

DENY, DENY, DENY – The On-going Saga of Colliery Dams: More of what the City would like us to believe and what the citizens are discovering along the way.

I recently discovered the “Chase River Inundation Study -1963” at BC Archives (CM/B 2547 # 1247 –Sheet 1 & CM/C 2667 # 584 – Sheet 2). These maps (no report was available) were produced by BC department of Lands & Forests, Surveys & Mapping Board, Topography Division (scale 1” = 1000’). Since Harwood Improvement District relied on the province prior to its incorporation into the City of Nanaimo in 1975, this study was probably paid for and produced by the province. However, the City of Nanaimo has owned Westwood Lake since 1957, and the inundation shown almost reached the western boundary of the city. One might presume that they received a copy of the map in 1963 and certainly should have acquired the original from Harewood in 1975. Conversations with former emergency coordinators for the city reveal that they had no knowledge of this inundation study. What happened to it? Was it withheld by former Harewood officials and kept in a basement somewhere, like a lot of other documents, as some legends have it. Or was it simply discarded by city staff after amalgamation, as another legend has it. Maybe, it is still buried in the vault at City Hall.

The 1963 inundation map illustrates what I had long suspected, that water flows in a gully from Westwood Lake alongside the hydro line down stream into the Chase River. It shows a dotted line from the southeast corner of Westwood Lake to Power Line Dam (now known as Morrell Lake), then a solid line to Reservoir #2 (Upper Colliery Dam). Solid lines go from #1 and #2 Reservoirs to Howard #3 (Middle Colliery Dam) and thence to Howard #4 (Lower Colliery Dam), continuing on to the inundation boundary in Harewood below. Perhaps surprisingly, this boundary though similar to both the 2002 and 2012 studies actually covers a wider area. To the northeast, most of Robbins Park is flooded. In the southeast, the flood almost reaches Ninth Street, and it extends in the east well past Park Avenue. In the southwest, it runs south and west of a line between Bruce and Eighth and Howard and Seventh. In the northwest and north, it covers much less of Sixth Street, which is a bit incongruous. The outer boundary has a solid line while a slightly smaller inner boundary has a dotted line (related to 210 and 280 acres).

In the absence of an accompanying report, one has to make some assumptions from the notations on the map. The first is that all the dams mentioned have breached and the water flow is as shown, which is fairly obvious. The inundation area shows two values: One – 28,000 cfs (cubic feet per second) flood yields 210 acres. The other – 36,000 cfs flood yields 280 acres. We don’t know whether or not some hypothetical major flood is included in this study or to what extent Westwood Lake might flood. We also have no comparable figures of the actual 2002 and 2012 flood areas to compare with. However, we are given some descriptions of the various dams:

Power Line – earthfill, 27 feet high, 176 acre feet (217,092 cubic metres), unlicensed;

#2 Reservoir – earthfill, 15 feet high, 45 acre feet (55,506 cubic metres);

#1 Reservoir – concrete gravity, 30 feet high, 67 acre feet (82,643 cubic metres);

Howard #3 – earthfill/concrete upstream, 35 feet high, 130 acre feet (160,352 cubic metres), unlicensed;

Howard #4 – earthfill, 75 feet high, 200 acre feet (246,695 cubic metres), unlicensed.

Total capacity = 618 acre feet (762,291 cubic metres). Compare this figure (762,291 cubic metres) with those extrapolated from the 2002 Chase River Dams Incremental Damage Assessment of all the Chase River dams breaching releasing a total of between 390,000 to 422,000 cubic metres (please see my “Is Nanaimo Safe” for details). Or compare the 762,291 cubic metres figure with those extrapolated from the 2012 Chase River Dams Breach Flood Inundation Study of the two Colliery dams breaching during a one-hundred year flood to a Probable Maximum Flood – 312,000 to 443,000 cubic metres (again, see “Is Nanaimo Safe”). Clearly, the 1963 study deals with a flood of a different magnitude – and even without a flood, almost twice the water considered in the 2002 and 2012 studies. Who remembers Morrell Lake being drained a few years ago and a new emergency outlet was installed? Somebody knew its significance downstream!

