WINNEMUCCA DISTRICT OFFICE
2025 GEOTHERMAL LEASE SALE
APPENDICES A-L

DOI-BLM-NV-W000-2025-0004-EA

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Appendix A: Soil Types and Biotic Communities

Soil Types in the Analysis Area

Aridisols

Aridisols are soils typically found in arid and semi-arid environments, characterized primarily by limited moisture availability. Due to persistent dryness, these soils do not support the regular growth of moisture-demanding (mesophytic) vegetation and generally experience prolonged drought periods lasting three months or longer each year. Aridisols commonly occur on stable landscapes such as valley bottoms, basin floors, and alluvial terraces where mineral-rich sediments accumulate, but can also form in upland areas under suitable dry conditions.

The lack of moisture restricts the weathering processes and organic matter accumulation, resulting in poorly developed or absent organic horizons (O horizons). Consequently, these soils are dominated by mineral horizons enriched with calcium carbonate, gypsum, soluble salts, or silica—materials typically leached away under more humid conditions. A distinctive feature in some Aridisols is the presence of subsurface diagnostic horizons such as calcic (calcium carbonate-rich), gypsic (gypsum-rich), salic (salt-rich), or duric (silica-cemented hardpan known as duripan). Duripans specifically limit water infiltration, exacerbating the already dry conditions.

Common Aridisol suborders identified within the analysis area include:

- Cambids: Characterized by minimal horizon differentiation, these represent the youngest and least-developed Aridisols.
- Argids: Defined by an argillic horizon, a subsurface accumulation of clay translocated downward by percolating water.
- Salids: Distinguished by the presence of significant soluble salts accumulated near the soil surface, causing salinity issues detrimental to plant growth.
- Orthids: Orthids are historically referred to Aridisols lacking distinctive subsurface diagnostic horizons (such as argillic, calcic, gypsic, or salic layers). Typically, Orthids exhibited minimal horizon differentiation due to limited soil-forming processes in very dry conditions. Although the suborder "Orthids" has been replaced in current USDA Soil Taxonomy, it persists in older soil surveys and historical literature.

Entisols

Entisols are young mineral soils characterized by minimal horizon development and little differentiation from their parent material. These soils typically lack well-developed subsurface horizons (B horizons) due to continuous disturbance, rapid erosion, frequent deposition, or short periods of soil formation. They commonly exhibit only a thin, poorly developed A horizon (surface mineral horizon), directly above the parent material or bedrock. Entisols occur widely across diverse landscapes: in mountainous regions, they frequently occupy steep, actively eroding slopes and ridge tops, while at lower elevations, they're typically found in dynamic depositional environments such as alluvial fans, floodplains, river terraces, and other disturbed areas.

Entisols generally have coarse textures—often sandy or gravelly—resulting in well-drained soils with high permeability. However, finer textures can occur where recent sedimentation is dominated by silts and clays, such as in floodplains or alluvial basins.

Suborders of Entisols commonly identified within the study area include:

- Orthents: Shallow, rocky soils on steep slopes or bedrock outcrops, characterized by minimal soil development due to constant erosion or resistant parent materials.

- Psamments: Sandy soils that are deep, excessively drained, and highly vulnerable to wind erosion and drought when exposed.
- Aquents: Poorly drained soils that are saturated or flooded frequently, resulting in anaerobic conditions near the surface during part of the year.
- Fluvents: Young, recently deposited soils occurring in floodplain or stream-channel environments. These soils show stratification (layering) of sediments due to frequent flood events.

Mollisols

Although Mollisols are not identified within the current analysis area, this description is provided because these soils commonly occur in similar nearby environments and offer valuable context for regional soil conditions. Mollisols are distinguished primarily by their thick, dark, organic-rich surface horizon known as a mollic epipedon, which forms from prolonged organic matter accumulation due to dense root systems of grasses and other herbaceous vegetation. These soils typically possess higher fertility, moisture retention, and nutrient availability compared to other regional soil orders.

Mollisols predominantly develop on relatively stable landscapes, including gentle mountain slopes, older alluvial fans, and terraces, where stable vegetation communities can persist and enhance soil stability. The mollic epipedon commonly has excellent structure, promoting water infiltration and retention, thus supporting robust grassland or forb-dominated ecosystems.

Aquolls, a specific suborder within Mollisols, are characterized by poor drainage conditions and periodic or continuous near-surface water saturation. These saturated conditions support wet meadow vegetation and are typically associated with landscape features such as riparian zones, depressions, and floodplain margins, where groundwater or surface water maintains high moisture levels.

Inceptisols

Inceptisols are soils characterized by moderate horizon development—more advanced than Entisols but still lacking the pronounced features of other more developed soil orders. These soils typically possess a distinct, though limited, B horizon, indicating initial soil-forming processes such as accumulation of clay, iron, aluminum, or organic matter. Inceptisols often exhibit an ochric epipedon, a surface horizon lower in organic content and thickness compared to the mollic epipedon found in Mollisols.

Inceptisols develop in various landscape positions, including moderately steep slopes, mountain valleys, floodplains, and former lakebeds, where soil formation is intermittently disturbed or relatively recent. Their textures commonly range from loamy to finer materials (such as silt loams or clay loams), resulting in moderate to poor drainage depending on landscape position and local hydrology.

In the analysis area, Inceptisols predominantly belong to the suborder Aquepts, which specifically indicates soils with poor to very poor drainage conditions. Aquepts regularly experience near-surface water saturation, typically during wetter seasons or periodically throughout the year, creating conditions of reduced oxygen availability (anaerobic conditions). Unless artificially drained, these soils commonly have groundwater at or near the surface for significant periods annually, though generally not year-round.

Soils Without Assigned Orders

In the analysis area, some soil map units identified via Natural Resources Conservation Service (NRCS) Soil Survey do not fit into any recognized USDA soil orders. These map units represent specialized landforms or anthropogenic features where soil characteristics or land-use histories preclude their classification under the conventional USDA Soil Taxonomy system. Two primary soil components identified in this analysis area without assigned orders are playas and dumps.

Playas

Playas are ephemeral depressions typically occurring within intermountain basins throughout the southwestern United States. These features temporarily hold water following precipitation events and occasionally are fed by shallow groundwater sources. Due to fluctuating water conditions, playas exhibit extreme variability in moisture regimes and salinity levels, complicating their classification within the traditional soil orders. Playa soils commonly exhibit high concentrations of salts and minerals, deposited either by upward percolation from subsurface aquifers or through evaporation following storm events. The surface substrates of playas typically consist of fine-textured sediments, such as stratified clay, silt, and fine sand. High salinity, combined with predominantly dry and hot conditions for most of the year, typically restricts vegetation establishment on playas. Additionally, their fine-grained sediments may become hazardous mud or sinkholes immediately following heavy rainfall.

Dumps

"Dumps" refer to areas characterized by deposited human-made materials, such as mine tailings, industrial debris, construction waste, or other disturbed soils and fill materials. These anthropogenic deposits represent drastically altered landscapes where natural soil formation processes are disrupted or absent altogether. Due to their highly variable composition, lack of horizon development, and artificial nature, dump sites cannot be accurately classified within the existing soil order categories. Soil characteristics in these areas depend heavily on the nature and origin of deposited materials, often resulting in significant variability in physical, chemical, and hydrologic properties.

Plant Communities in the Analysis Area

The vegetation in the project area is characteristic of the northern Great Basin, comprising a mosaic of shrub-steppe and salt-desert shrub communities adapted to arid conditions. Table A provides a summary of the ecological site descriptions (ESDs) identified within the project area and their characteristic plant communities. Each ESD represents a distinct combination of soil, climate, and landform that supports a specific plant community in reference condition. These range from loamy upland sites, dominated by sagebrush and perennial bunchgrasses, to saline lowland flats dominated by salt-tolerant shrubs and grasses.

Table A-1. Ecological Site Descriptions in Project Area

Ecological Site Description	Dominant Vegetation	Secondary Vegetation
R024XY002NV – Loamy 5–8" P.Z.	Shadscale saltbush; bud sagebrush	Indian ricegrass; galleta grass; winterfat
R024XY003NV – Sodic Terrace 6–8"	Shadscale saltbush; black greasewood	Bud sagebrush; inland saltgrass
R024XY004NV – Silty 4–8" P.Z.	Shadscale saltbush; winterfat	Bud sagebrush; Indian ricegrass
R024XY005NV – Loamy 8–10" P.Z.	Wyoming big sagebrush; Thurber’s needlegrass	Indian ricegrass; bottlebrush squirreltail
R024XY007NV – Saline Bottom	Black greasewood; basin wildrye	Inland saltgrass; alkali sacaton
R024XY010NV – Sodic Floodplain	Black greasewood; inland saltgrass	Basin wildrye; alkali sacaton
R024XY011NV – Sodic Flat 6–8"	Black greasewood; basin wildrye	Shadscale saltbush; inland saltgrass
R024XY015NV – Deep Sodic Fan	Black greasewood; basin wildrye	Inland saltgrass (patchy)

R024XY017NV – Sandy 8–10" P.Z.	Wyoming big sagebrush; Indian ricegrass	Spiny hopsage; needleandthread grass
R024XY020NV – Droughty Loam 8–10"	Wyoming big sagebrush; Thurber's needlegrass	Spiny hopsage; Indian ricegrass
R024XY022NV – Sodic Terrace 8–10"	Black greasewood; basin wildrye	Inland saltgrass; shadscale saltbush
R024XY025NV – Loamy Slope 5–8"	Shadscale saltbush; bud sagebrush	Indian ricegrass; galleta grass
R024XY028NV – South Slope 8–12"	Wyoming big sagebrush; Thurber's needlegrass	Indian ricegrass; Sandberg bluegrass
R024XY030NV – Shallow Calcareous 8–10"	Black sagebrush	Indian ricegrass; bottlebrush squirreltail
R024XY041NV – Gravelly Fan	Wyoming big sagebrush; Thurber's needlegrass	Indian ricegrass; spiny hopsage
R024XY057NV – Channery Hill	Black sagebrush	Indian ricegrass; Sandberg bluegrass
R027XY008NV – Droughty Loam 8–10"	Wyoming big sagebrush; Thurber's needlegrass	Spiny hopsage; Indian ricegrass
R027XY009NV – Sandy 5–8" P.Z.	Shadscale saltbush; Indian ricegrass	Nevada jointfir (Ephedra); needleandthread grass
R027XY013NV – Loamy 4–8" P.Z.	Shadscale saltbush; bud sagebrush	Indian ricegrass; winterfat
R027XY018NV – Gravelly Loam 4–8"	Shadscale saltbush; Indian ricegrass	Bud sagebrush; galleta grass
R027XY019NV – Stony Slope 4–8"	Nevada jointfir (Ephedra); Indian ricegrass	Shadscale saltbush; desert needlegrass
R027XY022NV – Valley Wash	Fourwing saltbush; rubber rabbitbrush	Big sagebrush (scattered); Indian ricegrass
R027XY024NV – Sodic Terrace	Shadscale saltbush; black greasewood	Bud sagebrush; inland saltgrass
R027XY047NV – Eroded Granitic Slope	Spiny hopsage; desert needlegrass	Wyoming big sagebrush; Indian ricegrass
P.Z. = Precipitation Zone (annual average); e.g., "8–10 P.Z." indicates 8–10 inches of precipitation per year.		

Great Basin Foothill and Lower Montane Riparian Woodland and Shrubland

This plant community occurs in mountain ranges of the Great Basin and along the eastern slope of the Sierra Nevada within a broad elevation range from about 1220 m to over 2135 m. This system often occurs as a mosaic of multiple communities that are tree-dominated with a diverse shrub component. The variety of plant associations connected to this system reflect elevation, stream gradient, floodplain width, and flooding events. Dominant trees may include grey alder (*Alnus incana*), narrowleaf cottonwood (*Populus angustifolia*), black cottonwood (*Populus trichocarpa*), Fremont cottonwood (*Populus fremontii*), red willow (*Salix laevigata*), Gooding's willow (*Salix gooddingii*), and Douglas fir (*Pseudotsuga menziesii*). Dominant shrubs include dwarf sagebrush (*Artemisia cana*), red osier dogwood (*Cornus sericea*), narrowleaf willow (*Salix exigua*), arroyo willow (*Salix lasiolepis*), Lemmon's willow (*Salix lemmonii*), or yellow willow (*Salix lutea*). Herbaceous layers are often dominated by species of the *Carex* and *Juncus* genera, and perennial grasses and mesic forbs such tufted hairgrass (*Deschampsia*

cespitosa), slender wheatgrass (*Elymus trachycaulus*), fowl mannagrass (*Glyceria striata*), Rocky Mountain iris (*Iris missouriensis*), star-flowered lily-of-the-valley (*Maianthemum stellatum*), or Fendler's meadow-rue (*Thalictrum fendleri*). Introduced forage species such as creeping bentgrass (*Agrostis stolonifera*), Kentucky bluegrass (*Poa pratensis*), and the weedy annual cheatgrass (*Bromus tectorum*) are often present in disturbed stands. These are disturbance-driven systems that require flooding, scouring and deposition for germination and maintenance. This includes both perennial and intermittent streams. Sites are typically subject to temporary flooding during spring or late winter runoff. Overbank flooding and some gravel areas are required for regeneration of these riparian forests and woodlands, especially for cottonwoods (NatureServe, 2024).

Great Basin Pinyon-Juniper Woodland

This ecological system occurs on dry mountain ranges of the Great Basin region and eastern foothills of the Sierra Nevada extending south in scattered locations throughout southern California. This woodland is typically found at lower elevations ranging from 1600-2800 m. These woodlands occur on warm, dry sites on mountain slopes, mesas, plateaus and ridges. This plant community is characterized by an open to moderately dense, short (2-10 m tall) evergreen needle-leaved or scale-leaved tree canopy. Open to dense shrub and herbaceous layers may be present or absent. Herbaceous layers are usually sparse. Woodlands dominated by a mix of single-leaf pinyon pine (*Pinus monophylla*) and Utah juniper (*Juniperus osteosperma*), pure or nearly pure occurrences of single-leaf pinyon pine, or woodlands dominated solely by Utah juniper comprise this system. Understory layers are variable. Associated species include shrubs such as greenleaf manzanita (*Arctostaphylos patula*), little sagebrush (*Artemisia arbuscula*), black sagebrush (*Artemisia nov*a), big sagebrush (*Artemisia tridentata*), curl-leaf mountain mahogany (*Cercocarpus ledifolius*), little-leaf mountain mahogany (*Cercocarpus intricatus*), blackbrush (*Coleogyne ramosissima)*, Gambel oak (*Quercus gambelii*), turbinella oak (*Quercus turbinella*), Tucker oak (*Quercus john-tuckeri*), California juniper (*Juniperus californica*), and bunchgrasses including needle-and-thread grass (*Hesperostipa comata*), blue bunchgrass (*Festuca idahoensis*), bluebunch wheatgrass (*Pseudoroegneria spicata*), Great Basin wild rye (*Leymus cinereus*), and muttongrass (*Poa fendleriana*; NatureServe, 2024).

Great Basin Xeric Mixed Sagebrush Shrubland

This ecological system occurs in the Great Basin on dry flats and plains, alluvial fans, rolling hills, rocky hillslopes, saddles and ridges at elevations between 1000 and 2600 m. Sites are dry, often exposed to desiccating winds, with typically shallow, rocky, non-saline soils. This plant community is associated with shallow, rocky soils which experience extreme drought in summer. At mid and low elevations, these shrublands are dominated by black sagebrush (*Artemisia nova*) and little sagebrush (*Artemisia arbuscula*). At higher elevations, shrublands are more likely to be dominated by little sagebrush and may be co-dominated by Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) or yellow rabbitbrush (*Chrysothamnus viscidiflorus*). Other shrubs that may be present include shadscale (*Atriplex confertifolia)*, gymnosperm shrubs (*Ephedra* spp.), rabbitbrush (*Ericameria* spp.), spiny hopsage (*Grayia spinosa*), Shockley's desert-thorn (*Lycium shockleyi*), budsage (*Picrothamnus desertorum*), and horsebrush (*Tetradymia* spp.). The herbaceous layer is likely sparse and composed of perennial bunchgrasses, such as sand rice grass (*Achnatherum hymenoides*), desert needlegrass (*Achnatherum speciosum*), Thurber's needlegrass (*Achnatherum thurberianum*), squirreltail (*Elymus elymoides*), or Sandberg bluegrass (*Poa secunda*; NatureServe, 2024).

Inter-Mountain Basins Big Sagebrush Shrubland

This ecological system occurs throughout much of the interior western U.S., typically in broad basins between mountain ranges, plains and foothills between 800 and 2500 m elevation. Soils are typically deep, well-drained and non-saline. The climate where this system occurs is semi-arid with annual precipitation ranging from 18-40 cm and high inter-annual variation. Much of the precipitation falls as snow, and growing-season drought is characteristic. These shrublands are dominated by big sagebrush

(*Artemisia tridentata*) and/or Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*; predominant in Wyoming and Montana). Scattered juniper trees and shrubs (*Juniperus* spp.), greasewood (*Sarcobatus vermiculatus*), and saltbushes (*Atriplex* spp.) may be present in some stands. Rubber rabbitbrush (*Ericameria nauseosa*), yellow rabbitbrush (*Chrysothamnus viscidiflorus*), bitterbrush (*Purshia tridentata*), or mountain snowberry (*Symphoricarpos oreophilus*) may co-dominate disturbed stands (e.g., in burned stands, these may become more predominant). Perennial herbaceous components typically contribute less than 25% vegetative cover. Common graminoid species can include sand rice grass (*Achnatherum hymenoides*), blue gama (*Bouteloua gracilis*), thickspike wheatgrass (*Elymus lanceolatus*), blue bunchgrass (*Festuca idahoensis*), needle-and-thread grass (*Hesperostipa comata*), Great Basin wild rye (*Leymus cinereus*), James' galleta (*Pleuraphis jamesii*), western wheatgrass (*Pascopyrum smithii*), Sandberg bluegrass (*Poa secunda*), or bluebunch wheatgrass *(Pseudoroegneria spicata)* (NatureServe, 2024).

Inter-Mountain Basin Big Sagebrush Steppe

This widespread matrix-forming sagebrush steppe group occurs throughout much of the western U.S. in the Great Basin, Columbia Plateau, northwestern Great Plains, eastern Sierra Nevada, Wyoming Basins, Rocky Mountains, and Colorado Plateau between elevations of 1200 and 2400 m. Stands are characterized by open to sparse shrublands dominated by big sagebrush (*Artemisia tridentata*) or threetip sagebrush (*Artemisia tripartita* ssp. *tripartita*) which tend to occupy more mesic sites with well-developed soil, and bitterbrush (*Purshia tridentata*) which tends to occupy drier, rockier soils and positions, as well as sandy dune areas. Some Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) associations are included here, where they occur in biophysical settings conducive to an abundant herbaceous layer, and more mesic-indicator species. Herbaceous layers are often dense and dominated by perennial bunchgrasses, especially Idaho fescue (*Festuca idahoensis*) and bluebunch wheatgrass (*Pseudoroegneria spicata*). Other common graminoids include Indian ricegrass (*Achnatherum hymenoides*), western needlegrass (*Achnatherum occidentale*), and Pennsylvania sedge (*Carex pensylvanica*). In some cases, scattered trees may form an emergent layer of individual trees; species include curl-leaf mountain mahogany (*Cercocarpus ledifolius*), western juniper (*Juniperus occidentalis*), Utah juniper (*Juniperus osteosperma*), or Ponderosa pine (*Pinus ponderosa*). Many perennial forb species are important in these shrublands, and microphytic crust is very important in this group. This group may occur on stream terraces, point bars, valley floors, alluvial fans, floodplains, washes, gullies, stabilized dunes, swales, and rocky slopes. Soils vary from deep and well-developed to shallow, rocky and poorly developed sandy loams, loamy sands, sand, silt loams, and clay loams derived from alluvium, loess, shale, and sandstone (NatureServe, 2024).

Inter-Mountain Basins Cliff and Canyon

This ecological system ranges from Wyoming and Utah west to the Pacific states. It is found from foothill to subalpine elevations and includes barren and sparsely vegetated landscapes (generally <10% plant cover) of steep cliff faces, narrow canyons, and smaller rock outcrops of various igneous, sedimentary, and metamorphic bedrock types. Also included is vegetation of unstable scree and talus slopes that typically occurs below cliff faces. Widely scattered trees and shrubs may include white fir (*Abies concolor*), pinyon pine (*Pinus edulis*), limber pine (*Pinus flexilis*), single-leaf pinyon pine (*Pinus monophylla*), scattered juniper trees and shrubs (*Juniperus* spp.), big sagebrush (*Artemisia tridentata*), bitterbrush (*Purshia tridentata*), curl-leaf mountain mahogany (*Cercocarpus ledifolius*), gymnosperm shrubs (*Ephedra* spp.), ironwood (*Holodiscus discolor*), and other species often common in adjacent plant communities (NatureServe, 2024).

Inter-Mountain Basins Greasewood Flat

This ecological system occurs throughout much of the western U.S. in inter-mountain basins and extends onto the western Great Plains and into central Montana. It typically occurs near drainages on stream terraces and flats or may form rings around more sparsely vegetated playas. Sites typically have saline

soils, a shallow water table and flood intermittently, but remain dry for most growing seasons. The water table remains high enough to maintain vegetation, despite salt accumulations. This system usually occurs as a mosaic of multiple communities, with open to moderately dense shrublands dominated or co-dominated by greasewood (*Sarcobatus vermiculatu*s). In high salinity areas, greasewood often grows in nearly pure stands, and on less saline sites, it commonly grows with other shrub species and typically has a grass understory. Other shrubs that may be present to co-dominant in some occurrences include four-wing saltbush *(Atriplex canescens*), shadscale (*Atriplex confertifolia*), Gardner's saltbush (*Atriplex gardneri*), Parry's saltbush (*Atriplex parryi*), Wyoming big sagebrush (*Artemisia tridentata wyomingensis*), big sagebrush (*Artemisia tridentata*), dwarf sagebrush (*Artemisia cana*), or winterfat (*Krascheninnikovia lanata*). Occurrences are often surrounded by mixed salt desert scrub or big sagebrush shrublands. The herbaceous layer, if present, is usually dominated by graminoids (NatureServe, 2024).

Inter-Mountain Basins Mixed Salt Desert Shrub

This extensive ecological system includes open-canopied shrublands of typically saline basins, alluvial slopes and plains across the Intermountain western U.S. This type also extends in limited distribution into the southern Great Plains. Substrates are often saline and calcareous, medium- to fine-textured, alkaline soils, but include some coarser-textured soils. The vegetation is characterized by a typically open to moderately dense shrubland composed of one or more *Atriplex* species, such as shadscale (*Atriplex confertifolia)*, four-wing saltbush (*Atriplex canescens*), mound saltbush (*Atriplex obovata*), allscale (*Atriplex polycarpa*), or spiny saltbush (*Atriplex spinifera*). Other shrubs present to co-dominant may include Wyoming big sagebrush (*Artemisia tridentata wyomingensis*), yellow rabbitbrush (*Chrysothamnus viscidiflorus*), rubber rabbitbrush (*Ericameria nauseosa*), Mormon tea (E*phedra nevadensis*), spiny hopsage (*Grayia spinosa*), winterfat (*Krascheninnikovia lanata*), desert-thorn species (*Lycium* spp.), budsage (*Picrothamnus desertorum*), or horsebrush (*Tetradymia* spp.). In the Great Basin, greasewood (*Sarcobatus vermiculatus*) is generally absent but, if present, does not co-dominate. The herbaceous layer varies from sparse to moderately dense and is dominated by perennial graminoids such as sand rice grass (*Achnatherum hymenoides*), blue gama (*Bouteloua gracilis*), thickspike wheatgrass (*Elymus lanceolatus*), western wheatgrass (*Pascopyrum smithii*), James' galleta (*Pleuraphis jamesii*), big galleta (*Pleuraphis rigida*), Sandberg bluegrass (*Poa secunda*), or alkali sacaton (*Sporobolus airoides*). Various forbs are also present (NatureServe 2024).

Inter-Mountain Basins Playa

This ecological system is composed of barren and sparsely vegetated playas (generally <10% plant cover) found in the intermountain western U.S. Salt crusts are common throughout, with small saltgrass beds in depressions and sparse shrubs around the margins. These systems are intermittently flooded. The water is prevented from percolating through the soil by an impermeable soil subhorizon and is left to evaporate. Soil salinity varies greatly with soil moisture and greatly affects species composition. Characteristic species may include iodine bush (*Allenrolfea occidentalis*), greasewood (*Sarcobatus vermiculatus*), spiny hopsage (*Grayia spinosa*), Lemmon's alkaligrass (*Puccinellia lemmonii*), Great Basin wild rye (*Leymus cinereus*), desert saltgrass (*Distichlis spicata*), and/or saltbushes (*Atriplex* spp.) (NatureServe, 2024).

Inter-Mountain Basins Semi-Desert Grassland

This widespread ecological system includes the driest grasslands throughout the intermountain western U.S. It occurs on xeric sites over an elevation range of approximately 1450 to 2320 m on a variety of landforms, including swales, playas, mesas, alluvial flats, and plains. This system may constitute the matrix over large areas of intermountain basins and may occur as large patches in mosaics with shrubland systems dominated by big sagebrush (*Artemisia tridentata*), Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), saltbushes (*Atriplex* spp.), blackbrush *(Coleogyne ramosissima*), gymnosperm shrubs (Ephedra spp.), broom snakeweed (*Gutierrezia sarothrae*), or winterfat (*Krascheninnikovia lanata*) (NatureServe, 2024).

Invasive Annual Grassland

Although this vegetation type is not considered an ecological type, it is a plant community that accounts for portions of the project area. Areas that have been disturbed may be invaded by invasive annual species, sometimes to the exclusion of native species. Dominant plants are cheatgrass (*Bromus tectorum*) and/or halogeton (*Halogeton glomeratus*). Other plants often present in these areas are Russian thistle (*Salsola tragus*), clasping pepperweed (*Lepidium perfoliatum*), tumble mustard (*Sisymbrium altissimum*) and Russian knapweed (*Centaurea repens)* (Peterson, 2006).

Invasive Annual and Biennial Forbland

Although this vegetation type is not considered an ecological type, it is a plant community that accounts for portions of the project area. Areas that are dominated by introduced annual and/or biennial forb species such as: Russian thistle (*Salsola tragus*), clasping pepperweed (*Lepidium perfoliatum*), tumble mustard (*Sisymbrium altissimum*) and Russian knapweed (*Centaurea repens)* (Peterson, 2006).

Riparian Woodland and Shrubland in the Analysis Area

Riparian woodlands and shrublands in the Winnemucca District are defined by higher moisture availability and are dominated by woody vegetation adapted to the varying hydrological conditions of the region. These communities are typically found along stream banks, spring peripheries, and other areas with elevated water tables.

Cottonwoods (*Populus* spp.): Cottonwoods are deciduous hardwood trees commonly found in riparian zones with abundant moisture. They are fast-growing, reaching heights over 80 feet and diameters up to five feet. Though relatively short-lived (up to 150 years), they regenerate effectively through both seed dispersal and root sprouting. Cottonwoods provide canopy cover, stabilize streambanks, and support diverse riparian communities.

Willows (*Salix* spp.): Willows are deciduous hardwoods that thrive in areas with high water tables. They range from 10 to 40 feet in height and represent the most diverse hardwood genus within the analysis area. Willows frequently form dense, monotypic stands or occur alongside other riparian species such as sedges, rushes, and cottonwoods. Their dense root systems help control erosion and enhance habitat complexity.

Quaking Aspen (*Populus tremuloides*): Quaking aspens are deciduous, clonal hardwood trees found in both riparian corridors and upland slopes at elevations between 4,600 and 10,500 feet. They typically form groves through root suckering and support a rich understory of shrubs, forbs, and grasses. Aspen stands, while patchy in distribution within the Winnemucca District, contribute significantly to plant and wildlife biodiversity.

Red-osier Dogwood (*Cornus sericea*): Red-osier dogwood is a deciduous shrub that typically grows along streams, wetlands, and other moist riparian settings. It can form dense thickets that enhance the structural diversity of the understory. This species provides critical forage and cover for wildlife and contributes to bank stabilization.

Alders (*Alnus* spp.): Alders, including thinleaf alder (*Alnus incana*), are deciduous hardwood shrubs or small trees prevalent in montane riparian habitats. They often grow in dense stands along streambanks and seeps. Alders are notable for their ability to fix atmospheric nitrogen, improving soil fertility and supporting broader ecosystem productivity in riparian areas.

Woods' Rose (*Rosa woodsii*): Woods’ rose is a deciduous, multi-stemmed shrub commonly found in riparian understories along streams and moist drainages. It typically forms thickets and produces showy flowers and fruit, offering valuable food and cover for a variety of wildlife species.

Migratory Bird Communities in the Analysis Area

A list of common migratory bird species known to occur in the vicinity of the project was compiled through data from various organizations (BLM 2024, iNaturalist 2024, National Audubon Society 2024, NDOW 2024, Nevada Division of Natural Heritage 2024, USFWS 2024). Species commonly found in the plant communities detailed above are described in Table 19.

Table 1A-2. Migratory birds associated with the plant communities in WDO proposed parcels.

Plant Community	Bird Species
Cliff and Canyon	Black Rosy-Finch (*Leucosticte atrata*)
	Common Raven (*Corvus corax*)
	Gray-crowned Rosy-Finch *(Leucostcte tephrocots)*
	Peregrine Falcon (*Falco peregrinus*)
	Prairie Falcon *(Falco mexicanus)*
Grasslands and Meadows	American Kestrel (*Falco sparverius*)
	Barn Swallow (*Hirundo rustica*)
	Bobolink *(Dolichonyx oryzivorus)*
	Brown-headed Cowbird (*Molothrus ater*)
	Common Nighthawk *(Chordeiles minor)*
	Ferruginous Hawk (*Buteo regalis*)
	Golden Eagle (*Aquila chrysaetos*)
	Gray-crowned Rosy-Finch *(Leucostcte tephrocots)*
	Northern Harrier (*Circus hudsonius*)
	Horned Lark (*Eremophila alpestris*)
	Killdeer (*Charadrius vociferus*)
	Lark Sparrow (*Chondestes grammacus*)
	Loggerhead Shrike (*Lanius ludovicianus*)
	Long-billed Curlew *(Numenius americanus)*
	Prairie Falcon *(Falco mexicanus)*

	Rough-legged Hawk (*Buteo lagopus*)
	Rufous Hummingbird *(Selasphorus rufus)*
	Sandhill Crane *(Grus canadensis)*
	Savannah Sparrow (*Passerculus sandwichensis*)
	Say's Phoebe (*Sayornis saya*)
	Short-eared Owl *(Asio flammeus)*
	Swainson’s Hawk (*Buteo swainsoni*)
	Western Kingbird (*Tyrannus verticalis*)
	Western Meadowlark (*Sturnella neglecta*)
	Vesper Sparrow (*Pooecetes gramineus*)
Montane Riparian Woodland and Shrubland	American Crow (*Corvus brachyrhynchos*)
	American Robin (*Turdus migratorius*)
	Bald Eagle (*Haliaeetus leucocephalus*)
	Belted Kingfisher (*Megaceryle alcyon*)
	Black-billed Magpie (*Pica hudsonia*)
	Black-chinned Hummingbird (*Archilochus alexandri*)
	Black-throated Sparrow (*Amphispiza bilineata*)
	Black Rosy-Finch (*Leucosticte atrata*)
	Brewer's Blackbird (*Euphagus cyanocephalus*)
	Broad-winged Hawk (*Buteo platypterus*)
	Bullock's Oriole (*Icterus bullockii*)
	Calliope Hummingbird (*Selasphorus calliope*)
	Cassin’s Finch (*Carpodacus cassinii*)
	Cedar Waxwing (*Bombycilla cedrorum*)
	Common Nighthawk (*Chordeiles minor*)

	Dusky Flycatcher (*Empidonax oberholseri*)
	Gray-crowned Rosy-Finch (*Leucostcte tephrocots*)
	Gray Flycatcher (*Empidonax wrightii*)
	Flammulated Owl (*Psiloscops flammeolus*)
	Great-tailed Grackle (*Quiscalus mexicanus*)
	Lewis's Woodpecker (*Melanerpes lewis*)
	Loggerhead Shrike (*Lanius ludovicianus*)
	Mountain Bluebird (*Sialia currucoides*)
	Mountain Quail (*Oreortyx pictus*)
	Mourning Dove (*Zenaida macroura*)
	Northern Flicker (*Colaptes auratus*)
	Northern Goshawk (*Accipiter gentilis*)
	Olive-sided Flycatcher (*Contopus cooperi*)
	Prairie Falcon (*Falco mexicanus*)
	Red-tailed Hawk (*Buteo jamaicensis*)
	Rufous Hummingbird (*Selasphorus rufus*)
	Spotted Towhee (*Pipilo maculatus*)
	Turkey Vulture (*Cathartes aura*)
	Warbling Vireo (*Vireo gilvus*)
	Western Wood-Pewee (*Contopus sordidulus*)
	White-crowned Sparrow (*Zonotrichia leucophrys*)
	Virginia's Warbler (*Oreothlypis virginiae*)
	Yellow Warbler (*Setophaga petechia*)
Pinyon-Juniper Woodland	Black-headed Grosbeak (*Pheucticus melanocephalus*)
	Cassin's Finch (*Haemorhous cassinii*)

	Common Raven (*Corvus corax*)
	Cooper's Hawk (*Accipiter cooperii*)
	Ferruginous Hawk (*Buteo regalis*)
	Great Horned Owl (*Bubo virginianus*)
	Lewis’s Woodpecker (*Melanerpes lewis*)
	Long-eared Owl (*Asio otus*)
	Pinyon Jay (*Gymnorhinus cyanocephalus*)
	Red-breasted Nuthatch (*Sitta canadensis*)
	Ruby-crowned Kinglet (*Corthylio calendula*)
	Swainson’s Hawk (*Buteo swainsoni*)
	Swainson's Thrush (*Catharus ustulatus*)
	Western Tanager (*Piranga ludoviciana*)
	Varied Thrush (*Ixoreus naevius*)
	Yellow-rumped Warbler (*Setophaga coronate*)
	American Avocet (*Recurvirostra americana*)
Playa	American Bittern (*Botaurus lentginosus*)
	American White Pelican (*Pelecanus erythrorhynchos*)
	Bank Swallow (*Riparia riparia*)
	Black Tern (*Chlidonias niger*)
	California Gull (*Larus californicus*)
	Canvasback (*Aythya valisineria*)
	Cinnamon Teal (*Spatula cyanoptera*)
	Common Loon (*Gavia immer*)
	Long-billed Dowitcher (*Limnodromus scolopaceus*)
	Mallard (*Anas platyrhynchos*)

	Northern Pintail (*Anas acuta*)
	Peregrine Falcon (*Falco peregrinus*)
	Redhead (*Aythya americana*)
	Red-winged Blackbird (*Agelaius phoeniceus*)
	Red-necked Phalarope (*Phalaropus lobatus*)
	Sandhill Crane (*Grus canadensis*)
	Short-billed Dowitcher (*Limnodromus griseus*)
	Western Sandpiper (*Calidris mauri*)
	Western Snowy Plover (*Charadrius nivosus nivosus*)
	White-faced Ibis (*Plegadis chihi*)
	Wilson's Phalarope (*Phalaropus tricolor*)
	Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*)
	Brewer's Sparrow (*Spizella breweri*)
Sagebrush Shrubland and Salt Desert Shrub	Bushtit (*Psaltriparus minimus*)
	Canyon Wren (*Catherpes mexicanus*)
	Common Poorwill (*Phalaenoptilus nuttallii*)
	Ferruginous Hawk (*Buteo regalis*)
	House Wren (*Troglodytes aedon*)
	Loggerhead Shrike (*Lanius ludovicianus*)
	Mountain Quail (*Oreortyx pictus*)
	Northern Goshawk (*Accipiter gentilis*)
	Pinyon Jay (*Gymnorhinus cyanocephalus*)
	Prairie Falcon (*Falco mexicanus*)
	Rock Wren (*Salpinctes obsoletus*)
	Rufous Hummingbird (*Selasphorus rufus*)

	Sagebrush Sparrow (*Artemisiospiza nevadensis*)
	Sage Thrasher (*Oreoscoptes montanus*)
	Short-eared Owl (*Asio flammeus*)
	Swainson’s Hawk (*Buteo swainsoni*)
	Western Burrowing Owl (*Athene cunicularia hypugaea*)
	Woodhouse's Scrub-Jay (*Aphelocoma woodhouseii*)

Appendix B: Sensitive Species, Special Status Species, Threatened and Endangered Species

All species listed here are Nevada BLM Special Status Species as designated by the State Director and are identified on the State Director's list as occurring in the Winnemucca District, as of November 11, 2023 (NV-IM-2024-003). Criteria set forth in the BLM 6840 Manual for designating sensitive species are:

1. Species designated as Bureau special status must be native species found on BLM administrated lands for which BLM has the capability to significantly affect the conservation status of the species through management, and either:

   a. There is information that a species has recently undergone, is undergoing, or is predicted to undergo a downward trend such that the viability of the species or a distinct population segment of the species is at risk across all or a significant portion of the species range; or

   b. The species depends on ecological refugia or specialized or unique habitats on BLM-administrated lands, and there is evidence that such areas are threatened with alteration such that the continued viability of the species in that area would be at risk.

2. All federally designated candidate species, proposed species, and delisted species in the 5 years following their delisting shall be conserved as BLM Special Status Species.

Table 18 indicates species that have been proposed by the USFWS for ESA listing, or under Section 7 are to be treated as proposed for ESA listing. Table 19 indicates species listed under the ESA that may occur in the proposed parcels identified in Table 1. All species listed under the ESA are also considered Nevada BLM Special Status Species. Tables 20 and 21 list Nevada BLM Special Status Plant and Animal Species, respectively, which may occur in proposed parcels.

Table B-12. WDO Proposed Parcel List of Species Proposed for ESA Listing

Common Name (Scientific Name; 4)	Federal Status
Northwestern pond turtle (*Actinemys marmorata*)	USFWS proposed for ESA Threatened status on 10/3/2023. No critical habitat proposed.
Suckley's cuckoo bumble bee (*Bombus suckleyi*)	USFWS proposed for ESA Endangered status on 12/17/2024. No critical habitat proposed.
Monarch Butterfly *(Danaus plexippus)*	USFWS proposed for ESA Threatened status on 12/12/2024. Critical habitat is proposed, but not within the WD.
California condors (*Gymnogyps californianus*)	Proposed parcels may overlap with a USFWS designated range for a non-essential, experimental population in the Pacific Northwest. This population has no critical habitat and is to be treated for purposes of section 7 (other than subsection (a)(1) thereof) as a species proposed to be listed under the Act as a threatened species (86 FR 15602 15623, 50 CFR 17.83(a)). No observations of California condors have been recorded in the WD by the BLM, NDOW, or NDNH.

Table B-23. WDO Proposed Parcel BLM Special Status Plant Species List.

Common Name (27)	Scientific Name
Lahontan Milkvetch	*Astragalus porrectus*
Tonopah Milkvetch	*Astragalus pseudiodanthus*
Winged Milkvetch	*Astragalus pterocarpus*
Weak Milkvetch	*Astragalus solitarius*
Tiehm's Milkvetch	*Astragalus tiehmii*
Osgood Mountains Milkvetch	*Astragalus yoder-williamsii*

Nevada Suncup	*Eremothera nevadensis*
West Humboldt Buckwheat	*Eriogonum anemophilum*
Crosby Buckwheat	*Eriogonum crosbyae var. crosbyae*
Lemmon Buckwheat	*Eriogonum lemmonii*
Pueblo Valley Peppercress	*Lepidium montanum var. nevadense*
Owyhee Prickly Phlox	*Leptodactylon glabrum*
Succor Creek Parsley	*Lomatium packardiae*
Candelaria Blazingstar	*Mentzelia candelariae*
Smooth Stickleaf	*Mentzelia mollis*
Nye County Smelowskia	*Nevada holmgrenii*
Sagebrush Cholla	*Opuntia pulchella (Grusonia pulchella)*
Nevada Oryctes	*Oryctes nevadensis*
Watson's Spinecup	*Oxytheca watsonii*
Nevada Dune Beardtongue	*Penstemon arenarius*
Cordelia Beardtongue	*Penstemon floribundus*
Lahontan Beardtongue	*Penstemon palmerivar var. macranthus*
Susanville Beardtongue	*Penstemon sudans*
Reese River Phacelia	*Phacelia glaberrima*
Obscure Scorpionflower	*Phacelia inconspicua*
Playa Phacelia	*Phacelia inundata*
Lahontan Indigobush	*Psorothamnus kingii*

Table B-34. WDO Proposed Parcel BLM Special Status Animal Species List.

Amphibian Common Name (3)	**Scientific Name**
Western Toad	*Anaxyrus boreas*
Northern Leopard Frog	*Lithobates pipiens*
Columbia Spotted Frog (including the Toiyabe Spotted Frog subpopulation)	*Rana luteiventris*
Bird Common Name (31)	**Scientific Name**
Northern Goshawk	*Accipiter gentilis*
Golden Eagle	*Aquila chrysaetos*
Sagebrush Sparrow	*Artemisiospiza nevadensis*
Short-eared Owl	*Asio flammeus*
Long-eared Owl	*Asio otus*
Burrowing Owl (includes Western Burrowing Owl)	*Athene cunicularia (hypugaea)*
Ferruginous Hawk	*Buteo regalis*
Swainson’s Hawk	*Buteo swainsoni*
Greater Sage-grouse	*Centrocercus urophasianus*
Western Snowy Plover	*Charadrius nivosus nivosus*
Common Nighthawk	*Chordeiles minor*
Olive-sided Flycatcher	*Contopus cooperi*
Bobolink	*Dolichonyx oryzivorus*
Great Basin Willow Flycatcher	*Empidonax traillii adastus*

Peregrine Falcon	*Falco peregrinus*
Pinyon Jay*	*Gymnorhinus cyanocephalus*
Cassin's Finch	*Haemorhous cassinii*
Bald Eagle	*Haliaeetus leucocephalus*
Least Bittern (includes Western Least Bittern)	*Ixobrychus exilis (hesperis)*
Loggerhead Shrike	*Lanius ludovicianus*
Virginia's Warbler	*Leiothlypis virginiae*
Black Rosy-Finch	*Leucosticte atrata*
Gray-crowned Rosy-Finch	*Leucosticte tephrocotis*
Lewis's Woodpecker	*Melanerpes lewis*
Long-billed Curlew	*Numenius americanus*
Mountain Quail	*Oreortyx pictus*
Sage Thrasher	*Oreoscoptes montanus*
Flammulated Owl	*Psiloscops flammeolus*
Bank Swallow	*Riparia riparia*
Black-throated Gray Warbler	*Setophaga nigrescens*
Brewer’s Sparrow	*Spizella breweri*
Gastropod Common Name (3)	**Scientific Name**
Pleasant Valley Pyrg	*Pyrgulopsis aurata*
Sada's Pyrg	*Pyrgulopsis sadai*
Wong’s pyrg	*Pyrgulopsis wongi*
Insect Common Name (10)	**Scientific Name**
Plain-marked Wood Nymph	*Cercyonis pegala paucilineatus*
Humboldt Aphodius Beetle	*Dellacasiellus humboldti*
Honey Lake Blue	*Euphilotes pallescens calneva*
Rice’s Blue	*Euphilotes pallescens ricei*
Nevada Viceroy	*Limenitis archippus lahontani*
Dune Honey Ant	*Myrmecocystus arenarius*
Great Basin Yuma Skipper	*Ochlodes yuma lutea*
Great Basin Small Blue	*Philotiella speciosa septentrionalis*
Pallid Sylvinus Hairstreak	*Satyrium sylvinus megapallidum*
Humboldt Serican Scarab	*Serica humboldti*
Mammals Common Name (24)	**Scientific Name**
Pallid Bat	*Antrozous pallidus*
Pygmy Rabbit*	*Brachylagus idahoensis*
Townsend's (Western) Big-eared Bat	*Corynorhinus townsendii*
Desert Kangaroo Rat	*Dipodomys deserti*
Spotted Bat	*Euderma maculatum*
Silver-haired Bat	*Lasionycteris noctivagans*
Hoary Bat	*Lasiurus cinereus*
Western Red Bat	*Lasiurus blossevillii*

Dark Kangaroo Mouse	*Microdipodops megacephalus*
California Myotis	*Myotis californicus*
Western Small-footed Myotis	*Myotis ciliolabrum*
Long-eared Myotis	*Myotis evotis*
Little Brown Bat	*Myotis lucifugus*
Fringed Myotis	*Myotis thysanodes*
Long-legged Myotis	*Myotis volans*
Yuma Myotis	*Myotis yumanensis*
American Pika	*Ochotona princeps*
Bighorn Sheep (all species)	*Ovis canadensis* spp.
Canyon Bat	*Parastrellus hesperus*
Merriam's Shrew	*Sorex merriami*
Western Water Shrew	*Sorex palustris*
Preble's Shrew	*Sorex preblei*
Smoke Creek Desert Pocket Gopher	*Thomomys bottae canus*
Western Jumping Mouse	*Zapus princeps*
Mollusk Common Name (2)	**Scientific Name**
Western Ridged Mussel	*Gonidea angulata*
Western Pearlshell	*Margaritifera falcata*
Reptile Common Name (4)	**Scientific Name**
Western (Northwestern) Pond Turtle*	*Actinemys marmorata*
Northern Rubber Boa	*Charina bottae*
Pygmy Short-horned Lizard	*Phrynosoma douglasii*
Greater Short-horned Lizard	*Phrynosoma hernandesi*

*Currently under review for ESA listing by USFWS.

Greater Sage-Grouse

Greater sage-grouse (GRSG) is a sagebrush-obligate species. They are dependent on sagebrush habitat for lekking, nesting, brood rearing, and wintering (feeding almost exclusively on sagebrush leaves during the winter). The GRSG are known to occur in foothills, plains, and mountain slopes with nearby sagebrush meadows. Dense sagebrush overstory and an herbaceous understory of grasses are important to provide shade and security. Both new herbaceous growth and residual cover are important in the understory. The GRSG have specific habitat requirements for carrying out each of their life cycle functions (e.g., courtship and mating on lek habitat, nesting habitat, brood-rearing habitat and wintering habitat). Each of these habitat types can be widely separated geographically, hence having corridors between habitats is important. Early spring breeding sites called "leks" are usually situated on ridge tops or grassy areas surrounded by a substantial brush and herbaceous components. Leks have less herbaceous and shrub cover than surrounding areas. In early spring, males gather on leks where they strut to attract females (BLM, 2018).

The distribution of GRSG in Nevada is dependent on the sagebrush ecosystem that provides lekking habitat, nesting habitat, brood-rearing habitat, and fall/winter cover as well as forage throughout the year. Summer habitat consists of sagebrush mixed with areas of wet meadows and riparian vegetation. They may also use irrigated agricultural fields. Fall habitat consists of mosaics of low-growing sagebrush and Wyoming big sagebrush. Areas used as winter habitat are influenced by the severity of winter weather,

topography, and vegetative cover. Nesting sites are located in thick cover in sagebrush habitat beneath sagebrush or other shrubs. Nests are situated on the ground in a shallow depression, with an average distance between nest sites and nearest leks ranging from 2.1 to 4.8 miles (Schroeder et al., 1999). In some cases, females may move greater than 12.4 miles from a lek to nest. Individual GRSG move seasonally between habitat types throughout the year. Additionally, GRSG exhibit strong site fidelity (loyalty to a particular area) to seasonal habitats, which includes breeding, nesting, brood rearing, and wintering areas (BLM, 2018).

Appendix C: Definitions, Abbreviations, and Acronyms

Definitions:

Invasive plant: a plant that is not part of (if exotic) or a minor component of (if native) the original plant community or communities and has the potential to become a dominate or co-dominate species on the site if future establishment and growth are not actively controlled by management interventions; or a plant that is classified as exotic or noxious under state or federal law. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants.

Noxious weed: a plant designated by federal or state laws as generally possessing one of more of the following characteristics: aggressive and difficult to manage; parasitic; a carrier or host of serious insect of disease; or nonnative, new or not common to the U.S. The BLM Winnemucca District recognizes the current noxious weed list designated by the State of Nevada Department of Agriculture (NDA) statute, found in Nevada Administrative Code (NAC) 555.010.

Weed: any plant that interferes with management objectives for a given area of land at a given point in time.

Abbreviations and Acronyms:

ACEC	Area of Critical Environmental Concern
AFY	acre-feet (AF) or acre-feet per year
AIRFA	American Indian Religious Freedom Act
AML	Appropriate Management Level
APD	Application for Permit to Drill
AQI	Air Quality Index
AQRV	Air Quality Related Values
ARMPA	Approved Resource Management Plan Amendment
ATV	All-terrain Vehicle
AUM	Animal Unit Month
avg	Average
BAPC	Bureau of Air Pollution Control
BG	Census Block Group
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BMPs	Best Management Practices
BOPE	Blow-out Prevention Equipment
BR	Black Rock
BRFO	Black Rock Field Office
CAA	Clean Air Act
CAP	Criteria Air Pollutants
CCS	Conservation Credit System
CESA	Cumulative Effects Study Area
CFR	Code of Federal Regulations
cm	Centimeters
CMA	Critical Management Area
CNIDC	Central Nevada Interagency Dispatch Center
COA	Condition of Approval
CR	Cultural Resources
CSU	Controlled Surface Use
CWA	Clean Water Act

DOI	United States Department of the Interior
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
EPA	Environmental Protection Agency
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FLPMA	Federal Land Policy and Management Act of 1976
FR	Federal Register
FW	Fish and Wildlife
FY	Fiscal Year
GAP	Gap Analysis Program
GDP	Geothermal Drilling Permit
GHG	Greenhouse gas
GHMA	General Habitat Management Area
GIS	Geographic Information System
GRSG	Greater Sage-Grouse
GSN	Geothermal Sundry Notice
HA	Hydrographic Area
HAP	Hazardous Air Pollutants
HMA	Herd Management Area
HRFO	Humboldt River Field Office
HUC	Hydrologic Unit Code
IDT	interdisciplinary team
IB	Instruction Bulletin
IM	Instruction Memorandum
kV	Kilovolts
LCT	Lahontan Cutthroat Trout
LN	Lease Notice
LUA	Land Use Authorization
LUP	Land Use Plan
LWC	Lands with Wilderness Characteristics
m	Meters
MBTA	Migratory Bird Treaty Act
MD	Management Decision
MOU	Memorandum of Understanding
MR	Mineral Resources
Mt	Megatonne
MT	Magnetotelluric
MW	Megawatt hour
NAAQS	National Ambient Air Quality Standards
NAC	Nevada Administrative Code
NAGPRA	Native American Graves Protection and Repatriation Act
NDA	Nevada Department of Agriculture
NDEP	Nevada Division of Environmental Protection
NDOT	Nevada Department of Transportation
NDOW	Nevada Department of Wildlife
NDWR	Nevada Division of Water Resources
NEPA	National Environmental Policy Act
NHD	National Hydrography Dataset

NHPA	National Historic Preservation Act
NHT	Nation Historic Trails
NNHP	Nevada Natural Heritage Program
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NSE	Nevada State Engineer
NSO	No Surface Occupancy
NV	Nevada
NVSO	Nevada State Office
OHMA	Other Habitat Management Area
OHV	Off-highway Vehicle
OP	Operations Plan
PEIS	Programmatic Environmental Impact Statement for Geothermal Leasing in the Western United States
PFYC	Potential Fossil Yield Count
pH	Potential of Hydrogen (denotes acidity or alkalinity)
PHMA	Priority Habitat Management Area
PILT	Payment in Lieu of Taxes
PL	Public Law
PM	Particulate Matter
ppm	Parts per Million
POD	Plan of Development
PROT	Protracted
PRPA	Federal Paleontological Resources Preservation Act, or Omnibus Act
PWR	Public Water Reserve
RCOP	Resource Confirmation Operations Plan
RDF	Required Design Feature
RFD	Reasonably Foreseeable Development
RFE	Reasonably Foreseeable Effects
RFFA	Reasonably Foreseeable Future Actions
RMP	Resource Management Plan
ROD	Record of Decision
ROW	Right-of-Way
RS	Revised Statute
SETT	Sagebrush Ecosystem Technical Team
SFA	Sagebrush Focal Area
SHPO	Nevada State Historical Preservation Office
SSS	Special Status Species
T&E	Threatened and Endangered
TGW	Thermal Gradient Well
TL	Timing Limitation
tpy	Tons per year
UP	Utilization Plan
US	United States
USC	United States Constitution
USCD	United States Climate Data
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOC	Volatile Organic Compound
VRI	Visual Resource Inventory

VRM	Visual Resource Management
WAFWA	Western Association of Fish and Wildlife Agencies
WHB	Wild Horse and Burro
WD	Winnemucca District
WDO	Winnemucca District Office
WFRHBA	Wild Free-Roaming Horse and Burro Act of 1971
WR	Water Resources
WRCC	Western Regional Climate Center
WSA	Wilderness Study Area

Appendix D: Geothermal Resource Exploration, Confirmation and Development

Background

At any time during the 10-year term of a geothermal lease, the lessee (operator), would submit plans for projects to BLM for approval for geophysical exploration, geothermal resource confirmation, and development of the resource for utilization. These plans would be in the form of a Notice of Intent to explore (NOI), Geothermal Drilling Permit (GDP), or Plan of Development (POD). BLM then reviews the submission to determine if there are any other site-specific conditions of approval that should be applied. Such conditions of approval must be consistent with the lease rights granted. The operator may also seek a right-of-way to access the leased lands in conjunction with obtaining approval to explore or develop a leased parcel.

The following section provides a general description of possible post-leasing activities, based on the *Geothermal Leasing in the Western United States Programmatic Environmental Impact Statement, 2008.*

Geophysical Exploration Surveys

Geophysical exploration on the surface of land can be performed on foot, by using vehicles with off-road capabilities, or helicopters. These surveys use different instruments and methods to collect electrical, magnetic, chemical, seismic, temperature and rock data. Surficial geophysical exploration methods include magnetotellurics (MT), gravimetry and seismic surveys. The shallow subsurface can be further characterized with two-meter rod and direct push (up to 50-meters) temperature studies, and the drilling of temperature gradient wells (TGWs). Data collected during these surveys and TGW drilling activities are used to develop geothermal resource confirmation and utilization project plans.

Gravimetry surveys are used to map changes in rock densities and characterize the subsurface. For geothermal purposes, this method is used to locate subsurface anomalies, such as fault lines and dense granite bodies. These surveys can be performed on foot while hand carrying the instrument to take measurements over the point array. Airborne gravitational studies can also be performed over large areas. Disturbance with this method is minimal. No tools are necessary to set up the gravimeter for measurement, although overland travel may occur along a predetermined grid in large areas.

MT surveys are performed early in the life cycle of a geothermal project to search for areas of low resistivity in the rock formations surrounding a potential resource. Low resistivity indicates an area where electrical currents can flow through rock materials more easily. This method allows for the detection of low-resistivity anomalies that could indicate the presence of subsurface geologic structures that conduct and/or hold heat, areas of high porosity, and estimations of geothermal reservoir temperatures at various depths. MT Resistivity surveys can be conducted on foot with equipment placed by hand. Long cables are set up over a small area (approximately 100 feet diameter) on the land surface. The cables are moved and set up along a grid line repeatedly. Overland travel may occur in large survey areas without creating new roads.

Seismology is used to map subsurface geology over large areas using an array of data collectors (geophones). These surveys can be performed using active or passive methods. Active seismic surveys are performed while a pulse of seismic energy is released via small charges below the ground surface or by a vibroseis truck. A vibroseis truck is heavy, ranging from three tons for “minivibroseis” to several tens of tons for the largest models, and is driven along the survey lines, stopping to vibrate a large pad attached to the truck at each geophone position, or between them. These surveys take several days to complete. Weight from the truck may crush vegetation and compact soil, causing slowed vegetation growth along the line and at the vibration site. For this reason, this type of activity may result in moderate though spatially limited disturbance. Passive seismic methods to collect data involve placing the geophones over an array and leaving them in place to collect natural earthquake and other tectonic data over a longer period of time. Seismic surveys involve minor, temporary disturbances (tens of square meters).

Two-meter rod temperature surveys methods are used to gather temperature data from the shallowest subsurface. A rod, two meters long and about four centimeters in diameter, is pounded into the ground with a pneumatic hammer mounted on the back of either a truck or ATV. The rods are left in the ground to allow the temperature to equilibrate before a measurement is taken. Disturbance from this activity is minimal.

Direct-push temperature surveys are used to collect temperature data from deeper in the subsurface, up to 50-meters below the surface. The installation methods are the same as for a two-meter survey, except the rod segments are screwed together as the pneumatic hammer is pounding them into the ground. The rods are left in for a longer period before measurements are taken and groundwater can be sampled if encountered.

Geothermal Exploration Drilling

Temperature gradient wells (TGWs) are used to measure thermal increase with depth. Drilling is usually done with a truck-mounted rotary or diamond-core drill at depths between 500 and 2,000 feet, though drills may penetrate deeper into the crust so long as they do not contact the geothermal resource. Geologists determine characteristics of the strata and presence of underground geothermal reservoirs by assessing rock fragments or core from the subsurface and groundwater. The borehole is cemented with downhole casing or tubing and is filled with water. Later, temperature measurement equipment is used to assess thermal gradient. Ordinary exploration drilling requires a minimal work area, often less than one acre of disturbance. Well pads are about 0.1 acres (55 feet by 80 feet) in size and may be bladed or established without removing existing vegetation. Typically, these wells are located adjacent to existing roads; however, new road construction could be necessary. Disturbance for a new road is estimated to be between one to six acres. Access and use of a drill site may involve land clearing of up to 0.1 acres per site. The drill rig may be up to 60 feet tall. A generator, tanker truck, and support vehicles are present during drilling. When completed, the TGW would have a small diameter well cellar (about three feet) surrounding a conductor casing. Drilling may take several weeks.

Drilling fluids are often used to lubricate the bit and to aid in cuttings removal. Fuel, coolant, and lubricants are needed for the drill and support equipment. Drilling additives and water are used during drilling, and cement and water are needed to complete the well. These materials are expected to be present at any time during drilling. The risk of spills of other fluids is reduced through BMPs identified in the drill plan. If a well is not successful, the well is plugged and abandoned according to State regulations, and the surface disturbance is reclaimed. If a well is successful, the surface disturbance is usually reclaimed within one year. The well may continue to be used for measuring temperature gradient for a period consistent with the approved permit, while additional exploration takes place. Reclamation includes removing all surface equipment and structures, grading the site to pre-disturbance contours, and replanting native or appropriate vegetation to facilitate natural restoration.

Geothermal Resource Confirmation and Testing

Once exploration identifies the presence of a geothermal resource, additional exploration wells are drilled to test the commercial viability of the geothermal resource. Drilling operations involve producing geothermal fluids for chemical analysis and flow testing, as well as using the well to inject fluids back into the geothermal reservoir. Larger equipment is needed along with a larger well pad. Wells are typically deeper, with larger diameter holes, and blow out prevention equipment is used to protect people and drilling equipment from accidental release of geothermal fluids. Full-time site staffing usually ranges from 10-15 personnel with additional temporary personnel and vehicles facilitating delivery of equipment and supplies.

If a reservoir is discovered and sufficient for development, a wellhead with valves and control equipment would be installed on top of the well casing. Excess geothermal fluids are stored in temporary pits or sumps, generally lined with plastic (small sumps) or clay (large sumps). The water is left to evaporate,

and any sludge is removed and properly disposed. A geothermal well may be left in place for a longer time during the resource utilization planning stage. Up to five acres per well pad may be expected. An additional 1-5 acres of disturbance may result from building and improving roads.

If the well is not successful, the well is plugged and abandoned according to State regulations, and the surface disturbance is reclaimed as described above.

Geothermal Reservoir Development and Utilization

Once the geothermal reservoir is identified, additional wells are drilled for use as production or injection wells. Well pads, access roads, pipelines, transmission lines, and power generation facilities are also constructed. The utilization plan is dependent upon the quality of the geothermal reservoir. Geothermal resources are classified as low temperature (less than 90°C, or 194°F), moderate temperature (90°C to 150°C, 194°F to 400°F), and high temperature (greater than 150°C, 302°F). Three types of power plants that harness geothermal resources are dry steam plants, flash steam plants, and binary-cycle plants; binary-cycle power plants are the most common type of geothermal plant in Nevada. The binary-cycle power plants use water from the geothermal reservoir to heat another "working fluid." The working fluid is vaporized and used to turn the turbine/generator units. The geothermal water and the working fluid never come into contact with each other. Binary-cycle power plants can operate with lower water temperatures ranging from 74°C to 182°C, (165°F to 360°F) and produce fewer air emissions (PEIS, 2008).

The number of personnel required during construction varies significantly, but at any one point there may be a few hundred laborers and professionals on-site with associated vehicles. Routine power plant operations personnel needs typically include nine to fifteen people per shift dependent upon the plant size. Additional maintenance and management personnel are typically present during the day. A 50 MWh geothermal power plant would be expected to disturb between 53 and 367 acres (including roads, well pads, pipelines, power plant and electrical transmission lines.)

Appendix E: Reasonably Foreseeable Development Scenario

This Reasonably Foreseeable Development Scenario (RFD) is based on NEPA permitting and as built figures for geothermal development in Nevada over the last decade. These RFD figures may be used to analyze foreseeable development and potential impacts to a project area if the lease or leases are sold, exploration proves that sufficient geothermal resources exist to support development, and the project proceeds to Utilization. At the leasing stage, the BLM does not know which if any parcels will sell, and where the exploration and development activities would take place.

At any time during the term of a geothermal lease, the lessee, or operator, would submit specific plans for geothermal exploration and development to BLM for approval. These plans would be in the form of a Notice of Intent to Conduct Geophysical Geothermal Resource Exploration Operations (NOI), Resource Confirmation Operations Plan (RCOP), Geothermal Drilling Permit (GDP), or Utilization Plan (UP). BLM would then review the proposed activities and conduct additional project and site specific NEPA prior to authorization of any surface disturbing activities. Any Conditions of Approval (COAs) must be consistent with the lease rights granted.

As of May 2025, there are 171 active geothermal leases in the WDO that encompass ~375,506 acres.; 21 in the Black Rock Field Office and 150 in the Humboldt River Field Office. Future development of geothermal resources in the Winnemucca District is expected to occur in the following ways:

- Small electric generating facilities to show proof of concept.
- Expansion of existing power plant(s) and well fields.
- Indirect use for greenhouse heating, vegetable dehydration plants, and home heat.

Based on proposed geothermal projects in the WD, approximately 12 temperature gradient wells, 51 resource confirmation wells, and eight full size utilization wells would be drilled, and up to 138 acres of surface disturbance would be caused by the construction of well pads necessary for the proposed geothermal well drilling through 2027.

The following section provides a general description of possible post-leasing activities. These are based on the activities that occur within the Winnemucca District and those outlined in the 2008 PEIS.

Geophysical Exploration Projects

The geophysical exploration activities summarized in Appendix D have occurred in Granite Springs Valley, New York Canyon, Baltazor Hot Springs, Trego Hot Springs, Buffalo Valley, Pumpernickel, San Emidio, Blue Mountain, Toulon, Leach Hot Spring, Kyle Hot Spring, the west Eugene mountains, the Colado/Lovelock area, the Valmy-Hot Pot Spring area, McGee, Pinto Hot Springs, Dun Glenn, and Mill City, among others.

Given the current amount of exploration in the WD, it is reasonably foreseeable that continued interest in geothermal projects could result in up to 40 temperature gradient wells over the next 10 years. The estimated disturbance associated with those wells, based on historical exploration averages is 2.5 acres per well or about 100 acres of disturbance associated with exploration. The table below is taken from the PEIS and modified for the WDO.

Table E-15. Typical Disturbance for Geophysical Exploration.

Exploration Phase	Disturbance Estimate per Project
Geologic mapping and geochemical sampling	Negligible
Gravity surveys	Negligible
Magnetotelluric surveys[1]	~70 square feet

Passive Seismic surveys[2]	250 square feet
3D Seismic surveys	Negligible
Resistivity surveys	Negligible
Two-meter and Direct Push surveys[3]	100 square feet
Temperature gradient wells[4]	0.1 - 6 acres
Total	Up to 10 acres

[1] Calculated assuming a 78-point array, at a disturbance of 0.89 square feet per site.
[2] Calculated assuming a 250-point array, at a disturbance of 1 square foot per site.
[3] Calculated assuming a 360-point array, at a disturbance of less than 4 square inches per point.
[4] Estimate is a representative average disturbance of all TG well sites in the WDO. Most TG well pads constructed in the WDO are kept within a small footprint, usually less than 100 x 100 feet.

Geothermal Resource Confirmation and Testing

Once geophysical exploration identifies the presence of a geothermal resource, additional exploration wells are drilled to test the geothermal resource. Drilling operations involve producing geothermal fluids for chemical analysis and flow testing, as well as using the well to inject fluids back into the geothermal reservoir. Larger equipment is needed along with a larger well pad. Wells are typically deeper, with larger diameter holes, and blow out prevention equipment (BOPE) is used to protect people and drilling equipment from accidental release of geothermal fluids. Full-time site staffing typically ranges from 10 to 15 personnel with additional temporary personnel and vehicles facilitating delivery of equipment and supplies.

