, wire corrals and 1000 sheep. The patent for the property was issued in 1922.

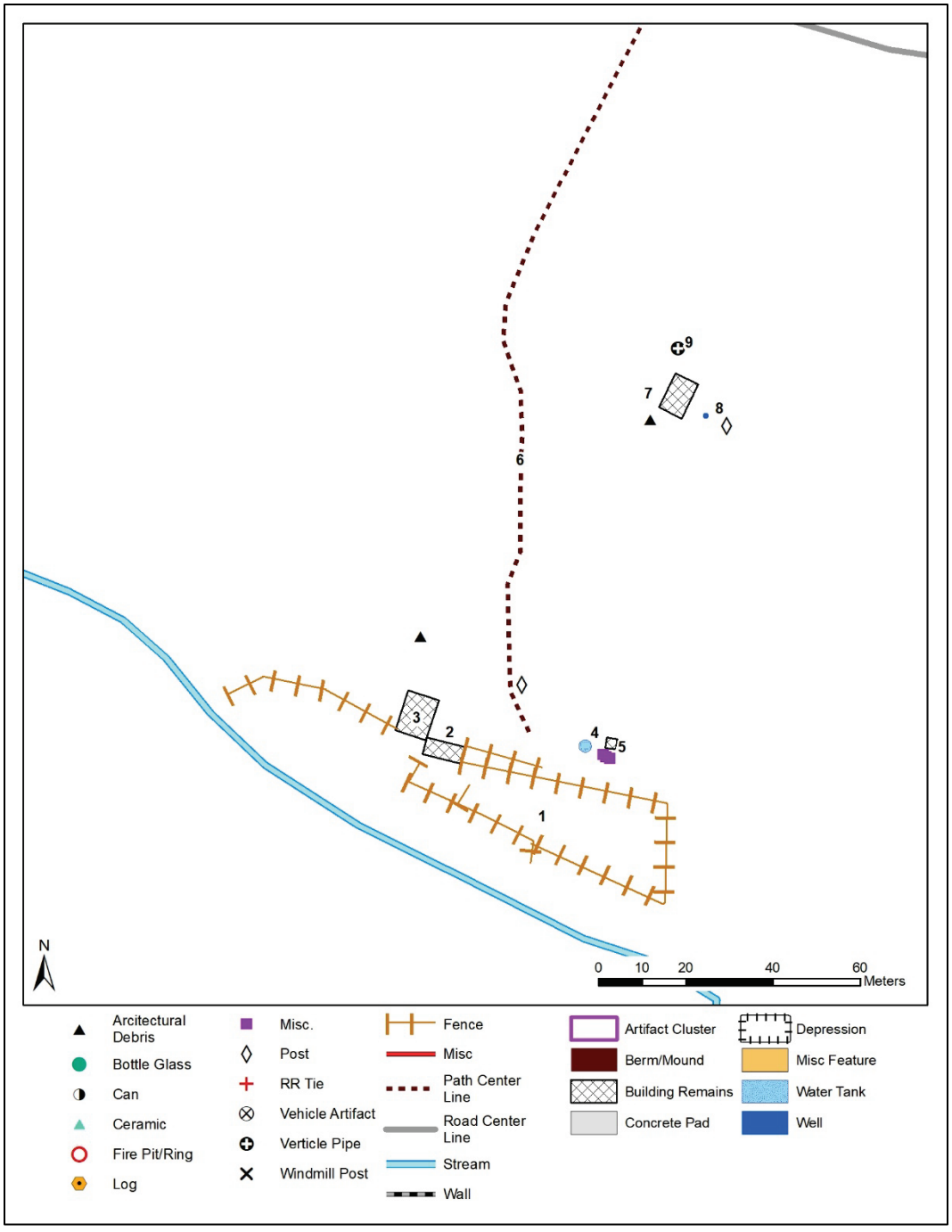
By 1940, the ranch had been sold to Julius Gunter. Gunter was a son-in-law of S. T. Brown and a principle owner of Brown's Sheep Camp, one of the largest ranching operations in the region. Gunter had served as Associate Judge to the Colorado State Court of Appeals from 1901 to 1904, Justice of the Colorado Supreme Court 1904-1916, and as Governor of Colorado 1916-1919. In 1919, he returned to a private law practice in Denver. Gunter is not recorded as having lived at 5LA5820 and the site was used as a station for Brown's Sheep Camp and later the Big Canyon Grazing Association.

8.5.3 ERDC-CERL site visit

CERL researchers located 9 features at the site (Figure 99). Not located were the rail car and metal water tank with doors and windows that were

described in 1985 (probably removed prior to 1987). The limestone foundation west of the dugout and the rock pile southwest of the dugout described in various site reports were also not relocated. It is possible that the rock pile was disturbed enough during shovel testing that is it no longer discernible as a feature.

Figure 99. Site 5LA5820 site map.



Source: ERDC-CERL (2020).

The site feature descriptions are:

1. Fence. Wooden post and barbed wire fencing to form a corral. Wooden mangers and stock chutes are located near the center of the corral near Feature 2.
2. Building Remains. Small wooden and metal shed that joins into the corral. Most of the walls are wooden but the western half of the south side is metal sheeting. Roof is tin and slightly slanted away from the corral. A poll with wiring extends about the roof on east side indicating the potential for electricity either in the shed or for the corral. Footers are concrete. Structure is near collapse.
3. Building Remains. 1 ¾ story barn with a gabled metal roof and metal sheeted walls. Plywood door has modern hasp and pad lock on it. The southern door is open and a military style desk was seen inside the structure. Footers are stone clad in concrete. Northwest of structure is a collapsed wooden table with 3-4 in. tall walls around the outer side. May have been feeding trough, worktable, washbasin, etc. Lack of axle or wheel precludes this from being a narrow wagon.
4. Water Tank. Galvanized steel water tank fed from a PVC pipe. Solar panels located SE of tank (south of Feature 5). This tank is a modern feature. Old power line (with aircraft balls on the wire) terminates at the tank and runs NE off the site.
5. Building Remains. Concrete cellar covered with wooden planks. Planks look like door or lid – not collapsed building. On the west side of the feature is an upright pole with switchbox wired to it. Feature may be the remains of an old stock tank, well or cistern.
6. Path. Track dirt road.
7. Building Remains. Partially subterranean stone dugout structure. Roof is slightly arched, wooden and covered in asphalt shingles. Stone is mortared together with concrete window frames are wooden. Structure is on a slight hill that sloped downward toward the south so the southern wall is taller than the northern wall. On the south side of the structure there is a frame addition with milled lumber walls covered in tar paper and asphalt sheets. The door is on the south side and windows are on all other sides. A metal stovepipe emerges from the roof on the east side of the house and a pole with electrical wiring and switchbox is also located on the east side.
8. Well/Cistern. Concrete square platform with 1-ft metal vertical pipe in the center. Pipe is covered with plywood weighted down with rocks. Likely well or underground cistern.
9. Metal Pipe. 8” metal pipe lying on ground. Pipe is more than 4 meters long. Oriented approximately N-S.

The site is a preserved sheep camp with domestic and ranching activity areas clearly discernible. The only structure that is clearly part of the original construction is the stone dugout (Feature 7) (Figure 100). This dugout has been modified by the addition of a frame addition on the south side (date unknown) and wall board and concrete floor additions in the interior. The garage/stable (Feature 2, Figure 101) is of unknown date but Feature 3 was described as being of 1950s or 1960s construction. Historical documents state the original corrals were located east of Feature 7 near a spring and reservoir so the Feature 1 corrals are a later construction. The cistern east of the house is dated to 1940 and Feature 5 is of unknown date (Figure 102).

There is also evidence of continued site use by the military. Early site reports indicate tank activity between Feature 6 and 7. Feature 3 has a current pad lock and a military desk is located within that building. A modern water tank powered by solar panels is also present. Very few artifacts were observed on the ground. These consisted of nails and window glass near Feature 7 as well as nails and wire fragments around Feature 1.

Figure 100. 5LA5820 Feature 7. View from NE to SW.



Source: ERDC-CERL (2019).

Figure 101. 5LA5820 Feature 2. View from SE to NW.



Source: ERDC-CERL (2019).

Figure 102. 5LA5820 Feature 5. View from S to N.



Source: ERDC-CERL (2019).

8.5.4 Ranch Eligibility Evaluation Form

Based on the information above the evaluation form is as follows.

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to the 1850s? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **NO**
    a. If NO: Is the site 75% or more disturbed? **YES**
        (1) If YES: Site has altered integrity and therefore is NOT significant.
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a ranch? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **YES**
4. Is there potential for intact buried deposits based on subsurface testing and/or evidence of ground disturbance or erosion? **UNKNOWN**
5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **YES**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **NO**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **NO**
2. Does this site possess a source of water (dam ponds, well, cistern, stock tank, spring, etc.)? **YES**
3. Is there a foundation larger than 10 x 10 ft. and less than 30 x 30 ft. on the site? (Note: structures that fall outside of these ranges are likely outbuildings.) **YES**
4. Is there evidence of small (wells, privy, shed, etc.) or large (stables, barns, bunk houses) architectural features? **YES**
5. Is there evidence of corrals, stock chutes and/or stock dip ponds? **YES**

6. Is there evidence of fence construction? **NO**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**
8. Is there evidence of landscape features (such as roads, paths, gardens, regular shaped depressions, berms, etc.) at the site? **NO**
9. Was the site occupied by a person of historical, regional, or local significance? **NO**

Based on the results of the eligibility evaluation form, site 5LA5820 is **Not Eligible** for inclusion on the NRHP. With two "yes" answers in Level 1 and 4 "yes" answers in Level 2 the site meets the bare minimum of criteria for eligibility. However the answers to Level I question 1 indicate that the site has been modified so much with continued use that the original integrity of the site no longer meets NRHP standards. This modification has continued even after archaeological surveys began in 1985 with the removal of two features (water tank and train car) and the addition of metal stock tanks and solar panels.

8.5.5 NRHP evaluation results

In 2005 the site was revisited for the purpose of conducting shovel tests (CO OAHP n.d.). The tests were focused on the northern portion of the site, around the dugout structure. The limestone foundation and rock pile were relocated. Only two shovel tests produced material more than 10 cmbs. A brass fragment was found 40-50 cmbs and a bottle glass fragment was 20-30 cmbs. Most material was found in the shovel tests located south of the dugout. Artifacts types recovered include clear and brown bottle glass, window glass, mason jar fragments, wire nails, a horse shoe nail, tin can fragment, a bottle cap, .22 shell casing, two battery cores, and determinant brass and metal fragments. Shovel tests conducted at the rock pile did not demonstrate that the feature was a privy and the function of this feature is unclear. One additional feature was located. This was a square subterranean structure of concrete walls with a milled lumber frame and a wood frame top. The feature was 1.3 m in depth and a broken off power pole was located immediately west of the feature. This feature had an indeterminate function but it was suggested that it might have been a pump house or electrical equipment storage area. The feature was believed to be modern (ca. 1960s – 1970s) in construction

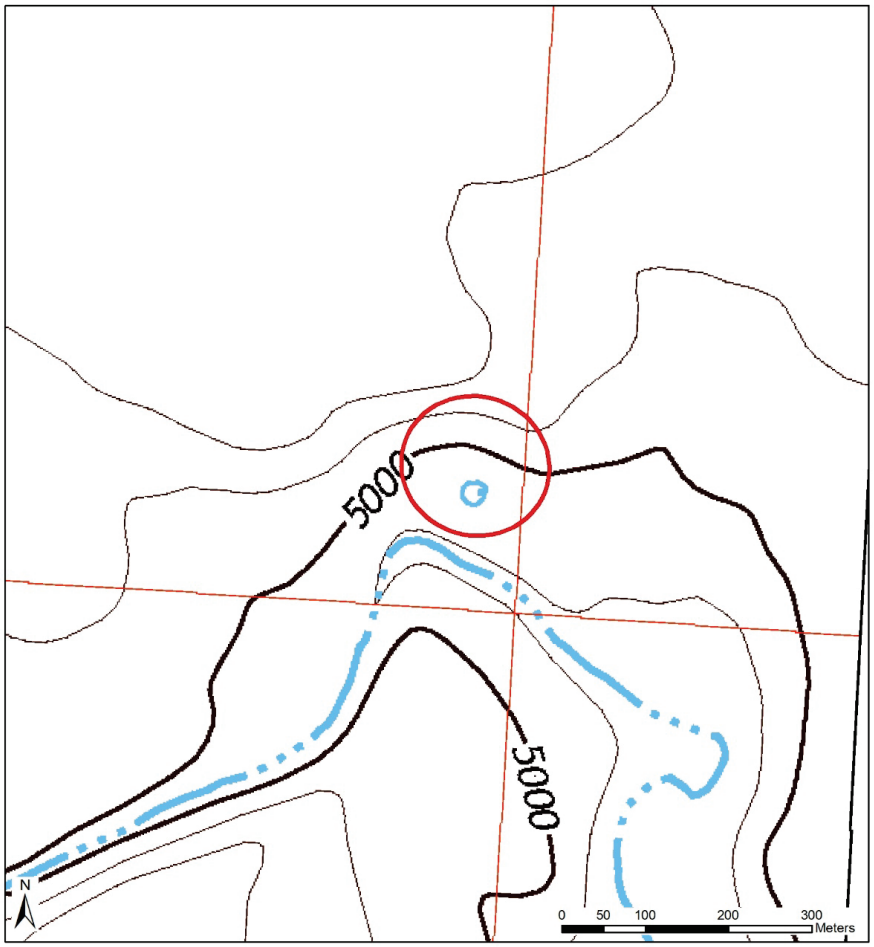
From the earliest site assessment through the 2005 survey all investigations of the site conclude that 5LA5820 is **Not Eligible** for the NRHP. The site's

preservation is based primarily on the fact that it was used for ranching activities into the 1960s and 1970s. The dugout is the only feature that is clearly from the original site occupation and this feature has been modified with the frame addition and wall board and concrete floors added to the interior. The level of disturbance and modification of all features indicate that the site no longer has sufficient integrity for NRHP eligibility.

8.6 Site 5LA5830 field test

Site 5LA5830 is located at the base of rock outcrops and vertical faces with many of the features incorporating the rock as natural barrier. A modern road is located on the southern boundary of the site. An intermittent stream is located on the southern side of the road. At the time of CERL's site visit the stream was dry.

Figure 103. Site 5LA5830 on 2019 USGS 7.5 quadrangle map.



Source: https://ngmdb.usgs.gov.

8.6.1 Original Phase I results

The site documentation occurred in 1987 (Haynes and Bastian 1987). This documentation included the NRHP evaluation and will be discussed in the NRHP evaluation section below. No site revisits concerning the historic structures are documented. The site was described as consisting of five structures oriented on an east-west line on the south side of large rock outcrops. In many cases the natural stone faces are incorporated into the structure construction. Most of the site description was withheld from the CERL archaeologists prior to the site visit.

8.6.2 Historic documentation

Archival history of the site was conducted as part of the 1987 survey (Haynes and Bastian 1987). The origins of the farmstead are not documented in county records. Beatrice Cross Hill reported in oral histories that the homestead was established by her father, John Sanders Cross, in 1905 or 1906 and she remembered growing up at the site as a child. The Cross family was well known in the region and members of the family had land patents in Piñon Canyon dating a back to the 19th century. The first documented owner of the site was Thomas H. Hughes. The list of filed titles kept at the Las Animas County Land Records is:

- 03/31/1919 – Thomas Hughes
- 03/31/1919 – D.W. Wills
- 07/14/1919 - Jerome Gregory
- 03/03/1922 – Porter A. Thomson
- 11/15/1923 – Thompson Livestock Company/ Glen A. Watkins Family
- 06/17/1933 – Eads Livestock Company
- 03/08/1935 – Western Properties, Inc.
- 06/17/1936 – T.G. Watkins
- 10/15/1948 – Georgia Watkins
- 01/19/1953 – Glen A. Watkins
- 04/10/1967 – Lorna Linda Univerisy
- 09/20/1968 – Glen A. and Vera Watkins
- 03/21/1972 – LeRoy and Edna Biernacki
- 1984 – U.S. Army.

Despite the frequent transfers of title, the principle occupants of the site were John Sanders Cross (1905/1906 – early 1910s), Thomas Hughes (early 1910s – 1923), Glen Watkins (1923- 1936) and Tom Watkins (1936-

1940). After 1940 it is believed that the house was occupied by employees of the Watkins ranch. Both Cross and Hughes had worked as ranch hands at the Circle Diamond Ranch of the Bloom Cattle Company. The Bloom Cattle Company (1884-1914) was one of the largest cattle operations in the region with a value in 1910 of $32,000.00. The company folded due to the end of the Open-Range Era and the fencing of rangelands by homesteaders. Many of those homesteaders had, like Cross and Hughes, got their start as paid ranch hands for the larger ranches.

The original structures on the site were a one-room stone dwelling and stone chicken coop. Cross added additions to the house in 1913 using jacal construction. Thomas Hughes built a stone bunkhouse and barn in 1920. Glenn Watkins built a second frame addition to the house in 1924, a cool house in 1936 and enlarged the barn in 1940.

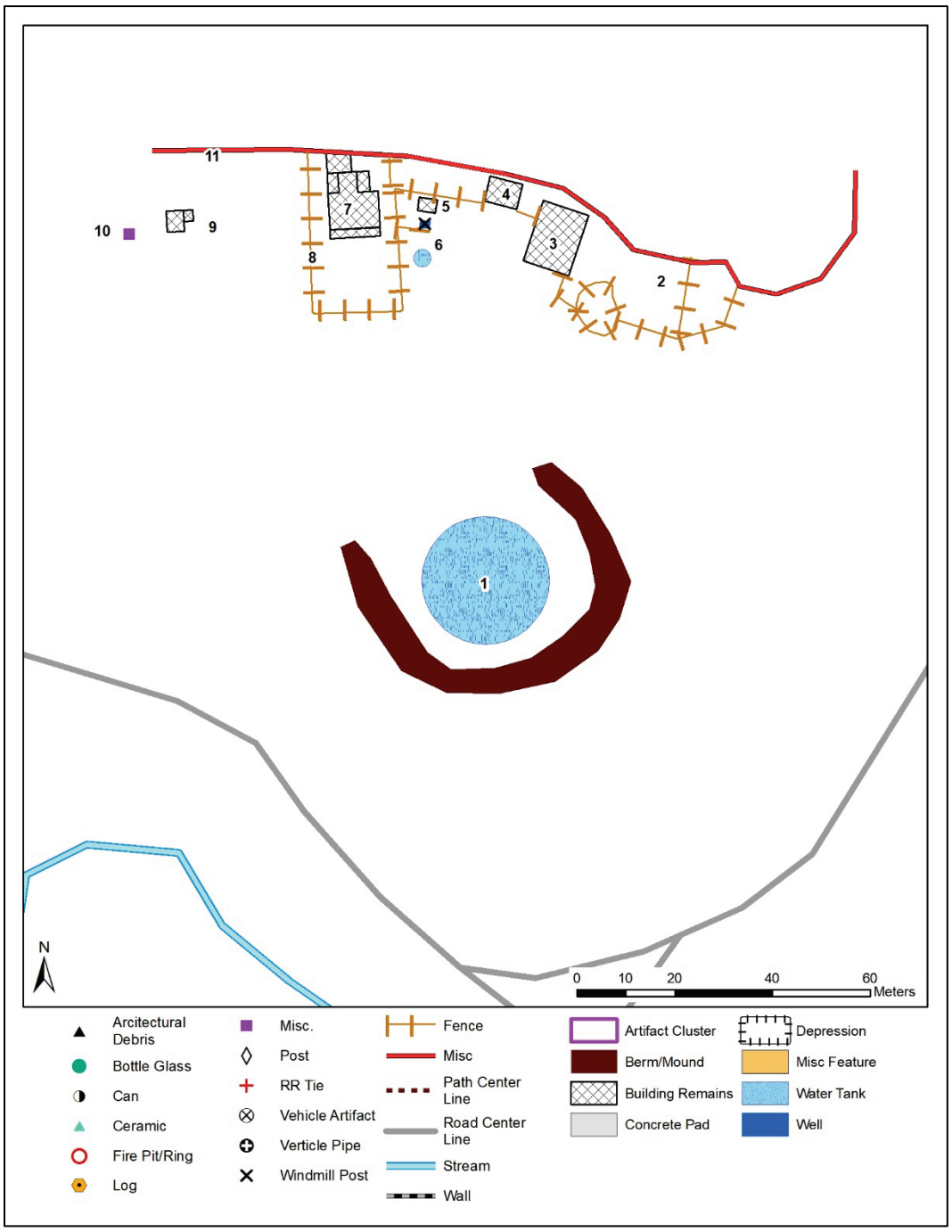
8.6.3 ERDC-CERL site visit

CERL researchers identified 11 features at the site (Figure 104). One feature, the natural rock outcrops on the north side of the site is natural but is key to the layout of the site and has been incorporated into numerous constructed features at the site.

At the time of the CERL visit to the site the covered in dry grass and low scrub brush. Surface visibility was less than 25% in most portions of the site. The most densely overgrown areas of located around the structures. The southern portion of the site had much vegetation. A slight E-W oriented depression crossed the site south of buildings and fences but north of the stock tank.

The site is currently surrounded by a modern wire fence and marked as off limits. There is no evidence of site disturbance due to military activity or training.

Figure 104. Site 5LA 5830 site map.



Source: ERDC-CERL (2020).

