

## Submission on Queenstown Lakes Proposed District Plan

Clause 6 of First Schedule, Resource Management Act 1991  
FORM 5

**To:**  
Submission Team  
Queenstown Lakes District Council  
Private Bag 50072  
QUEENSTOWN 9348

For office use only

**Submission No:**

**Receipt Date:**

### 1. Submitter details:

**Name of Submitter:** Trojan Helmet Limited (Submission 1 Resort Zone and General Submission)

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### 2. This is a submission on the Queenstown Lakes District Proposed District Plan (“Proposed Plan”).

### 3. The specific provisions that the submission relates to are:

The entire Proposed Plan, including but not limited to:

- |     |                         |                                     |
|-----|-------------------------|-------------------------------------|
| 3.1 | Proposed New Zone:      | Chapter 45 The Hills Resort Zone    |
| 3.2 | Proposed Planning Maps: | Map 26 (Speargrass Flat, Millbrook) |
| 3.3 | Chapter 3:              | Strategic Direction                 |
| 3.4 | Chapter 6:              | Landscapes                          |
| 3.5 | Chapter 21:             | Rural zone                          |
| 3.6 | Chapter 36:             | Noise                               |

## 4. Submission

### 4.1 The submitter (Trojan Helmet Limited) owns The Hills Golf Course

The Hills was designed by John Darby of Darby Partners and opened in 2007 to host the New Zealand Open. It is set in over 500 acres of land across a glacial valley. The layout highlights the dramatic elevation changes and rocky schist outcrops that are a feature of the area.

The championship layout provides a serious challenge for accomplished players while thoughtful and considerate design means that the golf course is equally enjoyable for golfers of all abilities. The beauty of the courses lakes, waterways and wetland areas are complimented by a stunning array of sculptures made by local and international artists. It has hosted the New Zealand Open four times and the NZ PGA Championship twice. The media coverage for these events and the showcasing of the local environment has contributed to putting New Zealand on the map in terms of golfing tourism.

The award winning Club House nestled near the centre of the course was designed by NZ Architect Andrew Patterson, his brief from Michael Hill was to design a building that is totally in harmony with the landscape and then give it a presence of religious proportions that stops people in their tracks, and polish it off by making everything function flawlessly.

The championship golf course and the stunning architecture of the Club House set a benchmark for design and for buildings to be integrated into the landscape.

There is now an opportunity to build on the successful and carefully designed golf course and buildings and provide for further development that complements, is in harmony with and further showcases The Hills Golf Course and its surrounds.

Accordingly, the submitter seeks the golf course and its surrounds be rezoned The Hills Resort Zone to enable such development.

The proposed Hills Resort Zone includes a bespoke set of District Plan provisions, along with a Structure Plan, for inclusion in the District Plan, the purpose of which is to provide for world class resort facilities, including residential, visitor accommodation, worker accommodation, a small commercial area and art and sculpture, spread throughout the championship golf course. The new zoning also seeks to recognise and provide for consented activities.

The proposed Structure Plan will ensure that this development is appropriately located and well integrated with the golf course and the surrounding landscape.

The proposed District Plan provisions are comprehensive and have, along with the Structure Plan, been carefully considered and drafted to ensure that development is enabled within those areas of the golf course that have the ability to absorb change without giving rise to adverse landscape, visual and other effects, subject to appropriate controls on building design, materials, height, and landscaping.

The proposed Resort Zone also seeks to provide for further opportunities for world class events, like the New Zealand Open for which The Hills is renowned, as well as smaller events such as charity tournaments and other temporary events that showcase the District and contribute to its tourism and the economy. The proposed Resort Zoning provides an opportunity to wrap a specific regulatory framework around these events, to provide certainty around the ability to continue hosting them, while at the same time providing the Council with appropriate control over matters such as traffic management, operations, waste management and sanitation.

The Proposed Resort Zone will result in new employment opportunities in the District. Accordingly, the proposed zone seeks to provide for accommodation for workers in the Zone, thereby avoiding exacerbating the apparent shortage of worker accommodation experienced elsewhere in the District.

Finally, commercial activities related and ancillary to the purpose of the new zone are sought to be enabled, to ensure the needs of residents and visitors to the resort can be met.

The proposed Hills Resort Zone has been comprehensively assessed as to its appropriateness by a range of experts. Their assessments, in summary, are that:

**Landscape:** the proposed zoning, in conjunction with the controls contained in the proposed District Plan provisions and the Structure Plan, will not give rise to adverse effects on landscape character and amenity, or to adverse visual effects. With the proposed controls in place, the development enabled by the new zoning is appropriate for the environment within which it is located and will ensure its special landscape characteristics are maintained.

**Traffic:** the surrounding roading network can accommodate the increase in traffic that will arise as a result of development enabled by the rezoning, and accessways to the new zone can be appropriately and safely designed.

**Natural Hazards:** the proposed zone is not subject to any natural hazard risk.

**Servicing and Infrastructure:** the development enabled by the rezoning can be appropriately serviced, and infrastructure is/can be made available/appropriately designed in terms of water supply, wastewater and stormwater.

**Noise:** Noise associated with temporary events (e.g. golf tournaments such as the NZ Open), including helicopter activities, can be appropriately managed so as not to give rise to adverse noise and amenity effects.

**Contamination:** The site does not present any risk to human health and is suitable residential activity.

**Planning:** the proposed rezoning is more appropriate than the current rural zoning because:

- It better reflects the current uses and appropriately provides for future uses of The Hills Golf Course;
- It appropriately enables events such as the NZ Open, which contribute significantly to the District's tourism and economy;
- It will ensure landscape values associated with the site are appropriately recognised and maintained;
- It is appropriate in terms of section 32 and the Purpose of the Resource Management Act (**Act**)

To provide further detail as to the above, the following information and reports are **attached** to and form part of this submission:

- A plan showing the land to which this submission relates, and which the submitter seeks be rezoned Hills Resort Zone as **Annexure A**
- The Proposed Structure Plan for The Hills Resort Zone as **Annexure B**
- The Proposed District Plan provisions that will apply in The Hills Resort Zone as **Annexure C**
- A Section 32 evaluation of the Hills Resort Zone prepared by Brown & Company Group, dated October 2015 as **Annexure D**
- The Hills Resort Zone, Master Planning report, prepared by Darby Partners, Dated 21 October 2015 as **Annexure E**
- The Hills, Structure Plan Resort Zone for The Hills, Assessment of Landscape and Visual effects, Prepared by Boffa Miskell, Dated October 2015 as **Annexure F**

- The Hills Rezoning, Helicopter Noise Assessment, Prepared by Marshall Day Acoustics, 12 October 2015 as **Annexure G**
- The Hills Resort Zone, Transportation Assessment Report, Prepared by Traffic Design Group, dated October 2015 as **Annexure H**
- The Hills Golf Course Land, Infrastructure Feasibility. Prepared by Hadley Consultants Limited, dated 21 October 2015 as **Annexure I**
- Hills Golf Course Land (including McDonnell Road Land) and Hogans Gully Land, Natural Hazard Assessment, Prepared by Hadley Consultants Limited, dated 21 October 2015 as **Annexure J**
- The Hills Special Zone Submission, Preliminary and Detailed Site Investigations, Prepared by Davis Consulting Limited, Dated 21/10/2015 as **Annexure K**

Accordingly, the Submitter seeks its land be rezoned as outlined above.

- 4.2 An alternative and much less preferred way of addressing the Submitter's concerns is to amend the Proposed Plan to appropriately recognise and provide for the existing golf course and its associated and ongoing development in the Rural zone, and for resort style development to be enabled on the land identified in Annexure A.

The amendments required to achieve this alternative and less preferred relief are set out below, along with reasons. Consequential changes would also be required to the rules that would continue to apply to the land under the notified rural zoning.

#### 4.2.1 Chapter 3: Strategic Direction

##### 4.2.1.1 Goals, objectives and policies:

- (a) The Submitter **SUPPORTS and OPPOSES** the goals, objectives and policies in Chapter 3.2 of the Proposed Plan, and seeks the following amendments, or similar:

*Objective 3.2.1.4* ~~Recognise the potential for rural areas to diversify their land use beyond the strong productive value of~~ **traditional rural activities including** farming, provided a sensitive approach is taken to rural amenity, landscape character, healthy ecosystems, and Ngai Tahu values, rights and interests.

...

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

*Objective 3.2.5.2* ~~Minimise the adverse landscape effects of subdivision, use or development in specified Rural Landscapes.~~ **Recognise the landscape character and visual amenity values of the Rural Landscapes and manage the adverse effects of subdivision, use and development on these values.**

*Policies 3.2.5.2.1* ~~Identify the district's Rural Landscape Classification on the district plan maps, and minimise the effects of subdivision, use and development on these landscapes.~~

**3.2.5.2.2** **Avoid, remedy or mitigate the adverse effects of subdivision, use and development within these landscapes.**

*Policies 3.2.5.4.2 Provide for rural living opportunities in appropriate locations.*

*Objective 3.2.5.5 Recognise that agricultural land use **and other activities that rely on rural resources** is **are** fundamental to the character of our landscapes.*

*Policies 3.2.5.5.1 Give preference to farming ~~activity~~ **and other activities that rely on rural resources** in rural areas except where it conflicts with significant nature conservation values.*

*3.2.5.5.2 Recognise that the retention of the character of rural areas is often dependent on the ongoing viability of **activities that rely on rural resources and farming** and that evolving forms of agricultural **and other** land uses which may change the landscape are anticipated.*

(b) The reasons for the submission include:

*General Reasons:*

- (i) As notified the Proposed Plan does not strike an appropriate balance between accepting the inevitability of growth and how landscape values should be managed in the face of this growth. Rather, the Proposed Plan is weighted too far in the direction of protection of all landscapes, and this will frustrate appropriate development proposals.
- (ii) Growth impacts on other resource management issues facing the District. One of the most important of these (alongside managing natural conservation values, managing urban amenity values, and servicing growth with utilities and road access) is managing the District's landscape values. It is inevitable that growth will affect landscape values. This inevitability should be accepted, and the Proposed Plan should focus on how the effects can be appropriately managed so that adverse effects are avoided, remedied or mitigated and future generations can continue to enjoy the values that attract growth.
- (iii) Further, the notified Proposed Plan over-emphasises the importance of farming activities. Farming is one method for utilising rural resources, but its long term economic opportunities, in many rural parts of the District, are very uncertain. The value of rates in many cases means that the farming incomes need to be high to meet those costs as well as to provide an income for the farmer. There are very few farmers that derive their income entirely from farming, particularly within the Wakatipu Basin.
- (iv) Other activities that require a rural location, such as rural residential and rural lifestyle uses, and golf courses, may better provide economic wellbeing for landowners and the wider community in the face of rapid growth, and therefore should also be enabled and should be on at least an equal footing with farming, depending on location and managing potential adverse effects on landscape and other values.
- (v) The District Plan regime should balance protection **and** use and development of all resources, taking into account particularly Sections 6(b) (the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development); 7(c) (the maintenance and enhancement of amenity values) and 7(f) (the maintenance and enhancement of the quality

of the environment) is the most appropriate regime to achieve the purpose of the Act.

*Specific Reasons:*

- (vi) Objective 3.2.1.4 and Objective 3.2.5.5 and its allied policies overly emphasise the importance of farming activities and do not recognise that other important natural factors and processes, and human activities, have shaped the landscape character of the District.
- (vii) The proposed amendments address this by acknowledging that, along with farming, other activities that rely on rural resources are fundamental to landscape character.
- (viii) The proposed amendments to Objective 3.2.5.2 and Policy 3.2.5.2.1 are appropriate for the following reasons:
- (a) The use of the term *minimise* in the objective is too broad and could disenable otherwise legitimate development proposals. The proposed words *recognise ... values and manage the adverse effects ... on these values* more clearly sets out that, in any specific proposal (whether a plan change or resource consent) the landscape and visual amenity values must be recognised (which, in practice, would be by way of thorough assessment) and then adverse effects on such values must be managed. This means that adverse effects must be avoided, remedied or mitigated, as is the duty under section 5 of the Act.
  - (b) The splitting of Policy 3.2.5.1 into two policies 3.2.5.2.1 and 3.2.5.2.2 better separates the two distinct purposes which are:
    - to identify the relevant landscapes; and
    - to set out the intent of the District Plan for those landscapes.
  - (c) Further it better aligns the policy with the parent objective, which is to manage the adverse effects of subdivision and development on the relevant values.
  - (d) Adverse effects should be *avoided, remedied or mitigated*, rather than *minimised*, and this aligns with section 5(2)(c) of the Act. It also better provides for the different (and in many cases unique) circumstances of any particular development proposal where the adverse effects on landscape character and visual amenity values may, in the broad determination under section 5, not necessarily need to be completely avoided but could be adequately remedied or mitigated. The opportunities for this should be expressed in the policy.
- (ix) Policy 3.2.5.4.2 is supported because it correctly identifies that some parts of the District have capacity to absorb change without detracting from landscape and visual amenity values, whether by way of zone or consent, but that residential development in rural areas needs to be carefully managed to avoid, remedy or mitigate potential adverse effects on landscape character and visual amenity values.
- (c) The submission points above are examined further and in more detail in the subsequent parts of this submission, in relation to Chapters 6 (Landscapes) and 21 (Rural Zone).

#### 4.2.2 Chapter 6: Landscapes

#### 4.2.2.1 Chapter 6.1 – Purpose and 6.2 – Values

- (a) The Submitter **OPPOSES** the goals, objectives and policies in Chapter 3.2, and seeks amendments, or similar:

##### 6.2 Values

...

*Some rural areas, particularly those closer to Queenstown and Wanaka town centres and within parts of the Wakatipu Basin, have an established pattern of housing on smaller landholdings. The landscape character of these areas has been modified by vehicle accesses, earthworks and vegetation planting for amenity, screening and shelter, which have reduced the open character exhibited by larger scale farming activities.*

*While acknowledging these rural areas have established housing, a substantial amount of subdivision and development has been approved in these areas and the landscape values of these areas are vulnerable to degradation from further subdivision and development. It is realised that rural lifestyle development has a finite capacity if the District's distinctive rural landscape values are to be sustained.*

**However, rural living can be enabled in certain locations if landscape character and visual amenity values are not unduly compromised.**

- (b) The reasons for the submission include:
- (i) The vision statement as notified recognises the finite capacity of the rural resources to absorb new rural lifestyle and rural residential development, but needs to also recognise that there are rural areas that can absorb development, whether in new areas or infill within existing areas, provided that the potential adverse effects on the landscape character and visual amenity values are properly considered when determining applications.
  - (ii) Further subdivision within some areas should not be forbidden or necessarily discouraged. Rather, the focus should be on accepting that there will be pressure on the rural resources to absorb new development and to focus the assessment on such matters as specific location within the topography, boundaries, access, landscaping, colours and materials of buildings, and visibility from other areas.

#### 4.2.2.2 Objectives and policies

- (a) The Submitter **OPPOSES** Objective 6.3.1 and Policies 6.3.1.1 . 6.3.1.4, and seeks the following amendments, or similar:

**6.3.1 Objective** **The District contains and values Outstanding Natural Features, Outstanding Natural Landscapes, and Rural Landscapes that require protection from inappropriate subdivision and development and Rural Landscapes where the adverse effects of subdivision and development are appropriately managed.**

**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)

- 6.3.1.3** *That subdivision and development proposals located within the Outstanding Natural Landscape, or an Outstanding Natural Feature, ~~be assessed against the assessment matters in provisions 21.7.1 and 21.7.3~~ because ~~subdivision and development is~~ are inappropriate in almost all locations, meaning successful applications will be exceptional cases.*
- 6.3.1.4** *~~That subdivision and development proposals located within the Rural Landscape be assessed against the assessment matters in provisions 21.7.2 and 21.7.3 because subdivision and development is inappropriate in many locations in these landscapes, meaning successful applications will be, on balance, consistent with the assessment matters.~~ That subdivision and development proposals within the Rural Landscape Classification are located and designed in such a manner that adverse effects on landscape character and visual amenity values are avoided, remedied or mitigated.*
- 6.3.1.5** *Avoid urban subdivision and development in the Rural Zones.*
- 6.3.1.6** *Enable rural ~~lifestyle~~ living through ~~applying~~ Rural Lifestyle Zone and Rural Residential Zone zones ~~plan changes~~ in areas where the landscape can accommodate change, and carefully considered applications for subdivision and development for rural living.*

- (b) The reasons for the submission include:
- (i) Objective 6.3.1 should only apply the term ~~%inappropriate+~~ to landscapes that are protected through section 6(b) of the Act, i.e. Outstanding Natural Landscapes and Outstanding Natural Features. The term ~~%inappropriate+~~ cannot be applied to the Rural Landscape Classification for the following reasons:
- (a) It is contrary to Section 6(b) of the Act;
- (b) It is contrary to the relevant objectives and policies in the Strategic Direction Chapter, including Objective 3.2.5.2 and 3.2.5.3 and their allied policies.
- (ii) The basic mechanics of the rules that serve these objectives and policies require that proposals are assessed against the assessment matters. The policies should not state that proposals will be assessed against the assessment matters; the wording in Policies 6.3.1.3 and 6.3.1.4 is redundant.
- (iii) The revised wording of Policies 6.3.1.4 and 6.3.1.6 is appropriate for the following reasons:
- (a) For Policy 6.3.1.4:



- The reason in (ii) above in relation to the assessment matters; and
  - To ensure that the ~~an appropriate~~ test of Section 6(b) of the Act does not apply to subdivision and development within landscapes that are not outstanding, and
- (b) For Policies 6.3.1.4 and 6.3.1.6: Adverse effects should be ~~avoided, remedied or mitigated~~ which aligns with section 5(2)(c) of the Act. It also better provides for the different (and in many cases unique) circumstances of any particular development proposal where the adverse effects on landscape character and visual amenity values may, in the broad determination under section 5, not necessarily need to be completely avoided but could be adequately remedied or mitigated. The opportunities for this should be expressed in the policy.
- (c) The Submitter **OPPOSES** Objective 6.3.2 and Policies 6.3.2.1 . 6.3.2.5, and seeks the following amendments, or similar:

**6.3.2 Objective** ***Avoid, remedy or mitigate adverse cumulative effects on landscape character and amenity values caused by incremental subdivision and development.***

*Policies* **6.3.2.1** *Acknowledge that subdivision and development in the rural zones, specifically residential development, has a finite capacity if the District's landscape quality, character and amenity values are to be sustained.*

**6.3.2.2** *Allow residential subdivision and development only in locations where the District's landscape character and visual amenity would not be degraded significantly adversely affected, recognising that there are parts of the rural areas that can absorb rural living development, provided that the potential adverse effects on the landscape character and visual amenity values are properly considered when determining applications.*

**6.3.2.3** *Recognise that proposals for residential subdivision or development in the Rural Zone that seek support from existing and consented subdivision or development have potential for adverse cumulative effects-, particularly where the subdivision and development would constitute sprawl along roads.*

**6.3.2.4** *Have particular regard to the potential adverse effects on landscape character and visual amenity values from infill within areas with existing rural lifestyle development or where further subdivision and development would constitute sprawl along roads.*

**6.3.2.5** *Ensure incremental changes from subdivision and development do not degrade landscape quality, or character ~~or openness~~ as a result of activities associated with mitigation of the visual effects of proposed development such as screening planting, mounding and earthworks.*

- (d) The reasons for the submission include:
- (i) Objective 6.3.2 as notified seeks to avoid adverse cumulative effects. This is too strong and may foreclose the opportunity for proposals for which adverse effects can be adequately remedied or mitigated, if not entirely avoided. Such an assessment would be made at the time of the application. The insertion of *remedy or mitigate* into the objective is therefore necessary.
  - (ii) Policy 6.3.2.2 should be amended to recognise that there are rural areas that can absorb development, whether in new areas or infill within existing areas, provided that landscape character and visual amenity values are not *significantly* adversely affected. This wording recognises that the landscape values are one component in the overall determination of applications, and seeks that any potential adverse effects are properly considered in this determination.
  - (ii) Policy 6.3.2.5 is should be amended by deleting reference to *openness*. The Environment Court has repeatedly identified that *openness* is not a factor except in relation to outstanding landscapes.

- (e) The Submitter **SUPPORTS and OPPOSES** Objective 6.3.4 and Policies 6.3.4.1 . 6.3.4.3, and seeks the following amendments, or similar:

**6.3.4 Objective *Protect, maintain or enhance the District's Outstanding Natural Landscapes (ONL).***

*Policies*      **6.3.4.1** *Avoid subdivision and development that would ~~degrade~~ **adversely affect** the important qualities of the landscape character and amenity, particularly where there is no or little capacity to absorb change.*

**6.3.4.2** *Recognise that large parts of the District's Outstanding Natural Landscapes include working farms and accept that viable farming involves activities which may modify the landscape, providing the quality and character of the Outstanding Natural Landscape is not adversely affected.*

**6.3.4.3** *Have regard to adverse effects on landscape character, and visual amenity values as viewed from public places, with emphasis on views from formed roads.*

**6.3.4.4** *Have regard to the adverse effects from subdivision and development on the open landscape character where it is open at present.*

- (f) The reasons for the submission include:
- (i) The outstanding natural landscapes of the District are in many cases iconic and contribute to the District's identity, and their ongoing protection, maintenance and enhancement is generally necessary and supported.
  - (ii) Given the spatial scale of the ONLs and the varied topography, they have some limited capacity to absorb development and adverse effects of development should be avoided. The words *adversely affect* in Policy 6.3.4.1 are preferable to the term *degrade*. *Degrade* is too absolute,

whereas ~~%adversely affect+~~in this context promotes assessment of whether any actual or potential effects are or could be adverse.

- (iii) The openness of a landscape may be an issue in ONLs, but not in non-outstanding landscapes. This has been confirmed many times by the Environment Court. The new Policy 6.3.4.4 is therefore appropriate under Objective 6.3.4 and is relocated from Policy 6.3.5.6.
- (g) The Submitter **OPPOSES** Objective 6.3.5 and Policies 6.3.5.1 . 6.3.5.6, and seeks the following amendments, or similar:

**6.3.5 Objective** *Ensure subdivision and development does not ~~degrade~~ avoids, remedies or mitigates adverse effects on landscape character and diminish visual amenity values of the Rural Landscapes (RLC).*

*Policies* **6.3.5.1** *Allow subdivision and development only where it will not degrade landscape quality or character, or diminish the visual amenity values identified for any Rural Landscape.*

**6.3.5.2** *Avoid, remedy or mitigate any adverse effects from subdivision and development that are:*

- *Highly visible from public places and other places which are frequented by members of the public generally (except any trail as defined in this Plan); and*
- *Visible from public roads.*

**6.3.5.3** *Avoid planting and screening, particularly along roads and boundaries, which would ~~degrade~~ adversely affect openness views where such openness views are is an important part to the appreciation of the landscape quality or character.*

**6.3.5.4** *Encourage any landscaping to be sustainable and consistent with the established character of the area.*

**6.3.5.5** *Encourage development to utilise shared accesses and infrastructure, to locate within the parts of the site where they will be least visible, and have the least disruption to the landform and rural character.*

~~**6.3.5.6** *Have regard to the adverse effects from subdivision and development on the open landscape character where it is open at present.*~~

- (h) The reasons for the submission include:

- (i) Objective 6.3.5 is modified by replacing ~~%degrade+~~with ~~%avoids, remedies or mitigates adverse effects on+~~which aligns with section 5(2)(c) of the Act. It also better provides for the different (and in many cases unique) circumstances of any particular development proposal where the adverse effects on landscape character and visual amenity values may, in the broad determination under section 5, not necessarily need to be completely avoided but could be adequately remedied or mitigated. The opportunities for this should be expressed in the policy.

- (ii) Policy 6.3.5.2 is modified for the same reasons as in (i) above.
  - (iii) Policy 6.3.5.3 is modified by deleting references to ~~“openness”~~, as the Environment Court has confirmed that that is not an issue in non-outstanding landscapes and replacing with ~~“views”~~ where such views ~~“are important to the appreciation of the landscape quality of character”~~. This then invites specific analysis of the views, whether open or not, in the particular circumstances of any proposal.
  - (iv) Policy 6.3.5.6 is deleted from this part of the Proposed Plan and shifted to where it is relevant under outstanding natural landscapes, under Objective 6.3.4.
- (i) The Submitter **SUPPORTS** Objective 6.3.8 and its allied policy for the following reasons:
- (i) The District’s landscapes provide the opportunities for tourism and therefore must be sustained.

**4.2.3 Chapter 21: Rural Zone**

**4.2.3.1 Zone Purpose 21.1 and objectives 21.2.1 and associated policies**

- (a) The Submitter **OPPOSES** these provisions but seeks modifications as follows:

**21.1 Zone Purpose**

*The purpose of the Rural zone is to enable farming activities **and other activities that rely on rural resources** while protecting, maintaining and enhancing landscape values, nature conservation values, the soil and water resource and rural amenity.*

*A wide range of productive activities occur in the Rural Zone and because the majority of the District’s distinctive landscapes comprising open spaces, lakes and rivers with high visual quality and cultural value are located in the Rural Zone, there also exists **a wide range of the desire for rural living, recreation, commercial and tourism activities and the desire for further opportunities for these activities**.*

...

**21.2.1 Objective** ***Enable farming, permitted other activities that require a rural location and established activities while protecting, maintaining and enhancing landscape, ecosystem services, nature conservation and rural amenity values.***

*Policies* **21.2.1.1** ***Enable farming and other activities that require a rural location and other established** activities while protecting, maintaining and enhancing the values of indigenous biodiversity, ecosystem services, recreational values, the landscape and surface of lakes and rivers and their margins.*

**21.2.1.2** *Provide for Farm Buildings ~~associated with larger landholdings~~ where the location, scale and colour of the buildings will not adversely affect landscape values.*

**21.2.1.4** *Minimise ~~the~~ dust, visual, noise and odour effects of activities on ~~by requiring facilities to locate a~~*

~~greater distance from~~ formed roads, neighbouring properties, waterbodies and zones that are likely to contain residential and commercial activity.

**21.2.1.6** ~~Avoid, mitigate, remedy or off-set~~ adverse cumulative impacts on ecosystem services and nature conservation values.

- (b) The reasons for the modifications sought include:
- (i) The Zone Purpose, Objective 21.2.1 and Policy 21.2.1.1 over-emphasise the importance of farming activities and do not recognise that many other activities require a rural location because they rely on rural resources. The Hills Golf Course is an example of this. The proposed modifications remedy this by enabling, along with farming, other activities that rely on rural resources.
  - (ii) Farming is one method for utilising rural resources, but its long term economic future, in many rural parts of the District, is uncertain. Other activities that require a rural location, such as commercial recreation activities, may better provide economic wellbeing for landowners and the wider community and therefore should also be enabled and should be on at least an equal footing with farming.
  - (iii) Because of their over-emphasis on farming, these provisions are inconsistent with other provisions that directly promote diversification of the use of rural resources. Examples of other such provisions are:
    - 21.1 . Zone Purpose: second and third paragraphs;
    - Objective 21.2.10 and allied policies, regarding diversification of farms (subject to the modifications in Part 3.3.2 below).
  - (iv) Policy 21.2.1.2 should be amended to avoid confusion of what a ~~larger~~ landholding may be perceived to be (it is not a defined term in the PDP). Farm buildings to be provided for on rural zoned sites of any size.
  - (v) Policy 21.2.1.4 is attempting to control reverse sensitivity effects, however the phrase ~~locate a greater distance~~ provides no certainty of intent or outcome.
  - (vi) Policy 21.2.1.6 does not align well with the RMA. ~~Ecosystems services~~ is defined within the PDP, however further nature conservation values are not defined within the PDP and should be clarified.

**4.2.3.2 Objective 21.2.10 and associated policies relating to the potential for diversification of farms**

- (a) **The Submitter SUPPORTS and OPPOSES** the objective and policies and seeks modifications as follows.

**21.2.10 Objective** ~~Recognise the potential for diversification of rural activities (including farming activities) farms that utilises support the sustainability of the natural or and physical resources of farms rural areas and supports the sustainability of farming activities.~~

**Policies** **21.2.10.1** ~~Encourage revenue producing activities that can support the long term sustainability of farms in the rural areas of the district.~~

**21.2.10.2** *Ensure that revenue producing activities utilise natural and physical resources (including buildings) in a way that maintains and enhances landscape quality, character, rural amenity, and natural values.*

**21.2.10.3** *Recognise that the establishment of complementary activities such as commercial recreation or visitor accommodation located within farms may enable landscape values to be sustained in the longer term. Such positive effects should be taken into account in the assessment of any resource consent applications.*

- (b) The reasons for the support and amendments are:
- (i) The notified wording of these provisions follows on from the higher order provisions in Chapter 3 and in Objective 21.2.1 and its allied policies, as discussed in parts 3.2 and 3.4.1 of this submission. In many parts of the District farming is not an economically sustainable activity, and it may remain that way for the foreseeable future.
  - (ii) The modifications seek to ensure that the sustainability applies to the natural and physical resources of the rural areas and is not exclusively about the sustainability of farming. Farming is one of many activities that utilise those natural and physical resources.
  - (iii) The Hills Golf Course is not farmed at present but contributes to the visual amenity of the surrounding area.

4.3. Consequential changes to the rules that apply in the chapters of the PDP addressed in the above submission points may be required to give effect to the modifications to the objectives and policies sought.

4.4. The Submitter considers that without the amendments detailed in this submission the Proposed Plan:

- (a) will not promote the sustainable management of natural and physical resources;
- (b) will not provide for the efficient use and development of natural and physical resources;
- (c) is otherwise inconsistent with the relevant provisions of the Resource Management Act 1991, including the purposes and principles of Part 2 of the Act; and
- (d) does not result in the most appropriate plan provisions in terms of section 32 of the Act.

## **5. Trojan Helmet Limited seeks the following decision from the Queenstown Lakes District Council:**

- (a) That the land identified in **Annexure A** be rezoned Hills Resort Zone, and the Structure Plan in **Annexure B** and District Plan Provisions in **Annexure C** be included in the Proposed Plan and apply to the new zone; or
- (b) As a less preferred relief, that the Proposed Plan be amended to appropriately recognise and provide for the existing golf course at The Hills and its associated and ongoing development in the Rural zone, and for resort style development on the land identified in

Annexure A to be enabled, by making the amendments set out in Part 4 of this submission, including any similar and/or consequential amendments; or

- (c) That the Proposed Plan be amended in a similar or such other way as may be appropriate to address the matters raised in this submission; and
- (d) Any consequential decisions required to address the matters raised in this submission.

Trojan Helmet Limited **DOES** wish to be heard in support of this submission.

If others make a similar submission Trojan Helmet Limited will consider presenting a joint case with them at a hearing.

Signature of Submitter



A A Hutton  
*Authorised to sign on behalf of Trojan Helmet Limited*

Date: 23 October 2015

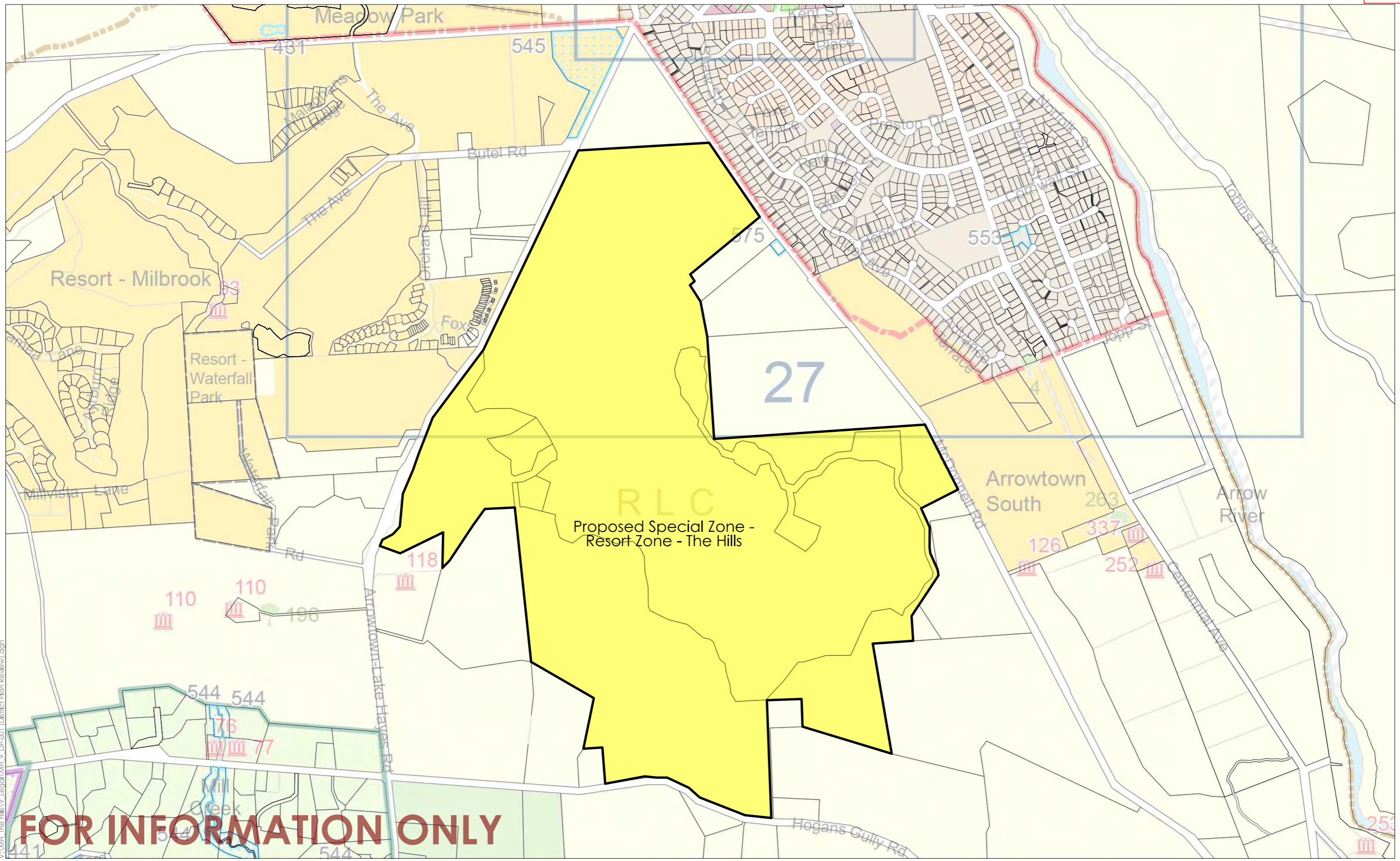
Telephone: 03 409 2258 / 021 529745

**Notes to person making submission:**

If you make your submission by electronic means, the email address from which you send the submission will be treated as an address for service.


If you are a person who could gain an advantage in trade competition through the submission, your right to make a submission may be limited by clause 6 (4) of Schedule 1 of the Resource Management Act 1991.

**The submitter could NOT gain an advantage in trade competition through this submission**



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 CONSULTANTS:

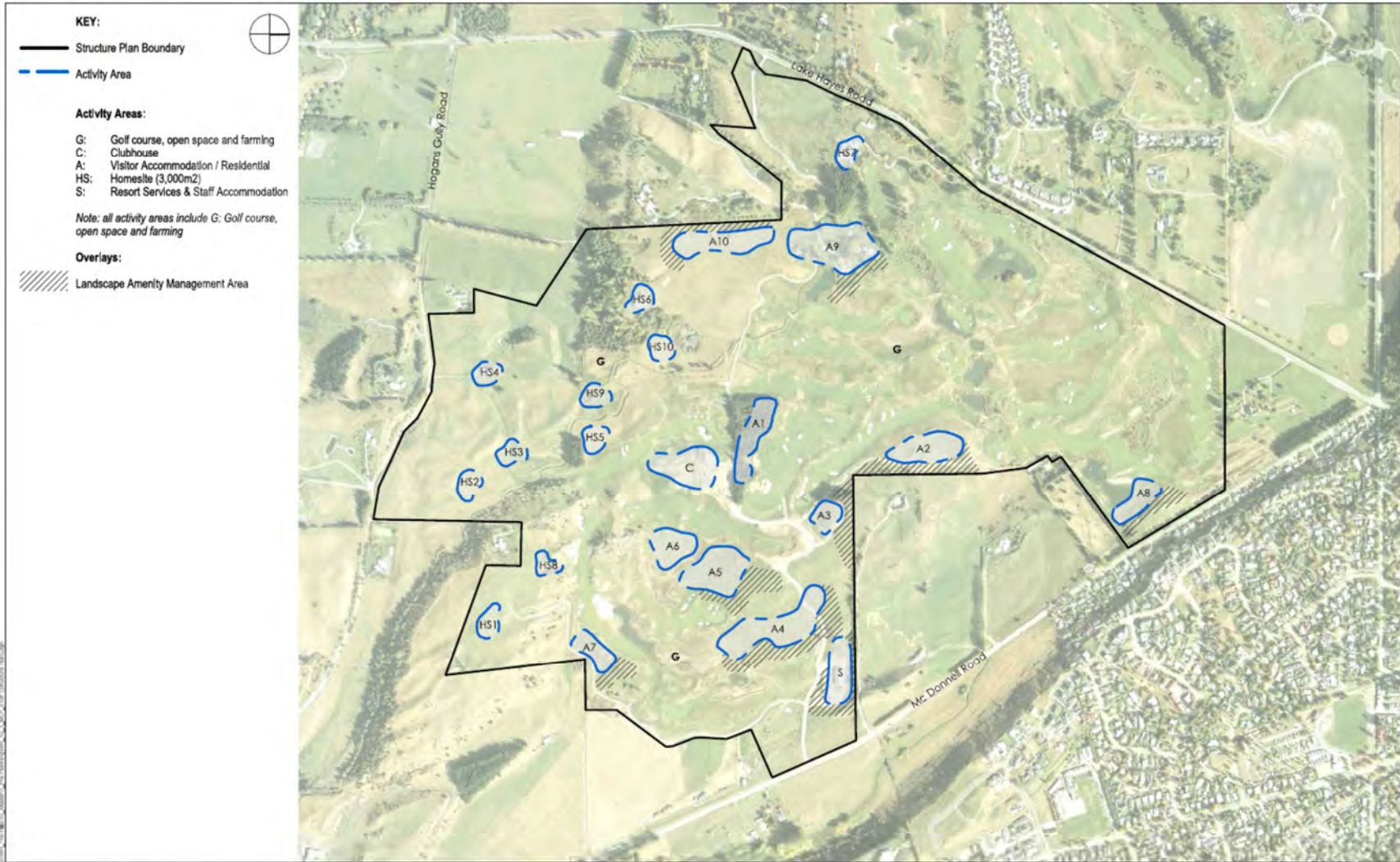
NOTES:  
 Datum: NZGD: Linds Peak Circuit 1949

REVISION:		DATE	DRAWN	REVIEWED	APPROVED
NO	DESCRIPTION	20.10.15	HF	-	-
-	For Information Only				

**DISTRICT PLAN REVIEW**  
**MAP 26: THE HILLS RESORT ZONE**

PLAN STATUS:	JOB CODE:	DRAWING NO:	REV:
<b>DRAFT</b>	<b>MH_9</b>	<b>DP-001</b>	





**KEY:**

- Structure Plan Boundary
- Activity Area

**Activity Areas:**

- G: Golf course, open space and farming
- C: Clubhouse
- A: Visitor Accommodation / Residential
- HS: Homestead (3,000m<sup>2</sup>)
- S: Resort Services & Staff Accommodation

*Note: all activity areas include G: Golf course, open space and farming*

**Overlays:**

- Landscape Amenity Management Area

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SCALE: 1:4,000 (A1): 1:8,000 (A3)  
 PLAN STATUS:  
**DP REVIEW**

**THE HILLS  
 STRUCTURE PLAN**

DESIGNED: HENNINGSEN, RTJ & C  
 APPROVED: DT  
 DATE: 14/10/18

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## 44 The Hills Resort Zone

### 44.1 Resort Zone Purpose

The purpose of the zone is to provide world class resort facilities. The zone includes residential, visitor accommodation, worker accommodation, a small commercial area and art and sculpture spread throughout a championship golf course. A structure plan applies to the zone to ensure that development is appropriately located and well integrated with the golf course and the local and wider landscape.

### 44.2 Objectives and Policies

**44.2.1 Objective- Development of a resort environment containing residential activity, visitor accommodation, ancillary worker accommodation and commercial activities, commercial recreation activities and an evolving sculpture park within the context of a premier golf course, while having regard to the landscape and amenity values of the site and wider environment.**

#### Policies

- 44.2.1.1 Require development to be located in accordance with a Structure Plan to ensure that it is appropriately sited and integrated with the golf course and that adverse effects on landscape and amenity values are mitigated.
- 44.2.1.2 To ensure that the character of the wider landscape is maintained by controlling the density, location and appearance of built form within the zone.
- 44.2.1.3 To provide for visitor accommodation and residential activities in areas with potential to absorb development and which are designed to complement the landscape within which they are sited.
- 44.2.1.4 To provide a world class golfing experience which showcases the resort's natural amenity, sculpture park and well designed development.
- 44.2.1.5 To provide for an evolving sculpture park within the resort.
- 44.2.1.6 To provide a venue for events which may contribute to the District's economy.
- 44.2.1.7 To provide for workers' accommodation associated with the resort within the Service Activity Area.
- 44.2.1.8 To allow for the take-off and landing of helicopters provided effects on neighbours' amenity are mitigated.
- 44.2.1.9 To avoid commercial, industrial and other activities that are not related to the development of the resort.

### 44.3 Other Provisions and Rules

#### 44.3.1 District Wide

Attention is drawn to the following District Wide Chapters. All chapters referred to are within Stage 1 of the Proposed Plan, unless marked as Operative District Plan (ODP).

1. Introduction	2. Definitions (& ODP)	3. Strategic Directions
4. Urban Development	5. Tangata Whenua	6. Landscapes
24. Signs (ODP)	25. Earthworks (ODP)	26. Historic Heritage
27. Subdivision	28. Natural hazards	29. Transport (ODP)
30. Utilities and Renewable Energy	31. Hazardous Substances (ODP)	32. Protected Trees
33. Indigenous Vegetation	34. Wilding Exotic trees	35. Temporary Activities and Relocatable Buildings, except as provided for in this zone.
36. Noise	37. Designations	Planning Maps

#### 44.3.2 Clarification

Where an activity does not comply with a Standard listed in the Standards table at 44.5 the activity status identified by the “Non Compliance Status” column shall apply. Where an activity breaches more than one Standard, the most restrictive status shall apply to the Activity.

