DIVISION OF GEOLOGY AND EARTH RESOURCES OPEN FILE REPORT. NO. 75-2

Environmental geology of the Parkland-Spanaway area, Washington. 1975.
7 map sheets. Non-reproducible

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State of Washington
Department of Natural Resources
Division of Geology and Earth Resources
Olympia, WA 98504

MINERAL RESOURCES
PARKLAND--SPANAWAY AREA
PIERCE COUNTY, WASHINGTON

by
John Battie, Donnella Johnston,
and Craig Searls

Two mineral resources occur in the Parkland--Spanaway area: gravel and peat. Knowing the location, extent and quality of these resources is necessary for their proper utilization and management--a factor that must be considered when determining the best possible land use.

Sand and Gravel Resources

There is an abundance of glacial outwash sediments in the study area. These loosely consolidated sands and gravels show a large variety both in particle size and impurities. They vary from fine silt to large boulders, averaging between sand and pebble size. Impurities are lenses of clay. In some locations, a highly oxidized zone, as much as three feet thick, occurs at the base of the gravels.

The mapped area has been divided into four classes of resource potential: (1) over 25 feet of overburden, (2) impurities in the gravels, (3) more than 50 percent sand, and (4) probable high potential gravel resource locations. These have all been contoured to show the approximate thickness of the gravel deposits.

Explanation

Red areas are very low in gravel resource potential. These areas generally have more than 25 feet of till, a highly compacted sediment, overlying any gravels that might be present. Developing gravel resources is not recommended in this area because of high extraction costs.

Well logs indicate lenses of clay may be intermixed with gravels in areas shown in orange on the map. The clay lenses may make the gravels uneconomical to mine. These areas should be considered as marginal gravel resource possibilities.

Yellow areas contain more than 50 percent sand at the surface. This sand to gravel ratio is undesirable, making the gravels uneconomical for mining.

White areas have high gravel resource potential. These sediments contain less than 50 percent sand and are more economical to mine.

Peat Resources

The resources in the Parkland--Spanaway area consist of the Parkland peat reserve, Clover Creek reserve, and Spanaway Lake reserve 1 and 2. The McChord peat reserve is not shown; it has apparently been covered by a freeway interchange. Of the mapped peat reserve, aerial photographs and field checks show the Clover Creek reserve has been drained of water to stabilize the ground.

Data on these peat reserves is based on Rigg, 1958.

REFERENCE CITED:

Rigg, George, 1958, Peat Resources of Washington, Division of Mines and Geology Bulletin No. 44, pp. 137-151. (available from Department of Natural Resources, Division of Geology and Resources, Olympia, WA)

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RELATIVE INFILTRATION RATE
PARKLAND—SPANAWAY AREA
PIERCE COUNTY, WASHINGTON

by
John Battie, Donnella Johnston
and Craig Searls

Water wells in the Parkland—Spanaway area are constantly drawing upon the supply of ground water, which is being replenished by precipitation.

Explanation

Green areas exhibit a high infiltration rate. Water falling on the surface infiltrates rapidly.

Brown areas are very poor for infiltration of precipitation. Water falling upon till infiltrates very slowly, enabling most to go into runoff or evapo-transpiration and return to the air rather than replenishing the ground water.

Modified land, shown in white, exhibits a highly variable infiltration rate.

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LIMITATIONS FOR SANITARY LANDFILLS
PARKLAND—SPANAWAY AREA
PIERCE COUNTY, WASHINGTON

by
John Battie, Donnella Johnston, and
Craig Searls

An ever present problem of man is the disposal of waste. One method of solid waste disposal is the sanitary landfill. The location of these landfills needs to be carefully chosen to avoid contamination of ground water.

The best locations for sanitary landfills are where bacteria have time to break down most of the harmful material in the water leached from the waste prior to its reaching the water table.

EXPLANATION

White areas indicate severe limitations for sanitary landfills. Water in this area percolates almost immediately into the ground water table. Sanitary landfill leacheate could easily contaminate ground water in these areas.

Green areas indicate the most suitable locations for sanitary landfills. Tills in these areas allow water to seep through to the water table very slowly, thereby protecting the ground water from sudden contamination; however, indirectly, it will lead to a long term contamination of the ground water table because the leacheate will be released slowly over a long period of time.

