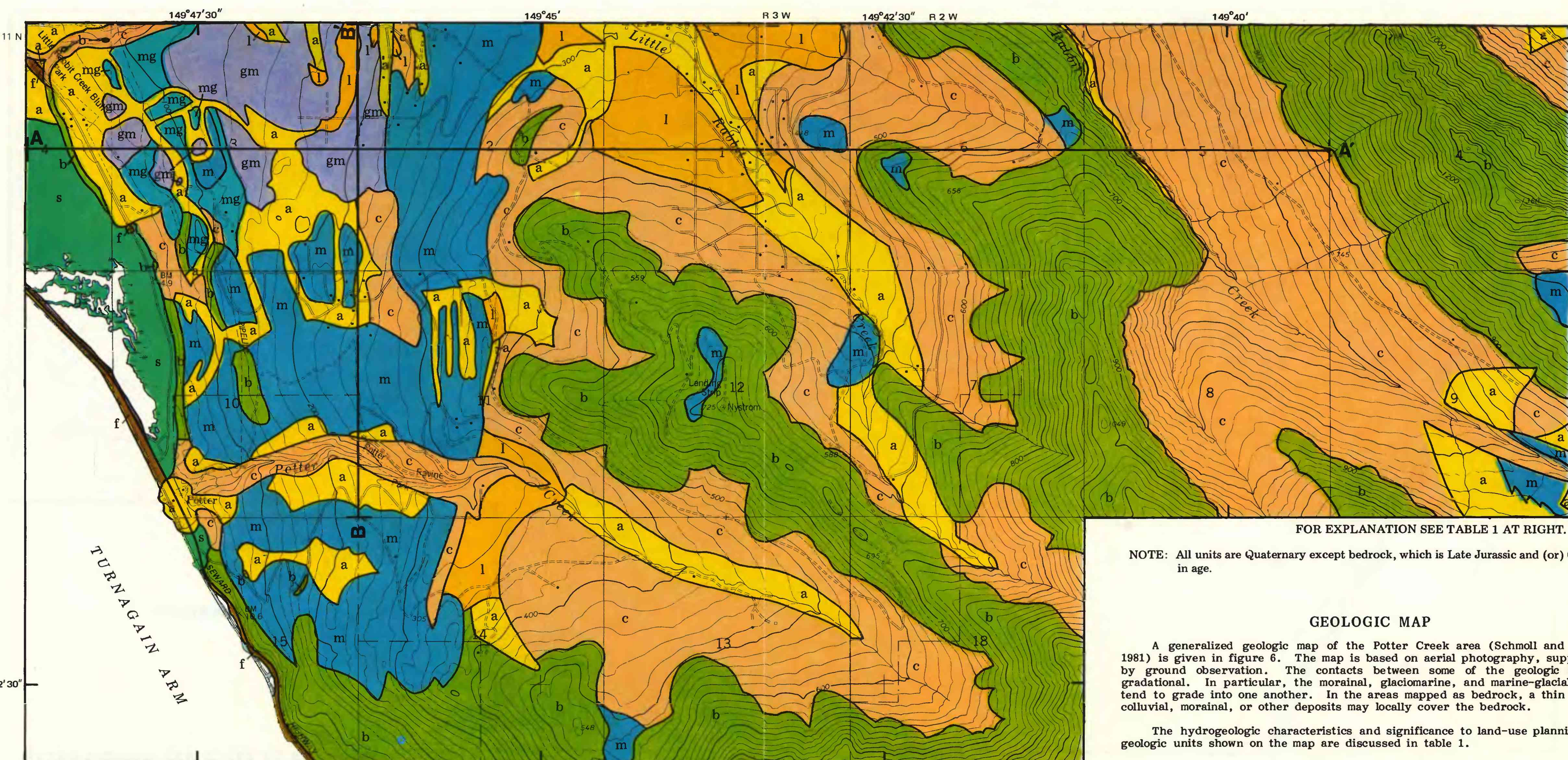


FOR EXPLANATION SEE TABLE 1 AT RIGHT.