The following abbreviations are used within this Chapter:

P	Permitted	C	Controlled
RD	Restricted Discretionary	D	Discretionary
NC	NC Non Complying	PR	Prohibited

### 44.4 Rules – Activities

	Activities – Hills Resort Zone	Status
44.4.1	<b>Any outdoor art installations</b> not visible from McDonnell Road, Lake Hayes-Arrowtown Road, Hogans Gully Road – including those that are defined as a <i>Building</i> because of their size.	P
44.4.2	<b>Any Rural Activities</b>	P
44.4.3	<b>Any Earthworks</b> associated with the development of the Golf Course, landscaping or development of home sites or activity areas.	P
44.4.4	<p><b>Structure Plan – Permitted Activities</b></p> <p>44.4.4.1 In all activity areas: Development and operation of golf courses, including associated earthworks, green keeping, driving ranges, administrative offices, sales and commercial instruction, and sheds for utilities, service and accessory buildings, or buildings necessary for golf course management of up to 40m<sup>2</sup> in gross floor area.</p> <p>44.4.4.2 Visitor Accommodation/ Residential Activity Area (A1-A10)</p> <ul style="list-style-type: none"> <li>▪ Residential and Visitor Accommodation</li> <li>▪ Commercial Recreation Activities</li> <li>▪ Commercial and community activities</li> </ul> <p>44.4.4.3 Golf Course, Open Space and Farming Activity Area (G):</p> <ul style="list-style-type: none"> <li>▪ Rural Activities</li> <li>▪ Ancillary buildings</li> <li>▪ Art installations</li> </ul>	P

	Activities – Hills Resort Zone	Status
	<ul style="list-style-type: none"> <li>▪ Art and Sculpture tours</li> <li>▪ Temporary events</li> </ul> <p>Licensed Premises for temporary events</p> <p>44.4.4.4</p> <p>Clubhouse Activity Area (C):</p> <ul style="list-style-type: none"> <li>▪ Golf Club houses, restaurants, bars, beauty spas, gymnasiums, theatres, pools, conference, cultural and community facilities</li> <li>▪ Office and administration ancillary to the above activities,</li> <li>▪ Licensed premises</li> <li>▪ Commercial and community activities</li> <li>▪ The takeoff and landing of helicopters.</li> </ul> <p>44.4.4.5</p> <p>HS Home Sites Activity Areas (HS1-HS10):</p> <ul style="list-style-type: none"> <li>▪ Single residential units that can be used for Residential or Visitor Accommodation Activities.</li> </ul> <p>For HS7, licensed premises</p> <p>44.4.4.6</p> <p>Resort Services and Staff Accommodation Activity Area (S):</p> <ul style="list-style-type: none"> <li>▪ Servicing activities related to the development and operation of the resort ancillary to approved or permitted activities within the zone</li> <li>▪ Workers accommodation for employees of the resort and their families</li> </ul> <p>44.4.4.7</p> <p>Landscape Amenity Management Area (shown with hatching on the structure plan)</p> <ul style="list-style-type: none"> <li>▪ Landscaping including the re-contouring of land through earthworks to soften the built form and mitigate the effects of development in the adjacent activity area. The landscaping must: <ul style="list-style-type: none"> <li>i. Include a mix of species and densities of tussocks and naturalised groups of exotic and indigenous trees and shrubs</li> <li>ii. Be maintained to ensure a survival rate of at least 90% within the first 5 years.</li> </ul> </li> </ul> <p>44.4.4.8</p> <ul style="list-style-type: none"> <li>▪ Access ways as shown on the Structure plan (+/- 30m)</li> </ul>	
44.4.5	<p><b>Buildings</b> in</p> <ol style="list-style-type: none"> <li>a. Clubhouse Activity Area</li> <li>b. Activity Areas: A1, A2, A5, A6, A7, A9, A10</li> <li>c. Resort Services and Staff Accommodation Activity Area</li> </ol> <p>Provided that:</p> <ol style="list-style-type: none"> <li>i. Colours and materials meet the standard in Rule 44.5.2</li> <li>ii. Height limits are not exceeded</li> <li>iii. Any Landscaping Amenity Management Area shown on the Structure plan adjacent to the activity area will be landscaped to provide for planting and land contouring before development in the adjacent activity area is completed.</li> </ol>	P
44.5.6	<p><b>Premises licensed</b> for the consumption of alcohol on the premises between the hours of 0800 and 2300, excluding the Service Activity Area and Staff Accommodation Activity Area</p>	P
44.4.7	<p><b>Buildings</b> in:</p> <ol style="list-style-type: none"> <li>a. Activity Areas: A3, A4, A8 (provided that development in A8 is limited to two dwellings and ancillary buildings)</li> <li>b. Activity Areas: HS1, HS2, HS3, HS4, HS5, HS6, HS7, HS8, HS9, HS10</li> </ol> <p>With the exercise of Council's control limited to:</p> <ol style="list-style-type: none"> <li>i. The external appearance of the building including colours and materials</li> <li>ii. The location of car parking and curtilage areas</li> <li>iii. Signage for Visitor Accommodation activities</li> </ol>	C

	Activities – Hills Resort Zone	Status
	<ul style="list-style-type: none"> <li>iv. The extent and nature of proposed landscaping and earthworks to screen or soften the visual and effects of the building</li> <li>v. The location of buildings to ensure that landscape effects are minimised.</li> <li>vi. The extent to which buildings in HS1 and HS8 are cut into the back slope to avoid their appearance on the skyline.</li> <li>vii. Whether any Landscaping Amenity Management Area shown on the Structure plan adjacent to the activity area will be landscaped before development in the adjacent activity area is completed.</li> </ul>	
<b>44.4.8</b>	<p><b>Any outdoor art installations</b> visible from McDonnell Road, Lake Hayes-Arrowtown Road, and Hogans Gully Road– including those that are defined as a <i>Building</i> because of their size.</p> <p>With the exercise of Council’s control limited to:</p> <ul style="list-style-type: none"> <li>i. Siting of the art installation</li> <li>ii. Traffic safety</li> </ul>	C
<b>44.4.9</b>	<p>Premises licensed for the consumption of alcohol on the premises between the hours of 2300 and 0800, provided that this rule shall not apply to the sale and supply of alcohol:</p> <ul style="list-style-type: none"> <li>a. To any person who is residing (permanently or temporarily) on the resort;</li> <li>b. To any person who is present on the premises for the purposes of dining up to 12am.</li> <li>c. Mini bars within Visitor Accommodation in the resort.</li> </ul> <p>With the exercise of Council’s control limited to:</p> <ul style="list-style-type: none"> <li>i. The scale of the activity</li> <li>ii. The configuration of activities with the building and the site (e.g., outdoor seating, entrances).</li> <li>iii. Noise and hours of operation.</li> </ul>	C
<b>44.4.10</b>	<p><b>Temporary events</b>, including golf tournaments and concerts, provided that:</p> <ul style="list-style-type: none"> <li>a. The event does not exceed 14 consecutive calendar days (excluding set up and pack down)</li> <li>b. The event does not operate outside the hours of 0600 to 2200. Set up and pack down outside of these hours is permitted, provided it complies with the noise limits for the Zone.</li> <li>c. There shall be no more than 10 temporary events per calendar year</li> <li>d. All structures and equipment is removed from the zone within 10 working days of the completion of the event</li> <li>e. For the purpose of this rule the relevant noise standards for the Zone shall not apply within the hours of 6am to 10pm</li> </ul> <p>With the exercise of Council’s control limited to:</p> <ul style="list-style-type: none"> <li>i. The acceptance of a Traffic Management Plan</li> <li>ii. Implementation of waste minimisation and management measures</li> <li>iii. The provision of adequate sanitation for event attendees</li> <li>iv. The acceptance of an Operations Plan for the event</li> </ul>	C
<b>44.4.11</b>	<p><b>Buildings</b> in the Golf Course, Open Space and Farming Activity Area, except for utilities, service and accessory buildings, or buildings necessary for golf course management of up to 40m<sup>2</sup> in gross floor area</p> <p>With the exercise of the Council’s discretion limited to:</p> <ul style="list-style-type: none"> <li>i. The external appearance of the building</li> <li>ii. Surrounding landscaping, whilst having regard to the use of the building and the need to access the building</li> </ul>	RD
<b>44.4.12</b>	<p><b>Residential activity</b> in the Resort Services and Staff Accommodation, Golf Course, Open Space and Farming Activity Areas, except for:</p> <ul style="list-style-type: none"> <li>▪ Workers accommodation in the Resort Services and Staff accommodation Activity Area</li> </ul>	D
<b>44.4.13</b>	<p><b>Commercial and Community Activities</b>, except for:</p> <ul style="list-style-type: none"> <li>▪ Commercial recreation activities; or</li> </ul>	D

	Activities – Hills Resort Zone	Status
	<ul style="list-style-type: none"> <li>▪ Offices and administration activities within the Resort Services and Staff Accommodation, and Clubhouse Activity Areas, and Activity Areas A1-A10 that are directly associated with the management and development of the resort or ancillary to a permitted or approved activity;</li> <li>▪ Licensed premises</li> <li>▪ Bars, restaurants, theatres, pools, gymnasiums, beauty spas, conference and cultural facilities in the Clubhouse Activity Area and Activity Areas A1 – A10.</li> </ul>	
<b>44.4.14</b>	<b>Commercial Recreation Activities</b> , except for: <ul style="list-style-type: none"> <li>▪ Golf courses, including the development and operation of golf courses, including associated earthworks, green keeping, driving ranges, administrative offices, sales and commercial instruction</li> <li>▪ Art and sculpture tours;</li> <li>▪ Gymnasiums, beauty spas, theatres and pools within the Clubhouse Activity Area and Activity Areas A1-A10.</li> </ul>	D
<b>44.4.15</b>	<b>Mining</b>	NC
<b>44.4.16</b>	<b>Service Activities</b> , except for: <ul style="list-style-type: none"> <li>▪ service activities directly related to approved or permitted activities within the zone; and</li> <li>▪ located within the Resort Services and Staff Accommodation Activity Area; or</li> <li>▪ located within the Golf Course, Open Space and Farming Activity Area with a gross floor area of no more than 40m<sup>2</sup></li> </ul>	NC
<b>44.4.17</b>	<b>Any other activity in an activity area not provided for by rule 44.4.17 or by any other rule</b>	D
<b>44.4.18</b>	<b>Industrial Activities</b> ; except for: <ul style="list-style-type: none"> <li>▪ Industrial activities directly related to approved or permitted activities within the zone;</li> <li>▪ metal work and industrial activities undertaken in Activity Area 9 for the purpose of art and sculpture</li> <li>▪ industrial activities located within the Resort Services and Staff Accommodation Activity Area associated with the development and operation of the resort</li> </ul>	NC
<b>44.4.19</b>	<b>Panelbeating, spray painting, motor vehicle repair or dismantling</b> except for activities directly related to other approved or permitted activities within the Zone and located within the Resort Services Activity Area.	PR
<b>44.4.20</b>	<b>Forestry Activities</b>	PR
<b>44.4.21</b>	<b>Fibreglassing, sheet metal work, bottle or scrap storage, motorbody building or wrecking, fish or meat processing (excluding that which is ancillary to a retail premises such as a butcher, fishmonger or supermarket), or any activity requiring an Offensive Trade Licence under the Health Act 1956.</b>	PR
<b>44.4.22</b>	<b>Factory Farming</b>	PR

#### 44.5 Standards – The Hills Zone

	Standards – The Hills Resort Zone	Non-compliance status
44.5.1	<p><b>Setbacks</b></p> <p>No building or structure shall be located closer than 6m to the Zone boundary, and <u>in addition</u>:</p> <p>No building shall be located closer than 10m from McDonnell Road or the Arrowtown Lake Hayes Road</p>	RD
44.5.2	<p><b>Building Materials, Colours and Landscaping</b></p> <p><b>To ensure that they are visually recessive within the surrounding landscape all new, relocated, altered, re clad or repainted buildings, including any structure larger than 5m<sup>2</sup>, are subject to the following:</b></p> <p>Exterior colours of buildings:</p> <p><b>44.5.1.1</b> All exterior surfaces (excluding windows) shall be coloured in the range of black, browns, greens or greys;</p> <p><b>44.5.1.2</b> Pre-painted steel, and all roofs shall have a reflective value of not greater than 20%</p> <p><b>44.5.1.3</b> Surface finishes shall have a reflective value not greater than 30%</p> <p><b>44.5.1.4</b> Natural materials such as locally sourced schist an unstained cedar may be used</p> <p>Discretion is restricted to all of the following:</p> <ul style="list-style-type: none"> <li>i. Whether the building will be visually prominent, especially in the context of the wider landscape, and as viewed from neighbouring properties</li> <li>ii. Whether the proposed colour and/or material is appropriate given the existence of established or proposed screening or in the case of alterations, if the proposed colour and/or material is already present on an established building</li> <li>iii. The size and height of the building where the proposed colours and/or materials would be used</li> <li>iv. Whether landscaping has been undertaken in an adjacent Landscaping Amenity Management Area including the size of any plantings at planting and maturity, and/or any land contouring.</li> </ul>	RD
44.5.3	<p><b>Residential Density</b></p> <p>In The Hills Resort Zone the maximum number of residential units shall be 100.</p>	NC

	<b>Standards – The Hills Resort Zone</b>	<b>Non-compliance status</b>
<b>44.5.4</b>	<p><b>Building (Maximum Height)</b></p> <ul style="list-style-type: none"> <li>- Activity Area A1                      RL418.5 masl</li> <li>- Activity Area A2                      RL416 masl</li> <li>- Activity Area A3                      RL421 masl</li> <li>- Activity Area A4                      RL418 masl</li> <li>- Activity Area A5                      RL419.5 masl</li> <li>- Activity Area A6                      RL419.5 masl</li> <li>- Activity Area A7                      RL414 masl</li> <li>- Activity Area A8                      RL402.5 masl</li> <li>- Activity Area A9                      RL420.5 masl</li> <li>- Activity Area A10                      RL413.5 masl</li>   <li>- Activity Area HS1                      RL443 masl</li> <li>- Activity Area HS2                      RL405.5 masl</li> <li>- Activity Area HS3                      RL407 masl</li> <li>- Activity Area HS4                      RL380.5 masl</li> <li>- Activity Area HS5                      RL 423 masl</li> <li>- Activity Area HS6                      8m</li> <li>- Activity Area HS7                      8m</li> <li>- Activity Area HS8                      435.5 masl</li> <li>- Activity Area HS9                      411.5 masl</li> <li>- Activity Area HS10                      RL413 masl</li>   <li>- Filming towers                      12m</li> <li>- Clubhouse Activity Area              8m</li> <li>- Resort Services and Staff Accommodation Activity Area 8m</li>   <li>- All other buildings and structures (except in the Residential and Visitor Accommodation Areas (A1-A10) 4m</li>   <li>- All marquees and structures permitted under Temporary Events are exempt from these height restrictions.</li> </ul>	NC
<b>44.5.5</b>	<p><b>Glare</b></p> <p>44.5.4.1      All fixed lighting shall be directed away from adjacent roads and properties with low light spill to areas located outside of the Zone.</p> <p>44.5.4.2      Any building or fence that will be highly visible from a public road that is constructed or clad in metal, or material with reflective surfaces shall be painted or otherwise coated with a non-reflective finish.</p> <p>44.5.4.3      No activity shall result in a greater than 3.0 lux spill, horizontal and vertical, of light onto any property located outside of the Zone, measured at any point inside the boundary of the adjoining property.</p>	DIS



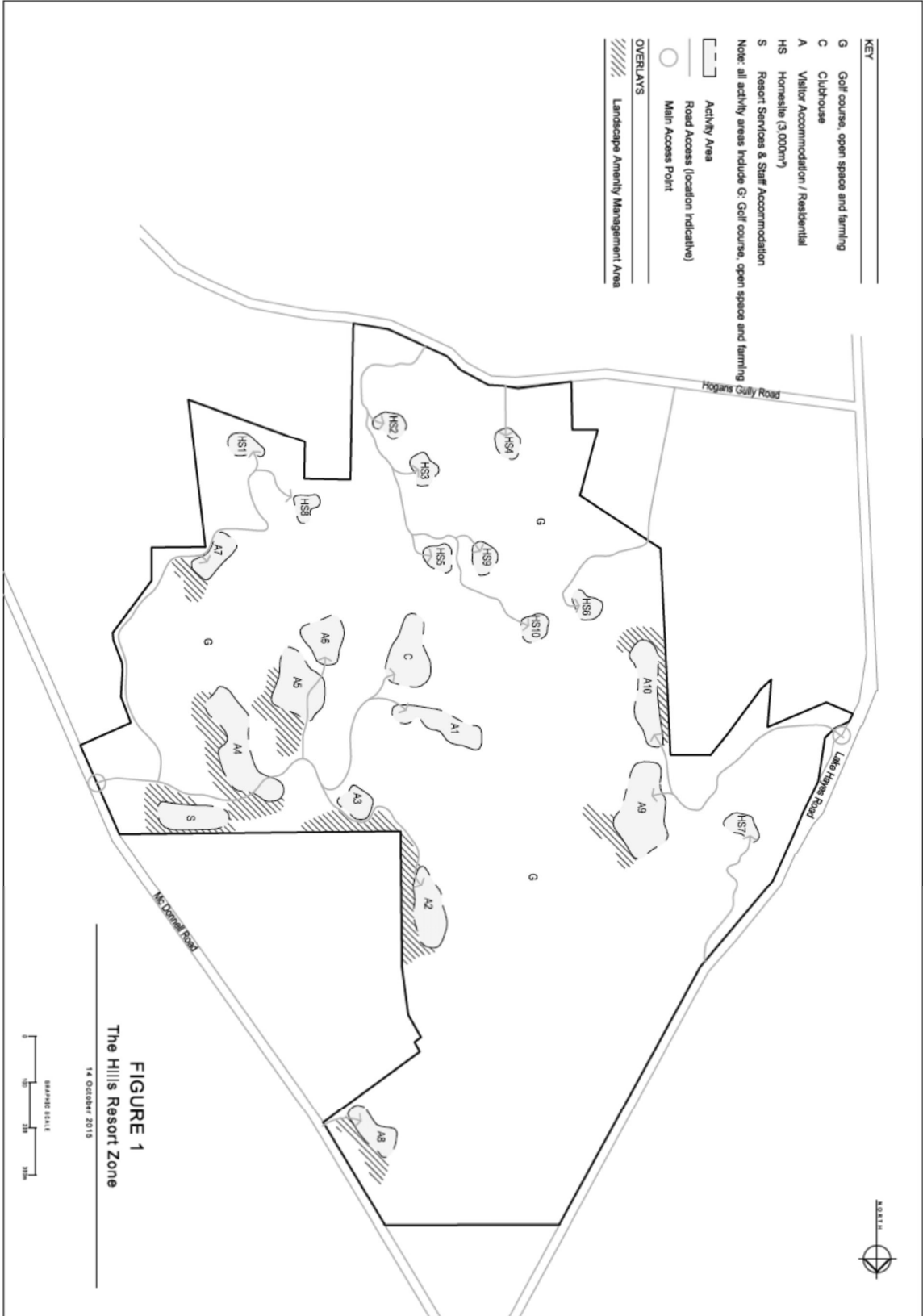
	<b>Standards – The Hills Resort Zone</b>	<b>Non-compliance status</b>
<b>44.5.6</b>	<p><b>Retail Sales</b></p> <p>Goods or services be displayed, sold or offered for sale from a site shall be limited to:</p> <ul style="list-style-type: none"> <li>a. Goods grown, reared or produced at the resort;</li> <li>b. Delicatessen style or convenience retail for temporary or permanent residents of the resort</li> <li>c. Within the Clubhouse Activity Area, in addition to a. and b above, goods and services associated with, and ancillary to the permitted Recreation and Commercial Recreation activities taking place.</li> </ul>	NC
<b>44.5.7</b>	<p><b>Maximum Total Site Coverage</b></p> <p>The maximum site coverage shall not exceed 5% of the total area of the zone. For the purposes of this rule, site coverage includes all buildings, accessory, utility and service buildings but <b>excludes</b> weirs, filming towers, bridges and roads and parking areas.</p>	NC
<b>44.5.8</b>	<p><b>Fire Fighting</b></p> <p>A firefighting reserve of water shall be maintained. The storage shall meet the New Zealand Fire Service Firefighting Water Supplies Code of Practice 2008.</p>	NC
<b>44.5.9</b>	<p><b>Take off and Landing of Helicopters</b></p> <p>Noise from helicopter operations shall not exceed 50 dB L<sub>dn</sub> at the notional boundary of any dwelling, The day night average noise level (L<sub>dn</sub>) shall be averaged over any consecutive seven day period and shall not exceed 53 dB L<sub>dn</sub> on any one day.</p> <p>Assessment should be undertaken in accordance with NZS 6807: 1994 <i>“Noise Management and Land Use Planning for Helicopter Landing Areas”</i></p>	NC

## 4.6 Non-Notification of Applications

- 44.6.1** Except as provided for by the Act, all applications for controlled activities and restricted discretionary activities will be considered without public notification or the need to obtain the written approval of or serve notice on affected persons.

# THE HILLS RESORT ZONE 44

## 4.7 Hills Resort Zone Structure Plan



# THE HILLS RESORT ZONE 44

Make the following amendments to other parts of the Proposed and Operative District Plan:

Chapter 36 – Noise

Add: The Hills Resort Zone” to Rule 36.5.3 so it reads as follows

Table 2	General Standards				Non Compliance Status
	Activity or Sounds Source	Assessment Location	Time	Noise Limits	NC
36.5.3	Millbrook Resort Zone	Any point within the Residences/Residential Activity Areas	0800h to 2000h	50 dB L <sub>Aeq</sub> (15 min)	
	Jacks Point Resort Zone  (see also 36.5.17)  <u>The Hills Resort Zone</u>		2000h to 0800h	40 DB L <sub>Aeq</sub> (15 min)  75 dB L <sub>AFmax</sub>	

**The Hills  
Resort Zone**

**Section 32 Evaluation  
Report**



# Contents

- 1. Strategic Context..... 14
- 2. Regional Planning Documents..... 14
- 3. Proposed Queenstown Lakes District Plan . Strategic Direction..... 15
- 4. Commissioned Reports ..... 16
- 5. Key Issues ..... 17
- 6. Options ..... 18
- 7. Purpose of the Proposed Resort Zone..... 20
- 8. Scale and Significance Evaluation ..... 20
- 9. Evaluation of proposed Objective [S32 (1) (a)]..... 20
- 10. Evaluation of the proposed provisions S32 (1) (b) ..... 12
- 11. Efficiency and effectiveness of the provisions. .... 16
- 12. Conclusions ..... 16

## 1. Strategic Context

Section 32(1)(a) of the Resource Management Act 1991 ('the Act') requires that a Section 32 evaluation report must examine the extent to which the proposed objectives are the most appropriate way to achieve the purpose of the Act.

The purpose of the Act requires an integrated planning approach and direction:

5  
Purpos  
e

- (1) *The purpose of this Act is to promote the sustainable management of natural and physical resources.*
- (2) *In this Act, sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while—*
  - (a) *sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
  - (b) *safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*
  - (c) *avoiding, remedying, or mitigating any adverse effects of activities on the environment.*

In terms of the evaluation required in relation to the proposed Hills Resort Zone, section 32(3) clarifies that the assessment under section 32(1)(b) must relate to:

- The provisions and objectives of the proposed new zone (i.e. the Hills Resort Zone);
- The objectives of the Proposed Plan to the extent that they are:
  - Relevant to the objectives of the proposed Hills Resort Zone; and
  - Would remain if the proposed Hills Resort Zone were to take effect.

## 2. Regional Planning Documents

The Regional Policy Statement 1998 [RPS] is also currently under review, and may be further advanced in that process by the time the District Plan Review is notified. At the time of submissions closing on the QLDC proposed District Plan, further submissions have closed on the Proposed Regional Policy Statement. Amendments to this evaluation may be required to accommodate any changes to the RPS. That is appropriate as a Section 32 evaluation is an evolving document and changes can be made up to and including at the stage of an Environment Court decision.

The District Plan must *give effect to* the operative RPS and must *have regard to* any proposed RPS.

This Proposed Regional Policy Statement has significance under Section 75 of the Act. Its overview states:

*Continued prosperity and wellbeing is essential to ensuring the community is equipped to face the environmental, economic, cultural and social changes of the 21st century, and to provide opportunities for all people to realise their aspirations. A thriving and healthy natural environment is vital to sustaining our wellbeing.*

The operative RPS contains a number of objectives that are relevant to this proposal, including:

- 4.4.1 to 4.4.5 (Manawhenua Perspective)
- 5.4.1 to 5.4.5 (Land)

- 6.4.2 to 6.4.7, 6.57 (Water)
- 7.4.1 (Air)
- 9.4.1 to 9.4.3 (Built Environment)
- 10.4.1 (Biota)

Each objective has related policies which have also been considered.

The proposed plan change provisions are consistent with, and give effect to, the relevant operative RPS provisions.

A District Plan must not be inconsistent with a Regional Plan.

The Regional Plan . Water for Otago is relevant to this proposal. The following objectives in particular are identified:

- 7.A.1 to 7.A.3. (In relation to the maintenance of water quality).

There are a number of related policies which have also been considered. Overall, it is assessed that this submission is consistent with relevant regional plans.

### 3. Proposed Queenstown Lakes District Plan – Strategic Direction

The following goals and objectives from the Strategic Directions chapter of the proposed District Plan are relevant to this assessment:

**Table 1 – Assessment against the Goals and Objectives of the Proposed Strategic Direction Chapter**

Strategic Directions Chapter	Assessment
<p><i>Goal 3.2.1: To develop a prosperous, resilient and economy</i></p> <p>Objective - To enable the development of innovative and sustainable enterprises that contribute to diversification of the District's economic base and create employment opportunities.</p>	<p>The Hills Golf Course has already contributed significantly to the economy of the District. It has supported the diversification of the District's tourism base, by providing a world class golf course. The hosting of the New Zealand Open as strengthened Queenstown's scenic beauty (tourism) as well as highlighting Queenstown as a designation for golf tourism.</p> <p>The proposed rezoning will ensure the ongoing economic viability of the golf course and its contribution to the district's economy.</p> <p>The proposed rezoning seeks to provide for carefully considered and sensitively sited innovative and sustainable development that will create numerous employment opportunities related to the golf course development and maintenance, visitor accommodation and related services, hospitality, events, commercial recreation etc.</p>
<p>Objective 3.2.1.4 – Recognise the potential for rural areas to diversify their land use beyond the strong productive value of farming, provided a sensitive approach is taken to rural amenity, landscape character, healthy ecosystems, and Ngai Tahu values, rights and interests.</p>	<p>The Hills Golf Course has not been farmed for some 10 years, it has been developed as a world class golf course, as such does not already contribute to the strong productive value of farming. The proposed rezoning has been sensitively designed to take into account and maintain existing rural/semi-rural amenity values of the site and wider area.</p>
<p><i>Goal 3.2.3: A quality built environment taking into account the character of individual communities</i></p>	<p>The Structure Plan for the development has been created through the undertaking of a detailed landscape analysis as to the appropriate siting of buildings in parts of the zone that can absorb</p>

Strategic Directions Chapter	Assessment
<p>Objective - To protect the District's cultural heritage values and ensure development is sympathetic to them.</p>	<p>development.</p> <p>Buildings will be subject to a list of suitable building materials, and buildings in more sensitive locations will be subject to a controlled activity consenting regime.</p> <p>The proposed Resort Zone will not affect the existing character of Arrowtown, some development may be viewed from the higher points in Arrowtown but the development will be seen in the context of a golf course resort as opposed to urban development.</p>
<p><i>Goal 3.2.4 The protection of our natural environmental and ecosystems</i></p> <p><i>Objective 3.2.4.1 Promote development and activities that sustain or enhance life-supporting capacity of air, water, soil and ecosystems.</i></p>	<p>The land within the Golf Course contains a mixture of exotic and native species, most have been planted recently to contribute to the landscaping of the Golf Course. There will not be any effects of the life-supporting capacity of air, water, soil and ecosystems.</p>
<p><i>Goal 3.2.5: Our distinctive landscapes are protected from inappropriate development.</i></p> <p>Objective - To direct new subdivision, use or development to occur in those areas that have potential to absorb change without detracting from landscape and visual amenity values.</p> <p>Objective - To recognise there is a finite capacity for residential activity in rural areas if the qualities of our landscape are to be maintained.</p> <p>Objective - To recognise that agricultural land use is fundamental to the character of our landscapes.</p>	<p>The Structure Plan process has enabled a thorough investigation of the appropriate locations within the site that can absorb development without detracting from the scenic qualities that the golf course contributes to the wide landscape.</p> <p>The Hills golf course is already a highly modified environment and has the characteristics of the neighboring Millbrook Resort Zone, as opposed to a farmed rural environment. The site is mostly manicured and landscaped.</p> <p>It is recognised that there are other land uses that can be enabled in the Rural Zone that contribute to the landscape as well as farming. A golf course is a perfect example, it contributes to the economy as well as the landscape.</p>
<p><i>Goal 3.2.7: - Council will act in accordance with the principles of the Treaty of Waitangi and in partnership with Ngai Tahu.</i></p> <p>Objective - Protect Ngai Tahu values, rights and interests, including taonga species and habitats, and wahi tupuna.</p> <p>Objective . Enable the expression of kaitiakitanga by providing for meaningful collaboration with Ngai Tahu in resource management decision making and implementation</p>	<p>Consultation has not been undertaken with Ngai Tahu in the drafting of this submission. However it is considered the proposal will not give rise any adverse effects lwi or the values and principles of the Treaty of Waitangi.</p>

#### 4. Commissioned Reports

A number of expert and technical reports have been commissioned to support the proposed rezoning, and which in essence undertake an assessment of environmental effects to assist with and provide context for this Section 32 evaluation.



The reports (where relevant, names used from hereon in the rest of this report are in brackets):

**Landscape:** the proposed zoning, in conjunction with the controls contained in the proposed District Plan provisions and the Structure Plan, will not give rise to adverse effects on landscape character and amenity, or to adverse visual effects. With the proposed controls in place, the development enabled by the new zoning is appropriate for the environment within which it is located and will ensure its special landscape characteristics are maintained.

**Traffic:** the surrounding roading network can accommodate the increase in traffic that will arise as a result of development enabled by the rezoning, and accessways to the new zone can be appropriately and safely designed.

**Natural Hazards:** the proposed zone is not subject to any natural hazard risk.

**Servicing and Infrastructure:** the development enabled by the rezoning can be appropriately serviced, and infrastructure is/can be made available/appropriately designed in terms of water supply, wastewater and stormwater.

**Noise:** Noise associated with temporary events (e.g. golf tournaments such as the NZ Open), including helicopter activities, can be appropriately managed so as not to give rise to adverse noise and amenity effects.

**Contamination:** It is concluded that the house sites and activity areas sought through the submission are suitable for rural residential and residential/visitor accommodation landuse and it is highly unlikely this development would present a risk to human health.

## 5. Key Issues

The key resource management issues that are considered to arise in relation to the proposal relate to:

- Landscape and Amenity
- Access
- Infrastructure Provision

These issues are addressed later in this evaluation.

## 6. Options

This section outlines options considered to address the issues identified in section 5 (above), and makes recommendations as to the most appropriate course of action in each case.

The options considered are as follows:

1. Status Quo (i.e. retain proposed Rural zoning)
2. Rezone to create a Resort Zone+based around golf (i.e. Hills Resort Zone)

The following tables outline the Benefits, Costs, Efficiency, Effectiveness and the Risk of Acting or not acting for each option.

<b>Option 1: Status Quo (Rural General Zoning)</b>	
Benefits	<ul style="list-style-type: none"> <li>○ Preserves the land for another land use in the future (which may or may not be residential or rural in nature)</li> </ul>
Costs	<ul style="list-style-type: none"> <li>○ The Hills is already a World Class Golf Course and hosts large scale events such as the New Zealand Golf Open, it is not used for rural or farming purposes. Retaining the rural zoning does not reflect that.</li> <li>○ Works associated with the existing golf course and related/ancillary activity (eg art and sculpture) may require resource consents, which is costly and inefficient.</li> <li>○ The rural zoning does not allow for the comprehensive and integrated development of the golf course and related activities</li> <li>○ The rural zoning does not allow for residential or resort development without a plan change/variation process.</li> <li>○ Does not recognize or provide for existing activities and uses</li> <li>○ Potential for ad-hoc development if the future aspirations of the landowner are undertaken by resource consent.</li> </ul>
Efficiency	<ul style="list-style-type: none"> <li>○ Does not take advantage of the District Plan Review process, where the Council must consider the zoning of land within the District.</li> </ul>
Effectiveness	<ul style="list-style-type: none"> <li>○ This option is not effective and does not assist in providing a framework for events and development that has been undertaken with the benefit of significant analysis (landscape, visibility, infrastructure)</li> </ul>
Risk of Acting (or not acting)	<ul style="list-style-type: none"> <li>○ Lost opportunity to align zoning with actual/existing land uses and activities and provide for future compatible uses</li> <li>○ Lot opportunity to utilize the District Plan review process for the above.</li> </ul>

<b>Option 2 Rezone to Create a Resort Zone based around Golf</b>	
Benefits	<ul style="list-style-type: none"> <li>○ Would create a resort zone based around the existing golf course..</li> <li>○ Gives security to the owners that events such as the New Zealand Golf Open can be held without a large resource consenting burden (See Appendix 1 which lists the consents previously required and granted for such events).</li> <li>○ Aligns zoning with actual land use, reducing the consenting burden (refer Appendix 1)</li> <li>○ Would allow the opportunity for a structure plan development to be created that is integrated with the golf course, including comprehensive analysis of appropriate places for development so effects can be minimized.</li> <li>○ Provide choice for accommodation for residents and visitors to the District</li> <li>○ Provides opportunities for employment, and contributes to the District's economy</li> <li>○ Provides for the ongoing use and development of the golf course and related activities as a high quality asset that contributes to the District's tourism appeal</li> </ul>
Costs	<ul style="list-style-type: none"> <li>○ Large up-front cost to undertake and support a submission of this size, extensive study as to appropriate locations for development within the proposed zone.</li> </ul>
Efficiency	<ul style="list-style-type: none"> <li>○ A resort zone centered around golf, residential and visitor accommodation is not uncommon in the Queenstown Lakes District, there are templates that can be used from Millbrook and Jacks Point to create a resort zone (with site specific changes)</li> </ul>
Effectiveness	<ul style="list-style-type: none"> <li>○ Creating a resort zone is an effective way to facilitate development around a structure plan.</li> <li>○ The new District Plan splits out the Resort Zone (Millbrook, Jacks Point and Waterfall Park), previously they were all in one "Resort Zone"; this would have been an efficient option.</li> </ul>
Risk of Acting (or not acting)	<ul style="list-style-type: none"> <li>○ Should a resort zone not be enabled the owners may pursue other ad-doc development options for their land.</li> </ul>

Ranking:

Option 1: Status Quo – Rural General Zoning (2)

Option 2: Rezone to a Create a Resort Zone based around Golf (1)

Based on the above analysis, Option 2 is ranked the most appropriate.

## 7. Purpose of the Proposed Resort Zone

The proposed purpose of the Hills Resort Zone is as follows:

“The purpose of the zone is to provide world class resort facilities. The zone includes residential, visitor accommodation, worker accommodation, a small commercial area and art and sculpture spread throughout a championship golf course. A structure plan applies to the zone to ensure that development is appropriately located and well integrated with the golf course and the local and wider landscape. “

## 8. Scale and Significance Evaluation

The level of detail contained in this evaluation has been determined by an assessment of the scale and significance of the effects that are anticipated if the proposed Hills Resort zone is approved. In making this assessment, regard has been had to whether the proposed objective, policies and rules:

- Have effects on matters of national importance.
- Adversely affect those with specific interests, e.g., Tangata Whenua, neighbours
- Involve effects that have been considered implicitly or explicitly by higher order planning documents
- Impose increased costs or restrictions on individuals, communities or businesses.

## 9. Evaluation of proposed Objective [S32 (1) (a)]

**45.2.1 Objective- Development of a resort environment containing residential activity , visitor accommodation, ancillary worker accommodation and commercial activities, commercial recreation activities and an evolving sculpture park within the context of a premier golf course, while having regard to the landscape and amenity values of the site and wider environment.**

The above objective is considered appropriate to address the key resource management issues identified in section 5 because:

- The objective undertakes to outline the main activities anticipated within the zone, namely residential, visitor accommodation, ancillary worker accommodation, commercial and commercial recreational activities and an evolving sculpture park, which are to be provided for within the context of a premier golf course.
- The golf course has already been developed and is an asset for the Queenstown Lakes District. The New Zealand Open has put New Zealand on the map as a world class destination for premier golf.
- The landscape of the golf course is already modified to create the golf course, however the physical attributes of the course have been designed to showcase the natural environment.
- Careful design and the use of a structure plan and associated rules can ensure that development has appropriate regard to the landscape and amenity values of the site and the wider environment.
- Proposed development will be in some cases viewable from Arrowtown and other public places, however the design and placement of buildings within the landscape will not detract from the wider landscape or the manicured and landscaped golf course.

## 10. Evaluation of the proposed provisions S32 (1) (b)

The below table considers whether the proposed provisions are the most appropriate way to achieve the relevant objectives. In doing so, it considers the costs and benefits of the proposed provisions. (See also Table 1- Broad options considered, in Section 4 above.)

**Table 5 – Evaluation of proposed policies**

<b>Policy Number</b>	<b>Policy</b>	<b>Is the policy the most appropriate way to support the Objective? Is it efficient and effective? Does it support the objectives in the Proposed District Plan?</b>
<b>44.2.1.1</b>	Require development to be located in accordance with a Structure Plan to ensure that it is appropriately sited and integrated with the golf course and that adverse effects on landscape and amenity values are mitigated.	<p>A structure plan is a common tool used within the Queenstown Lakes District Plan. It is created through the building up of layers of information (landforms, amenity, ecology, availability of services etc) to create a framework for development and provides the finer detail of a zone.</p> <p>As shown by the analysis accompanying the structure plan, there has been a great deal of research into the landscape characteristics of the site and its potential to absorb additional development.</p> <p>This is an effective process in that it requires all of the information about the zone to be assessed in a comprehensive manner.</p> <p>A structure planning process provides increased certainty to both the community (where and how development can occur) and the land owner (where development can occur and the consenting process required to achieve it). If alternative development options are considered desirable in the future they can then be considered through a consenting regime.</p> <p>The process has resulted in determining the maximum number of dwellings that is appropriate for the site, both for the potential for development to be absorbed in the landscape and for the ability of the dwellings to be serviced.</p> <p>Accordingly, the policy supports the objective, and provides for the best use of the land.</p>

<b>Policy Number</b>	<b>Policy</b>	<b>Is the policy the most appropriate way to support the Objective? Is it efficient and effective? Does it support the objectives in the Proposed District Plan?</b>
		It also supports Goal 3.2.1 and its objective; golf tourism is an important part of the District's economy.
<b>44.2.1.2</b>	To ensure that the character of the wider landscape is maintained by controlling the density and location and appearance of built form within the zone.	<p>It is important than when considering any rezoning proposal in the Rural zone which seeks to provide for development of a greater density than is provided for by the Rural zoning, the context of the wider landscape is considered.</p> <p>The structure plan is an important part of the proposed zone in that it sets out the parameters for future development. The creation of the structure plan has been informed by the visual and landscape assessment. It is efficient that this assessment is undertaken during the zoning change, as under any new zoning the development envelope for the future is set. In the future all that is required is a regulatory framework to ensure that the design and appearance of buildings enabled by the rezoning can be assessed.</p> <p>Accordingly, the policy supports Goal 3.2.5 and its objective, as a landscape analysis has been undertaken to ensure that development is only located in activity areas or home sites that can absorb development.</p>
<b>44.2.1.3</b>	To provide for visitor accommodation and residential activities in areas with potential to absorb development and which are designed to complement the landscape within which they are sited.	<p>The proposed Resort zone provides for residential and visitor accommodation, and as with the other resort zones, (namely Millbrook and Jacks Point) it is centered around a golf course.</p> <p>Given the undulating topography of the golf course there are opportunities for sensitively located visitor accommodation and residential development.</p> <p>The structure plan provides security for both the landowner and the Council that the location of development has been through the rigors of the 1<sup>st</sup> Schedule process to ensure it complements the landscapes in which it is sited.</p> <p>Accordingly, the policy supports Goal 3.2.1 and its objective, as golf tourism is an important part of the District's economy.</p>
<b>44.2.1.4</b>	To provide a world class golfing experience which showcases the resort's natural amenity, sculpture park and well-designed development.	At present the site is zoned Rural which does not reflect the activities that are currently occurring, which have been enabled through the resource consents granted for the land. The Hills is already a world class golf course, as evidenced by its hosting of prestigious golfing

<b>Policy Number</b>	<b>Policy</b>	<b>Is the policy the most appropriate way to support the Objective? Is it efficient and effective? Does it support the objectives in the Proposed District Plan?</b>
		<p>events such as The New Zealand Open.</p> <p>The proposed rezoning provides the landowner with the opportunity to further develop the golfing experience while having the security of a more suitable and appropriate underlying zoning.</p> <p>The policy is supportive of the Proposed District Plan in that it highlights the need for the design and natural amenity of the Golf Course and sculpture park to be paramount.</p> <p>It particularly supports Goal 3.2.1 and its objective, as golf tourism is an important part of the District's economy.</p>
<b>44.2.1.5</b>	To provide for an evolving sculpture park within the resort.	<p>A sculpture park has, for some time, been being developed within, and as part of the Golf Course environment. This has been the subject of resource consents for buildings within the Rural Zone as a discretionary activity creating uncertainty and inefficiencies in terms of consenting requirements.</p> <p>The policy supports proposed objective and the evolution of the sculpture park where changes can be made over time to introduce new sculptural elements into the landscape</p> <p>The policy supports Goal 3.2.1 and 3.2.4.</p>
<b>44.2.1.6</b>	To provide a venue for events which may contribute to the District's economy.	<p>The Hills Golf Course has hosted a number of events in recent years including the New Zealand Open. These events contribute greatly to the economy both in terms of visitor spending and showcasing the golf course and surrounding landscape in the media worldwide. The landowner has a good track record for running events and to ensure these events can continue, including within the tight timeframes that often apply, it is important and appropriate that there are minimal consenting requirements. This may encourage more investment in the events.</p> <p>It is therefore efficient and effective to provide for temporary activities within the proposed Resort Zone.</p> <p>The policy supports Goal 3.2.1 and its objectives, especially Objective 3.2.1.3 in the development of innovative and sustainable enterprises that contribute to the diversification of the District's economic base.</p>
<b>44.2.1.7</b>		A hindrance to businesses expanding in the District at present is the availability of

<b>Policy Number</b>	<b>Policy</b>	<b>Is the policy the most appropriate way to support the Objective? Is it efficient and effective? Does it support the objectives in the Proposed District Plan?</b>
	To provide for workers accommodation associated with the resort within the Service Activity Area.	<p>accommodation for workers. For The Hills to continue to develop the resort they need workers with skills such as green keeping and hospitality. It is recognized that providing for the on-site accommodation of workers will enable The Hills to further the develop the zone efficiently and effectively . removing the need to compete in a difficult housing market.</p> <p>The policy supports Goal 3.2.6 and its objectives- especially the provision of access to housing that is more affordable.</p>
<b>44.2.1.8</b>	To allow for the take-off and landing of helicopters provided effects on neighborsq amenity are mitigated.	<p>It is common for helicopters to be used as a method of transport in resort environments. It is important that the effects of these are mitigated accordingly. As shown by the noise assessment by Marshall Day the typical daily usage of helicopters and their increased usage during temporary events will not give rise to adverse noise effects, nor will the amenity of the surrounding environment and neighboring properties be compromised.</p> <p>The policy supports Goal 3.2.1.</p>
<b>44.2.1.9</b>	To avoid commercial, industrial and other activities that are not related to the development of the resort.	<p>It is proposed to create a world class golfing and resort environment, accordingly there is no place for unrelated commercial, industrial and other activities that detract from that goal.</p> <p>It is efficient and effective for these activities (unless directly relating to the Resort Zone or existing activities (an art and sculpture workshop)) to be avoided within the proposed zone.</p> <p>The policy supports Goal 3.2.5.</p>



## 11. Efficiency and effectiveness of the provisions.

In electing the preferred options regard has been had to their potential effectiveness and efficiency.

Overall, it is considered that the proposed Hills Resort Zone:

- Provides for residential and visitor accommodation in a way that does not detract from the landscape characteristics of wider environment within which it is sited;
- Will enable the efficient consenting and running of large scale events such as the New Zealand Open which make a significant contribution to the District's economy
- Achieves the purpose of the Act and the overarching objectives of the Plan through well managed and carefully located development.

## 12. Conclusions

The proposed changes to the District Plan to create a %Resort Zone+will meet the purpose of the Act in that it supports sustainable management. The Hills Golf Course already contributes to the social, economic and cultural well being of the owners and contributes to Arrowtown.

The Council is promoting the diversification of the economy, The Hills Resort Zone supports the enhancement and development of the economy in that Golf Tourism is a rapidly growing sector of the tourism industry in the District.

The Resort zoning will enable a number of activities that already undertake as part of the Golf Course and its development as well as providing for residential and visitor accommodation in parts of the Zone that can absorb development. This has been established through the extensive reports appended to this submission addressing landscape, infrastructure provisions, masterplanning, possible contamination, natural hazards and noise.

