

NOT COMING CLEAN: THE CULVERT CREEK LANDSLIDE

A REPORT ON THE RECENT LANDSLIDE INTO THE CAPILANO RESERVOIR, AND THE GREATER VANCOUVER WATER DISTRICT'S CLAIMS TO THE PUBLIC

Research, Content, Graphics and Production,

By Will Koop.

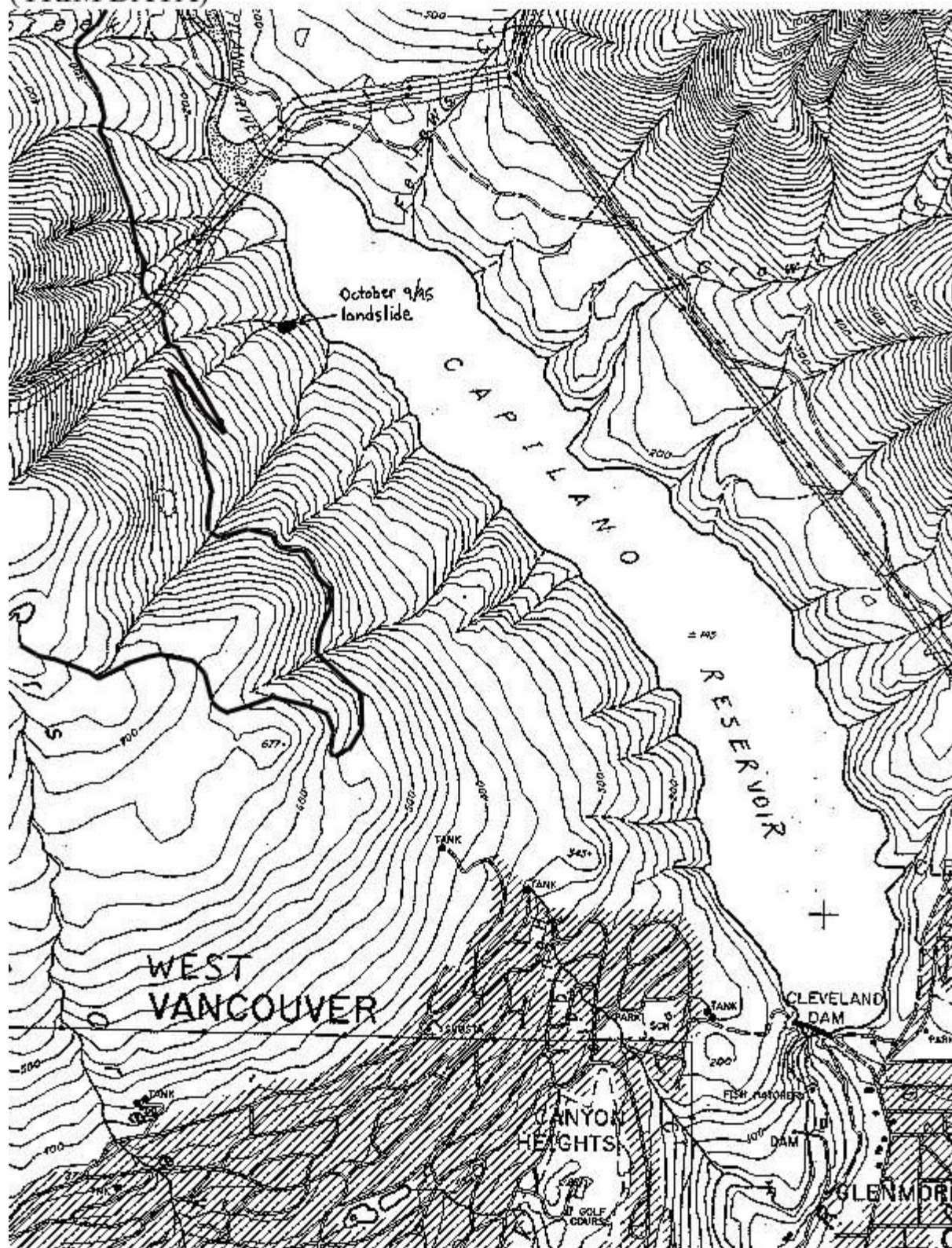
December 8, 1995.

The following report was originally presented to the Greater Vancouver Regional District Board on December 10, 1995, and was written and produced in three weeks. When this report was first presented, it appeared well in advance of the Greater Vancouver Water District consultant's reports by Thurber Engineering on the cause of the landslide: *Capilano Reservoir October 1995 Slide Slope Stabilization - Interim Report*, January 18, 1996; *Capilano Reservoir Investigation of Shoreline Instability*, March 29, 1996. Though Thurber Engineering had a copy of the *Not Coming Clean* report well in advance of their findings, there was virtually no written or photo description of the historical logging activity in either of their reports. Readers should note that the author of this report has also spent three years in various seasons documenting erosion activities on the switchback road near Hurricane Creek. These documented observations were presented to the Greater Vancouver Regional District in 1997.

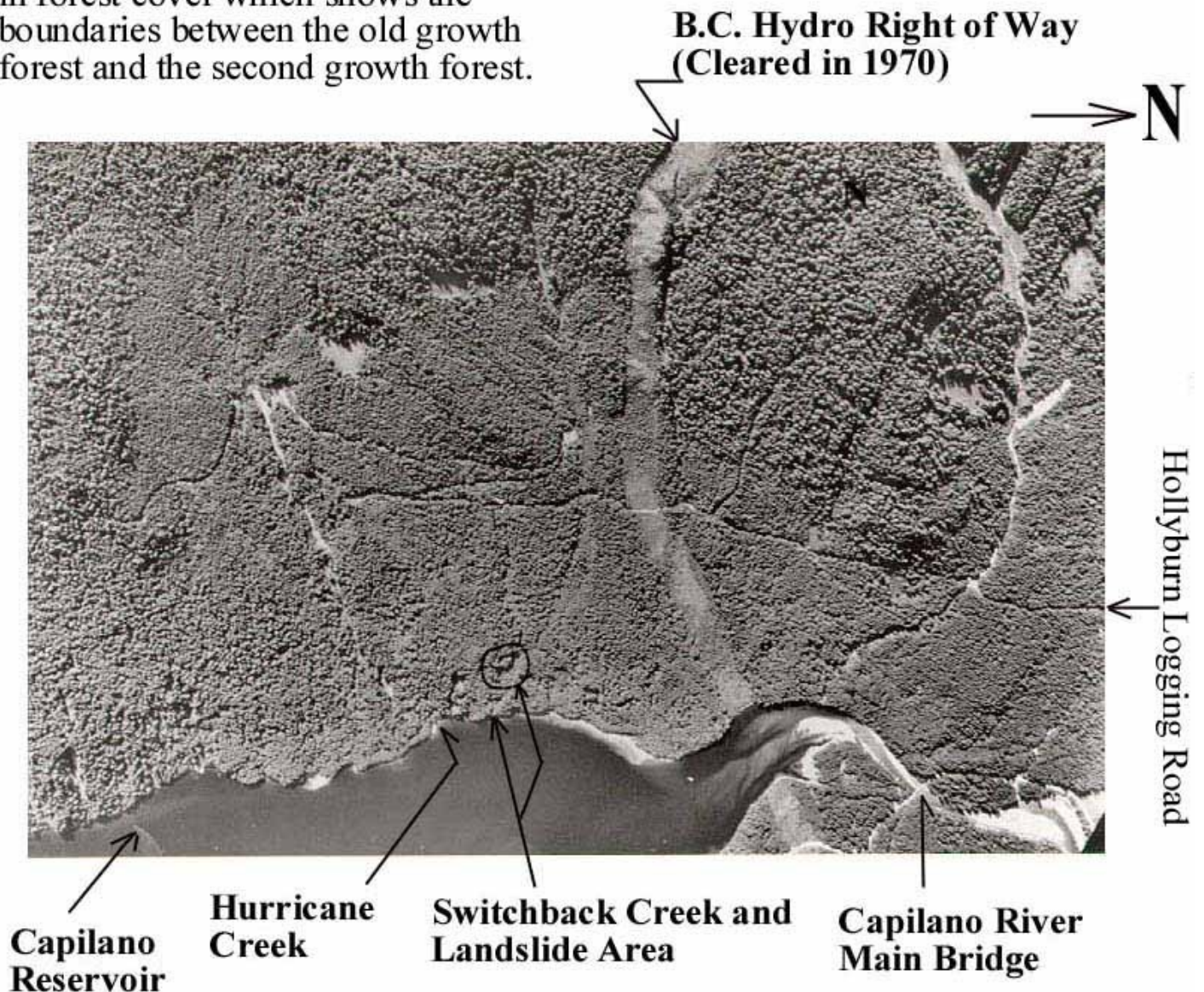
CONTENTS

Contour Map of the Capilano Reservoir Area	3
Opening Quotations	5
Summary	
PART ONE	
1. The Capilano Timber Company and the Water District	9
2. The Capilano Timber Company's 1931 Logging Plan	15
3. GRVD Tree Farm Licence #42	18
4. The December 1994 – February 1995 Rain Storms	22
5. The Culvert Creek Landslide	28
6. The Trip to Culvert Creek	36
PART TWO	
1. The GVWD and the Media	43
2. The November 17 th Water Committee Meeting	47
3. The Water District and Mother Nature	52
Conclusion	53
3 Newspaper Articles	55

METRIC CONTOUR MAP OF THE CAPILANO RESERVOIR AREA (TRIM DATA)



1992 AERIAL PHOTO: showing the location of the landslide site in relation to the Hollyburn logging road and the Capilano Reservoir. Note the difference in forest cover which shows the boundaries between the old growth forest and the second growth forest.



OPENING QUOTATIONS

We maintain and patrol these watersheds on a regular basis. Every one of these culverts are put to bed in the winter. They are all maintained in the major areas during the winter, when people are tucked away in their homes when the rain is pouring down. We have people up in the watershed making sure these culverts are kept open on the major ones. Now, this is a minor, obscure, seldom-used road, geographically well removed from the reservoir. (April 13, 1995: John Morse, Water District chief engineer and manager of water and construction, on CBC radio, 4:45-5:00 pm, commenting on the Hollyburn logging road in the Capilano, after Will Koop, who was being interviewed on CBC radio, related erosional problems in the area.)

CBC: ... in taps these days, due to naturally occurring mudslides, or is it connected to past logging and roadbuilding in the watershed?" Well, a watershed researcher says he has a videotape that proves that logging is a factor. Carol Thorbes reports: "With a cameraman in tow, Will Koop recently made an unauthorized trip to the Capilano watershed, one of the major suppliers of Greater Vancouver's drinking water. His mission: to find the source of the landslide that's polluting our water."

Will Koop: It's an old wooden culvert, and it's about three feet wide by about two feet high. It used to be a lot higher. It's got a bunch of debris in it. But all this water that comes down from the hillside, who knows where, and who knows what kind of dynamics are going on, all comes in this area right by the landslide.

CBC: Koop says the culvert and ditches have trapped mud and debris from the Hollyburn branch logging road, and over the years heavy rains have created a stream of dirt that leads into today's slide area. The manager of the Greater Vancouver Water District says GVRD video shows there is a large creek leading into the Capilano Reservoir, but it is nowhere near the Hollyburn logging road.

John Morse: What I am disputing is, the fact that the road has nothing to do with this issue. It is almost 700 meters or more away from the road. The creek itself, there are no creeks that are contributed from the road to this particular area that are of any consequence.

CBC: Morse maintains the real source of the Capilano Reservoir's muddy waters is the area's naturally occurring soil problems, soil that's coarse and loose, and susceptible to erosion in heavy rains. (CBC television 6 o'clock news, November 15, 1995)

THE CULVERT CREEK LANDSLIDE - A SUMMARY

This report is divided into two parts. First, in detailing the history, location, and possible contributing factors of the October 1995 landslide into the Capilano Reservoir. Secondly, in evaluating how the Greater Vancouver Water District has responded on the cause of the landslide event to the public.

During the early hours of Tuesday October 10th, 1995, Greater Vancouver residents and commercial businesses were becoming alarmed by progressive concentrations of a grey-brown presence in their bathtubs, toilets, sinks, facilities, etc. And on the same day the GVRD Communications Department prepared a press release from the Water District to notify the public, through the media chain, on the closure of the Capilano water supply. The press release also provided unfounded assumptions regarding the very high turbidity readings of 45 NTUs (Nephelometric Turbidity Units) in the reservoir.

Later that week, the Water District issued another press release regarding the source of the turbidity in the Capilano Reservoir. A large section of earthen material, estimated to be between 30,000 to 40,000 cubic meters in volume, was presumed to have collapsed beside and into the northwestern area of the Capilano Reservoir on October 9th. The material, which was almost entirely composed of clay and silt, dispersed a high concentration of finely suspended particles into the Reservoir current and were transported to the water intake pipe and dam outflow. It was announced that the Capilano supply could be closed for months.

The Water District, and representatives of their forestry department, immediately announced that the slide was unrelated to logging, implying that this was part of ongoing natural phenomena, which repeats itself about once every decade. However, staff had no evidence to support such claims. An unusually large and low elevation slide of this type had never yet collapsed into the Capilano Reservoir, nor had a slide ever caused the extensive closure of the water intake system which supports roughly 40% of all the water distributed to Greater Vancouver users.

A week after the press release, the Water District's claims on the cause and history of the slide site were challenged in the media with details on logging activities over the previous 70 or more years in the area. CBC television featured some interviews; there was a relatively informative article in the Georgia Straight on details of a switchback road built by the Water District directly above the landslide site; and the North Shore News was the only other newspaper in the Greater Vancouver area to take interest to comment on the historical details of forestry management in the area, and were the first to feature the location with a map. Despite the compelling challenges, the Water District continued to maintain their claims and announced that they were hiring experts to examine the slide and to determine its origins.

In the 1920's the Capilano Timber Company had clearcut and disturbed the predominant western red cedar forest where the landslide occurred. Numerous historical sources elaborated on the erosional effects from the timber company's operations in the lower half of the Capilano watershed, which were of great concern to Vancouver's Water District. In particular, the Water District commented upon the consequential release of the Capilano's glacial lacustrine deposits, the fine clay-silts which were washing into their water supply. After the Water District had forced out the logging operations and the denuded landscape was beginning to regenerate naturally, they were still suffering from the effects of the logging operations. The Water District's subsequent policy was to wisely prohibit logging and the building of any roads in the watersheds.

After the controversial initiation of sustained yield logging in the three watersheds was approved in 1967, the Water District embarked on an extensive road building plan. In about 1970, they built a secondary logging road branch above the western length of the Capilano Reservoir, overtop the Capilano Timber Company's old railway grade. This seven kilometer Hollyburn branch was built to supposedly access a high elevation old-growth forest which had suffered a minor blowdown from Typhoon Frieda in the fall of 1962, eight years previous. And according to recent accounts from the Water District's forestry department, the Hollyburn branch was not built and maintained to the same standards as other roads in the watersheds.

After a series of intense rain storms and rain-on-snow events in December 1994 and in February 1995, individuals documented and reported on a series of problems on the upper portion of the Hollyburn road last February 26th (1995). Concentrated water run-off in road ditches caused road washouts on a switchback road, many plugged culverts, slope failures, the distribution of sediments into the Capilano Reservoir, and erosional activities below the Hollyburn road from water being directed through culverts. Water District administrators denied that the Hollyburn road was causing erosive problems which were responsible for transporting sediments into the Capilano Reservoir over the years.

The documented disturbance to the Hollyburn road, especially along the switchback to the north of Hurricane Creek, became serendipitous, as the same individuals discovered, on November 12th, that there may have been a relationship with the storms and blocked culverts earlier this year. There are some good reasons to believe that the recent landslide may have been caused by water run-off originating from a wide culvert on the switchback road: hence the name Culvert Creek landslide.

August 1994 photo showing northwest area of and above the Capilano Reservoir.

Hollyburn road at Hurricane

Creek. Area of road bank

erosion at 460 meters

elevation.

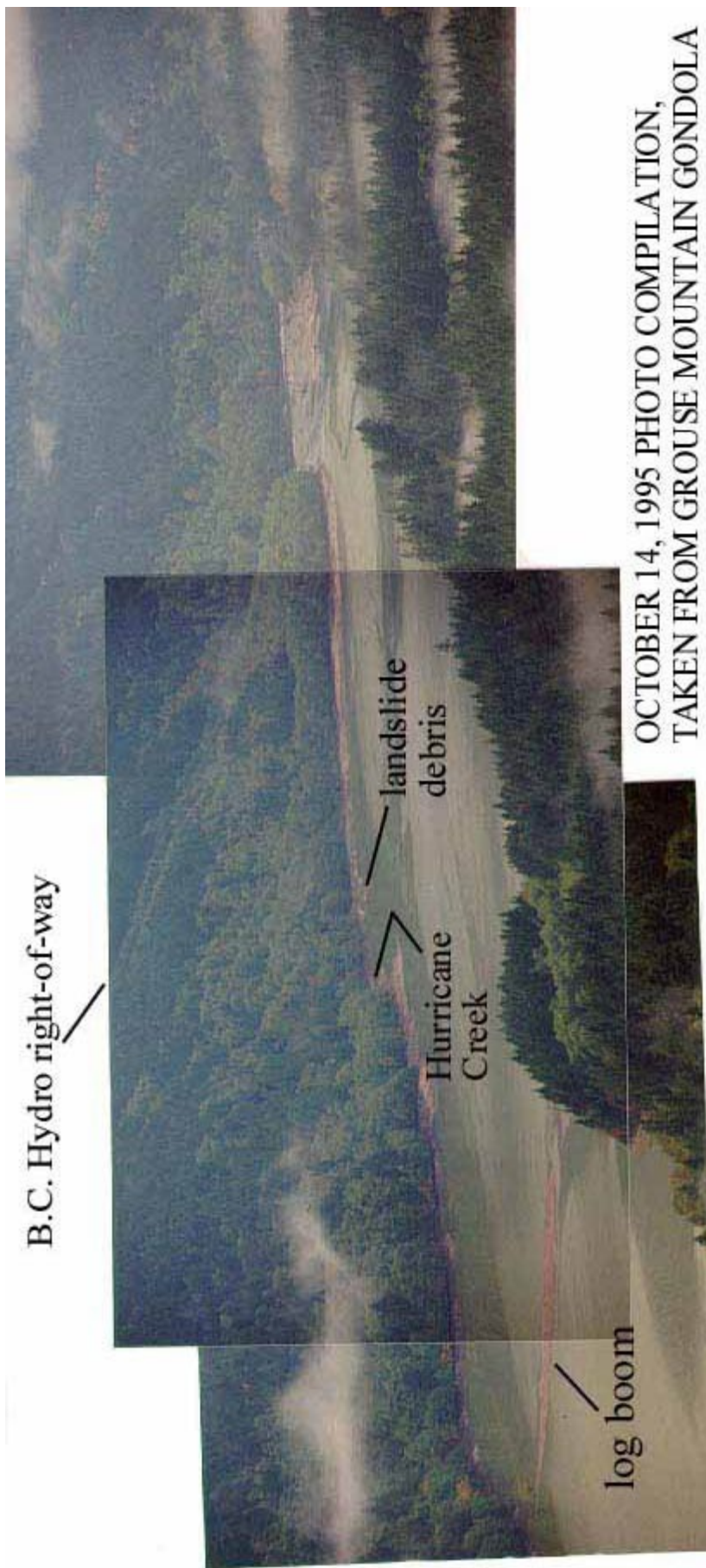
B.C. Hydro right-of-way

Hurricane Creek
drainage



Capilano Reservoir elevation - 145 meters

Mouth of Hurricane Creek



OCTOBER 14, 1995 PHOTO COMPILATION,
TAKEN FROM GROUSE MOUNTAIN GONDOLA

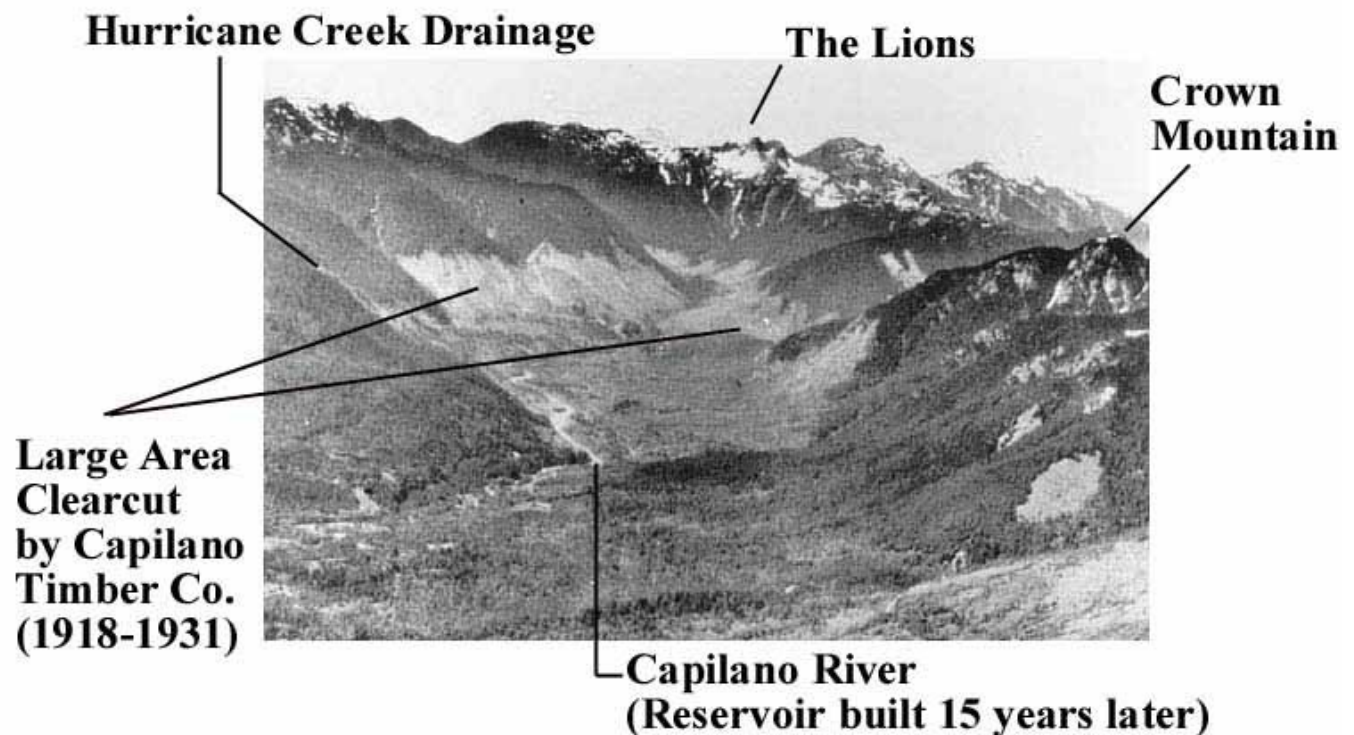
PART ONE

1. THE CAPILANO TIMBER COMPANY AND THE WATER DISTRICT

There are only a few published works that have managed to explore some of the history of the Capilano Timber Company's operations in the Capilano watershed. Dr. James Morton's Capilano, Story of a River (1970); Timber Down the Capilano by David M. Rees-Thomas (1979); and a University of B.C. Geography Department's Master's thesis, Logging and Landscape Change on the North Shore of Burrard Inlet, B.C., 1860's to 1930's, by Anna Gabrielle Kahrer (October, 1988). Other than relating stories on some of the interesting characters, hardships, and the pioneering industrial technology behind the extensive clearcutting operations of the Capilano Timber Co. - their splendid logging camps, enormous wooden trestle bridges, the very tall spar trees, and their shiny locomotives - only Kahrer explored some of the detrimental repercussions from their operations, which she describes as "substantial" (page 92):