The site feature descriptions are:

1. Water Tank. Large stock tank formed by an earthen U-shaped berm. Open side of tank faces NW.
2. Fence. Wooden stockade to form a corral. The north side of the corral is a sheer rock face. Stock chutes are located in eastern two corral pens. A gate opening is located in the southwest corner.
3. Building remains. Stone, metal and wooden single story barn. Metal roof is slightly gabled and stone is mortared together with concrete. Wide openings on the west and east side with sliding barn doors. Interior is divided into two east-west oriented chambers. Southern wall has two wooden cased windows.
4. Building remains. Stone building with gabled metal roof. Door is on western wall. Windows are located on the other walls of the structure. This structure corresponds in location and description to the bunk house described in the historic record.
5. Building remains. Log structure with metal tank on roof. Door is on the north side. Likely well or chiller house.
6. Well and Water Tank. Concrete pad well with standing metal windmill still in place. A galvanized steel stock tank is located immediately south of the well. Two 1-in. metal pipes are stacked on top of the tank and were the likely feed from the well to the tank.
7. Building Remains. Main dwelling house. Southern portion of the house is 1.5 stories and constructed of vertically placed railroad ties and logs with bark still in place. The southern wall has been plastered over. The entire south side has a covered porch approximately 2m deep. Roof is a metal cross gabled roof. A square brick chimney is located in the center of the structure indicating the probable location of the kitchen. The structure appears originally L-shaped with small lean-to additions to nearly fill in the structure to square shape. The north side of the structure is of stone construction and abuts the natural stone outcrop. Furniture and debris could be seen inside but researchers did not enter the structure for safety reasons.
8. Fence. Wooden post, barbed wire and wire mesh fence. Large shade trees located with enclosed space.
9. Building Remains. Stone structure with flat wooden roof. On the east side the entrance is enclosed in a metal lean-to.
10. Misc. Tiller and reaping machine.
11. Misc. Rock outcrop that forms the north boundary of the site. In some places, particularly on the west side of the site, where there was a natural break in the natural outcrop, the gaps were filled by dry stone walls.

Site 5LA5830 is a very well preserved 20th century ranch and homestead. Livestock features such as earthen stock tank (Feature 1), corrals (Feature 2, Figure 105) and barn (Feature 3, Figure 106) are clearly defined with the flow of activities discernible. Additionally the additions to the barn described in the historic record are also clearly visible from the exterior of the structure. All of the construction techniques described for the house are visible from the exterior (Figure 107, Figure 108). Furniture and personal items could be seen inside the house but the researchers did enter the structure.

There was a lack of artifacts seen on the ground but this was not unexpected due to the vegetation. The lack of artifacts on the exterior may be countered by the density of items inside the house. Historic documentation would indicate that the site was occupied into the middle of the 20th century and possibly even as late as the 1970s. Artifacts located inside the house will likely represent the last period of site occupation instead of the full range of the 20th century. Another aspect of the site that was expected but not seen was any form of access road to the loading chutes or the house. It is possible that these were obscured by the vegetation. The site is fenced off to all vehicle traffic. This would indicate that roads seen at other sites in this study are visible today due to continued vehicle use.

Despite the long occupation of the site, there were surprisingly little evidence of site modification after the mid-century. For example there was no evidence of electrification at the site. This supports the premise in historic documents that the site was used by hired hands after 1940 and not the relatively prosperous owners.

Figure 105. 5LA5830 Feature 2. View from S to N.



Source: ERDC-CERL (2019).

Figure 106. 5LA5830 Feature 3. View from SW to NE.



Source: ERDC-CERL (2019).

Figure 107. 5LA5830 features 5, 6, 7 and 8. Roof of Feature 4 visible in foreground. View from atop Feature 11 N of Feature 4 to SW.



Source: ERDC-CERL (2019).

Figure 108. 5LA5830 Features 7 and 8. View from SW to NE.



Source: ERDC-CERL (2019).

8.6.4 Ranch Eligibility Evaluation Form

Based on the information above the evaluation form is as follows.

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to the 1850s? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **YES**
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a ranch? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **YES**
4. Is there potential for intact buried deposits based on subsurface testing and/or evidence of ground disturbance or erosion? **YES**
5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **YES**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **NO**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **NO**
2. Does this site possess a source of water (dam ponds, well, cistern, stock tank, spring, etc.)? **YES**
3. Is there a foundation larger than 10 x 10 ft. and less than 30 x 30 ft. on the site? (Note: structures that fall outside of these ranges are likely outbuildings.) **YES**
4. Is there evidence of small (wells, privy, shed, etc.) or large (stables, barns, bunk houses) architectural features? **YES**
5. Is there evidence of corrals, stock chutes and/or stock dip ponds? **YES**
6. Is there evidence of fence construction? **YES**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**

8. Is there evidence of landscape features (such as roads, paths, gardens, regular shaped depressions, berms, etc.) at the site? **YES**
9. Was the site occupied by a person of historical, regional, or local significance? **NO**

Based on the results of the eligibility evaluation form, site 5LA5830 is **Eligible** for inclusion on the NRHP. With four "yes" answers in Level I and six "yes" answers in Level II this site demonstrates a high degree of integrity and potential to provide information on ranching and domestic practices for the region in the 20th century. The potential occupation of the site into the second half of the 20th century did not result in modernization of the site or features that would impact integrity. The function of each feature is clearly evident at the site and is supported by historic documentation. The site contains a variety of construction techniques and each construction event has an assigned date in historic documentation. A prominent rancher for the region, Glen Watkins, owned the property and briefly lived on it but the length and period of occupation and Watkins' regional importance was not considered sufficient to justify a "yes" answer to question II 9.

8.6.5 NRHP evaluation results

The NRHP evaluation was determined as part of the 1987 site survey and report (Haynes and Bastion 1987). No addition site investigation has been reported.

The main residence was a stone masonry house with later additions of jacal[6] and frame construction on a stone foundation. The oldest portion of the house is the stone construction room abutting the rock outcrop constructed in 1905 or 1906. In 1910-1915 additions of Jacal construction were added to the south. Frame additions, including a full porch on the south side and lean-to on the east and west side were added in the 1920s. The result is a 1.5 story four room structure with the main entrance facing south. Interior rooms consist of a living room and bedroom on the south side of the house, a kitchen immediately to the north of that, flanked by two storage sheds on the east and west. The final room, located in the original

[6] Jacal construction is a technique found in the southwest USA and Mexico that predated European settlement and continued into the historic period by both native and immigrant peoples. It is a variant of adobe construction with similarities to wattle and daub or colonial French style *poteaux en terre* and *poteaux sur solle* log cabin construction. Instead of using adobe brick the structures consists of closely spaced vertical poles, posts or logs that are filled in with mud, clay and/or grasses and given a surface treatment of adobe mud.

cabin may have been a second bedroom or storage. All rooms, with the exception of the original stone portion have direct access to the outside. The access to the attic, located above the southern addition is located on the exterior east side of the house. The house incorporated decorative elements including pattern shingles on the east gable.

The second largest structure is a barn/garage located on the eastern side of the site. The year 1915 was proposed as the construction date. It is constructed of stone masonry with railroad tie supports inserted into the wall and covered with adobe and cement stucco. The roof is a pitched front gable metal roof. The southern 2/3 of the structure have sliding metal doors and a cement floor. The northern 1/3 has a dirt floor and is partitioned from the rest of the barn with a stone wall. Wooden corrals of mixed wire, finished poles and lumber and raw post construction with loading chutes still easily discernible are located east of the barn. The corral also incorporates the rock face as part of the enclosure system.

Between the barn and house was located a bunk house built in the 1920s. It is constructed of stone with a curved gabled roof overlaid with a pitched gabled metal roof. The lower roof is probably original with the later roof dating to the 1940s. The interior walls are plastered with adobe with a wooden floor.

West of the main house is a flat roofed stone chicken coop with a frame lean-to. East of the house is a well house of railroad tie and milled lumber construction with a flat roof that supports a metal water tank. This structure was built in 1936. A windmill and clothes line were located on the site. An embanked bond was mapped on the south side of the site. Barbed wire fencing surrounding a yard south of the house was also included in the site plan map.

The site was recommended **Eligible** for inclusion in the NRHP under Criteria A, B and C. The site represents the homestead and early residence of cowboys, ranchers, their families and employees, an industry and pattern important culturally and economically to the region. Two of the owners, the Crosses and Watkinses were well known families in the region and the two earliest occupants were former employees of an important 19th century ranching operation. The buildings are examples of the range of regional vernacular architecture that include locally obtained materials as well as manufactured materials brought from outside.

It was recommended that the site be adaptively reused, if it could be done sympathetically to the site to prevent the site falling into disrepair due to neglect. This recommendation was not undertaken but the site was fenced off to prevent human and animal access to the site.

A Historic American Buildings Survey (HABS) report for the site was submitted to the Library of Congress in 1989. The site was assigned HABS No. CO-93.

8.7 Site 5LA6104 field test

Site 5LA6104 is situated on the edge of a deep drainage cut (Figure 109). The south side of the site is a rock face too steep to easily traverse on foot. The constructed portion of the site is gently sloping with the highest elevation to the east of the site. Natural rock outcrops occur on the northwestern portion of the site and several features use the natural rock in their construction. The site is covered in dry grass with some low scrub brush with an average of 25% visibility of the ground surface. Larger juniper trees occur in the site as well as along the periphery. Across the site, particularly on the southern and western side, there were numerous places where bedrock was exposed. Soil of any significant depth is not expected across the site. The stream marked on the quad map would not be useful as a water source due to the extreme slope and drop off between the site and the surface water.

8.7.1 Original Phase I results

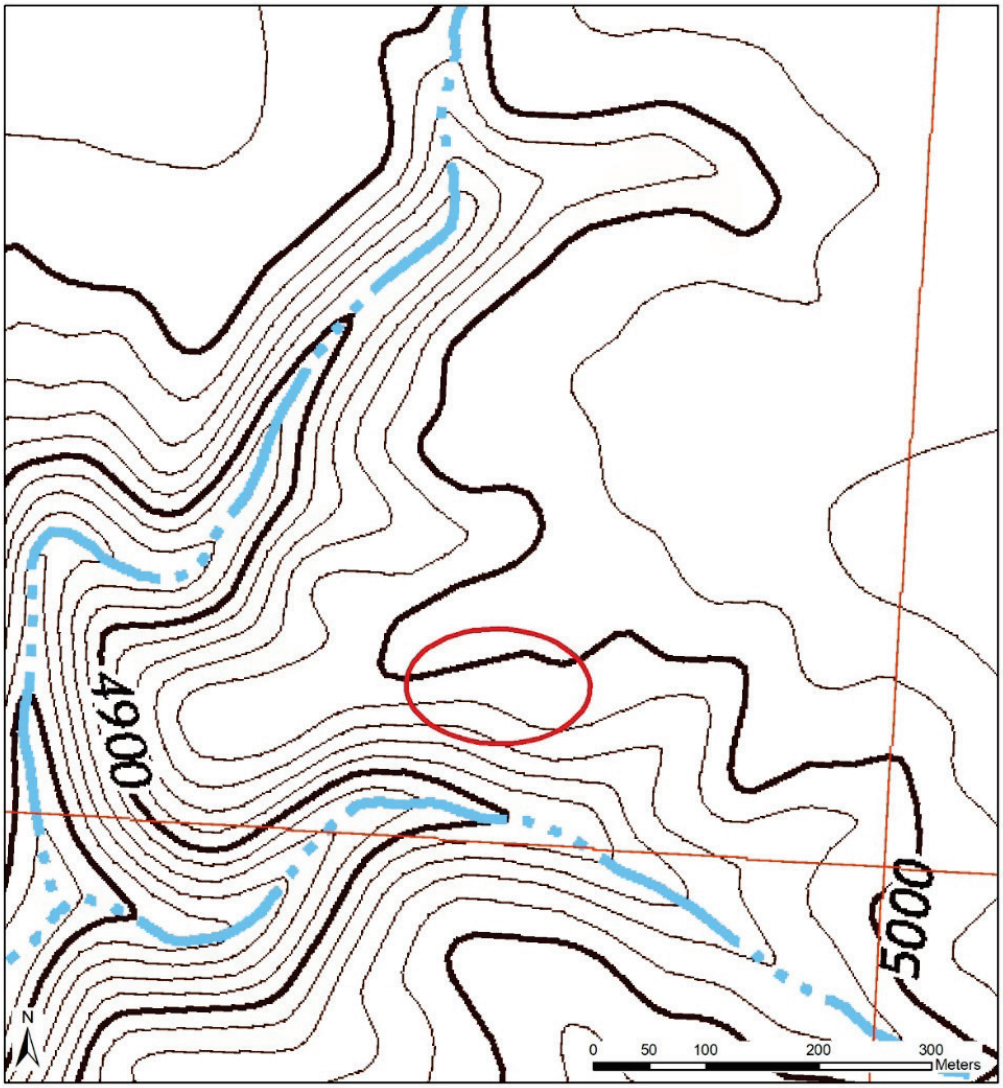
The site was originally documented with the state in in 1993 (CO OAHP n.d.) with a report published in 1996 (Carrillo et. al. 1996). The NRHP evaluation occurred at this time. There is no documentation of subsequent work on the historic component of the site.

The site is described as consisting of five habitation structures and associated outbuildings around a central plaza. Feature descriptions were not provided to the field archaeologist prior to the site visit.

8.7.2 Historic documentation

The site reports and Carrillo et. al. (1996) do not contain any information on historic documentation or archival research.

Figure 109. Site 5LA6104 on 2019 USGS 7.5 quadrangle map.

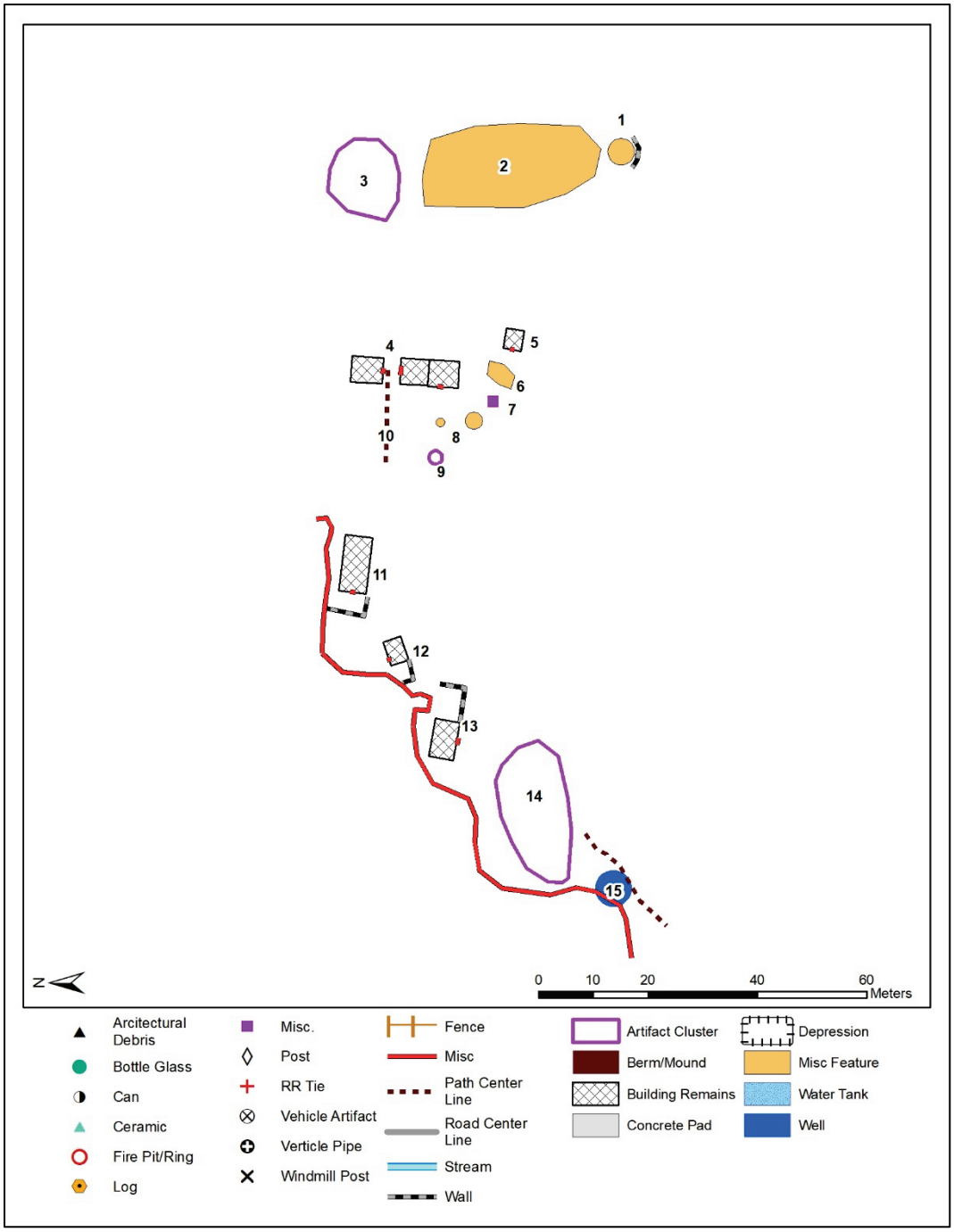


Source: https://ngmdb.usgs.gov.

8.7.3 ERDC-CERL site visit

CERL researchers located 15 elements at the site to be described. At the time of the CERL visit, the site was covered in dry grass and low scrub brush. Some portions of the center of the site were shaded by trees. Surface visibility was variable with some areas with less than 25% visibility with exposed bedrock in other portions of the site. The site is some distant from roads and is difficult to access. No evidence of site disturbance due to military activity was observed.

Figure 110. Site 5LA6104 site map. Please note orientation is rotated 90 degrees.



Source: ERDC-CERL (2020).

The site feature descriptions are:

1. Misc. enclosed area under a rock shelter. Beneath the rock shelter is a smooth rock that is slightly domed. A low rough semicircular stone wall was built on the east side with a gap in the wall on the southwest side.
2. Misc. Rock outcrop. Natural feature but it forms the rock shelter over Feature 1 and seems to be the eastern boundary of the site.
3. Artifact Cluster. Dense cluster of food cans. No labels observed. This feature is interpreted as a deliberate trash dump and not a domestic activity area.
4. Building Remains. Stone buildings with no visible mortar or cement. No evidence of roof construction. Window casings are wooden. Doorframes are not present but openings are marked by miscellaneous lines on the map. One building has one room, the second building has two rooms with no direct access between the rooms. A stone fireplace is located in the corner of the northern room of the southern building opposite the door openings. The structures are in perfect alignment and it is possible that they shared a roof so that space between the structures may have been covered.
5. Building Remains. Stone building with no visible mortar or cement. No evidence of roof construction. No windows or doorframes. Door opening is located on western side.
6. Misc. Rock pile made up of larger stone pieces. There is some evidence of burning of the stones.
7. Misc. Metal mattress frame and springs
8. Misc. Two rock piles. Some evidence of burning on the northern pile. The northern pile is very clearly circular and may be a collapsed feature
9. Artifact Cluster. Cluster of domestic debris. Artifact types include metal food cans, a cooking pot, milk glass and amethyst glass.
10. Path. Stone paved walkway.
11. Building Remains. Stone building with no visible mortar or cement. North and southern wall have partially collapsed. The east and west walls are approximately 3m high. There is a window opening on the western wall. On the west side there is an L-shaped wall that runs into a rock face to the west of the structure. This would form an enclosed space if there was a door, gate or fence off the northeast corner of the structure.
12. Building Remains. Stone building with no visible mortar or cement. North and southern walls have partially collapsed. The east and west wall are approximately 2m high. There is a small window opening on the northern wall. On the west side there is an L-shaped wall that runs into a rock face to the northwest of the structure. This would form an enclosed space if there was a door, gate or fence off the southwest corner of the structure.

13. Building Remains. Stone building with no visible mortar or cement. The south wall has partially collapsed. The remaining walls are approximately 2m high. On the east side there is an L-shaped wall that runs into a rock face to the west of the structure. This would form an enclosed space if there was a door, gate or fence off the north corner of the wall.
14. Artifact cluster. There is a bare stone area with natural step downs. This area is covered in a general scatter of domestic debris including bottle glass fragments, cans (food and oil) and nails.
15. Well/Spring. A natural spring that pools in a natural circular basin beneath a rock shelter. There is a low stone wall at the entrance to the spring to restrict access to the water. A foot path is visible from site past this feature and off down the slope to the south west. Above the spring, on the top of the rock shelter, there is a natural basin in the stone approximately 1 m in diameter. It is clear that this basin regularly holds water due to the presence of evaporation lines around the margins. It most likely is a natural pool that holds run-off from the rock face to the north. There is no evidence of modification around this feature but wearing of the stone surface in the area of Feature 14 indicate that the pool was regularly visited by the site inhabitants.

Site 5LA4106 is a collection of stone structures with corresponding artifact clusters and miscellaneous features. The Phase I described five dwellings around a central plaza. The layout of the site with linear alignment of buildings, single room square or nearly square buildings and corner fireplaces correspond to site patterns associated with Hispanic peoples (Clark 2011). No roofs survive on any structures and the structures on the west side of the site have collapsed walls, particularly on the north and south sides.

Feature 4 is two structures that are tightly associated with each other (Figure 111, Figure 112). It is possible that these structures shared a roof based upon the exact alignment and spacing. For this reason, the two structure were considered one feature. Feature 5 is smaller structure and there was no evidence of a doorframe or windows. It is possible that this feature was an out building to house animals or for storage. Features 6-9 are piles of rock, some of them showing evidence of burning and clusters or examples of domestic debris. Small fragments of glass, metal cans and ceramics were scattered over the entire area. This area is interpreted as domestic activity area with potentially firepits or collapsed outdoor ovens. The size of the rooms in Feature 4 would prevent the full range of domestic activities occurring inside the structures.

One artifact type of note was the prevalence of sun-purpled glass. This was the dominate glass type across the site and particularly in this domestic area. Sun-purpled glass results from the addition of magnesium to the silica mixture to counteract the impurities within the glass to produce clear glass. Exposure to ultraviolet light over times causes the clear to turn purple. The use of magnesium as a glass additive is associated with the 1880-1915 time frame. Nails seen at the site included rectangular cut and wire nails.

CERL researchers could not with certainty describe the western structures as domestic buildings. This is due in part based upon the larger side of the buildings (particularly Feature 11) and the addition of the exterior walls (Figure 113) that tied into natural rock faces to create enclosures. These exterior spaces were interpreted as potential animal pens. If that is the case it seems unlikely that people would choose to sleep and possibly to eat so near to animals and their waste. Also the surface artifact assemblage in this portion of the site had less domestic material and more construction/architectural debris such as nails and wire.

The site water source is a natural spring beneath a rock shelter on the south western side of the site (Figure 114). A low loose stone rock wall partially restricts the feature entrance. Feature 1 on the east side of the site is a very similar feature (Figure 115). Initially it was believed that this a second spring but closer examination demonstrated that the interior floor surface was convex and not concave and therefore could not hold water. The function of this feature is not clear but it is naturally shaded and shielded from the elements by the rock shelter so could have been used as a storage area.

