BEFORE THE QUEENSTOWN LAKES DISTRICT COUNCIL

IN THE MATTER	of the Resource Management Act 1991
AND	
IN THE MATTER OF	Queenstown Lakes Proposed District Plan – Queenstown Mapping Hearing

STATEMENT OF EVIDENCE OF SCOTT SNEDDON EDGAR

ON BEHALF OF THE FOLLOWING SUBMITTER:

LAND INFORMATION NEW ZEALAND (SUBMISSION #661)

9th June 2017

SOUTHERN LAND

SURVEYING | PLANNING | LAND DEVELOPMENT

Introduction

1 My name is Scott Sneddon Edgar. I am a Resource Management Planner and hold a Bachelor of Arts Degree (Honours) in Town and Country Planning from Strathclyde University in Glasgow, Scotland. I am an Associate Member of the New Zealand Planning Institute.

2 I have been employed by Southern Land Limited, a Wanaka based survey and planning consultancy, since October 2006. During my time at Southern Land I have been involved principally with the preparation of resource consent applications and the presentation of planning evidence at Council hearings.

3 Prior to relocating to New Zealand in 2005 I worked as a development control planner with various Scottish local authorities in both rural and urban regions.

4 Upon my arrival in New Zealand I was employed as a resource consents planner in the Wanaka office of Civic Corporation Limited before taking my current position with Southern Land Limited. I have a total of 17 years' planning experience, 11 of which have been gained in New Zealand.

5 I confirm that I have read the Code of Conduct for Expert Witnesses contained in the Environment Court of New Zealand Practice Note 2014 and I agree to comply with it. In that regard I confirm that this evidence is written within my expertise, except where I state that I am relying on the evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

Scope of Evidence

6 I have been engaged by Land Information New Zealand (Submission #661) to provide expert planning evidence relating to their submission seeking the amendment to the Outstanding Natural Landscape (ONL) line at Peninsula Road, as shown on Proposed District Plan Maps 31a and 33 and the rezoning of the submission site from Rural to Low Density Residential.

7 The submission included a landscape assessment undertaken by Mr. Paddy Baxter. Mr. Baxter has also prepared a brief of evidence for this hearing. In addition a hazard assessment of the site has been carried out by Mr. Jeff Bryant of Geoconsulting Limited and is attached as Appendix A to this evidence. In addressing this submission I have relied on and been assisted by this information.

8 I have read the relevant Section 42A Reports, the associated Section 32 Evaluation Reports and Council's expert evidence relating to ecology, landscape, transport and infrastructure as they relate to this submission. I have considered the facts, opinions and analysis therein when forming my opinions set out in this evidence.

9 My brief of evidence is set out as follows:

- Background and Submission
- Statutory Framework
- Section 32(1) Evaluation
- Assessment of Environmental Effects
- S42A Report
- Low Density Residential or High Density Residential
- Part 2 Assessment
- Conclusion

Background and Submission

10 The land to which the submission relates (the site) is legally described as Section 2 Survey Office Plan 448337 (referred to as RESERVE ADJ SEC 1 BLK I CONEBURN SD in Ms. Banks s42A report) and comprises 6.7 hectares of land between Peninsula Road and Kingston Road (SH6) at Frankton. The site is approximately 700m in length and generally 110m wide but tapering to its eastern extent. The Peninsula Road – Kingston Road intersection is located at the eastern end of the site while the Hilton and Lake Edge development (being land zoned High Density Residential) lies to the west.

11 Peninsula Hill lies to the south, on the southern side of Peninsula Road, while the Kawarau River lies to the north. At the approximate midway point of the site the land on the southern side of Peninsula Road is zoned Low Density Residential with that zoning extending around the lower slopes of Peninsula Hill to the west. Two residential lots, one of which includes an existing dwelling, are located within the Rural General Zone (but adjoin the eastern extent of the Low Density Residential zone) on the southern side of Peninsula Road.

12 The site is vegetated in a mix of exotic species and generally flat as it adjoins Peninsula Road and falls relatively steeply towards Kingston Road to the north.

13 The site is zoned Rural under the Proposed District Plan as shown on proposed Planning Maps 31a and 33 and, while it is contained within the proposed Urban Growth Boundary, the site is classified as Outstanding Natural Landscape.

14 Given relatively small size of the site in rural terms and its limited productive use, its proximity to existing and zoned urban development and its location within the proposed Urban Growth Boundary the submitter, who administer the site on behalf of The Crown, sought to investigate whether the proposed Rural zoning was the most appropriate zoning for the site and whether the Outstanding Natural Landscape classification was appropriate.

15 In considering the most appropriate zoning for the site a number of Proposed District Plan zones were considered including Low, Medium and High Density Residential and Rural. Based on landscape advice from Mr. Paddy Baxter, who felt that the Outstanding Natural Landscape line could be realigned to follow the proposed Urban Growth Boundary and that the site could accommodate some form of residential zoning, a submission was lodged seeking the following:

- That the Urban Growth Boundary as it relates to the site is made operative as proposed; and
- That the Outstanding Natural Landscape line as it relates to the site is realigned to follow the Urban Growth Boundary; and
- That the site is rezoned from Rural to Low Density Residential; and
- That location specific objectives, policies and provisions are incorporated into Chapter 27 – Subdivision & Development of the Proposed District Plan.

Statutory Framework

16 The statutory framework for the preparation of District Plans is set out in Sections 31, 32, 33A, 72, 73, 74, 75 and 76 of the Act. Under this statutory framework a district plan must (amongst other things):

- be in accordance with Part 2 of the Act
- give effect to any National Policy Statement
- be in accordance with any regulations
- give effect to any Regional Policy Statement
- have regard to any Proposed Regional Policy Statement

<u>Part 2 of the Act</u>

17 The RMA requires Council's to promote the sustainable management of natural and physical resources through the management of use, development and protection of natural and physical resources to provide for the social, economic and cultural well-being and health and safety of people, communities and future generations.

18 The following matters of national importance, as set out under section 6 of the RMA, are of relevance to the consideration of this submission:

(b) the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development:

and

(h) the management of significant risks from natural hazards.

19 In addition the following other matters, as set out under section 7 of the Act, are of relevance to the consideration of this submission:

(b) the efficient use and development of natural and physical resources:

(c) the maintenance and enhancement of amenity values:

(f) the maintenance and enhancement of the quality of the environment:

<u>The National Policy Statement on Urban Development Capacity (NPSUDC)(NPS)</u>

20 The NPSUDC came into effect on 1 December 2016 and seeks to ensure that planning decisions result in effective and efficient urban environments that enable people and communities and future generations to provide for their wellbeing, provide opportunities to meet demand for housing and business land and provide choices in terms of dwelling type and location. The NPS directs Councils to provide in their plans enough development capacity to ensure that demand can be met and to ensure that the development capacity provided in plans is supported by infrastructure.

21 Queenstown is identified as a High Growth Urban Area under the NPS and given that the site is within the proposed Urban Growth Boundary the NPS is of relevance to the consideration of the submission.

22 I consider that the proposed rezoning of the site as Low Density Residential will assist in giving effect to the NPS through the provision of additional development capacity such that demand for a range of different residential opportunities in terms of type, size and location can be met.

I note that Mr. Glasner confirms in his evidence that the site can be adequately serviced with planned network upgrades providing adequate capacity. Consequently I consider that the proposed rezoning is generally in accordance with the NPS.

