

Wescliffe Common Forest Strip Management Plan

by Robert Sweet, Certified Arborist March 30, 2002

Project Setting

The common forest strip (CFS) at the Wescliffe development in University Place, WA is an approximately four and one half acre, mostly forested, predominantly north to south strip of undevelopable land downslope from the Wescliffe I section and upslope from the Wescliffe II section of the development. Both parts are within the same homeowners' association (Wescliffe Homeowners' Association: WHA).

Brief Biotic Survey

Tall growing native trees (big-leaf maple, madrona and Douglas-fir) dominate the site. Native shrubs (ocean spray, snowberry, red huckleberry, hazel and poison oak) and native ground covers (twin flower, starflower and creeping blackberry) are common except on two slope sections where fill dirt from above apparently smothered them during upslope site preparation work approximately 16 years ago. The vegetation on the upper part of these sections is mostly non-native Himalayan and evergreen blackberry. Downslope in the forest there is simply no ground cover vegetation. In general, the forest health is good in the southern half, while only fair to poor in the north. This tree health difference correlates with the extensive and severe madrona canker disease and the history of more severe tree topping in the north. See map overlay: Current vegetation

Brief Abiotic Survey

The site soil appears to be Everett gravely sandy loam just as mapped by the Soil Conservation Service (SCS) in its 1979 soil survey. Where steep, as most of this site is, this soil has some susceptibility to shallow-failure landslides especially if healthy plant cover is not maintained. One existing shallow-failure landslide path exists just north of the CFS where it crosses its extreme northern tip. What appears to be a deep-failure rotational land slump exists at the foot of the slope downhill from the CFS boundary. The only landslide predominantly on the CFS is not of native soil at all but rather of fill material pushed onto the site from above. See map overlay.

An Introduction to the Issues: perceptions and complications

As this development has filled in over the past sixteen to twenty years, a variety of concerns have surfaced about possible dangers and other impacts to homes both upslope and downslope due to management practices on the CFS. The central issue has been the view maintenance work done downslope of Wescliffe 1 and the concern of some residents downslope of the CFS that this work is reducing the stability of the slope by weakening and killing trees. This is, however, far from the only major concern. There is a significant fire hazard, especially to the upslope homes, due to a build-up of brush generated by view maintenance work both last summer and seven years ago. Both times the brush was left as it dropped, much without good ground contact, which is needed for fast decomposition. Even now the old brush from seven years ago (which covered a much larger area) has only half decomposed. Evidently, as this report is in preparation, the WHA is working on a new contract to have the recent brush chopped short and flattened to the ground to ameliorate this hazard (see e-mail to Mike Kendall, chair of WHA by Robert Sweet, Certified Arborist for specifications of this work). Further work to treat the old brush both on the CFS and downslope of the property line would complete the fire hazard mitigation work. I must stress that the boundary of the CFS does not include all the undevelopable land. One of the steepest, longest slopes in this functional unit of land is largely on the upper part of lot #10 Wescliffe 2. There is also a long steep blackberry choked slope of lot #10 Wescliffe 1. It is only proper to invite those homeowners, both above and below, whose lots consist partly of wild land adjacent to the CFS to allow a degree of joint ecosystem enhancement work on the steep non-landscaped parts of their lots. This enhancement work includes reduction of fire hazards, native ground cover plantings, control of noxious weeds, and erosion control. The part of this report dealing with the contentious issue of tree cutting for view maintenance only refers to the CFS itself. In contrast, the invitation to allow joint ecosystem enhancement only concerns work which is clearly, a win-win situation. Indeed, such issues as erosion control; noxious weed removal and slope stability simply cannot be adequately addressed if work is limited to the CFS.

