10.0 TECHNICAL REPORTS

A number of separate reports have been completed for Arbutus and form a supplementary information package. These reports are to be read as a part of this rezoning application and include the following subjects:

- An updated environmental assessment, carried out in 2009, by Technology Resource Inc.
- A geotechnical assessment by AMEC
- A site servicing assessment by AMEC
- A hydrology and storm water management study by AMEC
- A green energy study by Compass Resource Management Ltd.
- An arborist report by Arbortech Consulting Ltd.
- A commercial development opportunity and impact study by Cushman & Wakefield Lepage, Inc..
- A charge summary prepared by Pavolin & Company.

Brief summaries of several of these reports are included below:

Site Servicing

Storm Sewer

The Storm Water Management Plan demonstrates that for the new development, the impact on the adjacent neighbourhood will be positive, as more green areas will be created and, as a direct consequence, stormwater peak flows will be reduced in an estimate order of a 25%.

Additional flow attenuation and pollution control can be also considered by the design of a stormwater wet pond.

LEED Credits 6.1 Rate and Quantity & 6.2 Treatment will be achieved by implementing BMP's.

A 200 mm diameter on –site storm sewer is expected to connect to the existing storm sewer line running on Arbutus Village Park. The off–site storm sewer discharges then into the combined 1650 mm concrete Balaclava trunk.

Sanitary Sewer

The analysis demonstrates that the new development has only a minimal impact on the overall total flow of the system and the sanitary sewer operation will not be affected after redevelopment. A 200 mm diameter on–site sanitary sewer is expected to connect to the existing sanitary storm sewer line running on Arbutus Village Park.

Watermain

After confirming the size of watermain for fire flow requirements, the on-site watermain will be connected to the City's distribution system

Energy Report Summary

Compass Resource Management led an energy study to establish baseline energy performance for the site, and to identify opportunities for improved performance and additional LEED® credits, including opportunities for district energy. Based on Vancouver's current building code, the site would use more than 8,000 MW.h of energy for heating, cooling, and hot water, and a further 11,000 MW.h for non-thermal loads such as lighting and appliances. Under baseline technology assumptions, the site would use required about 14,000 MW.h of electricity and 7,000 MW.h of natural gas at build out, resulting in about 1,600 tonnes per year of greenhouse gas emissions.

The proposed building orientation within the site is optimal with respect to minimizing total energy consumption, but occupant comfort can be improved with attention to vegetation and structural shading devices, particularly on the west faces of buildings. The minimum three LEED® Optimize Energy Performance credits required by the City can likely be achieved at lowest first and lifecycle costs through modest building envelope improvements. These will need to be confirmed in the detailed design phase. Further improvements may be possible in this phase by maximizing waste heat recovery within individual buildings.

Additional LEED® credits could be achieved through alternate energy supplies. Given the large cooling loads expected for the site, geo-exchange may be

a cost-effective option. A district scale system could be a feasible and cost-effective way to implement geo-exchange for the site. A more detailed business case for district energy is recommended in the design phase. In addition to geo-exchange, the detailed study should consider high-efficiency boilers and chillers and co-generation alternatives based on the preliminary screening. This site offers interesting opportunities for co-generation given the large commercial loads (and requirements for on-site back-up power) and proximity to a major BC Hydro substation. Natural gas co-generation may also be an effective stepping stone to a biogas co-generation system when that technology is commercialized. In addition, the implementation of a district system offers the potential to serve nearby existing loads in the Arbutus Village and Arbutus Club with alternative energy sources. These expansion opportunities should be considered in the more detailed analysis.

Arborist Report Summary

A tree retention assessment was undertaken by Arbortech Consulting Ltd. covering a portion of the site at the Arbutus Village Mall. While there are trees found throughout the property, the study area is restricted to two main sections of the site; the south parking lot interface along Nanton Street, and the north parking lot interface along the section bordering the north adjacent residential strata property.