23 I do not consider any other National Policy Statement to be of relevance to the consideration of the submission.

Regulations

24 The regulations referred to in s74(1)(f) of the Act include the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (the NES). The NES requires consideration of the extent to which land may be contaminated if activities listed on the MfE's Hazardous Activities or Industries List (HAIL) have been, or are more likely than not been, undertaken on the land. Initial investigations do not indicate that any HAIL activity is being, or has been, undertaken on or in the vicinity of the site and as such the provisions of the NES are not likely to apply.

Operative Regional Policy Statement (ORPS)

25 The Objectives and Policies of the ORPS that are relevant to the consideration of this submission include those relating to Land, Built Environment and Natural Hazards. Of particular relevance to the consideration of this submission are Objectives 5.4.2 and 5.4.3 and their associated policies which relate to Land and seek to avoid, remedy or mitigate degradation of Otago's natural and physical resources and protect Otago's outstanding natural landscapes from inappropriate subdivision, use and development.

26 Objectives 9.4.1 and 9.4.3 and their associated policies, which relate to Built Environment, are also of relevance to the consideration of this submission. Those objective and policies seek to promote the sustainable management of Otago's built environment while avoiding, remedying or mitigating the adverse effects of the built environment on Otago's natural and physical resources.

27 In addition Objectives 11.4.1 and 11.4.2 and their associated policies, which recognise and avoid or mitigate the adverse effects of natural hazards on Otago's communities are of particular relevance.

28 In my opinion the objectives and policies of the Proposed District Plan as they relate to the protection of Outstanding Natural Landscapes will give effect to the ORPS and I consider that the realignment of the ONL line and the proposed rezoning sought in the submission will

provide additional residential opportunities within the proposed Urban Growth Boundary while protecting the wider ONL from inappropriate subdivision, use and development.

29 With regard to natural hazards the site is identified on Council's hazard maps as being susceptible to a range of natural hazards including liquefaction and landslide hazards. A hazard assessment of the site has been undertaken by Mr. Jeff Bryant of Geoconsulting Limited and is attached as Appendix A to this evidence. Mr. Bryant finds that in general terms the risk posed by natural hazards is low but certain areas of the site may be more exposed to hazards, specifically rockfall hazards in the eastern portion of the site. Mr. Bryant considers that the extent of such hazards can be appropriately assessed and mitigated or avoided at such time as the land is developed.

30 I therefore consider that the relief sought in the submission of Land Information New Zealand is generally consistent with the provisions of the ORPS.

Proposed Regional Policy Statement (PRPS)

31 The PRPS was notified on 23 May 2015 with decisions on submissions being released on 1st October 2016.

32 Objectives 3.1 and 3.2[1] and associated policies of the PRPS recognise the importance and value of Otago's landscapes and seek to identify and protect Outstanding Natural Landscapes within the Region.

33 Objectives 4.1 and its associated policies recognise the risk posed to Otago's communities by natural hazards and seek to avoid, remedy or mitigate the effects of those risks while Objective 4.5 and its associated policies seek to ensure that urban growth and development is appropriately managed and occurs in an integrated manner through the identification of Urban Growth Boundaries and location growth and development where services are available or can be upgraded or extended.

34 As with the ORPS I consider that the objectives and policies of the Proposed District Plan will give effect to the PRPS in terms of the identification and protection of the ONL. Similarly I consider that the Proposed District Plan adequately provides for the assessment, avoidance or mitigation of natural hazards at such time as land is developed.

35 In terms of the management of growth and development in an integrated manner the site is located within the proposed Urban Growth Boundary and adjacent to existing Low Density

[1] Numbering as per the Decisions Version of the Proposed Regional Policy Statement for Otago

and High Density Residential zoned land. In addition Mr. Glasner has confirmed in his evidence that, with planned infrastructure upgrades, the site can be appropriately serviced.

36 I therefore consider that the relief sought in the submission of Land Information New Zealand is generally consistent with the provisions of the PRPS.

Section 32(1) Evaluation

37 Section 32(1) of the Act requires that an evaluation report examines the extent to which the objectives of a proposal being evaluated are the most appropriate way to achieve the purpose of the Act. The Proposed District Plan's objectives and policies that are of particular relevance to the consideration of the submission of Land Information New Zealand are contained in Chapter 3 – Strategic Direction, Chapter 4 – Urban Development, Chapter 6 – Landscapes, Chapter 7 – Low Density Residential and Chapter 28 – Natural Hazards.

Chapter 3 – Strategic Direction

38 The Strategic Direction Chapter of the Proposed District Plan establishes a policy framework which seeks to, amongst other things, identify and protect Outstanding Natural Landscapes, manage urban growth in a strategic and sustainable manner and direct urban development to occur within urban areas.

39 I consider the following provisions of the Strategic Direction Chapter to be relevant to the consideration of the submission:

3.2.2 Goal *– The strategic and integrated management of urban growth* ***Objective 3.2.2.1*** *Ensure urban development occurs in a logical manner;* • *to promote a compact, well designed and integrated urban form;* • *to manage the cost of Council infrastructure; and* • *to protect the District's rural landscapes from sporadic and sprawling development.*
Policies *3.2.2.1.1 Apply Urban Growth Boundaries (UGBs) around the urban areas in the Wakatipu Basin (including Jack's Point), Arrowtown and Wanaka.* *3.2.2.1.2 Apply provision that enable urban development within the UGBs and avoid urban development outside of the UGBs.* *3.2.2.1.3 Manage the form of urban development within the UGBs ensuring:* • *Connectivity and integration with existing urban development;* • *Sustainable provision of Council infrastructure; and*

- *Facilitation of an efficient transport network, with particular regard to integration with public and active transport systems*

3.2.2.1.5 Ensure UGBs contain sufficient suitably zoned land to provide for future growth and a diversity of housing choice.

3.2.2.1.6 Ensure that zoning enables effective market competition through distribution of potential housing supply across a large number and range of ownerships, to reduce the incentive for land banking in order to address housing supply and affordability.

Efficiency & Effectiveness	Benefits	Costs	Risk of Acting/Not Acting
The submission site is within the proposed UGB and is well positioned in terms of infrastructure, connectivity and transport. The proposed rezoning will contribute to the overall supply and availability of development land within the UGB.	The proposed zoning will contribute towards the supply and availability of residential land without compromising the efficiency or capacity of infrastructure or the wider transport network.	The proposed rezoning does not result in any significant cost to the community.	There is no uncertainty or insufficient information regarding this objective and its associated policies.

Objective 3.2.2.2

Manage development in areas affected by natural hazards.

Policies

3.2.2.2.1 Ensure a balanced approach between enabling higher density development within the District's scarce urban land resource and addressing the risks posed by natural hazards to life and property.

Efficiency & Effectiveness	Benefits	Costs	Risk of Acting/Not Acting
A hazard assessment is attached to this evidence which finds that while parts of the site may potentially be subject to natural hazards the overall risk of natural	The proposed zoning will provide development opportunities within the urban land resource and is unlikely to be compromised by natural hazards to the extent that the	The proposed LDRZ is not likely to result in any significant cost to the community as a result of natural hazards.	While there is some uncertainty with regard to the extent of natural hazards over certain parts of the site the hazard assessment finds that there are parts of the site that are free from significant

hazards is likely to be low and that the site includes areas that are free from significant natural hazards.	site would be undevelopable.		natural hazards and therefore the risk of acting is considered to be low.

***3.2.5 Goal** – Our distinctive landscapes are protected from inappropriate development.*

Objective 3.2.5.1

Protect the natural character of Outstanding Natural Landscapes and Outstanding Natural Features from subdivision, use and development.

Policies

3.2.5.1.1 Identify the district's Outstanding Natural Landscapes and Outstanding Natural Features on the district plan maps, and protect them from the adverse effects of subdivision and development.