If a reservoir is discovered and sufficient for development, a wellhead with valves and control equipment would be installed on top of the well casing. Excess geothermal fluids are stored in temporary pits or sumps, generally lined with plastic (small sumps) or clay (large sumps). The water is left to evaporate, and any sludge is removed and properly disposed. A geothermal well may be left in place for a longer period of time during the resource utilization planning stage. Up to five acres per well pad may be expected. In addition, roads would add additional disturbance, usually ranging from 1-5 acres. If the well is not successful, the well is plugged and abandoned according to State regulations, and the surface disturbance is reclaimed.

There are currently two projects in the WDO that have completed the NEPA process for the resource confirmation phase: Baltazor and Gerlach. There are four proposed resource confirmation projects, McGee, Buffalo Valley, Pinto, and Harmony. If the resource at Baltazor is confirmed, Ormat would enact their authorized utilization plan. If resources are confirmed at Gerlach, McGee, Buffalo Valley, Pinto, and Harmony, the operators would likely submit utilization plans to develop the resources and plans of development for the transmission lines to deliver power to the commercial grid. The table below shows typical disturbance for a geothermal resource confirmation project:

Table E-26. Typical disturbance for Geothermal Resource Confirmation and Testing. Estimates a project ranging from 5-20 wells.

Resource Confirmation: Drilling and Testing Phase	Disturbance Estimate per Site
Drilling and well pad construction[1]	~11 – 42 acres
Road improvement/construction[2]	~1 – 5 acres
Aggregate Pit[3]	~1 – 5 acres
Well workovers, repairs and maintenance[3]	Negligible

Total	13 – 52 acres
[1] Size of the well pad varies greatly based on the site-specific conditions and necessary ancillary facilities. Based on WDO inspections, well pads can range from 0.5 to 4.5 acres. Using the proposed Gerlach Geothermal Exploration Project as an example, up to 19 wells and well pads (2.1 acres each). Drilling and testing take place within well pad footprints. [2] Approximately 0.23 acres of roads per well including site access, estimates 30-foot-wide surface disturbance for a 18-20-foot road surface, including 10% cut and fill slopes and ditches. Estimates 5 to 20 wells. [3] Proposed project uses an existing pit that would be expanded. [4] Disturbance would be limited to previously disturbed areas around the well(s).	

Geothermal Development and Utilization

Once the geothermal reservoir is identified, additional wells are drilled for use as production or injection wells, along with well pads, access roads, pipelines, transmission lines, and power generation facility. The utilization plan is dependent upon the quality of the geothermal reservoir. Geothermal resources are classified as low temperature (less than 90°C, or 194°F), moderate temperature (90°C to 150°C, 194°F to 400°F), and high temperature (greater than 150°C, 302°F). Three types of power plants that harness geothermal resources are dry steam plants, flash steam plants, and binary-cycle plants.

Most geothermal development in Nevada consists of air-cooled binary systems. These systems have the largest acreage disturbance per MWh for geothermal development; however, that disturbance has been trending down as efficiency improves, averaging less than 2 acres/ MWh of capacity for recent developments. Air-cooled binary cycle power plants use water from the geothermal reservoir to heat another “working fluid.” The working fluid is vaporized and used to turn the turbine/generator units. The geothermal water and the working fluid never come into contact with each other, or the atmosphere, and one hundred percent of the geothermal fluid is reinjected back into the reservoir in a closed loop system that produces very few air emissions (PEIS, 2008) and eliminates the risk of depleting the geothermal resource. Additionally, because of the legal and economic difficulty in acquiring water rights for consumptive use of water in flash or water-cooled systems, air-cooled binary systems have become the most efficient and economically feasible model for geothermal plants.

Typical Geothermal Development in Nevada

1. 8-12 well pads at 3-5 acres per pad (smaller pads for individual wells, larger but fewer multi-well pads depending on resource), total of 30-40 acres.
2. 1-2 power plant sites for turbines and cooling equipment and control room/maintenance 15-30 acres each, site total 30-60 acres.
3. Access roads w/ 14 ft running surface and geothermal pipelines 20-30" insulated pipe on expansion stands, site total 15-30 acres.
4. Transmission line 60kV, 110kV, or 230kV with large temporary disturbance ROW for installation, 10-30 acres of total permanent disturbance for poles varies depending on distance required.
5. Total disturbance for a typical 40-60 MWh Binary air-cooled facility is ~80-120 acres.

Additional capacity would require less additional disturbance as there are certain economies of scale, and minimum feature sizes for any facility. Geothermal facilities in Nevada range from less than 1 to about 4 acres per MWh, with most recent facilities averaging around 2 acres per MWh of capacity. These disturbance per MWh figures are much lower than for any other form of renewable energy, and geothermal has the advantage of providing stable, dispatchable 24/7 baseload power regardless of wind, rain, or shine. In fact**,** Geothermal facilities perform better in colder weather due to the more efficient cooling of the binary fluid.

Table E-37. Typical Disturbance for Geothermal Resource Development.

Development: Drilling and Utilization Phase	Disturbance Estimate per Plant
Drilling and well field development[1]	2.5 – 50 acres
Road improvement/construction[2]	4.5 – 75 acres
Power plant construction[3]	5 – 40 acres
Installing wellfield equipment including pipelines[4]	6 – 60
Installing transmission lines[5]	15 – 145
Well workovers, repairs and maintenance[6]	Negligible
Total (2 - 15 MWh facilities)	33-370 acres

[1] Size of the well pad varies greatly based on the site-specific conditions. Based on WDO inspections, well pads range from 0.5 to 4.5 acres. Using the North Valley – San Emidio plant as an example, a 25 MWh power plant requires about ten well pads to support five to 10 production wells and five to 10 injection wells. Multiple wells may be located on a single well pad.
[2] One-quarter to two miles per well, five to ten wells. Estimates 30-foot-wide surface disturbance for a 18-20-foot road surface, including cut and fill slopes and ditches.
[3] Expect disturbance co-location with production or injection wells, about 15 acres of disturbance for 25 MWh plant.
[4] Pipelines between well pad to plant assumed to be 2-4 miles with a 25-foot-wide corridor.
[5] Three to 30 miles long, 20-foot-wide corridor.
[6] Disturbance would be limited to previously disturbed areas around the well(s).

For the purposes of this analysis, the following assumptions are made for lease and production operations:

- A total of 60 to 80 exploration wells (temperature gradient and small production test wells) would be drilled in the next twenty years. These wells would identify two small geothermal fields. Each exploration well site and access road would result in an average of 2.5 acres of surface disturbance or up to 200 acres of surface disturbance associated with exploration.
- Each power producing plant would require between five and ten wells to supply geothermal fluids for a binary power plant and between five and ten wells would be used to re-inject the spent water to the reservoir. Wells would be co-located where possible, up to two wells per well pad with the average pad disturbance of 2.5 acres per pad or up to 50 acres total. Production and injection wells for two power plants would utilize exploration roads but an additional 75 acres of road may be required.
- Wells would not exceed 10,000 feet in depth and temperatures would be expected in the ‘moderate’ range. Therefore binary-cycle power plants would be expected to be used. Both power plants would be between five and twenty acres in size, or up to 40 acres total.
- Wells would pump geothermal fluids to the power facility between two and four miles away, with pipelines aggregated in a 25-foot-wide corridor, for up to 60 acres of disturbance. Transmission lines are expected to be between three and thirty miles in length with a 20-foot-wide corridor, up to 145 acres of disturbance.

In summary, geothermal exploration and production activities could result in up to 450 acres of surface disturbance in the next twenty years. In comparison, this figure represents less than 0.005% of the 8.2 million acres of land managed by the Winnemucca District.

Below are the links and figures from three example NEPA documents used to aid in the creation of this RFD:

Table E-48. Proposed Disturbance in the Area of Interest (AOI) for the Gerlach Geothermal Resource Confirmation Project.

Proposed Disturbance in the AOI		
Project Components	Acre Disturbance	
	Temporary	Permanent
Well Pads[2]	39.9	20.0[1]
Access Roads[3]	4.4	4.4
Expanded Existing Aggregate Pit	5.0	5.0
Total	49.3	29.4
Source: Ormat 2022: Gerlach Geothermal Resource Confirmation Project – DOI-BLM-NV-W030-2022-0001-EA (Gerlach Geothermal Exploration Project) https://eplanning.blm.gov/eplanning-ui/project/2016744/510 [1] Assumes half of each well pad would be reclaimed during interim reclamation. [2] The ancillary features, such as air compressors, tanks for mud, fuel, and water, a reserve pit, control room, a maintenance building, and smaller auxiliary buildings, would be constructed within the well pads' footprints. [3] Includes acres of disturbance from new roads and upgrades to existing roads.		

Table E-59. Proposed Disturbance in the Area of Interest (AOI) for the New York Canyon Geothermal Development Project.

Proposed Disturbance in the AOI		
Project Components	Acre Disturbance	
	Temporary	Permanent
Power Plants[1]	60	60
Pipelines	40	20
Well Pads	80	42
Access Roads	13	13
Aggregate Pit	5	5
Airstrip and Hangar[3]	20	15
Total	218	155
Source: Ormat 2013: New York Canyon Geothermal Development Project - 70 MWh DOI-BLM-NV-W010-2012-0005-EA (New York Canyon Utilization and Interconnect Project) https://eplanning.blm.gov/eplanning-ui/project/24752 [1] The substation and ancillary features, such as offices, restrooms, a control room, a maintenance building, and smaller auxiliary buildings, would be constructed within the power plants' footprints. [2] Includes acres of disturbance from new roads and upgrades to existing roads. [3] For the purpose of employee commuting		

Table E-610. Proposed Disturbance in the Area of Interest (AOI) for the North Valley Geothermal Development Project at the San Emidio Geothermal Field.

Proposed Disturbance in the AOI	
Project Components	Acre Disturbance

	Temporary	Permanent
Power Plants[1]	30	30
Pipelines	36.7	18.8
Well Pads	105	62.5
Access Roads	13	13
Aggregate Pit	5	5
Total	189.7	129.3

Source: Ormat 2020: North Valley Geothermal Development Project at the San Emidio Geothermal Field Environmental Assessment (DOI-BLM-NV-W030-2020-0003-EA) https://eplanning.blm.gov/eplanning-ui/project/1503204/510

[1] The substation and ancillary features, such as offices, restrooms, a control room, a maintenance building, and smaller auxiliary buildings, would be constructed within the power plants' footprints.

[2] Includes acres of disturbance from new roads and upgrades to existing roads.

Appendix F: Land Use Authorization Table

The following table shows the authorized rights-of-way (ROW) authorizations located within the 2025 parcels. For more information regarding these ROWs, please contact the Winnemucca District Office.

The lessee accepts this lease subject to the right of individuals, authorized by BLM Winnemucca District Office, to access, operate within, and maintain the ROW as described in case file(s) (see below). The lessee agrees that its operations will not interfere with the use of the ROW(s) by these individuals.

These entities must be contacted in the event that geothermal exploration or development activities are authorized.

Table F-111. Parcels with existing ROWs, the legal land description, case file number and entity.

Parcel #	Legal Land Description	ROW Case File/ROW Holder (no particular order)
NV-2025-10-2188	**T. 41N., R. 35E., MOUNT DIABLO MERIDIAN** Sec. 31, Lot 4, SE1/4SW1/4, S1/2SE1/4; Sec. 32, SE1/4SW1/4, SW1/4SE1/4, SE1/4SE1/4; Sec. 33, SW1/4SW1/4, SE1/4SW1/4, SW1/4SE1/4, SE1/4SE1/4.	NVNV105973179/NVN041945 – Harney Electric Coop NVNV105990544/NVN019632 - Harney Electric Coop
NV-2025-10-2191	**T. 26N., R. 27E., MOUNT DIABLO MERIDIAN** Sec. 26, SE1/4NE1/4, NW1/4NW1/4, SE1/4SE1/4; Sec. 28, NE1/4SW1/4;	NVNV106248003/NVN081723 – Aqua Trac LLC NVNV106252890/NVN081441 – Aqua Trac LLC
NV-2025-10-2192	**T. 25N., R. 27E., MOUNT DIABLO MERIDIAN** Sec. 10, SW1/4NE1/4.	NVNV106248003/NVN081723 – Aqua Trac LLC
NV-2025-10-2194	**T. 40N., R. 35E., MOUNT DIABLO MERIDIAN** Sec. 16, SE1/4NE1/4, NE1/4SE1/4, SE1/4SE1/4.	NVNV105973179/NVN041945 – Harney Electric Coop

Parcel #	Legal Land Description	ROW Case File/ROW Holder (no particular order)
NV-2025-10-2201	**T. 39N., R. 36E., MOUNT DIABLO MERIDIAN** Sec. 01, lots 1,5,6, and 7; Sec. 12, lots 1-4; Sec. 13, lots 1-4. **T. 40N., R. 36E., MOUNT DIABLO MERIDIAN** Sec. 25, E1/2E1/2; Sec. 26, E1/2E1/2, W1/2W1/2; Sec. 36, W1/2W1/2.	NVNV105844620/NVN099853 – Harney Electric Coop NVNV105960282/NVN016624 – Harney Electric Coop NVNV106184446/NVN060463 – Oregon Idaho Utilities Inc NVNV106255005/NVN057556 – Humbolt County
NV-2025-10-2202	**T. 39N., R. 36E., MOUNT DIABLO MERIDIAN** Sec. 24, lots 1-4.	NVNV105844620/NVN099853 – Harney Electric Coop
NV-2025-10-2205	**T. 40N., R. 37E., MOUNT DIABLO MERIDIAN** Sec. 18, lot 4, N1/2NE1/4, SW1/4NE1/4, SE1/4NW1/4, E1/2SW1/4. Sec. 19, lot 1.	NVNV105844620/NVN099853 – Harney Electric Coop
NV-2025-10-2208	**T. 27N., R. 40E., MOUNT DIABLO MERIDIAN** Sec. 17, NE1/4, E1/2SW1/4, SW1/4SE1/4, NW1/4SE1/4; Sec. 19, SE1/4NE1/4, SE1/4; Sec. 30, lots 2-4, NW1/4NE1/4, E1/2NW1/4, NE1/4SW1/4.	NVNV106177145/NVN046266 – AT&T Lease Administration NVNV106259012/NVCC0021089 – Nevada Bell Telephone Company DBA AT&T Nevada
NV-2025-10-2225	**T. 22N., R. 24E., MOUNT DIABLO MERIDIAN** Sec.08, NE1/4NE1/4; Sec. 26, NE1/4NW1/4, NW1/4, W1/2NW1/4, NW1/4SW1/4.	NVNV106162079/NVN080531 – UNAVCO Inc. NVNV105960925/NVN024394 – Sierra Pacific Power Company NVNV105969326/NVN007639 – Sierra Pacific Power Company NVNV106080372/NVN0058689 – Southwest Gas Corporation NVNV106264435/NVN028999 – Southwest Gas Corporation
NV-2025-10-2228	**T. 20N., R. 24E., MOUNT DIABLO MERIDIAN** Sec. 02, lots 1-4, W1/2SW1/4NW1/4, NW1/4SW1/4. **T. 21N., R. 24E., MOUNT DIABLO MERIDIAN** Sec. 36, lot 1 and 4, NW1/4NE1/4, N1/2NW1/4, SE1/4SW1/4, SW1/4SE1/4.	NVNV105970023/NVN000661-Sierra Pacific Power Company NVNV106086129/NVN0030375 – Nevada Bell Telephone Company DBA AT&T Nevada NVNV106143626/NVN062841 – Washoe County

Parcel #	Legal Land Description	ROW Case File/ROW Holder (no particular order)
		NVNV106259012/NVCC0021089 – Nevada Bell Telephone Company DBA AT&T Nevada NVNV106185481/NVN0002551- Sierra Pacific Power Company
NV-2025-10-7035	**T. 37 1/2N., R. 43E., MOUNT DIABLO MERIDIAN** Sec. 32, lot 1. **T. 38N., R. 43E., MOUNT DIABLO MERIDIAN** Sec. 32, E1/2E1/2; Sec. 34, SE1/4SW1/4, S1/2SE1/4; Sec. 36, S1/2NE1/4, SE1/4NW1/4, N1/2SW1/4, NW1/4SE1/4.	NVNV106184446/NVN060463 – Oregon Idaho Utilities Inc. NVNV105960535/NVN047570 – Sierra Pacific Power Company NVNV106216410/NVN084650 – Ruby Pipeline LLC
NV-2025-10-7036	**T. 37 1/2N., R. 43E., MOUNT DIABLO MERIDIAN** Sec. 33, lots 1 and 4; Sec. 34, lots 2-4, SE1/4SW1/4. **T. 37N., R. 43E., MOUNT DIABLO MERIDIAN** Sec. 04, lots 1-3, SW1/4NW1/4; Sec. 06, SE1/4SW1/4, S1/2SE1/4; Sec. 16, N1/2NE1/4, SE1/4NE1/4, NE1/4SE1/4; Sec. 18, E1/2NE1/4	NVNV105960535/NVN047570 – Sierra Pacific Power Company NVNV106184446/NVN060463 – Oregon Idaho Utilities Inc. NVNV106216410/NVN084650 – Ruby Pipeline LLC

Appendix G: Range Management

The following parcels contain one or more existing grazing allotment(s) and/or range improvements. For more information regarding grazing and water rights, please contact the Winnemucca District Office. These entities must be contacted in the event that geothermal exploration, resource confirmation or development activities are proposed or authorized.

Table G-112. Grazing Allotments by parcel in the Analysis Area.

Parcel #	Allotment Name	Land Description
NV-2025-10-2228	Desert Queen	All lands in Parcel within the allotment
NV-2025-10-2225	Desert Queen	All lands in Parcel within the allotment
NV-2025-10-2192	Blue Wing/Seven Troughs	All lands in Parcel within the allotment
NV-2025-10-2200	Blue Wing/Seven Troughs	All lands in Parcel within the allotment
NV-2025-10-2192	Blue Wing/Seven Troughs	All lands in Parcel within the allotment
NV-2025-10-2152	Blue Wing/Seven Troughs	All lands in Parcel within the allotment
NV-2025-10-2153	Blue Wing/Seven Troughs	All lands in Parcel within the allotment
NV-2025-10-2176	Blue Wing/Seven Troughs	All lands in Parcel within the allotment
NV-2025-10-2149	Humboldt Valley	All lands in Parcel within the allotment
NV-2025-10-7039	Humboldt Valley	All lands in Parcel within the allotment
NV-2025-10-2150	Humboldt Valley	All lands in Parcel within the allotment
NV-2025-10-2187	Bottle Creek	All lands in Parcel within the allotment
NV-2025-10-2196	Bottle Creek	All lands in Parcel within the allotment
NV-2025-10-2188	Daveytown	All lands in Parcel within the allotment
NV-2025-10-2194	Daveytown	All lands in Parcel within the allotment Potential Impacts to Range Improvements
NV-2025-10-2195	Daveytown	All lands in Parcel within the allotment Potential Impacts to Range Improvement
NV-2025-10-2201	Daveytown	All lands in Parcel within the allotment Potential Impacts to Range Improvements
NV-2025-10-2202	Daveytown	T. 39 N., R. 36 E., Mount Diablo Sec. 24 LOTS 1 thru 4; Sec. 24 W1/2NE1/4, W1/2, W1/2SE1/4.
NV-2025-10-2202	Bloody Run	T. 39 N., R. 37 E., Mount Diablo Sec. 4 LOTS 1 thru 4; Sec. 4 S1/2NE1/4, S1/2NW1/4, S1/2; Sec. 5 LOTS 1 thru 4; Sec. 5 S1/2NE1/4, S1/2NW1/4, S1/2; Sec. 6 LOTS 1 thru 7;

		Sec. 6 S1/2NE1/4, SE1/4NW1/4, E1/2SW1/4, SE1/4; Sec. 7 LOTS 1 thru 4; Sec. 7 E1/2, E1/2NW1/4, E1/2SW1/4; Sec. 8 ALL.
NV-2025-10-2211	Gallagher Flat	All lands in Parcel within the allotment
NV-2025-10-2204	Bloody Run	All lands in Parcel within the allotment Potential Impacts to Range Improvements
NV-2025-10-2205	Long Canyon	All lands in Parcel within the allotment Potential Impacts to Range Improvements
NV-2025-10-2208	South Buffalo	All lands in Parcel within the allotment Potential Impacts to Range Improvements
NV-2025-10-2215	Buffalo	All lands in Parcel within the allotment
NV-2025-10-2143	Pumpernickel	All lands in Parcel within the allotment Potential Impacts to Range Improvements
NV-2025-10-7036	Jakes Creek	All lands in Parcel within the allotment Potential Impacts to Range Improvements
NV-2025-10-7035	Jakes Creek	All lands in Parcel within the allotment Potential Impacts to Range Improvements

Table G-2. Contact information for the allotment holders.

Grazing Allotment	**Allotment Holder**
Bloody Run	Crawford Cattle Attn: Ryan Crawford 146 Greyson Ranch Road Winnemucca, NV 89445 T Quarter Circle Ranches, Inc. 4405 T Quarter Circle Winnemucca, NV 89445
Blue Wing/Seven Troughs	C Punch Ranch Inc. Attn: Diane Irvin 1100 1/2 Fuss Road Lovelock, NV 89419 Dufurrena Land LLC 44115 Big Creek Road Winnemucca, NV 89445 Estill Ranches P.O. Box 320 Gerlach, NV 89412 John Espil Sheep Company 2889 Granville Drive Sparks, NV 89436

Bottle Creek	Attn: Kim Summers DeLong Ranches, Inc. 3274 Hackamore Way Winnemucca, NV 89445 DeLong Ranches, Inc 5115 Jungo Road Winnemucca, NV 89445 Mel Hummel 1165 South Bottle Creek Road Winnemucca, NV 89445 G&S Giordano Farms, Inc. 9880 N. Bottle Creek Road Winnemucca, NV 89445 Wilson Ranch Inc. P.O. Box 144 Orovada, NV 89425
Buffalo Valley	Goemmer L & L Buffalo Ranch LLC P.O. Box 517 Battle Mountain, NV 89820 Ellison Ranching Co. P.O. Box 2150 Elko, NV 89803
Daveytown	Home Ranch LLC P.O. Box 70 Orovada, NV 89425 Henry McErquiaga P.O. Box 300 Orovada, NV 89425
Desert Queen	Ceresola Estate DBA Ceresola Brothers 2600 Farm District Road Fernley, NV 89408 High Desert Cattle and Land LLC 580 Hanson Street Winnemucca, NV 89445
Gallagher Flat	Zimmerman Ranches Attn: Ron & Dorothy Zimmerman 4320 West Winnemucca Blvd. Winnemucca, NV 89445 Henry McErquiaga P.O. Box 300

	Orovada, NV 89425
Humboldt Valley	Humboldt Ranches Attn: Gene Heckman P.O. Box 1216 Winnemucca, NV 89446 T Quarter Circle Ranches Inc. 4405 T Quarter Circle Winnemucca, NV 89445 Thacker Properties Inc. P.O. Box 1476 Winnemucca, NV 89446 The Rose of Snowville Attn: Ken Crandall P.O. Box 676 Snowville, UT 84336
Jakes Creek	Squaw Valley Ranch, LLC P.O. Box 1770 Winnemucca, NV 89446 Kenneth Buckingham Trust c/o Dave Buckingham P.O. Box 10 Paradise Valley, NV 89426 Oro Vaca, Inc. 2489 W. Main Street Littleton, CO 80120
Long Canyon	Frey Ranches 14485 South Valley Road Winnemucca, NV 89445
Pumpernickel	Chester F. Dawson Exemption Trust Attn: Helen Dawson 3538 Mustang Street Las Vegas, NV 89108 Nevada Gold Mines LLC 1655 Mountain City Highway Elko, NV 89801 Rock Creek Cattle Company P.O. Box 99 Golconda, NV 89414 Roger Johnson P.O. Box 916 Winnemucca, NV 89446

South Buffalo	Goemmer L & L Buffalo Ranch LLC P.O. Box 517 Battle Mountain, NV 89820 Vesco Ranch P.O. Box 506 Winnemucca, NV 89445

Appendix H: Stipulations and Lease Notices

BLM Nevada Standard Lease Notices

NV-W-00-A-LN

These lease notices apply to **all lands in all parcels** and represent standard Best Management Practices (BMPs) for ensuring compliance with extant Federal Laws and resource protection.

T&E, Sensitive and Special Status Species

The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modification of a designated or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act as amended, 16 U.S.C. §1531 et seq., including completion of any required procedure for conference or consultation.

Migratory Birds

The Operator is responsible for compliance with provisions of the Migratory Bird Treaty Act (MBTA) by implementing measures to prevent take of migratory birds. Operators should be aware that any ground clearing or other disturbance (such as creating cross-country access to sites, drilling, and/or construction) during the migratory bird (including raptors) nesting season (March 1 -July 31) risks a violation of the MBTA. Disturbance to nesting migratory birds should be avoided by conducting surface disturbing activities outside the migratory bird nesting season.

If surface disturbing activities must be implemented during the nesting season, a preconstruction survey for nesting migratory birds should be performed by a qualified wildlife biologist during the breeding season (if work is not completed within a specified time frame, then additional surveys may be needed). If active nests are found, an appropriately-sized no surface disturbance buffer determined in coordination with the BLM biologist should be placed on the active nest until the nesting attempt has been completed. If no active nests are found, construction activities must occur within the survey validity time frame specified in the conditions of approval.

Cultural Resources and Tribal Consultation

This lease may be found to contain historic properties and/or resources protected under the National Historic Preservation Act (NHPA), American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, EO 13007, or other statutes and executive orders. The BLM will not approve any ground-disturbing activities that may affect any such properties or resources until it completes its obligations (e.g., State Historic Preservation Officer (SHPO) and tribal consultation) under applicable requirements of the NHPA and other authorities. The BLM may require modification to exploration or development proposals to protect such properties or deny the permit for any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized, or mitigated.

Fossils

This area has low to moderate potential for vertebrate paleontological resources, unless noted to have higher potential in a separate stipulation. This area may contain vertebrate paleontological resources. Inventory and/or on-site monitoring during disturbance or spot checking may be required of the operator. In the event that previously undiscovered paleontological resources are discovered in the performance of any surface disturbing activities, the item(s) or condition(s) will be left intact and immediately brought to

the attention of the authorized officer of the BLM. Operations within 250 feet of any such discovery will not be resumed until written authorization to proceed is issued by the Authorized Officer. The lessee will bear the cost of any required paleontological appraisals, surface collection of fossils, or salvage of any large conspicuous fossils of significant scientific interest discovered during the operations.

Water

The Operator is responsible for compliance with provisions of the Clean Water Act, Safe Drinking Water Act, and applicable State laws and regulations regarding protection of state water resources. Operators should contact Nevada Division of Water Resources and Nevada Division of Environmental Protection regarding necessary permits and compliance measures for any construction or other activities.

Mining Claims

This parcel may contain existing mining claims and/or mill sites located under the 1872 Mining Law. To the extent it does, the oil and gas lessee must conduct its operations, so far as reasonably practicable, to avoid damage to any known deposit of any mineral for which any mining claim on this parcel is located, and should not endanger or unreasonably or materially interfere with the mining claimant's operations, including any existing surface or underground improvements, workings, or facilities which may have been made for the purpose of mining operations. The provisions of the Multiple Mineral Development Act (30 U.S.C. 521 et seq.) shall apply on the leased lands.

Fire

The following precautionary measures should be taken to prevent wildland fires. In the event your operations should start a fire, you could be held liable for all suppression costs.

1. All vehicles should carry fire extinguishers and a minimum of 10 gallons of water.
2. Adequate fire-fighting equipment i.e. shovel, pulaski, extinguisher(s) and a minimum 10 gallons of water should be kept at the drill site(s).
3. Vehicle catalytic converters should be inspected often and cleaned of all brush and grass debris.
4. When conducting welding operations, they should be conducted in an area free from or mostly free from vegetation. A minimum of 10 gallons of water and a shovel should be on hand to extinguish any fires created from the sparks. Extra personnel should be at the welding site to watch for fires created by welding sparks.
5. Report wildland fires immediately to the BLM Central Nevada Interagency Dispatch Center (CNIDC) at (775) 623-3444. Helpful information to report is location (latitude and longitude if possible), what's burning, time started, who/what is near the fire and direction of fire spread.
6. When conducting operations during the months of May through September, the operator must contact the BLM Winnemucca District Office, Division of Fire and Aviation at (775) 635-4000 to find out about any fire restrictions in place for the area of operation and to advise this office of approximate beginning and ending dates for your activities.

Stipulation Numbering System

(Ex: NV-W-02-A-TL)

The numbering system used in the following table is based on the NVSO stipulation list and numbering system; stipulation numbers from the WDO RMP have also been included under their designated stipulations for reference. The stipulations included here are based on those in the WDO RMP, with some being separated into multiple stipulations in order to comply with the national sales database for geothermal leasing (NFLSS); other stipulations included here are from the Nevada State Office. Any WDO stipulations not explicitly included in this document that are pertinent to the proposed parcels still apply. The full list of WDO Fluid Mineral Lease Sale Stipulations can be found in the WDO RMP under Appendix L.

Table H-113. Stipulation Numbering System.

State	District	Resource	Resource #	Stip #	Constraint (LN, TL, CSU, NSO)
NV	Battle Mtn = **B** Carson City = **C** Elko = **E** Ely = **L** Southern NV = **S** Winnemucca = **W**	Standard Lease Notices	00	A	LN
		Sensitive Resources	01	AB	TL
		Threatened & Endangered Species and Special Status Species	01	AB	LN
		Threatened & Endangered Species – CSU	02	A	CSU
		Threatened & Endangered Species – NSO	03	D	NSO
		Special Status Species – CSU/TL	05	A	CSU/TL
		Pronghorn Antelope Seasonal Habitat	01	A	TL
		Pronghorn Antelope Calving Habitat	01	B	TL
		Mule Deer Seasonal Habitat	02	A	TL
		Elk Seasonal Habitat	03	A	TL
		Bighorn Sheep Year-Round Habitat	04	A	CSU
		Wild Horse and Burros Notice	05	A	LN
		Raptor Nests	06	B	TL
		Sites Eligible for National Register of Historic Places	07	B	NSO
		Trails	07	D	NSO
		Trails	07	D	CSU
		Fossils (PFCY-4) Notice	08	A	LN
		Fossils (PFCY-5) Stipulation	08	B	NSO
		Recreation	09	A	NSO
		Riparian Habitat	10	A	NSO
		Riparian Habitat Buffer	10	B	CSU
		100-Year Flood Plains	10	C	NSO
		Playas	10	D	NSO
		Municipal Wellhead Zones Notice	10	E	LN
		Soil Slopes > 15 - <50 percent	11	A	CSU
		Soil Slopes >50 percent	11	B	NSO

State	District	Resource	Resource #	Stip #	Constraint (LN, TL, CSU, NSO)
		Severe Soil Erosion	11	C	CSU
		NDOT Mineral Sites Notice	12	A	LN
		Saleable Minerals- Community Pit Notice	12	B	LN
		Existing Right of Way	13	A	LN
		Existing Water Well	15	B	LN
		Sage-Grouse Habitat – Lekking Habitat	16	B	TL
		Sage-Grouse Habitat – Winter Habitat	16	C	TL
		Sage-Grouse Habitat – Early Brood Rearing	16	D	TL
		Sage-Grouse Habitat – Brood Rearing	16	E	TL
		Sage-Grouse Habitat – Noise	16	F	CSU
		Sage-Grouse Habitat – Lek Buffer	16	G	CSU
		Sage-Grouse Habitat Notice – Design Features	16	H	LN
		Lands with Wilderness Characteristics	17	A	LN
		Range Management	18	A	LN

Note: The purpose of the following stipulations is to allow for adaptive management of resources as policy changes over time to protect species of concern and/or their designated habitats. These stipulations would apply if a resource were determined to be present in a given location either now or in the future.

- Sensitive Resources – NV-W-01-AB-TL
- Threatened & Endangered Species and Special Status Species – NV-W-01-AB-LN
- Threatened & Endangered Species – NV-W-02-A-CSU
- Threatened & Endangered Species – NV-W-03-D-NSO
- Special Status Species – NV-W-05-A-CSU/TL

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Sensitive Resources

(NV-W-01-AB-TL) *(NV-WD-SSS-1.2)*

Objective: Protection of Sensitive Resources

Stipulation: Timing Limitation

Species	Locations	Distance of Spatial Buffer Zone/ Type of Restriction
Mule Deer	Protect Mule Deer from disturbance during fawning	NSO within a ¼ mile radius of designated fawning habitat May 15-June 15
Mule Deer	Protect Migration Corridors	Varies by location NSO within a ¼ mile of delineated corridors Nov 15-April 30
Mule Deer	Crucial Winter Habitat	NSO within crucial mule deer winter habitat Nov 15-April 30
Pronghorn Antelope	Protect Fawning areas	NSO within a ¼ mile radius of designated fawning areas
Pronghorn Antelope	Crucial Winter Habitat	NSO from Nov 15-April 30
Bighorn Sheep	Protect from disturbance during lambing	NSO within a ¼ radius of designated lambing habitat Feb 1-June 30

Where standard lease terms and permit-level decisions are deemed insufficient to protect sensitive resources, but where an NSO is deemed overly restrictive, the BLM would apply seasonal or time limited stipulations to leases as appropriate by wildlife species to protect habitat, provide continuity of migration corridors, and protect seasonal use areas.

Exception: The Authorized Officer may grant an exception if an environmental review determines that the action, as proposed or otherwise restricted, does not adversely affect the resource being protected by the restriction. An exception may also be granted if the proponent, BLM, and other affected interests negotiate mitigation that would satisfactorily offset the anticipated negative impacts.

Modification: The Authorized Officer may modify the size and shape of the restricted area if an environmental analysis indicates the actual suitability of the land for the resource in question differs from that in the otherwise applicable restriction. Similarly, timeframes may be modified based on studies documenting local periods of actual resource use that differ from those in the applicable restriction. Modifications may be made to allow for an increasing level of environmental protection when changing circumstances warrant stronger measures to meet goals, objectives, and outcomes identified in this RMP and any future amendments (see IM-2010-117).

Waiver: It is unlikely that this stipulation will be waived once it has been applied.

Parcel # **Legal Land Description**

All lands in all parcels.

Threatened & Endangered and Special Status Species

(NV-W-01-AB-LN) *(NV-WD-SSS-01)*

Objective: Allowance for Future Designations of Threatened, Endangered, or other Special Status Species.

Stipulation: Lease Notice The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. All plants and any member of the animal kingdom, including without limitation any mammal, fish, bird, amphibian, reptile, mollusk, crustacean, arthropod, or other invertebrates, (BLM Manual Rel. 6840, IM 2009-039), designated as endangered, threatened, or other special status will be considered in each project proposal. BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed, threatened, endangered, or other special status species or result in the destruction or adverse modifications of a designated or proposed critical habitat. No surface disturbance would be authorized before a special status species inventory of the project area is completed by a qualified biologist or botanist. In the event a special status species inventory cannot be conducted, a determination will be made by a BLM biologist or botanist as to the likelihood of suitable habitat for the special status species in the project area and if such habitat is likely, it will be assumed the special status species is present as well. BLM will not approve any ground disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act, 16 U.S.C. 1531, as amended, including completion of any required procedure for conference or consultation.

Parcel #	**Legal Land Description**
All lands in all parcels.	

Threatened & Endangered Species – Controlled Surface Use

(NW-W-02-A-CSU) *(NV-WD-SSS-02)*

Objective: Controlled Surface Use for Designated or Proposed Critical Habitat for Listed Species

Stipulation: Controlled Surface Use (CSU) Controlled surface use of designated or proposed critical habitat for listed species under the Endangered Species Act of 1973 (as amended) would be applied if fluid mineral activities would be likely to adversely modify the habitat for the short term. Controlled surface use will be applied within the designated habitat to protect the values and functions of these areas. Specific measures required will be based on the nature, extent, and value of the area potentially affected.

Exception: The Authorized Officer may grant an exception if an environmental review determines that the action, as proposed or otherwise restricted, does not adversely affect the species being protected by the restriction. An exception may also be granted if the proponent, BLM, and other affected interests (e.g. NDOW) negotiate mitigation that would satisfactorily offset the anticipated negative impacts. Actions designed to enhance the long-term utility or availability of the habitat to the protected species may be exempted from the otherwise applicable restriction.

Modification: The Authorized Officer may modify the size and shape of the restricted area if an environmental analysis indicates the actual suitability of the land for the species in question differs from that identified in the stipulation. Modifications may be made to allow for an increasing level of environmental protection when changing circumstances warrant stronger measures to meet goals, objectives, and outcomes identified in this RMP and any future amendments (see IM-2010-117).

Waiver: The restriction may be waived if it is determined that the described lands do not contain the subject species or are incapable of serving the requirements of the species and therefore no longer warrant consideration as a component necessary for protection of that species. In certain instances, this determination would come after consulting with other managing agencies or interested publics.

Parcel #	**Legal Land Description**
All lands in all parcels.	

Threatened & Endangered Species - No Surface Occupancy (NSO)

(#NV-W-03-D-NSO) *(NV-WD-SSS-03)*

Objective: Protection of Designated or Proposed Critical Habitat for Listed Species

Stipulation: No Surface Occupancy (NSO) No surface occupancy of designated or proposed critical habitat for listed species under the Endangered Species Act of 1973 (as amended) would be applied if fluid mineral activities would be likely to adversely modify the habitat for the long term. For listed or proposed species without designated habitat, no surface occupancy would be implemented to the extent necessary to avoid jeopardy.

Exception: The Authorized Officer may grant an exception if an environmental review determines that the action, as proposed or otherwise restricted, does not adversely affect the species being protected by the restriction. An exception may also be granted if the proponent, BLM, and other affected interests (e.g. NDOW) negotiate mitigation that would satisfactorily offset the anticipated negative impacts. Actions designed to enhance the long-term utility or availability of the habitat to the protected species may be exempted from the otherwise applicable restriction.

Modification: The Authorized Officer may modify the size and shape of the restricted area if an environmental analysis indicates the actual suitability of the land for the species in question differs from that identified in the stipulation. Modifications may be made to allow for an increasing level of environmental protection when changing circumstances warrant stronger measures to meet goals, objectives, and outcomes identified in this RMP and any future amendments (see IM-2010-117).

Waiver: The restriction may be waived if it is determined that the described lands do not contain the subject species or are incapable of serving the requirements of the species and therefore no longer warrant consideration as a component necessary for protection of that species. In certain instances, this determination would come after consulting with other managing agencies or interested publics.

Parcel #	**Legal Land Description**
All lands in all parcels.	

Special Status Species – Controlled Surface Use/Timing Limitation

(NV-W-05-A-CSU/TL)

(NV-WD-SSS-05)

Note: This stipulation is combined with a Timing Limitation (NV-WD-SSS-05) below. Full number for both the CSU and TL is NV-W-05-A-CSU/TL.

Objective: Protection of BLM-Designated Sensitive Species

Stipulation: Controlled Surface Use (CSU) For BLM-designated sensitive species (e.g. sage-grouse and others), a lease stipulation for controlled surface use, would be applied to defined avoidance areas where fluid mineral activities would be likely to adversely impact the species or modify the habitat and other existing measures are inadequate to meet agency management objectives. Controlled surface use will be applied within the designated habitat to protect the values and functions of these areas. Specific measures required will be based on the nature, extent, and value of the area potentially affected.

Exception: The Authorized Officer may grant an exception if an environmental review determines that the action, as proposed or otherwise restricted, does not adversely affect the species being protected by the restriction. An exception may also be granted if the proponent, BLM, and other affected interests (e.g. NDOW) negotiate mitigation that would satisfactorily offset the anticipated negative impacts. Actions designed to enhance the long-term utility or availability of the habitat to the protected species may be exempted from the otherwise applicable restriction.

Modification: The Authorized Officer may modify the size and shape of the restricted area if an environmental analysis indicates the actual suitability of the land for the species in question differs from that identified in the stipulation. Modifications may be made to allow for an increasing level of environmental protection when changing circumstances warrant stronger measures to meet goals, objectives, and outcomes identified in this RMP and any future amendments (see IM-2010-117).

Waiver: The restriction may be waived if it is determined that the described lands do not contain the subject species or are incapable of serving the requirements of the species and therefore no longer warrant consideration as a component necessary for protection of that species. In certain instances, this determination would come after consulting with other managing agencies or interested parties.

Parcel #	**Legal Land Description**
All lands in all parcels.	

Special Status Species – Controlled Surface Use/Timing Limitation

(NV-W-05-A-CSU/TL)

(NV-WD-SSS-06)

Note: This stipulation is combined with Controlled Surface Use (NV-WD-SSS-06) stipulation, see previous. Full number for both the CSU and TL is NV-W-05-A-CSU/TL.

Objective: Protection of Eagles and Raptors – Nesting Habitat

Stipulation: Timing Limitation (TL) Bald or Golden eagles or other raptors or their habitat may be present in the lease area or within the vicinity of the lease area. These species will be managed in accordance with FLPMA, the Bald and Golden Eagle Protection Act (BGEPA) and the Migratory Bird Treaty Act (MBTA). The following restrictions apply.

Species	**Locations**	**Distance of Spatial Buffer Zone/ Type of Restriction**	**Restriction Dates**
Bald eagle	Nests Winter roosts	¼ mile non-los and ½ mile los and 1 mile blasting ½ mile	Jan 1-Aug 31 Dec 1-April 1
Northern goshawk	Nests (occupied) Previous Years Nest	¼ mile, ½ mile los	Feb 1 – Aug 31
Golden eagle	Nests	¼ mile non-los, ½ mile los	Feb 1-Aug 31
Ferruginous hawk	Nests	¼ mile non-los, ½ mile	Mar 1-Aug 31
Red-tailed hawk	Nests	¼ mile	Mar 1- Aug 31
Swainson's hawk	Nests	¼ mile nonlos, ½ mile los	Mar 1-Aug 31
Prairie falcon	Nests	¼ mile	Mar 1-Aug 31
Burrowing owl	Nests	¼ mile – Permanent Disturbance or Occupancy 260 feet Temporary Disturbance	Mar 1-Aug 31
Flammulated owl	Nests	¼ mile	April 1 – Sept 30.

Exception: The authorized Officer may grant an exception if an environmental review determines that the action, as proposed or otherwise restricted, does not adversely affect the species being protected by the restriction. An exception may also be granted if the proponent, BLM, and other affected interests (e.g. NDOW) negotiate mitigation that would satisfactorily offset the anticipated negative impacts. Actions designed to enhance the long-term utility or availability of the habitat to the protected species may be exempted from the otherwise applicable restriction.

Modification: The Authorized Officer may modify the size and shape of the restricted area if an environmental analysis indicates the actual suitability of the land for the species in question differs from that identified in the stipulation. Modifications may be made to allow for an increasing level of environmental protection when changing circumstances warrant stronger measures to meet goals, objectives, and outcomes identified in this RMP and any future amendments (see IM-2010-117).

Waiver: The restriction may be waived if it is determined that the described lands do not contain the subject species and therefore no longer warrant consideration as a component necessary for protection of

that species. In certain instances, this determination would come after consulting with other managing agencies or interested publics.

Parcel #	Legal Land Description
All lands in all parcels.	

Raptor Nest Sites

(NV-W-06-B-TL)

Objective [Purpose]: To protect raptor nesting activities necessary to maintaining the critical life stages of existing raptor populations.

Stipulation: Timing Limitation. No surface activity from January 31 through August 31 within 0.5 miles of a raptor nest site which has been active within the past five years.

Exception: The Authorized Officer may grant an exception if an environmental review determines that the action, as proposed or otherwise restricted, does not adversely affect raptor nest sites being protected by the restriction. An exception may also be granted if the proponent, BLM, and other affected interests, in consultation with Nevada Department of Wildlife, negotiate mitigation that would satisfactorily offset the anticipated impacts. An exception may be granted for actions designed to enhance the long-term utility or availability of the habitat.

Modification: The boundaries of the stipulated area may be modified if the authorized officer, in consultation with Nevada Department of Wildlife, determines that portions of the area can be occupied without adversely affecting raptor nesting activity. The dates for the timing restriction may be modified if new information indicates the dates are not valid for the leasehold.

Waiver: The stipulation may be waived if the authorized officer, in consultation with Nevada Department of Wildlife determines that the entire leasehold no longer contains raptor nest sites.

Parcel #	**Legal Land Description**
All lands in all parcels.	

Pronghorn Antelope Seasonal Habitat

(#NV-W-01-A-TL)

Objective: To protect Pronghorn Antelope crucial winter habitat necessary to maintain the critical life stages of Pronghorn wildlife populations.

Stipulation: Timing Limitation (TL) -No surface activity within designated Pronghorn Antelope crucial winter habitat from November 15 through April 30.

Exception: The Authorized Officer may grant an exception if an environmental review determines that the action, as proposed or otherwise restricted, does not adversely affect the Pronghorn Antelope and its habitat. An exception may also be granted if the proponent, BLM, and other affected interests negotiate mitigation that would satisfactorily offset the anticipated impact to Pronghorn Antelope and its habitat. An exception may be granted for actions designed to enhance the long-term utility or availability of the habitat.

Modification: The boundaries of the stipulated area may be modified if the authorized officer, in consultation with Nevada Department of Wildlife, determines that portions of the area no longer contain the crucial winter Pronghorn Antelope habitat or that the proposed action would not affect the species and habitat. The dates for the timing restriction may also be modified by the Authorized Officer if new information indicates the dates are not valid for the leasehold.

Waiver: The restriction may be waived by the Authorized Officer if it is determined that the described lands do not contain suitable pronghorn habitat or are otherwise incapable of serving the requirements of for the species and therefore no longer warrant consideration as a component necessary for their protection.

Parcel #	**Legal Land Description**
NV-2025-10-2149	**T. 34 N., R. 32 E.,** Sec. 02 L19, L20 **T. 34 N., R. 33 E.,** Sec. 06 L1 – L7 Sec. 06 SE1/2NE, SENW, SE1/4, E1/2SW Sec. 08 ALL **T. 35 N., R. 33 E.,** Sec. 32 NE1/4, NENW, S1/2NW, S1/2
NV-2025-10-2150	**T. 35 N., R. 33 E.,** Sec. 22 L1, L2, L6, L7, L8 Sec. 22 SENE Sec. 24 L1 – L5 Sec. 26 N1/2, SW1/4 Sec. 34 ALL
NV-2025-10-2152	All Lands in Parcel
NV-2025-10-2153	All Lands in Parcel
NV-2025-10-2176	All Lands in Parcel
NV-2025-10-7039	All Lands in Parcel

Pronghorn Antelope Calving Habitat

(#NV-W-01-B-TL)

Objective: To protect Pronghorn Antelope Calving habitat necessary to maintain the critical life stages of Pronghorn wildlife populations.

Stipulation: **Timing Limitation (TL)** No surface activity within a ¼ mile of designated Pronghorn Antelope calving habitat from April 1 through June 31.

Exception: The Authorized Officer may grant an exception if an environmental review determines that the action, as proposed or otherwise restricted, does not adversely affect the Pronghorn Antelope Calving Areas. An exception may also be granted if the proponent, BLM, and other affected interests negotiate mitigation that would satisfactorily offset the anticipated impacts to Pronghorn Antelope Calving Areas. An exception may be granted for actions designed to enhance the long-term utility or availability of the habitat.

Modification: The boundaries of the stipulated area may be modified if the authorized officer, in consultation with Nevada Department of Wildlife, determines that portions of the area no longer contain Pronghorn Antelope Calving habitat or that the proposed action would not affect the species and habitat. The dates for the timing restriction may also be modified by the Authorized Officer if new information indicates the dates are not valid for the leasehold.

Waiver: The restriction may be waived by the Authorized Officer if it is determined that the described lands do not contain suitable Pronghorn Calving habitat or are otherwise incapable of serving the requirements of for the species and therefore no longer warrant consideration as a component necessary for their protection.

Parcel #	**Legal Land Description**
NV-2025-10-2150	**T. 35 N., R. 33 E.,** Sec. 24 L3 – L7 Sec. 26 NE1/4, E1/2NW, SWNW, S1/2 Sec. 34 E1/2SE

Mule Deer Seasonal Habitat

(#NV-W-02-A-TL)

Objective: To protect Mule Deer crucial winter habitat necessary to maintaining the critical life stages of Mule Deer wildlife populations.

Stipulation: **Timing Limitation (TL)** No surface activity within designated Mule Deer crucial winter habitat from November 15 through April 30.

Exception: The Authorized Officer may grant an exception if an environmental review determines that the action, as proposed or otherwise restricted, does not adversely affect the Mule Deer and its habitat. An exception may also be granted if the proponent, BLM, and other affected interests negotiate mitigation that would satisfactorily offset the anticipated impacts to the Mule Deer and its habitat. An exception may be granted for actions designed to enhance the long-term utility or availability of the habitat.

Modification: The boundaries of the stipulated area may be modified if the authorized officer, in consultation with Nevada Department of Wildlife, determines that portions of the area no longer contain the crucial winter Mule Deer habitat or that the proposed action would not affect the species and habitat. The dates for the timing restriction may also be modified by the Authorized Officer if new information indicates the dates are not valid for the leasehold.

Waiver: The restriction may be waived by the Authorized Officer if it is determined that the described lands do not contain suitable Mule Deer habitat or are otherwise incapable of serving the requirements of for the species and therefore no longer warrant consideration as a component necessary for their protection.

Parcel #	**Legal Land Description**
NV-2025-10-2143	**T. 34 N., R. 41 E.,** Sec. 06 L1 – L6 Sec. 06 SE1/4, E1/2SW Sec. 08 N1/2, NESW, SW1/4 Sec. 18 L1 – L4 Sec. 18 N1/2NE, SWNE, E1/2NW, NESW
NV-2025-10-2150	**T. 35 N., R. 33 E.,** Sec. 26 SENE, NESE, SWSE
NV-2025-10-2208	**T. 27 N., R. 39 E.,** Sec. 13 PROT ALL

Elk Seasonal Habitat

(#NV-W-03-A-TL)

Objective: To protect Elk crucial winter habitat necessary to maintain the critical life stages of Elk wildlife populations.

Stipulation: **Timing Limitation (TL)** No surface activity within Elk crucial winter habitat from November 15 through April 30.

Exception: The Authorized Officer may grant an exception if an environmental review determines that the action, as proposed or otherwise restricted, does not adversely affect the Elk Seasonal habitat. An exception may also be granted if the proponent, BLM, and other affected interests negotiate mitigation that would satisfactorily offset the anticipated impacts to Elk and its habitat. An exception may be granted for actions designed to enhance the long-term utility or availability of the habitat.

Modification: The boundaries of the stipulated area may be modified if the authorized officer, in consultation with Nevada Department of Wildlife, determines that portions of the area no longer contain the crucial winter Elk habitat or that the proposed action would not affect the species and habitat. The dates for the timing restriction may also be modified by the Authorized Officer if new information indicates the dates are not valid for the leasehold.

Waiver: The restriction may be waived by the Authorized Officer if it is determined that the described lands do not contain suitable Elk habitat or are otherwise incapable of serving the requirements of for the species and therefore no longer warrant consideration as a component necessary for their protection.

Parcel #	**Legal Land Description**
NV-2025-10-7035	**T. 38 N., R. 43 E.,** Sec. 26 N1/2, N1/2SE, N1/2SW Sec. 28 ALL Sec. 32 E1/2NE

Bighorn Sheep Year-round Habitat

(#NV-W-04-A-CSU)

Objective: To protect bighorn sheep year-round occupied habitat necessary to maintaining the critical life stages of bighorn sheep populations.

Stipulation: **Controlled Surface Use (CSU)** Applies to lands within bighorn year-round occupied habitat. Surface occupancy or use is subject to the following special operating constraint:

Exception: The Authorized Officer may grant an exception if an environmental review determines that the action, as proposed or otherwise restricted, does not adversely affect the Bighorn Sheep and their habitat. An exception may also be granted if the proponent, BLM, and other affected interests negotiate mitigation that would satisfactorily offset the anticipated impacts. An exception may be granted for actions designed to enhance the long-term utility or availability of the habitat.

Modification: The boundaries of the stipulated area may be modified if the authorized officer, in consultation with Nevada Department of Wildlife, determines that portions of the area no longer contain the habitat or that the proposed action would not affect the species and habitat. The dates for the timing restriction may also be modified if new information indicates the dates are not valid for the leasehold.

Waiver: The restriction may be waived if it is determined that the described lands do not contain suitable habitat or are otherwise incapable of serving the requirements of for the species and therefore no longer warrant consideration as a component necessary for their protection. In certain instances, this determination would come after consulting with other managing agencies or interested publics.

Parcel #	**Legal Land Description**
NV-2025-10-2208	**T. 27 N., R. 39 E.,** Sec. 13 PROT ALL

Lease Notice - Wild Horse and Burro

(#NV-W-05-A-LN)

Wild horse or burro herds are known to use some or all of the proposed lease areas. If proposed fluid mineral activities are to occur in a herd management area (HMA) or a Herd Area (HA) the BLM Authorized Officer may identify mitigation measures necessary for reducing adverse impacts to wild horses and/or burros. These measures would be designed in a manner that does not hinder the wild and free-roaming behavior of the horses and burros and may include, but are not limited to, providing alternative water sources for horses of equal quality and quantity as well as fencing to prevent access to project area. Additional specific measures to protect horses and burros may be developed during review of proposals.

Parcel #	**Legal Land Description**
NV-2025-10-2152	**T. 29 N., R. 29 E.,** Sec. 07 L1 – L4 Sec. 07 E1/2, E1/2NW, E1/2SW Sec. 18 L1 – L4 Sec. 18 E1/2, E1/2NW, E1/2SW
NV-2025-10-2153	**T. 29 N., R. 29 E.,** Sec. 08 N1/2NW, SWNW, W1/2SW Sec. 17 W1/2NW
NV-2025-10-2176	**T. 29 N., R. 29 E.,** Sec. 19 W1/2

Sites Eligible for National Register of Historic Places

(#NV-W-07-B-NSO)

Objective: To protect National Register-eligible Properties and Districts setting and visual integrity critical to their eligibility.

Stipulation: **No Surface Occupancy (NSO)** within National Register-eligible Properties and Districts. Prior to surface disturbance, a survey would be required to confirm the Area of Potential Effect of National Register-eligible Properties (NRHP) and Districts.

Exception: The Authorized Officer may grant an exception if the BLM determines, in consultation with the Nevada SHPO (if required by the Statewide Protocol Agreement), that the action, as proposed or otherwise restricted, will not adversely affect National Register-listed Properties and Districts, National Historic Landmarks, and Traditional Cultural Properties listed or eligible for the NRHP. An exception may also be granted if BLM, in consultation with the Nevada State Historic Preservation Office (SHPO), negotiates mitigation that would satisfactorily take into account any anticipated adverse effects. The authorized officer may also grant an exception if the BLM determines, in consultation with Tribes, interested parties, and the Nevada SHPO (if required by the Statewide Protocol Agreement) that the action, as proposed or otherwise restricted, does not adversely affect Traditional Cultural Properties (TCP) listed on, or eligible for the NRHP.

Modification: The Authorized Officer may modify the size and shape of the NSO restricted area if the BLM determines, in consultation with the Nevada SHPO, interested parties, and/or Tribes, that the Area of Potential Effect to the National Register-listed Properties and Districts, National Historic Landmarks, and TCPs listed or eligible on the NRHP may be modified without causing adverse effects from those described in the original stipulation.

Waiver: NSO restrictions may be waived if it is determined that the described lands do not, in fact, contain sites listed on the NRHP or TCPs listed or eligible for the NRHP, or if the described lands within extended boundaries are determined to be not necessary to protect listed sites or listed or eligible TCPs where the setting and visual integrity are critical to their eligibility.

Parcel #	**Legal Land Description**
NV-2025-10-2152	**T. 29 N., R. 29 E.,** Sec. 07 L1
NV-2025-10-2187	**T. 39 N., R. 34 E.,** Sec. 01 PROT ALL Sec. 12 PROT ALL
NV-2025-10-2188	**T. 41 N., R. 35 E.,** Sec. 28 NWNE, NENE
NV-2025-10-2194	**T. 40 N., R. 35 E.,** Sec. 08 E1/2SE, NWSE Sec. 09 NW, NWNE, SWSW Sec. 17 E1/2NE, SWNE, NWSE, E1/2SE, SESW, W1/2SW Sec. 18 L2 Sec. 18 SWNE, SESE

NV-2025-10-2195	**T. 40 N., R. 35 E.,** Sec. 20 NWNE Sec. 29 N1/2SE, E1/2NW Sec. 31 SESE Sec. 32 NESW
NV-2025-10-2196	**T. 40 N., R. 34 E.,** Sec. 13 PROT ALL
NV-2025-10-2211	**T. 41 N., R. 36 E.,** Sec. 24 SWSW
NV-2025-10-7036	**T. 37 N., R. 43 E.,** Sec. 04 L1 Sec. 06 W1/2SE **T. 37.5 N., R. 43 E.,** Sec. 34 L3, L4

Trails

(#NV-W-07-D-NSO)

Objective: To protect the National Scenic and Historic Trails and Trails under Study or Recommended as Suitable for Congressional Designation, and National Trail Management Corridor resources, qualities, values, and associated settings.

Stipulation: **No surface occupancy (NSO)** will be applied on congressionally designated historic trails and additional lands bordering the trails to the extent necessary to protect values where the integrity of setting is critical to their designation or eligibility. This applies specifically within a mile of the NHT. To accomplish this, any quarter quarter-quarter section (10-acre parcel) within or intersected by the NHT or the one-mile buffer line would be subject to NSO.

Exception: The Authorized Officer may grant an exception if, through the National Historic Preservation Act (NHPA) requirements, it is determined that the action, as proposed or otherwise restricted, does not adversely affect the NHT and/or setting. An exception may also be granted if mitigations satisfactorily off-set the anticipated impacts.

Modification: The Authorized Officer may modify the size and shape of the restricted area if the NHPA and Management of National Scenic and Historic Trails and Trails under Study or Recommended as Suitable for Congressional Designation Manual 6280 requirements indicate the Proposed Action does not adversely impact the resource.

Waiver: The restriction may be waived if the NHPA and Management of National Scenic and Historic Trails under Study or Recommended as Suitable for Congressional Designation Manual 6280 requirements determine that the described lands are not contributing elements to the resource. This determination can only come after consultation with the National Park Service, Nevada State Historic Preservation Office and other interested publics.

Parcel #	**Legal Land Descriptions**
NV-2025-10-2228	**T. 20 N., R. 24 E.,** Sec. 02 L1 – L4 Sec. 02 S1/2NE, S1/2NW, N1/2SW, N1/2SE Sec. 36 L4 Sec. 36 SWSE, S1/2SW
NV-2025-10-7039	**T. 33 N., R. 33 E.,** Sec. 22 L19 Sec. 23 L8

Trails

(#NV-W-07-D-CSU)

Objective: To protect the setting of National Scenic and Historic Trails and Trails under Study or Recommended as Suitable for Congressional Designation, and National Trail Management Corridor resources.

Stipulation: **Controlled Surface Use (CSU)** will be applied within the viewshed of National Scenic and Historic Trails and Trails under Study or Recommended as Suitable for Congressional Designation and within National Trail Management Corridors. New development within 6 miles of the trail will be managed to Visual Resource Management Class II objectives.

Exception: The Authorized Officer may grant an exception if, through the National Historic Preservation Act (NHPA) and Management of National Scenic and Historic Trails and Trails Under Study or Recommended as Suitable for Congressional Designation Manual 6280 requirements, it is determined that the action, as proposed or otherwise restricted, does not adversely affect the resource. An exception may be granted for actions designed to enhance the long-term utility or availability of the trail.

Modification: The Authorized Officer may modify the size and shape of the restricted area if the NHPA and Management of National Scenic and Historic Trails and Trails under Study or Recommended as Suitable for Congressional Designation Manual 6280 requirements indicate the Proposed Action does not adversely impact the resource, for example topography blocks view of the proposed development from the trail.

Waiver: The restriction may be waived if the NHPA and Management of National Scenic and Historic Trails and Trails under Study or Recommended as Suitable for Congressional Designation Manual 6280 requirements determine that the described lands are not contributing elements to the resource. This determination can only come after consultation with the National Park Service, Nevada State Historic Preservation Office and other interested publics.

Parcel #	**Legal Land Description**
NV-2025-10-2228	**All Lands in Parcel**
NV-2025-10-7039	**All Lands in Parcel**

Lease Notice - Fossils (PFYC-4)

(#NV-W-08-C-LN)

This area has high and very high potential for paleontological resources. This land is underlain by geologic units that have been documented to contain a high occurrence of fossils, which may consist of scientifically significant paleontological resources protected by Public Law 111-11, Paleontological Resources Preservation Act. A field survey by a qualified paleontologist, and at the lessee's expense, will be required prior to surface disturbing activities. If significant paleontological resources of scientific or educational importance are discovered, they will require avoidance or data recovery prior to their disturbance. On-site monitoring may be necessary during construction activities.

Parcel #	**Legal Land Description**
NV-2025-10-2149	**T. 34 N., R. 32 E.,** Sec. 02 L13, L19, L20 **T. 34 N., R. 33 E.,** Sec. 06 L7 Sec. 06 S1/2SE
NV-2025-10-2150	**T. 35 N., R. 33 E.,** Sec. 24 L4 – L7 Sec. 26 NE1/4, SW1/4, SENW, W1/2SE, NESE
NV-2025-10-2201	**T. 40 N., R. 36 E.,** Sec. 26 W1/2NW
NV-2025-10-7039	**T. 33 N., R. 33 E.,** Sec. 23 L3, L4, L7, L8

Fossils (PFYC-5)

(#NV-W-08-D-NSO)

Objective: Protection of Potential Fossil Yield Classification (PFYC) 5: Very High Potential

Stipulation: **No surface occupancy (NSO)** within the limits of identified paleontological resource occurrences classified by WO-IM-2008-009 (Potential Fossil Yield Classification [PFYC] System for Paleontological Resources on Public Lands) as PFYC 5 (being of scientific or educational interest). This area has very high potential for paleontological resources or is known to contain paleontological resources of scientific or educational importance, and protected by Public Law 111-11, Paleontological Resources Preservation Act. Any quarter-quarter-quarter section (10-acre parcel) within or intersected by the limits of the site are subject to NSO.

Exception: The Authorized Officer may grant an exception if an environmental review determines that the action, as proposed or otherwise restricted, does not affect the resource. An exception may also be granted if the proponent, BLM, and other affected interests (e.g. NDOW) negotiate mitigation that would satisfactorily offset the anticipated negative impacts. An exception may be granted for actions designed to enhance the long-term utility or availability of the fossil resource.

Modification: The Authorized Officer may modify the size and shape of the restricted area if an environmental analysis indicates the actual suitability of the land for the paleontological resource in question differs from that in the otherwise applicable restriction. Modifications may be made to allow for an increasing level of environmental protection when changing circumstances warrant stronger measures.

Waiver: The restriction may be waived if it is determined that the described lands do not contain the subject resource or are incapable of serving the requirements of the resource and therefore no longer warrant consideration as a component necessary for protection of the resource.

Parcel #	**Legal Land Description**
NV-2025-10-2208	**T. 27 N., R. 40 E.,** Sec. 17 N1/2NW Sec. 18 L1 Sec. 18 E1/2NW, NE1/4, SWNW, N1/2SE

Recreation

(#NV-W-09-A-NSO)

Objective: Protection of Recreation Management Areas.

Stipulation: **No Surface Occupancy (NSO)** on developed recreational facilities/sites, Special Recreation Management Areas, and areas with significant recreational use with which fluid mineral development is deemed incompatible.

Exception: The Authorized Officer may grant an exception if an environmental review determines that the action, as proposed or otherwise restricted, does not affect the resource. An exception may also be granted if the proponent, BLM, and other affected interests (e.g. NDOW) negotiate mitigation that would satisfactorily offset the anticipated negative impacts. An exception may be granted for actions designed to enhance the long-term utility or availability of the recreational resource.

Modification: The Authorized Officer may modify the size and shape of the restricted area if an environmental analysis indicates the actual suitability of the land for the resource in question differs from that in the otherwise applicable restriction. Modifications may be made to allow for an increasing level of environmental protection when changing circumstances warrant stronger measures.

Waiver: The restriction may be waived if it is determined that the described lands do not contain the subject resource or are incapable of serving the requirements of the resource and therefore no longer warrant consideration as a component necessary for protection of the resource. In certain instances, this determination would come after consulting with other managing agencies or interested publics.

Parcel #	**Legal Land Description**
NV-2025-10-2152	**T. 29 N., R. 29 E.,** Sec. 07 ALL Sec. 18 ALL
NV-2025-10-2153	**T. 29 N., R. 29 E.,** Sec. 08 ALL Sec. 17 NW1/4
NV-2025-10-2176	**T. 29 N., R. 29 E.,** Sec. 19 L1 – L6, E1/2SW
NV-2025-10-2200	**T. 27 N., R. 27 E.,** Sec. 29 ALL Sec. 30 ALL Sec. 31 ALL Sec. 32 ALL
NV-2025-10-2200	**T. 26 N., R. 27 E.,** Sec. 04 ALL Sec. 05 L3 – L4, S1/2NW Sec. 06 ALL Sec. 07 L1 – L2, E1/2NW

Riparian Habitat

(#NV-W-10-A-NSO)

Objective: To protect the values and functions of riparian and wetland areas based on the nature, extent, and value of the area potentially affected.

Stipulation: **No Surface Occupancy (NSO)** on and within riparian-wetland vegetated areas to protect the values and functions of these areas.

Exception: The Authorized Officer may grant an exception if an environmental review determines that the action, as proposed or otherwise restricted, does not affect the resource. An exception may also be granted if the proponent, BLM, and other affected interests (e.g. NDOW) negotiate mitigation that would satisfactorily offset the anticipated negative impacts. An exception may be granted for actions designed to enhance the long-term utility or availability of the riparian habitat.