## Appendix 1: List of Resource Consents . The Hills

RC number	Date of Issue	Lapse date if stated/Current Status	Type of consent	Summary of what was consented
RM010864	15/01/2002		Land use	Undertake Earthworks For The Construction Of Additions To A Private Golf Course
RM021019	9/12/2002		Land use	Construct A Pump Shed
RM030160	24/09/2003	Variation Decision Issued	Land use	Construct A Greenkeepers Workshop For The Private Golf Course
RM020696	15/10/2004	Extended	Land use	Undertake Additional Earthworks For An Existing Golf Course
RM020797	15/10/2004	Extended	Land use	Construct An Additional 9 Hole Golf Course & Access Roads By Way Of Earthworks
RM041043	10/02/2005		Land use	Commercially Operate A Newly Constructed Golf Course And Construct A Clubhouse And Golf Cart Storage
RM040658	17/02/2005	Withdrawn	Land use	Erect A Sculpture
RM050226	21/04/2005		Variation	Application For Variation To Resource Consent Rm020797 - Construct An Additional 9 Hole Golf Course & Access Roads By Way Of Earthworks
RM051093	24/03/2006		Land use	Erect An Implement Shed On Property
RM051232	29/03/2006			Variation To Resource Consent Rm041043 To Construct And Operate A Golf Course At Property Which Is Assessed
RM050589	14/08/2006	FIR	Land use	Retrospective Consent To Erect Two Sculptures And Consent To Erect A Further Six Sculptures
RM060862	13/10/2006		Subdivision	Undertake A Boundary Adjustment Subdivision
RM060862	13/10/2006		Variation to RM041043	Undertake A Boundary Adjustment Subdivision
RM070530	15/06/2007	FIR		Establish 17 Residential Dwellings With Associated Earthworks And Visitor Accommodation
RM070603	29/10/2007	29/10/2010	Temporary land use	Host A Temporary Event Being The New Zealand Golf Open On An Annual Basis For A Three Year Period
RM070604	17/01/2008		Variation Of Rm041043 & Rm051232	Increase The Commercial Operation Of The Existing Golf Course From 20 Players Per Day To 16 Players Per Hour And Alteration To On-Site Car-Parking
RM080793	26/08/2008		Variation To Rm 070603	Nominate Sculpture Platforms Until May 2010

RC number	Date of Issue	Lapse date if stated/Current Status	Type of consent	Summary of what was consented
RM071229	5/09/2008		Variation of RM041043	Boundary Adjustment To Re-Arrange The Overall Title Structure Of The Site
RM081223	16/06/2009		Subdivision	Subdivide To Create 17 Allotments And Identify 16 Residential Building Platforms And Undertake Associated Works
RM081224	16/06/2009		Land use	Identify 17 Residential Building Platforms, Construct 17 Dwellings For Both Residential & Visitor Accommodation Purposes And Undertake Associated Earthworks.
RM090714	9/10/2009		Variation To Rm070603	To Enable Alternate Dates For A Golfing Event
RM100270	9/06/2010		Variation To Rm070603	To Allow Signage Platforms To Remain In Place For An Additional 5 Years
RM120041	21/03/2012		Land use	To host the PGA tournament for a further 10 years and the retention of the sculpture platforms on the course.
RM120394	30/08/2013		Land use	Construct two separate toilets on the hills golf course
RM130850	17/01/2014	2016	Land use	To hold an event (NZ golf open tournament) at the Hills and Millbrook resort golf courses for one week per year for three years, to undertake associated helicopter landings, to erect event signage
RM150314	27 May 2015		Land use	Undertake earthworks and landscaping on the hills

# The Hills Resort Zone

Masterplanning Report  
Prepared for District Plan Review

21 October 2015

Prepared by Darby Partners



<b>Document:</b> Darby Partners 2015. <i>The Hills Resort Zone: Masterplanning Report</i> . Report prepared by Darby Partners for District Plan Review.		
Prepared by:	Richard Tyler Darby Partners	
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# CONTENTS

1.0	The Hills Resort Zone – Vision Statement	1
2.0	Anticipated Environmental Outcomes	1
3.0	Landscape Context	2
4.0	Previous Consent	3
5.0	Visibility Analysis	3
5.1	Visibility Assessment	3
6.0	Proposed Structure Plan	4
6.1	Activity Area Summary	5
6.2	Zone Density	5
6.3	Building Colours, Materials and Height	6
6.4	Landscape Amenity Management Areas (LAMA)	6
6.5	Activity Areas	7
7.0	Summary	15
8.0	Appendices	16

## 1.0 The Hills Resort Zone – Vision Statement

The Hills currently features a world class championship golf course, high quality hospitality and a constantly changing sculpture park set amongst a stunning landscape of rolling hills and schist rock outcrops. It is the home to the BMW New Zealand open golf tournament – the largest golf event in NZ. This event sees the first round shared between Millbrook and the Hills, with the finals event hosted by the Hills.

The intention of the Hills Resort Zone is to provide a framework for long term growth and management of the golf course and surrounds - catering for a range of existing and anticipated activities / outcomes while ensuring that open space and natural landscape character are maintained and enhanced.

The zone will foster the on-going vision of an exclusive world of golf, art, architecture and landscape where you can 'escape' from daily life and be at one with the outdoor environment.

It is anticipated that architecture will exhibit a modern sustainable approach in harmony with the landscape to ensure natural character predominates. The style will draw on the unique rural vernacular of central Otago buildings, with a simplistic approach to form and siting. All built form will provide spectacular views of the surrounding landscape, with privacy / seclusion from neighbours and connection with golf, art and other passive outdoor recreation.

Within the defined activity areas buildings will be sited and spaced to allow the landscape to flow freely through and interact with the activity areas identified for use, management and development. Landscape treatment will be in character with surrounding landform and planting with a minimisation of defined boundaries to integrate with the landscape.

## 2.0 Anticipated Environmental Outcomes

The aim is for the Hills zone to remain consistent with the existing Millbrook zone to the northwest in order to help maintain a predominantly semi-rural border around Arrowtown.

The zone will allow for visitor accommodation and residential activities in areas capable of absorbing change in the landscape, or around areas where existing development exists or is already consented. These activities will be complementary to the golf course, supporting the growing stay and play philosophy of golf worldwide.

Proposed development will be subservient to the landscape, sited in locations which are visually recessive and allowing for long term management of the land to protect the rural outlook from nearby Arrowtown and other public viewpoints.

## 3.0 Landscape Context

The geology of the floor of the Wakatipu basin is made up of glacial tills from the early Pleistocene era, interspersed with areas of Pelitic schist. These rock outcrops have been overrun by glaciers and created the rolling landform evident today.

Historically the area has undergone significant change from predominantly native forest to barren, open pasture with pockets of scrub. During the past 10 – 20 years a reversal of this trend has begun towards a seasonal forested landscape interspersed with areas of farmland, largely associated with on-going development of the rural landscape. This change is part of the modern cultural landscape of the Basin.

The Hills property generally contains gently hummocky terrain with a network of gully systems interspersed by small lakes, wetlands and tussock planting. There are schist rock outcrops towards the interior of the property which make up the unique character of the Hills Golf Course.

There are two main catchments separated by a crest running through the middle of the property in a north-west / south-east direction. The crest includes a series of hillocks - the highest in the south eastern corner of the property where the ground rises to RL 438m.

The first is defined as the McDonnell Road Catchment, the location of the Hills Golf Course. From the crest the ground slopes gently towards McDonnell Road with a series of hill, gully systems and small lakes. Beyond the property to the other side of McDonnell Road lies the Cotter Ave Terrace, a defined landscape feature and the extent of the south-western extent of Arrowtown Village.

To the south-west of the property is the Hogans Gully Road Catchment. From the crest the ground slopes towards a semi-defined terrace, more defined towards the north. At the base of the terrace the flatter low lying valley floor gently slopes towards the Hogans Gully / Arrowtown – Lake Hayes Road corner, and the lowest part of the property.

The historic Arrow Irrigation Water race generally follows the crest of the property in a north-west to south-east direction from Lake Hayes Road to the south west towards Hogans Gully Road. The race takes a sinuous path through the property at a fixed grade following the gently undulating topography.

Vegetation includes a mix of matagouri and wild rose to the south eastern and recently unmodified parts of the property. In and around the golf course there are large swathes of tussock planting and Poplar, Willow, Pine and other exotic tree species. The boundaries along Arrowtown – Lake Hayes Road and McDonnell Road are mostly planted with a mix of evergreen conifer and deciduous tree species.



## 4.0 Previous Consent

The property holds consent for 17 Lots including a series of guest units / dwellings. Each unit was specifically designed and proposed to be dug in to the ground with green roofs. A similar visibility analysis was undertaken to determine recessive topography appropriate for dwellings.

Most of the activity areas in the Proposed Structure Plan are sited close to or in the same location as the 17 Lot consent sites.

## 5.0 Visibility Analysis

Building on visibility mapping that was undertaken for the 17 Lot consent, an updated study was undertaken to clearly understand visibility from key viewpoints outside of the property to determine appropriate areas for development.

Significant stands of existing vegetation within the property were mapped and included with the existing terrain as a basis for the ray analysis. Views from Cotter Ave are considered relevant being static viewpoints (from private residences or public places).

Visibility mapping was undertaken from the following locations:

- Arrowtown-Lake Hayes Road @ 75m intervals – (moving)
- McDonnell Road @ 75m intervals – (moving)
- Hogans Gully Road @ 75m intervals – (moving)
- Cotter Ave @ 3 key viewpoints – (static)

The resulting visibility map highlights areas that are recessive with respect to topography and landform to inform appropriate pattern of development, and to ensure that rural amenity is maintained through protection of prominent landform / slopes.

### 5.1 Visibility Assessment

Due to planting within the boundary of the property there are limited or no views in to the property from Arrowtown – Lake Hayes Road and the north-eastern end of McDonnell Road. The most visible parts of the property are the exposed slopes facing Hogans Gully Road, and parts of the McDonnell Road Catchment visible from Cotter Ave.

Several folds and undulations on the elevated ground to the south of the property are highlighted as not visible or with low visibility, supporting potential single home sites / dwellings nestled into the landform. Large swathes of the internal parts of the property are not visible or with low visibility.

The resulting areas of visibility are summarised on the analysis plans as high to no visibility. This in combination with an assessment of landscape character derives the ability of various parts of the

property to absorb change. Generally the internal parts of the property have a high ability to absorb change. Some of the more peripheral or open parts of the property to the Cotter Ave Terrace are seen to have a lower ability to absorb change, and rely on visual softening by way of landform and planting to further integrate buildings in to the landscape. These areas have been defined on the structure plan as Landscape Amenity Management Areas (LAMA) – explained in section 6.1.

The Proposed Structure Plan generally discourages development unless:

- It occurs in areas that have the ability to absorb change, or relies on enhancement of landscape features to increase the ability to absorb change;
- It ensures retention of open space;
- The development is in harmony with the topography / landscape;
- It achieves visual coherence;
- It comprises comprehensive and sympathetic development;
- It avoids sprawl.

## 6.0 Proposed Structure Plan

The proposed Hills Structure Plan provides for ongoing management and development of the property to achieve anticipated environmental outcomes. Activity Areas are sited in response to visibility assessment and landscape features and builds on the following concepts:

- The clubhouse as a node for the resort;
- A central cluster of hamlets close to the clubhouse to foster a social village atmosphere;
- A series of homesites throughout the property to cater for retreat style guest accommodation;
- Provision for development of the central clubhouse area to support future growth within the activity areas;
- The landscape as an important asset for the golf course;
- Consideration of rural amenity when viewing the property from outside of the property;
- Access routes located to minimise impact on the functionality of the golf course;
- Internal cart paths for access to the clubhouse and golf course to discourage through roads across the property.

## 6.1 Activity Area Summary

A broad description of each type of activity area is:

### **G: Golf Course, open space and farming**

Provides for open space, golf course activities and land management practises such as grazing. A range of activities associated with the golf course tournaments or other public events is anticipated within this area, and fosters the ongoing development of the golf course and a world class sculpture park.

### **C: Clubhouse**

Includes the existing clubhouse and the location of the temporary hospitality tent during the Hills Open Golf Tournament.

### **A: Visitor Accommodation / Residential**

Defines the zones in which clusters of visitor accommodation or residential units can be located including features such as garaging, courtyards, domestic planting and outdoor living features.

### **HS: Homesite**

Sites of single dwellings including associated features such as garaging, courtyards, domestic planting and outdoor living.

### **S: Resort Services**

Designated area for resort servicing including worker accommodation. The existing maintenance shed is located in this zone.

### **Landscape Amenity Management Area (LAMA)**

The purpose of this overlay is to soften built form in the landscape so that buildings are not directly visible or prominent from public places.

*(Refer Section 6.4 for detailed explanation of this Area)*

## 6.2 Zone Density

The Structure Plan ensures that less than 5% of the zone is built on to maintain a rural amenity and predominance of open space.

Within the Visitor Accommodation / Residential Areas ('A' on the Structure Plan) density is proposed to be between 1 and 8 units per Hectare, or a minimum lot size of 1,250m<sup>2</sup> (noting that some of the area may be taken up by access leading to a smaller Lot size). This Lot size is equivalent to a standard medium to large sized Lot at Jacks Point - allowing an integration of landscape treatment from the golf course and Landscape Amenity Management Areas between the buildings.

Homesite Areas ('HS' on the Structure Plan) are limited to a principle dwelling and are each approximately 3,000m<sup>2</sup> in size.

If maximum yield is maintained throughout the zone the average Lot size would be 1.9Ha, close to the Rural Lifestyle zone of 2Ha average.

## 6.3 Building Colours, Materials and Height

Buildings will be subject to QLDC's Guide to Suitable Building Colours and Materials in Rural Zones.

To ensure that built form is nestled in to the landform a reduced level maximum height has been nominated for each Activity Area.

Heights were selected by:

- Nominating a ground contour to ensure that development is set in to the ground rather than sitting proud, in particular where ground rises or towards the higher edge of an area;
- From the nominated contour adding the Rural General Standard for height as the maximum RL. Underneath this RL height will follow the Rural General Standard rolling height plane, with a set height following existing ground.

This process enables the standard height plane to be adopted, but ensures that buildings are cut in where ground rises or for isolated high points within each Activity Area. Any earth cut to achieve the height limits as described above is proposed to be used as fill to accentuate or heighten existing landform within the proposed LAMA areas.

The nominated maximum heights are described for each Activity Area in the following section.

## 6.4 Landscape Amenity Management Areas (LAMA)

LAMA will be undertaken by way of additional landform and tree planting to build on existing landscape features. Terrain modification shall read as a continuation of existing hummocky topography around the property, and tree planting is to blend with surrounding areas.

Tree planting will include a combination of evergreen beech and exotic deciduous trees laid out in naturalistic clusters consistent with the rural character of the basin. The combination of evergreen and deciduous species will enable year round visual functionality whilst allowing seasonal interest throughout the property.

Trees may include a combination of Mountain Beech, Lombardy Poplar, Ash, Oak, Maple or any other appropriate species.

All landform modification will be at a gentle grade and re-grassed to blend with surrounding areas of the golf course.

## 6.5 Activity Areas

### A1:

This area is sited on gently sloping ground above the existing driving range, within a stand of large pine trees. The area could accommodate a series of accommodation units nestled into the trees facing the driving range. The existing water race runs along the front of the trees defining the northern extent of the Activity Area.



The maximum height is set at RL 418.5, 8m above a contour towards the mid - front of the area running perpendicular to the existing water race. This is generally the same height as rising ground to the rear of the Area (and location of the existing clubhouse building), allowing a backdrop of landform when viewed from the north and east.

### A2:

The area is sited on a plateau above the 13<sup>th</sup> hole, offering views of the course to the west. There are two depressions formed in the topography, each a location of homesites from the 17 lot consent. It is anticipated that the entire area would be flattened to nestle proposed buildings into the topography, and the resulting earth be used to build on existing landform directly to the east to minimise views from the neighbouring property. (Noted on the structure plan as LAMA).



The maximum height is set at RL 416, 8m above a contour sitting at the base of the small depressions to ensure proposed buildings are nestled in to the ground at a low elevation, and not prominent from the neighbouring house to the east.

**A3:**

A3 includes a small flat area contained within hummocky terrain that is suitable for buildings. An existing stand of pine trees sits to the north. Several of these trees on the southern end of the stand could be removed to allow views of the driving range to the west. Existing landform directly to the north of the area could be accentuated to minimise views from the neighbouring property (Noted on the structure plan as LAMA).



The maximum height is set at RL 421, 8m above a contour towards the base of the small flat area to keep proposed building low and reduce prominence from the neighbouring house to the north.

**A4:**

A4 covers a large flat bench contained by gently hummocky landform to the west, and stands of existing tree planting to the east. There is extensive space available for the LAMA to include construction of rolling landform and evergreen tree planting such as beech trees to further provide visual containment from the north-east.



The maximum height is set at RL 418, 8m above a contour running through the flat bench, and limits building height at the northern end of the area where ground gently rises up to a small hillock.

**A5 / A6:**

A5 and A6 are located internally to the golf course and suitable for a small hamlet of golf accommodation. It is anticipated that the buildings could face the golf course, with internal road access courtyards. To the east of A5 is rising hummocky landform that limits views from Cotter Ave Terrace, and can be built on as part of the wider landscaping and LAMA area. Between the two areas is a gully / waterway with red tussock planting providing a natural separation for the two activity areas.



The maximum height is set at RL 419.5, 8m above a contour towards the base of a subtle bench in a south facing slope within the A5 Area. The hillock to the north of the Area rises to RL 418 at its highest point. It is anticipated that this hillock be accentuated / extended to protect views from Cotter Ave.

**A7:**

A7 is situated on the eastern side of the 17<sup>th</sup> hole in a small depression near the dog-leg of the hole. A small hummock to the north-east of the area could be enhanced with planting and landform to provide additional visual softening of the proposed dwellings if required when viewed at a distance from Cotter Ave Terrace and the 17<sup>th</sup> tee block.



The maximum height is set at RL 414, 8m above a contour running through the middle of the Area. The height of the existing hillock to the north east of the Area is RL 412.5 at its highest point.

**A8:**

A8 is sited on a low lying part of the McDonnell Road catchment adjacent to a small lake. Views of the lake and course beyond are offered towards the west to south west. Adjacent to McDonnell Road is a small hill with evergreen planting buffering views in to the property. This area could be built on to provide additional screening if required depending on the height and location of proposed dwellings.



The maximum height is set at RL 402.5, 6.5m above the contour following the edge of the existing lake. This allows a flat building site be formed by cutting in to sloping ground towards McDonnell Road, and using the fill to accentuate existing landform as required. This height is consistent with the existing 6.5m height limit to the other side of McDonnell Road.



**A9:**

A9 includes two existing dwellings and is located internally to the property on flattish terrain. A large hill lies to the south-east of the area providing visual backdrop and shelter. A small lake is to the east which could be expanded to provide a focal point for buildings in this area.



The maximum height is set at RL 420.5, 8m above the contour at the location of the existing dwelling to the foreground of the photo. This will ensure that buildings in A9 are of similar height to this existing dwelling

**A10:**

A10 is located to the south of A9, and includes a minor gully system running to the south from the crest of the property. A large hill to the east provides backdrop and restricts distant views from Cotter Ave Terrace. There are panoramic views towards the north-west / south-west. The centre of the gully could be landscaped as a feature or focal point for the cluster of buildings, with the LAMA to the south and west to provide additional visual buffer to the neighbouring property and HS6.



The maximum height is set at RL 413.5, 8m above a contour running along the rising ground towards the northern edge of the Area. This ensures that buildings will sit low against the rising landform.

**HS1:**

HS1 is located on a northward sloping gully towards the higher part of the property with views of the golf course and valley to the north. It is generally the same location as one of the 17 lot consents homesites, which was located on higher ground further to the east.



The maximum height is set at RL 443, 8m above a contour sited at the lower part of the homesite area. The intention is to encourage excavating into the gully so built form reads as a continuation of the landform, and within the context of the gully. The ground rises to RL 441 to the west of the area

**HS8:**

HS 8 includes a narrow incised north facing gully with views towards the golf course, and a depression / basin in the landform between a knoll to the west (*to the left of photo*) and rising ground behind.



The maximum height is set at RL 435.5, 8m above a contour running along the top of the gully. The specified RL ensures that a proposed dwelling to this area would sit within the context of the small depression and rising landform to the rear.

**HS5:**

HS5 is on a shallow basin below the 18<sup>th</sup> hole, with a stand of pine trees directly to the south. The Arrow Irrigation water race borders the site to the west and runs around the south side of the trees.



The maximum height is set at RL 423, 8m above a contour running along the base of the shallow basin. This ensures that a building will sit low against the rising landform.

**HS9:**

HS9 is located on a shallow plateau within hummocky terrain bordered by the Arrow Irrigation water race to the north and east.



The maximum height is set at RL 411.5, 8m above a contour running along the base of the shallow basin. This ensures that a building will sit low against the rising landform.

**HS10:**

HS10 is on west sloping ground facing towards a vegetated gully. A small wetland to the north could be landscaped as a pond or natural feature.



The maximum height is set at RL 413, 8m above a contour running along the slope towards the middle / rear of the Area.

**HS6 & 7:**

Both these sites accommodate existing dwellings.

**HS2 – 4:**

3 homesites are sited around small basins within hummocky terrain on the Hogans Gully Road catchment. There are panoramic views of the basin to the west. The hummocky topography generally limits views of proposed buildings in these locations from Hogans Gully Road. Each of these sites were homesites in the 17 Lot consent.



Maximum heights for each homesite are as follows:

HS2: RL 405.5

HS3: RL 407

HS4: RL 380.5

Each have been set above a contour running through the middle of the Area to ensure that a building will sit low against sloping ground.

## 7.0 Summary

The proposed Structure Plan provides a framework for long term growth and management of the golf course and surrounds - catering for a range of existing and anticipated activities / outcomes. It protects the main asset of the property – the landscape and enables sculpture as an on-going positive addition to the landscape.

The Landscape Amenity Management Areas will focus landscape treatment to soften and integrate new buildings into the landscape, ensuring that landscape amenity and outlook is protected from outside of the property. It is intended that these areas are well designed, and blend with other areas of the property.

The proposed Hills Resort Zone will maintain consistency with the existing Millbrook zone to the northwest in order to help maintain a predominantly rural border around Arrowtown.

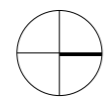
It will foster the on-going vision of an exclusive world of golf, art, architecture and landscape where you can 'escape' from daily life and be at one with the outdoor environment.

## 8.0 Appendices

MH_10_1_MLP_010F	Structure Plan
MH_10_1_MLP_011B	Structure Plan – Access
Figure 1	Structure Plan (District Plan Format)
MH_O_RS_001 - 007	Visibility Mapping
MH_10_1_MLP_020	Topography / Landform

KEY:

- Structure Plan Boundary
- - - Activity Area



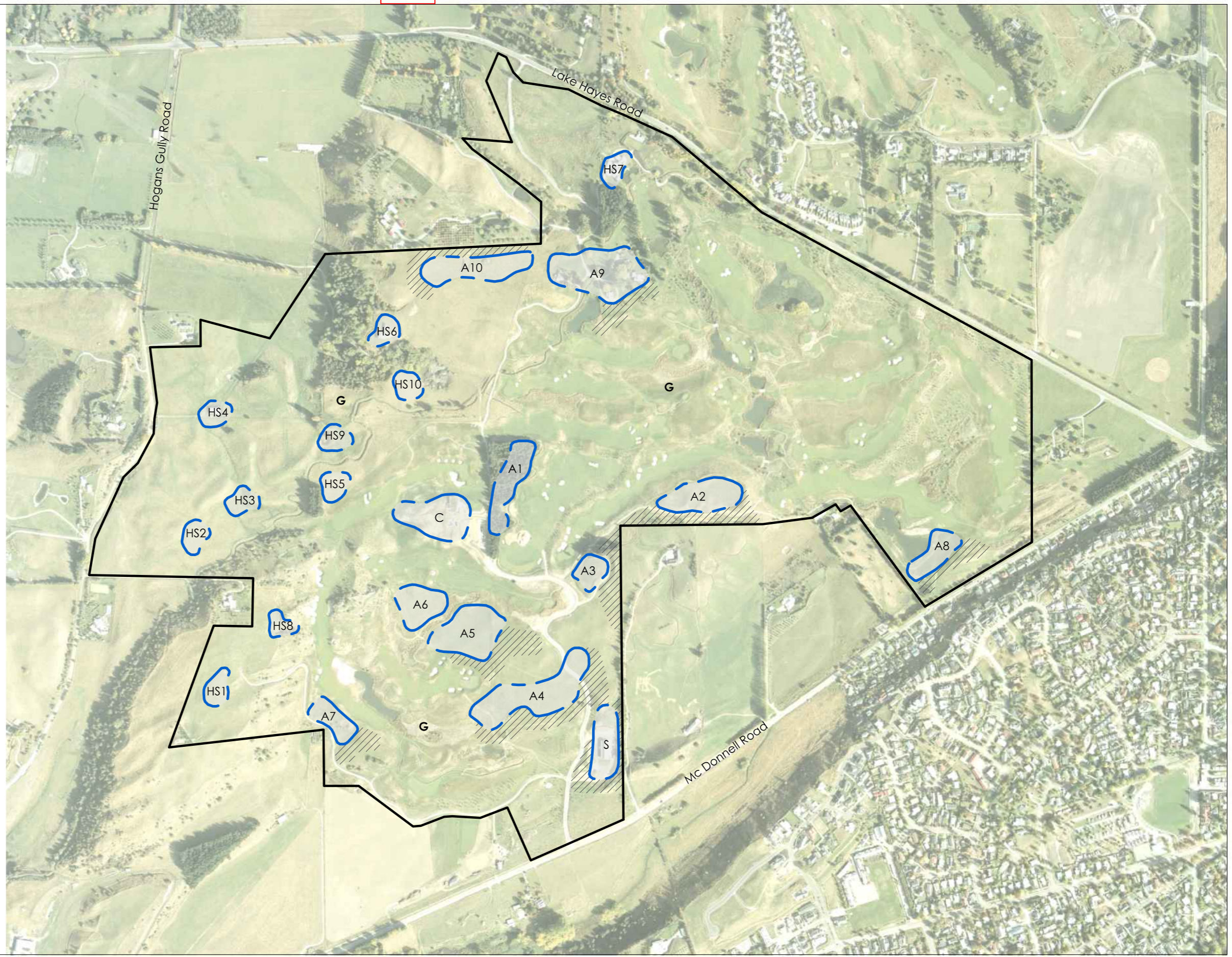
Activity Areas:

- G: Golf course, open space and farming
- C: Clubhouse
- A: Visitor Accommodation / Residential
- HS: Homesite (3,000m2)
- S: Resort Services & Staff Accommodation

Note: all activity areas include G: Golf course, open space and farming

Overlays:

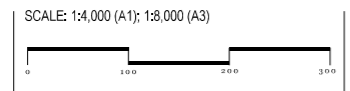
- /// Landscape Amenity Management Area



V:\MH\_The Hills\10\_Master\1\_Preliminary\MH\_10\_1\_MLP\_010F (Structure Plan).dgn



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PLAN STATUS:  
DP REVIEW

# THE HILLS STRUCTURE PLAN

DRAWN / REVIEWED: RT / JC  
 APPROVED: DT  
 DATE: 14.10.15

DRAWING NO:  
 MH\_10\_1\_MLP\_010F

**KEY:**

- Structure Plan Boundary
- - - Activity Area

**Activity Areas:**

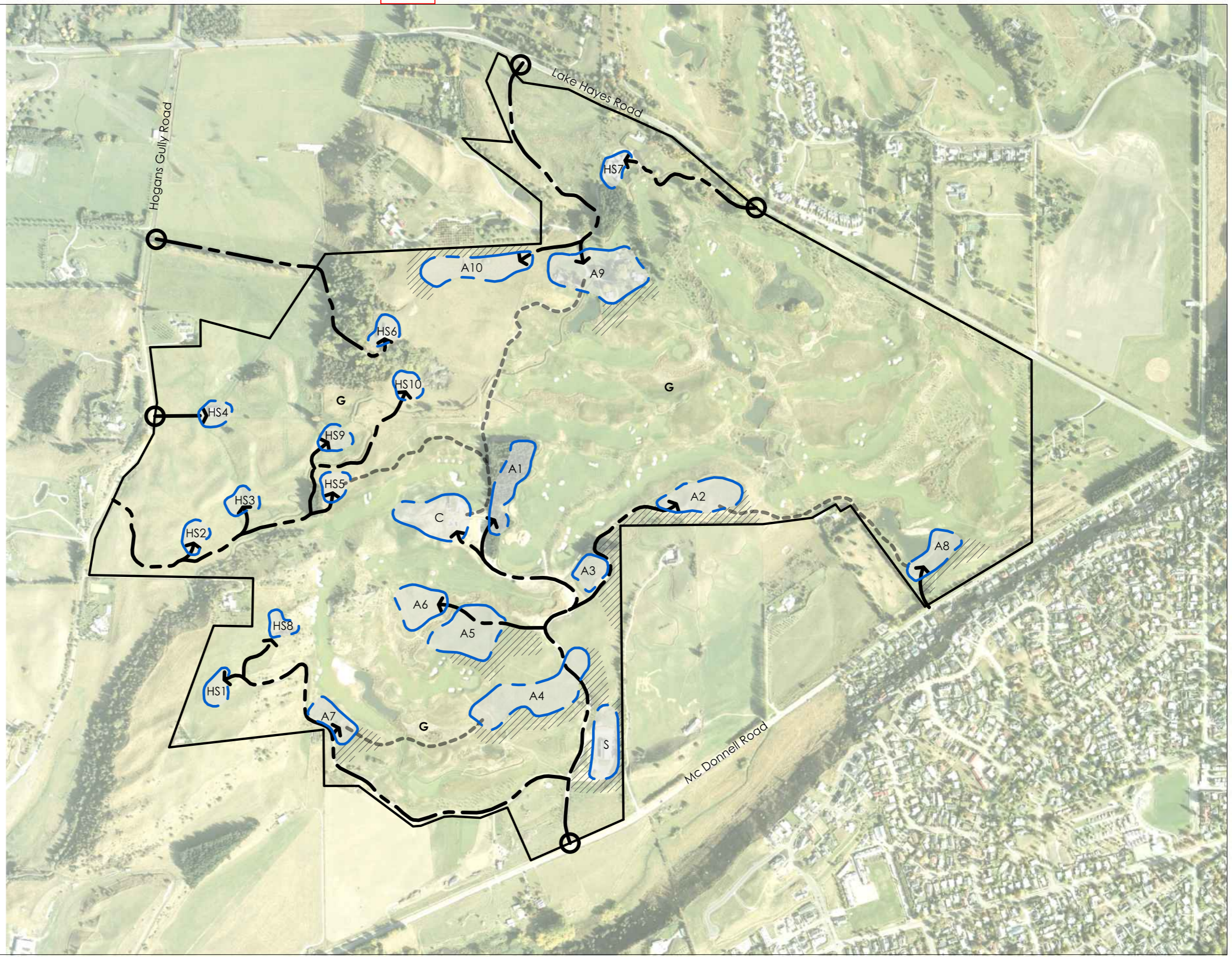
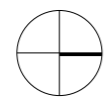
- G: Golf course, open space and farming
- C: Clubhouse
- A: Visitor Accommodation / Residential
- HS: Homesite (3,000m<sup>2</sup>)
- S: Resort Services & Staff Accommodation

Note: all activity areas include G: Golf course, open space and farming

**Overlays:**

- /// Landscape Amenity Management Area

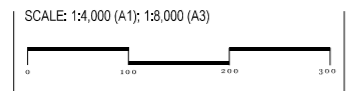
- Existing access point
- Road access
- - - Buggy / cart access



V:\MH\_The Hills\10\_Master\1\_Plan\10\_1\_MLP\_011B (Structure Plan - Access).dgn



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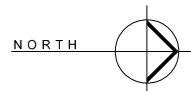
PLAN STATUS:  
**DP REVIEW**

**THE HILLS  
 STRUCTURE PLAN - ACCESS**

DRAWN / REVIEWED: RT / DT  
 APPROVED: DT  
 DATE: 14.10.15

DRAWING NO:  
**MH\_10\_1\_MLP\_011B**



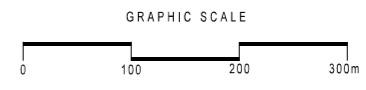


- KEY**
- G Golf course, open space and farming
  - C Clubhouse
  - A Visitor Accommodation / Residential
  - HS Homesite (3,000m<sup>2</sup>)
  - S Resort Services & Staff Accommodation
- Note: all activity areas include G: Golf course, open space and farming
- OVERLAYS**
- Activity Area
  - Road Access (location indicative)
  - Main Access Point
  - Landscape Amenity Management Area



**FIGURE 1**  
The Hills Resort Zone

14 October 2015

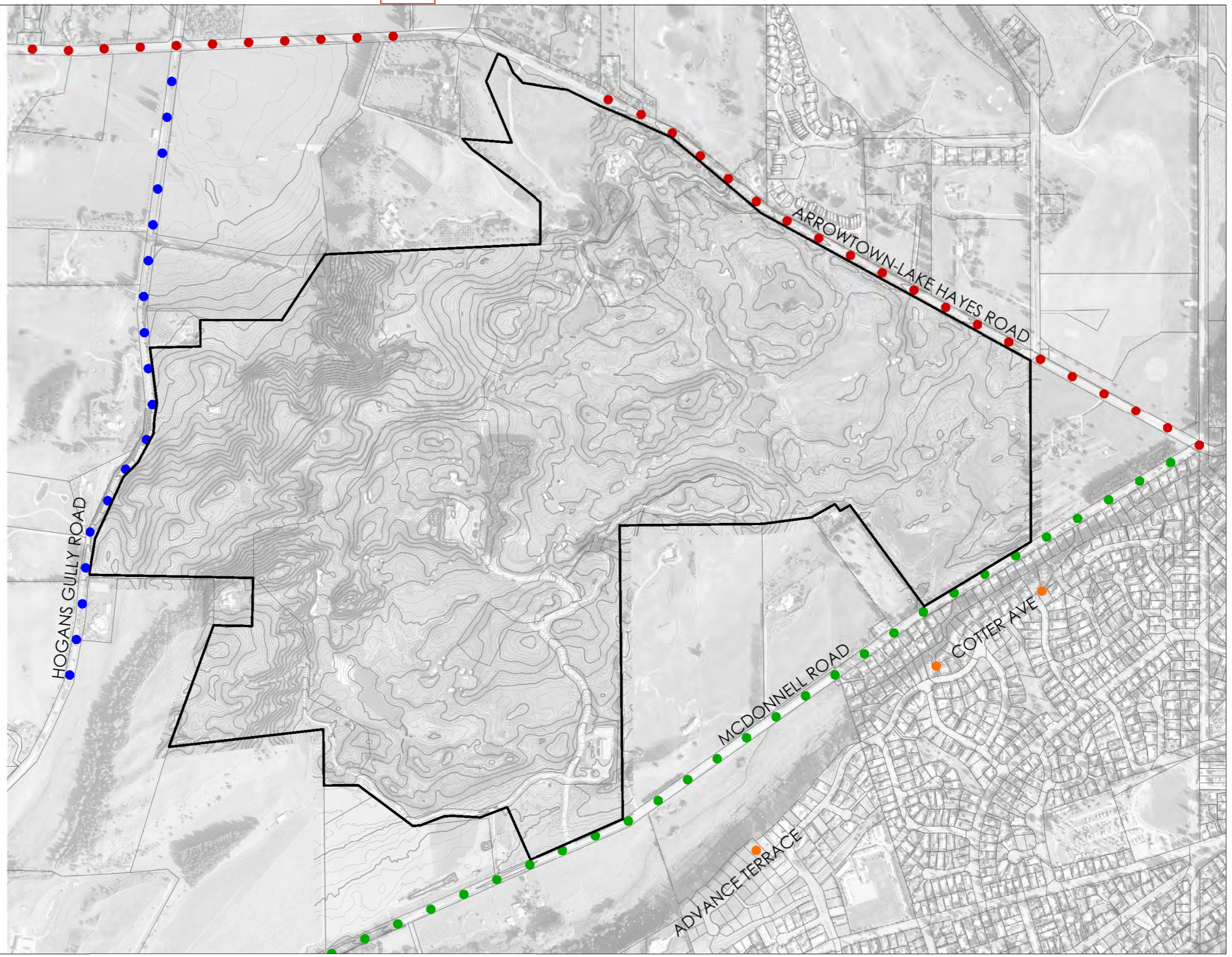


KEY:

- Structure Plan Boundary
- Title Boundaries
- Contours

VIEWPOINTS:

- Arrowtown-Lake Hayes Road
- Hogans Gully Road
- McDonnell Road
- Private Residences



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SCALE: 1:4,000 (A1); 1:8,000 (A3)




PLAN STATUS:  
**RESOURCE STUDY**

THE HILLS - VISIBILITY MAPPING  
 MASTER VIEWPOINTS

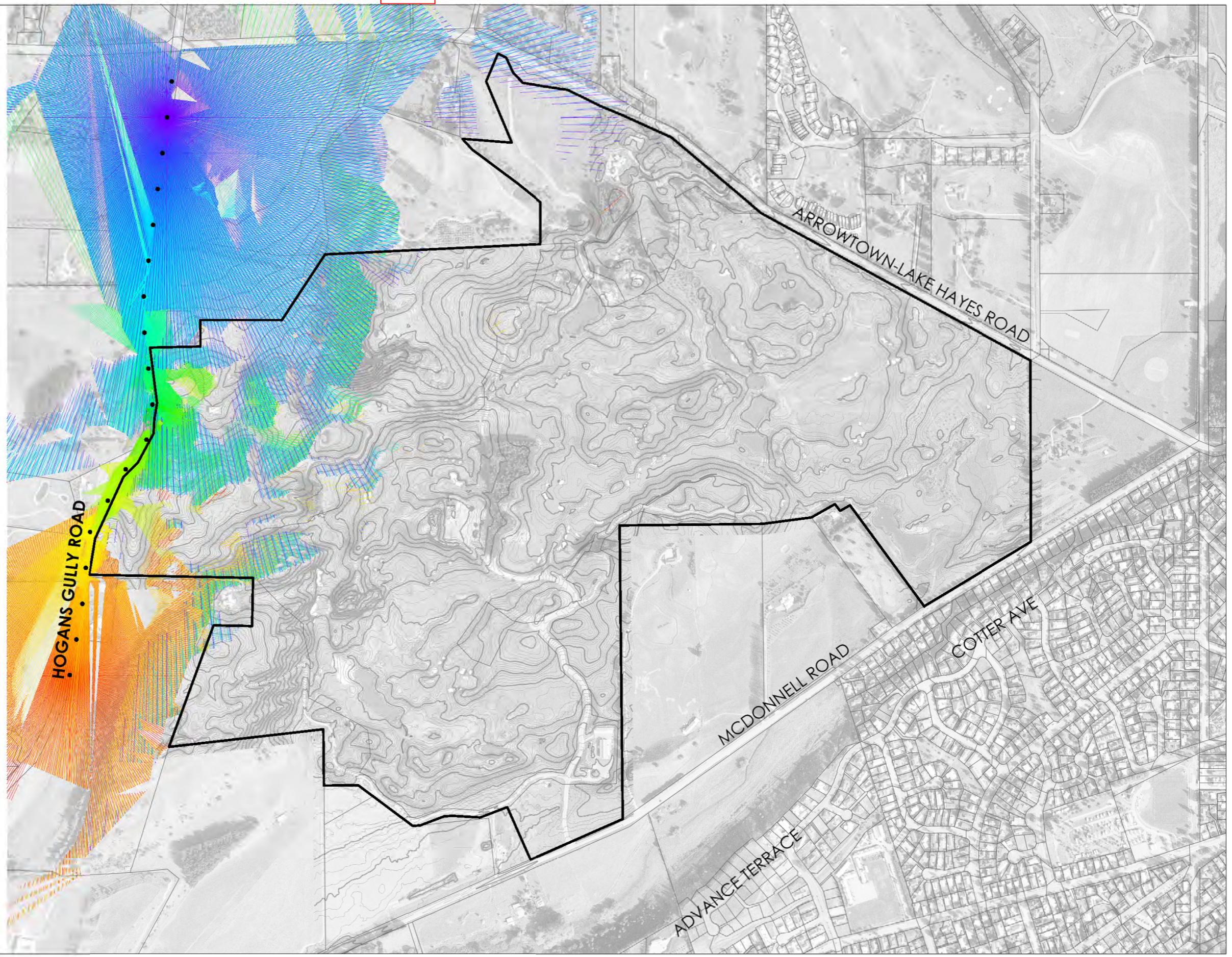
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 APPROVED: DT  
 DATE: 24.09.15

DRAWING NO:  
 MH\_0\_RS\_001

KEY:


-  Structure Plan Boundary
-  Title Boundaries
-  Contours

Note:  
 -Model has been constructed using a combination of 2007 aerial survey, areas of site survey and LINZ 20m data for the wider context/surrounding area.  
 -Terrain model assume existing vegetation mapped within the site at approximate heights only.  
 -Line of Sight' lines radiated at 0.1 degree intervals about each viewpoint.  
 -Viewpoints are positioned at 75m centres along the surrounding roads and several key viewpoints in Arrowtown.



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SCALE 1:4,000 (A1); 1:8,000 (A3)






PLAN STATUS:  
**RESOURCE STUDY**

THE HILLS - VISIBILITY MAPPING  
 HOGANS GULLY ROAD

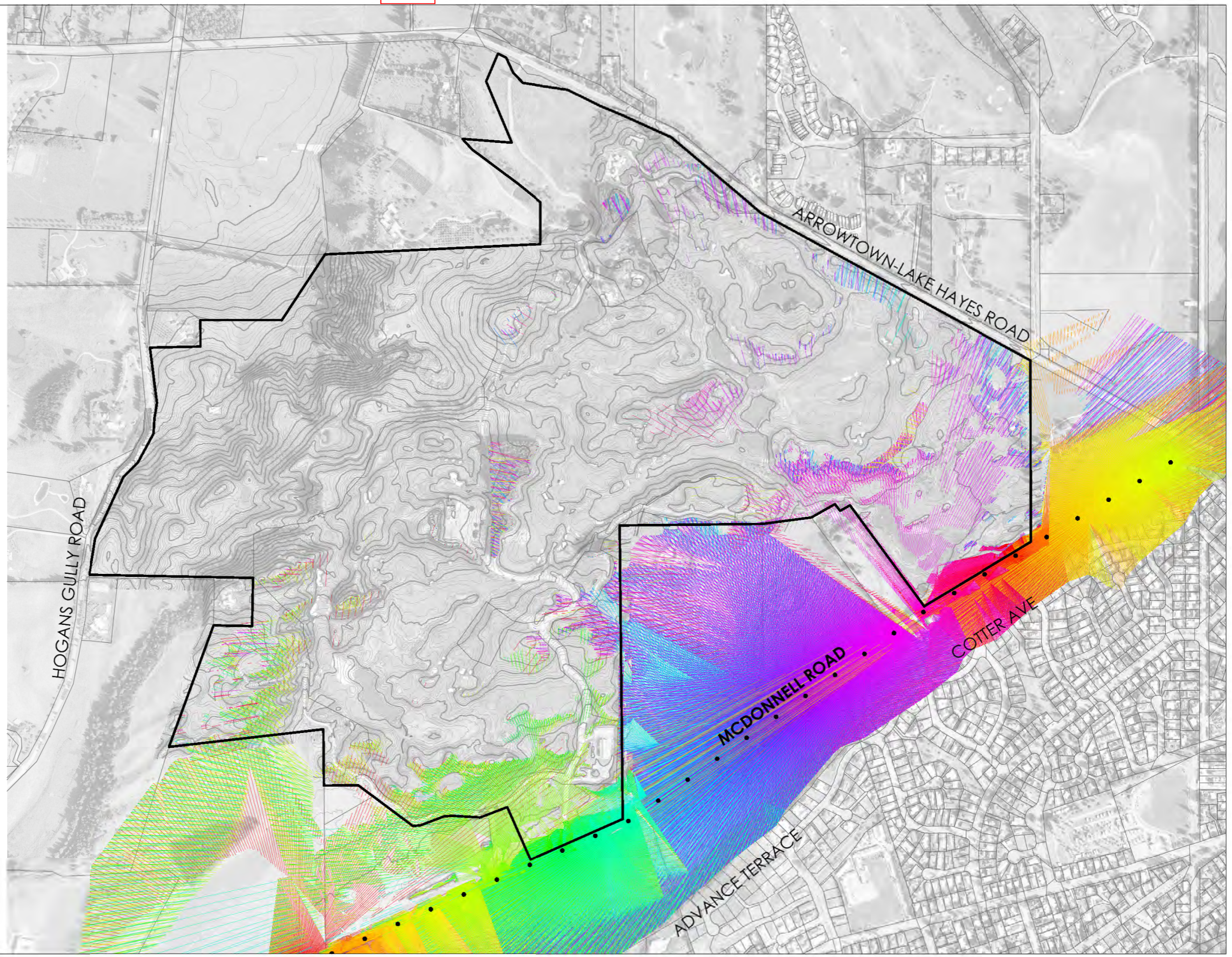
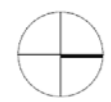
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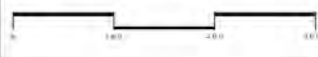
-  Structure Plan Boundary
-  Title Boundaries
-  Contours

Note:  
 -Model has been constructed using a combination of 2007 aerial survey, areas of site survey and LINZ 20m data for the wider context/surrounding area.  
 -Terrain model assume existing vegetation mapped within the site at approximate heights only.  
 -Line of Sight' lines radiated at 0.1 degree intervals about each viewpoint.  
 -Viewpoints are positioned at 75m centres along the surrounding roads and several key viewpoints in Arrowtown.