NOTE: All units are Quaternary except bedrock, which is Late Jurassic and (or) Cretaceous in age.

FIGURE 6. – GENERALIZED GEOLOGY.

GEOLOGIC MAP

A generalized geologic map of the Potter Creek area (Schmoll and Emanuel, 1981) is given in figure 6. The map is based on aerial photography, supplemented by ground observation. The contacts between some of the geologic units are gradational. In particular, the morainal, glaciomarine, and marine-glacial deposits tend to grade into one another. In the areas mapped as bedrock, a thin mantle of colluvial, morainal, or other deposits may locally cover the bedrock.

The hydrogeologic characteristics and significance to land-use planning of the geologic units shown on the map are discussed in table 1.

GEOLOGIC SECTIONS

Geologic sections A-A' and B-B' (fig. 7) illustrate the spatial relations of geologic units in the Potter Creek area. The locations of the section lines are shown on the geologic map (fig. 6). The positions of subsurface contacts between units are inferred from drillers' logs; surface contact locations are taken from the geologic map. Morainal, glaciomarine, and marine-glacial units are combined in the sections as an undifferentiated glacial unit; they are similar in geologic and hydrologic character and difficult to distinguish in well logs.

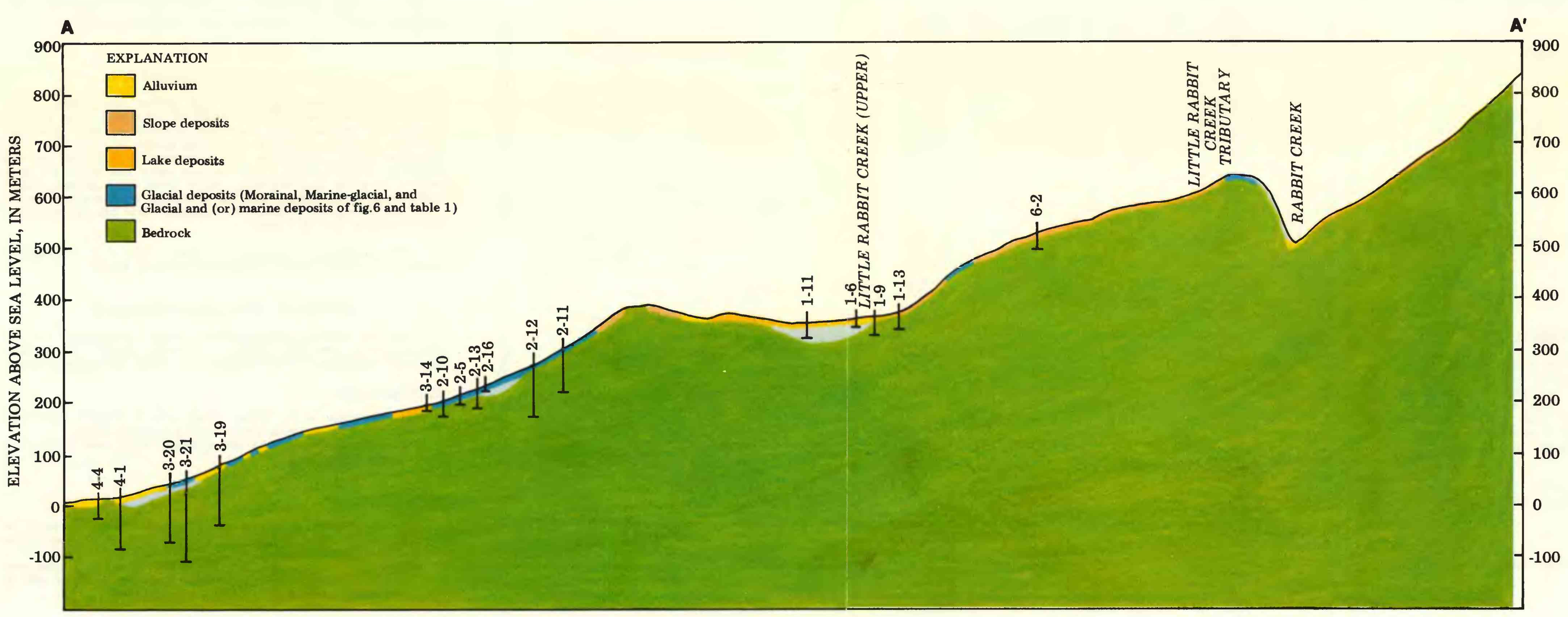
Wells whose logs were used to determine subsurface contacts are shown on the sections and identified by a numerical code. The code corresponds to that used to describe well locations in figure 12 (sheet 4); the text accompanying that figure describes the numerical code in detail.