There is no evidence of corrals or fencing at the site. There is also no evidence of roads large enough for wagons or motor vehicles. Multiple oil cans were seen across the site indicating that there was some machinery that needed maintenance either at the site or somewhere that the site inhabitants regularly visited.

It is considered unlikely that any significant number of large animals would be kept at this site. This assumption is based not only on the lack of corrals and large pens but also due to the presence of the rock drop off on the south side of the site. This natural drop would pose a danger for animals going over the edge. Additionally there does not seem to be an easy way to get a herd of animals to the water source on a regular basis. These

factors would suggest that this site was not primarily used as a ranching site. It is also unlikely that significant agricultural in close proximity of site due to the lack of significant soil across the site. The exact nature of the site remains unclear.

Figure 111. 5LA6140 Feature 4. View from SW to NE.



Source: ERDC-CERL (2019).

Figure 112. 5LA6140 Feature 4 interior. View from N to S.



Source: ERDC-CERL (2019).

Figure 113. 5LA6140 Feature 11. View from N to S.



Source: ERDC-CERL (2019).

Figure 114. 5LA6140 Feature 15. View from NW to E.



Source: ERDC-CERL (2019).

Figure 115. 5LA6140 Feature 1. View from S to N.



Source: ERDC-CERL (2019).

8.7.4 Ranch Eligibility Evaluation Form

Based on the information above the evaluation form is as follows.

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to the 1850s? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **YES**
2. Did the site have a function other than an agricultural property? **UNKNOWN**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **UNKNOWN**
4. Is there potential for intact buried deposits based on subsurface testing and/or evidence of ground disturbance or erosion? **NO**

5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **YES**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **YES**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **UNKNOWN**
2. Does this site possess a source of water (dam ponds, well, cistern, stock tank, spring, etc.)? **YES**
3. Is there a foundation larger than 10 x 10 ft. and less than 30 x 30 ft. on the site? (Note: structures that fall outside of these ranges are likely outbuildings.) **YES**
4. Is there evidence of small (wells, privy, shed, etc.) or large (stables, barns, bunk houses) architectural features? **YES**
5. Is there evidence of corrals, stock chutes and/or stock dip ponds? **NO**
6. Is there evidence of fence construction? **NO**
7. Is there evidence of a cottage industry typical to the region at the site? **UNKNOWN**
8. Is there evidence of landscape features (such as roads, paths, gardens, regular shaped depressions, berms, etc.) at the site? **YES**
9. Was the site occupied by a person of historical, regional, or local significance? **UNKNOWN**

Based on the results of the eligibility evaluation form, site 5LA6104 is **Eligible** for inclusion on the NRHP. With three "yes" answers in Level I and four "yes" answers in Level II, the site meets the minimum standards of integrity and diversity to be able to provide additional research potential. The site appears to be older in date, potentially dating to the later 19th century and has a clear stylistic tie to an ethnic minority population.

In it unclear, however, if the site should be evaluated under a farmstead or ranching evaluation methodology. There is no clear evidence that significant amounts of agricultural or large scale animal husbandry activities took place at the site. The assumed cottage industry for the region is mining but there was no evidence for that activity at the site either. The absence of historic documentation significantly impacted the site evaluation resulting in numerous questions having the answers as "unknown." It is possible that the answers to what the site function was is located in the archives.

8.7.5 NRHP evaluation results

The NRHP evaluation is documented in the state site forms (CO OAHP n.d.) and summarized in a report published in 1996 (Carrillo et. al. 1996). The report describes the site as a placita complex with five habitation structures, associated outbuildings and a central plaza. The site forms only include a hand drawn map with no scale reference and Carrillo et. al. 1996 has no site map. The site forms, however, do have detailed scale maps of individual structures.

The features were documented at the site and are described as follows:

- A central plaza around which the structures are arranged. This corresponds to the area south of Feature 11, east of Feature 13 and west of features 4-10 on CERL's map.
- Two structures (counted as separate features) that correspond to CERL's Feature 4. One building is a two-room structure with a corner fireplace in one room. The second structure is a single room aligned with the two-room building. The possibility of a shared roof between these two structures is mentioned.
- Two small structures south of the CERL's Feature 4 that were interpreted as a chicken coop and a domestic structure converted to a chicken coop or shed. One of these features is CERL's Feature 5 the other one may be the rubble pile designated as Feature 6.
- A trash scatter east of the dwelling structures corresponds to CERL's Feature 3. Artifact types include large quantities of bottle glass (amethyst, green, aqua and brown), amethyst lamp base and chimney glass, milk glass mason jar lid, ceramics (black glazed earthenware and plain and transfer print decorated irons stone), cut and wire nails, interior rolled seam cans with hole in top, baling wire, wagon leaf springs, a barrel hoop and a corset stay.
- An informal masonry animal pen that uses a bedrock outcrop. The description and location of the feature corresponds to CERL's unknown Feature 1.
- Two rock piles that were suggested as collapsed outdoor ovens correspond to CERL's Feature 8.
- A one-room structure with a stone fence that incorporates the stone outcrop corresponds to CERL's Feature 11. There is no stated hypothesis for this buildings function.
- CERL's Feature 12 was described as a building with possibly an attached animal been.

- CERL's Feature 13 was described as a two-room structure with one room of stone construction and the second room of adobe construction on a stone foundation.
- A path was described as passing from the plaza, past the spring and on to the bottom of the canyon. This is the same path mapped near CERL's Feature 15.
- A trash scatter located in the same location as CERL's Feature 14 was noted. Artifact types include amethyst bottle glass, ceramics (ironstone and brown glazed earthen ware), a porcelain cup fragment with gold trim, inner rolled seam can with hole in the top, fuel can, metal bucket, baling wire, barbed wire, barrel hoop, and miscellaneous wagon parts.
- A modified rock shelter with a natural spring corresponding to CERL's Feature 15.
- A small rock walled shelter located in the slope south of Feature 12 was described. It was suggested that this was an animal cage. CERL researchers did observe this feature.

The site report concludes that this site was an ethnic Hispanic site based upon the artifact assemblage and site layout and construction. The occupation period was strongly suggested as 1880-1900. Similarities in layout and construction suggest that the site is associated with coal mining activities at nearby sites 5LA6101, 5LA6102, and 5LA6103. The site is recommended as **Eligible** for the NRHP under criteria A, C and D. The site is a mineral extraction site that can illustrate the technologies employed in small commercial coal mines, the relationships within the coal mining community and between the coal mining community and the remainder of sites on the installations. Sites 5LA6101 – 5LA6104 were also recommended to be listed as a small commercial coal mining subdistrict within the larger proposed PCMS EuroAmerican Archaeological District. From other documents consulted for this effort, it is known that the EuroAmerican district was not finalized. It is not known if the coal mining subdistrict was finalized.

8.8 Summary of field tests, PCMS, CO

Six sites at PCMS were evaluated by CERL for this report. Site evaluations were conducted blind with the researcher unaware of the original NRHP evaluation determinations. After the site evaluation was complete the results were compared to the original determinations (Table 1).

Table 4. Summary of NRHP Eligibility Findings for PCMS, Colorado.

Site	NRHP determination based on traditional methodology	NRHP determination based upon CERL methodology
5LA2302	Eligible	Eligible
5LA3250	Not Eligible	Not Eligible
5LA4406	Not Eligible	Not Eligible
5LA5820	Not Eligible	Not Eligible
5LA5830	Eligible	Eligible
5LA6104	Eligible	Eligible

For the sites evaluated at PCMS, Fort Carson Colorado, there is 100% concurrence between the traditional NRHP and CERL methodology. All but one of the sites had historic documentation to support and supplement the observations in the field. While visibility was not ideal and the sites were relatively clean of artifacts there was sufficient information to determine most features function and age.

Despite the success of the methodology at this location there are two items of note that could lead to the improvement of the methodology. The first was site 5LA5820. At this site there were many features present that indicated a well preserved ranch site. The site, however, had been modified and added to in recent years to the point that the historic integrity of the site was impacted and the site was Not Eligible. Having questions where the presence or absence of features is the only area of inquiry without reference to their historic integrity may prove more problematic at other sites than at this one.

The second site for discussion is 5LA6104. Coal mining was described as cottage industry for the region and questions exist in the methodology on if cottage industry activity is present in addition to ranching or agricultural activity at the site. At this site coal mining was the primary activity with no agriculture or ranching activities occurring. The site barely met the criteria in the methodology for NRHP eligibility despite the fact that this is probably a very significant mining site. This highlights the fact that methodology is only applicable to sites where farming or ranching is the primary activity.

9 Field Test Results: Fort Hunter Liggett, CA

Field work was conducted in November 2019 by Carey Baxter and Susan Enscore of ERDC-CERL. Principle field support at FHL was provided by Mitch Evans, Lauren Mirasol, and Susanna Seidensticker, Archaeologists, Colorado State University. The instillation Cultural Resource Manager is Lisa Cipolla.

Six sites were tested in this effort at FHL. These are CA-MNT-258, CA-MNT-1531, CA-MNT-1542, CA-MNT-1569, CA-MNT-1638, CA-MNT-1786. Site CA-MNT-1569 was a substitute site for a site that was not accessible due to active brush fires. Ground visibility at the sites was not optimal low to moderate scrub brush and dried grasses obscuring the ground surface at many of the sites.

9.1 Determination of typical site features

FHL is located is located in Region 2 – California. Historic contexts specific to FHL can be found in Galvin et. al. (2009), Allen and Hildebrand (1997), Joslin and Jones (1997), Zahniser and Roberts (1980) and Pezzutti and Sherman (2017). Historic documentation indicates that both ranching and farmstead sites are possible within FHL. Several general trends can be gleaned from these, and other reports that inform on what is a typical ranche for the region.

The first historic period of agricultural settlement in the area was during the Mission Era (1769-1821) (Galvin et. al. 2009, Pezzuttie and Sherman 2017). The Mission San Antonio de Padua was established in 1771 and moved to the current location adjacent to FHL in 1772. The Mission was a self-sustained agricultural operation that had the primary objective of converting the local indigenous population to Christianity. Much of the working population associated with the Mission were Native Americans who were trained in western agricultural practices and as *vaqueros*. While most sites were located close to the main Mission, satellite farms and ranches were established as the operation increased in size. Principle crops included fruit trees, olive trees, grapevines, wheat and maize. Ranching practices were primarily the open-range style. In 1827 the mission reported owning 1827 cattle, 11,000 sheep, and 800 horses (Galvin et. al. 2009). Features anticipated Mission Era sites would include adobe ruins, water diversions (including irrigation and aqueducts), sites of vineyards and orchards, wells and artificial

ponds. Any sites from this era would be considered atypical farmsteads due to their age and Native American association.

The next period was the Land Grants and First Settlers Period (1821-1865) (Galvin et. al. 2009, Pezzuttie and Sherman 2017). The area was under the administration of Mexico and land grants were available if the applicants had constructed a residence and lived in it for a year, had built fences and planted fruit trees. The Mission properties were seized by the Mexican authorities and secularized in 1831 with most new land holders being ethnic Mexicans or Spaniards. By 1846 11 private ranches were located with the FHL region (Galvin et. al. 2009). Open-range stock raising, especially cattle, was the dominant practice of the period with hides and tallow as the principle products. Sites of this period were widely spaced and consisted of adobe and timber dwelling and small outbuildings, a water source, corrals, fencing near the buildings and corrals, and food gardens. The project area was directly affected by the Gold Rush but many failed miners chose to stay in California and settle as ranchers or farmers.

In the state chronology the next period is referred to as the Large Cattle Ranches Period (1865-1915). In the project area, however, this period is marked by the decline in cattle ranching, the rise of dry farming and the influx of settlers (Galvin et. al. 2009.). This change was a result of multiple years of drought (1860-1965) that killed off cattle herds, the arrival of the railroads and the availability of land through the Homestead Act (Joslin and Jones 1997). Some of the ranches located in the best watered valleys did survive but even they had diversified the activities to include dry farming. Ranching sites of this period may include features such as a frame or adobe dwelling, corrals with livestock shoots, water sources and watering areas, barns for animals and/or equipment, structures for feed or hay storage, smaller outbuildings clustered around open work areas, barbed wire fencing, and workers housing structures.

Homesteaders settled the area during the Large Cattle Ranch Period. They often did not have an abundance of resources of cash so their sites are often initially rudimentary and then improved or expanded if the homestead was profitable. While adobe continued to be used, the settlers from the mid-west, south and eastern regions used more wood frame and even log construction (Galvin et. al. 2009). Principle crops included wheat and barley. Homestead sites are widely scattered across the landscape as each

land grant consisted of 160 acres. Characteristics of homestead sites include rectangular multiroom houses of adobe, wood frame or logs, houses with porches, clusters of outbuildings, barns for livestock or mechanical equipment, silo for grain storage, water sources (including windmills, raised water tanks and cisterns), shade trees and vegetable gardens, fencing and corrals.

In 1920, William Randolph Hearst Jr. purchased over 200,000 acres of land in and around the project area (Joslin and Jones 1997). About 8% of the land was devoted to raising feed with the rest used as grazing land. Many of the homesteads were bought up in this process. Existing farmsteads that were advantageously located were retained and maintained to be used as satellite facilities and to house Hearst's cattle employees. In 1940 the U.S. military took control of much of Hearst's properties as well as surrounding ranches and farms for the establishment of the Hunter Liggett Military Reservation.

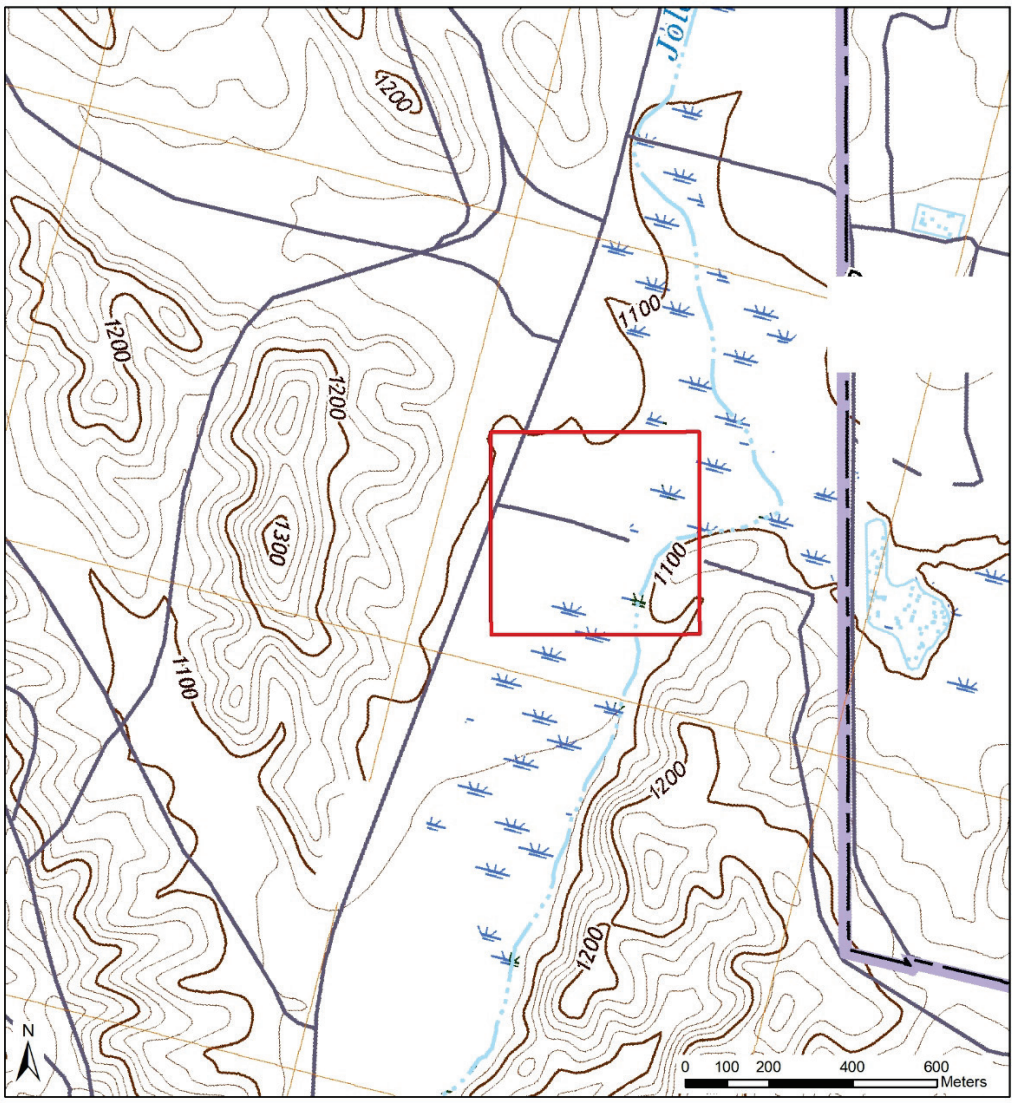
9.2 Site CA-MNT-258 field test

Site CA-MNT-258 is located at a valley floor with hills located to the east and west of the site (Figure 116). At the time of the survey the area was dry and no water was present in the intermittent stream that runs through the site. The site area was covered in dried grass and low scrub brush. Surface visibility was less than 30% in most portions of the site. A road that is currently maintained and used by the Army cuts through the site on an E-W orientation. Several large oak trees that are likely older than 60 years are present at the site. There were signs of bioturbation by pigs in the shaded areas under the trees.

9.2.1 Original Phase I results

Information about previous site work is reported in Edwards (1973), Zahniser and Roberts (1980), California Site Forms (1995) and Allen and Hildebrand (1997). The 1973 site forms (Edwards 1973) describe a four room American period adobe house with a boulder fireplace, hand-hewn lintels, white washed exterior and wallpaper and painted interior. No other features were described and photographs or maps of the site were not included in the report. Zahniser and Roberts (1980) describes the site as consisting of an adobe house occupied until the 1940s and bulldozed by the 1960s with the only marker of the site being a Tree of Heaven.

Figure 116. Site Ca-MNT-258 on 2018 USGS 7.5 quadrangle map.



Source: https://ngmdb.usgs.gov.

The discrepancy between these two reports concerning when the site was demolished is not rectified in later reports. The Edwards description corresponds to the military description of the site in 1949 (Allen and Hildebrand 1997) and it is unclear if Edwards was basing his description of the site on historic accounts or observations of the site.

The 1995 site forms (CA OHP n.d.) document five features at the site. Artifacts collected from the surface in 1995 included white and brown earthenware, and sun-purpled bottle glass. Two of the features, an adobe house south of the road and a large barn north of the road, were documented as

no longer existing but their approximate location was described. It is assumed that the approximate location was derived from historic maps, photographs or interviews with historic eyewitnesses. The third feature was a barbecue measuring 6 x 7.5 x 2.5 ft. in dimension with walls 1 ft. thick. Construction of this feature was estimated to be early 20th century. The fourth feature was the remains of a military bivouacking site including a series of concrete pads.

The final feature was a potential irrigation feature. Components of the feature include a watering trough on the bank of the creek and abutments to support a seasonal dam, both constructed of cobbles set in concrete likely dating to the early 20th century. A large galvanized pipe and cast concrete watering trough with associated standpipes was estimated to have been added in the 1920-1930s. Army additions to the feature included a pump house and spring box, prefab pipe frameworks, a concrete platform and a round wooden water tank on the top of a hill on the east side of the site.

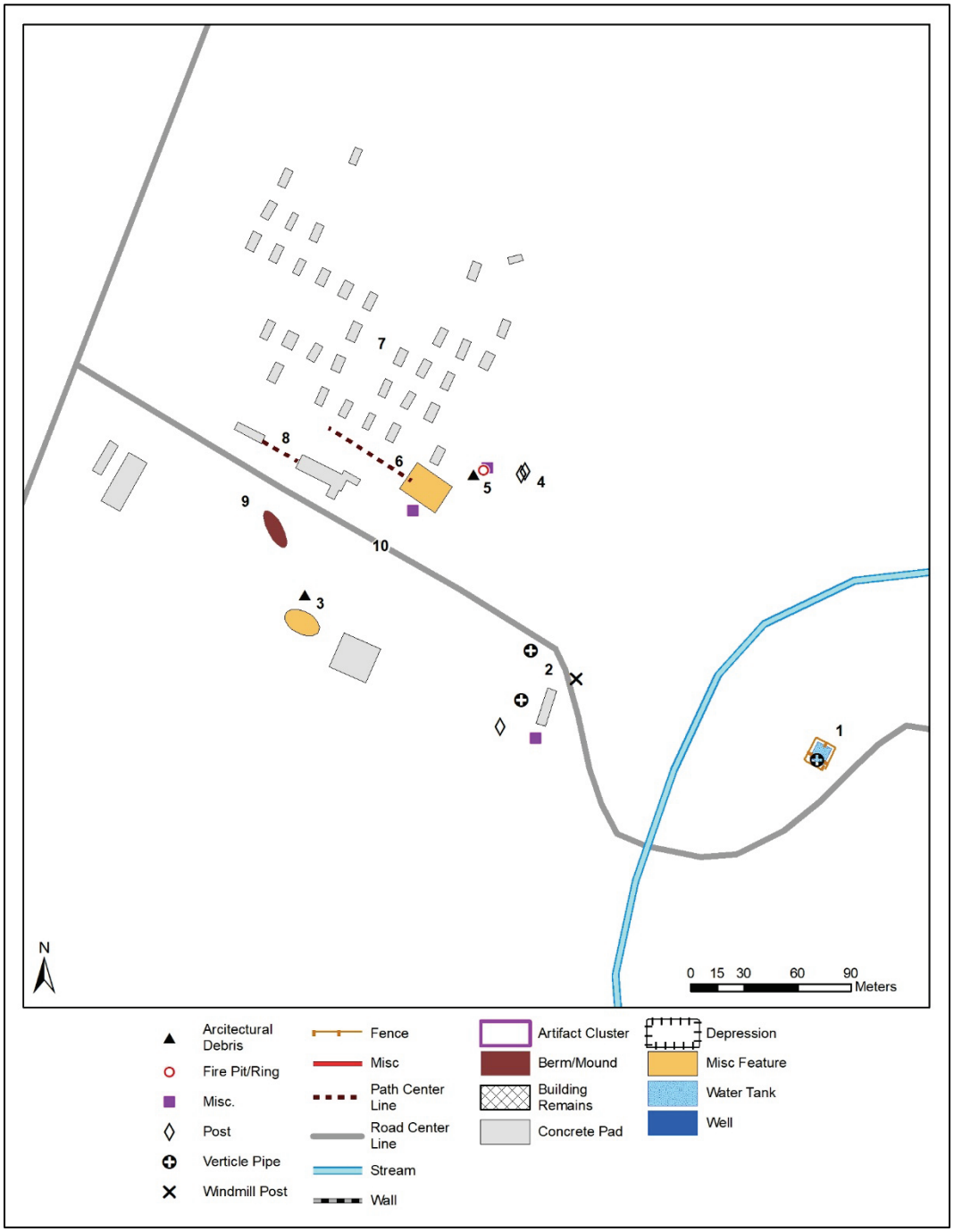
9.2.2 Historic documentation

Historic documentation was reported in Zahniser and Roberts (1980) and Allen and Hildebrand (1997). The site is historically documented as being a satellite ranch facility that was part of the Milpitas Ranch, which was formed from the Mission San Antonio lands. Construction is estimated to have occurred around 1860 with Milpitas Ranch manager, William Earl, living at the site by 1862 (Zahniser and Roberts 1980). The site was purchased in 1872 by Faxton Atherton and used as a headquarters for his ranching operation (Allen and Hildebrand 1997). The site was sold in 1910 to the James Brown Cattle Company and in 1920 by William R. Hearst Jr. and was used as a satellite location again. Zahniser and Roberts (1980) and Allen and Hildebrand (1997) both document oral history accounts from persons who lived at the site in the 1930s or were related to site occupants. Historic photographs and the oral histories demonstrate that the dwelling house was a two-story, New England saltbox style adobe construction with access to the second floor via an external stair case. The U.S. Government purchased the property in 1940 and demolished portions of the site in 1949 and completed the demolition in 1960s (Allen and Hildebrand 1997). The earlier site reports referenced by Allen and Hildebrand (1997) described pear trees located at the site but these were not present at the time of the 1995 survey.