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SCALE 1:4,000 (A1); 1:8,000 (A3)






PLAN STATUS:  
**RESOURCE STUDY**

THE HILLS - VISIBILITY MAPPING  
 MCDONNELL ROAD

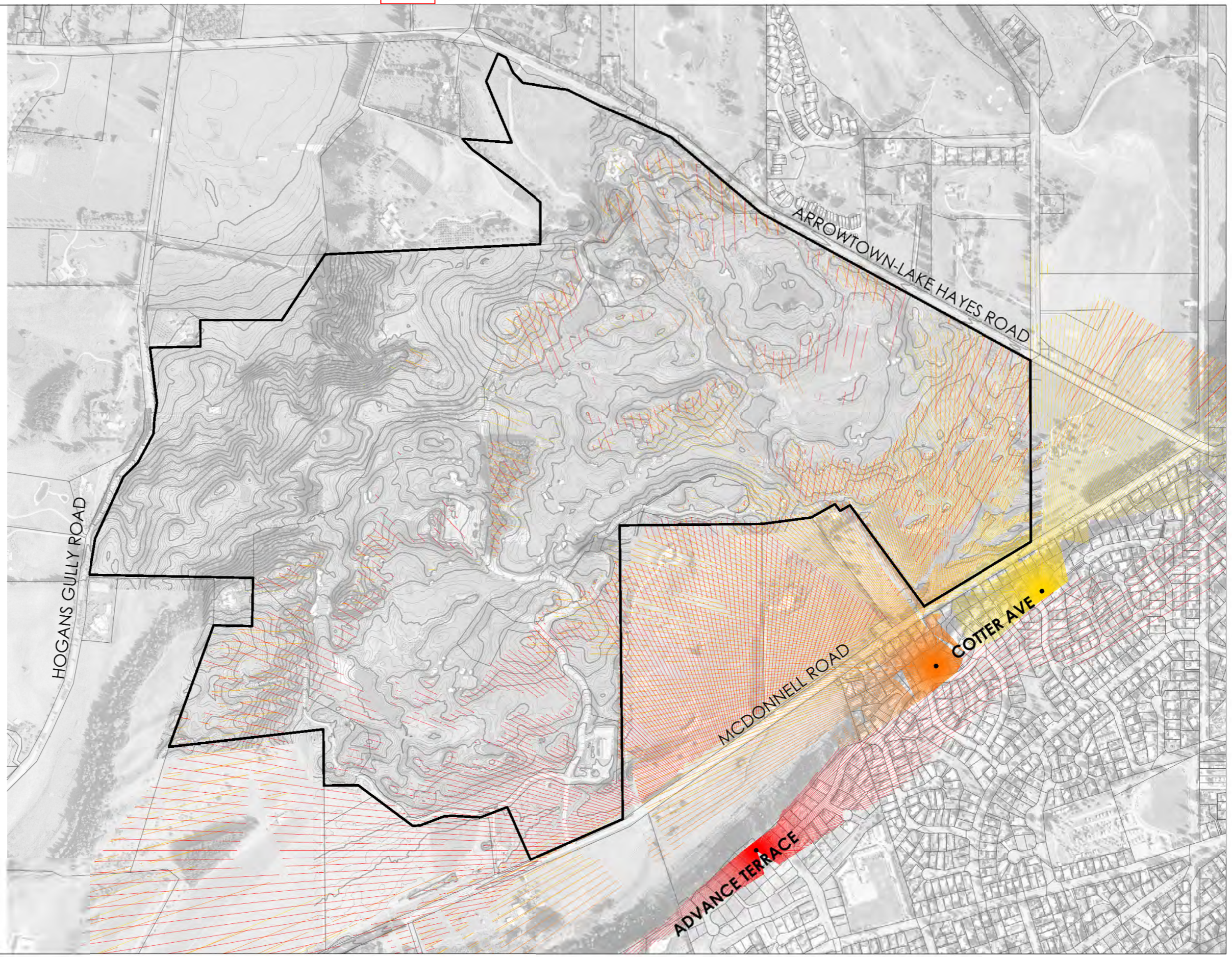
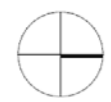
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 APPROVED: DT  
 DATE: 21.09.15

DRAWING NO:  
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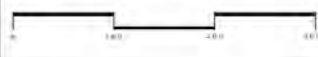
-  Structure Plan Boundary
-  Title Boundaries
-  Contours

Note:  
 -Model has been constructed using a combination of 2007 aerial survey, areas of site survey and LINZ 20m data for the wider context/surrounding area.  
 -Terrain model assume existing vegetation mapped within the site at approximate heights only.  
 -Line of Sight' lines radiated at 0.1 degree intervals about each viewpoint.  
 -Viewpoints are positioned at 75m centres along the surrounding roads and several key viewpoints in Arrowtown.



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SCALE 1:4,000 (A1); 1:8,000 (A3)



PLAN STATUS:  
**RESOURCE STUDY**

THE HILLS - VISIBILITY MAPPING  
**COTTER AVE & ADVANCE TERRACE**

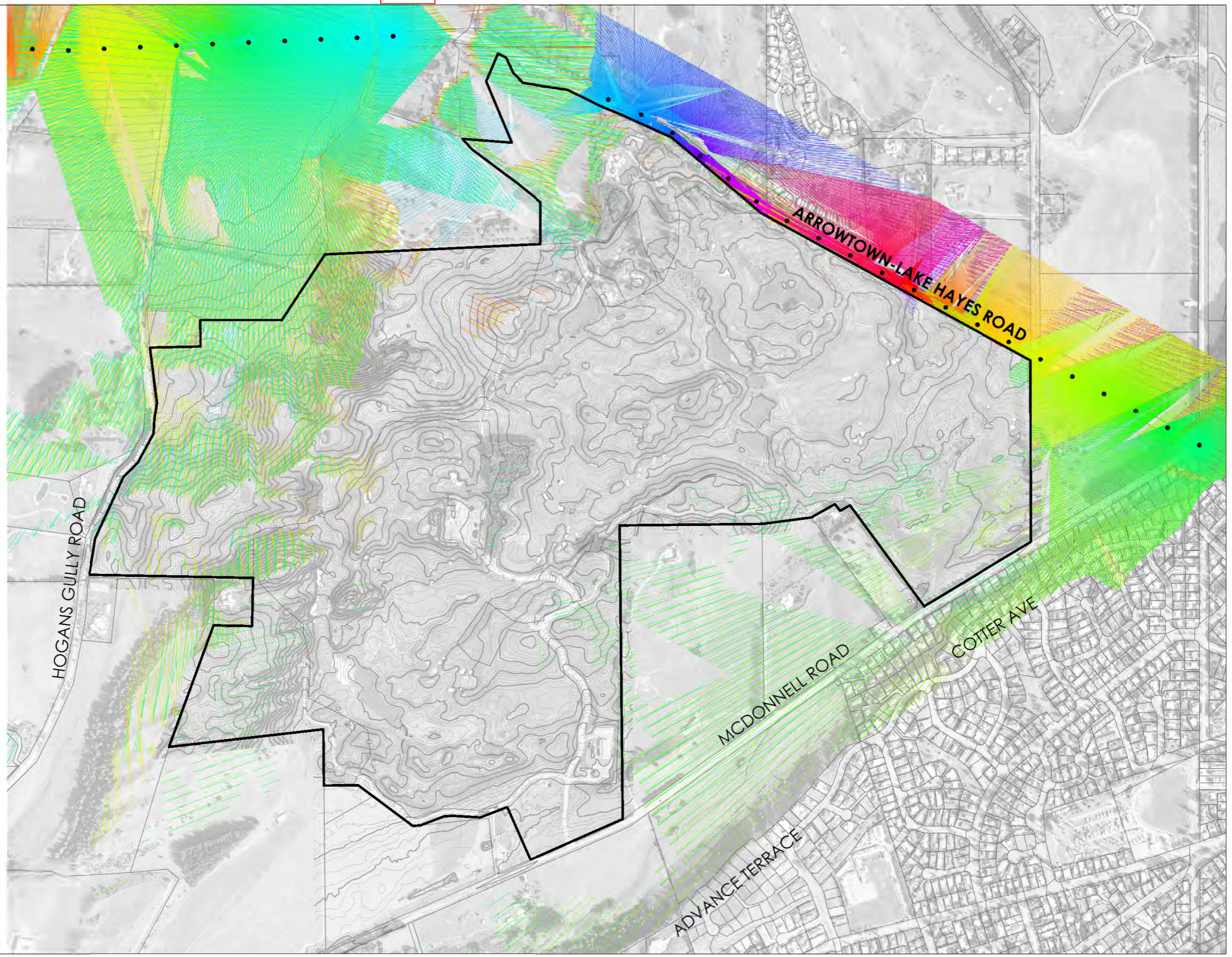
DRAWN / REVIEWED: HF/RT  
 APPROVED: DT  
 DATE: 21.09.15

DRAWING NO:  
**MH\_0\_RS\_004**

- KEY:**
- Structure Plan Boundary
  - Title Boundaries
  - Contours

**Note:**

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SCALE 1:4,000 (A1); 1:8,000 (A3)

PLAN STATUS:  
**RESOURCE STUDY**

**THE HILLS - VISIBILITY MAPPING  
 ARROWTOWN-LAKE HAYES ROAD**

DRAWN / REVIEWED: HF/-  
 APPROVED: DT  
 DATE: 21.09.15

DRAWING NO:  
**MH\_0\_RS\_005**

**KEY:**

— Structure Plan Boundary

— Title Boundaries

— Contours

**VISIBILITY ANALYSIS:**

— Arrowtown-Lake Hayes Road

— Hogans Gully Road

— McDonnell Road

— Private Residences

**STRUCTURE PLAN:**

— Activity Area

**OVERLAYS:**

/// Landscape Amenity Management Area

**Note:**  
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 -Terrain model assume existing vegetation mapped within the site at approximate heights only.  
 -Line of Sight' lines radiated at 0.1 degree intervals about each viewpoint.  
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PLAN STATUS:

RESOURCE STUDY

**THE HILLS - VISIBILITY MAPPING  
 STRUCTURE PLAN OVERLAY**

DRAWN / REVIEWED: HF/RT  
 APPROVED: DT  
 DATE: 21.09.15

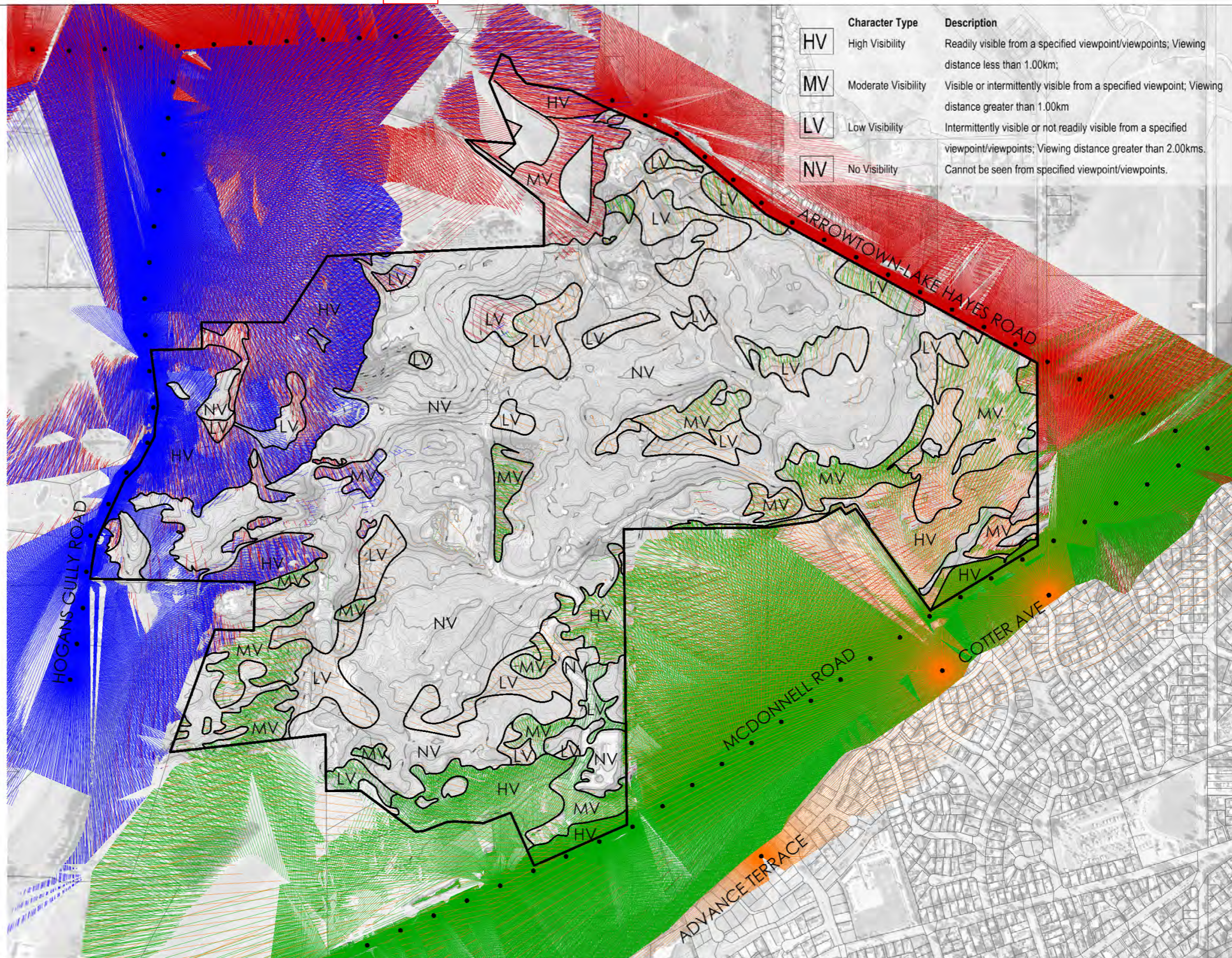
DRAWING NO  
 MH\_0\_RS\_006

**KEY:**

- Structure Plan Boundary
- Title Boundaries
- Contours
- VISIBILITY ANALYSIS:**
- Arrowtown-Lake Hayes Road
- Hogans Gully Road
- McDonnell Road
- Private Residences

Note:  
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 -Viewpoints are positioned at 75m centres along the surrounding roads and several key viewpoints in Arrowtown.

Character Type	Description
HV	High Visibility Readily visible from a specified viewpoint/viewpoints; Viewing distance less than 1.00km;
MV	Moderate Visibility Visible or intermittently visible from a specified viewpoint; Viewing distance greater than 1.00km
LV	Low Visibility Intermittently visible or not readily visible from a specified viewpoint/viewpoints; Viewing distance greater than 2.00kms.
NV	No Visibility Cannot be seen from specified viewpoint/viewpoints.



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SCALE 1:4,000 (A1); 1:8,000 (A3)

PLAN STATUS:  
**RESOURCE STUDY**






**THE HILLS - VISIBILITY MAPPING  
 VISIBILITY ANALYSIS**

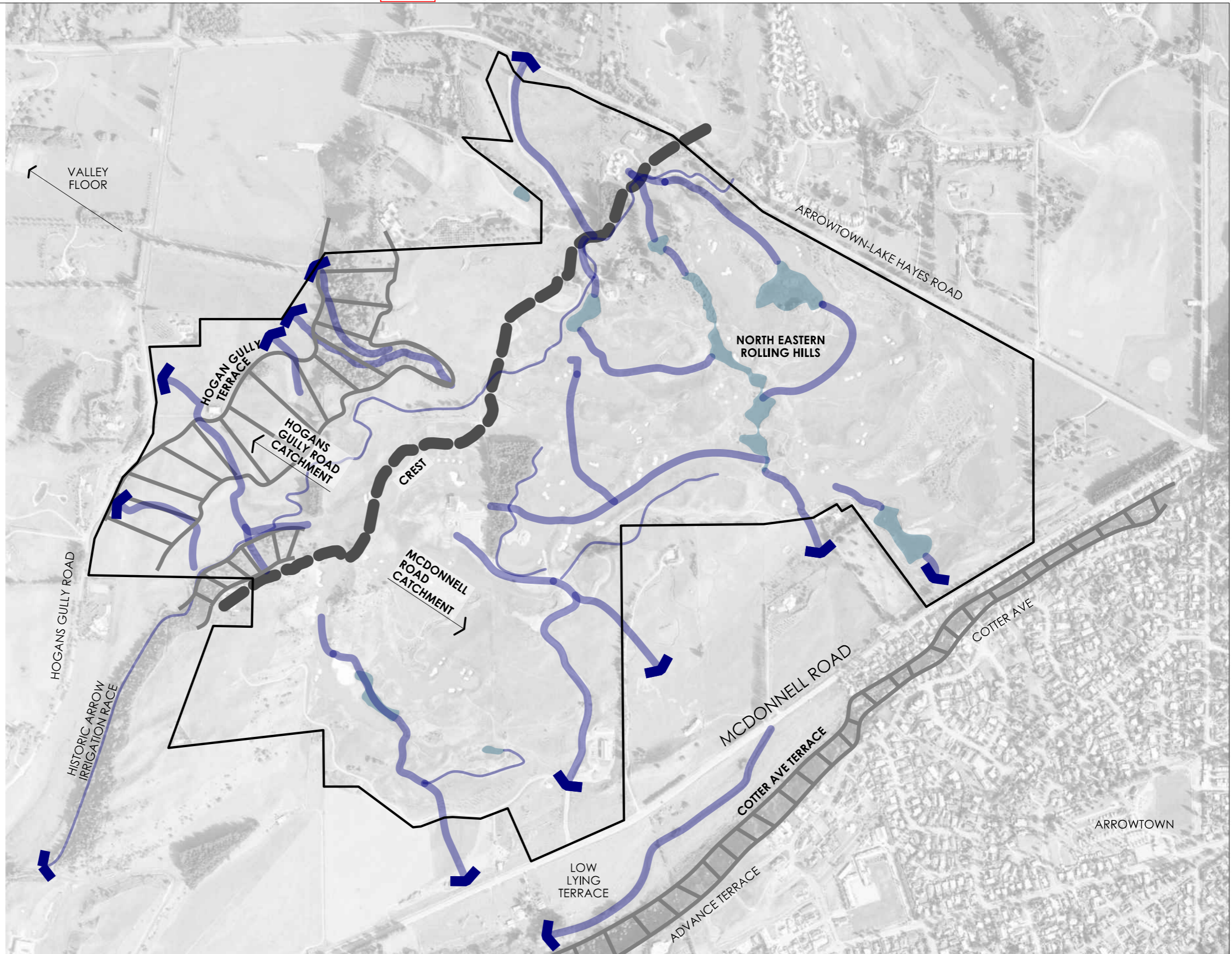
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 APPROVED: DT  
 DATE: 21.09.15

DRAWING NO:  
**MH\_0\_RS\_007**



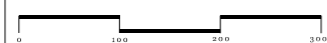
KEY:

-  Hills Structure Plan Boundary
-  Catchments Boundary / Crest
-  Gully / Watercourse
-  Wetland / Pond
-  Terrace / Escarpment



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SCALE: 1:4,000 (A1); 1:8,000 (A3)



PLAN STATUS:  
DP REVIEW

# THE HILLS TOPOGRAPHY / LANDFORM

DRAWN / REVIEWED: HF/RT  
 APPROVED: -  
 DATE: 14.09.15

DRAWING NO:  
 MH\_10\_1\_MLP\_020

Trojan Helmet Limited  
Proposed Hills Resort Zone  
Assessment of Landscape and Visual Effects

October 2015



Boffa Miskell

## Contents

Background and Approach.....	3
Description of the Existing Environment .....	4
Site Location .....	4
Existing Landscape Character and Values .....	4
Proposal Description.....	5
Assessment of Landscape and Visual Effects.....	6
Assessment Methodology .....	6
Assessment of Landscape and Visual Effects on Values by Activity Area .....	8
Visitor Accommodation/ Residential Activity Areas within Resort Zone: .....	8
Clubhouse and Resort Services Area .....	13
Homesites within Resort Zone.....	14
Conclusion on Visual and Landscape Effects .....	15
Statutory Assessment .....	17
Part II of the RMA .....	17
Proposed District Plan .....	17
Proposed Hills Resort Zone Provisions .....	20
Conclusion.....	21

## Background and Approach

Boffa Miskell Limited (BML) has been commissioned to prepare a landscape and visual assessment of the development that would be enabled under the proposed Hills Resort zoning for the Hills golf course near Arrowtown.

The proposed Hills Resort zoning and related structure plan covers the approximately 162ha site currently occupied by The Hills golf course near Arrowtown. This assessment addresses this proposed rezoning only, while separate reports have been prepared for the Rural Lifestyle Zoning proposed for two separate parcels of land also owned by the Hills, adjacent to McDonnell Road and Hogans Gully Road.

The purpose of this assessment is to assess the landscape effects, including the visual effects, of the proposed Hills Resort rezoning, including the individual development areas shown on the structure plan, and where the potential for adverse landscape/visual effects is identified, to consider and make recommendations on whether/how those effects can be mitigated. It is noted that BML provided advice on these issues during the formulation of the structure plan and associated Hills Resort Zone rules, including in respect to building location, colours and materials, and landscaping to ensure that any potential landscape and visual effects can be minimised. In this assessment I will also assess the effectiveness of these proposed mitigation measures, as they have been carried through into the proposed zone rules.

This assessment is based on the proposed Structure Plan for the Hills Resort Zone (see graphic attachment Figure 2) and the Masterplanning Report prepared by Darby Partners. A site visit was undertaken on 7 September 2015 to assess the existing landscape on and surrounding the site, as well as the potential visibility of the proposal in relation to existing development and public viewpoints. The photographic record from this site visit forms part of the landscape assessment (see graphic attachment Figure 5-8).

A description of the existing landscape character of the site and surrounding landscape, including the land cover and existing development forms the first part of the landscape assessment.

Secondly, a visibility analysis of the maximum level of development that would be enabled under the proposed Hills Resort zoning is undertaken. This part of the assessment also provides a short description of the landscape's potential to absorb change. An overall conclusion is then reached as to the potential visual and landscape effects of the proposed development.

Thirdly, an assessment of the proposal against the relevant proposed District Plan provisions relating to landscape is provided.

Finally, an assessment of the proposed Hills Resort zone provisions is provided to ascertain whether appropriate landscape outcomes will be achieved and are ensured by the proposed rezoning.

## Description of the Existing Environment

### Site Location

The Site is located on the south western side of Arrowtown Township. The former deer farm has been developed into an international 18 hole golf course (the Hills) over the past decade based on a design provided by Darby Partners. The Site is part of a larger triangular shaped landholding encompassing approximately 190 hectares in total and extends between Arrowtown-Lake Hayes Road in the west to McDonnell Road in the east, and Hogans Gully Road in the south. The proposed Hills Resort zoning applies to only part of this property (approximately 162ha), with a Rural Lifestyle zoning being sought for the remainder, which is assessed in separate reports.

### Existing Landscape Character and Values

The surrounding topography of this north eastern corner of Wakatipu Basin is varied and of high visual diversity. Arrowtown Township is contained to the east by the slopes of the Crown Range Terrace and to the north by Brow Peak/German Hill. The township is nestled below the slopes along the Arrow River, which enters the Wakatipu Basin at this point. The small-scale glacial landform of Feehly Hill, with its popular scenic reserve, lies to the north of the Site, adjacent to the developed areas of Arrowtown.

The existing Millbrook Resort and golf course is located on the western side of Arrowtown-Lake Hayes Road. The design of the landscaping within the resort has similarities to the Site and the rolling terrain provides similarly manicured but diverse landscape characteristics.

The Arrowtown escarpment extends along the township and along its southern part it forms the current urban boundary. This prominent landscape feature contains urban development along the northern 900 metres of McDonnell Road. Intensive development extends along the road and creates a strong residential character along this stretch of road. South of this intensively developed section the road extends through a more rural landscape, with views to prominent dwellings along the top edge of the escarpment. A number of individual buildings are located on the flats adjacent to McDonnell Road to the south, including an existing maintenance shed on the Hills property near the entrance way to the Hills golf course.

The south western corner of the larger landholding, along McDonnell Road, is currently occupied by a driving range associated with the Hills golf course. This area contains flat modified pasture and, therefore provides distinctively different landscape characteristics to the remainder of the property, which is comprised of more undulating terrain and more visual diversity. For this 8.4 hectare area a Rural Lifestyle Zoning is sought, which is addressed in a separate report (see assessment for Proposed Rural Lifestyle (Area B)).

The Site itself comprises the Hills golf course and contains varied terrain with clusters of exotic and native trees, areas of tussock grassland, sand bunkers and small ponds interspersed between the holes. The setting is of high aesthetic quality and designed and maintained to the highest standards. While significant earthworks have occurred as part of the establishment of the golf course, the appearance of the Site provides a high level of visual amenity and a semi-rural outlook for Arrowtown residences located along the western escarpment of the township (Cotter Ave and Advance Terrace).

The Site also contains existing buildings on its southern and eastern sides. These buildings are predominantly set within well-established clusters of vegetation and are difficult, if not impossible to see from outside the Site. These nodes of existing development are also proposed to form part of the Hills Resort Zone.

The south eastern corner of the larger landholding, on the intersection of Arrowtown-Lake Hayes Road and Hogans Gully Road, contains a block of land that is visually separated from the remainder of the golf course by a distinctive change in elevation. The terrace edge that contains Speargrass Flat Valley steps up along Arrowtown-Lake Hayes Road and forms a series of small, visually contained terraces. These terraces currently contain residential dwellings that are largely out of view from the road due to the screening landform. The farmed block of land at the low-lying intersection currently does not contain buildings, unlike the immediately adjacent property along Hogans Gully Road. A Rural Lifestyle Zoning is proposed for this 19.71 hectare area which is addressed in a separate report (see assessment for Proposed Rural Lifestyle (Area A)).

## Proposal Description

In summary, the proposed Hills Resort Zone comprises a 162 hectare area of land that is currently occupied by the existing Hills golf course and residential dwellings owned by the Hills family members. The proposed Resort Zone is based on a structure plan, prepared by Darby Partners (see Figure 2), that identifies areas suitable for development within the Zone. The location of the activity areas and home sites has been chosen based on the high ability of these areas to absorb change due to their low visibility from outside the property.

The structure plan identifies 10 areas as suitable for residential and/or visitor accommodation activities, that could accommodate clusters of buildings for these purposes. Additionally, the currently consented<sup>1</sup> 17 home sites on the property are proposed to be carried over into the structure plan. It is proposed that seven of these consented home sites be absorbed into the residential/visitor accommodation activity areas (Areas A2, A3, A5, A7, A9 and A10), with the remaining 10 home sites proposed for individual residential homes (i.e. single residential units).

An objective, policies and rules have been developed for the proposed Resort Zone, which generally enable development within the activity areas identified on the structure plan, provided specified standards are met. Building levels/heights, colours and materials are proposed to apply to development in each area in order to maintain an overall low visibility of buildings throughout the Site and when viewed from beyond. The master planning report prepared by Darby Partners contains more detailed information about the vision and anticipated design outcomes for the proposed Zone.

All fixed lighting will be directed away from adjacent roads and properties with low light spill to areas located outside of the Zone.

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<sup>1</sup> RM081223 and RM081224.

## Assessment of Landscape and Visual Effects

The following sections of this assessment address the potential landscape and visual effects of development in each of the proposed activity areas. The assessment:

- Provides a description of each area's ability to absorb change based on existing landform and vegetation;
- Provides an analysis of potential visibility from public and private places;
- Recommends mitigation and enhancement measures, where necessary, to mitigate any potential landscape and visual effects that might arise from the proposed development;
- Reaches conclusions about the anticipated landscape effects of development as a whole.

### Assessment Methodology

#### Assessment of Effects on Landscape Values

Landscape and visual impacts result from natural or induced change in the components, character or quality of the landscape. Usually these are the result of landform or vegetation modification or the introduction of new structures, facilities or activities. All these impacts must be assessed to determine the effects of a proposal on landscape character and quality, rural amenity and on public and private views. In this assessment the potential effects are based on a combination of the landscape's sensitivity and visibility and the nature and scale of the development proposal.

#### Landscape's Ability to Absorb Change

The assessment of the landscape's ability to absorb change is based on its existing character sensitivity and visual sensitivity.

The analysis of landscape character sensitivity/its ability to absorb change is based on judgments about sensitivity of aspects most likely to be affected. These aspects cover natural and cultural factors, quality/condition of the landscape and aesthetic factors.

Visual sensitivity covers the visibility of an activity area as well as the nature and extent of population likely to visually experience the area (eg private/ public viewpoints).

It is worth noting that the landscape character of the Site has been substantially modified through the existing golf course development, which has created a manicured landscape appearance. While the landscape is aesthetically pleasant and well maintained, the landform and vegetation within the site are of a low naturalness. The openness of the landscape is generally aligned with rural landscapes, but the character differs from that of rural land with productive land uses.

The landscape's ability to absorb change is identified as follows:

- High: change can be readily absorbed due to low visibility without causing adverse landscape character effects within the golf course
- Medium: the area can absorb some change due to medium visibility and moderately sensitive landscape character within the golf course
- Low: high visibility of an area combined with moderate or high landscape character sensitivity within the golf course

### Visibility Analysis

The analysis of potential visibility includes an assessment from viewpoints on surrounding public roads and reserves, in particular from Arrowtown and the roads adjacent to the Site.

Two representative elevated viewpoints around Arrowtown (Feehly Hill and top of Tobins Track on Crown Terrace) were assessed and conclusions about visibility from private properties drawn based on an assessment from nearby public viewpoints, such as roads.

The assessment of visibility is framed in the following way:

Viewpoint distances:

- Long distance: more than 1.0 km (eg top of Tobins Track and Feehlys Hill)
- Mid distance: 500m – 1.0km (eg southern edge of Arrowtown)
- Short distance: less than 500m (eg McDonnell Road, Arrowtown-Lake Hayes Road)

Visibility:

- Low: viewed from mid to long distance, partly visible (less than half of the building)
- Medium: viewed from mid distance, partly visible (more than half of the building)
- High: viewed from short to mid distance, partly or fully visible (more than half of the building)

It is worth noting that the methodology above is based on a factual assessment on whether a building is visible, and does not include a consideration of whether a building can be made less visible by landscaping, colours and materials etc. These matters are taken into account when assessing visual effects however.

The visibility analysis is also informed by the mapping of the Zone of Visual Influence (ZVI), prepared by Darby Partners (refer graphic attachment to Master Planning Report). The on-site investigations carried out for the assessment (07/09/2015), however, formed the main basis for the analysis.

Findings from the visibility analysis form the basis for the assessment of visual effects.

### Recommended mitigation and enhancement

A number of measures are recommended to mitigate the visual and landscape effects of the proposed development, and/or to enhance landscape outcomes. These measures are proposed to form part of/be secured by the rules that apply to the new Zone. The measures include vegetation planting, earth contouring for screening, restrictions on building heights and on colours and materials used on buildings. The implementation of these measures has been taken into account when reaching a conclusion on the visual and landscape effects of the proposal.



## Assessment of Landscape and Visual Effects on Values by Activity Area

The following section provides an assessment of the visual effects of the proposed development for each activity area within the Proposed Hills Resort zone, including a short description of the area's ability to absorb change, an assessment of visibility based on the site investigations and recommended measures to appropriately mitigate any landscape and/or visual effects.

### Visitor Accommodation/ Residential Activity Areas within Resort Zone:

#### Activity Area A1:

- Ability to Absorb Change: MEDIUM. Activity Area 1 is located near the centre of the golf course in close proximity to the existing clubhouse, which forms a node of built development along with the existing adjacent car parks. The higher-lying, southern part of the activity area is visible from parts of Arrowtown, but overall the area has a medium ability to absorb change due to the existing vegetation in the form of mature pine trees and the small scale terrain variation that creates a low-lying bowl overlooking the adjacent holes of the golf course. The area has a low visibility from public roads outside the property due to its location at a distance of over 750m. Views from Arrowtown can be gained towards the higher part of the existing pine trees.
- Potential Visibility: MEDIUM. Buildings proposed in this central part of the golf course have a medium potential to be seen from long distance external viewpoints. The viewpoints most likely to be affected would be high-lying areas to the east, such as Feehly Hill and the Crown Terrace. The visibility from Arrowtown would be medium to low, provided buildings are kept off the rising ridgeline to the west, by appropriate choice of finished building height (RL). The internally facing area is located to the west of a number of low ridges with linear mature vegetation that would provide screening even from elevated viewpoints along the Arrowtown escarpment. The existing dwelling and planting on the neighbouring McDonnell Road property would form the foreground to this view. The activity area is located next to a stand of mature pine trees that would provide a backdrop to buildings in this area when viewed from the east.
- Recommended Mitigation and Enhancement Measures: The exact height of buildings would determine the extent of visibility from Arrowtown, and therefore a finished floor level of RL 418.5 masl, which is below the elevation of the pine trees to the southwest, is recommended for this area, meaning that buildings of up to 8 meters can be accommodated, without giving rise to significant visual effects. Enhancement options for the area could include further planting on the ridge to the east, identified in the LAMA along the eastern property boundary.

#### Activity Area A2:

- Ability to Absorb Change: HIGH. Activity Area 2 contains two consented building platforms facing the interior of the golf course oriented to the west. The area is well screened by an existing ridgeline to the east. Currently a small spur separates the two consented platforms from each other. In order to accommodate the maximum level of development proposed for this area, this small spur will need to be removed to create a larger low-lying area, backed by the screening ridge to the east.

- Potential Visibility: LOW. The area is low lying in relation to the surrounding terrain and low in visibility due to the existing ridgeline to the east. It may be visible from the neighbouring property located approximately 200 meters to the east however. The views from Arrowtown are unlikely to be affected by development in this activity area, as it is oriented in a westerly direction, backed by intervening landform.
- Recommended Mitigation and Enhancement Measures: To ensure adverse visual effects on the neighbouring property are avoided, a low floor level (RL 416masl) is recommended for the buildings in this activity area. Planting of vegetation and/or land contouring within the LAMA area identified on the structure plan adjacent to this activity area may be required to soften the development in the event that the existing landform is not sufficient to fully screen it when viewed from the neighbouring dwelling and potentially from Arrowtown.

#### Activity Area A3:

- Ability to Absorb Change: HIGH. An individual building platform is consented in this activity area, which is proposed to be incorporated into the slightly larger activity area. The area is visually well contained by landform that wraps around the area on the northern and eastern sides. Existing mature vegetation along the Hills property boundary to the north provides further screening.
- Potential Visibility: MEDIUM to LOW. This small activity area is located in a discrete part of the golf course and is well screened from views from Arrowtown. The landform separating this activity area from the neighbouring property will help to block most of the views, but it is possible that the tops of the proposed buildings may be visible. A row of young conifers has been planted along the northern boundary of the Site, which will provide additional screening on the existing landform over time.
- Recommended Mitigation and Enhancement Measures: Existing landform and planting of vegetation in the LAMA shown on the structure plan adjacent to this activity area would provide screening if necessary. Buildings at RL 421masl are likely protrude above the existing landform, but for lower buildings existing screening may be sufficient to block all outside views into the area, in particular views from the immediately adjacent property. Careful consideration needs to be given to the extent and nature of surrounding landscaping and earthworks to screen or soften the building, and the final building design and location, to ensure that landscape effects are minimised.

#### Activity Area A4:

- Ability to Absorb Change: MEDIUM-LOW. Currently this Activity Area is not as well contained by landform as the areas previously discussed. A large flat part of the golf course expands in a north-south direction at a distance of around 350m from McDonnell Road adjacent to the entrance drive. Parts of the area are contained by low ridges to the east, while others, in particular those adjacent to the entrance way, are open.
- Potential Visibility: MEDIUM. This relatively large area is visually quite exposed to the east and views from parts of the Arrowtown escarpment, in particular from Advance Terrace, extend across parts of this activity area. Depending on the screening and exact location of buildings it is likely that some of the buildings would be visible from a mid distance of around 500 metres, in particular from parts of the Arrowtown escarpment.

- Recommended Mitigation and Enhancement Measures: With the proposed RL 418masl, buildings would require some additional screening to reduce their visibility from Arrowtown. It is recommended that the existing terrain undulation on the east side of and adjacent to this activity area is contoured further to provide more landform screening. The landform could also be planted on, preferably with evergreen indigenous trees (eg beech) to provide further screening. The proposed LAMA shown on the structure plan adjacent to the activity area provides an appropriate means by which to achieve these outcomes. Careful consideration needs to be given to the extent and nature of surrounding landscaping and earthworks to soften the buildings, and the building location and design to ensure that landscape effects can be appropriately mitigated and minimised.

#### Activity Area A5:

- Ability to Absorb Change: HIGH. Area A5 is located in the central part of the Site, in proximity to the existing golf course development of the access road and Clubhouse. A consented residential building platform occupies part of this area, which would be absorbed into the activity area as part of this proposal. The low-lying area is adjacent to a small waterway and forms an amphitheatre shaped oval, generally out of view from outside of the Site. Due to its internal location this activity area is at a considerable distance (around 800m) from Advance Terrace in Arrowtown, and has a high potential to absorb buildings. Views to the area can only be gained from high-lying viewpoints in the east, such as the Crown Terrace, but not from Arrowtown. Some of the eastern part of the area is currently elevated towards an internal ridgeline and buildings in this part of the area would need to be accommodated low in the terrain, with landform screening to the east, to ensure appropriate landscape outcomes. A small cluster of existing conifers can be found within the area adjacent to the existing access road, which would provide a screening function for views from Arrowtown.
- Potential Visibility: LOW. This internal area faces into the central part of the golf course and is visually well contained. Due to the existing landform to the east, views to this area from Arrowtown are screened as long as buildings are located within low lying buildings platforms, off the eastern ridgeline that confines this area. It is anticipated that buildings up to 8 metres in height could be accommodated in this area, if sited at the proposed RL of 419.5masl, which would allow for full screening through planting or contouring in the LAMA adjacent to the northeast, if necessary.
- Recommended Mitigation and Enhancement Measures: A low-lying floor level that enables a balance of cut and fill is recommended for this area, in particular RL 419.5masl, meaning that buildings of up to 8m may be accommodated within the area. If additional mitigation is needed to fully screen views from the east, planting can be implemented on the eastern ridgeline, which would be highly effective for views from the Arrowtown escarpment. The LAMA shown on the structure plan appropriately provides for this.

#### Activity Area A6:

- Ability to Absorb Change: HIGH. Similar to activity area A5, A6 faces the internal part of the Site in a low-lying area near the Clubhouse. This circular area is contained by ridgelines on all sides. Due to the surrounding terrain, no or minimal additional mitigation would be needed to accommodate development in this area without causing adverse effects on external views.

- Potential Visibility: LOW. Similar to A5, this internal area faces into the central part of the golf course, is relatively low lying and is visually well contained. Due to its internal location, the activity area is at a considerable distance (about 900m) from Advance Terrace in Arrowtown, with existing landform to the east of the activity area screening views to the area, provided buildings are located on low lying buildings platforms.
- Recommended Mitigation and Enhancement Measures: Development in this activity area is likely to be screened from views from Arrowtown by existing landform and vegetation, meaning buildings of up to 8m can be accommodated without adverse visual or landscape effects. No other mitigation measures are required.

#### Activity Area A7:

- Ability to Absorb Change: HIGH. This relatively small activity area expands the site of a consented building platform. The landform surrounding this area is made up of undulating terrain to the north east with a cluster of willows, and a rising terrace to the south that form the southern boundary of the Hills property. Due to its secluded and contained location at a distance of over 800 metres from Arrowtown's Advance Terrace, this area could accommodate a small cluster of buildings.
- Potential Visibility: LOW. This contained area, including the proposed development, has low visibility from outside the Site, although some care needs to be taken to ensure that views from Advance Terrace are successfully blocked by the intervening ridgelines in the golf course. The area is contained by existing landform and deciduous trees to the east, and lends itself to a small cluster of buildings.
- Recommended Mitigation and Enhancement Measures: This area is well screened by existing landform and vegetation. Additional screening, if required, can be implemented in the LAMA shown on the structure plan. Fixed floor levels (RL414masl) are recommended to ensure views to the area from Advance Terrace are blocked.

#### Activity Area A8:

- Ability to Absorb Change: MEDIUM- LOW. This small activity area is located near the north eastern boundary of the Site, along McDonnell Road. This area is considered to be the visually most sensitive, since it is located in the immediate vicinity of the existing Arrowtown township. At a distance approximately 150m its proximity to the elevated residential dwellings along Cotter Avenue in Arrowtown and the intervening landform, which is restricted to a very low bund along the Hills' property boundary, makes this areas more susceptible to views from these elevated viewpoints. However, existing vegetation in the form of a shelterbelt of young conifers along the property boundary and mature poplars and willows add a degree of visual separation between Activity Area A8 and existing dwellings along the Arrowtown escarpment.
- Potential Visibility: HIGH. The elevated escarpment of Arrowtown (Cotter Ave and parts of Advance Terrace) have direct views to the area despite the existing landform (a bund) and vegetation (a shelterbelt) along the Site boundary. The outlook to the Site/Hills golf course from these elevated properties currently provides a high level of amenity to those properties. Due to the elevated position of these existing dwellings, it would be difficult to fully screen development in this activity area, even with mature vegetation. It is anticipated however

that a small number of buildings could be accommodated in this area amongst the vegetation along the lake edge, if appropriate height limits are imposed.

- Recommended Mitigation and Enhancement Measures: The rural outlook across this area and the character of the area could be maintained if building heights are restricted to 6.5 metres (at RL 402.5masl), a maximum of two buildings are established, and they are carefully sited along the frontage of the existing pond and between existing mature vegetation. Some additional planting along the Site boundary could also further assist in blending/softening the buildings into the surroundings without restricting the outlook beyond. The LAMA identified on the structure plan appropriately provides for this planting. With these measures in place, the outlook and visual amenity from elevated Arrowtown residences would not be adversely affected by development in the activity area.

#### Activity Area A9:

- Ability to Absorb Change: HIGH. This activity area, is located around a cluster of existing buildings and mature trees. The existing development in this area includes two residential dwellings, set in a visually enclosed part of the property, as well as an additional consented building platform. The trees surrounding the existing dwellings form an attractive amenity setting. Views into the area from the Arrowtown- Lake Hayes Road are blocked by a dense row of shelterbelts, and long-distance views from the Arrowtown escarpment (at over 1km) are obscured by several intervening ridges and vegetation.
- Potential Visibility: LOW. This proposed development area is barely visible from outside the property, as it is located amongst a cluster of existing buildings and mature trees. It is visually separated from roads and existing residential dwellings, including those on the Arrowtown escarpment, by both landform and existing vegetation. If glimpses to the area are possible, buildings would be hardly detectable at viewing distances of over 1km.
- Recommended Mitigation and Enhancement Measures: Due to the existing screening, buildings of up to 8m could be located in this area without adverse visual effects if the mature vegetation is maintained for screening purposes. Should any additional screening be required for this activity area, planting could be implemented within the LAMA to the east of this area, where it would blend in with the existing vegetation.

#### Activity Area A10:

- Ability to Absorb Change: HIGH. This activity area lies on a high elevated terrace that is visually separated from the remainder of the golf course. This flat terrace faces in a westerly direction towards Lake Hayes and has no visual connection to Hogans Gully and Arrowtown Lake Hayes Road. The only views to the area are from a long distance on Slope Hill above Lake Hayes. The buildings proposed in this area would be located behind an existing dwelling on a lower terrace. Due to the existing modifications in the vicinity of the area in the form of the neighbouring dwelling, and the high-lying nature of the terrace, the change absorption capacity of this activity area is high.
- Potential Visibility: MEDIUM. The flat elevated terrace is not visible from Arrowtown- Lake Hayes Road and Hogans Gully Road. The views from the neighbouring existing dwelling, adjacent to the west, should be taken into account (and gives rise to the 'medium' visibility classification), as development on the terrace has the potential to be seen from this dwelling at a distance of around 200 metres. The remainder of views to the area would be restricted

to elevated long distance viewpoints on Slope Hill and beyond, at over 2km distant. If views to the top part of buildings were to be possible from Hogans Gully and Arrowtown Lakes Hayes Road, they would be perceived in the context of existing buildings located on adjacent terraces, which means visual effects from these areas would be low.

- Recommended Mitigation and Enhancement Measures: Vegetation planting is recommended to be carried out adjacent to the western aspect of this activity area to soften the appearance of buildings and address any visual effects on the neighbouring property. The LAMA shown on the structure plan is an appropriate mechanism by which to ensure such mitigation plantings.