Issues list

View loss

Tree topping, the usual direct means to staving off view loss, often weakens the tree. Weakened trees reduce a forest's ability to stabilize a slope against mass wasting (i.e. landslides). Therefore, switching to an alternative method to maintain views is highly desirable. I recommend a phased replacement of most of the existing trees on the upper slope with lower growing native species such as vine maple, quaking aspen and mountain hemlock. Intermixed with these will also be western red cedar, which, while needing occasional topping, is a slower growing species than the existing big-leaf maples and Douglas-firs. Also, with proper planning, these cedars can be topped when needed with much less damage to the trees than is true with the existing trees. Due to long steep slopes below some lots, the existing trees below the 40' elevation drop line do not interfere with views to the same degree. Nevertheless, a thinning removal of roughly 30 trees per acre on the 40' – 50' elevation drop zone followed by supplemental planting (50 trees per acre) will have two key values. First, this will allow the removal with replacement some of the worst diseased Madronas and the occasional repeat-topping prone Douglas-fir. Second, this will enhance the species diversity lower on the slope as insurance against heavier than anticipated canker death to this mostly Madrona forest. Note, the affected 40' – 50' zone (see Planting Zone overlay) is an estimated 0.51 acres so about 15 trees would be removed coinciding with the 2004 cutting on the upper slope. Note also, the 50 trees per acre planting refers to the entire lower slope north of WC2#9 (estimated 1.5 acres so about 75 planted trees) not merely the 40'-50' zone. Finally, the view from some WC1 lots seems to be more affected by trees offsite (school land?) than by the lower slopes of the CFS. These offsite trees are beyond the scope of this report.

Slope stability

This should be a serious concern for both upslope and downslope residents. While healthy, sturdy tree roots are not a guarantee against mass wasting; favoring healthy native trees and shrubs is one of the few ways we can minimize the threat. There is an existing landslide path at the northern tip of the CFS and an apparent slip of an eight-foot wide swath of the fill dirt starting at the back fence line of lot #16 Wescliffe 1. There is a scallop shaped depression just downslope from the CFS boundary entirely on lot #9 Wescliffe 2 that appears to be old soil slump. A further note: not all the pipe systems that convey excess water from Wescliffe 1 are in good repair. The efficient piping of collected drainage water to the foot of the slope is another way to minimize the risk. Furthermore, since a storm water pipe failure on a recently planted steep slope could easily result in damage to both the slope and the planting, a thorough inspection of the entire pipe system should be done and any needed repairs completed prior to the plantings.

Much of the tree removals on the CFS will be on slopes steep enough to qualify as critical slopes by the City of University Place. The presence or absence of critical slope designation has not much affected my tree removal/replacement schedule for the CFS. This is for three reasons:

- Almost all of the steep CFS land hovers right around – just above or below- the 30% steepness at which critical slope is designated.
- The shallow landslide in the extreme NW area of the CFS is on a slope much less than 30%. It is evident that the milder slopes need careful management, also.
- My proposed schedule for tree removal/replacement is formulated to apply a more stringent standard; appropriate to the critical slope areas, to the entire affected area.

Fire hazard

Typically from mid-July through mid-September the Puget Sound lowlands are very dry. The combination of abundant fuel, in very dry condition on a steep slope, and homes at the upslope crest makes any fire, however unlikely, a frightening prospect (I did find one spent fireworks rocket on the CFS). Aside from this danger, brush chopping needs to be an early priority simply because much of the ground most in need of new plantings is made treacherous to work on by this same brush. It is likely that planting labor and spray labor costs will be much higher if this preparatory work is not done first. As it turns out, getting the brush/slash chopped and

flattened to the ground as opposed to the more expensive offsite disposal should actually improve prospects for erosion control by improving the forest soil duff layer.

Soil Erosion/lack of ground cover

This is primarily a problem stemming from fill material that had been pushed over the upper slope lip onto the CFS. This evidently happened during the site preparation work on some of the adjacent Wescliffe 1 lots, especially #16, 12, 11, and 10. The combination of fill and steep slopes has worked for years against re-establishment of an absorbent forest duff layer as well as of the native ground cover. This fill also made an ideal seedbed for Himalayan blackberries where trees did not block the light. There are several smaller areas of fill detailed on the overlay. Fortunately, the chopped and flattened slash will slow soil loss and help trap fallen leaves to rebuild the needed absorbent organic layer. These are the areas where log check dams will be most useful. Most of the ground cover plantings will be on these slopes. See over-lay of proposed ground cover plantings. The old footpath along the northwest border of the CFS with non-Wescliffe forestland is another significant source of erosion.

Noxious weeds

The good news is that there is no English ivy or clematis in the trees on site as is common on similar sites in the Tacoma area. The bad news is that poison oak, native, but regionally rare, is common, especially in the southern part. Also, non-native blackberries smother much ground on both sides of the upslope boundary. The invasive blackberries on the CFS must be a priority for elimination early in the project. The same should be considered for the adjacent land. This is not merely because it is impossible to make the necessary plantings on the affected CFS land until the berries are gone. The existence of this belt of blackberries adjacent to Wescliffe 1 backyards would make impractical the beneficial periodic hose watering of new plantings from yard faucets during the critical first summer. Alternatively, the roughly eighty percent of infested land not on the CFS (overwhelmingly on lots 12, 11 and 10 Wescliffe 1) could be excluded. It is true that the blackberry roots provide some soil binding. If some arrangement to follow eradication with planting of native ground covers, shrubs and small trees on this area is not agreed upon, then berry eradication could worsen the situation. If these briars stay, the CFS plants below lots 12, 11, and 10 of Wescliffe 1 will need a higher density planting to compensate for the lack of hose routes to water during the first summer.

