Report date range from: 4/16/2025 3:00:01 PM to: 4/17/2025 5:00:00 PM

CD-1 Rezoning: 461-479 East 16th Avenue - Oppose

Date Received	Time Created	Subject	Position	Content	Author Name	Neighborhood	Attachment
2025-04-17	16:59	CD-1 Rezoning: 461-479 East 16th Avenue	Oppose	I oppose this application. The existing hydrogeological information and the geo-pacific assessment is not insufficient and inadequate to meet the criteria of the City Bulletin for Preliminary Hydrogeological Study. As an engineer myself, I am not confident despite the developer's attempts with the geotechnical and hydrogeological report, that this project would not have a significant impact on impact on the surrounding structures, sewage, roads. The structure will not be suitable on this type of ground even without seismic activity, let alone with. There will be no liability by the developer in the future despite significant risk. The referral report does not fully address concerns regarding excavation and groundwater management. The city's conditions do not ensure protection damage to neighbouring properties. The project does not even increase long term and family oriented homes, as evidenced by their size and styles. It will only be suitable for transient individuals. This will reduce adequate day light to the neighbouring homes causing poor health for individuals. Overall this project poses to many risks and will reduced social determinants of health for our neighbourhood.	Pradeep Sharma	Mount Pleasant	
2025-04-17	10:39	CD-1 Rezoning: 461-479 East 16th Avenue	Oppose	I oppose this rezoning application. Construction of a 20-storey building in a Ground Water Area of Concern could negatively impact surrounding properties, the neighbourhood, not to mention the safety on site as well. This rezoning proposal is a gross overreach, the infrastructure of 16th Ave cannot support such a massive project.	Jessica Sharpe	Mount Pleasant	
2025-04-17	09:22	CD-1 Rezoning: 461-479 East 16th Avenue	Oppose	I strongly oppose the rezoning and building of this project. The size of the project alone does not seem feasible with the current soil structure of Mount Pleasant as it was developed on a swamp. Additionally removal of multi family dwellings that are affordable and replacing them with apartments, even if they are "below market value" does not allow for low income individuals to survive. East 16th does not have the width to support the increased traffic and parking this structure will bring in.	Heather Jerred	Mount Pleasant	

2025-04-17	09:25	CD-1 Rezoning: 461-479 East 16th Avenue	Oppose	East 16th is a very busy and dangerous street that adding a tower will make it so much worse. I have witnessed a number of accidents. Having a tower on this street doesn't make any sense.	Shellina Tarmohamed	Strathcona	
2025-04-17	09:55	CD-1 Rezoning: 461-479 East 16th Avenue	Oppose	I am writing to express my strong opposition to the proposed rezoning. This development is out of scale with our neighborhood, both in height and density, and does not align with the character of our community. The proposed building's height and massing are disproportionate compared to surrounding structures, leading to concerns about shadowing, loss of privacy, and the overall aesthetic disruption of our streetscape. Additionally, the increased density will strain existing infrastructure, including parking, traffic flow, and public amenities, which are already operating at capacity. While I understand the need for housing, developments should be thoughtfully integrated into existing neighborhoods, respecting their unique characteristics and ensuring that growth is sustainable and beneficial for all residents. I urge you to consider these points and reject the rezoning application.	Andreas Psaltis	Downtown	
2025-04-17	07:44	CD-1 Rezoning: 461-479 East 16th Avenue	Oppose	It's unsafe to build such a large building on bog soil. 16th is a single lane street that is not designed or adequate to handle the traffic that would come with a 20 Storey building. It would make the area super congested and not safe for families or pedestrians.	Rosanna Lin	Mount Pleasant	
2025-04-17	09:03	CD-1 Rezoning: 461-479 East 16th Avenue	Oppose	I'm writing to express my strong opposition to the proposed development for several key reasons: A 20-storey tower would drastically alter the fabric of the neighbourhood, which is currently characterized by low-rise condos and townhomes. This type of high-rise structure is completely out of step with the existing scale and architectural character. If this proposal were located along West Broadway or near a future Broadway Subway station, it might make more sense. But in this location, it's completely misplaced. Additionally, the application contradicts the City's zoning regulations — the site falls short of the required 150 ft frontage, coming in at only 132 ft. This alone should disqualify the project at the proposed density. Developers shouldn't be permitted to selectively apply zoning criteria only when it benefits their plans. Dropping a high-rise into a low-density neighbourhood puts serious pressure on existing infrastructure and public amenities — from transit and traffic to sewage and schools. The sudden influx of residents could overwhelm local systems that were never designed to support this scale of development. The tallest building along East 16th Avenue right now is just four storeys. Adding two 20-storey towers would cast significant shadows over the area,	Bich Nhung	Mount Pleasant	

