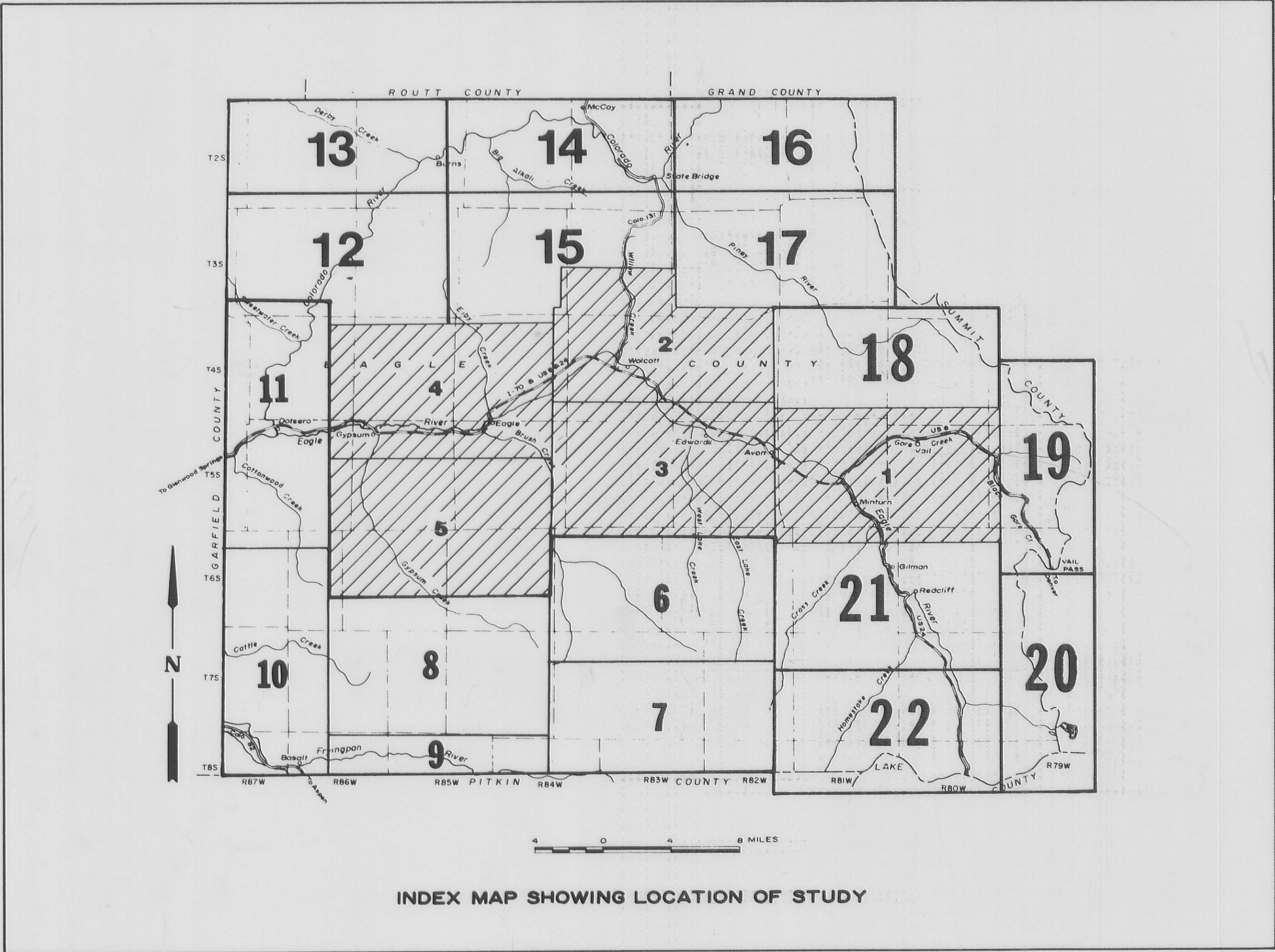


PREPARED FOR:
COLORADO GEOLOGICAL SURVEY
and
EAGLE COUNTY, COLORADO

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Steamboat Springs, Colo. 1976-77-78
After:
C. S. Robinson & Assoc. - 1975