In 15 years of operation the Capilano Timber Company harvested some 400,000,000 feet of high grade virgin timber, laid 80 kilometers of railway tracks and spent \$9,000,000 on wages and equipment in the Vancouver area. Typical of the large, integrated industrial operations that used powerful machinery to harvest British Columbia timber during these years, it also left behind a clear-cut, barren wasteland of slash and stumps. The drive for efficiency had a detrimental effect on the land. The Forest Branch had investigated logging practices in the Capilano watershed in 1923 and had advised the Capilano Timber Company that "the effect of high-lead operations on the steeper slopes should be carefully watched", and to consider confining high-lead systems "to the bottom land, benches and moderate slopes...to avoid excessive erosion which would foul the water and render the steeper hillsides permanently barren. The company never followed these instructions and there is ample evidence of the effects of careless logging practices on the landscape. (Kahrer, page 98)

1939 (OBLIQUE) AERIAL PHOTO OF THE LOWER CAPILANO WATERSHED

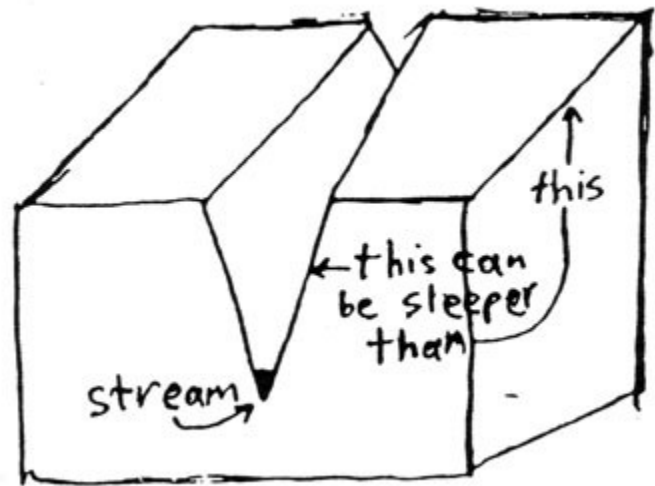


The Company had a network of railway routes, many of which cut through steeply inclined clay banks, eroding material into tributaries and into the Capilano River. Of course in those days, there were almost no standards for proper railway and ditch construction and the careful placement and maintenance of culverts, nor responsible logging practices in Vancouver's water supply catchment.

During intense rainstorms and rain-on-snow events, water run-off would be intercepted and concentrated and then run down along the railway track ditches and haphazardly spill over and down the slope, causing erosive actions. Slopes, either above or below the tracks, which had been destabilized by the railway grades, were also slumping and eroding from these rain events. The long-term effects from these occurrences were most likely compounded over the years, especially since the Capilano Timber Company clearcut long sections of steeply inclined slopes and denuded drainage courses. Ephemeral streams and year-round flowing creeks were deprived of forested buffers to support their adjacent slopes, some sections of which are quite steep and high.

Since the most recent glacial era, of about 10,000 years ago, some mountain creeks had cut through the deep glacial deposits of clays. These clays are generally defined as glacial lacustrine deposits, some of which, as in the present landslide site, are very deep. The banks of these stream incisions were later fortified by root structures and slowly blanketed with a soil layer, preventing the silt and clay from leaching into water courses. When the Capilano Timber cleared these undulating steep slopes, they destroyed the main protective root structures which bound together the soils with the clay deposits, and severely altered the natural hydrology.

A stream may cut deeply into the ground and have banks that are much steeper than the average slope gradient. From the water quality perspective it is the streambank gradient which is often more critical than the general slope gradient. (Michael Feller, May, 1991, public submission)



Matters were also further complicated when the Capilano Timber Company caused fires which burned the protective humus and soil layers. According to early Water District correspondence, the Capilano Timber Company was responsible for creating 37 fires over a period of fourteen years (Kahrer documents a number of these). The (in)famous 1925 summer fire burned some 3,200 acres, the fire which spawned the birth of the Greater Vancouver Water District and its policy to protect the watersheds from logging.

By the end of that year (1923) almost all trees had been removed from over 1,600 acres of Capilano land. The upper catchment was turned into a landscape of barren clearcuts covered with slash, which posed serious fire threats. Indeed new logging technologies had created conditions for a new, especially dangerous type of forest fire: slash fires burned at temperatures, up to 1,814 degrees Fahrenheit, and destroyed much of the organic layer in the forest soil. Without this absorbent upper layer, runoff increased and caused severe erosion on steep mountain sides. (Kahrer, page 90)

The Forest Branch...had carried out investigations on seven sample areas logged in November 1918, November 1919, June 1920 and May 1921 and found "almost entire absence of reproduction". Hemlock was the only coniferous species on the cut-over areas and it grew "only in satisfactory quantity on torn-up railway grades and cuttings where the mineral soil [was] exposed."... The Capilano Timber Company never reforested forest land it had cut and left more than 8,000 acres of logged or burnt timber land to the Greater Vancouver Water District. E.A. Cleveland, then Chief Commissioner of the GVWD, clearly

recognized the need to replant these logged-off slopes, but he was restrained by a lack of funds and the forest was left to regenerate by itself. (Ibid., pages 101-102)

The impact upon the operations and quality of Vancouver's water supply from the Capilano were of grave concern to the Vancouver Water District, impacts which continued for decades. The Capilano Timber Company was monitored at times by the Water District's Watershed Observer, William Taylor. The following are observations noted in his 1922 logbook:

They are logging around (the) mouth of Sisters Creek chiefly for R. (Red) Cedar but they are taking everything in sight and using it for pulpwood. They are going to log the slopes clean up to 2500 feet in places, average around 2000 feet when they get through. The logged off areas will be cut up by roads, etc., which will divert and interfere with natural drainage. If fire comes after, the watershed might be years before it will reforest itself. [January]

Received orders to go up Capilano and get samples of water to ascertain what damage the logging company is doing especially in regard to polluting the water from clay banks they have cut into and made them drain directly into river. [February]



Railway construction by Capilano Timber Co. Railway is cut into steep clay bank and is destabilized, causing erosion of fine clay silts.

Source: North Vancouver Archives.

They have logged off base of side hill of all standing timber. Their spar trees stand at the foot of slopes which is near an angle of 30 degrees. The bench land is all logged off on east side of creek with no attempt made to burn slash. If fire ever goes through this it is liable to burn out the intake and damage pipe line by trees falling across it. Crown Creek has still got considerable slash in it. The banks are logged clean and in places the clays and gravels are moving into creek bed. Another good flood will clear the creek out of slashings. [April] (These excerpts are from my draft manuscript "Wake Up Vancouver", April 1993, page 13)

Kahrer mentioned that the provincial Forest Service had been monitoring the Capilano Timber Company's operations in 1923. This was greatly related to a report which the province's Water Rights Comptroller, E.A. Cleveland, completed in October 1922, *Report to the Honourable T.D. Pattullo, Minister of Lands, on the Question of Joint Control of Water Supply to the Cities and Municipalities on Burrard Inlet*. Pressure from the concerns of the Province's Chief Medical Health Officer, local politicians, outspoken and well-respected consultants, and many others for many years, had been the impetus behind the report. Cleveland had carefully scrutinized the logging operations and concluded with thunderous language that the logging operations were destroying the public's water supply and strongly advised that the local municipalities become organized and stop all logging in the Capilano, Lynn and Seymour:

Nature has clothed the drainage areas of the three principal streams on the north shore of Burrard Inlet (Capilano, Lynn, and Seymour) with a magnificent forest growth.

It is generally agreed that forests exercise a beneficent influence upon the run-off from a catchment area. The principal and more obvious benefits are the protection of winter snowfall from a rapid melting and run-off by the defense of the trees against wind and sun; the retarding effect of the trees, humus and forest waste generally on precipitation in its movement toward the streams, thus affording opportunity for the water to sink into the soil and so reduce the fluctuations of stream flow and diminish the intensity of floods; and the protection of the surface against erosion and wash of soil into the streams. Among the minor beneficial influences of forests are: the tendency to equalize and increase the rainfall locally because of the more constant and lower temperatures in their proximity which favour condensation on the moisture of the air; the reduction of evaporation due to the shade of the trees; and their constant contributions to the leaf litter and humus with which the layers of inorganic soil overlying the rock are covered. (page 83)

Considered as economic resources, it is not open to debate that the value of these watershed areas lies first in their importance as sources of pure water supply and secondly as stands of merchantable timber. (page 85)

The failure of the City to guard its own interests in so vital a matter as the disposition of the timber resources within the Capilano watershed and its neglect to prevent the already established beginnings of the removal of timber above the City intake within the much more important Seymour watershed, does not inspire confidence in its ability to assure the all-essential future water supply of its neighbors. (page 9)

The enquiry with which we are concerned here is as to the effect on the value of the streams of the North Vancouver slopes as sources of water supply by the removal of all the merchantable timber that it may be possible to log from the drainage areas above the several intakes. In general terms the answer is that the effect is detrimental and damaging....The answer is based on two considerations: first, the danger of pollution of the water supply, and secondly, the physical effects of forest removal on run-off and erosion. (page 84)

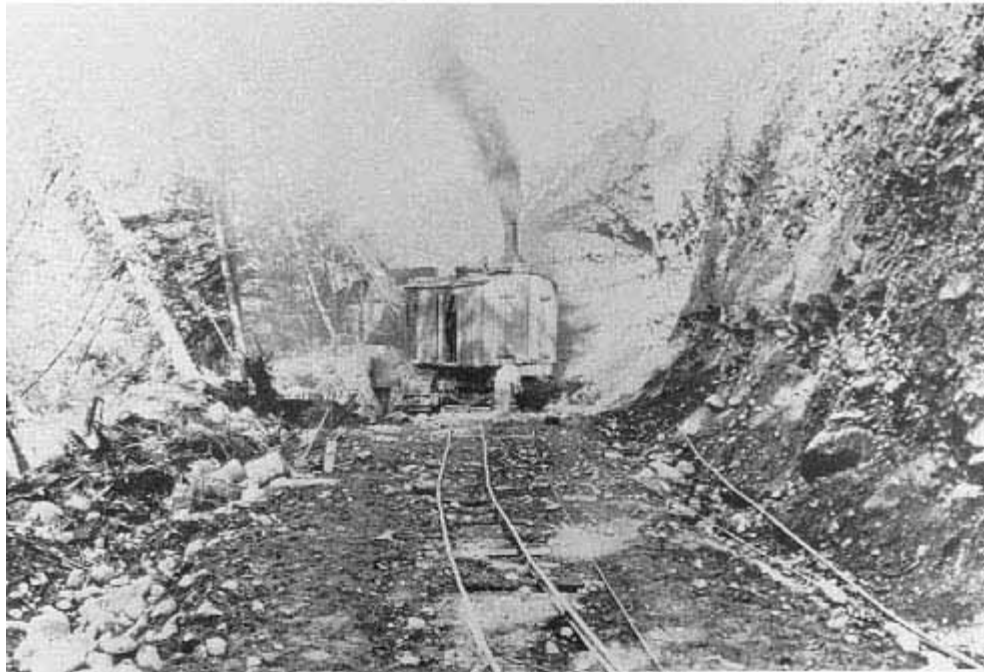
The other hazard attending the operations of logging within the watershed is of vastly greater importance. It is the danger of fire sweeping the inflammable slash and forest litter and consuming with it the humus and other organic matters that form the upper soil layers thus exposing the solid rock, hardpan or other unproductive subsoil. Since the soil is the supreme factor in slowing up the movement of the precipitation toward the stream, the removal of the absorbent upper portion by fire deprives the

hillsides of this restraining and filtering influence, and runoff is hastened and erosion results. The finer inorganic parts of the subsoils and the clay constituents when present are swept into the main stream to add turbidity and discoloration to what would otherwise have been a clear and sparkling water. (page 88)

These ends (to protect the watersheds) would seem most readily served by the creation of a Metropolitan Water Board. The Board should be endowed with authority...to purchase lands and timber rights within the North Vancouver watersheds, with the object of protecting the sources of supply. (page 10)

The pre-eminent object to be attained is the maintenance of an adequate supply of pure i.e. unpolluted water - all other considerations are subordinate: and to that end the watershed should be preserved inviolate. (page 93)

Capilano Timber Company's Marion Steam Shovel cutting through Capilano Valley Slope for railway track. Note the steep slope to the right of track which is exposed and destabilized.
(Vancouver Public Library Photo)



Incredibly, just over one year after Cleveland's internal report was reviewed by Lands and Forests Minister Pattullo and the provincial Cabinet, Pattullo inflamed the embers of public concern by the issuance of an additional timber sale for the Capilano Timber Company. This event partially provoked an important and famous address. On October 1, 1924, the president of the Vancouver Natural History Society, John Davidson, who was also professor of Botany at the University of British Columbia, gave a riveting speech to a crowd of some 300 people on the Capilano Timber Company's operations, which he entitled *Hand-Writing on the Wall, or, Wake Up! Vancouver*. In Scotch-like sermon fashion he likened the fevered rate of destruction of the forested lands of British Columbia and in the Capilano to the denuded landscape of the Middle East mentioned in the Old Testament, and commented on the consequences associated with the Capilano logging.

We cannot over-estimate the value of reliable source of cold, fresh water, furnished by slowly melting snows percolating through the sandy, gravelly soil and cool shady forests to the water intakes; Vancouver is in an enviable position in this respect. When the citizens of Vancouver realize the necessity of the trees on the mountain slopes for the maintenance of this supply, they will not tolerate any interference with the timber or any part of the watershed.

Then a logging firm started in on Capilano - the thin edge of the wedge - they deforested the valley just below the intake, then around Sisters' Creek, then the slopes of Crown Mountain, and where next. They want to go higher and higher up the watershed; Vancouver's water supply is of no interest to them, it's the timber they are after, and they mean to get it whether Vancouver survives or not. It looks as if British Columbia's forest resources were almost depleted if it is found necessary to attack the watershed of the largest city in the Province; this must be the last resort.

The more that logging is carried on in Capilano Valley, the more erosion there will be....All logging in that area should cease at once...nature should be assisted in every way to prevent erosion before it is too late. We cannot afford to listen to the reports of so-called engineering experts who say, "there is no danger, we can build a dam to store water." That is not the type of Engineer we need; we need men with experience, vision, foresight or whatever you call it, that will advise us to preserve our assets, and not tell us how to repair them after they are ruined. We need men today who can see and act straight, whose eyes are not fixed on TODAY, but who are looking forward to the FUTURE welfare of the Province. A man with his eyes focused on too close an object becomes cross-eyed, distant vision helps him to see straight.

We must elect representatives who will protect the interests of the people. In this connection I wish to heartily endorse and commend the recent action of Mr. Chas. Woodward for the stand he took in regard to the protection of our watershed; I only regret that he was not elected 12 years earlier; it will take more than 100 years to repair the damage done within the past few years; even now it may be too late.

In March 1926, just a month after the Greater Vancouver Water District was officially formed, Bremner, Daniels & Armstrong, a forest engineering firm, contacted the Water District to solicit their experience in assessing the denuded Capilano basin. The letter noted that:

Where the forest cover has been removed on the slopes it will usually be found that erosion [sic] is rapidly taking place, causing discoloration of the water, sedimentation of the pipes and greatly increased surface run-off. Such conditions now exist in the watershed and should be checked immediately by efficient natural methods.

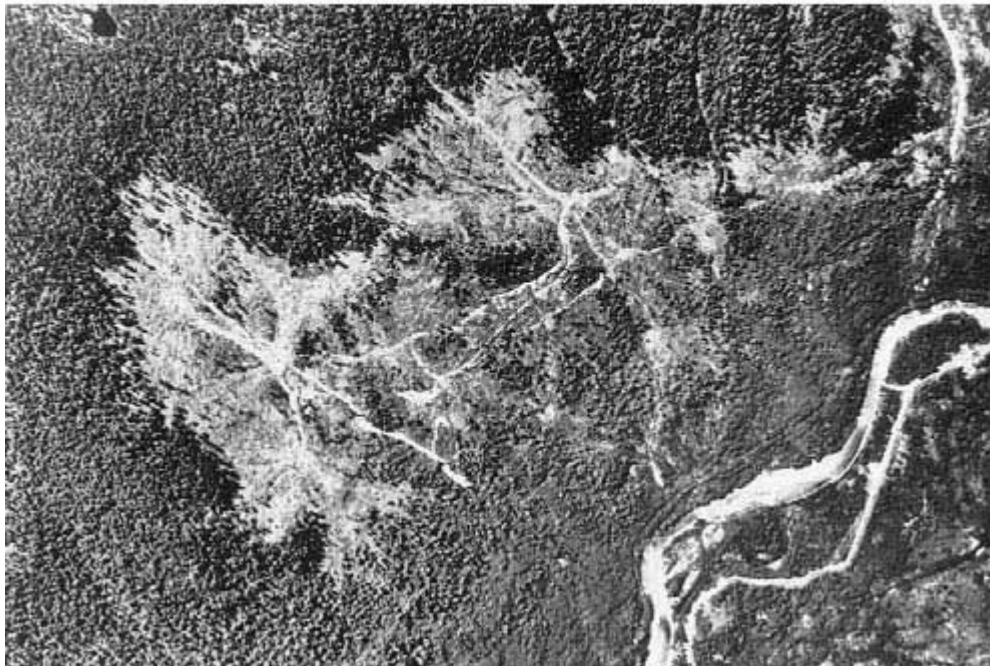
Warnings and observations by provincial authorities, Water District Staff, the Vancouver Natural History Society, forestry consultants, all discuss the problems of erosion to the Capilano landscape. These select quotations and the two early photographs indicate the problematic disturbances initiated by the Capilano Timber Company.

2. THE CAPILANO TIMBER COMPANY'S 1931 LOGGING PLAN

The area of the recent landslide was clearcut by the Capilano Timber Co. in the 1920's. This was once a very old, magnificent, and predominant Western Red Cedar stand, with individuals randomly spaced from 5 to 20 meters apart: their root structures tied the landscape with a vast interconnected grid. The Company had clearcut both sides of the main unnamed creek, which I will name Switchback Creek, for some 400 meters in elevation above the present Reservoir level. They also logged through a small ephemeral connecting drainage, which may have been created by the placement of the switchback railway track, and which I will name Scar Creek, shown as beginning immediately below the bottom middle section of the lowest area of the switchback. These are shown on the following map (see page 17), which is an extract from the company's logging plan map, dated June 15, 1931.

Two spar trees are marked on the map on either side of the recent landslide location. Attached to these two spars was a swing cable, or swing line, to move fallen and bucked logs from the upper slope area to a loading zone next to the main railway line (spar A to spar B on the map). The top most spar (A) was mounted just above the southwest corner of the slide. Logs were dragged from locations far above and then beside spar (A) where they were then piled. This procedure sometimes dragged either the entire log or the end of a log along the surface of the slope, disturbing the ground with drag marks. These grooves can later act as channels for water to run along which may erode the surface soil.