TABLE 1. -- HYDROGEOLOGIC CHARACTERISTICS OF GEOLOGIC MATERIALS.

MAP UNIT	MANMADE FILL (f)	TIDAL DEPOSITS (s)	ALLUVIUM (a)	SLOPE DEPOSITS (c)	LAKE DEPOSITS (l)	MORAINAL DEPOSITS (m)	MARINE-GLACIAL DEPOSITS (mg)	GLACIAL AND (OR) MARINE DEPOSITS (gm)	BEDROCK (b)
LITHOLOGY	Chiefly gravel and sand, but may include considerable silt and clay. Primarily fill for roadbeds and railroad embankments. Note: Mapped only where unusually extensive fills have been emplaced.	Silt and very fine sand deposited by tidal waters; may contain clay. Includes sediments in the tidal zone and in adjacent areas no longer or only rarely covered by tidal water.	Chiefly sand and gravel, mostly well sorted and bedded; may contain silt and clay, as well as pockets of more heterogeneous sediments. Unit includes glacial-stream deposits, alluvial fan and cone deposits, emerged delta deposits, and ice-contact glacial deposits such as kames, eskers, and kame terraces.	Colluvium or slope deposits. Mixed deposits of bedrock fragments and reworked glacial drift; includes sand and gravel deposits that ranged from well to poorly sorted.	Silt and clay deposits with some beds of fine sand or sand and gravel, deposited in lakes that were dammed by glaciers. Deposit thicknesses range from less than 3 to several 10's of feet.	Primarily glacial till, consisting of intermixed gravel, sand, silt, and clay deposited directly by glacial ice; lenses of moderately sorted sand and gravel are locally present, but may not be clearly distinguishable from glacial alluvium.	Proglacial marine deposits; also, morainal deposits that have been extensively reworked by marine processes. Interbedded fine sand and clay, with some beds of gravelly silt and some deposits of mixed gravel, sand, silt, and clay. This unit generally grades into glacial and (or) marine deposits.	Chiefly morainal deposits that have been partly reworked by marine processes. Mixed deposits of gravel, sand, silt and clay, containing some local beds of fine sand and silt and thin beds of sand and marine gravel. May grade into morainal or marine-glacial deposits.	Metamorphic rocks, primarily of the Cretaceous McHugh Complex, composed of metamorphosed siltstone, graywacke, arkose, and conglomeratic sandstone, and of greenstone associated with chert and argillite; near the mouth of Little Rabbit Creek, rocks of another complex include marble, greenstone, and cherty argillite (Clark, 1972, 1973). A local mantle of colluvium or morainal deposits may cover bedrock. The boundary between bedrock and adjacent deposits is commonly a broad area of transition only approximated by the contact of the map.
TOPOGRAPHIC EXPRESSION	Linear banks, often steep and up to 30 ft high.	Flat plains, tidal flats, or marshes.	Stream deposits form low terraces parallel to the modern streams. Alluvial fans and cones have moderately steep slopes. Kames and eskers are hills and sinuous ridges of low relief.	Smoothly sloping talus fans and cones near steep bedrock exposures; many merge into smooth valley deposits that may be extensive. Steeply sloping deposits along major stream valleys.	Smooth, gentle slopes of former lake bottoms; locally cut by modern streams.	Generally elongated hills or ridges, mostly smooth; some rounded mounds.	Broad plains having nearly uniform slope, smooth to slightly hummocky.	Narrow, parallel ridges having low relief, mostly trending northwest.	Steep-sided ridges and knobs.
DISTRIBUTION	Some fill underlies virtually all roadbeds and railroad tracks; deposits are extensive only along major roadways and railway embankments where they cross streambeds or incised valleys.	Adjacent to Cook Inlet; primarily Potter Marsh area.	Scattered, but generally more common near the lower reaches of the streams.	Common on steep hillsides and in valleys above 400 m in altitude, and along steep valley walls. Thin deposits of colluvium are common downslope from bedrock outcrops.	Primarily at altitudes greater than 200 m, normally along stream valleys or at the heads of minor drainages.	Mostly in a wide belt parallel to the mountain front at altitudes of 200-300 m. Scattered remnants of older moraines at higher altitudes.	Generally restricted to altitudes of less than 200 m near lower Rabbit Creek.	Generally restricted to altitudes less than 200 m near lower Rabbit Creek.	Exposed on steep slopes and ridge crests over large areas in the eastern and southern parts of the study area, particularly above 400 m in altitude, and in smaller outcrops along steep slopes and ridges at lower altitudes throughout the study area.
