

Map Unit Properties Table: Fort Laramie National Historic Site

Colored rows indicate map units exposed within the borders of Fort Laramie National Historic Site.

Age	Unit Name (Symbol)	Features and Description	Erosion Resistance	Suitability for Development	Hazards	Paleontological Resources†	Cultural Resources	Mineral Occurrence	Habitat	Recreation	Geologic Significance
QUATERNARY (Holocene)	Flood plain deposits (Qfp)	Silt, fine-grained sand, and some gravel in the present floodplains, channel bars, and islands of the North Platte and Laramie rivers. Derived from Oligocene and Miocene rocks.	Low.	Site of historic fort's buildings.	Flash flooding.	Unknown.	Bison and elk bones; possible American Indian sites.	Sand and gravel.	Grasses, trees, other floodplain vegetation.	Suitable for most uses, including hiking, picnicking, camping.	None.
	Sand and loess (Qsl)	Wind-blown silt and fine sand, which form soil mantle on broad, relatively flat surfaces, such as the bottom of Goshen Hole and the surface of the High Plains. Commonly thin deposits, but may locally be 6 m (20 ft) thick. <u>Not exposed in Fort Laramie National Historic Site.</u>	Low.	Ranchland with windmills, pipelines, and unimproved roads.	None.	None.	Thin deposits; possible American Indian sites.	Aggregate sand.	High Plains vegetation: e.g., prairie grasses, prickly pear cacti.	Suitable for most uses, including hiking, picnicking, camping.	None.
QUATERNARY (latest Pleistocene-Holocene)	Tributary valley alluvium (Qta)	Mostly silt and sand with gravel lenses, but also includes some unstratified silt, sand, and talus veneer on slopes below some of the steep escarpments of Oligocene and Miocene rocks along the southeast rim of the Laramie River valley.	Low.	Good. Contains roads and buildings.	Flooding.	Cherry Creek valley: <i>Bison bison</i> ; Little Cottonwood Draw: <i>Ovis canadensis</i> Shaw (mountain sheep) skull.	Charcoal layers.	Sand and gravel.	High Plains vegetation: e.g. prairie grasses, prickly pear cacti.	Suitable for most uses, including hiking, picnicking, camping.	None.
QUATERNARY (Pleistocene)	Gravel (Qg)	Gravel and boulder deposits with some silt, fine sand, and bentonitic clay lenses capping hills above the present flood plain of North Platte and Laramie rivers and the divide between Deer and Cherry creeks. <u>Not exposed in Fort Laramie National Historic Site.</u>	Under normal conditions, gravel and boulders are relatively resistant to erosion.	Contains gravel pits, pipelines, unimproved roads.	None.	Mammoth tooth.	Possible American Indian sites.	Gravel.	High Plains vegetation: e.g. prairie grasses, prickly pear cacti.	Suitable for most uses, including hiking, picnicking, camping.	None.
REGIONAL UNCONFORMITY (At least 31.6 million years of missing time in the rock record.)											
TERTIARY (Miocene*)	Arikaree Formation* (Ta)	<p>Light-gray, orange-gray, fine- to medium-grained, loosely cemented sandstone containing many hard, pipe-shaped, calcareous sandstone concretions and siliceous root casts. Over 200 m (700 ft) thick. <u>Not exposed in Fort Laramie National Historic Site.</u></p> <p><u>Upper unit:</u> Orange-gray, fine- to medium-grained, soft, massive, sandstone; exposed northwest of Fort Laramie National Historic Site; hard, common calcareous sandstone concretions similar to Middle unit; spherical concretions common and may fuse to form clusters and ledges; weathers to vertical cliffs and steep columnar-type badlands; siliceous root casts more abundant than in Lower and Middle units; thin claystone and tuff beds locally interbedded with sandstone; high clay content in matrix. Thickness: 60 m (200 ft).</p> <p><u>Middle unit:</u> Light-gray, fine- to medium-grained, calcareous and tuffaceous sandstone and fresh-water limestone; more carbonate and white, siliceous root casts than Lower unit; sandstone concretions common; chert nodules; weathers to a broad, undulating surface that forms the high plain on the divide between the Laramie River and Goshen Hole. Thickness: 60 m (200 ft).</p> <p><u>Lower unit:</u> Orange-gray, fine- to medium-grained, massive, loosely-cemented sandstone; weathers into vertical cliffs and columnar-type badlands; high clay content in matrix; sandstone concretions in irregularly spaced layers either as individual pipes or fused into concretionary ledges; locally, crystalline calcite precipitated around sand grains; hard, white siliceous root casts throughout unit; a few thin tuff beds. Thickness: 60-90 m (200-300 ft).</p>	Variable. Lower unit forms vertical cliffs and badlands; Middle unit contains hard, calcareous layers; Upper unit forms ledges and cliffs.	Sparsely populated but contains roads, pumping station, pipelines, windmills, and other structures.	Potential rockfall and slumping.	Fossils used to relative age-date formation in area: <u>Upper unit:</u> Oreodont " <i>Phenacocoelus stouti</i> " (now <i>Merycooides longiceps</i>). <u>Middle unit:</u> fossil rodent burrow, <i>Daemonelex</i> <u>Lower unit:</u> Oreodonts " <i>Cyclopidius lullianus</i> " (now <i>Leptauchemia major</i>) and " <i>Mesoreodon megalodon</i> " (now <i>Desmatochoerus megalodon</i>).	Unknown. Possible American Indian sites.	Calcite sand crystals.	Sparse High Plains vegetation: e.g. short prairie grasses, prickly pear cacti.	Suitable for most uses, including hiking, picnicking, camping.	Arikaree at Agate Fossil Beds National Monument, 80 km (50 mi) northeast of Fort Laramie, contains one of the most significant records of Miocene fossils in the world.