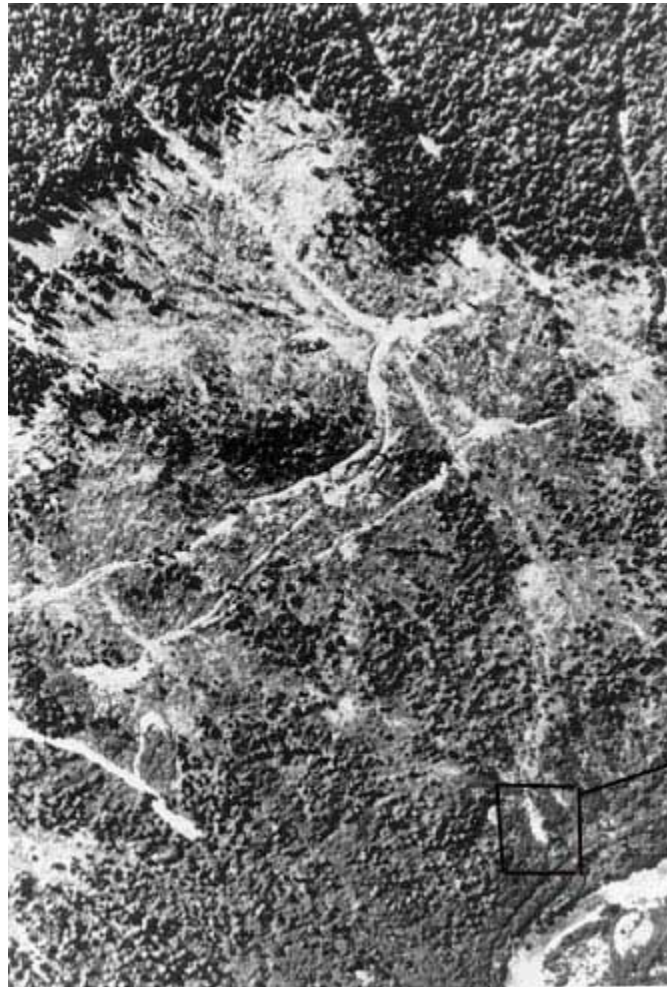
1939 aerial photo, showing railway switchback in center, and Big (alias, Hurricane) Creek to left. Note erosion channels and scars. Capilano River and railway track on bottom right.



The forested slope area farther above and along the top area of Scar Creek was logged later in that decade, as the Company built a long railway grade from Sisters Creek to reach the upper slope area. The Capilano Timber Company decided to build a railway switchback, because the slopes and Big Creek gulley to the south were too steep for the railway track to directly access the big timber up above. Switchbacks can cause more damage to a steep landscape than a single railway grade, as it can aggravate water run-off and affect slope stability in more complex ways.

Some of the earliest aerial photographs of this area were taken in 1939. As you can see, these photos correspond to the logging plan map. Note the erosion scars which are highlighted on the photo. These scars are above and below the railway track, from Big Creek to the south to Switchback Creek to the north. Note the erosion scar below the confluence of Scar and Switchback Creeks - the present location of the Capilano slide. Whatever the damages incurred from logging practices (and possibly fire) were later slowly healed and reforested by natural regeneration of mostly western hemlock and deciduous species (refer to photos on pages 15 and 16).

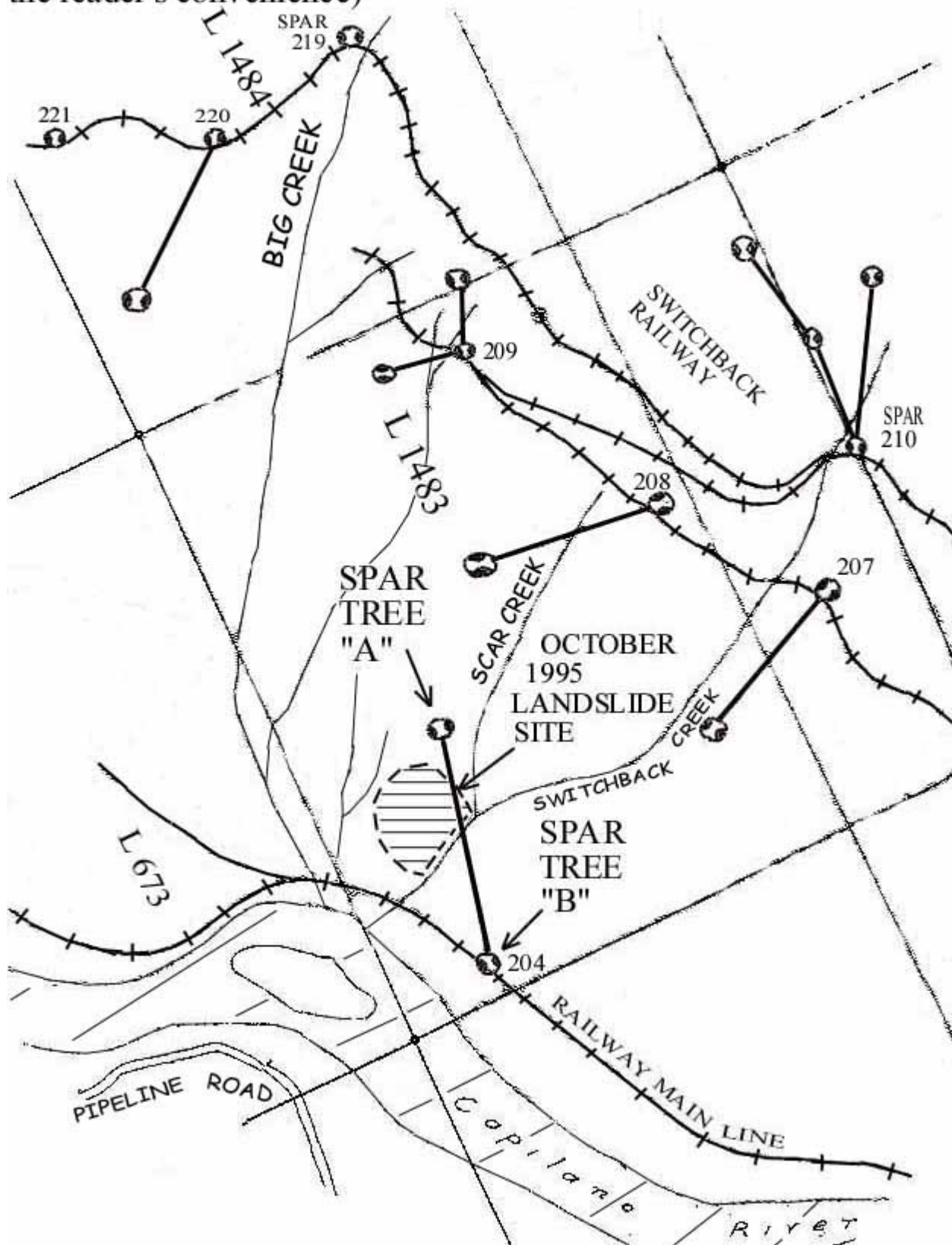
**Hurricane
Creek**



Close up of 1939
aerial photo shown
earlier. Note the
location of the
railway switchback
and the erosion
scar (see rectangle
area) at the
confluence of
Switchback and
Scar Creeks.

**Erosion
Scar**

1931 CAPILANO TIMBER CO. LOGGING OPERATIONS MAP
(original map shading removed and other features highlighted for
the reader's convenience)



3. GVRD TREE FARM LICENCE #42

The descriptions of the erosional effects from the logging operations in the Capilano, which are generally noted above, are in clear contrast to statements initially fabricated by forestry consultants in the 1950's. In 1953, the Water District hired the forestry consulting firm, C.D. Schultz & Co., which also principally solicited and serviced the large forest companies in the province, to conduct an inventory of the watersheds' forests. The Schultz Co. produced a two volume inventory report by late 1956, and also included lengthy recommendations for logging the three watersheds. Contrary to what the Greater Vancouver Water District's expectations may have been, the firm's intentions were to fragment the Water District's policy of protecting the forests by committing them to promote road access and a sustained yield logging program. To rationalize such a difficult and controversial proposal, the company skewed the effects from past forestry operations and convoluted information on forest hydrology in their final report:

Investigations of the logged and/of burned areas in the Capilano Valley failed to show that erosion was appreciably increased by logging. Any erosion that took place subsequent to burning was slight and has now been stabilized. (*Appreciation of Factors Affecting Watershed Management on the Watershed of the Greater Vancouver Water District*, page 84)

Slides and stream cutting are natural forms of erosion found throughout the Watershed. (Ibid., page 85)

An analysis of available precipitation and stream flow records for the Capilano Valley indicates that logging had no adverse effect on water yield. (Ibid., page 134)

A forest management program is an essential part of an over-all Watershed Management Plan. Such a program would provide for the orderly development of the forest resources without jeopardizing water yield and water quality. (Ibid., page 61)

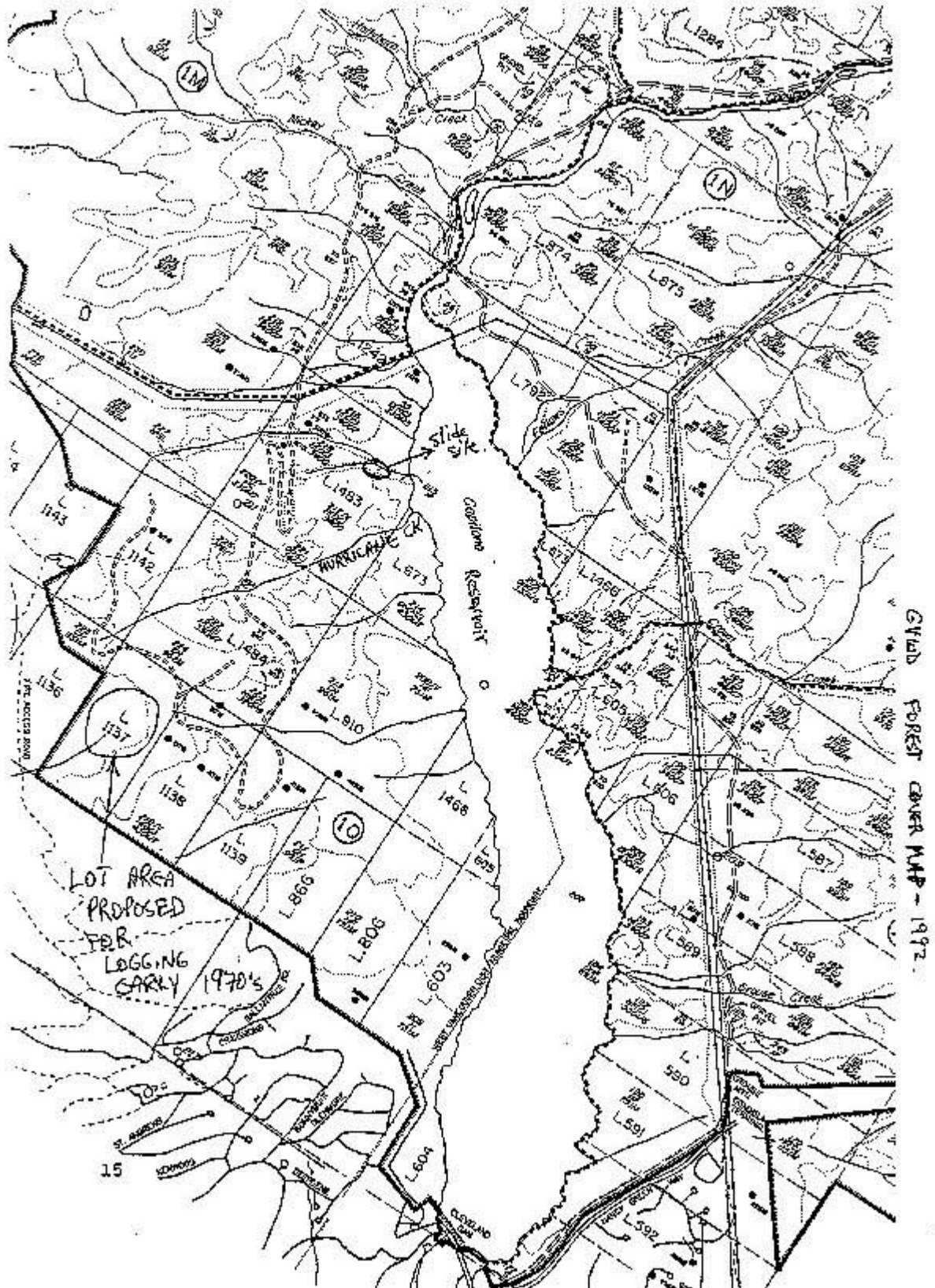
The Schultz report, and its recommendations, were kept waiting in the wings after late 1956, because the firm's president was involved in the famous public scandal with Social Credit's Forests Minister Robert Sommers (note: some of these details are mentioned in my manuscript *Wake Up Vancouver*).

In the spring of 1967 the Social Credit government signed an amending agreement with the Greater Vancouver Water District (GVWD), known as the Amending Indenture, to allow logging on provincial Crown lands in the three watersheds. No thanks to some aggressive foresters, the GVWD had already approved logging its own private lands in the Seymour and Capilano since 1961, lands which were ironically acquired and purchased by Greater Vancouver taxpayers for protection after 1926. These Crown and private lands were then re-designated by the Ministry of Forests as a special working forest to produce a not-so- rigidly-enforced allowable annual cut, and christened them as Tree Farm Licence #42. And in accordance with all Tree Farm Licencees, a Management and Working Plan had to be provided every five years which detailed, along with many other matters, proposed road construction and clearcutting plans to account for the annual volumes of wood.

The first plan in 1969, *Management and Working Plan No.1*, stressed that "road development will be of an extensive nature" (vol.2, page 15) in the watersheds. The Plan detailed the continuance of a logging road branch to access the upper Sisters Creek valley to Lembke Creek, and construction of a road to access the forests just east of Brothers Creek above West Vancouver. Both of these secondary roads were constructed overtop the old Capilano Timber Company's railway grades.

Access to these connecting roads was by a main bridge across the Capilano River which was constructed in about 1968. This bridge was built to bypass the more difficult and old hydro access route to the east below mountainous cliffs, a road which the GVWD had hauled logs out along since 1964. From the new bridge, the GVWD later constructed a road northward along the western flank of the Capilano River to meet with the old road at the confluence of Eastcap Creek.

1992 Water District Forest Cover Map showing
Hollyburn logging road (on left) and location of
District Lot # 1137 (area proposed for logging).



According to the 1969 plan, the secondary road to the Brothers Creek area, later named Hollyburn branch, was to first access and “selectively log” 70 acres of forest on District Lot #1137 in the Glenmore area, which is shown on the following map.

For some reason this area was never logged, and one could speculate that residents or officials who discovered these plans were opposed and had them cancelled, or that these plans were reconsidered because of viewscape concerns from Grouse Mountain (and it is yet unknown if the GVRD is planning to log this area). **Whatever the original reason, the road appears to have been built most unnecessarily and was abandoned.**

The Hollyburn road was constructed exactly overtop the old Capilano Timber Company railway grade, which now runs above almost the entire western length of the Capilano Reservoir, and right over the old railway switchback mentioned above. It is difficult to comprehend what the effects of this switchback may previously have incurred on the landscape immediately below it - how water had been routed, concentrated, and re-routed above and below the soil horizon. The 1968 aerial photograph [see below] shows a scar below the switchback (hence, Scar Creek) possibly indicating some problems from the switchback, and that the area had started to heal through vegetative regeneration.

It is equally difficult to ascertain what the effects of reconstructing a road in this area have had since. But one may casually surmise that it may have opened old wounds over the years and created a new one. To support such an possibility, there are a number of trouble spots which have developed over the years, some of which will be discussed in chapter 4 of this section.

In the Management and Working Plan No.1, the Ministry of Forests included guidelines for all road construction in the watersheds:

The policy as based on this initial assessment [as to how much of the watershed should be utilized for the purposes of timber yield] will be to avoid those areas where clear cutting and road building may result in: (a) significant erosion, (b) compaction of the soil or soil mantle, (c) accelerate the run-off of heavy rainfalls, (d) changes in the accumulation and melt of snow pack. (Vol.2, pages 5-6)

The prime purpose of special road specifications for watershed areas is to minimize, or avoid, practices contributing to erosion, stream turbidity, and the reduction of water infiltration area through soil compaction. (Vol.2, pages 16-17)

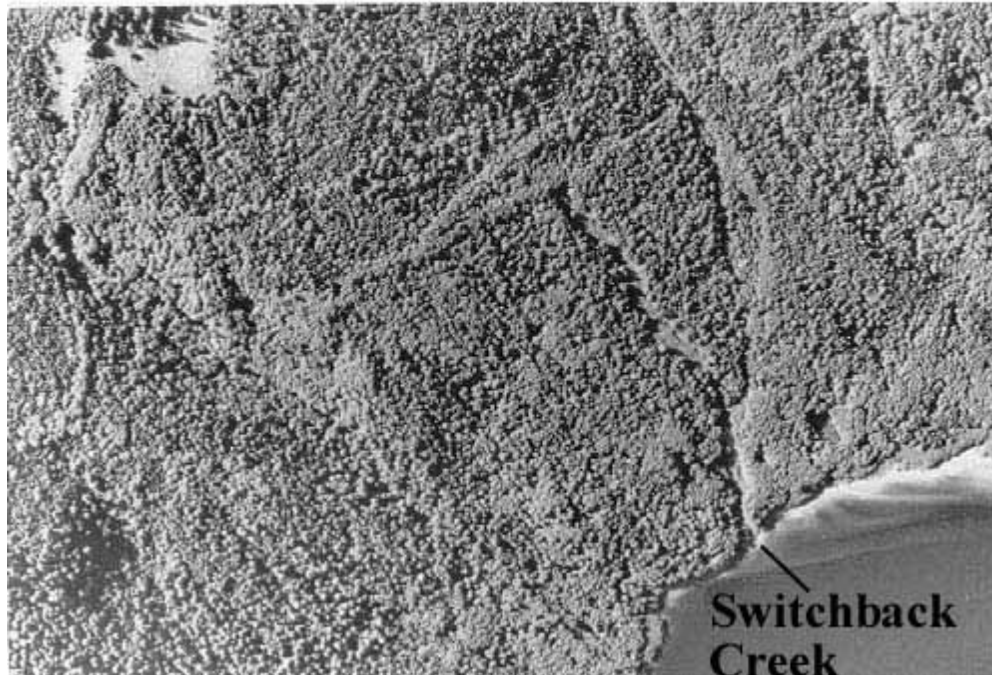
Location Specifications. (d) **avoid switchback locations necessitating steep road grades and/or heavy cuts and fills.** (f) avoid locations on cut banks of dubious stability i.e., where natural sluffing or slides are in evidence. (g) favour undulating rather than sustained grades, particularly on secondary or spur roads.

Construction Specifications. (c) install sufficient ditches and culverts to handle peak run-off. (d) where possible, dispose of road drainage where it can settle before entering into main channels. (Vol.2, page 17)

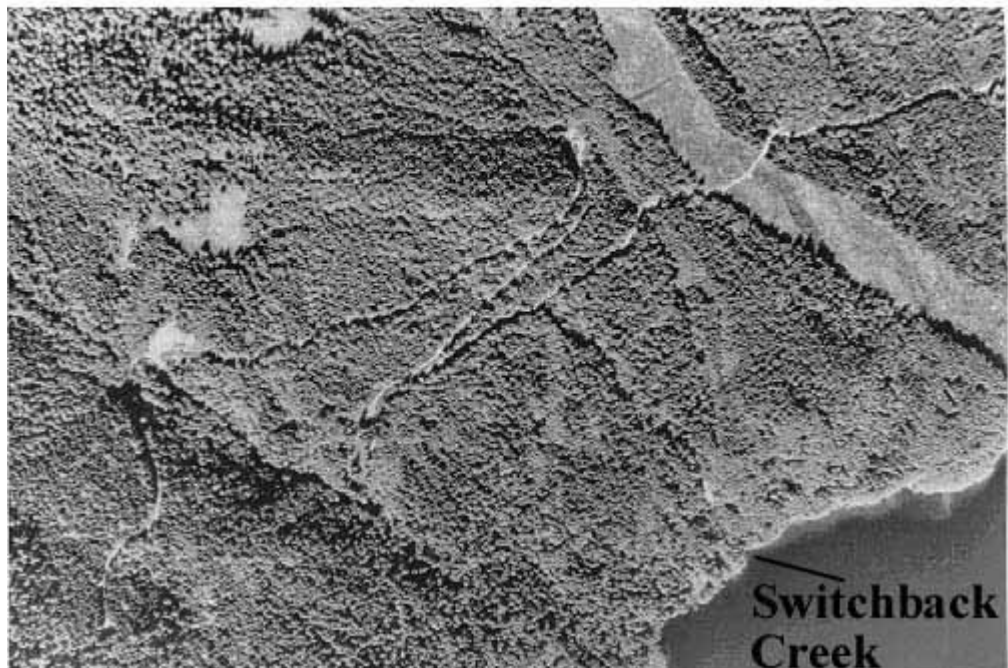
Note the special reference to switchback roads. Of course the GVRD had not been carefully measuring the long-term effects that roads, road ditches, and culverts were having on concentrated water run-off, sediments transferred along road ditches, and water quality, so it is impossible to understand if their roads were in compliance with the specifications mentioned above. The fact that this reconstructed Hollyburn branch has been in existence for the last 25 or more years is very important in understanding that water run-off has been interrupted, which, under natural unmanaged conditions, is more evenly transferred down a slope. Such unnatural conditions can affect both soil saturation levels and sub-surface drainage patterns farther down the slope during very heavy rain events. These matters are further complicated and compounded if the artificial drainage patterns along the road ditch are blocked and rerouted.