Efficiency & Effectiveness	Benefits	Costs	Risk of Acting/Not Acting
The submission seeks the realignment of the ONL line as it relates to the site such that the ONL line follows the UGB. It is considered that the relief sought in the submission appropriately identifies the ONL and protects it from subdivision, use and development.	The realignment of the ONL line will result in land which makes little contribution to the overall landscape values of the wider ONL being removed from the ONL. Resulting in a more robust and defensible ONL line.	There are no costs to the wider ONL.	There is no uncertainty or insufficient information regarding this objective and its associated policy.

Objective 3.2.5.3

Direct new subdivision, use or development to occur in those areas which have potential to absorb change without detracting from landscape and visual amenity values.

Policies

3.2.5.3.1 Direct urban development to be within Urban Growth Boundaries (UGB's) where these apply, or within the existing rural townships.

Efficiency & Effectiveness	Benefits	Costs	Risk of Acting/Not Acting
The relief sought will result in urban development being located within the UGB in an area with greater ability to absorb change when compared to the wider ONL.	The relief sought will provide for urban development without compromising the landscape values of the wider ONL.	There are no costs to the wider ONL.	There is no uncertainty or insufficient information regarding this objective and its associated policy.

Chapter 4 – Urban Development

40 Chapter 4 – Urban Development of the PDP is also of relevance to the consideration of this submission with the following objectives and policies being of particular relevance:

4.2.1 Objective *Urban development is coordinated with infrastructure and services and is undertaken in a manner that protects the environment, rural amenity and outstanding natural landscapes and features.*			
Policies *4.2.1.1* *Land within and adjacent to major urban settlements will provide the focus for urban development, with a lesser extent accommodated within smaller rural townships.* *4.2.1.2* *Urban development is integrated with existing public infrastructure, and is designed and located in a manner consistent with the capacity of existing networks.* *4.2.1.3* *Encourage a higher density of residential development in locations that have convenient access to public transport routes, cycleways or are in close proximity to community and education facilities.* *4.2.1.5* *Urban development is contained within or immediately adjacent to existing settlements.* *4.2.1.6* *Avoid sporadic urban development that would adversely affect the natural environment, rural amenity or landscape values; or compromise the viability of a nearby township.*			
Efficiency & Effectiveness	Benefits	Costs	Risk of Acting/Not Acting
The submission site is within the proposed UGB and adjacent to existing	The relief sought will result in urban development that is	There are no significant costs to the community.	There is no uncertainty or insufficient information

LDR and HDR zoned land. In addition the site can be appropriately serviced and accessed and the relief sought will not result in sporadic urban development.	appropriately integrated with infrastructure and services without detracting from the environment, rural amenity or the wider ONL.		regarding this objective and its associated policy.

4.2.2 Objective *Urban Growth Boundaries are established as a tool to manage the growth of major centres within distinct and defendable urban edges.*			
Policies *4.2.2.1 Urban Growth Boundaries define the limits of urban growth, ensuring that urban development is contained within those identified boundaries, and urban development is avoided outside of those identified boundaries.* *4.2.2.2 Urban Growth Boundaries are of a scale and form which is consistent with the anticipated demand for urban development over the planning period, and the appropriateness of the land to accommodate growth.* *4.2.2.3 Within Urban Growth Boundaries, land is allocated into various zones which are reflective of the appropriate land use.* *4.2.2.4 Not all land within Urban Growth Boundaries will be suitable for urban development, such as (but not limited to) land with ecological, heritage or landscape significance; or land subject to natural hazards. The form and location of urban development shall take account of site specific features or constraints to protect public health and safety.*			
Efficiency & Effectiveness	Benefits	Costs	Risk of Acting/Not Acting
The submission site is within the proposed UGB and the relief sought will result in the land being allocated into a zone which will provide for residential development. The form and location of urban development within the site will be informed by existing constraints	The relief sought will provide additional zoned land suitable for residential development while ensuring that site constraints are appropriately addressed at such time as the land is developed.	There are no significant costs to the community.	There is no uncertainty or insufficient information regarding this objective and its associated policies.

of topography and natural hazards.			

4.2.3 Objective *Within Urban Growth Boundaries, provide for a compact and integrated urban form that limits the lateral spread of urban areas, and maximises the efficiency of infrastructure operation and provision.*			
Policies *4.2.3.1 Provide for a compact urban form that utilises land and infrastructure in an efficient and sustainable manner, ensuring:* • *Connectivity and integration;* • *The sustainable use of public infrastructure;* • *Convenient linkages to the public and active transport network; and* • *Housing development does not compromise opportunities for commercial or community facilities in close proximity to centres.* *4.2.3.2 Enable an increased density of residential development in close proximity to town centres, public transport routes, community and education facilities.* *4.2.3.3 Low density development does not compromise opportunities for future urban development.* *4.2.3.4 Urban development occurs in locations that are adequately serviced by existing public infrastructure, or where infrastructure can be efficiently upgraded.*			
Efficiency & Effectiveness	Benefits	Costs	Risk of Acting/Not Acting
The submission site is located within the UGB and as well positioned in terms of infrastructure, servicing, access and connectivity. While the proposed LDR zoning is considered appropriate it is considered that a more intensive zoning may not be inappropriate and could potential provide for the more efficient use of the submission site.	The relief sought will provide for integrated urban development within the UGB and will contribute to the availability of urban development land.	A more efficient use of land could potentially be achieved through a more intensive (HDR) or unrestricted LDR zoning.	There is no uncertainty or insufficient information regarding this objective and its associated policies.

4.2.4 Objective

Manage the scale and location of urban growth in the Queenstown Urban Growth Boundary.

Policies

4.2.4.1 Limit the spatial growth of Queenstown so that:

- *The natural environment is protected from encroachment by urban development*
- *Sprawling of residential settlements into rural areas is avoided*
- *Residential settlements become better connected through the coordinated delivery of infrastructure and community facilities*
- *Transport networks are integrated and the viability of public and active transport is improved*
- *The provision of infrastructure occurs in a logical and sequenced manner*
- *The role of Queenstown Town Centre as a key tourism and employment hub is strengthened*
- *The role of Frankton in providing local commercial and industrial services is strengthened*

4.2.4.2 Ensure that development within the Queenstown Urban Growth Boundary:

- *Provides a diverse supply of residential development to cater for the needs of residents and visitors*
- *Provides increased density in locations close to key public transport routes and with convenient access to the Queenstown Town Centre*
- *Provides an urban form that is sympathetic to the natural setting and enhances the quality of the built environment*
- *Provides infill development as a means to address future housing demand*
- *Provides a range of urban land uses that cater for the foreseeable needs of the community*
- *Maximises the efficiency of existing infrastructure networks and avoids expansion of networks before it is need for urban development*
- *Supports coordinated planning for transport, public open space, walkways and cycleways and community facilities*
- *Does not diminish the qualities of significant landscape features*

Efficiency & Effectiveness	Benefits	Costs	Risk of Acting/Not Acting
The relief sought involves the rezoning of land within the UGB to provide for urban development.	The proposed rezoning will provide for integrated urban development and contribute to the availability of development land within the UGB	There are no significant costs to the community.	There is no uncertainty or insufficient information regarding this objective and its associated policies.

	without resulting in sprawl or compromising the landscape values of the wider area.		