				blocking sunlight and natural daylight for surrounding homes. Many of these homes are occupied by families with young children, for whom access to daylight has real implications for health and well-being. On top of that, neighbouring residents would lose a considerable amount of privacy as their homes and yards would be overlooked by the new towers. East 16th is a single-lane road already dealing with high traffic volumes during peak hours. Introducing towers of this scale would only worsen congestion, creating safety and mobility issues for everyone in the area. Street parking is already under pressure due to the design of many existing buildings in the area, which don't provide enough off-street parking. The proposed project includes just 77 underground stalls for 171 units — a 0.45 parking-to-unit ratio — which simply isn't enough, especially when many of these units will house multiple residents. This shortfall will push even more cars onto already crowded streets. To make matters worse, the City is reviewing another rezoning application for two additional high-rises (32 and 25 storeys) just a few blocks away at 2950 Prince Edward Avenue, bringing over 540 more units into the mix. Even if half of those have dedicated parking, we're still looking at a major strain on local street parking. This area is built on soft, peaty soil, which is already causing issues like road and sidewalk subsidence. Adding the weight of two more towers to an already unstable area will likely intensify those problems, potentially leading to long-term impacts on nearby properties and infrastructure. In closing, this proposal — at this scale — is simply not appropriate for this location and should be rejected. I want to be clear: I'm not against density. I recognize that more housing is needed, and I support thoughtful intensification. But this particular proposal lacks contextual sensitivity and fails to address the practical limitations of the site. A low- to mid-rise project could be far more suitable and would go a long way toward addressing the concerns I've outlined.			

Report date range from: 4/16/2025 3:00:01 PM to: 4/17/2025 5:00:00 PM

CD-1 Rezoning: 461-479 East 16th Avenue - Oppose

Date Received	Time Created	Subject	Position	Content	Author Name	Neighborhood	Attachment
2025-04-17	00:40	CD-1 Rezoning: 461-479 East 16th Avenue	Oppose	This project inevitably involves excavating in peat soil. This poses a high risk of soil subsidence and instability, with a high risk of adversely affecting neighboring properties, roads, sewage systems, and other city infrastructure. The applicant's Hydrogeological Report is inadequate. The preliminary report commissioned by the developer is insufficient to meet the provisions of the city's own Groundwater Management Bulletin. An independent geotechnical expert found that the current report poses significant risks. The referral report does not fully address concerns regarding excavation and groundwater management, and the City's conditions fail to ensure adequate protection against subsidence or damage to neighboring properties. Please: 1. Deny this rezoning application, or 2. At the very least, postpone the application and direct the applicant to address for the residents of East 16th Ave the concerns of their independent geotechnical expert to that independent expert's reasonable satisfaction.	Mike Mangan	Mount Pleasant	
2025-04-16	17:33	CD-1 Rezoning: 461-479 East 16th Avenue	Oppose	I strongly oppose the rezoning proposal to allow a 20-story building in our residential neighborhood. This development would drastically alter the character and scale of our community. A 3-6 story building is much more reasonable - especially given that this location is on the outskirts of the Broadway plan. A structure of this magnitude would bring increased traffic congestion and strain on infrastructure. Additionally, the current proposal does not comply with frontage requirements - this is concerning. Why should such an exception be made?!	Andrea Blazenko	Riley Park	