SURFICIAL DRAINAGE	Emplacements are too small to have significant impact on drainage or recharge except locally; properly built culverts prevent uphill ponding of water. Erosion of steep fill embankments, especially those with high clay or silt content, may add considerable sediment to water downstream from a large emplacement. Permeability of the fill is high, as is infiltration.	Runoff is high and primarily directly into Cook Inlet; deposits are dissected by shallow drainage channels that tend to shift with time. Infiltration and permeability are extremely low.	Low runoff, high permeability, and rapid infiltration except where silt content is high.	Low runoff, except where compacted. Infiltration and permeability are high, allowing rapid downward flow. At high altitudes, these deposits are important sources of recharge to aquifers throughout the study area.	Generally high runoff and low infiltration due to low permeability. Springs may occur along contacts with alluvium or slope deposits.	Runoff is low to moderate, even where slopes are steep; permeability and infiltration rates are moderate. Where deposits are compacted or contain considerable clay, permeability may be low and infiltration may be slow, causing water to collect in depressions.	Runoff is moderate, although drainage patterns are generally poorly developed. Infiltration rates and permeabilities range from low to moderate. Permeability and infiltration rates may be locally high in sandy material.	Commonly low runoff snd moderate infiltration rates and permeability, except where high silt content or compaction reduce permeability and infiltration.	Runoff is high where bedrock is exposed. Permeability and infiltration are very low, except where bedrock is extensively fractured or weathered.
WATER CONTENT	Usually unsaturated.	Generally saturated, at least near the surface; perhaps periodically submerged. May be modern tidal flat or marsh.	Commonly saturated at depths below 10-20 ft, especially along modern stream channels.	Typically unsaturated, except briefly after heavy rains, due to rapid drainage and downward movement of infiltrating water.	May be saturated at or near the surface; water may collect at the surface due to low infiltration and permeability.	Mostly unsaturated, except at depth in deposits thicker than 50 ft. During wet seasons, perched water may exist at shallower depths.	Generally saturated along drainages; mostly unsaturated elsewhere.	Generally unsaturated, except where silt beds at shallow depth cause bogs to develop in depressions.	Fresh bedrock has low porosity and low water content even when saturated. Where bedrock is extensively fractured or weathered, water content is higher.
WATER-YIELDING CAPABILITY	Not applicable -- not suitable for general construction.	Not applicable -- not suitable for general construction.	Fair to good. Yields may be 10-30 gal/min or more where saturated thickness exceeds 10 ft. The important aquifers are alluvial.	Poor. Generally too thin and sporadically saturated to provide a reliable supply of water.	Poor, although excavations in lake deposits usually fill with water owing to slow seepage of water from near-surface sediments.	Usually poor to fair due to low or moderate permeability; may be good, however, if saturated lenses of sand and gravel are present. Yields of 5-20 gal/min may be obtained from such lenses.	Generally poor. Permeability is low to moderate and units are generally thin.	Generally poor. Deposits are either unsaturated or too thin to yield significant quantities of water.	Generally poor. Yields of 1-5 gal/min are obtainable from some weathered or fractured zones; limited quantities of ground water may be available at the bedrock-sediment interface. Rare extensively fractured zones may yield 10 gal/min or more.
HYDROGEOLOGIC CHARACTERISTICS	Not applicable -- not suitable for general construction.	Not applicable -- not suitable for general construction.	Percolation rates are moderate to high, and locally may be too rapid to permit sdequate attenuation of contaminants before they reach ground water.	Generally unfavorable for onsite disposal of wastes. Percolation rates are rapid and may not permit adequate attenuation of waste before it reaches ground water.	Unfavorable. Percolation rates are very slow. Unless these deposits are penetrated, liquid wastes tend to collect at the surface.	Percolation rates generally result in adequate attenuation of pollutants, although silty or clayey horizons may cause percolating liquids to perch at shallow depths, possibly contaminating local water supplies.	Generally fair percolation rates and fair suitability for onsite waste disposal systems, except where high silt or clay content reduces permeability, rendering percolation rates inadequate.	Generally unfavorable for onsite disposal of waste. Percolation rates are fair to poor, being poor where high silt content or compaction reduce permeability and cause inadequate infiltration of effluent.	Unfavorable for onsite disposal of wastes. Contaminants may travel quickly and far through fractures, possibly to reach wells or surface-water bodies that intersect them.