Chapter 6 – Landscapes

41 Chapter 6 – Landscapes is also of relevance to the consideration of this submission with the following objectives and policies being of particular relevance:

Objective 6.3.1 *The District contains and values Outstanding Natural Features, Outstanding Natural Landscapes, and Rural Landscapes that require protection from inappropriate subdivision and development.*			
Policies *6.3.1.1* *Identify the District's Outstanding Natural Landscapes and Outstanding Natural Features on the Planning Maps.* *6.3.1.2* *Classify the Rural Zoned landscapes in the District as:* • *Outstanding Natural Feature (ONF)* • *Outstanding Natural Landscape (ONL)* • *Rural Landscape Classification (RLC)* *6.3.1.5* *Avoid urban subdivision and development in the Rural Zones* *6.3.1.7* *When locating urban growth boundaries or extending urban settlements through plan changes, avoid impinging on Outstanding Natural Landscapes or Outstanding Natural Features and minimise disruption to the values derived from open rural landscapes.*			
Efficiency & Effectiveness	Benefits	Costs	Risk of Acting/Not Acting
The submission site, while located within the proposed ONL makes limited contribution to the landscape values of the wider ONL. In addition the site is within the UGB. Consequently the realignment of the ONL line to follow the UGB will not	The realignment of the ONL line to follow the UGB as it relates to the submission site will avoid potential conflict between the urban development and landscape provisions of the Proposed District Plan.	There are no costs to the wider ONL.	There is no uncertainty or insufficient information regarding this objective and its associated policies.

compromise the landscape values of the wider ONL.			

Chapter 7 – Low Density Residential

42 Chapter 7 – Low Density Residential is of relevance to the consideration of this submission with the following objectives and policies being of particular relevance:

7.2.1 Objective			
The zone provides for low density residential living within the District's urban areas.			
Policies *7.2.1.1* *Low density zoning and development is located in areas that are well serviced by public infrastructure, and is designed in a manner consistent with the capacity of infrastructure networks.* *7.2.1.2* *The zone is suburban in character and provides for a low density housing development on larger urban allotments primarily comprising dwellings up to two storeys in height.*			
Efficiency & Effectiveness	Benefits	Costs	Risk of Acting/Not Acting
The proposed zoning will provide for low density residential living opportunities that are well integrated in terms of services, infrastructure and access and the submission site can appropriately accommodate the type of development anticipated in the LDR zone.	The relief sought will provide for additional low density residential living opportunities.	There are no significant costs to the community.	There is no uncertainty or insufficient information regarding this objective and its associated policies.

7.2.2 Objective
Ensure protection of amenity values in recognition of the zone's lower intensity character, whilst providing for subtle and low impact change.
Policies

7.2.2.1 *Enable residential development on allotments of a size consistent with a low density character, which are typically larger than 450 square metres, but enable infill development at a higher density where it is low scale and discrete, and relates well to existing land use.* *7.2.2.2* *Apply height, building coverage, and bulk and location controls as the primary means of retaining the lower intensity character of the zone and ensuring protection of amenity values in terms of privacy, access to sunlight, and impacts arising from building dominance.*			
Efficiency & Effectiveness	Benefits	Costs	Risk of Acting/Not Acting
The submission site can accommodate the type of development anticipated within the LDR zone without compromising amenity and landscape values in the wider area.	The relief sought will provide for additional low density residential living opportunities within a pleasant living environment.	There are no significant costs to the community.	There is no uncertainty or insufficient information regarding this objective and its associated policies.

7.2.7 Objective *Ensure development efficiently utilises existing infrastructure and minimises impacts on infrastructure and roading networks.*			
Policies *7.2.7.1* *Access and parking is located and designed to optimise efficiency and safety and minimise impacts to on-street parking.* *7.2.7.2* *Development is designed consistent with the capacity of existing infrastructure networks and seeks low impact approaches to storm water management and efficient use of potable water supply.* *7.2.7.3* *Development is integrated with, and improves connections to, public transport services and active transport networks (tracks, trails, walkways and cycleways).*			
Efficiency & Effectiveness	Benefits	Costs	Risk of Acting/Not Acting
The submission site is well positioned in terms of services and infrastructure and the layout and design of services, access and parking	The relief sought will provide for well integrated urban development.	There are no significant costs to the community.	There is no uncertainty or insufficient information regarding this objective and its associated policies.

can be appropriately managed through detailed design at subdivision stage.			

Chapter 28 – Natural Hazards

43 Chapter 28 – Natural Hazards is of relevance to the consideration of this submission with the following objective and policies being of particular relevance:

28.3.2 Objective

Development on land subject to natural hazards only occurs where the risks to the community and the built environment are avoided or appropriately managed or mitigated.

Policies

28.3.2.1 *Seek to avoid intolerable natural hazard risk, acknowledging that this will not always be practicable in developed urban areas.*

28.3.2.2 *Allow subdivision and development of land subject to natural hazards where the proposed activity does not:*

- *Accelerate or worsen the natural hazard and/or its potential impacts.*
- *Expose vulnerable activities to intolerable natural hazard risk.*
- *Create an unacceptable risk to human life.*
- *Increase the natural hazard risk to other properties.*
- *Require additional works and costs that would be borne by the community.*

28.3.2.3 *Ensure all proposals to subdivide or develop land that is subject to natural hazards provide an assessment covering:*

- *The type, frequency and scale of the natural hazard.*
- *The type of activity being undertaken and its vulnerability to natural hazards.*
- *The effects of a natural hazard event on the subject land.*
- *The potential for the activity to exacerbate natural hazard risk both in and off the subject land.*
- *The potential for any structures on the subject land to be relocated.*
- *The design and construction of buildings and structures to mitigate the effects of natural hazards, such as the raising of floor levels.*
- *Site layout and management to avoid the adverse effects of natural hazards, including access and egress during a hazard event.*

28.3.2.4 *Promote the use of natural features, buffers and appropriate risk management approaches in preference to hard engineering solutions in mitigating natural hazard risk.*

28.3.2.5 Recognise that some infrastructure will need to be located on land subject to natural hazard risk.			
Efficiency & Effectiveness	Benefits	Costs	Risk of Acting/Not Acting
While the submission site may in part be subject to natural hazards those hazards are unlikely to apply to the entirety of the site such that development is likely to be able to occur free from natural hazards and that natural hazards are not likely to compromise the overall development of the submission site. The extent of natural hazards and any mitigation required can be appropriately addressed at the time of subdivision.	The proposed rezoning will provide for the development of parts of the submission site that are not subject to significant natural hazards or where the adverse effects of natural hazards can be appropriately mitigated or avoided thus striking an appropriate balance between the enabling of urban development while avoiding intolerable risks from natural hazards.	Parts of the submission site may prove to be inappropriate for development due to the presence of natural hazards but this is not considered to be a cost to the wider community.	While there is some uncertainty with regard to the extent of natural hazards over certain parts of the site the hazard assessment finds that there are parts of the site that are free from significant natural hazards and therefore the risk of acting is considered to be low.

44 Overall it is considered that the proposed realignment of the ONL line as it relates to the submission site and the rezoning of the site to Low Density Residential is an effective and reasonably efficient means of achieving the relevant objectives of the Proposed District Plan. That being said I consider that there is potential for a intensive zoning (HDR) or a less restricted form of the Low Density Residential zoning that may be more efficient in terms of realising the development potential of the submission site. These options are discussed below.

Assessment of Environmental Effects

45 Section 76(3) of the Act requires that a territorial authority have regard to the actual and potential effects on the environment of activities when making a rule. I consider the environmental effects associated with the proposed realignment of the ONL line and rezoning of the site as Low Density Residential are:

- Landscape and visual effects

- Effects arising from natural hazards
- Effects on services
- Transport effects

Landscape and visual effects

46 Mr. Baxter has undertaken a landscape assessment of the site and surrounding area and confirms that, in his opinion, it is appropriate to realign the Outstanding Natural Landscape line to follow the Urban Growth Boundary as it relates to the site. In addition Mr. Baxter considers that, subject to the inclusion of the proposed structure plan and design controls set out in his evidence, that the proposed Low Density Residential zoning is appropriate.