2025-04-17	16:43	CD-1 Rezoning: 461-479 East 16th Avenue	Oppose	I am not generally opposed to any development, but I am strongly opposed to this proposed development. As a property owner beside this development, I feel the assumptions the preliminary hydrogeological report is based upon are questionable especially considering that the development is located in an area where there is soil sensitivity with ground water level changes. Thus I feel there are significant consequences to my property if this development goes ahead, and therefore high risk. This development is also not in line with the broadway plan. It is not located within the transit orientated development tier, and thus isn't allowed to be as high as it has been proposed. If you look at the proposed FSR, is it so out of line with even other proposed developments under review by council. This property should not be allowed to be rezoned for this proposal.	Ashley Perry	Mount Pleasant	
2025-04-17	14:41	CD-1 Rezoning: 461-479 East 16th Avenue	Oppose	The ground does not support this. It’s too large a project for this area. It ruins the neighborhood	Elissa Heisch	Kitsilano	
2025-04-17	11:46	CD-1 Rezoning: 461-479 East 16th Avenue	Oppose	This is not the right building for this residential block and the ground does not offer the right conditions. How many people ‘for’ this build work for the company developing or stand to make money versus residents? Take this into account.	Jem Garrard	Mount Pleasant	
2025-04-17	10:55	CD-1 Rezoning: 461-479 East 16th Avenue	Oppose	I strongly oppose the proposed 18-storey building in this already dense, residential neighborhood. Placing a high-rise among single-family homes, far from main roads or other towers, will dramatically disrupt the area's character, scale, and livability. Growth should be thoughtful and context-sensitive—this development is neither appropriate nor responsible for this location.	Henry Slaughter	Mount Pleasant	
2025-04-17	10:59	CD-1 Rezoning: 461-479 East 16th Avenue	Oppose	I am against this for many reasons but this proposal is so bad. This tall building for this area is not suitable. The roads and parking are not built for it and it would increase the accident rates and be unsafe for pedestrians and bikers. Also the peat bog which this building would be built on is not an ideal area for a big tower like this and would likely cause damage to surrounding areas.	Janelle Knihnitski	Mount Pleasant	
2025-04-17	11:13	CD-1 Rezoning: 461-479 East 16th Avenue	Oppose	Dear Mayor and Council, I am writing in opposition to the proposed rezoning at 461–479 East 16th Avenue. I have also attached two engineering letters from Richard C. Butler, P.Eng., FEC, a senior geotechnical consultant retained by neighbouring property owners. Mr. Butler submitted a preliminary letter to the City on June 12, 2024, and a second letter, dated April 15, 2025, which includes his review of the referral report. Both letters conclude that the developer’s hydrogeological assessment is incomplete and does not meet the requirements of the City’s Groundwater Management Bulletin. In his most	Louise Pick	Mount Pleasant	Appendix A Appendix B

recent letter, Mr. Butler formally recommends that the City require a Revised Preliminary Hydrogeological Study at this stage—prior to approving rezoning.

The City's referral report acknowledges that this site sits within one of Vancouver's largest known peat areas—a location that presents significant geotechnical risk. Yet instead of resolving those risks before recommending rezoning, the report proposes that critical assessments be deferred to the development and building permit stages.

Deferring these assessments is not a procedural formality—it puts Council in the position of approving a project without knowing whether the site can safely accommodate the proposed development. That is a fundamental issue of feasibility and risk that should not be deferred.

According to the Groundwater Management Bulletin, a Preliminary Hydrogeological Study is required at the rezoning stage to determine whether a project can proceed without causing significant on- or off-site harm. Butler has assessed that the developer's submission fails to meet those requirements, and the City has effectively acknowledged this by requiring further study at a later stage. This is a clear indication that the current application is incomplete.

Yet the referral report still recommends that Council approve the rezoning before this critical information is available. This is not best practice—it is risk deferral disguised as progress.

Council should insist that all required hydrogeological work be completed and reviewed prior to approval. That is what the policy demands, and that is what responsible planning requires. Approving a speculative application without the necessary technical foundation creates long-term risk for both the neighbourhood and the City.

These issues are compounded by several additional concerns that arise directly from the referral report:

• Between May and November 2024, the public consultation summary noted that 125 of 210 public submissions were in opposition. This strong response came before the application was referred to Council. Some residents are now concerned that more recent supportive submissions may reflect perspectives from individuals who are supportive of the project in principle, but who do not live near the site and are not directly impacted by the associated risks of building in peat soils, or who may be professionally or personally aligned with the applicant's interests.

• The referral report supports an increase to 8.0 FSR, yet provides only a single line of rationale. This exceeds the maximum 6.5 FSR identified for this area under the Broadway Plan (Mount Pleasant South Apartment Area), where even tower forms are limited to minor increases—not more than 0.3 FSR—if accompanied by childcare or local-serving retail. There is no clear policy path to 8.0 FSR at this location.

				• The applicant has not yet acquired three of the four parcels included in this application, and no underpinning agreements have been secured. Given the unresolved geotechnical risks, it is difficult to interpret this as anything other than a speculative play. If rezoning is granted and the project proves infeasible—as the engineering letters submitted outline—it is likely the site will be sold, leaving the City and surrounding neighbourhood with unresolved risk and no affordable housing outcomes. • The site is located approximately 1,200 metres from the future Broadway–Main SkyTrain station—well outside the 800-metre tier prioritized for high-density, transit-oriented development. While adding housing is important, this site is neither transit-connected nor geotechnically straightforward. With over 130 Broadway Plan towers already approved or in progress, there is no rationale to rush this application without clear data confirming the site is feasible to build on. Council must understand what forms of housing are actually possible to build in this area. Peat soils present real and long-term barriers to development. A fulsome geotechnical assessment of this part of Mount Pleasant is warranted before Council supports projects of this scale. I urge Council to defer this application until a Revised Preliminary Hydrogeological Study is submitted—as recommended by senior geotechnical engineer Mr. Butler, and in accordance with the City's own Groundwater Management Bulletin. The current submission does not meet City policy, and the long-term risk to public infrastructure and nearby homes is too great to ignore. Thank you for your time and consideration.			
2025-04-17	11:39	CD-1 Rezoning: 461-479 East 16th Avenue	Oppose	I strongly oppose the proposed 18-storey building in this already dense, residential neighborhood. Placing a high-rise among single-family homes, far from main roads or other towers, will dramatically disrupt the area's character, scale, and livability. Growth should be thoughtful and context-sensitive—this development is neither appropriate nor responsible for this location.	Sarah Ardron	Mount Pleasant	