The poison oak must be an early priority because its presence makes any work on site a significant risk for severe skin rash. Fortunately, the heaviest infestation of poison oak is in the southern part of CFS while most of the planting needs are in the north. See the map overlay Current vegetation for locations. See Appendix A.

Excess Water

Healthy plants pump a lot of water from the soil for loss through the leaves in a process termed transpiration. On a potentially landslide prone slope this is a benefit since it tends to depress soil moisture levels. A soil becomes weaker as it becomes wetter. High rates of transpiration reduce the amount of deep percolation water which, if excessive, could contribute to lower slope soil slumps. For these reasons, the tree removal and stem thinning (of multi-stemmed trees) I am recommending on the upper slopes must be *gradually* implemented. It cannot be completed until perhaps fifteen years of growth of the replacement trees and shrubs to ensure a continued high rate of transpiration.

Some excess water comes from drainage pipes from Wescliffe 1 lots. This water is generally conveyed by pipes to the foot of the slope well beyond the CFS boundary. However, at least one such pipe (just below the fence line of lot #8 Wescliffe 1) is broken at the upslope boundary. A modest amount of erosion is in evidence just downslope from the break and, of course, the drainage water is not getting to the slope foot as designed. A second problem point is at the northwest corner of lot #16 Wescliffe 1 where what appears to be excessive surface run-off has recently caused significant erosion of the old fill on the slope. A third problem exists at the boundary between lots #17 and #18 Wescliffe 2 where several tons of material has been deposited this winter by run-off from the new construction onto the CFS as well as addition material onto the land to the west adjacent to the elementary school. These situations, although tangential to the CFS Management Plan, certainly should be corrected. As noted above under Slope Stability, an inspection of the storm pipe system would be very valuable.

Reading through the above list of issues, it should be evident that most are interrelated. This fact conveniently allows multiple benefits from the individual component actions of the multi-year vegetation management plan.

Vegetation Management Plan

First Year (2002)

Winter-Spring:

- Chop and flatten to the ground all brush generated by 2001 view maintenance work.
- Set aside, if so decided, the 5-foot logs for later check dam building.

Spring:

- Locate remaining unknown patches of poison oak

April:

- Treat knapweed with herbicide

May:

- Treat introduced blackberry briars with herbicide.

June:

- Treat poison oak with herbicide See Appendix A for specifics of noxious weed control

August/September:

- Flatten or shred the dead, standing brier canes. Can use heavy tarps to drape and stomp down or some kind of lightweight, maneuverable brush chopper

September:

- IF AVAILABLE spray or otherwise spread a one to two-inch layer of utility company wood chips onto the areas formerly occupied by briars. This will not only greatly improve the dead berry cane mulch (reduce erosion) but will also bury most of the buildup of blackberry seeds. This will tend to suppress germination of this seed.

November/December:

- Order bareroot native tree and shrub stock and ground covers (for Mar 2003 pickup.) See PCCD conservation plant sale order form included. See also appendix for plant details.

Second Year (2003)

March:

- Pickup purchased plant stock from Pierce County Conservation District.
- Plant all stock according to general tree, shrub, and ground cover layout. (See planting layout overlay)
- Protect young plants from heavy browsing by deer with a deer repellent spray and/or protective sleeves. Pierce County Cooperative Extension will have information on the more effective repellent sprays.

June:

- Recheck all areas sprayed in 2002 for regrowth of blackberry, poison oak, and knapweed. Spot spray any regrowth.

June 15 – September 1:

- All spring 2003 planted stock should be hand watered an average of 5-gallons per plant once/month. Note, some summers are wet enough to obviate most of the survival and growth rate benefits from first year dry season watering. The more typical summer with a mere 1-inch of rain from July 10 to Sept. 10 will definitely test these plantings resulting in some losses.

By October:

- Log check dams for erosion control should be in place.