Despite the previous statement, another point of interest is that in 1963 like Morrell Lake, the two Colliery dams were unlicensed, perhaps indicating that these pools were considered of little importance because of their relatively small size. Now, comparing the relative size of the watersheds and stored water of the Chase River, Millstone River and Nanaimo River, the former is obviously considerably smaller than the other two, yet, unaccountably, has the highest possible Dam Failure Consequence Classification.

Besides the 1963 figure quoted previously, I have discovered a number of different water volumes for the two Colliery dams (those marked * are from bathymetric surveys)
27 Million Gallons = 122,740 cubic metres (assuming Imperial gallons) – 1910, Report on the properties of Western Fuel Company by Harry J. Lewis, A.F. Buckham Papers MS 0436, Volume 32, file 10. BC Archives (Lower Dam only in existence at this time)
*78.8 and 80.1 dam³ = 78,000 and 80,100 cubic metres – Middle and Lower Colliery Dams – April 1994, Chase To Nanoose, Water Allocation Plan, BC Ministry of Environment, Lands & Forests.

*92,600 and 173,000 cubic metres – Middle and Lower Colliery Dams – 2002, Middle & Lower Chase River Dams Spillway Hydrology Study and 2010, Seismic Hazard Assessment Middle & Lower Chase Dams.

*110,000 and 112,000 cubic metres – Middle and Lower Colliery Dams – 2012, Chase River Dams Breach Flood Inundation Study.

You can see that the highest assessment is about three times that of the lowest (Lower dam), putting the subsequent engineering conclusions into question. Also, not addressed in any of the inundation studies, is how much water might remain within the bowl of the lake, or the river bottom, particularly in the case of the Middle Colliery Dam.

So what was Chase River flood boundary within and beyond Harewood like in 1963? The closest city directory of Nanaimo available at the library is 1964. The following streets showed numbered houses as follows (and including a number of listed apartments within them): Bruce Avenue – 28; Carlisle Street – 5 + 1; Deering Street – 3; Eighth Street – 22 + 2; Haliburton Street – 1; Howard Avenue – 3 + 1; Jordon Avenue – 1; Murray Street – 1; Nova Street – 23 + 1; Park Avenue – 45 + 2; Seventh Street – 40 + 1; Sixth Street – 2; Stirling Avenue – 27 + 1; Victoria Road – 1; Winchester Avenue – 13 + 4.

Total – 215 houses plus 12 suites = 227 housing units. John Barsby School was built in the early 1950's, so obviously was already in place with several hundred students/staff.

It is immediately apparent that certain roads existent today are missing: Aebig Street; Brookside Place (developed since about 1976); Gardasan Way; Georgia Avenue; Hewgate Street (developed since about 1967); Honey Drive, and some existing streets have been extended and built on since 1964. From the 1963 map the greatest concentration of houses is between Nova and Seventh, from Park to where Georgia is now. There appear to be some farms too. The following multiple dwellings have been added as shown: Country Gardens (Bruce Avenue – eventually 19 units) since about 1965; Ed's Mobile Home Park (Honey Drive off Park Avenue – eventually 49 units) since about 1973; Willow Grove Apartments (Sixth Street at Bruce Avenue – 147 units) since about 1983; Rivergate Town Houses (Sixth Street near Bruce Avenue – 31 units) since about 1994; Gardasan Way (principally four-plexes – 22 units since about 1995; Bruce Avenue at Eighth Street (four-plexes – 20 units) authorized in 2010 and currently still under construction.

Much of the building expansion in the inundation area has occurred since amalgamation in 1975, especially the multiple units, significantly increasing the permanent population. Using 2.2 persons per housing unit, the nighttime population in 1963 can be estimated at about 500. The city estimates that the current nighttime population is almost 1900. From a number of independent sources, I estimate it between about 900 and 1100. If the present flooding danger has been present for the past fifty years, why has the population density been allowed to double or nearly quadruple in that time frame? Or, if that danger was not perceived in the intervening years, does it really exist now? The daytime population at risk includes perhaps 600 or 700 at Barsby School, as has been the case for sixty years.

