Map Unit Properties Table: Whitman Mission National Historic Site

Colored rows indicate units mapped within Whitman Mission National Historic Site.

Age	Map Unit (Symbol)	Geologic Description	Geologic Features and Processes	Geologic Resource Management Issues	Geologic History
QUATERNARY (Recent)	Modified land (Qaf)	Soil, sediment, or geologic material modified by excavation. The Mill Creek Dam is the only feature mapped as **Qaf**.	None documented.	**Flooding** The Mill Creek Project was constructed after the devastating 1931 floods in Walla Walla. The project successfully thwarted major floods in 1964 and 1996.	**After the Floods: The Holocene** The Mill Creek Project is one example of recent human alteration of geologic processes to facilitate development.
QUATERNARY (Holocene)	Alluvium (Qa)	Discontinuous, unconsolidated deposits of clay, silt, fine sand, and gravel found in and adjacent to stream channels and on the floodplain adjacent to streams on the valley floor; primarily reworked, locally derived silt and flood deposits. Local occurrences of gravel are differentiated from **MPcg** by the absence of weathered basalt clasts, presence of clay matrix, and cementation. Contacts between these deposits and the parent materials are rarely exposed.	**Holocene Alluvium** Floodplain deposits of clay, silt, sand, and pebbles represent uniform, persistent processes common to streams. Characteristic features of modern fluvial systems include cutbanks, point bars, meander necks, and oxbow lakes.	**Flooding** Surrounded by floodplain, Whitman Mission National Historic Site may be impacted by floods.	**After the Floods: The Holocene** The Walla Walla River, Mill Creek, and their tributaries have spread alluvium across the Walla Walla Valley since the end of the Missoula floods, approximately 13,000 years ago.
QUATERNARY (Pleistocene)	Touchet Beds, terraces (Qfst2) Touchet Beds, hills (Qfst 1)	Two types of glacial slackwater flood deposit: an older sequence (**Qfst1**) with subtle rhythmic bedding and a younger sequence (**Qfst2**) with conspicuous rhythmic bedding. Exhibit soft-sediment deformation features. Individual beds range from a few centimeters to 1 m (3 ft) thick. Up to 2 m (7 ft) loess mantles most of Touchet Beds. Cross-cutting clastic dikes are common in roadcuts of Touchet Beds. **Qfst2**: Well-stratified sand grading upward to silt. Underlies the younger, less-dissected terraces in the gently west-sloping area immediately north of Mill Creek Valley, the area east and southeast of Walla Walla, and isolated hills surrounded by stream valleys west and southwest of Walla Walla.	**Pleistocene Rhythmites from Lake Missoula Floods** **Qfst2**: well-stratified rhythmic bedding with fine- to medium-grained sand grading upward to silt in each cyclic interval. Underlies the younger, less-dissected terraces in the map area, including the hill at Whitman Mission.	None documented.	**Catastrophic Floods and the Rhythmites of Whitman Mission: The Pleistocene** When Missoula floodwaters backed up behind Wallula Gap and formed Lake Lewis, sediments settled out of the water column and formed rhythmites, some of which are preserved in the hill at Whitman Mission National Historic Site.
		Qfst1: Light-gray or tan to white sand with minor silt, clay, and sparse pebbles and some local, ice-rafted gravel indicating subaqueous to aqueous origin. Faint rhythmic bedding may be seen under low-angle light and higher (spring) moisture conditions. Underlies the older, more-dissected rolling hills in the north-central, northeastern corner, and east-central areas of the map.	**Pleistocene Rhythmites from Lake Missoula Floods** **Qfst1**: older sequence of subtly rhythmic graded beds that underlie the older, more-dissected rolling hills north of Whitman Mission. Coarser sediment (i.e., sand) at the base of each cycle grades upward into finer-grained sediment (i.e., silt).	None documented.	**Catastrophic Floods and the Rhythmites of Whitman Mission: The Pleistocene** Stopped by Wallula Gap, the catastrophic Lake Missoula floodwaters backed up to form Lake Lewis. In the calm waters of the lake, sediment settled out of the water column to form the rhythmites in the Touchet Beds.
	Loess, terraces (Ql2) Loess, hills (Ql1)	Tan to light-brown, massive to poorly stratified silt and very fine sand. Appears brown on plowed fields. Underlies the Touchet Beds. Loess that mantles Touchet Beds (generally less than 2 m [7 ft] thick) was mapped as Touchet Beds. Loess thickness ranges from about 1.5 to 15 m (5–50 ft) in the map area. **Ql2**: Loess underlying the younger, less-dissected terraces. **Ql1**: Loess underlying the older, more-dissected rolling hills.	**Loess Originating from Pleistocene Glaciers** Pleistocene glaciers pulverized bedrock to produce silt and Pleistocene winds spread this silt as loess throughout the Columbia Basin.	None documented.	**Catastrophic Floods and the Rhythmites of Whitman Mission: The Pleistocene** Spread by dust storms during interglacial periods, loess covered the barren landscape south of the Cordilleran Ice Sheet. The Missoula floods eroded and transported much of the loess, which settled out of the water column in Lake Lewis to form the top layers of silt of many rhythmites in the Touchet Beds.