The south interface was found to contain a row of 11 maple and oak trees growing in an open landscape condition, within planters that line the parking lot. Most trees were observed to be in fair condition, with the exception of two being found in poor condition, but with the defects relating to the poor rating appearing correctable. These trees are all deemed to be viable for retention based on their current condition. However, protective and enhancement measures would be required to be implemented during the construction phase of the project, and limitations on grading and landscaping would be required in order to maintain sufficient roots to keep these trees viable. Two of the trees were found to be in direct conflict with elements of the concept design and would need to be removed accordingly.

The north interface landscape is comprised of a grove of predominantly pine trees, with a few oak, spruce and cedar trees mixed with them. The growing site is a steeply sloped planting bed between the parking lot and the adjacent property. The trees are planted with close spacing, and form a dense grove with merged crowns. While the trees act as a good visual screening buffer, the majority of the pines were found to have significant disease and many contain serious structural defects. Twenty-two of the 30 existing trees in this area are rated in very poor condition as a result, and they are deemed to be non-viable for retention. Regardless of future development, some trees pose high risk to the site in the current land use, and many more will become high risk within the next decade. With the proposed development, it would be irresponsible to retain and protect these trees. Since the trees in this grove are all reliant on the grove conditions for structural support, selective retention is not appropriate. The entire grove of trees in the north interface study area is recommended for removal, the majority being in very poor condition and the remainder of them being destabilized by the removal of their counterparts. Three of those trees are located on the city road frontage, therefore parks board approval is required in advance of their removal.

A total of 43 trees are found within the two study areas, with 9 proposed for retention and 34 proposed for removal. All of the subject trees are protected by City Bylaw, and a permit is required before they can be removed. Further review and detailed tree protection measures will be required to be developed as the project design advances.

Geotechnical Report Summary

Results of the site investigations indicate fill overlying firm to stiff sandy silt underlain by dense to very dense granular soils. Based on encountered soil conditions, it is recommended that all temporary unsupported slopes within the existing fill and silt materials should be no steeper than 1.75H:1V, which could be steepened to no greater than 1.25H:1V for slopes comprised of very stiff to hard silt and dense to very dense granular materials. However, these slopes must be protected from the weather with poly sheeting or similar material. These temporary excavation slope recommendations assume negligible to minor groundwater seepage into the excavations as well as no heavy loads close to the crest of the excavations. These recommendations for temporary excavation slopes should be confirmed during actual construction by a qualified Geotechnical Engineer as required by Workers Compensation Board (WCB) regulations. For excavations close to adjacent roads or buildings located within a 1H:1V slope threshold, it is recommended that a geotechnical underpinning or shoring design be completed to avoid undermining existing roads and building foundations.

Hydrology and Storm Water Management Report Summary

The Arbutus Village Shopping Center re-development is to include up to three levels of underground parking. Groundwater levels at the site are generally shallow, within one to three meters below ground surface. Consequently, the underground parking structure will be constructed and maintained below groundwater levels. This will require either a water proof foundation or passive drainage in order to create dry conditions within the parkade. Passive drainage can be created by installing perimeter and floor drains and keying into City of Vancouver storm sewers. This would have a net effect of lowering groundwater levels site wide. Alternatively, a water proof foundation would create elevated groundwater levels to the east of the property and to a lesser extent to the north and south of the property.

Commercial Development Opportunity and Impact Study

A commercial impact study was commissioned by the City to determine the appropriate level of retail and office space within the development. The findings of the study concluded that additional retail expansion over the 80,000 sq.ft. proposed is not technically, economically or financially feasible. The subject site is simply not suitable for retail space over 80,000 sq.ft. and neither the market nor industry standards could support anything larger. In summary, the commercial development as proposed is optimal, and balances supply and demand with the site's characteristics.

Title Summary

All of the existing chargeholders who at the time of redevelopment will have registered interests in the Property will be accommodated in respect of the redevelopment at their option, there are accordingly no charges on title that should prevent the redevelopment from being effected.