9.2.3 ERDC-CERL site visit

CERL researchers identified 10 features at site CA-MNT-258 (Figure 117). Many of the features date to military use of the site.

Figure 117. Site CA-MNT-258 site map.



Source: ERDC-CERL (2020).

The site feature descriptions are:

1. Water Tank, Fence and Pipe. This feature is the remains of a water tank and piping. The feature is located at the top of a hill that overlooks the site. The tank remains include five large wooden beams large metal hoops lying on the top. This indicates that the tank was circular and slightly raised. On the south side a metal standpipe could have been used to drain the tank. The tank is surrounded by barbed wire fencing on metal fenceposts.
2. Cluster of Military Era items. This area includes a concrete pad with a low concrete sill, a concrete vertical manhole pipe that is entirely above ground (mapped as a misc. point) to modern standpipes with shut off valves, a utility post, and a metal frame that may have supported a windmill or small structure. This area clearly is a mid-late 20th century activity area and may represent showering or latrine facilities.
3. Misc. Feature. This feature is a scrape scar – there is evidence of clear soil disturbance and much less vegetation. A couple of large shade trees are located in proximity. A concrete pad is located to the south east and a concrete block is to the north. The field surrounding this feature was densely vegetated but walking around the researchers encountered the remains of heavy vehicle tracks and small push piles.
4. Posts. Small cluster of cut utility poles and one 30cm square post with a large metal pole near the top of the post. All posts are approximately 1 m. tall. The square post may be a gatepost.
5. Misc. Foundation and Firepit. This is a large constructed barbeque of cobbles set in concrete. The firepit consists of an arched opening at ground level on the back side of the foundation that would allow indirect feeding of fuel to the fire. Large oak trees that predate military occupation shade this feature. A 55 gallon metal drum and a concrete pillar are located nearby. The area has been bioturbated by pigs.
6. Misc. Feature and Path. The misc. feature is area of leveled dirt surround by small push piles. Extending northwest off of this feature is a dirt path or road that has been graded with low berms on north and south side. South of the leveled dirt is a concrete manhole pipe buried vertically in the ground.
7. Concrete Pad cluster. Large cluster of small concrete pads that is likely a bivouac site.
8. Concrete Pads and Path. Two concrete pads with rebar extending vertically from the wall sills. Wire nails and blank brass rifle casings are scattered across the pads. The two pads are connected by a concrete walkway. The

eastern pad had "CO A 84 ENG" scratched into the surface when the concrete was wet. Additional concrete pads are located to the west of the site and are of similar construction and description of Feature 8.

9. Berm. This feature consisted of a soil and vegetation push pile
10. Road. This road is graded and graveled road. Electrical lines on wooden utility poles run along the road.

Site CA-MNT-258 represents a heavily disturbed historic site. Historic documents and earlier research indicate that this is a ranch site associated with the Milpitas Ranch. Most features at the site, however, date to the military occupation. The only aboveground feature that clearly predates the military is the barbeque structure (Figure 118). All of the concrete pads and the observed water features are military constructions (Figure 119). The possible irrigation feature described in the 1995 site forms could not be relocated. The Feature 3 soil disturbance corresponds approximately to the location of the adobe structure in the historic documents but there were no artifacts or structural elements to confirm this. Both sides of the road show evidence of mechanized ground disturbance in the form of push piles and graded areas. This disturbance appears to be ongoing as demonstrated by Feature 9.

Figure 118. CA-MNT-258 Feature 5. View from NW to SE.



Source: ERDC-CERL (2019).

Figure 119. CA-MNT-258 Feature 8. View from NW to SE.



Source: ERDC-CERL (2019).

9.2.4 Ranch Eligibility Evaluation Form

Based on the information above the evaluation form is as follows.

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to the 1860s? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **NO**
   a. If NO: Is the site 75% or more disturbed? **YES**
      (1) If YES: Site has altered integrity and therefore is NOT significant.
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a ranch? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **YES**

4. Is there potential for intact buried deposits based on subsurface testing and/or evidence of ground disturbance or erosion? **NO**
5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **NO**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **NO**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **YES**
2. Does this site possess a source of water (dam ponds, well, cistern, stock tank, spring, etc.)? **YES**
3. Is there a foundation larger than 10 x 10 ft. and less than 30 x 30 ft. on the site? **NO**
4. Is there evidence of small (wells, privy, shed, etc.) or large (stables, barns, bunk houses) architectural features? **NO**
5. Is there evidence of corrals, stock chutes and/or stock dip ponds? **NO**
6. Is there evidence of fence construction? **NO**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**
8. Is there evidence of landscape features (such as roads, paths, gardens, regular shaped depressions, berms, etc.) at the site? **NO**
9. Was the site occupied by a person of historical, regional, or local significance? **NO**

Based on the results of the eligibility evaluation form, site is **Not Eligible** for inclusion on the NRHP. With one "yes" answers in Level I and two "yes" answers in Level II this site does not have sufficient integrity or diversity of feature types. This is particularly indicated by the "no" answer to Level I Question 1a, which automatically moves a site into the Not Eligible category. The amount of ground disturbance indicates very little possibility of subsurface features.

9.2.5 NRHP evaluation results

The NRHP evaluation was recorded by Allen and Hildebrand (1997) based upon field work conducted in 1991 and 1995 and the findings are summarized here. The 1991 survey was unable to locate the house structure but estimated its location from historic documents and previous site visits. Site surveyors estimated that 100% of the site had been disturbed by military activity to a depth of 200cm below the surface.

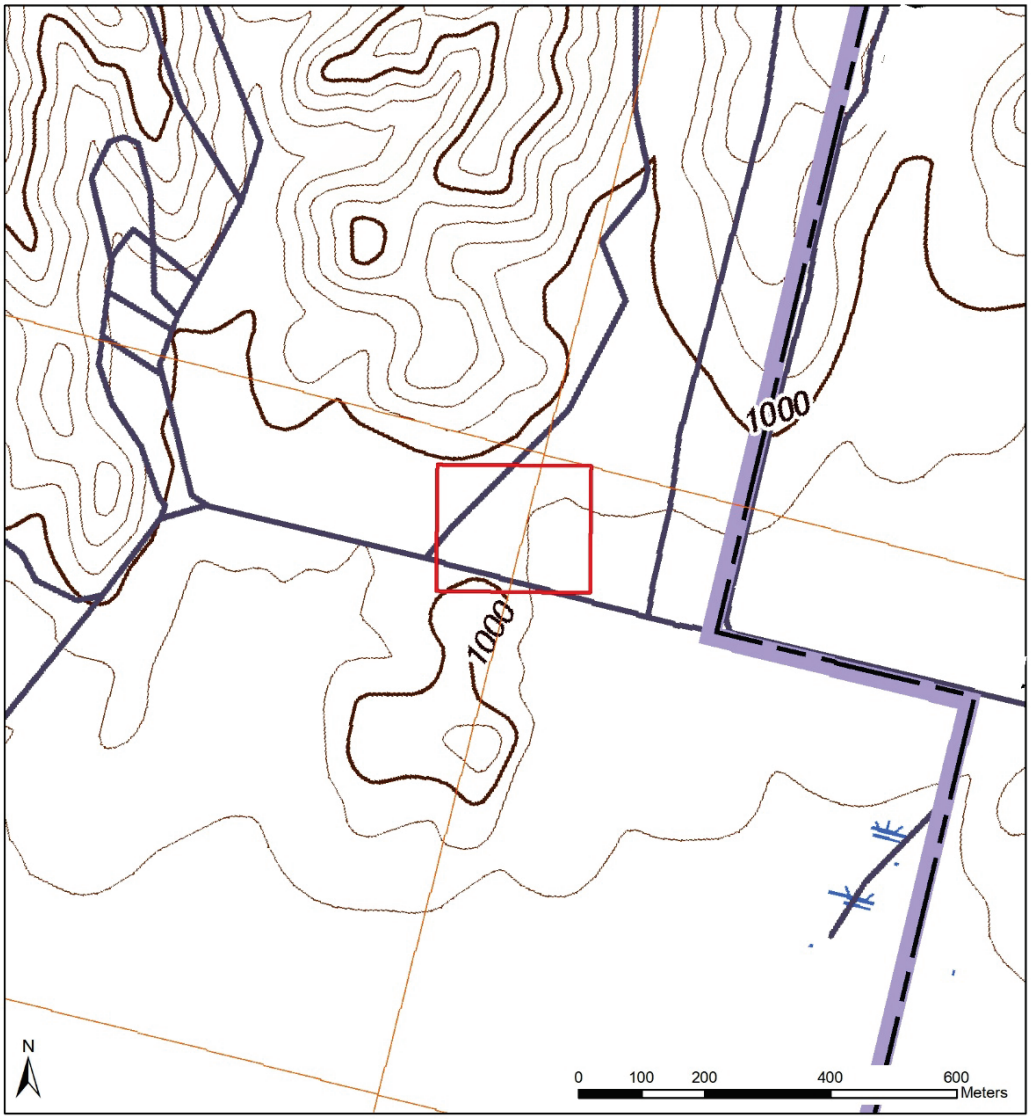
The 1995 field work focused on the search for the adobe house. This search included using a road grader to clear two areas (100 x 60 ft and 50 sq ft) south of the road. The larger scrape area corresponds to CERL Feature 3 with the smaller scrape area located southwest of Feature 3. Surface artifacts from these two scraped areas consisted of whiteware, stoneware, porcelain, wire nails, tin can fragments, and bottle glass (clear, milk, brown and green). Artifacts represented a date range of 1890-1920. Two test units were excavated within the larger scrape area. One was excavated to a depth of 18 in. the other to a depth of 3 in.; both excavations were halted when sterile subsoil was reached. In both units, the artifact distribution and soil stratigraphy were mixed with artifacts dating to the early 20th century similar in nature to the surface artifacts intermixed with post 1940 artifacts. This indicates that the area was heavily and homogenously disturbed with the possibility of soil removal over portions of the site. No evidence of foundations was encountered but amounts of small roof tiles were encountered in the smaller southwest scrape area and this was identified as the likely location of the house. The scrape area north of the road was shown on the map and given a number but not described in the report. The barbeque and potential irrigation features described in this survey are described in the "Original Phase I results" section above. Oral histories indicated that that a large barn and corral were located north of the road, but no evidence of these structures was found.

It was determined that all site remains were ephemeral. While the site was dated to the 1860s, its continued occupation for 80 years had likely resulted in upgrades to all structures over time so that the only artifacts recovered dated to the 1880s or later. The military activities, including the mechanized ground disturbance and house demolition had seriously compromised the site integrity. The site was determined to be **Not Eligible** for inclusion in the NRHP.

9.3 Site CA-MNT-1531 field test

Site CA-MNT-1531 sits on level ground at the intersection of two active military roads. Portions of the site were heavily covered with dry grass and brush while other portions were relatively clear of vegetation and showed signs of recent grading. A marshy area was located approximately 500 m. south east of the site and an intermittent creek is located on the southeast side of the site. At the time of the survey the creek was dry. A small historic cemetery was located on the summit of a knoll 300 m. south of the site but was assigned a different site number from CA-MNT-1531

Figure 120. Site CA-MNT-1531 on 2018 USGS 7.5 quadrangle map.



Source: https://ngmdb.usgs.gov.

9.3.1 Original Phase I results

CA-MNT-1531 was described in Zahniser and Roberts (1980) but was not filed with the state and did not receive a trinomial site number. Most of the site description was based on historic accounts and oral history. The only description of the condition of the site in 1980 was that a faint oval mound line remained at the house location.

The site was surveyed and registered with the state in 1991 (CA OHP n.d.). Three features were identified including a 7 x 10 ft rectangular depression, an old roadbed oriented east-west through the site and a historic artifact

scatter that contained bottle glass, ceramic sherds and metal debris. Site disturbances included a large bulldozer mound and erosion caused by intermittent drainage on the site.

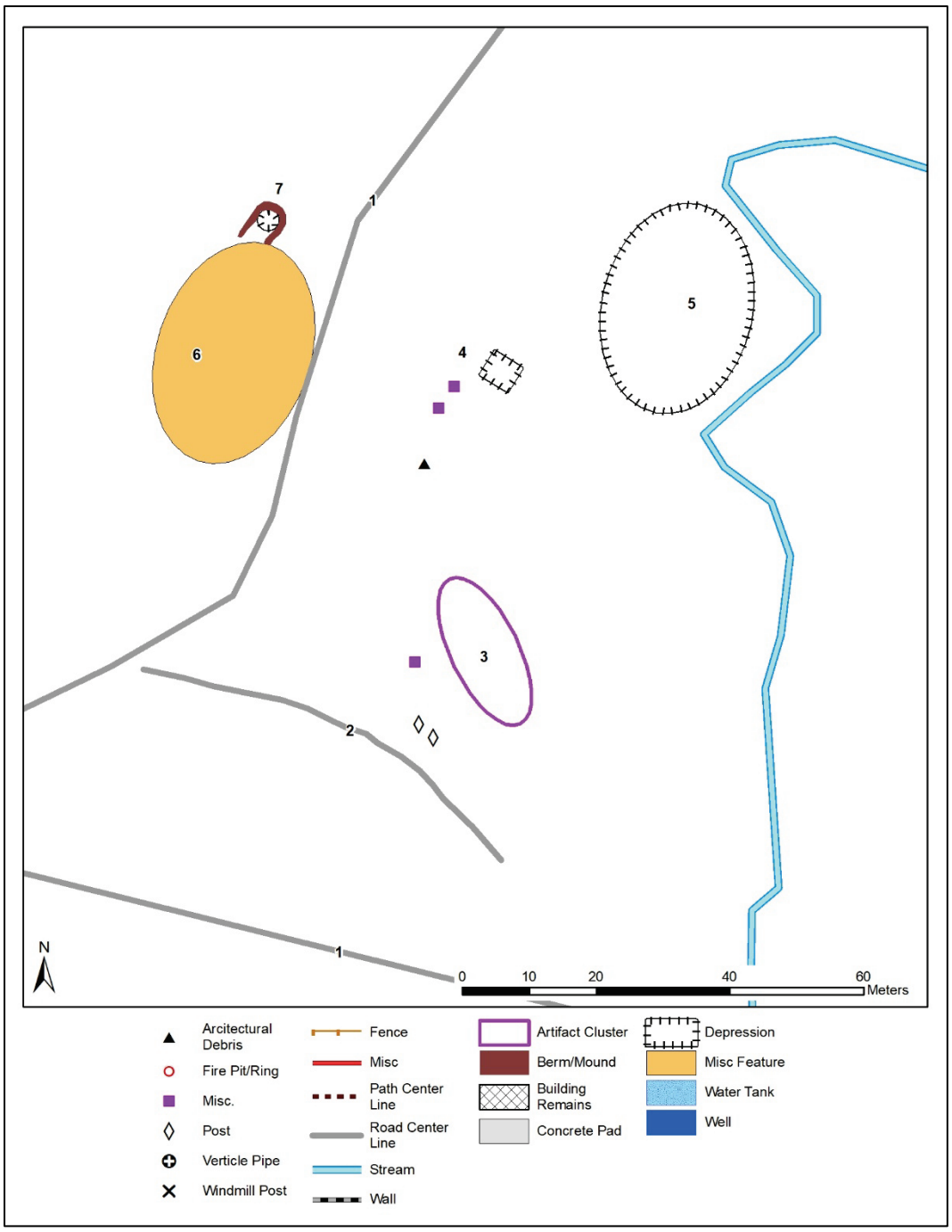
9.3.2 Historic documentation

CA-MNT-1531 was established in the early 1870s by David and Rebecca Escolastica-Freeman as a 160 acre homestead claim (Zahniser and Roberts 1980). Rebecca Escolastica de Sales Rodreiguez is a well-known individual in the region who had multiple husbands and last names. It is for this reason that sites associated with her use her maiden name in conjunction with her husbands. The site consisted of a wooden frame house and wheat farming was the principle crop they produced. Freeman died in 1878 and Rebecca remained at the house with their daughter, Marta Estema. Rebecca married James Bolton who built a multistory adobe house on property nearby that was finished in the late 1880s (Zahniser and Roberts 1980). Marta Estema continued to live at the original Escolastica-Freeman house until her death in 1940 (Allen and Hildebrand 1997). The site was likely demolished by the Army in the 1940s.

9.3.3 ERDC-CERL site visit

CERL identified seven features CA-MNT-1531 at least two of which are modern elements. The site is situated northeast of a maintained and active gravel road intersection. The road bounds the site on the south and cuts through the site on the western side. The portion of the site to the north and west of the active road shows evidence of recent mechanical disturbance and limited vegetation. Ground visibility is between 50-75%. The site between the two roads is covered with dry grass and scrub with surface visibility less than 25%.

Figure 121. Site CA-MNT-1531 site map.



Source: ERDC-CERL (2020).

The site feature descriptions are:

1. Road. This is a gravel road that is actively maintained and used
2. Road. This is a historic road that is no longer in use. No evidence of paving or gravel surface treatment was evident. The south side of the site slopes upward and the road is cut into the side of the hill. Barbed wire lying on the ground and two standing fenceposts on the north side of the road indicate that the north side of the road was once fenced.
3. Artifact Cluster. This was a cluster of barbed wire pieces scattered on the surface. A pattern to the scatter could not be discerned. It is unclear if this is the remains of a collapsed fence, pen or corral, a dumping area or a former storage location. An oil filter was located south west of the feature.
4. Depression and scattered artifacts. The depression is rectangular and approximately 4 x 5 m in plan and 1.5m deep. South west of the depression was a milled wooden plank fragment, an oval curved piece of tin sheeting that may be a piece of machinery, and a piece of metal machinery debris. A portion of a tree log is lying on the ground on the south side of the feature. There is no evidence of any working or modification of the log.
5. Depression. Large circular depression with a low berm on north, east and southern sides. Low gravel piles were located in the middle of the depression. This feature is located near an intermittent stream and its location would allow easy flooding of the depression. This feature may represent a stock tank or water retention pond.
6. Misc. feature. This feature is a graded area that is flat with low parallel loose soil ridges between scrape lines. There is much less vegetation indicating that the grading event was recent. No artifacts were found in the exposed soil within this feature.
7. Mound with depression. This feature is a low horse shoe shaped mound approximately 4 x 5 m in plan and 0.5 m high. The open portion of the feature faces south west. In the center of the feature is a circular depression. The base of the depression is approximately 15 cm below the ground level surrounding the mound. No artifacts were observed on the surface of the mound or depression.

The area is divided into two portions by the passage of a gravel road on the west side of the site. The area between the two roads shows less evidence of disturbance and multiple potential historic features related to ranching and/or farming activities. Feature 2 is clearly historic, requiring construction activity and not simply the result of repeated use creating a roadbed (Figure 122). Feature 3 may be the remains of an animal pen or fenced garden but

there is not enough material or pattern left to make that determination. Feature 4 may be a cellar but there is no other material that would indicate the presence of a building other than a single piece of milled lumber. Historic documents record the house structure as adobe and no mound typically associated with a collapsed adobe structure was noted. If this the remains of a historic feature or building it is unlikely that it was the house. Feature 5's location and configuration strongly suggest that this may be a historic stock tank or retention pond (Figure 123). The site forms dating to 1995 describe this feature as a large bulldozer push pile affected by erosion from the stream. There are, however, no borrow pits described in the site reports or seen by CERL researchers that could account for this amount of soil.