Third Year (2004)

Winter:

- Remove approximately one third of the upper slope madronas and one third of upper slope big leaf maples stems (i.e. cut to the ground). In the case of the multi-stemmed maples this cutting would merely mean a

reduction in number of trunks per tree. The openings in the forest so provided will aid the continued healthy growth of interplanted tree and shrub seedlings (herbicide treatment of madrona stumps would obviate the need to fight stump sprouts later). Larger stems (8-inch diameter) can be left flat to the ground to rot if desired but the limbs and tops must be reduced and flattened to the ground as specified in attached e-mail to Mike Kendall concerning the 2001 generated brush.

- Remove 15 of worst diseased trees (30 per acre on 0.51 acre) on the 40'-50' zone as noted on the Planting Zone overlay

Spring and summer:

- Monitor plantings for excessive deer browsing. You may need to reapply a deer repellent.

Anytime before wet season:

- Install 3 or 4 well spaced, angled 20-foot long log water bars across the erosion-trenched old trail along the NW border of the CFS. This need not be fancy (I can provide more detailed specs and locating if desired)

Fourth Year: (2005)

The ground covers should be nearing full coverage together with the interplanted shrubs and small trees.

Spring and summer:

- Monitor plantings for excessive deer browsing.

June:

- Check entire upper belt (both on CFS and upslope) for blackberry seedlings or new noxious weeds. Spot spray or hand grub if needed.

Fifth Year: (2006)

Planted cedars and other trees should be beyond serious damage by deer browsing.

- No scheduled actions

Eighth Year: (2009)

Winter:

- Second installment of one-third removal of madronas and big-leaf maple stems on the upper slope. Again, this means killing the cut madronas (they may stump spout; herbicide treatment of stumps may be desired) but only reducing the multi-stemmed maples to fewer stems. Remaining madronas and maple stems slated for eventual removal will probably have accumulated height growth into the marine view field. These can be topped with work performed to minimize premature decline. Brush from both operations should be treated as specified under Third Year plans *unless* a certified arborist or forester determines that even with good ground contact, woody debris level would be excessive.
- At the same time the scattered Pacific dogwoods and previously planted Douglas-firs (below lot # 17 Wescliffe 2) on the upper slope can be *carefully topped*. These trees, unlike almost all the madronas and big-leaf maples on the upper slope are slated to *remain* but under carefully specified management. See Appendix B for details of height control
- Remove the scattering of large-diameter previously badly topped Douglas-firs on the upper slope.

Ten Year (2011)

Growth of small trees and tall shrubs in the former brier patches should be sufficient to give excellent woody root binding of soil. Their shade should now be enough to deny blackberry re-invasion. However some monitoring should continue so that backyard plants like English ivy and Clematis do not become problems. This is also an excellent time to selectively prune to the ground volunteer Douglas-firs on the highest parts of the slope to favor planted and volunteered short growth potential trees (like vine maple and Oregon grape). Much of this area, being upslope of the CFS boundary, will only have been planted if the relevant homeowner has made similar plantings on his side of the line. As stressed earlier, the slope stability issue especially will be much better addressed if 1) joint plantings can be (in 2002 or 2003) made on the previously jointly cleared and killed blackberries or 2) the adjacent areas get planted in a parallel private operation. Even if this planting doesn't happen, at the very least appropriate volunteer shrubs can be encouraged.

Fifteenth Year: (2016)

Winter:

- Third and final installment of madrona and big-leaf maple removals on the upper slope. Treat the stumps with herbicide if don't want to fight stump sprouts later. Again appropriate brush treatment.
- When the red cedars planted in 2003 on the upper slope average about 25 feet tall, (15-18 years approximately,) they will be ready for height reduction in accordance with the specifications in Appendix B. Other year 2003 tree species like Shore pine, mountain hemlock and quaking aspen should not need height control at all. However, if an occasional tree grows surprisingly tall, enough density of planting is factored in to the plan to allow such trees to be removed.

This will complete the incremental removal of upper slope CFS existing trees over a period where planted and desirable volunteer trees and shrubs interplanted with height manageable cedars can grow sufficient woody roots to bind the soil.

Lot-Specific Comments

I have arbitrarily defined the upper slope as the first 40 feet of drop from the fence line of a Wescliffe I backyard. Concerning view comments: the following observations, where they concern the view from a given lot, are made from the vantage of the back fence line. This is generally several feet lower than the deck, but I have tried to compensate for this difference so the observation will apply to that level. The key qualification is that, according to WHA's 1992 memorandum of understanding, the relevant level at which the marine view must be clear, for view lots, is not the deck but the main living area of the house. These observations are intended, therefore, only as a measure of the relative security or fragility of the view from various lots.

