To:- Parks & Natural Environment Advisory Committee

From:- David L. Cook P. Eng.

Date:- May 18, 2002

Subject:- Riverside Terrace ("Gravel Pit") Development Proposal in Draft Seymour Local Plan

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Introduction:-

This report is a response to proposals made for development of "Riverside Terrace", a former gravel pit, by the Seymour Local Plan Residents Committee in the Draft Seymour Local Plan dated April 2002 and accepted unanimously by DNV Council for public process at the regular Council meeting of May 13, 2002.

The area referred to as "Riverside Terrace" in the Seymour Local Plan is a private parcel of land that covers an area of about 5.7 ha (14 acres) west of the intersection of Berkley Rd and Mt Seymour Parkway and which once operated as a sand and gravel pit. It shares a common boundary with Hogan's Pools Conservation Park at its southwest corner and an undeveloped coniferous forest of Crown land on its northwest boundary. (see Figure 1)

"Riverside Terrace" is currently owned by Riverside Terrace Realty Inc. of 403-938 Howe St., Vancouver. Its legal description is DL676, Plan No. 12608, Property No. 111672, Folio 0460-4850-2, Lot 1, Block H. (see Figure 1)

Within the Draft Seymour Local Plan this area is proposed for development of approximately 200 units of Seniors' supportive housing or other residential use (Chapters 3 & 4 of the Draft Plan) with access to this development through Hogan's Pools Conservation Park via the unopened street allowance of Jordan Street which connects with Riverside Drive to the west.

History:-

"Riverside Terrace" as a name had its origins from the Riverside Terrace Neighbourhood Plan, one of a number of Neighbourhood Plans making up the Seymour Development Plan adopted by Council in 1983, which in 1986 became the Seymour Official Community Plan or Seymour Local Plan. The Riverside Terrace Neighourhood was originally an area bounded by Carnation St. to the north, Berkley Rd to the east, Mt. Seymour Parkway to the south and Riverside Drive to the west. Since 1966, when proposals were made for resumption of gravel operations at "Riverside Terrace", local residents have been in confrontation with developers and District Hall for retention of the natural setting of their neighbourhood. As with all such conflicts there were some losses

and some gains on both sides and the area covered by the original Riverside Terrace Neighbourhood Plan received some residential development along its western, northeastern and eastern margins and the establishment of the southern section as Hogan's Pools Conservation Park. The two remaining residentially zoned (RS1) undeveloped areas are the coniferous forest on Crown land located in the north-west corner and the privately owned former gravel pit referred to as "Riverside Terrace" in the Draft Seymour Local Plan now before us. Once again this latter area is presented for development.

Discussion:-

Now that the Seymour Local Plan has at last been approved by Council to go forward to Public Process, it is timely to present my arguments against development in the "Riverside Terrace" area. These are as follows:-

1. Hogan's Pools Conservation Park, which shares a common boundary with the southwest sector of "Riverside Terrace" is a wetland that acts as a collecting point for water flowing via springs from the aquifer that underlies "Riverside Terrace" and the residential areas beyond. This aquifer, the Capilano Gravel Formation, now forms a terrace or terraces of unconsolidated to poorly consolidated gravels with interlayered narrower bands of impermeable silt and clay representing quiescent lacustrine periods. This Formation is the remnant of a raised marine delta formed along the Seymour River valley as the valley ice retreated about 10,000 years ago. The Capilano Gravel Formation overlies glacial till which is more compacted and therefore less permeable to water than the sand and gravels within the Capilano Gravel Formation. As the land rose due to the release of the weight of the ice, the Seymour River cut down through the Capilano Gravel Formation and to a lesser extent, the till, forming steep, escarpments on both sides of the river. The east escarpments in the "Riverside Terrace" reach a maximum elevation of about 70 metres above the Seymour River. The Hogan's Pools wetland lies at the bottom of this escarpment.

   The water holding capacity of the Capilano Gravel is considerable and is the source of water for Hogan's Pools and the salmon bearing Maplewood Creek which flows out of Hogan's Pools. Springs occur on the slope and at the base of the escarpment. As an example of the water holding capacity of the Capilano Gravel, wells into it were reported in 1916 as exceeding 300,000 gallons per day (Armstrong 1956, reprinted 1970, Page 16). The flow from this aquifer at the present time is assumed to be considerably less than the 1916 figure due to the modification of the hydrology by the urban development that has taken place over its surface in the last 86 years. However, because the Capilano Gravel is continuing to successfully function as a water recharge for Hogan's Pools and Maplewood Creek, further development should not take place on the remaining undeveloped remnants of it.
   Continued development over this aquifer will therefore probably destroy two sensitive eco-systems which are dependent on it for water.

2. Because of the excavation into the escarpment by the gravel pit operation, the trace of the escarpment winds through “Riverside Terrace” for about 600 metres (see Figure 1). This configuration of the escarpment, together with the fact that the gravels are unconsolidated to poorly consolidated, renders the entire area unstable for residential development. Slope instability has been and will continue to be a major problem. Increasing the area available for lots by placing fill where the gravel was removed, as has been proposed, is not an option, as the potential for the fill to produce slides is too great.

   The known history of slide events in the area is described below, some of them destructive to private property and potentially life threatening. A number of these slides had their origins in unstable fill used to extend lot size at the top of the escarpment. These have been documented in a report by Klohn Leonoff Ltd. for the District of North Vancouver dated September 1970 and summarized below (see a to e below). Other slides (f & h below) have been described to the writer by local residents, and the most recent event at Bow Court (i below) was observed by the writer. These slides were caused by excavations into the toe of the escarpment to level lots for house construction or into the escarpment slope in the case of Bow Court. The Thody Slide (g below) is of unknown type.