Modification: The Authorized Officer may modify the size and shape of the restricted area if an environmental analysis indicates the actual suitability of the land for the resource differs from that in the otherwise applicable restriction.

Waiver: The restriction may be waived if it is determined that the described lands do not contain the subject resource or are incapable of serving the requirements of the resource and therefore no longer warrant consideration as a component necessary for protection of the resource.

Parcel #	**Legal Land Description**
NV-2025-10-2149	**T. 34 N., R. 32 E.,** Sec. 02 L5 - L9, L11 - L18 **T. 34 N., R. 33 E.,** Sec. 06 L3, L4 Sec. 08 NWSW, NENE, SENE **T. 35 N., R. 33 E.,** Sec. 32 NW1/4, W1/2NE, NENE
NV-2025-10-2150	**T.35 N., R. 33 E.,** Sec. 22 L1, L2, L8 Sec. 22 NE1/4, NENW, W1/2NW
NV-2025-10-2152	**T. 29 N., R. 29 E.,** Sec. 07 NENE, S1/2NE, N1/2SE Sec. 10 NENE, NWNE Sec. 14 NENW
NV-2025-10-2153	**T. 29 N., R. 29 E.,** Sec. 08 NW1/4
NV-2025-10-2187	T. 39 **N., R. 34 E.,** Sec. 02 PROT ALL Sec. 11 PROT ALL Sec. 12 PROT ALL
NV-2025-10-2194	**T. 40 N., R. 35 E.,** Sec. 06 L6, L8, L9, L11 Sec. 06 SE1/4, E1/2SW

	Sec. 07 L1, L4, L5, L8 Sec. 07 N1/2NE, E1/2NW, SWNW, E1/2SW, SE1/4 Sec. 08 W1/2, W1/2NE, SWSE Sec. 17 NW1/4, N1/2NE, NESW Sec. 18 N1/2NE, SENE
NV-2025-10-2195	**T. 40 N., R. 35 E.,** Sec. 20 NENE Sec. 29 NWNE Sec. 31 N1/2SE, SWNE, SENE
NV-2025-10-2196	**T. 40 N., R. 34 E.,** Sec. 01 PROT ALL Sec. 12 PROT ALL Sec. 13 PROT ALL
NV-2025-10-2200	**T. 26 N., R. 27 E.,** Sec. 04 S1/2SE, E1/2SW, NWSE
NV-2025-10-2201	**T. 40 N., R. 36 E.,** Sec. 25 N1/2NE Sec. 26 NESW, SENW **T. 39 N., R. 36 E.,** Sec. 12 SWNE
NV-2025-10-2202	**T. 39 N., R. 36 E.,** Sec. 24 E1/2SW, SWSE Sec. 24 L4
NV-2025-10-2204	**T. 39 N., R. 37 E.,** Sec. 18 L4 Sec. 18 SESW, SWSE
NV-2025-10-2205	**T. 40 N., R. 37 E.,** Sec. 18 L4 Sec. 18 SWSE Sec. 19 L1 – L4 Sec. 19 E1/2, E1/2NW, E1/2SW Sec. 20 SWNW, N1/2SW, NWSE Sec. 29 SW1/4, NWNW Sec. 30 L1 Sec. 30 NE1/4, SWSE, NENW, E1/2SW, NWSW
NV-2025-10-2208	**T. 27 N., R. 40 E.,** Sec. 18 L3
NV-2025-10-2211	**T. 41 N., R. 36 E.,** Sec. 12 SESW, SWSW Sec. 13 NW1/4, NWSW, NWNE Sec. 24 SENW, W1/2NE

NV-2025-10-2215	**T. 29 N., R. 41 E.,** Sec. 29 NWNW
NV-2025-10-2228	**T. 21 N., R. 24 E.,** Sec. 12 L1 Sec. 36 L1 – L4 Sec. 36 NWSE
NV-2025-10-7035	**T. 37.5 N., R. 43 E.,** Sec. 32 L3 **T. 38 N., R. 43 E.,** Sec. 32 S1/2NW, SENE
NV-2025-10-7036	**T. 37 N., R. 43 E.,** Sec. 12 NENE Sec. 16 N1/2SE Sec. 18 S1/2NE

Riparian Habitat Buffer

(#NV-W-10-B-CSU)

Objective: To protect the values and functions of riparian and wetland areas based on the nature, extent, and value of the area potentially affected.

Stipulation: **Controlled Surface Use (CSU)** will be applied within 500 feet of riparian-wetland vegetation to protect the values and functions of these areas. An engineering plan or a study may be required by the operator that identifies the extent of the resource or how the resource will be managed or protected.

Exception: The Authorized Officer may grant an exception if an environmental review determines that the action, as proposed or otherwise restricted, does not affect the resource. An exception may also be granted if the proponent, BLM, and other affected interests (e.g. NDOW) negotiate mitigation that would satisfactorily offset the anticipated negative impacts. An exception may be granted for actions designed to enhance the long-term utility or availability of the riparian habitat.

Modification: The Authorized Officer may modify the size and shape of the restricted area if an environmental analysis indicates the actual suitability of the land for the resource differs from that in the otherwise applicable restriction.

Waiver: The restriction may be waived if it is determined that the described lands do not contain the subject resource or are incapable of serving the requirements of the resource and therefore no longer warrant consideration as a component necessary for protection of the resource.

Parcel #	**Legal Land Description**
NV-2025-10-2149	**T. 34 N., R. 32 E.,** Sec. 02 L5 - L19 **T. 34 N., R. 33 E.,** Sec. 06 L3, L4, L6 Sec. 06 S1/2NE, SENW, E1/2SE Sec. 08 N1/2SW, NENE **T. 35 N., R. 33 E.,** Sec. 32 NENE, W1/2NE, NW1/4, NWSW
NV-2025-10-2150	**T. 35 N., R. 33 E.,** Sec. 22 L1 – L3, L8 Sec. 22 N1/2
NV-2025-10-2152	**T. 29 N., R. 29 E.,** Sec. 07 NENE, N1/2SE, S1/2NE Sec. 07 L4 Sec. 10 N1/2NE, SENE Sec. 14 N1/2NW, NWNE Sec. 18 L1
NV-2025-10-2153	**T. 29 N., R. 29 E.,** Sec. 08 NWSW, NW1/4
NV-2025-10-2187	**T. 39 N., R. 34 E.,**

	Sec. 02 PROT ALL Sec. 11 PROT ALL Sec. 12 PROT ALL
NV-2025-10-2194	**T. 40 N., R. 35 E.,** Sec. 06 L6 – L11 Sec. 06 SE1/4, E1/2SW, SWNE Sec. 07 L1 – L6, L8 Sec. 07 E1/2NE, NWNE, E1/2NW, E1/2SW, SE1/4 Sec. 08 W1/2, W1/2NE, W1/2SE, SESE Sec. 16 NWNW Sec. 17 N1/2, NWSW, E1/2SW, SESE Sec. 18 E1/2NE, SWSE, NENW, NWNE
NV-2025-10-2195	**T. 40 N., R. 35 E.,** Sec. 20 NENE Sec. 31 N1/2SE, S1/2NE, NWNE
NV-2025-10-2196	**T. 40 N., R. 34 E.,** Sec. 01 PROT ALL Sec. 12 PROT ALL Sec. 13 PROT ALL
NV-2025-10-2200	**T. 26 N., R. 27 E.,** Sec. 04 SE1/4, E1/2SW **T. 27 N., R. 27 E.,** Sec. 29 NENE
NV-2025-10-2201	**T. 40 N., R. 36 E.,** Sec. 25 NE1/4 Sec. 26 S1/2NW, N1/2SW **T. 39 N., R. 36 E.,** Sec. 12 L2 Sec. 12 W1/2NE, SENW
NV-2025-10-2202	**T. 39 N., R. 36 E.,** Sec. 24 L3, L4 Sec. 24 W1/2SE, E1/2SW
NV-2025-10-2204	**T. 39 N., R. 37 E.,** Sec. 18 L3, L4 Sec. 18 E1/2SW, W1/2SE
NV-2025-10-2205	**T. 40 N., R. 37 E.,** Sec. 18 L4 Sec. 18 S1/2SE, SESW Sec. 19 L1 – L4 Sec. 19 E1/2NW, E1/2SW, W1/2 Sec. 20 W1/2NW, SENW, SWNE, NWSE, NESW, W1/2SW Sec. 29 W1/2NW, SW1/4, SENW, SWNE, NWSE

	Sec. 30 L1, L2 Sec. 30 E1/2NW, E1/2
NV-2025-10-2208	**T. 27 N., R. 40 E.,** Sec. 18 L3 **T. 27 N., R. 39 E.,** Sec. 13 PROT ALL
NV-2025-10-2211	**T. 41 N., R. 36 E.,** Sec.12 W1/2SE, E1/2SW, SWSW Sec. 13 NW1/4, W1/2NE, N1/2SW Sec. 24 W1/2NE, E1/2NW, NWSE, NESW
NV-2025-10-2215	**T. 29 N., R. 41 E.,** Sec. 29 N1/2NW
NV-2025-10-2228	**T. 21 N., R. 24 E.,** Sec. 12 L1, L2 Sec. 36 L1 – L4 Sec. 36 NWNE, W1/2SE, NESW **T. 21 N., R. 25 E.,** Sec. 30 L4
NV-2025-10-7035	**T. 38 N., R. 43 E.,** Sec. 32 S1/2NW
NV-2025-10-7036	**T. 37 N., R. 43 E.,** Sec. 16 SE1/4 Sec. 18 L1, L2 Sec. 18 NE1/4, E1/2NW, E1/2SW

Playas

(#NV-W-10-D-NSO)

Objective: Protection of playas.

Stipulation: **No Surface Occupancy (NSO)** on playas. Playas are defined as the ephemeral round depressions within areas of dry lake beds in which water collects after a rain event and evaporates relatively quickly.

Exception: The Authorized Officer may grant an exception if an environmental review determines that the action, as proposed or otherwise restricted, does not affect the resource. An exception may also be granted if the proponent, BLM, and other affected interests (e.g. NDOW) negotiate mitigation that would satisfactorily offset the anticipated negative impacts. An exception may be granted for actions designed to enhance the long-term utility or availability of the playa resource.

Modification: The Authorized Officer may modify the size and shape of the restricted area if an environmental analysis indicates the actual suitability of the land for the resource differs from that in the otherwise applicable restriction.

Waiver: The restriction may be waived if it is determined that the described lands do not contain the subject resource or are incapable of serving the requirements of the resource and therefore no longer warrant consideration as a component necessary for protection of the resource.

Parcel #	**Legal Land Description**
NV-2025-10-2150	**T. 35 N., R. 33 E.,** Sec. 22 L3 Sec. 22 NENW, E1/2NE, W1/2NE
NV-2025-10-2187	**T. 39 N., R. 34 E.,** Sec. 02 PROT ALL Sec. 11 PROT ALL
NV-2025-10-2194	**T. 40 N., R. 35 E.,** Sec. 17 E1/2NW, NESW, SWNE
NV-2025-10-2200	**T. 26 N., R. 27 E.,** Sec. 04 SESE, E1/2SW, NWSE
NV-2025-10-2201	**T. 40 N., R. 36 E.,** Sec. 25 N1/2NE **T. 39 N., R. 36 E.,** Sec. 01 L4 Sec. 01 SWNW
NV-2025-10-2205	**T. 40 N., R. 37 E.,** Sec. 19 L2, L3, L4 Sec. 19 NESW, NENE Sec. 30 SESE, S1/2NE Sec. 30 L1 Sec. 18 SWSE Sec. 29 W1/2SW, NWNW, NWSE

	Sec. 20 SWNW, W1/2SW
NV-2025-10-2211	**T. 41 N., R. 36 E.,** Sec. 13 NW1/4, NWSW
NV-2025-10-2228	**T. 21 N., R. 24 E.,** Sec. 36 L1, L3, L4 Sec. 36 NWSE

Lease Notice – Municipal Wellhead Zones

(#NV-W-10-E-LN)

The lease area may be within a source water protection zone designated by a specific public water system or community with endorsement from the Nevada Division of Environmental Protection (NDEP). Source water protection areas are defined as the land surface and area beneath in which activities and land uses must be managed in order to protect the underlying ground water which is used as a source of drinking water (also commonly referred to as a Wellhead Protect ion Area). The areas are typically delineated using a computer-generated model and outline a specific time it may take a contaminant to reach the well. It may be necessary to manage activities in areas located some distance from the well (outside of the protection area) because any spills or discharge activities could contribute to groundwater contamination in the event of heavy precipitation (snow melt and rain) which recharges the well or spring. If proposed mineral activities/lease activities could result in fluid spills or discharges in a source water protection area, it is mandatory to work with local communities and/or public water systems that are responsible for implementing source water protection activities. Analysis to determine if any impacts due to the activity are to be expected, either avoid areas or coordinate with local agencies and NDEP to develop and implement mitigation measures to reduce adverse impacts.

Parcel #	**Legal Land Description**
NV-2025-10-2191	**T. 26 N., R.27 E.,** Sec. 26 ALL

Soil Slopes > 15 and < 50 percent

(#NV-W-11-A-CSU)

Objective: To maintain soil productivity, provide necessary protection to prevent excessive soil erosion on steep slopes, to avoid areas subject to slope failure, mass wasting, piping, or having excessive reclamation problems, and to ensure successful interim and final reclamation.

Stipulation: **Controlled Surface Use (CSU)** applies to lands with slopes greater than 15 percent and less than 50 percent. An engineering/reclamation plan must be submitted by the applicant and approved by the BLM Authorized Officer before any surface disturbance can occur.
The plan must demonstrate to the Authorized Officer's satisfaction how the operator will meet the following performance standards:
• Soil stability is maintained preventing slope failure and wind or water erosion.
• The site will be stable with no evidence of accelerated erosion features.
• The rate of soil erosion will be controlled to maintain or improve soil quality and sustainability. The disturbed soils shall have characteristics that approximate the reference site with regard to quantitative and qualitative soil erosion indicators described in H-7100-1 Soil Inventory, Monitoring, and Management Handbook.
• Sufficient topsoil is maintained for ensuring successful final reclamation. How interim reclamation will be completed for producing well locations and long-term roads, including the re-spreading of all salvaged topsoil over the areas of interim reclamation.
• The original landform and site productivity will be partially restored during interim reclamation and fully restored as a result of final reclamation.

Exception: An exception may be granted if the operator can demonstrate in a plan of operations that adverse effects can be minimized and activities safely conducted.

Modification: The area affected by this stipulation may be modified by the authorized officer if it is determined that portions of the area do not include slopes over 15 percent, or the operator can demonstrate in a plan of operations that adverse effects can be minimized. The authorized officer may modify the size and shape of the restricted area subject to the stipulation based upon a Natural Resource Conservation Service (NRCS) soil survey or BLM evaluation. The stipulation and performance standards identified above may also be modified based on negative or positive monitoring results from similar Proposed Actions on similar sites or increased national or state performance standards.

Waiver: This stipulation can be waived by the authorized officer if it is determined that none of the leasehold includes slopes over 30 percent.

Parcel #	**Legal Land Descriptions**
NV-2025-10-2143	**T. 34 N., R. 41 E.,** Sec. 06 L3 – L6 Sec. 18 L1
NV-2025-10-2149	**T. 34 N., R. 32 E.,** Sec. 02 L13, L19, L20 **T. 34 N., R. 33 E.,** Sec. 06 SW1/4, SWSE, E1/2SE
NV-2025-10-2150	**T. 35 N., R. 33 E.,** Sec. 24 L6, L7

	Sec. 26 NE1/4, SW1/4, E1/2NW, SWNW, W1/2SE, NESE Sec. 34 E1/2NE
NV-2025-10-2176	**T. 29 N., R. 29 E.,** Sec. 19 L2, L3, L5
NV-2025-10-2194	**T. 40 N., R. 35 E.,** Sec. 09 E1/2SW, SWSE, SWSW Sec. 16 N1/2 Sec. 17 E1/2SE, SENE, SWSE
NV-2025-10-2195	**T. 40 N., R. 35 E.,** Sec. 20 NE1/4, SENW, NESW, NWSE, E1/2SE
NV-2025-10-2202	**T. 39 N., R. 37 E.,** Sec. 04 SE1/4, E1/2SW
NV-2025-10-2225	**T. 22 N., R. 24 E.,** Sec. 04 L1, L2, Sec. 04 W1/2, SWNE, W1/2SE Sec. 08 L10, L11 Sec. 08 E1/2NE Sec. 16 S1/2SE Sec. 22 ALL Sec. 26 ALL Sec. 28 L1 – L3
NV-2025-10-2228	**T. 21 N., R. 24 E.,** Sec. 12 ALL Sec. 24 L1 – L4 Sec. 24 NW1/4, W1/2NE, W1/2SE, E1/2SW **T. 21 N., R. 25 E.,** Sec. 30 N1/2, SW1/4, NWSE, E1/2SE
NV-2025-10-7039	**T. 33 N., R. 33 E.,** Sec. 22 L18 – L20 Sec. 23 L3, L4, L7, L8

Soil Slopes >50 percent

(#NV-W-11-B-NSO)

Objective: To maintain soil productivity, provide necessary protection to prevent excessive soil erosion on steep slopes, to avoid areas subject to slope failure, mass wasting, piping, or having excessive reclamation problems.

Stipulation: **No Surface Occupancy (NSO)** on slopes greater than 50 percent.

Exception: The Authorized Officer may grant an exception if a staff review determines that the Proposed Action is of a scale (pipeline, vs. road, vs. well pad) or sited in a location or a site-specific evaluation determines that the slope would not result in mass slope failure or accelerated erosion and the operator would be able to meet BLM's reclamation standards.

Modification: The Authorized Officer may modify the area subject to the stipulation based upon a BLM evaluation of the area. The stipulation and performance standards identified above may also be modified based on negative or positive monitoring results from similar Proposed Actions on similar sites or increased national or state performance standards.

Waiver: The restriction may be waived if it is determined that the described lands do not include lands with slopes greater than 50 percent. This determination shall be based upon USGS mapping and a BLM evaluation of the area.

Parcel #	**Legal Land Descriptions**
NV-2025-10-2152	**T. 29 N., R. 29 E.,** Sec. 07 L2 Sec. 07 SW1/4, SENW Sec. 16 SWSW
NV-2025-10-2153	**T. 29 N., R. 29 E.,** Sec. 17 E1/2NW
NV-2025-10-2176	**T. 29 N., R. 29 E.,** Sec. 20 NE1/4, NENW, NESE

Soil Severe Erosion

(#NV-W-11-C-CSU)

Objective: To maintain soil productivity, provide necessary protection to prevent excessive soil erosion on steep slopes, to avoid areas subject to slope failure, mass wasting, piping, or having excessive reclamation problems, and ensure successful interim and final reclamation.

Stipulation: **Controlled Surface Use (CSU)** on lands with a severe soil wind or water erosion hazard rating (as designed by NRCS soil survey data when available). Prior to surface disturbance on soils with a severe erosion hazard rating, a site-specific construction, stabilization, and reclamation plan (Plan) must be submitted to the BLM by the applicant as a component of the Geothermal Drilling Permit (GDP)/Application for Permit to Drill (APD)– Plan of Operations. The operator may not initiate surface disturbing activities unless the Authorized Officer has approved the Plan or approved it with conditions. The plan must demonstrate to the Authorized Officer's satisfaction how the operator will meet the following performance standards:
• Soil stability is maintained preventing slope failure and wind or water erosion.
• The site will be stable with no evidence of accelerated erosion features.
• The rate of soil erosion will be controlled to maintain or improve soil quality and sustainability. The disturbed soils shall have characteristics that approximate the reference site with regard to quantitative and qualitative soil erosion indicators described in H-7100-1 Soil Inventory, Monitoring, and Management Handbook.
• Sufficient topsoil is maintained for ensuring successful final reclamation. Interim reclamation will be completed by re-spreading the topsoil over the areas being reclaimed.
• The original landform and site productivity will be partially restored during interim reclamation and fully restored as a result of final reclamation.

Exception: The Authorized Officer may grant an exception if a staff review determines that the Proposed Action is of a scale (pipeline, vs. road, vs. well pad) or sited in a location, or a soil survey determines that the soil properties do not meet the severe erosion hazard criteria so that the Proposed Action would not result in a failure to meet the performance standards above.

Modification: The Authorized Officer may modify the size and shape of the restricted area subject to the stipulation based upon a NRCS soil survey or BLM evaluation. The stipulation and performance standards identified above may also be modified based on negative or positive monitoring results from similar Proposed Actions on similar sites or increased national or state performance standards. The authorized officer may modify the size and shape of the restricted area subject to the stipulation based upon a NRCS soil survey or BLM evaluation. The stipulation and performance standards identified above may also be modified based on negative or positive monitoring results from similar Proposed Actions on similar sites or increased national or state performance standards.

Waiver: The restriction may be waived if it is determined that the described lands do no do not include soils with severe erosion hazard. This determination shall be based upon NRCS mapping and BLM evaluation of the area.

Parcel #	**Legal Land Description**
NV-2025-10-2143	**T. 34 N., R. 41 E.,** Sec. 08 SE1/4, SENE, E1/2SW, SWSW Sec. 18 SE1/4, SENE, E1/2SW
NV-2025-10-2149	**T. 34 N., R. 32 E.,** Sec. 02 L5 – L20 **T. 34 N., R. 33 E.,**

	Sec. 06 L1 – L7 Sec. 06 S1/2NE, SENW, SE1/4, E1/2SW Sec. 08 N1/2, SW1/4, W1/2SE **T. 35 N., R. 33 E.,** Sec. 32 ALL
NV-2025-10-2150	**T. 35 N., R. 33 E.,** Sec. 22 L1 – L8 Sec. 22 N1/2 Sec. 24 L1 - L4 Sec. 34 W1/2NW, W1/2SW, NENW, NESW
NV-2025-10-2187	**T. 39 N., R. 34 E.,** Sec. 01 PROT ALL Sec. 02 PROT ALL Sec. 11 PROT ALL Sec. 12 PROT ALL
NV-2025-10-2188	**T. 40 N., R. 35 E.,** Sec. 04 L1 – 4 Sec. 04 S1/2NE, S1/2NW, S1/2 **T. 41 N., R. 35 E.,** Sec. 28 ALL Sec. 29 ALL Sec. 30 L1 – L4 Sec. 30 E1/2, E1/2NW, E1/2SW Sec. 31 L1 – L4 Sec. 31 E1/2, E1/2NW, E1/2SW Sec. 32 ALL Sec. 33 ALL
NV-2025-10-2194	**T. 40 N., R. 35 E.,** Sec. 05 L1 – L4 Sec. 05 S1/2NE, S1/2NW, S1/2 Sec. 06 L1 – L11 Sec. 06 S1/2NE, SENW, E1/2SW, SE1/4 Sec. 07 L1 – L8 Sec. 07 E1/2, E1/2NW, E1/2SW Sec. 08 ALL Sec. 09 ALL Sec. 16 N1/2NE, W1/2NW Sec. 17 ALL Sec. 18 L1 – L8 Sec. 18 E1/2, E1/2NW, E1/2SW
NV-2025-10-2195	**T. 40 N., R. 35 E.,** Sec. 19 L1 – L8 Sec. 19 E1/2, E1/2NW, E1/2SW Sec. 20 W1/2, SE1/4, W1/2NE Sec. 29 NW1/4, NWNE, W1/2SW Sec. 30 L1 – L8

	Sec. 30 E1/2, E1/2NW, E1/2SW Sec. 31 L1 – L8 Sec. 31 NE1/4, E1/2NW, E1/2SW, N1/2SW, NWSE Sec. 32 NW1/4, W1/2NE, NWSE, N1/2SW
NV-2025-10-2196	**T. 40 N., R. 34 E.,** Sec. 01 PROT ALL Sec. 12 PROT ALL Sec. 13 PROT ALL Sec. 24 PROT ALL Sec. 25 PROT ALL Sec. 36 PROT ALL
NV-2025-10-2201	**T. 39 N., R. 36 E.,** Sec. 01 L1 – L7 Sec. 01 SWNE, S1/2NW, SW1/4, W1/2SE Sec. 12 L2 – L4 Sec. 12 NW1/4, SWNE, W1/2SE, N1/2SW Sec. 13 L1 – L4 Sec. 13 NW1/4, W1/2SW, W1/2NE, W1/2SE **T. 40 N., R. 36 E.,** Sec. 25 ALL Sec. 26 N1/2, SE1/4, NWSW, E1/2SW Sec. 36 ALL
NV-2025-10-2202	**T. 39 N., R. 36 E.,** Sec. 24 L1 – L4 Sec. 24 NWSE, SWNE **T. 39 N., R. 37 E.,** Sec. 04 L4 Sec. 04 NWSW, S1/2SW, SWNW, SWSE Sec. 05 L1 – L4 Sec. 05 E1/2SE, NWSE, S1/2NE, SENW Sec. 06 L1 – L7 Sec. 06 NESW, S1/2NE, SENW Sec. 07 S1/2SE, E1/2SW, NWSE Sec. 08 S1/2, E1/2NE
NV-2025-10-2204	**T. 39 N., R. 37 E.,** Sec. 18 L2 – L4 Sec. 18 E1/2NE, E1/2SE, E1/2SW, SENW, NWNE Sec. 20 W1/2, W1/2NE, W1/2SE
NV-2025-10-2205	**T. 40 N., R. 37 E.,** Sec. 18 L1 – L4 Sec. 18 E1/2, E1/2NW, E1/2SW Sec. 19 L1 – L4 Sec. 19 E1/2, E1/2NW, E1/2SW Sec. 20 ALL Sec. 29 ALL Sec. 30 L1 – L4

Sec. 30 E1/2, E1/2NW, E1/2SW
Sec. 31 L1 – L7
Sec. 31 NE1/4, E1/2NW, NESW, N1/2SE
Sec. 32 L1 – L4
Sec. 32 N1/2, N1/2SW, N1/2SE

NV-2025-10-2208

T. 27 N., R. 40 E.,
Sec. 17 SW1/4, E1/2NW, SWNW, S1/2SE
Sec. 18 SESE
Sec. 19 SE1/4, SWNE, E1/2NE
Sec. 30 L4
Sec. 30 W1/2NE, E1/2NW, NWSE, E1/2SW

NV-2025-10-2211

T. 41 N., R. 36 E.,
Sec. 12 ALL
Sec. 13 ALL
Sec. 24 ALL
T. 41 N., R. 37 E.,
Sec. 07 L1 – L4
Sec. 07 E1/2, E1/2NW, E1/2SW
Sec. 18 L1 – L4
Sec. 18 E1/2, E1/2NW, E1/2SW
Sec. 19 L1 – L4
Sec. 19 E1/2, E1/2NW, E1/2SW

NV-2025-10-2215

T. 29 N., R. 41 E.,
Sec. 29 N1/2, SW1/4, W1/2SE
Sec. 32 W1/2

NV-2025-10-7035

T. 37 1/2 N., R. 43 E.,
Sec. 32 L1 – L4
T. 38 N., R. 43 E.,
Sec. 26 S1/2, W1/2NW
Sec. 28 ALL
Sec. 32 N1/2, SE1/4
Sec. 34 ALL
Sec. 36 ALL

NV-2025-10-7036

T. 37 N., R. 43 E.,
Sec. 02 L1 – L4
Sec. 02 SE1/4, S1/2NE, SWNW, SESW
Sec. 04 L1 – L4
Sec. 04 S1/2SE, S1/2SW, W1/2NW, SENE, NESE
Sec. 06 L1 – L7
Sec. 06 S1/2NE, E1/2SW, SENW, SE1/4
Sec. 10 L1 – L4
Sec. 10 E1/2, NESW, W1/2SW
Sec. 12 NW1/4, N1/2NE, W1/2SW
Sec. 14 N1/2NW
Sec. 16 ALL
Sec. 18 L1 – L4

Sec. 18 NE1/4, E1/2NW, E1/2SW

T. 37 1/2 N., R. 43 E.,

Sec. 31 L1 – L4
Sec. 33 L1 – L4
Sec. 34 L1 – L4
Sec. 35 L1 – L4
Sec. 36 L1 – L4

Lease Notice - Saleable Minerals: Community Pits

(#NV-W-12-B-LN)

The lessee accepts this lease subject to the right of individuals, authorized by Bureau of Land Management District Office, to remove sand and gravel from the land embraced in Community Pit No. (see below) The lessee agrees that its operations will not interfere with the use of the pit(s) by these individuals.

Parcel #	**Legal Land Description**	**Community Pit Serial #**
NV-2025-10-2153	**T. 29 N., R. 29 E.,** Sec. 08 ALL	**N 89665** (community pit)

Lease Notice – Existing Right of Way

(#NV-W-13-A-LN)

Some parcels contain one or more existing Rights of Way (ROW). A complete list of existing ROWs and land use authorizations (LUA) in the proposed parcels can be found in Appendix F. For more information, please contact the Winnemucca District Office.

The lessee accepts this lease subject to the right of individuals, authorized by Bureau of Land Management Winnemucca District Office, to access, operate within, and maintain the ROW as described in case file(s). The lessee agrees that its operations will not interfere with the use of the ROW(s) by these individuals.

Lease Notice – Sage-Grouse Habitat

(#NV-W-16-H-LN)

According to the Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment (NVCA Approved GRSG RMP Amendment), specific Required Design Features (RDFs) are required for certain activities in all Greater Sage-Grouse (GRSG) habitats. RDFs establish the minimum specifications for certain activities to help mitigate adverse impacts. However, the applicability and overall effectiveness of each RDF cannot be fully assessed until the project level when the project location and design are known. Because of site-specific circumstances, some RDFs may not apply to some projects (e.g., a resource is not present on a given site) and/or may require slight variations (e.g., a larger or smaller protective area). All variations in RDFs would require that at least one of the following be demonstrated in the NEPA analysis associated with the project/activity:

- A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g. due to site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable;
- An alternative RDF is determined to provide equal or better protection for GRSG or its habitat;
- A specific RDF will provide no additional protection to GRSG or its habitat.

A list of the RDFs may be found in Appendix C of the NVCA Approved GRSG RMP Amendment; however, application of the RDFs is site specific at the project proposal stage.

Parcel #	**Legal Land Description**
NV-2025-10-2143	**T. 34 N., R. 41 E.,** Sec. 06 L3 – 5, NESW
NV-2025-10-2150	**T. 35 N., R. 33 E.,** Sec. 26 N1/2SE, SWSE
NV-2025-10-2208	**T. 27 N., R. 39 E.,** Sec. 24 PROT ALL **T. 27 N., R. 40 E.,** Sec. 18 SWSE, SESW Sec. 19 L2 Sec. 19 NWNE, S1/2NE, E1/2NW Sec. 30 L1 – 4 Sec. 30 E1/2, E1/2NW, E1/2SW
NV-2025-10-7039	**All Lands in Parcel**

Lease Notice – Lands with Wilderness Characteristics

(#NV-W-17-A-LN)

Per WMDO RMP LWC 1.1, the units identified as containing wilderness characteristics (including the Fencemaker Area of the Stillwater Range), will be managed to meet multiple use and sustained yield objectives. Prior to any surface disturbing activities, the wilderness characteristics inventory will be reviewed in accordance with BLM Manual 6320. Individual projects proposed within areas identified as possessing wilderness characteristics will be evaluated during the NEPA process for impacts to wilderness characteristics. Mitigation measures to protect wilderness characteristics will be applied as appropriate.

In 1980, initial Land with Wilderness Characteristics Inventory was prepared in 1980 using BLM Manuals 6300-1 and 6300-2 *Wilderness Inventory*. BLM Manual 6310 *Conducting Wilderness Characteristics Inventory* and BLM Manual 6320 *Considering Lands with Wilderness Characteristics in the Land Use Planning Process* provides new guidance in addressing this aspect of land use planning. A portion of the proposed parcels occur within LWC units that have not been re-inventoried since issuance of the new guidance. If proposed fluid mineral activities are to occur within the units identified as containing wilderness characteristics, the wilderness character inventory would be reviewed according to BLM manual 6320 - Considering Lands with Wilderness Characteristics in Land Use Plans. The BLM Authorized Officer may identify mitigation measures necessary for reducing adverse impacts to wilderness characteristics. These measures would be designed to manage areas identified as possessing wilderness characteristics through the inventory described in Manual 6310 and may include, but are not limited to, impact minimization measures on wilderness characteristics, limiting surface disturbance footprints, or reducing visibility of surface disturbance. Additional specific measures to protect lands with wilderness characteristics may be developed during review of proposals.

Parcel #	**Legal Land Description**
NV-2025-10-2152	**T. 29 N., R. 29 E.,** Sec. 07 L1 – L4 Sec. 07 NE1/4, W1/2SE, NESE, E1/2NW, E1/2SW; Sec. 18 L1, L2 Sec. 18 NENW
NV-2025-10-2215	**T. 29 N., R. 41 E.,** Sec. 29 N1/2NW

Lease Notice – Range Management

(#NV-W-18-A-LN)

This parcel contains one or more existing grazing allotment(s) and/or range improvements. For more information regarding grazing and water rights, please contact the Winnemucca District Office. These entities must be contacted in the event that geothermal exploration, resource confirmation or development activities are proposed or authorized.

See Appendix G for a complete list of grazing allotments, range improvements, and contact information for permit holders.

Appendix I: Maps of Proposed Lease Parcels and Associated Resource

This appendix contains maps of the proposed lease parcels with the associated resource stipulations applicable to each parcel. No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

The maps are organized by stipulation, in the same order as Appendix H. Maps have not been included for the Standard Lease Notices (NV-W-00-A-LN), Sensitive Resources (NV-W-01-AB-TL), Threatened & Endangered and Special Status Species (NV-W-01-AB-LN), Threatened & Endangered Species – CSU (NV-W-02-A-CSU), Threatened & Endangered Species – NSO (NV-W-03-D-NSO), Special Status Species – CSU/TL (NV-W-05-A-CSU/TL), and Raptor Nest Sites (NV-W-06-B-TL), as these stipulations affect all lands in all parcels. Please refer to the Table of Figures below.

Table of Figures

Figure 1. Pronghorn Antelope Seasonal Habitat (TL) in parcel NV-2025-10-2149.

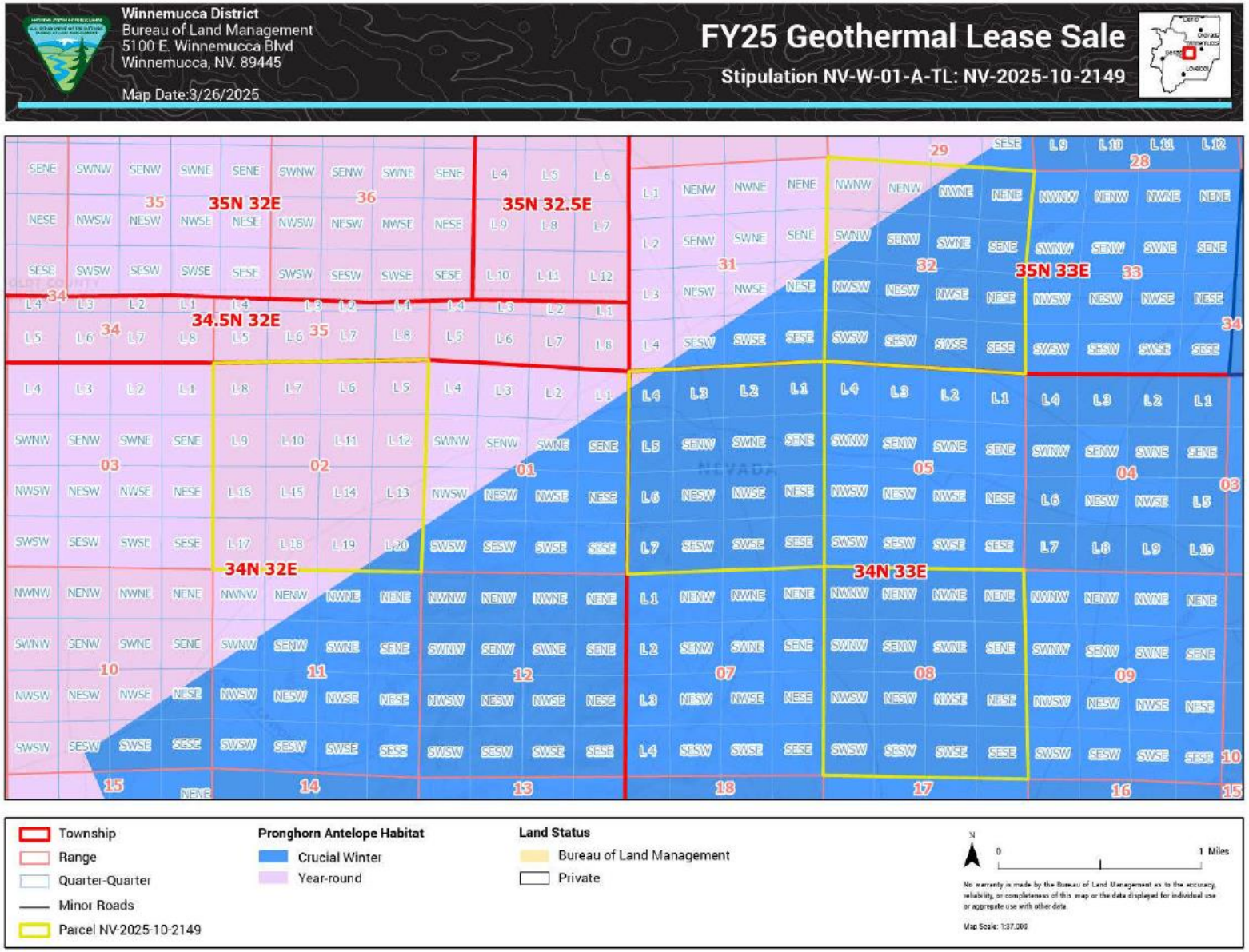

Figure 2. Pronghorn Antelope Seasonal Habitat (TL) in parcel NV-2025-10-2152 and NV-2025-10-2153.

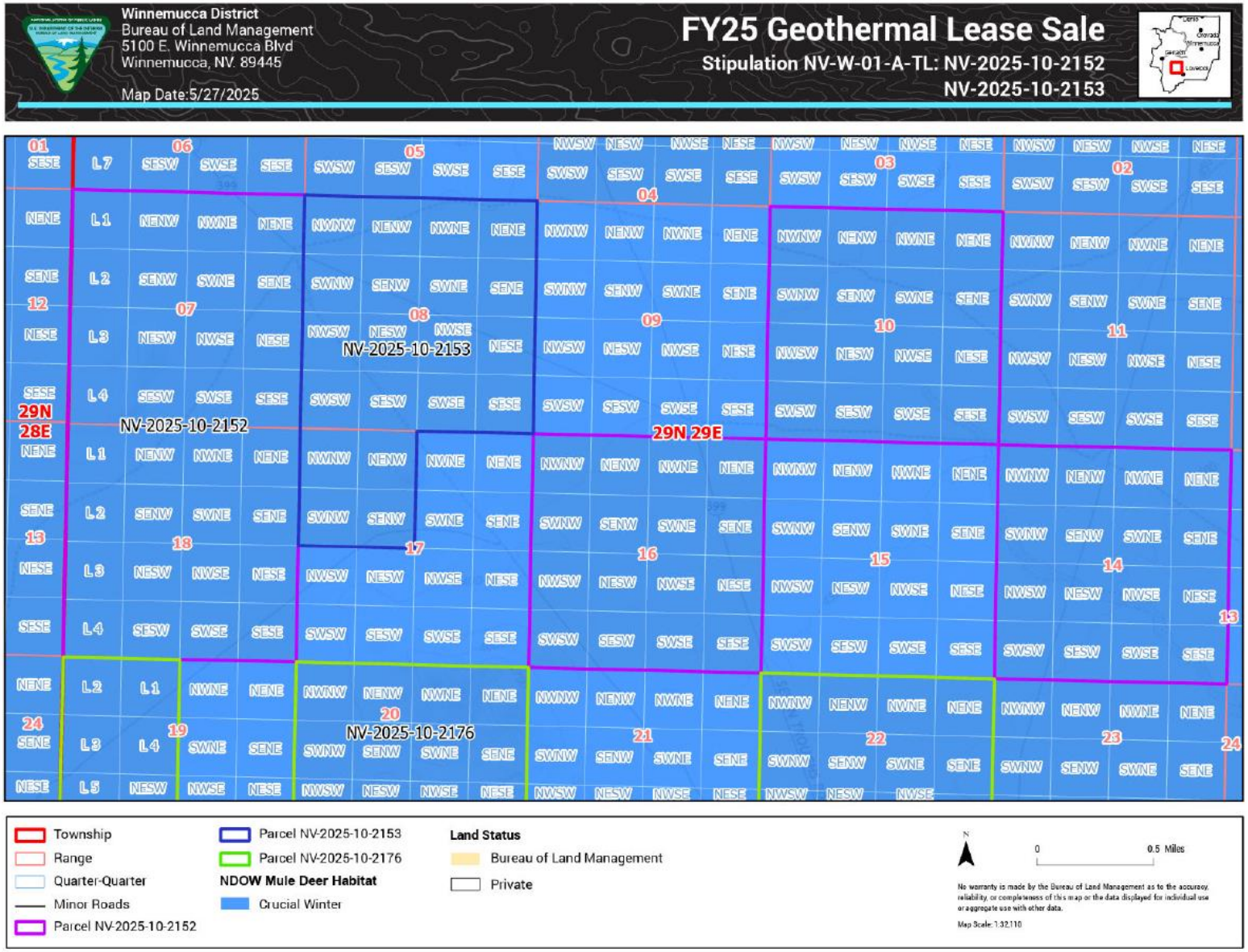

Figure 3. Pronghorn Antelope Seasonal Habitat (TL) in parcel NV-2025-10-2176.

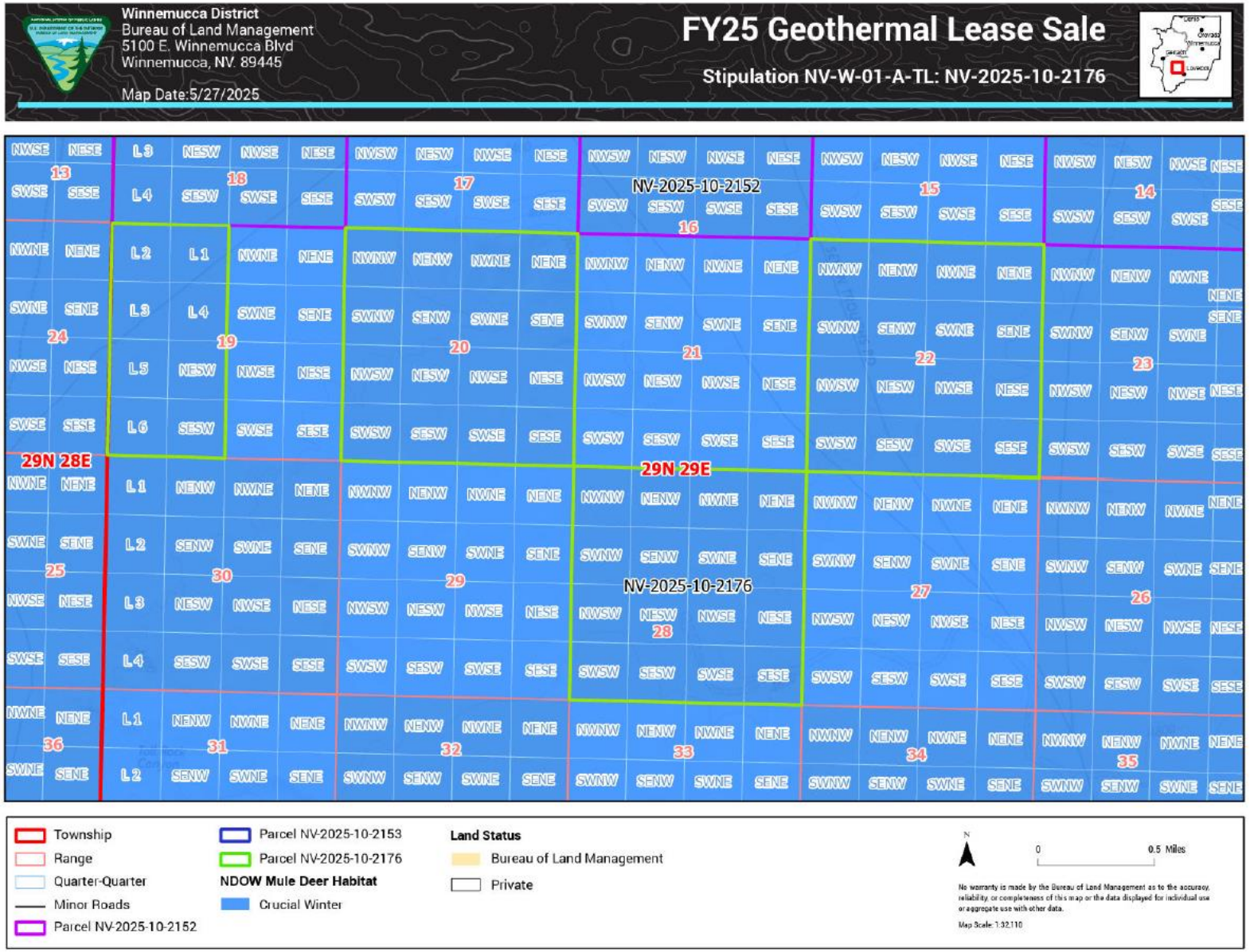

Figure 4. Pronghorn Antelope Seasonal Habitat (TL) in parcel NV-2025-10-7039.

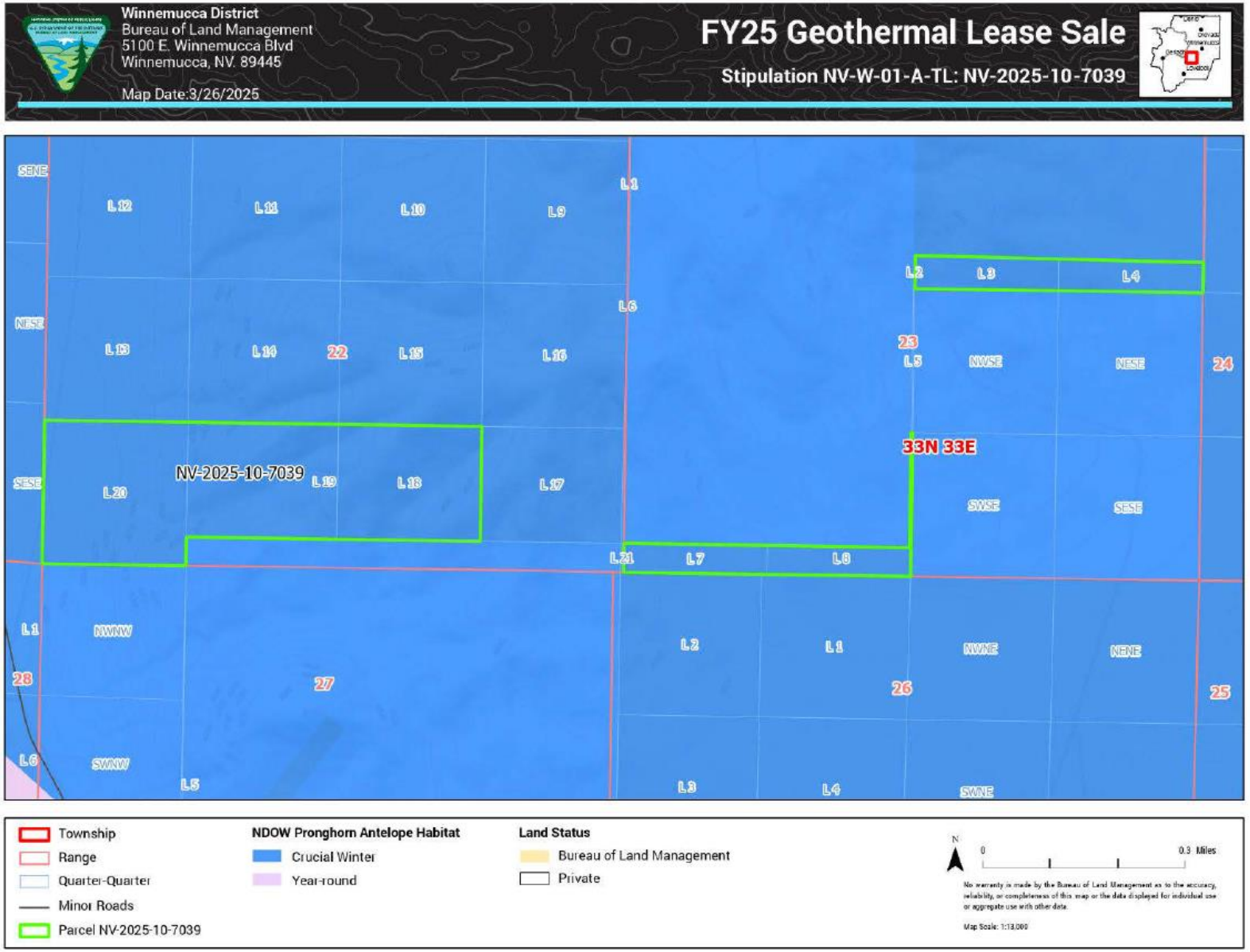

Figure 5. Pronghorn Antelope Seasonal Habitat (TL) and Pronghorn Antelope Calving Habitat (TL) in parcel NV-2025-10-2150.

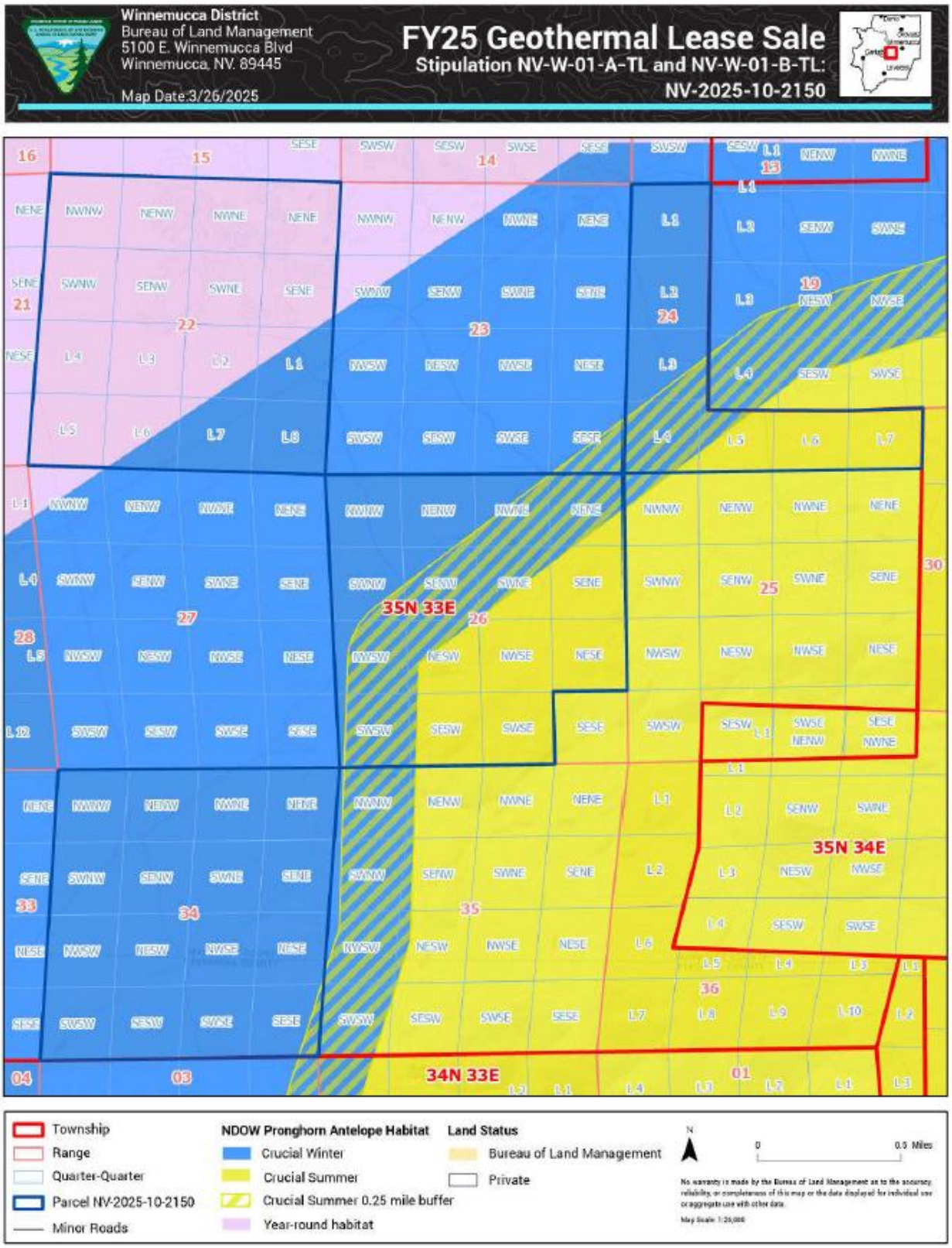

Figure 6. Mule Deer Seasonal Habitat (TL) in parcel NV-2025-10-2143.

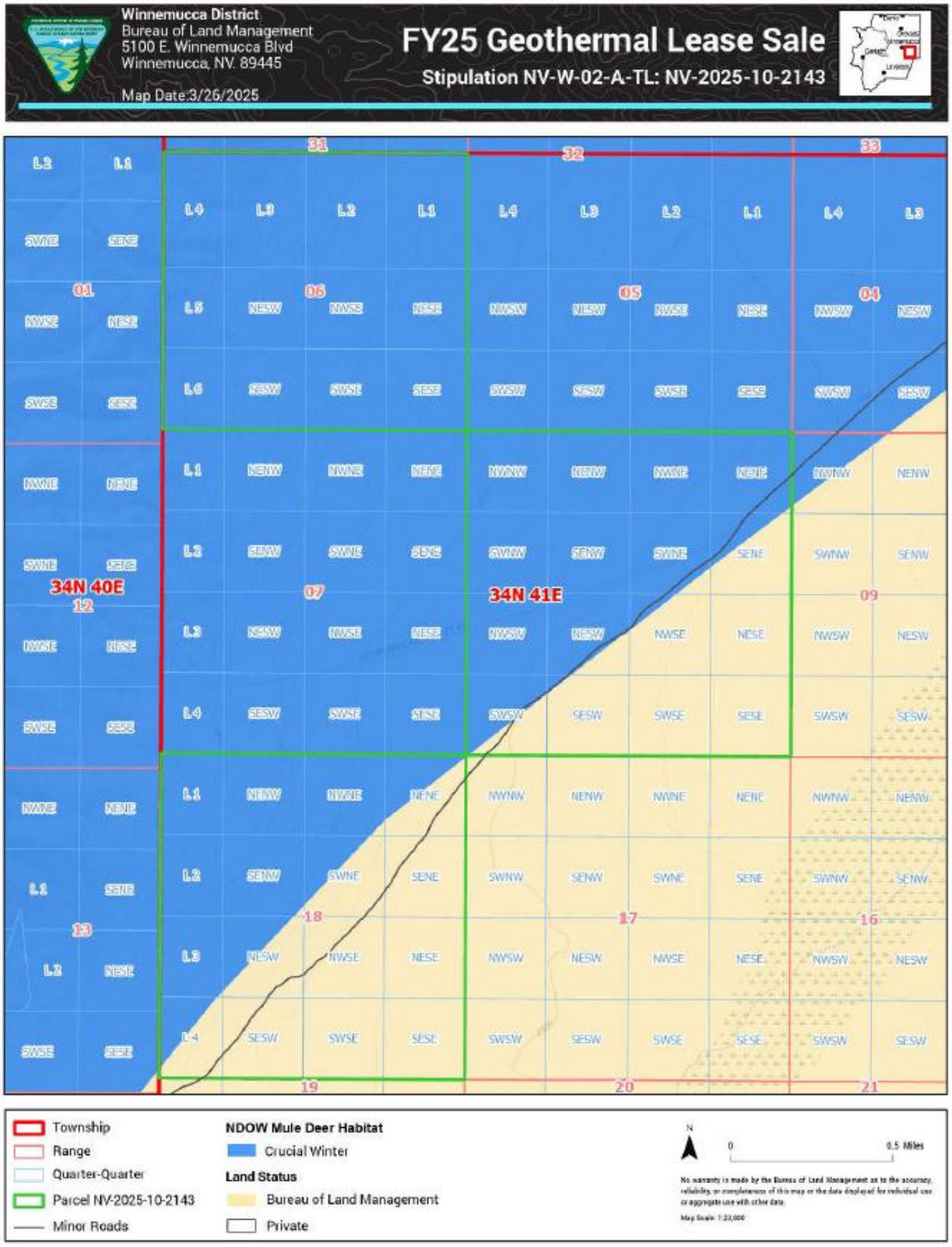

Figure 7. Mule Deer Seasonal Habitat (TL) in parcel NV-2025-10-2150.

Figure 8. Mule Deer Seasonal Habitat (TL) in parcel NV-2025-10-2208.

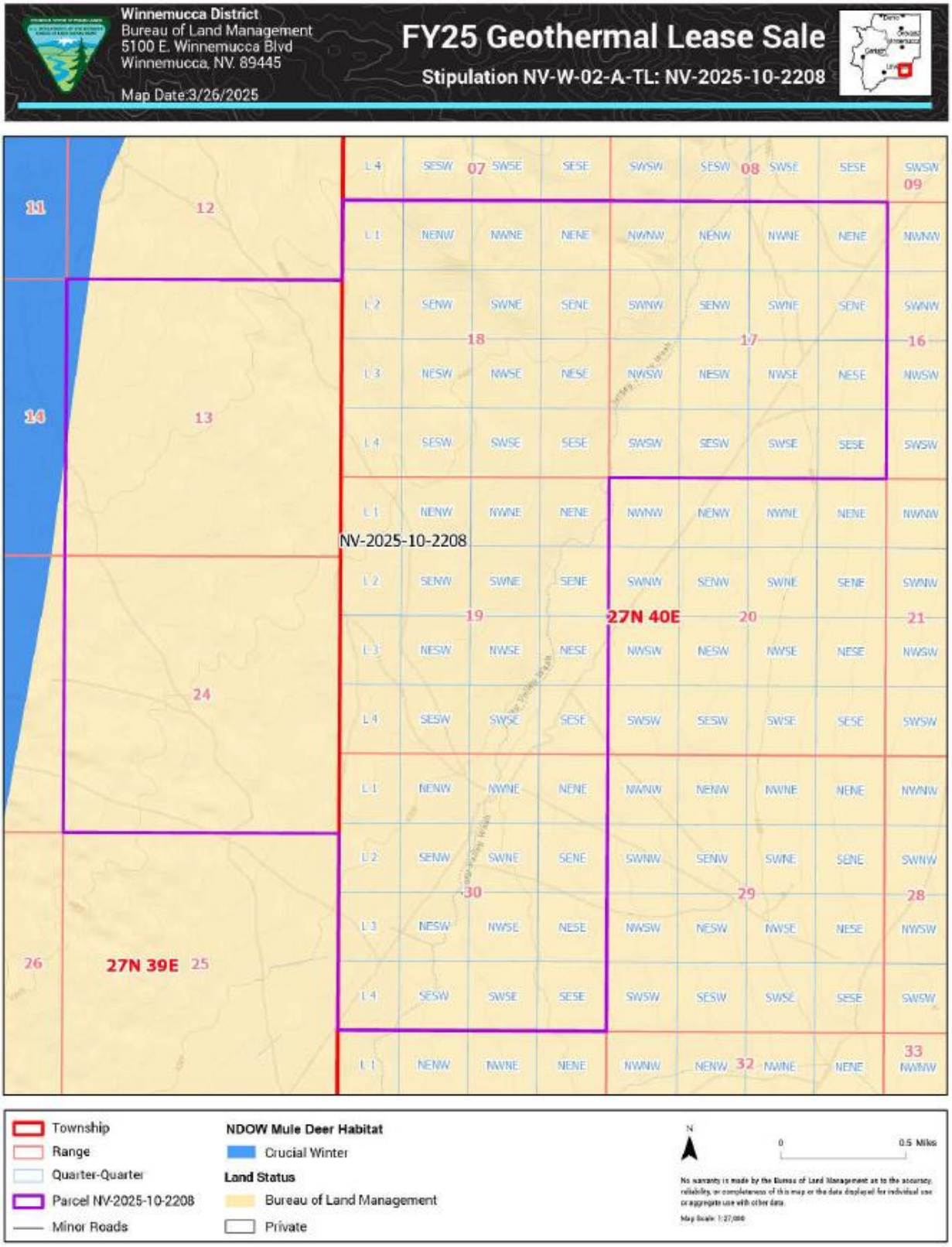

Figure 9. Elk Seasonal Habitat (TL) in parcel NV-2025-10-7035.

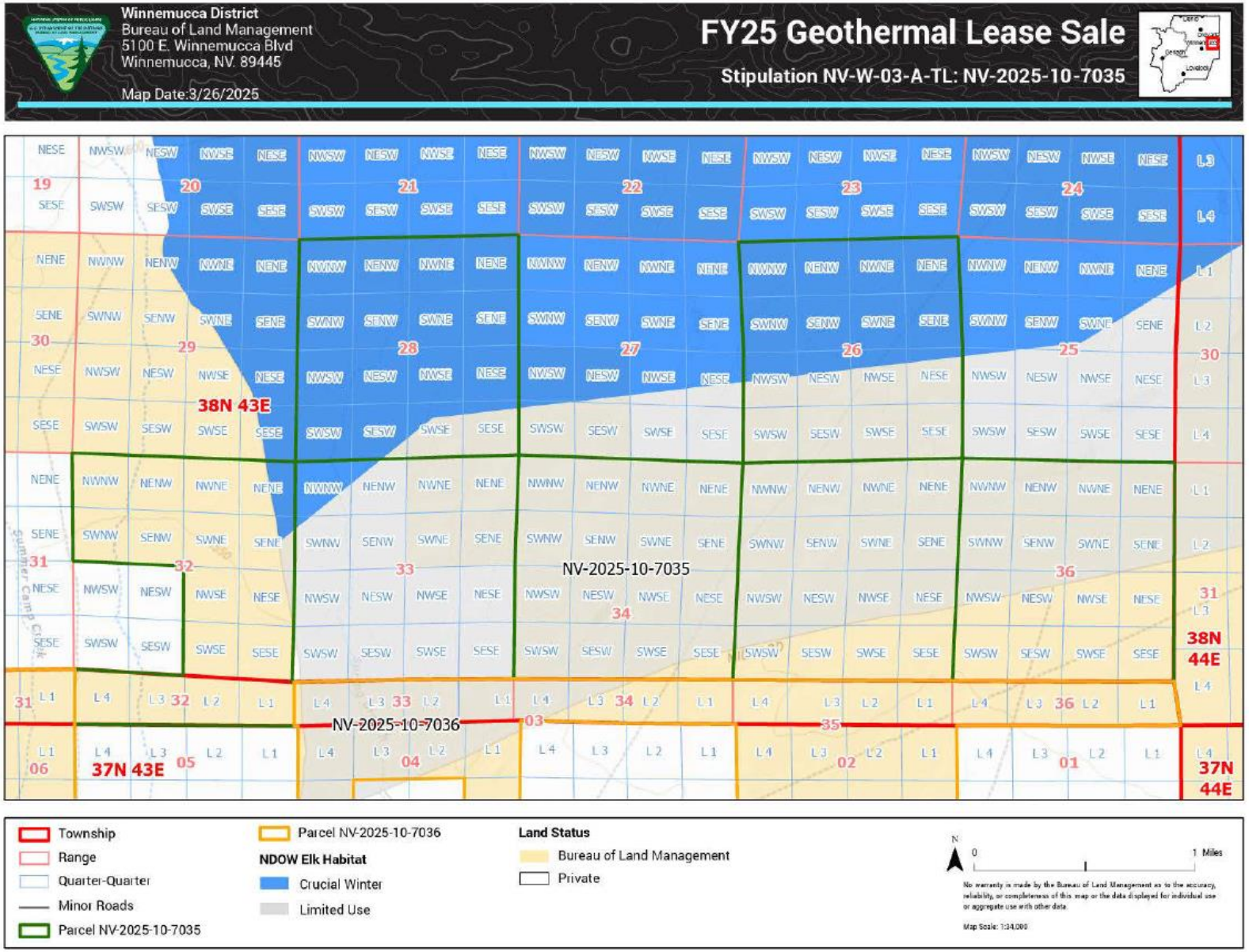

Figure 10. Wild Horse and Burros Notice (LN) in parcel NV-2025-10-2152, NV-2025-10-2153, and NV-2025-10-2176.

Figure 11. Bighorn Sheep Year-Round Habitat (CSU) in parcel NV-2025-10-2208.