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Age	Map Unit (Symbol)	Geologic Description	Geologic Features and Processes	Geologic Resource Management Issues	Geologic History
NEOGENE – Miocene and Pliocene	Conglomerate (PLMIcg)	Variably cemented sandy gravel with a muddy to sandy, silicic to calcic matrix that underlies much of the Walla Walla Basin. Clasts are predominantly basaltic in composition and are well rounded. Distinguished from **Qa** by the presence of weathered basalt clasts, clay matrix, and cementation.	None documented.	None documented.	**Massive Flows of Basalt: The Miocene** Drainage networks formed in the Columbia Basin following the deposition of the Columbia River Basalt Group. Channels shifted across the basin, depositing gravel, sand, and silt.
NEOGENE – Miocene and Pliocene	Fine-grained sediments (PLMIf)	Silt, sandy silt, sandy mud, and blue, green, and yellow clay. Variations in thickness may be due to faulting or rapid changes in depositional environments, perhaps as clastic debris was shed from the nearby Blue Mountains. The contact between **PLMIcg** and **PLMIf** is probably not a single, continuous surface, but rather a series of interfingering conglomeratic and fine-grained sediments. Mapped only on the cross section (see poster in pocket).			
NEOGENE (Miocene)	Wanapum Basalt – Columbia River Basalt Group – Frenchman Springs Member (MIvwfs)	The three small exposures of basalt in the northwestern corner of the College Place quadrangle are the chemical type of the Frenchman Springs Member and probably represent Sentinel Gap or Silver Falls basalt flows.	**Miocene Columbia River Flood Basalts** The Frenchman Springs Member contains the most basalt among Wanapum Basalt members. Frenchman Springs basalt flows covered an estimated 72,595-km^2 (28,029-mi^2) area with approximately 7,628 km^3 (1,830 mi^3) of basalt.	None documented.	**Massive Flows of Basalt: The Miocene** Between 17.5 million and 6 million years ago, 174,000 km^3 (41,700 mi^3) of basaltic lava that now covers 164,000 km^2 (63,000 mi^2) of eastern Washington and Oregon and western Idaho flooded the Columbia Basin. Collectively, these flows form the Columbia River Basalt Group, which includes the approximately 15-million-year-old Frenchman Springs Member of the Wanapum Basalt.

Map source: Derkey, R. E., D. F. Stradling, K. A. Lindsey, and T. L. Tolan. 2006. Geologic map of the College Place and Walla Walla 7.5-minute quadrangles, Walla Walla County, Washington, and Umatilla County, Oregon. Geologic map GM-62 (scale 1:24,000). Washington Division of Geology and Earth Resources, Olympia, Washington.