We recognize that there was some concern for the stability of the Colliery dams in 1978 and rehabilitation work was completed by 1980. It was not until 2002/2003 that concern was again voiced by engineers hired to inspect the dams. We waited until 2010 for a seismic hazard assessment and 2012 for yet another dam breach inundation study. This time staff didn't ignore it. Well actually, they rather kept it to themselves for three or four months. A draft copy was quietly released in June 2012, identical to that overtly released in September. City Council was not informed of the conclusions staff had made until late October. If the danger was as critical as staff expressed, was it not willfully negligent of them to have withheld the information from the public for four months? If it wasn't so, from a safety perspective, aren't we overreacting now?

Part of the problem lies with changes to the Dam Failure Consequence Classification. It changed in 1999 and again in 2011, making it harder and harder to fix the dams within the risk criteria. Fundamentally, as an engineer who has known the dams for some years admitted (in an exchange with Colliery Dam Preservation Society members), they have not really changed in condition – but the politics surrounding them has. Throughout the 1990's and into the 2000's, Dam Safety Branch cooperated with city staff to allow time to fix a serious problem with the Jump Creek Dam. Today, they appear to continue that cooperation with staff by ignoring all attempts from outsiders that want to preserve and repair the dams or change the Consequence Classification through mitigation. Unless we get permission to rebuild from all authorities (DSB, DFO, MOE etc.) before the dams are removed, it is most likely that such permission will be declined in the future.

It is my understanding, that the idea of removing the dams can be traced back to certain staff comments in 2009. This is about the time that the notion of a Harewood Neighbourhood Plan first appeared. I suspect that a desire to create more density within Harewood and appease the development community is the agenda pushing staff and perhaps the majority of Council in their decisions on the removal of the Colliery Dams. How else can one explain their obedience to staff direction, regardless of the issue or opposition from citizens. The wishes of the Harewood residents seem inconsequential within these decisions. Both senior staff and most of Council have ignored almost every presentation to consider an alternative to removal. Yes, they have agreed to replacement, but without prior permission this may be doomed. 2014 is an election year and some councilors may not be returning. They may simply change their minds or claim lack of funds, and there will be nothing that the rest of us can do about it. Such is the lack of trust. Conversely, I want to thank the minority of independent, thinking members of council for their support so far, and using their common sense.

It has been suggested that the dams be largely dewatered during the winter as a safety measure pending removal of the Middle dam next year and its subsequent replacement. I wonder if anyone has considered how long it would take to refill either one of the lakes. I suggest that, even in winter, the flow from upstream is less significant than one might suppose, without a major flood. The 2010 seismic hazard assessment made many assumptions and concluded that the Lower dam was probably not on bedrock, nor was there rebar in the concrete. A front page Nanaimo Free Press newspaper article from 10th November 1910 states clearly how the dam was built on bedrock. Furthermore, recent core sampling has shown the presence of rebar and mesh in the cement. All of this has been ignored by staff and minimized by their hired engineers. They simply will not contemplate an alternative to their conclusion – the dams are unsafe and have to go.

There is evidence from the aforementioned Ministry of Environment plan, that the dams control the water flow to the salmon fishery downstream. We don't know what effect their removal might have. Due to the release of sediment, both taking the dams down as well as rebuilding them may have a negative effect on the fishery. If so, perhaps we need to reconsider both options. Were we to, for instance, dispense with the Middle dam and the water held back by it, accepting the limitations of whatever water may remain in a pool. The Lower dam could be reinforced by compounding considerable rock and earth fill into the basin below, but allowing the exit of Chase River downstream as well as increasing the capacity of the spillway somewhat. Maybe even including a relatively small concrete dam at the narrowest part of the river below. Despite what the latest engineering reports state, this may still be the best and most cost-effective solution.

I remain very suspicious of the 2012 Inundation study conclusions: it is the only one ever done in Nanaimo using two-dimensional computer modeling; with alarming results. It should be remodeled with more precise data and re-analyzed. The population at risk needs studying and revising and the fatality rate should be explained in considerably more detail. It is at the very root of the Consequence re-Classification and what followed.

Lawrence Rieper, June 2013