

Plate 1. Material, landform, and process characteristics of land resource units.					
UNITS	Substrate	MATERIALS Soil	Slope/Relief	LANDFORMS Morphology	PROCESSES
Process Units <i>Surface-Water Process Suite</i>					
P1 Flood-Prone Areas	Mostly alluvial mud, sand, and gravel; local bedrock exposed where streams are incised	Loamy soils (more than 4 ft thick); may be locally clayey or sandy	Nearly flat slopes (1 to 2 percent); may be locally steep along incised reaches; relief mostly 20 ft per square mile	Lowlands along major stream courses	Flooding; erosion; siltation; recharge
P2 Valley Bottoms	Alluvial sand, gravel, and mud; locally admixed with colluvium; local bedrock may also be exposed	Clayey or loamy with common stony fraction (2 to 4 ft thick)	Mostly concave upward (1 to 2 percent); also local incised bluffs and dissected terraces; total relief up to 60 ft	Lowlands along minor stream courses	Flooding adjacent to streams; landsliding and soil creep along valley edges
Aquifer Suite					
P3 Limestone Recharge Areas	Limestone	Thin to absent (less than 2 ft thick) stony, clayey, or loamy soil	Gently sloping (2 to 5 percent) uplands; incised streams; relief 80 to 150 ft per square mile	Uplands pitted with sinkholes (karst topography); most recharge in adjacent stream bottoms (commonly mapped as Flood-Prone Areas or Valley Bottoms)	Recharge
P4 Upland Sandstone Recharge Areas	Sandstone; conglomerate; generally well cemented	Sandy to loamy (less than 2 ft thick)	Variable slopes (5 to 15 percent); locally up to 30 percent; average relief 150 ft per square mile	Discontinuous (fault-bound) strata; rolling uplands, local bluffs	Recharge; local erosion and mass wasting
P5 Mixed Rock Recharge Areas	Sandstone and conglomerate with local limestone and shale	Sandy to clayey (more than 2 ft thick) on sandstones; thin, stony soils on limestone	5 to 8 percent slopes; average relief 130 ft per square mile	Rolling terrain; local bluffs	Recharge; slumping near bluffs; erosion and flooding along streams
P6 Sand and Sandstone Recharge Areas	Sandstone; loosely consolidated; some ironstone	Sandy surface commonly over clayey subsoil (up to 4 ft thick)	5 to 8 percent slopes; relief 110 ft per square mile	Low hills, rolling terrain	Recharge; wind erosion deposition forming dunes and "windrows"; local stream erosion
P7 Coastal Plain Recharge Areas	Interbedded sandstone and mudstone; local lignite	Variable sandy or loamy surface over clayey subsoil (generally greater than 4 ft thick)	Slopes variable, but mostly less than 8 percent; relief generally less than 120 ft	Low rolling hills with intervening open prairies; gullies locally prominent	Recharge; erosion; shrinking and swelling of clayey soils; flooding near streams
Slope Process Suite					
P8 Unstable Limestone and Shale Terrane	Interlayered strata of shale and limestone	Variable soils; mostly clayey (less than 2 ft thick)	2 to 15 percent slopes; average relief 110 ft per square mile	Discontinuous, fault-bound strata bluffs common near contact between limestone and shale	Slumping, rock falls, soil creep
P9 Unstable Clay Terrane	Clay, marl	Thin (less than 2 ft thick), clayey	Slopes greater than 10 percent; total relief up to 160 ft	Commonly occurs as stream bluffs or as edges of high alluvial plains	Slumping, creep, shrinking and swelling of soils
Material-Landform Units <i>Surface Deposit Suite</i>					
M1 Alluvium and Terrace Deposits	Alluvial sand, gravel, and mud	Mostly loamy, locally sandy or clayey (more than 4 ft thick)	Less than 5 percent slope; relief averages 20 ft per square mile	Nearly flat lowlands above floodplain	Local recharge; ponding in poorly drained areas
M2 Upland Gravel and Alluvial Plains	Gravel, some sand, caliche cement	Clayey, loamy soil (more than 4 ft thick)	Maximum slope 5 percent; relief 20 ft per square mile	Broad flat upland surfaces	Local ponding; shrinking and swelling of soils; some recharge to shallow water table