FOLIO OF GEOLOGIC LAND USE MAPS
EAGLE COUNTY, COLORADO



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EXPLANATION

BEDROCK GEOLOGIC MAP

Qal Alluvium Boulders, gravel, sand and silt accumulated by fluvial processes in large stream valleys.	Je Entrada Sandstone Light reddish-orange, fine grained aeolian cross-bedded sandstone.
Qm Moraine Thick deposit of boulders, gravel, sand and silt deposited by glaciers.	Tc Chinle Formation Fine grained red sandstones and sandy shales with local lenses of limestone conglomerate.
Tv Extrusive Volcanics Basaltic lavas, interbedded flow breccias, ash flows and tuffaceous sedimentary rocks overlying older sedimentary rocks.	Tc Pab State Bridge Formation Reddish-orange clay free sandstones and fine grained sandstones with interbedded conglomerates and limestones.
Ti Intrusive Rocks Thin dikes composed of dark gray or greenish-gray, fine grained to aphanitic vesicular basalt.	IPpm Maroon Formation Grayish-red to moderate reddish-orange siltstone and silty sandstone; grayish-red, pale red and pale red-purple arkosic sandstones.
Tqm Quartz Monzonite Light to dark gray, fine to medium grained quartz-feldspathic intrusive rock.	IPe Eagle Valley Formation White to medium gray gypsum and associated greenish-gray claystone, siltstones and sandstones.
Kp Pierre Shale Dark gray or dark brownish-gray clay shale with interbedded thin limestones and siltstones in the lower part and two thick shaley and silty sandstone beds in the upper part.	IPm Minturn Formation Medium to very coarse-grained, gray to reddish-brown sandstone, conglomeratic sandstone, thin beds of reddish-brown siltstone and sandy and silty shale and prominent pinkish-gray to gray limestone beds. In the Ruedi area it includes the Gothic Formation.
Kn Niobrara Formation Dark to light gray calcareous and non-calcareous shale interbedded with thin beds of limestone and calcareous siltstones.	Pb Belden Formation Interbedded dark gray to black fine grained fossiliferous limestones and gray to black fissile shales. Two massive, arkosic, conglomeratic sandstones occur near the middle of the formation.
Kb Benton Shale Dark gray shale with interbedded, fine grained, brownish-gray, clayey sandstone and thin beds of white clay.	MI Leadville Limestone Dark gray massive to thin bedded lithographic limestones with a lower unit of grayish-brown medium grained calcareous sandstone.
Kd Dakota Sandstone Fine to very coarse sandstones with thin interbedded shale and coal.	Dc Chaffee Formation Uniformly thin bedded gray dolomite with a lower member of white massive and crossbedded medium to coarse grained quartzitic sandstone with some thin gray shale units.
Jm Morrison Formation Interbedded lenticular sandstone, variegated and calcareous claystones and fine grained, fossiliferous fresh-water limestones.	

Om Manitou Dolomite Dark gray to reddish-brown or purple thin bedded crystalline dolomite.	Oh Harding Quartzite White to yellowish gray-green interbedded conglomerates, sandstones and orthoquartzites.
Ohm Harding and Manitou formations undivided	Cp Peerless Formation Brown sandy dolomite with streaks and laminae of greenish-gray or dark red dolomite interbedded with brown or gray shale and sandstone.
Cs Sawatch Quartzite Fine to medium grained brown dolomitic sandstones and white orthoquartzites.	pC Precambrian Igneous, meta-sedimentary and metavolcanic rocks including granites, gneisses, lamprophyres, pegmatites and schists of the core of the Sawatch and Gore Ranges.

SYMBOLS
Contact Contact between bedrock units.
Fault (bar and bell on down thrown side)
Thrust Fault (teeth on up thrown side)
Strike and dip of bed 5-10° 10-40° 40-70°
Strike and dip of bedrock, Photogeologic
Anticline Showing crestline and direction of plunge.
Syncline Showing troughline and direction of plunge.