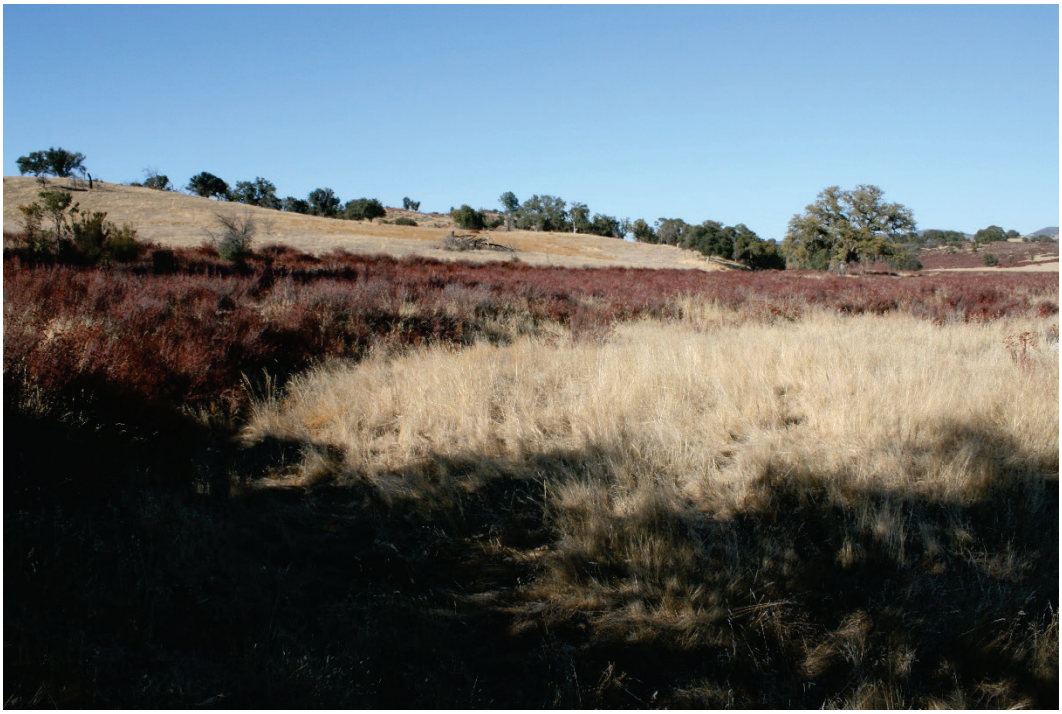
Feature 7 may be the remains of the adobe house. If features 3, 4 and 5 are historic farm or ranching features then the area of Feature 6 or 7 would be logical for the residential portion of the. No domestic or architectural artifacts were observed and this portion of the site has been and continues to be impacted. Feature 7 may simply be a bulldozer push pile.

Figure 122. CA-MNT-1531 Feature 2 and fenceposts (right central). View from SE to NW.



Source: ERDC-CERL (2019).

Figure 123. CA-MNT-1531 Western portion of Feature 5 taken from southern edge of Feature 5 view to NW.



Source: ERDC-CERL (2019).

9.3.4 Ranch Eligibility Evaluation Form

Based on the information above the evaluation form is as follows.

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to the 1860s? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **UNKNOWN**
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a ranch? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **YES**

4. Is there potential for intact buried deposits based on subsurface testing and/or evidence of ground disturbance or erosion? **UNKNOWN**
5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **NO**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **NO**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **NO**
2. Does this site possess a source of water (dam ponds, well, cistern, stock tank, spring, etc.)? **YES**
3. Is there a foundation larger than 10 x 10 ft. and less than 30 x 30 ft. on the site? **NO**
4. Is there evidence of small (wells, privy, shed, etc.) or large (stables, barns, bunk houses) architectural features? **NO**
5. Is there evidence of corrals, stock chutes and/or stock dip ponds? **NO**
6. Is there evidence of fence construction? **YES**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**
8. Is there evidence of landscape features (such as roads, paths, gardens, regular shaped depressions, berms, etc.) at the site? **YES**
9. Was the site occupied by a person of historical, regional, or local significance? **NO**

Based on the results of the eligibility evaluation form, site CA-MNT 1531 is **Not Eligible** for inclusion on the NRHP. With one "yes" answers in level 1 and 3 "yes" answers in level two this site does not exhibit significant level of integrity or diversity. The northwest portion of the site has clearly been disturbed and the amount of disturbance in the remainder of the site is unclear. Feature 2 and the associated barbed wire fence fragment is the only clearly historic element of the site. CERL researchers are of the opinion that Feature 5 is a historic water management feature but this contradicts the statements in the CA OHP site report that describe it as modern soil disturbance. In addition there is no clear trace of any structures and no artifacts could be clearly dated.

9.3.5 NRHP evaluation results

The site was evaluated for the NRHP in 1995 and reported in Allen and Hildebrand (1997). The investigation included survey, mapping and photography. An artifact concentration was identified around and to the south of CERL's Feature 4. Artifact types include porcelain, glass bottle fragments, white improved ironstone, barbed wire, and metal fragments. All ceramics and glass were collected but metal was left in situ. Vegetation was removed from around the rectangular depression (CERL's Feature 4) and no evidence of any evidence of any structure was located. The road trace was identified and dated to the historic occupation of the site.

The western portion of the site (in the area of CERL Feature 6) was mechanically scrapped with a road grader and some hand excavation was also conducted in this area. This investigation was focused on locating the house. On average 3-4 in. of soil was removed. The U-shaped mound was determined to be a bulldozer or grader push pile that had been disturbed after its deposition. Soil homogeneity indicated that the area had previously been disturbed. Artifact assemblages collected from the scrapped area included glass, ceramics, two hand-forged plow shares, ferrous metal fragments, and cut and wire nails. A 10 x 10 ft test unit was excavated 3 in. deeper by hand. The soil was homogeneous and artifacts recovered included ceramics, and bottle glass similar to what was found across the site. Also recovered were a significant number of cut and wire nails and more than 130 pieces of a cast iron stove. These artifacts indicate that the house was likely in the western portion of the site but no structural remains or subsurface feature was identified.

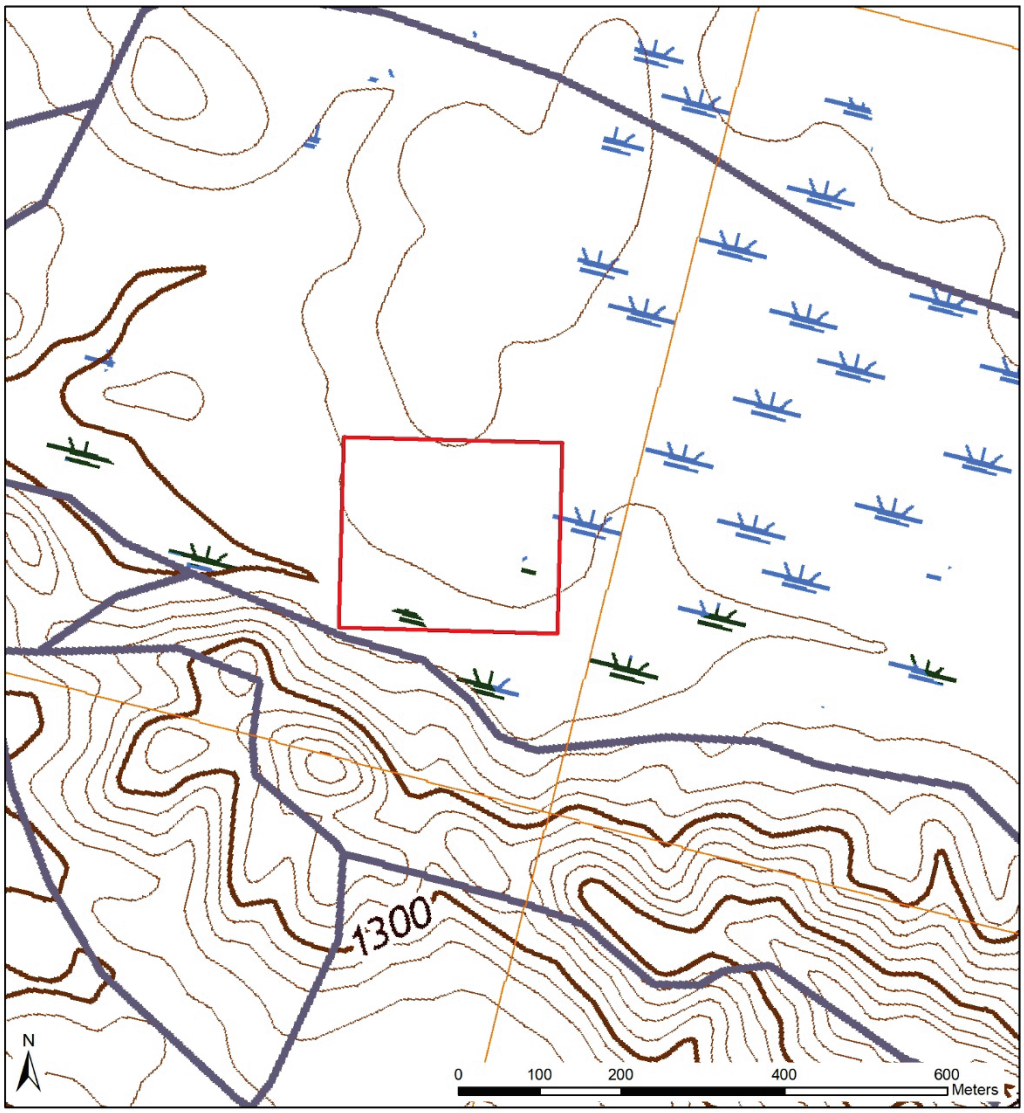
It was determined that the site had little or no integrity. No intact architectural or associated features could be found and property did not have the potential to provide any additional information to the historic record. The site was determined **Not Eligible** for the NRHP.

9.4 Site CA-MNT1542 field test

Site CA-MNT-1542 is a mound or tell site located on low ridge with hills and upland located 200m to the south. The area to the east and south is slightly marshy. One hundred and forty meters south of the site is what appeared to be an east-west flowing stream. It is not mapped as such on the USGS quad map (Figure 124). Satellite imagery shows that it does not drain in a larger stream located slightly further south. At the time of

CERL's visit there was standing water but no noticeable flow. This source of water is abundant enough to support large deciduous trees and reed vegetation. The vegetation at the site was dense, dry grasses and scrub brush growing above the researchers' heads. The only places where the ground surface was visible was in the backdirt of the animal burrows that were located across the tell.

Figure 124. Site CA-MNT-1542 on 2018 USGS 7.5 quadrangle map.



Source: https://ngmdb.usgs.gov.

9.4.1 Original Phase I results

The site was recorded in 1991 and is documented in the California State site forms (CA OHP n.d.). Three historic features were documented at the site. The first is the ruin of an adobe structure that has melted into a 30 x 11 m. mound with a north/south orientation. Roof tile fragments were scattered around the site. Other artifacts include undecorated whiteware, Chinese porcelain, blue transfer printed whiteware, aqua glass, abalone shell, and chert flakes. The site was impacted by military encroachments including a road cut into the north side of the mound. Modern artifacts include ammunition boxes, a communication board, and aluminum cans.

The second feature was a series of concrete pier foundations consisting of three rows of nine piers each. This feature is west of the mound. Each pier has a threaded metal bolt centered at the top. This feature may represent a temporary military structure that has since been removed. The final feature was located south of the feature and consisted of a poured concrete 12 sided reservoir.

9.4.2 Historic documentation

Historic documentation of the site was reported in Zahniser and Roberts (1980) and is summarized here.

CA-MNT-1542 is documented as a Mission Period Ranch adobe. The first documentation of a structure was in 1823 when the annual report for the Mission of San Antonio recorded that a house with two apartments was built for the shepherds. The structure measured 39 x 29 ft, had a tiled adobe roof and a covered porch or walkway along the sides. The site was secularized by the Mexican authorities and granted to Jose Rafael Gonzales in 1841 and then transferred to Mauricio Gonzales in 1867.

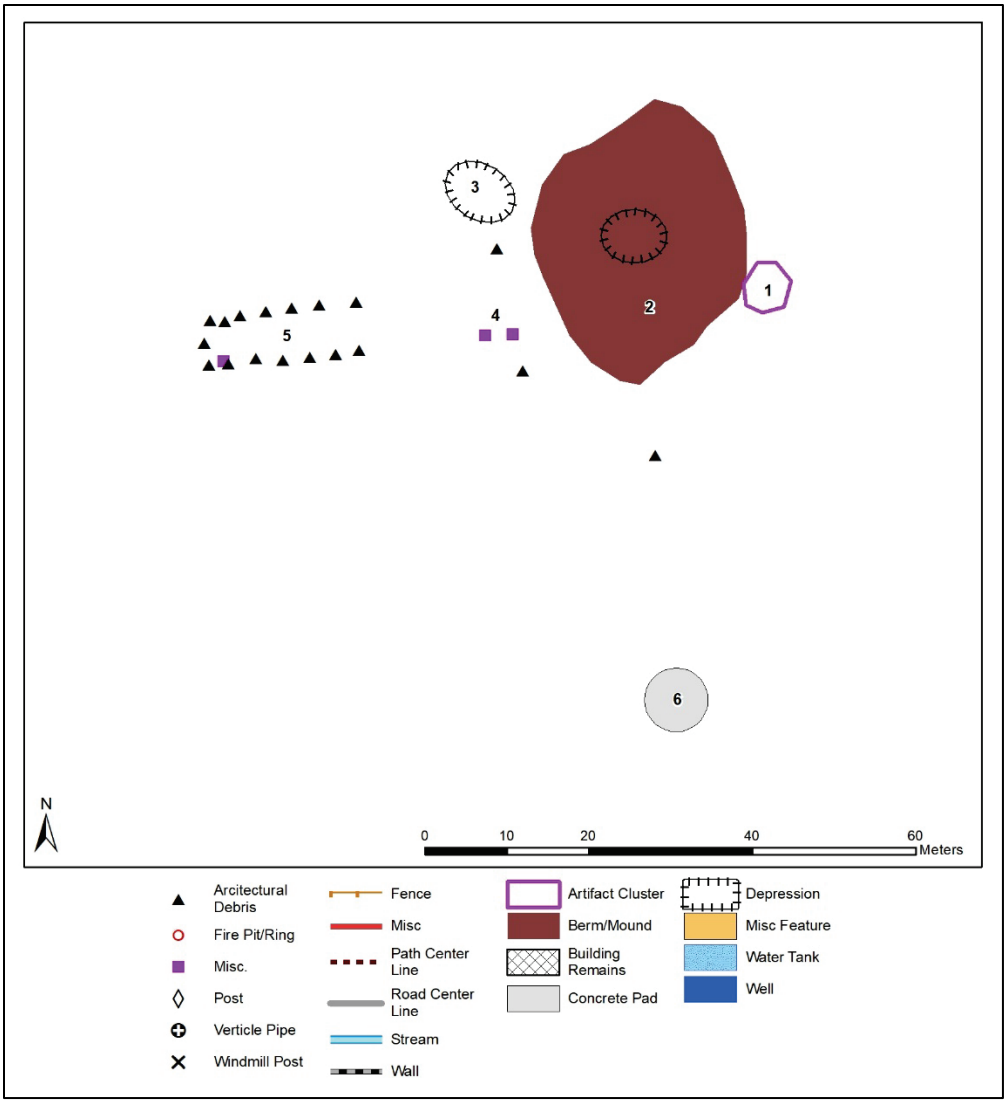
There is a gap in the title records until 1872-1874 when there were a series of closely spaced land sales and leases between San Francisco investors. In 1874 the site and its associated ranch was sold to Henry M. Newhall for $45,000.00. Newhall then merged it with an adjacent ranch he already owned to create a single ranch of 35,000 acres. Newhall continued purchasing surrounding ranches and in 1883 he incorporated six ranches (including our site) into the Newhall Land and Farming Company. In 1922, William Randolph Hearst's Piedmont Land and Cattle Company bought the original 35,000 acre ranch (including CA-MNT-1542) and all of

Newhall's private property from his heirs for $150,000.00. In 1940 the deed was transferred to the U.S. Army.

9.4.3 ERDC-CERL site visit

CERL researchers identified six features at the site, at least three of these are military in origin (Figure 125). The base of the tell is surrounded by coiled barbed wire and the site is marked with signage.

Figure 125. Site CA-MNT-1542 site map.



Source: ERDC-CERL (2020).

The site feature descriptions are:

1. Artifact Cluster. This artifact cluster contained a variety of domestic debris including undecorated white ware, bottle glass and a matte glazed green earthenware sherd with molded decoration that appears to be long flowing hair. Based on the texture of the paste, the matte finish and decoration it is suggested that this sherd is late 19th or early 20th century, perhaps in the art nouveau style.
2. Berm/Mound. This is the melted remains of an adobe structure. Adobe brick fragments, ceramic roof tiles and plaster fragments are scattered across the surface. Near the center there is a circular depression that may represent looting or the result of a roof collapse within the house. Some lithic chert flakes were also scene. The mound has a significant amount animal burrows in it.
3. Depression. An oval depression was located on the northwest side of the mound. No artifacts could be seen and the date of this feature is unknown.
4. Misc. An orange plastic traffic cone and metal strapping were located on the southwest side of the mound.
5. Architectural debris. A series of concrete piers with metal bolts embedded in the top likely indicate the presence of a temporary military structure or structures. At the west end of this feature are two small pillars of cobles embedded in concrete. Some of the piers of connected by metal frames.
6. Concrete Pad. Concrete water tank foundation.

It is evident that military activity continues in the vicinity of the site (Figure 126). Feature 3 may be the remains of the road cut described in 1991. Construction elements to the adobe structure such as bricks, roof tiles and plaster (Figure 127) indicate that the adobe has not melted completely and there is a good chance that excavation could reveal internal elements of the structure (Figure 128). Due to the very early age of the site it is possible that the earliest inhabitants were Native American *vaqueros*. As a result it is possible that the lithic artifacts seen at the site date to the historic period and do not necessarily indicate a prehistoric component.

Figure 126. CA-MNT-1542 Feature 5 View from SE to NW.



Source: ERDC-CERL (2019).

Figure 127. CA-MNT-1452. Adobe bricks and plaster fragments located atop Feature 2.



Source: ERDC-CERL (2019).

Figure 128. Site CA-MNT-1542. Eastern portion of the site taken from the top of Feature 2.



Source: ERDC-CERL (2019).

9.4.4 Ranch Eligibility Evaluation Form

Based on the information above the evaluation form is as follows.

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to the 1860s? **YES**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **UNKNOWN**
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a ranch? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **YES**

4. Is there potential for intact buried deposits based on subsurface testing and/or evidence of ground disturbance or erosion? **YES**
5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **YES**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **YES**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **YES**
2. Does this site possess a source of water (dam ponds, well, cistern, stock tank, spring, etc.)? **YES**
3. Is there a foundation larger than 10 x 10 ft. and less than 30 x 30 ft. on the site? **YES**
4. Is there evidence of small (wells, privy, shed, etc.) or large (stables, barns, bunk houses) architectural features? **NO**
5. Is there evidence of corrals, stock chutes and/or stock dip ponds? **NO**
6. Is there evidence of fence construction? **NO**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**
8. Is there evidence of landscape features (such as roads, paths, gardens, regular shaped depressions, berms, etc.) at the site? **NO**
9. Was the site occupied by a person of historical, regional, or local significance? **NO**

Based on the results of the eligibility evaluation form, site is **Atypical** and should be set aside for a traditional Phase II testing. The early date of construction and the possibility of Native American habitation (based upon the presence of lithic artifacts, the site age and its association with Spanish Mission ranching) means that this site falls outside of what can be considered typical of the region and the lack of ranching or agricultural features (as demonstrated by only three "yes" answers in Level II questions) and the evidence of military impacts to the site should not automatically eliminate it from consideration from the NRHP.

9.4.5 NRHP evaluation results

The NRHP evaluation was reported in Pezzuttie and Sherman 2017. One E-W transect of six shovel tests was excavated west of the adobe mound and a N-S transect of six shovel tests was excavated west to northwest of the

adobe mound. Seven of the 12 transects were positive with recovered artifacts consisting of bone, lithic and metal fragments. The deepest test was 40 cmbs with testing stopping at a layer of impregnable rocks and gravel. The soil in all the shovel tests was homogenous. The archaeologist determined that these tests indicated the presence of a midden on the west and northwest portion of the site.

The site was described as a Mission Period adobe structure dating to 1823 with an associated prehistoric/historic period midden that may predate or be contemporaneous with the adobe. The site was determined **Eligible** for the NRHP.

9.5 Site CA-MNT-1569 field test

Site CA-MNT1569 is located at the base of a valley with uplands to the southwest and northeast (Figure 129). The site is located approximately 1.4 km distant from the Mission San Antonio de Padua. An intermittent stream flows roughly north-south to the west of the site with intermittent marshlands northwest of the site. At the time of CERL's visit the stream and marsh were dry. Dense dry grass and scrub brush growing over the researchers' heads covered the site. Ground visibility was virtually zero.