Report date range from: 4/16/2025 3:00:01 PM to: 4/17/2025 5:00:00 PM

CD-1 Rezoning: 461-479 East 16th Avenue - Oppose

Date Received	Time Created	Subject	Position	Content	Author Name	Neighborhood	Attachment
2025-04-17	15:26	CD-1 Rezoning: 461-479 East 16th Avenue	Oppose	I am writing to express concern and opposition to the proposed development in its current form. This site is located in a low-rise, boggy residential neighbourhood, where existing homes are not built on piles. Building a tower without a podium in these soil conditions raises serious safety concerns. The increased risk of high winds, compounded by climate change, introduces additional hazards—items falling from balconies could injure pedestrians or damage the surrounding lower homes. The development site is within a designated "Ground Water Area of Concern," yet the current hydrogeological review and the GeoPacific assessment do not appear to meet the City Bulletin's standards for a Preliminary Hydrogeological Study. These conditions warrant a much more thorough investigation before any further consideration is given. The Referral Report outlines an increase from 6.5 FSR to 6.8 FSR as "minor" to accommodate local-serving retail. However, this proposal seeks an increase to 8.0 FSR—four times the stated "minor" increase—without addressing why this substantial change was not clearly presented in the report. This site was previously considered too small for such density, with less than 150 feet of frontage, and lies at the edge of the Broadway Plan and outside the Transit-Oriented Area. Offering more density in these conditions lacks transparency and proper justification. There is opportunity to consider innovation and housing growth in Mount Pleasant with a truly community approach. Why not see this an opportunity to build and grow housing within the low-rise realm. Perhaps not all folks want to live in towers.	Prem Gill	Mount Pleasant	

Richard C. Butler, P. Eng., FEC
s. 22(1) Personal and Confidential

Appendix A

April 14, 2025

City of Vancouver
453 West 12th Avenue
Vancouver, BC, V5Y 1V4

Attention: City Clerk and City Planning Department

ENGINEERING REVIEW AND ASSESSMENT
PRELIMINARY HYDROGEOLOGICAL INVESTIGATION REPORT
PROPOSED 461-479 EAST 16TH AVENUE DEVELOPMENT
VANCOUVER, BC

As authorized by several neighbouring property owners, Richard Butler, P. Eng., FEC has conducted a senior level engineering review of available information and an assessment of the potential adverse impacts on their and other adjacent properties due to the proposed high-rise development, including four levels of underground parking, at 461-479 East 16th Avenue, in an area known to be underlain by peat and other settlement susceptible soils.

The information provided for my review included the January 25, 2024 GeoPacific Consultants report titled "Preliminary Hydrogeological Investigation Report: Proposed Residential Development, 461-475 E. 16th Ave., Vancouver, BC", the City of Vancouver Groundwater Management Bulletin, last amended January 1, 2024, and the Referral Report to Council, the Francel Architecture Inc. building plans available on the City of Vancouver rezoning application website, and the City of Vancouver plan titled "Peat, Assorted Soils and Historic Waterways". I also reviewed the 1989 revised Vancouver Old Streams publication and drawing.

Mr. Richard Butler, P. Eng., FEC, is a senior engineering consultant, having in excess of 45 years of experience on a wide range of geotechnical projects, ranging from residential developments to major infrastructure, commercial, and industrial facilities throughout British Columbia, across Canada, and internationally. Mr. Butler served as co-chair during preparation of the Engineering and Geoscientists British Columbia (EGBC) "*Guidelines for Geotechnical Engineering Services for Building Projects*" and acted as an internal reviewer during preparation of the EGBC "*Guidelines for Legislated Landslide Assessments for Proposed Residential Developments in British Columbia*". He has also published papers based on his extensive knowledge and experience related to development in areas underlain by peat and other organic or weak soil.