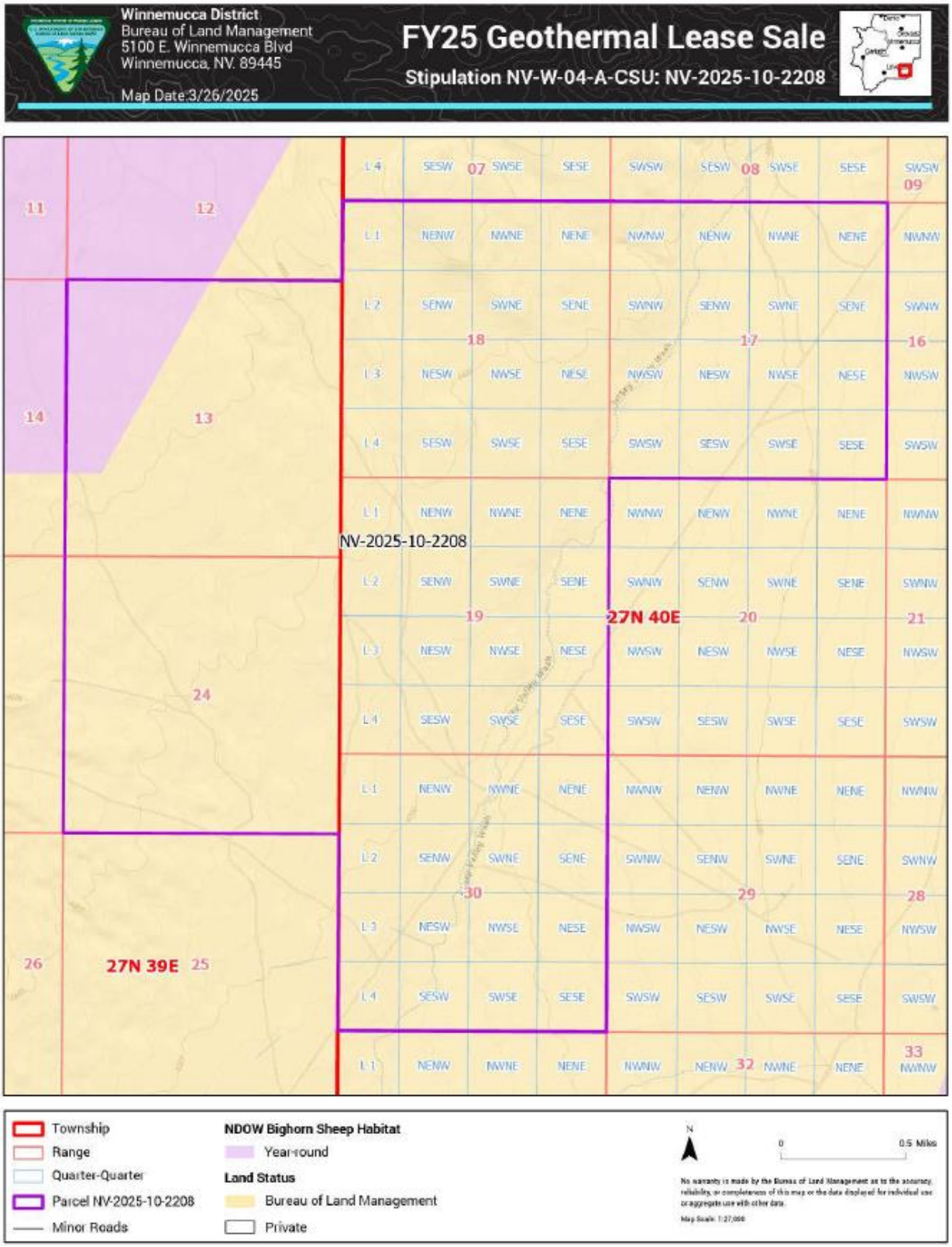

Figure 12. Sites Eligible for National Register of Historic Places (NSO) in parcel NV-2025-10-2150.

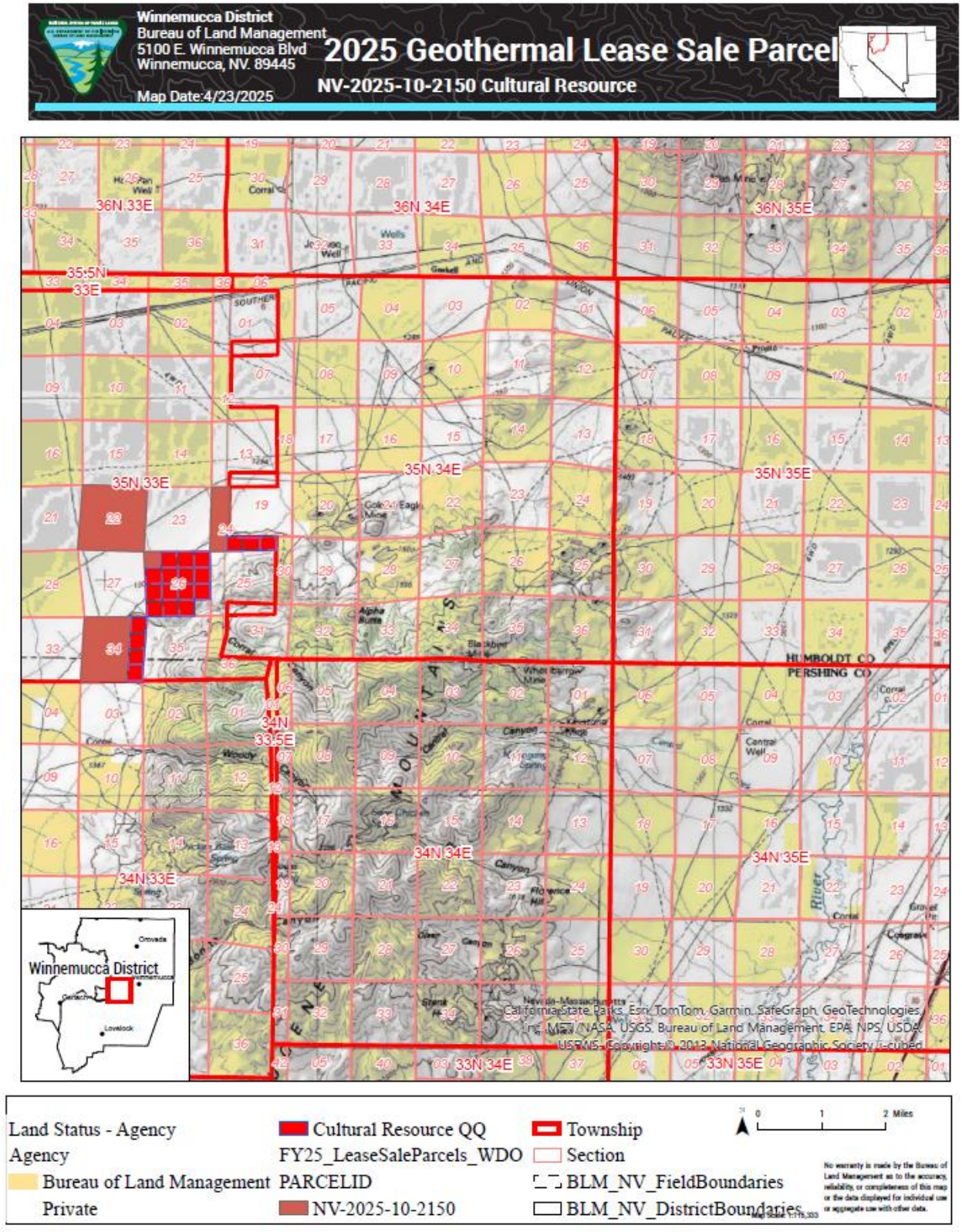

Figure 13. Sites Eligible for National Register of Historic Places (NSO) in parcel NV-2025-10-2152, NV-2025-10-2153, and NV-2025-10-2176.

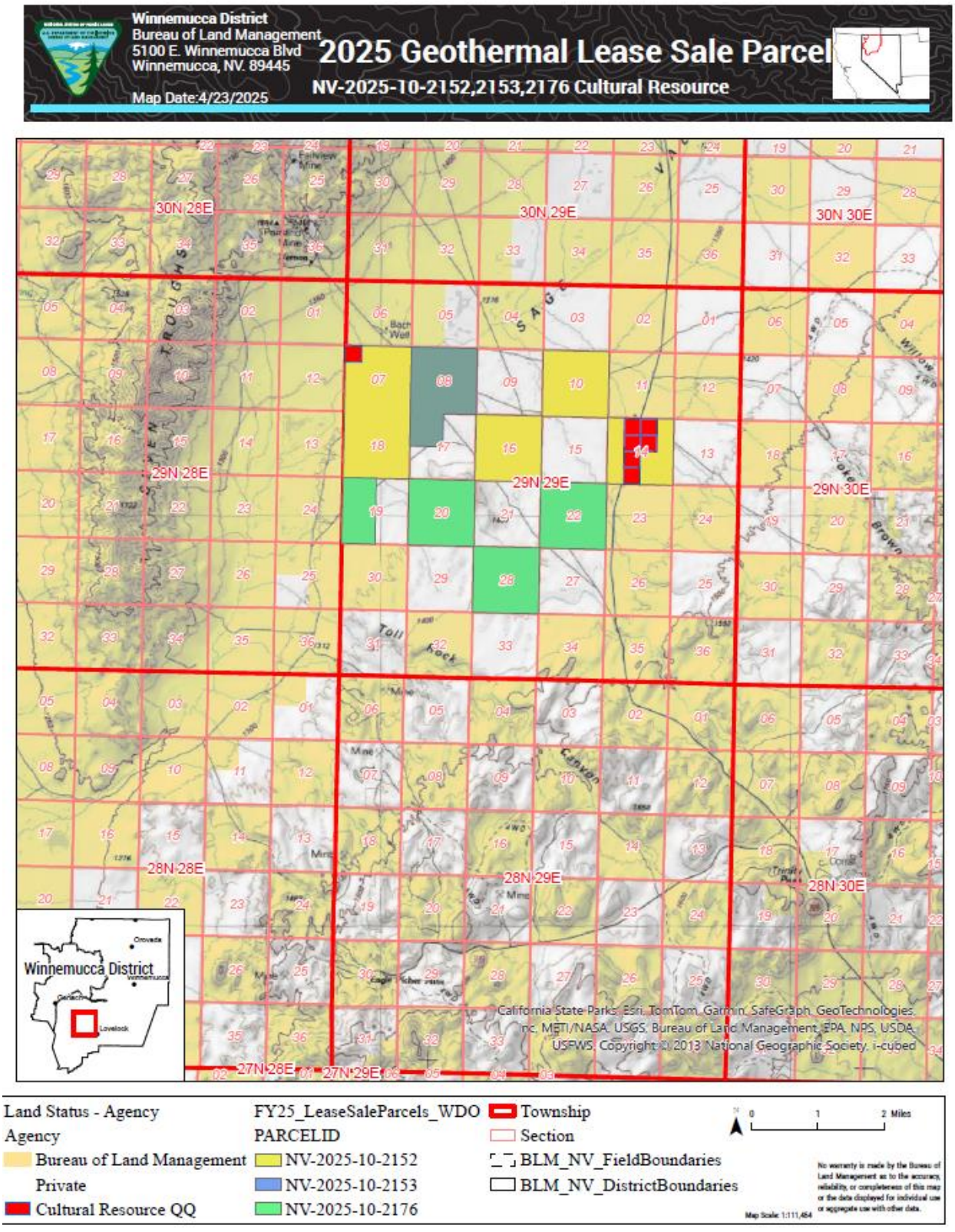

Figure 14. Sites Eligible for National Register of Historic Places (NSO) in parcel NV-2025-10-2187, NV-2025-10-2188, NV-2025-10-2194, NV-2025-10-2195, and NV-2025-10-2196.

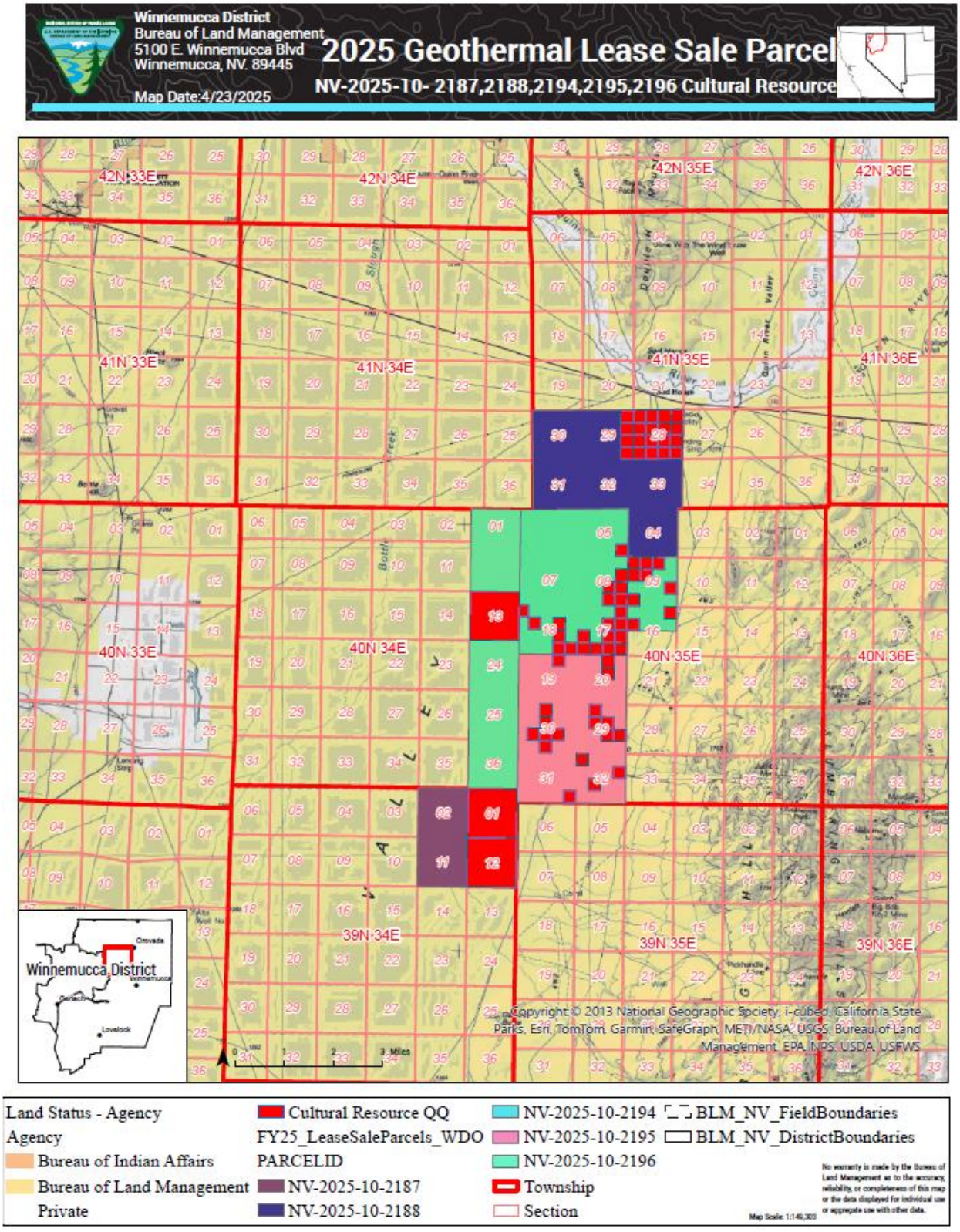

Figure 15. Sites Eligible for National Register of Historic Places (NSO) in parcel NV-2025-10-2191, NV-2025-10-2192, and NV-2025-10-2200.

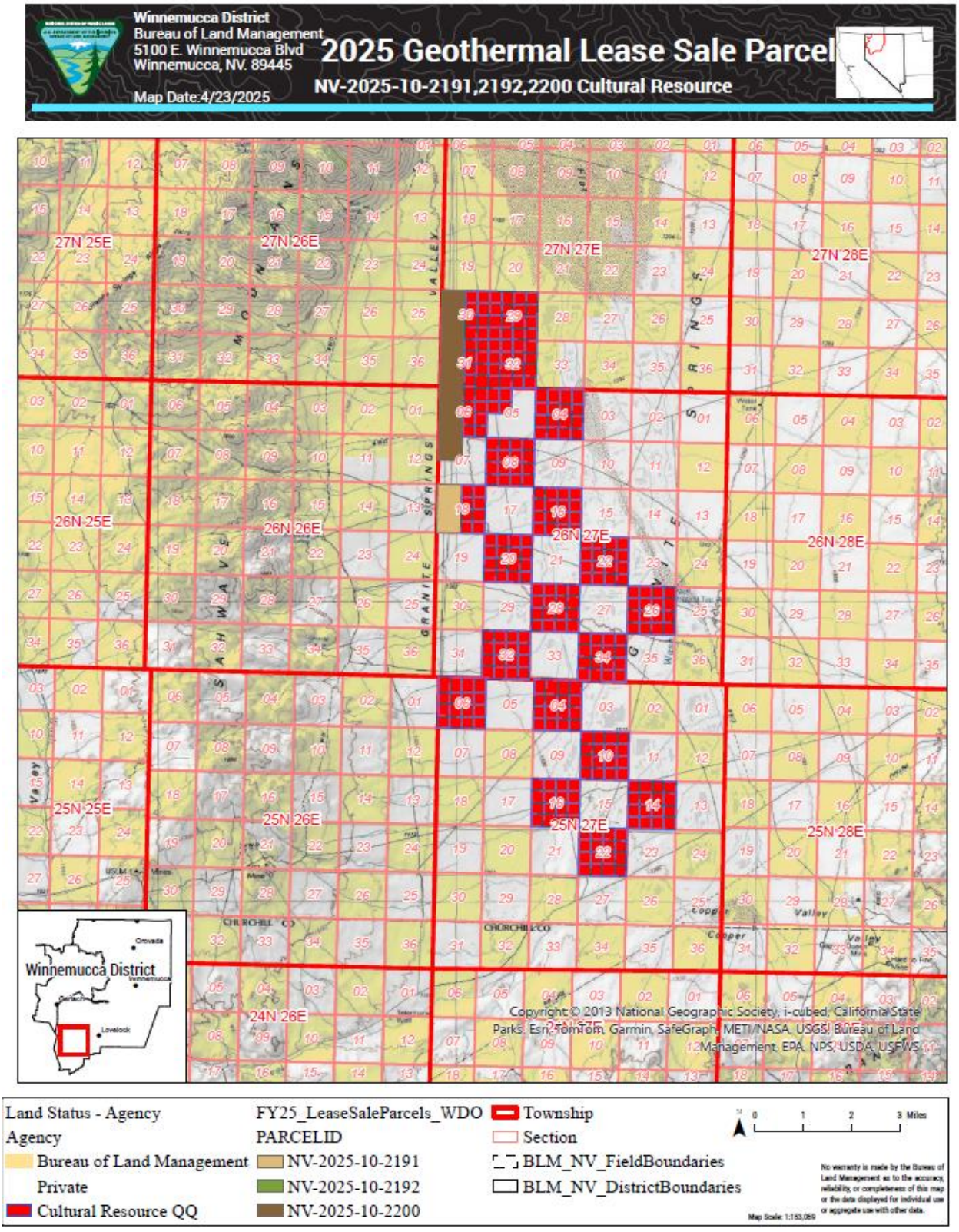

Figure 16. Sites Eligible for National Register of Historic Places (NSO) in parcel NV-2025-10-2201, NV-2025-10-2202, NV-2025-10-2204, NV-2025-10-2205, and NV-2025-10-2211.

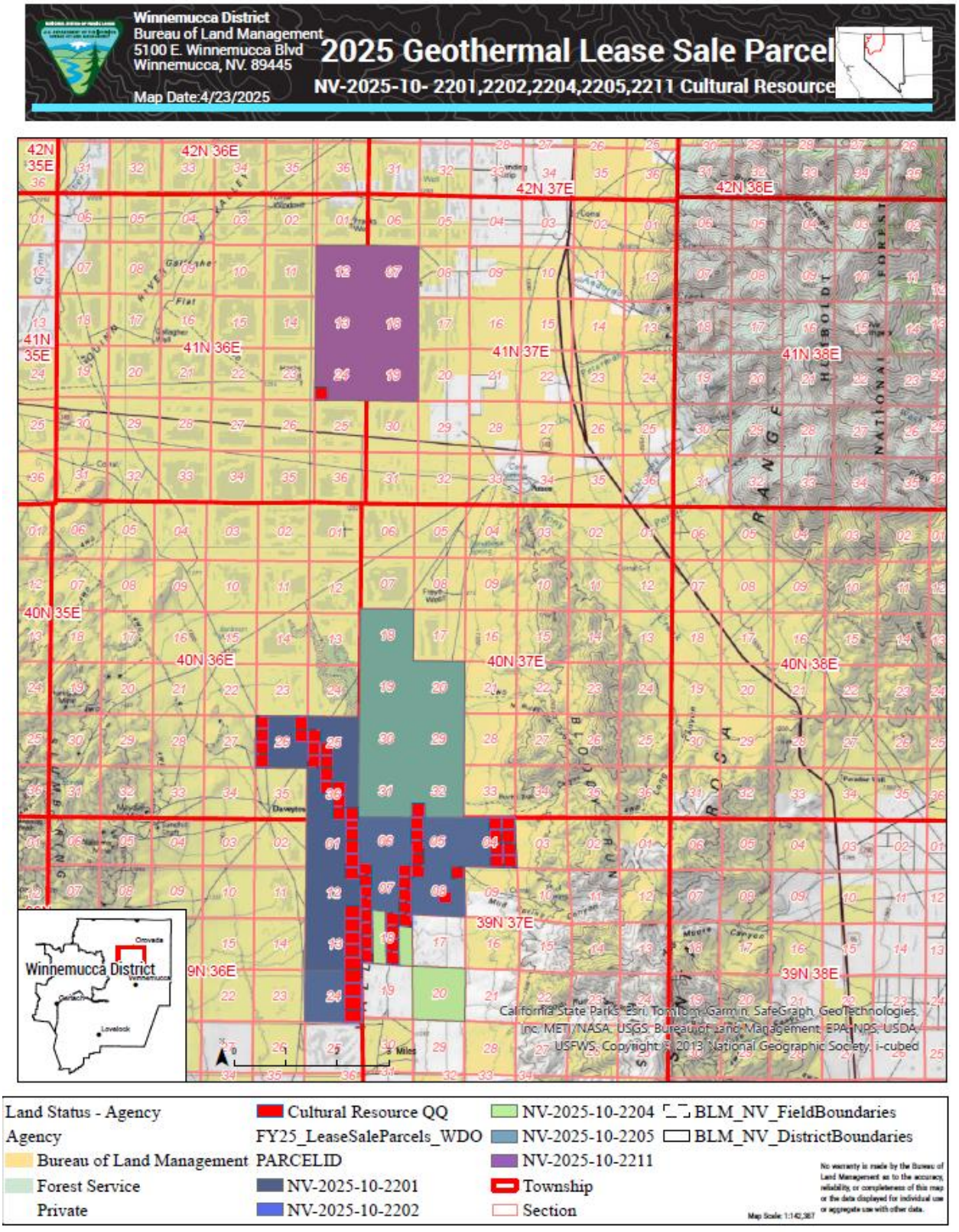

Figure 17. Sites Eligible for National Register of Historic Places (NSO) in parcel NV-2025-10-2228.

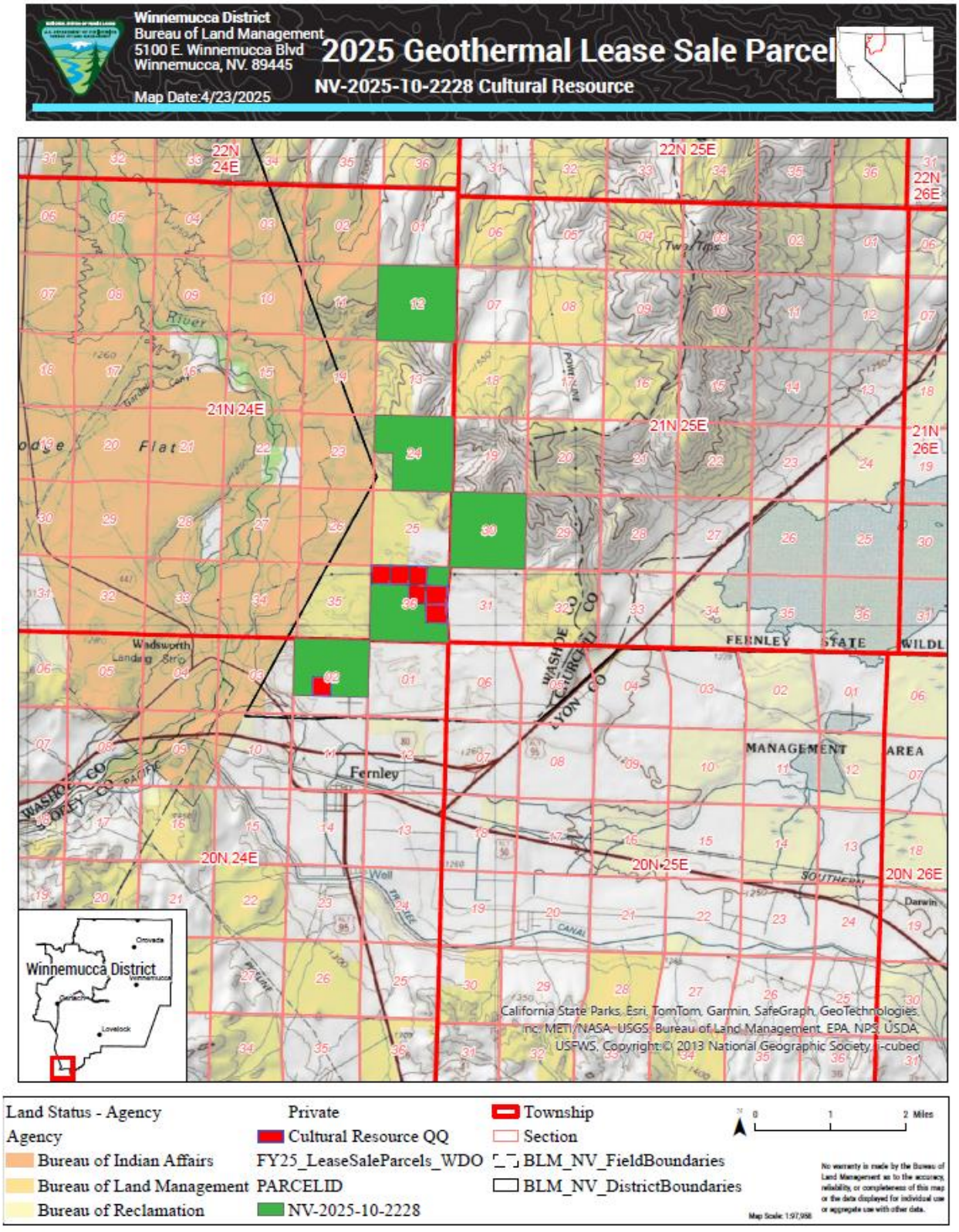

Figure 18. Sites Eligible for National Register of Historic Places (NSO) in parcel NV-2025-10-7039.

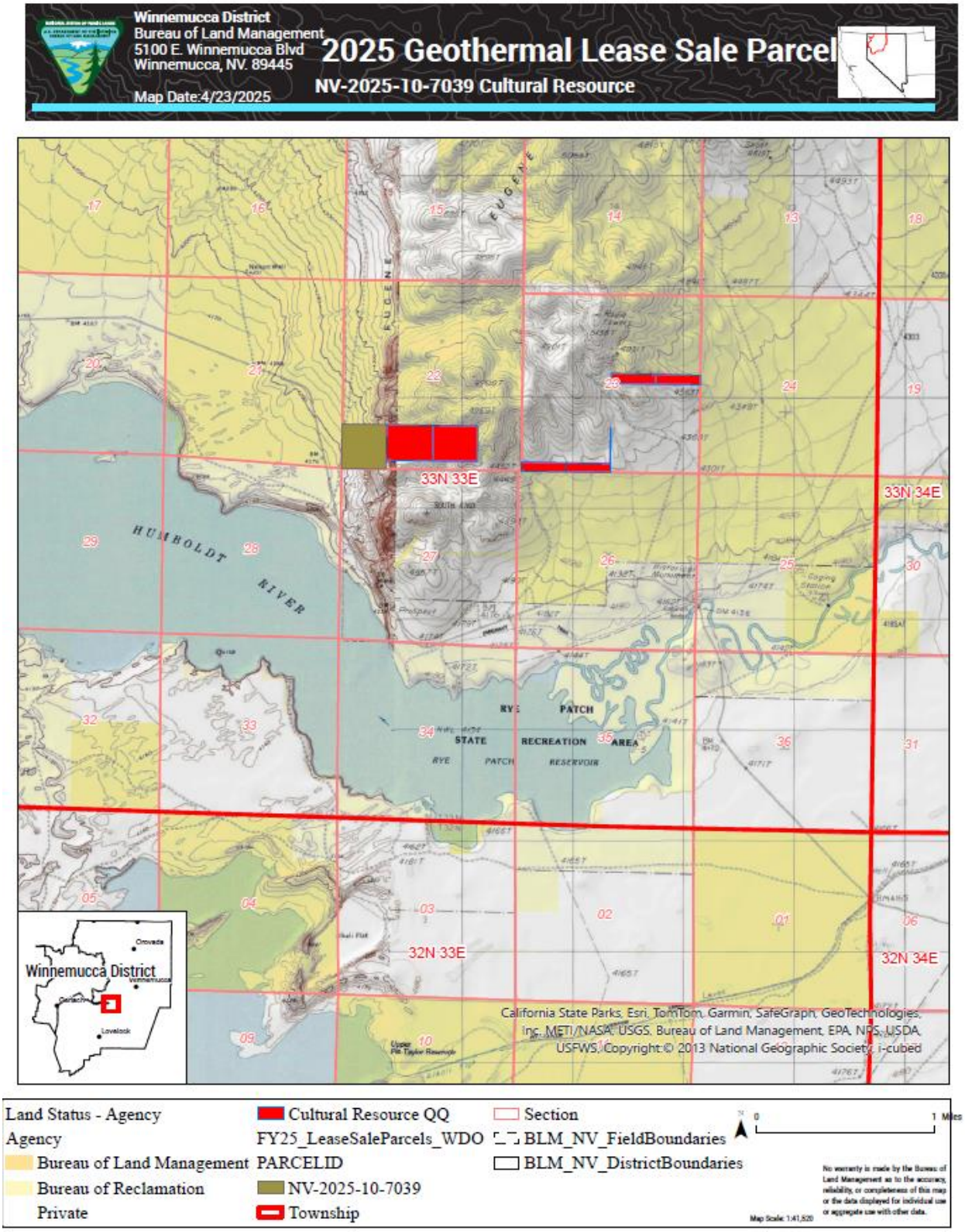

Figure 19. Trails (NSO) and Trails (CSU) in parcel NV-2025-10-2228.

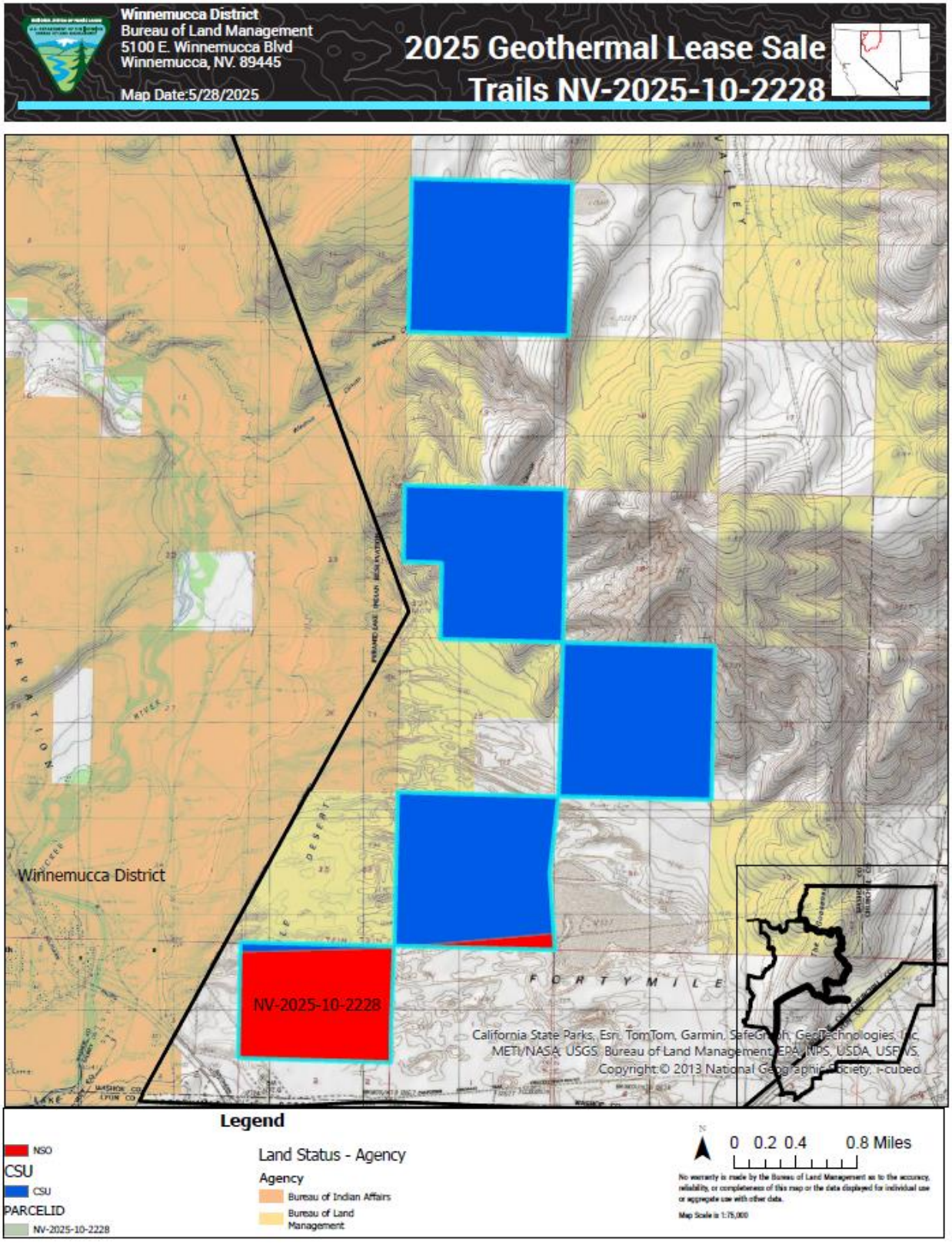

Figure 20. Trails (NSO) and Trails (CSU) in parcel NV-2025-10-7039.

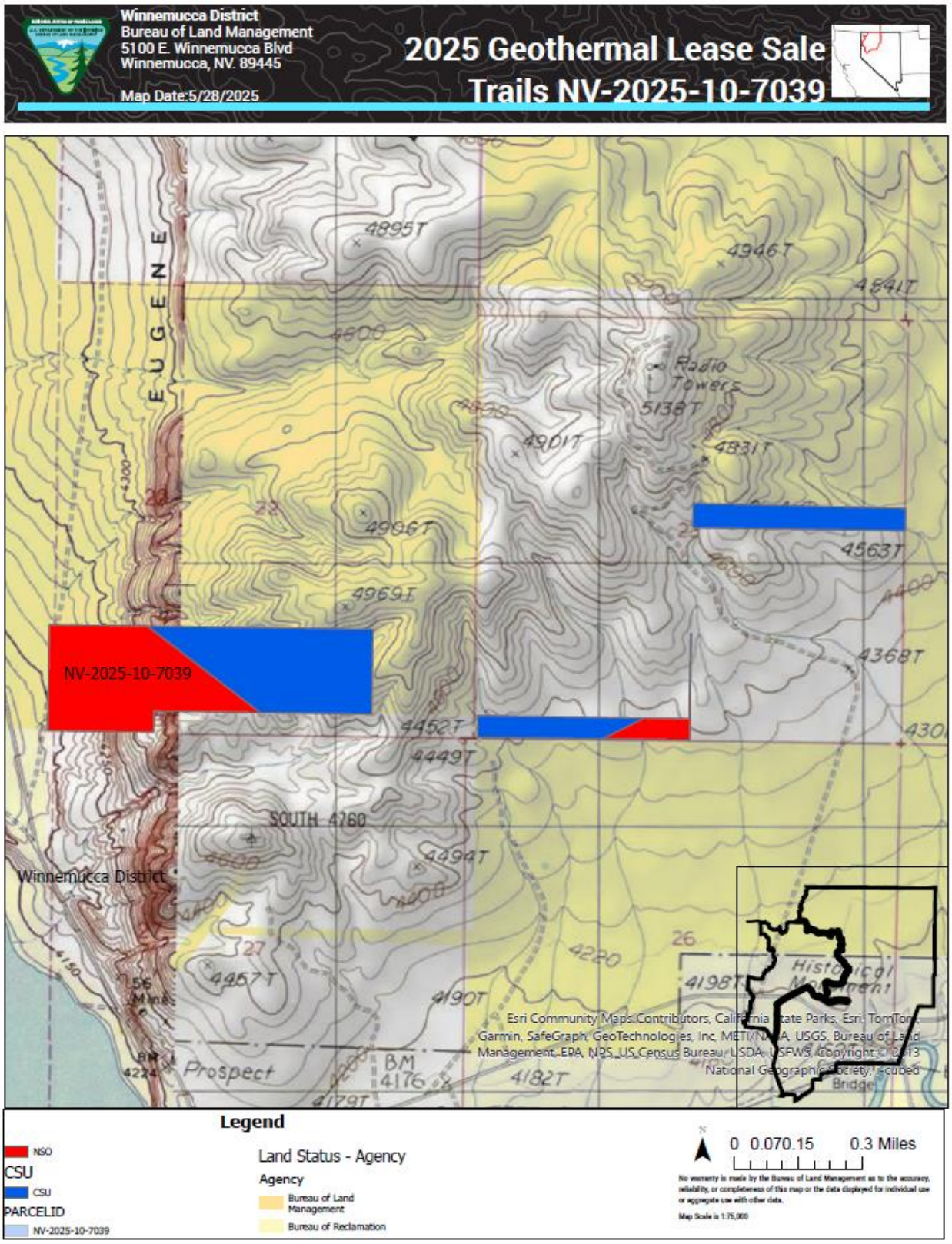

Figure 21. Fossils (PFYC-4) Notice (LN) in parcel NV-2025-10-2149.

Figure 22. Fossils (PFYC-4) Notice (LN) in parcel NV-2025-10-2150.

Figure 23. Fossils (PFYC-4) Notice (LN) in parcel NV-2025-10-2201.

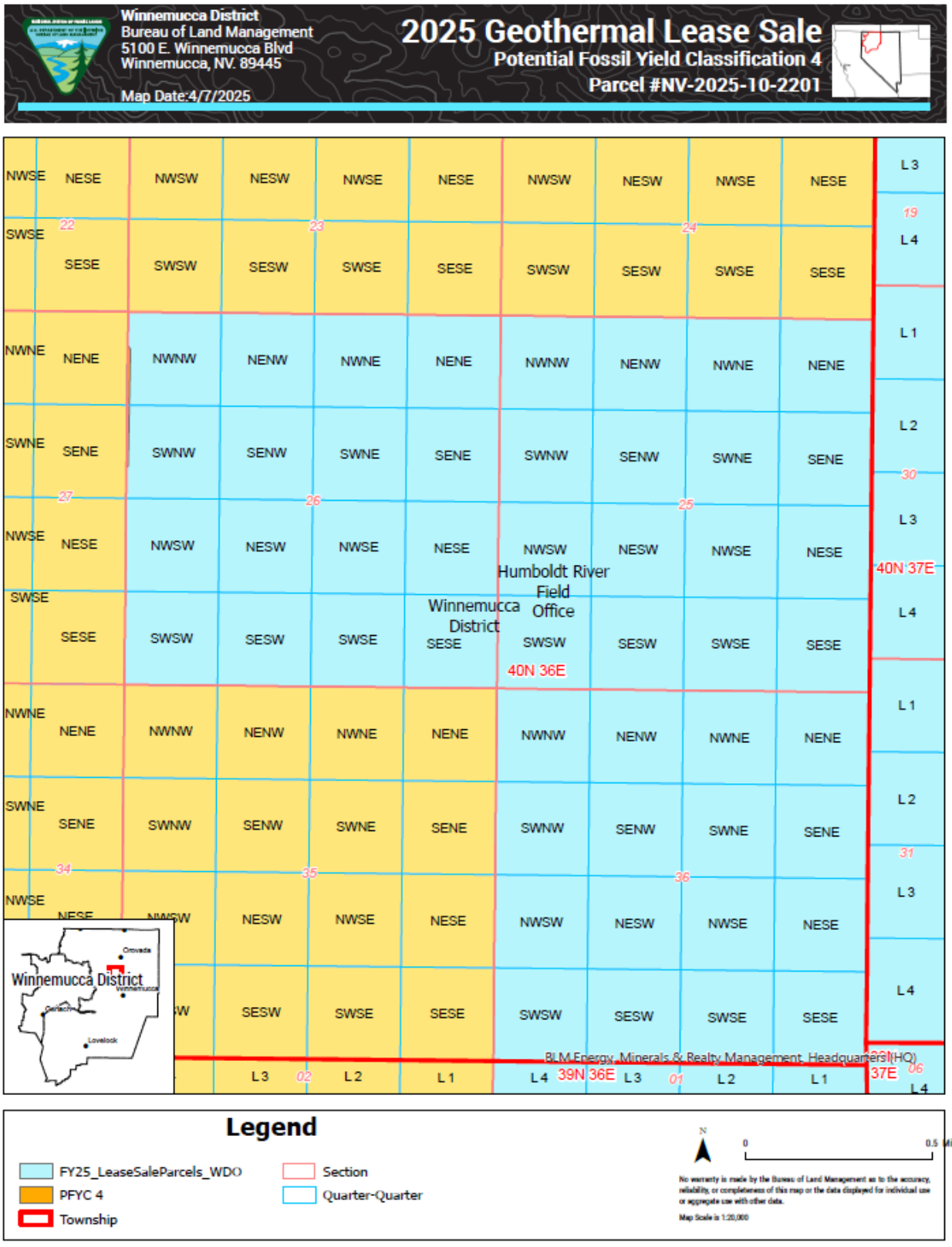

Figure 24. Fossils (PFYC-4) Notice (LN) in parcel NV-2025-10-7039.

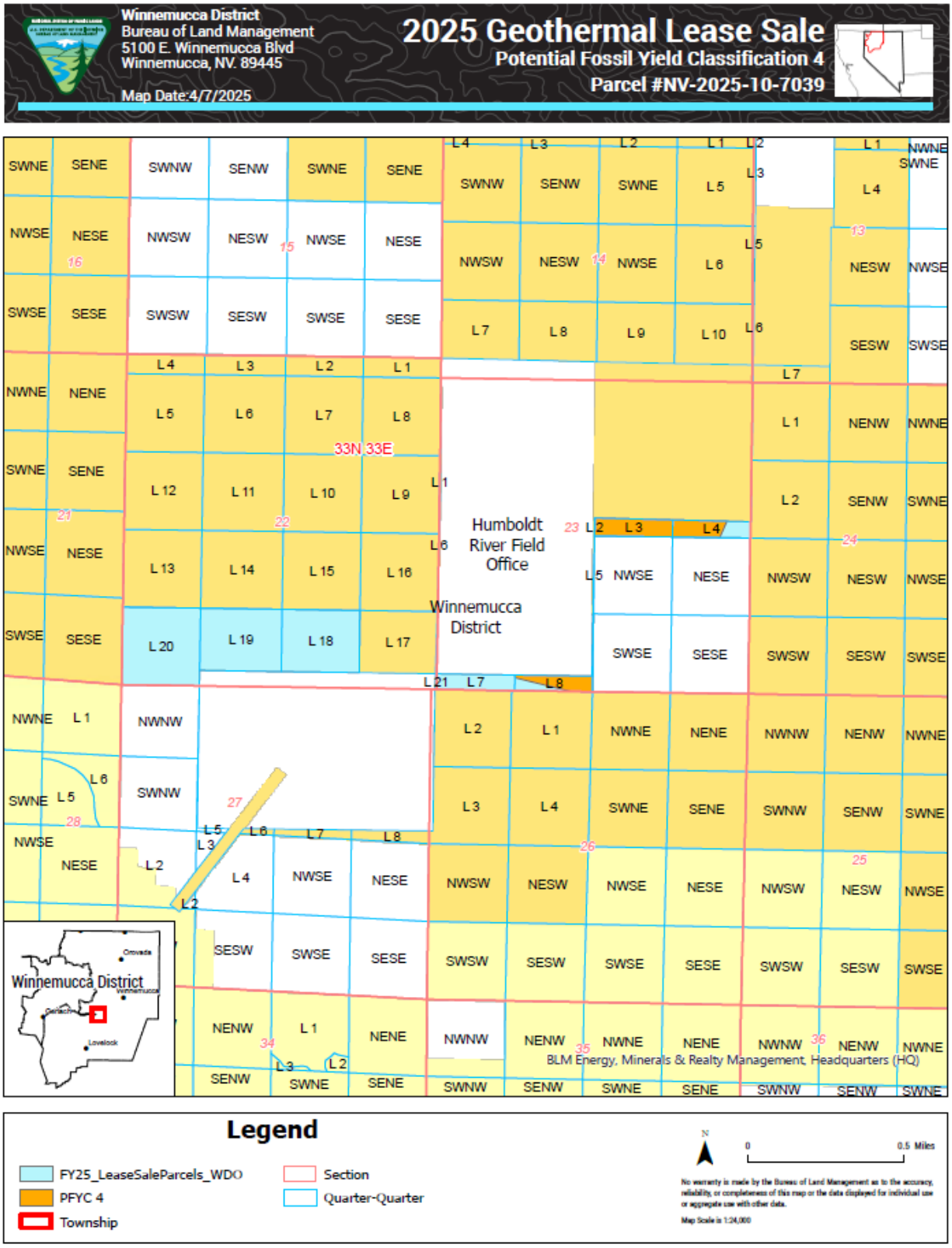

Figure 25. Fossils (PFYC-5) Stipulation (NSO) in parcel NV-2025-10-

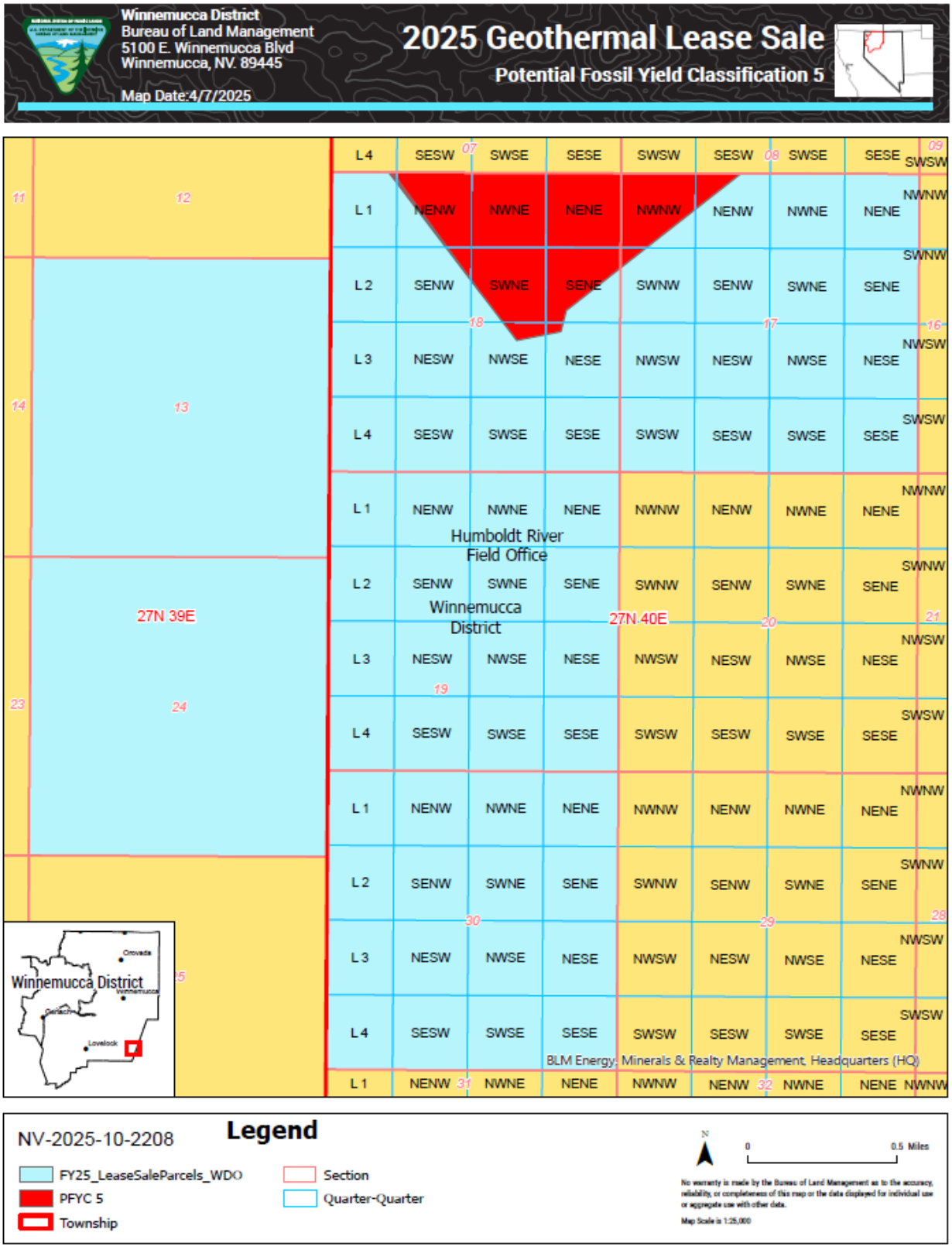

Figure 26. Special Recreation Management Area (NSO) in parcel 2152.

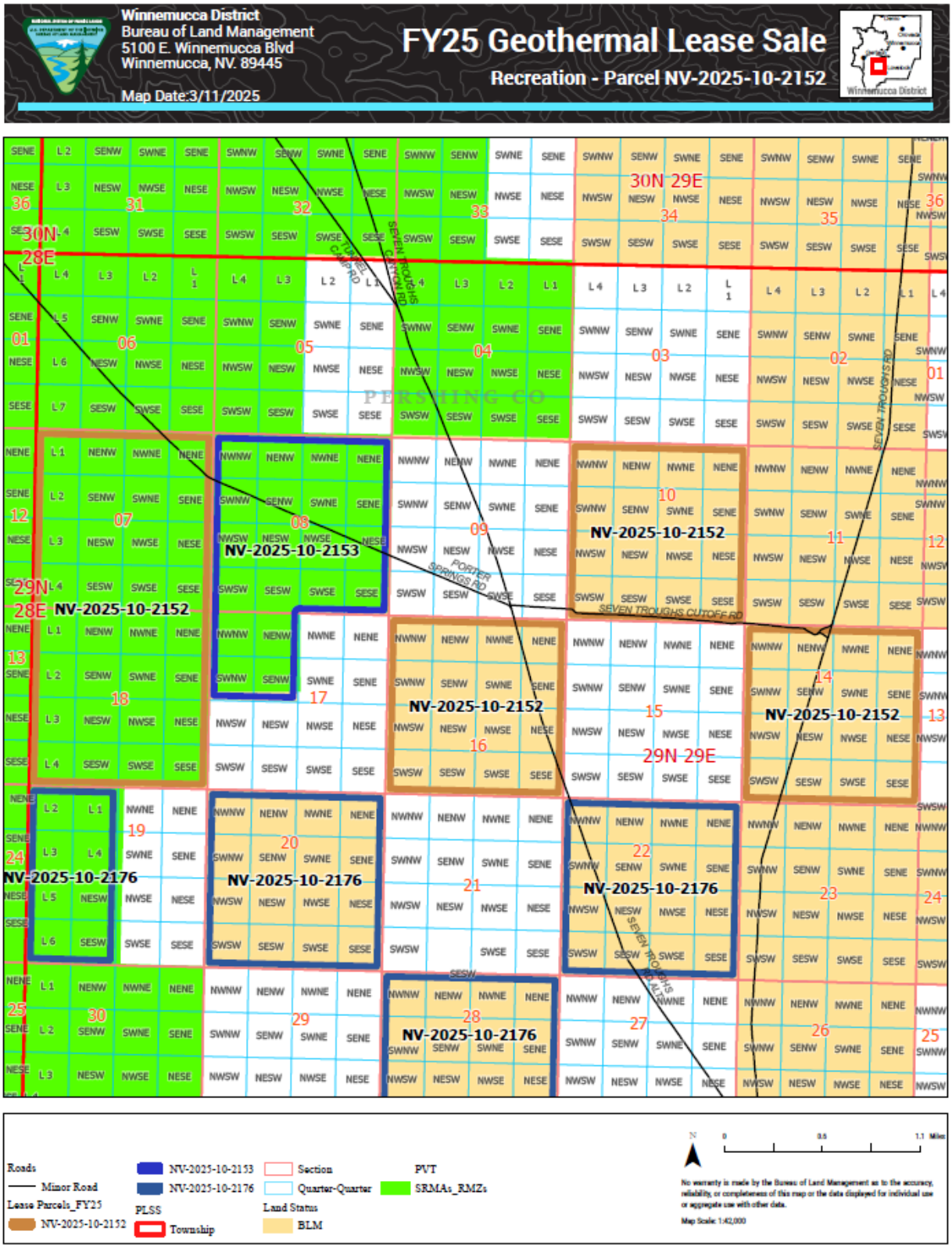

Figure 27. Special Recreation Management Area (NSO) in parcel 2153.

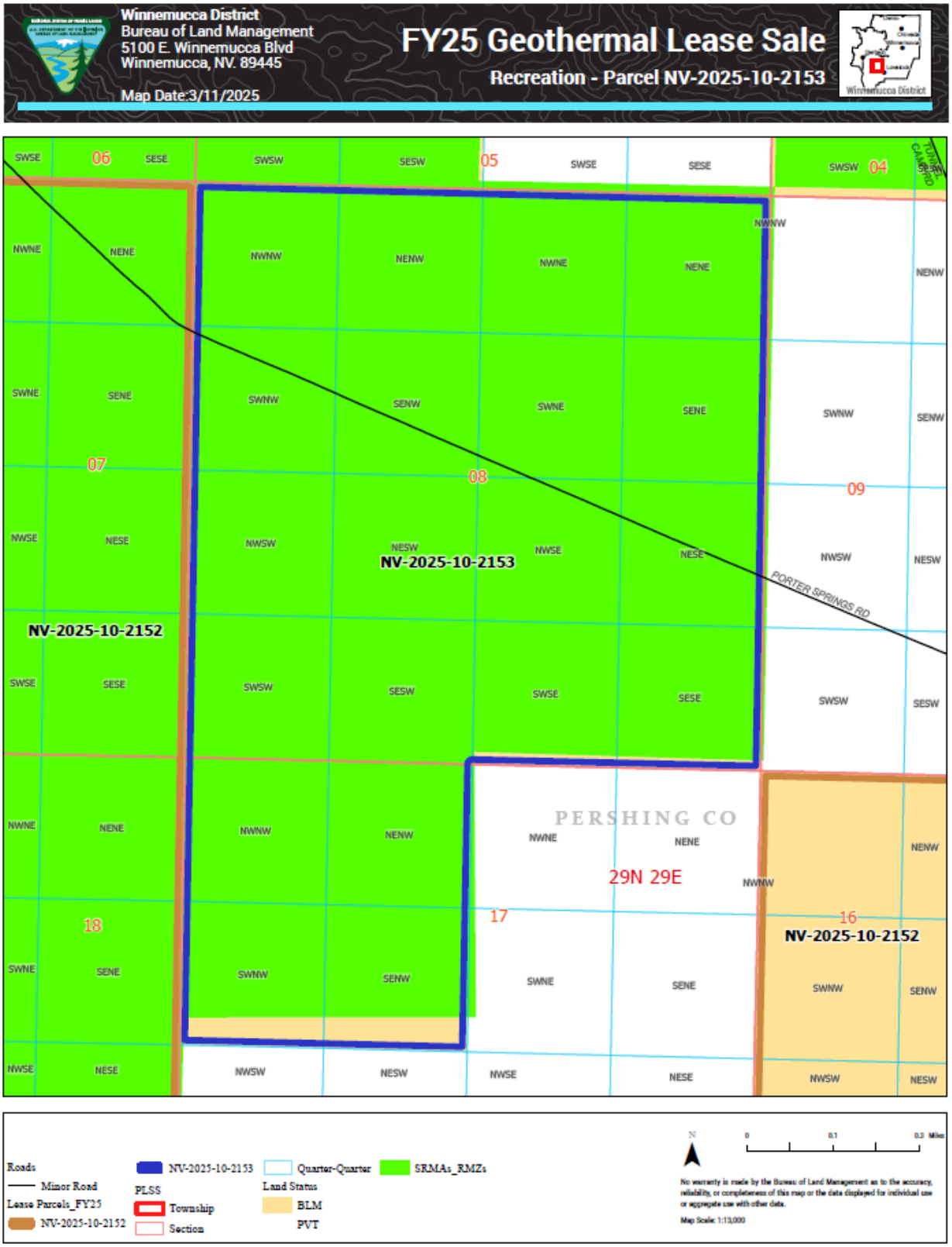

Figure 28. Special Recreation Management Area (NSO) in parcel 2176.

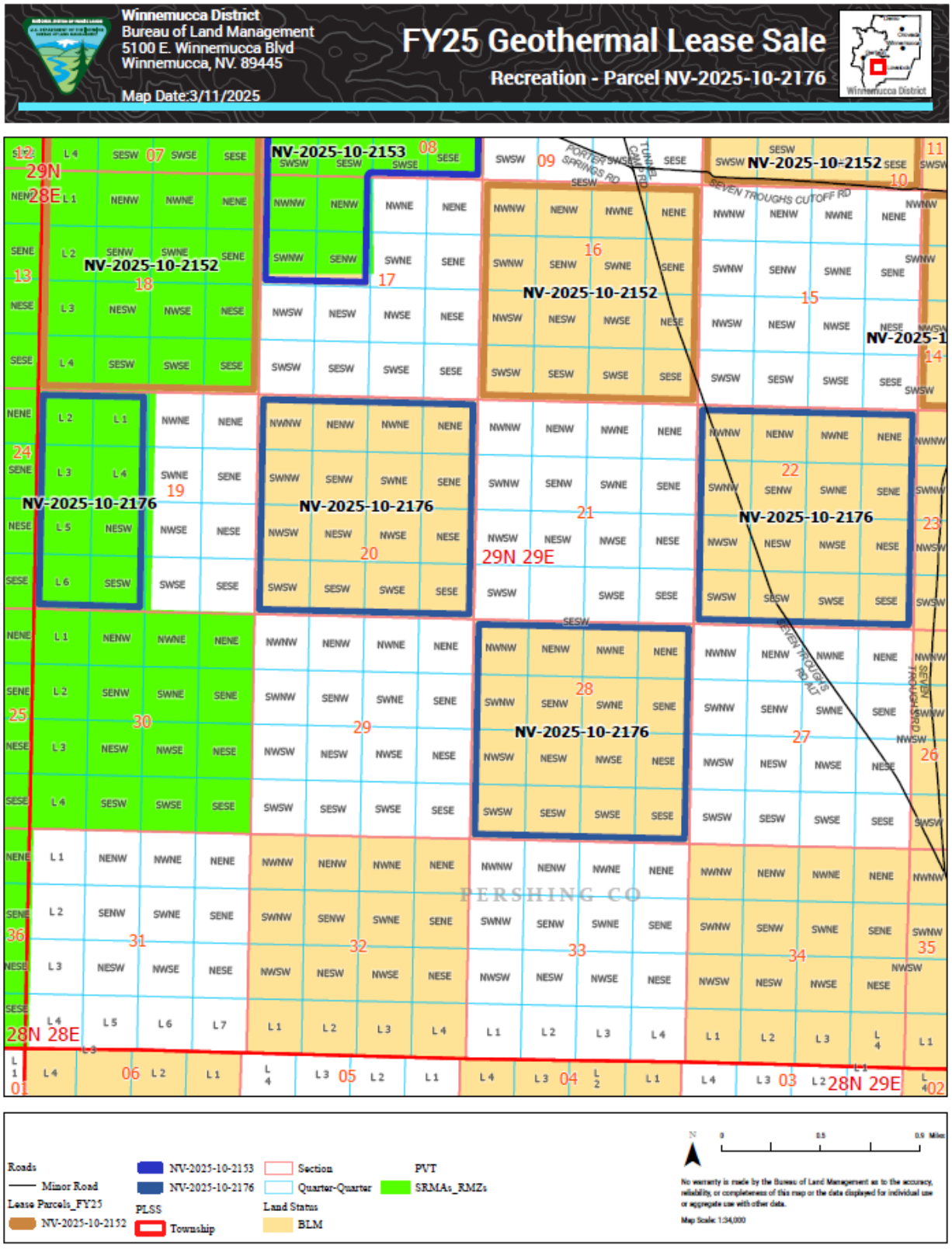

Figure 29. Special Recreation Management Area (NSO) in parcel 2200.

Figure 30. Riparian Habitat (NSO) in parcel NV-2025-10-2149.

Figure 31. Riparian Habitat (NSO) in parcel NV-2025-10-2150.

Figure 32. Riparian Habitat (NSO) in parcel NV-2025-10-2152.

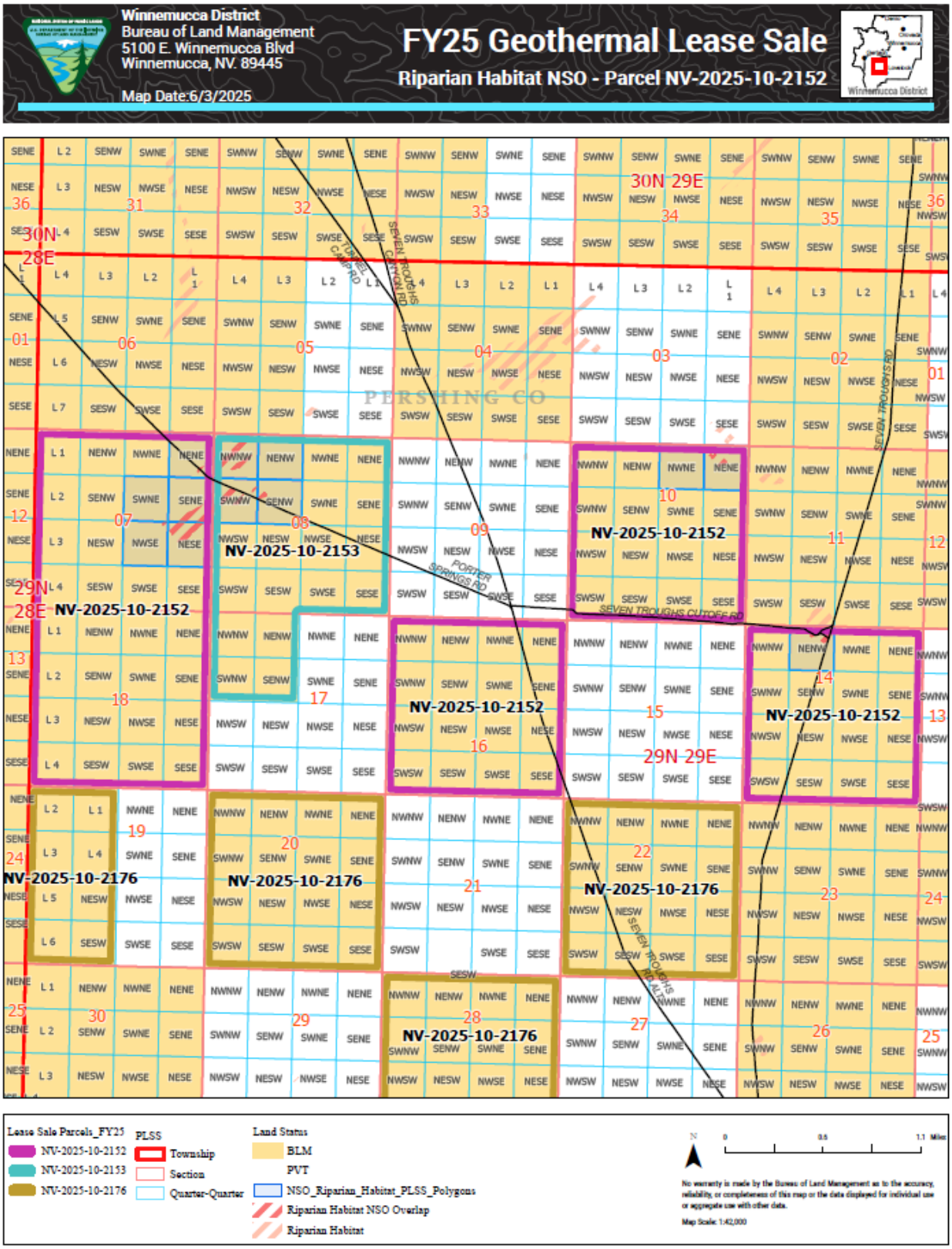

Figure 33. Riparian Habitat (NSO) in parcel NV-2025-10-2153.

