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September 13, 2012

Ms. Glynis Carrosino
Department of Ecology
Northwest Regional Office
3190 - 160th Avenue Southeast
Bellevue, Washington 98008

**RE: Area-Wide Geological and Hydrological Analysis:
Lynnwood Auto Body Shop
19230 Highway 99
Lynnwood, Washington 98036**

VCP Site No. NW 2555

Dear Ms. Carrosino,

Per your verbal request of August 24, 2012, we have prepared an area-wide analysis of the soil and groundwater conditions adjacent to the subject Property.

Site Remedial Response History

As you are aware, in October of 2011, Langesth Environmental Services, Inc., performed a soil remediation action at the subject Property known as the *Lynnwood Auto Body Shop* located at 19230 Highway 99, Lynnwood. Personnel from Aerotech Environmental Consulting, Inc., ("Aerotech") were on Site during all of the Work to observe and collect Confirmatory Soil Samples which were analyzed by the Site mobile Analytical Laboratory operated by ESN Northwest, Inc.

The Remedial Action was conducted from October 4 through October 6, 2011 with approximately 339.07 tons of petroleum-impacted soil being excavated and transported off Site for final disposal.

The excavation operations extended to an approximate depth of 22 feet below ground surface and did not encounter groundwater. During the initial excavation activities, brief perched water seepage at a depth of approximately 12 feet below ground surface in the former tank pit area occurred; it is believed this water was seepage or perched water and not Site groundwater. Excavation operations did not appear to encounter the local water table.

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It is the belief of Aerotech that the local geology and groundwater environment in the region of the subject Property is of a nature that any potential contaminants remaining on the Lynnwood Auto Body Shop property will be unlikely to be transported off Site due to dense subsurface conditions that are not favorable to a near-ground surface water table or groundwater flows. The water table beneath the subject Property is believed to be moderately deep (Please refer to the attached *Depth to Shallow Groundwater* map).

Area-Wide Geological Conditions

Research and a review of well logs posted by the State of Washington Department of Ecology and the United States Geological Survey revealed that the general geological conditions surrounding the subject Property are composed predominantly of Vashon glacier deposits. These deposits are in the form of till, a non-sorted mixture of clays, silts, sand, pebbles, gravels and sometimes even boulders. Till is essentially the glacial debris that was deposited on the ground surface while the glacier moved over head. The amounts of sand, silt and gravel mixture in till varies greatly. While till tends to be sandy, Vashon till usually contains larger than usual amounts of silts and clays in its sand.

The significant quantities of clays and silts added into the sand makes Vashon Till denser than most tills. It is this hardness that gives Vashon Till the nickname of "hardpan". An additional factor that contributed the till density was the sheer weight of the glacial ice bearing down on and compressing the underlying till. The very density of till makes it a poor pathway for groundwater flow as the pore space is very low and compressed. In the hydrogeological environment till formations often act as aquitards.

Area-Wide Groundwater Conditions

As mentioned above till has poor groundwater flow and drainage characteristics; however surface water can percolate down 3 to 9 feet in the upper layer of till because the upper layer tends to be more sandy, less dense, and more weathered than till at deeper depths making it more vulnerable to surface water infiltration. The surface water's lateral movement, however, stops once it encounters the unweathered, more silty and clayey till that is too dense and prevents further percolation. Under these circumstances the water becomes static and remains in place thus becoming perched water.

A review of nineteen well logs of groundwater wells that encircle the subject Property revealed a generalized view of the area-wide subsurface conditions along with the local groundwater environment.

Data gathered from the well logs showed a subsurface composed of till to a depth of at least 27 feet with some of the well logs showing till to a depth in excess of 48 feet. The layer of till is

usually followed by a brown sand with some silt. The sand layer goes to a considerable depth of 200 to 400 feet with variations of silt and clay mixtures. The sand layers are followed by layers of clay at the 400 to 500 feet plus depths. The clay can also be mixed with sand and silt. There is, however, at least one layer of Blue Clay.

The deepest well log reviewed was terminated at a depth of 535 feet below surface grade. The well logs that had water readings suggest the groundwater table is about 16 feet. Two logs showed groundwater at 12 feet but groundwater table levels can vary according to the time of year. Two wells logs recorded much deeper water levels, but both wells were also deeper well borings and likely represented the water level in a deep confined aquifer.

A review of the shallow groundwater data suggests that groundwater flow is to the southeast. Sciber Lake and Hall Lake would likely be a "draw" for the local shallow groundwater. (Please refer to the attached maps).