CONVERSION TABLE

Multiply	by	To obtain
foot (ft)	0.3048	meter (m)
gallons per minute (gal/min)	0.063	liters per second (L/s)



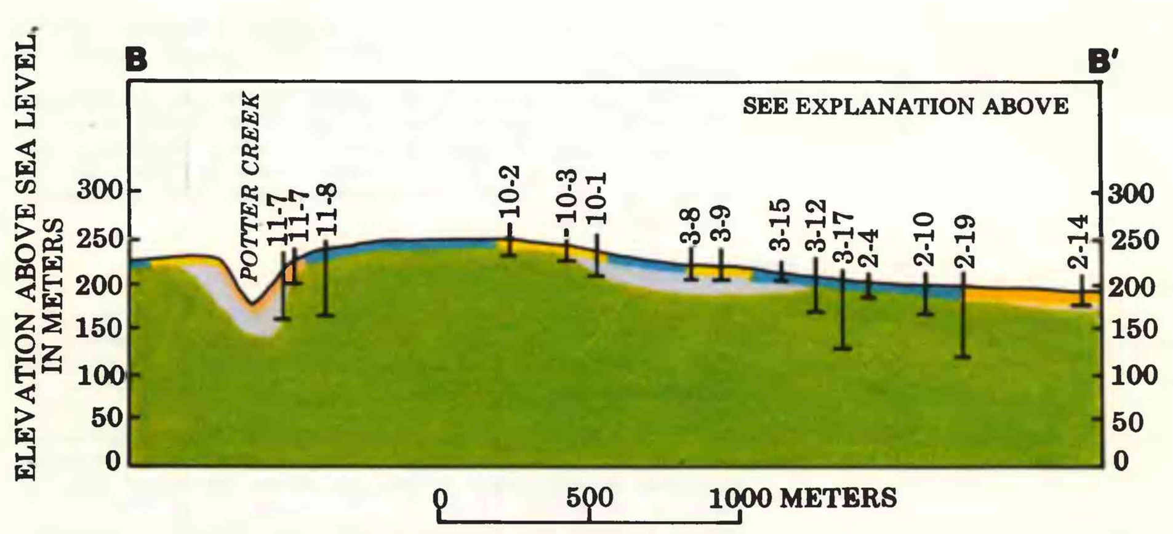


FIGURE 7.-- GENERALIZED GEOLOGIC SECTIONS.