#19 Wescliffe 1

Other than one maple, which can be removed in the eighth year of this project, the extremely narrow northern tip of the CFS west of this new house has little effect on the view. Off site tall Douglas-firs may have a significant effect. This small bit of the CFS needs blackberry removal followed by the measures outlined above. Several small willows should be retained. The only known infestation of knapweed on the CFS is here. All of the blackberries appear to be on the CFS.

#18 Wescliffe 1

Several maples and madrona on CFS can be removed in years eight and fifteen. There are some low-density brier patches here, but it is generally forested with established native shrubs like oceanspray. The primary danger to the view for this new construction home appears to be same offsite forest as for #19. The landscape appears to go to the CFS line.

#17 Wescliffe 1

Three to four pole-sized topped Douglas-firs and a number of madronas on the upper slope of CFS could be gradually removed and replaced with more suitable species over the next 15 years. There are several Pacific dogwoods that should be retained. The CFS is much wider here (and slightly steeper) than further north, so it's 95 feet of elevation drop means the lower part is lower slope. This lower slope needs much less management for view retention. The view appears to be much less affected by the offsite Douglas-firs. There is no brier patch problem. While the soil duff layer is mainly intact, it has been thinned apparently by lots of foot and deer hoof traffic, resulting in isolated patches where erosion is beginning. Some small Douglas-firs have already been planted on the upper slope. While this species grows faster than ideal for this slope placement, these can be retained if a proper height reduction schedule is adhered to.

#16 Wescliffe 1

There is a well-defined brier strip apparently mostly on CFS. Gradual removal and replacement of the madronas just downslope from the berries and of the upper slope topped Douglas-firs with suitable native species is scheduled. One very nice dogwood can be retained with proper management. The shrubby willows

are to be retained. There is an elevation drop of about 80 feet to the lower boundary. The CFS zone below #16 is blanketed almost entirely by site preparation fill roughly sixteen years ago. This is why this part of the CFS is so erosionally active. This is also the cause of a small surface-failure landslide that happened sometime between building and two years ago (only the mantle fill slid, not the underlying native soil, and stopped well before the bottom of the slope). This part of the CFS is one of two areas needing extensive native ground cover planting and check dam establishment.

#15 Wescliffe 1

There is a narrow brier strip at the boundary. A gradual removal of topped madronas and Douglas-firs on the upper slope is scheduled and will be replaced with suitable native species. There is about 50 feet of elevation drop. The scattered shrub willow should be retained. One narrow strip of fill is in a shallow swale on the edge of the CFS zone shared with #14 Wescliffe 1. Some native ground cover reestablishment is needed for this swale. In general, this zone of CFS has a very good absorptive organic surface layer downslope of the briers.

#14 Wescliffe 1

There is a plateau of private land here, including a fence set back upslope about 25 feet from #15's fence. Anything tall planted here could impede the view quickly. Most of this land is covered with briers and severely topped madronas. There are several upper slope madronas and a large willow that (if indeed are on the CFS,) are to be gradually removed and replaced with more suitable native species. Retain the shrub willows just downslope. The small body of fill on the swale mentioned in the comment under #15 Wescliffe 1 appears to have originated on the back western corner of #14 Wescliffe 1. In general though, the CFS slope below this lot has a good duff layer covering.

#13 Wescliffe 1

There is an elevation drop of about 60 feet (the upper 15 feet *not* on CFS). While the view to southwest benefits from the steep slope close to the deck, the view to northwest is hindered by the shelf westward from #14. The deck is higher, though, and may not have as much view impairment by the shelf. Briers are apparently confined to non-CFS land. Big-leaf maples on upper slope to the west are to be gradually removed and replaced with suitable native species. There are two nice vine maples near the top (but probably not on the CFS). It would be good to retain them.

#12, #11 and #10 Wescliffe 1

These lots (as well as #13) sit atop a large steep bowl. The elevation drop is about forty feet of steep and fifteen more feet of moderate slope (nearly level at places) to the western boundary of the CFS. Twenty to thirty feet of the steep drop is upslope from the CFS. It is densely packed with briers then becomes a thicket of multi-stemmed big-leaf maples, all repeatedly topped. The CFS itself is mostly maples, too. The largest expanse of briers on the land between the two divisions of Wescliffe is here, especially on lot #10 Wescliffe 1. All of it is on steep slopes. All of it is off the CFS. Both CFS and private land parts of this slope appear to be mantled with fill pushed from above. As with the part of CFS below lot #16, this more extensive area has little development of an absorbent organic layer to replace that of the buried native soil. Erosion is quite active. While as part of this report I am recommending native ground cover planting and check dam installation on the CFS, an even greater need exists on the generally steeper private land. Gradual removal of the big-leaf maple on the upper fringe of the CFS and replacement with a more suitable species is scheduled. Also scheduled is a gradual thinning to a single stem of the multi-stemmed maples lower on the slope.