47 In her evidence Dr. Read finds that, while she considers the submission site to be appropriately classified as Outstanding Natural Landscape, the contribution the site makes to the Outstanding Natural Landscape is limited given its proximity to Peninsula Road, Kingston Road and the existing and proposed Low Density and High Density Residential zones to the south and west. On that basis Dr. Read does not oppose the realignment of the Outstanding Natural Landscape line and the rezoning of the site to provide for urban development. As such Mr. Baxter and Dr. Read appear to be in general agreement that the proposed realignment of the Outstanding Natural Landscape line is appropriate and that the site can accommodate some form of residential zoning without compromising wider landscape values. I adopt the opinions of Mr. Baxter and Dr. Read in this regard and consider that the relief sought in the submission of Land Information New Zealand will result in less than minor adverse effects in terms of landscape and visual amenity values.

48 In her evidence Dr. Read also assesses the relief sought in the submission of Winton Partners (Submission #533) which relates to the same site as the submission of Land Information New Zealand and seeks more intensive urban zoning in the form of Low, Medium or High Density Residential or Business Mixed Use zoning. Given the sites location within the proposed Urban Growth Boundary and the fact that she considers it appropriate that the Outstanding Natural Landscape line is amended Dr. Read considers that the site could absorb either Low Density or High Density Residential development and consequently does not oppose rezoning to either of those zones. In addition Dr. Read does not support the limited Low Density Residential development put forward in the structure plan included as part of the LINZ submission on the basis that it would result in an inefficient use of the site.

49 It therefore appears that the relief sought by LINZ is perhaps somewhat conservative, at least from a landscape perspective and there may be scope for a broader or unrestricted Low Density Residential zoning or potentially High Density Residential zoning without resulting in significant adverse effects in terms of landscape and visual amenity.

Effects arising from natural hazards

50 The hazard assessment, undertaken by Mr. Bryant and attached as Appendix A to this evidence, assesses a range of natural hazards to which the site is susceptible to varying degrees. These natural hazards include landslide, rockfall, debris flow and liquefaction.

51 Mr. Bryant finds that the landslide on Peninsula Hill to the south of the site is dormant and does not present any risk to the site. The risk of small scale instability along the terrace edge which runs parallel to the northern boundary of the site, where the land falls to Kingston Road, is however identified. I understand that this area of potential instability lies beyond (to the north) of the parts of the site that are intended to accommodate residential properties as shown on the structure plan that was lodged with the submission. I also understand that the extent of instability could be assessed at the time the land is developed and mitigated or avoided.

52 With regard to rockfall hazards Mr. Bryant finds that, under normal circumstances, the risk appears to be very to extremely low. During strong earthquake shaking however the risk of rockfall is likely to be greater. In his assessment Mr. Bryant identifies terrain features that are likely to protect the western portion of the site while the eastern portion of the site may be more exposed. Further investigation is recommended to assess the likely risk of rockfall, particularly in the eastern portion of the site. I consider, based on Mr. Bryant's assessment, the western portion of the site is likely to be free of significant rockfall hazard and further investigation may demonstrate that the risk of rockfall hazard on the eastern portion of the site is suitably low or can be appropriately mitigated.

53 Mr. Bryant also identifies potential debris flow hazards however these hazards are restricted to the central gully which passes between the two areas identified for residential development on the proposed structure plan. Mr. Bryant considers that some intervention may be required where the gully crosses under Peninsula Road to ensure that the adverse effects associated with the potential debris flow hazard are appropriately avoided or mitigated. I consider that such works could be undertaken at such time as the land is developed.

54 Based on the local soils and expected groundwater conditions Mr. Bryant does not consider liquefaction to pose a risk to the submission site.

55 Overall Mr. Bryant finds that the site has only a minor exposure to natural hazards. I adopt Mr. Bryant's opinion in this regard and consider that, while some further investigation is required to determine the extents of minor slope instability along the northern terrace edge and the extent of rockfall hazards, particularly in the eastern portion of the site, such further assessment can be undertaken at the time the land is developed. I consider that while parts of the site may prove to be unsuitable for development, particularly if the risk of rockfall hazards is found to be more than minor in the eastern portion of the site, it is unlikely that natural hazards will preclude development across the wider site. I therefore consider that the adverse effects of natural hazards can be appropriately avoided or mitigated at such time as the land is developed such that those effects will be no more than minor.

Effects on services

56 In his evidence Mr. Glasner states that planned service upgrades in the vicinity of the site will ensure that the proposed rezoning can be adequately serviced. I adopt Mr. Glasner's opinion on this matter and consider that the proposed rezoning will result in less than minor adverse effects on the availability or capacity of services.

Transport effects

57 In her evidence Ms. Wendy Banks does not oppose the relief sought by LINZ from a transport perspective. In addition, in relation to the submission of Winton Partners (#533) which relates to the same site but seeks more intensive zoning, Ms. Banks does not oppose the rezoning of the site as Low Density Residential or Medium Density Residential but opposes High Density Residential or Business Mixed Use zoning. With regard to potential Low or Medium Density Residential rezoning Ms. Banks considers that a transport assessment should be undertaken to determine the likely effect of the rezoning on the Peninsula Road / Kingston Road intersection.

58 A traffic assessment has not been undertaken in support of the LINZ submission and I do not know whether such an assessment will have been undertaken by Winton Partners (Submitter #533).

59 While the Low Density Residential zoning of the site could in theory enable up to 99 dwellings the relief sought by LINZ limits future development to 19 residential lots. In the context to existing and zoned development along Peninsula Road and along Kingston Road to the south east I consider that the adverse effects of the relief sought by LINZ in terms of transport and road safety are likely to be at the lower end of the scale and would increase if the proposed limitations on residential development were relaxed or a more intensive zoning were adopted. Without the transport assessment recommended by Ms. Banks it is difficult to tell at what point effects on transport and road safety would become inappropriate (if indeed they would). I consider however that, when considered against more intensive zoning, the relief sought by LINZ is not likely to result in significant adverse effects in this regard.

Overall Assessment

60 Overall I consider that the adverse effects of the proposed realignment of the Outstanding Natural Landscape line and the rezoning of the site as Low Density Residential will result in no more than minor adverse effects on the environment, particularly if the zoning is subject to the structure plan and location specific provisions included in the relief sought. In addition I consider that there is potential for a more intensive zoning (either LDR without the proposed structure plan and location specific provisions or HDR) without resulting in significant adverse effects.

S42A Report

61 In her s42A Report Ms. Kimberley Banks addresses the submission of LINZ and draws on the expert evidence of Dr. Read, Mr. Glasner and Ms. Wendy Banks noting, as set out above, that they do not oppose the realignment of the ONL line and rezoning to LDR from a landscape, infrastructure or transport perspective. Consequently Ms. Banks considers that the site is appropriate for urban development and in principle would support a High Density Residential zoning. However Ms. Banks highlights the uncertainty around natural hazards, specifically the identified landslide hazard. On that basis Ms. Banks recommends that the submission of Land Information New Zealand (and that of Winton Partners) is rejected.

62 I generally agree with Ms. Banks in her assessment and acknowledge that natural hazards are a matter that, at the time of making the submission, there was some uncertainty around. The hazard assessment prepared by Mr. Bryant (and attached as Appendix A to this evidence) provides more clarity around the risk and extent of natural hazards.