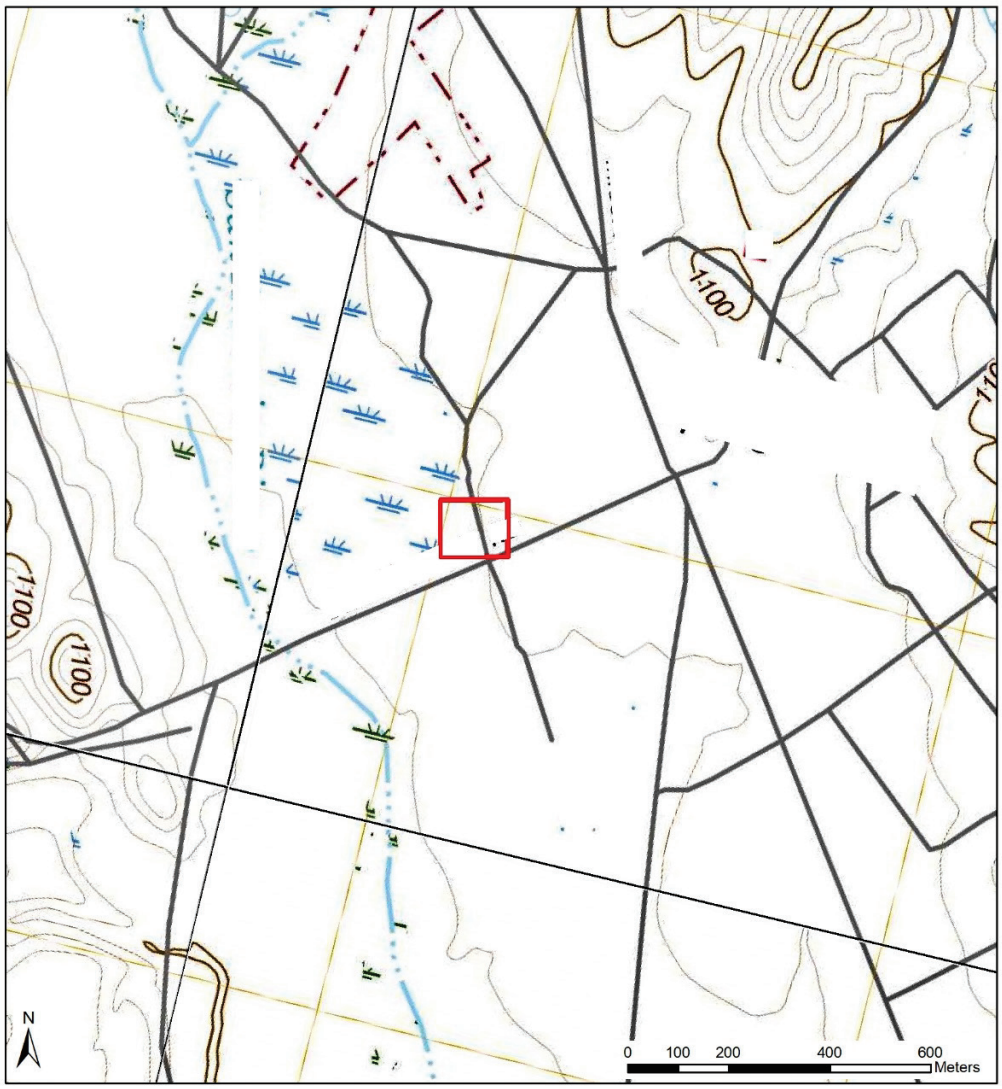
9.5.1 Original Phase I results

The site is first documented in the 1991 California State site forms (CA OHP n.d.). It is described as a roughly rectangular, 3 ft tall mound of melted adobe. Roof tiles were scattered over the feature. The mound was disturbed by numerous rodent burrows and most artifacts were found in rodent backdirt. Artifacts include black painted whiteware, blue transfer print whiteware, olive and aqua bottle glass, a Chinese dry center ring bowl fragment, aqua window glass, a cast iron pot fragment and metal debris. The artifacts were dated to the early to mid-19th century. Despite the animal burrows, it was concluded that architectural elements and occupational strata likely were still in place.

9.5.2 Historic documentation

Historic documentation and archival research were conducted as part of the NRHP evaluation and reported in Allen (1997). The research results are summarized here.

Figure 129. Site CA-MNT-1569 on 2018 USGS 7.5 quadrangle map.



Source: https://ngmdb.usgs.gov.

Site CA-MNT-1569 is located 1.4 km away from Mission San Antonio, originally established in 1771 as one of the Alta California missions. The Franciscans produced annual reports on the activities in the mission and surrounding ranges and no reports document structures at the location of the adobe site. The mission was secularized in 1835 and its lands were converted to ranching operations and homesteads. The population consisted primarily of Native Americans neophytes and Mexican citizens with Anglo-American immigrants arriving during or after the 1849 gold rush.

The site appears on maps dating from 1860 - 1880. The survey date of the first map was January 1860, indicating that the structure was constructed in 1859 or earlier. On the historic maps this site is identified with the

names “Adobe House,” “Sanchez” or “M. Sanchez.” Miguel Sanchez was a Mexican citizen who had moved to southern California at or before 1857 when his marriage was documented. He is documented as occupying site CA-MNT-1569 on a possessory claim in 1865. The site was described as and adobe house with fences. It is unclear if he was the original constructor of the adobe or if he had taken possession in 1865 of a structure that was already there. General Land Office records indicate that Miguel Sanchez was still on the site in 1872.

In 1872 Faxon Atherton acquired the Milpitas Rancho and began a campaign to evict all squatters on Milpitas Rancho lands. When the courts ruled in Atherton’s favor in 1875, he successfully pursued evections ordered in the Monterey County District Court. Miguel Sanchez was not listed in the 1875 court records but a Juan Sanchez was. It is unclear if there was any relation between the two men. It is possible that M. Sanchez had already given up his possession of the site by 1875 and, therefore, did not need to be evicted. Other possibilities are that the site had been handed off to Juan Sanchez or that Juan Sanchez occupied a different site on Milpitas Rancho. The adobe house last appears on a map filed with Monterey County in 1880.

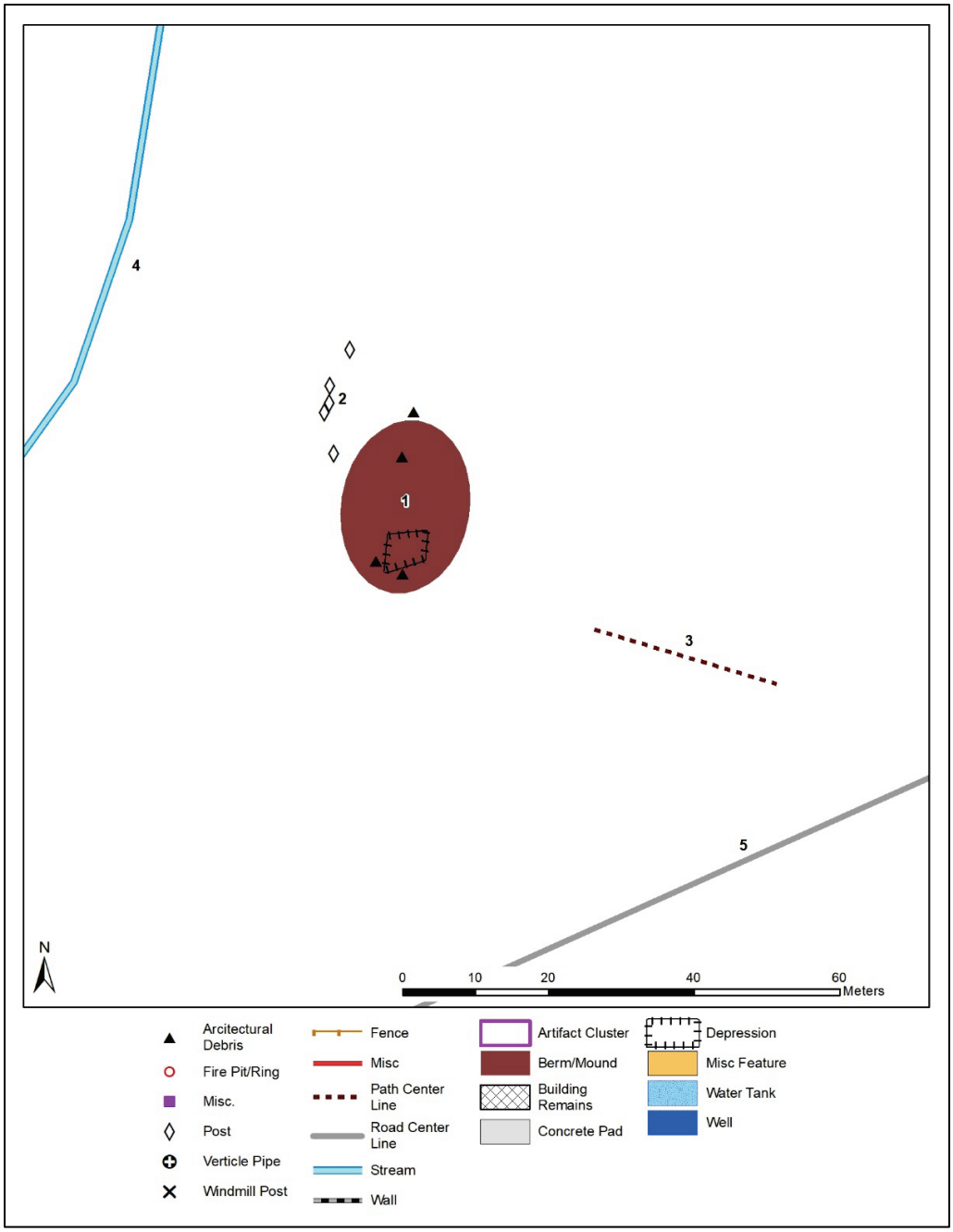
9.5.3 ERDC-CERL site visit

CERL researchers identified five features at site CA-MNT-1569 (Figure 130). The entire site was covered with dense overgrowth of grasses and brush that was over the researchers’ heads. There was 0 - 15% surface visibility in non-disturbed areas.

The site feature descriptions are:

1. Berm/Mound. Remains of a melted adobe structure. On the south side of the berm is a rectangular depression or wash out. Adobe brick, window glass and undecorated whiteware were observed in the exposed soil. A small pile of river cobles was located on the north side of the berm.
2. Fenceposts. Wooden fenceposts standing approximately 2m tall. Barbed wire is strung between the posts.
3. Path. Old road or path. Researchers discovered the feature by stepping on it. No sign of pavement or gravel.
4. Drainage Wash. Sizable drainage wash cutting across the site. At the time of the survey the feature and all the vegetation growing in it was dry.
5. Road. Modern paved road that has been recently repaved.

Figure 130. Site CA-MNT-1569 Site map.



Source: ERDC-CERL (2020).

Site CA-MNT-1569 is a melted adobe structure with a rectangular depression on the southern side. The site was heavily overgrown and the only artifacts observed were seen in the exposed erosion areas around the depression (Figure 131). This depression may represent an interior room to the structure. The small pile of river cobbles on the north side of the site may represent a firepit or chimney remains but no evidence of burning could be seen. The wooden post and barbed wire fence are located on the west side

of the site (Figure 132). The fence is historic but the presence of barbed wire would make it unlikely that the fence dates to the known occupation of the site (1865-1872). The ditch feature described in the site forms should have been located between the mound and the fence. This feature was not found but if it were not of significant depth it is possible that it could not be seen through the vegetation.

Figure 131. CA-MNT-1569, Depression in Feature 1. View from NE to SW.



Source: ERDC-CERL (2019).

Figure 132. CA-MNT-1569 Features 2 and 4 (behind). View from E to W.



Source: ERDC-CERL (2019).

9.5.4 Ranch Eligibility Evaluation Form

Based on the information above the evaluation form is as follows.

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to the 1860s? **YES**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **UNKNOWN.**
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a ranch? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **YES**
4. Is there potential for intact buried deposits based on subsurface testing and/or evidence of ground disturbance or erosion? **YES**
5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **YES**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **NO**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **NO**
2. Does this site possess a source of water (dam ponds, well, cistern, stock tank, spring, etc.)? **YES**
3. Is there a foundation larger than 10 x 10 ft. and less than 30 x 30 ft. on the site? **YES**
4. Is there evidence of small (wells, privy, shed, etc.) or large (stables, barns, bunk houses) architectural features? **NO**
5. Is there evidence of corrals, stock chutes and/or stock dip ponds? **NO**
6. Is there evidence of fence construction? **YES**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**

8. Is there evidence of landscape features (such as roads, paths, gardens, regular shaped depressions, berms, etc.) at the site? **NO**
9. Was the site occupied by a person of historical, regional, or local significance? **NO**

Based on the results of the eligibility evaluation form, site CA-MNT-1569 is **Atypical** and should not be given a final NRHP evaluation until it has undergone a traditional Phase II evaluation. With three "yes" answers in level 1 and e "yes" answers in level two this site would not normally be considered eligible under this methodology. The existence of the site on a historic map with a survey date of January 1860, however, puts this outside of the temporal range of the checklist. The presence of adobe brick, window glass, ceramics and a rectangular depression in the mound indicate that the principle feature of the site still has some integrity on may provide information about the structure. The fence and path are unlikely to date to the historic occupation period. The water management feature described in the 1991 site forms was not located but it could have been missed due to the vegetation conditions.

9.5.5 NRHP evaluation results

Site CA-MNT-1569 NRHP evaluation was documented in Allen (1997). Their findings are summarized below.

At the time of the investigation it was documented that the site had been used as a cattle holding area for many years and the site was trampled by cattle. The mound was also disturbed due to bioturbation. The site was investigated with a large amount of excavation occurring on the mound including 11 test units and two trenches excavated by hand as well as four backhoe excavated trenches. A cluster of hand excavated units were located at the site of the depression mapped by CERL. It is possible that this depression was a result of the settling of backfilled excavation units.

Artifacts from the excavations mostly dated from the mid to late 19th century, which corresponds to the occupation periods in the historic documents. Some artifact types, however, indicate an occupation perhaps as early as 1834 (Mission Secularization). These include black transfer print earthenware, blue shell-edged earthenware dark green and aqua glass. Ceramic and glass artifacts (molded whiteware and purpled glass medicine bottle) found at the level of the original floor level would indicate that the

house was abandoned sometime after 1880. The number of artifacts recovered was low, indicating that the abandonment of the building was organized, that the site was scavenged after the residents left, that the occupants did not have the resources or access to acquire possessions or a combination of all of those factors. Excavations located no trash dumping features.

The excavations indicated that the structures were two roomed and measured 51 x 21 ft. This made the structure small by period standards. Variations in building technique indicated that the building was constructed in two phases. The northern rooms were considered older and had a foundation of river cobbles. Poor preservation of the adobe bricks and the floor surface was attributed to rodent disturbances. Despite the amount of animal burrows located on the surface the underlying strata were considered to maintain enough integrity to reveal archaeological information. Cattle disturbance was limited to the surface.

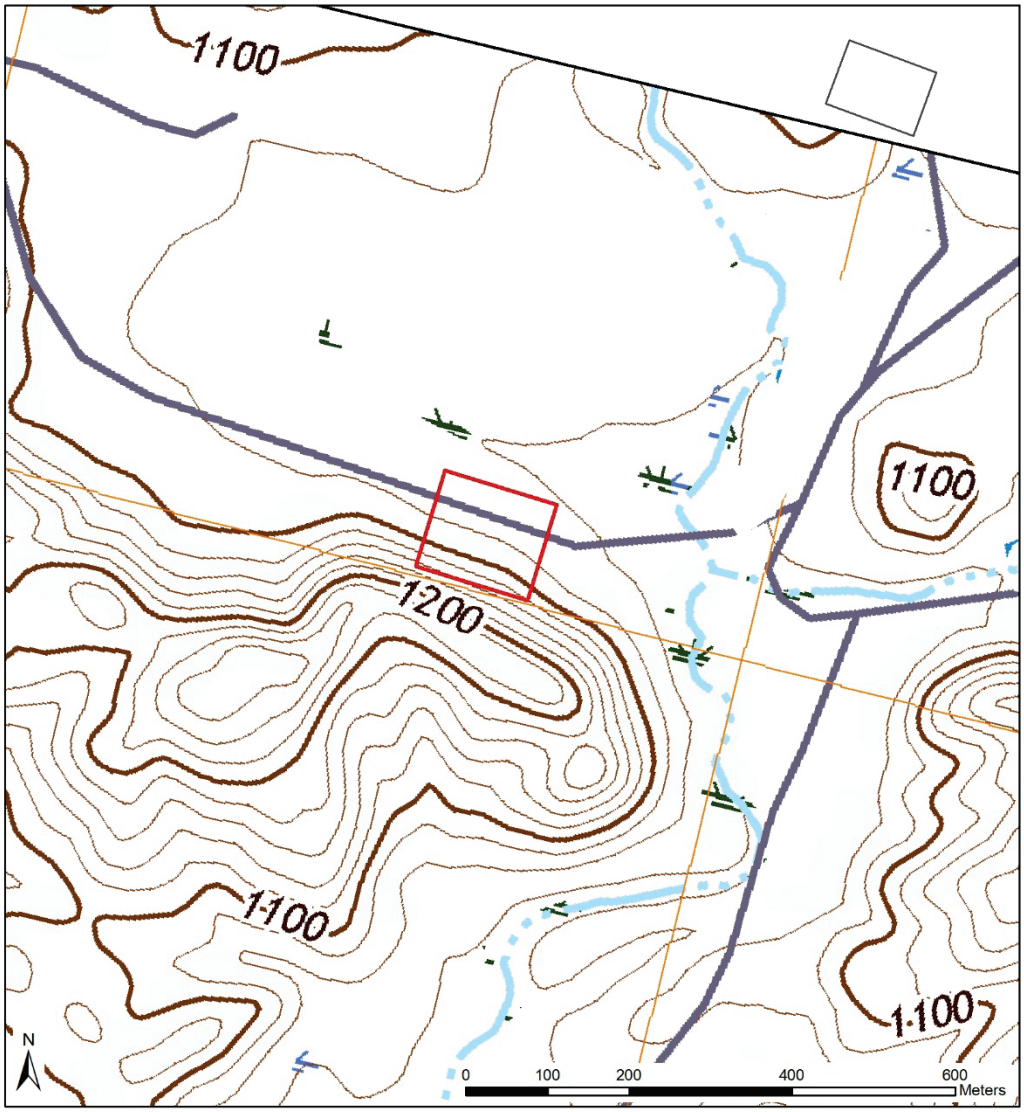
The north-south water ditch system (described in the 1991 site forms) located on the west side of the adobe melt was also investigated with backhoe trenches. One branch of the ditch originated at the Mission San Antonio located nearby. In some portions the ditch was earth and stone lined but north of the site it was concrete lined. The ditch was shallow and had a uniformed sand infill indicating that it had been used briefly and silted in quickly. The date of the ditch construction, use and maintenance could not be determined. The link to the Mission water system could indicate an early 19th construction but water features were added to existing systems in the late 19th century.

It was determined that the site was occupied by a Mexican-American family with limited economic means. This site could provide information not only on the secularization processes but also on the shift from Mexican-American to Anglo-American land ownership patterns. Site CA-MNT-1569 was determined to be **Eligible** for the NRHP.

9.6 Site CA-MNT-1638 field test

Site 1638 is located at the edge of a river valley with wooden uplands located immediately south of the site (Figure 133). The intermittent creek located east of the site was dry at the time of CERL's visit. Most of the site was covered with dry grasses, obscuring the surface, but the central portion of the site was heavily disturbed by the rooting action of pigs. The site is cut by an actively used east/west oriented gravel road.

Figure 133. Site CA-MNT-1638 on 2018 USGS 7.5 quadrangle map.



Source: https://ngmdb.usgs.gov.

9.6.1 Original Phase I results

The site was first reported in the California State site files in 1992. The information there is summarized here.

Five features were reported at the site. North of the current road was a cluster of three blocks of siltstone and part of a foundation wall that indicated a 21 x 28 ft. structure and a line of four siltstone rocks interpreted as the footers for a 10 x 21 ft. structure. South of the road was an old road cut that paralleled the current road, an artificial terrace located between the old and current road measuring 190 x 15 ft. with an east-west berm along

its northern edge and five north-south berms along the length. This was interpreted as a possible long structure with room divisions. Finally there was a rock cluster at the southwest end of the site that may have been footers to another building of unknown size. A dense artifact cluster was located between this feature and the artificial terrace building.

Artifacts recovered included a portion of an olive green Clubhouse Gin brand bottle (1857-1878), an aqua glass molded glass flask (1820-1840), a copper Henry's.44 caliber bullet casing (1860-1934), amethyst glass medicine bottle fragments, gilt milk glass goblet fragment, whiteware, bottle glass (olive, amethyst, clear, and aqua), a square cut nail and roofing tile fragments.

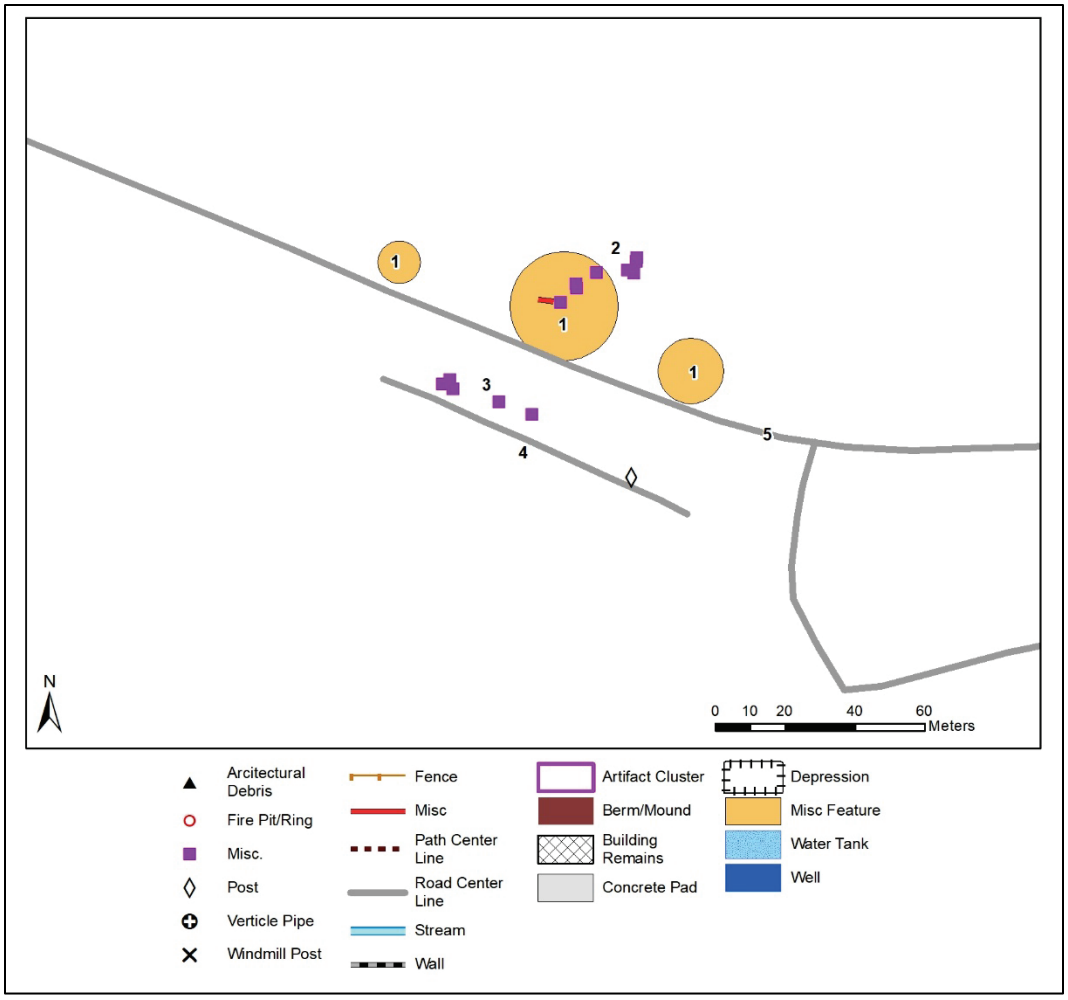
9.6.2 Historic documentation

Historic documentation for this site was reported as part of the NRHP evaluation in Allen and Hildebrand (1997). This documentation did not include any reference to deed, claim, tax or census records. The land was part of a large secularized ranch that was later divided into smaller units. Oral histories referenced a small wood framed structure at the site but it the informants did not know when it was built or destroyed.