Limitations

The use of this report and map in the evaluation of areas for sanitary landfills is limited by the state of the art, available information in literature, and a general field investigation.

The conclusions, and opinions made in this report and map are based on the presently available information and are made for land use pre-planning purposes only. This report and map are not intended to be, nor should they be used as, an engineering geology report for any given site. In all cases an engineering and geology investigation by private consultants is recommended for

individual site evaluations.

The field work for this report and map has been limited to visual inspections, no laboratory testing or subsurface exploration has been made, other than that information in the available literature.

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SURFICIAL GEOLOGY
PARKLAND—SPANAWAY AREA
PIERCE COUNTY, WASHINGTON

by
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The major body of Vashon till is located east of Parkland. Smaller areas of Vashon till occur to the southeast of Spanaway Lake. Vashon till is nonsorted and consists principally of clay- to boulder-size particles. Most of the till is well compacted and nonpermeable-water and other liquids do not seep through the sediment easily.

Vashon recessional outwash is stream-deposited gravel and sand. Particle sizes range from 1/8 inch to approximately six inches. The gravel is stratified, fairly well sorted, and quite permeable.

Alluvium of Clover Creek consists of fine-grained sediments deposited by the creek itself.

Certain areas in Parkland and Spanaway consist of land highly modified by man. Gravel pits, freeways, and railroad cuts and fills are classified as modified land. The response of these areas to natural stimuli, such as heavy rainfall or earthquakes, is difficult to predict.

RECENT

MODIFIED LAND. Includes railroad tracks, freeways, and gravel pits. Land that has been altered in such a way that its response to natural stimuli is unpredictable.

SWAMP AND BOG DEPOSITS. Poorly drained areas occupied by partially decayed organic material and fine-grain silts and clays.

ALLUVIUM. Unconsolidated silt, sand, clay, and gravel valley fill. May contain some organic material.

LATE PLEISTOCENE

VASHON RECESSIONAL OUTWASH. A mixture of stratified sand and gravel. The amount of gravel is greater than fifty percent. The size of the stones are predominately one inch in diameter, but the sizes vary locally.

VASHON TILL. Nonsorted, nonstratified well-compacted mixture of clay, silt, sand, and gravel. Mostly gray in color. The weathered areas near the surface may be softer and show colors varying from yellow through reddish brown.

Contact includes known, approximate, and inferred.

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DEPTH TO WATER AND LOCATION OF WELLS
PARKLAND — SPANAWAY AREA
PIERCE COUNTY, WASHINGTON

by
John Battie, Donnella Johnston,
and Craig Searls

This map shows the depth at which the water table is encountered below the ground surface. Areas on the map designated by red are those in which water is found within 8 feet of the surface; orange areas designate where water is usually found from 9 to 17 feet below the surface. Water found at 18 feet and deeper is indicated by green.

The accuracy of this map is limited by the amount of data available in the form of well logs. Generally, accuracy increases proportionally to the amount of well logs available. The actual depth to water in any given location may vary also by seasonal or yearly fluctuations in precipitation.

This map is intended to be a general guide for pre-planning purposes, and is not intended to be used to evaluate individual potential well sites. Well site evaluation should be done by a consulting ground-water geologist.

The close proximity of septic tanks and cow pastures to shallow wells dug in the red areas presents a potential for contamination of these wells. Wells located in these areas generally yield only small amounts of water, and may go dry during the summer months.

LOCATION OF WELLS

The locations of wells in the Parkland—Spanaway area are shown on the depth to water map. The numbering system for the wells was taken from Walters and Kimmel, 1968. Each section in the area is divided into 40-acre parcels and each parcel is assigned a letter according to the following chart:

D	C	B	A
E	F	G	H
M	L	K	J
N	P	Q	R

The first part of the number identifying each well is the section number, followed by a letter indicating the location of the well within the section. The last number is the serial number of the well in the 40-acre subdivision. For example, well 17R1 is in the SE¼SE¼ sec. 17 and is the first well listed.

REFERENCE CITED:

Walters, Kenneth L. and Kimmel, Grant E., 1968, Ground water occurrences and stratigraphy of unconsolidated deposits, central Pierce County, Washington: U. S. Geological Survey Water Supply Bulletin No. 22.

