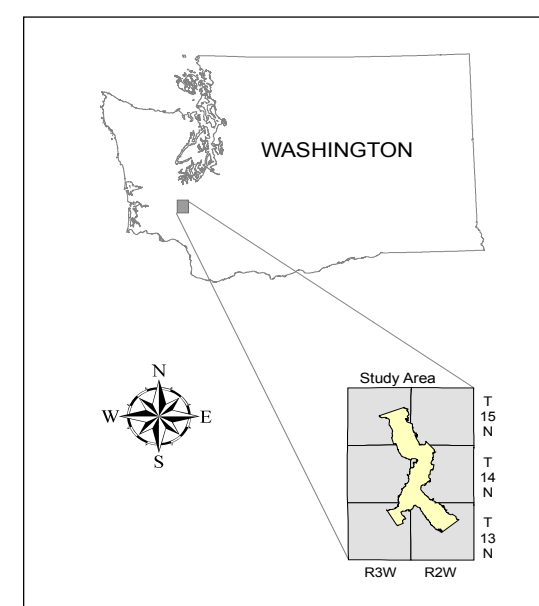


### EXPLANATION

○ CROSS SECTION WELL AND MAP ID (see plate B)  
 A—A' CROSS SECTION TRACE  
 - - - - - AXIS OF ANTICLINE  
 - - - - - AXIS OF SYNCLINE