As described in the GeoPacific report, the proposed 21-storey residential tower over a 4-level parkade (P4 Parkade) site is located at 461 – 475 East 16th Avenue, and is bounded to the

north by a municipal lane, East 16th Avenue to the south, a duplex strata building to the east, and a three storey townhouse development to the west. Existing single family properties, including historic residences, together with a low-rise rental building, are located to the north of the municipal lane. The site is stated as being approximately 40 m from north to south and 37 m east-west in plan, and is generally level, with the existing ground surface elevation at about 46.5 m. GeoPacific also states that the P4 Parkade slab elevation is 34.28 m, 12.22 m below the existing ground surface level at and adjacent to the site. As stated in Section 8.0 of the Preliminary Hydrogeological Investigation report, GeoPacific anticipates that a conventional parkade perimeter and underslab drainage system at or slightly below the P4 Parkade level is appropriate for the soil and groundwater conditions at the site.

1.1 SOIL AND GROUNDWATER CONDITIONS

Based on the Geological Survey of Canada Surficial Geology map 1484A, and the City map titled Peat, Assorted Soils and Historical Waterways, the site and adjacent areas are identified as being underlain by peat and other bog deposits (the Mt. Pleasant Peat Bog), overlying glacial till, with bedrock more than 10 m below ground surface. Both the City and the Old Streams maps show that an old stream (Brewery Creek) is located within or close to the proposed highrise development. The GeoPacific report also states that the BC Water Atlas shows that the Quadra Aquifer is mapped as being present below the site.

The GeoPacific report states that two boreholes were carried out at the site on October 28, 2022 and advanced to depths of 18.3 and 16.8 m below ground surface, with both boreholes close to the north property line. Dynamic Cone Penetration Tests (DCPTs) were carried out to determine the relative density/consistency of the soil conditions, and samples were collected at various depths.

Both boreholes encountered similar soil conditions, with a thin (0.15 m) surficial fill layer underlain by peat extending to a depth of about 1.5 m, followed by clayey silt extending to about 3 m depth. Based on DCPT values typically less than 5, both the peat and clayey silt are considered to be soft to very soft, and moderately to highly compressible.

The peat and clayey silt deposits are underlain by glacial till deposits or layers, described as varying in composition from silt or sandy silt to silty sand and gravel or sand. DCPT values within an approximately 1 m thick zone of the silty sand and gravel glacial till directly underlying the clayey silt deposit are highly variable, but generally less than 30, indicating potential or likely loosening or disturbance. It is also noted that the underlying sand and sandy silt till layers or zones are described as compact or compact to dense. Siltstone bedrock was encountered at both boreholes underlying the glacial till, at a depth of about 13.7 m.

Monitoring wells were installed at the base of the boreholes, within the siltstone bedrock. No monitoring wells were installed within the near surface peat and clayey silt or the glacial till soils overlying the bedrock. Groundwater levels at both boreholes were recorded at about 2.2 m below ground surface on November 13, 2021. The groundwater level was subsequently measured as 1.45 m below ground surface at only monitoring well MW22-02 on June 6, 2023. However, no groundwater levels were determined and monitored within the peat and soft clay near ground surface, nor within the upper zone of loose or disturbed glacial till, and the sandy layers within the till deposit.

Although samples of the various soils encountered at the boreholes were collected, laboratory testing was limited to water content measurement. No grain size distribution (gradation) or other laboratory testing and no hydraulic (drainage) tests were carried out to permit suitable assessment of the drainage properties of these soils, as would be expected in a Preliminary Hydrogeology Study to suitably determine and assess the waterflow conditions at various depths and the potential impact on peat and other compressible soils within adjacent properties.

1.2 ENGINEERING ASESSMENT AND OPINION

It is my opinion that the existing borehole and hydrogeological information in the GeoPacific report is not sufficient or adequate to meet the criteria of the City Bulletin for a Preliminary Hydrogeological Study, and that additional hydrogeological investigation and analyses should be carried out as part of a Revised Preliminary Hydrogeological Study, in accordance with Item 2.3.3 of the Groundwater Management Bulletin. In my opinion and experience, the groundwater levels and seasonal variations identified within the siltstone bedrock could vary, potentially significantly, from the groundwater levels within the peat, clayey silt, and glacial till soils overlying the siltstone bedrock. These potential or likely differences in groundwater levels and seasonal variations were not identified or addressed in the GeoPacific report. Specifically, it is my opinion that the GeoPacific assessment is not sufficient to exclude the risk and impact of damages to offsite structures and other facilities that could occur due to groundwater extraction or lowering within the moderately to highly compressible peat and soft clayey soils underlying the properties adjacent to and potentially significant distance beyond the P4 Parkade development site.

It is recommended that borehole and monitoring wells be installed within the peat and clayey silt, as well as within the potentially higher drainage flow zones within the glacial till layers, including the less dense layer of silty sand and gravel directly underlying the clayey silt deposit, as well as the sand or silty sand layers or zones identified at a depth of approximately 5 m below ground surface. Hydraulic testing together with collection of representative samples of the various soils, together with laboratory testing (grain size analysis, Atterberg limits) should be carried out to provide suitable data and correlation with the drainage properties determined by the hydraulic testing.