MAP OF SURFICIAL DEPOSITS

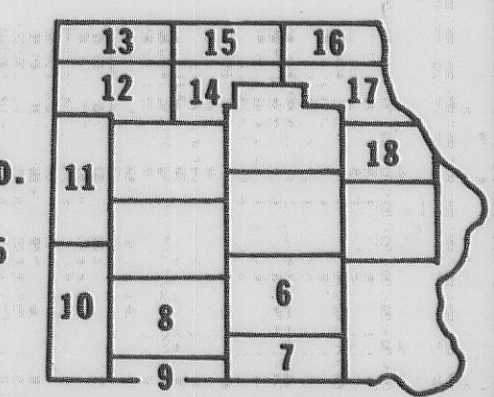
af Artificial fill Tailings pond deposit of fine sand, silt and clay.	Ql Lake Deposits Fine grained sands, silts and clay of fluvial origin deposited behind barriers in the drainage.
ALLUVIAL DEPOSITS	Sw Swamp Deposits Organic and clay accumulation occurs where groundwater table intersects the surface.
Qal Alluvium Stream sediments in the tributaries of the Eagle River.	Qcw Colluvial Wedge Areas of fine grained slope wash deposits.
Qto Active floodplain Boulders, gravel, sand and silt reworked by the present stream.	Qc Colluvium Material derived by the weathering of bedrock in place. Letter symbols in parenthesis indicate formation from which material is derived.
Qt Terraces Terrace levels along Eagle River and tributaries. Numerical subscript indicates relative age; number 1 is the youngest. May be unnumbered.	Qta Talus Accumulations of coarse debris at base of a cliff as a result of weathering of the cliff. Includes rock glaciers above 11,000 feet. Letter symbols in parenthesis indicate formation from which material is derived.
Qaf Alluvial Fan Cone shaped deposit of fluvial sediments that are deposited where a tributary enters into a larger stream valley.	
Qof Older Alluvial Fans Cone shaped deposits of fluvial sediments that were deposited where a tributary entered into a larger stream valley. Recent erosion is greater than deposition, resulting in dissection of fan surface by down-cutting of tributary stream.	

GLACIAL DEPOSITS	LANDSLIDE DEPOSITS
Qm Moraine Boulders, gravel, sand and silt deposited at the margins of glaciers.	Qbs 1,2,3 Landslides of Bedrock Failure of bedrock slopes. Letter symbol in parenthesis indicates bedrock formation that failed. Numerical subscript indicates relative age; 1 being the youngest.
Qg Glacial undifferentiated Thin deposit of boulders, gravel, sand and silt deposited as a lag on older units.	Qsfc 1,2,3 Slope Failure Complex Large areas including a variety of types of slope failures as debris slides, mudflows, debris flows, landslides, etc. Letter symbol in parenthesis indicates unit that failed. Numerical subscript indicates relative age; 1 being the youngest.
	Qds 1,2,3 Debris slides Fine colluvium to boulder deposits including morainal deposits that have failed and moved down slope. Letter symbol in parenthesis indicates unit that failed. Numerical subscript indicates relative age; 1 being the youngest.
	Qac Accelerated Creep An area of colluvial slope that is moving relatively rapidly downslope. Letter symbols in parenthesis indicate formation from which material is derived.

POTENTIAL GEOLOGIC HAZARDS MAP GEOLOGIC HAZARDS DEFINED OR INFERRED IN COLORADO GEOLOGICAL SURVEY SPECIAL PUBLICATION No. 6.