#9 Wescliffe 1 (main part)

The CFS is extremely steep (forty-foot drop) to the west, then fifteen feet more of moderate slope for this narrow stretch. To the southwest the CFS is at its widest and the elevation drop exceeds 100 feet. The CFS boundary is about where the wild land starts (approximately the top of the slope). There is a narrow belt of briers with associated shrub willows apparently on the CFS. The willows shall be retained. Some madronas on upper slope can be gradually removed with replacement. And there are areas of pushed fill on the steepest slope under trees (and likely under the briers too) with very active erosion. Native ground cover planting and check dams are needed here. Most of the CFS below #9 is in excellent condition. Native ground cover is good.

Native shrubs are common and diverse. A well-established absorbent duff layer exists. Even one small strip of swale bottom with a mantle of fill has successfully re-established ground cover and leaf litter. Probably because of the amount of elevation drop, a number of mature Douglas-firs on the lower slope, although topped twice, were topped much higher above the ground than firs elsewhere on the CFS. Since a much smaller percentage of the live top was removed, these trees have suffered less shock than those farther north on the CFS. Late in the fifteen-year schedule as upslope plantings as well as the less dense lower slope tree plantings achieves some size it *may* be appropriate to fell some of these Douglas-firs both here and where they occasionally occur below other lots. Alternatively, though I hate to recommend topping, such continued management on these *few* trees would likely have to be maintained. I don't expect significant stress to the overall forest as a result of either the above actions.

#8 Wescliffe 1

No upper swath of briars is present. The boundary of the CFS appears to be at the back fence line. There is about eighty feet of elevation drop on a moderately steep, uniform slope. The upper slope madronas to west should be gradually removed and replaced with more suitable species. My understanding is that the upper slope madronas to the southwest (never topped) are not a view concern. This surprisingly healthy (also little development of canker disease) madrona stand should remain. Like #9, the forest below #8 has good ground cover vegetation, good duff layer and a well-developed native shrub component. The poison oak is thick but only in the way of planting on the minority area so scheduled

#17, 16, 15 and 14 Wescliffe 2

These lots are downslope from #8 Wescliffe 1. The slope and forest conditions on the CFS described under #8 Wescliffe 1 do not suggest significant problems for downslope homeowners. Indeed the upper part of #17 Wescliffe 2 is immediately upslope from #16 and 15 Wescliffe 2. This land too, appears to be in near natural condition just like the CFS below #8 Wescliffe 1. The only significant cutting on this part of the CFS is above #14 Wescliffe 2. As described above, the topped madronas on the CFS in question are slated for gradual removal with replacement. These replacements, as discussed under the Management Section of this report, will require much less height control; thus enduring much less induced stress. This should improve the slope stability even as it improves the forest aesthetically.

#13 and #12 Wescliffe 2

These lots are below the CFS zone west of #9 Wescliffe 1. Both of these lots have nice, mostly natural, maturing Douglas-fir stands on their upper part. Because most of these trees have never been topped even high, this timber is probably in even better condition than the adjacent CFS stand. This, combined with the moderate slope on both sides of the boundary, is quite favorable to high slope stability. The northeast corner of #12 Wescliffe 2, however, is somewhat different. It is much closer to the very steep slope just below the westernmost edge of #9 Wescliffe 1. As discussed above, the gradual replacement of existing damaged trees with more suitable species will strengthen the slope binding. The ground cover plantings and check dams will reduce the erosion.

#11 and #10 Wescliffe 2

The immediately preceding comments also apply to the southeast corner on #11 Wescliffe 2. The paragraph #12, #11, #10 and northern fringe of #9 Wescliffe 1 addresses the problems shared by their downslope neighbors, including all of #10 Wescliffe 2 and the northeast corner of #11 Wescliffe 2. As I have tried to make clear, to adequately address the slope stability concerns here rehabilitation of the CFS land alone will not be enough. Nonetheless, the gentle slope on CFS at the bottom of this bowl appears to be a good sediment trap and, if it were to happen, a good landslide debris trap. It is also true that the slope gets much steeper just west of the CFS boundary for a forty-foot elevation drop. Part of this slope is inadequately vegetated (mostly non-woody plants.) This is a strong contrast to further south in Wescliffe 2 with its well-timbered moderate slopes. There are some nice fifteen year-old Douglas-fir saplings on both sides of the boundary (#10 Wescliffe 2) and some planted pines on the slope. Those on the CFS will be retained. I recommend the adjacent homeowners retain and plant more of their native shrubs and small trees.