M3 Low-Relief Residium	Granular rubble from weathering of granite; local granite bedrock	Sandy loams (more than 4 ft thick)	1 to 5 percent slopes; relief 110 ft per square mile	Low rolling terrain	Recharge into shallow aquifer; local erosion along stream banks
Igneous-Metamorphic Rock Suite					
M4 High-Relief Crystalline Rock Terrane	Granite, gneiss	Soils thin and stony or absent	6 to 15 percent slopes (locally more than 35 percent); typical relief 270 ft per square mile, may exceed 475 ft per square mile	Domes and knobs of bare rocks	Sheetwash, soil erosion
M5 Moderate-Relief Crystalline Rock Terrane	Highly diverse, schist, gneiss, marble, various types of igneous rock	Variable, but mainly sandy loamy soil with common stony fraction	2 to 8 percent slopes; typical relief 100 ft per square mile	Low rolling hills and valleys	Local erosion, small amounts of local recharge to shallow ground water, flooding along stream bottoms
M6 Basalt Knob	Basaltic (dark extrusive) igneous rock, weathered volcanic ash	Stony soil (less than 2 ft thick) on basalt; clayey soil (greater than 2 ft thick) on weathered ash	2 to 8 percent slopes; total relief 150 ft	Broad, low hill	Local soil erosion
Limestone Suite					
M7 Karstic Limestone	Limestone; dolomite	Clayey or loamy (less than 2 ft thick)	Locally steep slopes (8 to 15 percent) with relief of 180 ft per square mile; also gently sloping (less than 8 percent) on karstic plains	Karstic uplands; dissected limestone hills	Sheetwash; rock falls; local recharge
M8 High-Relief Interbedded Limestone, Sandstone, and Shale	Admixed strata of limestone, sandstone, and shale	Stony (less than 2 ft thick)	Slopes mostly greater than 15 percent; typical relief more than 300 ft per square mile; locally slopes as low as 4 percent with relief of less than 200 ft per square mile	Discontinuous, fault-bound "mountains"	Sheetwash; erosion; some recharge in gently sloping areas
M9 High- to Moderate-Relief Alternating Beds of Limestone, Dolomite, and Marl	Resistant limestone and dolomite strata interbedded with erodible marl; local valley-fill alluvium and colluvium	Thin to absent (less than 2 ft thick) clayey, loamy with common stony fraction	Slopes 8 to 15 percent; relief averages 250 ft per square mile; local areas as low as 100 to 150 ft per square mile	Stairstep topography	Erosion, some recharge in areas of low slope
M10 Low-Relief Alternating Beds of Limestone, Dolomite, and Marl	Resistant limestone and dolomite strata interbedded with erodible marl and chalk	Clayey, loamy, mostly less than 2 ft thick	Slope 1 to 6 percent; relief 60 to 100 ft per square mile	Broad uplands; local stairstep topography	Local recharge; soil erosion on steep slopes
M11 Chalk/Sandstone Prairie	Chalk; limestone, limy sandstone	Clayey; may be more than 4 ft thick, locally thin or absent	5 to 8 percent slopes; average relief 100 ft per square mile	Broad gently rolling prairie	Recharge locally important
Claystone-Sandstone Suite					
M12 Claystone/Shale Uplands	Claystone; shale; local lenses of resistant sandstone	Clayey (less than 2 ft thick)	5 to 8 percent slopes; relief 80 ft per square mile; local steep slopes along stream courses and where sandstone occurs	Discontinuous fault-bound areas of low relief	Erosion; slope failure in steep areas
M13 Clay Rolling Terrane	Claystone; marl	Clayey, organic-rich (greater than 4 ft thick)	1 to 5 percent slopes; relief 60 to 80 ft per square mile	Broad gently rolling prairie	Shrinking and swelling of soils; slope failure
M14 Sandy Clay Prairie	Claystone; locally admixed with sandstone and mudstone	Clayey, loamy (greater than 4 ft thick)	1 to 5 percent slopes; typical relief 60 ft per square mile, may be as much as 150 ft per square mile	Narrow "string" prairies	Shrinking and swelling of soils; erosion; flooding near stream courses
M15 Muddy Sand Prairie	Mostly sandy substrate, but complex interbeds of sandstone, mudstone, and lignite; volcanic sediment common	Highly variable, sandy to clayey (greater than 4 ft thick)	1 to 5 percent slopes; relief 60 to 160 ft per square mile	Wooded hills and open prairies; local gullied "badlands"	Erosion; shrinking and swelling of soils; local recharge