LANDSLOPE

The distribution of landslope values in the Potter Creek area is shown in figure 8. Landslope is determined from the horizontal spacing between contour lines. Where contours are close together, slope is steep; where widely spaced, slope is gentle. Figure 8 was produced for this study by a photomechanical process by the National Mapping Division of the U.S. Geological Survey. The process may create false slope values where contours double back closely upon themselves, such as in steep valleys or along ridgetops. In addition, the 20-m contour interval used to produce this map limits the amount of local detail shown. Small areas or specific sites may have slopes different from those shown to prevail in the site's vicinity on the map. Figure 8, then, is intended to serve only as a guide, indicating those parts of the Potter Creek area where special attention should be devoted to possible problems created by steep or very steep landslope.

Landslope can be a critical factor in determining the susceptibility of an area's water resources to contamination by onsite waste-disposal systems, such as septic tanks. Where landslope exceeds 20 percent, "the successful operation of [conventional] septic-tank systems is unlikely" (Dearborn and Barnwell, 1975, p. 26). In such areas, ground-water flow patterns tend to return effluent to the surface short distances downslope from seepage pits. This effluent may pollute nearby wells or surface-water bodies.

Slopes are flat to moderately gentle in only about one-third of the Potter Creek study area. Slopes are generally steeper in the eastern part of the study area.

EXPLANATION FOR FIGURE 8

Slope percentage	Slope	Description	Suitability for development	Percentage of study area
Less than 5 percent	Nearly flat to very gentle	Generally on low-altitude alluvial surfaces and former lake bottoms. Locally, hummocks may have relief of several meters and somewhat steep local slopes. May be poorly drained.	Favorable -- except where poorly drained	4
5-15 percent	Gentle to moderately gentle	Fairly smooth slopes on alluvial fans and terraces and in some stream valley bottoms. Locally, hummocks may have relief of several meters and somewhat steep slopes. A few areas may be poorly drained.	Generally favorable -- except where poorly drained	24
15-25 percent	Moderate	Slopes may be smooth, es on morainal ridges or landslide deposits, or hummocky with relief of 15 meters or more.	Mixed -- local drainage and slope may constrain development in places	22
25-45 percent	Steep	Valley walls and mountainsides, bedrock usually either exposed or overlain by thin deposits.	Generally unfavorable -- slopes may be unstable; surface runoff may cause severe drainage problems; septic-system effluent may tend to return to surface undegraded	24
More than 45 percent	Very steep	Escarpments along high valley walls and mountainsides, having bedrock either exposed or overlain by thin deposits.	Unfavorable -- slopes may be unstable with high potential for landslides and avalanches; surface drainage problems may be severe; septic-system effluent will probably return to surface undegraded	26

