



Consulting Arborists

Memo

TO: Mr. Gerry Kaelin
JOB SITE: Lot at 4825 East Mercer Way
FROM: Scott D. Baker, Registered Consulting Arborist
DATE: 2-28-08
SUBJECT: 2-27-08 site visit to observe Eagle tree and observe air excavation South of tree.

Dear Mr. Kaelin,

At your request I visited the above addressed site on 2-27-08, which is immediately adjacent to your property on the South side. You asked me to provide a memorandum with my observations and comments based on my visit to the property so you could share it with your neighbors.

I have visited your property previously, on 12-11-07, to view the property next door (4825 E Mercer Way) and the trees that are growing on that property. An eagle nest tree that is monitored by the Washington State Department of Fish and Wildlife (WSDFW) is present on the site. This means that any development on the site will require an Eagle Management Plan (EMP) that assures that the tree will be protected.

On this 2-27 visit I had agreed to meet on the site and, with the permission of Mr. Skall (a builder who is planning to build a house on the site), to enter the property and visually inspect the trees. Mr. Skall also had another arborist, Mr. See, on site to perform an excavation with a pneumatic excavation tool. Mr. Skall gave permission for me to observe this activity.

Mr. See had produced a report that was used, in part, as justification for a plan that proposes to protect the tree with a 20' diameter tree protection zone, at the center of which is the eagle tree.

I wrote a letter dated 1-13-08 that stated my opinion, based only on my review of correspondence and a reduced copy of a site plan and my visual observations made from your property, that the tree protection plan was inadequate to protect the tree as required by WSDFW.

Site

The site is an empty lot that has a mature native forest present on it. There are several non-native invasive plants present on the site including English Ivy (*Hedera helix*), Himalayan blackberry (*Rubus discolor*) Holly (*Ilex* spp) and Laurel (*Prunus laurocerasus*). There is a creek running along the north edge of the lot.

"Valuable Knowledge of Trees"

There are a number of mature trees on the lot including the Eagle's nest Douglas-fir (*Pseudotsuga menziesii*) and an adjacent smaller fir, small seedlings of Western red cedar (*Thuja plicata*), a Western hemlock (*Tsuga heterophylla*) snag, and a large dead hemlock.

The property slopes from the road steeply up to the West for ~15', then levels out somewhat, and towards the rear of the parcel slopes steeply up again. Along the East edge the land slopes to the North to the creek bed which lies near the property line.

The road that serves the neighborhood runs along the East edge of the lot. A sewer line and other utilities are buried beneath the road.

It is my observation that the area surrounding the site has many large tall native trees present.

Tree

The large Douglas-fir tree (eagle tree) is shown in several documents as measuring 80" in diameter. I measured it as 72" in diameter at 4.5' or standard height (DSH). The tree is a remnant of the forest present on Mercer Island prior to recent settlement. I measured the tree height using a laser hypsometer as 188.3'. The large tree has a companion Douglas-fir tree that is 42" DSH growing a few feet to the West. The two trees compose a shared canopy. Based on my knowledge, the two trees are likely grafted together within their root systems. When trying to preserve trees with grafted root systems, my experience is that they should be considered as one tree.



I used a steel soil probe and determined that I could probe easily to 40" depth in the area immediate to the eagle tree and its companion. In my experience this generally indicates a sandy soil.

Based on the approximate 31" radius of the wood (radius less estimated bark thickness) of the larger tree I estimate that it is at least 180 years old and likely closer to 300 years old. This

assumes a growth rate of between 6 and 10 growth increments (rings) per radius inch which is based on my experience with this species growing in similar conditions.

I observed that, based on my observations from the ground, the Eagle tree has its center of gravity to the East. I am aware that one concern about the proposed development and the tree is that disturbance, especially the driveway grading South of the tree, may destabilize it. It is my opinion, now that I have been on the site, that if the tree failed at the ground for any reason, it would most likely fall in an Easterly direction. This would reduce risk to the Kaelin home, which is North of the tree. There are three other homes located East of it that, based on measurements I made while on site, are within range of the tree. Climbing the tree would allow a more accurate assessment of the center of gravity if needed.