#9 Wescliffe 2

This lot is below the CFS zone west of #14 and #15 Wescliffe 1 (see comments for #14 and #15 Wescliffe 1 for conditions). The only fill pushed from above affecting this slope is the small body down the shallow swale between #15 and #14. This will be planted with ground cover. On #9 Wescliffe 2's side on the line is a steep bowl (35 feet elevation drop) which may be a soil slump. A geologist's report would be needed to confirm this. Though the soil duff layer and ground covers are generally good on the CFS here (and on #9 Wescliffe 2's fringe of nearly flat land just above the scarp of the bowl), there certainly is some surface runoff (not erosion) from this CFS zone. This is inevitable though. Perhaps placing some check dams up slope could further reduce it. The main stabilization work that may be required is clearly on #9 Wescliffe 2.

#8 Wescliffe 2

This lot is below #16 Wescliffe 1. The mantle of pushed fill covers about eighty percent of the CFS zone and goes right to the boundary of #8 Wescliffe 2. The active sheet erosion combined with the apparent landslide (see above comments for #16 Wescliffe 1) certainly warrants extensive ground cover planting and numerous check dams.

Appendix A: Herbicides for use on noxious weeds**Himalayan and Evergreen Blackberry (*Rubus discolor* and *Rubus laciniatus*)**

Material: Crossbow™ (i.e. Triclopyr + 2,4-D)

Timing: spray when plants are actively growing

Rate: 1 pint to 12 gallons water

Follow-up treatment: suppress seedling reestablishment with heavy mulch

12 month inspection: inspect for possible regrowth from berry crowns

Re-spray if necessary

Poison Oak (*Rhus diversiloba*)

Material: Crossbow™ (i.e. Triclopyr + 2,4-D)

Timing: spray when plants are actively growing

Rate: 1 pint to 12 gallons water

Follow-up treatment: none

12 month inspection: inspect for possible regrowth

Re-spray if necessary

OR

Material: Glyphosate such as Roundup™

Timing: during active growth, but best results if applied in August after fruit forms

Rate: 2% solution used with hand-held equipment

12 month inspection: inspect for possible regrowth

Spot re-spray if necessary

CAUTION: use care around desirable plants

Knapweed (*Centurea* spp.)

Material: Glyphosate such as Roundup™

Timing: during active growth, but best results if applied in August after fruit forms

Rate: 2% solution used with hand-held equipment

12 month inspection: inspect for possible regrowth

Spot re-spray if necessary

CAUTION: use care around desirable plants

Appendix B: Low Impact Height Reduction

While it is true that any shortening of a tree will to some extent affect tree health, there is a wide range of harm depending on percent of top removed, age of tree and season of cutting. In short, cutting five feet from a 25 foot tall western red cedar (15 years old) in winter, is generally much less stressful than cutting 30 feet from a 90 foot tall Western Red Cedar (60 years old) in summer. Type of cutting equipment used also has an effect. Climbing with the aid of spurs causes multiple damaging wounds to the tree that decreases the tree's vitality and invites disease. In contrast, a ground operated power pole pruner can avoid unnecessary wounds to the tree. "No spur use in live trees" should be written into the contract for the view maintenance work (and all future tree maintenance work). This site is well suited to the use of such power tools and combined with the younger age of the trees, should be well set to be more efficient and more cost-effective (or perhaps amended specifications reflecting improved knowledge).