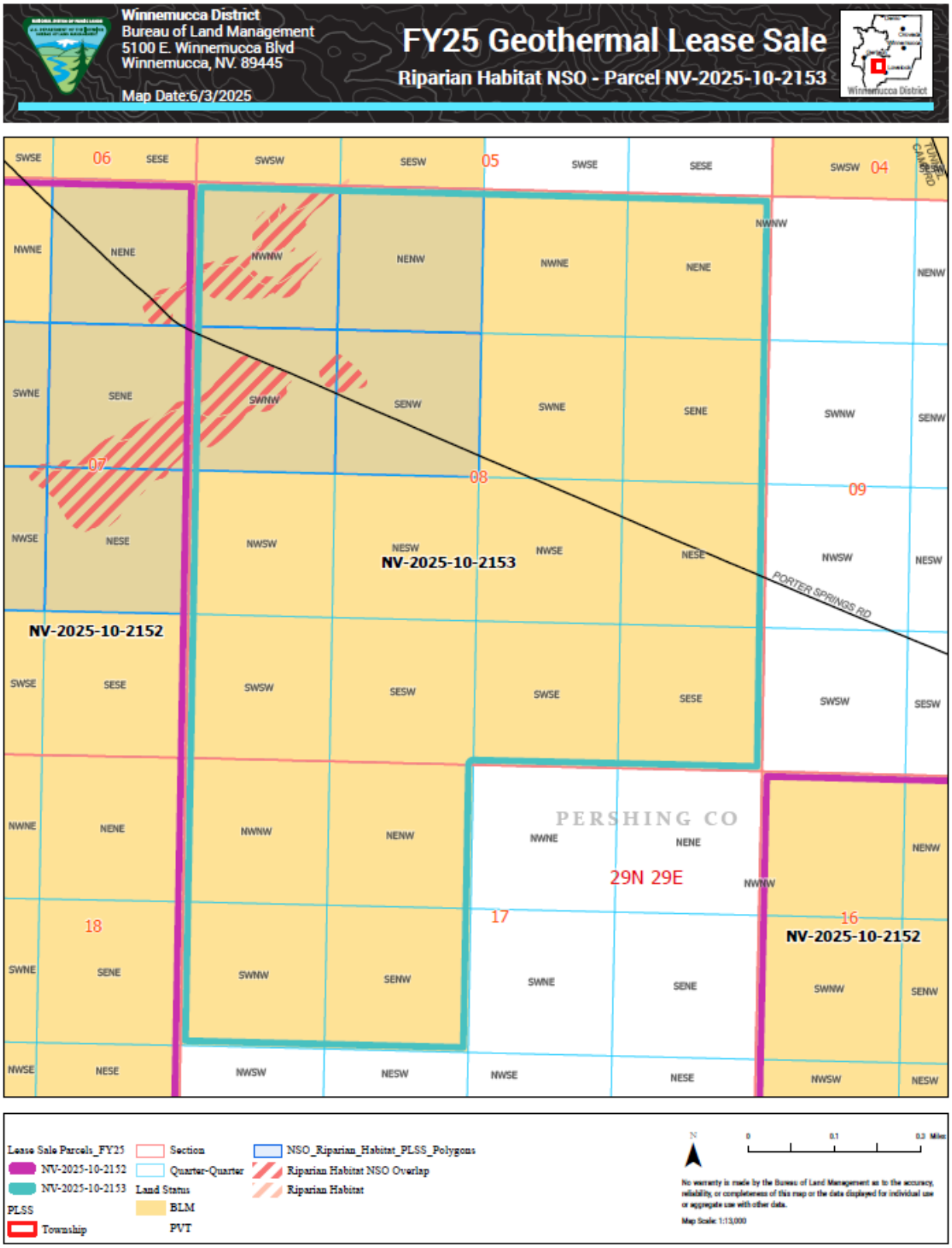

Figure 34. Riparian Habitat (NSO) in parcel NV-2025-10-2187.

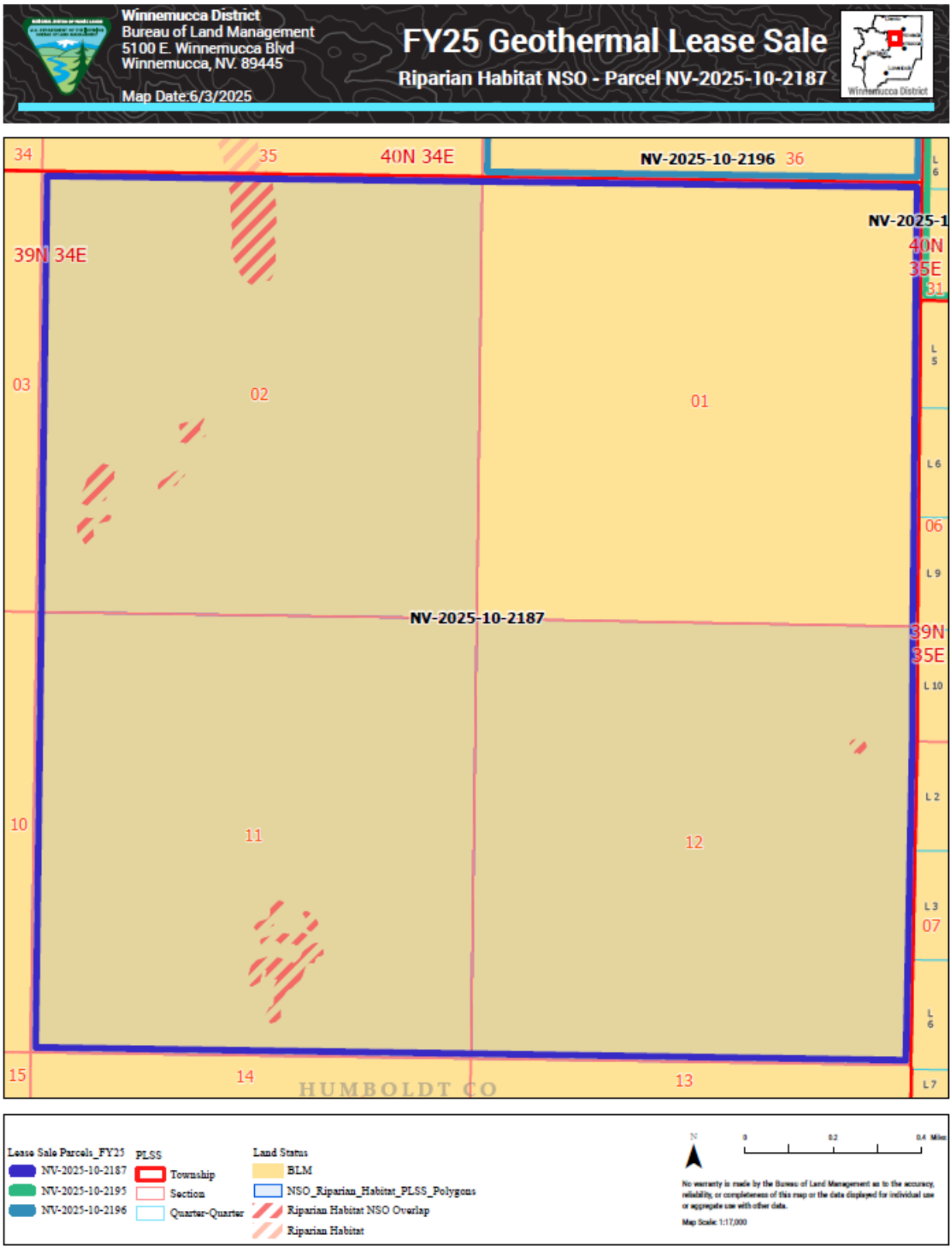

Figure 35. Riparian Habitat (NSO) in parcel NV-2025-10-2194.

Figure 36. Riparian Habitat (NSO) in parcel NV-2025-10-2195.

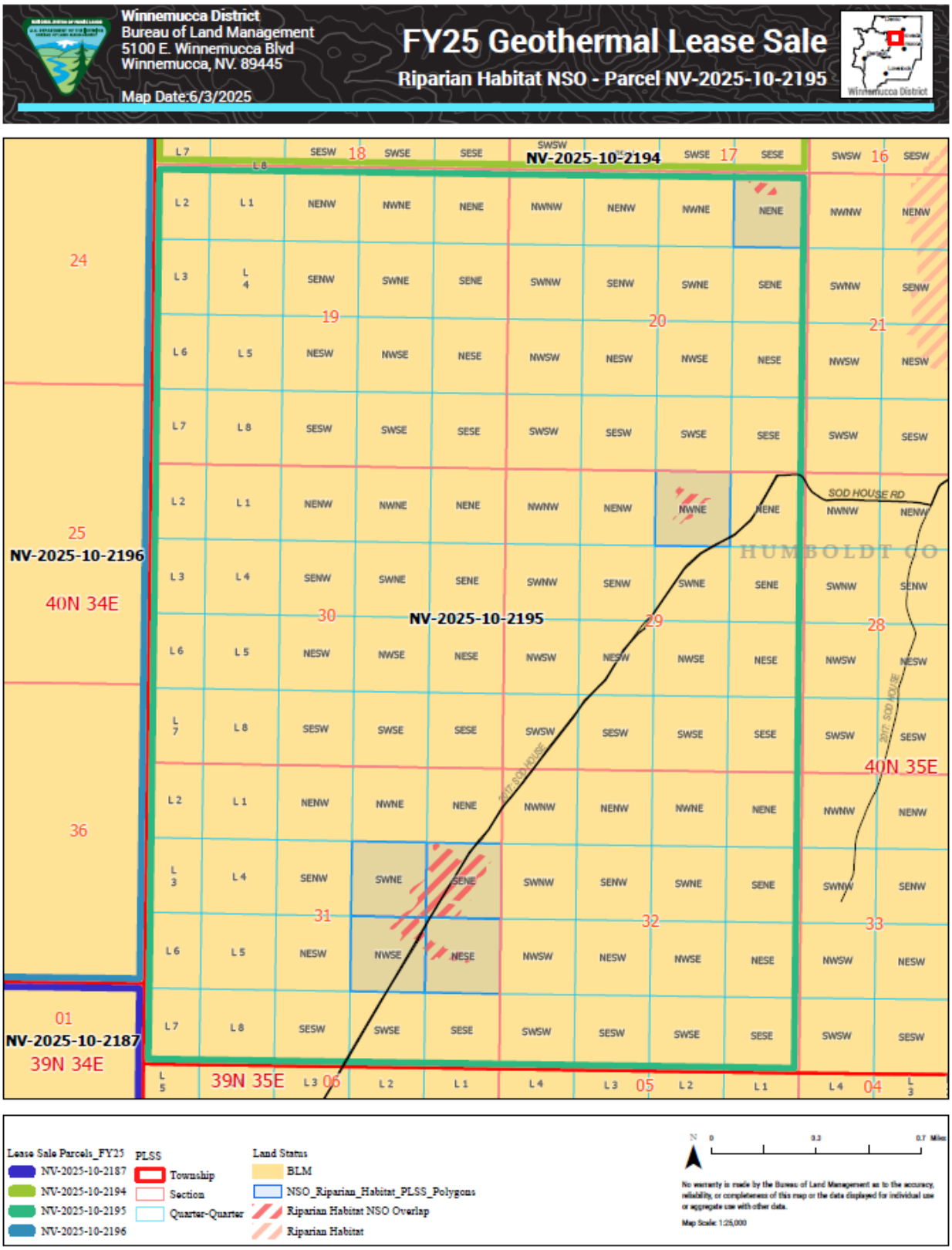

Figure 37. Riparian Habitat (NSO) in parcel NV-2025-10-2196.

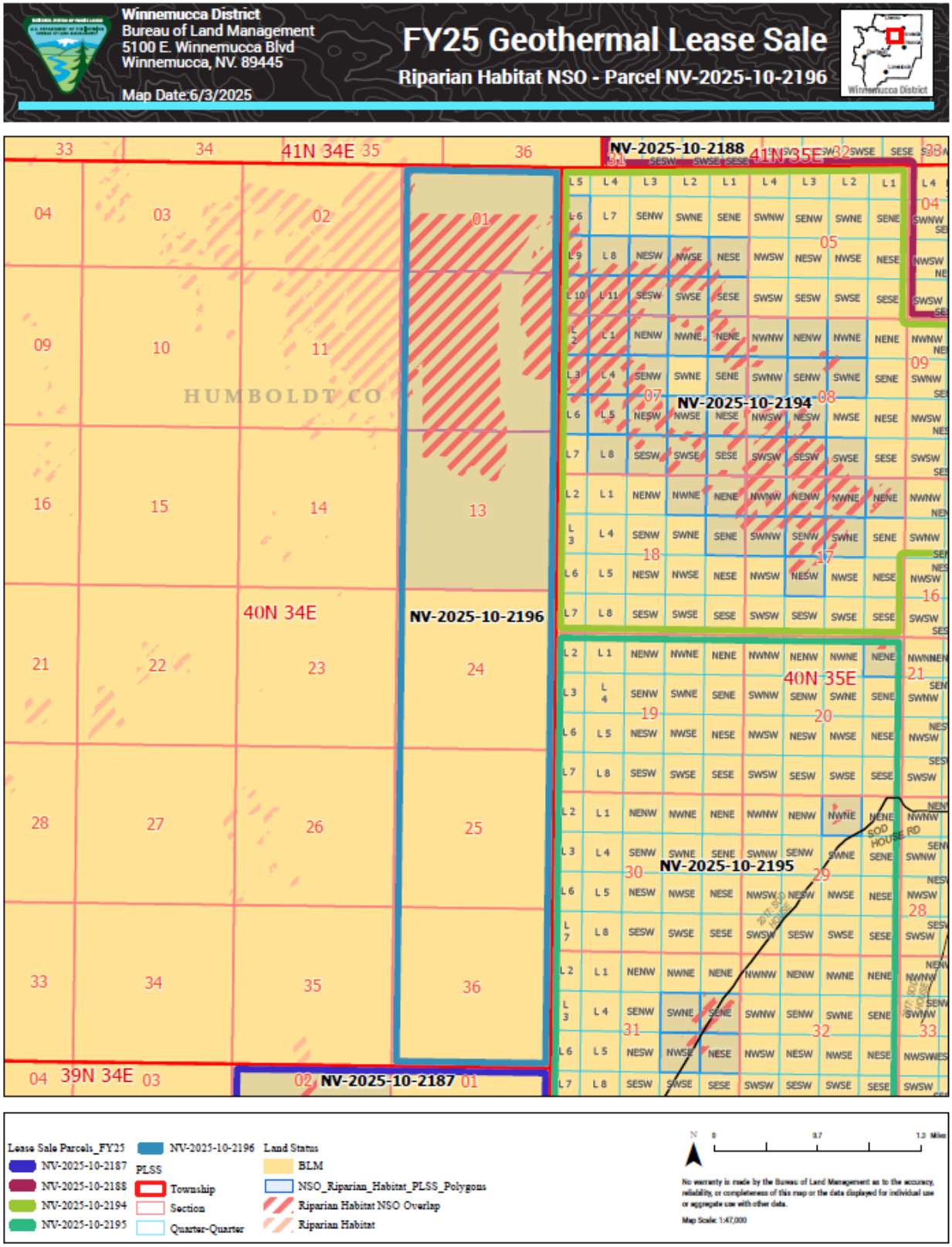

Figure 38. Riparian Habitat (NSO) in parcel NV-2025-10-2200.

Figure 39. Riparian Habitat (NSO) in parcel NV-2025-10-2201.

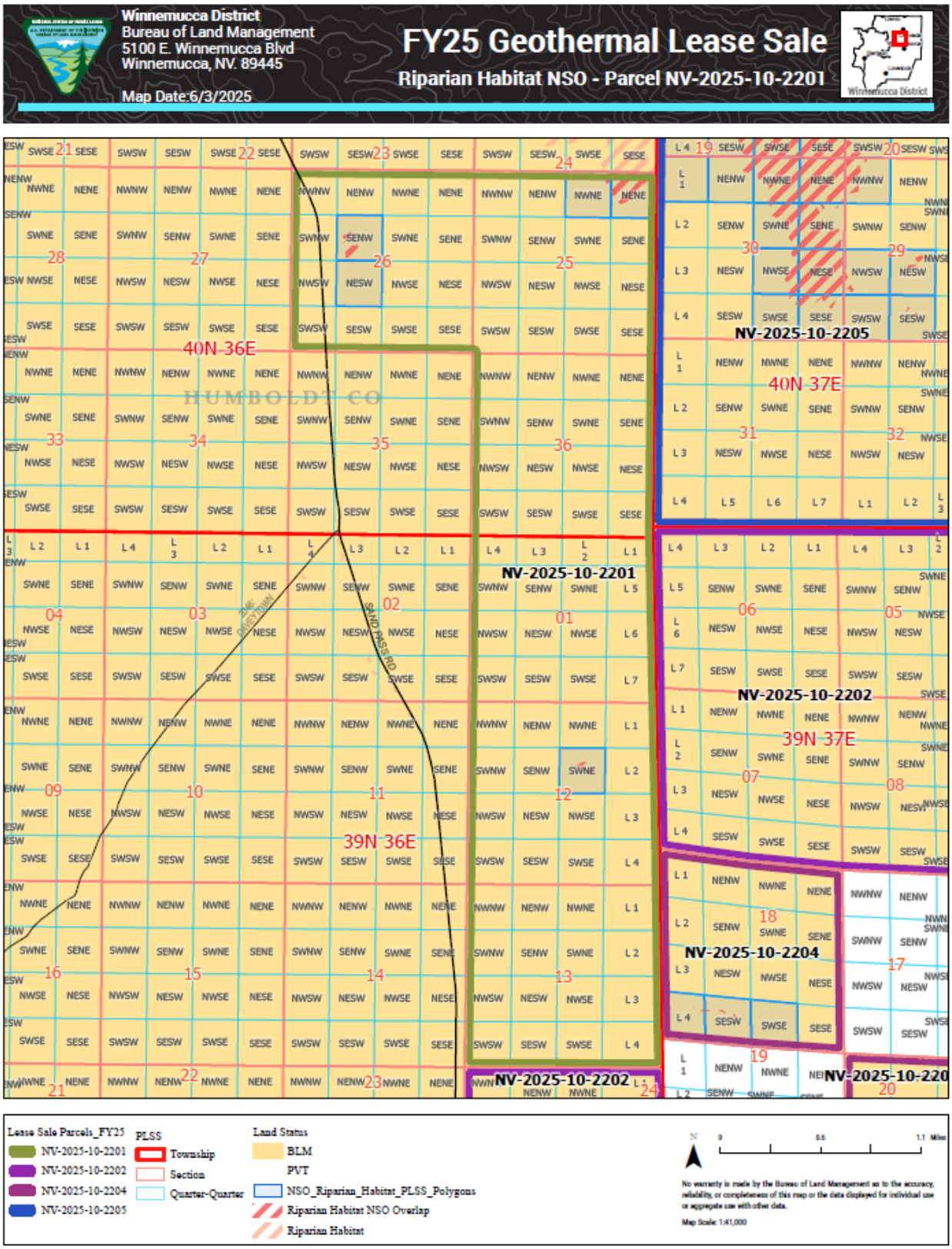

Figure 40. Riparian Habitat (NSO) in parcel NV-2025-10-2202.

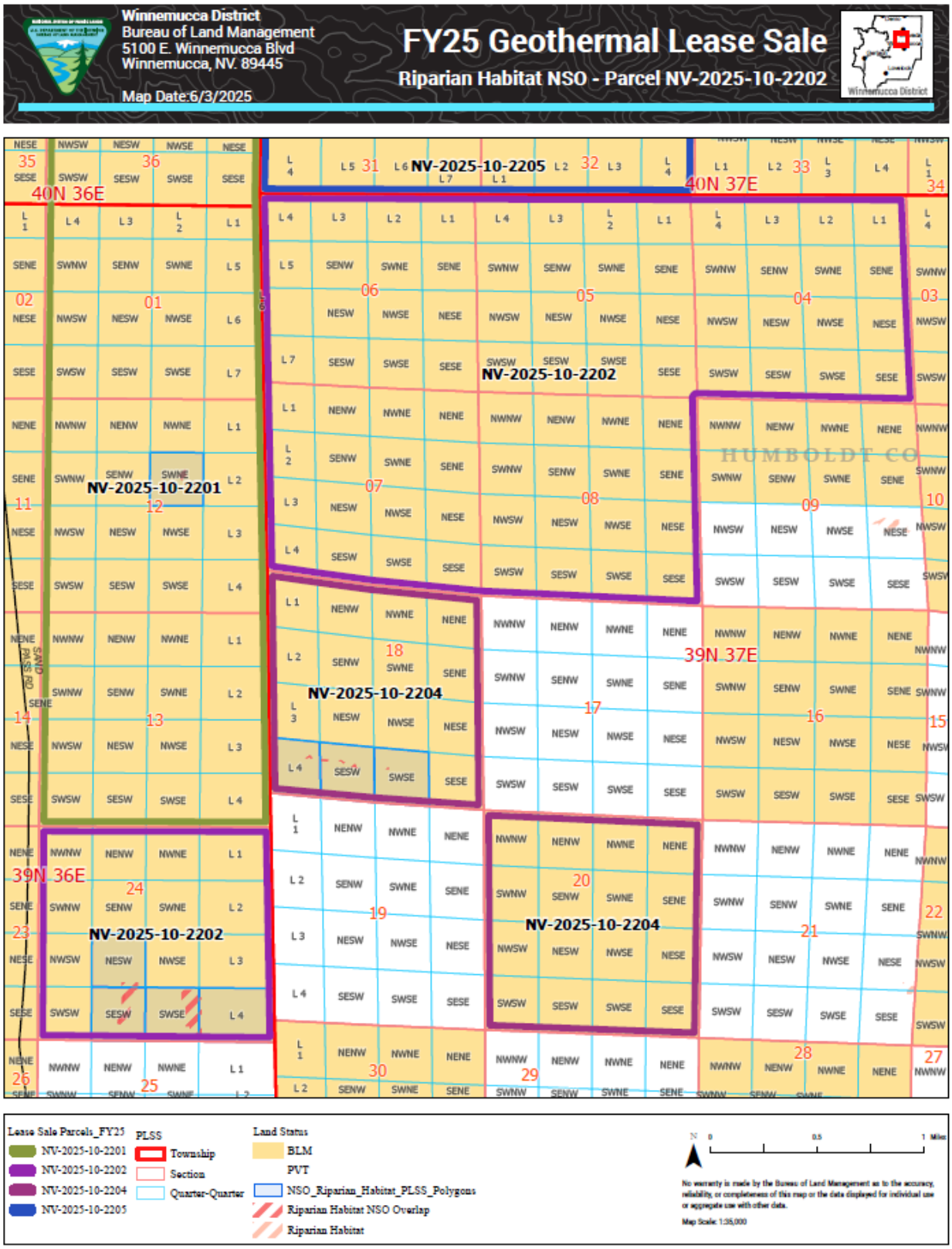

Figure 41. Riparian Habitat (NSO) in parcel NV-2025-10-2204.

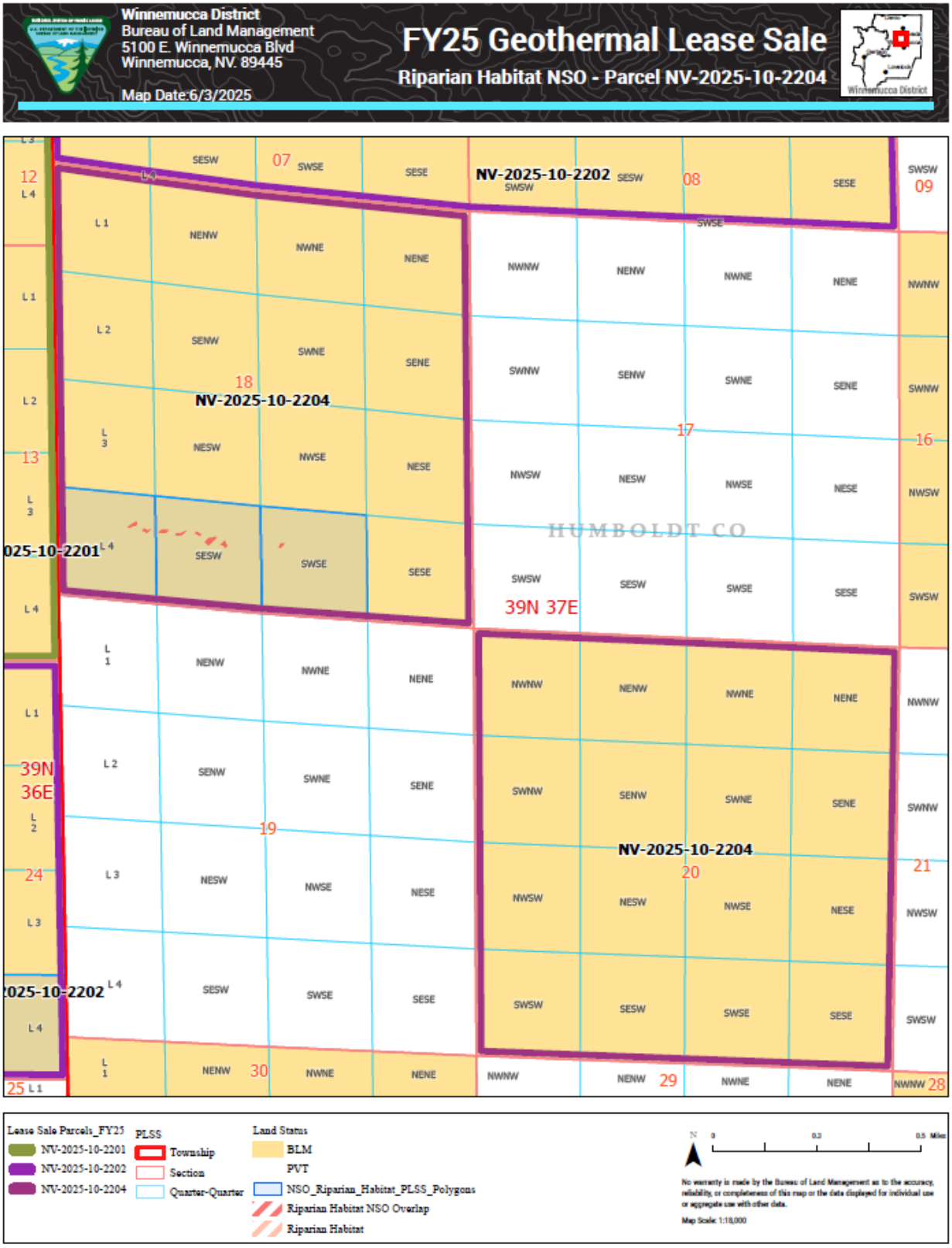

Figure 42. Riparian Habitat (NSO) in parcel NV-2025-10-2205.

Figure 43. Riparian Habitat (NSO) in parcel NV-2025-10-2208.

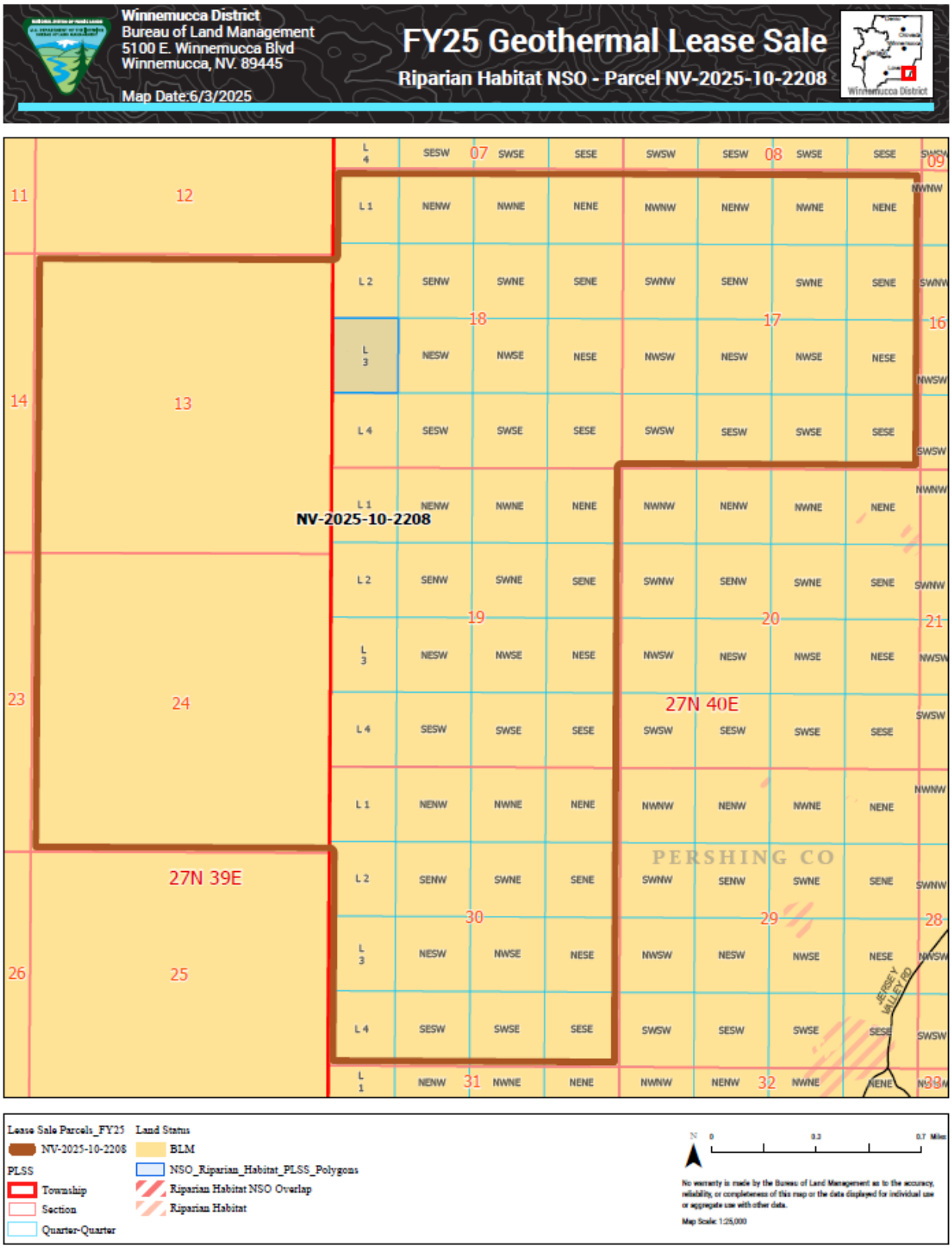

Figure 44. Riparian Habitat (NSO) in parcel NV-2025-10-2211.

Figure 45. Riparian Habitat (NSO) in parcel NV-2025-10-2215.

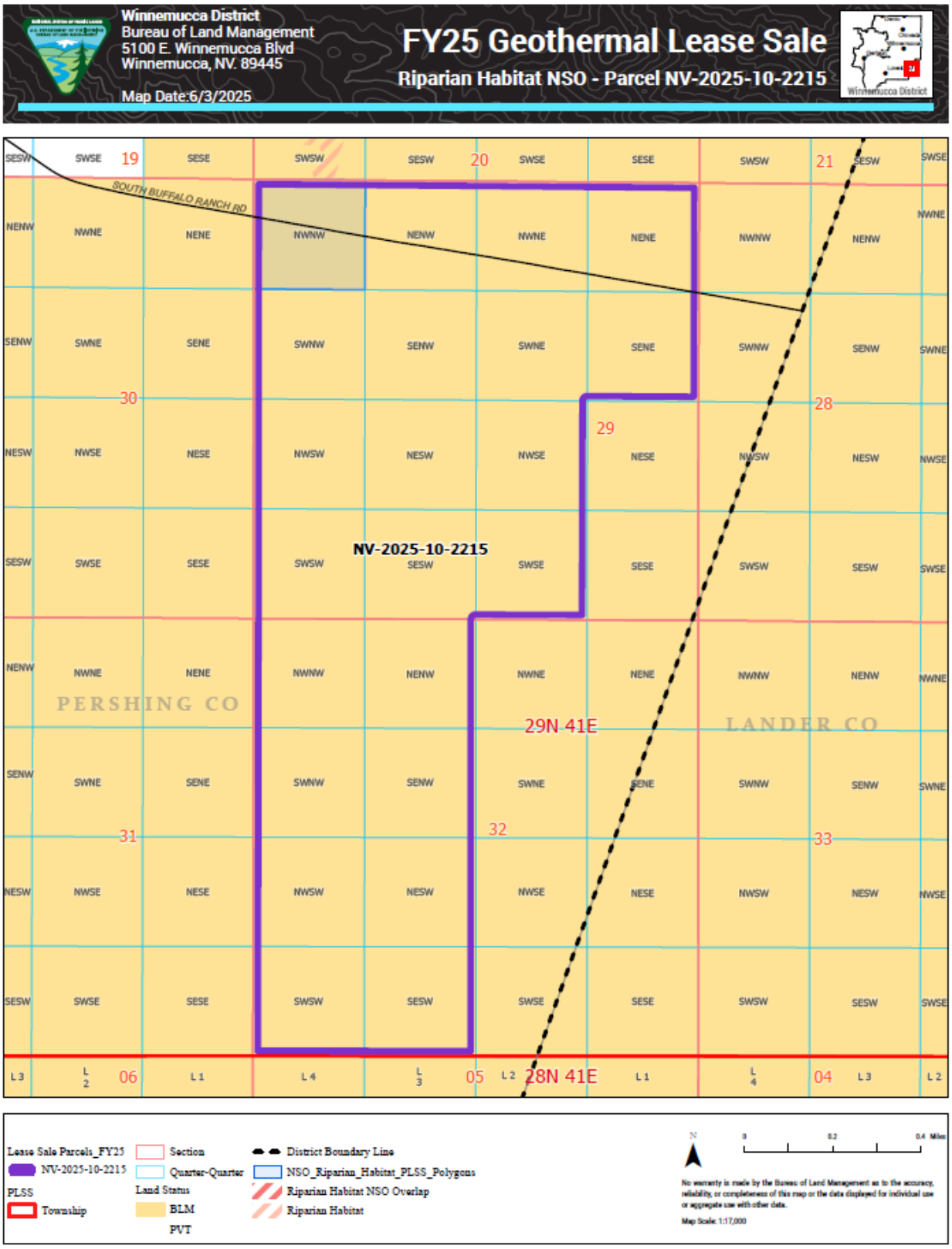

Figure 46. Riparian Habitat (NSO) in parcel NV-2025-10-2228.

Figure 47. Riparian Habitat (NSO) in parcel NV-2025-10-7035.

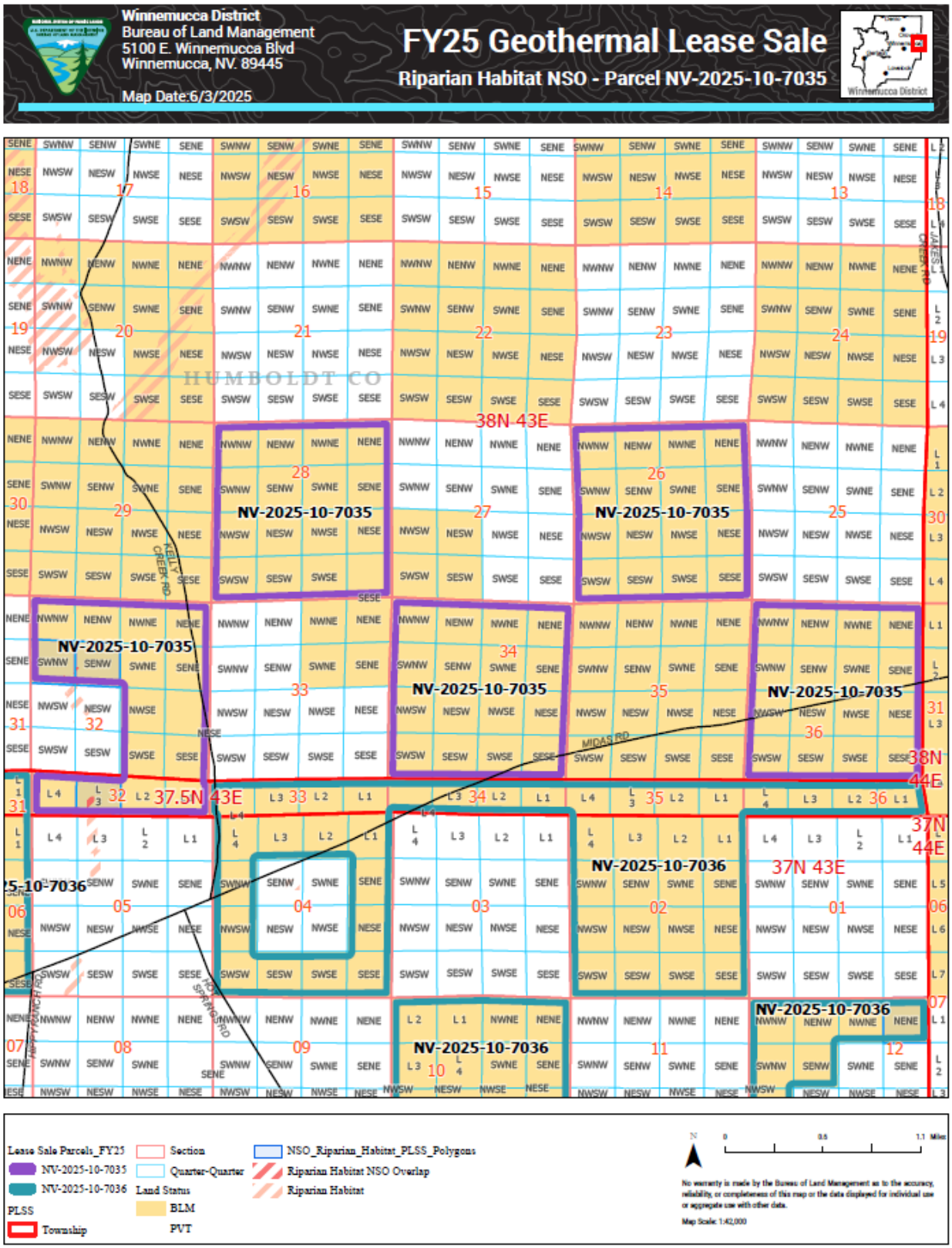

Figure 48. Riparian Habitat (NSO) in parcel NV-2025-10-7036.

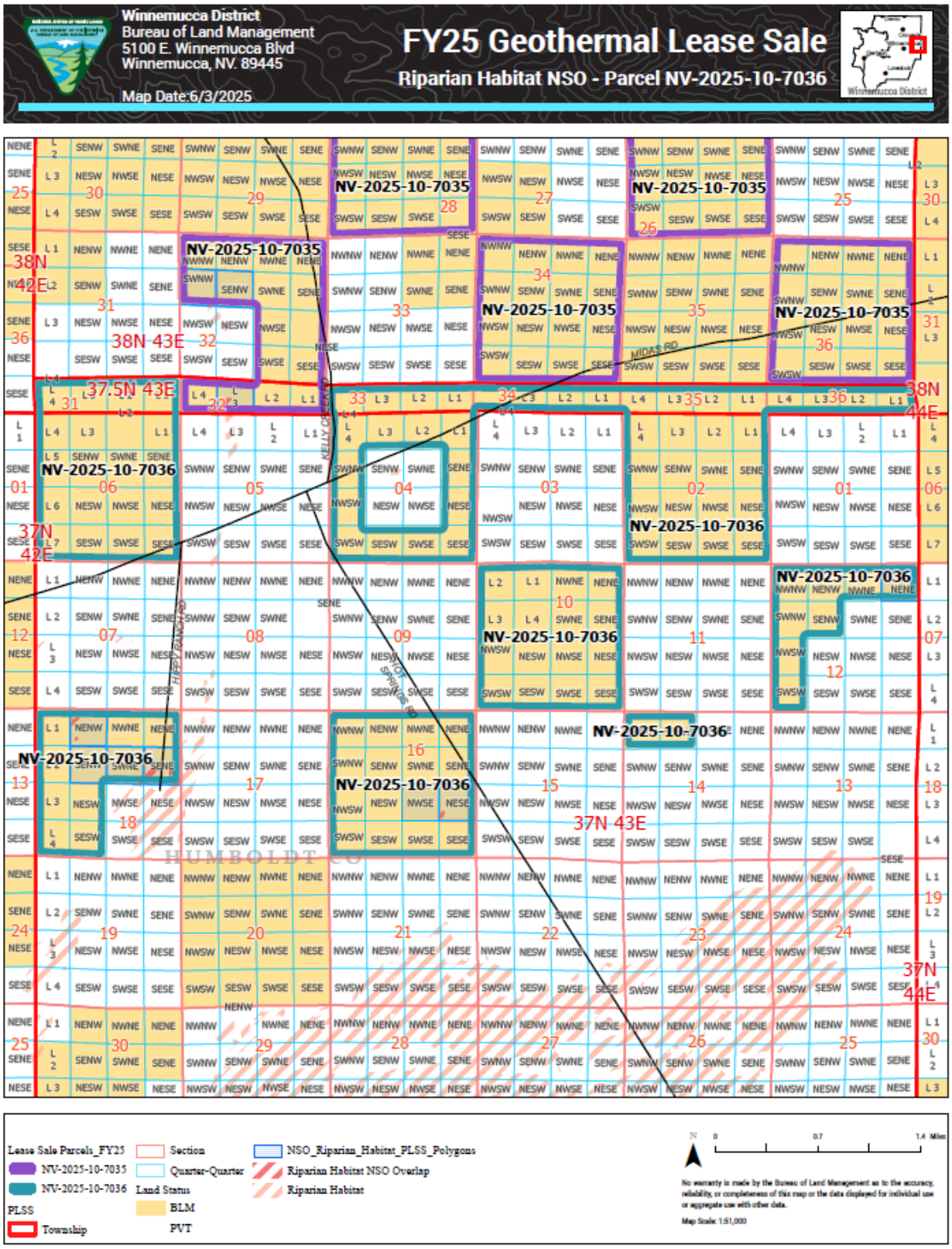

Figure 49. Riparian Habitat Buffer (CSU) in parcel NV-2025-10-2149.

Figure 50. Riparian Habitat Buffer (CSU) in parcel NV-2025-10-2150.

Figure 51. Riparian Habitat Buffer (CSU) in parcel NV-2025-10-2152.

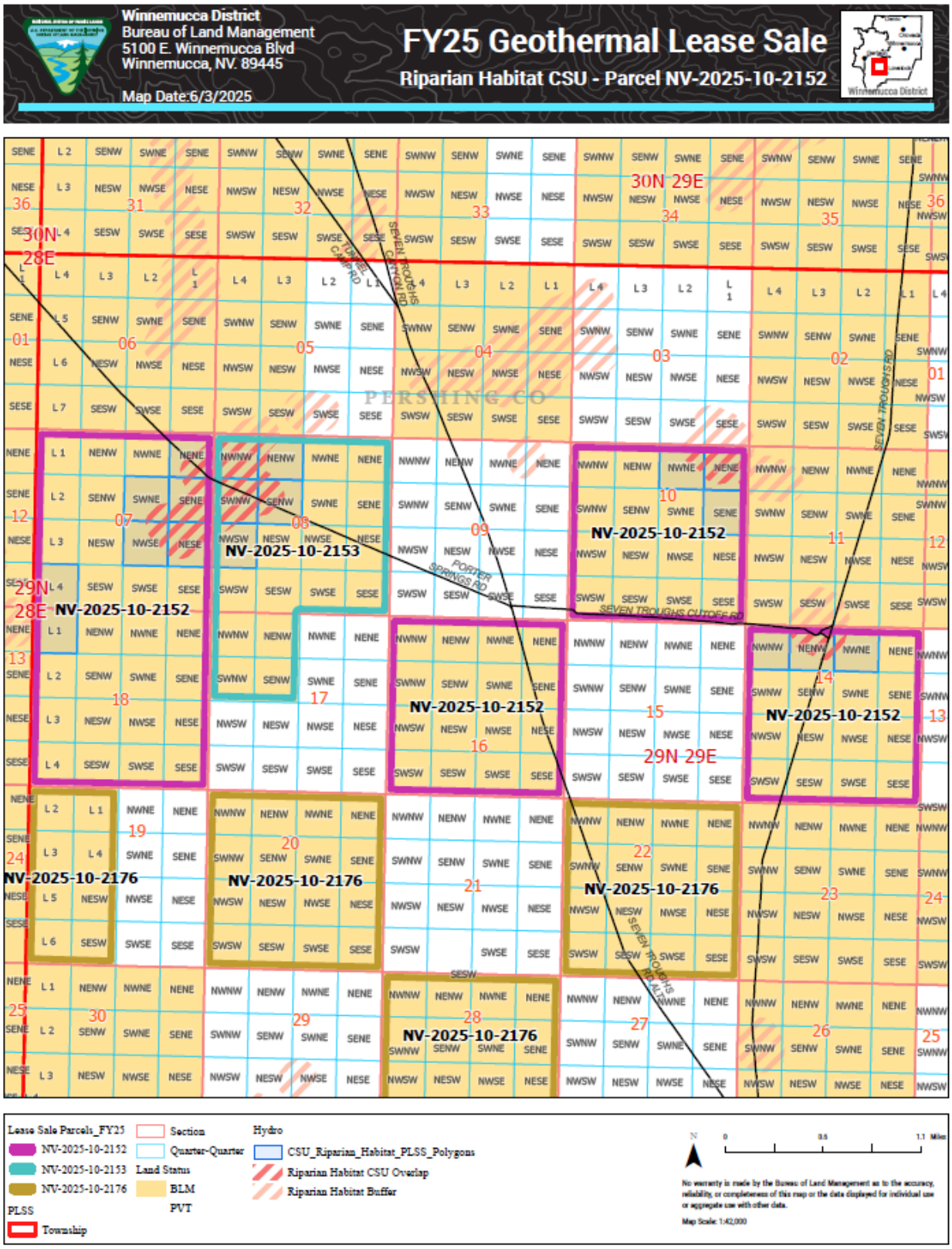

Figure 52. Riparian Habitat Buffer (CSU) in parcel NV-2025-10-2153.

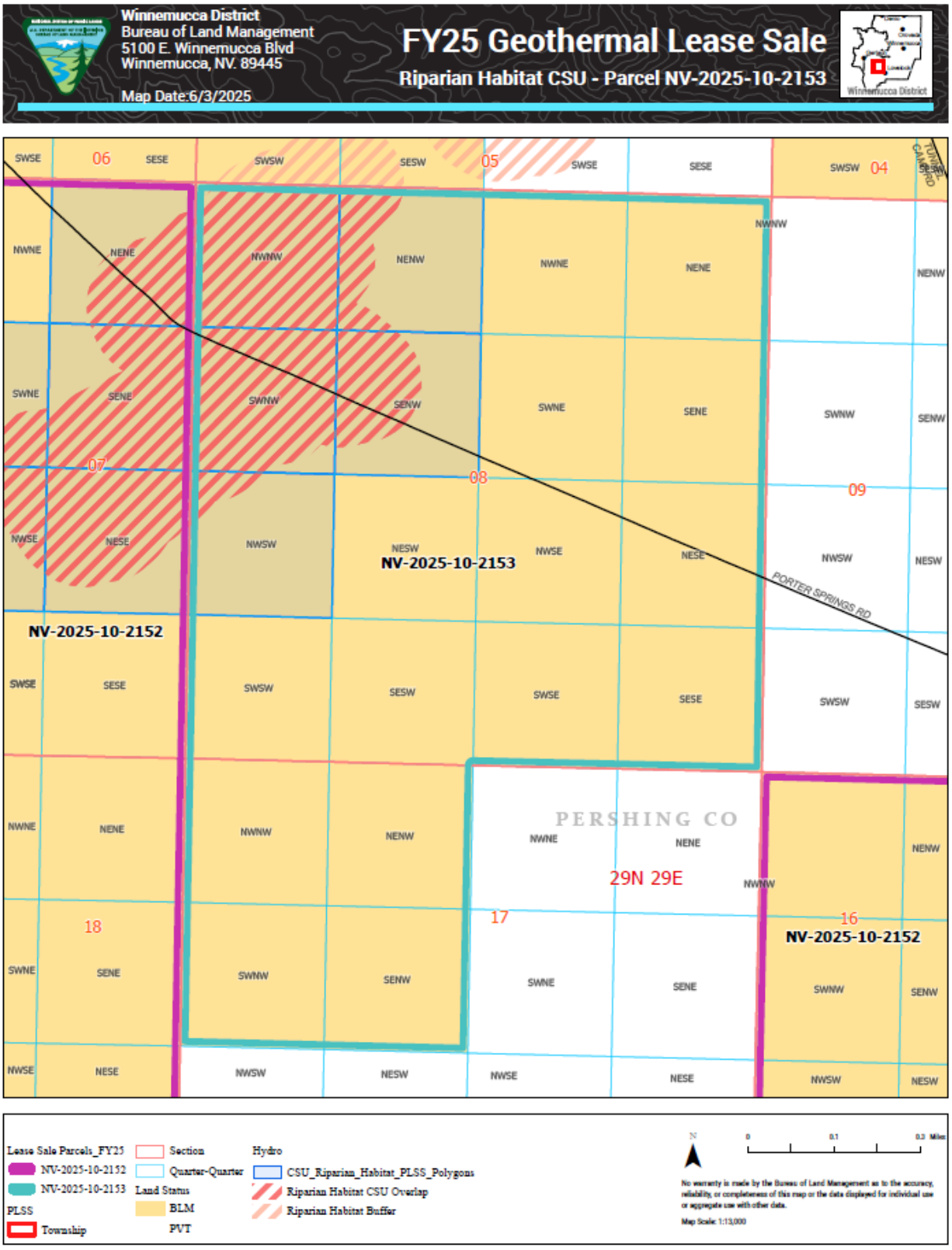

Figure 53. Riparian Habitat Buffer (CSU) in parcel NV-2025-10-2187.

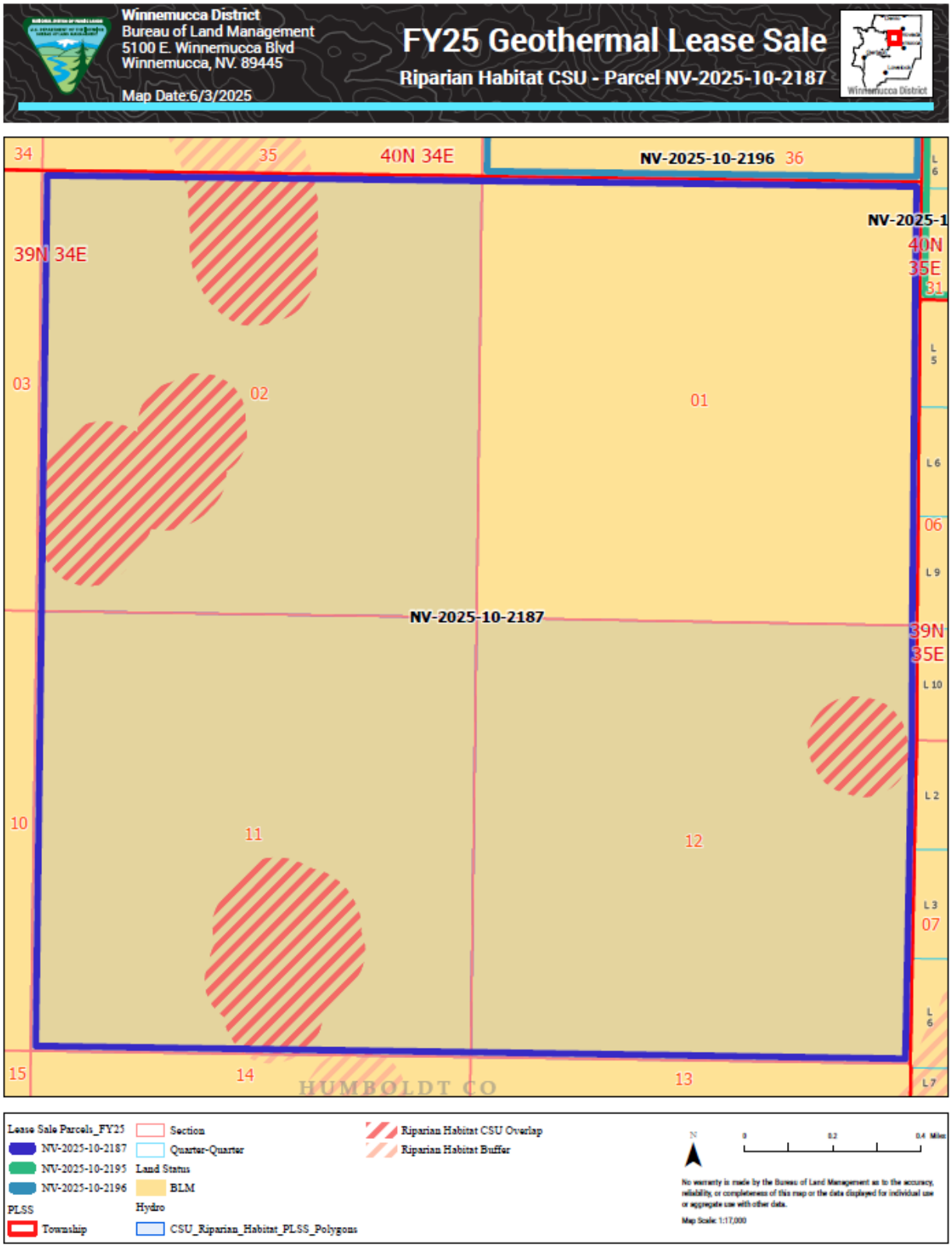

Figure 54. Riparian Habitat Buffer (CSU) in parcel NV-2025-10-2194.

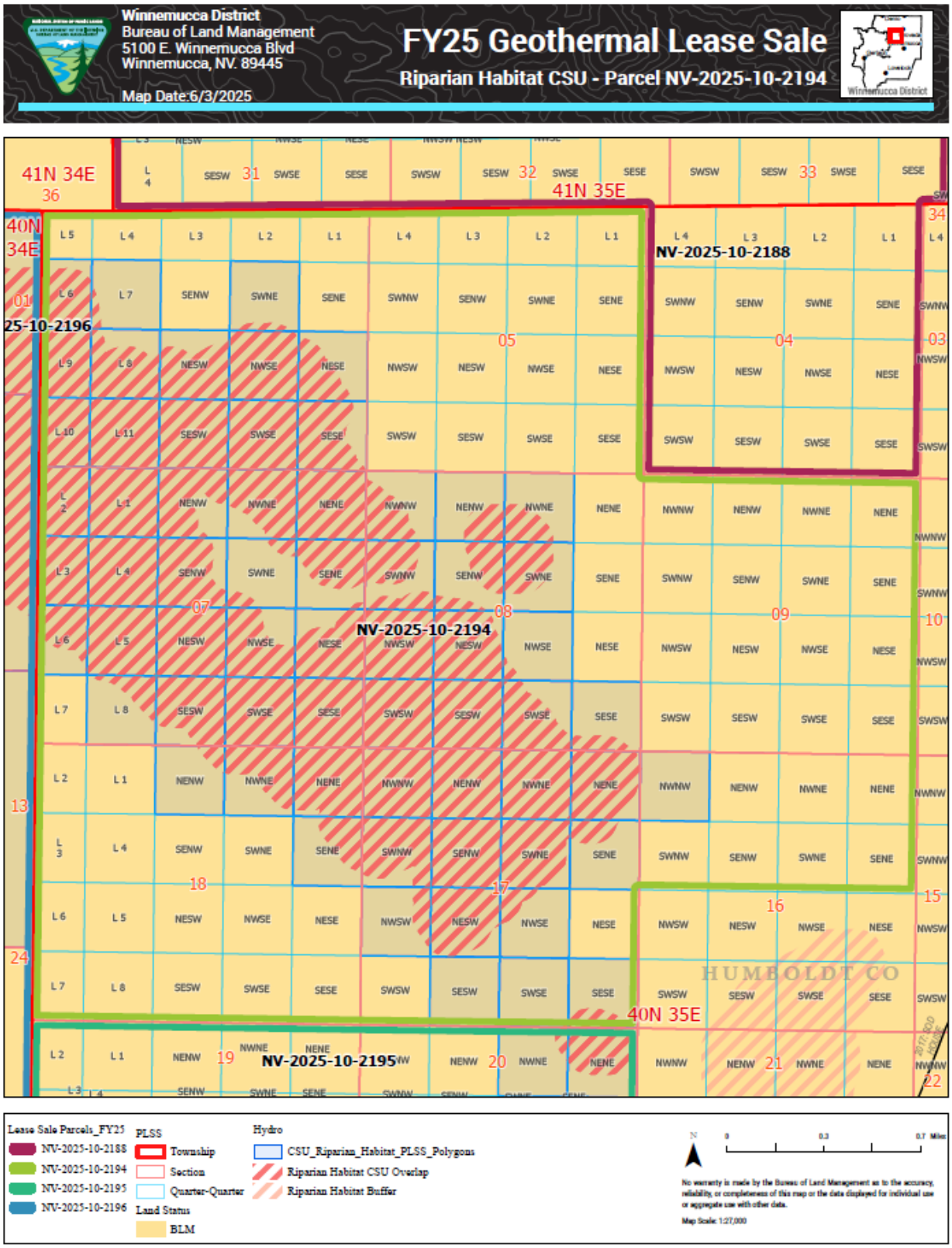

Figure 55. Riparian Habitat Buffer (CSU) in parcel NV-2025-10-2195.

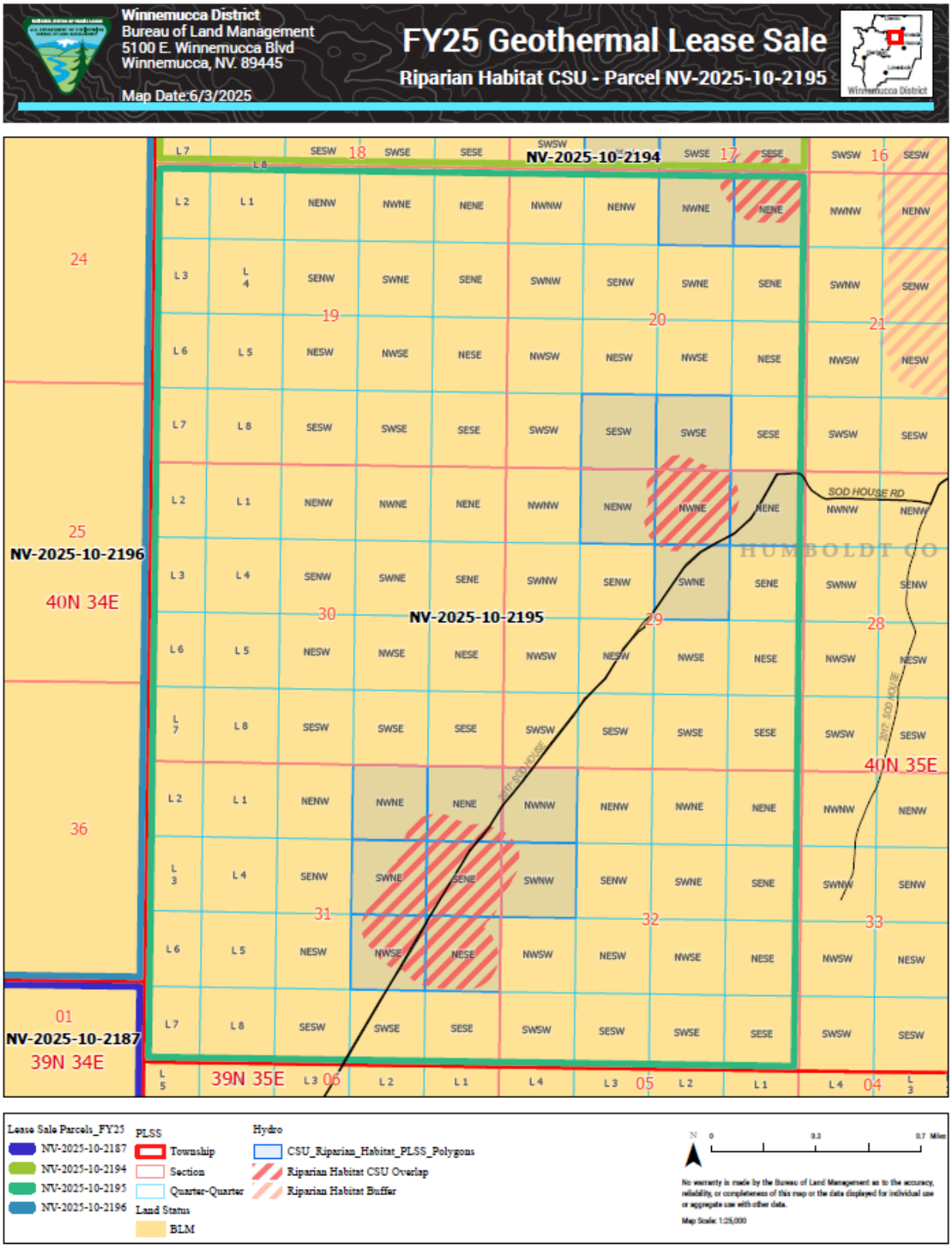

Figure 56. Riparian Habitat Buffer (CSU) in parcel NV-2025-10-2196.

Figure 57. Riparian Habitat Buffer (CSU) in parcel NV-2025-10-2200.

Figure 58. Riparian Habitat Buffer (CSU) in parcel NV-2025-10-2201.

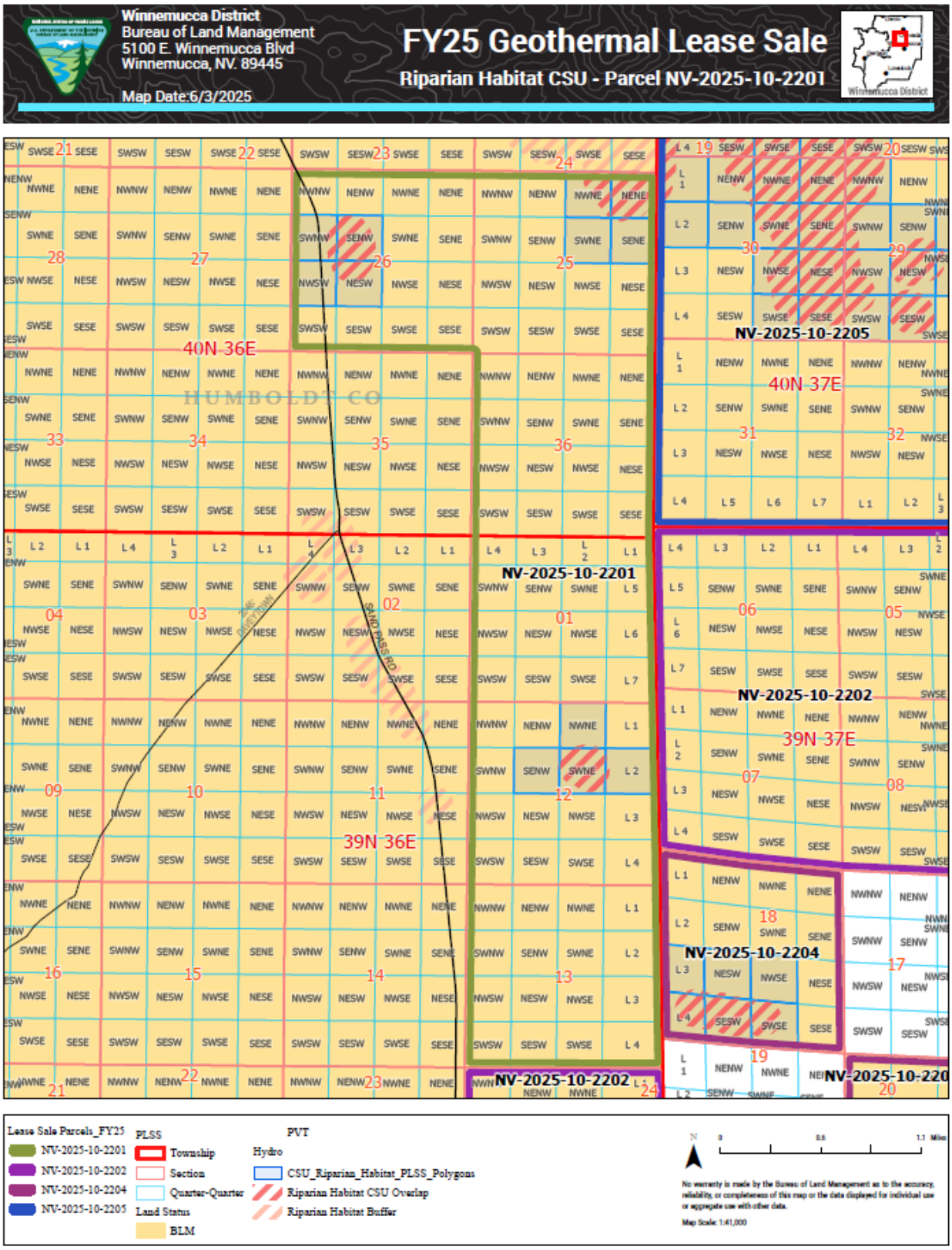

Figure 59. Riparian Habitat Buffer (CSU) in parcel NV-2025-10-2202.