pfp Physiographic floodplain The portion of a major stream valley where erosion and deposition presently occurs and is generally subject to flooding on an approximate 25-year cycle.	ac Accelerated Soil Creep Areas of colluvial slope that is moving downslope at a relatively rapid rate.
ls Landslides Mass movements where there is a distinct surface of rupture or zone of weakness. Subtypes identified and described below.	rf Rockfall Hazard Areas of either active or potential falling, rolling or sliding of large bedrock blocks. Symbol in parenthesis indicates unit involved.
sfc Slope failure complex Large areas of failure of surficial and bedrock units. May consist of a combination of slope failure types. Symbol enclosed in parenthesis indicates unit involved. Subscript number indicates relative age; number 1 is youngest.	ta Talus Areas of potential rockfall and small localized debris flows. Symbol enclosed in parenthesis indicates unit involved.
ds Debris slides Landslide type consisting primarily of surficial material. Symbol enclosed in parenthesis indicates unit involved. Subscript number indicates relative age; number 1 is youngest.	dta Debris Fan Areas of possible recurrent flooding, debris flows and hydrocompaction.
bs Bedrock slides Slope failure deposits consisting primarily of large detached blocks of bedrock. Symbol enclosed in parenthesis indicates unit involved.	sw Swamps Areas where poor drainage or high ground water cause permanent or seasonal saturation. Soils may be compressible because of high organic content.
MAP SYMBOLS	Corrosive soils Soils which may contain minerals in variable amounts that produce serious detrimental effects on concrete, metal or other substances that are in contact with the soil.
Fractures	Subsidence Areas that may be susceptible to subsidence due to solution.
Shear Zones	shy Subsidence Areas that may be susceptible to subsidence due to hydrocompaction in low density soils.
Unit Contacts	Expansive soils and rock Soil and rock which contains clay and which expands to a significant degree upon wetting and shrinks upon drying.
Landslide Scarp	
Sinkholes in Limestone or evaporite rocks	
Subsidence Areas Areas enclosed show several features related to subsidence	

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BEDROCK GEOLOGIC, SURFICIAL DEPOSITS AND POTENTIAL GEOLOGIC HAZARDS MAP EAGLE COUNTY, COLORADO

SNOW AVALANCHE HAZARD CLASSIFICATION

1

Areas where numerous or individual slide paths are readily identifiable.

2

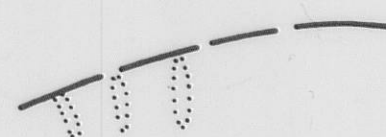
Areas highly susceptible to snow avalanches, but no paths readily identifiable.

2A

Areas considered as potential runout or airblast zone associated with 1 or 2.

3

Area that may be susceptible to snow sliding or snow avalanches under extreme weather conditions.



Area susceptible to snow avalanches with photo interpreted avalanche path outlined.

Classification takes into account

1. Slope, 5-40°
2. Wind direction, W-N
3. Elevation, >8000'
4. Slope aspect, lee slopes
5. Ability to identify paths
6. vegetation density

EXPLANATION

ENVIRONMENTAL AND ENGINEERING GEOLOGIC MAP FOR LAND USE CLASSIFICATION OF AREAS INDICATING MINIMUM ENGINEERING AND ENGINEERING GEOLOGIC INVESTIGATIONS REQUIRED FOR DEVELOPMENT PLANNING

1

BASIC GEOLOGIC AND ENGINEERING INVESTIGATIONS OF AREA AS REQUIRED BY SENATE BILL 35, ADEQUATE FOR DEVELOPMENT PLANNING AND GENERALLY FOR CONSTRUCTION SITE SELECTION.

- A. High stable gravel covered terraces above the physiographic floodplain. Emphasis on, but not limited to, groundwater, surface and subsurface drainage, composition and characteristics of underlying bedrock that may be penetrated and possible resource evaluation.
- B. Stable colluvium or bedrock on flat to gentle slopes. Emphasis on, but not limited to, surface and subsurface drainage and slope stability.
- C. Stable glacial material on flat to gentle slopes. Emphasis on, but not limited to, surface and subsurface drainage, slope stability, and possible resource evaluation.

2

GENERAL GEOLOGIC AND ENGINEERING INVESTIGATIONS OF AREA REQUIRED FOR DEVELOPMENT PLANNING FOR EACH CONSTRUCTION SITE.

- A. Stable colluvium or bedrock on gentle slopes that may have a thin gravel cap. Emphasis on, but not limited to, surface and subsurface drainage, composition and characteristics of near surface bedrock and slope stability.
- B. Stable glacial deposits on gentle to moderate slopes. Emphasis on, but not limited to, surface and subsurface drainage, slope stability and possible resource evaluation.
- C. Swamps, bogs or lakes where surface water collects permanently or seasonally. Emphasis on, but not limited to, compaction, high ground water table and surface drainage.
- D. Stable colluvial slopes with gravel cap in areas of past subsidence. Emphasis on, but not limited to, subsidence potential, corrosive and expansive soils.