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EARTHQUAKE DAMAGE SUSCEPTIBILITY DUE TO GROUND FAILURE PARKLAND—SPANAWAY AREA PIERCE COUNTY, WASHINGTON

by
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and Craig Searls

The Pacific Northwest, especially along the coast, has a history of high earthquake incidence. The earthquakes are usually of small magnitude, with some occasional larger shocks. Damage caused to a structure by an earthquake depends upon the design of the structure, the surface upon which it is built, the magnitude of the earthquake, the location of the quake's epicenter, and the duration of the earthquake. Man can neither predict nor control an earthquake's magnitude, epicenter, or duration. Therefore, the geologic material upon which a structure is proposed to be built should be considered in land use planning.

The Parkland—Spanaway map area has been divided into 3 classes of earthquake damage susceptibility: (1) high damage susceptibility; (2) moderate damage possibility from differential ground settling; (3) low damage possibility from ground buckling and cracking during extremely strong earthquakes.

Explanation

Red areas indicate areas which are most susceptible to earthquake damage from ground failure. Peat bogs and other saturated sediments are among the most unstable ground during an earthquake. As the ground is shaken, these react much like gelatin and may increase the duration and the ground motion of the earthquake. Water acts like a lubricant between sediment grains, making the ground unstable. In this state, the ground may either flow, if on a hill, or allow foundations to settle into it.

Yellow indicates areas which are slightly susceptible to earthquake damage from ground failure. Dry gravels and sands may settle slightly causing foundation damage.

White indicates areas which are least susceptible to earthquake damage from ground failure. Till covering these areas may buckle and crack, causing minor deformation in foundations when shaken by an extremely large earthquake. Till exhibits the greatest foundation stability of all materials exposed in the Parkland—Spanaway area.

Limitations

The use of this report and map in the evaluation of ground settlement because of earthquake shaking is limited by the state of the art, available information in literature, and a general field investigation.

The conclusions and opinions made in this report and map are based on the presently available information and are made for land use pre-planning purposes only. This report and map are not intended to be, nor should they be used as, an engineering geology report for any given site. In all cases, an engineering and geology investigation by private consultants is recommended for individual site evaluations.

The field work for this report and map has been limited to visual inspections, no laboratory testing or subsurface exploration has been made other than that information in the available literature.

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LIMITATIONS FOR SEPTIC TANK DRAINAGE FIELDS
PARKLAND—SPANAWAY AREA
PIERCE COUNTY, WASHINGTON

by

John Battie, Donnella Johnston,
and Craig Searls

The limitations of septic tank usage are indicated on the map.

Explanation

Brown areas on the map indicate slight to severe limitations for septic tank drainage fields. In these areas, septic tank drainage fields will usually function well because of good infiltration characteristics of the geologic materials. However, the shallow ground water table will usually receive contaminants.

Red areas on the map indicate severe limitations for septic tank drainage fields. These are areas directly underlain by swamp and bog deposits, or glacial till. In these areas, septic tank drainage fields will not function properly because of the very poor infiltration characteristics of the geologic materials.

Modified land exhibits greatly varied limitations for septic tank drainage fields.

Limitations

The use of this report and map in the evaluation of septic tank drain fields is limited by the state of the art, available information in literature, and a general field investigation.

The conclusions, and opinions made in this report and map are based on the presently available information and are made for land use pre-planning purposes only. This report and map are not intended to be, nor should they be used as, an engineering geology report for any given site. In all cases, an engineering

and geology investigation is recommended for individual site evaluations.

The field work for this report and map has been limited to visual inspections, no laboratory testing or subsurface exploration has been made, other than that information in the available literature.

MINERAL RESOURCES
PARKLAND--SPANAWAY AREA
PIERCE COUNTY, WASHINGTON

- Till
- Gravel - More than 50% Sand
- Gravel - Possible interbedded clays
- Gravel
- Peat
- Gravel Pits
- 40 — Thickness of Gravel in feet

SCALE 1 24000
0 1/2 1 MILE

BY:
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RELATIVE INFILTRATION RATE
PARKLAND—SPANAWAY AREA
PIERCE COUNTY, WASHINGTON

- High Infiltration Rate
- Poor Infiltration Rate
- Modified Land

SCALE 1 24000
0 1/2 1 MILE

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LIMITATIONS FOR SANITARY LANDFILLS
PARKLAND—SPANAWAY AREA
PIERCE COUNTY, WASHINGTON

Slight

Severe

BY:
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SCALE 1 24000
0 1/2 1 MILE