### Clubhouse and Resort Services Area

- Ability to Absorb Change: The proposed service area for the golf course is located near the entrance to the Site off McDonnell Road. This service area currently contains a large maintenance shed that is well screened from the road with mounding and vegetation. Due to the existing level of development in this area and the existing screening around it this area is considered to provide a HIGH ability to absorb further change with buildings of a similar height.

The existing clubhouse is located in a central location of the Site at a distance of at 700 metres from the nearest road. The clubhouse has been developed to a very high design standard with a low-lying building platform and both the clubhouse and adjacent car park are well screened by vegetation and landform from viewpoints outside the Site. The area to the south of the clubhouse is located within undulating terrain and the low-lying parts of this area have a HIGH potential to absorb change.

- Potential Visibility: While glimpses to the service area are possible from the golf course entrance at McDonnell Road and some parts of the Arrowtown escarpment, effective screening is already in place for this area to ensure that visibility of existing and potential future structures is LOW.

The existing clubhouse has very LOW visibility due to its low profile and surrounding landform and vegetation, in particular the cluster of pine trees to the north. Parts of the ridgeline immediately south of the existing clubhouse are visually more exposed to views from the southern Arrowtown escarpment (Advance Terrace), so future development in this area should be kept off the main ridgeline.

- Recommended Mitigation and Enhancement: The service area is well screened from most viewpoints and any potential mitigation would be required along the private property boundary to the north, where deciduous trees are already established.

The currently developed clubhouse area is screened by the cluster of existing pine trees. Buildings within the proposed clubhouse extension area to the south could be screened or softened, if required by planting immediately adjacent to buildings on the eastern boundary of the proposed area.

### Homesites within Resort Zone

- Ability to Absorb Change: The proposed homesites are located in visually discrete areas that are separated from each other by landform. It is proposed that eight of these homesites will be absorbed within the activity areas described above, with nine of them to be retained as sites for individual dwellings. HS7 and HS 6 already contain dwellings. It is considered positive landscape outcomes that fit with the character of the Site can be achieved by careful design and siting of buildings, and that a visually cohesive development that integrates well with the landscape can be achieved.
- Potential Visibility: The location of the homesites has been undertaken with care and it is expected that buildings can be absorbed well in these areas. HS2-5 are located in varied terrain amongst hummocks that can visually absorb the buildings with low visibility from Hogans Gully Road. It is likely that parts of the proposed buildings on HS2-4 will be visible from Hogans Gully Road at a distance of around 150- 250m, if they are developed to a height of 8 metres. However, the buildings would be seen in the context of a number of existing dwellings along this road. HS5, HS9 and HS10 are in the vicinity of the Clubhouse, facing into the internal aspect of the Site, tucked against rising landform, which leads to low visibility of the sites from outside the Site boundary. HS5 is located to the north of an existing cluster of pine trees, which currently block views from Hogans Gully Road to the homesite.

HS1 and 8 are located on the north facing terrace in the south eastern corner of the Site. The propose homesite HS8 is within a low point of the terrain, which would mean that it is of low visibility from outside the Site. HS1 is on a higher lying part of the rocky escarpment along the southern boundary of the Site, which will lead to a medium visibility from viewpoints to the east, such as McDonnell Road and Arrowtown. While the frontage of this building would be visible from parts of McDonnell Road and the Arrowtown escarpment, a suitable building platform can be achieved in relation to the terrain by partly cutting it into the slope on the southern side of the building. In combination with dark colours and low reflectivity, buildings in this area are not going to appear visually prominent from Arrowtown, which is at a distance of over 1km away. Visibility of HS1 from Mc Donnell Road would be restricted to glimpses between existing conifers along the eastern boundary of the property.

- Recommended Mitigation: For HS2-5 specific low-lying RLs (see proposed Zone provisions) are recommended to ensure that the buildings can be successfully integrated in the hummock landscape on the southern side of the site. The internally facing platforms on HS9 and 10 may accommodate higher buildings without visual effects. For HS 1 and 8, the building design and colour is of importance to ensure that the structures can be successfully integrated into the landscape. A design that allows for these buildings to be cut into the back slope would avoid their appearance on the skyline.

## Conclusion on Visual and Landscape Effects

The above visibility analysis provides an individual assessment of views that would likely be gained to the proposed activity areas, homesites, the clubhouse and resort services area. In this section overall conclusions are drawn on the visual effects that would be experienced by viewers on public and private land surrounding the property.

The visibility of activity areas and homesites on the eastern part of the Site, including the clubhouse and resort services areas, would be largely restricted to the Arrowtown escarpment (Cotter Avenue and Advance Terrace) with few glimpses possible from McDonnell Road and some of the neighbouring properties. The implementation of additional mounding and screen planting within the proposed LAMAs, in combination with low-lying, fixed building platforms would ensure that significant adverse visual effects can be avoided. The proposed colours for the buildings would mean that at viewing distances of more than 500 metres (apart from A8 at 200 metres) would not dominate the landscape when viewed from these private residences.

The remainder of the proposed development areas in the central and western part of the Site are generally focussed internally with low visibility from outside the Site. The steeply rising terrain along Hogan Gully Road and parts of Arrowtown-Lakes Hayes Road almost entirely blocks views from a southwesterly direction. There is very limited need to implement additional screening within this part of the Site, as visual effects are expected to be low from public viewpoints.

From long-distance elevated viewpoints the majority of the proposed Resort Zone would be visible, but at viewing distances of over 1km, the buildings would form a very small component of the view and would be perceived together with numerous existing buildings, such as Arrowtown and Millbrook Resort. The visual effects from these elevated viewpoints are, therefore, not considered to be adverse.

The domestication that has taken place within the Site over the past decade, as the golf course has been established, has led to a change from its original rural characteristics. While the golf course still provides open space and amenity values, these values differ significantly from rural areas that contain productive agricultural land uses.

The proposed activity areas are sited in confined areas that are visually not connected to each other, and therefore, the development would not lead to cumulative visual effects within the site.

While a number of buildings may be partially visible from Arrowtown, the clusters would form a small component of the view across the open golf course, as they are at considerable distance from the township.

The proposed mitigation within the Site will build on existing landform and planting patterns and the landscape change from the mitigation will not be readily detectable from outside the golf course. Few activity areas are located close to the property boundaries and for those areas that are mitigation is proposed to ensure that adverse visual effects of buildings on neighbouring properties can be avoided as described in the assessment.

As part of the Structure Plan design particular emphasis was placed on maintaining the current visual coherence of the golf course by placing the proposed activity areas and home sites in areas, where they are in harmony with the line and form of the landscape. The small scale terrain of the Site and the landform variation allows the buildings to be sited, so that adverse effects of the structures on



the internal ridges and slopes can be avoided. Due to the existing screening from low-lying viewpoints, such as roads, appearance of buildings on the skyline is avoided. The development setbacks from public roads in combination with existing landform and vegetation screening will ensure that amenity values associated with the views from public roads are maintained.

## Statutory Assessment

In accordance with Section 32 of the Resource Management Act 1991 ('RMA'), this part of the report addresses assesses the proposal against the following statutory documents, as relevant:

- Part II of the RMA
- The objectives of the Proposed Queenstown Lakes District Plan;
- The provisions of the proposed Hills Resort Zone.

### Part II of the RMA

Part II of the RMA sets out the purpose and principles of the Act (**Sections 6-8**).

**Section 6** requires the matters listed in the section be recognised and provided for as “matters of national importance”. The only section 6 matter potentially of relevance to this proposal and landscape assessment is “(b) *the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development.*”

There are no outstanding natural landscapes or features within or close to the Hills’ property. Therefore there are no matters of national importance relevant to this assessment.

*Section 7 RMA identifies “other matters” to which particular regard must be had by the council when assessing this proposal.*

The section 7 matters considered potentially relevant to this proposal are:

- (b) *The efficient use and development of natural and physical resources.*
- (c) *The maintenance and enhancement of amenity values.*
- (f) *Maintenance and enhancement of the quality of the environment.*

These matters are discussed below within the assessment of the objectives and policies of the Proposed Plan as notified, and the provisions of the proposed Hills Resort Zone.

### Proposed District Plan

#### Chapter 3 Strategic Direction:

#### **Relevant objectives and policies under 3.2.5 Goal - Our distinctive landscapes are protected from inappropriate development**

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

*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.*

The Hills golf course differs in character from rural and productive farm land in the basin. It is considered that the golf course can absorb the resort style buildings proposed under the Resort Zone without adverse effects on the amenity of the area. Within the Site discrete areas are chosen

for development that can absorb change without detracting from existing landscape and visual amenity values or causing cumulative effects in terms of the inherent landscape character.

The existing landscape within the Site contains a golf course to a high design standard. While this manicured landscape provides high amenity values, it is in reality highly modified. It provides a pleasant outlook for a number of residents in Arrowtown, but the landscape and visual amenity values are not considered vulnerable to degradation due to the degree of human intervention that has taken place in the past. Within the Site care has been taken under the preparation of the structure plan for the Hills Resort Zone to locate the proposed activity areas and home sites within areas that have a greater potential to absorb change. The activity areas are all located in parts of the Site where they will not adversely affect the landscape and visual amenity values currently provided in the golf course. The location of buildings has taken into account the local small scale topography and existing vegetation of the Site to ensure that the proposed buildings can be successfully accommodated within significant visual effects on viewpoints located outside the property.

## **Chapter 6 Landscape:**

*6.3.1.8 Ensure that the location and direction of lights does not cause glare to other properties, roads, and public places or the night sky.*

*6.3.1.11 Recognise the importance of protecting the landscape character and visual amenity values, particularly as viewed from public places.*

For external lighting down lights are proposed to minimise visibility. While lights from some of the buildings will be seen from outside the Site, including Arrowtown, the impact in the context of the township is considered to be minimal.

It is considered that the landscape character and visual amenity of the property, when viewed from surrounding viewpoints, including public and private places, can be maintained under this particular proposal.

*6.3.2 Objective - Avoid adverse cumulative effects on landscape character and amenity values caused by incremental subdivision and development.*

*6.3.2.2 Allow residential subdivision and development only in locations where the District's landscape character and visual amenity would not be degraded.*

*6.3.2.4 Have particular regard to the potential adverse effects on landscape character and visual amenity values from infill within areas with existing rural lifestyle development or where further subdivision and development would constitute sprawl along roads.*

*6.3.2.5 Ensure incremental changes from subdivision and development do not degrade landscape quality, character or openness as a result of activities associated with mitigation of the visual effects of proposed development such as screening planting, mounding and earthworks.*

It is proposed to change the existing operative rural zoning to the Hills Resort zone, which is considered appropriate for the existing and proposed landscape character of the golf course, which provides low landscape character values generally associated with rural land. The absence of productive farming land uses differentiates the golf course on the Site from other rural land in the district. However, within the context of the present landscape the visual coherence of the landscape will be preserved by ensuring that proposed buildings will be located in areas with the potential to absorb change, as described in detail in the assessment of activity areas.

In terms of landscape outcomes it is considered preferable to provide for this style of development, encompassing clustered residential and visitor accommodation, within a specific resort zone, to avoid residential development in rural areas. The proposed Resort Zone would not constitute sprawl of conventional residential development. The proposed residential activity areas are clustered in central parts of the Site, which avoids sprawl along the roads. As part of the proposal very specific areas have been identified for mitigation measures, where screen planting and mounding would visually form part of the existing golf course environment without impacting on the openness of the site.

*6.3.5 Objective – Ensure subdivision and development does not degrade landscape character and diminish visual amenity values of the Rural Landscapes (RLC)*

*6.3.5.2 Avoid adverse effects from subdivision and development that are:*

- *Highly visible from public places and other places which are frequented by members of the public generally (except any trail as defined in this Plan); and*
- *Visible from public roads.*

*6.3.5.3 Avoid planting and screening, particularly along roads and boundaries, which would degrade openness where such openness is an important part of the landscape quality or character.*

*6.3.5.4 Encourage any landscaping to be sustainable and consistent with the established character of the area.*

*6.3.5.5 Encourage development to utilise shared accesses and infrastructure, to locate within the parts of the site where they will be least visible, and have the least disruption to the landform and rural character.*

*6.3.5.6 Have regard to the adverse effects from subdivision and development on the open landscape character where it is open at present.*

It is understood that the proposed rezoning does not need to be assessed under this objective and its associated policies because if the rezoning is granted the Rural Landscape classification in the Proposed Plan will no longer apply. Nonetheless it is considered the proposal achieves these provisions. The Site in general is not highly visible from the adjacent roads due to existing landform and vegetation screening. The topography of the terrain within the Site is highly variable and a number of internally oriented spaces have been created that can absorb development without being visible from public roads. From high-lying public viewpoints, such as Feehly Hill and Tobins Track, large parts of the proposed development would be visible, but seen in the context of Arrowtown Township and Millbrook Resort. No additional screen planting along the roads is proposed as part of the Structure Plan, and therefore, no loss of openness or views from public roads is expected under the proposal. The design of the proposed development will be in character with the Hills golf course to provide high amenity. The proposed resort zone would be in character with the existing land use and would be perceived as a logical extension to the tourism and recreation experience provided within the Site. The design of the golf course with a mix of manicured greens, areas of native grasses and clusters of exotic trees and shrubs allows for the small pods of development to integrate among the undulating landform of the Site. The creation of unnatural lines and incongruous appearance of development will be avoided in order to maintain the internal amenity of the site, as well as the outlook of adjacent residents. The access tracks between activity areas and homesites will be shared, which reduces the need for additional internal roads.

## Proposed Hills Resort Zone Provisions

A specific range of development is proposed to be enabled under in the Hills Resort Zoning, provided specified standards are met, including in relation to building heights and locations, colours, materials, and reflectivity. In addition, areas of mitigation landscaping and planting (LAMAs) are shown on the structure plan and rules are proposed which require landscaping in these areas to be undertaken before development in the adjacent activity area is completed. These planting areas will help to ensure appropriate landscape outcomes will be achieved, and buildings are screened or softened (whichever is required for the particular area). Together, these measures will ensure that buildings and development within the new zone is appropriate for and well integrated with its location and the character of the site and the wider environment.

The design of the structure plan has been undertaken with input from the landscape assessment. As part of this the building locations, height and activity status are specifically tailored for each activity area and home site to ensure that landscape outcomes without adverse effects on the wider landscape can be achieved. The proposed Structure Plan provides certainty around the comprehensive design of the individual areas of development. The location of activity areas and home sites responds to the site characteristics and is considered a sympathetic development within the modified environment of the golf course.

Three of the proposed activity areas are considered visually more sensitive (A3, A4, A8), principally due to the potential views that can be gained to these areas from Arrowtown. It is proposed that buildings in these areas require resource consent as controlled activities, with the following matters of control specified:

- The external appearance of the building including colours and materials
- The location of car parking and curtilage areas
- Signage for Visitor Accommodation activities
- The extent and nature of surrounding landscaping and earthworks to soften the building
- The location of buildings on ridgelines to ensure landscape effects are minimised

The controlled activity status and matters of control specified in the rules for these more sensitive activity areas also applies to the homesites, (with an additional matter for HS1 and HS8, namely the extent to which buildings in these areas are cut back into the slope to avoid the appearance on the skyline), which means that the individual design of these dwellings can be assessed prior to construction. This approach will ensure that the visually most sensitive parts of the Site will be developed in a way that adverse visual effects on private and public views can be avoided. The openness of the site, perceived from Arrowtown and adjacent roads, would not be changed and through landscaping, which will be consistent with the established character of the property, the overall landscape quality and character of the Hills golf course can be maintained.

It is proposed that for all buildings in the Resort Zone, the colours and materials used be restricted to a range of black, browns, greens or greys; pre-painted steel; and that all roofs must have a reflective value not greater than 20% and surface finishes a value not greater than 30%. These measures means that buildings will not be visually prominent, even if parts of buildings are visible from various viewpoints.

A reduced level (RL) maximum height has been nominated for most activity areas, meaning that buildings of up to 8 metres can be built in all activity areas (other than A8), including the Clubhouse, Resort Services and Homesites areas. For those areas where an RL is nominated, buildings may need to be cut into the ground in order to achieve this maximum height, which will ensure they are appropriately nestled into the landform. For A8, which is located in close proximity to the Arrowtown escarpment, a lower building height of 6.5 metres is proposed which will ensure that the

openness and views across the site can be maintained without adverse effects on the visual amenity experienced by residents in Arrowtown. In general the approach to building heights is considered appropriate, since visibility from surrounding roads to the internally located individual house sites is very low and long distance views from Arrowtown (over 1km) will only be affected to a minor extent.

The development proposed under the proposed Hills Resort zoning is not urban or rural lifestyle/residential in character. The Zone provides for a sensitively designed resort style development instead. The structure plan aims to maintain large areas of open space in the golf course activity area (approximately 95 % of the site) with confined nodes of built development where they can be absorbed in the landscape. The design builds on the existing land use pattern and will not adversely affect landscape or visual amenity values. The primary driver behind the design was to maintain the operation and aesthetic value of the golf course and to develop accommodation in a complementary style. The activities to be provided within the club house and resort services areas are considered complementary to the existing land use and appropriate in the context of the golf course.

## Conclusion

This assessment of landscape and visual effects of the development that would be enabled by the proposed Hills Resort Zoning provides an analysis of the proposed residential/ visitor accommodation activity areas (A1-10) and home sites (HS1-10), as well as the club house and resort services area.

The structure plan for the proposed Resort Zone has been developed following a detailed analysis of the Site, and having particular regard to the parts of the Site with high potential to absorb change and development.

Development within the activity areas identified on the structure plan can generally occur, provided specified standards relating to building design, height and landscaping etc are met. These standards will ensure that buildings and development is in character with the surrounding local and wider environment, is not visually prominent or dominant but is recessive in appearance to blend into the landscape, and will not give rise to significant adverse landscape or visual effects.

Areas for development are located within internal parts of the Site, where landscape and visual effects will be minor when viewed from surrounding roads as well as from the residential areas of Arrowtown.

The comprehensive development proposal has been tailored specifically for this Site, with its current recreational/golf uses and high design and maintenance standards. The proposed rules for the zone will ensure that the significant majority of the Site (approximately 95%) will be maintained as open space which is appropriate given its current recreational uses and location in proximity to Arrowtown.

The existing golf course on the Site currently provides high visual diversity in terms of landform and land cover. The visual amenity of the Site is high, due primarily to its manicured character. Despite its current Rural Zoning, given it is used as a golf course, does not currently provide rural landscape values relating to productive land uses. The existing landscape character lends itself to the proposed development, and due to the low visibility of the proposed activity areas, in combination with the proposed restrictions on building design, heights, colours and materials etc, as detailed above, adverse effects on landscape character and values can be avoided.



# The Hills Resort Zone

## QLDC DPR Submission

Graphic Supplement for Landscape and Visual Amenity Assessment  
October 2015



Boffa Miskell





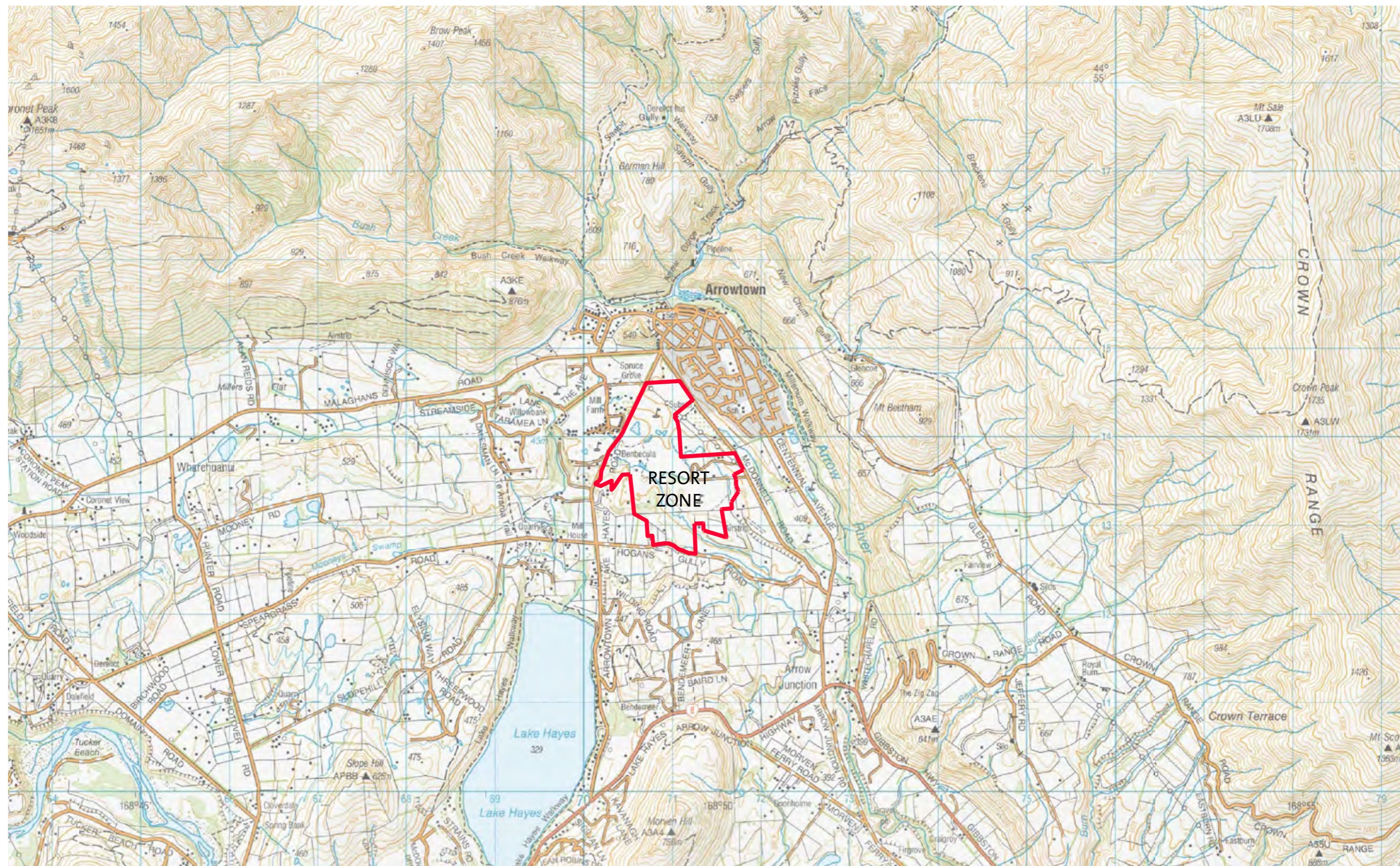
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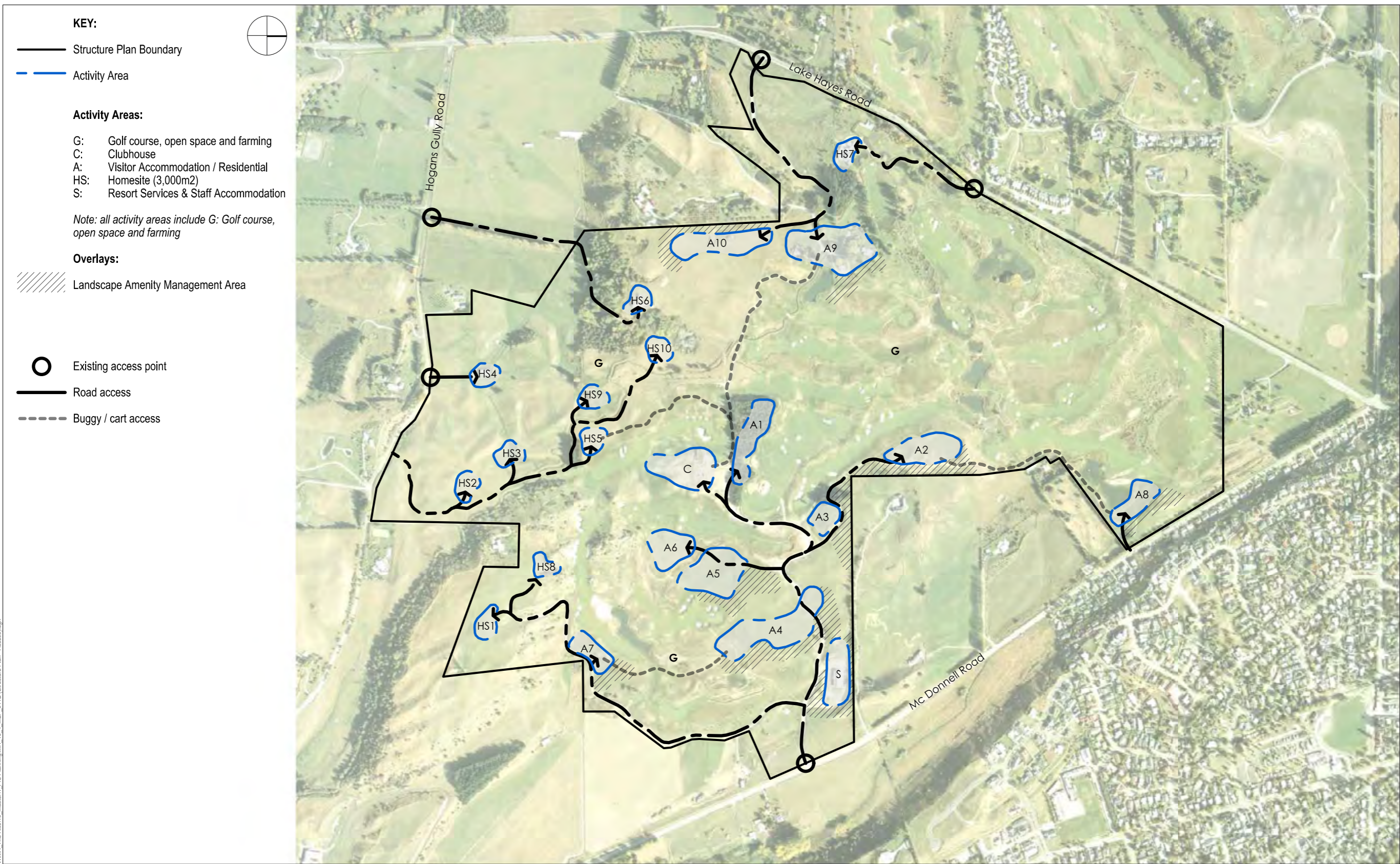
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## Contents

Figure 1: Site Location	3
Figure 2: Proposed Resort Zone Plan	4
Figure 3: Activity Areas and Home Sites	5
Figure 4: Site Context Photograph Locations	6
Figure 5: Site Context Photographs 1, 2	7
Figure 6: Site Context Photographs 3, 4	8
Figure 7: Site Context Photographs 5, 6	9
Figure 8: Site Context Photographs 7, 8	10

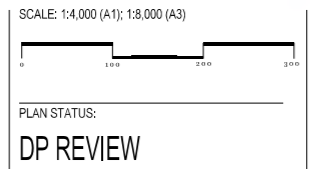




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## THE HILLS STRUCTURE PLAN - ACCESS

DRAWN / REVIEWED: RT / DT  
 APPROVED: DT  
 DATE: 14.10.15

DRAWING NO:  
**MH\_10\_1\_MLP\_011B**



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### THE HILLS RESORT ZONE, QLDC DPR SUBMISSION

Figure 2: Proposed Resort Zone Plan

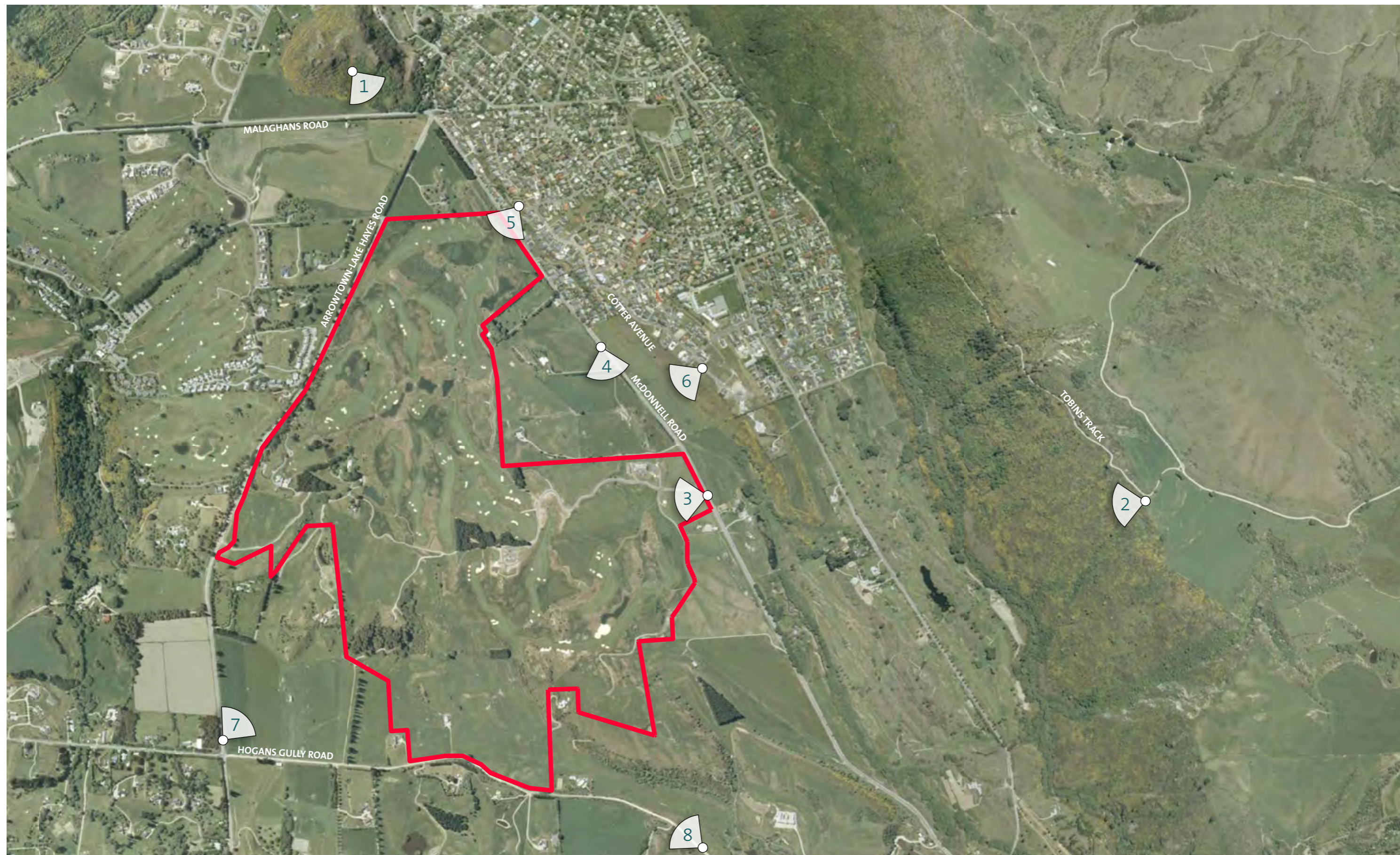
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 Plan prepared by Boffa Miskell Limited

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Figure 2  
 PAGE 4



Aerial photograph showing the approximate locations of activity areas and home sites.





Site Context Photograph 1: View from Feehlys Hill, in Arrowtown, looking in a southerly direction towards the Site



Site Context Photograph 2: Photograph taken from a location near the top of Tobins Track looking in a southwesterly direction towards the Site



Site Context Photograph 3: View from McDonnell Road looking in a westerly direction toward the Site



Site Context Photograph 4: View from McDonnell Road looking in a southwesterly direction toward the Site



Site Context Photograph 5: View from Arrowtown escarpment (walkway to Cotter Avenue) looking in a westerly direction toward the Site



Site Context Photograph 6: View from Cotter Avenue looking in a westerly direction toward the Site





Site Context Photograph 7: View from Arrowtown-Lake Hayes Road looking northeast toward the Site



Site Context Photograph 8: View from Hogans Gully road looking west toward the Site



**MARSHALL DAY**   
**Acoustics**

**THE HILLS REZONING  
HELICOPTER NOISE ASSESSMENT**

Rp001 R01 2015564C | 12 October 2015

Project: **THE HILLS REZONING**

Prepared for: **Boxer Hill Trust  
C/- Lane Neave  
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Queenstown 9348**

Attention: **Rebecca Wolt**

Report No.: **Rp001 R02 2015564C**

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#### Document Control

Status:	Rev:	Comments	Date:	Author:	Reviewer:
Client Draft			8 October 2015	Steve Peakall	
	R01	Internal Review	12 October 2015	Steve Peakall	Laurel Smith
	R02	Legal Review	15 October 2015	Steve Peakall	

## TABLE OF CONTENTS

1.0	INTRODUCTION.....	4
2.0	PROPOSAL.....	4
2.1	Proposed Activity .....	5
2.2	Existing Environment .....	5
3.0	NOISE PERFORMANCE STANDARDS.....	5
3.1	Operative Queenstown Lakes District Plan.....	6
3.2	Proposed (Notified District Plan Review) .....	6
3.3	New Zealand Standard 6807:1994 .....	6
3.4	Recommended Performance Standards.....	7
4.0	PREDICTED NOISE LEVELS .....	7
4.1	Noise Modelling Methodology .....	7
4.2	Measured Sound levels .....	8
4.3	Predicted Noise Levels.....	8
4.4	Assessment of Noise Effects.....	9
5.0	CONCLUSION .....	9

APPENDIX A GLOSSARY OF TERMINOLOGY

APPENDIX B FIGURES

## 1.0 INTRODUCTION

Marshall Day Acoustics has been engaged by the Boxer Hill Trust (the Trust) to undertake an assessment of helicopter noise effects from helicopter movements using a private helicopter landing area on the Hills golf course, located at 164 McDonnell Road, Arrowtown.

Noise emissions from the proposed helicopter operations have been predicted using the Integrated Noise Model (INM) software. Predicted noise levels are considered in relation to the noise rules of the Operative Queenstown Lakes District Plan and the relevant text of the notified Proposed District Plan.

Noise performance standards have been recommended based on the Operative and Proposed District Plan noise provisions and New Zealand Standard NZS 6807: 1994 *“Noise Management and Land Use Planning for Helicopter Landing Areas”*.

This report presents the findings of the noise assessment. A glossary of terminology is presented in Appendix A.

## 2.0 PROPOSAL

It is proposed by the Boxer Hill Trust to formalise a helicopter landing area at the Hills Golf Course in Arrowtown for private transportation to and from the site.

The golf course is located at 164 McDonnell Road, Arrowtown. The total land area of the site is approximately 162 Hectares. The proposed helicopter landing area is located just to the south of the existing clubhouse associated with the golf course and is currently used on an informal basis for helicopter movements.

Figure 1 shows the location of the proposed helicopter landing area.

**Figure 1: Proposed Helicopter Landing Area**



## 2.1 Proposed Activity

Typically the landing site has been used infrequently with approximately five movements per week on average. The landing zone has also been used historically for a higher number of movements on special event days at the golf course, an example of which is the New Zealand Golf Open.

The Trust is seeking to rezone its land to provide for resort style development, including visitor accommodation, residential activity, worker accommodation and ancillary commercial activity. In association with these activities the Trust is also seeking to formally allow for a number of helicopter movements to and from the site, for both special event days and for typical everyday usage.

For typical activity, the helicopter landing area would be used for not more than 12 movements (6 landings and 6 take-offs) in any consecutive seven day period. Helicopter movements would take place between the hours of 7.00 am and 10.00 pm Monday to Sunday

The type of helicopter would vary but is likely to be a Eurocopter EC130 or other type that is equivalent or lower in noise emissions. The helicopters would approach and depart the site generally to the south-east; and would not directly overfly any building or when below 500 ft in altitude.

For special event days it is envisaged that up to 20 helicopter movements could occur on any given day. MDA understand that special event days would only occur for up to ten days per year. The noise effects of consecutive special event days are discussed in more detail in section 4.3.

## 2.2 Existing Environment

Surrounding the site are several dwellings at various distances. Most are located over one kilometre from the proposed helipad, the closest being 500m away to the south. The receivers used in the assessment are shown on Figure 1, Appendix B.

It is noted that Receiver E is a wood shed and therefore not a noise sensitive receiver and that Receiver I, L, M and N are associated with the site and therefore not considered to be affected by helicopter noise for the purposes of this assessment. These have been excluded from our assessment.

Marshall Day Acoustics has visited the general area of the site on a number of occasions and observed the vicinity of the site and surrounding environs to be typical of a rural environment. The golf course is expected to be reasonably similar to a typical rural environment, and for extended periods of time may be noticeably quieter. Whilst, at the time of writing this report, no specific noise measurements on-site have occurred, the noise environment is expected to be relatively quiet, with natural sounds such as wind, birds in trees and trees rustling the main noise sources on-site.

Occasional heavy vehicles using the nearby road would be audible, as would aircraft activity associated with Queenstown Airport. The area is also subject to a moderate degree of existing helicopter activity, serving the various tourist operations that are common in the Queenstown Lakes District.

## 3.0 NOISE PERFORMANCE STANDARDS

General noise performance standards are not suitable for controlling noise from helicopter operations which involve high noise levels for short intermittent periods of time.

Helicopter noise emissions involve periods of relatively high noise levels for short periods, followed by periods where no noise is occurring, as the helicopter has either departed and left, or has been shut down. The general noise performance standards do not allow for or recognise that helicopters are inherently noisy, but also that noise occurs over a relatively short timeframe, with significant periods of respite between events where no noise is occurring.

New Zealand Standards published NZS 6807:1994 “Noise Management and Land Use Planning for Helicopter Landing Areas” (NZS 6807) to provide a standard approach to managing the effects of helicopter noise on sensitive receivers (e.g. dwellings). Some district plans throughout the country reference NZS 6807 directly, whereas others apply the principles of the Standard but with modified noise limits. The approach taken in the Operative Proposed Queenstown Lakes District Plan is described below.

### 3.1 Operative Queenstown Lakes District Plan

The site is currently zoned Rural General in the Queenstown Lakes District Plan. Helicopter landing areas are not provided for explicitly in the Operative District Plan, and helicopter noise emissions would be controlled by the general noise rules of the zone.

We understand that a helicopter landing area in the General Rural zone is a Discretionary Activity. For reference the general noise limits for the General Rural Zone are contained in Rule 8.2.4.2 (iii) (a) and are as follows:

**Table 1: Noise from non-residential activities received within the Notional Boundary in Rural General Zone**

Noise Limits dBA $L_{eq}(15mins)$	
Daytime 8.00am – 8.00pm	Night-time 8.00pm – 8.00am
50	40 and 70 dBA $L_{AFmax}$

As mentioned, general noise limits are not considered suitable for controlling noise from helicopter operations. In addition, the District Plan specifically refers, in rule 5.3.5.2 (v) (a), to New Zealand Standard NZS 6802:2008 “Acoustics - Environmental Noise” for the assessment of environmental noise emissions. This standard specifically defines helicopter noise emissions as requiring special assessment techniques outside the general scope of that standard.

Therefore the Operative Plan (to the extent it is relevant) acknowledges that helicopter noise requires special consideration, but does not provide any express guidance as to how it should be assessed.

### 3.2 Proposed (Notified District Plan Review)

The notified text of the Queenstown Lakes Proposed District Plan recognises helicopter noise emissions as requiring special consideration by proposing a specific rule (Proposed District Plan, Chapter 36, Rule 36.5 Table 3 – Specific Standards, 36.5.13) , as outlined below:

*“Table 3 Specific Standards*

*36.5.13 – Helicopters: Sound from any helicopter landing area must be measured and assessed in accordance with NZ 6807:1994 Noise Management and Land Use Planning for Helicopter Landing Areas. Sound from helicopter landing areas must comply with the limits of acceptability set out in Table 1 of NZS 6807. For the avoidance of doubt this rule does not apply to designated airports.”*

The rule also specifies a noise limit of 50 dB  $L_{dn}$  for residential sites, which is consistent with NZS 6807.

### 3.3 New Zealand Standard 6807:1994

NZS 6807:1994 “Noise Management and Land Use Planning for Helicopter Landing Areas” has been written to provide territorial authorities guidance on the control of noise from helicopter landing areas by way of resource consents or rules in the District Plan. The Standard recognises that general

community noise controls are not appropriate for managing the noise effects of helicopter operations.

NZS 6807 is intended for helicopter landing areas used for ten or more movements in any month or where flight movements are likely to result in a maximum sound level exceeding 70 dB  $L_{AFmax}$  at night or 90 dB  $L_{AFmax}$  during the day in any residential zone or notional boundary of any rural dwelling. It is not intended to apply to infrequently used helicopter landing areas or emergency operations. Given that under the proposed re-zoning of the Trust's land there may be more than 10 flight movements per month, it is appropriate to apply the NZS 6807 in this case.

The Standard sets out the following limits of acceptability for helicopter noise for a range of receivers:

**Table 2: NZS 6807 Limits of Acceptability**

Affected Land Use	$L_{dn}$ day-night average sound level (dB)	$L_{Amax}$ night-time maximum sound level (dB)
i. Industrial	75	n/a
ii. Commercial	65	n/a
iii. Residential	50	70
iv. Rural (at notional boundary)	50	70
v. Residential (internal)	40	55

The hours for night-time  $L_{max}$  shall be defined by the local authority. In the absence of any specific definition by the local authority for helicopter landing areas, the hours of 10.00pm to 7.00am the following day shall be defined as night-time for the purposes of the Standard.

The Standard defines an acceptable limit of 50 dB  $L_{dn}$  and an additional night-time limit of 70 dB  $L_{Amax}$  for residential and rural receivers.  $L_{dn}$  is the day night average noise level where helicopter noise between 10pm and 7am is penalised by ten decibels to account for the extra sensitivity at night. The Standard states the  $L_{dn}$  may be averaged over seven days provided that the level on any one day does not exceed 53 dB  $L_{dn}$ .  $L_{AFmax}$  is the maximum noise level received during a helicopter movement. It applies at night to protect against sleep disturbance.

### 3.4 Recommended Performance Standards

The proposed activity is for helicopter operations during the day time only. Based on the provisions of NZS 6807 and the Proposed District Plan we recommend the following noise limits apply to helicopter operations from the site in the (newly formed) zone:

Noise from helicopter operations shall not exceed 50 dB  $L_{dn}$  at the notional boundary of any dwelling. The day night average noise level ( $L_{dn}$ ) shall be averaged over any consecutive seven day period and shall not exceed 53 dB  $L_{dn}$  on any one day.

## 4.0 PREDICTED NOISE LEVELS

### 4.1 Noise Modelling Methodology

Aircraft noise modelling software called the Integrated Noise Model (INM) has been used to predict  $L_{dn}$  noise emissions from the proposed helicopter operations. The INM is produced by the Federal Aviation Administration (FAA) of the United States and is widely used internationally for modelling noise emissions from airports and heliports.



We understand the proposed helicopter landing area would be approached and departed from the south east, although other routes may be flown depending on prevailing meteorological conditions on any given day.

We understand that either a Eurocopter EC130 or AS350 Squirrel helicopter or an alternative that is equivalent or quieter will be operated to and from the proposed helipad. Noise levels have been predicted using the EC130 (which has a similar noise footprint to a AS350 Squirrel) in the INM and using the model's standard approach and departure profiles which include time on the ground with the engine and rotor operating before a departure and after an arrival.

#### 4.2 Measured Sound levels

MDA has measured noise emissions from a Eurocopter EC130 in general accordance with the New Zealand noise measurement standard NZS6801:2008. Detailed sound exposure level ( $L_{AE}$  or SEL) measurements of these helicopters arriving, departing and flying at 500 feet were performed. These measurements have been used to verify the INM modelling. In general the INM modelling is accurate for the helicopter types under investigation on centreline of the flight paths, but the model tends to over-predict noise levels off axis from the helicopter flight path, in some cases by up to 5 decibels. Therefore the noise modelling presented in this report is considered to be conservative.

#### 4.3 Predicted Noise Levels

Four scenarios have been modelled:

<b>(A) Existing Activity</b>	<b>5 movements per week</b>
<b>(B) Future Typical Activity</b>	<b>12 movements per week</b>
<b>(C) Special Event Days</b>	<b>20 movements per day</b>
<b>(D) Cumulative Noise level</b>	<b>The cumulative noise level averaged over 7 days from the future typical activity and three consecutive days of Special Event activity</b>

The predicted noise levels for each receiver shown in Appendix B are shown in Table 3 below. Note that for Scenario (A), (B) and (D) the noise levels have been averaged over 7 days in accordance with NZS 6807. For Scenario (C) the noise level is for a single day of activity has been calculated to assess whether the single daytime  $L_{dn}$  exceeds a noise level of 53 dB  $L_{dn}$  on any one day.