Of course the most important and blatantly obvious question which everyone should be asking themselves is: **why did the Water District allow a road to be built above their Reservoir, a road which rises steeply and one which transects thick clay and silt deposits?**

AUGUST 30, 1968 AERIAL PHOTO (CLOSE-UP).
Shows regeneration of clearcuts and of the railway line.
Railway switchback is faintly visible. Note erosion scar
starting below lower track on the switchback.



JULY 15, 1979 AERIAL PHOTO (CLOSE-UP).
Shows Hollyburn logging road (built after 1968) and B.C.
Hydro right-of-way.



4. THE NOVEMBER 1994 - FEBRUARY 1995 RAIN STORMS

The late November 1994 to February 1995 rain storms, and rain-on-snow events, caused increased levels of reservoir turbidity and a number of landslides in the watersheds. In fact, the GVWD had to close the Capilano Reservoir because of unacceptably high turbidity readings on two separate occasions for a total of about 42 days.

In mid-February, well after the landslide events and the first closure was announced in the press, John Morse, the Manager of Water and Construction, provided a brief and general report for the Water Committee on the storms and their effects:

At the time of the December 1994 storm events, the three GVWD reservoirs were near full capacity with minimal drawdown zone exposure, thereby reducing the erosion opportunities from this source of turbidity generating sediment. The other sources of turbidity generating sediment are landslides and stream bank erosion. The significant turbidity event that occurred in the Capilano watershed can be attributed to the glacial lacustrine deposits (clay-silt) that surround the Capilano reservoir. (Water Committee Agenda, February 10, 1995)

Curiously, there was no specific information on the source of the Capilano turbidity. But the report identified 3 “significant” landslides in the Capilano, none of which were, I believe, responsible for the closure of the Capilano. However, the fact that the report actually mentioned the clay-silt deposits around the Reservoir, without zeroing in on a specific source, is of great interest and will be discussed later.

During that period, the GVRD had denied access to myself and other individuals who were genuinely interested in investigating the landslide sites in the watersheds. I, and another interested party, decided to inspect two of the Capilano landslide sites ourselves without authorization from the GVRD. What we discovered on our way to the sites at the top of Sisters Creek access road were a series of problems on the Hollyburn logging road, problems which were carefully documented with a camcorder.

Hollyburn road bank, showing exposed clays still eroding 30 years after construction. Fine clay material is flushed along the road ditch into Switchback Creek 30 meters distant.



I eventually wrote a 22 page report (*A Critique of the Landslide Report from John Morse to the Water Committee*) and delivered it to the Water Committee on March 17th, and later that month to the GVRD Administration Board and the media. Amongst many problems related to ditches and culverts on the Hollyburn branch, part of that report described how a double slide on the southern end of the switchback was caused by water being rerouted away from the road ditch. I commented that there was no observable indication of sediments running into the reservoir from these two landslides.

Another part of that report was on how the road construction next to Hurricane Creek had been responsible for slope failures and leaching of clay and silt material directly into the Capilano Reservoir. The Hurricane Creek drainage, which was renamed because of a very small blowdown section nearby from the November 1962 Typhoon Frieda, was formerly known by the Capilano Timber Company as Big Creek, and had been severely disturbed by their logging operations in the late 1920's. It is also interesting to note that the Hurricane Creek drainage is immediately south of the Culvert Creek landslide, indicating the proximity and instability of the area. After the slopes around Big Creek had healed from the first logging operations, the GVRD re-initiated the erosional disturbance process. This is shown progressively in aerial photographs taken after 1970 (see photos one pages 24-25).

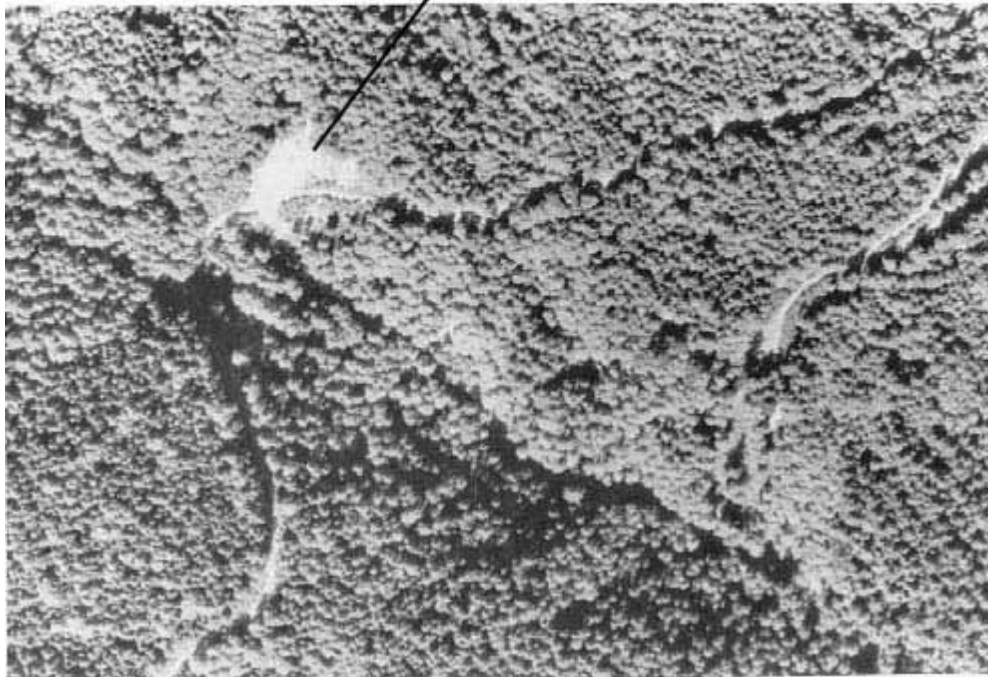
The problems were becoming so acute at one point on this site that the Water District had to fortify the lower road bank at the Hurricane Creek juncture with enormous boulders, or rip-rap.

At the March 17, 1995, Water Committee meeting, Paul Hundal, president of SPEC (Society Promoting Environmental Conservation), spoke on the two small and interrelated landslides and showed the Water Committee about 5 minutes from the video we took on the Hollyburn road. Water Committee members were also told of other significant problems on the road. Shortly afterwards, John Morse asked the Manager of the forestry department, Bob Cavill, to speak to the Committee members on the history and status of the Hollyburn road, to provide an explanation for the documented problems:

In the 1960's, during Typhoon Frieda [November, 1962], there was a decision made to access that blowdown timber, and some work was done in the 1960's design and standard. It's about 7 kilometres of road. To put it into perspective, we manage 330 kilometres of road per year. The design and construction standard are not up to the standards of our other roads. The reason we haven't done a lot of work up there, in terms of improving the road, is we simply use it for fire access, North Shore Search and Rescue uses it from time to time to fish people out when they get into trouble. Other than that it serves us well as a fire access. It's held up well. We are looking at it and watching it. The culverts and ditch line are inadequate, not up to the standards of the roads built in the 1970's and 1980's. We have done some work up there in terms of erosion control. Hurricane Creek, we've done some bank stabilization. Nickey Creek, we've done some rechannelling in order to maintain the recent sediment load. So we've done some work up in that area. The road we are looking at and it serves our purposes now. The other thing we have to be a bit concerned about is viewscape, because it can be seen from Grouse Mountain, so we want to consider a whole bunch of things. We do an annual maintenance program on that road. Last year in November 1994 we had our staff supervise the road up there for about 10 hours worth of work. So we are cognisant of the challenges with the road, and we are also working on maintaining it. (Videotape transcript.)

Cavill's statement, that the Hollyburn road was "not up to standards", is a cautious admission of its condition, where he states that the Water District has failed to comply with standards which were implemented "in the 1970's". However, it is important to understand that the 1969 *Management and Working Plan* had tabled strict road standards in accordance with maintaining water quality, and that construction had actually been done on the Hollyburn road in the 1970's, information which is inconsistent with Cavill's analysis on suggesting the road was not built according to standards. In this respect then, it will be important for someone to carefully investigate what those particular standards are, why they were not followed during construction, and what has been the result of not meeting them on the Hollyburn branch.

Close up of 1979 aerial photo showing upper switchback area. Note erosion scar beginning on upper road bank just north of (to the right of) Hurricane Creek.



August 9, 1987 aerial photo close-up. Note that the erosion scar has expanded (contrast with 1979 aerial photo) above and below the logging road. Note the change in the Hurricane Creek channel.



1995 photo of the upper and lower road bank at Hurricane Creek. From road to top of cutslope erosion is 58 meters. Note the rip-rap below road after road failure in 1980's.



↑
58
meters
↓

July 29, 1992 aerial photo close-up. Note the change along most of the Hurricane Creek channel; it begins immediately below the road.



About one month after the Water Committee meeting in March, John Morse, who had read my report, had publicly denied that the Hollyburn logging road had been responsible for transporting clay and silt into the Reservoir, after the CBC radio announcer asked him if that was indeed the case:

This is a minor, obscure, seldom-used road, geographically well removed from the reservoir. (John Morse on CBC radio, 4:45- 5:00 pm, April 13, 1995)

About two weeks later, Morse was specifically questioned on his statement by Mayor Weinburg of Anmore Village during the GRVD Board meeting, after Paul Hundal had provided the GVRD directors with a map of the Capilano Reservoir area, showing the Hollyburn road directly above it:

Mr. Chairman. I also heard the comments by Mr. Morse on the radio relative to the proximity of the slides in Capilano (Reservoir). And I wonder if he would comment on this because it seems to me, looking at this map, listening to these comments, that his remarks were inconsistent with the reality of what we see in front of us, namely that these slides may have been contributing to the quality in that (Reservoir). (Mayor Weinburg, Rogers Cable videotape of GVRD Board meeting, April 28, 1995)

Morse reinterpreted and then defended his statement by claiming that he actually meant that the coarse sediments from the switchback double slide itself were geographically removed from the reservoir, that no material had flushed into the reservoir, and carefully avoided discussion on the Hurricane Creek area. When Paul Hundal, who was standing next to Morse, heard this and interjected into the podium microphone, pointing out his obvious deflection, the Chairman of the Board remained uninterested in Hundal's rebuttal:

Hundal: If I may respond to that, you'll notice that the south slide is in a gulley that goes...

Halsey-Brandt: No, you're not going to interrupt us. You've made your presentation and we certainly appreciate that.

Hundal (determined): I just ask that you look at the south slide. It's right beside a stream. How could it not have gotten into the (Reservoir).

Halsey-Brandt: Thankyou very much for your presentation Paul. (Ibid.)



Photo taken November 12, 1995. Excavator on upper Hollyburn road removing old culverts, blocking and digging out ditches. Culvert removed in foreground, and new placement of water bar.

During Hundal's delegation to the GVRD Board, he mentioned that someone had flown over the Capilano Reservoir at the end of December 1994 and photographed a plume of sediment which was coming from a small creek. Greg Helten, and two others, had flown over the Reservoir on December 31, 1994, to investigate the recent landslides in the Capilano. According to Helten this was the only observable source of turbidity entering the entire Reservoir. Remarkably, that clay and silt sediment came from the mouth of Switchback Creek, as shown in the photo taken by Greg Helten on December 31.



Turbidity plume from mouth
of Switchback Creek.
Photo taken from airplane
on December 31, 1994, by Greg Helten.

This little fact may possibly shed some interesting light on the present Culvert Creek landslide and on some factors behind the closures of the Capilano reservoir in late 1994 and early 1995. According to the February 1994 Morse report, mentioned above:

The significant turbidity event that occurred in the Capilano watershed can be attributed to the glacial lacustrine deposits (clay-silt) that surround the Capilano reservoir.

Theoretically, if some independent observers had noticed this plume from the air, then the Water District most likely had known about the turbidity as well. And if the Water District had prior knowledge of this problem, then the recent landslide becomes intriguing. First of all, the sediment from the mouth of Switchback Creek may have been one of the contributing factors for the first or second closure, or even both Capilano closures, at the beginning of this year. Secondly, the Water District may have been withholding specific information from the public about this. If the Water District was, then why was it withholding the information and who decided not to release the information? If the Water District has more information on this site before it slid away last October, then it may help us to understand how it may have been precipitated. In fact, the plume may have been acting much like smoke rising from a volcanic crater, indicating imminent danger. On November 6th, 1995, I asked the Water District for any information on previous turbidity problems and comments from staff monitoring this area.

The Water District indeed has knowledge of previous problems in this area. On CBC French Television, the superintendent of forestry, Derek Bonin, commented on the landslide site:

It's very steep, it's on the edge of a terrace, and it keeps breaking away. And we've seen this material cause us some dirty water in the past and we could probably see similar types of circumstances in the future. (Video transcript, October 18, 1995)

While I was at the landslide site, I looked to find the terrace described by Bonin. From two different perspectives I identified a steep slope, but not a terrace. The steep angle of the slope at the site of the landslide varied to some extent, and the steep slopes to the south and around the corner of the landslide also varied in pitch. The area at the top of and to the south of the slide is also described on an image prepared by the forestry department as a bench with an escarpment immediately below it (refer to maps in Part 2, chapter 2). I don't believe that the true definition of a terrace or escarpment is accurate here, rather a variety of steeper slopes falling from a not-so-horizontal bench area.

In a Vancouver Sun newspaper article on November 13, the reporter reviewed a report prepared by John Morse for the November 17th Water Committee Agenda, and Morse commented that the area was already unstable, indicating the Water District's knowledge of the area:

The slide, about 700 metres from the nearest logging road....occurred in an unstable area where several other slides have occurred periodically during the past decade.

The Water District's 1992 culvert inventory map also shows that there had recently been a slide near the landslide site (see map in chapter 6). In fact, the slide is immediately south and around the corner from the present slide, and, according to information given to the Water Committee on November 17th, the slide occurred about 1990.

5. THE CULVERT CREEK LANDSLIDE

The reason I've nick-named this site the Culvert Creek landslide is because I believe it is this culverted-ephemeral tributary which may have been the catalyst for the landslide. If that is indeed the case, as I will try to demonstrate from visitations and an analysis of the area, then the focus of any investigation must be to carefully examine the way in which water run-off had been entering this zone, as it is primarily assumed that water, and the accompanying gravitational force, are responsible for triggering the slope failure.

There seem to be three immediate and possible theories for the Culvert Creek landslide, theories which are interrelated with the fact that the area had been disturbed by clearcutting some 70 years ago, and the rebuilding of the Hollyburn logging road:

- The first theory is that water courses eventually carved one or more channels into the clay bank material causing it to eventually collapse;
- The second is that water from another source had seeped far underneath the clay bank weakening a clay or silt deposit layer which eventually forced the bank to slip away and collapse;
- The third theory is a combination of theories one and two.

I have provided a series of four chronological aerial photo close-ups, one large compilation of 10 color photos, and three illustrations of the landslide area.

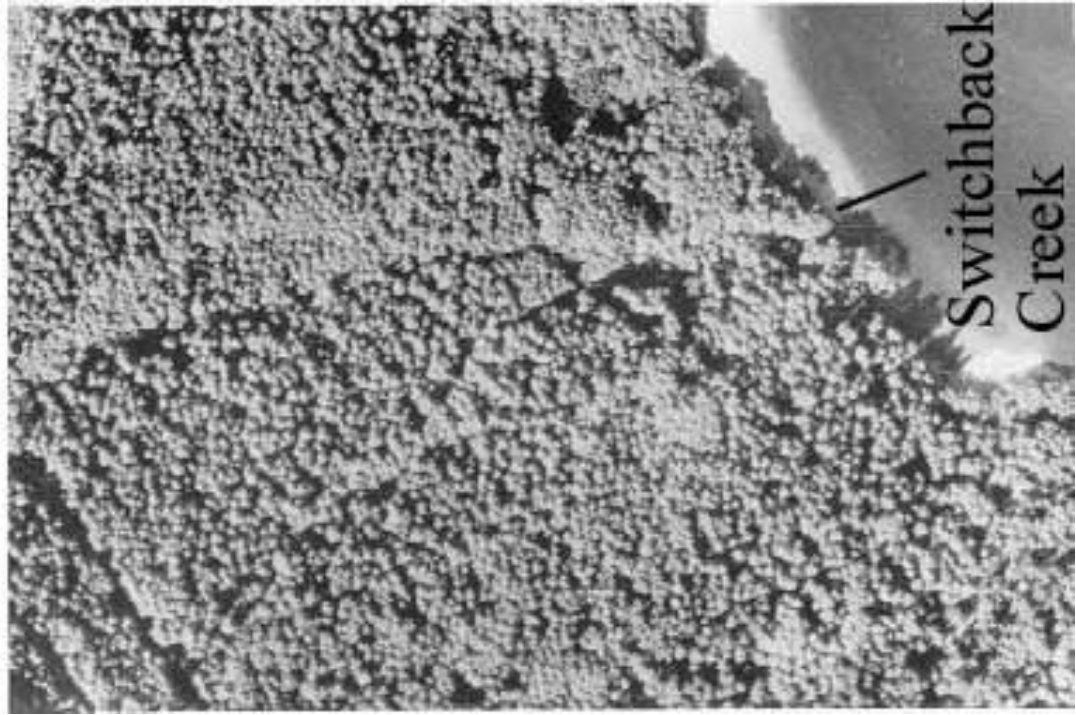
1968 aerial photo close-up showing visible slide scar beginning immediately below old railway grade



1979 aerial photo close-up showing Scar Creek regenerating, and new erosion scar at the bottom of Scar Creek area.

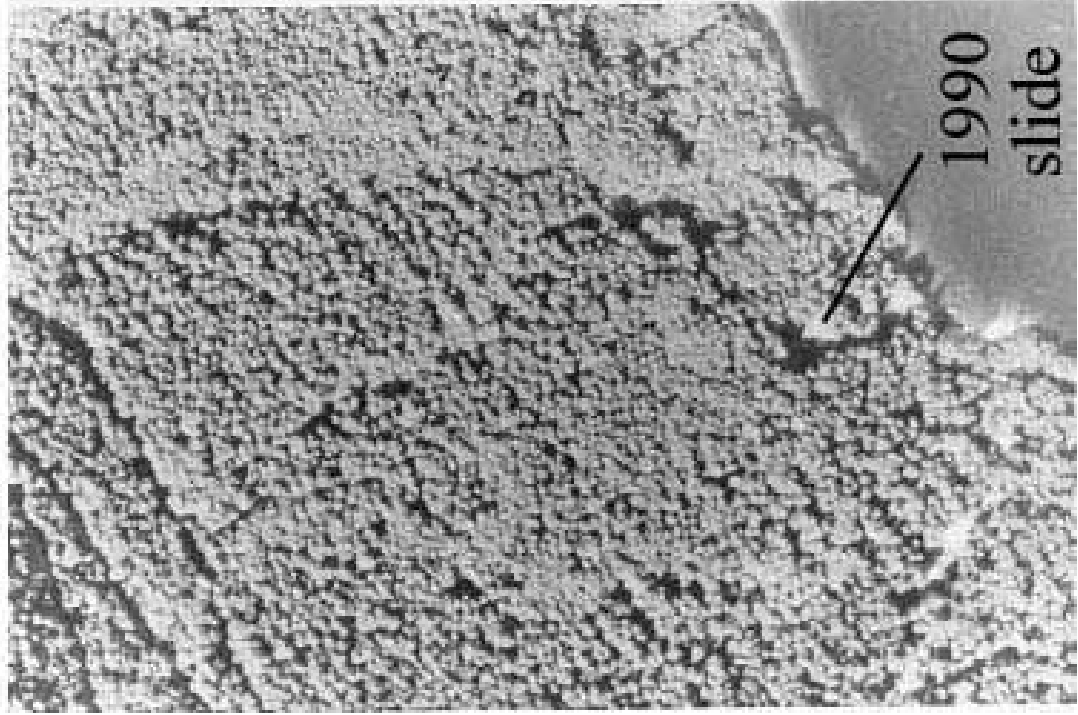


1987 aerial photo close-up showing advanced regeneration of forest cover below switchback road.