Section 5.5 of the GeoPacific report states that the BC Water Atlas confirmed that the Quadra Acquifer is mapped as being present below the site, but also states that, since it wasn't identified at the two boreholes, both located near the north site boundary, the potential impacts of the acquifer were not taken into consideration. It is recommended that a Revised Preliminary Hydrogeological Study be carried out before rezoning, including at least one borehole near the south boundary drilled through all soil or other deposits and extending at least 1 m into the underlying siltstone bedrock.

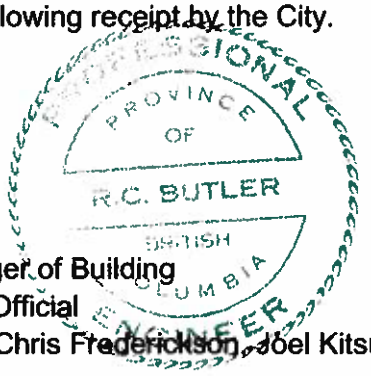
If differing natural soil, fill, or potential Quadra Aquifer conditions are encountered, additional boreholes, sampling, hydraulic testing and monitoring should be carried out. If significant artesian or other high groundwater flow conditions are present within or close to the site, it is my opinion that the proposed P4 Parkade tower development will not be safely buildable, and there is substantial risk of potentially severe impacts on the adjacent properties, as well as City facilities and utilities, including but not limited to significant short term and permanent

groundwater discharge to the sewer system, in non-compliance with Item 2.2.1 of the Groundwater Management Bulletin.

Due to the potential significant impacts on neighbouring properties due to the proposed P4 Parkade development, it is recommended that all additional and future reports be provided to the neighbouring property owners following receipt by the City.

Yours truly,

s. 22(1) Personal and Confidential



Richard C. Butler, P. Eng., FEC
105009

cc: Lon LaClaire, General Manager of Building
Saul Schebs, Chief Building Official
Lawrence Pick, Louise Pick, Chris Frederickson, Joel Kitsul

Richard C. Butler, P. Eng., FEC
s. 22(1) Personal and Confidential

Appendix B

June 12, 2024

Louise Pick
s. 22(1) Personal and Confidential

Attention: Louise Pick

ENGINEERING REVIEW AND ASSESSMENT
PRELIMINARY HYDROGEOLOGICAL INVESTIGATION REPORT
PROPOSED 461-479 EAST 16TH AVENUE DEVELOPMENT
VANCOUVER, BC

1.0 INTRODUCTION

As authorized, Richard Butler, P. Eng., FEC has conducted a senior level engineering review of available information and an assessment of the potential impact on the Pick residence and neighbouring properties due to the proposed high-rise development, including four levels of underground parking, at 461-479 East 16th Avenue, in an area known to be underlain by peat and other settlement susceptible soils. In addition, an assessment and recommendations are provided on the need for additional hydrogeological investigation, testing and other studies, as input to a Revised Preliminary Hydrogeological Study meeting the criteria and requirements of the City of Vancouver Groundwater Management Bulletin.

The information provided for my review included the January 25, 2024 GeoPacific Consultants report titled "Preliminary Hydrogeological Investigation Report: Proposed Residential Development, 461-475 E. 16th Ave., Vancouver, BC", the City of Vancouver Groundwater Management Bulletin, last amended January 1, 2024, the Francel Architecture Inc. building plans available on the City of Vancouver rezoning application website, and the City of Vancouver plan titled "Peat, Assorted Soils and Historic Waterways". I also reviewed the 1989 revised Vancouver Old Streams publication and drawing.

2.0 EXPERTISE AND EXPERIENCE

Mr. Richard Butler, P. Eng., FEC, is a senior geotechnical engineering consultant, having in excess of 45 years of experience on a wide range of geotechnical projects, ranging from residential developments to major infrastructure, commercial, and industrial facilities throughout British Columbia, across Canada, and internationally. Mr. Butler served as co-chair during preparation of the Engineering and Geoscientists British Columbia (EGBC) "*Guidelines for Geotechnical Engineering Services for Building Projects"* and acted as an internal reviewer during preparation of the EGBC "*Guidelines for Legislated Landslide Assessments for Proposed*

Residential Developments in British Columbia". He has also published papers based on his extensive knowledge and experience related to development in areas underlain by peat and other organic or weak soil.