**Table 3: Predicted Noise Levels**

Assessment Location	Predicted Noise Levels			
	(A) Existing Activity	(B) Future Typical Activity	(C) Special Event Days	(D) Cumulative Noise level
	(dB $L_{dn}$ 7day)	(dB $L_{dn}$ 7day)	(dB $L_{dn}$ )	(dB $L_{dn}$ 7day)
Receiver A	<30	<30	31	<30
Receiver B	<30	<30	37	34
Receiver C	<30	<30	38	35
Receiver D	<30	32	43	40
Receiver F	<30	33	43	40
Receiver G	34	37	48	45
Receiver H	31	35	46	43
Receiver J	<30	33	44	41
Receiver K	<30	<30	39	36

The results show that for all scenarios the proposed noise control of 50 dB  $L_{dn, 7 \text{ day}}$  at the notional boundary of all surrounding dwellings can be readily complied with. This applies for typical activity and also for weeks where up to 3 special event days occur in any 7 day period.

For the worst case “Special Event Day” where up to twenty movements occur on any day, the noise levels are predicted to be no greater than 48 dB  $L_{dn}$  at the notional boundary of all dwellings. This ensures that on any one day the maximum noise level does not exceed 53 dB  $L_{dn}$  and is therefore compliant with NZS 6807. If there were to be more than three special event days in any 7 day period noise levels may exceed the criterion to a small extent.

Noise contours for the three scenarios are shown in Figure 2, Appendix B. It can be seen that terrain effects have some influence on the shape of the contours in some locations, but that generally the noise level is higher along the flight path, with noise emissions from the ground idle and flight idle components of each movement contributing to noise levels in close proximity to the helipad.

#### 4.4 Assessment of Noise Effects

Based on the predicted noise levels presented above, noise from helicopter operations would typically be at a low level at nearby residences. For special event days, noise would approach the upper limit of acceptability for helicopter noise emissions, but still fall within the proposed maximum noise control by some margin. Because there are only envisaged to be a small handful of such days per year, we consider that helicopter movements as presented in this report would result in noise effects that are reasonable.

#### 5.0 CONCLUSION

Marshall Day Acoustics has assessed noise emissions from proposed typical helicopter activity and special event days at the Hills golf course, Arrowtown.

The assessment has been carried out generally in accordance with the provisions of New Zealand Standard NZS 6807:1994 “*Noise Management and Land Use Planning for Helicopter Landing Areas*”, as required in the Proposed Queenstown Lakes District Plan.

Our predictions show that in both cases noise emissions can readily comply with a noise control of 50 dB  $L_{dn}$  at all nearby sensitive receivers. In addition, on any one day the predicted noise levels would not exceed the criterion by more than 3 decibels, which would be compliant with the provisions of NZS 6807. On this basis we recommend the new zone rules should limit helicopter use so that:

- Helicopter noise emissions do not exceed 50 dB  $L_{dn}$  at the notional boundary of any dwelling (averaged over seven days) and shall not exceed 53 dB  $L_{dn}$  on any one day, when assessed in accordance with New Zealand Standard NZS 6807:1994 “*Noise Management and Land Use Planning for Helicopter Landing Areas*”

It is considered that the noise effects from the proposed helicopter operations on noise sensitive receivers would be reasonable where emissions are below the recommended performance standards in Section 3.3.

## APPENDIX A GLOSSARY OF TERMINOLOGY

<b>Noise</b>	A sound that is unwanted by, or distracting to, the receiver.
<b>Ambient</b>	The ambient noise level is the noise level measured in the absence of the intrusive noise or the noise requiring control. Ambient noise levels are frequently measured to determine the situation prior to the addition of a new noise source.
<b>dB</b>	<u>Decibel</u> The unit of sound level.  Expressed as a logarithmic ratio of sound pressure P relative to a reference pressure of $P_r=20 \mu\text{Pa}$ i.e. $\text{dB} = 20 \times \log(P/P_r)$
<b>A-weighting</b>	The process by which noise levels are corrected to account for the non-linear frequency response of the human ear.
<b>Notional Boundary</b>	In the Queenstown Lakes District, means a line 20m from the façade of any residential unit or the legal boundary whichever is closer to the residential unit.
<b><math>L_{Aeq}(t)</math></b>	The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the average noise level.  The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.
<b><math>L_{A90}(t)</math></b>	The A-weighted noise level equalled or exceeded for 90% of the measurement period. This is commonly referred to as the background noise level.  The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.
<b><math>L_{dn}</math></b>	The day night noise level which is calculated from the 24 hour $L_{Aeq}$ with a 10 dB penalty applied to the night-time (2200-0700 hours) $L_{Aeq}$ .
<b>SEL or <math>L_{AE}</math></b>	<u>Sound Exposure Level</u> The sound level of one second duration which has the same amount of energy as the actual noise event measured.  Usually used to measure the sound energy of a particular event, such as a train pass-by or an aircraft flyover
<b>NZS 6801:2008</b>	New Zealand Standard NZS 6801:2008 <i>"Acoustics – Measurement of environmental sound"</i>
<b>NZS 6802:2008</b>	New Zealand Standard NZS 6802:2008 <i>"Acoustics – Environmental Noise"</i>
<b>NZS 6805:1992</b>	New Zealand Standard NZS 6805:1992 <i>"Airport Noise Management and Land Use Planning"</i>
<b>NZS 6807:1994</b>	New Zealand Standard NZS 6807:1994 <i>"Noise Management and Land Use Planning for Helicopter Landing Areas"</i>

## APPENDIX B FIGURES

Figure 1 – Receiver Locations

Figure 2 – Predicted Noise Levels

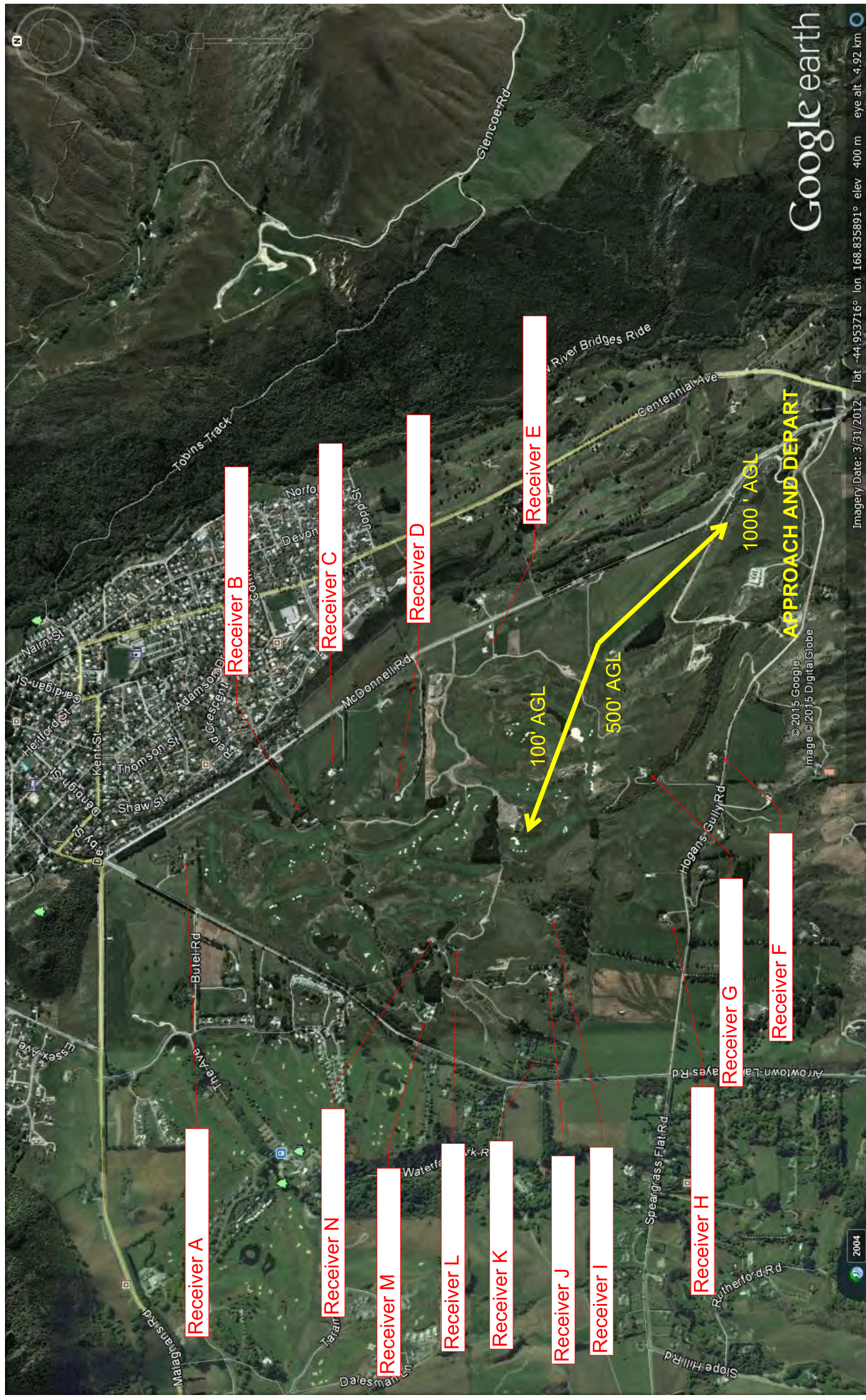


Figure 1 - Receiver Locations



Path: Z:\Jobs\2015\2015564C\06 Drawings\Out\GIS001 2005564C 151008 Figure 1.mxd

**Map Legend**

**Predicted Noise Levels**

- Existing (5 p/week) (dB Ldn 7day)
- Typical Weekly movements (12 p/week) (dB Ldn 7day)
- Special Event Day Movements (20 p/day) (dB Ldn)





## **The Hills Resort Zone**

Queenstown Lakes District Plan  
Review

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## **Transportation Assessment Report**

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October 2015

## The Hills Resort Zone

### Queenstown Lakes District Plan Review

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## Transportation Assessment Report Quality Assurance Statement

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Prepared by:

**Cameron Bradley**

Transportation Planner



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Reviewed by:

**Tony Penny**

Principal Consultant

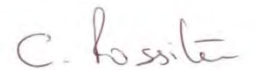


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Approved for Issue by:

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Status: Final report

Date: 21 October 2015

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## Table of Contents

1.	Introduction .....	1
2.	Existing Transport Infrastructure .....	2
2.1	Site Location .....	2
2.2	Roading Network .....	2
2.3	Roading Form.....	2
3.	Current and Future Travel Patterns .....	8
3.1	Traffic Volumes .....	8
3.2	Provision of Public Transport.....	8
3.3	Travel to Work .....	8
3.4	Road Safety .....	9
4.	Future Changes .....	10
4.1	Queenstown Lakes District Council .....	10
4.2	The Arrowtown Plan .....	10
4.3	Wakatipu Trails .....	10
5.	Levels of Service .....	12
5.1	Vehicles .....	12
5.2	Road Safety .....	12
6.	The Proposal .....	13
6.1	Development .....	13
6.2	Events .....	13
7.	Traffic Generation and Distribution .....	17
7.1	Existing Site Traffic Generation .....	17
7.2	Additional Site Traffic Generation .....	17
7.3	Total Traffic Generation of the Site .....	18
7.4	Construction Traffic Generation .....	18
7.5	Trip Distribution.....	18
8.	Assessment of Rezoning Effects.....	20
8.1	Effects on Rooding Network .....	20
8.2	Buses, Cyclists and Pedestrians .....	20
8.3	Access Arrangements .....	21
8.4	Internal Rooding .....	22
9.	Compliance with Planning Requirements.....	24
9.1	District Plan Requirements .....	24
10.	Summary and Conclusions .....	25

## 1. Introduction

It is proposed to create a Resort Zone around The Hills golf course as part of the Queenstown Lakes District Plan review. The proposed zone will provide for limited residential and visitor accommodation in areas of the golf course that are able to absorb development. The zone also provides for the on-going development and maintenance of the championship golf course, hosting events, ancillary commercial activity and a sculpture park.

The report provides a description of the existing transport infrastructure in the vicinity of the golf course and existing travel patterns. This is followed by a description of the transport components of the proposed development and the expected traffic generation of the development enabled by the rezoning. This forms the basis of the assessment of traffic effects and the assessment against the transport rules of the District Plan.

## 2. Existing Transport Infrastructure

### 2.1 Site Location

The location of the proposed zone is indicated in Figure 1 to the south of the Arrowtown urban area and is bounded by McDonnell Road to the north-east, Arrowtown-Lakes Hayes Road to the west and Hogans Gully Road to the south.

The Operative Queenstown Lakes District Plan (“District Plan”) includes this land within the Rural General Zone. The site currently contains two dwellings, the Hills Golf Course and associated buildings.

Figure 1 also shows the location of the site in relation to the road hierarchy as defined in the District Plan.

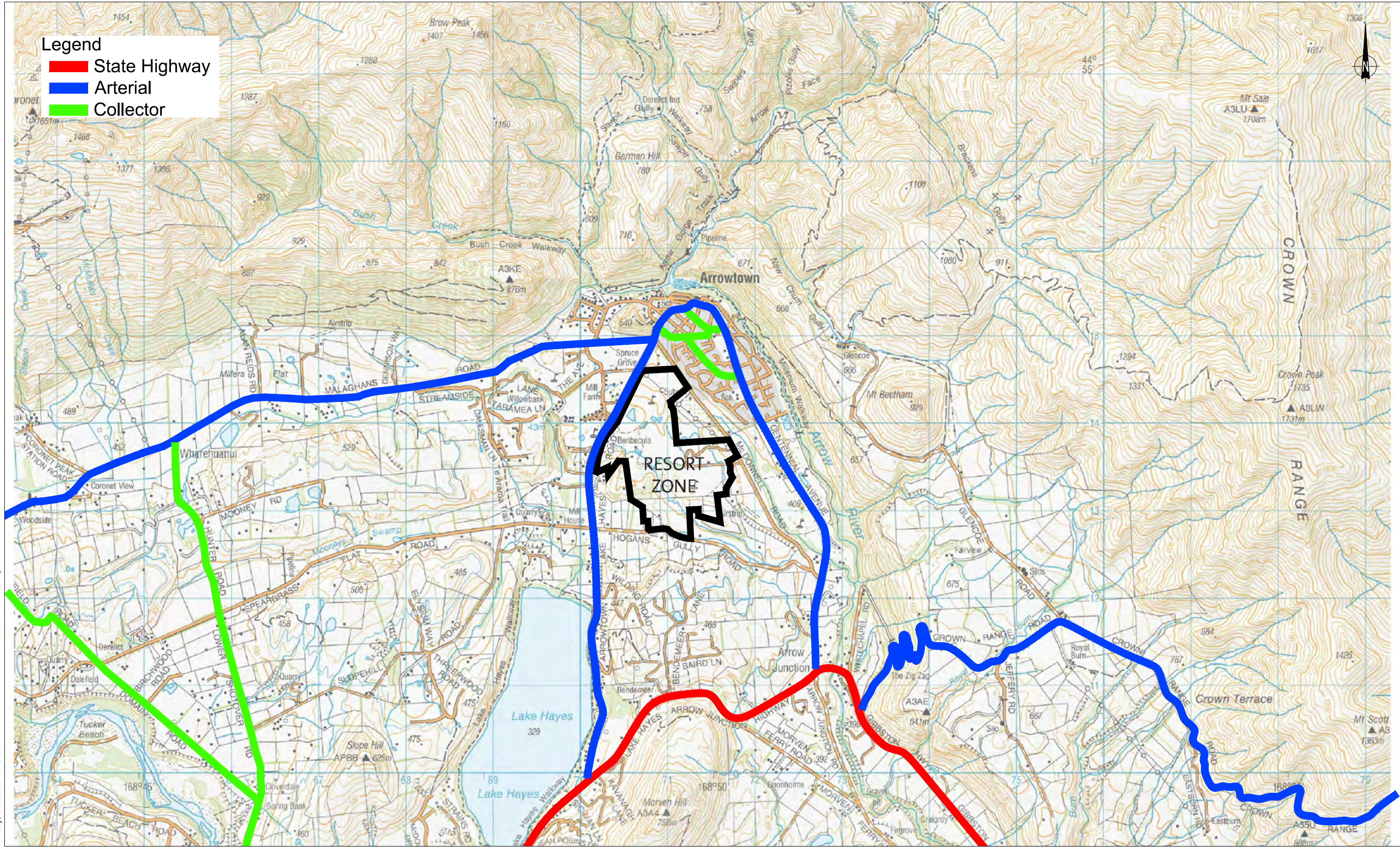
### 2.2 Rooding Network

On the west side of the site, Arrowtown-Lake Hayes Road is classified as an Arterial Road with a role of being a dominant element in the road network, connecting the major settlements with the District. The District Plan states that arterial roads will be managed to minimise their local access function. McDonnell Road runs in a generally northwest-southeast direction and is defined as a local road in the vicinity of the site. Local roads are described by the District Plan as functioning almost entirely as accessways to properties and are not intended to act as through-routes for vehicle travel. Hogans Gully Road along the southern side of the site is also a local road.

### 2.3 Rooding Form

In the vicinity of the site, Arrowtown-Lake Hayes Road has a seal width of 8.0m to 8.5m. No footpaths are provided in this location.

The speed limit along the section of Arrowtown-Lake Hayes Road near the site is 70 km/h, except near its intersections with McDonnell Road (to the north) where the speed limit changes to 50km/h.



Friday, 9 October 2015 5:07:24 PM 0 20mm@A3

REV	DATE	DRN	CHK	DESCRIPTION
A	09.10.15	CTM		Base Boffa Miskell : The Hills Resort Zone, QLDC DPR Submission (Sept2015)

**The Hills Golf Course QLDC Planning Review**  
 Site Location  
 ---



DRAWN: CTM	---	---
DATE: 09.10.15	STATUS: ---	
SCALE: NTS		
DWG NO: 13470A2A		





**Photograph 1: Arrowtown-Lake Hayes Road, Looking North Past Hogans Gully Road**

At its northern end, Arrowtown-Lake Hayes Road intersects with McDonnell Road and Malaghans Road. This intersection is in the form of a 'GIVE WAY' priority-controlled, cross-road intersection, with priority given to Arrowtown-Lake Hayes Road.



**Photograph 2: Arrowtown-Lake Hayes Road Looking South Past McDonnell Road**

McDonnell Road in the vicinity of the site access has a seal width of approximately 7.0m, with unsealed shoulders of between 2.2m and 2.5m on both sides of the carriageway. It has a speed limit of 80 km/h except for 1 km of the northern section within the urban area where the speed limit is 50 km/h. In this section of McDonnell Road speed humps have been installed with an advisory negotiation speed of 25 km/h.



***Photograph 3: McDonnell Road, Looking North at Existing Golf Course Entrance***



***Photograph 4: McDonnell Road, Looking South at Existing Golf Course Entrance***

No sealed footpaths are provided on McDonnell Road in the vicinity of site. An unsealed track is provided on the western side of McDonnell Road separated from the sealed carriageway, from the northern end of the site through to the intersection with Hogans Gully Road. In the vicinity of the Hogans Gully Road intersection this walking track switches to the eastern side of McDonnell Road, before extending further south through to the intersection with Centennial Avenue.



**Photograph 5: McDonnell Road, Looking North at Existing Golf Course Access with the Unsealed Walking Track on the Western Side**



**Photograph 6: Hogans Gully Road, Looking East**

At the southern boundary of the site, Hogans Gully Road runs in a generally east-west direction. At its western end it intersects with Arrowtown-Lake Hayes Road and Speargrass Flat Road. To the east Hogans Gully road terminates at a T-intersection with McDonnell Road. Both the intersections with Arrowtown-Lake Hayes Road and McDonnell Road are priority controlled, with Hogans Gully Road being restricted in both cases by a “GIVE WAY” control.



**Photograph 7: Hogans Gully Road, Looking Towards Intersection with McDonnell Road**

Hogans Gully Road has an 80 km/h speed limit. It is unsealed and has a formed width of about 5.2m. In the vicinity of Arrowtown-Lake Hayes Road there are grass verges of 6.2m and 1.7m on the southern and northern side of the road respectively. Further east the road winds over a hilly section and the verges vary in width. Footpaths are not provided on either side of Hogans Gully Road.



**Photograph 8: Hogans Gully Road, Looking Towards Intersection with Arrowtown-Lake Hayes Road**

It is understood that Queenstown Lakes District Council has no plans for the sealing of Hogans Gully Road.



### 3. Current and Future Travel Patterns

#### 3.1 Traffic Volumes

Table 1 shows the most recent daily traffic count data for roads in the vicinity of the site collected from records held by the Queenstown Lakes District Council.

Road Section	ADT (vpd)	Count Date
Arrowtown-Lake Hayes Rd, north of Hogans Gully Rd	3,157	November 2010
Arrowtown-Lake Hayes Rd, south of McDonnell Rd	2,978	June 2005
Malaghans Rd, west of Arrowtown-Lake Hayes Rd	1,522	November 2011
McDonnell Rd, east of Arrowtown-Lake Hayes Rd	847	February 2013
McDonnell Rd, east of Arrowtown-Lake Hayes Rd	403	April 2005
McDonnell Rd, north of Hogans Gully Rd	257	February 2004
Hogans Gully Rd, west of McDonnell Rd	133	March 2012
Hogans Gully Rd, east of Arrowtown-Lake Hayes Rd	137	May 2005

**Table 1: Daily Traffic Counts**

The traffic volumes to the south-west of Arrowtown show the strength of the town’s relationship with Queenstown. The other roads surrounding the site have relatively low traffic counts. However a significant amount of growth can be seen on McDonnell Road traffic in the past 10 years.

#### 3.2 Provision of Public Transport

Connectabus runs the Number 10 route from Arrowtown to Queenstown which operates 13 times a day between 7:35am and 9:35pm. Six of these services run via Arthurs Point, the other seven travel down Arrowtown-Lake Hayes Road and through Frankton down State Highway 6 to Queenstown. Passengers may interchange onto Kelvin Heights, Sunshine Bay, Fernhill, Quail Rise, Wanaka or a number of other places including Remarkables Park and the airport. Connectabus also runs a service to Wanaka twice daily.

There are several smaller operators targeted towards tourists who offer services from Queenstown to Arrowtown and vice versa, often allowing stops along the way. There is also a school bus which operates down Hogans Gully Road.

#### 3.3 Travel to Work

It has been identified from the 2013 census, that there were 2,445 people living in Arrowtown and 699 jobs there. Of these jobs 261 were taken by employees who commute to Arrowtown from a different area, primarily Queenstown and Frankton, while the remaining 438 jobs were taken by residents of Arrowtown. There were 741 people who commute out of Arrowtown for work, again mainly to Queenstown and Frankton. The largest percentage commuting increase from 2006 to 2013 was people commuting to

Arrowtown, which increased by 55% or 93 people. However the number commuting out of Arrowtown also increased by 17%, or 103 people. Further increases in these commuting patterns will lead to increases, primarily in the peak hour, of traffic volumes using Arrowtown-Lake Hayes Road, and particularly the intersection with Malaghans and McDonnell Roads.

Of those who travelled to work on the census day in 2013, the overwhelming majority, (84% or 867 people) drove a vehicle to get there. This number remained relatively consistent with 2006, where 852 people drove. Cycling's share of travel choice has had an increase of 3% between 2006 and 2013 (33 people), but walking remained the second most popular mode of travel to get to work with 84 commuters (8%) choosing this method. There was also an increase of 40% in people who work from home, jumping from 105 in 2006 to 147 in 2013.

### 3.4 Road Safety

The New Zealand Transport Association Crash Analysis System (CAS) has been used to identify all reported accidents on Arrowtown-Lake Hayes Road, McDonnell Road, and Hogans Gully Road, between and inclusive of their respective intersections. The search covered all reported crashes for the period between 2008 and the present.

A total of 18 crashes were reported within this area, with six crashes resulting in minor injuries. There have been no crashes which resulted in fatal or serious injuries in this area since 2008.

Eleven of these crashes occurred on Arrowtown-Lake Hayes Road, three of these causing minor injuries. Two of these injury crashes were the result of drivers failing to give way at the intersection of McDonnell Road and the other at the intersection of McDonnell Road was caused by following too closely.

Four crashes on Arrowtown-Lake Hayes Road had rain, snow, frost or ice as a factor in the cause, with two of these located 100m and 500m north of Waterfall Park Road. Neither of these crashes involved injuries.

There were four recorded crashes on Hogans Gully Road, all due to loss of control from the unsealed road, frost or ice or speed. The speed related crash resulted in a head on collision, but no injuries. Three crashes were recorded on McDonnell Road, with two of these caused by intoxicated drivers hitting parked vehicles.

Overall seven of the 18 crashes recorded were affected by environmental factors, made up of narrow, unsealed, frosty or icy roads. Three crashes were attributed down to alcohol and six to driver error at intersections. Three of these occurred at the intersection of Arrowtown-Lake Hayes Road / McDonnell Road and three at the intersection of Arrowtown-Lake Hayes Road / Hogans Gully Road.

No crashes occurred at existing driveways to The Hills property or adjacent properties.

## 4. Future Changes

### 4.1 Queenstown Lakes District Council

On 30 June 2015 Queenstown Lakes District Council (QLDC) adopted their 10 year land transport plan (2015-2025). There are no specific changes to the transportation network around Arrowtown planned. However, the report did have a key objective to reduce growth in vehicle use by promoting greater use of other transport modes. This will be achieved by:

- Increasing affordability and convenience of public transport; and
- Making cycling and walking easier and safer.

### 4.2 The Arrowtown Plan

A Strategic Planning document outlining the future growth and community planning proposals for Arrowtown has been prepared. This Plan resulted from a community planning workshop carried out in February 2003 with the aim of reviewing and updating Arrowtown planning. It should be noted that this document does not have formal statutory status, but is a statement of community desire. Amongst the issues outlined in this Plan was traffic management, and the comments relating to relevant sections of the road network are referenced below:

- McDonnell Road was installed as a heavy traffic route being described as providing a logical bypass to the town and good access to the industrial area;
- In time, the Malaghans / Arrowtown-Lake Hayes / McDonnell intersection may need improvement. However, a threshold treatment involving planting is envisaged to assist in speed management. There was not full support for a roundabout solution;
- From Arrowtown-Lake Hayes Road adequate signage and encouragement is needed to ensure heavy traffic is routed along Malaghans Road to the industrial area.

It is noted that McDonnell Road has since been sealed and speed humps installed. However no other actions have evolved that have a confirmed timeframe.

### 4.3 Wakatipu Trails

The Wakatipu Trails Strategy, released in May 2004 was prepared to guide development of an integrated network of walking and cycling trails and cycle-ways in the Wakatipu Basin. Preparation of the strategy was initiated by the Wakatipu Trails Trust in association with Transfund and Queenstown Lakes District Council. The Strategy identified a series of desired outcomes with those relevant to The Hills site listed below:

- Construction of a premier walking and cycling trail linking Queenstown to Arrowtown via Lake Hayes;
- Improvements to rural roads to accommodate horse riding and road cycling;
- New trail signs, publications and information on trails.

An extensive range of walking and cycling tracks have now been developed within the Queenstown and Arrowtown area. One of the routes constructed links Arrowtown with the Historic Shotover Bridge. This follows Manse Road from Arrowtown and passes through the Millbrook resort to Lake Hayes and does not cross any part of The Hills golf course land.

## 5. Levels of Service

### 5.1 Vehicles

The AUSTRROADS Guide to Traffic Engineering Practice Part 2 ('Roadway Capacity') provides a generalised measure for the capacity and performance of a route. This concept of level of service indicates that with the existing traffic flows, Arrowtown-Lake Hayes Road, McDonnell Road and Hogans Gully Road retain a condition of free flow in which individual drivers are virtually unaffected by the presence of other vehicles in the traffic stream, have freedom to select their own desired speeds and generally experience high levels of comfort and convenience.

### 5.2 Road Safety

Based upon the information from the Land Transport New Zealand Crash Analysis System (CAS), it does not appear that there are any underlying road safety issues on Arrowtown-Lake Hayes Road. Since McDonnell Road has been sealed, the number of loss of control crashes on this road has reduced. If Hogans Gully Road were to be sealed, this would also yield a reduction in this type of crash. The traffic effects of the proposal are not considered to be sufficient reason for sealing because the expected volume changes on Hogans Gully Road will be minimal.

## 6. The Proposal

### 6.1 Development

The proposal to create a Resort Zone centred on The Hills Golf Course could allow for a total of up to 100 residential / visitor accommodation units including 10 home sites. These would be developed in conjunction with the existing golf course in a manner similar to that indicated on the concept structure plan presented as Figure 2. The proposal would also enable development of some ancillary commercial activity as part of the Clubhouse facilities.

The concept structure plan shows the potential locations for permanent dwellings. HS7 and HS6 are existing dwellings. Resource consent is currently being sought to replace HS6. The HS6 replacement will obtain access via an existing access point to Hogans Gully Road and HS7 has existing access to Arrowtown-Lake Hayes Road as indicated in Figure 3.

The new dwelling HS4 would gain access from an existing driveway off Hogans Gully Road while HS2, HS3, HS5, HS9 and HS10 would require a new shared driveway from Hogans Gully Road. HS1 and HS8 will have access off the existing main entrance to the golf course on McDonnell Road.

Activity Areas (A1-A7) will provide for the visitor accommodation and may contain about 50 lots, all of which will have access via the existing main entrance to the golf course. Activity Area A8 will have a new access formed to McDonnell Road.

Activity areas A9 and A10 could accommodate about 20 lots and will have access from an existing driveway to Arrowtown-Lake Hayes Road.

The McDonnell Road driveway will continue to provide the main access to the clubhouse area and other areas of the golf course.

### 6.2 Events

The proposal also seeks provision for “temporary events” including golf tournaments and concerts as a controlled activity subject to the following conditions:

- The duration of the temporary events does not exceed 14 consecutive calendar days (excluding set up and pack down);
- The event does not operate outside the hours of 0600 to 2200. Set up and pack down outside of these hours are permitted but cannot breach the noise limits for the Zone;
- There shall be no more than 10 temporary events per calendar year;
- All structures and equipment is removed from the zone within 10 working days of the completion of the event;
- For the purpose of this rule the relevant noise standards of the Zone shall not apply.

It is proposed that Council’s control is limited to:

- (i) A Traffic Management Plan
- (ii) The ability to minimise and manage waste from the event
- (iii) The provision of adequate sanitation for event attendees
- (iv) The acceptance of an Operations Plan for the event
- (v) Signs located off-site on public or private land

This proposal would facilitate the hosting of events such as the NZ Open and smaller charity golf tournaments.

**KEY:**

— Structure Plan Boundary

- - - Activity Area

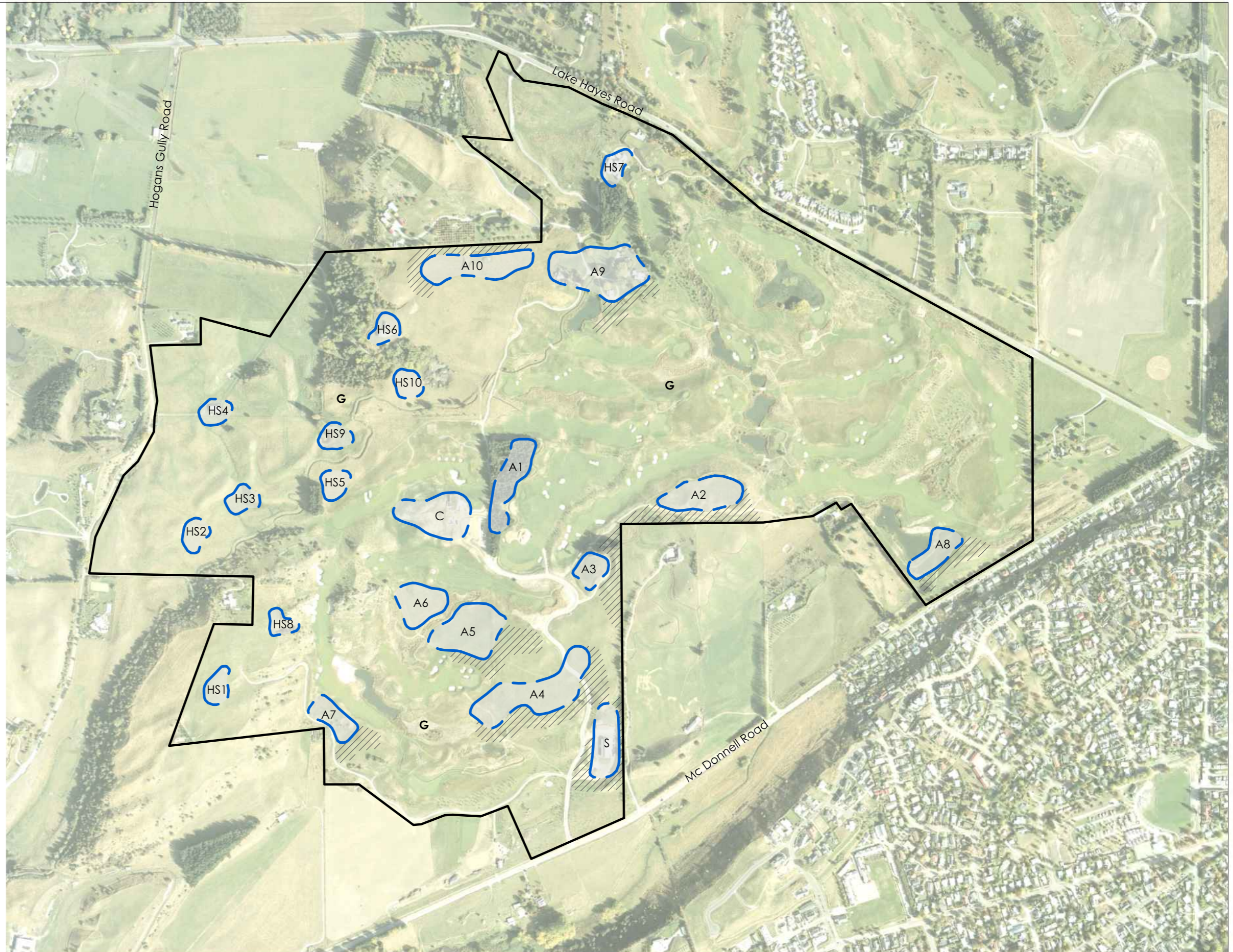
**Activity Areas:**

- G: Golf course, open space and farming
- C: Clubhouse
- A: Visitor Accommodation / Residential
- HS: Homesite (3,000m<sup>2</sup>)
- S: Resort Services & Staff Accommodation

*Note: all activity areas include G: Golf course, open space and farming*

**Overlays:**

/// Landscape Amenity Management Area



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SCALE: 1:4,000 (A1); 1:8,000 (A3)



PLAN STATUS:

**DP REVIEW**

**THE HILLS  
 STRUCTURE PLAN**

DRAWN / REVIEWED: RT / JC  
 APPROVED: DT  
 DATE: 14.10.15

DRAWING NO:

**MH\_10\_1\_MLP\_010F**



**KEY:**

— Structure Plan Boundary

- - - Activity Area

**Activity Areas:**

- G: Golf course, open space and farming
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- A: Visitor Accommodation / Residential
- HS: Homesite (3,000m<sup>2</sup>)
- S: Resort Services & Staff Accommodation

Note: all activity areas include G: Golf course, open space and farming

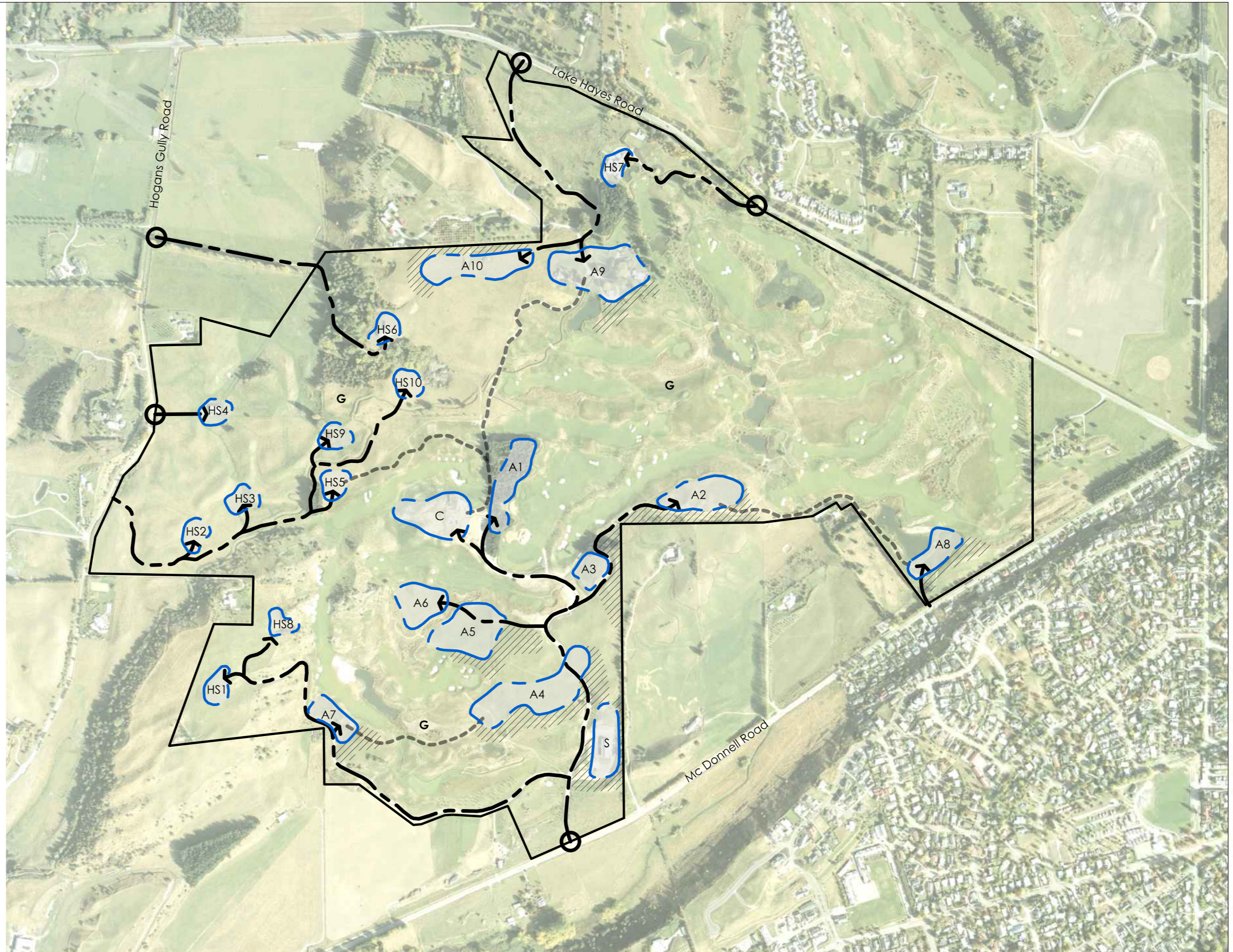
**Overlays:**

/// Landscape Amenity Management Area

○ Existing access point

— Road access

- - - Buggy / cart access



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PLAN STATUS:

**DP REVIEW**

# THE HILLS STRUCTURE PLAN - ACCESS

DRAWN / REVIEWED: RT / DT  
 APPROVED: DT  
 DATE: 14.10.15

DRAWING NO:

MH\_10\_1\_MLP\_011B

## 7. Traffic Generation and Distribution

### 7.1 Existing Site Traffic Generation

The proposed zone area currently contains a golf course, clubhouse, dwellings, a large implement shed, farmland and a farm building.

The Transfund NZ Research Report 209: "Trips and Parking Related to Land Use" includes daily rates of between 6 and 9 vehicles per day (vpd) (IN+OUT) for rural residential subdivisions. It notes that these rates are lower than for urban residences and "reflect the increased trip linking which occurs when the primary employment trip is longer, eg greater than 20 minutes, as with rural lifestyle properties located on the outskirts of an urban area". For the purposes of this assessment, a rate of 8vpd per unit has been adopted. On this basis, the two existing dwellings would currently generate 16vpd on average.

Residential activity typically generates a high proportion of outbound movements during the morning peak period (80%) with a more balanced pattern in the evening, 35% outbound and 65% inbound. While visitor accommodation will not usually have a high traffic generation during the morning peak period, the pattern of movements in the evening peak is expected to be comparable to residential activity.

The golf course operation is limited through resource consent conditions to a maximum of 16 commercial players per hour. Adopting the rates of traffic generation previously used, this equates to a traffic generation of between 200 and 350 vpd for the golf course.

Two special charity tournament events per year are currently permitted at which approximately 100 persons per day may attend. It could be expected that these charity tournament occasions would generate around 200 vpd. During the tournaments, the tee times will be closer together resulting in a higher number of players on the course at any one time.

The golf course has also secured the rights to host the New Zealand Golf Open. This is a major event which can attract significant numbers of spectators. However it is an infrequent occurrence (annual) and there is no guarantee that the rights will be extended indefinitely. Consequently it has been disregarded for the purposes of this assessment and because a specific traffic management plan is prepared for this event.

### 7.2 Additional Site Traffic Generation

It is anticipated that up to 100 residential / visitor accommodation units will be developed within the resort zone. Residential dwellings or visitor accommodation units in this location are expected to generate between 6 and 9 vpd. The traffic generation of the resort accommodation will be at the lower end of this range with residential accommodation being at the upper end of the range. Again, to ensure a robust analysis, an average traffic generation rate of 8 vpd per unit has been adopted. Based on this rate, the expected additional traffic generation for this development is as follows:

DEVELOPMENT	NUMBER OF UNITS	TRIP VOLUMES (Vehicle Movements)								
		Morning Peak Hour			Evening Peak Hour			Daily		
		In	Out	Total	In	Out	Total	In	Out	Total
Residential / Visitor Accommodation Units	100	20	80	100	65	35	100	400	400	800

**Table 2: Additional Trip Generation of the Proposed Residential / Visitor Accommodation Units**

### 7.3 Total Traffic Generation of the Site

The total future traffic generating activities for the proposed resort zone will consist of 100 dwellings which will generate about 800 vpd and the golf course operation (200-350vpd).

The typical daily traffic generation is expected to be in the range 1,000 to 1,150vpd.

### 7.4 Construction Traffic Generation

Previous survey work by TDG has indicated that the construction phase of a single residential dwelling could generate up to some 20vpd. The simultaneous construction of all dwellings would not result in this daily traffic generation for all dwellings due to the number of common trips to several dwellings and to dwellings being at different stages of construction. Moreover, it is considered extremely unlikely that all new dwellings would be constructed simultaneously. In fact it is expected that individual dwellings or groups of dwellings will be constructed over a long period and by their nature, construction traffic movements for each site would occur only over a short timeframe.

### 7.5 Trip Distribution

The design of the proposed development allows all of the proposed visitor accommodation dwellings in A1 – A10, except those in A9 and A10 (and possibly A8) to access the external road network via the existing McDonnell Road access. Homesites HS1 and HS8 will also use this access. The clubhouse and other golf course facilities will continue using the McDonnell Road access. HS2-HS6 and HS9-HS10 will use the Hogans Gully Road accesses. A9-A10 and HS7 will use two existing driveways on the Arrowtown-Lake Hayes Road. Based on 100 dwellings being constructed, this broadly represents about ten dwellings using the Hogans Gully Road access, about 25 using Arrowtown-Lake Hayes Road for access, and about 65 dwellings using the McDonnell Road access. Currently there is one dwelling with access off Hogans Gully Road and one with access off Arrowtown-Lake Hayes Road.

The distribution of additional trips generated by the site is summarised in the following table:

ACCESS LOCATION	TRIP DISTRIBUTION								
	Morning Peak Hour			Evening Peak Hour			Daily		
	In	Out	Total	In	Out	Total	In	Out	Total
McDonnell Road	13	52	65	42	23	65	260	260	520
Hogans Gully Road	2	8	10	7	3	10	40	40	80
Arrowtown-Lake Hayes Road	5	20	25	16	9	25	100	100	200
Total	20	80	100	65	35	100	400	400	800

**Table 3: Trips Generated by the Proposal – Distribution**

With this level of development, it is expected that about 520 new vehicle movements per day will occur at the McDonnell Road access. Approximately 80 vehicle movements per day will occur at the Hogans Gully Road accesses and a further 200 vehicle movements per day will be made to / from Arrowtown-Lake Hayes Road.

