Map Unit Properties Table

Age	Unit Name (Symbol)	Lithology and Description	Topographic Expression	Erosion Resistance	Suitability for Development	Hazard Potential	Potential Paleontologic Resources	Mineral Specimens & Resources	Global Significance
Quaternary	Unconsolidated material (Q)	Highly variable; includes alluvial, landslide, terrace and gravel deposits, eolian sand, talus, and debris fan deposits; variable thickness	Variable	Low	Variable	Debris flow and flooding potential	Quaternary (Holocene) flora	None	None
Major Regional Unconformity									
Tertiary	Browns Park Formation (Tbp)	Variable; primarily sandstones and unconsolidated tuffs with minor chert, limestone, siltstone, conglomerate, and mudstone; 600 ft (490 m) thick	Forms Browns Valley north of Gates of Ladore	Variable	Some lake clay and volcanic deposits; some floodplain	Low	Lake clays: ostracods and diatoms	Unknown	Type locality in Browns Park
	Bishop Conglomerate (Tb)	Light gray to pinkish- gray to tan, poorly sorted, loosely cemented, pebble, cobble, boulder conglomerate and coarse- grained sandstone; 200- 500 ft (60- 150 m) thick to very thin due to post-Bishop erosion	Local outcrops on Blue Mountain, Yampa Plateau, Ruple Ridge, trail to Harpers Corner, near Jones Hole, and drainages of Diamond Gulch and Pot Creek	Loosely cemented	Isolated deposits; probably not an issue with regards to development	Low	None documented	Unknown	None
Major Regional Unconformity									
Upper Cretaceous	Mesaverde Group (Kmv)	Transitional from marine and near- shore sandstone and shale to lagoon, swamp, and continental sandstone with coal in upper part: 2600 ft (800 m) thick	Ridge former; Not exposed in Dinosaur	Variable	Not exposed in Dinosaur	Not exposed in Dinosaur	Not exposed in Dinosaur	Coal elsewhere	None
	Sego Sandstone (Kmvs)	Gray marine shale with fossiliferous (Baculites) dolomite concretions; 0- 250 ft (0- 75 m) thick	Ridge former; Not exposed in Dinosaur	Moderate	Not exposed in Dinosaur	Not exposed in Dinosaur	Not exposed in Dinosaur	Not exposed in Dinosaur	None
	Buck Tongue, Mancos Shale (Kmb)	Thickness: 200- 500 ft (60- 150 m)	Slope former; Not exposed in Dinosaur	Low	Not exposed in Dinosaur	Not exposed in Dinosaur	Not exposed in Dinosaur	Not exposed in Dinosaur	None
	Castlegate Sandstone (Kc)	Gray marine shale with fossiliferous (Baculites) dolomite concretions; thickness: 0- 100 ft (0- 30 m)	Ridge former; not exposed in Dinosaur	Moderate	Not exposed in Dinosaur	Not exposed in Dinosaur	Not exposed in Dinosaur	Not exposed in Dinosaur	None
	Mancos Shale (Km)	Dark gray, silty to clayey, marine shale that weathers light gray to light yellow; minor siltstone and sandstone in upper part with layered bentonite and a few limestone beds in the lower part; locally fossiliferous; thickness : 4800- 5600 ft (1450- 1700 m)	Slope and valley former	Low: landslide potential; cutbank erosion along streams and rivers	Bentonite clay may cause problems	Slippery when wet; Swelling clay	Invertebrate marine fauna: mollusks (*Inoceramus*), ammonites (*Baculites*), brachiopods, bryozoans, trace fossils	Gypsum	None
	Frontier Sandstone (Kmf)	Upper part: light- brown to light- greenish- gray, thin- bedded to massive, fine- grained calcareous sandstone; locally cross- bedded with ripple marks; Lower part: dark- gray, fossiliferous, calcareous shale, silty shale, and siltstone; 100- 300 ft (30- 90 m) thick	Upper part: hogbacks & flatirons; Lower unit: slopes & saddles	Upper part: resistant to erosion; Lower part: low resistance	Development on hogbacks will impact viewscape	Potential rockfall	Invertebrate marine fauna in lower part: bivalves, ammonites, gastropods & petrified wood	Coal in upper part; hydrocarbons elsewhere	None
	Mowry Shale (Kmm)	Hard, gray, fissile, siliceous shale; 33- 220 ft (10- 65 m) thick	Forms narrow strike valley between Dakota Sandstone and Frontier Sandstone	Low: forms valleys	Bentonitic soils	Slippery when wet	Fish scales, shark teeth	Bentonite	None