9.6.3 ERDC-CERL site visit

CERL researchers identified five elements of the site to be documented. Most of the site was covered in dry grass, limiting the visibility of the surface. The area north of the modern road is flat with the land sloping upward on the southern portion of the site.

Figure 134. CA-MNT-1638 Site map.



Source: ERDC-CERL (2020).

The site feature descriptions are:

1. Misc. Feature. Large oak trees. These trees are at least 70 years old and could be significantly older, particularly the central one. The area on the map indicates the tree canopy and the trunks. The areas beneath the trees have been significantly disturbed by feral pigs or hogs rooting the soil and no ground vegetation was present in these areas.
2. Misc. Features. Flat-topped stones and one burnt log located north of the largest tree trunk. These stones could be footers to a structure but no square or rectangular pattern could be discerned. The log was cut to length but no other modification was seen.
3. Misc. Features. Large stones in a roughly linear pattern. It is unclear if the stones are naturally located, were randomly placed during the road cut clearage, or deliberately places as part of a feature.

4. Road Center Line. Old road cut near the base of the slope on the southern side of the site. The elevation of this feature is 4-6 meters above the elevation of the ground north of the modern road. A cut and burnt utility pole are located near the east side of the site.
5. Road Center Line. Actively maintained gravel road with current electrical utility lines on the south side of the road.

With the exception of the old road cut (Figure 135) on the south side of the site, there is little evidence that a farmstead was located here. There is a scatter of stone that are large enough to be foundation footers for wooden structures but no pattern could be discerned to indicate such structures (Figure 136). The berms described in 1992 could not be relocated. No artifacts were observed, including in the areas that were churned by pigs. No evidence of fencing, or any improved water features were found. The possible structure on the southwest of the site could not be relocated.

Figure 135. CA-MNT-1638 Feature 4 (center) and Features 1 and 5 (right). View from E to W.



Source: ERDC-CERL (2019).

Figure 136. CA-MNT-1638 Feature 2. View from S to N.



Source: ERDC-CERL (2019).

9.6.4 Ranch Eligibility Evaluation Form

Based on the information above the evaluation form is as follows.

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to the 1860s? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **NO**
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a ranch? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **NO**

4. Is there potential for intact buried deposits based on subsurface testing and/or evidence of ground disturbance or erosion? **NO**
5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **NO**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **NO**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **NO**
2. Does this site possess a source of water (dam ponds, well, cistern, stock tank, spring, etc.)? **NO**
3. Is there a foundation larger than 10 x 10 ft. and less than 30 x 30 ft. on the site? **NO**
4. Is there evidence of small (wells, privy, shed, etc.) or large (stables, barns, bunk houses) architectural features? **NO**
5. Is there evidence of corrals, stock chutes and/or stock dip ponds? **NO**
6. Is there evidence of fence construction? **NO**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**
8. Is there evidence of landscape features (such as roads, paths, gardens, regular shaped depressions, berms, etc.) at the site? **Yes**
9. Was the site occupied by a person of historical, regional, or local significance? **NO**

Based on the results of the eligibility evaluation form, site CA-MNT-1638 is **Not Eligible** for inclusion on the NRHP. With zero "yes" answers in level 1 and 1 "yes" answers in level two this site shows little to no potential to yield information about ranching and/or agricultural practices in the region. With the exception of the old road cut, there is no evidence of any historic features at the site. The artifact debris observed in 1992 was not visible in 2019, although the site was either covered in dense dry grass or disturbed by animals. None of the rock clusters displayed any patterning that would indicate structures. No fencing or stock corrals were observed.

9.6.5 NRHP evaluation results

The NRHP evaluation was conducted in 1995 after a controlled burn and reported in Allen and Hildebrand (1997). The findings are summarized here.

With the vegetation absent it was easy to determine that rock clusters were in a random alignment. It was also noted that the stones did not appear modified and identical to natural stone occurring in the ridge on the south side of the site. The old road was observed and documented. The artificial terrace described in 1992 was determined to be either a natural grade between the hill and valley or a result of the construction of the roadbed construction. No evidence of structures was found.

Artifacts dating to the 19th and 20th century were found scattered around the site. A soil disturbance on the north side of the active road (a result of road maintenance activity) demonstrated that soil had been disturbed. The other items of note include three live and one dead black locust trees equally spaced on the north side of the old road. These are an introduced species and indicate a historic house site.

The survey concluded that the site was probably the location of a house during the late 19th or early 20th century but the exact location of the house or any outbuildings could not be determined. Over 90% of the site surface had been disturbed due to military activity and road maintenance. The site also was not represented in the historic record. As a result CA-MNT-1638 was determine **Not Eligible** for the NRHP.

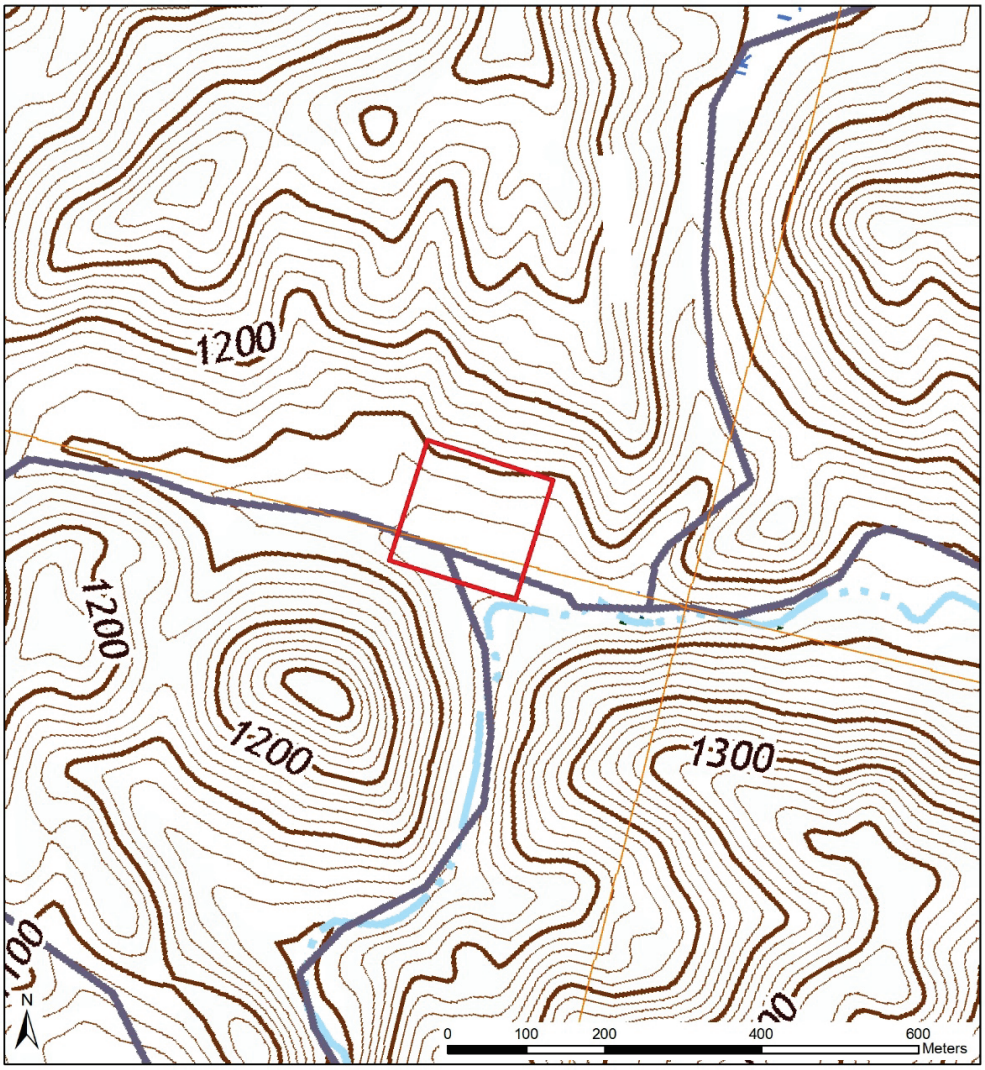
9.7 Site CA-MNT-1786 field test

Site CA-MNT-1786 on sloping land with high elevation located on the north side of the site (Figure 137). The lowest elevation is at the center of the site and then the land rises again as you continue south. A natural drainage ravine runs N-S west of the center of the sites. An intermittent stream is located south of the site. At the time of CERL's visit the stream was dry. The site was covered with dry grass vegetation and ground visibility across the site averaged at 20-30% visibility.

9.7.1 Original Phase I results

The site was documented in the California State site files (CA OHP n.d.) in 1994. The site was described as a cement and stone foundation, a water trough and an artifact scatter. The artifacts indicate an occupation period during the early 20th century.

Figure 137. Site CA-MNT-1786 on 2018 USGS 7.5 quadrangle map.



Source: https://ngmdb.usgs.gov.

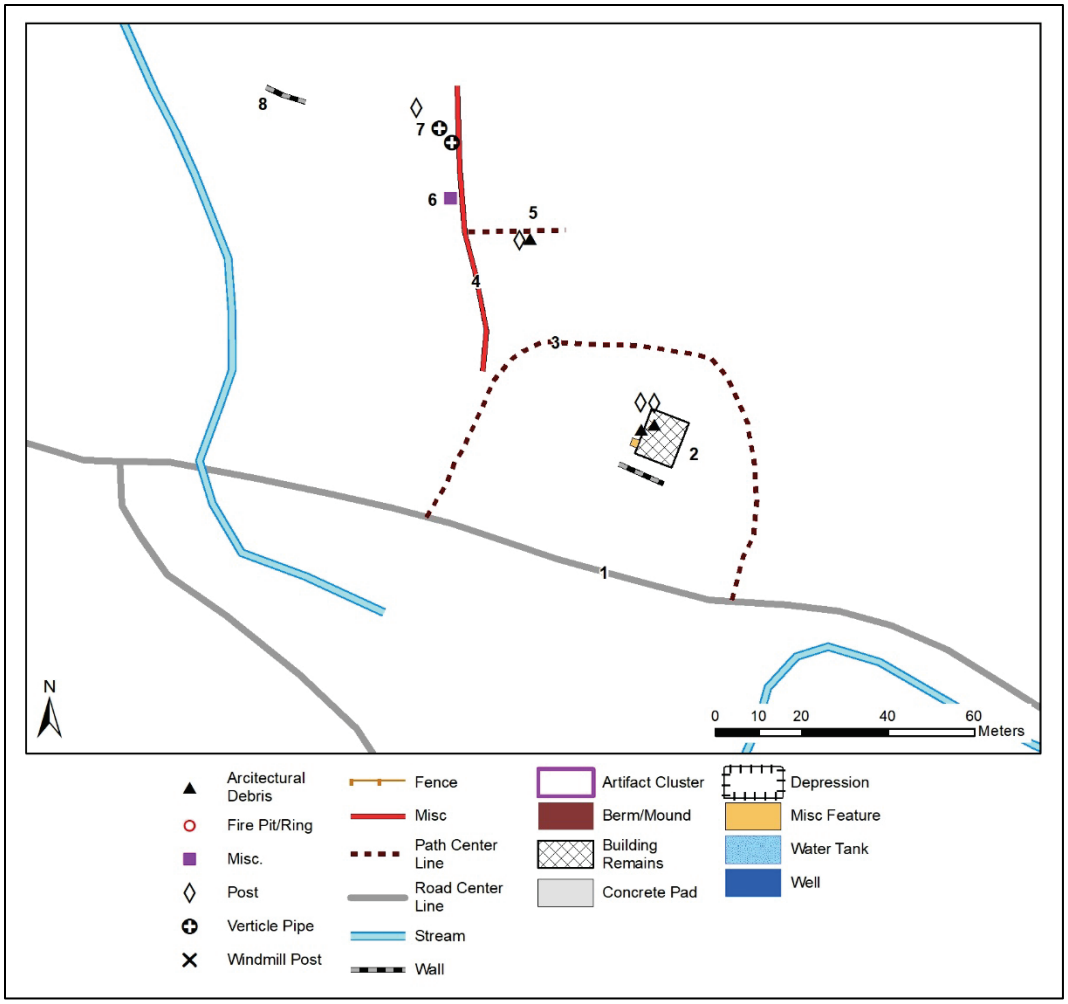
9.7.2 Historic documentation

Archival research was conducted and reported in Allen and Hildebrand (1997). No record of the site could be found in the archival record or oral histories. The Brown Cattle Company operated in the area from 1900-1920 and the land was owned by William Randolph Hearst from 1920-1940.

9.7.3 ERDC-CERL site visit

At the time of CERL's visit the site was covered with dry grasses and surface visibility was 20-25%. CERL researchers identified seven manmade and one natural feature.

Figure 138. CA-MNT-1786 Site map.



Source: ERDC-CERL (2020).

The site feature descriptions are:

1. Road Center Line. Actively maintained gravel road.
2. Building Remains. Ground level stone foundation with concrete mortar. Only three sides remain with the north side missing. Two milled wooden posts were lying on the ground at the northwest corner. South of the stone foundation was a second ground level stone wall that may have been the foundation of a porch or addition or low wall enclosure. On the southwest side of the structure was a concrete covered brick chimney base or fire box. Two clusters of flat stones were located within the feature. The center of the foundation is lower than the ground outside the house indicating a potential cellar.
3. Path. This is a low, flat U-shaped feature around the house and was interpreted as a circular drive or road.

4. Misc. Feature. Natural drainage ravine that cuts into the slope opposite the house structure.
5. Path and artifact cluster. This is a leveled area that cuts across the slope on the north side of the site. This may be a road cut into the hill or the location of a structure. A wooden post lying on the ground and a burnt rock cluster were located on the south side of the leveled area.
6. Misc. Feature. Metal trough or basin about the size of a 55 gallon drum. Partially buried and silted in with soil.
7. Pipes and Post. Metal pipes approximately 10 cm in diameter lying on the ground. Also in this area was a square wood post on the ground.
8. Wall. Low rock wall heavily overgrown with brush. Exact dimensions of the feature could not be determined due to the overgrowth.

This site consists of a dwelling structure, two potential structures, a curved drive and some water management features. Due to the presence of a fireplace (Figure 139) Feature 2 is clearly a dwelling structure. It is unclear why the northern wall is missing. The structure is slightly cut into a slope but no remains of a collapsed foundation wall could be found down slope. Two clusters of flat rocks were located within the feature but their location would be unusual for these to be structural supports. The purpose of these is unclear. A low wall, parallel to the southern wall of the house, is located 5 m south of the house. This may be a landscape wall or the foundation of a wooden addition or porch. The site is bisected by a low area that appears to be a circular drive (Figure 140). North of the drive was level area in the slope side with a wooden post and a burnt cluster of rocks. The level area ended abruptly indicating that it is a manmade feature. This may be the location of an animal pen, a building, a camp site, etc. A metal trough was located in the ravine and metal pipes were found upslope also in the ravine. This represent an effort to channel water from the ravine into water troughs or storage tanks. Alternatively a windmill may have been locating at the top of the slope and the pipe used to transport water to the trough (the site otherwise sits in an area sheltered from the wind). Finally, a low stone wall was located on the northwest side of the site (Figure 141). This feature was not reported in earlier investigations. Its exact size and shape could not be mapped due the overgrown of scrub brush and juniper. No artifacts were observed at the site.

Figure 139. CA-MNT-1786 Feature 2 detail. View from SE to NW.



Source: ERDC-CERL (2019).

Figure 140. CA-MNT-1786. Looking across Feature 3 toward Feature 2 (right of center). View from NW to SE.



Source: ERDC-CERL (2019).

Figure 141. CA-MNT-1786 Feature 8. View from S to N.



Source: ERDC-CERL (2019).

9.7.4 Ranch Eligibility Evaluation Form

Based on the information above the evaluation form is as follows.

Preliminary Questions

1. Is there evidence of historic occupation of the site prior to the 1860s? **NO**
2. Is there evidence of activity/production/industry at the site that is not related to agriculture or the common forms of cottage industry for the region? **NO**
3. Does the site contain a feature type that is unique or very rare (less than 10 occurrences) at known sites in the region? **NO**

Level I questions

1. Is the site less than 25% disturbed and therefore possesses high site integrity? **YES**
2. Did the site have a function other than an agricultural property? Is the property listed on deed records, maps, or other historical documents as something other than a ranch? **NO**
3. Is the site on historic maps, property deeds, census records, oral histories or other historic documents? **NO**

4. Is there potential for intact buried deposits based on subsurface testing and/or evidence of ground disturbance or erosion? **YES**
5. Does the site possess structural features, such as intact in-ground or aboveground architecture? **YES**
6. Does the site possess artifacts that were manufactured prior to the beginning of the 20th century and datable to a discrete period? **NO**

Level II questions

1. Is the site a portion of an associated series of sites within the local vicinity that could suggest a larger community or district? **NO**
2. Does this site possess a source of water (dam ponds, well, cistern, stock tank, spring, etc.)? **YES**
3. Is there a foundation larger than 10 x 10 ft. and less than 30 x 30 ft. on the site? **YES**
4. Is there evidence of small (wells, privy, shed, etc.) or large (stables, barns, bunk houses) architectural features? **NO**
5. Is there evidence of corrals, stock chutes and/or stock dip ponds? **NO**
6. Is there evidence of fence construction? **YES**
7. Is there evidence of a cottage industry typical to the region at the site? **NO**
8. Is there evidence of landscape features (such as roads, paths, gardens, regular shaped depressions, berms, etc.) at the site? **YES**
9. Was the site occupied by a person of historical, regional, or local significance? **NO**

Based on the results of the eligibility evaluation form, site CA-MNT-1786 is **Eligible** for inclusion on the NRHP. With three "yes" answers in level 1 and 4 "yes" answers in level two this site meats the minimum number of responses to classify as Eligible. The existence of landscape features in multiple parts of the site indicate that large scale ground disturbance is unlikely. The low area inside the house may indicate a cellar but the missing north wall also points to the possibility that the structure was deliberately demolished. Small rock wall located on the south and north portions of the site indicate either the locations of secondary structures or enclosed areas.

9.7.5 NRHP evaluation results

The site was evaluated for the NRHP in Allen and Hildebrand (1997). Their findings are summarized here.

The 1997 survey located 4 features. The first was the remains of a small house (CERL Feature 2). Two test units were excavated adjacent to the foundation. The demonstrated that the foundation consisted of river cobbles set in cement mortar extending 25 cmbs. Remains of redwood house framing survived demonstrating that the walls were famed with 2x6" lumber. The pile of stones was described as being a support for a small porch recessed within the outer wall of the house. The depression within the house was suggested to be a pit excavated by the Army. The only artifacts recovered was window glass. The second feature was a water trough located in the drainage northwest of the house. The third feature was a trash scatter located west of the house. This feature was not relocated by CERL. Artifacts recovered included window glass, sun-purpled bottle glass, wagon or early car parts, barbed wire, and milled wooden fragments. The final feature was a driveway following the natural contour on the eastern portion of the site. The report mentions the presence of excavated Army defensive positions but does not record the number or locations of the disturbances.

It was determined the site had a brief occupation of 10-30 years during the early 20th century. The site did not have corrals or barns. As a result they authors considered it unlikely that it would have been used as a ranching location during the Hearst ownership. The site was also considered to be damaged by military activities and was determined **Not Eligible** for the NRHP.

9.8 Summary of field tests

Six sites at FHL were evaluated by CERL for this report. Site evaluations were conducted blind with the researcher unaware of the original NRHP evaluation determinations. After the site evaluation was complete the results were compared to the original determinations (Table 5).

Table 5. Summary of NRHP Eligibility Findings for FHL, California.

Site	NRHP Determination Based on Traditional Methodology	NRHP Determination Based on CERL Methodology
CA-MNT-258	Not Eligible	Not Eligible
CA-MNT-1531	Not Eligible	Not Eligible
CA-MNT-1542	Eligible	Atypical
CA-MNT-1569	Eligible	Atypical
CA-MNT-1638	Not Eligible	Not Eligible
CA-MNT-1786	Not Eligible	Eligible

Of the six sites evaluated there is agreement on the findings for three of the sites. In two of the sites, CA-MNT-1542 and CA-MNT-1569 the sites were classified as "Atypical" due to the early date of their construction. When the site Eligibility evaluation form was filled out for these two sites the results indicated that these sites would have been ineligible primarily due to the absence of any secondary structures, fencing, landscape features or livestock management features. With the site listed as Atypical the full Phase II would have occurred and subsurface testing would have revealed the significance of the site.

There was also a difference in the eligibility results for site CA-MNT-1786. It should be noted that CERL researchers identified three additional historic features at the site that were not reported in the traditional NRHP evaluation. It is possible that if these had been identified it might have affected the traditional NRHP evaluation results.

A variable that was encountered at FHL and not at any other installation visited for this research was the occurrence of large scale archaeological investigations during the traditional NRHP evaluations. Two sites had been scraped with a road grater and a third site had more than a dozen test excavations including multiple backhoe trenches. The CERL researchers documented these disturbances in their field mapping. Due to the blind nature of CERL's test methodology, the date and nature of these excavations were unknown to testing archaeologist and, in at least one case, interpreted as part of a historic feature. In other cases this was seen as evidence of military disturbance.

Visibility at many of the sites was poor with dry grasses and scrub brush covering sites. In many cases the vegetation was over the heads of the researchers. This limited the visibility of features, particularly landscape features. At several sites, the researchers did not observe a single artifact because of the visibility issues. For this reason, the methodology proposed here would be best deployed after burning events that occur periodically throughout the installation.