## 8. Assessment of Rezoning Effects

### 8.1 Effects on Rooding Network

The AUSTRROADS Guide to Traffic Management Part 3 (“Traffic Studies and Analysis”) currently recommends that unsignalised intersections are evaluated using SIDRA intersection analysis software or an equivalent tool. This advice supersedes previous recommendations that detailed analysis of low volume driveways was not normally required because capacity was unlikely to be a critical factor.

The following table shows the traffic volume thresholds previously adopted by Austroads below which detailed analysis was not considered necessary and the expected traffic volumes at the resort zone access points. The peak hour traffic volumes on the frontage roads have been estimated as 105 of the average daily traffic volumes.

Intersection	Major Road Flow (vph)	Minor Road Flow (vph)
AUSTRROADS Guide to Traffic Management	400	250
Two-lane Road	500	200
Peak Hour Capacity Combinations	650	100
McDonnell Road / Site Access	80	65
Arrowtown-Lake Hayes Road / Site Access	300	25
Hogans Gully Road / Site Access	15	10

**Table 4: Intersection Capacity – Uninterrupted Flow Conditions (PM Peak)**

Since the expected traffic volumes on each of the access points are well below the thresholds previously adopted by Austroads, no further analysis has been undertaken to evaluate levels of service because there are no capacity issues. On this basis, the proposed development is not expected to have any adverse effect on the road network at these locations.

Although the peak hour traffic volumes at the temporary events will be higher than on a typical day, they will remain below 100vph and again it is considered unlikely that there would be any noticeable effects on the local road network. In the event that higher flows were anticipated, then this would be addressed by the proposed condition requiring a traffic management plan.

### 8.2 Buses, Cyclists and Pedestrians

The increase of traffic flow due to the proposal is not expected to affect the level of service provided to cyclists and pedestrians. The increase in traffic volume represents about one extra vehicle every minute which not be noticeable.

While it is also anticipated that the demand for public transport services would only increase marginally as a result of this proposal, equally the proposed zone would not adversely affect existing or possible future services.

### 8.3 Access Arrangements

The activities proposed with the new zone will obtain access via five existing access points and two new accesses, one located off McDonnell Road and one off Hogans Gully Road. It is intended that the Hogans Gully Road access point will not have a physical connection with the existing formed internal road network within the golf course.

The existing access from Hogans Gully Road provides a sight distance of 200m to the east, while sight distance to the west allows visibility right through to the intersection with Arrowtown-Lake Hayes Road. The District Plan requires access points on an 80km/h road to provide 115m sight distance if they serve a residential activity. The available sight distance at the existing Hogans Gully Road access exceeds the requirements in both instances and is therefore considered entirely appropriate.

The other existing access on Hogans Gully Road provides sight distance to the west in excess of the required 115m. However the sight distance available to the east is only about 90m. There are mitigating circumstances as this section of Hogans Gully Road has a winding alignment to the east which dictates a speed environment of less than 80 km/h. Furthermore it is an existing driveway and it is proposed that the driveway will continue to only serve one residence.

The proposed new access on Hogan's Gully Road will serve three new home sites. It will have a sight distance of more than 115m to the west but the sight distance to the east could be constrained by the local topography to less than 115m. Although the speed limit of Hogans Gully Road is 80km/h, it is considered that the topography, road surface and winding alignment create a speed environment of less than 80km/h and a lower sight distance requirement is acceptable. On this basis, it is considered that an access can be constructed that provides adequate sight distance for the speed environment.

The access on Arrowtown-Lake Hayes Road for HS7 will not have any extra traffic and therefore retains existing use rights.

The other existing access on Arrowtown-Lake Hayes Road is expected to carry an additional 20 vph at peak times associated with visitor accommodation or residential use. Visibility to the north (right) is well in excess of 180m, but to the south it is restricted to about 160m by the bend in the road. While the speed limit on this stretch of road is 70 km/h, the prevailing speed of vehicles, even those travelling uphill from the south, is in excess of 70 km/h. The Austroads Guide to Road Design Part 4A "Unsignalised and Signalised Intersections" recommends that a Safe Intersection Sight Distance of 181m is provided for a road with a design speed of 80km/h and 151m at 70km/h. On this basis, the available sight distance is considered to be adequate. However, it has been noted that installation of signage to alert drivers to the access would provide improved safety.

It is proposed that the Hogans Gully Road accesses will be constructed in accordance with Appendix 7, Diagram 2 of the District Plan, as required for a private access. This standard does not require any localised road widening. Hogans Gully Road has a formed width of approximately 5.2m in the vicinity of the accesses, which would generally be considered somewhat narrow for an access that is providing ingress and egress for both left and right turns. However, in this instance it is considered that few vehicles will turn right into the site accesses or left out onto Hogans Gully Road and therefore the current width is considered suitable for the projected turning volumes.

Similarly it is not considered necessary to modify the two existing accesses on Arrowtown-Lake Hayes Road.

The existing main golf course access from McDonnell Road provides a sight distance in excess of 200m in each direction. As non-residential traffic currently uses this access and will continue to do so under the proposal, the District Plan requires that a minimum sight distance of 170m be provided in an 80km/h area such as this. Accordingly this access also fully complies with the District Plan sight distance requirements.

The existing McDonnell Road access has been constructed as a private property access with no widening of the McDonnell Road shoulders. With the increased volume of movements at the driveway, it is recommended that the driveway is upgraded to comply with the design requirements of Austroads Guide to Road Design Part 4A. This involves widening of the carriageway shoulder to provide sufficient space for through traffic to pass a vehicle that has stopped to turn right.

## 8.4 Internal Roding

The District Plan requires that all vehicular access shall be in accordance with the standards contained in NZS4404. For the purposes of this analysis, the 2004 version of NZS4404 plus Council amendments has been used to assess the proposed roadway widths.

The policy standards relating to “rural general” areas are shown as follows:

Type	Number of Lots	Number of Traffic Lanes	Carriageway Width (m)	Shoulder Width (m)	Maximum Longitudinal Grade	Minimum Road Reserve Width (m)	Type of Surface
Private Right of Way	Less than 5 Lots	1	3.5	None	16.7%	6	Metal
Private Right of Way	5-10 Lots	1 or 2	3.5+ (1 lane), 5.5 (2 lanes)	0.5 Grass	12.5%	10	Seal
Public Cul-de-sac	Less than 15 Lots	2	5.5	0.5 Grass	10%	20	Seal
Public Local	Less than 250 vpd	2	6.25	0.5 Grass	10%	20	Seal

**Table 5: Council Subdivision Guidelines (Rural General, Rolling Topography)**

As such, several different geometric standards will be relevant to the assessment and design of the various internal roads within the development. It is proposed that those roads serving less than five lots will be constructed to the Private Right of Way (less than 5 Lots) standard given above (3.5m carriageway).

The 2005 Subdivision Policy guideline does not provide guidance as to when to provide 1 or 2 lanes for a Private Right of Way (5-10 lots) for rolling terrain. Only one lane (3.5m+) with passing bays would be required if the topography was deemed to be mountainous, while flat terrain would require two lanes (5.5m).

The internal road that provides a link through the development from the McDonnell Road access through to the clubhouse operates over a combination of terrain classified initially as flat from the main access and mountainous as it rises towards the accommodation and clubhouse areas.

Access to the section of this road between the McDonnell Road access and the clubhouse will be restricted to use by visitors to the clubhouse and traffic associated with residential / worker and visitor accommodation units through the use of electronic pin control gates. This section of road could provide access for up to 65 dwellings and will therefore meet the standard set down for a public local road.

The existing section of road to the clubhouse will provide for the golf course traffic as well as the new dwellings. The existing level of construction exceeds that required for a Public Local road and is therefore considered appropriate for the projected traffic volumes. It is also considered suitable for the higher peak hour volumes associated with temporary events at the Golf Course.

In order to maintain the 'rural' look of the existing rural environment, it is considered that the provision of a 3.5m one lane road, with 5.5m passing bays at regular intervals is appropriate for the access roads to individual accommodation blocks.

Compliance with the 2005 Subdivision Policy guideline would be achieved by construction of the accesses from the Hogans Gully Road at 5.5m for any flat sections and the 3.5m mountainous section as it rises towards the dwellings. This would allow continuous passing opportunities where driver inter-visibility is good and restrict passing opportunities where driver inter-visibility is not so good. It is considered more appropriate to construct the whole section with a consistent treatment with periodic passing opportunities over both the flat and mountainous sections so that drivers have a consistent experience of viewing approaching vehicles at places where passing opportunities are available.

The treatment proposed for the access road off Arrowtown-Lake Hayes Road at D6 to serve the visitor accommodation units is recommended to match the public cul-de-sac standard (5.5m width) even though the limit is indicated to be 15 units. The reduced width will encourage slower speeds with consequential road safety benefits.

The remaining sections of new internal roading serve fewer than five lots or are in mountainous terrain and the lower standards of a 3.5m width in the 2005 Subdivision Policy are appropriate.



## 9. Compliance with Planning Requirements

### 9.1 District Plan Requirements

The site currently lies within the Rural General Zone in the District Plan. The District Plan sets out a number of rules relating to the transport related elements of any development proposal which are relevant to the proposed rezoning because of the details included in the proposed structure plan. The relevant rules are set out below for the additional visitor accommodation and residential dwelling units associated with the proposed rezoning.

Criterion
<p><b>Rule 14.2.4.1 (i) (Table 1, Page 14/14)</b></p> <p><i>Residential units require 2 spaces per unit, while visitor accommodation units require 1 space per unit (2 spaces per unit Plan Change 8), plus one staff space per 10 units, plus one coach space per 30 units.</i></p>
<p><b>Rule 14.2.4.1 (iv)</b></p> <p><i>All vehicular access shall be in accordance with the standards contained in NZS4404:1981 including updates.</i></p>
<p><b>Rule 14.2.4.2 (ii)</b></p> <p><i>Vehicle crossings providing access to a road in a Rural Zone shall comply with the Appendix 7, Diagram 2 (Private Access) or Diagram 4 (Commercial Access).</i></p>
<p><b>Rule 14.2.4.2 (iv)</b></p> <p><i>The minimum sight distance for an access in an 80km/h zone serving a residential activity is 115m, or 170m for a non-residential activity. The minimum sight distance in a 100km/h zone is 170m for a residential activity or 250m for a non-residential activity.</i></p>
<p><b>Rule 14.2.4.2 (v)</b></p> <p><i>Maximum number of vehicle crossings for a site frontage greater than 100m and onto a local road is three (or two onto an Arterial).</i></p>
<p><b>Rule 14.2.4.2 (vi)</b></p> <p><i>The minimum distance between any vehicle access onto an arterial road and an intersection with a local road shall be 100m (100 km/h speed limit). For a vehicle crossing on a local road the minimum distance from an intersection with an arterial or local road is 25m (80 km/h speed limit).</i></p>

**Table 6: Existing Relevant Rules of the District Plan**

With the exception of the proposed new access on Hogans Gully Road, it is considered that all other access points will meet the sight distance requirements of the District Plan. The available sight distance at the proposed new access on Hogans Gully Road will depend upon its location which remains the subject of detailed design. In the event that the required sight distance cannot be achieved, this will trigger a requirement for an assessment of safety and the effects of the road geometry. This is considered appropriate to ensure that the new access operates safely. On this basis, no additional transport rules are considered necessary because all new roads and vehicle crossing locations are subject to existing rules to ensure that they can operate safely.

## 10. Summary and Conclusions

This Transport Assessment has identified, evaluated and assessed the various transport and access elements of the residential / visitor accommodation activities that are associated with the proposal for The Hills Resort Zone. It is considered that the traffic that would be generated by the proposed land use activities would be accommodated without adversely affecting the level of service or road safety on Arrowtown-Lake Hayes Road, McDonnell Road and Hogans Gully Road, and at their intersections.

Having due regard to the provision made for road users, it is considered that the proposed rezoning will have no discernible adverse effects upon the adjacent transport networks or adjacent properties.

Trojan Helmet Ltd

**Hills Golf Course Land**

**Proposed District Plan Submission**

Infrastructure Feasibility Report

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**Limitations**

This report has been written for the particular brief to HCL and no responsibility is accepted for the use of the report for any other purpose, or in any other context or by any third party without prior review and agreement.

In addition, this report contains information and recommendations based on information obtained by inspection, sampling or testing at specific times and locations with limited site coverage as outlined in this report. This report does not purport to completely describe all site characteristics and properties and it must be appreciated that the actual conditions encountered throughout the site may vary, particularly where ground conditions and continuity have been inferred between test locations. If conditions at the site are subsequently found to differ significantly from those described and/or anticipated in this report, HCL must be notified to advise and provide further interpretation.

# Contents

<b>1. Introduction</b>	<b>1</b>
<b>2. Nature of Proposed Development</b>	<b>2</b>
<b>3. Site Description</b>	<b>3</b>
<b>4. Water Supply</b>	<b>5</b>
4.1 General	5
4.2 Water Demand Assessment	5
4.3 Fire Fighting Demand	5
4.4 Water Supply - Option 1	6
4.5 Water Supply - Option 2	7
4.6 Conclusions and Recommendations	8
<b>5. Wastewater Disposal</b>	<b>9</b>
5.1 General	9
5.2 Demand Assessment	9
5.3 Wastewater Drainage – Option 1 – Council Reticulated Scheme	9
5.4 Wastewater Drainage – Option 2 – Communal System	11
5.5 Conclusions and Recommendations	12
<b>6. Stormwater Disposal</b>	<b>14</b>
6.1 General	14
6.2 Planning Rules and Regulations	14
6.3 Stormwater Quantities	15
6.4 Conclusions and Recommendations	16
<b>7. Natural Hazards</b>	<b>17</b>
<b>8. Conclusions and Recommendations</b>	<b>18</b>

## Appendix 1

Structure Plan

## Appendix 2

HCL Natural Hazards Assessment Report

# 1. Introduction

This report has been prepared to support a Submission to Queenstown Lakes District Council's (QLDC) Proposed District Plan Review to re-zone approximately 163 hectares of land near Arrowtown from Rural General to a new zone ("the site"). The site is referred to as "The Hills". The Submission is to be made by Trojan Helmet Limited (THL) as the land owner.

The site is located within the triangle formed by McDonnell Road, Hogans Gully Road and Arrowtown – Lake Hayes Road. The site is contained in various parcels held by various entities and is currently zoned Rural General under the Queenstown Lakes District Plan.

QLDC's Proposed District Plan Review seeks the re-zoning of the site to give effect to a resort style zoning enabling residential development of up to 100 new dwellings.

THL has engaged Hadley Consultants Limited (HCL) to investigate and report on the feasibility of providing utility services and the necessary development infrastructure for the development of the site.

This report considers the nature of the proposed development, the site conditions affecting the implementation of the necessary utility services and development infrastructure and describes the proposed implementation of the following elements:

- Water supply reticulation,
- Wastewater reticulation,
- Stormwater control, and
- Natural Hazards.

## 2. Nature of Proposed Development

THL proposes to develop the existing site near Arrowtown. The site, located to the south of Arrowtown and covering 162.7 hectares will cover land legally described as:

- Lot 7 Deposited Plan 392663, comprising 101.5914 ha, owned by Trojan Helmet Limited.
- Part of Lot 4 Deposited Plan 392663, comprising 53.2908 ha, owned by Trojan Helmet Limited.
- Lot 1 Deposited Plan 392663, comprising 11.5792 ha, owned by Richard Michael Hill and Ann Christine Hill.
- Lot 5 Deposited Plan 392663, comprising 1.5097 ha, owned by Richard Michael Hill, Ann Christine Hill and Veritas Limited.
- Lot 3 Deposited Plan 392663, comprising 0.6904 ha, owned by Trojan Helmet Limited.

The structure plan for the development indicates areas of open space and specific areas for dwelling development. The maximum number of dwellings in the proposed zone is limited to 100. This is made up of ten individual house sites and a further ten activity areas. These house sites and activity areas are laid out around the existing golf course and there is also golf course club house and associated services areas to be included in the proposed zone. A copy of the Structure Plan used to carry out the feasibility reporting is included in Appendix 1.

We note that the assessment of the necessary development infrastructure provided below is limited to consideration of the scale of the development as it is currently proposed and excludes consideration of specific stages and the specific locations of future dwellings and infrastructure within the site.

### 3. Site Description

The area of the proposed rezoning is located on 163 ha of land to the west of the Arrowtown – Lake Hayes Road between McDonnell Road and Hogans Gully Road. There are current accesses to the site from the Arrowtown – Lake Hayes Road, McDonnell Road and Hogans Gully Road. There is existing QLDC infrastructure for water supply and wastewater located along Arrowtown – Lake Hayes Road, McDonnell Road and Hogans Gully Road.

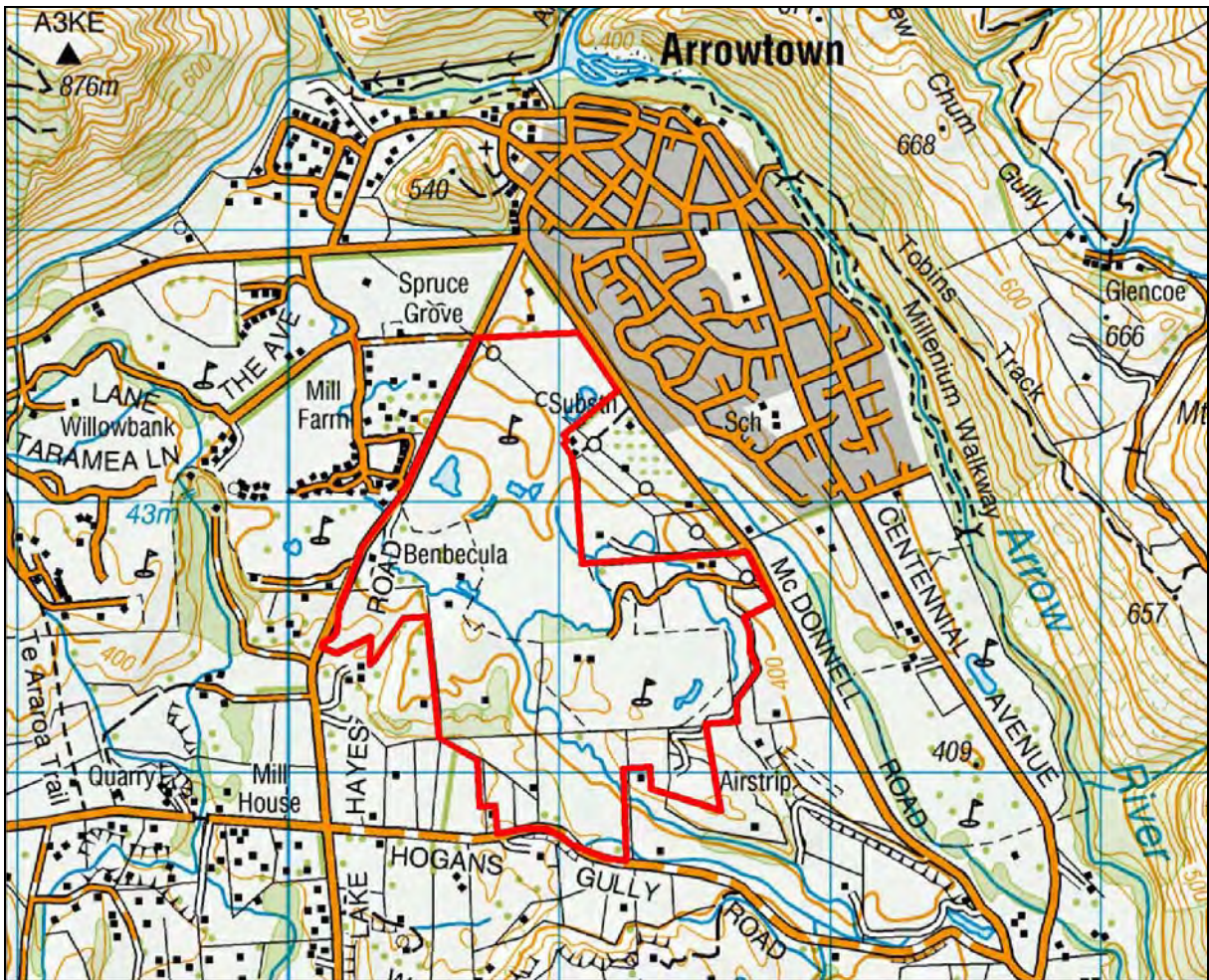


Figure 1 - Topographical Map Excerpt Showing Subject Site

The site comprises gently to moderately undulating land with some locally steeper slopes particularly in the southern areas. The overall topography of the site is gently falling to the north east.

Based upon the published geological information (Institute of Geological and Nuclear Sciences (IGNS), 1:250,000 Geological Map 18, Geology of the Wakatipu) and geological examination carried out by others the underlying geological materials within the site are comprised of



outwash gravels and till and morainic deposits. These soils overlie schist bedrock that can be seen as outcropping in various locations across the site.

The existing land use at the site comprises mainly a landscaped golf course with some grazing occurring in the southern areas. Vegetation covering the area is mainly that associated with golf courses and pasture. There are areas of landscape plantings across the site along with significant mature tree plantations.

There are areas of standing water such as streams, ponds and landscape features. It is expected that ephemeral watercourses may be formed in some of the topographic depressions on site during periods of high precipitation.

The proposed development site and surrounding Arrowtown area experience generally cold winters with severe frosts at times and hot dry summers. Strong north-westerly winds are also a climatic characteristic of the area. The land receives approximately 850mm of rainfall per annum and may be subject to drought conditions during the summer months.

## 4. Water Supply

### 4.1 General

The site is located between the QLDC water supply schemes of Arrowtown and Lake Hayes with infrastructure from both schemes being in road frontages of the site. In addition, the existing buildings and dwellings on the site are currently serviced by existing on site water bore supplies. The Arrow Irrigation Company irrigation water race runs through the site and provides existing landscaping irrigation and meets water feature water demand.

### 4.2 Water Demand Assessment

Peak water demand would be expected during the summer months when seasonal populations are at their peak and irrigation usage will be at its highest. The following design figures have been adopted.

Demand Item	Potable Demand (litres/day)	No.	Total (litres/day)
Dwelling (average day)	2,100	100	210,000

The additional average daily water supply demand of 210 m<sup>3</sup> per day equates to 2.43 litres per second average flow over twenty four hours.

From the QLDC Land Development and Subdivision Code of Practice the peaking factors for either the Arrowtown or Lake Hayes water supply schemes are as follows:

Item	Peaking Factor
Average daily flow to peak daily flow	3.3
Average daily flow to peak hourly flow	6.6

Using the QLDC peaking factor, the peak hour flow is estimated at 16.04 litres per second.

### 4.3 Fire Fighting Demand

In accordance with *SNZ PAS 4509:2008 New Zealand Fire Service Firefighting Water Supplies Code of Practice*, the usage for the developed site is expected to fall into the "Housing: includes single family dwellings, multi-unit dwellings but excludes multi storey apartment blocks" category. This will result in a fire fighting water supply classification of FW2. An FW2 classification requires 12.5

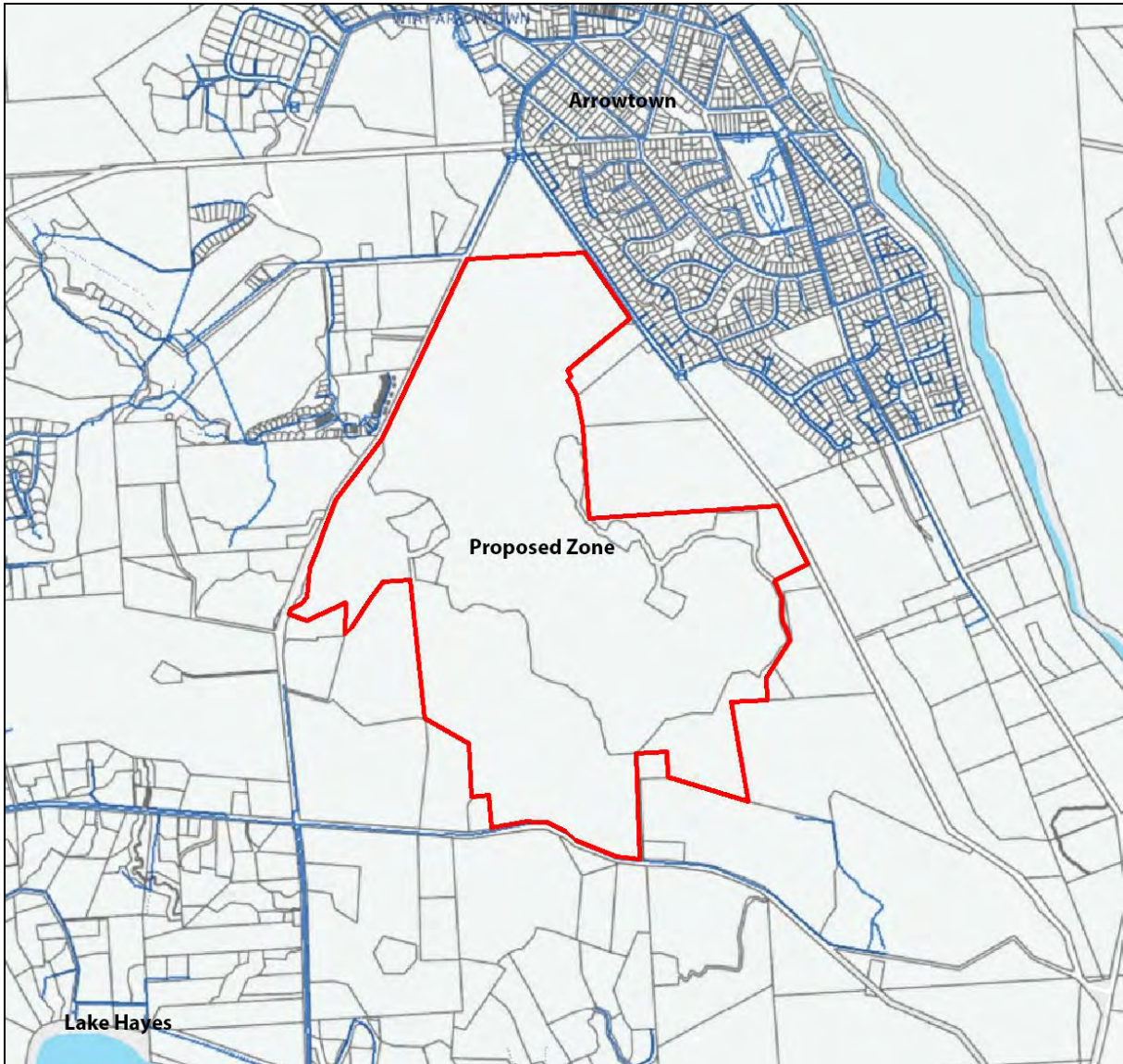
l/s of water flow available within a distance of 135 metres and an additional 12.5 l/s of water flow available within a distance of 270 metres.

#### **4.4 Water Supply - Option 1**

The first option to provide a water supply to the proposed zone, is to connect to an existing QLDC water supply scheme. Given the relative elevations and proximity to site, it would be most appropriate to connect to the Arrowtown water supply scheme.

No network modelling has been undertaken due to time constraints. However, it would appear that the relatively modest levels of flow required would be able to be accommodated. This would be by way of either a direct connection to the existing infrastructure or via some on site buffering to reduce the peak demands on the existing water supply scheme. If buffering was required, it is expected that booster pumping will be required to then reticulate water to the development areas around the site.

In order to connect to the QLDC Water Supply Scheme, approval of Council would be required to extend the water supply scheme boundary to include the proposed zone. In addition, Development Contributions would need to be paid for each dwelling connected. Council may include other conditions for extending the water supply scheme to include the proposed zone which may result in additional upgrade costs being borne by the developer. Early liaison with Council will be required in order to determine exact Council requirements and potential cost liabilities.



**Figure 2 - Map Showing Existing QLDC Water Supply Infrastructure.**

This option would also require the construction and installation of fire hydrants in proximity to the future dwellings in order to meet the fire fighting water supply requirements.

#### **4.5 Water Supply - Option 2**

The second option for providing a water supply for the development would be to use either a new water bore or an existing bore (or a combination of the two) to supply the proposed zone with potable water. This would mean that the zone would have a standalone water supply that was separate from any Council reticulation.

The basic components of such a system would include the water bore intakes and pumps, rising main and storage reservoir as well as a water treatment system sufficient to bring the supply in line with Drinking Standards for New Zealand 2005 (Revised 2008) (DWSNZ).

The water supply storage reservoir for the proposed zone, based upon Council reservoir requirements would be approximately 200 m<sup>3</sup>. As there is no significant high point with suitable elevation above the highest proposed area of development, it is likely that a water pressure boosting pump station would be required to provide domestic and firefighting pressures.

As well as the physical construction issues involved with this option a number of consenting and maintenance matters would also need to be addressed. A resource consent will be required to construct any new bore and it is likely that a further consent will be required for the water take itself as both the calculated total daily demand and the peak hourly flow exceed the permitted water take rates set out in the Otago Regional Council's Regional Plan for Water. Land use and building consents may also be required for the reservoir and water treatment facilities.

There are existing productive bores on the site and on neighbouring sites. Two bores are currently used for servicing the site with both potable and irrigation water. It is likely that these two bores would provide sufficient water for the potable demand for the proposed zone. However, this may reduce the amount of water available for irrigation of the associated golf course and landscaping and this would need to be assessed at the time development proceeded to ensure there was sufficient water for all purposes across the site.

The main issue to be considered with regards to this option would be the on-going maintenance and management of the water supply and treatment system. One option would see the system vested with Council. Alternatively, the water supply could be owned by a lot owners association (or similar) responsible for the on-going management and maintenance of the infrastructure. A similar system to this has been used at Jacks Point near Queenstown.

#### **4.6 Conclusions and Recommendations**

Both of the two options outlined above to supply water to the subject site are feasible. Further investigation, consultation with Council and cost analysis will be necessary to establish the final methodology used.

## 5. Wastewater Disposal

### 5.1 General

A Council reticulated sewerage scheme exists adjacent to the site including an existing rising main that runs through the site. In addition, there is the possibility of constructing a standalone communal treatment and disposal system to cater for the wastewater drainage from the development of the proposed zone.

Both of these options are considered further below.

### 5.2 Demand Assessment

Peak wastewater generation is expected to coincide with peak water demand. The following design figures have been adopted:

Wastewater Generation Item	Wastewater Generation (litres/day)	No.	Total (litres/day)
Dwelling (average day)	1,050	100	105,000

The additional average daily wastewater generation of 105 m<sup>3</sup> per day equates to 1.22 litres per second average flow over twenty four hours.

From the QLDC amendments to NZS4404:2004 Land Development and Subdivision Engineering, the peaking factors for the wastewater network are as follows:

Item	Peaking Factor
Dry weather diurnal peak flow	2.5
Wet weather dilution/infiltration factor	2

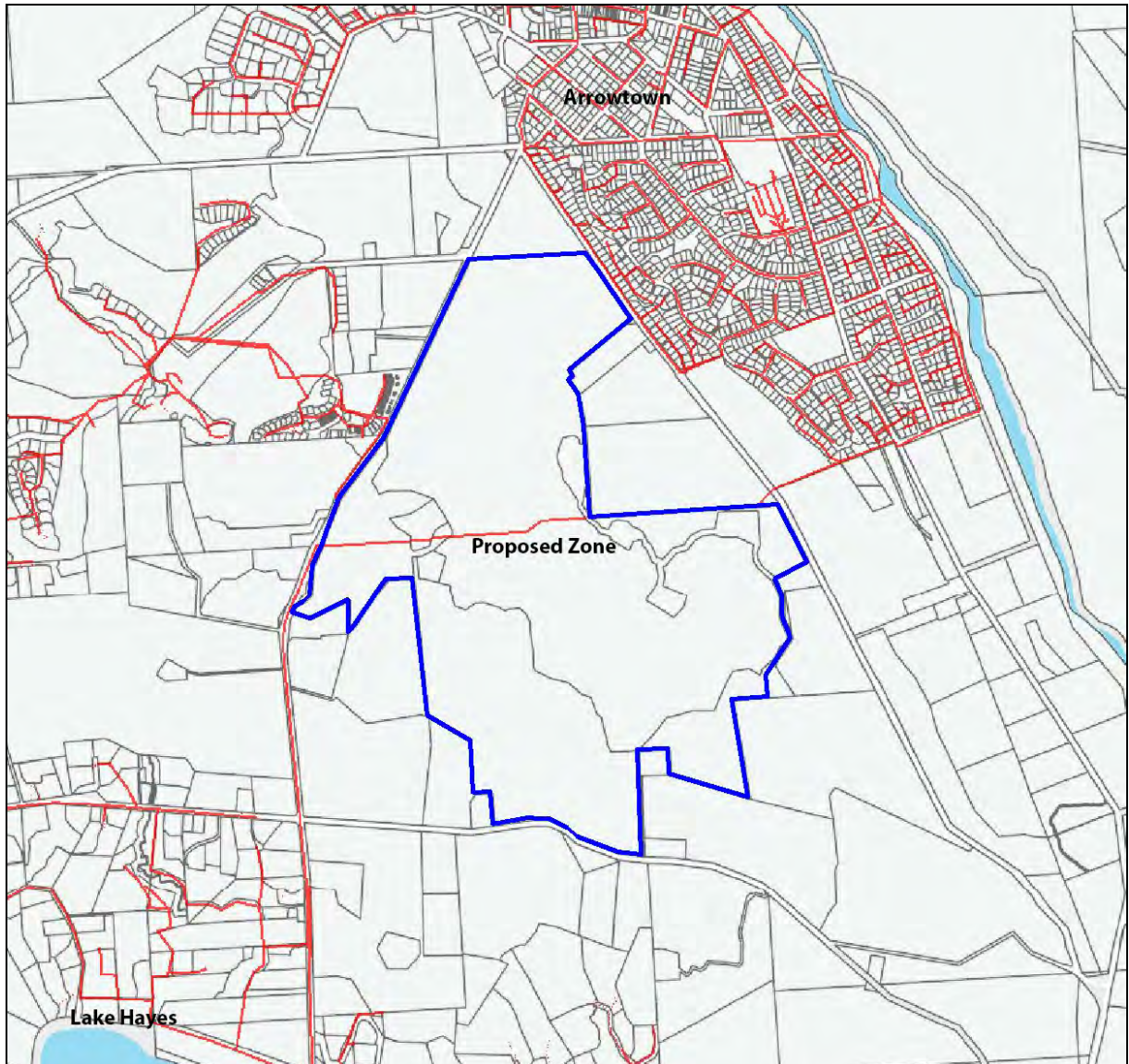
Using the QLDC peaking factors, during the wet weather peak flow is estimated at 6.08 litres per second.

### 5.3 Wastewater Drainage – Option 1 – Council Reticulated Scheme

This option involves connecting to the existing Council reticulation that runs through and adjacent to the site. An existing Council rising main runs through the site, this becomes

gravity reticulation near the Arrowtown – Lake Hayes Road. There is also Council reticulation in McDonnell Road adjacent to the proposed zone.

HCL have previously been engaged in order to connect the existing golf clubhouse to the nearby QLDC wastewater reticulation. This has been done by way of a small pump station with a rising main connection to the first gravity manhole after the Council rising main that runs through the site. QLDC formally approved this connection to their scheme.



**Figure 3 - Map Showing Existing QLDC Wastewater Drainage Infrastructure.**

As previously stated, the site is undulating. It is anticipated that much of the site will be able to be drained using standard trunk and lateral gravity pipelines. These will drain to a central primary pump station that will then pump to a suitable discharge point in the Council network.

To address topographical variation, it is possible that some home sites may require a small package grinder pump and small bore rising main to connect to the new internal reticulation.

The primary pump station would be able to be designed and constructed in such a fashion to enable buffering to reduce flows into the existing Council infrastructure at peak times.

In order to connect to the QLDC Wastewater Drainage Scheme, approval of Council would be required to extend the wastewater scheme boundary to include the proposed zone. In addition, Development Contributions would need to be paid for each dwelling connected. Council may include other conditions for extending the wastewater scheme to include the proposed zone which may result in additional upgrade costs being borne by the developer. Early liaison with Council will be required in order to determine exact Council requirements and potential cost liabilities.

#### **5.4 Wastewater Drainage – Option 2 – Communal System**

This option involves constructing a new communal wastewater treatment and disposal system at a suitable location on site and treating all wastewater flows from the proposed development prior to discharge to land.

It is envisaged that a package plant system similar to that used at Jacks Point could be accommodated to service the Golf Course Land and, if desired, this system could be designed to provide for future expansion to allow inclusion of adjacent development areas. The system would involve the primary treatment of wastewater at each individual dwelling or block of dwellings by way of a septic tank to remove solids. Primary treated effluent from each septic tank is then pumped or drained to the communal package treatment facility where it undergoes secondary and possibly tertiary treatment prior to disposal to land.

This type of system has a number of positive attributes including:

- The ability to stage expansion of the treatment plant to cater for staged development of the zone.
- No pond based treatment.
- Possible reuse of water for irrigation purposes.

The system would be made up of the following components:

1. Each dwelling would drain wastewater flows to a septic tank located close by. This septic tank would be installed at the time the dwelling was constructed. Depending on



the location and topography, the tank would be fitted with a pump and rising main to reticulate flows to gravity reticulation or would simply connect via gravity to nearby reticulation. The septic tanks will require routine inspections and maintenance. This will mostly involve pumping out the solid wastes from time to time. The inspections and maintenance would be managed by a lot owners association or similar. If dwellings were to consist of units or terraced residences, a communal septic tank would be used for that group of dwellings. This would require specific design at the time, but the tank's function would be similar to that for a single dwelling.

2. It is likely that a mix of gravity and pumped mains will reticulate flows to a suitably located treatment facility. In the case of pumped mains, individual tanks would connect to this via a non-return valve kit.
3. At this stage, a package treatment plant is anticipated to be located near the existing service area. This will receive all wastewater flows into a buffer tank and then treat it using a proprietary treatment system. This system would be a package treatment plant from a proprietary manufacturer/supplier. The actual process adopted will be the subject of detailed design and procurement evaluation. For some guidance, the system used at Jacks Point involves the use of textile packed bed reactors. If deemed necessary at the time of detailed design, tertiary treatment such as UV disinfection could be included to further treat the effluent.
4. The final treated effluent would be reticulated to a suitable disposal location. If suitable tertiary treatment is included, it is likely that this treated effluent could be used for shallow subsurface irrigation around the site. This would need to be carefully considered at the time of detailed design to ensure freezing pipes and public access were appropriately managed.

Similar to the water supply system, one of the main issues to be considered with regards to this option would be the on-going maintenance and management of the wastewater treatment and disposal system. One option would see the system vested with Council. Alternatively, the wastewater drainage and treatment system could be owned by a lot owners association (or similar) responsible for the on-going management and maintenance of the infrastructure. A similar approach to this has been adopted at Jacks Point near Queenstown and accepted by QLDC.

## 5.5 Conclusions and Recommendations

It is recommended that the wastewater generated from the proposed development be disposed of by way of connection to either the QLDC reticulated scheme or a new purpose built communal treatment and disposal facility on site. The feasibility of the chosen

wastewater option will need further detailed analysis, consultation and consenting prior to implementation.

## 6. Stormwater Disposal

### 6.1 General

Generally, it is proposed to maintain the runoff characteristics of the existing catchment. However the proposed development on the site will alter the existing stormwater run off patterns and will serve to increase the peak flow runoff. We recommend to collect and control the stormwater runoff and dispose via connection to local water courses or to dispose of on site using stormwater infiltration and soakage features.

### 6.2 Planning Rules and Regulations

Rule 12.5.1.1 of the Regional Plan: Water for Otago states that the discharge of drainage water to water (or onto land where it might enter water) from any drain is a permitted activity so long as certain conditions are met. The conditions of particular relevance to the discharge of stormwater from the proposed new roads and domestic allotments are as follows:

*12.5.1.1 (b) The discharge, after reasonable mixing, does not give rise to all or any of the following effects in the receiving water:*

- (i) The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials; or*
- (ii) Any conspicuous change in the colour or visual clarity; or*
- ...*
- (v) Any significant adverse effects on aquatic life.*

It is further stated that:

*The discharge of drainage water under Rule 12.5.1.1 will have no more than minor adverse effects on the natural and human use values supported by water bodies, or on any other person. This rule is adopted to enable drainage water to be discharged while providing protection for those values and the interests of those people. Any other activity involving the discharge of drainage water is a restricted discretionary activity in order that any adverse effects can be assessed.*

Contaminants associated with vehicular traffic can include oils, rubber, heavy metals and sediments. In large amounts these contaminants can greatly decrease the natural and human use values of bodies of water. As the stormwater from the site will likely be discharging either directly into local water courses or to ground, appropriate protections will need to be installed in the on-site drainage system in order to remove such contaminants

from the stormwater. The aim of stormwater quality treatment used at the site would be to ensure that the runoff from the new development is in a similar condition to that being achieved before the development. Of particular concern are the "first flush" flows that carry the highest pollutant loadings.

Appropriate technologies to separate contaminants from the stormwater flows might include the use of mud-tanks located in the on-site drainage sumps and a vortex separator mechanism such as a Hynds Downstream Defender which provide high removal efficiencies of suspended solids and floatables over a wide range of flow rates.

Careful design of the stormwater reticulation for the site will ensure that the requirements set out in the Regional Plan: Water for Otago are met.

### **6.3 Stormwater Quantities**

At this early stage in the development of the proposed zone, it is difficult to determine the increase in storm water runoff from the site. Initial calculations have been undertaken and these indicate that for a 10 minute rain event with an average reoccurrence interval (ARI) of 10 years the development is expected to increase the storm water flow rate by approximately 1 m<sup>3</sup> per second. This will vary depending upon the density of the development and the permeability of the site.

This level of increase in runoff would result in very large infrastructure if the traditional approach of reticulating all the flows from the site was adopted. If a single point of discharge was developed, the required outlet pipe would be approximately 675 mm in diameter. This level of infrastructure would be expensive and can be mitigated using a Low Impact Design (LID) approach.

From NZS4404:2010 Land Development and Infrastructure:

*Low impact design aims to use natural processes such as vegetation and soil media to provide stormwater management solutions as well as adding value to urban environments. The main principles of low impact design are reducing stormwater generation by reducing impervious areas, minimising site disturbance, and avoiding discharge of contaminants. Stormwater should be managed as close to the point of origin as possible to minimise collection and conveyance. Benefits include limiting discharges of silt, suspended solids, and other pollutants into receiving waters, and protecting and enhancing natural waterways.*

And:

*Low impact design is a type of storm water system that aims to minimise environmental impacts by:*

- (a) Reducing peak flow discharges by attenuation;*
- (b) Eliminating or reducing discharges by infiltration or soakage;*
- (c) Improving water quality by filtration;*
- (d) Installing detention devices for beneficial reuse.*

The types of low impact devices and practices that could be included in the zone include the following:

- Detention Ponds;
- Vegetated swales;
- Rain gardens;
- Rainwater tanks;
- Soakage pits and soak holes;
- Filter strips; and
- Infiltration trenches/basins.

Subdivision urban design principles may also assist in mitigating runoff from the site. These include clustering development to increase open area around developed areas and decreasing road setbacks in order to decrease the likely impervious areas.

In addition to reducing the peak discharge from the site, LID approaches may also improve the quality of the runoff from the site.

It is noted that due to the local topography, the area in the southwest corner of the site drains off site and through private land. The storm water runoff solutions in this area will need to ensure that the post development runoff is no greater than the pre-existing development runoff. It is expected that the use of specific soakage and attenuation devices will be used to meet this requirement.

## **6.4 Conclusions and Recommendations**

We consider that the collection and subsequent disposal of stormwater from the proposed development is entirely feasible via collecting and controlling the stormwater runoff and disposing by draining to the local water courses passing the site.

Dependent upon the overall design approach for the subdivision, the storm water runoff leaving the site could be greatly reduced by the introduction of low impact design approaches including the use of attenuation and filtration devices.

## 7. Natural Hazards

Natural Hazards have been separately assessed by HCL as part of a global Natural Hazards Assessment for THL land holdings.

The HCL Natural Hazards Assessment report is included as Appendix 2 and confirms there are no natural hazard constraints applying to the Golf Course Land.

## 8. Conclusions and Recommendations

The subject site and the proposed development have been assessed to determine the suitability for development in relation to infrastructure services. No significant constraints have been identified and the Golf Course Land is suitable for the proposed development from an infrastructure servicing viewpoint.