Appendix C: Rough Cost Estimates

First Year (2002)

- Blackberry spray: \$800 (very provisional)
Assume \$600 off CFS and \$200 for CFS
- Cane flattening: ?
- Wood chip mulch:
Materials: \$0
Labor: \$300
- Poison Oak spray: \$250
- Order and Buy Planting Stock: (payment to PCCD would not be due until plant pickup in March of following year)
Trees: \$380
Shrubs: \$850
Ground Cover: \$4,500 (if dense planting) OR \$2,300 (if non dense planting)
Subtotal: \$5730 (if dense GC planting) OR \$3530 (if non dense GC planting)

Second Year (2003)

- 1200 Deer protection sleeves:
- Planting Labor: \$1100 (if watering wells for trees and shrubs built in)
\$820 (if no provisions for 1st year watering provided)
These assume the \$5730 figure above

\$850 (if watering assumed)
\$600 (if no provisions for watering provided)
These assume the \$3530 figure above
- Log Check Dams:
Labor
For 30 dams below #16 WC1: \$70
For 30 dams below #s 12, 11 and 10 WC1: \$70
For 10 dams below #9 WC1: \$25
For 3 dams above #9 WC2: \$7
Total: \$172
- Herbicide Kill Inspection: \$120

Third Year (2004)

- Removal of 1/3 of slated trees on upper slope: \$5000
(With brush treatment)

- Marking of removal trees and stems: \$200
- Water bars on old trail: Labor: \$400

Eight Year (2009)

- Removal of 1/3 (2nd installment) Of slated upper slope trees and topping of those reserved for 15th year: \$7000 (with brush treatment)
- Marking of removal trees and stems: \$200
- Height reduction of 25 foot plus saplings and retention dogwoods: \$300
(With brush treatment)

Fifteenth Year (2016)

- Removal of remaining problem upper slope trees: \$5,000
- Marking of any retention trees that could be mistakenly cut: \$150
- Height reduction of year 2003 planted cedars and similar: \$450 (With brush treatment)

Appendix E: Numbers/Species/Cost of Stock for Proposed Planting (0-40' zone)

Native Trees:

	Number	Cost
Western Red Cedar	150	135
Mountain Hemlock	150	est. 170
Shore Pine	75	45
Quaking Aspen	60	78
Subtotal	435	428

Native Shrubs:

Vine Maple	270	243
Snowberry	80	112
Red-flowering Currant	40	68
Mock Orange	80	64
Red Osier Dogwood	40	36
Indian Plum	100	140
Oregon Grape	80	88
Ninebark	50	60
Ocean Spray	80	est. 100
Subtotal	820	911

Native Ground Covers:

Salal	1060 (if dense planting)	2040
Kinnickinnik	770 (if dense planting)	1617
Sword Fern	520 (if dense planting)	est 1196
Subtotal	2300	4853

OR

Salal	530 (if non dense planting)	1020
Kinnickinnik	385 (non dense)	810
Sword Fern	260 (non dense)	est. 600
Subtotal	1150	2430

Numbers/Species/Cost of stock for proposed planting (40'-western edge)

Native trees:	number	cost
Mountain hemlock	25	30
Shore pine	30	18
Quaking aspen	20	15

Appendix F: Tree and Shrub Planting Zones

Estimated acreage in the 0 – 40 foot zone requiring vegetation replacement

Acreage to be planted in trees and shrubs:

Northern part: 1.25

Southern part: 0.31

Total acreage: 1.56 acres

Eighty-three percent (1.3 acres) of these 1.56 acres need most of the existing trees to be removed gradually, one-third throughout at a time. This 1.3 acres is the area that the management plan refers to for the future removals on the upper slope. The remaining 0.26 acre is largely in blackberries.

Estimated acreage in 40'-western edge supplemental planting zone

Acreage to be supplementally planted in trees:

Total: 1.5

Appendix G: Non-CFS Comments and Relevant Statistics

As I have made clear elsewhere in this report, much of the land that would most benefit from vegetation replacement and improved slope stability is on private lands of portions of WCI and II lots. Much of this land is in official critical slope designation. Some is now deforested. Much is affected by fill dirt pushed from above about fifteen years ago.

For deforested non-CFS on the upper slope I suggest the same planting guidelines as for the adjacent CFS land at the same elevation drop from slope top. For the forested area on WC1#s 11, 12 and 13 I suggest this same planting guideline along with the tree removal schedule for adjacent CFS land. In addition all of this private land with a fill mantle should have log sediment trap dams installed.

Estimated area of adjacent private land needing vegetation adjustment (in acres)

WC1#10:	.07 (now in blackberries)
WC1#11:	.02 (now .01 in blackberries and .01 in maples)
WC1#12:	.04 (now .02 in bb and .02 in maples)
WC1#13:	.04 (now .01 in bb and .03 in maples and other trees)
WC1#14:	.005 (now in bb)
WC1#15:	.0025 (now in bb)
WC1#16:	.01 (now in bb)
WC2#9:	.1 (now in grass so no vegetation removal needed just additional planting)