Switchback
Creek

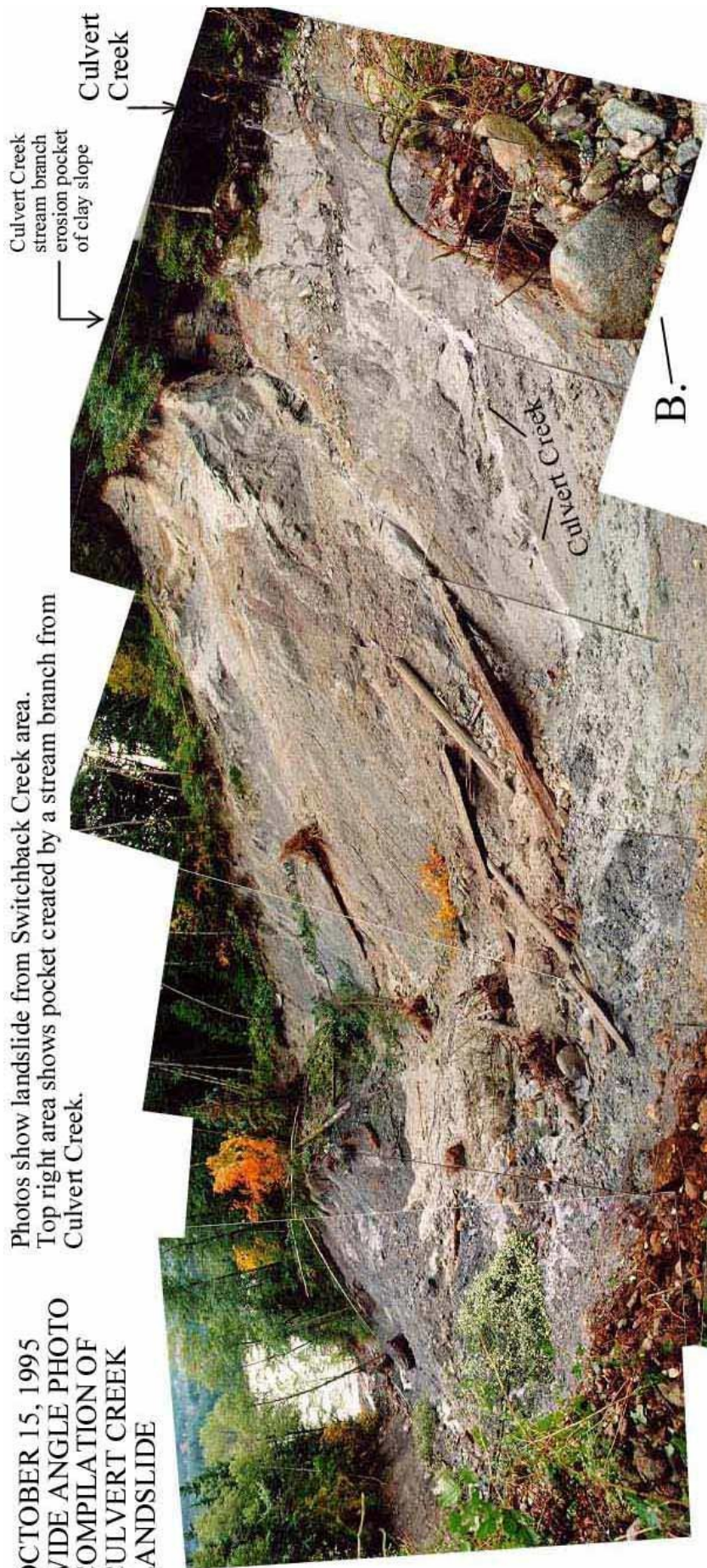
1992 aerial photo close-up showing 1990 slide, approximately 50 meters southeast of 1995 landslide.



1990
slide

OCTOBER 15, 1995
WIDE ANGLE PHOTO
COMPILATION OF
CULVERT CREEK
LANDSLIDE

Photos show landslide from Switchback Creek area.
Top right area shows pocket created by a stream branch from
Culvert Creek.



B.—

"Interglacial sands, silts, and clays are alluvial deposits laid down between two major glaciations. These alluvial deposits are compact and usually protected from the surface by moraine or till deposits. Where exposed, these deposits erode readily." (Water District Management and Working Plan No.1, vol.1, p.7.)

— A. —

"A." and "B." show area which was eroded by a previous undated event as described in the report.

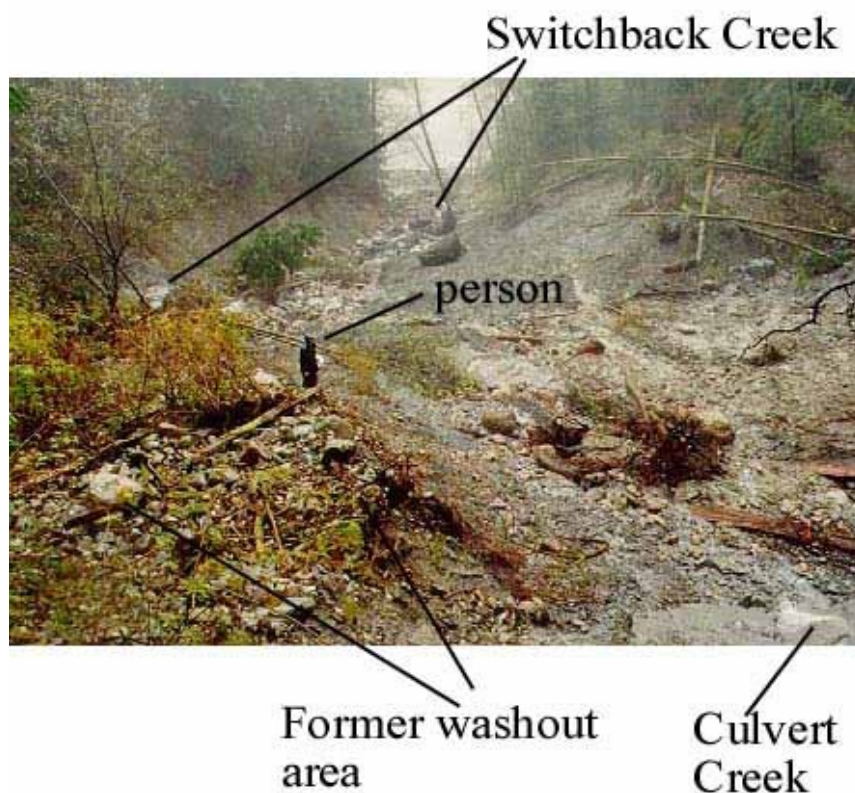
The first sketch (page 33) illustrates the impact zone from a bird's eye view in relation to the confluence of Culvert, Scar, and Switchback Creeks. The two other sketches (page 34) illustrate the area which had slumped, in what I call the middle bench zone, looking westward upslope to the landscape profile of Culvert and Switchback Creeks, and looking southward from the northern edge of Switchback Creek.

The bird's eye and horizontal sketches profile the area affected by the slide. As you can see, the main creek is on the very edge of the slide area and along the bottom bench zone. This is important to understand, because it shows that the slippage surface or middle bench zone, which is almost horizontal, is well away and above the main creek area. Culvert Creek is situated well into the southwestern section of the slide zone and intersects the upper cross-sectional horizon of the clay deposit.

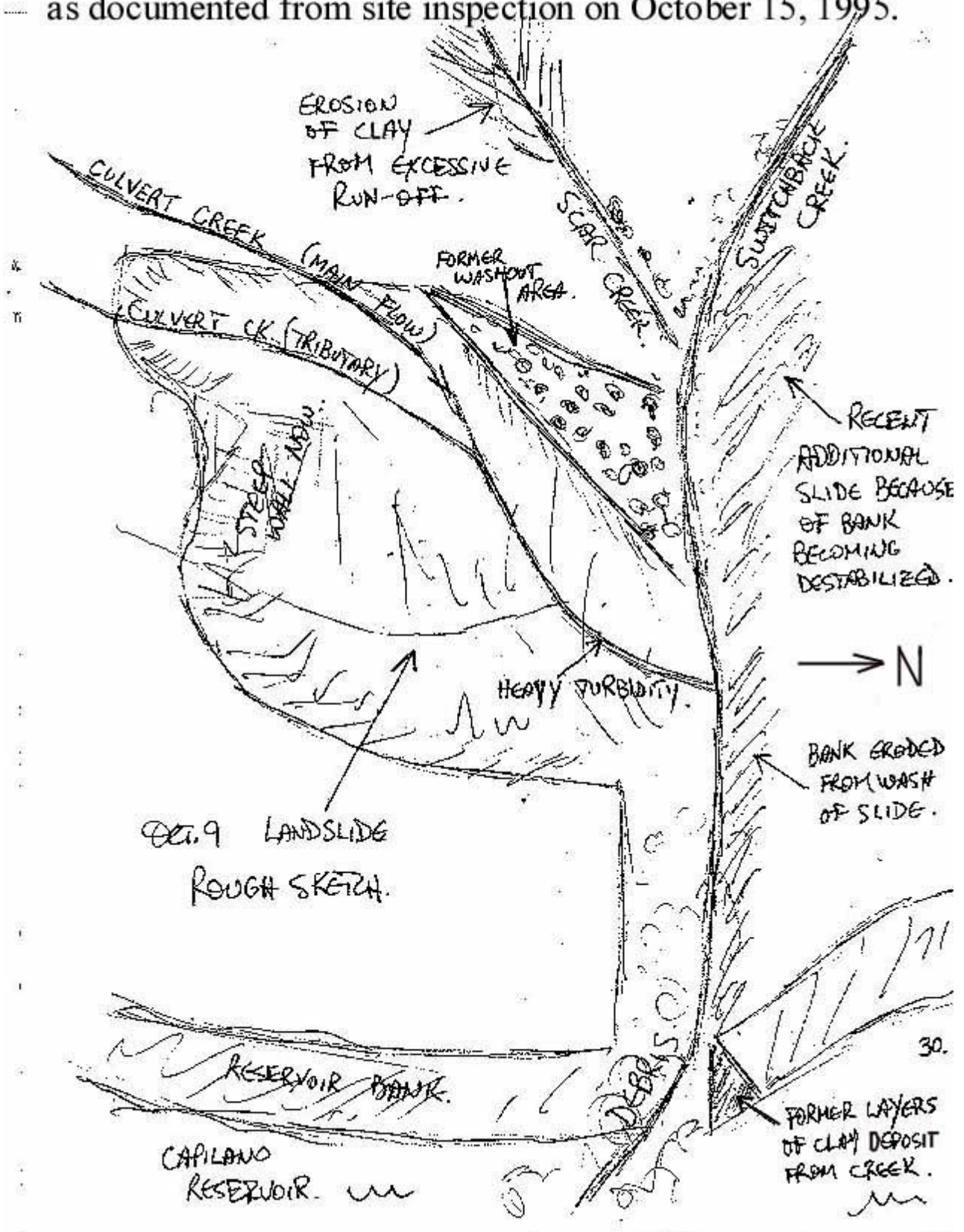
Knowing these factors, it is important to examine two aspects of the Culvert Creek zone. Firstly, that the water action along the tributary had probably been eroding and carving its way into the clay material over a period of time. Secondly, if this is the case, then water may have been working its way through and infiltrating the clay deposit layers and then finally saturating the middle bench area causing it to suddenly slip away. The failure of this clay slope material may have occurred in sections or in one mass exit. Irregardless, if the first case scenario is true, then that may explain the turbidity into the Capilano reservoir last December 1994 and February 1995, as the erosion process was beginning to accelerate after the heavy rains. The other possibility for the turbidity is another erosion zone at the bottom of Scar Creek and above its confluence with Switchback Creek, which was observed and documented during the site inspection. This erosion zone may also be the result of increased run-off from the road up above.

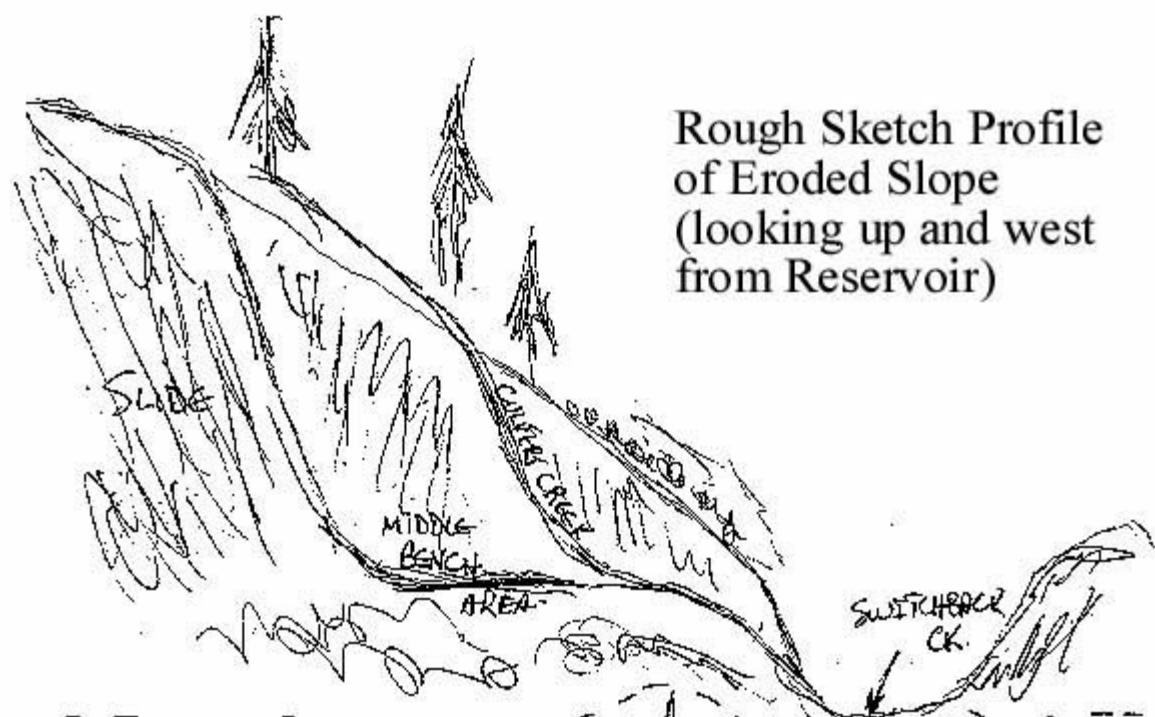
There is a clue from the slide site that there have been large quantities of water coming down the Culvert Creek tributary in the past. The overhead sketch shows a triangular zone at the northwestern edge of the slide site. The top two feet of the surface area of this zone had previously been washed away at some undetermined time by a flood, as the surface now is one of rounded boulders covered with a light layer of green fungus.

Photo taken on November 12, 1995 of landslide site, looking eastward and down toward the Capilano Reservoir from top western area of landslide edge.



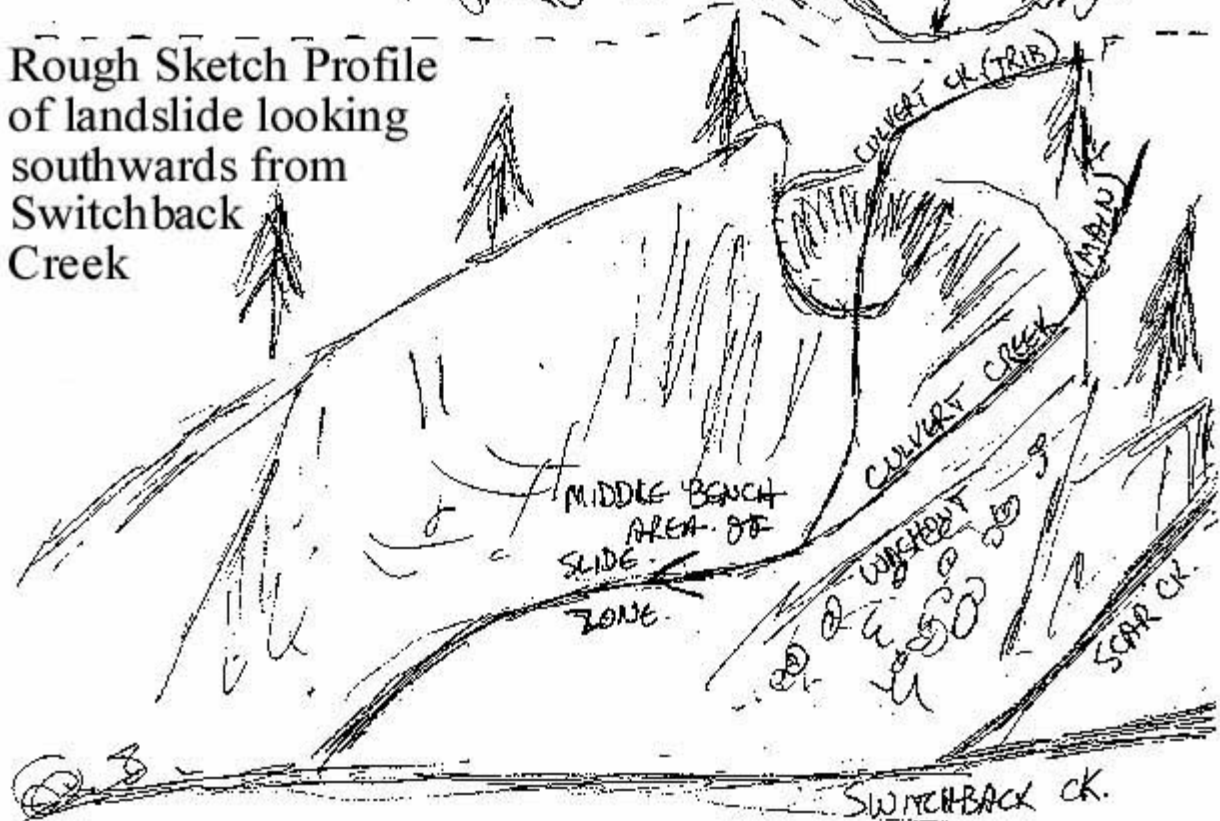
Rough sketch of the October 1995 landslide site,
as documented from site inspection on October 15, 1995.





Rough Sketch Profile
of Eroded Slope
(looking up and west
from Reservoir)

Rough Sketch Profile
of landslide looking
southwards from
Switchback
Creek



The soil profile immediately next to this site, and upslope along the edge of the slide site, shows the boulder zone beneath the soil surface. What this indicates is that at one time, or more, the Culvert Creek tributary had been so forceful that it eroded the top soil layer, perhaps from water being rerouted from the switchback ditches up above during a rain storm. The force of Culvert Creek may have been slowly working its way into the clay bank over many years, or perhaps from only recent events.



Looking up at the landslide site from Switchback Creek. Top right area shows pocket erosion created by the branch of Culvert Creek.

6. THE TRIP TO CULVERT CREEK.

On a rainy November 12, 1995, I decided to revisit the area which I documented a half a year ago. During the Water Committee meeting of October 17th, I had asked Water District administrators for a tour of the landslide site but was later informed that I had to make my request before the GVRD Board. So on October 27th, the GVRD Board voted to authorize myself and the Burke Mountain Naturalists to visit the landslide site. I expected an immediate visit to the site as I had planned to prepare a presentation for the next Water Committee meeting, because the Committee does not reconvene until the following February. I attempted to arrange a visit to the site on November 14th. However, after continuously faxing and calling the Water District from November 3rd to the 9th, I received no reply. Because of the decision by administrators not to contact me, I decided that I had little alternative but to visit the site without the accompaniment of the Water District, in order to prepare a report for the Water Committee meeting. The trip to the site uncovered some valuable information.

There are two obvious water courses that have passed and cut through the southwestern section of the landslide site. Because of this obviously important relationship, the streams were followed up the slope to determine their origins. Interestingly enough, these two streams stem from the same source - Culvert Creek - and become divided approximately 100 metres from the top of the landslide area. Culvert creek runs through a young and predominant naturally regenerated western hemlock stand, interspersed with enormous western red cedar stumps, legendary cedars which once dominated this slope. The stream was eventually traced to the bottom switchback road, where it poured out of a old and rectangular wooden culvert. The dimensions of the wooden culvert are about one meter wide by about two thirds of a meter deep.