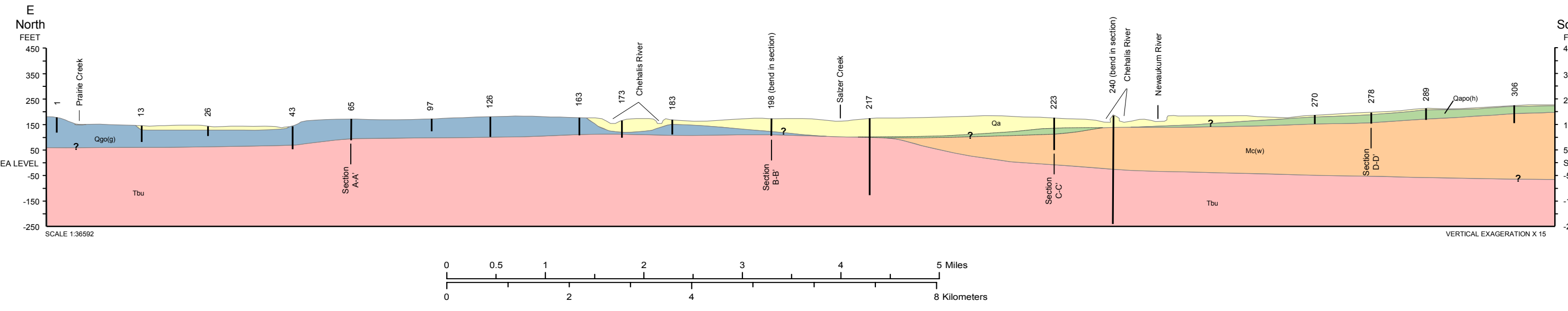
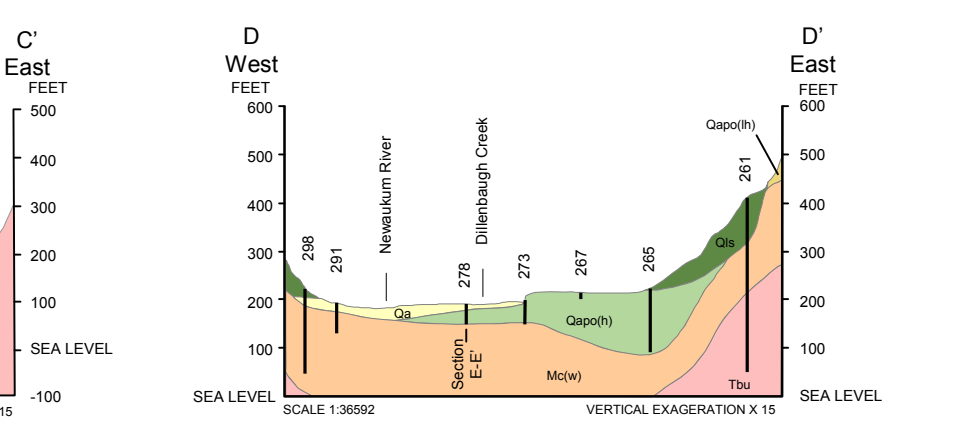
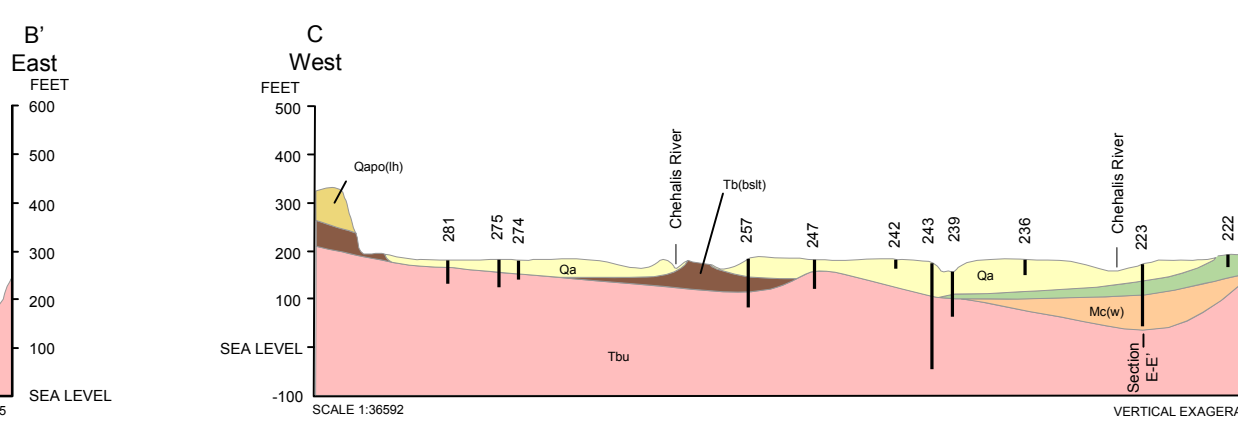