63 In particular Mr. Bryant's assessment finds that the landslide to the south of the site is dormant and does not present any risk. In addition, while Mr. Bryant acknowledges that there are areas of the site that may potentially be susceptible to rockfall, instability or debris flows, a reasonable proportion of the site appears to be free from significant natural hazards and there is scope for further assessment and, if necessary, mitigation where natural hazards may be present. I therefore consider that Mr. Bryant's assessment adequately addresses natural hazards to the extent that the Commissioners can be reasonably confident that natural hazards will not compromise the development of the site if it were to be rezoned.

Low Density Residential or High Density Residential

64 While the submission of LINZ sought the rezoning of the site as Low Density Residential the submission of Winton Partners sought more intensive zoning, proposing a range of urban zones from Low Density Residential to Business Mixed Use zoning. While an urban zoning beyond Low Density Residential is outside of the scope of the LINZ submission it is not outside of the scope of relief sought for the site generally.

65 In light of the evidence of Dr. Read and the assessment of Ms. Banks in her s42A report it appears that the relief sought by LINZ, including rezoning to Low Density Residential subject to a structure plan limiting future development to 19 lots and applying location specific provisions, is somewhat conservative.

67 I note Dr. Read's point that the proposed structure plan would result in an inefficient use of land. I agree that a broader Low Density Residential zoning or High Density Residential zoning as supported by Dr. Read and Ms. Kimberley Banks would result in the more efficient use of the site. Also, in light of Mr. Bryant's hazard assessment which acknowledges that parts of the site may be subject to rockfall, instability or debris flows to varying degrees, I consider that there may be parts of the site that prove to be unsuitable for development. I therefore consider that an unrestricted Low Density Residential zoning or a High Density Residential zoning would allow for the parts of the site that are suitable for development to be developed in an efficient manner and ensure that a reasonable yield can be achieved across the site.

68 Similarly more extensive or higher density development could potentially make hazard mitigation works more economically feasible such that the development potential of the site can be maximised.

69 I therefore consider that a unrestricted Low Density Residential zoning or the High Density Residential zoning that appears to be supported by Dr. Read and Ms. Kimberley Banks would not be inappropriate. In addition I note that Land Information New Zealand would happily accept a more intensive zoning than that put forward in their original submission.

Part 2 Assessment

70 Under Section 32 of the RMA the extent to which the objectives of a proposed plan are the most appropriate way to achieve the purpose of the Act, and whether the provisions of the proposed plan are the most appropriate way of achieving those objectives, must be examined.

71 I consider that the objectives and policies of the Proposed District Plan, as they relate to urban development, landscapes and natural hazards, are the most appropriate means of achieving the purpose of the Act.

72 I consider that the relief sough is an appropriate means of achieving the objectives of the Proposed District Plan.

73 I consider that the relief sought will be consistent with Section 5 of the Act in that it will provide for the use, development, and protection of natural and physical resource in a way, or at a rate, that enables people and communities to provide for the social, economic, and cultural wellbeing and for their health and safety while safeguarding the life-supporting capacity of air, water, soil and ecosystems.

74 Through the provisions of the Proposed District Plan the development enabled by the proposed rezoning will be appropriately controlled and managed to ensure that the environmental effects arising are appropriately avoided, remedied or mitigated.

75 I consider that the proposed amendments to the provisions of the Proposed District Plan adequately recognise and provide for the relevant matters of national importance set out in Section 6, specifically the protection of outstanding natural features and landscapes from inappropriate subdivision, use and development *(s6(b)).*

76 In addition I consider that the proposed amendments have appropriate regard to the relevant Section 7 matters, specifically the efficient use and development of natural and physical resources *(s7(b))*, the maintenance and enhancement of amenity values and the quality of the environment *(s7(c) and (f))* and the finite characteristics of natural and physical resources *(s7(g)).* That being said I consider that there is scope for more efficient use of the submission site through the application of a more intensive residential zoning.

77 With regard to Section 8 there are no known Treaty principles that will be affected by the proposed amendments to the Proposed District Plan.

78 I therefore consider that the relief sought in the submission of Land Information New Zealand appropriately achieves the purpose of the RMA.

Conclusion

79 Overall, having carefully considered the matters set out in Section 32, I consider that the realignment of the ONL line as it relates to the submission site and the rezoning of the site to Low Density Residential will meet the purpose of the RMA.

Scott Sneddon Edgar

9th June 2017

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15 May 2017

APL Property Queenstown Ltd

P.O. Box 1586

Queenstown 9348

Attn. *Jeff Reidy*

Dear Jeff:

Hazard Assessment: 35 Peninsula Road, Queenstown

1. Introduction

We have been engaged, by way of agreement dated 15 May 2017, to undertake a **Hazard Assessment** on the above captioned 6.658 ha site (legal description: Section 2 SO 448337). Parts of this block of land adjacent to the north side of Peninsula Road have been earmarked for subdivision into 19 lots suitable for low density housing.

The purpose of this report is to provide supporting documentation to a District Plan review hearing. The focus herein is on the identification of natural hazards and provide provisional advice on potential remedy, mitigation or avoidance measures.

2. Site Description

The proposed subdivision occupies a strip of land on the northern or downslope side of Peninsula Road. Figure 1 shows the Outline Development Plan and an aerial image of the site. A view of the site can be seen in Photo 1.

The land to be subdivided is split over two areas, Lots 1-8 to the west and Lots 9-19 to the east, with a central gully dividing the two areas. Within each area, the ground dips

gently away (0-10°) towards a terrace edge from which steeper slopes (20-30°) fall towards SH 6 and the Kawarau River.

Photo 1: Extent of subdivision shown by red bars from north side of Kawarau River. LS = landslide. SB = Schist bedrock.

Above the road, slopes gradually steepen although in different ways according to the predominant underlying material. Above Lots 11-19, slopes are generally concave across the large landslide area (see Photo 1). Above Lots 1-10, slopes rise step-wise before steepening markedly to the bedrock cliffs comprising the bulk of Peninsula Hill. The stepped terrain above Peninsula Road is formed of short cliff sections separating flat to gently inclined terraces.

One major drainage course passes through the area and is deeply incised where it passes between Lots 8 & 9. Another drainage course to the west of the site occupies a shallow gully above the road but is poorly defined where it passes through the western end of Lot 1. Other ephemeral courses are discernible from slightly lusher growth but are not associated with culverts. At the time of visit, there was no flow in any of the drainage courses although some seepage was noted in the largest gully.

3. Site Investigations

This study involved both a site walkover of slopes above and below Peninsula Road as well as a desk study. The latter comprised a review of Geoconsulting report dated 28 July 2015 (Geotechnical Assessment: Pt Lot 3 DP27200 Peninsula Road, Queenstown)

and examination of satellite imagery and aerial photograph stereopairs dated 1959 and 1976.

4. Local Geology

Schist forms the local bedrock and is exposed as a broad band of rock cliffs on the upper part of Peninsula Hill and as smaller outcrops with cliff faces at lower levels above the road. The only rock outcrops found within the subject site were on the northern parts of Lots 5 & 6 although natural outcrops and cut faces are present to the west of the site. The only other rock outcrops are those exposed by road widening for the new Kawarau Falls Bridge southern approaches and a river bank outcrop between the new south abutment and Pier 1.