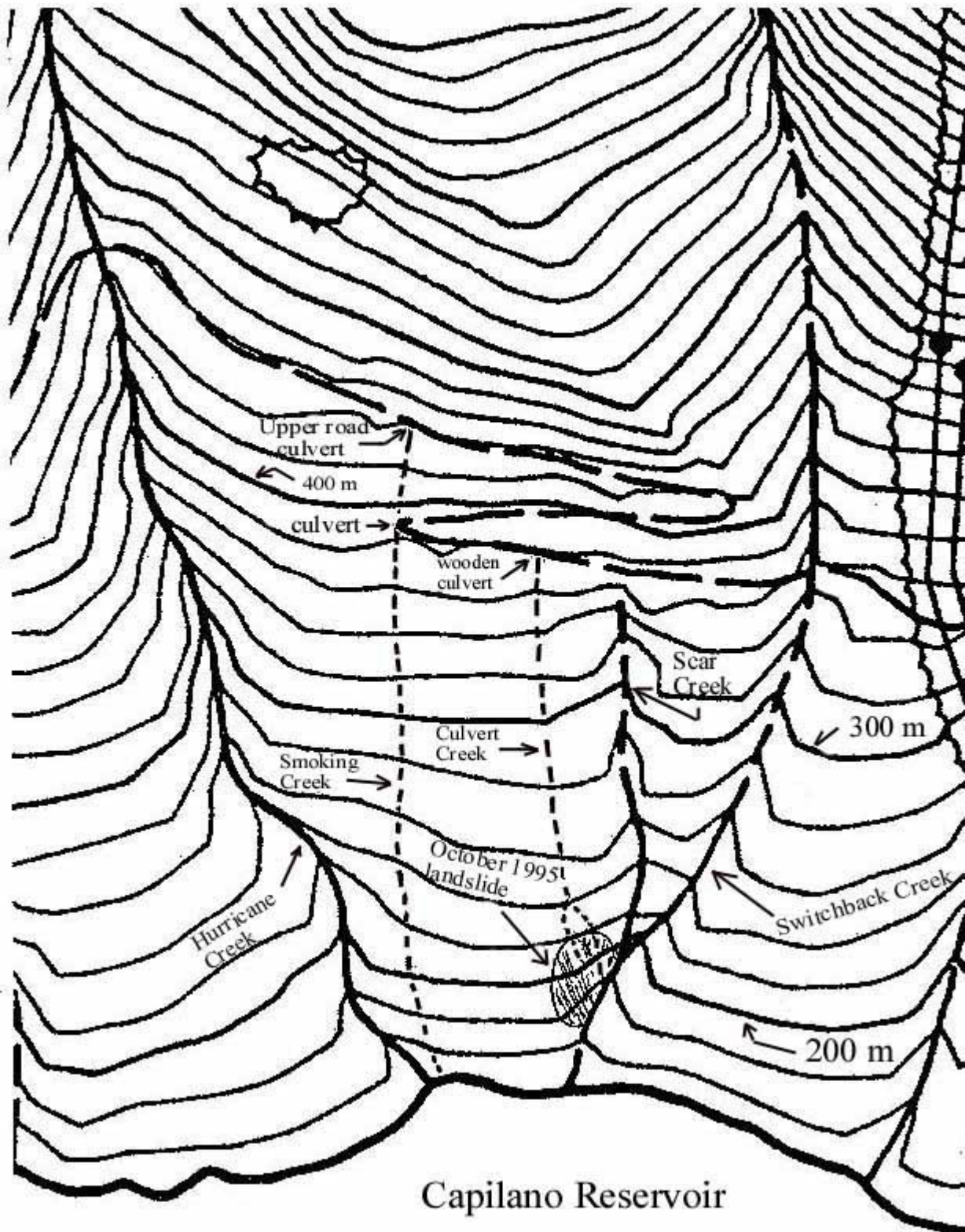
The fact that the origin of the stream stems from a wide and deep culvert is a most important and troublesome discovery:

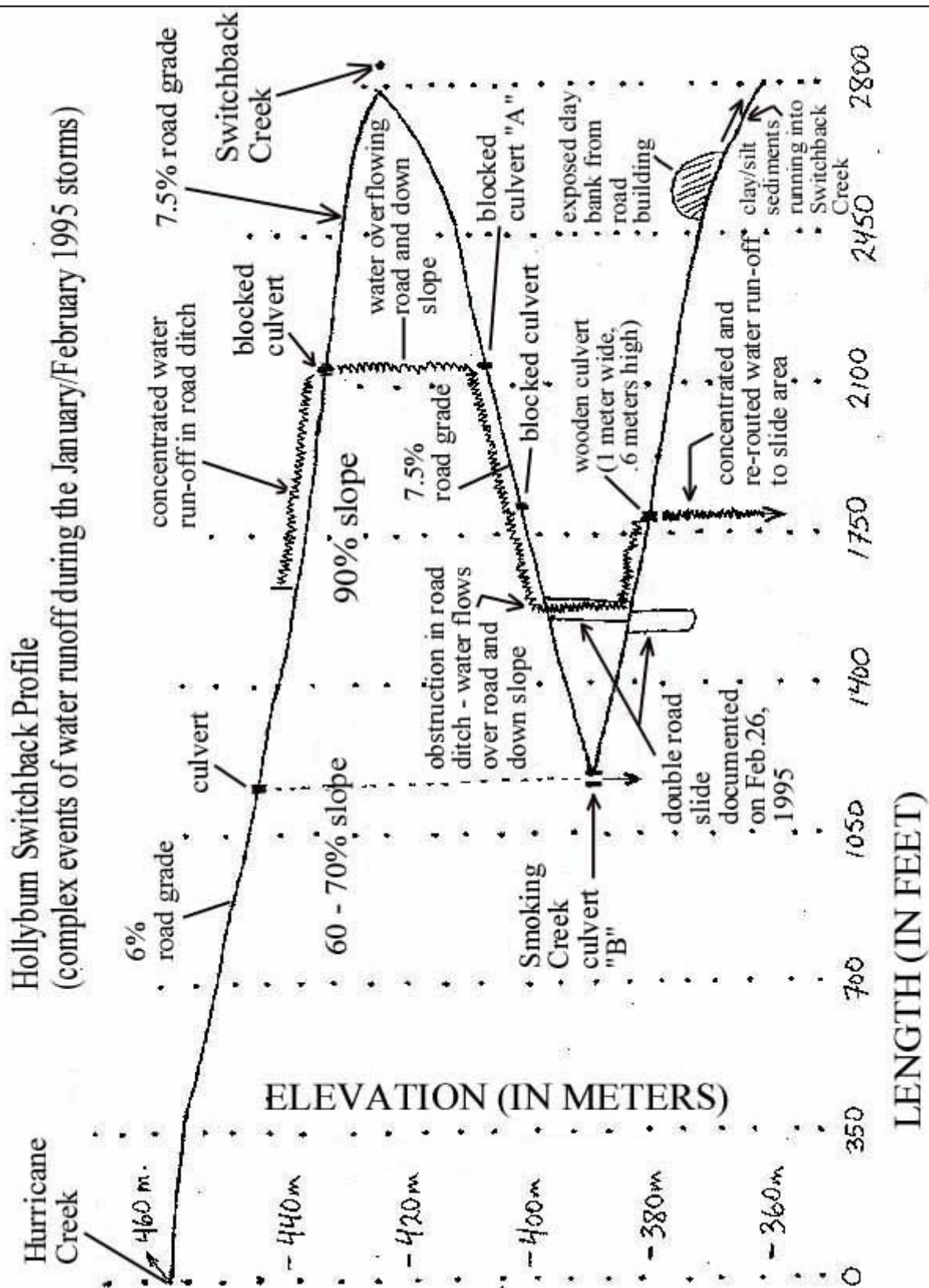
- It is important because it accounts for the passage of increased water flows concentrated in the road ditch from areas farther up the road and up the slope;
- It is troubling because forest management activities may be responsible for the eventuality of the landslide, and that the public are not being properly enlightened by the Water District on these matters.

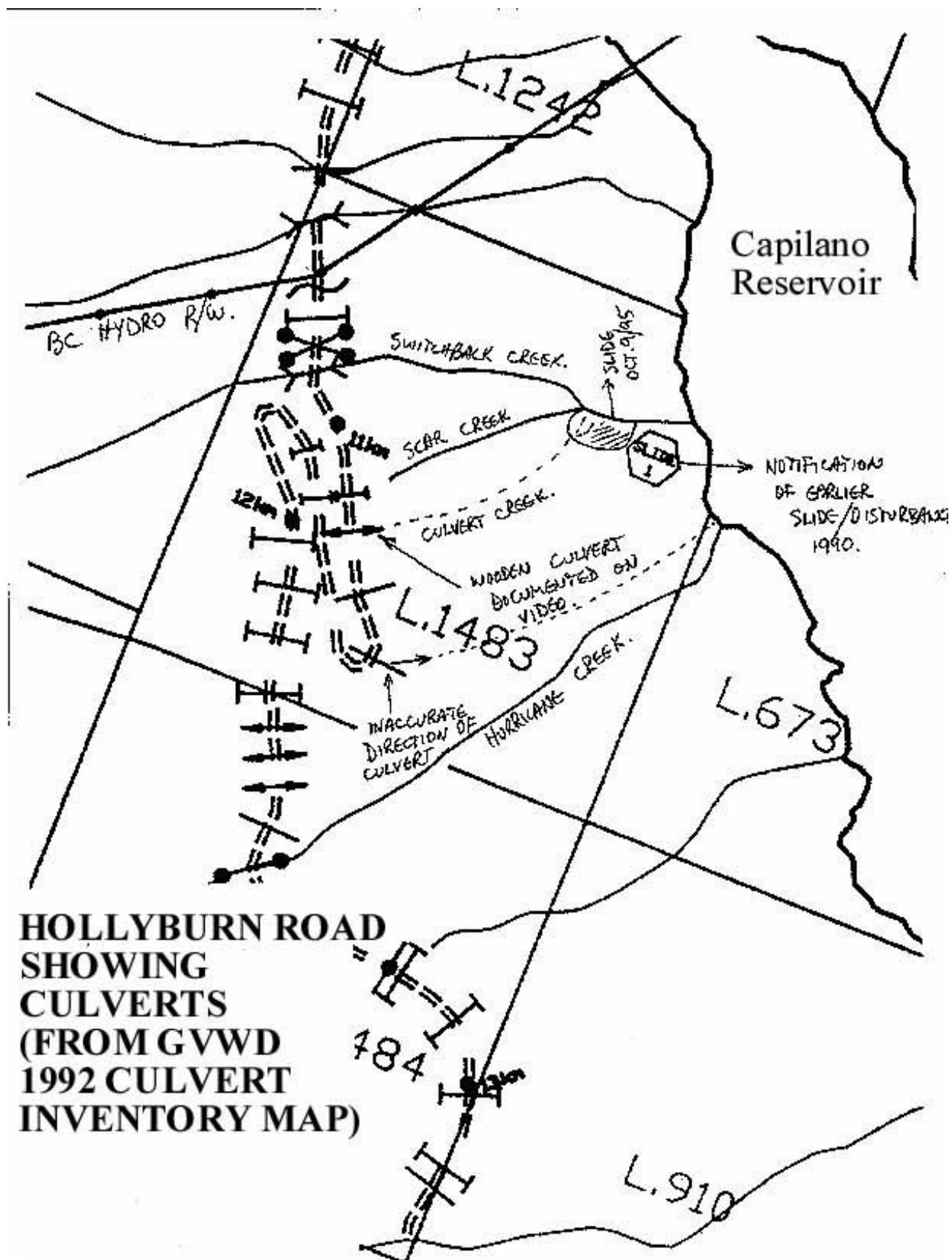
Discovering the origin of the stream turned out to be a significant revelation, because it dovetailed with the report I wrote last March (*A Critique of the Landslide Report from John Morse to the Water Committee*). Realizing this, I then reconstructed the effect of last year's rain events, which were documented on videotape, in connection with what I had just discovered.

Here it goes. Water run-off, which had been collected and concentrated into the upper switchback road ditch during storm events, raced northwards for over 100 meters where it suddenly crossed over the road beside a plugged and useless culvert, and then down a steep slope to the middle road in the switchback. At this juncture an old metal culvert, which was supposed to have transported water to the bottom road ditch, was partially dented by a falling rock and also blocked, and the water then traveled down the length of the middle road 180 degrees southwards. From this point the water was transported along the ditch, emerging with other concentrated run-off, for about 150 meters where it was deflected from the ditch onto the road, because the ditch was blocked, then off the road and down the slope to the bottom road. From this point water run-off then raced along the road ditch 180 degrees northwards again for about 70 meters where it entered the wooden culvert mentioned above and became Culvert Creek. All of this water raced downslope toward the slide site. That event, which occurred somewhere between last December and February, may have caused erosion of clay on the landslide site by concentrated run-off, resulting in turbidity bleeding into the Capilano Reservoir.

Contour map (Trim data) showing elevation horizon of slide area. Elevation shown in meters.







The relationship to overly concentrated flows of water run-off into Culvert Creek is important in consideration of the long-term effects which the switchback road may have had to the landslide site since 1970. This is equally true of run-off into Scar and Switchback Creeks, as both of these areas down near the landslide site have contributed to the erosion of clay deposits. And the fact that the Water District seems to have known about these problems over the last decade, and has appeared to have not done anything to alleviate the problems associated with road ditch run-off to areas below the road, nor accurately reported the situation to the Water Committee, is a serious matter which should be carefully investigated.

We have a video tape that was taken about, I believe it was December 30th [December 31st], and it showed a plume of sediment coming into the Lake right from this area. So, we are seriously concerned about the management activities. I note that one of the points made by the chief engineer (John Morse) was that this was an old road that we haven't really dealt with, and that's one of the problems, because we didn't maintain it to the same standards. Well this road is directly above the Lake. If there is any road you are going to give a priority to you think it would be roads directly above the Lake. And of course if (Water District forestry) management is more concerned about logging operations then they are not going to pay attention to things like this. And this is what our concern is, that management has really been focused on logging operations and not the issue of water quality. Because otherwise they would have made this road the priority, rather than cutting new roads into new cutblocks and creating more disturbance to the landscape. (Paul Hundal's delegation before the GVRD Board meeting, April 28, 1995, Rogers Cable videotape transcript)

I also discovered an interesting additional problem associated with water run-off from the switchback road. At the confluence of the middle and lower switchback roads is a culvert which funnels water run-off travelling from both a very long portion of the middle road ditch, some 300 meters in length without a culvert, and water coming directly down the slope from a culvert on the upper road. This is shown in illustration #4 (above), from blocked culvert "A" to Smoking Creek culvert "B". The volume of water entering this culvert from both sources can be quite high and constant in a heavy rain event. In fact, water traveling down the middle switchback road ditch, even well after a rain event, was observed to be strong and constant.

In another photograph (page 41) there is a deposit of fine coarse sediments at the bottom center area which were carried down the middle road during a heavy rain event. The run-off had pooled here before it was sucked in through the culvert, and deposited the coarser materials.

After following this predominantly unnatural stream flow down the slope to the Reservoir, it was discovered that the stream, which I will call Smoking Creek, was bleeding a light cloud of clay/silt into the Reservoir (see photo on page 42). Smoking Creek is now slowly cutting through clay deposits near the Reservoir because of the concentrated flows from the switchback road, affecting water quality, and may be responsible for initiating erosion activities for yet another slope failure.

Upper middle left area is the mouth of Hurricane Creek.
Note the amount of boulders that have been
washed down to the Reservoir area.
Hurricane stream channel upslope from here
has been heavily eroded and washed clean.



Just to immediate left of the person
is the mouth of Smoking Creek.



Bottom of middle switchback road ditch.
Smoking Creek culvert located to immediate right.
Note coarse sediments at bottom of photo,
carried from ditch and upper culvert area.



Middle switchback road ditch, looking upslope. Water run-off travels freely for about 300 meters. Old culverts no longer functioning.



Smoking Creek entering Capilano Reservoir. Note clay/silt milky water bleeding into Reservoir.

PART TWO

1. THE GREATER VANCOUVER WATER DISTRICT AND THE MEDIA

Probably by the late hours of October 9th, the automated turbidity monitoring instrument at the Capilano intake pipe was sending signals of distress to the Water District's control center. The emergency signals prompted the Greater Vancouver Water District (GVWD) to investigate and then initiated the complicated process of closing the Capilano water intake and transferring water flows from the Seymour Reservoir to the pipe systems which were distributing murky water to nearly 40% of Greater Vancouver residents. This process is referred to by the Water District as the Westerly Transfer.

On the morning of October 10th, the Water District released the following press statement:

The cause of the increased turbidity is scouring of the exposed areas of the lake shore due to water levels being drawn down over the summer.

A small article in the Vancouver Sun (page B5), which appeared the following day, stated that Water District "staff members ruled out the possibility the cloudiness was caused by a landslide or blown-down trees."

In retrospect, knowing what actually happened, it is interesting to pause for a moment to examine these statements. How did staff determine that the excessive turbidity, with readings as high as 45 NTU's for October 10th, was caused from rain pounding the Reservoir perimeter sidewalls? Hard rain has often buffeted the sidewalls without initiating problematic turbidity, especially a reading this extreme, so why did Water District staff turn an assumption into fact? How then did staff determine that the excessive turbidity was not from a landslide, or from a number of landslides?

By Wednesday, October 11th, Water District staff had discovered the slide and documented the area, a photo from which appeared in Friday's North Shore News. By Thursday, rumours were circulating that staff had discovered a major slide in the Capilano. On Friday morning, during the monthly Water Committee meeting, which meets to discuss issues regarding the three Greater Vancouver watersheds, it was extremely intriguing that the Committee members were not notified by the Chief Engineer, John Morse, who sits at the Committee table, of the Capilano closure and the major landslide, although Water District staff had prepared a presentation of the landslide for the Committee. The only public explanation for this peculiar omission was a letter by the Water Committee chairman and Port Moody Mayor John Northey the following week to the GVRD Board, a flimsy excuse that the Committee simply didn't have enough time on their hands to be notified.

That Friday afternoon, the Water District issued a press release on the slide, and news features on the radio and on television picked up the general story. By Saturday, the Vancouver Sun's reporter Scott Simpson, who attended the Water Committee meeting, had the story in print, with no attending map to show the location, and the Water District was taking a firm position on the cause of the slide.

The slopes of the Capilano are comprised of glacial deposits which are prone to slides, which typically happen once or twice a year but tend to clear within a week. The most recent slide is uncommonly large - Bonin (Derek Bonin, forestry superintendent) describes it as a once-in-10-year event. (GVRD communications officer Mairi) Welman said the landslide cannot be blamed on the controversial policy of logging in the watersheds - a policy that is now suspended while the district looks for alternative methods to control fire hazards in the forests that ring its reservoirs. The nearest cutblock is five kilometres from the slide area and the closest road is 700 metres away, Welman said.

During the October 13th Water Committee meeting, Simpson had interviewed myself because, hearing Thursday's rumours, I brought along a map of the Capilano Reservoir and aerial photographs of the area dating back to 1939. I had also asked forestry staff at the meeting to pinpoint the location of the landslide site on my map, none of whom were able to tell me, even though staff had visited the site. The exact location was also not

indicated on the forestry department's wall map. I told Simpson that this area had been clearcut in the 1920's, that a road had been built in the early 1970's above the landslide area, a road which had been providing problems in the general area, and related the problems I had discovered and documented last February, information which remained unprinted in the Vancouver Sun:

"This is an area that was logged 60 years ago," environmentalist Will Koop said Friday morning at the conclusion of a regional water committee meeting, adding that second-growth forests are less stable than areas of old growth." (Ibid.)

On the overcast morning of Saturday the 14th, I managed to pinpoint the location of the landslide site myself from the Grouse Mountain gondola. I spotted the landslide with my binoculars and marked it on my map. I then understood that the switchback road was directly above the slide, which made me extremely curious. The color of the Reservoir was quite murky and there was an enormous amount of debris caught in one of the boom lines at the mid point on the Reservoir. As the passengers observed the view, the gondola conductor, who provided oral information on the ride up, commented on the renowned quality of water from the Capilano.

On Sunday the 15th, I conducted an unauthorized reconnaissance of the forested area to find the landslide site. I descended through a second growth forest, amidst giant Western Red Cedar stumps, to the site. It was exactly where I had observed it the previous day. The area was explored, investigated, videotaped, and photographed from top to bottom.

After reading a very tiny article on Sunday the 15th in the Vancouver Province newspaper, I was quite entertained to read that John Morse had made his own conclusions on behalf of the Water District:

"He said the landslide was not caused by logging; it was five kilometres from the nearest logged area. This is a natural slide," Morse said. But critics of logging in the watershed say the area was cut in the 1920s and the landslide occurred because of it.

The following morning, October 16th, CBC television called me to enquire about the slide. I told them that I had a lot of information on the history of the area and pointed to the exact location of the slide. The Water District was going to provide a helicopter tour for CBC the following day, but thick fog around the Capilano Reservoir cancelled the trip. On the 17th, the CBC television 6 o'clock news were the first network to break some of the real story behind the Capilano landslide.

CBC: Derek Bonin says it was a bigger than usual slide, one that happens about every decade.

Derek Bonin: We pretty well can't prevent this type of thing. It's an inherent problem with the watershed. Its material that's been deposited here 10,000 years ago and it has a history of sliding and gravity takes over.

CBC: But whether gravity had a little help from a nearby road is being suggested by a local environmentalist, who believes this access road built decades ago may have been a catalyst for the slide.

Will Koop: The road carries the water down through the road ditches and then re-routes it and then it gets concentrated, gets sent down into an area. So this could have been the result of water traveling down these courses over a period of years already, and it's just taken this moment for this thing to happen.

On Wednesday the 18th, the Water District had arranged a helicopter press tour of the slide for three of the Greater Vancouver media: the Vancouver Sun, CBC French Television, and BCTV news. The North Shore News was not invited, a newspaper which has consistently taken interest and issue on the watersheds. Prior to the tour, a CBC French crew interviewed me and I showed them the same material I presented to their colleagues two days earlier. BCTV did not run story, probably because of other pressing news, but CBC French television did at 6:30 pm, mentioning the Hollyburn road, and the Water District's position:

Will Koop: At this point, the landslide may have been precipitated over all these years from water running off this switchback, this road site.

Derek Bonin: It's very steep, it's on the edge of a terrace, and it keeps breaking away. And we've seen this material cause us some dirty water in the past and we could probably see similar types of circumstances in the future. It's a quite clear issue that it's well separated from any logging issue. It's basically unstable terrain and the location of it is unfortunate because it easily mixes with the reservoir.

On October 19th, Scott Simpson had a second article on the slide ("Muddied reservoir not in clear yet", page B1), which the Water District later carefully selected for their November 17th Water Committee Agenda package. Again, and curiously enough, there was no detailed map of the Capilano Reservoir in the Vancouver Sun to show the location of the landslide, nor investigative questions to Water District staff.