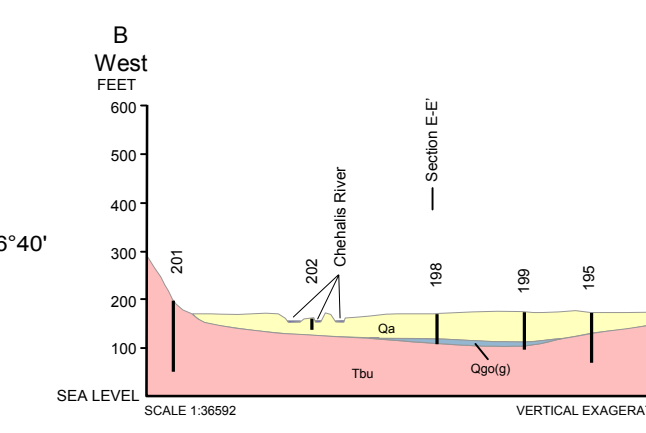
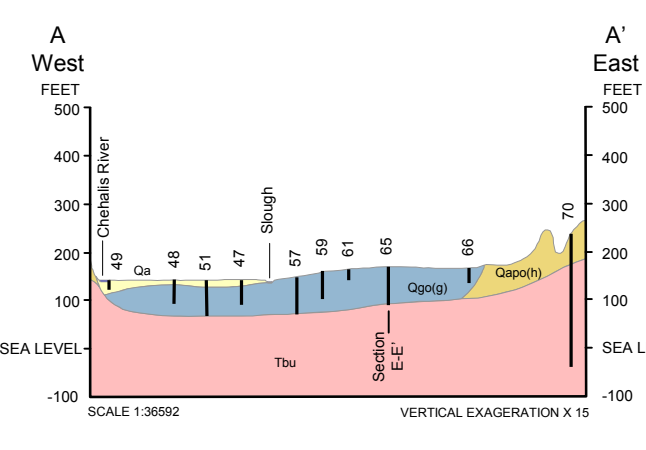
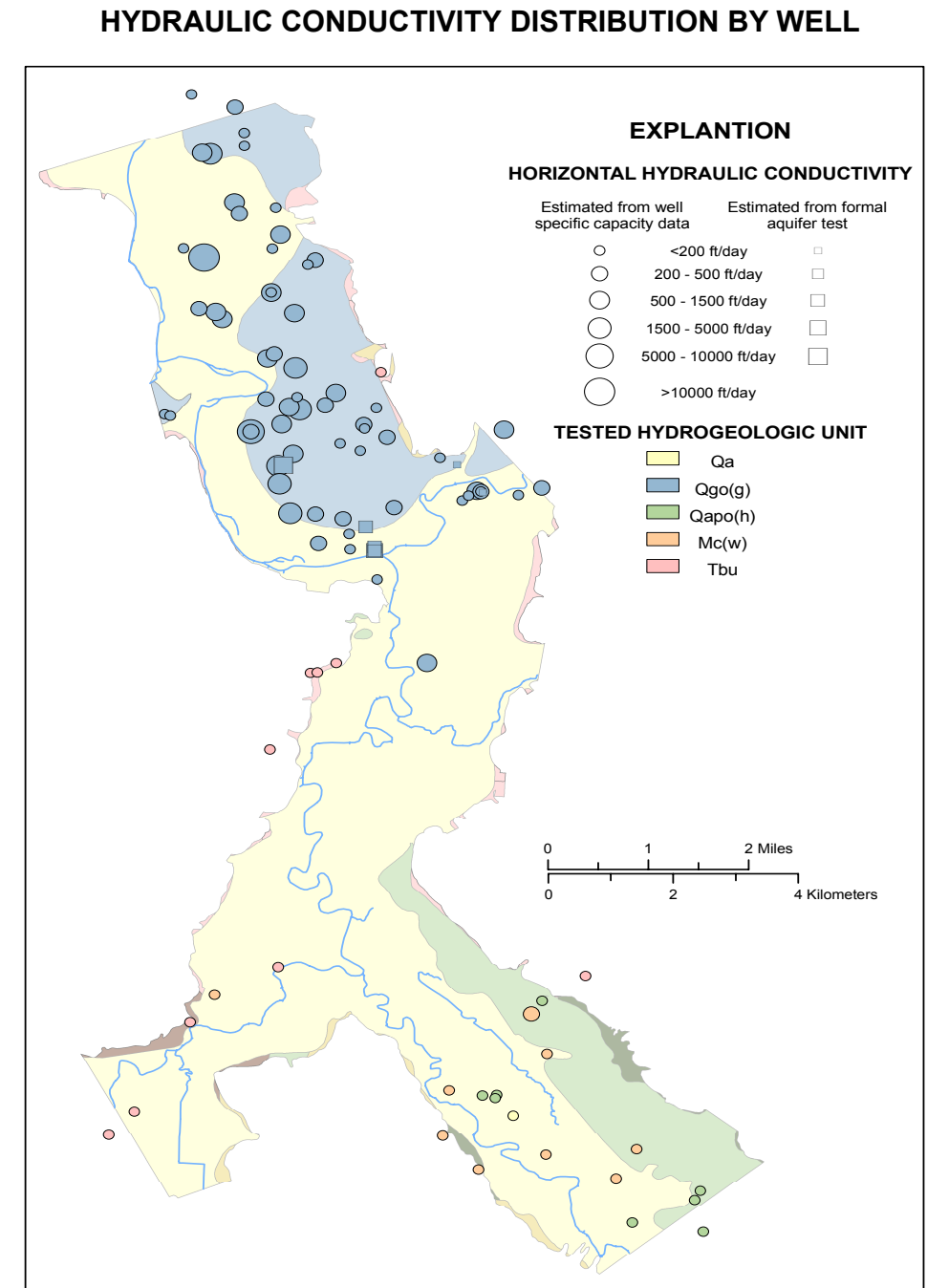
### SURFICIAL HYDROGEOLOGIC UNITS