As previously discussed, till is a poor pathway for groundwater flow and often forms a confining layer that restricts groundwater flow. While well boring logs suggest a water table is present it appears to be a some what fluid one suggested by the fact that many of the well logs reviewed recorded different static water levels. Furthermore, groundwater flow would likely be slow flowing because of the low porosity of till. Porosity being the aggregate volume of the interstices of the rock or soil to its total volume in relationship to that rock or soil will allow the free flow of liquids, usually water.

Well Logs Reviewed:

Washington State Department of Ecology Well Logs				
Map ID	Well ID Number	Depth of Boring (feet)	Water Table (feet)	Lithology:
1	ABY088	68	10	0-45'; Brown Silty Sand (Till) 45-68'; Brown Sand med to fine
2	NK27-B7	13	12	Silt, dense
3	BBR907	210		0-105', Till; 105-160', Sand; 160-210', Clay
4	27-4E-16P	20	12	Silty Sand with Gravel
5	ABV179	24	16	0-5', Brown Silty Sand (Till); 0-24', Grey Sand

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6	Appla.5463	137	6	0-49, Hardpan; 49-84,Sand with Gravel;84-92,Med. Course Sand;92-103, Sand with Silt;103-137,Fine Brown Sand
7	BHM980	22	10	Grey Silty Sands with Grave
8	BBK675	27	16	Sands and Gravel(Till)
9	AEB090	62.7	10	0-48,Brown Sandy Gravel (Till);48-62.7, Medium Sand
10	27-64-24J	380	308	0-138,Brown Clay and Gravel;138-150, Brown Clay;150-175,Brown Clay and Gravel;175-180, Rock;180-200,Brown Clay and Gravel;200-250, Blue Clay; 205-365, Brown Clay; 365-380, Sand, Water
11	27-4E-21M	12		0-7, Fill and Gravel; 7-12,Light Grey Sand and Gravel, (Very Hard)
12	27-64-20K	23.8	5	0-12,Sand and Gravel;12-16,Grey Tight Sandy Clay; 16-23,Silty Sand and Sandy Clay
13	Appl. 4128	535	270	25-85, hardpan and some gravel;85-116, Muddy Sand and Little Gravel;135-245,hard packed sand and blue clay;245-274, Sand and Gravel;274-535, Sand, Gravel, and Clays
14	A082017	27	22	Medium Brown Sand

Well Logs from United States Geological Survey				
Map ID	Well ID Number	Depth of Boring (feet)	Water Table (feet)	Land Surface Altitude (feet)
15	27N/04E-20A01	43		360
16	27N/04E-20D04	198	149	430
17	27N/04E-21F01	225	64.5	350
18	27N/04E-20N01	342	169	345
19	27N/04E-21N02	341	100	345

Conclusions

A review of soil and groundwater well boring logs revealed the subsurface conditions in the area surrounding the subject Property is comprised predominantly of a till known as hardpan, a very dense material. Furthermore, the till layer continues to a substantial depth. Till has low porosity and is a poor pathway for groundwater migration to the point of acting as an aquitard in many circumstances. An aquitard is a confining layer or layers of soil or rock with poor groundwater/fluid conductivity (i.e. till). Often an aquitard layer can act as "protective" buffer for an underlying aquifer from outside infiltration (i.e. contaminants).

During the subject Property's remediation in October of 2011 excavation operations extended to maximum depth of 18.5 feet below surface grade. Even at this depth the groundwater table was not encountered in the subject Property.

With the groundwater table not being encountered on the Site at a depth of almost 20 feet, it appears that off-site transportation of on-site contaminants is unlikely. In addition, a review of the well logs of surrounding groundwater wells and soil borings observed a subsurface environment that is not conducive to contaminants transport via groundwater flow.

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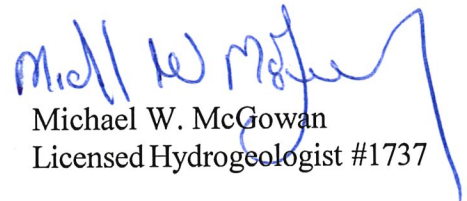
Area-Wide Geological and Hydrological Analysis