3

DETAILED GEOLOGIC AND ENGINEERING INVESTIGATIONS OF ENTIRE AREA IS REQUIRED FOR DEVELOPMENT PLANNING AND FOR SELECTION OF CONSTRUCTION SITES.

- A. Stable colluvium and bedrock on gentle to moderate slopes. Emphasis on, but not limited to, surface and subsurface drainage, slope stability and possible resource evaluation.
- B. Thick colluvium on gentle to moderate slopes. Emphasis on, but not limited to, expansive and corrosive soils, surface and subsurface drainage and hydrocompaction.
- C. Fine grained tailings deposit on flat to moderate slopes. Emphasis on, but not limited to, slope stability, corrosive material, surface and subsurface drainage.

- D. Debris fans. Gentle thick colluvial slopes consisting of fine to coarse rounded material. Emphasis on, but not limited to, surface and subsurface drainage, frequency and control of mudflows and debris flows, hydrocompaction and possible resource evaluation.
- E. Potential rockfall hazard. Emphasis on, but not limited to, slope stability, surface and subsurface drainage.
- F. Thin colluvium on potentially unstable gentle to moderate slopes. Emphasis on, but not limited to, surface and subsurface drainage, slope stability and corrosive and expansive soils.

4

DETAILED GEOLOGIC AND ENGINEERING INVESTIGATIONS REQUIRED FOR ENTIRE AREA FOR DEVELOPMENT PLANNING AND SOME CONSTRUCTION SITES MAY REQUIRE SPECIALIZED GEOLOGIC AND ENGINEERING INVESTIGATIONS FOR DESIGN PURPOSES.

- A. Thin glacial deposits overlying potentially unstable moderate to steep colluvial and bedrock slopes. Emphasis on, but not limited to, slope stability, surface and subsurface drainage.
- B. Stable colluvium and bedrock on moderate to steep slopes. Emphasis on, but not limited to, slope stability, rockfall hazard, expansive and corrosive soils and surface and subsurface drainage.
- C. Potential rockfall areas associated with talus slopes. Medium to coarse blocky material deposited by rockfall at the base of cliffs. Emphasis on, but not limited to, rockfall hazard, slope stability, surface and subsurface drainage.
- D. Areas of swamps or bogs on potentially unstable gentle to moderate slopes. Emphasis on, but not limited to, surface and subsurface drainage and slope stability.
- E. Area of active debris flows. Emphasis on but not limited to, flooding, control of water entrained debris.

5

DETAILED GEOLOGIC AND ENGINEERING INVESTIGATIONS OF ENTIRE AREA REQUIRED FOR DEVELOPMENT PLANNING AND SPECIALIZED INVESTIGATIONS REQUIRED FOR SPECIFIC CONSTRUCTION SITES.

- A. Rockfall hazard areas and talus on moderate to steep bedrock and colluvial slopes. Emphasis on, but not limited to, slope stability, surface and subsurface drainage and expansive and corrosive soils.
- B. Debris slides, bedrock slides and slope failure complexes composed of poorly sorted thin to thick, fine to coarse colluvial and bedrock on gentle to steep slopes. Emphasis on, but not limited to, slope stability, surface and subsurface drainage, corrosive and expansive soils.
- C. Stable or potentially unstable colluvium or bedrock on moderate to steep slopes. Emphasis on, but not limited to, slope stability, surface and subsurface drainage, debris flows in higher mountain areas.

- D. Potentially unstable colluvium or gypsiferous bedrock on gentle to steep slopes. Emphasis on, but not limited to, hydrocompaction, subsidence due to solution, surface and subsurface drainage, corrosive and expansive soils, and slope stability.
- E. Areas of accelerated creep composed of colluvial or bedrock on moderate unstable or metastable slopes. Emphasis on, but not limited to, slope stability, surface and subsurface drainage, corrosive and expansive soils.