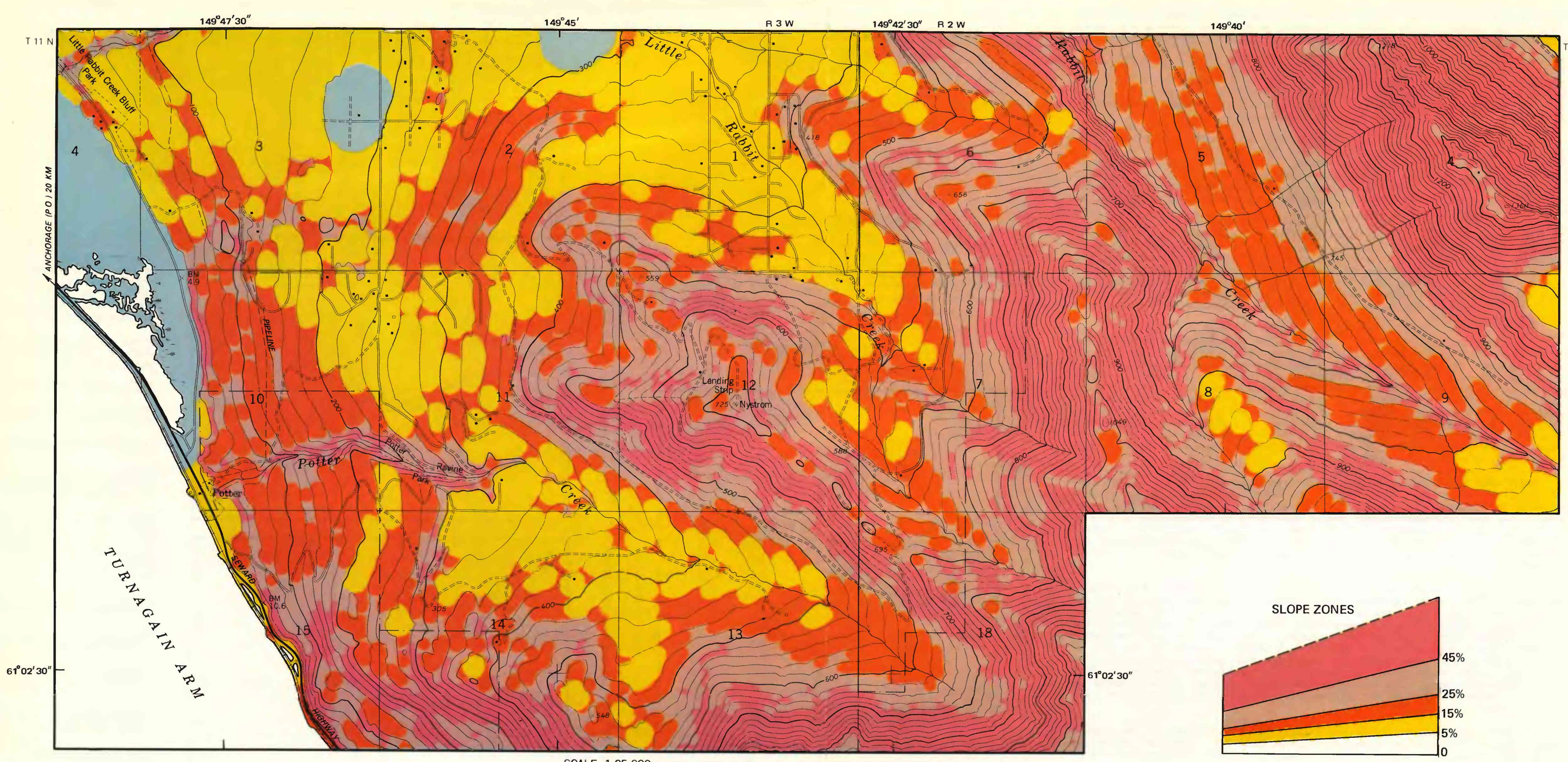


FIGURE 8. – GENERALIZED LANDSLOPE.

Note; The slope zones on this map are unedited. They were generated manually and by a photomechanical process which translates distance between adjacent contours into percentage of slope. Proximity of the same contour or absence of adjacent contours may have produced false slope information at small tops and depressions, on cuts and fills, along ridge crests, narrow drains and incised stream channels, along shores of open water, and at the edges of the map.

HYDROGEOLOGY FOR LAND-USE PLANNING: THE POTTER CREEK AREA, ANCHORAGE, ALASKA

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1982