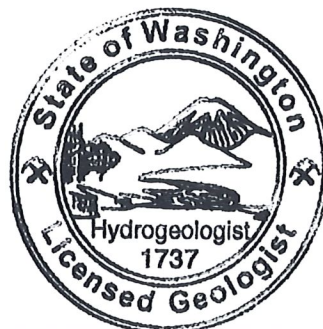
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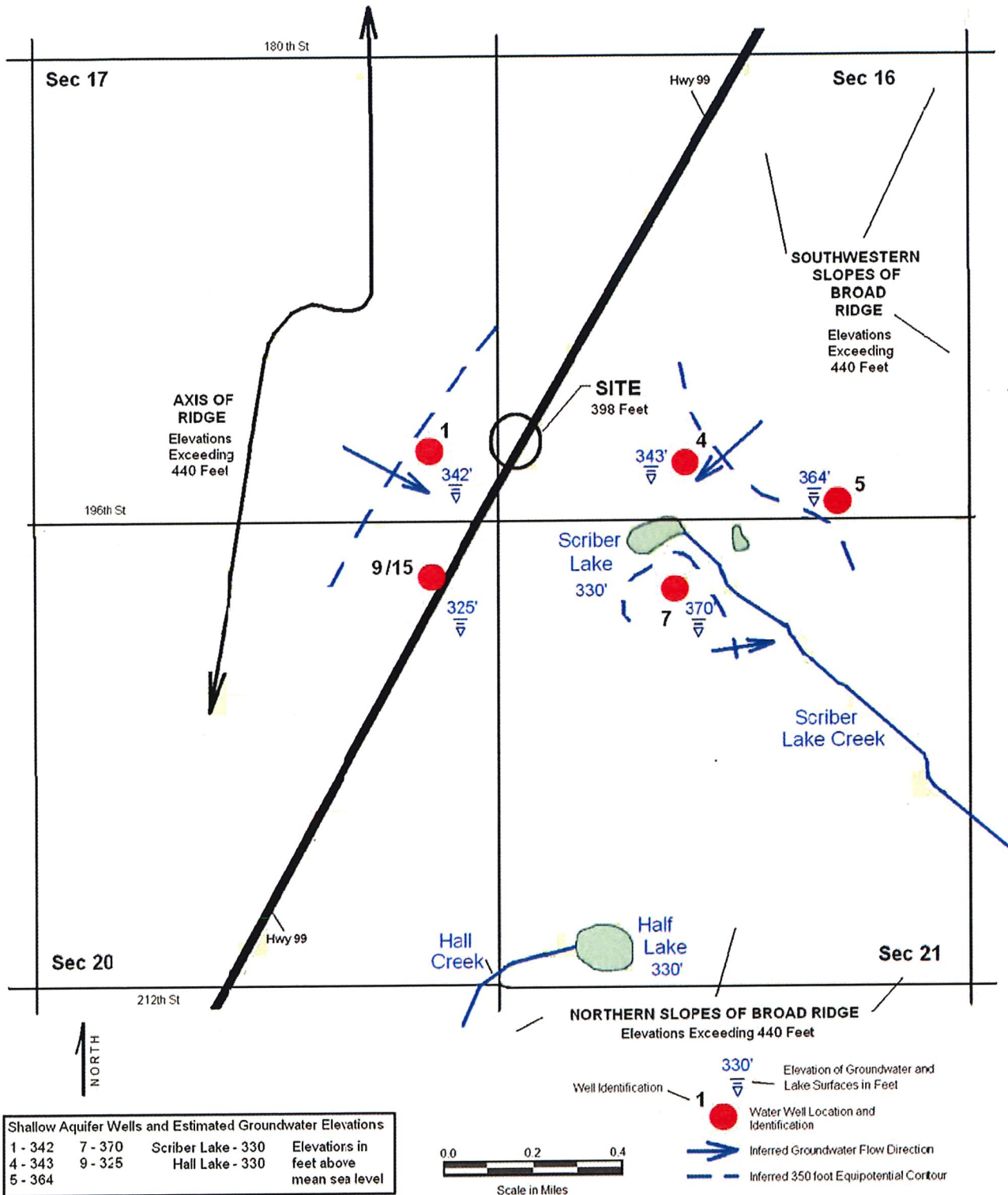
The subject Property is located in a developed urban area and is located directly on Highway 99, a heavily trafficked and commercially developed highway. Within the vicinity of the subject Property is at least one gasoline station and an automotive repair shop. Considering the nature of the underlying geology and the location of the subject Property in a heavily commercial urbanized area Aerotech Environmental Consulting, Inc., requests that a "No Further Action" letter be issued for the Lynnwood Auto Body Shop.