Landslide debris extends from the just below the eastern peak of Peninsula Hill to more or less the level of Peninsula Road in the area of interest but to lower levels further round to the east. The downslope extent is difficult to determine as the lower slopes are blanketed by colluvium which also extends across the footslopes of the bedrock part of the hill. Test pits dug in Pt Lot 3 DP27200, above Peninsula Road reveal the debris comprises a broadly graded sand-gravel-cobble-boulder mixture. The boulder component can exceed 10 m in greatest dimension.

Colluvium is derived from erosion of the loose landslide debris to the east and rock cliffs to the west. The sand and gravel material is transported downslope initially by gravity and remobilised by rainfall runoff to be deposited on the lower, flatter slopes. Exposures of colluvium immediately above and below the road clearly show water-laid deposits. Loess, a wind deposited silty fine sand, caps the colluvial deposits on lower slopes.

Road widening associated with the new bridge's southern approaches have exposed a suite of glacial and post-glacial sediments (till, lake sediments, deltaic sediments). It is likely that some of these sediments extend back upslope and underlay colluvium in the vicinity of the proposed subdivision. Instability may develop in these sediments where groundwater levels are elevated. A landslide has affected the slope between Peninsular Road and SH 6 to the east of the site (see upper diagram, Figure 1).

5. Natural Hazards

5.1. QLDC Hazards Register

The QLDC Hazards Register identifies broad categories of hazards based on some interpretation and generalisations centred round a knowledge of the underlying material type. More detailed hazard assessment and discussion can thus arise using the present field work and the Hazards Register as a basis.

5.2. Landslide Hazard

The deep seated landslide and subsidiary landslide to the west falling below the secondary peak of Peninsula Hill is the dominant feature in this area (Photo 1). The bulk of the landslide lies above the road although some boulders may have travelled to the downhill side of the road.

Mapping around the lower reaches has revealed alluvial sands and gravels of glacial or post-glacial times (say 10,000-15,000 years ago) overlying the toe suggesting a minimum age of emplacement. On the upper reaches, there are no signs of tension cracks or scarp extension which would indicate recent or ongoing movement. Evidence has been found for secondary debris flows indicating some reactivation has occurred following the main movement although test pits showed a well-developed topsoil horizon mantling the lower slope suggesting there have been no recent disruptions from slope movements. The overall impression is that the landslide has been inactive for a considerable time and slopes above the road are currently stable.

The other landslide linking Peninsula Road and SH 6 lies well to the east of the area of interest but it does provide insight into the sensitive nature of the underlying materials. Seepage is visible along SH 6 cut slopes and ongoing activity has been noted at both the head and the toe. The cut slopes recently constructed along the southern approaches have been the subject of specific design and supported with gabion baskets where necessary. The stability of the terrace edge to the north of the subdivision will need to be established once the site has been cleared and lot boundaries marked out.

5.3. Rockfall Hazard

Numerous large blocks were noted both above and below the road. The latter are mainly within Lots 13-19 (see Figure 2) although thick vegetation obscures much of this area and some may not have been able to be identified. The rocks have either fallen from rock cliffs or have been remobilised from disturbed blocks on the surface of the landslide. Photo 2 shows a portion of the rock cliffs and Photo 3 shows one of the larger boulders.

Photo 2: Portion of the rock cliffs below Peninsula Hill showing mostly competent rock with occasional overhangs.

Photo 3: One of three large boulders on Lots 17-18, this one estimated to be 2.5 m high and 125 m^3 in volume.

The boulders on and below the landslide area are suspected of mostly having rolled into place although their position suggests they could also have been transported into place by the initial movement of the landslide itself. Blocks below the cliff faces have a clear rock fall origin and a well defined source area. The exposed rock on the cliffs is relaxed with numerous open defects with some of adverse orientation that provide release surfaces for face collapse. Earthquake shaking and ice wedging are known triggering factors but rock falls can occur at any time through progressive toppling.

No evidence of recent activity was found during the field work. There does not seem to be any recent scars on the rock cliffs or recent tracks marking the path of a rock fall. None of the blocks examined had freshly exposed surfaces; all faces were weathered and lichen covered indicating considerable time had elapsed since emplacement. The overall impression is that rock fall development is not an active or ongoing process however strong earthquake shaking could initiate rock falls.

Should a rock fall occur from the cliff faces it is likely the favourable topography above the road (a terrace and gully trending across the general downhill paths) would trap moving blocks. These features (see Photos 4 & 5) probably account for the absence of blocks on Lots 1-8 and probably Lots 9-11.

Photo 4: Terrace and gully (right) above Peninsula Road and Lots 1-6 on which rock falls could run out on to.

Photo 5: Terrace above road and Lots 7-10 on which rock falls could run out on to.

Rock falls arising from some parts of the cliffs may be funnelled into the central gully (Figure 2). The contours of this gully above the road should confine most boulders and channel them into the gully on the downhill side of the road. Further investigation into potential travel paths will allow determination of whether mitigation measures such as training bunds are necessary.

Lots 12-19 do not have any natural protection apart from Peninsula Road which, in all probability, postdates emplacement of all rockfall blocks. The road formation will halt some but not all moving rocks, particularly those travelling at speed. Again, further investigation into the rockfall hazard in this area is considered advisable to assess the risk and viability of man-made mitigation measures to minimise the risk.

5.4. Debris Flow Hazard

Debris flows can arise in association with high intensity rainfalls which erode and mobilise large volumes of sediment and vegetation and transport it as flow through water courses. A steep face to the east of Lot 8 exposes debris flow materials built up by the nearby water course and deposited as a fan across either side of the water course below the road (see Figure 2).

Since deposition, the ephemeral stream has episodically degraded down through the fan and is now incised some 5-8 m below the fan terrace. Should debris flows arise in the future it will thus be confined within the gully although some intervention works (training bunds) on the upslope side of the road will help ensure flows are concentrated into the gully.

5.5. Liquefaction Hazard

Liquefaction can be an issue in recently deposited fine-grained sediments when subject to strong earthquake shaking. The sediments need to be in a saturated condition for the soils to be liquefied. The terrace on which the subdivision is planned is underlain by gravelly sediments and is well drained to the north and towards the central gully. Groundwater does appear on the cut slopes adjacent to the SH 6 southern approaches following prolonged wet spells but for the most part is absent. The available evidence suggests that the site is not susceptible to liquefaction.

6. Conclusions

The proposed subdivision lies near the foot of a hillside from which a number of hazards could possibly arise. The major landslide upslope of the road is considered dormant and not to present any risk to the eastern part of the subdivision. Small scale instability of the terrace edge to the north of the proposed lots has yet to be established but any threat could be avoided by imposition of a 'no-build' buffer zone if necessary.

Rockfalls appear to be an inactive process judging from the aged appearance of those blocks that have been examined. Under normal circumstances, the risk appears to be very low to extremely low with the lots to the east having greatest exposure. However, the risk is likely to be greater during strong earthquake shaking. Further investigation is recommended to better understand the risk and to consider mitigation measures.

Debris flow hazards are restricted to the central gully (Figure 2). Although aggradation was once an active process forming a small fan in the vicinity of Lots 8 & 9, the stream that occasionally flows in the gully has since incised deeply into the fan surface to remove this risk from the nearest lots. Some intervention may be necessary where the road intersects the gully to ensure any flows make their way into the incised gully on the opposite side of the road.

The local soils and expected groundwater profile do not meet the requirements for liquefaction susceptibility. Accordingly, liquefaction is not considered to be an issue affecting this site.

Overall, the proposed site has only minor exposure to natural hazards. More detailed study is recommended on the rockfall and debris flow hazards to determine if such risks are of an acceptably low level or whether some mitigation measure is necessary.