10 Conclusions

10.1 Project summary and lessons learned

A total of 29 sites at five installations were investigated for this effort. Depending on the site size and complexity, the field work for each site was accomplished by two people in 1-4 hours per site. The team archaeologist identified and mapped the features and artifacts while the team historian photographed the site and features and maintained the photo log (occasionally with the assistance of installation personnel). This is a significant decrease from the labor requirements for a traditional Phase II survey, which may require a team of three or more people several days to perform the subsurface testing with additional time and labor to perform the associated laboratory work.

The write-up and evaluation of each site took the project archaeologist between 4 and 8 hours per site depending on the site size, complexity and the amount of traditional Phase I documentation that needed to be examined. It should be noted that CERL researchers did not perform the archival and historical documentation research for the sites in this project and instead relied upon the archival work performed and conducted as part of the traditional Phase II surveys. Under the new methodology the historic documentation research will be the largest task in the site evaluation.

The summary of results is as follows (Table 6):

Table 6. Summary table of project results.

	Site	NRHP Determination Based on Traditional Methodology	NRHP Determination Based on CERL Methodology	Result Agreement
Fort Riley, Kansas	14GE0170	Not Eligible	Eligible	No
	14RY2117	Eligible	Atypical	
	14RY2136	Eligible	Eligible	Yes
	14RY2138	Not Eligible	Not Eligible	Yes
	14RY2140	Eligible	Eligible	Yes
Fort McCoy, Wisconsin	47MO286	Eligible	Eligible	Yes
	47MO465	Not Eligible	Eligible	No
	47MO704	Eligible	Not Eligible	No
	47MO848	Eligible	Not Eligible	No
	47MO897	Not Eligible	Not Eligible	Yes
	47MO903	Eligible	Not Eligible	No

	Site	NRHP Determination Based on Traditional Methodology	NRHP Determination Based on CERL Methodology	Result Agreement
Barry M. Goldwater Range, Arizona	AZ Y:6:24	Eligible	Not Eligible	No
	AZ Y:8:196	Contributing element to NRHP Eligible site	Not Eligible	No
	AZ Z:5:10	Eligible	Eligible	Yes
	AZ Z:6:81	Eligible	Eligible	Yes
	AZ Z:6:197	Eligible	Not Eligible	No
	BMGR-00-B-09	Eligible	Eligible	Yes
Piñon Canyon Maneuver Site, Colorado	5LA2302	Eligible	Eligible	Yes
	5LA3250	Not Eligible	Not Eligible	Yes
	5LA4406	Not Eligible	Not Eligible	Yes
	5LA5820	Not Eligible	Not Eligible	Yes
	5LA5830	Eligible	Eligible	Yes
	5LA6104	Eligible	Eligible	Yes
Fort Hunter Liggett, California	CA-MNT-258	Not Eligible	Not Eligible	Yes
	CA-MNT-1531	Not Eligible	Not Eligible	Yes
	CA-MNT-1542	Eligible	Atypical	
	CA-MNT-1569	Eligible	Atypical	
	CA-MNT-1638	Not Eligible	Not Eligible	Yes
	CA-MNT-1786	Not Eligible	Eligible	No

The Farmstead/Ranch Methodology reproduced the traditional Phase II NRHP eligibility assessments for 59% of the sites tested. At 31% of the sites the methodology did not reproduce the same results. Three sites (10%) were determined to be atypical and therefore the NRHP evaluation could not be determined under this methodology.

When the three atypical sites are removed from the total number of sites and the percent of agreement is examined by installation, a clear pattern emerges (Table 7). At three installations (Fort Riley, FHL, and PCMS) the methodology worked extremely well, at one installation the methodology worked half the time and at one installation it produced very poor results.

Table 7. Results by installation with atypical sites removed from consideration.

Installation	% Agreement between methodologies
Fort Riley	75
Fort McCoy	33
Barry M. Goldwater Range	50
Piñon Canyon Maneuver Site	100
Fort Hunter Liggett	75

At Fort McCoy, WI the Farmstead/Ranch Methodology reproduced the Phase II NRHP evaluation results at one-third of sites visited. A key aspect of the Farmstead/Ranch Methodology is that the archaeologists need to be able to see the site. Visibility is necessary to locate and map the architectural and landscape features, to see functionally and temporally diagnostic artifacts on the surface, and to see any evidence of post-abandonment site disturbances. Some sites at Fort McCoy were so overgrown with vegetation that the researchers could not see each other when separated by a distance of only 3-4 meters despite wearing high visibility vests. Personal communication with the installation archaeologists that escorted us around the installation indicated that the visibility never got better. There was only a 1-2 week window between when the snow melted and the foliage began to regrow. They reported that all sites were found in Phase I survey through systematic shovel testing. One site (47MO848) had been reported as a 20th century farmstead in the original Phase I survey based upon the presence of brick and early 20th century ceramics and glass. The Phase II survey, however, determined that the site was a WWI military training camp. The visibility issues prevented the CERL researchers from identifying that it was not an agricultural site. This is the only site in the project that may have been classified as atypical that was not successfully eliminated from the methodology by the CERL researchers. The two sites where there was agreement between the traditional Phase II survey results and the Farmstead/Ranch Methodology were the two sites where there was less vegetation and more aboveground features so that visibility was not as problematic.

There does not need to be 75-100% visibility of the ground surface. At Fort Riley the sites were located in wooded areas with undergrowth but the field work was conducted in early spring before the vegetation leafed out and the surface topography, structure remains, landscape features and even artifacts could be seen through the leaf litter on the ground. A similar issue was observed at some sites at FHL and PCMS with the ground surface obscured by dried grasses and low scrub brush. In these cases artifacts were often found in rodent burrow backdirt piles, in dirt road ways or the sites were evaluated only based upon the historic documentation in conjunction with landscape and architectural features. It was the opinion of the authors that the Farmstead/Ranch Methodology was impacted more by the researchers' inability to see features than the inability to see artifacts, particularly when a site had historic documentation to help identify the site establishment and occupation periods. The one installation where the distribution of artifact types was critical for the site interpretation and

evaluation was the Barry M. Goldwater Range. The extreme hardness of the soil at this installation prevented the construction of many landscape feature types and most occupation areas consisted of camp sites identified by firepit remains and clusters of food and beverage containers.

It is apparent that the proposed field data collection technique tested in this project, principally the elimination of subsurface testing, is not applicable at installations like Fort McCoy where visibility is likely to be problematic at most of the sites, most of the time. The *Farmstead/Ranch Eligibility Evaluation Form* could still be useful to systematically evaluate the site for eligibility at these installations. The usefulness is demonstrated by two sites at Fort McCoy. These sites were 47Mo704 and 47MO897. Both sites had evidence of only one building – 47MO704 was a depression with no surviving foundation while 47MO897 had a stone lined cellar. At both sites these were interpreted as dwelling structures. 47MO704 had a well and 47MO897 had a depression that could have been a filled in well or privy. Both had artifact assemblages and historic documentation indicating a period of occupation of less than 20 years in the early 20th century by members of a single family. The sites were evaluated for the NRHP with a Phase II survey 2 years apart by two different archaeologists. 47MO704 was deemed Eligible for the NRHP due to the short occupation period by a single family that could allow researchers to get a window into early 20th century farmstead without the added complications of interpreting multiple occupants over a many decades. 47MO897 was deemed Not Eligible due to the short occupation period of a single family, which would limit the ability of the site to provide information about the changing patterns of life ways in the region over time. This highlights the subjectivity of the traditional NRHP evaluation method. Whether a site is determined eligible or not can depend on the personal research interests or experiences of the archaeologist doing the evaluation. When CERL evaluated the sites using the Farmstead/Ranch Methodology and the *Farmstead/Ranch Eligibility Evaluation Form* both sites were determined to be Not Eligible for the NRHP.

Visibility at Barry M. Goldwater Range, AZ (BMGR) was excellent with 75-100% of the ground surface visible at most sites. Additionally the extremely hard nature of the soil prevented most excavation during the historic occupations so the likelihood of subsurface features was small. Military activity is in the form of air to ground target practice so large scale site disturbances was not present except in areas close to target locations. Excellent correlation between the traditional and new methodology results

was expected. The Farmstead/Ranch Methodology, however, only duplicated the results of the traditional Phase II survey half of the time. The authors are of the opinion that the new methodology was deployed very effectively at BMGR but that CERL researchers had a different opinion on how NRHP eligibility criteria should be interpreted and employed. Five sites at BMGR investigated for this project had been determined by the traditional Phase II evaluation to be Eligible for the NRHP under multiple criteria. The sixth site was considered eligible as a contributing element to another site not examined as part of this project. The broad interpretation of the NRHP criteria in the traditional Phase II surveys was encountered at every site regardless of the year of the evaluation or the identity of the archaeologists who performed the evaluation indicating that this is the standard operating procedure at BMGR, or possibly the State of Arizona, for NRHP evaluations.

An example of how NRHP criteria were interpreted in the Phase II surveys at BMGR was site AZ Z:6:197 (Lyon and Tucker 2001). This site consisted of a standing three pen livestock corral constructed of large wooden posts and barbed wire, a metal windmill with a concrete foundation and well shaft, a small concrete foundation 37 x 37 in. in size in close proximity to the well/windmill, and a large metal water tank. There was no evidence of any habitation (dwelling structure or camping area) at the site, no artifacts observed except pieces of wood and wiring associated with fencing, and the site does not appear in any historic documentation except the name is located on mid-20th century USGS quad maps. The archaeologists that performed the NRHP evaluation using the traditional methodology described the site as being in relatively poor condition with evidence of damage due to military activity (Lyon and Tucker 2001). They also listed four other nearby sites that had similar features. Their NRHP evaluation, however, determined the site was Eligible for the NRHP under three criteria.

> The historical Euroamerican component is recommended eligible under Criterion (d) because it is likely to hold information on early twentieth century farming and ranching, specifically regarding the research issues of technology (water extraction and storage) and economics (e.g., production, consumption, and distribution). The site is also recommended eligible under Criterion (a) because it is associated with early 20th century ranching in the southwestern desert, an event that has "made significant contributions to the broad patterns of our history," and under Criterion (c) because the features may "embody the characteristics of a type, period, and method of construction" (National Park Service 1982) ~(Lyon and Tucker 2001:123).

It is the opinion of the authors that this very broad interpretation of the NRHP criteria is not supported by the NRHP guidance documents provided by the National Park Service (NPS 1997). The guidance for Criterion A, for example, states that "mere association with historic events or trends is not enough, in and of itself to qualify under Criterion A: the property's specific association must be considered important as well" (NPS 1997:12). Considering that it is unknown when and by whom AZ Z:6:197 was constructed and used it does not have any specific association, much less one that can be considered important. CERL researchers located the same features in very similar condition and determined the site Not Eligible for the NRHP.

The Farmstead/Ranch Methodology is designed to identify and evaluate the best preserved and most complete typical farmsteads for each region. Atypical sites are identified and kicked out of the methodology in the Preliminary Questions portions of the *Farmstead/Ranch Eligibility Evaluation Forms*. These sites should undergo a complete Phase II survey with subsurface testing for NRHP evaluation. Three sites in this project were identified as atypical. The first was a farmstead in Fort Riley that was constructed into a hillside with a very unusual feature type. This site had a brick lined cave, probably used for cold storage, that was likely connected to surface features with an underground stairwell that had since filled in. Only one other site in the region (either on or off post) had anything comparable that resulted in the atypical designation. The researchers filled out the *Farmstead/Ranch Eligibility Evaluation Form* just to see what the results would be and the site did meet the minimal requirements for NRHP eligibility. The Phase II survey also concluded the site was eligible and also recommended a HABS/HAER documentation of the cave feature. Two sites at FHL were classified as atypical. Both sites predated the period of EuroAmerican farmstead/ranch establishment. The sites dated to the earlier Spanish Mission Period of ranching and one site may have been occupied by Native Americans associated with the local Mission. The age of the sites was determined by historic documentation, artifacts at the site and construction techniques of the features. When the *Farmstead/Ranch Eligibility Evaluation Form* for these two sites were filled out, both failed to meet the threshold for NRHP eligibility due primarily to the lack of any secondary structures or landscape features. Because the sites were atypical, the Farmstead/Ranch Methodology would recommend a complete Phase II survey with subsurface testing for NRHP evaluation. The traditional Phase II surveys concluded these sites were Eligible for the NRHP.

The Farmstead/Ranch Methodology focuses on the entire site, including landscape features such as paths, roads, leveled areas that may have been gardens, work yards or animal pens. Most traditional Phase I surveys and some Phase II surveys focus instead only on the architectural remains. One site, CA-MNT-1786 at FHL, is an example of this. The traditional survey methodologies identified the foundations of a house, a wall foundation near the house, an artifact scatter and a metal water trough. In the Phase II report a circular drive is mentioned in the text and partially mapped but not given a feature number. The site was determined Not Eligible for the NRHP. CERL researchers relocated the structure, wall remains and the water trough but not the artifact scatter area. CERL also mapped the entire drive and classified it as a feature, located a cluster of pipes that may have been part of water management system, located a stone wall outside of the site boundaries that may have been a secondary structure or part of a landscape feature and also located an artificially leveled area with a fencepost and cluster of burnt rocks on a hillside opposite the house that was interpreted as a possible secondary structure yard or work area. Using the Farmstead/Ranch Methodology the CERL researchers determined the site was Eligible for the NRHP. The traditional Phase II, with fewer identified features and focused only on the house foundation and artifacts, determined the site to be Not Eligible. It is unclear if the Phase II researchers would have come to a different eligibility assessment if they had included all of the features that were considered by CERL. This site was only typical site at FHL where the Farmstead/Ranch Methodology results differed from the traditional Phase II survey results.

In the execution of the Farmstead/Ranch Methodology evaluations for this project the researchers encountered two situations where it was determined that the *Farmstead/Ranch Eligibility Evaluation Form* could be changed and improved. The first was at PCMS. One of the sites visited was an early 20th century ranch with standing architecture and numerous secondary structures and features. The site, however, had been in use and was being modified into the 1960s or 1970s, and one barn was potentially a 1960s construction. There was evidence that the military was continuing to use and maintain portions of the site up to the present day, such as solar panels and a modern stock tank added to the well, new padlocks on barn doors, and a government style desk located in a barn. The interior of the house had been renovated multiple times including the doubling of the dwelling structure sometime in the mid-20th century. Many of the historic features had been altered to the point that they no longer had integrity.

The CERL researchers and the Phase II survey reports agreed that the site was Not Eligible based upon the lack of integrity (see Level I, Question 1). The wording of the rest of the *Farmstead/Ranch Eligibility Evaluation Form* focuses attention only on the presence/absence of feature types. It was felt that this may cause confusion if/when the methodology is deployed on a large scale. It was felt that it would be useful to consider rewording the existing questions or to add an additional question to the form to highlight if site features have been modified after the military assumed ownership of the property.

The second area where the Eligibility Evaluation Form could be improved with modification is concerning the ethnicity of the site occupants. At three installations (Fort McCoy, PCMS, and FHL) the ethnicity of the site occupants was considered a factor in site eligibility in the Phase II reports. At Fort McCoy it was repeatedly mentioned for three sites (47MO286, 47MO465 and 47MO903) and was considered a key factor in the determination of eligibility of 47MO465 and a principle factor for site 47MO903. At FHL and PCMS there was a distinction drawn between the Spanish-Mexican style of building construction and site layout that helped identify the age and function of sites. The *Farmstead/Ranch Eligibility Evaluation Form* does not inquire about or reference ethnic occupation, or ethnic variations in site layout or construction technique. It is recommended for consideration that the form be modified, perhaps with a Level I question, to highlight important ethnic and/or minority groups in the installation and regional historic contexts.

10.2 Final conclusions

This project was designed to test if the expanded Phase I methodology developed for farmstead sites at Fort Leonard Wood, MO and tested at Fort Bragg, NC could be applied nationwide and expanded to include historic ranch sites. It is the opinion of the authors that the test has been successful. There was a high degree of concurrence between the NRHP evaluation results using traditional Phase II survey and using the Farmstead/Ranch Methodology at Fort Riley, KS (75%), PCMS (100%), and FHL (75%). The authors believe that the 50% concurrence rate at Barry M. Goldwater Range, AZ, is a result of differences in the interpretation of NRHP criteria application and not a result of the methodology being unable to produce sufficient information to make a final NRHP eligibility determination.

At only one installation, Fort McCoy, WI, did the field data collection methodology fail to produce sufficient information to reliably determine site NRHP eligibility. This failure was a result of the lack of site visibility due to dense vegetation and/or snow cover that is dominant throughout much of the installation for most of the year. It is felt, however, that even if the field data collection techniques described here, primarily the elimination of subsurface testing of sites, is not feasible at installations like Fort McCoy, these installations can still benefit from the use of the *Farmstead/Ranch Eligibility Evaluation Form* to systemize and standardize the evaluation of NRHP eligibility.

The application of this technique showed that the Farmstead/Ranch methodology has the potential to allow installation CRM staff to make definitive NRHP eligibility assessments on many of the historic farmsteads and ranches located on military installations across the country. While atypical historic farmstead and ranch sites will continue to require Phase II evaluation, if a majority of historic farmsteads and ranches could be evaluated for the NRHP without undergoing the costly Phase II evaluation process (in both time and resources), the savings to the DoD would be significant. Additionally the Farmstead/Ranch Methodology does not include any activity that is not already part of the traditional Phase II survey process. If a site has been evaluated with Farmstead/Ranch Methodology and determined atypical, the Phase II testing can use all the information already gathered with no loss or duplication of effort.

A site listed as Potentially Eligible for the NRHP must be preserved as if it were eligible, until a final evaluation can be made. Many military CRM offices around the country have significant backlogs of sites listed as Potentially Eligible and awaiting Phase II survey. As a result of this backlog, many hundreds or thousands of acres of training land are declared to be off limits for years. By shortening the process required for NRHP evaluations of those sites, CRM staff would assist Range Control in opening up additional lands for military use. There is also the benefit of significant cost savings to the military, as the average cost of a Phase II survey is approximately $15,000-$20,000 per site. Most of this expense is focused on the labor needed to conduct the subsurface testing and the laboratory and curation costs associated with artifact collection. This second survey effort is a significant expense for DoD to evaluate all these sites to Phase II standards. If applying the methodology described in this report can reduce that cost by eliminating the need for a majority of the

Phase II surveys of historic farmstead and ranch sites, significant funds will be saved, and training can be accomplished more easily.

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Acronyms and Abbreviations

Abbreviation	Definition
CCC	Civilian Conservation Corps
ERDC-CERL	Engineer Research and Development Center, Construction Engineering Research Laboratory
CRM	Cultural Resource Manager
FHL	Fort Hunter Liggett
ICRMP	Integrated Cultural Resource Management Plans
PCMS	Pinon Canyon Maneuver Site
WPA	Works Progress Administration
AFB	Air Force Base
BLM	Bureau of Land Management
BMGR	Barry M. Goldwater Range
HABS	Historic American Buildings Survey
NHPA	National Historic Preservation Act of 1966
NRHP	National Register of Historic Places
OAHP	Office of Archaeology and Historic Preservation
OSD	Office of the Secretary of Defense
SRI	Statistical Research, Inc.
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey

Unit Conversion Factors

Multiply	By	To Obtain
acres	4,046.873	square meters
acre-feet	1,233.5	cubic meters
cubic feet	0.02831685	cubic meters
cubic inches	1.6387064 E-05	cubic meters
cubic yards	0.7645549	cubic meters
degrees (angle)	0.01745329	radians
degrees Fahrenheit	(F-32)/1.8	degrees Celsius
feet	0.3048	meters
gallons (U.S. liquid)	3.785412 E-03	cubic meters
horsepower (550 foot-pounds force per second)	745.6999	watts
inches	0.0254	meters
miles (U.S. statute)	1,609.347	meters
miles per hour	0.44704	meters per second
pounds (mass)	0.45359237	kilograms
square feet	0.09290304	square meters
square inches	6.4516 E-04	square meters
square miles	2.589998 E+06	square meters
square yards	0.8361274	square meters
tons (2,000 pounds, mass)	907.1847	kilograms
tons (2,000 pounds, mass) per square foot	9,764.856	kilograms per square meter
yards	0.9144	meters

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.

1. REPORT DATE (DD-MM-YYYY)	2. REPORT TYPE	3. DATES COVERED (From - To)
3-3-2021	Final Technical Report (TR)	

4. TITLE AND SUBTITLE
Nationwide Context and Evaluation Methodology for Farmstead and Ranch Historic Sites and Historic Archaeological Sites on DoD Property

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT
Legacy Resource Management

6. AUTHOR(S)
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5d. PROJECT NUMBER
468415

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
U.S. Army Engineer Research and Development Center (ERDC)
Construction Engineering Research Laboratory (CERL)
PO Box 9005
Champaign, IL 61826-9005

8. PERFORMING ORGANIZATION REPORT NUMBER
ERDC/CERL TR-20-13

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)
U.S. Department of Defense Legacy Resource Management Program
AT&L(I) Environment, Safety and Occupational Health (ESOH)
4800 Mark Center Drive
Alexandria, VA 22350

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

The Army is tasked with managing the cultural resources on its lands. For installations that contain large numbers of historic farmsteads, meeting these requirements through traditional archaeological approaches entails large investments of personnel, time and organization capital. Through two previous projects, ERDC-CERL cultural resource management personnel developed a methodology for efficiently identifying the best examples of historic farmstead sites, and also those sites that are least likely to be deemed eligible for listing on the National Register of Historic Places. This report details testing the applicability of the methodology to regions across the country. Regional historic contexts were created to assist in the determination of "typical" farmsteads. The Farmstead/Ranch Eligibility Evaluation Form created by ERDC-CERL researchers was revised to reflect the broader geographic scope and the inclusion of ranches as a property type. The form was then used to test 29 sites at five military installations. The results of the fieldwork show this approach is applicable nationwide, and it can be used to quickly identify basic information about historic farmstead sites that can expedite determinations of eligibility to the National Register.

15. SUBJECT TERMS
Cultural Resources, National Register of Historic Places, historic archaeology, farmstead, ranch

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			19b. TELEPHONE NUMBER (include area code)
Unclassified	Unclassified	Unclassified	SAR	483	