Lower Cretaceous	Dakota Sandstone (Kd)	Light- gray to yellow, cross- bedded, medium- to coarse- grained to pebbly sandstone and minor pebble conglomerate with subordinate black carbonaceous shale; 40- 100 ft (12- 30 m) thick	Forms hogbacks	Highly resistant	Development on hogbacks will impact viewscape	Potential rockfall	Petrified wood & invertebrate shell fragments	Hydrocarbons elsewhere	None
	Cedar Mountain Formation (Kcm)	Colorful clay- and siltstone, some sandstone; local conglomerate (Buckhorn Conglomerate); 0- 200 ft (0- 60 m) thick	Erodes with Morrison to form strike valleys & low ridges	Mudstone & siltstone have a lower resistance than sandstones	Similar to Morrison Fm.	Similar to Morrison Fm.	Sauropod skull, deinonychid (*Utahraptor*), and small mammals	Possible uranium	Sauropod skull is one of the most important Cretaceous fossils found to date

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Jurassic	Morrison Formation (Jm)	Multi- colored mudstone and siltstone, with bentonite, sandstone, and conglomerate; dinosaur fossils; 650- 1000 ft (200- 300 m) thick	Mudstones form slopes; sandstones tilted into hogbacks	Mudstones have a low resistance & landslide potential; sandstones are more resistant to erosion	Shifting substrate; bentonite in mudstone	Mudstones are slippery when wet due to bentonite; radon gas	Dinosaurs, e.g. *Stegosaurus*, *Camarasaurus* *Ornitholestes*, *Diplodocus*, *Apatosaurus*, *Allosaurus*, *Barosaurus*, *Camptosaurus*; also turtles	Major source of uranium ore minerals	World renown dinosaur fossils including relatively complete skeletons and skulls
	Stump Formation (Js)	Redwater mbr: light- green to olive- green, fissile, glauconitic siltstone and shape with sparse interbeds of tan, lavender, or greenish- gray cross- bedded, glauconitic, oolitic, fossiliferous limestone and sandstone; thins from about 130 ft (40 m) in the western part to 70 to 90 ft (22- 27 m) in the east. Curtis mbr: light- gray to light- greenish- gray, thin- to medium- bedded, cross- bedded, medium- to coarse- grained sandstone; ripple marks locally and fossiliferous; thins from about 50- 100 ft (15- 30 m) in western Dinosaur to about 23 ft (7 m) at Deerlodge Park	Redwater mbr: forms slopes; Curtis mbr: forms ledges	Redwater mbr: softer, less resistant to erosion. Curtis mbr: more resistsnt	None documented	Low	Redwater mbr: brachiopods, bivalves, echinoderms, cephalopods (belemnites). Curtis mbr: sparse bivalves, traces of bottom dwellers	None	None
	Entrada Sandstone (Je)	Pink to yellow- gray, fine- to medium- grained quartz sandstone with eolian cross- bedding; thins eastward from 165 ft (50 m) at Dinosaur Quarry to 40 ft (12 m) at Deerlodge Park	Cliff former but outcrops are more subdued than Glen Canyon Sandstone	High	Development on Entrada will impact viewscape	Rockfall	Not fossiliferous in Dinosaur	None	Evidence of vast sand dunes
	Carmel Formation (Jca)	Dark- red sandy siltstone and mudstone; thickens westward and pinches out toward the east, ranging from about 130 ft (40 m) thick near Island Park, about 110 ft (33 m) south of Cub Creek, to about 60 ft (19 m) at Plug Hat Rock	Forms a narrow ribbon of subdued, easily eroded red rocks and strike valleys	Low	None documented	Low	Marine fossils: clams (*Arctica*)	Gypsum crystals	None
	Glen Canyon Sandstone (Navajo/Nugget equivalent (JTRg)	Pink to gray- yellow eolian cross- bedded quartz sandstone; thickness 600- 650 ft (180- 200 m)	Strike ridges, hogbacks, cuestas flanking Split Mt. & Blue Mt.	High	Development on hogbacks will impact viewscape	Rockfall	None	None	Evidence of vast eolian sand dunes in extensive sand sea (erg)
Triassic	Chinle Formation (TRc)	Red to gray siltstone, sandstone, and shale with local basal conglomerate (Gartra member); 200- 460 ft (60- 140 m) thick	Garta mbr. forms cliffs, benches, caprocks, hogbacks; main body of Chinle forms slopes and narrow strike valleys	Low: erodes easily except for Garta member	Unknown	Low	Vertebrates, e.g. *Phytosaur* (crocodile relative), teeth, bone fragments, wood	Potential uranium resources; petrified wood	None