Plate 2. Estimated physical properties of land resource units.						
Unit	Slope stability	Foundation strength	Shrink-swell potential	Excavation potential	Corrosion potential	Permeability
Process Units <i>Surface-Water Process Suite</i> *						
P1 Flood-Prone Areas	Moderate to low	Moderate to low	Low to moderate	High	High to moderate	High to moderate
P2 Valley Bottoms	Moderate to low	Moderate to low	Moderate to high	High	Moderate to high	Moderate to low
Aquifer Suite						
P3 Limestone Recharge Areas	High	High	Not applicable (surficial soils very thin)	Very low	Low	High
P4 Upland Sandstone Recharge Areas	High	High	Not applicable (surficial soils very thin)	Low to moderate	Moderate	High
P5 Mixed Rock† Recharge Areas	High to low (low on claystone and adjacent limestone)	Moderate to low (locally high on limestone)	Moderate (high on shale, not applicable on limestone)	High to low	Moderate to high	Moderate to high (locally low on shale)
P6 Sand and Sandstone Recharge Areas	Moderate	Moderate	Low	High (locally moderate)	Moderate to high	Very high
P7 Coastal Plain† Recharge Areas	Moderate to low	Low to moderate	High (on clays) to low (on sands)	High	High to moderate	Low (on clays) to high (on sands)
Slope Process Suite						
P8 Unstable Limestone and Shale Terrane	Low	Low (locally high)	High	High (locally low on limestone)	Very high	Low
P9 Unstable Clay Terrane	Very low	Low	Very high	High	High	Very low
Material-Landform Units <i>Surface Deposit Suite</i>						
M1 Alluvium and Terrace Deposits	Moderate to low	Moderate to low	Low to moderate	High	High to moderate	High to moderate
M2 Upland Gravels and Alluvial Plains	Moderate	Moderate	Moderate to low	High to moderate	Moderate to high	High to moderate
M3 Low-Relief Residium	Moderate	Moderate	Moderate to low	High to moderate	Moderate to low	High to moderate
Igneous-Metamorphic Rock Suite						
M4 High-Relief Crystalline Rock Terrane	Very high	Very high	Not applicable	Very low	Low	Low (locally high in fractured zones)
M5 Moderate-Relief Crystalline Rock Terrane	High	High	Applicable only to surficial soils (highly variable)	Moderate to low	Low to moderate	Low (locally high fractured or weathered zones)
M6 Basalt Knob	High to moderate	High (on basalt) to low (on weathered areas)	Low (applicable only to weathered areas)	Low (on basalt) high (on weathered areas)	Moderate to high	Low
Limestone Suite						
M7 Karstic Limestone	High	High	Not applicable (surficial soils very thin)	Low	Low	High but localized
M8 High-Relief Interbedded Limestone, Sandstone, and Shale	High to moderate	High to moderate	Not applicable (surficial soils very thin)	Low to moderate	Low to moderate	Low to moderate (locally high for sandstone strata)
M9 High- to Moderate-Relief Alternating Beds of Limestone, Dolomite, and Marl	High to moderate	High to moderate	Low for marl strata; otherwise not applicable	Moderate to low	Moderate to low	Low to moderate (locally high for dolomites fracture and solution zones)
M10 Low-Relief Alternating Beds of Limestone, Dolomite, and Marl	High to moderate	High to moderate	Applicable only to marl strata and surficial soils; may be moderate	Moderate (locally low where hard limestone occurs)	Moderate	Low to moderate
M11 Chalk/Sandstone Prairie	Moderate to high	High to moderate	Applicable only to surficial soils which may have high potential	Moderate to low	Moderate to low	Moderate (locally high in fracture zones)
Claystone-Sandstone Suite						
M12 Claystone/Shale Uplands	Low	Moderate to low	Moderate to high	High (low for sandstone lenses)	High	Low
M13 Clay Rolling Terrane	Low	Low	Very high	High	High	Very low
M14 Sandy Clay† Prairie	Low to moderate	Low to moderate	High	High (low for cemented sandstone)	High to moderate	Low to moderate
M15 Muddy Sand† Prairie	Moderate	Moderate to low	Moderate to high	High (low for cemented)	Moderate to high	High to moderate