   The degree to which a slope will fail or shear is dependent on two properties of the slope material; the degree of friction (compressive force) and the cohesiveness (chemical bonding) between the particles. In the “Riverside Terrace” area, “Fill” has the lowest of these two properties, glacial till the highest and the Capilano Gravel is intermediate between the two. The impermeable fine clay and silt bands act as traps for localized perched water tables.

   The Klohn Leonoff “Fill” type slide is caused when the pore water pressure reaches a point where friction between sand grains is suddenly reduced and the soil/water combination starts to act as a fluid. The resultant slide is therefore usually sudden and potentially devastating. Because of its lack of cohesiveness, “Fill” is going to be the first type of material to fail and slide.

   With increased water into the pore spaces, the Capilano Gravel will be the next material to fail.
   This could happen in three ways:-

   i) In areas where residential development has taken place, intense localized slope saturation can take place as a result of concentrated run-off from man-made features such as buildings and paved surfaces during particularly heavy periods of rainfall. The water table can therefore be temporarily raised on slopes that normally would not have such a high water table. The result is loss of friction between grains followed by shear strength reduction and failure producing a slide.

   ii) Water in the Capilano Gravel could collect at a gravel/till interface or a gravel/clay interface because the till and clay are impermeable to water. The water pressure builds at this perched water table until it reaches a point where

the interface acts as a shear surface causing the overlying mass to move over the lower mass. If the shear is deep-seated, a large quantity of material can be mobilized with potentially destructive consequences.

iii) Subsurface water channels can occur through the gravels or along the gravel/till or gravel/clay interfaces. These flux as the springs that occur on the slope and at the base of the escarpment. This sub-surface erosion or "piping" can contribute to sliding.

The known slide events in the lower Seymour River area are:-

a) Treetop-Chapman Slide: Originating at 2205, 2217 & 2223 Berkley Ave. with toe of the slide on Chapman Way. Occurred December 17, 1979 after heavy rain. Horizontal length 130 metres. See Photos 1 & 2.
b) Patrick Slide: Originating at 2360 Carman Place with toe at 1802 Riverside Drive. Occurred on December 17, 1979 after heavy rain. Horizontal length 180 metres.
c) Dawson-Chu Slide: Originating at 2379 Carman Place with toe at 1710 & 1718 Riverside Drive. Occurred December 17, 1979 after heavy rain. Horizontal length 240 metres. One house was demolished, two other houses were damaged and a car was crushed in the path of this slide. See Photos 3 to 7.
d) Tate Slide: Originating at 1425 Lennox Street with toe at an unopened street east off Riverside Drive. Occurred December 1972 after heavy rain. Horizontal length 150 metres. The backyard of the residence at 1425 Lennox Street was lost to within 2 metres of the house. See Photo 8.
e) McGowan Slump at 1305 and 1345 Lennox Street. Occurred December 1972 after heavy rain. Earth support for the swimming pool slumped on the downslope side. See Photo 9.
f) In 1978 during a 9-home development in the 1000 and 1100 blocks of Riverside Drive, a slide occurred which crossed Riverside Drive, venting itself into the Seymour River. This slide originated on the previously mentioned Crown Land and was caused by excavations into the toe of the escarpment while levelling the residential lots on Riverside Drive. See Photo 10.
g) Thody Slide: Originating at 2465 Berton Place. See Photo 11.
h) Zorzinoni Slide above Seymour Court on the west side of the Seymour River where the Capilano Gravel forms the western escarpment along the Seymour River.
i) A small slide occurred above Bow Court also on the west side escarpment during recent excavations for a water main by the GVWD. See Photo 12.

3. "Riverside Terrace" lies on the major Seymour River Wild-life Corridor which begins in the North Shore mountains, passing down the Seymour River valley to Burrard Inlet. The reality of this Corridor is well supported by the numerous Black Bear sightings reported to the North Shore Bear Network by residents in the Riverside area each summer. The significance of Wildlife Corridors is explained by Guy, Payne & Rublee (1993, page 15). Development within this corridor will increase human/bear

conflict.

4. "Riverside Terrace" is intimately associated with Hogan's Pools in terms of both hydrology and ecology. The hydrological relationships between the two areas have been outlined under (1) above. For small ecosystems such as Hogan's Pools to be biologically sustainable, they must retain a connection with a larger natural ecosystem, in this case the Seymour Wildlife Corridor and the North Shore mountains. This is explained in Page & Millar (1995, page 25 & 26). Continued development within the Corridor will sever this connection and the eco-system will eventually fail.
5. It is accepted that the coincidence of high rainfall and an earthquake will precipitate numerous earth and rock slides throughout the area affected (Maynard 1978). Maynard states that "a moderately strong earthquake (average intensity VII) is a distinct possibility in the Seymour area. In such an event, higher intensities would be felt in areas underlain by fill or saturated Capilano cohesive sediments". The sediments referred to are the Capilano Gravel formation. In my opinion it is not a question of whether this type of event might occur, but when it will occur. Any development on poorly consolidated sediments such as the Capilano Gravel is subject to risk to private property as has already occurred and to human life. These risks increase with continued development.

Conclusions and Recommendations:-

Arguments have been presented here for no development in the "Riverside Terrace" area. In summary these arguments and the recommendations arising from them are:-

1. The unstable nature and risk potential of the terrain renders "Riverside Terrace" unsuitable for any form of development.
2. The Area is a necessary part of the Hogan's Pools ecosystem and hydrology as well as that of Maplewood Creek. It should be purchased from the present owner and made part of the Hogan's Pools Conservation Park.
3. "Riverside Terrace" lies on the Seymour Wildlife Corridor and should retain its function as part of that Corridor by protecting it from development.

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