- Qa Quaternary alluvium
- Qls Quaternary landslide debris
- Qgo(g) Outwash sand and gravel
- Qapo(h) Hayden Creek Drift, Pre-Frasier outwash
- Qapo(h) Logan Hill Formation, Pre-Frasier outwash deposits
- Mc(w) Miocene continental sediments
- Tb(bslt) Miocene volcanic rocks
- Tbu Miocene to Eocene age bedrock, undifferentiated



### HYDROGEOLOGIC UNIT CHARACTERISTICS

Period	Epoch	Geologic Unit	Hydrogeologic Unit	Lithology and hydrologic characteristics of hydrogeologic units	Hydrogeologic unit thickness range (and average) (feet)	Number of inventoried wells fully penetrating unit
Holocene		Alluvium	Qa	Broadly distributed accumulations of clay, silt, sand, and fine gravel deposited within stream channels and upon area flood plains by modern rivers. Fine grained glacio-lacustrine deposits of Vashon age are difficult to distinguish from, and are therefore included with this unit south of the Skookumchuck/Chehalis River confluence. The coarser sand and gravel fractions of this unit may be a productive aquifer where saturated.	1 to 80 (22)	101
		Landslide deposits	Qls	Typically unstratified, poorly sorted, and often hummocky appearing deposits of clay, silt, sand, gravel and soil, with occasional larger cohesive blocks that slumped or were otherwise disturbed through mass wasting processes. This unit is widely distributed along the foothills of the Newaukum river valley and within the uplands bordering the Chehalis river valley.	52 to 98	2
Quaternary		Outwash gravels and sand, Vashon Stage of Fraser Glaciation	Qgo(g)	The principal aquifer unit within the Chehalis and Skookumchuck River valley bottoms north of Salzer Creek. Unit comprised of poorly to well sorted deposits of coarse to medium gravel and sand, cobbles, and occasional boulders, with localized accumulations of interstitial silt or clay. The upper portion of the unit is generally fresh and little weathered while the lower portion may be iron stained and locally weakly cemented. A thin discontinuous till(?) layer is present between the upper and lower portions of the unit in some wells.	6 to 91 (56)	28
		Penultimate Drift, Pre-Frasier, (Lea, 1984)	Qgo(g)			
		Pre-Frasier drift, undifferentiated	Qgo(g)			
Pleistocene		Hayden Creek drift	Qapo(h)	Widely distributed aquifer unit within the Chehalis and Newaukum River valleys generally south of Salzer Creek. Unit composed of poorly sorted weathered to relatively un-weathered sand, gravel, and occasional cobbles, locally cemented, in a matrix of yellow-brown to yellow-green-gray silt or clay. Iron staining of gravel and sand common. The gravel is generally well rounded and is composed of local volcanic rock types.	19 to >134 (37)	32
		Logan Hill Formation	Qapo(h)	Widely distributed unit that caps many of the western and eastern foothills bordering the major river valleys of the study area. Comprised of yellow-gray to yellow-brown sand and gravel of local origin, often cemented, with interspersed sand and clay lenses. The upper surface of this unit is often deeply weathered to a red or red-brown clay soil. Where saturated, the less weathered basal sands and gravels can be an important aquifer.	19 to 76 (57)	5
Tertiary	Eocene to Miocene	Wilkes(?) Formation (Miocene)	Mc(w)	Widely distributed deposits of thinly bedded to massive blue-gray to blue-green clay with lenses of silt or fine sand and occasional plant and/or carbonized wood fragments, that overlie bedrock deposits throughout much of the Chehalis and Newaukum River valleys south of Salzer Creek. The thicker sand interbeds may contain appreciable quantities of confined, often poor-quality groundwater. Fine grained glacio-lacustrine deposits of Vashon age are difficult to distinguish from, and are therefore lumped with this unit in some areas.	8 to >364 (176)	6
		Columbia River Basalt Group (Miocene)	Tb(bslt)	Typically massive but locally vesicular or jointed, fine grained to finely porphyritic black to dark gray basalt. When exposed to weathering the upper surface of this unit is often reduced to reddish-brown clay soil. May yield small but usable quantities of water where fractured.	4 to 59 (25)	4
		Astoria Formation (Miocene)	Tbu	Marine, brackish water, and freshwater sandstones, siltstones, shales, claystones, and conglomerate beds (locally interbedded with basalt, tuff, or other volcanic rock types), that underlie the surrounding foothills and form the basal confining unit for the study area. The marine facies often contain fossil shells while the non-marine deposits contain appreciable coal seams and wood fragments. This unit is generally consolidated and produces little water, although secondary fractures may yield small but usable quantities of often poor quality water to wells.	Unknown	None
		Lincoln Creek Formation (Oligocene)	Tbu			
		Skookumchuck Formation (Eocene)	Tbu			



HYDROGEOLOGY, HYDROGEOLOGIC CROSS SECTIONS, AND HYDRAULIC CONDUCTIVITY DISTRIBUTION, CENTRALIA-CHEHALIS AREA, LEWIS AND THURSTON COUNTIES, WASHINGTON  
 By Charles F. Pitz, Kirk A. Sinclair, and Adam J. Oestreich

Base from U.S. Geological Survey Digital Data: 1:100,000  
 Hillshade modified from 30-meter USGS digital elevation model data: 1:100,000  
 Surficial geology modified from Logan, 1987; Schasse, 1987; and Walsh et al. 1987: 1:100,000