The regional district is anxious to demonstrate that the controversial practice of watershed logging, which has been linked by environmentalists to the instability of the Capilano reservoir, was not to blame in this case. The slide is about 700 meters from the nearest logging road, which showed no sign of disruption.

(Derek Bonin stated that): Unfortunately, you have these old glacial lake deposits, which are silt and clay perched above the reservoir. It has been failing ever since.

The same day I had an opinion article in the Georgia Straight which explained the logging history of the area and the relationship of the switchback logging road above the landslide.

On October 22nd, the North Shore News ran an informative article "Watershed slide cause investigated", along with the first publicized map showing the switchback road directly above the slide site.

A watershed historian points to logging as a possible cause of a significant slide in the Capilano watershed. But the Greater Vancouver Water District, which will bring in experts to determine the landslide's cause, isn't buying that argument.

Currently the water district believes the slide was caused by subterranean soil becoming saturated and sloughing off, said (Water District manager) Morse. He emphasized the opinion may not be corroborated by experts. Morse said the area was logged 75 to 85 years ago, but he points to factors that indicate logging is not to blame for the slide. He said the slide occurred below tree roots, not on the surface, and is part of the natural erosion process.

"In about 1970 the water district built a road to access the old growth above West Vancouver, Koop said. "They wanted to get into lot 1137, clearcut the area. They built the road right over the old railway grade and opened up this area which had already healed. Anything can happen when you build a road and heavy rain comes down."

Morse's answer, that "the slide occurred below tree roots", is obviously ambiguous, because it does not address the principal concern of water entering clay layers below the tree roots causing the slope to slip, and where that water may have originated. Morse has also not provided a good explanation to prove that the previous logging by the Capilano Timber Co. had not been in some way responsible for the disaster.

A Vancouver Sun article on November 13 ("Water Supply muddied by second slide near reservoir", page B1) once again reemphasized the Water District's claim that the slide was 700 meters from a logging road, but did not mention its relation to the slide, and that the slide simply "occurred in an unstable area where several other slides have occurred periodically during the past decade."

On November 15th, two days before the Water Committee meeting, the CBC television 6 o'clock news ran the first graphic story on the relationship between the switchback logging road and the slide. They played video footage of myself describing that a large culvert was the source of water run-off entering the landslide site, and CBC also produced an excellent contour map showing the run-off from the wooden culvert to the landslide site.

CBC: ... in taps these days, due to naturally occurring mudslides, or is it connected to past logging and roadbuilding in the watershed? Well, a watershed researcher says he has a videotape that proves that logging is a factor. Carol Thorbes reports. With a cameraman in tow, Will Koop recently made an unauthorized trip to the Capilano watershed, one of the major suppliers of Greater Vancouver's drinking water. His mission: to find the source of the landslide that's polluting our water.

Will Koop: It's an old wooden culvert, and it's about three feet wide by about two feet high. It used to be a lot higher. It's got a bunch of debris in it. But all this water that comes down from the hillside, who knows where, and who knows what kind of dynamics are going on, all comes in this area right by the landslide.

That day, CBC also interviewed John Morse about our video footage, and he categorically denied the relationship between the switchback road and the landslide:

CBC: Koop says the culvert and ditches have trapped mud and debris from the Hollyburn branch logging road, and over the years heavy rains have created a stream of dirt that leads into today's slide area. The manager of the Greater Vancouver Water District says GVRD video shows there is a large creek leading into the Capilano Reservoir, but it is nowhere near the Hollyburn logging road.

John Morse: What I am disputing is the fact that the road has nothing to do with this issue. It is almost 700 meters or more away from the road. The creek itself - there are no creeks that are contributed from the road to this particular area that are of any consequence.

CBC: Morse maintains the real source of the Capilano Reservoir's muddy waters is the area's naturally occurring soil problems, soil that's coarse and loose, and susceptible to erosion in heavy rains.

A Vancouver Sun article on November 18th by Scott Simpson, "GVRD Urged to Ponder Shutting Reservoir", who listened to three delegated speakers at the November 17th Water Committee meeting, two of which carefully addressed the relationship between the landslide and the switchback road, speakers who had visited the site and who also provided ample graphical information (see chapter 2 below), had only the following paltry description:

Some water committee watchdogs blame the slide on logging that occurred in the watershed in the 1910's, but district staff say the earth shifted at a depth of five metres - well below the level of surface soil and tree roots.

In lieu of the consistent position by Water District officials before the press on denying that the Hollyburn road, and previous logging some seventy years ago, may have had a factor to play in the slide, there was only one occasion which I heard a Water District staff member very cautiously comment in public on the relationship between the road and the slide. During the November 22nd Water Advisory Committee meeting, a committee member asked Derek Bonin about the origins of the water which had cut through the slide site.

Elaine Golds: Derek, can you explain where that stream (cutting through the landslide site) comes from?

Derek Bonin: Sure. It comes off the Hollyburn mountain. There is a road system about 700 meters up the slope. We've walked that stream. There appears to be no recent disturbance in that stream at all.

Elaine Golds: Is the disturbance in the stream below or above the road?

Derek Bonin: We walked the stream below the road. And we didn't see any disturbance into the stream until we came down at this point of course where the slide occurs.

Elaine Golds: But it has been carrying a lot of water from the switchback area.

Derek Bonin: Some water comes probably from the switchback area, but most of the water comes from an upper catchment area on Hollyburn mountain.

2. THE NOVEMBER 17th WATER COMMITTEE MEETING.

At ten to eight in the morning, and about an hour before the Water Committee meeting, CBC Am radio featured Paul Hundal and Water Committee chairman and Port Moody Mayor John Northey. Hundal, who had visited the site on November 12th, spoke on the relationship of the logging road with the water passing through the slide site, and that the Water District seemed to be hiding certain information from the public.

Hundal, after receiving a copy of the Water Committee agenda package three days before the meeting, had noticed a glaring inaccuracy on a graphic showing the location of the Culvert Creek landslide. This was the first and only image released to the public by the Water District on the location of the landslide site since it occurred in early October, 1995.

The graphic, which was a poorly designed image from a computer generated geographical data base, showing a 3-D interpretation of the landscape from the eastern side of the Reservoir, had the landslide in the wrong location!! (See copy image on page 48) Not only that, but the graphic didn't highlight the Hollyburn logging road which was unrecognizable, blending in with the 3-D grid on the graphic. In other words, there was no visible information on the image for anyone to learn about the Water District's management activities.

Hundal, who became extremely curious about this blatant error, had contacted forestry manager Bob Cavill the day before the meeting to enquire who was responsible for producing the image. After Cavill told him he became curious as to why Hundal was so interested. Hundal then told him about the glaring error. So, at the beginning of the Water Committee meeting on the following day, John Morse announced that forestry staff had made a terrible blunder, a miscommunication, and provided Water Committee members and observers with the corrected image, showing the landslide in the proper location. (See copy image on page 49)

Had Hundal decided not to inform the Water District, they would easily have been accused of a cover-up and were fortunately spared that embarrassment, to some degree.

Hal Wake: SPEC is basically saying that District staff have not given us an accurate picture at all of the location and the causes of the recent (Capilano) mudslide. What's your response?

John Northey: Well Hal, I'm not going to get into a tete a tete with Paul (Hundal). He's a very well known person to us, and he's made a lot of points to the Water Committee over the years. And each time the points that he raises we do research. All I can say at this point is the particular slide he is talking about is being researched by some very capable people, consultants that have been hired by the Water District, as well as the Water District staff (who are looking at the site).

Hal Wake: So you are saying there is some independent investigation going on?

Northey: Absolutely. Because we are concerned that that whole slope along the west side of the Capilano Reservoir has evidence of instability. It is something the District has known for some time, and it's just part of the geology of the area.

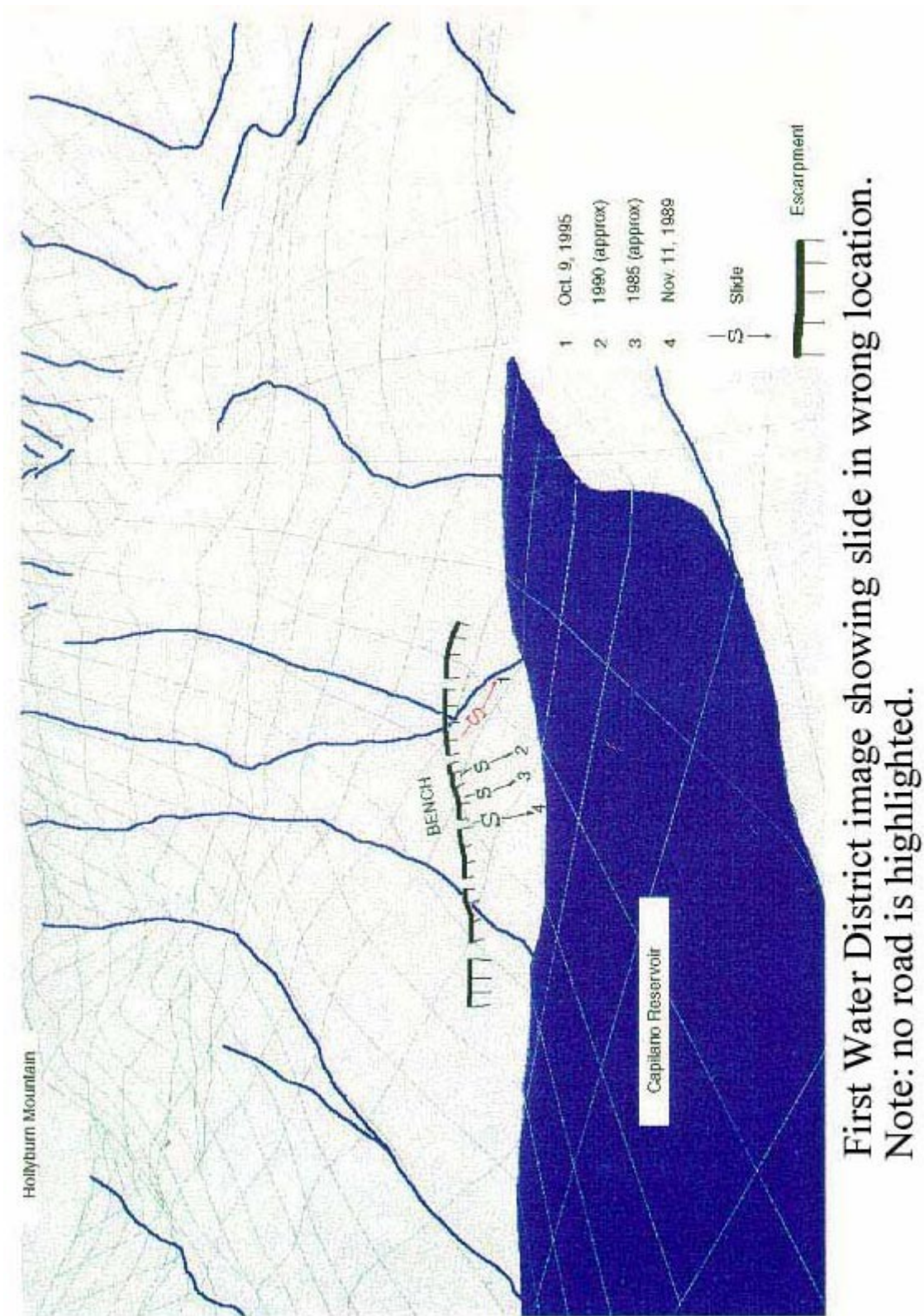
Hal Wake: Do you have any information at all at this point, that the specific situation he described with a logging road, that was dumping water into a stream, and then that stream heading down and undermining the cliff, that there is any basis for that at all?

Northey: Uh, No. We've stated that, or that we, the staff have made it clear that the particular road that I believe he is referring to is very well removed and very much above this area. This is a very significant soil movement that has happened up there. I don't know if you've seen the video tape, Hal, of it, but it's very deep, it goes down, it's not a surface movement at all, it includes a lot of soil that is many tens of feet, or meters, sorry, under the surface. And that type of thing usually you look at, and I'm just going from some of the information provided here, that from geotechnics, from a geotechnical advisor, usually you look at a deeper reason for this type of thing happening. That type of thing is not unusual.

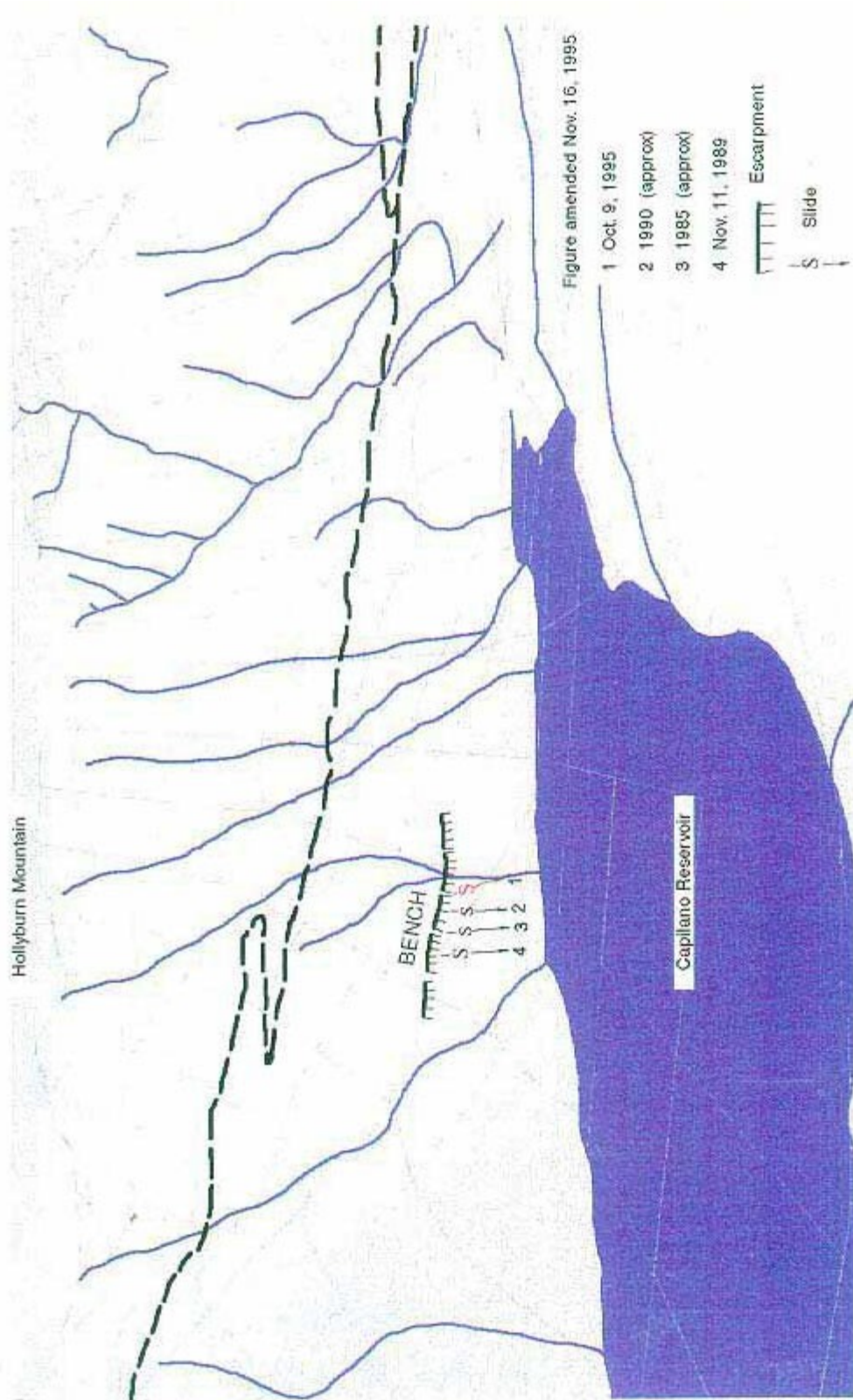
Hal Wake: Are you prepared, is the District prepared at all revisit the issue of logging, if there's information that shows that a logging road, and logging itself, may have contributed, and may be contributing to slides in the area?

Northey: Hal, this has been before the region constantly for several years. And the Board - this is before my involvement even - stopped logging as it is commonly known by the body politic. There isn't

logging as people would normally expect that to be. Timber removal is considered only where it is expected to affect water quality, and that comes down to fire risk or to disease risk. And that's been the policy since 1992.



First Water District image showing slide in wrong location.
Note: no road is highlighted.



Second Water District image showing road and slide in proper area, but the perspective does not show the slide located below the switchback road.

There were three delegations at the Water Committee meeting that morning. As is policy, the public may address the Committee with their concerns for five minutes, and then, if a public member so chooses, they are cleared to make a presentation to the GVRD Administration Board at a later date.

Elaine Golds, representing the Burke Mountain Naturalists, spoke first and read from a prepared text on the infrequency and inconsequential threat of natural fires, and on the relationship between logging and landslides in the watersheds. Her information, which was collected from the Water District own reports, demonstrated that forestry management staff were misrepresenting their own conclusions to the public:

Finally, I would like to suggest that more attention should be more directed towards what causes erosion in our watersheds. Recent events in Capilano and Seymour conflict with the assertion in the GVRD Watershed Management Booklet that “areas vulnerable to landslides can be identified.

Contrary to what Derek Bonin said when interviewed on BCTC news this week, logging and related road building activities are clearly linked to an increase in the frequency of landslides on the steeper slopes of our watersheds.

There is another Table which lies buried, and possibly, forgotten in the Appendix of the 1991 Watershed Management Report. Again, the information in this Table was provided in response to questions I raised at the public meetings in 1991 and in my written critique. My last graph illustrates this information. It shows that consistently, in all three watersheds, on slopes of 30-35 degrees, there is a 2 to 3 fold increase in the frequency of landslides in logged areas. The conclusion is obvious - logging and related activities on the steeper slopes of our watersheds are linked to an increased frequency of landslides.

The second delegation was by Paul Hundal, on behalf of SPEC. Hundal, in his prepared text, also provided a map showing the location of the slide in relation to the switchback logging road above. It also included a photocopy of the Water District’s computer generated image pointing out their mistake and then pointing to the correct location of the Culvert Creek landslide, as well as highlighting the location of the logging road.

We believe that (the) logging road intercepted and concentrated the flow of water that would normally have percolated down the slope in sheets. The logging road acts like a gutter intercepting the water and redirecting it along the road. When the water reached the switchback it was funnelled into the very stream that caused the landslide. Staff previously stated to media and to us that the stream passing the slide area undermined the bank causing a “rotational slump”.

SPEC has discovered that the (GVWD staff) map falsely places the slide well away from a group of switchback roads thus giving the false impression that these switchbacks have nothing to do with the landslide.

It strikes us as being particularly odd that with all the sophisticated GIS technology bought by the GVWD, and paid for by the taxpayer, along with helicopters to view the site, how could staff get the map so wrong. Either they deliberately falsified the map to make it appear that the slide was well away from the switchbacks, or they are not competent at this task. If they are not competent, why should we be leaving something as important as water quality under their care?

Last March, when we brought to your attention two other landslides in this same area, at that time staff said that this logging road was an obscure, rarely used road that it was unique in that it was not up to standard. If there was any road in this watershed that staff should have been giving priority to, it should have been this road because it is directly above the reservoir on a relatively steep slope. But they did not and instead have been promoting the building of new logging roads such as the proposal last month to build a kilometre of new road in order to log an area that had been hit by a landslide (the landslide had come out of another clearcut though staff claim it started above the clearcut).

The third and final delegation was from myself. I began by holding up a photograph of the landslide site which the Water District included in the Water Committee agenda, showing the Culvert Creek tributary running through the upper corner of the landslide. I then asked forestry manager, Bob Cavill, if he could tell the Committee where the source of water, which had been directly entering the landslide, originated from. He said that he didn’t know.

Originally, I had wanted to provide the Committee with a report, which was not finished, so I simply provided two separately stapled packages of information for the Committee members, one large color photo display of the landslide site, six aerial photographs from 1939, 1968, 1979, 1987, and 1992, each with informational descriptions, and a photograph of the sediment plume entering the Reservoir from Switchback Creek.

The first package of written material were faxed letters which I sent to Regional Manager Ben Marr about visiting the landslide site (which I had been given GRVD Board approval to inspect) before the Water Committee met. I received no replies from his office. I also included a letter I faxed to West Vancouver Mayor Mark Sager detailing the circumstances of my unsuccessful attempts at visiting the site, asking for his assistance.

The second package of information detailed various maps, illustrations, road building guidelines and staff quotations, and newspaper articles. Since I had carefully noted that there had been an odd vacancy of graphic information in the media about the landslide site, especially from the Water District, I provided the Committee with: a Water District forest cover map, showing the age class of the forest and the location of the Hollyburn logging road; a contour map of the Capilano Reservoir area; a detailed contour map of the landslide area showing the direction of water from the wooden culvert on the switchback road; data on precipitation, temperature, and turbidity readings in the Capilano during the time period of the slide; a 1992 culvert inventory map from the Water District, showing the location of the wooden culvert; a sketch showing the switchback road in elevation and length, which also showed the location of culverts and the former problems of blocked culverts and water re-routed into Culvert Creek; an overhead rough sketch of the landslide site, showing the path of the two streams from Culvert Creek through the site; and a 1931 map from the Capilano Timber Company showing the clearcut logging, railway switchback road, and the location of the present slide. I had also provided newspaper articles from the North Shore News and the Georgia Straight, because the Vancouver Sun article, which the Water District included in their agenda package, had no challenging or investigative elements in it.