* **Note:** These units are defined mainly by overriding natural process; thus substrate properties may be highly variable.

† **Note:** These units contain a highly varied assortment of substrate materials; thus properties are highly variable.

Plate 3. Generalized capability of land resources units for sustaining selected uses and activities.								
Unit	Septic tanks	Sanitary landfill	Feedlot	Light construction (single slab)	Heavy construction	Parks and recreation	Water containment small ponds and lakes	Local resource extraction
Process Units <i>Surface-Water Process Suite</i>								
P1 Flood-Prone Areas	—	—	—	—	—	+	+	+
P2 Valley Bottoms	—	—	—	—	—	+/?	+	0/+
Aquifer Suite								
P3 Limestone Recharge Areas	—	—	—	+	+	+	—	+
P4 Upland Sandstone Recharge Areas	+/?	—	—	+	0/+	+	—	+
P5 Mixed Rock† Recharge Areas	+/?	—	—	0/+	0/+	+	+/?	—
P6 Sand and Sandstone Recharge Areas	—	—	—	+	0	+	—	—
P7 Coastal Plain† Recharge Areas	0/+	+/?	—	+/?	0/+	+	+/?	+/?
Slope Process Suite								
P8 Unstable Limestone and Shale Terrane	+/?	+/?	—	+/?	—	+	+/?	—
P9 Unstable Clay Terrane	—	—	—	—	—	—	+/?	—
Material-Landform Units <i>Surface Deposit Suite</i>								
M1 Alluvium and Terrace Deposits	0/+	—	—	+	+/?	+	+/?	+
M2 Upland Gravels and Alluvial Plains	+/?	—	—	+	0/+	+	+/?	+
M3 Low-Relief Residium	0/+	—	—	+	0/+	+	—	+
Igneous-Metamorphic Rock Suite								
M4 High-Relief Crystalline Rock Terrane	—	—	—	+/?	—	+	—	+
M5 Moderate-Relief Crystalline Rock Terrane	+/?	0/+	0/+	+	+/?	+	+/?	+
M6 Basalt Knob	—	+/?	0	+	0/+	+	+/?	—
Limestone Suite								
M7 Karstic Limestone	—	—	—	+	+	+	—	+
M8 High-Relief Interbedded Limestone, Sandstone, and Shale	—	—	—	0	—	+	0/+	0
M9 High- to Moderate-Relief Alternating Beds of Limestone, Dolomite, and Marl	—	—	—	+/?	+/?	+	+/?	0
M10 Low-Relief Alternating Beds of Limestone, Dolomite, and Marl	+/?	—	0/+	+	+/?	+	+/?	0
M11 Chalk/Sandstone Prairie	+/?	—	+/?	+	+/?	+	+/?	+
Claystone/Sandstone Suite								
M12 Claystone/Shale Uplands	—	+	+	0	—	+	+	—
M13 Clay Rolling Terrane	—	+	+	+/?	—	+	+	0
M14 Sandy Clay Prairie	—	+/?	+/?	+/?	0/+	+	+	0
M15 Muddy Sand Prairie	0/+	+/?	+/?	+	+/?	+	+/?	+

+ = high potential
0 = moderate potential
+/? = low potential

† **Note:** These units contain a highly varied assortment of substrate materials, landforms, and possible processes; thus, specific allowable uses are easily generalized.