6

EXTENSIVE DETAILED GEOLOGIC AND ENGINEERING INVESTIGATIONS NECESSARY FOR DEVELOPMENT PLANNING. MOST OF THE AREA WITHIN THIS CLASSIFICATION MAY NOT BE SUITABLE FOR PERMANENT STRUCTURES.

- A. Debris slides and slope failure complexes made up of unsorted thick colluvial material on moderate to steep unstable or metastable slopes. Emphasis on, but not limited to, slope stability, surface and subsurface drainage, corrosive and expansive soils.
- B. Areas of accelerated creep composed of colluvial or bedrock on steep unstable or metastable slopes. Emphasis on, but not limited to, slope stability, surface and subsurface drainage, corrosive and expansive soils.
- C. Areas near physiographic floodplain that may be susceptible to flooding during severe weather conditions. Emphasis on, but not limited to, flooding potential, frequency and control.
- D. Rockfall hazard in gypsiferous material. Steep, unstable or potentially unstable bedrock slopes. Emphasis on, but not limited to, slope stability, surface and subsurface drainage and corrosive and expansive soils.

7

EXTENSIVE DETAILED GEOLOGIC AND ENGINEERING FIELD INVESTIGATIONS REQUIRED FOR DEVELOPMENT PLANNING. UTILITY CORRIDORS, TEMPORARY STRUCTURES AND SOME PERMANENT STRUCTURES MAY UTILIZE PARTS OF THESE AREAS AFTER EXTENSIVE INVESTIGATIONS AND DESIGN FOR THE SPECIALIZED PROBLEMS INVOLVED.

- A. Physiographic floodplain where erosion and deposition is presently active and is generally subject to recurrent flooding on an approximate 25-year cycle. Emphasis on, but not limited to, frequency, depth and control of water and water entrained debris.

Line delimiting areas susceptible to snow sliding or snow avalanches. See Snow Avalanche Hazard Map for details. Development within this area requires a thorough evaluation of snow avalanche hazard before development begins.

GEOLOGIC RESOURCES MAP

METALLIC MINERALS*

Production

Over \$100,000,000

\$100,000 to \$1,000,000

\$10,000 to \$100,000

Less than \$10,000

Reported occurrence, no record of production

NON-METALLIC MINERALS

Sand and gravel (known deposits)

Sand, Gravel and Quarry Aggregate

TERRACE
UNEVALUATED
COVERED

F

Floodplain Deposit

T

Stream Terrace Deposit

AF

Alluvial Fan Deposit

U

Upland Deposit

G

Glacial Deposit

Va

Volcanic Coarse Aggregate

(at least 30% retained on #4 screen, visual estimation)

1

Gravel: relatively clean and sound

2

Gravel: significant fines, decomposed rock, calcium carbonate.

Fine Aggregate

3

Sand

Unevaluated Resource

4

Possible resource covered by other
Surficial material

Volcanic scoria

Potassium mineral leases
(State of Colorado)

Building stone

Perlite and pumice

MINERAL FUELS

Oil and gas

Dry hole

Dry hole, show of oil and gas

URANIUM

Mineral showing

Radioactive anomaly

Uranium bearing sedimentary unit. ~~Mc~~ Chinle formation.

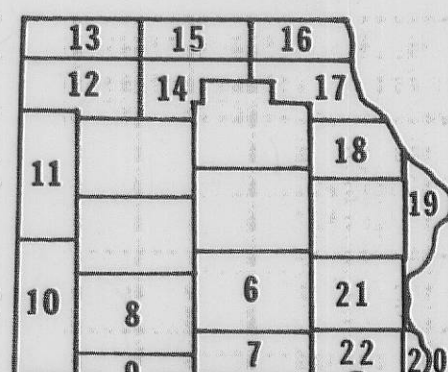
Line delimits area of probable location of possible disseminated or massive base metal sulfide deposits.

Line delimits area of probable location of possible vein type mineral deposits.

* Primary Mineralization

Au Gold
Ag Silver
Cu Copper
Pb Lead
Zn Zinc
V Vanadium

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SNOW AVALANCHE HAZARD, ENVIRONMENTAL AND ENGINEERING GEOLOGIC AND GEOLOGIC RESOURCE MAPS, EAGLE COUNTY, COLORADO