I examined the upper parts of the tree with binoculars. I noted that the growth increment in the foliage is small but not diminishing and that growth increments for the older trees growing nearby are similar. I noted that the majority of the larger branches of the tree are on the East side although there are branches on all sides especially along the upper part of the trunk.

I confirmed my opinion that the construction of the road into the neighborhood caused disturbance to the tree. I could not determine if any large supporting or structural roots were cut at that time.

I reviewed a preliminary plan provided by Mr. Skall showing the driveway and foundation layout of the proposed project that included the grade changes necessary. It is important to note that the house has a garage beneath it, requiring a deep excavation. I also noted that fill is needed in one area to make the grades work out.

This plan shows a 20' radius circle around the tree as protected with a rock retaining wall around a portion of it. The cut on the South side of the tree needed to build the driveway was shown and this was explained to me by Mr. Skall. The driveway would start out at a steep angle. It would require about a 5' cut at the top of the bank above the road and taper to a shallower cut as the driveway ran West toward the house.

Not shown on the plan is a storm water retention vault that is potentially to be located in the driveway area. This structure would require a deeper excavation below the driveway grade.

I noted that a significant cut would be made along the South edge of the property and contained by a placed rock retaining wall. This cut and the wall required to contain it would be as tall as 10' at the West end along the proposed house. The cut will sever the soil layers along this line and will likely, along with the other infrastructure impacts to surface soils, significantly change the way water flows through soils on the site.

Mr. See used his air tool to dig a narrow trench just beyond the 20' circle around the eagle tree. He exposed dead and decayed roots of a hemlock tree that has fallen on the site. Also exposed were three significant (2.5"-4" diameter) Douglas-fir roots along with a number of smaller (≤ 1 ") fir roots and many fine fibrous fir roots. The fine roots were most dense in the top 12" of soil, however, as is typical in sandy soils, fine roots were present deeper in the exposed soil.

2.
Excavation
with two fir
roots in
view.



The soil exposed by the excavation was sandy loam. A small lens of silt clay was also encountered. I was able to insert my probe another 36" from the bottom of the excavation without much force, indicating that the sandy well drained soils continue in this area. Given the soil conditions on the site it would not surprise me to find more roots of significant size growing at a greater depth than was exposed during this investigation.

After photographs were taken by various people on the site, Mr. See filled the trench having sprinkled some fertilizer and unidentified fungal (mycorrhizae) inoculants into the hole. I do not think that this was necessary but it is unlikely to cause any problems.

Mr. See also blew away surface soils (forest duff) around the base of the two fir trees and exposed a dense mat of fine fibrous fir roots some of which were growing in the decomposing outer bark of the trees. No large roots were exposed by this work. I observed that the base of the tree did not appear to have been excavated to expose the root flare of the tree in the recent past.

If a diagnostic hole was needed I would have used the air tool to dig a deep hole on the critical South side of the Eagle tree in order to expose an example of what the tree structure is below ground, at the root flare, without causing a lot of disturbance.

I expect, given the soil conditions on the site, that the large structural roots of the trees are growing downward at a fairly steep angle from the base and that a significant excavation would be necessary to expose them.

I noted that the hemlock tree that is laying on the ground near the eagle tree failed due to root rot. I know that root disease is present in the area. Another standing dead hemlock is nearby.

The eagle tree is old and is likely, based on my experience, to have some root disease present within its root system at the present time.

I noted that one of the trees that will be removed to accommodate the house is a large Bigleaf maple that is old and has a lot of wildlife habitat present including visible nest holes and large cavities.

Mr. See told me that he did not think that the roots we found were critical.

I suggested to Mr. Skall that if the project proceeded, that only invasive plant removal should be considered in areas outside of the area necessary for construction, and that that area should be tightly contained.