	Moenkopi Formation (TRm)	Mostly red to brown, green, and gray siltstone and shale and fine- grained sandstone; gypsiferous siltstone and shale near base; ripple marks; thickness: 500- 800 ft (150- 240 m)	Forms floor of many strike valleys and colorful flatirons at Split Mt. gorge	Low	Unknown	Low	Sparse; mollusks some reptile tracks (e.g., *Chirotherium*);	Gypsum	None
Major Regional Unconformity									
Permian	Park City Formation (Pp)	Phosphatic marine sandstone, siltstone, dolomite, and limestone with fossils; 100- 430 ft (30- 130 m) thick	Green and yellow flatirons; forms protective cap on Weber	Resistant lower ss and cherty limestone; Upper shale, siltstone, limestone, and sandstone more easily eroded	Development on flatirons will impact viewscape	Rockfall	Marine invertebrates: pelecypods, scaphopods, gastropods, fusulinids, corals.	Phosphate	None
	Weber Sandstone (Pw)	Light gray to yellow- gray sandstone with sweeping eolian cross- beds; locally interlayered limestone beds; 650- 1500 ft (200- 470 m) thick.	Monoliths and cliffs, most notable landforms	High with well- cemented quartz sandstone	Development on Weber will impact viewscape	Rockfall		Hydro- carbon reservoir	Exposes classic Laramide structures
Pennsylvanian	Morgan Formation (PNm)	Upper: Red fine- grained sandstone with gray to pale lavender, cherty, fossiliferous marine limestone; thickness 500- 575 ft (150- 175 m) Lower: light- gray to red and green shale and siltstone; 130- 300 ft (40- 90 m) thick	Upper: forms red cliffs Lower: forms gray slopes	Upper part is resistant; Lower part is easily eroded	Exposures in Yampa Canyon, Lodore Canyon, and Split Mountain anticline are unsuitable for development	Rockfall in upper part; upper part may be undercut by eroding lower part leading to cliff collapse	Marine invertebrates: abundant brachiopods, bryozoans, sponges, algae, foraminifera	None	None

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Pennsylvanian	Round Valley Limestone (PNrv)	Light gray to pale lavender, thick- bedded limestone, with thin partings of gray to red shale; pink to red chert; fossiliferous; 200- 300 ft (65- 90 m) thick at Split Mt. and 400 ft (120 m) at the head of Yampa Canyon	Forms gray ledgy slopes and/or multi- tiered cliffs	High	Topographic position makes this formation unsuitable for development	Rockfall and ledge collapse		Chert nodules	None
Mississippian	Doughnut Shale/Humbug Formation (Mdh)	Humbug: light- gray to red, fine- to very fine grained sandstone interbedded with light- gray limestone and red to black shale. Doughnut: gray shale and gray to red sandstone. Combined thickness: 250- 300 ft (75- 90 m)	Humbug: forms ledgy slopes Doughnut: forms slopes	Humbug Fm is relatively high; Doughnut Shale is relatively low	Doughnut Shale contains bentonite	Doughnut Shale becomes plastic when wet and prone to landslides	Fish and marine invertebrates: crinoids, trilobites, gastropods, cephalopods, corals, echinoderms	Traces of coal	None
	Madison Limestone (Leadville equivalent) (Mm)	Light- to dark- gray, thick and unevenly bedded, cherty limestone and dolomitic limestone, sparsely fossiliferous; 600- 680 ft (180- 200 m) thick	Jagged cliffs and dip slopes	High	Dip slopes pose potential development problems	Karst (sinkhole) potential		None	Part of interior sea from present day Arctic Ocean to the Gulf of Mexico
Major Regional Unconformity									
Cambrian	Lodore Formation (Cl)	Light brown to green sandstone and shale with basal coarse to pebbly transgressive marine sandstone; thickness: 230- 600 ft (70- 180 m)	Ledge- forming sandstone; slope- forming shale	Variable	Low	Rockfall and cliff collapse	Rare trilobite body parts, trace fossils	Glauconite occurrence	Type locality is near Limestone Draw in the lower reach of Lodore Canyon
Major Regional Unconformity									
Precambrian	Uinta Mountain Group (Yu)	Red fine- to coarse- grained, pebbly, quartzitic sandstone with occasional conglomerate; gray to green and red micaceous shale and siltstone. Thickness: 7000 ft (2100 m), bottom of formation is not exposed; up to 2400 ft (7000 m) thick in adjacent areas	Prominent outcrops and cliffs in Canyon of Lodore	High	Low	Rockfall and cliff collapse	Fossilized algal globules found north of Dinosaur	None documented	Deposited about 1.1 billion years ago