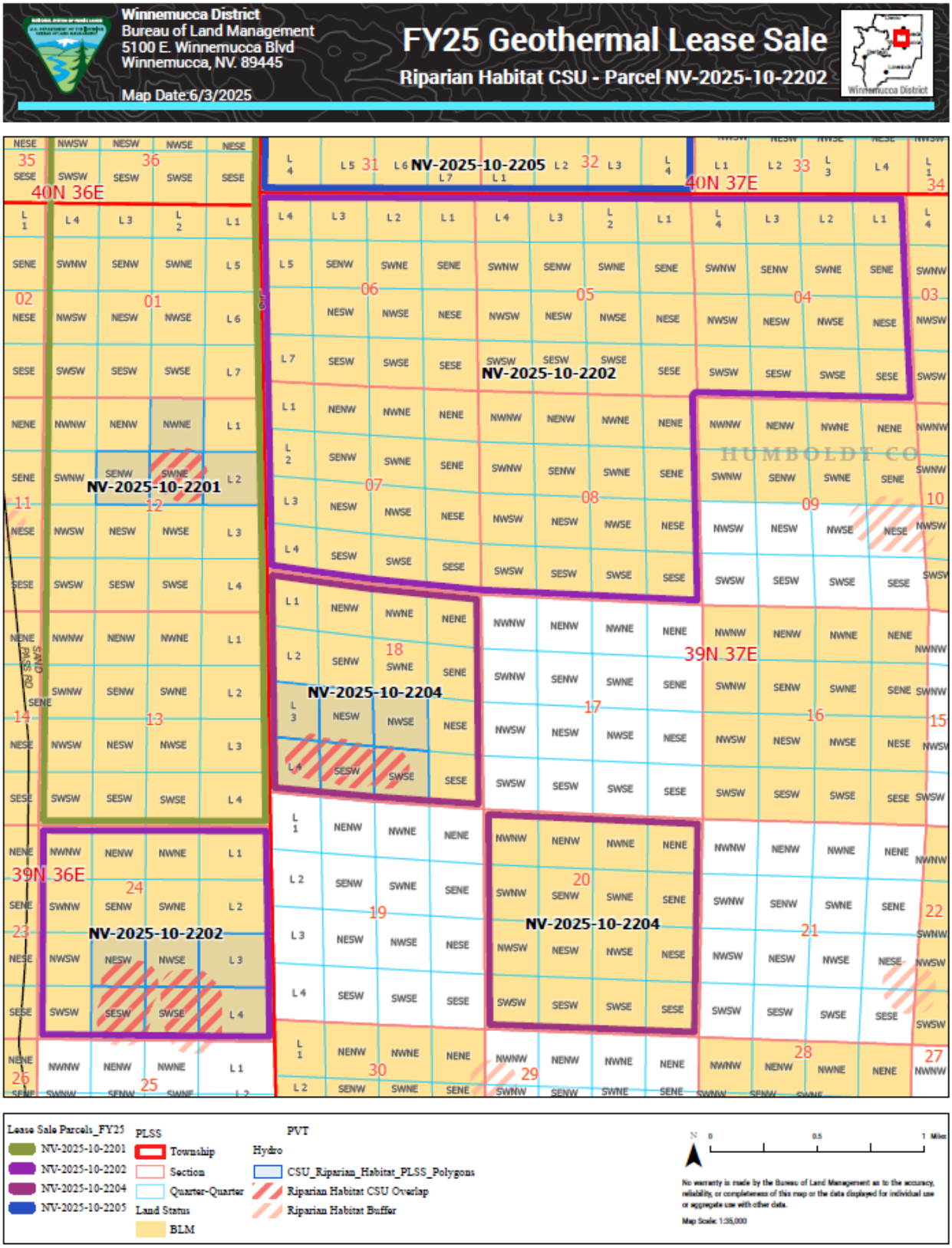

Figure 60. Riparian Habitat Buffer (CSU) in parcel NV-2025-10-2204.

Figure 61. Riparian Habitat Buffer (CSU) in parcel NV-2025-10-2205.

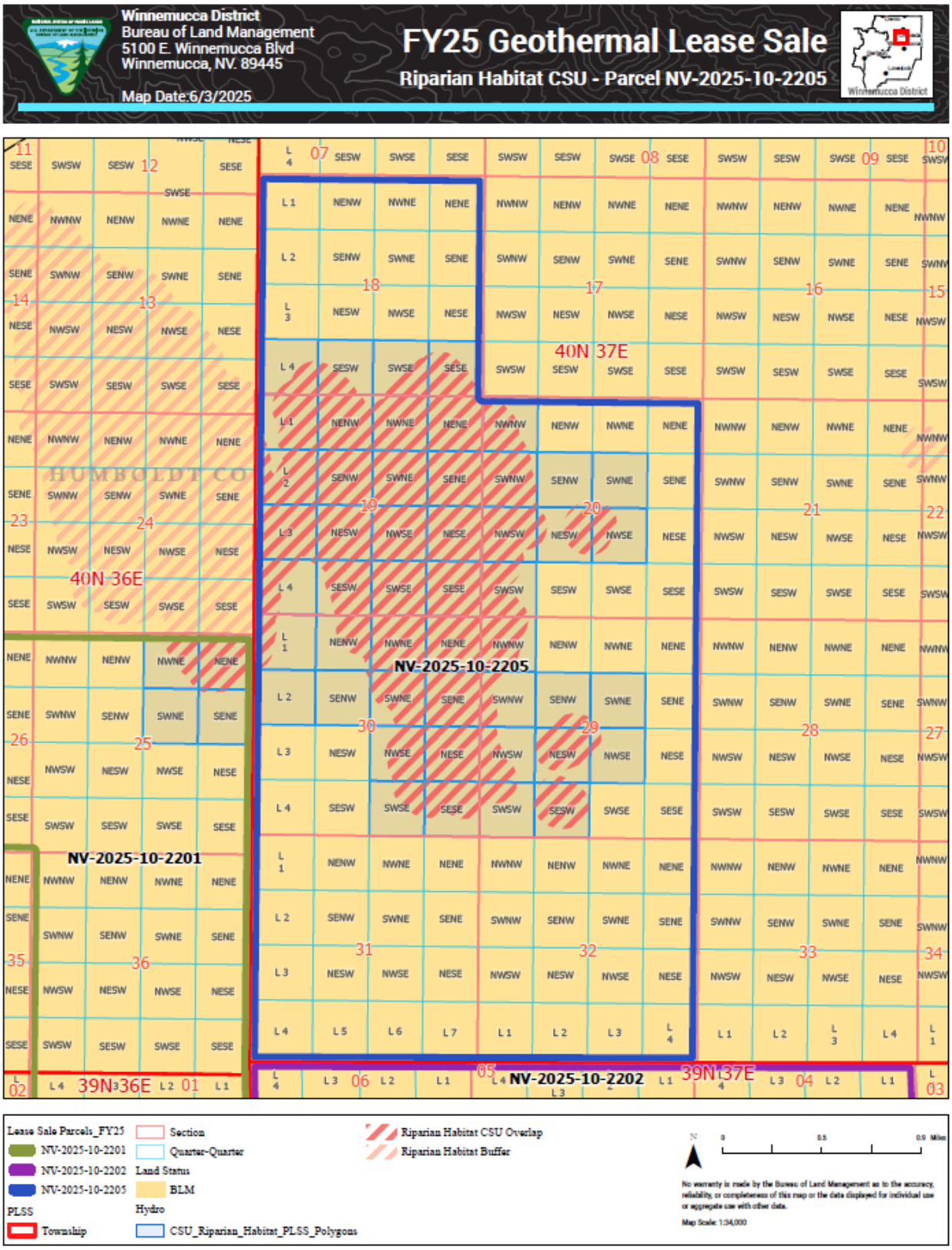

Figure 62. Riparian Habitat Buffer (CSU) in parcel NV-2025-10-2208.

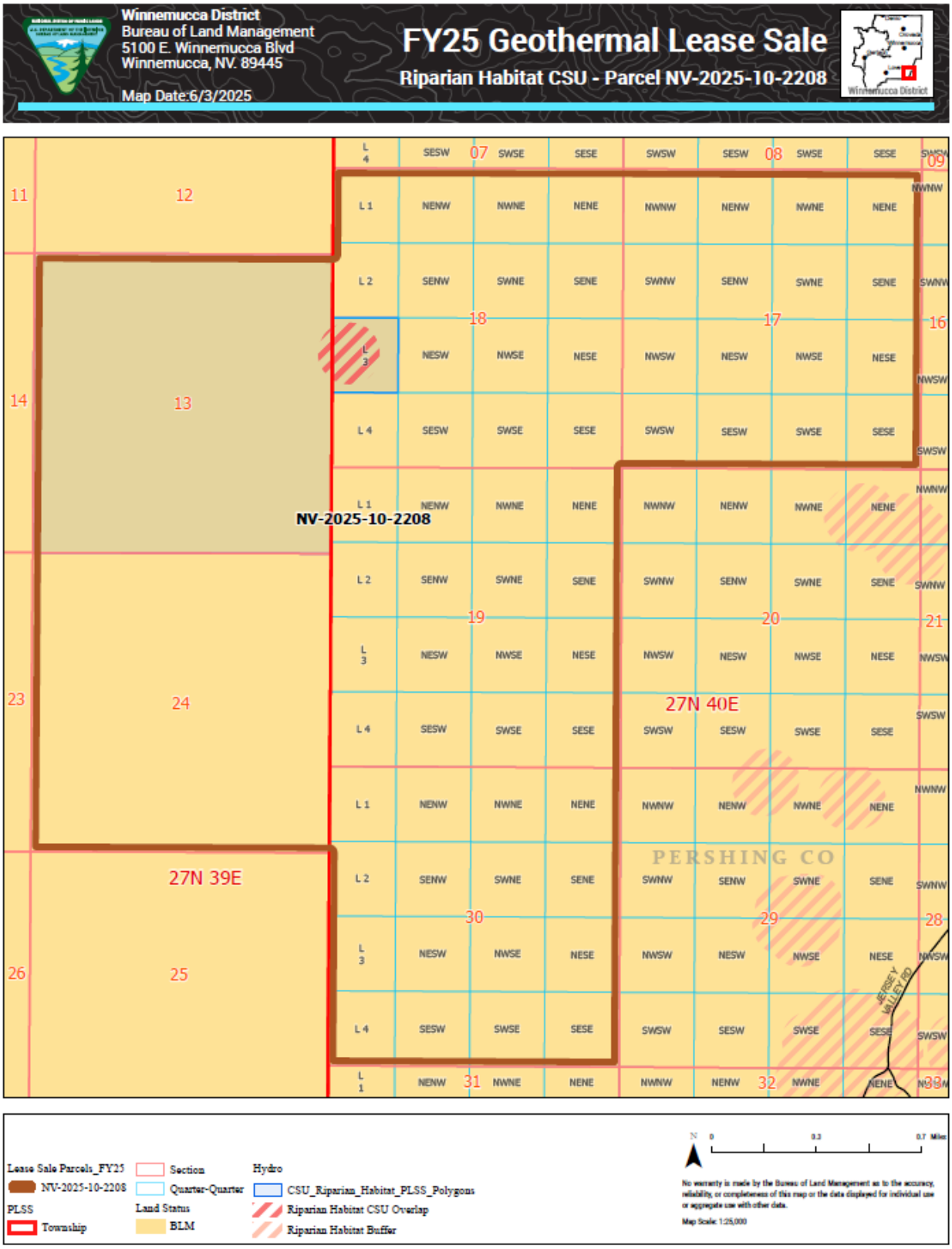

Figure 63. Riparian Habitat Buffer (CSU) in parcel NV-2025-10-2211.

Figure 64. Riparian Habitat Buffer (CSU) in parcel NV-2025-10-2215.

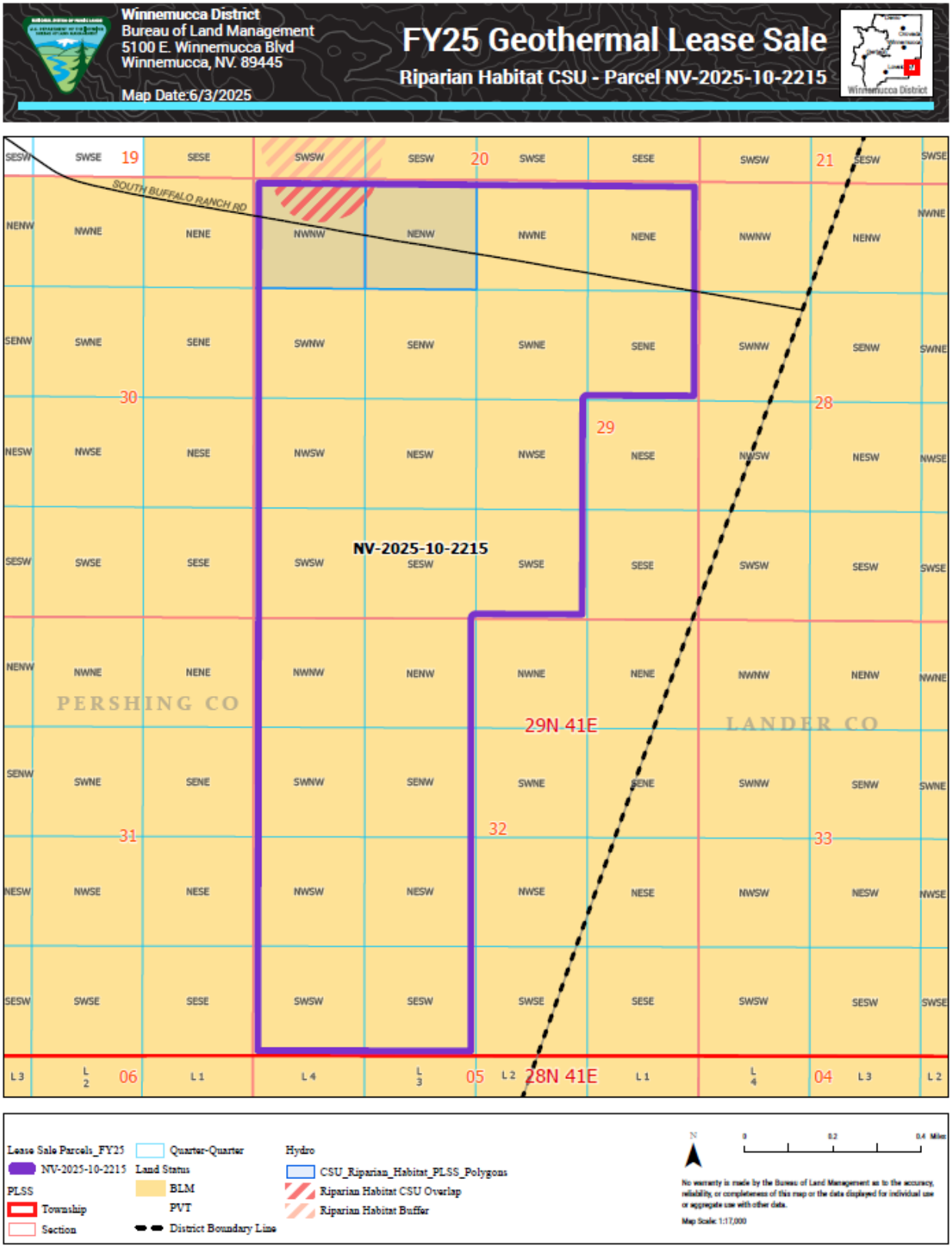

Figure 65. Riparian Habitat Buffer (CSU) in parcel NV-2025-10-2228.

Figure 66. Riparian Habitat Buffer (CSU) in parcel NV-2025-10-7035.

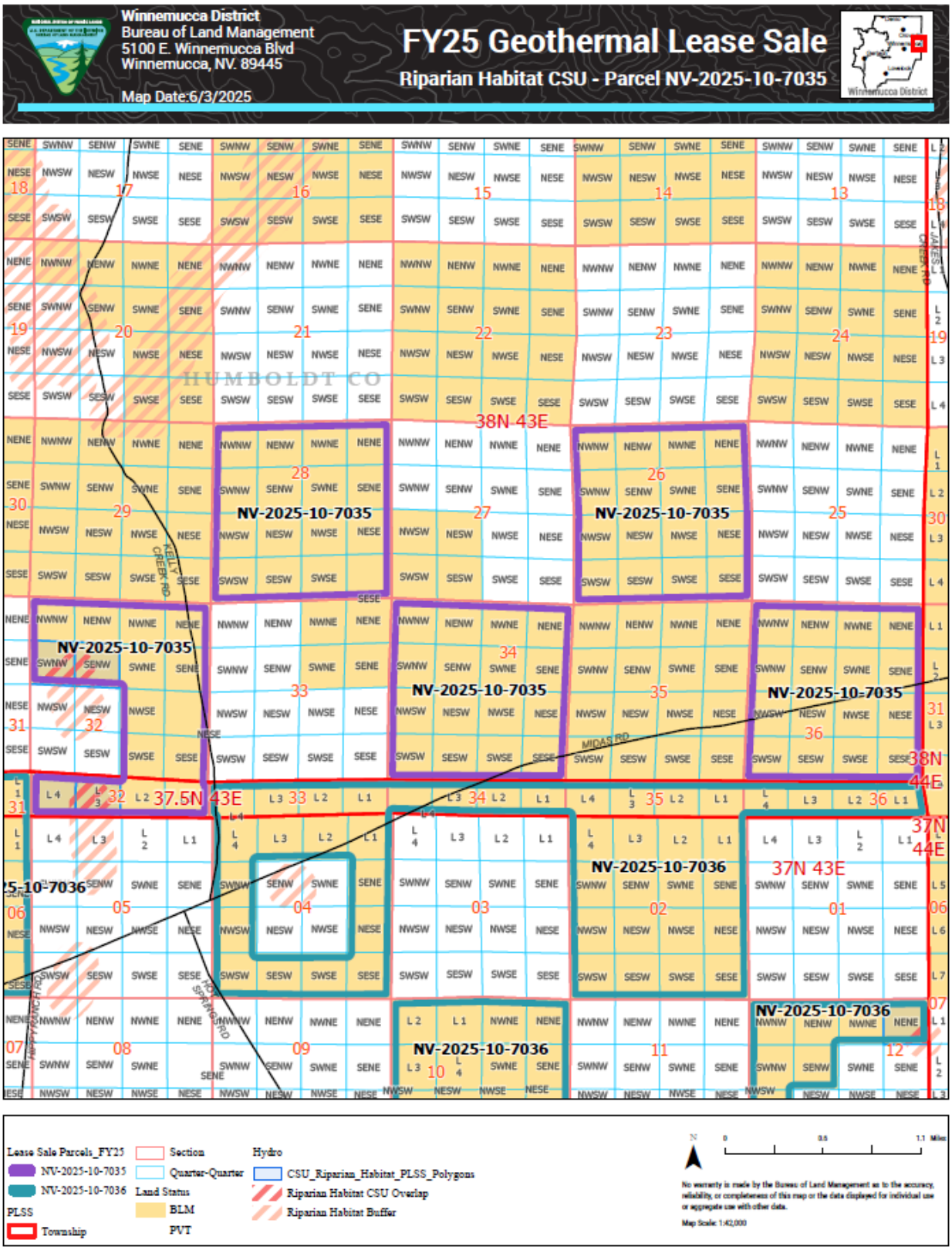

Figure 67. Riparian Habitat Buffer (CSU) in parcel NV-2025-10-7036.

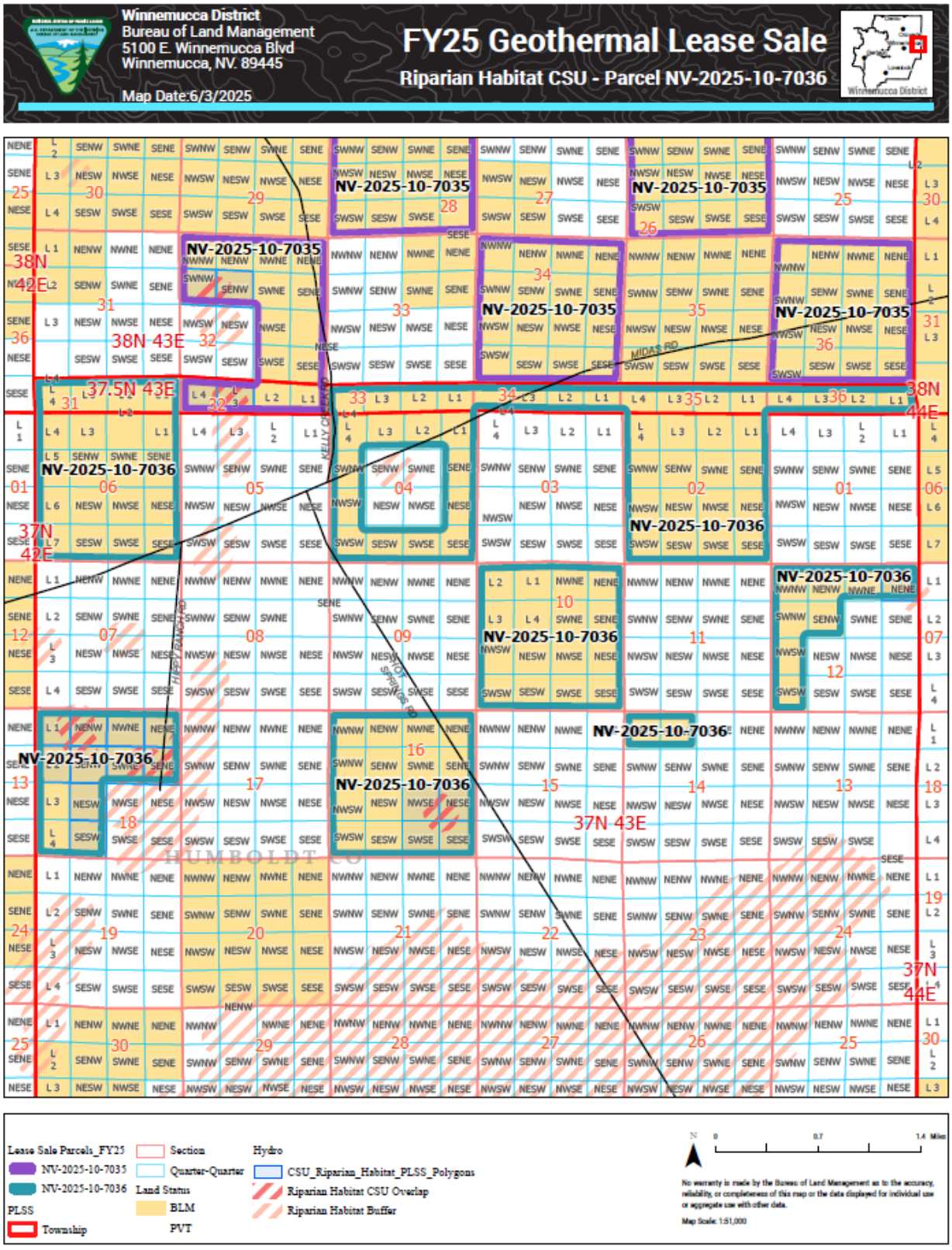

Figure 68. Playas (NSO) in parcel NV-2025-10-2150.

Figure 69. Playas (NSO) in parcel NV-2025-10-2187.

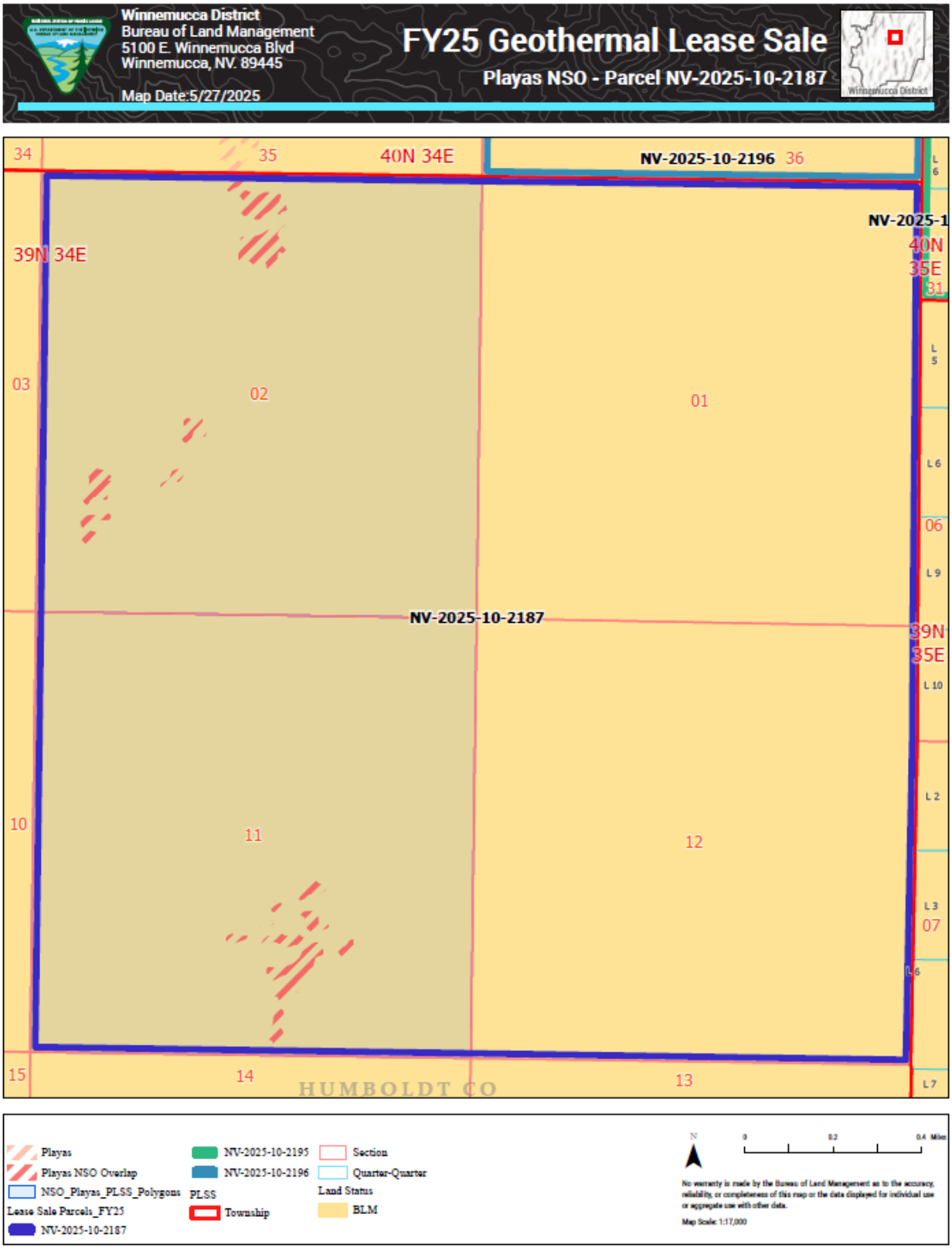

Figure 70. Playas (NSO) in parcel NV-2025-10-2194.

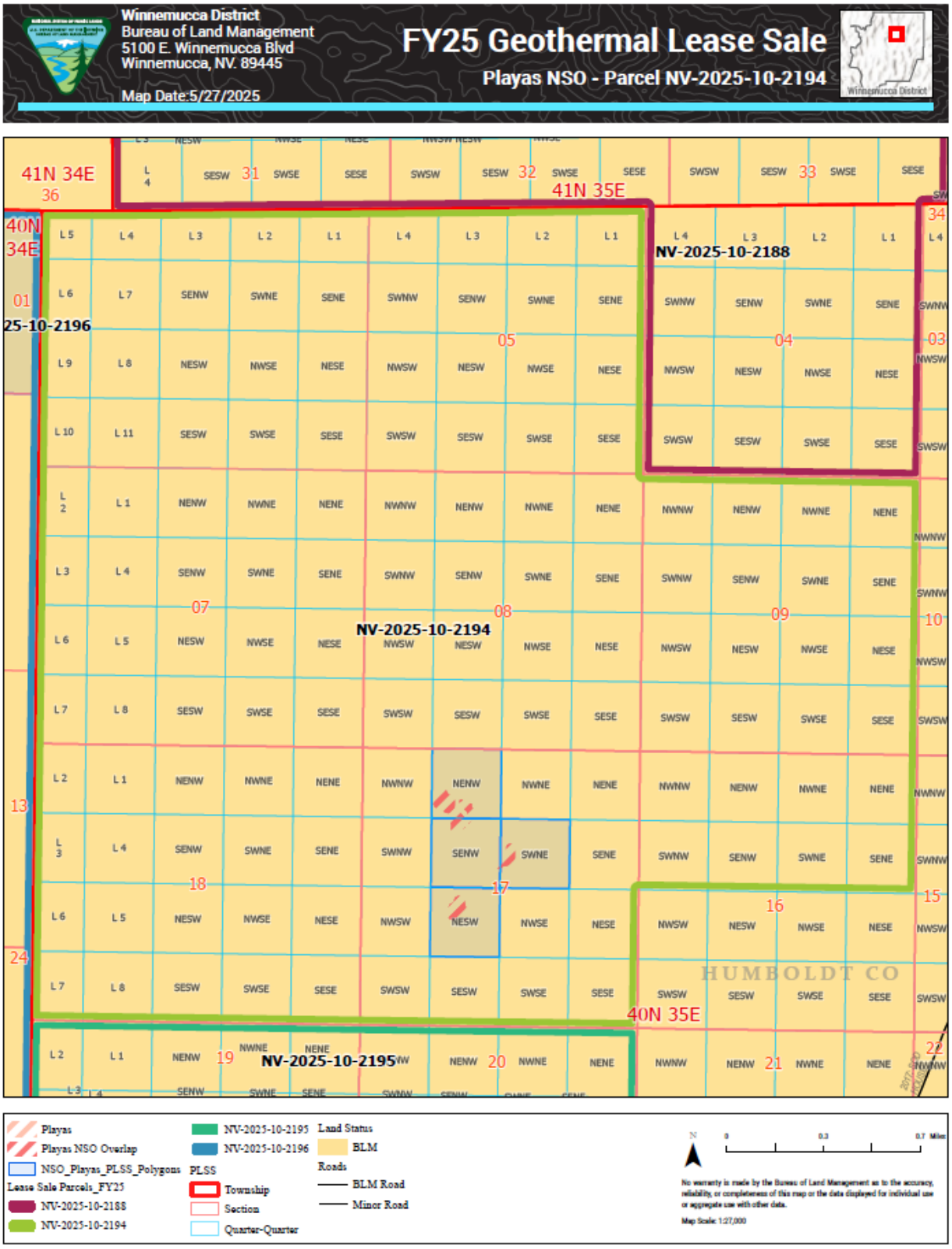

Figure 71. Playas (NSO) in parcel NV-2025-10-2200.

Figure 72. Playas (NSO) in parcel NV-2025-10-2201.

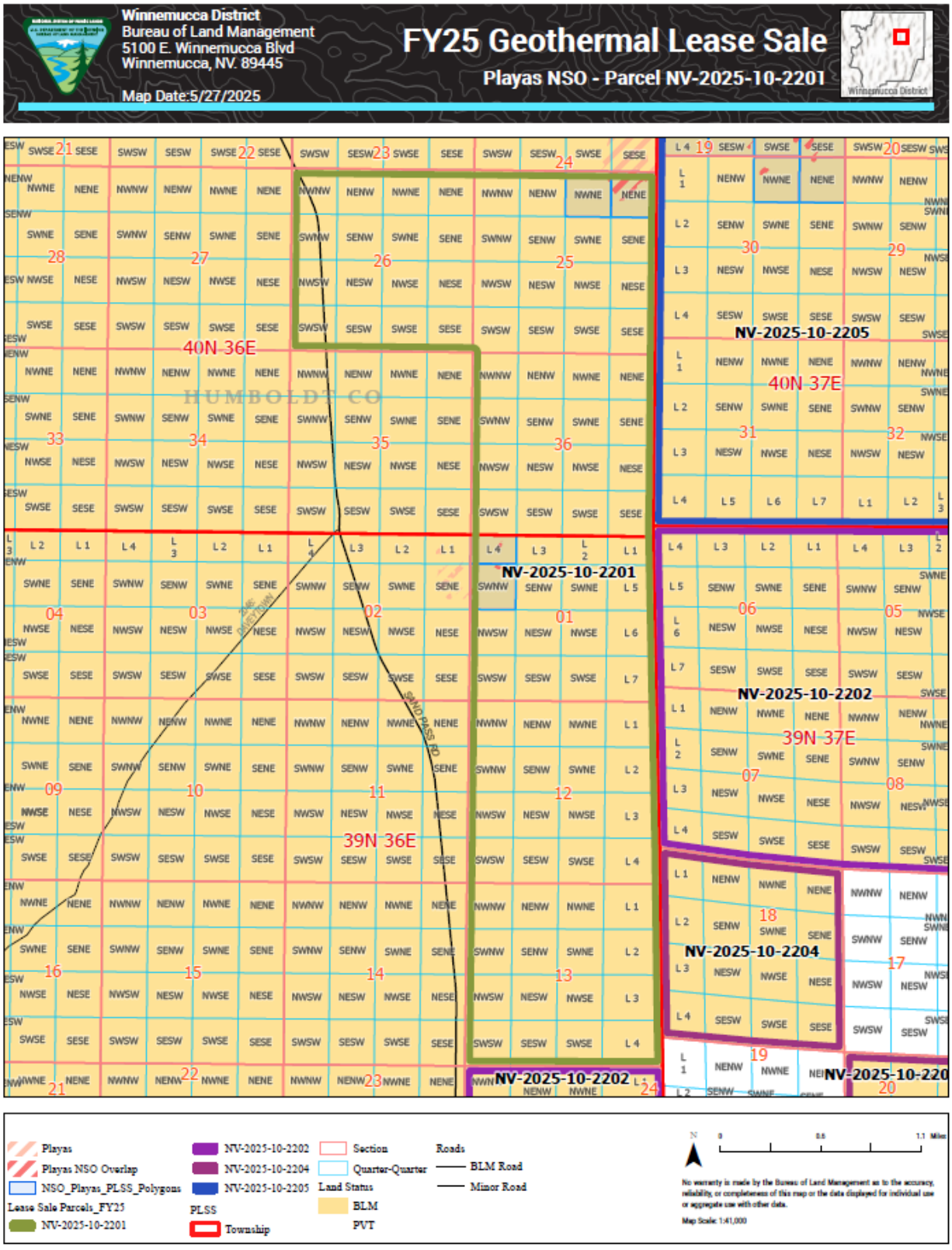

Figure 73. Playas (NSO) in parcel NV-2025-10-2205.

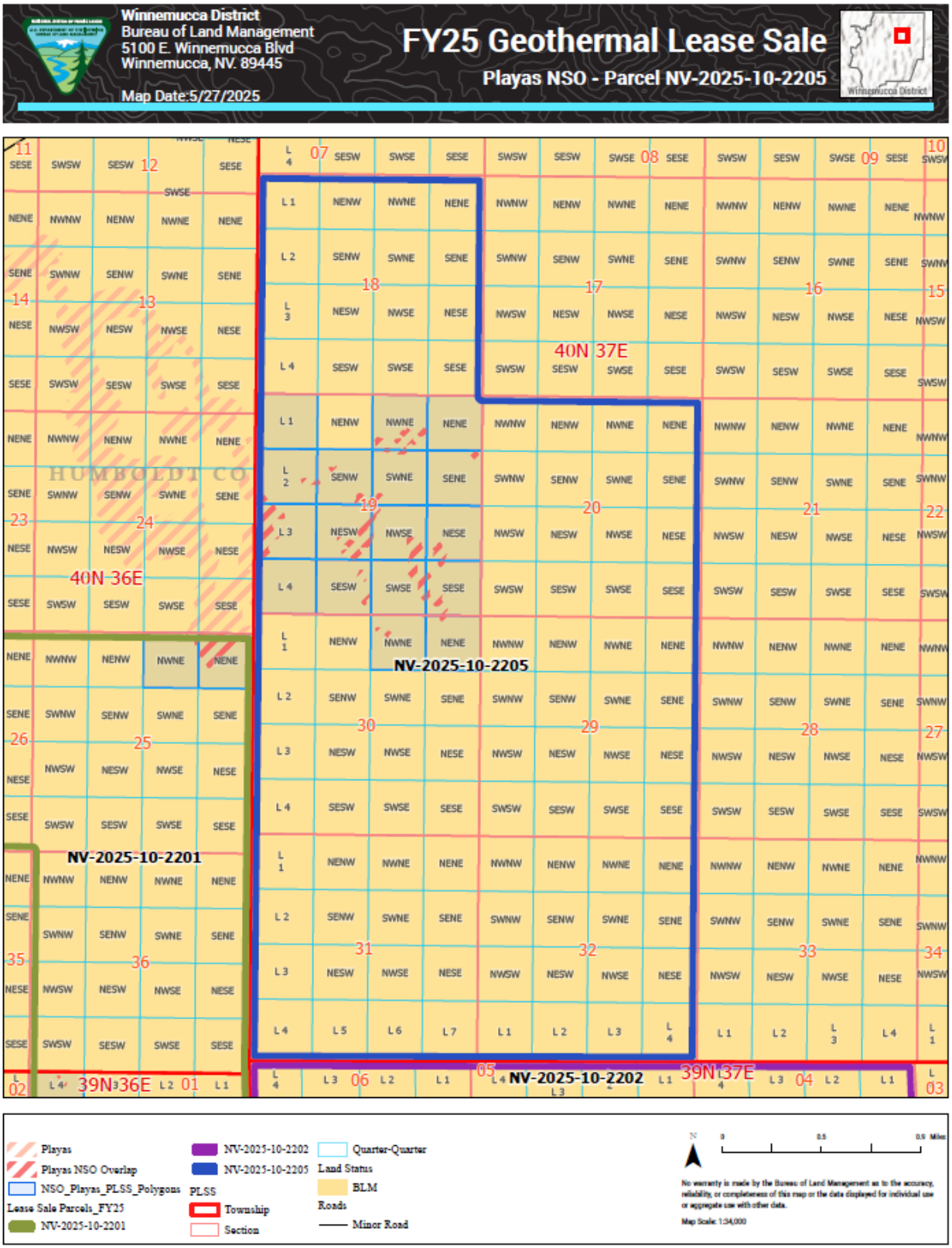

Figure 74. Playas (NSO) in parcel NV-2025-10-2211.

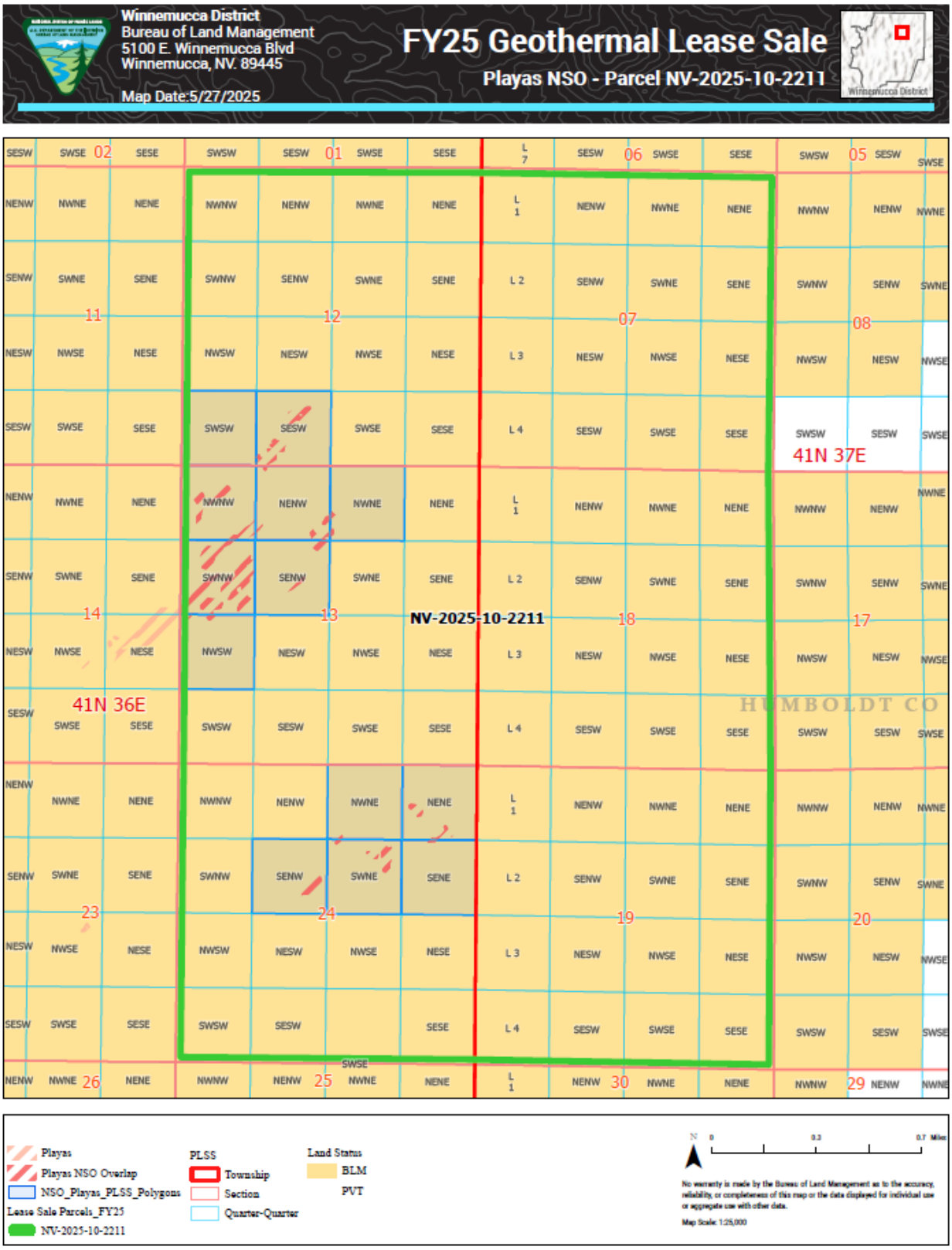

Figure 75. Playas (NSO) in parcel NV-2025-10-2228.

Figure 76. Municipal Wellhead Zones (LN) in parcel NV-2025-10-2191.

Figure 77. Soil Slopes >15% and <50% (CSU) in parcel NV-2025-10-2143.

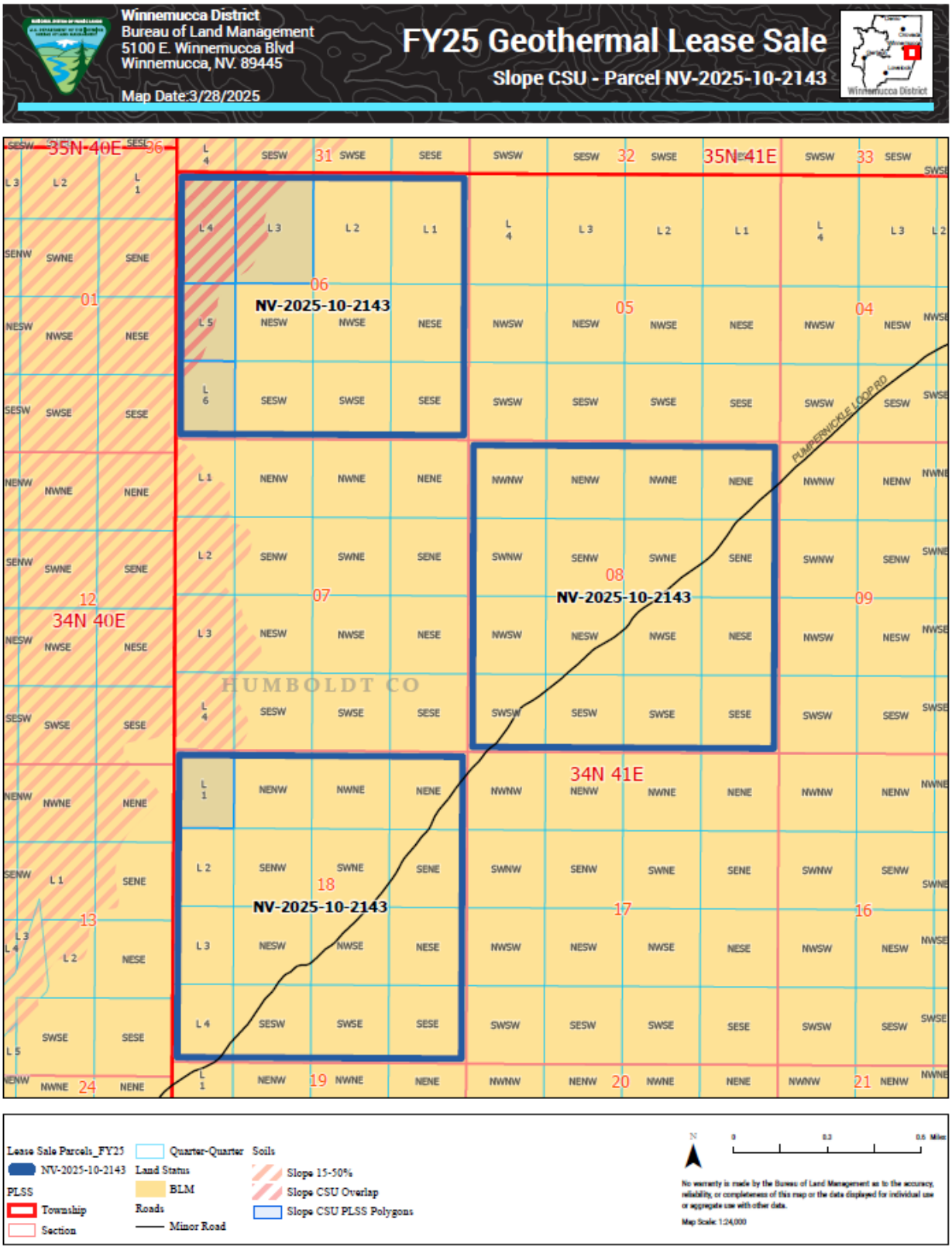

Figure 78. Soil Slopes >15% and <50% (CSU) in parcel NV-2025-10-2149.

Figure 79. Soil Slopes >15% and <50% (CSU) in parcel NV-2025-10-2150.

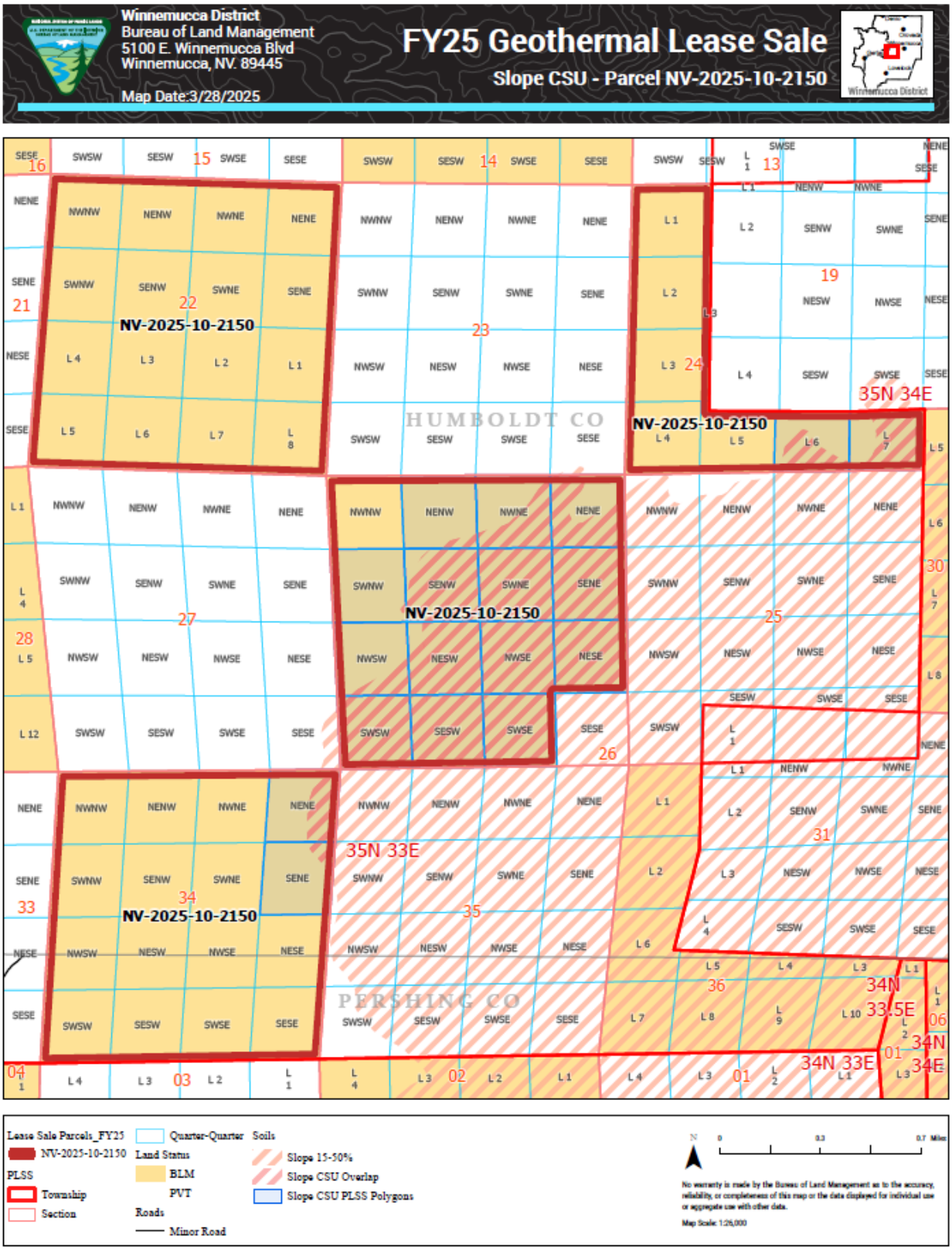

Figure 80. Soil Slopes >15% and <50% (CSU) in parcel NV-2025-10-2176.

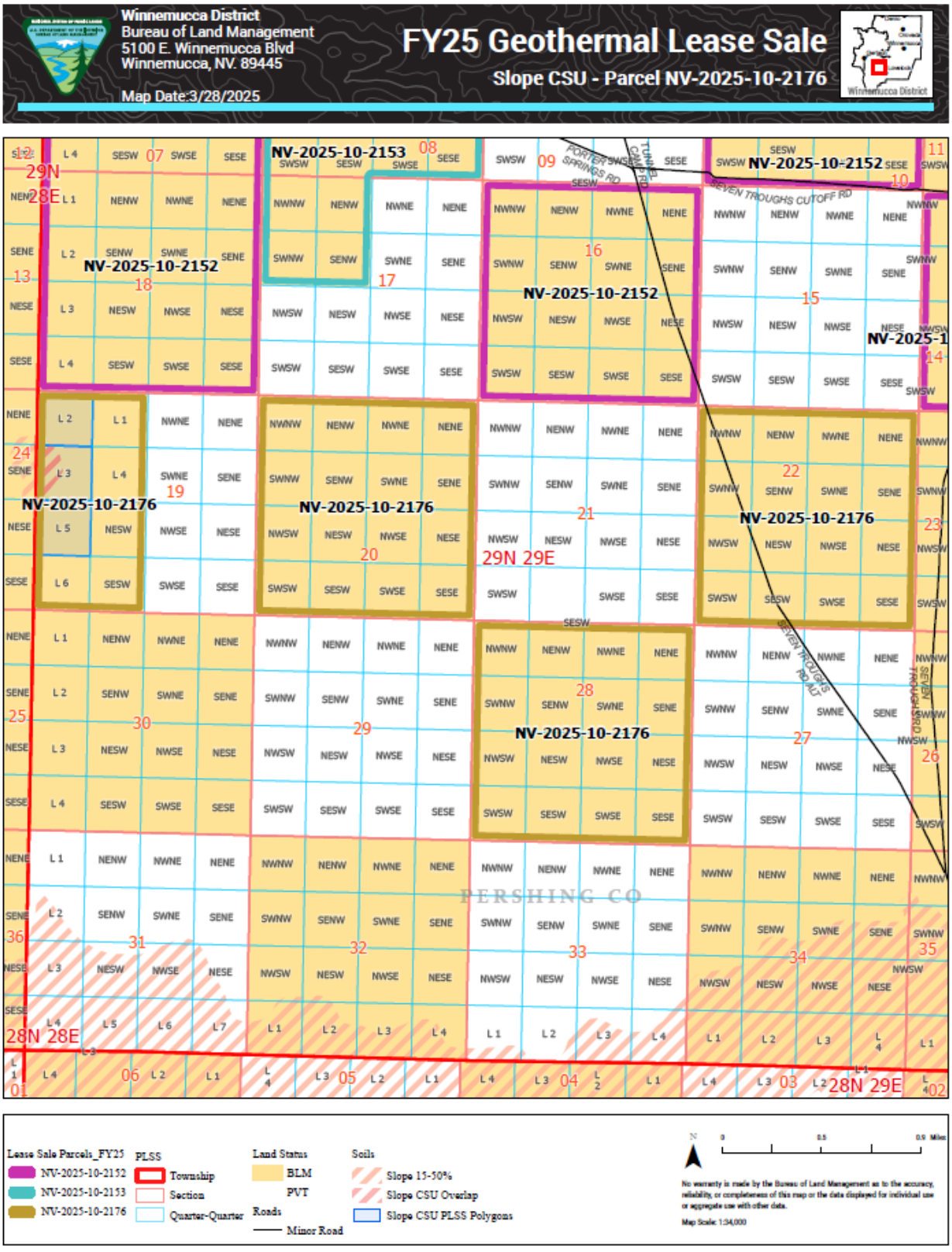

Figure 81. Soil Slopes >15% and <50% (CSU) in parcel NV-2025-10-2194.

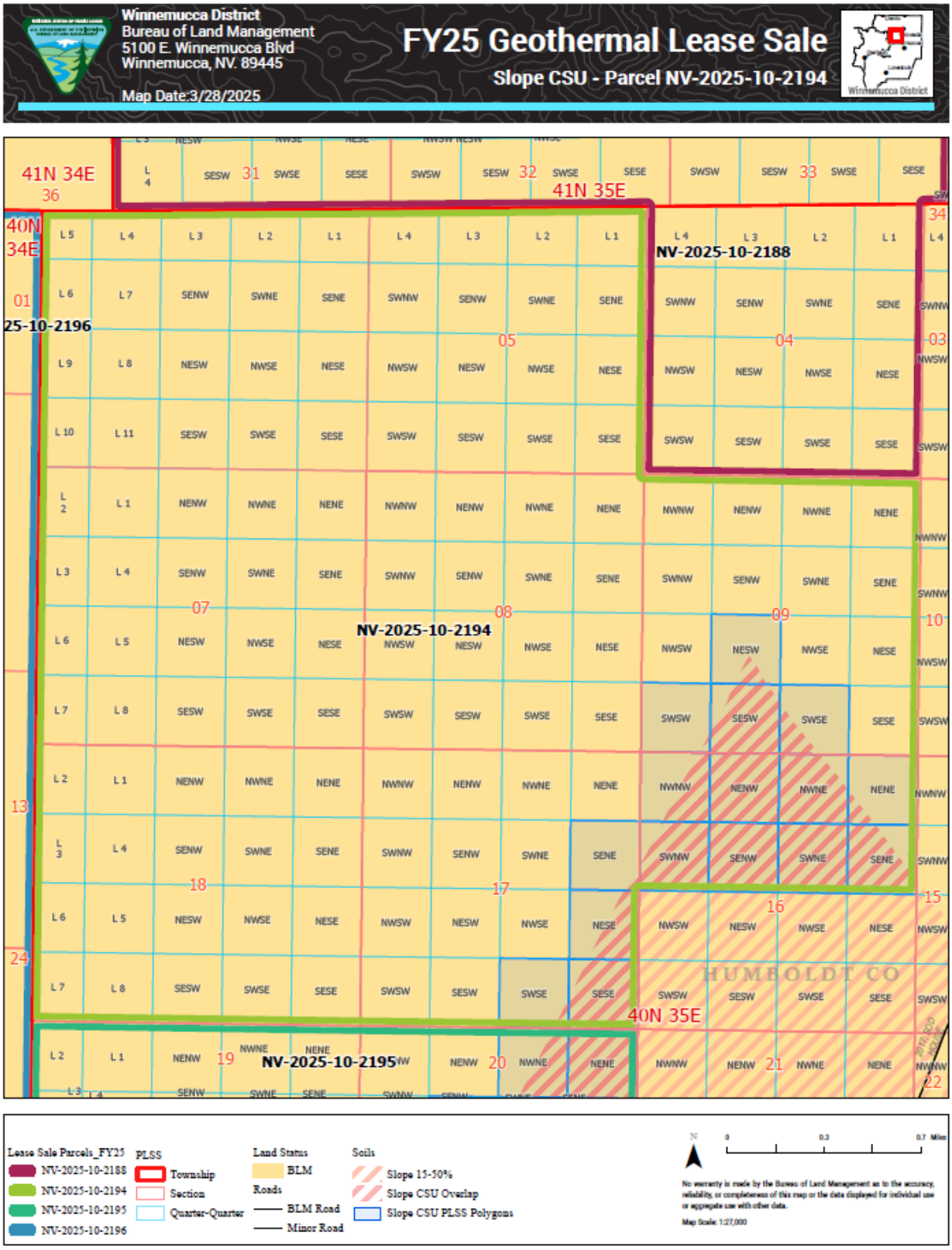

Figure 82. Soil Slopes >15% and <50% (CSU) in parcel NV-2025-10-2195.

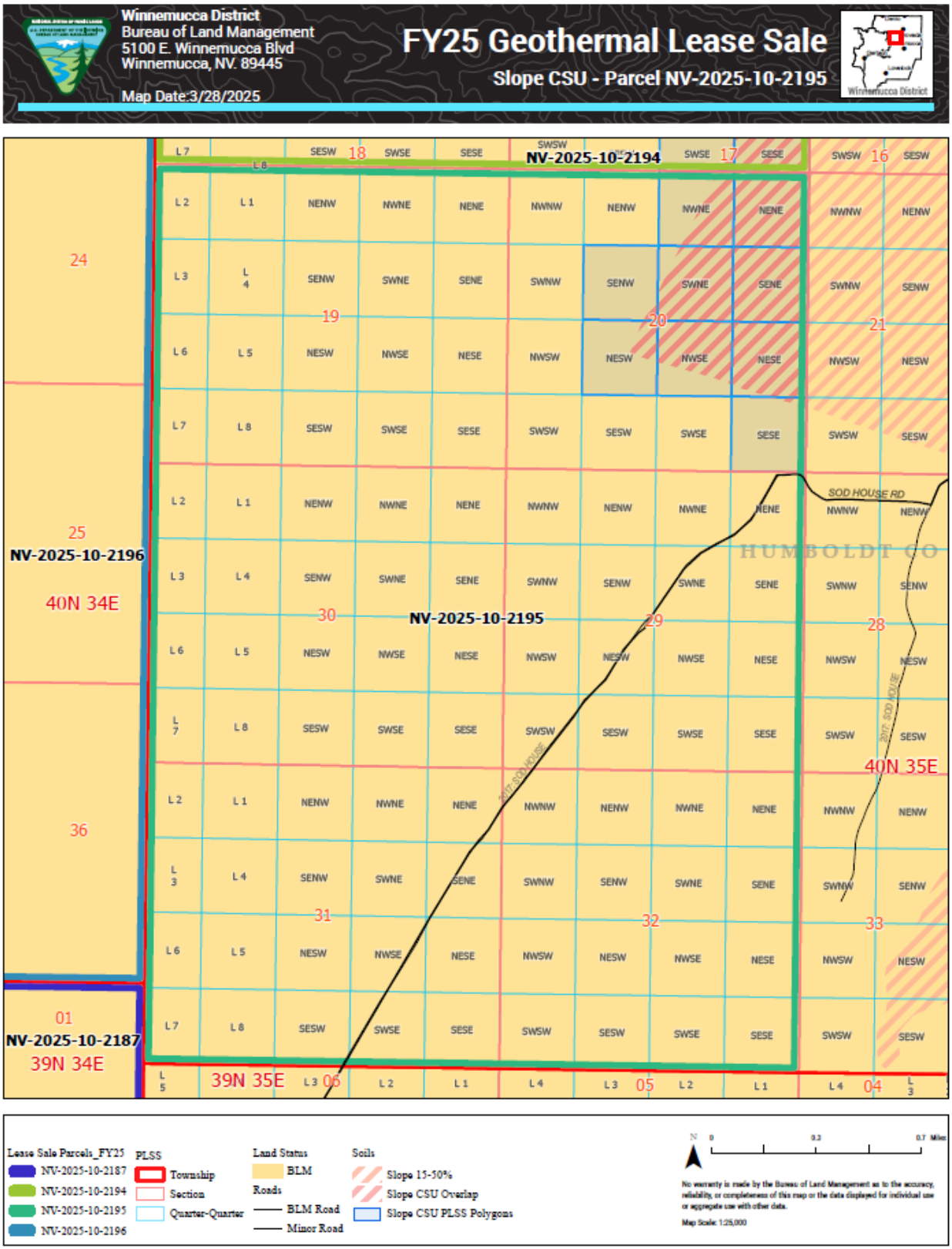

Figure 83. Soil Slopes >15% and <50% (CSU) in parcel NV-2025-10-2202.

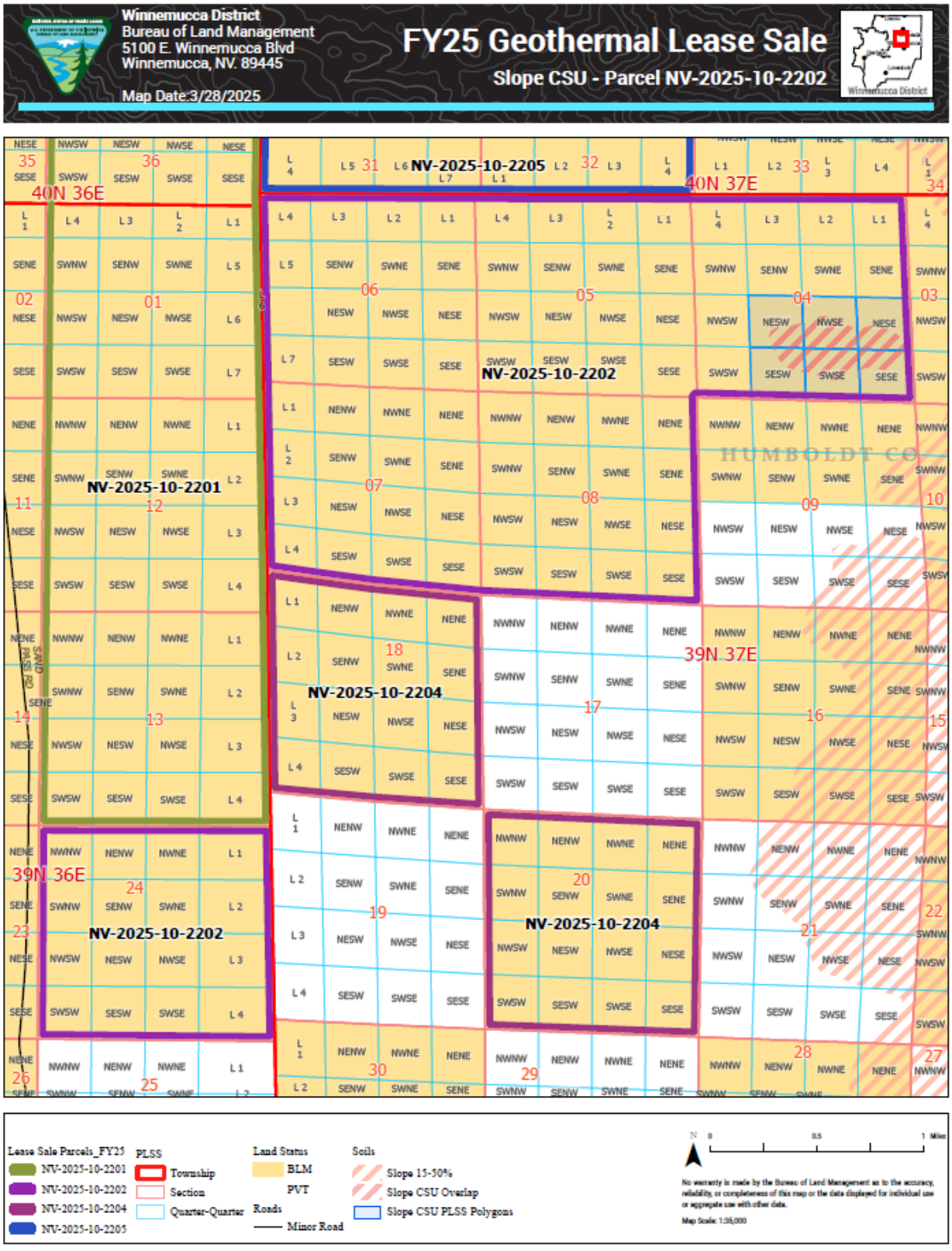

Figure 84. Soil Slopes >15% and <50% (CSU) in parcel NV-2025-10-2225.