Best Regards,


Michael W. McGowan
Licensed Hydrogeologist #1737



Michael W. McGowan

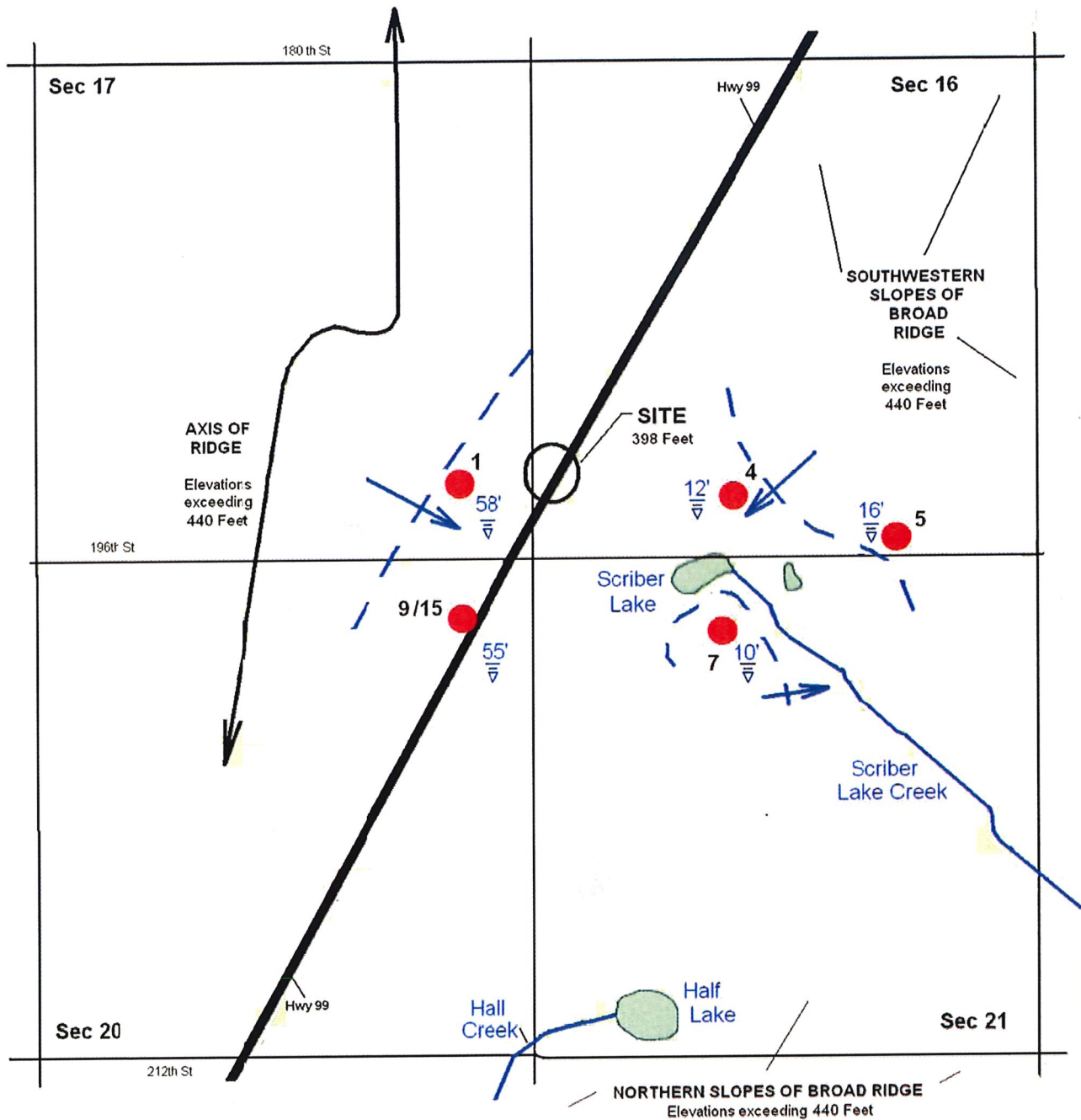


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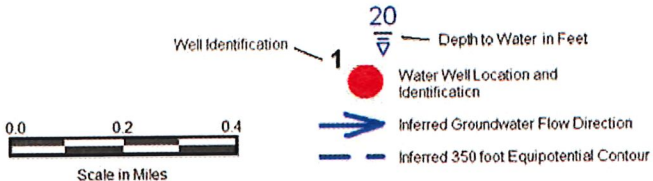
Drawing by McDermott - Sep 12, 2012