Discussion

As I told Mr. Skall, my personal opinion is that this parcel of land is best used by not building on it. It would be, in my opinion, a wise addition to permanent green space on Mercer Island.

I was informed later by Mr. Kaelin that an offer was made for the parcel with that intent, that was not accepted by the seller. If Mr. Skall does not proceed with his project it is possible that a buyer with conservation in mind may still be interested in the site.

My observations made on the site reinforced my opinion that the tree preservation plan that is currently proposed is not adequate to protect the eagle tree and its companion. Old trees like this one are very fragile and depend on the surrounding forest in many ways. The excavations, grade changes, and removal of several adjacent forest trees will harm the tree. It is, in my opinion, very important to note that the tree was disturbed about 30 years ago when the road was built and this new disturbance encroaches into the remaining rooting area that the tree depends upon.

As I mentioned in my earlier letter the 20' circle is far short of the 1'-1.5' protected area per inch of trunk diameter recommended by Matheny and Clark in the book "Trees and Development".

The excavation for the driveway will sever at least three important roots. These roots and any others that may be present but were not exposed in the air excavation may be critical to the stability of the tree. The best information available indicates that the roots within 5 times the diameter of the tree are very critical to stability. As the tree is 6' in diameter I think that it is not advisable to cut any roots 2" diameter or greater within 30' of the tree base. In my opinion, given the great height of the tree, cutting any roots even at this distance would potentially risky.

The roots that were exposed are definitely important to the health of the tree as they are the conduit for nutrients and water gathered by the fine root system that they connect to. The fine root system that lies in the surface soils will be completely removed on the South of the tree by the driveway and house foundation excavation. These roots are the most important roots for a tree and I know from long experience that disturbance or removal of these roots around an established tree is very detrimental to tree health, and that this is especially true for old trees.

If the storm water structure is installed in the driveway the additional ditch will extend below the cuts needed for the driveway and more large roots from the fir trees may be encountered.

The cuts on the South of the property will change the water regime in the soil environment on the site. The requirement for storm water retention will remove all of the water that once fell in the areas of the site that will be covered with impermeable surfaces. This will affect what is left of the eagle tree root system. There are some trees on the neighboring property to the South that may also be negatively affected by this cut.

The Eagle tree is very large and has many huge branches locate high in the canopy. I mentioned to the Skalls that once a home was built on the site that the tree would become a legitimate hazard as I am certain that it will shed parts over time. I do think that, due to the canopy form, that the highest target area for branches falling from the tree is directly beneath and to the East which would reduce somewhat the risk of the new home being struck. I also pointed out to them some of the other tall conifers that lie up slope of the new home site.

I do think that the sandy soils on the site are a plus for an attempt at preserving the tree should the project proceed. These soils accommodate roots deeper in the soil profile and this makes it less likely that large roots will be encountered during excavation. In this case we have found roots within the excavation depth required for one cut proposed for the site.

It is my opinion, based on my experience and training that if the eagle tree is retained and a home built on the site, it will be impossible to avoid significant disturbance to the tree. The likely outcome is decline and death of the tree over time.

The neighborhood has lived with the tree to this point and has accepted the risk associated with such a large tree. Every time someone drives under the tree, especially in stormy weather, there is risk from falling branches. Although the tree appears stable at the ground and has survived several severe storms there is always a chance that the tree may eventually fail. I think that it would be possible to perform a stability test on this tree to determine that is stable. This testing is referred to as Statics Integrated Testing or a pulling test. The testing is expensive but it might be something that the homeowners within range of the tree may want to consider in order that they may make accurate judgments about the potential risk from the tree. Finally, with all the focus on the eagle tree, I think it is important to note that there are a lot of large trees in the neighborhood that also pose some risk potential during severe weather. To me this is an indication that most of the neighbors are somewhat risk-tolerant of the trees in the area.

I hope that this information is helpful to you and your neighbors.

Respectfully,

Scott D. Baker, RCA