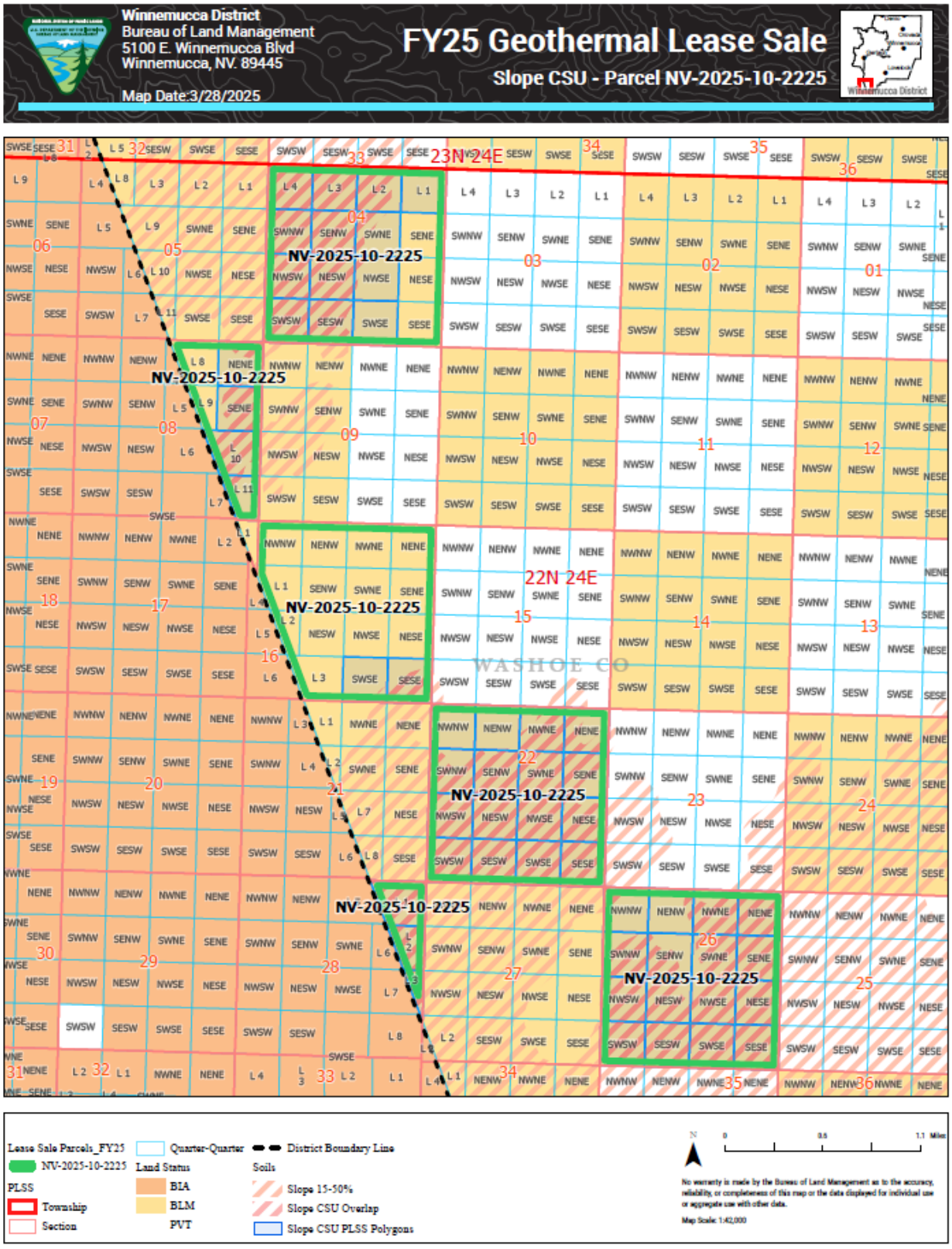

Figure 85. Soil Slopes >15% and <50% (CSU) in parcel NV-2025-10-2228.

Figure 86. Soil Slopes >15% and <50% (CSU) in parcel NV-2025-10-7039.

Figure 87. Soil Slopes >50% (NSO) in parcel NV-2025-10-2152.

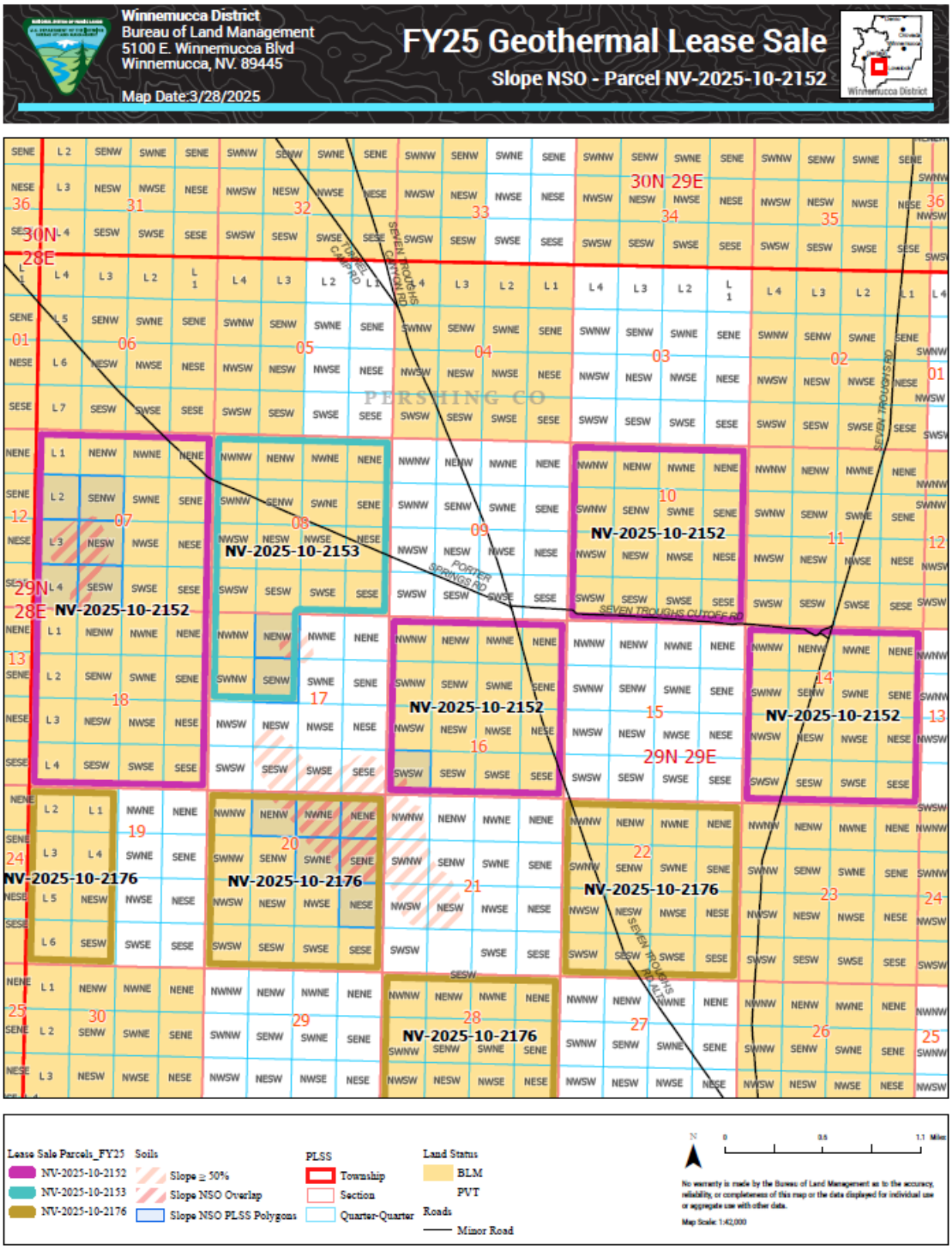

Figure 88. Soil Slopes >50% (NSO) in parcel NV-2025-10-2153.

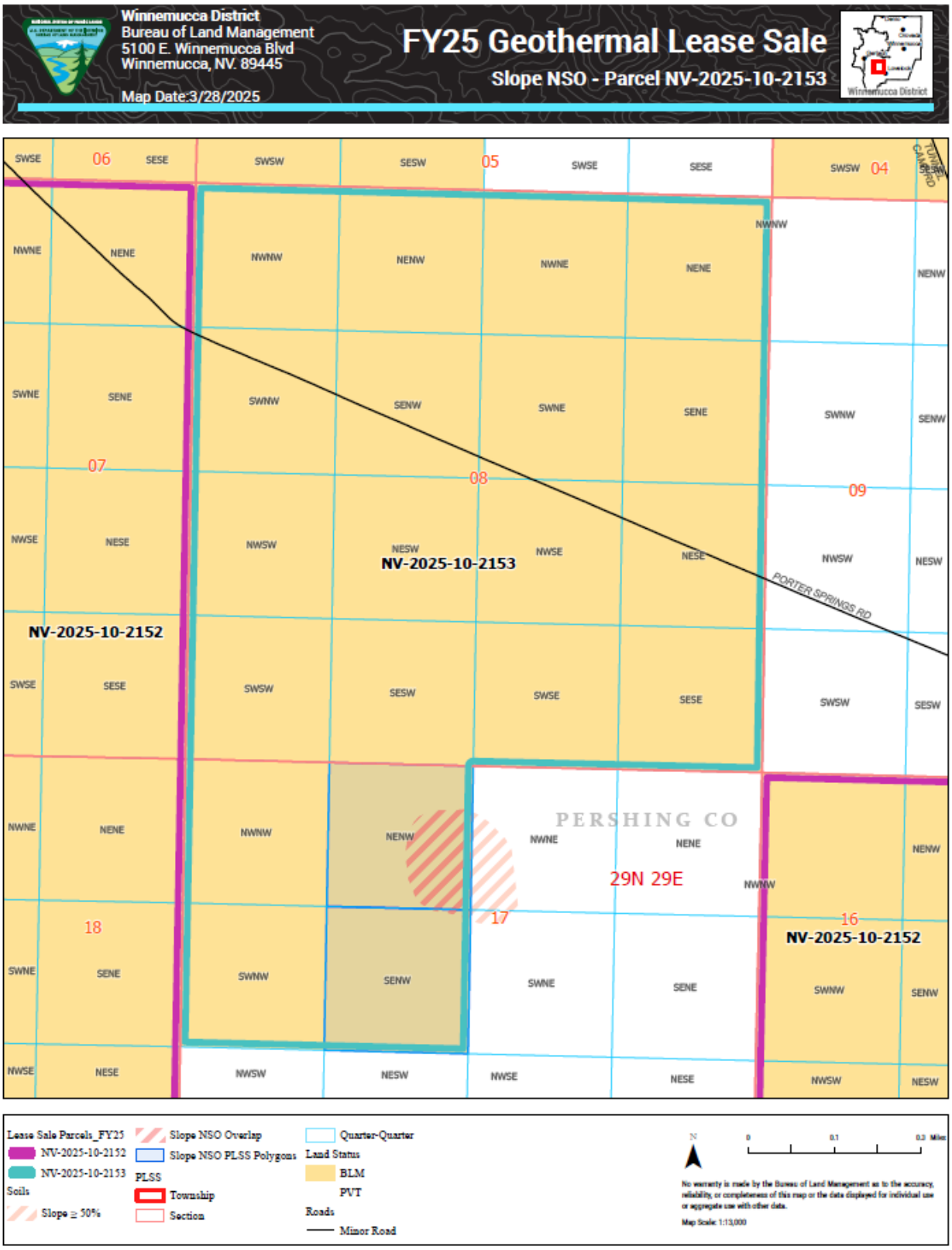

Figure 89. Soil Slopes >50% (NSO) in parcel NV-2025-10-2176.

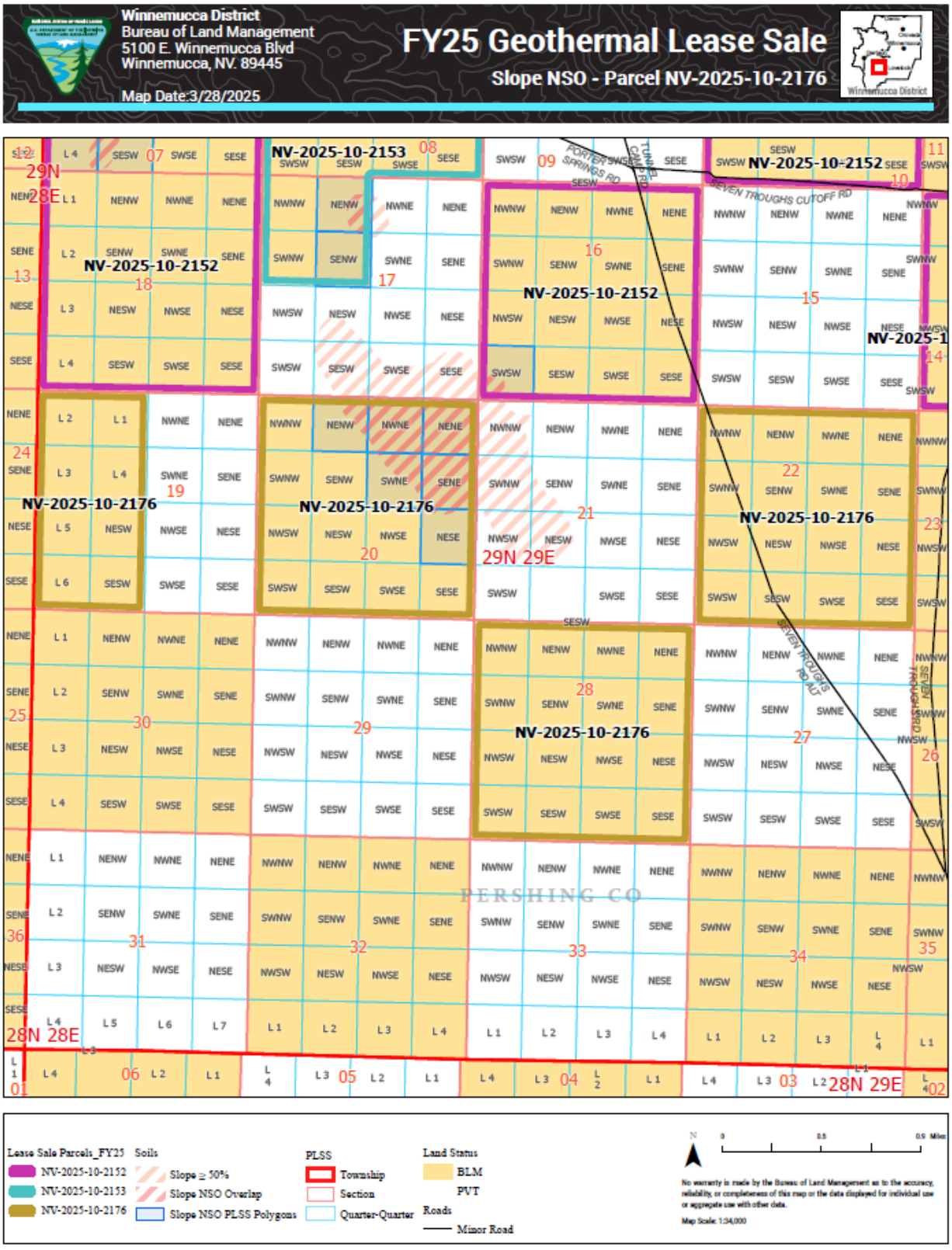

Figure 90. Soil Severe Erosion (CSU) in parcel NV-2025-10-2143.

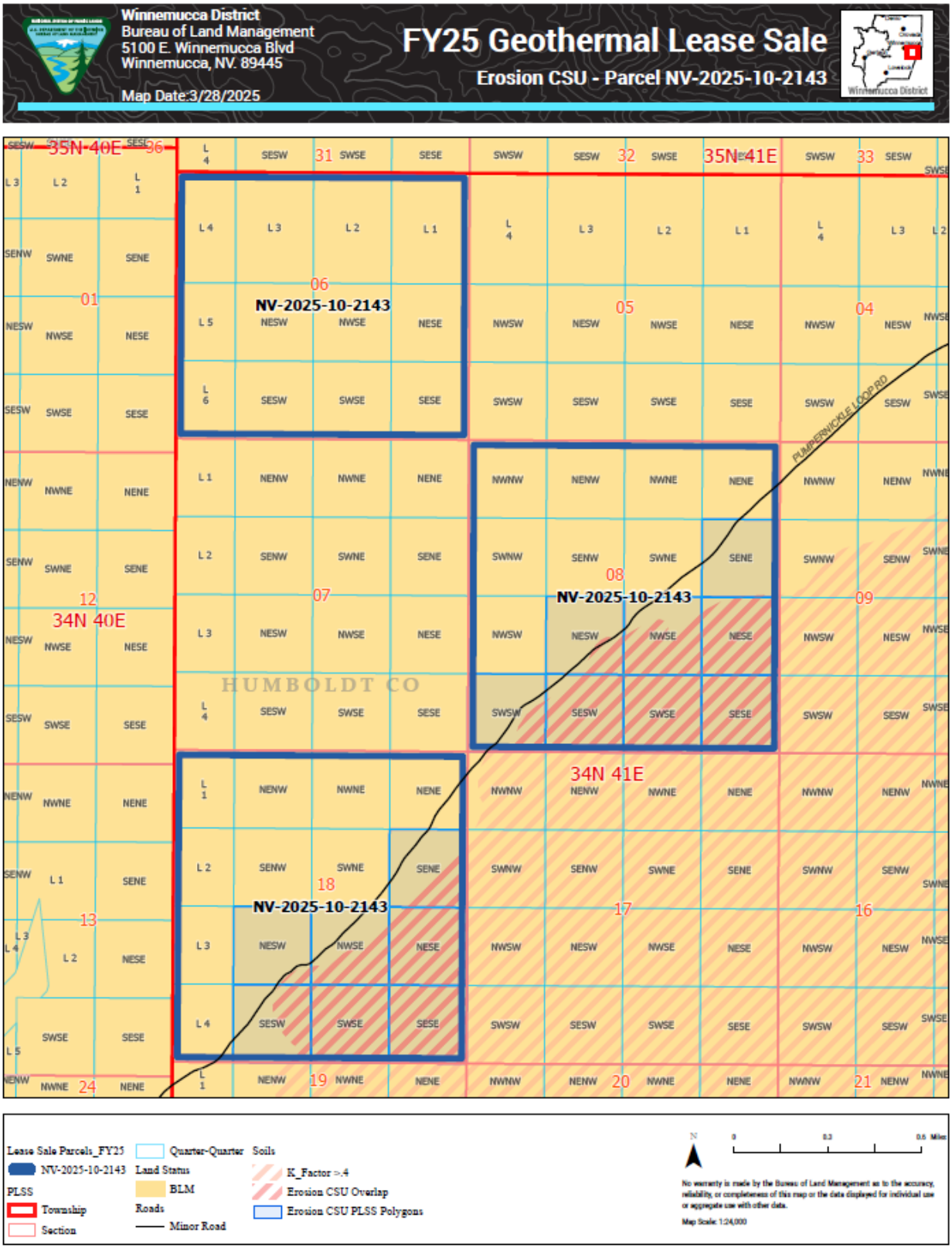

Figure 91. Soil Severe Erosion (CSU) in parcel NV-2025-10-2149.

Figure 92. Soil Severe Erosion (CSU) in parcel NV-2025-10-2150.

Figure 93. Soil Severe Erosion (CSU) in parcel NV-2025-10-2187.

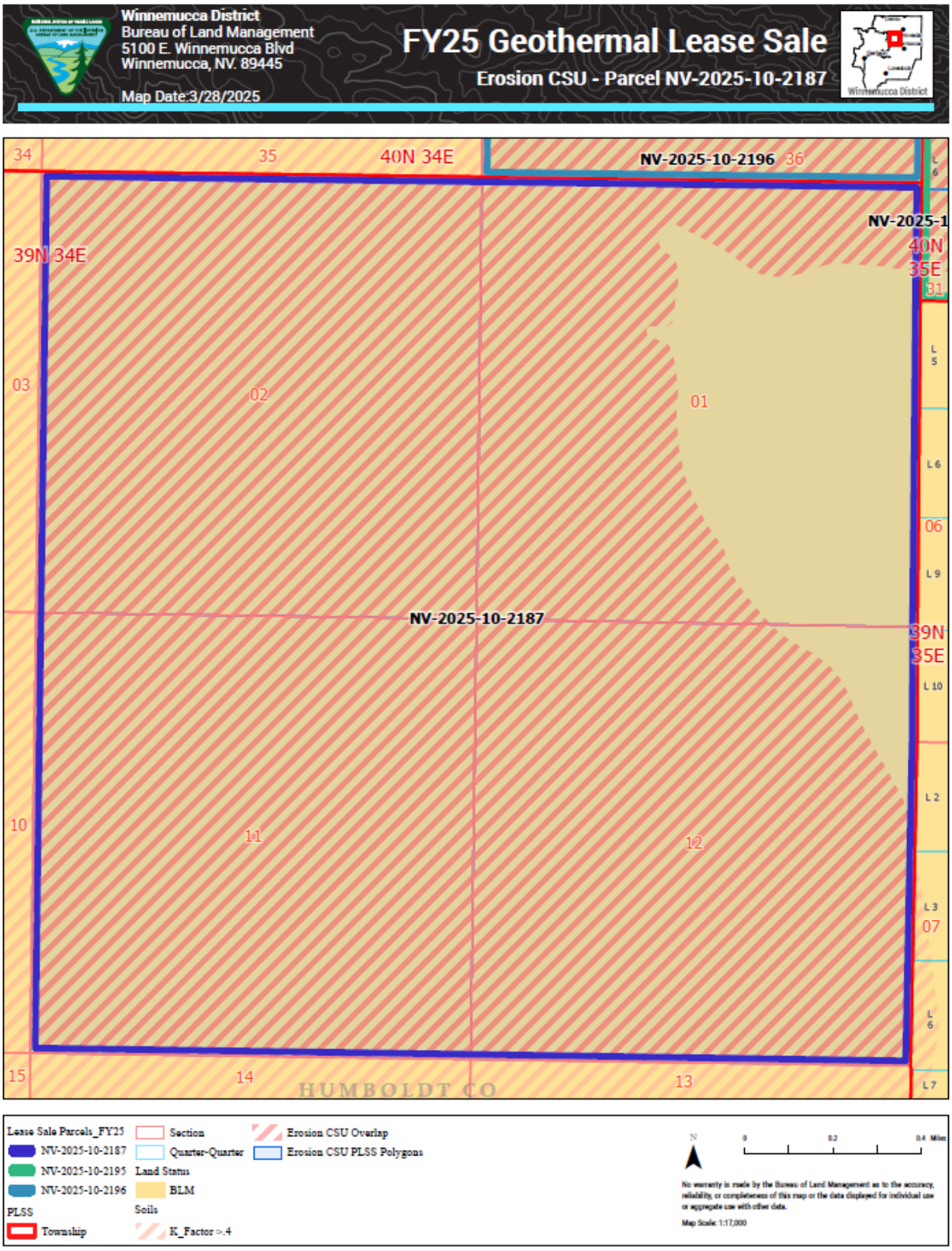

Figure 94. Soil Severe Erosion (CSU) in parcel NV-2025-10-2188.

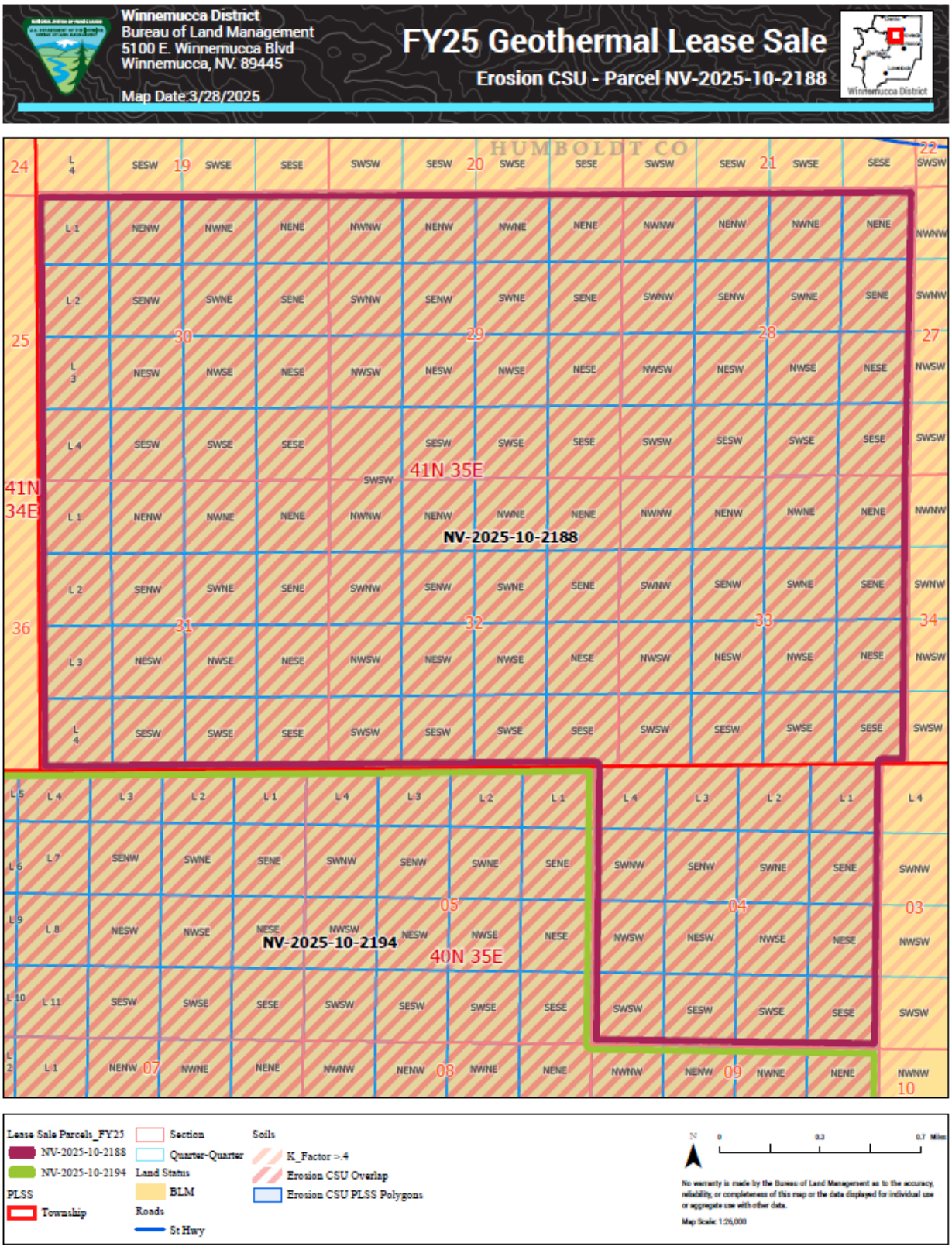

Figure 95. Soil Severe Erosion (CSU) in parcel NV-2025-10-2194.

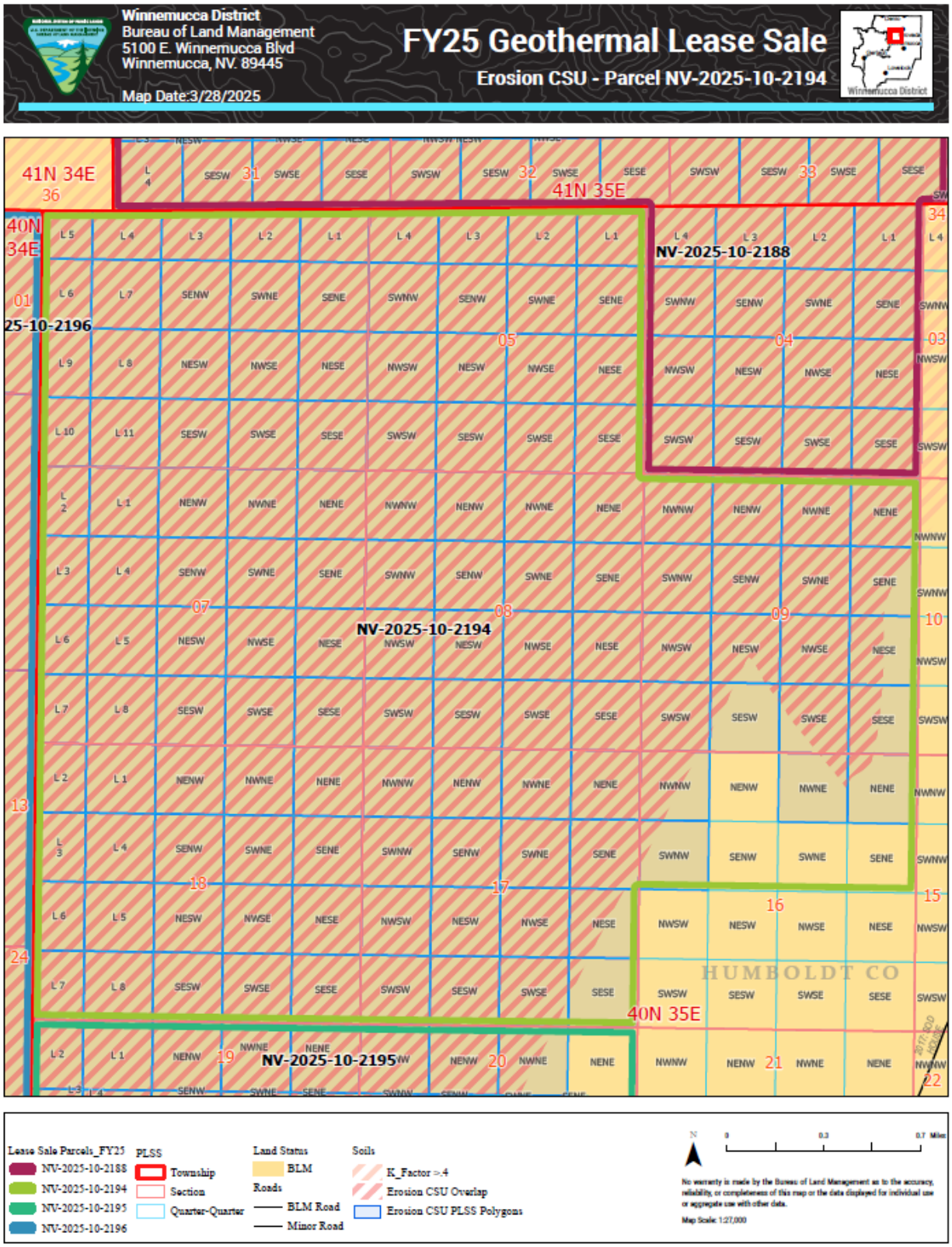

Figure 96. Soil Severe Erosion (CSU) in parcel NV-2025-10-2195.

Figure 97. Soil Severe Erosion (CSU) in parcel NV-2025-10-2196.

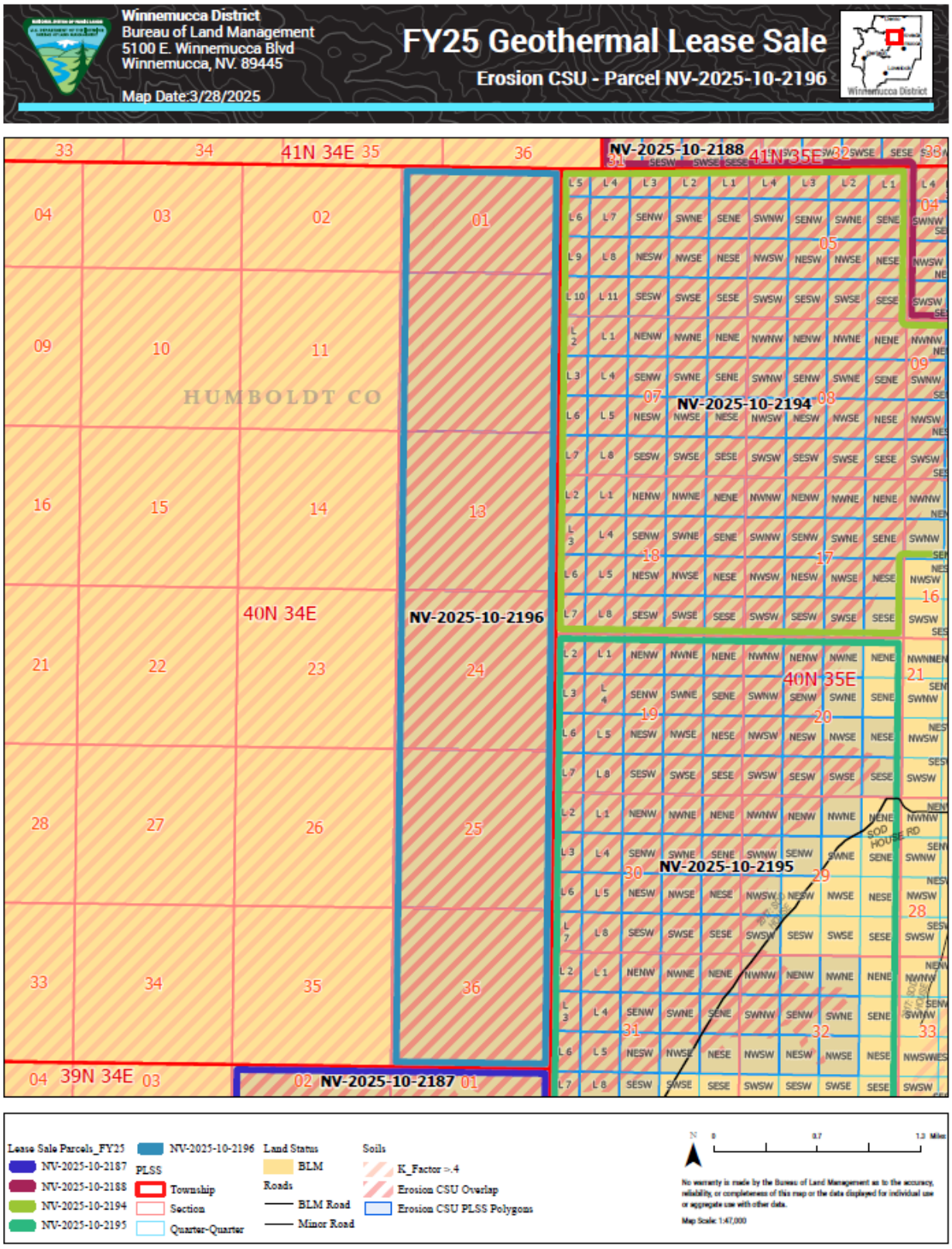

Figure 98. Soil Severe Erosion (CSU) in parcel NV-2025-10-2201.

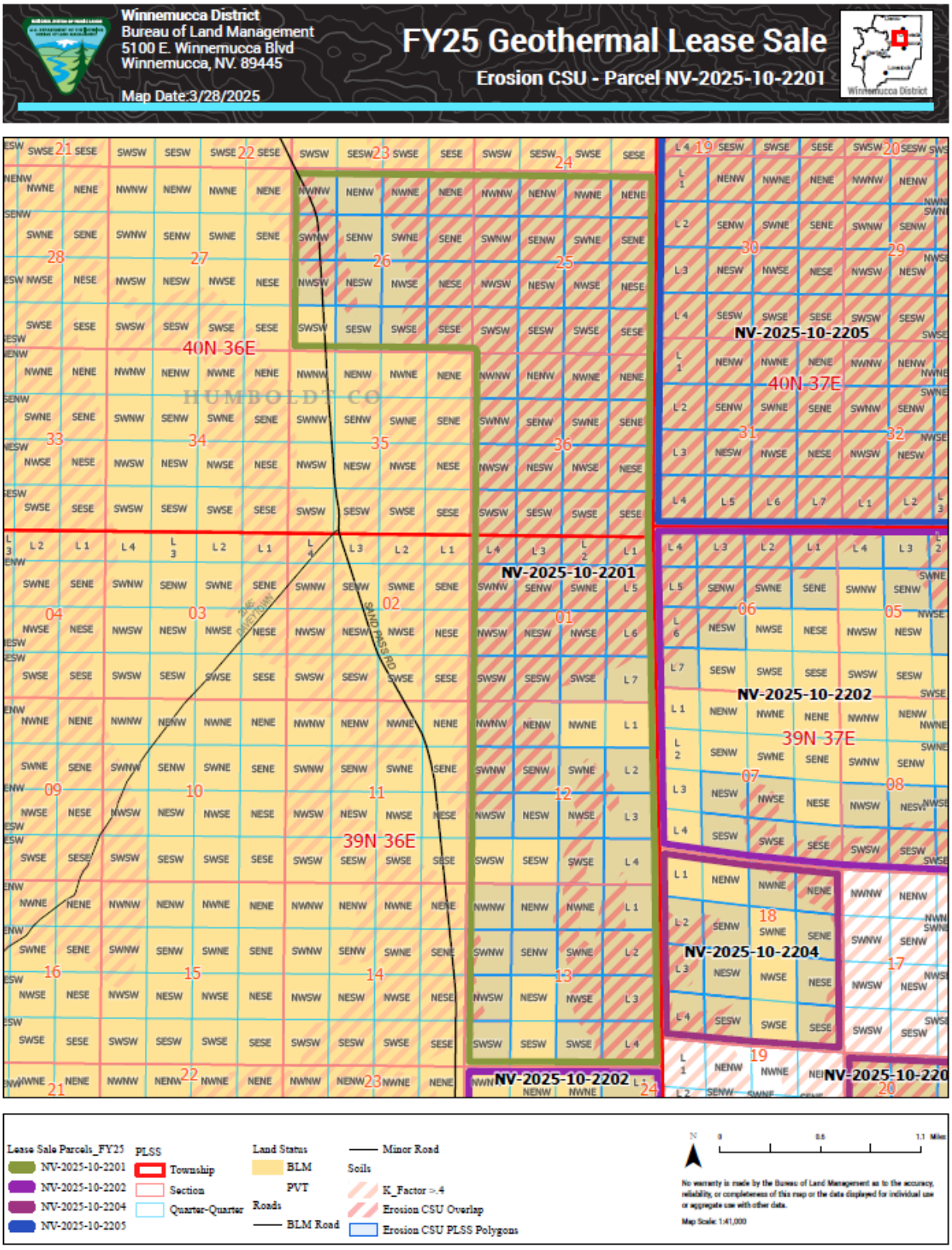

Figure 99. Soil Severe Erosion (CSU) in parcel NV-2025-10-2202.

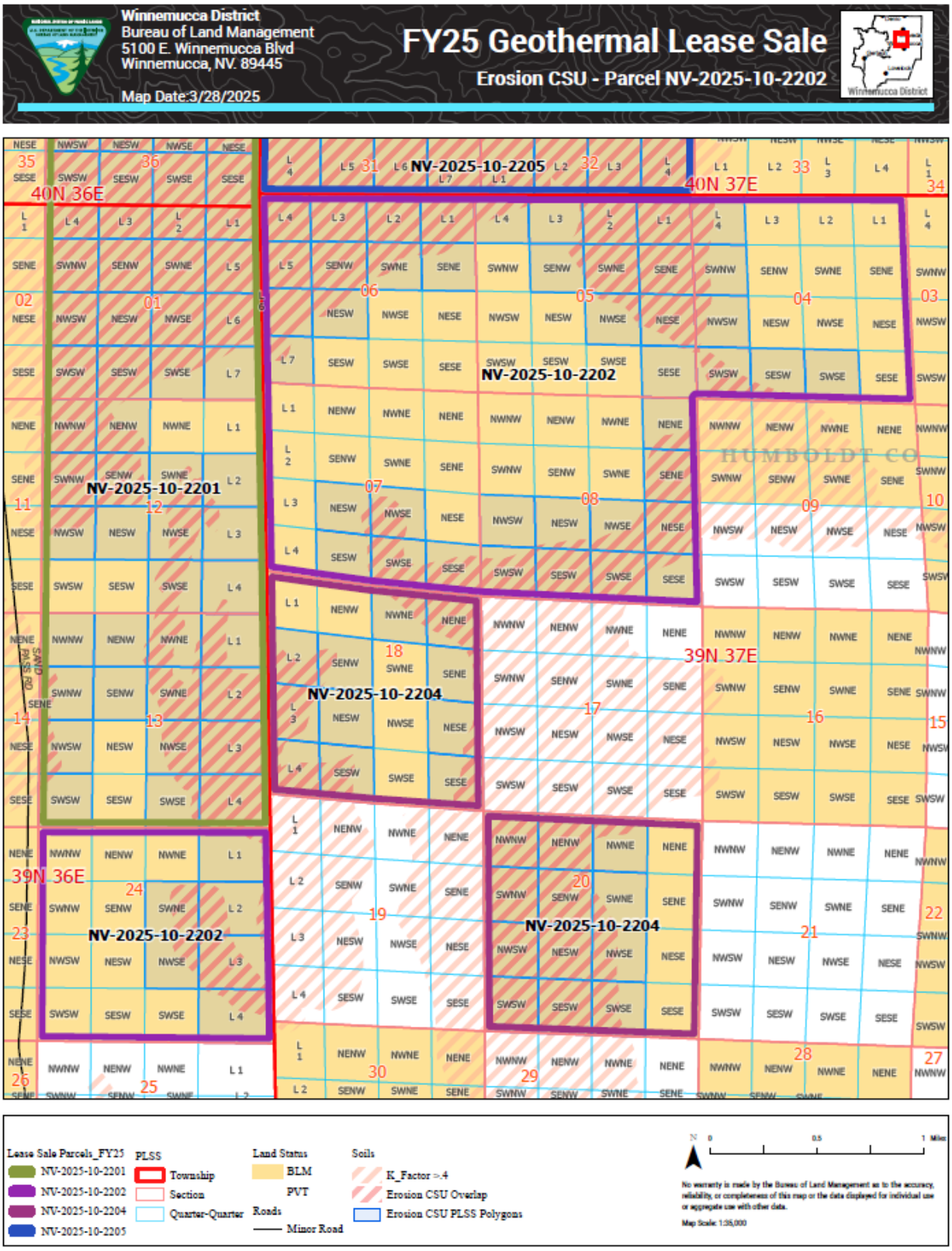

Figure 100. Soil Severe Erosion (CSU) in parcel NV-2025-10-2204.

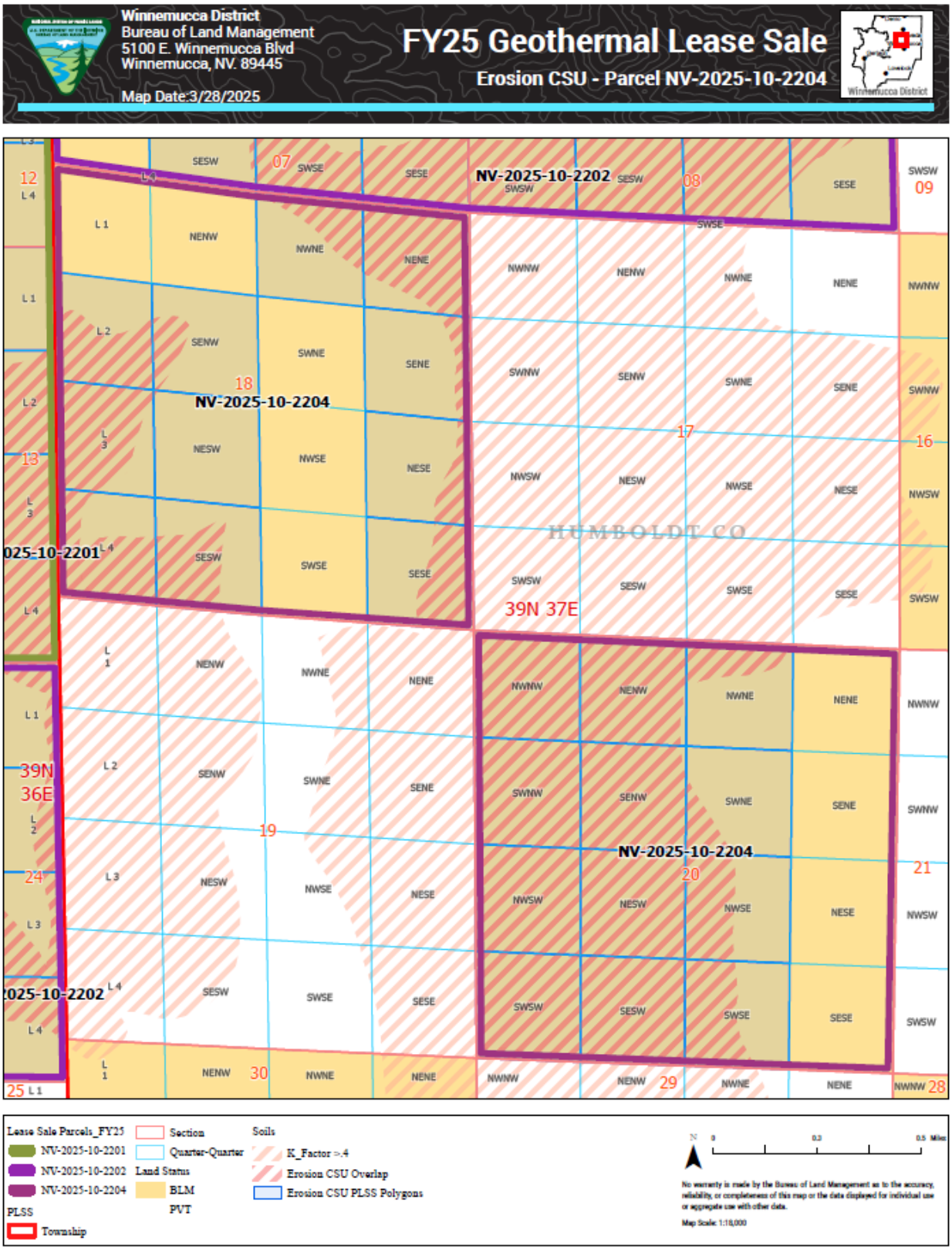

Figure 101. Soil Severe Erosion (CSU) in parcel NV-2025-10-2205.

Figure 102. Soil Severe Erosion (CSU) in parcel NV-2025-10-2208.

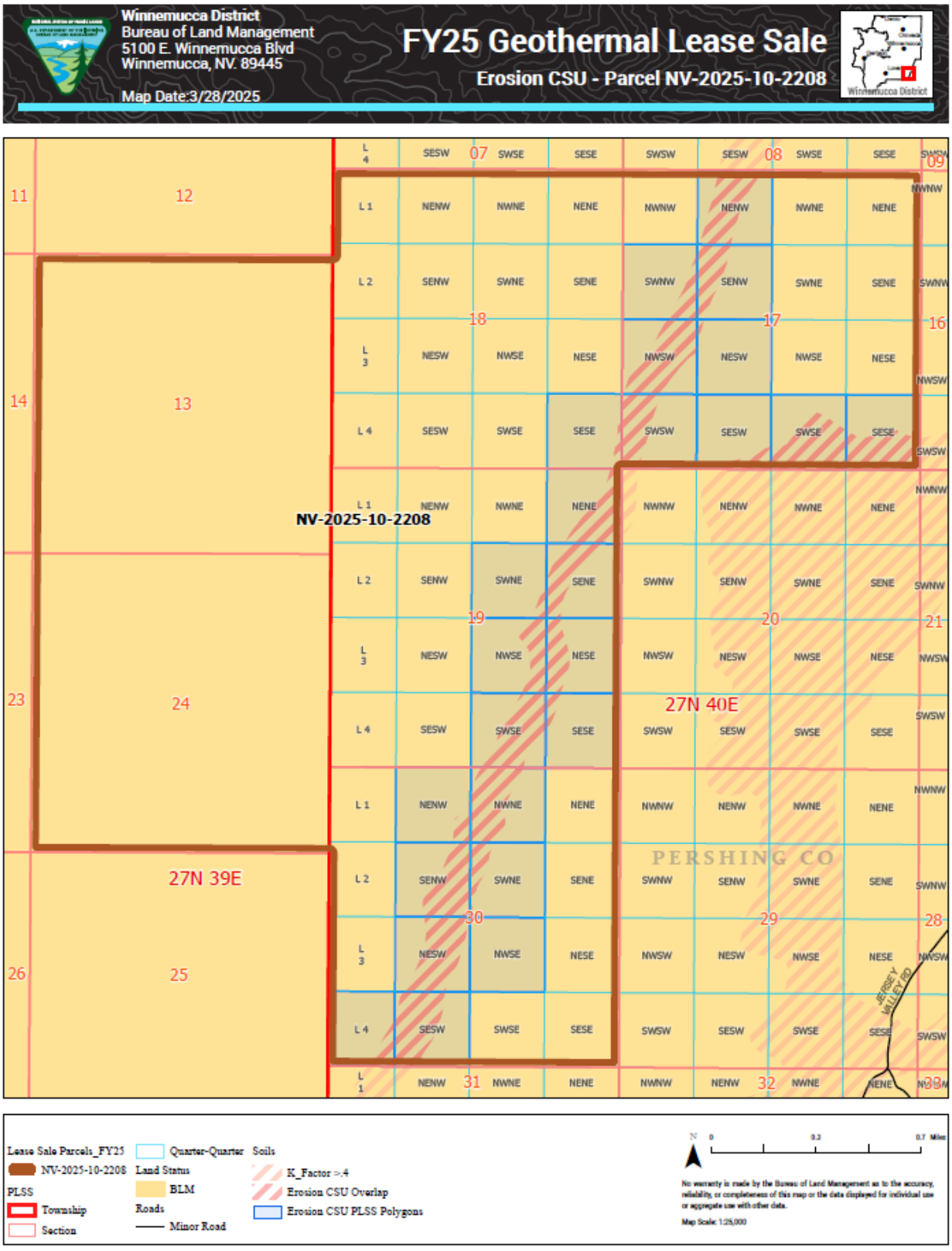

Figure 103. Soil Severe Erosion (CSU) in parcel NV-2025-10-2211.

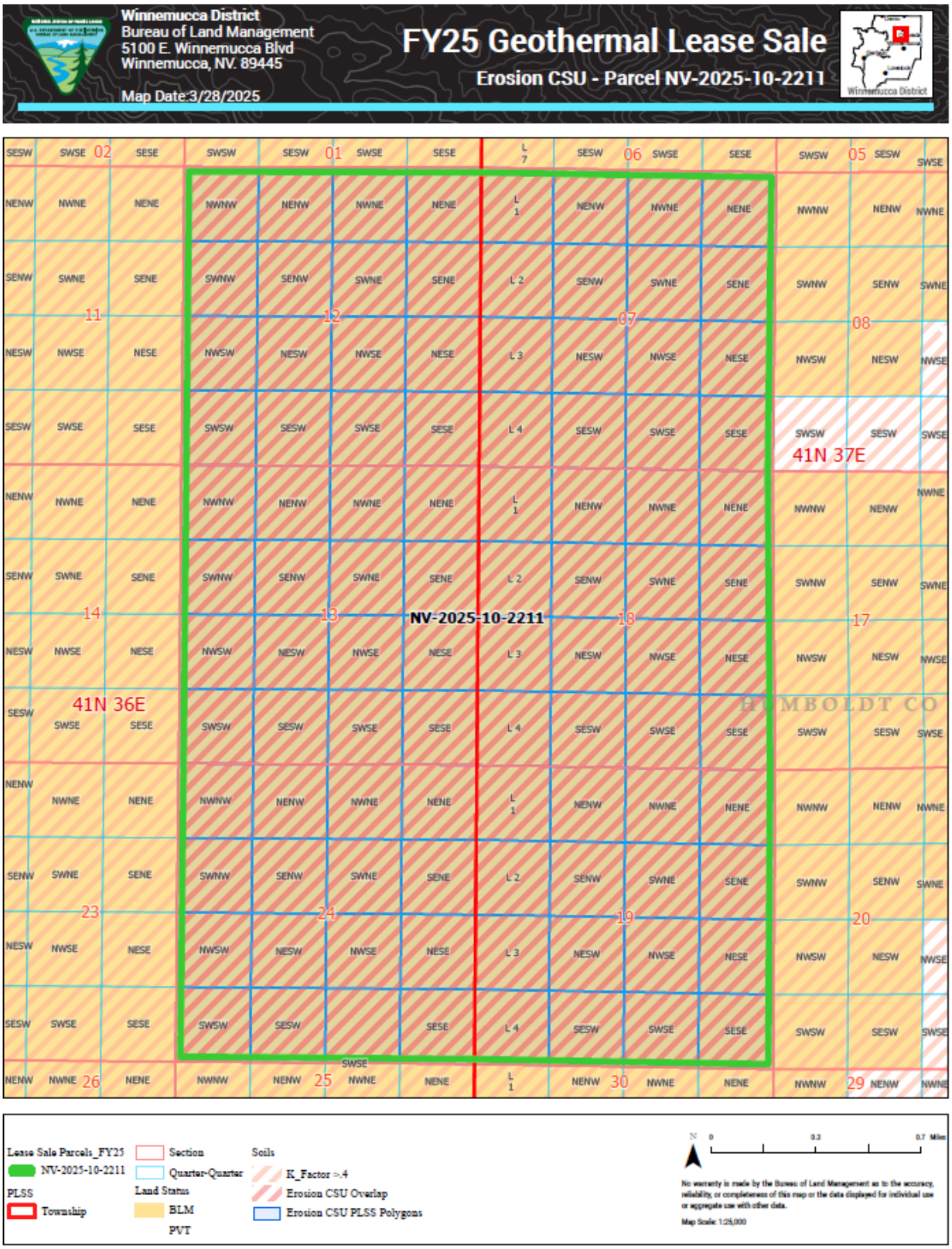

Figure 104. Soil Severe Erosion (CSU) in parcel NV-2025-10-2215.

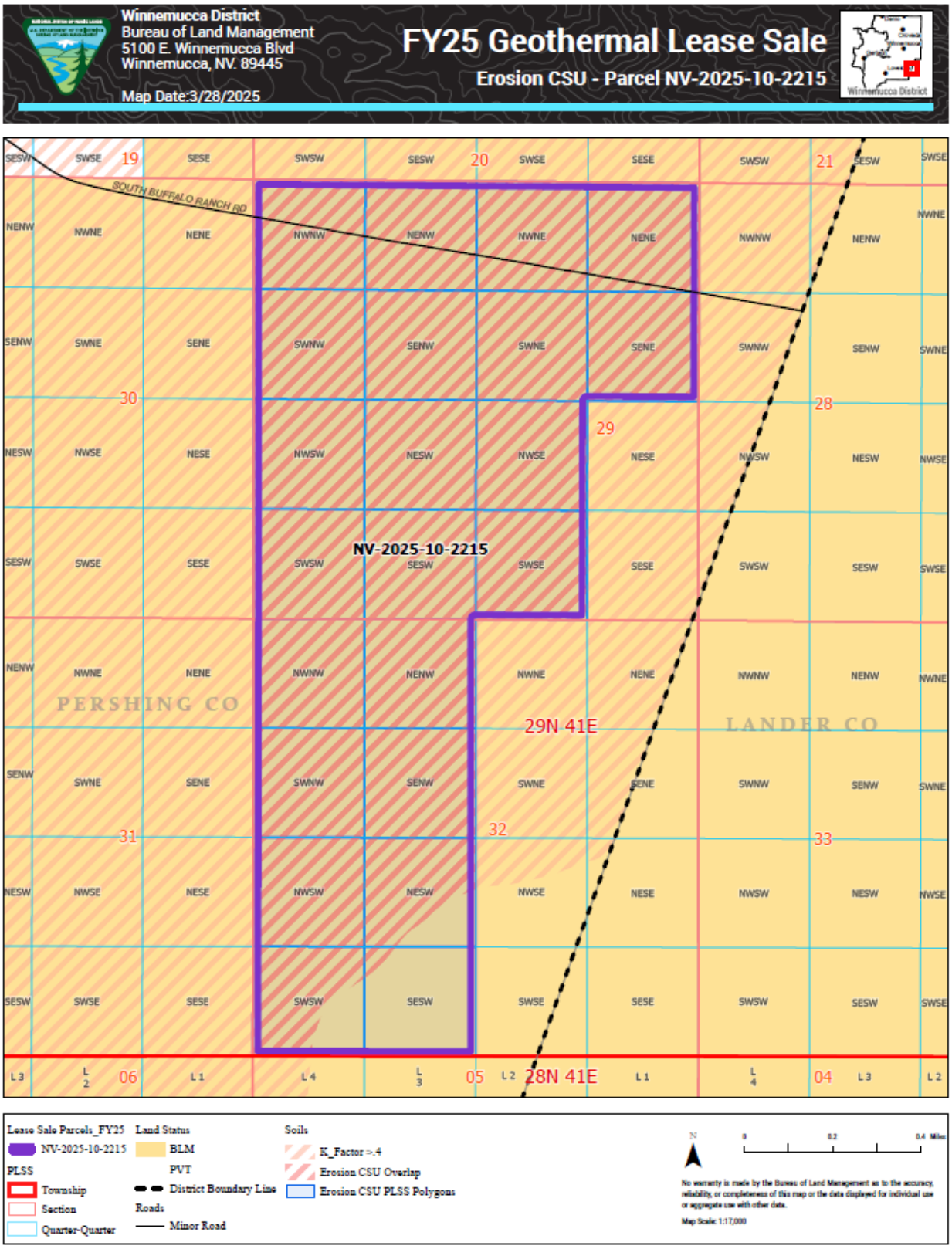

Figure 105. Soil Severe Erosion (CSU) in parcel NV-2025-10-7035.

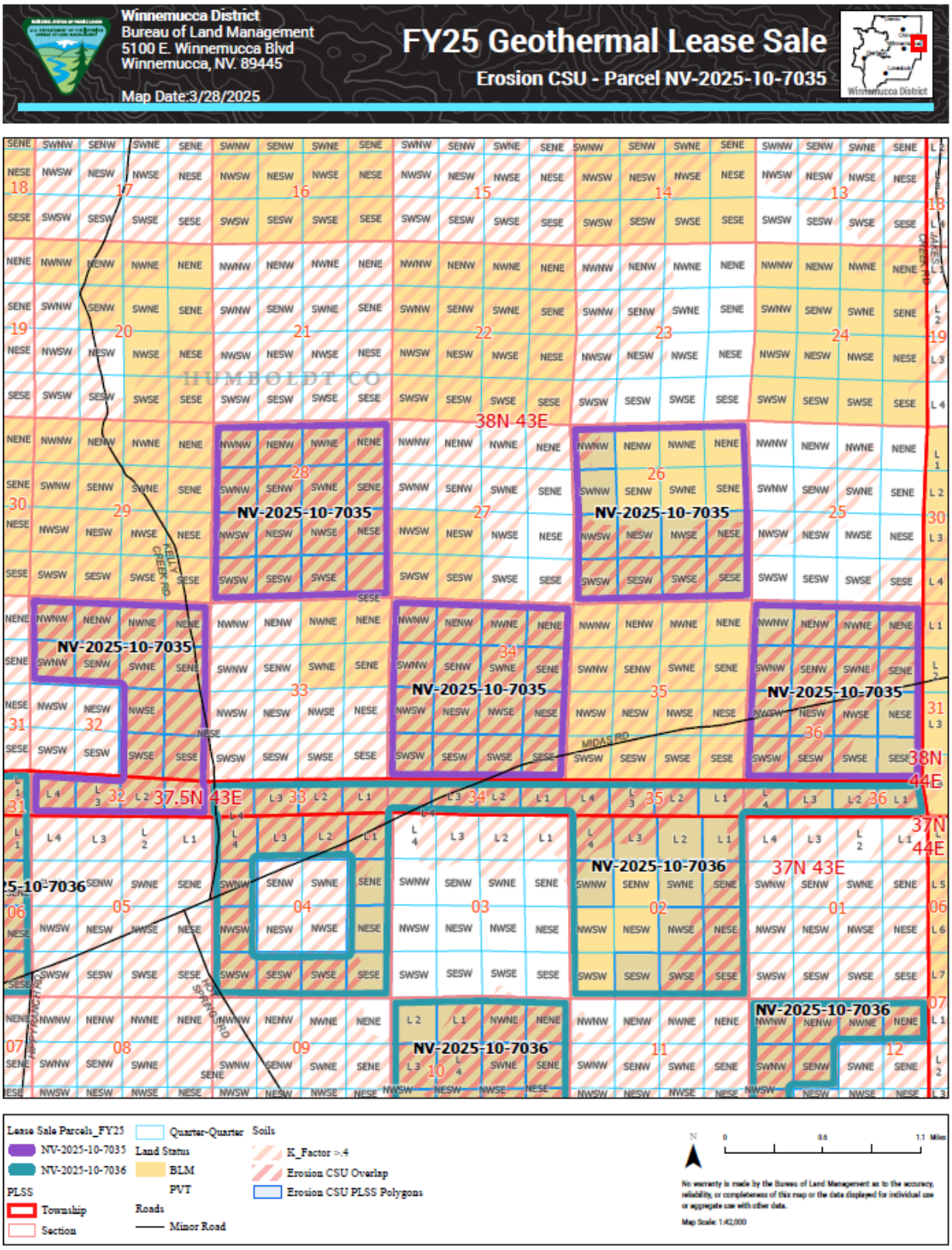

Figure 106. Soil Severe Erosion (CSU) in parcel NV-2025-10-7036.

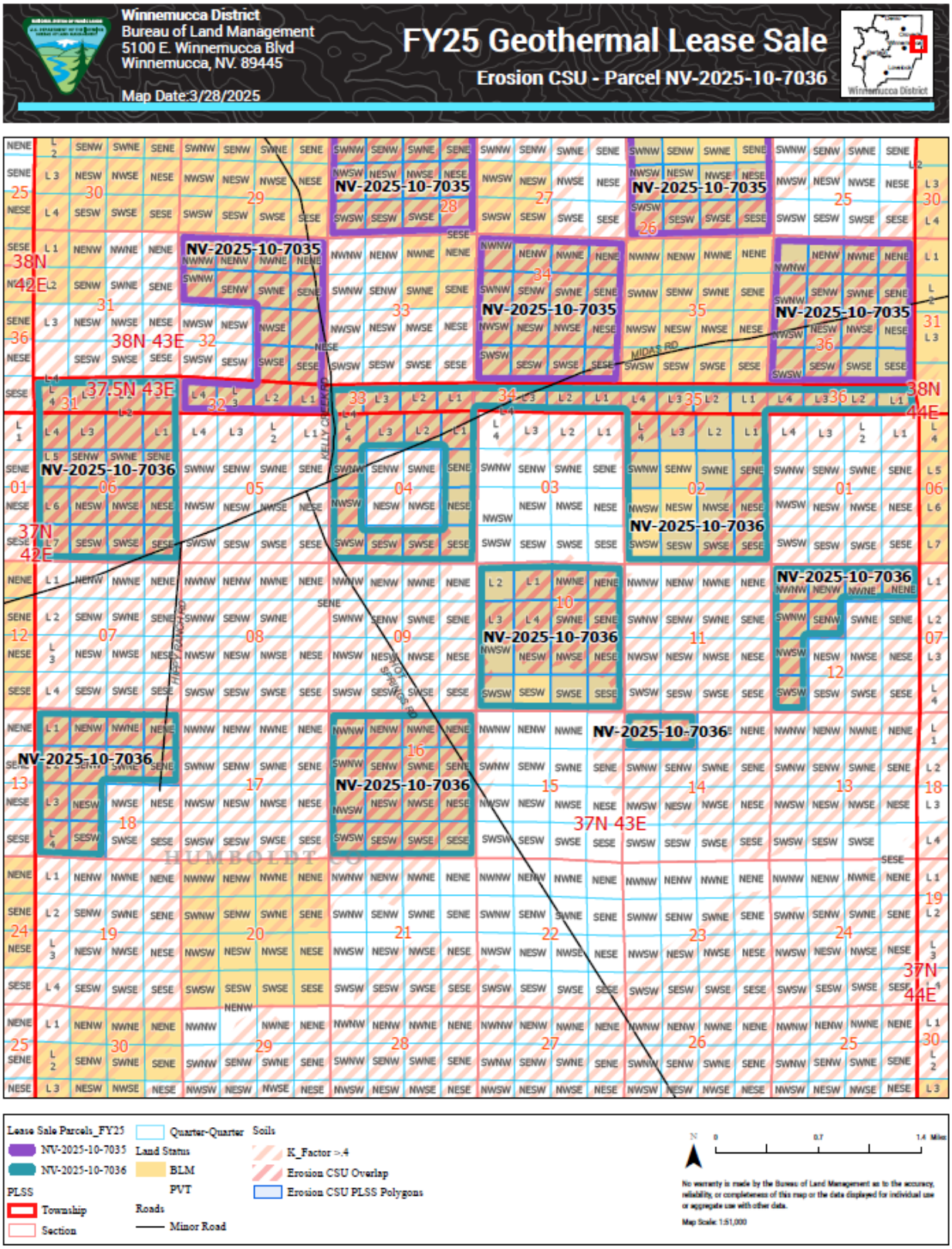

Figure 107. Sage Grouse Habitat (LN) in parcel NV-2025-10-2143.

Figure 108. Sage Grouse Habitat (LN) in parcel NV-2025-10-2150.

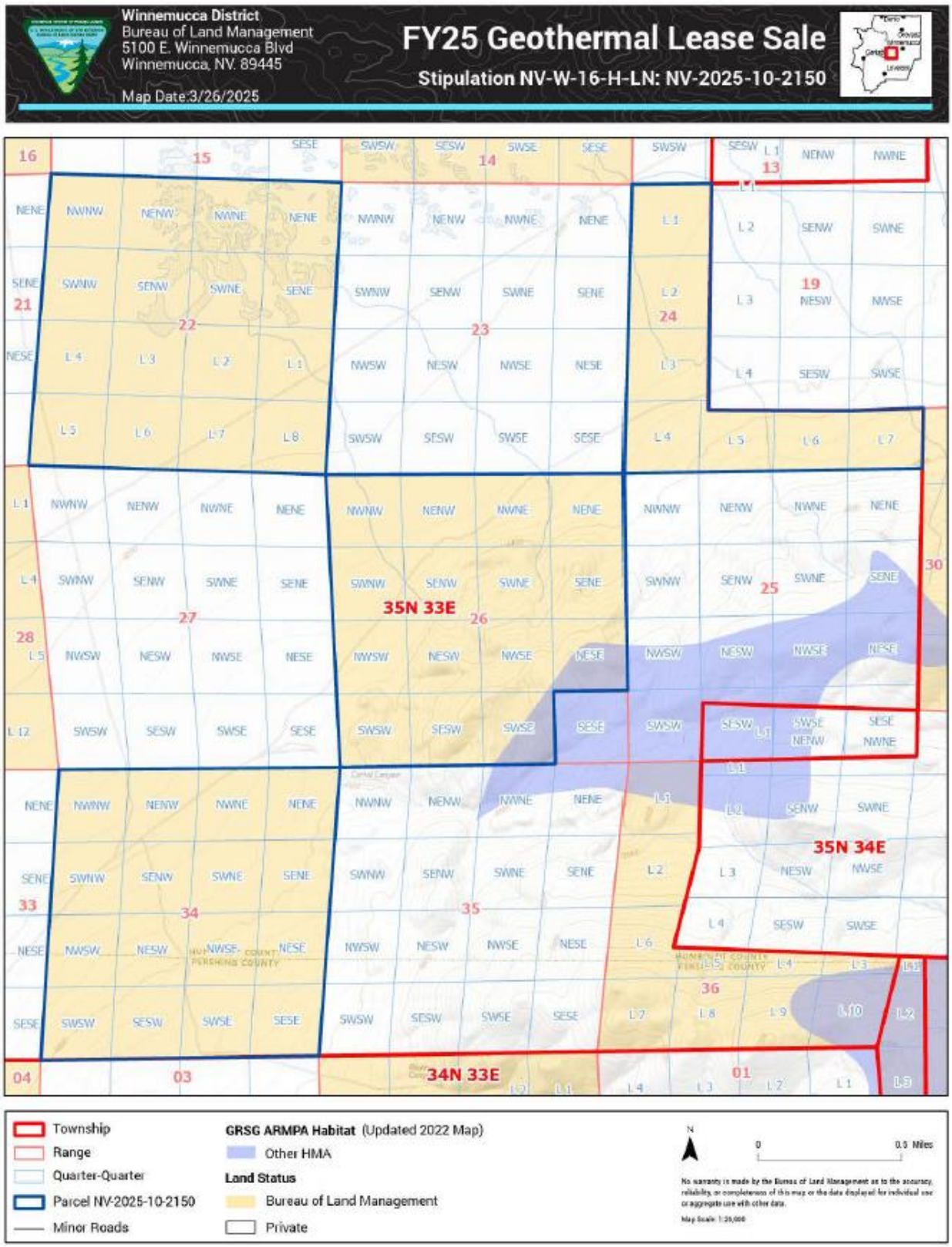

Figure 109. Sage Grouse Habitat (LN) in parcel NV-2025-10-2208.