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TERTIARY (Oligocene and Miocene*)	Unnamed conglomerate* (Tcg)	<p>Chiefly gray, coarse-grained sandstone and conglomerate. Both Upper and Lower units contain layers of orange-gray siltstone similar to the upper part of the White River Formation. Locally, calcareous matrix is red stained. Exposures along northwest rim of Goshen Hole north of Cherry Creek and northwest of the map area, north of North Platte River. Thickness: variable; 15-46 m (50-150 ft) in outcrops, thicker in subsurface. <u>Not exposed in Fort Laramie National Historic Site.</u></p> <p><u>Upper unit:</u> Gray, fine- to medium-grained conglomeratic sandstone. Some areas are mostly gray, massive, fine- to medium-grained sandstone with only scattered pebbles. Hard, dark-gray, pipe-shaped calcareous sandstone concretions present throughout. Thickness: 15-30 m (50-100 ft).</p> <p><u>Lower unit:</u> Gray, loosely- to well-cemented, cross-bedded to massive conglomerate with rounded to subrounded coarse-grained sand, pebbles, cobbles, and boulders as much as 0.3 m (1 ft) in diameter; matrix is fine-grained sand and silt generally cemented with calcium carbonate. Thickness: 15 m (50 ft).</p>	High for gray, well-cemented conglomerate that forms cliffs and ledges; loosely cemented red conglomerate is less resistant. Weathers into boulder-strewn rounded hills.	Sparsely populated but intersected by roads, pipelines, and other structures.	No potential hazard for the park.	Fossils used to relative age-date unit in area: <i>Miohippus</i> sp., <i>Hypisodus</i> sp., <i>Leptomeryx</i> sp.	Unknown. Possible American Indian sites.	None.	Sparse High Plains vegetation: e.g. short prairie grasses, prickly pear cacti.	Limited exposures; usually forms slopes associated with overlying <i>Ta</i> .	None.
TERTIARY (Oligocene*)	White River Formation* (Twr)	<p>Mostly siltstone and claystone; thin white tuff beds locally present throughout the formation. Difficult to map Lower and Upper units separately. Thickness: 113-198 m (370-650 ft). <u>Not exposed in Fort Laramie National Historic Site.</u></p> <p><u>Upper unit:</u> Orange-gray, calcareous, sandy, tuffaceous siltstone and silty claystone; few gray, coarse-grained, conglomeratic, cross-bedded channel sandstone beds present throughout unit but abundant in lower part. Thickness: 88-174 m (290-570 ft).</p> <p><u>Lower unit:</u> Variegated maroon, gray, green, pink, and white bentonitic claystone interbedded with numerous gray and greenish-gray, coarse-grained, conglomeratic, cross-bedded channel sandstone beds. Poor exposures; gradational lithologic change to Upper unit. Thickness: 24 m (80 ft).</p>	Moderate. Siltstone and claystone more resistant than unconsolidated sediments but less resistant than overlying conglomerate.	Limited aerial extent west of Whalen Fault System.	Bentonitic soils may generate mass wasting (landslides, slumps).	Diagnostic fossil rodent suggestive of late Eocene age: <i>Cylindrodon</i> . Many vertebrate fossils collected from formation in Fort Laramie area.	Unknown. Possible American Indian sites.	Bentonite; chert.	Forms badland topography with very little vegetation in southeastern Wyoming.	Badlands topography might limit recreational activities.	Produced small amounts of oil and gas in Shawnee Field, 56 km (35 mi) northwest of Fort Laramie.

Map reference: McGrew, L. W. 1963. Geology of the Fort Laramie area, Platte and Goshen Counties, Wyoming. Scale 1:31,680. Bulletin 1141-F. Reston, VA: U.S. Geological Survey.

† = The taxonomic classification of many fossils found in the Fort Laramie area has been revised since McGrew's publication. Updated taxonomic assignments are given in parentheses, based upon data in the Paleobiology Database (<http://paleodb.org>, accessed November 2009).

* = Revised geologic age interpretations show the age of the White River Formation extending from the late Eocene into the Oligocene and the Arikaree Formation spanning late Oligocene and early Miocene-aged sediments (Tedford et al. 2004). Under such an interpretation, the unnamed conglomerate unit would represent late Oligocene-aged sediments.