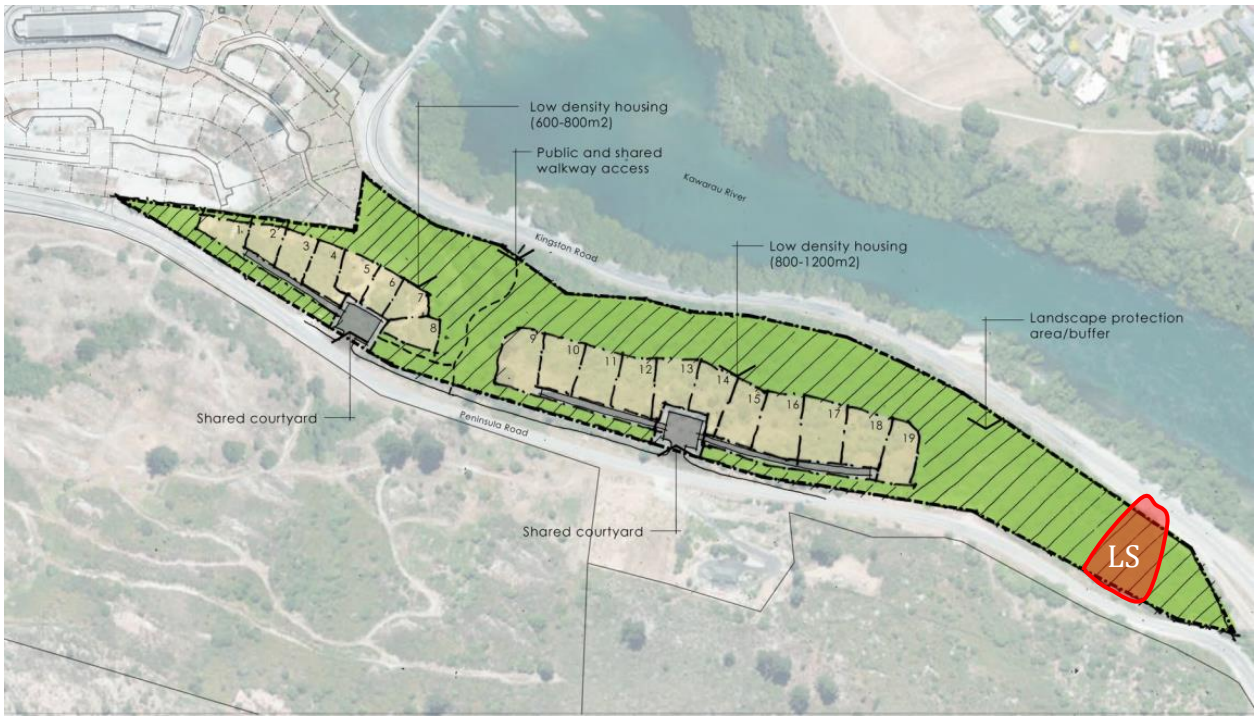
Sincerely,

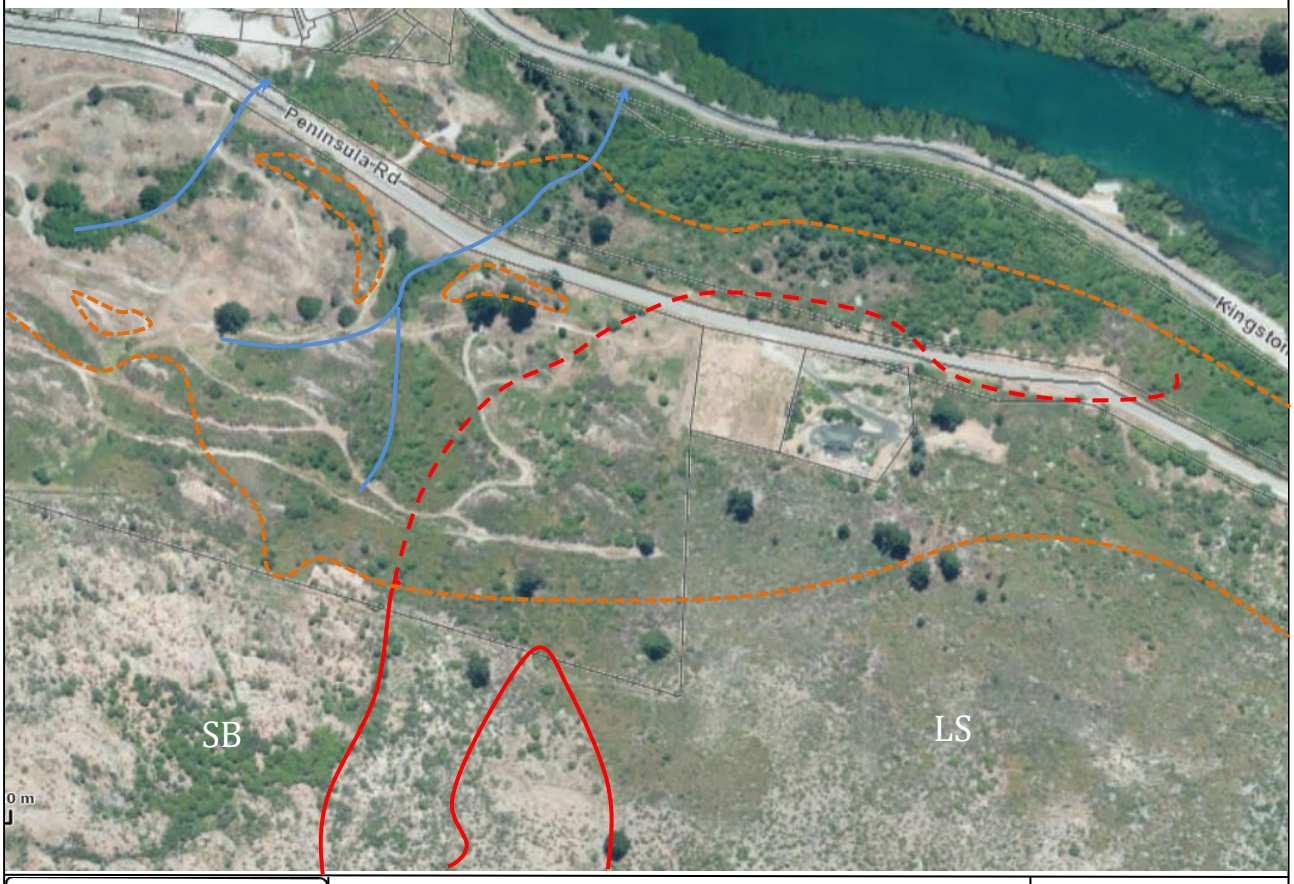
Geoconsulting Ltd

per J.M.Bryant

M.Sc. F.G.S.

THE GEOLOGICAL SOCIETY
CGeol
CHARTERED GEOLOGIST
Fellow No. 1000342





JEFF BRYANT GEOCONSULTING Ltd	PROJECT: 35 Peninsula Road	FIGURE: 1
	DESCRIPTION: (Upper) Indicative Outline Development Plan. (Lower) Aerial image showing outline geology and water courses (blue). Red lines encloses landslide areas, brown line encloses colluvial area overlying both landslide and bedrock.	Scale: NTS
		Report:
		Date: 20/05/2017

JEFF BRYANT GEOCONSULTING Ltd	PROJECT: 35 Peninsula Road	FIGURE: 2
	DESCRIPTION: Proposed subdivision shown in light blue. Brown dashed line shows extent of debris flow deposits and red dashed line shown main boulder field.	Scale: NTS
		Report:
		Date: 20/05/2017