Elevation of Shallow Groundwater and Groundwater Flow Direction

**Lynnwood Auto Body Shop
VCP Proj. No. NW 2555**
19230 Highway 99
Lynnwood, WA



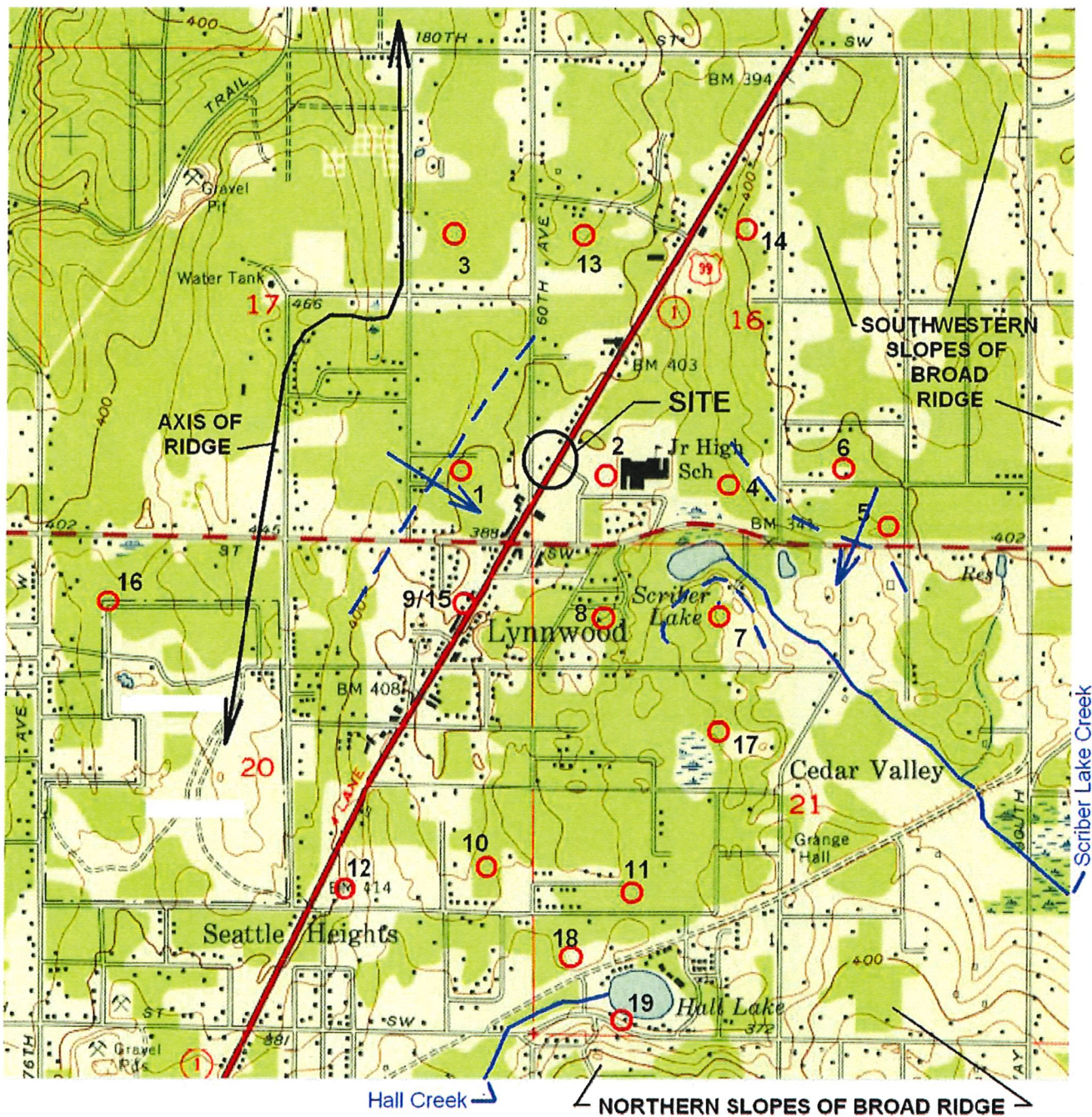
Shallow Aquifer Wells and Estimated Groundwater Elevations			
1 - 342	7 - 370	Scriber Lake - 330	Elevations in feet above mean sea level
4 - 343	9 - 325	Hall Lake - 330	
5 - 364			



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 SeaTac, Washington

Depth to Shallow Groundwater and Groundwater Flow Direction

Lynnwood Auto Body Shop
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 19230 Highway 99
 Lynnwood, WA



Shallow Aquifer Wells and Estimated Groundwater Elevations			
1 - 342	7 - 370	Scriber Lake - 330	Elevations in feet above mean sea level
4 - 343	9 - 325	Hall Lake - 330	
5 - 364			

0.0 0.2 0.4
Scale in Miles

- 1 Water Well Location and Identification
- Inferred Groundwater Flow Direction
- Inferred 350 foot Equipotential Contour

NORTH

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Drawing by McDermott : Aug 30, 2012

Groundwater Flow Direction

USGS Edmonds East
7.5-minute Quadrangle, 1953

Lynnwood Auto Body Shop VCP Proj. No. NW 2555

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Lynnwood, WA