I told the Committee members that it was largely unfair for them to have so much new information to analyze, and that it would be difficult for them to consider this relative to making a good decision on the matter of the landslide at this meeting. I also pointed out the fact that the Water District was not supplying the Committee with good information on the landslide.

With only minutes to spare, I then quickly went through my information, explaining the relationship with the switchback road culvert to the landslide. I then recommended that there be:

- a careful investigation of the cause of the landslide;
- that the Water District not build a road “down” to the landslide site from the switchback road to bring in heavy machinery to rehabilitate the site, as it would only aggravate more erosional processes;
- and that the Hollyburn road be deactivated and put to bed.

3. THE WATER DISTRICT AND MOTHER NATURE

There is a consistent attitude by the Water District in denying the relationship between logging practices and the consequential disturbance and distribution of sediments into our reservoirs. That became principally evident in the August 1991 evaluation of GVRD's thirty year logging practices in the watersheds:

The (Review) Panel has found no compelling water quality reason to suspend the present timber harvesting program....

That conclusion, which was not based on science but on convenient speculation, and which is confounded by the Water District's own data (see Elaine Gold's presentation in chapter 2 above), has been the celebrated and guiding principal for future logging considerations in our watersheds, not only by Water District staff, but by chief administrators in the provincial forest service as well.

The claim that the public are now hearing more often from the Water District, some municipal politicians, and some of the press, is that logging has temporarily ended, so don't worry, relax, there is no more disturbance occurring in the watersheds. These are words of comfort, a deceptive and naive theory, which act much like a powerful narcotic, stunning people into blindly repeating an untested refrain.

Last year, only one 30-hectare area in the Capilano was logged - to reduce the risk of fire. This year there has been no logging. Politicians on the GVRD's water committee say the environmentalist's main impact has been to cause confusion among residents. How much confusion? Enough that two experienced reporters, speaking with a member of the regional water committee a full month after the first slide in the Capilano watershed, expressed surprise when informed there has been no logging in any of the Lower Mainland (sic, Greater Vancouver) watersheds in 1995. (Scott Simpson, Vancouver Sun, December 4, 1995, p.B2)

There are good reasons for the public to be actively concerned about some of the present network of logging roads and clearcuts in our watersheds, as they can be likened to time bombs waiting to explode. Changes can occur on a small scale at first, and then become problematic. Concentrated water flows can saturate and destabilize a slope, and upper and lower road banks can slump and cause future problems. Collectively, materials transported down road ditches, be they from erosion occurring on clearcuts, from elevated run-off from clearcuts and roads eroding stream banks, and materials falling from the upper road banks into the ditches, can create a substantial difference in the overall rate of materials deposited in our reservoirs.

And on the other hand, management activities have caused and will cause blowdown in the watersheds along the edge of clearcuts and alongside roadways. Forestry management is also responsible to some extent for introducing disease and insects into the watersheds, information which is mentioned in their own reports.

The evidence which I detailed in my report last March on the Hollyburn logging road, and those observed recently on the same road, are prime examples of the power of nature on management activities. Yet, despite observations and information which were clearly tracked by some of the media last April from video footage on the Hollyburn road, the Water District carefully maintained their claims of protecting the watersheds.

CBC: This was an exception?

Bob Cavill: I would say that there are ... yes, I would say that it is a unique road system, it's an old road system, and this isn't typical of the roads in the watersheds.

CBC commentary: Bob Cavill denies that logging has increased sediment levels. He even rejects the claims that sediment levels in the reservoirs have increased in recent years.

Cavill: To my knowledge, and based on what I understand about the situation, is that turbidity has not increased over the years.

CBC: But you are also looking at filtration plants at source, correct?

Cavill: Yes we are.

CBC: And the purpose of those filtration plants, presumably, is to reduce the sediment that is getting

into the water distribution system, correct?

Cavill: That would certainly be part of it.

CBC: And these filtration plants were not deemed necessary ten, twenty years ago, correct?

Cavill: Right.

CBC: But they are today.

Cavill: Right.

CBC: And yet you still say that the turbidity has not increased.

Cavill: I believe it hasn't.

(CBC television 6 o'clock news, April 20th, 1995)

After I presented the information to the Water District and to the press about the Hollyburn road, the forestry department quickly and quietly dispatched an excavator to work on most of the Hollyburn road ditch, which also tore out some of the old culverts. Two large and exposed upper road clay banks were later hydro-seeded, banks which had been leaching clay/silt sediments in the road ditch. What I did notice afterwards on the Hollyburn road was that the excavator had loosened a lot of debris along the road ditch, materials which were later flushed down the ditch and into the culverts by rain storms.

Part of an ongoing problem associated with the Water District is the reluctant release and presentation of good and comprehensive information to the public. At the last GVRD Board meeting of October 27th, Water District staff had set up a television screen showing a short video on a continuous loop of the Capilano landslide site. Nowhere on the helicopter footage did the camera pan back and travel up slope to show the relationship of the Hollyburn logging road, an image which would no doubt make mayors and councillors start asking questions and possibly think twice about the Water District's claims. This strategy is also in keeping with the manner in which staff in recent years have carefully documented other events from a helicopter - the larger context is always avoided and management activities are rarely shown. There were also about three enlarged photographs of the landslide on two easels with no attached description of what the images portrayed. Staff should have presented a series of maps of the Capilano and aerial photographs to show, among other things, the exact location of the slide and the Hollyburn logging road, and when and why the road was built. This simple and additional information would have helped observers to understand more of the situation.

CONCLUSION

This report, though concerned about what the actual causes of the landslide may have been, in terms of laying out the logging history and carefully uncovering recent documented disturbances, matters which have been entirely avoided by the Water District so far, is more of an analysis of the manner in which the Water District controls information. In that sense, there seems to be little doubt that the informational events surrounding the Culvert Creek landslide into the Capilano Reservoir have, up to now, more to do with forest management politics than with thoughtful analysis and an open and conscientious concern.

From the very outset, the presumptive statements of fact in the first two press releases from October 10th and 13th, on the cause of the extreme turbidity, appear to be more like automatic defense statements meant to appease the public than ones that reflect genuine science and wholesome inquiry. The guarded and ambiguous nature in the Water District's pronouncements seem to be principally geared toward obfuscating the relationship between logging and Greater Vancouver's water quality, rather than admitting that it simply didn't know what caused the turbidity.

And that is precisely the point where the Water District got itself into unrecantable difficulty. The statements: it is an event that occurs once every ten years, and is a natural occurrence; it is five kilometers from the nearest clearcut; it is 700 meters from the nearest road; it is not associated with logging; it happened far below the tree roots; it is not related to the logging road; it is part of a terrace that keeps breaking away; this area is naturally unstable. All of these untested and non-contextualized statements maintain that logging practices, be they 70 or more years old, or be they recent, are not to be entertained, can't be to blame. This is also shown in the manner

in which they falsely represented the location of the landslide and excluded the Hollyburn logging road, in the informational package for the November 17th Water Committee meeting. And just what is at stake, you might ask, for the Water District to do this?

Over the last few years since the 1991 public review of watershed logging, the Water District has laboriously endeavored to convince and pamper the public that it's forestry management practices have not negatively impacted our reservoirs, that they are not logging as before, that if they do log and build roads that it is absolutely necessary, that turbidity originates from natural occurrences, and therefore claim themselves as protectors of an invaluable public resource. This is exemplified in their recently published watershed management booklet (refer to critique of this booklet in the report on this website, *Misinforming the Public*). Of course, that first argument, regarding the possible consequences and long-term impacts of logging, has not been thoroughly evaluated, because there is no meaningful process in place to allow that to transpire, because public process is managed by the Water District. If concerned members of the public cannot openly participate in the Water District's information, and are not privy, given clearance to physically access the watersheds to conduct ground-truthing to extend and build upon that sharing process, then we are at their mercy, so to speak, and the truth shall remain publicly unknown.

However, unauthorized trips by concerned citizens to the Hollyburn logging road area (one of which first sought permission and was flatly denied), above the western portion of the Capilano Reservoir, have proven that the Water District has not been forthcoming nor consistent in its defense of watershed management practices to the public. In fact, had it not been concerned citizens investigating water run-off problems associated with the Hollyburn logging road, the public would never have learned about the details in this report. But, despite the fact that documented evidence was released to the public, Water District officials publicly denied that sediments were entering the Reservoir and disputed the complex but plausible connections from the Hollyburn road for the landslide.

The fact that the Water District allowed a road to be built directly above the Capilano Reservoir, which cuts through thick clay deposits, and has been a problem in the past, is something which should be seriously investigated by the Greater Vancouver Regional District (the Water District has also built roads far above and alongside the Seymour and Coquitlam Reservoirs). One important consideration in this matter is in decommissioning the entire Hollyburn branch, that is in reshaping the natural contours of the landscape and replanting the site. The same may be said for another branch to the upper Sister's Creek area, which has also caused a few problems of upper clay bank instability. It is an expensive and possibly problematic proposition, one which could be partially funded from existing provincial provisions (Forest Renewal B.C.). Of course, if the Hollyburn road has in some way been responsible for triggering landslides above the Reservoir, and might still be, then the expense of decommissioning the road may pay for itself in the long run.

The fact that there has been contradictory evidence gathered by citizens who have ventured in the watershed provides an important lesson to corroborate the recent amended policy by the Greater Vancouver Regional District Administration Board to allow groups into the watersheds, upon their approval. In this matter, I strongly believe that the taxpayers of Greater Vancouver, and the Administration Board, vote to authorize an independent and publicly accountable body of responsible and knowledgeable citizens to be able to access the watersheds and report to the public with any and all of their concerns.

George Straight
Oct. 19-26/85
.....
OPINION P.17.

Big slide raises watershed logging doubts

BY WILL KOOP

On Tuesday, October 10, after a series of heavy rainstorms on the North Shore mountains, the Greater Vancouver Water District closed the tap from the Capilano reservoir. The district's first news release, issued the same day, stated that the excessive turbidity in drinking water was likely related to rain pounding upon the partially exposed reservoir perimeter and was not due to landslides in the Capilano watershed. However, two days later, rumours circulated of a very large landslide beside the reservoir. These were confirmed the following afternoon, Friday the 13th, by yet another news release. Approximately 40,000 cubic metres of mostly clay/silt material had collapsed and plunged into the reservoir. The district categorized this unprecedentedly large debris mass as a "one-in-ten-year" event.

The landslide couldn't have come at a worse time for the water district. Just prior to the news release that Friday morning, at the monthly meeting of the water committee (which discusses and decides issues concerning the three Greater Vancouver watersheds), the water district's forestry department tabled eight new watershed logging proposals, along with a proposal for some road construction. Though the proposals were discussed for almost two hours and eventually deferred, John Morse, the manager of water and construction, withheld information on the Capilano catastrophe from the water committee. That might have been done purposefully so as not to jeopardize the logging proposals through association.

In a tiny article in Sunday's *Province*, Morse was quoted as saying that the incident was unrelated to logging. There are, however, some good reasons to suggest otherwise. A 1939 aerial photograph of this area shows that clearcut logging, and probably slash fires, undertaken by the Capilano Timber Company in the 1920s was most likely responsible for an erosion scar in the same location as last week's landslide. The scar could also have been related to concentrated water runoff originating from a ditch in a railway switchback (like a compressed letter Z) directly above the landslide site: a drainage scar on the photograph begins immediately below the railway track and leads to the erosion scar. The wounded landscape eventually healed through natural regeneration, which clothed and strengthened the exposed soil.

Ironically, about 1970, the water district, through its new forest-management policy, constructed a road along the same old railway track to access and clearcut the high-elevation old-growth forest just above the mansions and homes of West Vancouver. For some reason, the logging plans were shelved and the road was abandoned. In 1979, another aerial photograph shows the future landslide site with a new little scar. Perhaps the continual rainstorms along the new road ditch were aggravating an old wound. Forest-hydrology studies have documented the negative impacts associated with roads. It is not far-fetched to assume that the road structure immediately above the landslide site may have eventually contributed to the current disaster.

According to the water district, the Capilano reservoir will be unavailable for months, if not longer, and residents will be relying on transferred flows from the Seymour and Coquitlam reservoirs. Greater Vancouver residents might now be witnessing and paying for the long-term consequences of logging practices in our reservoirs' watersheds. ■

Will Koop has researched and written extensively on water-reservoir issues.

North Shore News, Oct. 22/95, P. 3.

Watershed slide cause investigated

Researcher links logging to dirty water

A WATERSHED historian points to logging as a possible cause of a significant slide in the Capilano watershed.

By Michael Becker and Ian Noble
News Staff

But the Greater Vancouver Water District, which will bring in experts to determine the landslide's cause, isn't buying that argument.

Meanwhile, the water district cannot say when the Capilano watershed will resume providing water to North Shore residents.

"It's too early to tell," said water district manager John Morse, adding that turbidity in the Capilano is returning to manageable levels. The slide occurred Oct. 9 or Oct. 10.

Thirty thousand to 40,000 cubic metres of debris, including trees and boulders, fell to the lakeshore and into Capilano Lake.

That forced the water district to close the Capilano water source on Oct. 11. The lake serves parts of North Vancouver, West Vancouver, Vancouver and Richmond.

The areas are now being served by the Seymour water supply, which could supply Capilano customers throughout the winter months, "but it remains to be seen whether that is necessary," Morse said.

Morse said the water district will ask geotechnical experts to determine the cause of the slide and what can be done to anticipate future slides.

Experts will also study what can be done to take proactive measures to deal with possible future events, he said.

Morse added the areas adjacent to the slide show signs of instability, so that "sends a message" to the district to look at it soon.

"This may not be the end of it," he said.

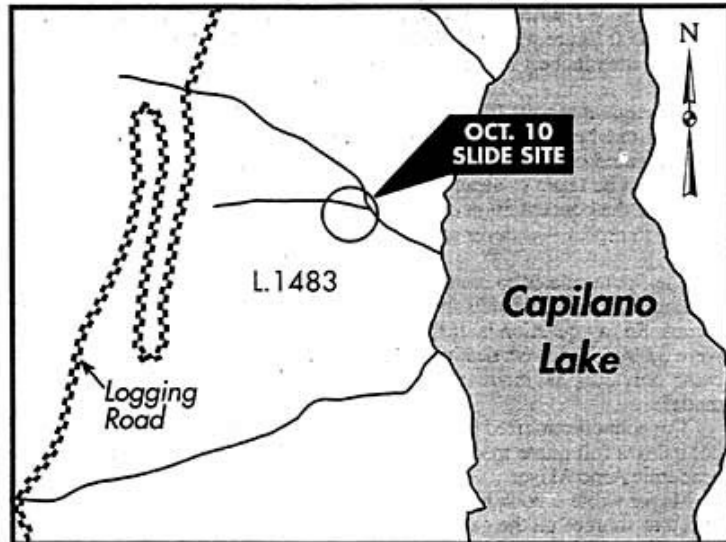
Currently, the water district believes the slide was caused by subterranean soil becoming saturated and sloughing off, said Morse.

He emphasized the opinion may not be corroborated by experts.

Morse said the area was logged 75 to 85 years ago, but he points to factors that indicate logging is not to blame for the slide.

He said the slide occurred below tree roots, not on the surface, and is part of the natural erosion process.

But water reservoir researcher Will Koop believes the slide that closed the Capilano reservoir as a source of drinking water is an indication of the long-term



NEWS graphic Linda Douglas

WATER RESERVOIR researcher Will Koop says lot No. 1483, where the Oct. 10 landslide occurred, was clearcut of old-growth trees in the late 1920s.

effects of logging.

"The GVRD has not been acknowledging this at all," Koop said.

The lot in which the slide site is located, on the western side of the northwestern area of the Capilano Lake reservoir, was clearcut of old growth trees in the late 1920s, he said. A Capilano Timber Company subsidiary, Sisters Creek Logging Co., logged the slope from where the reservoir now begins to above where a railway switchback was built (now a road).

A 1931 Sisters Creek Logging Co. map of lot 1483 shows the rail-line routes as well as the location of various sets of spar pole and cable configurations used to move logs. One set bisects the slide area.

An aerial photograph taken in 1939 shows erosion scars at the landslide site.

A 1963 aerial photograph shows an (erosion scar) just below the switchback road.

In about 1970 the water district built a road to access the old growth above West Vancouver, Koop said. "They wanted to get into lot 1137, clearcut the area. They built the road right over the old railway grade and opened up this area which had already healed. Anything can happen when you build a road and heavy rain comes down."

The area was not logged, but a 1979 aerial photo shows a new scar in the slide area.

"That's very interesting and we don't know what that's from but it may have something to do with this road being there," Koop said.

Creeks continue to flow through the slide area, contributing to the turbidity of the lake.

On Oct. 10, turbidity in the Capilano reservoir jumped to 45 ntu. The reading just the day before was 1.92. Five ntu is the maximum acceptable level.

WEDNESDAY
November 29, 1995

NE NORTH SHORE CREDIT UNION

Partners in your Community

We're the right place for Mortgages.

986-4321

north shore news

Weather

Thursday: Periods of rain
High 11°C, low 7°C.



inside the news

“We cannot fix what we've got... that's why there'll be a revolution.”

— From 1985-1995 author Peter C. Newman sees a fundamental shift in Canada's national character. See story page 20.

- Business.....31
- Christmas calendar.42
- Collins.....7
- Crossword.....45
- Fashion.....39
- Insights.....6
- N. Shore Alert.....8

Cap water too turbid

From page 1

said the committee's responsibility is to administer the water district and not to “play court games with members of the public.”

“Every single thing we try and do at the water committee is subject to total and constant challenge by Mr. Koop and Mr. (Paul) Hundal (who has also been banned from entering the watershed). And I'm sure the chair and members of the committee find it very difficult to be in a constantly challenged position on a quote, legal definition, because we're not lawyers,” said Dykeman.

Water committee chairman John Northey said the regulations are meant to protect the watersheds, not muzzle Koop. “Will has piddled in his own soup,” said Northey.

The Capilano reservoir has been closed again because of high turbidity.

PINK DOT

We deliver what you want when you need it!

Call 980-7300



NEWS photo Mike Wessford

WATERSHED PRESERVATIONIST Will Koop has been banned from local watersheds. The outspoken critic of logging and road building in watersheds says the ban is an attempt to muzzle him. Politicians say the access regulations protect drinking water.

Critic hit with watershed ban

GVRD water committee sets policy

GREATER VANCOUVER Water District staff turned away a vocal critic of watershed management before a naturalist group toured the Capilano reservoir on Monday morning.

By Ian Noble

News Reporter

Based on a retroactive water committee resolution to ban those who have entered the watershed without permission, staff told Will Koop he could not inspect the site of a massive landslide with the Burke Mountain Naturalists.

The Greater Vancouver Regional District's (GVRD) water committee approved the ban Nov. 17 and staff enforced the ban on Koop, even though “in the strictest, narrowest, legalist sense, the committees do not have the ability to set policy,” said GVRD communications officer Mairi Weiman.

Koop said the water district should not be enforcing policies that are not yet policy.

“If that is the case and the water district knows it cannot make policy on recommendations, that makes me angry,” he said.

Setting policy is up to the GVRD board. However Weiman added the committee believed the board had delegated responsibility to the committee because the issue required immediate action.

Koop acknowledged he had entered the Capilano watershed without permission to study a landslide that closed the watershed for a month.

Koop said the ban — and Monday's refusal to let him enter the watershed — is the water committee's attempt to muzzle him.

“It's draconian and an excessively punitive resolution aimed at silencing people who have been actively criticizing the water district,” Koop said.

Koop contends there is a strong link between logging in North Shore watersheds, landslides and the turbid water now flowing from Lower Mainland taps.

But the water district maintains that landslides result from natural erosion in the steep, wet watersheds. The water district has stated that the Oct. 10 Capilano slide resulted from subterranean soil becoming saturated and sloughing off. The site was logged in the 1920s.

Koop religiously attends water committee

meetings and has studied the history of Vancouver's watersheds.

His videotaped forays into the watersheds to document the effects of past logging and road building in the watersheds has landed him numerous television and newspaper appearances.

Koop called his watershed ban frustrating. He wants to prepare a report for a GVRD board meeting Dec. 8 on the Oct. 10 landslide.

A trip into the watershed and a question-and-answer session with water district staff, he said, would have helped him research the report.

Koop admits to entering the watershed without permission, but said his Oct. 30 request for permission was not fulfilled in time to do a report for the Nov. 17 water committee meeting.

That, however, doesn't wash with West Vancouver Mayor and acting GVRD board chairman Mark Sager.

Although Koop was granted board approval to go into the watershed with the water district's OK, Sager said Koop didn't need to go in unaccompanied by district staff before the water committee meeting.

“The watershed is not going anywhere,” the mayor said. “Don't decide unilaterally you can't wait and then go in.”

The health of Lower Mainland residents depends on keeping the watersheds closed, Sager said.

Water committee member and North Vancouver District Mayor Murray Dykeman

See Cap water page 3



WEST VAN Mayor Mark Sager ... says rules protect water.