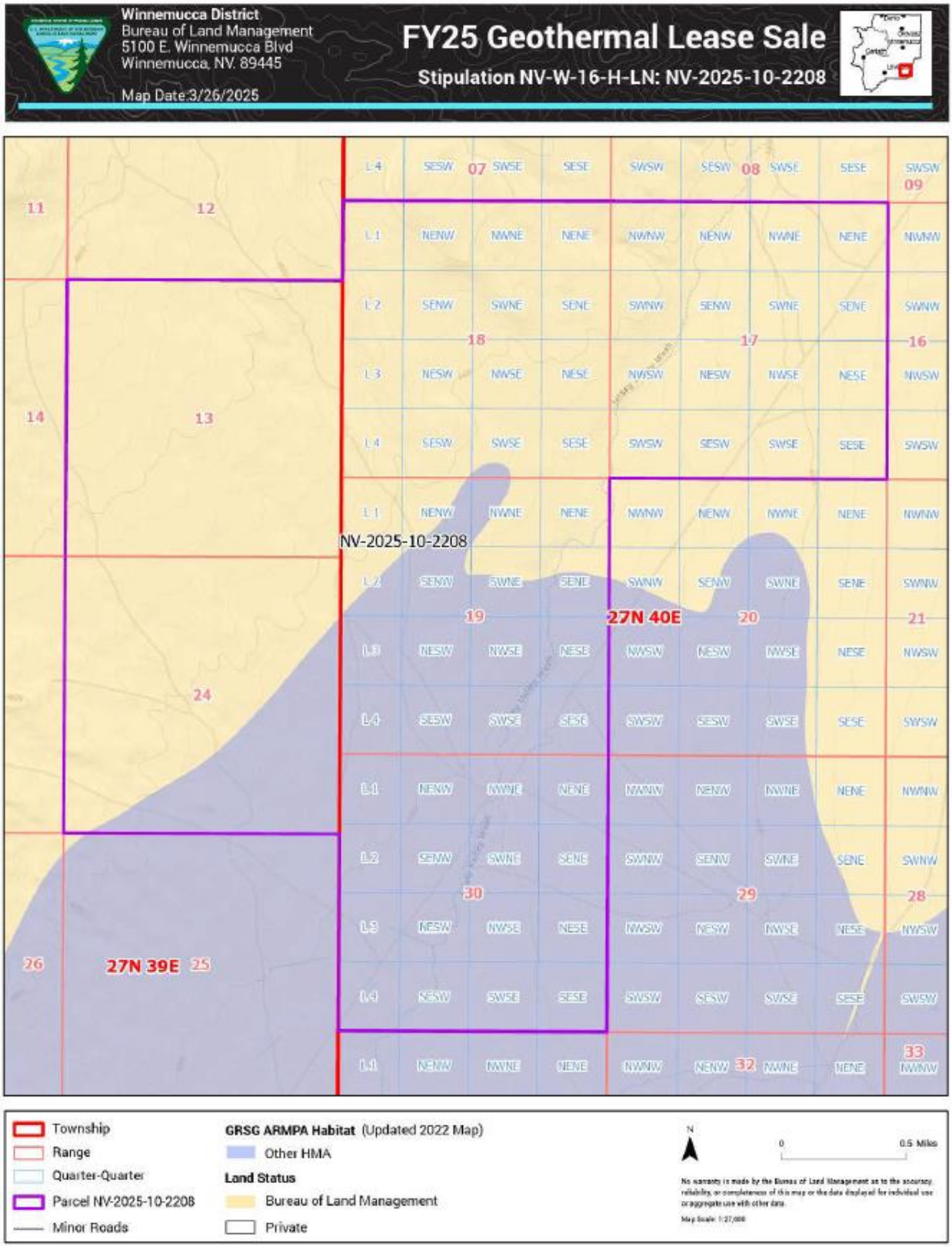

Figure 110. Sage Grouse Habitat (LN) in parcel NV-2025-10-7039.

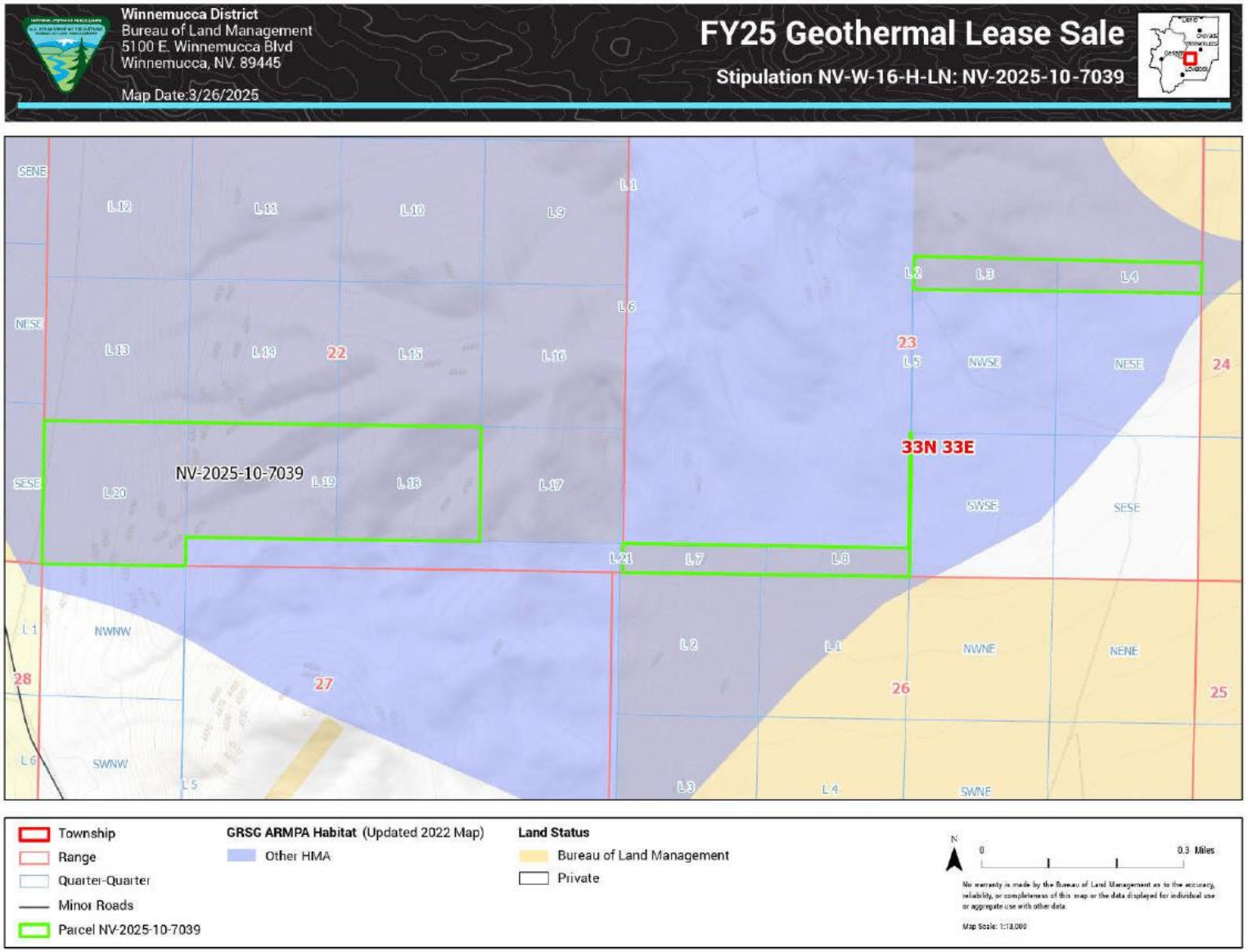

Figure 111. Saleable Minerals: Community Pits (LN) for parcel NV-2025-10-2153.

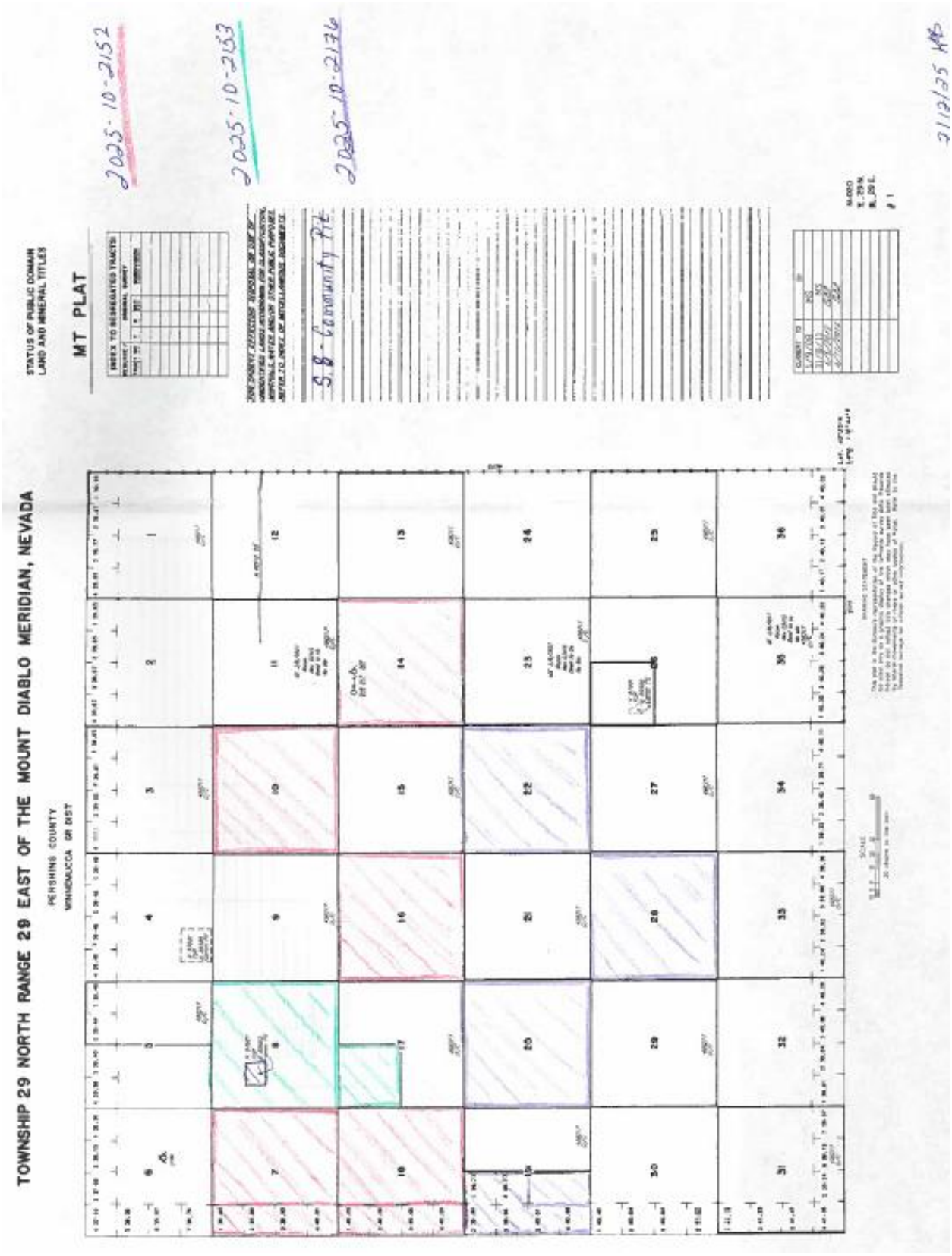

Figure 112. Lands with Wilderness Characteristics (LN) in parcel NV-2025-10-2152.

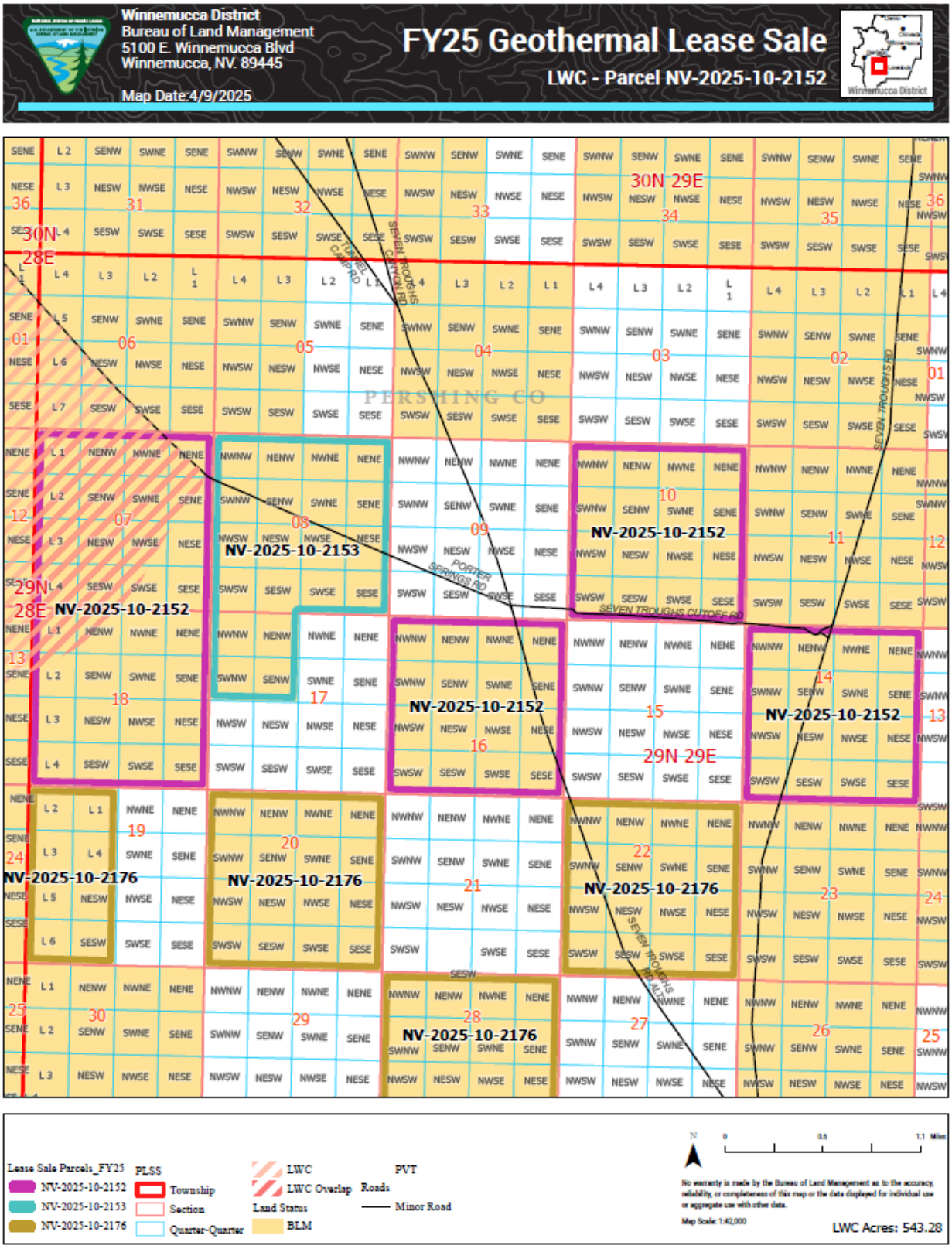

Figure 113. Lands with Wilderness Characteristics (LN) in parcel NV-2025-10-2215.

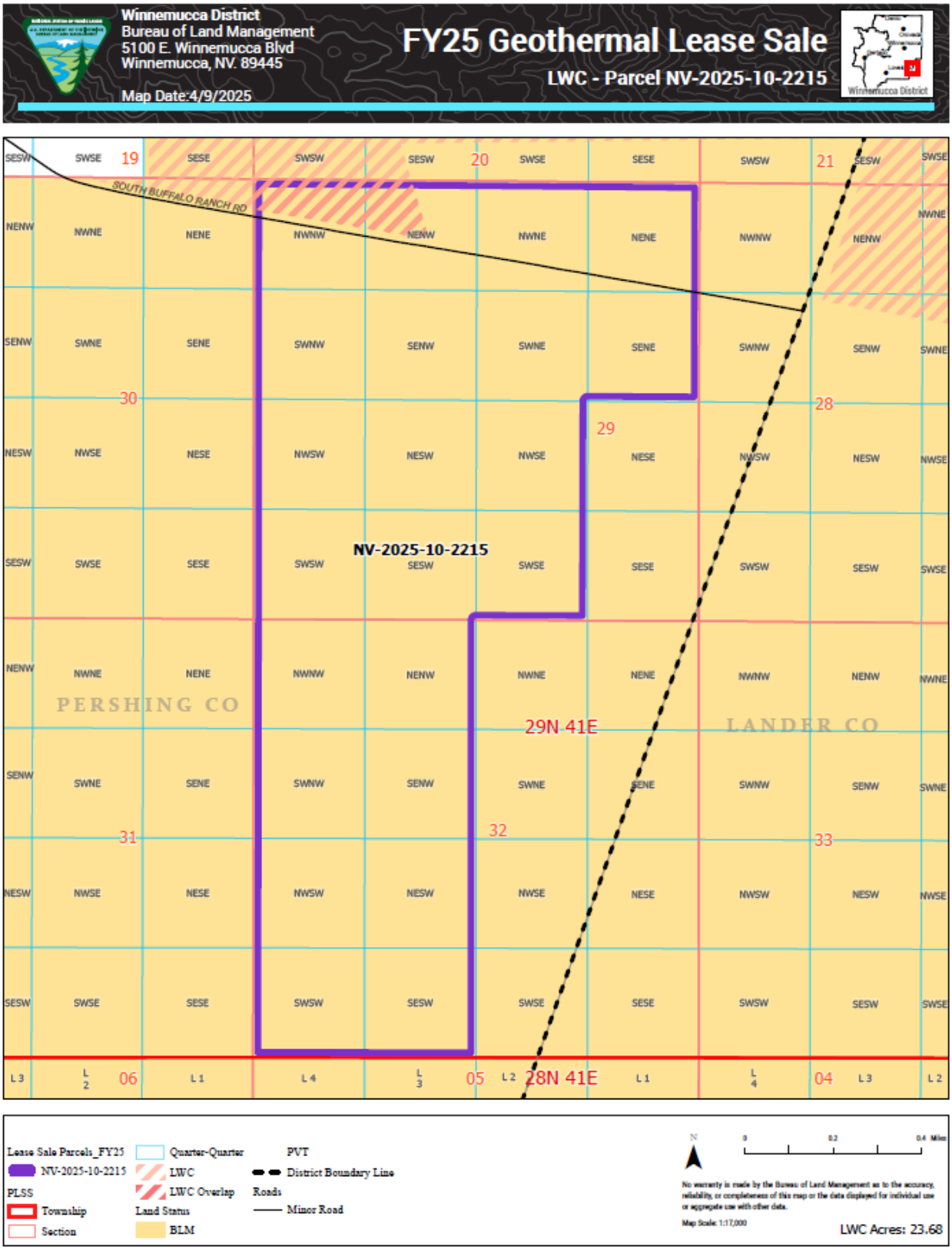

Figure 114. Socioeconomic Analysis Areas for the WDO FY25 Geothermal Lease Sale.

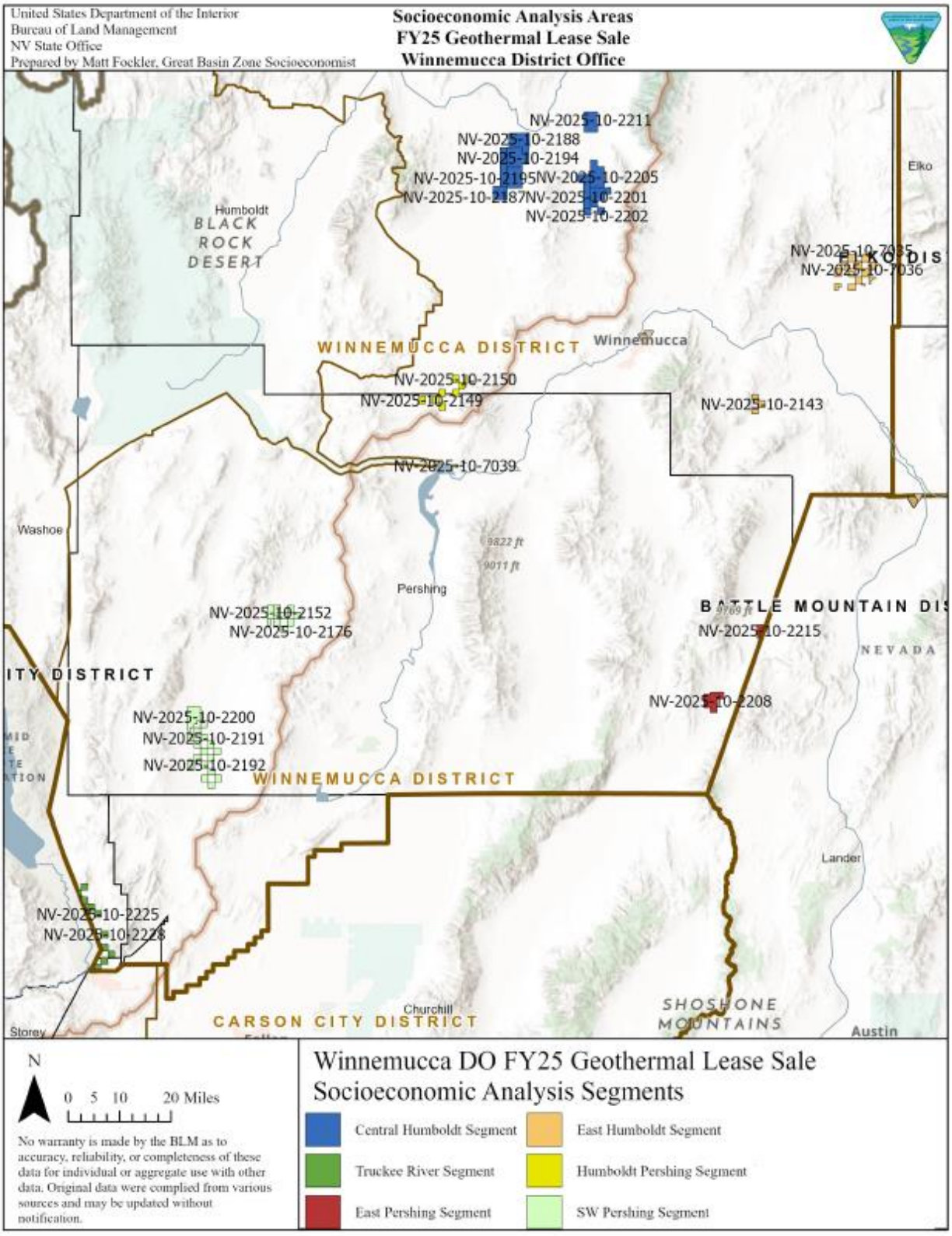

Table J-114. Public Comments.

Commenter	Identifier	Comment	Response

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Appendix L: Air Emission Inventory

The following tables illustrate how air emissions were estimated for this analysis based on the Reasonably Foreseeable Development Scenario in Appendix E.

Table L-115. RFD Inputs.

Exploration

Amount	Description	Basis
80	Maximum number of exploration wells	RFD App E
200	Maximum acres of disturbance for exploration	RFD App E
2.5	Acres per well	Estimate in RFD
2.4	Days drilling per exploration well	Gerlach Geothermal Exploration Project Final EA. BLM. DOI-BLM-NV-W030-2022-0001-EA. 2022
190	Total days Exploration	Calculated

Wellfield Development

Amount	Description	Basis
20	Maximum number of production wells per Plant	RFD App E
20	Maximum number of Injection wells per Plant	RFD App E
75	Maximum acres of disturbance for wellfield development per plant	Estimate in RFD App E
2.5	Acres disturbed per well pad	RFD
45.0	Days of drilling per well	ORMAT LLC's Tuscarora Geothermal Power Plant Final EA. U.S. Department of Energy. DOE/EA-1849. 2011
60.0	Drilling months	Estimated
1800	Total days Wellfield Development	Calculated

Power Plant Construction

Amount	Description	Basis
2	Maximum number of Plants	RFD
15	Maximum plant capacity (megawatts)	RFD App E
450	Maximum acres of disturbance for power plants, roads, pipelines, and transmission lines for whole RFD Power Plant construction	RFD App E

12	Construction Months	ORMAT LLC's Tuscarora Geothermal Power Plant Final EA. U.S. Department of Energy. DOE/EA-1849. 2011
264	Total days Plant Construction	Calculated

Operations

Amount	Description	Basis
2	Maximum number of Plants	RFD
15	Maximum plant capacity (megawatts)	RFD
20	Workers on site	Estimated

Table L-216. Emissions from Drill Rig Engines.

		Exploration		Operation	
		80	Number of Wells	40	Number of Wells
Fuel Type	Diesel	24	Operating Hours per day/drill rig	24	Operating Hours per day/drill rig
Total Operating Hours – Exploration	4,547	2.4	Drilling Days per well	45	Drilling Days per well
Total Operating Hours – Initial Wells	43,200				
Load Factor	0.5				

Data for Representative Drill Rigs				**Emission Factors (grams/hp-hr)**										**Emissions, lbs/hour**						**kg/hour**			
MD525	Model	HP	Tier	NO_x[a]	CO[a]	VOC[a]	SO_2[b]	PM_{10}[a]	$PM_{2.5}$[c]	CO_2[d]	CH_4[e]	N_2O[f]	HAPs[g]	NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
Drawworks engine	CAT C-15	540	4	0.88	0.31	0.03	0.00	0.02	0.00	530.96	0.02	0.004	0.0005	0.52	0.19	0.02	0.00	0.01	0.001	143.4	0.01	0.00	143.9
Top Drive - Hydraulic Engine	CAT C-18	700	4	0.88	0.31	0.03	0.00	0.02	0.00	530.96	0.02	0.004	0.0005	0.68	0.24	0.02	0.00	0.02	0.001	185.8	0.01	0.00	186.5
Power Plant Generator 1	CAT C-15	540	4	0.88	0.31	0.03	0.00	0.02	0.00	530.96	0.02	0.004	0.0005	0.52	0.19	0.02	0.00	0.01	0.001	143.4	0.01	0.00	143.9
Power Plant Generator 2	CAT C-15	540	4	0.88	0.31	0.03	0.00	0.02	0.00	530.96	0.02	0.004	0.0005	0.52	0.19	0.02	0.00	0.01	0.001	143.4	0.01	0.00	143.9
Mud Pump	CAT 3508	1,000	4	2.18	0.13	0.05	0.00	0.02	0.00	530.89	0.02	0.004	0.0008	2.40	0.15	0.05	0.01	0.02	0.002	265.4	0.01	0.00	266.4
Total														**4.65**	**0.95**	**0.12**	**0.02**	**0.07**	**0.007**	**881.4**	**0.03**	**0.01**	**884.6**
Rig 108																							
Power Plant Generator 1	Cat 3512C	1,500	4	0.40	0.81	0.01	0.00	0.03	0.00	531.01	0.02	0.004	0.0002	0.65	1.33	0.02	0.01	0.04	0.004	398.3	0.02	0.00	399.7
Power Plant Generator 2	Cat 3512C	1,500	4	0.40	0.81	0.01	0.00	0.03	0.00	531.01	0.02	0.004	0.0002	0.65	1.33	0.02	0.01	0.04	0.004	398.3	0.02	0.00	399.7
Power Plant Generator 2	Cat 3512C	1,500	4	0.40	0.81	0.01	0.00	0.03	0.00	531.01	0.02	0.004	0.0002	0.65	1.33	0.02	0.01	0.04	0.004	398.3	0.02	0.00	399.7
Aux Generator	CAT C-15	540	4	0.88	0.31	0.03	0.00	0.02	0.00	530.96	0.02	0.004	0.0005	0.52	0.19	0.02	0.00	0.01	0.001	143.4	0.01	0.00	143.9
Total														**2.49**	**4.19**	**0.07**	**0.03**	**0.15**	**0.014**	**1,338.1**	**0.05**	**0.01**	**1,343.1**
Average Drill Rig Emission Rates														**3.57**	**2.57**	**0.09**	**0.02**	**0.11**	**0.011**	**1,109.7**	**0.04**	**0.01**	**1,113.9**

Estimated Emissions

		Emissions, tons						**Metric tonnes**				**tons**	
	Operating Hours	NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e	HAPs	H_2S[p]

Exploration	4,547	8.12	5.84	0.22	0.05	0.25	0.024	5,046.4	0.20	0.04	5,065.2	0.0039	0
Wellfield Development	43,200	77.13	55.45	2.05	0.49	2.34	0.227	47,940.9	1.90	0.37	48,119.5	0.0369	70.4
	Total	**85.2**	**61.29**	**2.26**	**0.54**	**2.59**	**0.25**	**52,987.3**	**2.10**	**0.41**	**53,184.7**	**0.04**	**70.40**

Representative geothermal drill rig data

Model	MD525		Rig 108	
	Powered by	HP	Powered by	HP
Drawworks engine	CAT C-15	540	Electric	
Top Drive - Hydraulic Engine	CAT C-18	700	Electric	
Power Plant Generator 1	CAT C-15	540	Cat 3512C	1,500
Power Plant Generator 2	CAT C-15	540	Cat 3512C	1,500
Power Plant Generator 2	NA		Cat 3512C	1,500
Aux Generator	NA		CAT C-15	540
Mud Pump	CAT 3508	1,000	Electric	
	Total	3,320	Total	5,040

Table L-317. Emissions from Off-road Equipment; Data and Pounds per Hour Emissions.

Exploration	Count	HP	Load Factor	Tier	Days in Service	Daily Use (hrs/day)	Annual Use (hrs/yr)	Off-road Emission Factors (g/bhp-hr)										Emissions, lbs/hour						kg/hour				lbs/hour
								NO_x[a]	CO[a]	VOC[a]	SO_2[b]	PM_{10}[a,h]	$PM_{2.5}$[c]	CO_2[d]	CH_4[e]	N_2O[f]	HAPs[g]	NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e	HAPs
Tracked Loader	1	108	0.37	4	190	8.0	1,520.0	1.169	0.089	0.012	0.0049	0.009	0.001	531.0	0.021	0.004	0.0002	0.10	0.01	0.001	0.000	0.001	0.0001	21.1	0.0008	0.0002	21.2	0.00002
Wheeled Loader	1	164	0.36	4	190	11.0	2,090.0	1.169	0.089	0.012	0.0049	0.009	0.001	531.0	0.021	0.004	0.0002	0.15	0.01	0.002	0.001	0.001	0.0001	31.5	0.0012	0.0002	31.6	0.00003
Motor Grader	3	174	0.41	4	190	8.0	1,520.0	1.169	0.089	0.012	0.0049	0.009	0.001	531.0	0.021	0.004	0.0002	0.55	0.04	0.006	0.002	0.004	0.0004	113.3	0.0045	0.0009	113.4	0.00010
Water Truck	1	300	0.42	4	190	8.0	1,520.0	0.882	0.313	0.027	0.0049	0.020	0.002	531.0	0.021	0.004	0.0005	0.24	0.09	0.007	0.001	0.005	0.0005	66.2	0.0026	0.0005	66.3	0.00013

Wellfield Development	Count	HP	Load Factor	Tier	Days in Service	Daily Use (hrs/day)	Annual Use (hrs/yr)	Off-road Emission Factors (g/bhp-hr)										Emissions, lbs/hour						kg/hour				lbs/hour
								NO_x[a]	CO[a]	VOC[a]	SO_2[b]	PM_{10}[a,h]	$PM_{2.5}$[c]	CO_2[d]	CH_4[e]	N_2O[f]	HAPs[g]	NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e	HAPs
Tracked Loader	1	108	0.37	4	1,800	8.0	14,400.0	1.169	0.089	0.012	0.0049	0.009	0.001	531.0	0.021	0.004	0.0002	0.10	0.01	0.001	0.000	0.001	0.0001	21.1	0.0008	0.0002	21.2	0.00002
Wheeled Loader	1	164	0.36	4	1,800	11.0	19,800.0	1.169	0.089	0.012	0.0049	0.009	0.001	531.0	0.021	0.004	0.0002	0.15	0.01	0.002	0.001	0.001	0.0001	31.5	0.0012	0.0002	31.6	0.00003
Motor Grader	3	174	0.41	4	1,800	8.0	14,400.0	1.169	0.089	0.012	0.0049	0.009	0.001	531.0	0.021	0.004	0.0002	0.55	0.04	0.006	0.002	0.004	0.0004	113.3	0.0045	0.0009	113.4	0.00010
Water Truck	1	300	0.42	4	1,800	8.0	14,400.0	0.882	0.313	0.027	0.0049	0.020	0.002	531.0	0.021	0.004	0.0005	0.24	0.09	0.007	0.001	0.005	0.0005	66.2	0.0026	0.0005	66.3	0.00013

Powerplant Construction	Count	HP	Load Factor	Tier	Days in Service	Daily Use (hrs/day)	Annual Use (hrs/yr)	Off-road Emission Factors (g/bhp-hr)										Emissions, lbs/hour						kg/hour				lbs/hour
								NO_x[a]	CO[a]	VOC[a]	SO_2[b]	PM_{10}[a,h]	$PM_{2.5}$[c]	CO_2[d]	CH_4[e]	N_2O[f]	HAPs[g]	NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e	HAPs
Tracked Loader	1	108	0.37	4	264	8.0	2,112.0	1.169	0.089	0.012	0.0049	0.009	0.001	531.0	0.021	0.004	0.0002	0.10	0.01	0.001	0.000	0.001	0.0001	21.1	0.0008	0.0002	21.2	0.00002
Wheeled Loader	1	164	0.36	4	264	11.0	2,904.0	1.169	0.089	0.012	0.0049	0.009	0.001	531.0	0.021	0.004	0.0002	0.15	0.01	0.002	0.001	0.001	0.0001	31.5	0.0012	0.0002	31.6	0.00003
Motor Grader	3	174	0.41	4	264	8.0	2,112.0	1.169	0.089	0.012	0.0049	0.009	0.001	531.0	0.021	0.004	0.0002	0.55	0.04	0.006	0.002	0.004	0.0004	113.3	0.0045	0.0009	113.4	0.00010
Roller Compactor	1	95	0.42	4	264	11.0	2,904.0	0.882	0.313	0.027	0.0049	0.020	0.002	531.0	0.021	0.004	0.0005	0.08	0.03	0.002	0.000	0.002	0.0002	21.0	0.0008	0.0002	21.0	0.00004
Crane	1	399	0.29	4	264	11.0	2,904.0	0.882	0.313	0.027	0.0049	0.020	0.002	531.0	0.021	0.004	0.0005	0.22	0.08	0.007	0.001	0.005	0.0005	61.0	0.0024	0.0005	61.1	0.00012

Truck Mounted Lift	1	60	0.31	4	264	8.0	2,112.0	2.678	0.433	0.090	0.0055	0.058	0.006	590.1	0.023	0.005	0.0016	0.11	0.02	0.004	0.000	0.002	0.0002	10.9	0.0004	0.0001	10.9	0.00007
Water Truck	1	300	0.42	4	264	11.0	2,904.0	0.882	0.313	0.027	0.0049	0.020	0.002	531.0	0.021	0.004	0.0005	0.24	0.09	0.007	0.001	0.005	0.0005	66.2	0.0026	0.0005	66.3	0.00013

Plant Operations	**Count**	**HP**	**Load Factor**	**Tier**	**Days in Service**	**Daily Use (hrs/day)**	**Annual Use (hrs/yr)**	**Off-road Emission Factors (g/bhp-hr)**										**Emissions, lbs/hour**						**kg/hour**				**lbs/hour**
								NO_x[a]	CO[a]	VOC[a]	SO_2[b]	PM_{10}[a,h]	$PM_{2.5}$[c]	CO_2[d]	CH_4[e]	N_2O[f]	HAPs[g]	NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e	HAPs
Generator	1	500	0.37	4	365	8.0	2,400.0	0.882	0.313	0.027	0.0049	0.020	0.002	531.0	0.021	0.004	0.0005	0.36	0.13	0.011	0.002	0.008	0.0008	97.8	0.0039	0.0008	98.0	0.00020

Emissions in Tons

Exploration		**Emissions, tons**						**Metric tonnes**				**tons**
	Operating Hours	**NOx**	**CO**	**VOC**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**CO_2**	**CH_4**	**N_2O**	**CO_2e**	**HAPs**
Tracked Loader	1,520	0.08	0.00595	0.00078	0.00033	0.00059	0.00006	32.12	0.00127	0.00025	32.2	0.00001
Wheeled Loader	2,090	0.16	0.01220	0.00160	0.00068	0.00121	0.00012	65.85	0.00261	0.00051	66.1	0.00003
Motor Grader	1,520	0.42	0.03192	0.00419	0.00177	0.00317	0.00031	172.19	0.00681	0.00133	172.8	0.00008
Water Truck	1,520	0.18	0.06532	0.00567	0.00103	0.00412	0.00040	100.58	0.00398	0.00078	100.9	0.00010

Wellfield Development		**Emissions, tons**						**Metric tonnes**				**tons**
	Operating Hours	**NOx**	**CO**	**VOC**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**CO_2**	**CH_4**	**N_2O**	**CO_2e**	**HAPs**
Tracked Loader	14,400	0.74	0.05640	0.00740	0.00312	0.00560	0.00054	304.31	0.01204	0.00235	305.4	0.00013
Wheeled Loader	19,800	1.51	0.11563	0.01517	0.00640	0.01147	0.00111	623.85	0.02469	0.00482	626.2	0.00027
Motor Grader	14,400	3.96	0.30235	0.03967	0.01674	0.02999	0.00291	1631.31	0.06456	0.01260	1,637.4	0.00071
Water Truck	14,400	1.74	0.61886	0.05369	0.00978	0.03900	0.00378	952.82	0.03771	0.00736	956.4	0.00097

Powerplant Construction		Emissions, tons						Metric tonnes				tons
	Operating Hours	NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e	HAPs
Tracked Loader	2,112	0.11	0.00827	0.00109	0.00046	0.00082	0.00008	44.63	0.00177	0.00034	44.8	0.00002
Wheeled Loader	2,904	0.22	0.01696	0.00222	0.00094	0.00168	0.00016	91.50	0.00362	0.00071	91.8	0.00004
Motor Grader	2,112	0.58	0.04435	0.00582	0.00246	0.00440	0.00043	239.26	0.00947	0.00185	240.2	0.00010
Roller Compactor	2,904	0.11	0.03952	0.00343	0.00062	0.00249	0.00024	60.85	0.00241	0.00047	61.1	0.00006
Crane	2,904	0.32	0.11517	0.01004	0.00182	0.00725	0.00070	177.24	0.00702	0.00137	177.9	0.00018
Truck Mounted Lift	2,112	0.12	0.01866	0.00386	0.00024	0.00250	0.00024	23.05	0.00091	0.00018	23.1	0.00007
Water Truck	2,904	0.35	0.12480	0.01083	0.00197	0.00786	0.00076	192.15	0.00761	0.00148	192.9	0.00019

Powerplant Operations		Emissions, tons						Metric tonnes				tons
	Operating Hours	NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e	HAPs
Generator	2,400	0.43	0.15257	0.01330	0.00241	0.00961	0.00093	234.79	0.00929	0.00181	235.7	0.00024
	0	0.00	0.00000	0.00000	0.00000	0.00000	0.00000	0.00	0.00000	0.00000	0.0	0.00000

Total Construction Emissions by Project Phase

	Emissions, tons						Metric tonnes				tons
Estimated Emissions	NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e	HAPs
Exploration	0.84	0.115	0.012	0.004	0.009	0.001	370.7	0.015	0.003	372.1	0.0002
Wellfield Development	7.96	1.093	0.116	0.036	0.086	0.008	3512.3	0.139	0.027	3525.4	0.0021
Powerplant Construction	1.81	0.368	0.037	0.009	0.027	0.003	828.7	0.033	0.006	831.8	0.0007
Operations-Generator	0.43	0.15	0.01	0.002	0.010	0.001	234.79	0.009	0.002	235.66	0.0002
Project Total	**10.61**	**1.576**	**0.165**	**0.048**	**0.122**	**0.012**	**4711.7**	**0.186**	**0.036**	**4729.3**	**0.0030**

Table L-418. Fugitive Dust Emissions.

Maximum Daily Emissions **Controlled**

Project Phase	Total Area to be Disturbed, acres	Maximum Daily Disturbance. Description	Maximum Daily Disturbance. Acres	Emission Factor, tons PM10 per acre-month[i]	PM10 lbs/day	PM2.5 lbs/day[j]
Exploration	200	1 well pad	2.5	0.11	18	1.8
Wellfield Development	75	1 well pad	2.5	0.11	18	1.8
Power Plant Construction	450	1/30 of total	15.0	0.11	110	11.0

Control: Water 2 times per day
Efficiency: 50 percent

Total Project Fugitive Dust

Project Phase	Total duration, months	Acres disturbed per month		Emission Factor, tons PM10 per acre-month[i]	PM10 tons	PM2.5 tons
Exploration	9	23		0.11	22.0	2.2
Wellfield Development	60	1		0.11	8.3	0.8
Power Plant Construction	12	38		0.11	49.5	5.0

Table L-519. Construction Worker Commute Emissions.

Emission Factors						NOx[k]	CO[k]	VOC[k]		SO_2[l]	PM_{10}[k]		$PM_{2.5}$[k]		CO_2[m]	CH_4[k]	N_2O[k]	CO_2e	HAPs[g]	
Project Phase	**Vehicle Class**	**No. of Workers**	**Carpool factor**	**VMT**	**Days per Phase**	**Running Exhaust**	**Running Exhaust**	**Running Exhaust**	**Running Evap-orative**	**Running Exhaust**	**Running Exhaust**	**Tire & Brake Wear**	**Running Exhaust**	**Tire & Brake Wear**	**Running Exhaust**	**Running Exhaust**	**Running Exhaust**	**Running Exhaust**	**Running Exhaust**	**Running Evap-orative**
				mi/vehicle-day		**g/mi**	**g/mi**	**g/mi**	**g/mi**	**g/mi**	**g/mi**	**g/mi**	**g/mi**	**g/mi**	**g/mi**	**g/mi**	**g/mi**	**g/mi**	**g/mi**	**g/mi**
Exploration	Light-Duty Auto	7	1	80	190	0.090	2.986	0.074	0.164	0.002	0.002	0.031	0.002	0.004	363	0.016	0.006	365	0.0013	0.003
	Light-Duty Truck	3	1	80	190	0.107	3.027	0.08	0.120	0.003	0.004	0.031	0.003	0.004	474	0.016	0.01	477	0.0014	0.0022
Wellfield Development	Light-Duty Auto	100	1	80	1800	0.090	2.986	0.074	0.164	0.002	0.002	0.031	0.002	0.004	363	0.016	0.006	365	0.0013	0.003
	Light-Duty Truck	100	1	80	1800	0.107	3.027	0.08	0.120	0.003	0.004	0.031	0.003	0.004	474	0.016	0.01	477	0.0014	0.0022
Power Plant Construction	Light-Duty Auto	100	1	80	264	0.090	2.986	0.074	0.164	0.002	0.002	0.031	0.002	0.004	363	0.016	0.006	365	0.0013	0.003
	Light-Duty Truck	100	1	80	264	0.107	3.027	0.08	0.120	0.003	0.004	0.031	0.003	0.004	474	0.016	0.01	477	0.0014	0.0022

Construction Phase	Vehicle Class	Emissions, lbs/day						Emissions, kg/day				lbs/day
		NOx	**CO**	**VOC**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**CO_2**	**CH_4**	**N_2O**	**CO_2e**	**HAPs**
Exploration	Light-Duty Auto	0.11	3.69	0.29	0.003	0.04	0.01	203.3	0.01	0.00	204.6	0.004
	Light-Duty Truck	0.06	1.60	0.10	0.002	0.02	0.00	113.8	0.00	0.00	114.4	0.001
Totals		**0.17**	**5.29**	**0.40**	**0.004**	**0.06**	**0.01**	**317.0**	**0.01**	**0.01**	**319.0**	**0.005**
Wellfield Development	Light-Duty Auto	1.59	52.66	4.20	0.041	0.58	0.11	2,904.0	0.13	0.05	2,922.9	0.052
	Light-Duty Truck	1.89	53.39	3.44	0.051	0.62	0.12	3,792.0	0.13	0.06	3,813.3	0.038
Totals		**3.47**	**106.05**	**7.64**	**0.092**	**1.20**	**0.23**	**6,696.0**	**0.26**	**0.10**	**6,736.2**	**0.090**
Power Plant Construction	Light-Duty Auto	1.59	52.66	4.20	0.041	0.58	0.11	2,904.0	0.13	0.05	2,922.9	0.052
	Light-Duty Truck	1.89	53.39	3.44	0.051	0.62	0.12	3,792.0	0.13	0.06	3,813.3	0.038
Totals		**3.47**	**106.05**	**7.64**	**0.092**	**1.20**	**0.23**	**6,696.0**	**0.26**	**0.10**	**6,736.2**	**0.090**
Project Total		**7.12**	**217.39**	**15.67**	**0.19**	**2.46**	**0.47**	**13,709.0**	**0.52**	**0.21**	**13,791.4**	**0.19**

Construction Phase	Vehicle Class	Total Emissions, tons						Total Emissions, metric tonnes				tons
		NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e	HAPs
Exploration	Light-Duty Auto	0.01	0.35	0.03	0.000	0.00	0.00	38.6	0.002	0.001	38.9	0.000
	Light-Duty Truck	0.01	0.15	0.01	0.000	0.00	0.00	21.6	0.001	0.000	21.7	0.000
Totals		**0.02**	**0.50**	**0.04**	**0.000**	**0.01**	**0.00**	**60.24**	**0.002**	**0.001**	**60.61**	**0.000**
Wellfield Development	Light-Duty Auto	1.43	47.40	3.78	0.037	0.52	0.10	5,227.2	0.230	0.086	5,261.2	0.047
	Light-Duty Truck	1.70	48.05	3.10	0.046	0.56	0.11	6,825.6	0.230	0.101	6,863.9	0.034
Totals		**3.13**	**95.44**	**6.87**	**0.083**	**1.08**	**0.21**	**12,052.8**	**0.461**	**0.187**	**12,125.2**	**0.081**
Power Plant Construction	Light-Duty Auto	0.21	6.95	0.55	0.005	0.08	0.01	766.7	0.034	0.013	771.6	0.007
	Light-Duty Truck	0.25	7.05	0.45	0.007	0.08	0.02	1,001.1	0.034	0.015	1,006.7	0.009
Totals		**0.46**	**14.00**	**1.01**	**0.012**	**0.16**	**0.03**	**1,767.7**	**0.068**	**0.027**	**1,778.4**	**0.016**
Project Total		**3.60**	**109.95**	**7.92**	**0.095**	**1.24**	**0.24**	**13,880.78**	**0.531**	**0.216**	**13,964.14**	**0.097**

Table L-620. Construction Truck Trip Emissions.

Emission Factors						NOx^k	CO$_k$	VOC^k		SO_2^n	PM_{10}^k		$PM_{2.5}^k$		CO$_{2^o}$	CH$_{4^k}$	N_2O^k	CO_2e	HAPs^g	
Project Phase	**Vehicle Class**	**No. of Trucks per day**	**Carpool factor**	**VMT miles/ vehicle- day**	**Days per Phase**	**Running Exhaust g/mi**	**Running Exhaust g/mi**	**Running Exhaust g/mi**	**Running Evaporative g/mi**	**Running Exhaust g/mi**	**Running Exhaust g/mi**	**Tire & Brake Wear g/mi**	**Running Exhaust g/mi**	**Tire & Brake Wear g/mi**	**Running Exhaust g/mi**	**Running Exhaust g/mi**	**Running Exhaust g/mi**	**Running Exhaust g/mi**	**Running Exhaust g/mi**	**Running Evaporative g/mi**
Exploration																				
Support Truck	Medium-Duty Truck	4	1	80	190	1.821	2.806	0.256	0.022	0.014	0.046	0.111	0.042	0.014	1,459	0.058	0.005	1461	0.004608	0.000396
Delivery Truck	Heavy-Duty Truck	1	1	80	190	3.525	5.272	0.452	0.033	0.015	0.006	0.202	0.005	0.026	1,571	0.098	0.01	1574	0.008136	0.000594
Wellfield Development																				
Support Truck	Medium-Duty Truck	16	1	80	1800	1.821	2.806	0.256	0.022	0.014	0.046	0.111	0.042	0.014	1,459	0.058	0.005	1462	0.004608	0.000396
Delivery Truck	Heavy-Duty Truck	3	1	80	1800	3.525	5.272	0.452	0.033	0.015	0.006	0.202	0.005	0.026	1,571	0.098	0.01	1571	0.008136	0.000594
Power Plant Construction																				
Support Truck	Medium-Duty Truck	8	1	80	264	1.821	2.806	0.256	0.022	0.014	0.046	0.111	0.042	0.014	1,459	0.058	0.005	1459	0.004608	0.000396
Delivery Truck	Heavy-Duty Truck	2	1	80	264	3.525	5.272	0.452	0.033	0.015	0.006	0.202	0.005	0.026	1,571	0.098	0.01	1571	0.008136	0.000594

Construction Phase	Vehicle Class	Emissions, lbs/day						Emissions, kg/day				lbs/day
		NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e	HAPs
Exploration												
Support Truck	Medium-Duty Truck	1.28	1.98	0.20	0.010	0.11	0.040	466.9	0.02	0.00	467.6	0.000
Delivery Truck	Heavy-Duty Truck	0.62	0.93	0.09	0.003	0.04	0.005	125.7	0.01	0.00	125.9	0.000
Totals		**1.91**	**2.91**	**0.28**	**0.012**	**0.15**	**0.04**	**592.6**	**0.03**	**0.00**	**593.5**	**0.000**
Wellfield Development												

Support Truck	Medium-Duty Truck	5.14	7.92	0.78	0.039	0.44	0.16	1,867.5	0.07	0.01	1,870.9	0.001
Delivery Truck	Heavy-Duty Truck	1.87	2.79	0.26	0.008	0.11	0.02	377.0	0.02	0.00	377.0	0.000
Totals		**7.00**	**10.71**	**1.04**	**0.047**	**0.55**	**0.17**	**2,244.6**	**0.10**	**0.01**	**2,248.0**	**0.001**
Power Plant Construction												
Support Truck	Medium-Duty Truck	2.57	3.96	0.39	0.020	0.22	0.08	933.8	0.04	0.00	933.8	0.001
Delivery Truck	Heavy-Duty Truck	1.24	1.86	0.17	0.005	0.07	0.01	251.4	0.02	0.00	251.4	0.000
Totals		**3.81**	**5.82**	**0.56**	**0.025**	**0.29**	**0.09**	**1,185.1**	**0.05**	**0.00**	**1,185.1**	**0.001**
Project Total		**12.72**	**19.44**	**1.89**	**0.08**	**1.00**	**0.31**	**4,022.2**	**0.18**	**0.01**	**4,026.6**	**0.00**
Construction Phase	**Vehicle Class**	**Total Emissions, tons**						**Total Emissions, metric tonnes**				**tons**
		NOx	**CO**	**VOC**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**CO_2**	**CH_4**	**N_2O**	**CO_2e**	**HAPs**
Exploration												
Support Truck	Medium-Duty Truck	0.12	0.19	0.02	0.001	0.01	0.00	88.7	0.004	0.000	88.9	0.000
Delivery Truck	Heavy-Duty Truck	0.06	0.09	0.01	0.000	0.00	0.00	23.9	0.001	0.000	23.9	0.000
Totals		**0.18**	**0.28**	**0.03**	**0.001**	**0.01**	**0.00**	**112.59**	**0.005**	**0.000**	**112.77**	**0.000**
Wellfield Development												
Support Truck	Medium-Duty Truck	4.62	7.13	0.71	0.035	0.40	0.14	3,361.5	0.134	0.012	3,367.7	0.001
Delivery Truck	Heavy-Duty Truck	1.68	2.51	0.23	0.007	0.10	0.01	678.7	0.042	0.002	678.7	0.000
Totals		**6.30**	**9.64**	**0.94**	**0.042**	**0.50**	**0.16**	**4,040.2**	**0.176**	**0.014**	**4,046.3**	**0.001**
Power Plant Construction												
Support Truck	Medium-Duty Truck	0.34	0.52	0.05	0.003	0.03	0.01	246.5	0.010	0.001	246.5	0.000
Delivery Truck	Heavy-Duty Truck	0.16	0.25	0.02	0.001	0.01	0.00	66.4	0.004	0.000	66.4	0.000
Totals		**0.50**	**0.77**	**0.07**	**0.003**	**0.04**	**0.01**	**312.9**	**0.014**	**0.001**	**312.9**	**0.000**
Project Total		**6.99**	**10.68**	**1.04**	**0.047**	**0.55**	**0.17**	**4,465.67**	**0.195**	**0.015**	**4,471.98**	**0.002**

Table L-721. Annual Operating Emissions.

Emission Factors						Nox[k]	CO[k]	VOC[k]		SO_2[l, n]	PM_{10}[k]		$PM_{2.5}$[k]		CO_2[m,o]	CH_4[k]	N_2O[k]	CO_2e	HAPs[g]	
Project Phase	**Vehicle Class**	**No. of Workers/ Trips per day**	**Car pool factor**	**VMT** mi/vehicle-day	**Days per Phase**	**Running Exhaust**	**Running Exhaust**	**Running Exhaust**	**Running Evap-orative**	**Running Exhaust**	**Running Exhaust**	**Tire & Brake Wear**	**Running Exhaust**	**Tire & Brake Wear**	**Running Exhaust**	**Running Exhaust**	**Running Exhaust**	**Running Exhaust**	**Running Exhaust**	**Running Evap-orative**
						g/mi	**g/mi**	**g/mi**	**g/mi**	**g/mi**	**g/mi**	**g/mi**	**g/mi**	**g/mi**	**g/mi**	**g/mi**	**g/mi**	**g/mi**	**g/mi**	**g/mi**
Operations Workers	Light-Duty Auto	8	1	80	365	0.090	2.986	0.074	0.164	0.002	0.002	0.031	0.002	0.004	363	0.016	0.006	365	0.0013	0.0030
	Light-Duty Truck	12	1	80	365	0.107	3.027	0.08	0.120	0.003	0.004	0.031	0.003	0.004	474	0.016	0.01	477	0.0014	0.0022
Truck Deliveries	Medium-Duty Truck	1	1	80	365	1.821	2.806	0.256	0.022	0.014	0.046	0.111	0.042	0.014	1,459	0.058	0.005	1459	0.0046	0.0004
	Heavy-Duty Truck	0.14	1	80	365	3.525	5.272	0.452	0.033	0.015	0.006	0.202	0.005	0.026	1,571	0.098	0.01	1573	0.0081	0.0006

Project Phase	Vehicle Class	Emissions, lbs/day						Emissions, kg/day				lbs/day
		NOx	**CO**	**VOC**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**CO_2**	**CH_4**	**N_2O**	**CO_2e**	**HAPs**
Operations Workers	Light-Duty Auto	0.13	4.21	0.34	0.003	0.05	0.01	232.3	0.01	0.00	233.8	0.004
	Light-Duty Truck	0.23	6.41	0.41	0.006	0.07	0.01	455.0	0.02	0.01	457.6	0.005
Truck Trips	Medium-Duty Truck	0.32	0.49	0.05	0.002	0.03	0.01	116.7	0.00	0.00	116.7	0.000
	Heavy-Duty Truck	0.62	0.93	0.09	0.003	0.04	0.01	125.7	0.01	0.00	125.9	0.000
Totals		**1.30**	**12.04**	**0.88**	**0.014**	**0.19**	**0.04**	**929.8**	**0.04**	**0.01**	**934.0**	**0.009**

Project Phase	Vehicle Class	Total Emissions, tons						Total Emissions, metric tonnes				tons
		NOx	**CO**	**VOC**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**CO_2**	**CH_4**	**N_2O**	**CO_2e**	**HAPs**
Operations Workers	Light-Duty Auto	0.02	0.77	0.06	0.001	0.01	0.00	84.8	0.004	0.001	85.3	0.001
	Light-Duty Truck	0.04	1.17	0.08	0.001	0.01	0.00	166.1	0.006	0.002	167.0	0.001
Totals		**0.06**	**1.94**	**0.14**	**0.002**	**0.02**	**0.00**	**250.89**	**0.009**	**0.004**	**252.37**	**0.002**
Truck Trips	Medium-Duty Truck	0.06	0.09	0.01	0.00	0.01	0.00	42.60	0.002	0.000	42.6	0.000
	Heavy-Duty Truck	0.02	0.02	0.00	0.00	0.00	0.00	6.55	0.000	0.000	6.6	0.000

Totals		**0.07**	**0.11**	**0.01**	**0.001**	**0.01**	**0.00**	**49.16**	**0.002**	**0.000**	**49.17**	**0.000**
Plant Maintenance	Heat transfer fluid leaks & venting			24.00								
Totals		**0.00**	**0.00**	**24.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Totals		**0.14**	**2.05**	**24.15**	**0.00**	**0.03**	**0.01**	**300.04**	**0.01**	**0.00**	**301.54**	**0.00**

Table L-822. Footnotes for Air Emissions Inventory Tables.

a. EPA (2021) Exhaust and Crankcase Emission Factors for Nonroad Compression-Ignition Engines in MOVES3.0.2. EPA-420-R-21-021, September 2021 (https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1013KWQ.pdf)
b. SO2 emission factors calculated as shown in the equation below. SO2 = (0.367 * 453.6 -VOC) * 0.01 * 0.0015 * 2 Where: SO_2 is in g/hp-hr 0.367 is the in-use adjusted fuel consumption in lb/hp-hr 453.6 is the conversion factor from pounds to grams soxcnv is the fraction of fuel sulfur converted to direct PM VOC is the in-use VOC emissions in g/hp-hr 0.01 is the conversion factor from weight percent to weight fraction 0.0015 is the weight percent of sulfur in ULSD diesel fuel 2 is the grams of SO_2 formed from a gram of sulfur
c. For diesel engines, all exhaust PM emissions are assumed to be smaller than 10 microns and reported as PM10. For PM2.5, an adjustment of 0.097 is applied to the PM10 output based on an analysis of size distribution data of particulate matter emissions from diesel engines.
d. The spreadsheet uses in-use adjusted brake-specific fuel consumption (BSFC) to compute CO_2 emissions directly, as shown in the equation below. The carbon that goes to exhaust VOC emissions is subtracted as the correction for unburned fuel. CO_2 = (BSFC * 453.6 -VOC) * 0.87 * (44/12) Where: CO2 is in g/hp-hr BSFC is 0.367, the in-use adjusted brake-specific fuel consumption in lb/hp-hr for engines in this size range 453.6 is the conversion factor from pounds to grams VOC is the in-use adjusted hydrocarbon emissions in g/hp-hr 0.87 is the carbon mass fraction of diesel 44/12 is the ratio of CO_2 mass to carbon mass
e. EPA GHG Emission Factors Hub (https://www.epa.gov/climateleadership/ghg-emission-factors-hub), 18 April 2023 Methane (CH_4) emissions from No.2 Fuel oil (diesel) combustion = 0.41 g/gallon. CH4 emission rate estimated as 0.41 g CH4/gallon * BSFC / ULSD lbs/gallon = 0.021 g/hp-hr Where: BSFC = 0.367 ULSD density is 7.16 lbs/gallon
f. EPA GHG Emission Factors Hub (https://www.epa.gov/climateleadership/ghg-emission-factors-hub), 18 April 2023 N_2O emissions from No.2 Fuel oil (diesel) combustion = 0.08 g/gallon. N_2O emission rate estimated as 0.08 g N_2O/gallon * BSFC / ULSD lbs/gallon = 0.0041 g/hp-hr Where: BSFC = 0.367 ULSD density is 7.16 lbs/gallon
g. HAPs estimated as 1.8% of VOC-based on the ratio of HAP to VOC ratio shown in AP-42 Tables 3.3-1 and 3.3-2.
h. See Fugitive Dust section for estimates of construction fugitives-related PM10 and PM 2.5
i. WRAP Fugitive Dust Handbook. 2006. Table 3-2. This emission factor assumes water spreading on all project roads and work areas and a 50% control efficiency has been factored in
j. The PM2.5/PM10 ratio for fugitive dust from construction and demolition activities is 0.1 based on the analysis conducted by Midwest Research Institute (MRI) in 2005 on behalf of WRAP. WRAP Fugitive Dust Handbook. 2006. Section 3.3.1 page 3-8.

k. According to National Transportations Statistics 2021 (https://www.bts.gov/sites/bts.dot.gov/files/2021-12/NTS-50th-complete-11-30-2021.pdf), the average light passenger vehicle was 11.9 years old in 2020. (https://www.bts.gov/sites/bts.dot.gov/files/2021-12/NTS-50th-complete-11-30-2021.pdf. Table 1-26) Accordingly, the emission factors used in this analysis are EPA MOVES3 emission factors for the model year (MY) 2010 vehicles as reported in MOVES3 Vehicle Operation Emission Factors. Argonne National Laboratory. 2021. (https://greet.es.anl.gov/files/update_moves3). This document presents MOVES3 estimate emission rates for every five years from MY 1990 to MY 2035
l. EPA (2016) Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2016. EPA-420-R-16-010. Table 3.2 2010 Cars miles per gallon = (26.2 +23.0)/2 = 24.6 mpg. 2010 Light Trucks miles per gallon= (16.9+19.7+20.1)/3 = 18.9 mpg. Since 2017 EPA has limited the sulfur content of gasoline to 10 ppm. Sulfur dioxide grams/mile = gasoline lbs/gallon * 10ppm Sulfur * g/lb / miles/gallon * 64.066 g SO2/32.065g S. For cars SO_2 g/mile = 6.17 lbs/gallon * 453.6 g/lb * 10e-6 / 24.6 * 1.998 = 0.0022g/mile SO_2. For light trucks SO2 g/mile = 6.17 lbs/gallon * 453.6 g/lb * 10e-6 / 18.9 * 1.998 = 0.0029g/mile SO_2.
m. EPA (2016) Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2016. EPA-420-R-16-010. Table 3.2 2010 average Cars CO_2 g/Mile = (340 +386)/2 = 363 g/mile. 2010 average Light Trucks CO_2 g/Mile = (527+452+442)/3 = 474 g/mile.
n. NAS (2020) Reducing Fuel Consumption and Greenhouse Gas Emissions of Medium- and Heavy-Duty Vehicles, Phase Two: Final Report (https://doi.org/10.17226/25542). TABLE 4-6 Vehicle Specifications for Different Fuel Pathways and Different Vehicle Applications: Medium Duty (Class 6) Box Truck - 7.0 mpg diesel. Heavy Duty Class 8 Tractor-Trailer Line Haul - 6.5 mpg. Since December 2014 EPA has limited the sulfur content of on-road diesel fuel to 15 ppm. Sulfur dioxide grams/mile = diesel lbs/gallon * 15ppm Sulfur * g/lb / miles/gallon * 64.066 g SO2/32.065g S. For Medium Trucks SO2 g/mile = 7.16 lbs/gallon * 453.6 g/lb * 15e-6 / 7.0 * 1.998 = 0.0139g/mile SO2. For Heavy trucks SO2 g/mile = 7.16 lbs/gallon * 453.6 g/lb * 15e-6 / 6.5 * 1.998 = 0.0150g/mile SO2.
o. EPA (2023) Emission Factors for Greenhouse Gas Inventories (https://www.epa.gov/system/files/documents/2023-03/ghg-emission-factors-hub.xlsx) Diesel Fuel combustion produces 10.21 kg CO2 per gallon. 10.21 kg/gallon * 1000 g/kg /7.0 miles/gallon = 1459 g CO_2/mile for a Medium truck. 10.21 kg/gallon * 1000 g/kg /6.5 miles/gallon = 1571 g CO_2/mile for a Heavy truck.
p. Potential H2S emissions estimated as 1.76 tons per developed well based on data from Coyote Canyon South Geothermal Exploration Environmental Assessment. 2012. DOI-BLM-NV-C010-2012-0051-EA