3.0 ENGINEERING ASSESSMENT AND OPINION

As described in the GeoPacific report, the proposed 21-storey residential tower over a 4-level parkade (P4 Parkade) site is located at 461 – 475 East 16th Avenue, an assembly of four residential lots, and is bounded to the north by a municipal lane, East 16th Avenue to the south, a duplex strata building (not a single family residence as stated in the GeoPacific report) to the east, and a three storey townhouse development to the west. Existing single family properties, including historic residences, together with a low-rise rental building, are located to the north of the municipal lane. The site stated as being approximately 40 m from north to south and 37 m east-west in plan, and is generally level, with the existing ground surface elevation at about 46.5 m. GeoPacific also states that the parkade P4 slab elevation is 34.28 m, 12.22 m below the existing ground surface level at and adjacent to the site.

As stated in Section 8.0 of the Preliminary Hydrogeological Investigation report, GeoPacific anticipates that a conventional parkade perimeter and underslab drainage system at or slightly below the P4 Parkade level is appropriate for the soil and groundwater conditions at the site.

3.1 SOIL AND GROUNDWATER CONDITIONS

Based on the Geological Survey of Canada Surficial Geology map 1484A, and the City map titled Peat, Assorted Soils and Historical Waterways, the site and adjacent areas are identified as being underlain by peat and other bog deposits (the Mt. Pleasant Peat Bog), overlying glacial till, with bedrock more than 10 m below ground surface. Both the City and the Old Streams maps show that an old stream (Brewery Creek) is located within or close to the proposed highrise development. The Vancouver Old Streams report states that Brewery Creek was one of the largest streams that provided natural drainage of these and adjacent properties, flowing to False Creek, and extending south as far as Mountain View Cemetery. The GeoPacific report also states that the BC Water Atlas shows that the Quadra Aquifer is mapped as being present below the site.

The GeoPacific report states that two boreholes were carried out at the site on October 28, 2022 and advanced to depths of 18.3 and 16.8 m below ground surface, with both boreholes close to the north property line as illustrated on the aerial photograph in drawing 22015-1 of the GeoPacific report. Dynamic Cone Penetration Tests (DCPTs) were carried out to determine the relative density/consistency of the soil conditions, and samples were collected at various depths for examination and testing.

Both boreholes encountered similar soil conditions, with a thin (0.15 m) surficial fill layer underlain by peat extending to a depth of about 1.5 m, followed by clayey silt extending to about 3 m depth. Based on DCPT values typically less than 5, both the peat and clayey silt are considered to be soft to very soft, and moderately to highly compressible.

The peat and clayey silt deposits are underlain by glacial till deposits or layers, described as varying in composition from silt or sandy silt to silty sand and gravel or sand. DCPT values within an approximately 1 m thick zone of the silty sand and gravel glacial till directly underlying

the clayey silt deposit are highly variable, but generally less than 30, indicating potential or likely loosening or disturbance. It is also noted that the underlying sand and sandy silt till layers or zones are described as compact or compact to dense, although the DCPT tests were terminated within the overlying silty sand and gravel till.

Siltstone bedrock was encountered at both boreholes underlying the glacial till, at a depth of about 13.7 m.

Monitoring wells, with a 1.5 m screening zone, were installed at the base of the boreholes, within the siltstone bedrock. No monitoring wells were installed within the near surface peat and clayey silt or the glacial till soils overlying the bedrock. Groundwater levels (Table 2) at both boreholes are reported to have been recorded at about 2.2 m below ground surface on November 13, 2021 at both boreholes. However, as described above, GeoPacific stated (Section 3.0) that the borehole investigation was conducted on October 28, 2022. The groundwater level was subsequently measured as 1.45 m below ground surface at only monitoring well MW22-02 on June 6, 2023. GeoPacific states that groundwater monitoring is ongoing, but no additional information on recent groundwater levels and seasonal variations is provided in the report,

Although samples of the various soils encountered at the boreholes were collected, laboratory testing was limited to water content measurement. No grain size distribution (gradation) or other laboratory testing was carried out to confirm the soil descriptions based on visual observations, and to permit suitable assessment of the fines (silt and clay size particles) content and assessment of the drainage properties of these soils, as would be expected in a Preliminary Hydrogeology Study to suitably determine and assess the waterflow conditions at various depths and the potential impact on groundwater conditions within adjacent properties.

3.2 ENGINEERING ASSESSMENT AND RECOMMENDATIONS

As described above, the proposed highrise development at the site will require excavation to depths of at least 12.2 m, and likely 1 to 2 m more, below existing ground surface over much or all of the site to permit construction of the foundations and the P4 floor slab at elevation 34.28 m. Based on groundwater level measurements at the two existing boreholes, use of perimeter and underslab drains at or slightly below the parkade P4 elevation will result in long term (or permanent) lowering of the existing groundwater level by 10 m or more.

GeoPacific states (Section 6.0-I) that both the temporary dewatering during construction and the long term perimeter and P4 underslab drainage conditions will not have any noticeable impact on subsidence of the off-site peat, although it is acknowledged that the peat is considered to be moderately to highly compressible due to increased loading. GeoPacific does recommend that some additional shallow groundwater wells be installed to determine whether the groundwater table is present within the peat and whether the peat dries out during the summer months, such that subsidence would not occur due to groundwater drainage caused by the parkade drainage system. However, GeoPacific does not identify the number and locations of the recommended additional monitoring wells.

It is my opinion that the existing hydrogeological information and the GeoPacific assessment is not sufficient or adequate to meet the criteria of the City Bulletin for a Preliminary Hydrogeological Study, and that additional hydrogeological investigation and analyses should

be carried out as part of a Revised Preliminary Hydrogeological Study. In my opinion and experience, the groundwater levels and seasonal variations identified within the siltstone bedrock could vary, potentially significantly, from the groundwater levels within the peat, clayey silt, and glacial till soils overlying the siltstone bedrock. These potential or likely differences in groundwater levels and seasonal variations were not identified or addressed in the GeoPacific report. Specifically, the GeoPacific assessment is not sufficient to exclude the risk and impact of damages to offsite structures and other facilities that could occur due to groundwater extraction or lowering within the moderately to highly compressible peat and soft clayey soils underlying the properties adjacent to P4 Parkade development site.

It is recommended that borehole and monitoring wells be installed within the peat and clayey silt, as well as within the potentially higher drainage flow zones within the glacial till layers, including the less dense layer of silty sand and gravel directly underlying the clayey silt deposit, as well as the sand or silty sand layers or zones identified at a depth of approximately 5 m below ground surface. Hydraulic testing together with collection of representative samples of the various soils, together with laboratory testing (grain size analysis, Atterberg limits) should be carried out to provide suitable data and correlation with the drainage properties determined by the hydraulic testing.

The existing boreholes/monitoring wells are located relatively close together near the north site boundary, offset from the properties and buildings adjacent to the west and east boundaries of the site. No borehole or other relevant data is available at or near the south boundary of the site and East 16th Avenue. It is recommended that additional boreholes/monitoring wells be installed at or close to both the north and south boundaries of the site and, where access is available or can be developed, close to the west and east boundaries of the site and the buildings on the adjacent properties. Hydraulic testing or other suitable measures to determine the drainage characteristics of the peat, clayey silt, the various glacial till layers or zones should be carried out, in particular within the loose to compact till layer underlying the clayey silt, and at sand or sand and gravel layers within the glacial till soils. It is also recommended that hydraulic testing be carried out at the existing monitoring wells to determine the drainage properties of the siltstone bedrock which will be at or close to the P4 slab and foundations.

Regular (monthly or bi-weekly) monitoring of the new and existing monitoring wells is recommended and considered necessary to determine the elevation and depth of the static water levels, as well as seasonal high and low water levels, within the various soil and bedrock deposits underlying the site.

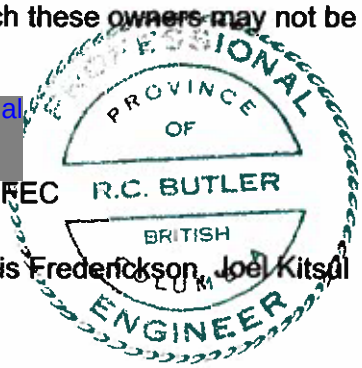
Due to the potential presence of the old stream channel deposits and/or the Quadra Aquifer deposit within the site, it is also recommended that at least one borehole near the south boundary be drilled through all soil or other deposits and extend at least 1 m into the underlying siltstone bedrock. If differing natural soil, fill, or potential Quadra Aquifer conditions are encountered, additional sampling, hydraulic testing and monitoring should be carried out.

It is also recommended that GeoPacific provide additional comments and recommendations on groundwater management measures, such as cut-off walls or other measures, to prevent or minimize adverse impacts on neighbouring or nearby properties and existing buildings, as well as municipal facilities and utilities. Further, from a geotechnical and structural engineering perspective, the 12.2 m deep excavation for the P4 Parkade, extending to, or close to, the

property lines, creates a significant risk to the stability of both the three storey townhouse building, with a one level below grade parkade, to the west and the duplex strata to the east. It is my opinion that it will be very difficult or not possible to mitigate this issue and risk without the neighbouring property owners consenting to intrusive underpinning or other measures installed within their properties, which these owners may not be obliged to accept.

Yours truly,

s. 22(1) Personal and Confidential



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cc: Lawrence Pick, Chris Frederickson, Joel Kitsul