The key findings are summarised as follows;

- i. There are two options for supplying water to the site. The first option would be to utilise the QLDC reticulated water supply. This would likely require the construction of water storage and water pressure boosting to achieve buffering and firefighting flows. The second option would be to install a new, private water bore intake and treatment along with a new reservoir and a water supply boosting pump station. The final decision on which methodology to use will be decided at a later point following further investigation, consultation and cost analysis.
- ii. Wastewater drainage reticulation from the site will be able to be catered for with either connection to the existing QLDC reticulation or construction of a proposed wastewater reticulation and treatment and disposal system. The majority of the site will be able to be reticulated by the construction of gravity sewer pipes. However, it is anticipated that parts of the development site will require pump stations in order to convey flows to either the existing QLDC infrastructure or the new treatment plant.
- iii. Stormwater runoff from the site can be satisfactorily disposed of by the construction of necessary reticulation with disposal to local water courses. It is recommended that in order to reduce the peak runoff and to improve runoff quality, low impact design approaches are adopted.
- iv. Based on the global Natural Hazard Assessment prepared by HCL, no natural hazard issues exist which constrain development on the Golf Course Land.

Overall, we confirm that there are no significant impediments to development of the site with respect to Infrastructure Services or Natural Hazard.

We recommend that the timing and scale of the proposed infrastructure upgrades be further assessed once the layout of the proposed zone has been further progressed and staging of development has been confirmed.

Appendix 1  
Structure Plan



**KEY:**

— Structure Plan Boundary

- - - Activity Area

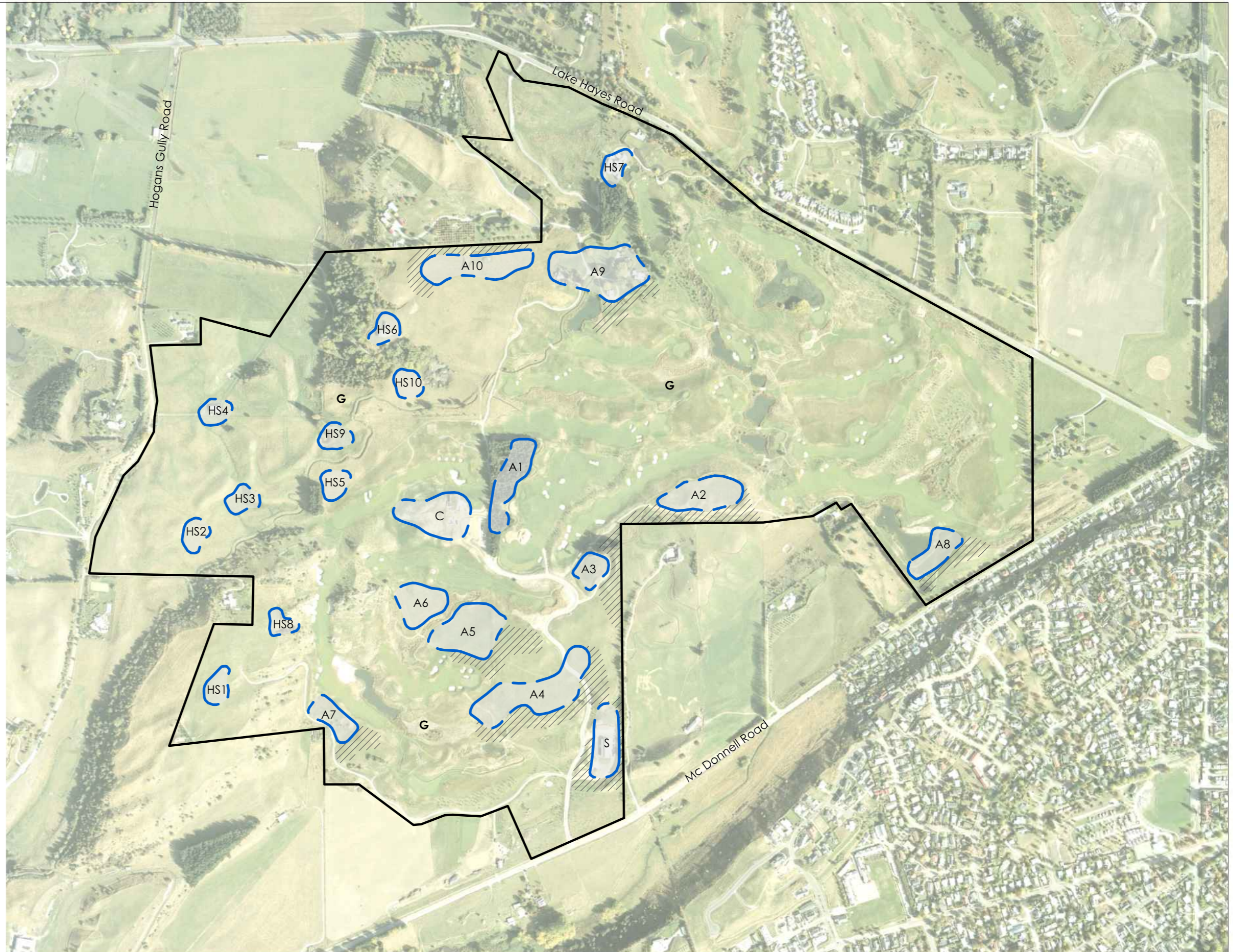
**Activity Areas:**

- G: Golf course, open space and farming
- C: Clubhouse
- A: Visitor Accommodation / Residential
- HS: Homesite (3,000m<sup>2</sup>)
- S: Resort Services & Staff Accommodation

Note: all activity areas include G: Golf course, open space and farming

**Overlays:**

/// Landscape Amenity Management Area



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SCALE: 1:4,000 (A1); 1:8,000 (A3)



PLAN STATUS:

**DP REVIEW**

# THE HILLS STRUCTURE PLAN

DRAWN / REVIEWED: RT / JC  
 APPROVED: DT  
 DATE: 14.10.15

DRAWING NO:

MH\_10\_1\_MLP\_010F

**KEY:**

— Structure Plan Boundary

- - - Activity Area

**Activity Areas:**

- G: Golf course, open space and farming
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*Note: all activity areas include G: Golf course, open space and farming*

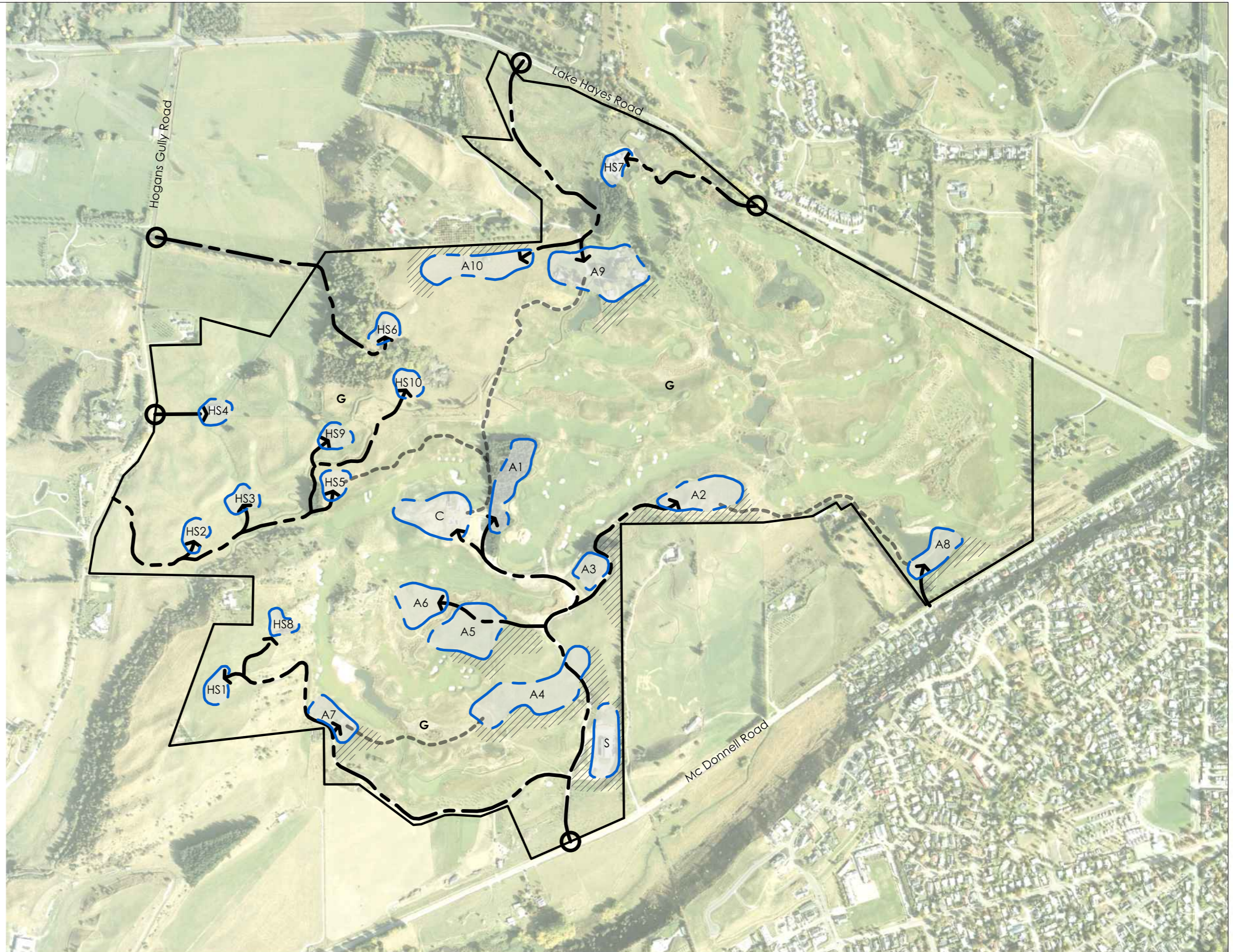
**Overlays:**

/// Landscape Amenity Management Area

○ Existing access point

— Road access

- - - Buggy / cart access

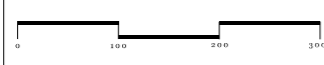


V:\MH\_The Hills\10\_Master\1\_Plan\10\_1\_MLP\_011B (Structure Plan - Access).dgn



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SCALE: 1:4,000 (A1); 1:8,000 (A3)



PLAN STATUS:

**DP REVIEW**

**THE HILLS  
 STRUCTURE PLAN - ACCESS**

DRAWN / REVIEWED: RT / DT  
 APPROVED: DT  
 DATE: 14.10.15

DRAWING NO:

**MH\_10\_1\_MLP\_011B**

Appendix 2  
HCL Natural Hazards  
Assessment Report

Trojan Helmet Ltd

**Hills Golf Course (including  
McDonnell Road Land) and  
Hogans Gully Road Land**

**Proposed District Plan Submission**

Natural Hazard Assessment

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**Document Status**

Revision	Author:		Reviewer:		
	Name	Signature	Name	Signature	Date
A (Initial Issue)	J. Hadley		J. McCartney		20 October 2015
B (For Submission)	J. Hadley		J. McCartney		21 October 2015
C (Final)	J. Hadley		J. McCartney		22 October 2015

**Limitations**

This report has been written for the particular brief to HCL from their client and no responsibility is accepted for the use of the report for any other purpose, or in any other context or by any third party without prior review and agreement.

In addition, this report contains information and recommendations based on information obtained by inspection, sampling or testing at specific times and locations with limited site coverage as outlined in this report. This report does not purport to completely describe all site characteristics and properties and it must be appreciated that the actual conditions encountered throughout the site may vary, particularly where ground conditions and continuity have been inferred between test locations. If conditions at the site are subsequently found to differ significantly from those described and/or anticipated in this report, HCL must be notified to advise and provide further interpretation.

# Contents

<b>1. Introduction</b>	<b>2</b>
<b>2. Nature of Proposed Development</b>	<b>3</b>
<b>3. Scope of Assessment</b>	<b>4</b>
<b>4. Site Description</b>	<b>5</b>
<b>5. QLDC Hazard Register and Previous Work</b>	<b>7</b>
<b>6. Geological Setting</b>	<b>8</b>
6.1 Physiography	8
6.2 Site Lithologies	8
<b>7. Specific Development Area Assessment</b>	<b>10</b>
7.1 General	10
7.2 Liquefaction Risk and Flood Hazard	10
7.3 Proposed Rural Lifestyle Area A	11
7.4 Proposed Rural Lifestyle Area B	11
7.5 Sites Requiring Little or No Mitigation	12
7.6 Site A8	12
7.7 Site A6	13
7.8 Site A10	13
7.9 Site A7	13
7.10 Site HS10	13
7.11 Site HS9	14
7.12 Sites HS2, HS3 and HS4	14
<b>8. Conclusions and Recommendations</b>	<b>15</b>

## **Appendix A**

Darby Partners and HCL Topographic Drawings

## **Appendix B**

QLDC Hazard Maps

## **Appendix C**

Figure 2

## **Appendix D**

Figure 10

# 1. Introduction

Trojan Helmet Ltd (THL) has engaged Hadley Consultants Limited (HCL) to conduct a natural hazards assessment of their land which comprises both the Hills Golf Course and an adjacent land holding which fronts Hogans Gully Road.

This report considers the relevant site conditions and natural hazard issues affecting the potential building development within possible development areas identified by others. Specifically, the natural hazard elements investigated and assessed are:

- Liquefaction hazard,
- Alluvial fan hazard, and
- Inundation and flood risk.

The purpose of this report is to provide a reference document to assess whether any natural hazard constraints exist in a global context which will adversely impact proposed development areas on the THL land holdings.

This report is intended to inform submissions made by THL on the Queenstown Lakes District Council's (QLDC) Proposed District Plan.

## 2. Nature of Proposed Development

The development proposed across the THL land comprises new zoned Rural Lifestyle Areas combined with a new Resort Zoning (the Hills Resort Zone) in which specific pockets of building development are identified for activities which include discrete Homesites, Visitor Accommodation, Farm and Resort Services and Staff Accommodation.

There are two primary Proposed Rural Lifestyle zones as follows;

- Proposed Rural Lifestyle Area A comprising a 19.7Ha block bounded by Hogans Gully Road to the south and Arrowtown – Lake Hayes Road to the west; and
- Proposed Rural Lifestyle Area B comprising an 8.4Ha block with frontage to McDonnell Road.

The remainder of the proposed development areas are located wholly within the existing Golf Course area (which will form the new Hills Resort Zone) and represent discrete pockets of development across the site.

The overall development sites and areas are indicated on the Darby Partners and HCL topographic drawings contained in Appendix A.

Some of the proposed development areas within the Golf Course site include building platforms previously consented under RM081223. Where relevant, previous work on these platforms has been considered in this more global evaluation of natural hazards impacting the land holding.



### 3. Scope of Assessment

The purpose of this report is to provide a global overview of the natural hazard issues which might affect development capability across the THL land holdings. In making this assessment, HCL have undertaken the following activities;

- Stereo pair photo analysis of geological features to identify potential areas of instability.
- Review of previous site investigation and assessment work by others for previous developments at the THL site. These investigations have been used to verify the HCL developed geological and geotechnical models adopted when assessing hazard.
- Detailed site walkover and geological mapping of all proposed development areas.
- Logging and mapping of open excavations and test pits across the site to confirm site lithologies.
- Review and consideration of QLDC Hazard Maps and their impact and relevance to the THL site following specific evaluation and verification of the geomorphology which exists.

It is intended that this document form a master Natural Hazards document for the THL land holdings which may be referred to when considering discrete planning submissions for the separate Rural Lifestyle A and B areas, and the other Activity Areas within the proposed Hills Resort Zone.

## 4. Site Description

The proposed development takes in the Hills Golf Course Land, located at 164 McDonnell Road approximately 1km south of Arrowtown and an area of land comprising 19.7Ha to the south of the Golf Course. This land, referred to as the Hogans Gully Land, is bounded by Hogans Gully Road to the south and Arrowtown – Lake Hayes Road to the west. The drawings included in Appendix A illustrate the site location and development areas.

The Golf Course is accessed from McDonnell Road which runs along the eastern boundary of the site and the Hogans Gully Land is accessed from Hogans Gully Road which runs along the southern site boundary.

Prior to the development of the golf course the THL land comprised farmland. The existing vegetative cover comprises a combination of long pasture, golf course green, landscaped areas and wooded areas. Vegetative cover on the Hogans Gully Land currently comprises farmland, paddocks and pasture.

The site includes several existing structures and these existing building sites have not been assessed as it is assumed they have been considered in detail as part of previous assessment work which allowed their construction.

Topographic contours of the site are shown on HCL Drawings 152859-S01 and S02 in Appendix A.

The site is undulating and ground levels typically vary between RL350m to RL430m. Slopes on the site are predominately gentle (5 to 15°); however, localised steep slopes are also present in some areas across the site.

Rock exposures also exist across the site, most notably on the Golf Course Land but also on the south facing flanks above the Hogans Gully Land.

There are a number of springs, gullies and manmade drainage features present across the site which will give rise to ephemeral flows during wet periods. The most significant drainage features include a stream which runs along the southern boundary of the THL land roughly parallel with Hogans Gully Road and an internal water race system which traverses the higher elevation Golf Course Land roughly west to east.

The site is primarily accessed from McDonnell Road, although additional farm track access is possible from Hogans Gully Road and from Arrowtown – Lake Hayes Road for existing private residences.

The site also includes a relatively complex system of internal roads, footpaths, cart paths and farm tracks that will impact local catchment boundaries and run off characteristics.

The land receives approximately 850mm of rainfall per annum and may be subject to drought conditions during the summer months.

## 5. QLDC Hazard Register and Previous Work

QLDC Hazard Maps (refer Appendix B) note that the site may be affected by;

- Liquefaction Hazard, assessed as provisionally LIC1.
- Alluvial Fan Hazard.

The liquefaction risk classification is shown to affect the majority of the Golf Course Land, whilst the Alluvial Fan Hazard is limited in its extent, taking in parts of the south facing slopes above the Hogans Gully Land.

In August 2006, Tonkin and Taylor Ltd (T&T) conducted a detailed investigation of the Golf Course area as part of a previous development proposal. This work by T&T included;

- Site evaluation,
- The excavation and logging of 12 test pits ranging in depth from 1.8m to 4.8m,
- Scala Penetrometer testing.

As part of their reporting T&T also provided soil parameters for foundation design and slope stability analysis.

T&T recorded that there was no evidence of slope instability recorded in the vicinity of the proposed building platforms, although some instability was observed in the oversteepened slopes above the Hogans Gully Land.

With regard to liquefaction, T&T noted that;

- i) Subgrade materials were expected to provide good bearing for shallow foundations.
- ii) Settlement of the subgrade materials under seismic loading is expected to be minimal.
- iii) For detailed design in accordance with NZS 1170.5:2004, subsoil Class C conditions could be assumed.
- iv) The regional groundwater table was not encountered and is expected to lie at a depth several metres below existing ground surface across the site.

Overall the T&T work did not identify any natural hazard issues (such as liquefaction) affecting any of the proposed Golf Course sites and concluded that building foundations were expected to be founded on glacial outwash and glacial sediment which should provide good bearing.

## 6. Geological Setting

### 6.1 Physiography

The site is located within the Wakatipu Basin, a feature formed by a series of glacial advances.

The most recent glacial advance occurred in the area between 10,000 and 20,000 years ago. This glacial activity has deposited glacial till, outwash and lake sediments over scoured bedrock.

Post glacial times were then dominated by erosion and deposition of alluvial gravels by local watercourses and river systems and during periods of high lake levels. This is relevant in the context of the Hogans Gully Land, where Shotover River derived alluvium is identified.

### 6.2 Site Lithologies

The predominant site lithologies across the site may be summarised as follows;

- i) **Schist.** Schist outcrops irregularly, and is particularly evident beneath the higher terrain towards the south above the Hogans Gully Land. No particular distress was observed (eg glacial shearing/plucking), nor was there any evidence of mass movement.
- ii) **Glacial Till.** Glacial Till dominates across the Golf Course Land, and is particularly notable by the presence of the hummocky terrain. Where visible in outcrop and suboutcrop, it is a lodgement till, comprising compact silt/sand, with subordinate gravel clasts, and generally rare cobbles with rare boulders.

There appear to be three different ages of tills, the oldest being a capping on schist in the vicinity of Sites HS1 and HS8, intermediate age tills form the hummocky terrain within the Golf Course proper, while the youngest till has intruded into the Hogans Gully Land. The latter is finer than the older type, but there isn't a marked difference in grading. Additional observations include;

- No mass movement noted in the till,
- Possible historic fill mounds sometimes hard to differentiate from insitu till.

- iii) **River Alluvium.** The presence of river alluvium is defined in different areas of the site as follows;

- **Within Proposed Rural Lifestyle Area A:** This area is assessed as Shotover derived alluvium sourced from the west. Of particular note are the finger-like beach deposits which accumulated at the surface of the river alluvium by long shore drift when the lake was high.
  - **Within Proposed Rural Lifestyle Area B:** Observations in a test pit near the western margin of this zone disclosed a well-bedded, river alluvium comprising well-graded sandy gravel to cobbly sandy gravel. Clasts appear to be Shotover sourced, hence it is likely that the sediments were deposited by a former Hayes Creek draining the basin south of Coronet Peak. Degradation has produced a stepped morphology, grading gently down towards McDonnell Road.
- iv) **Fans.** Small fans do grade out into the Proposed Rural Lifestyle Area A, but they do not appear to be active. A small, intra-course fan is present near Site A6 and there may be other fan elements around the site and away from proposed development areas. Due to their lack of activity these fan areas require consideration in any detailed design, but are not considered a high risk hazard.

## 7. Specific Development Area Assessment

### 7.1 General

Consideration of the Development Area as a whole has been separated as follows;

- i) Proposed Rural Lifestyle Area A,
- ii) Proposed Rural Lifestyle Area B,
- iii) Development Sites designated "HS" and "A" across the Golf Course area.

We note that due to the presence of existing structures the following sites were excluded from evaluation by HCL;

- Site S – the Resort Services Area,
- Site C – the Clubhouse,
- HS6 – An existing house site,
- HS7 – Existing loge.

We confirm that all other development areas indicated on the Darby Partners drawings contained in Appendix A have been assessed. To avoid repetition in reporting, we have grouped sites with common features.

### 7.2 Liquefaction Risk and Flood Hazard

We collectively address the Liquefaction Risk noted by QLDC as affecting Proposed Rural Lifestyle Area B and all of the HS and A development areas within the Golf Course Land.

HCL's assessment of the site lithologies is that the Golf Course Land is mantled by glacial till comprising compact sands and gravels with a regional groundwater level located at depth. Schist bedrock outcrops in several locations and neither the compact till or the bedrock are susceptible to liquefaction. Further, Proposed Rural Lifestyle Area B includes alluvial deposits, again with a significant depth of groundwater.

HCL's assessment is also verified by the previous reporting and site investigation work of T&T.

The confirmed presence of compact glacial tills and the absence of shallow groundwater allow us to confirm that liquefaction hazard is not a relevant risk for any of the proposed development areas.

A flood hazard is not recorded by QLDC and we confirm that subject to normal cut off drainage and catchment management, no large scale flood or inundation risk exists.

### 7.3 Proposed Rural Lifestyle Area A

Observations relevant to this area include;

- Greater than 50% of the proposed site is located on flat to gently sloping terrain comprising Shotover-derived alluvium.
- Some inactive fan elements encroach into the development area from the north and northeast mantling both glacial till and alluvial deposits in these areas. This is depicted in Figure 2 contained in Appendix C.
- Streams associated with the fan elements are small and assessed as ephemeral with minor source catchments.
- Former high level Lake Wakatipu storm benches are identifiable features in the central reaches of the site and are well drained.
- Based on field inspection and the small size of the streams and source catchments, we do not believe the QLDC classification of the fan elements as active and debris dominated to be correct.

In summary, we believe that the alluvial fan hazard risks associated with this development area are very low subject to;

- a) Provision of normal cut off drainage measures to control upslope runoff from ephemeral watercourses.
- b) Further test pitting as part of any resource consent application to confirm the age and activity of the fan deposition.

### 7.4 Proposed Rural Lifestyle Area B

The following observations were made with respect to Proposed Rural Lifestyle Area B;

- The area contains alluvial deposits and consists of low relief with terraces degrading to the east.
- The exposed cut in the western edge of the development area shows Shotover-derived alluvium circa 23,000 years old comprising sandy gravels.
- The lithology is consistent across the site with the depth to groundwater likely to exceed 10m.



In summary, and noting our earlier comment under Section 7.2 with regard to liquefaction and flood risk, we again believe that the natural hazard risks associated with this development area are very low.

## 7.5 Sites Requiring Little or No Mitigation

The following sites have been assessed and grouped as relatively benign with minimal mitigation required for building development. These sites are;

- A1,
- A2,
- A3,
- A4,
- A5,
- A9,
- HS1,
- HS5, and
- HS8.

Other than the southern extent of A4 where a small depression exists, all of these sites are well drained with competent subgrade conditions. The sites are considered very low risk with regard to natural hazard where normal building controls around verification of bearing capacities for foundation design along with the provision of positive surface drainage control will allow development of these sites.

## 7.6 Site A8

Site A8 at the northern end of the Golf Course Land occupies a low relief mound on the north east side of the low relief pond.

Concern exists that the building or development area could include uncertified fill as part of pond construction. The relative heights of the pond water level (controlled by its outlet) and likely subgrade levels for foundations increases the risk of saturated subgrade conditions.

The site is not subject to natural hazard, but should be the subject of a specific geotechnical investigation to confirm the presence or otherwise of uncertified fill prior to the construction of any building.

## **7.7 Site A6**

This site occupies a low relief localised fan which grades out from the hummocky till zone to the west. The site is located slightly above the creek level, suggesting a perched water table may be present in this area.

Some surface water control from the catchment to the west is required.

Again, the site is not subject to any natural hazard issues, but prior to construction of buildings the site should be subject to a specific geotechnical investigation to confirm the nature and extent of any fan materials and presence or otherwise of a perched water table which may require draining.

## **7.8 Site A10**

This site takes in a substantial area of saturated ground in a through-drainage depression heading south. There are also overland flow issues to be resolved from the steep terrain catchment to the east.

The site could be developed subject to specifically designed drainage and ground improvement works involving cut to waste, installation of piped stormwater reticulation including resolution of secondary overflow issues and import to fill to achieve positive drainage to the area and to provide suitable foundation conditions.

## **7.9 Site A7**

This site is currently constrained by existing services due to the presence of a pump shed, transformer and inspection panels.

There is also localised uncertainty regarding lithologies with the possible presence of fill due to the services modifications.

There are no natural hazard issues affecting the site, however we recommend a detailed geotechnical investigation to define fill areas prior to any building construction occurring.

## **7.10 Site HS10**

This site is affected by water race leakage concentrating in the slope comprising the house site area.

Prior to building development at this site it will be necessary to;

- Complete subsurface investigations to confirm the impact of the race leakage on overall slope stability.
- Pipe the water race for long term security of the site and provide for some form of diversion away from buildings in the event of a catastrophic pipe rupture.

### **7.11 Site HS9**

This site is located in a localised depression and it will be necessary to resolve drainage to the south to avoid a ponding risk.

Similar to HS10, it will be necessary to;

- Complete subsurface investigations to confirm the depth to competent bearing materials (till) in the base of the depression due to likely thick colluvium/soil layer accumulation in the natural basin.
- Pipe the water race for long term security of the site and provide for some form of diversion away from buildings in the event of a catastrophic pipe rupture in the race.

### **7.12 Sites HS2, HS3 and HS4**

These three sites are all located in the valley lines of ephemeral drainage systems. Consequently they are presently wet and saturated. Figure 10 included in Appendix D illustrates the location of the sites and how the channel and ephemeral gully systems affect each area.

It will be possible to develop Sites HS2, HS3 and HS4 if drainage, diversion and ground improvement work is completed, but we recommend that at the time detailed house designs are proposed, consideration is given to locating construction to higher relief ground within the respective Housesite areas. This will minimize the diversion and drainage works required.

All of HS2, HS3 and HS4 are subject to risk from a failure in the water race. Again, piping of the race and consideration of diversions in the event of a breach are recommended to mitigate this risk.

## 8. Conclusions and Recommendations

Based on our site evaluation and assessment work we have made the following conclusions with regard to Natural Hazards and how they impact the THL Golf Course Land (encompassing the proposed Hills Resort Zone and proposed Rural Lifestyle Area B Zone) and Hogans Gully Land (encompassing the proposed Rural Lifestyle Area A Zone);

### Natural Hazard Risks

- i) The Golf Course Land, including Proposed Rural Lifestyle Area B where alluvial deposits are identified, comprises competent and compact glacial till underlain by near surface schist bedrock. These materials are not susceptible to liquefaction and the risk of liquefaction is further reduced by low regional groundwater levels.
- ii) Based on our assessment and investigation of the Golf Course Land, the provisional classification of the site as an LIC1 liquefaction risk by QLDC is not valid. The risk of liquefaction impacting the site is assessed as very low and liquefaction does not constrain the site as a natural hazard.
- iii) The Proposed Rural Lifestyle Area A (Hogans Gully) Land comprises predominately alluvial material where the northern section of the Proposed Rural Lifestyle Area A may potentially be impacted by an alluvial fan hazard. Based on our assessment we don't believe the fan area is active and in the event it was active, its extent would be significantly reduced from that indicated by QLDC Hazard Maps. We have assessed any risk from alluvial fan hazard as low, recognising that if further investigation confirms activity, the risk can be mitigated through bunding protection and regrading at the time of resource consent.
- iv) None of the land areas or development areas are subject to regional flood or inundation hazard.

### Specific Development Site Controls

- v) Prior to any building construction occurring we recommend that sites A6, A7 and A8 require specific geotechnical investigation and design of foundations by a Chartered Professional Engineer. This investigation shall include rationalisation of cut off drainage to improve subgrade conditions and to address overland flow paths.
- vi) Sites HS9 and HS10 are impacted by the existing water race and potential leakage from this race. Prior to any building construction occurring we recommend that a specific geotechnical investigation be completed by a Chartered Professional Engineer to confirm the extent of potential soil accumulation in the depression on HS9 and slope stability impacts of the water race on HS10. Both sites will require piping of the water race and diversion design in the event of a catastrophic pipe breach.

vii) Development sites A10, HS2, HS3 and HS4 are more complex sites as a result of being sited across some natural drainage paths. The sites are not subject to large scale natural hazard risk, but to develop them will require specific design of works to cut off and divert existing flow paths to prevent site inundation, and to address hazards associated with the water race to the north. To ensure that these site development issues are properly addressed, we recommend that prior to any building construction occurring, specific engineering design of drainage and ground improvement works be completed by a Chartered Professional Engineer. We recommend consideration be given to refining the location of these development sites so that they take in higher ground within their respective activity areas, removed from natural drainage paths.

Appendix A  
Darby Partners and HCL  
Topographic Drawings

**KEY:**

— Structure Plan Boundary

- - - Activity Area

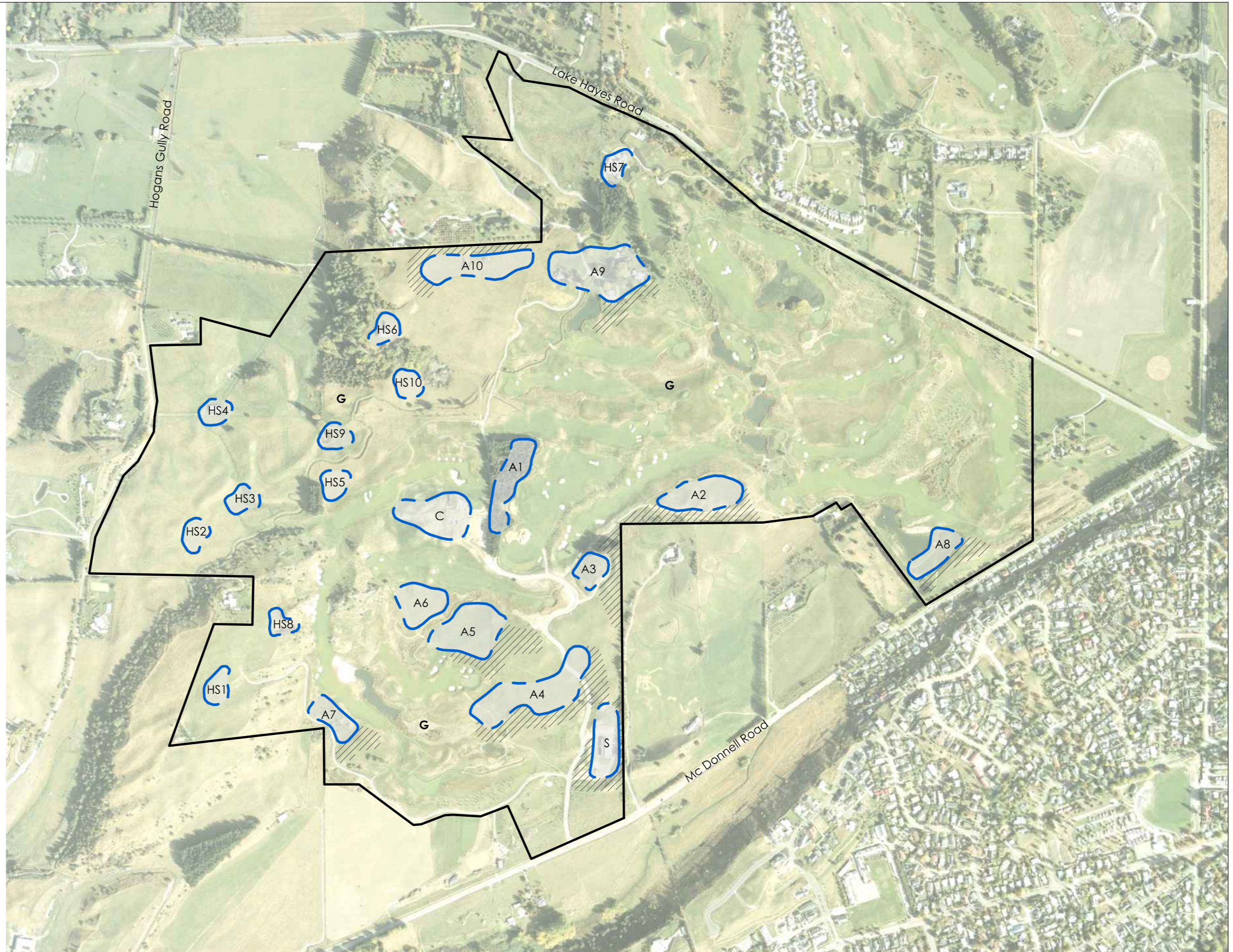
**Activity Areas:**

- G: Golf course, open space and farming
- C: Clubhouse
- A: Visitor Accommodation / Residential
- HS: Homesite (3,000m<sup>2</sup>)
- S: Resort Services & Staff Accommodation

Note: all activity areas include G: Golf course, open space and farming

**Overlays:**

/// Landscape Amenity Management Area



V:\MH\_The Hills\10\_Master\1\_Preliminary\MH\_10\_1\_MLP\_010F (Structure Plan).dgn



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 info@darbypartners.co.nz  
 www.darbypartners.co.nz

SCALE: 1:4,000 (A1); 1:8,000 (A3)



PLAN STATUS:

**DP REVIEW**

# THE HILLS STRUCTURE PLAN

DRAWN / REVIEWED: RT / JC  
 APPROVED: DT  
 DATE: 14.10.15

DRAWING NO:

MH\_10\_1\_MLP\_010F

**KEY:**

— Structure Plan Boundary

- - - Activity Area

**Activity Areas:**

- G: Golf course, open space and farming
- C: Clubhouse
- A: Visitor Accommodation / Residential
- HS: Homesite (3,000m<sup>2</sup>)
- S: Resort Services & Staff Accommodation

*Note: all activity areas include G: Golf course, open space and farming*

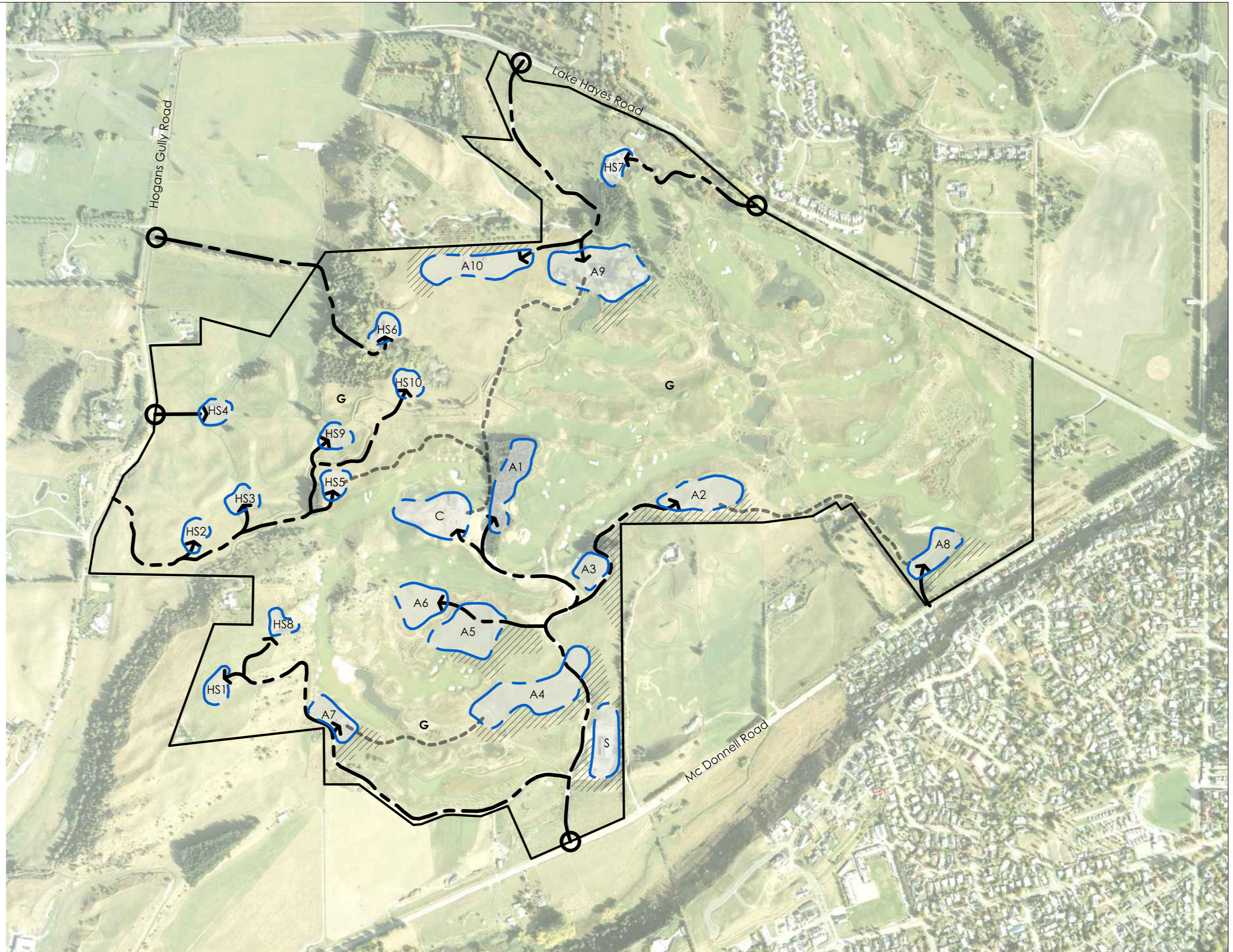
**Overlays:**

/// Landscape Amenity Management Area

○ Existing access point

— Road access

- - - Buggy / cart access



V:\MH\_The Hills\10\_Master\1\_Plan\10\_1\_MLP\_011B (Structure Plan - Access).dgn



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SCALE: 1:4,000 (A1); 1:8,000 (A3)



PLAN STATUS:

**DP REVIEW**

**THE HILLS  
 STRUCTURE PLAN - ACCESS**

DRAWN / REVIEWED: RT / DT  
 APPROVED: DT  
 DATE: 14.10.15

DRAWING NO:

**MH\_10\_1\_MLP\_011B**

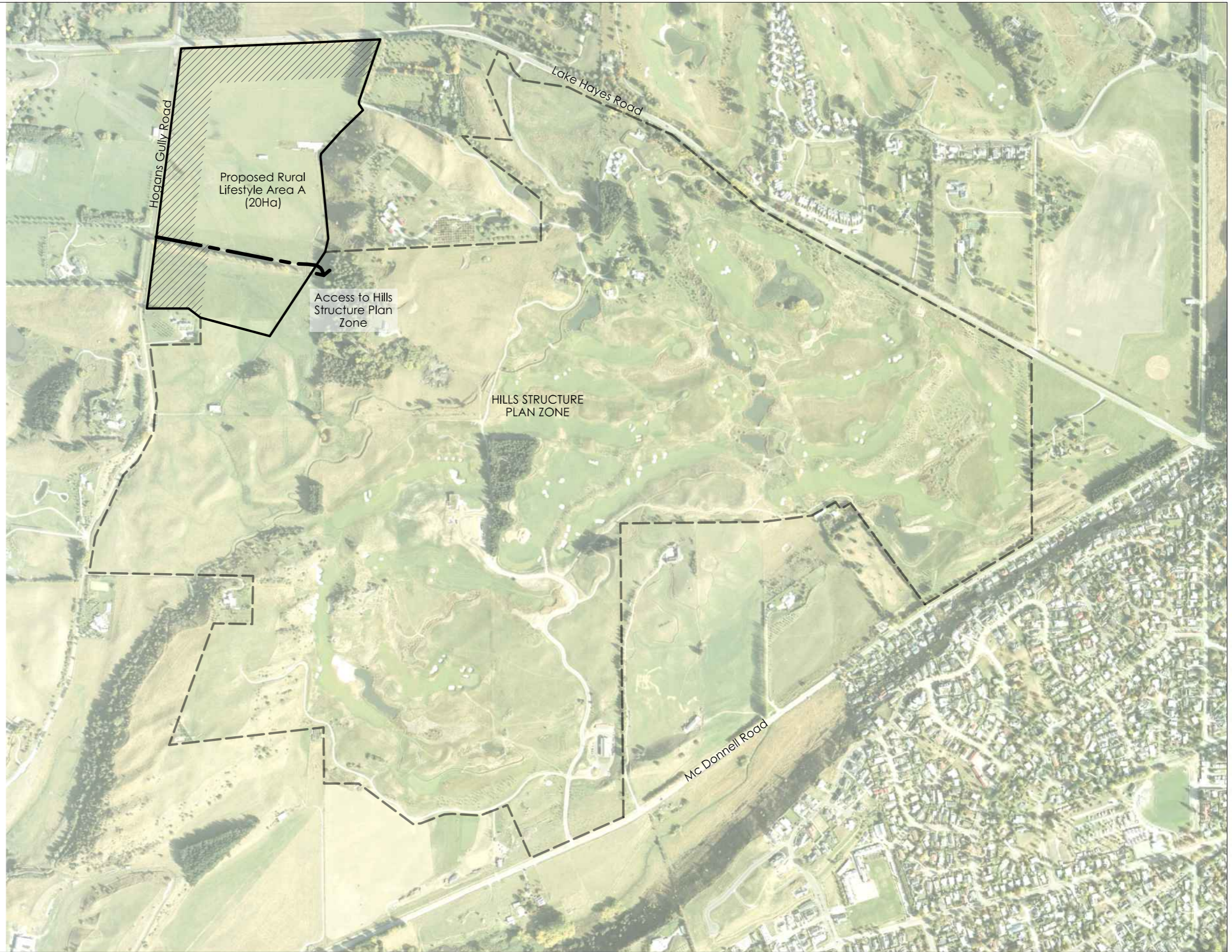


**KEY:**

- Hills Structure Plan Boundary
- Proposed zoning Areas

**Overlays:**

- /// Landscape Amenity Management Area:  
*Includes tree planting, sited to preserve views of surrounding landscape and partially screen proposed dwellings*



V:\MH\_The Hills\10\_Master1\_Preliminary\MH\_10\_1\_MLP\_012B (Rural Lifestyle Area A).dgn



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SCALE: 1:4,000 (A1); 1:8,000 (A3)



PLAN STATUS:  
**DP REVIEW**

# THE HILLS PROPOSED RURAL LIFESTYLE AREA A

DRAWN / REVIEWED: RT / JC  
 APPROVED: DT  
 DATE: 14.10.15

DRAWING NO:  
 MH\_10\_1\_MLP\_012B

**KEY:**

- Hills Structure Plan Boundary
- Proposed zoning Areas



**Overlays:**

- /// Landscape Amenity Management Area:  
*Includes tree planting, sited to preserve views of surrounding landscape and partially screen proposed dwellings*



V:\MH\_The Hills\10\_Master\1\_Preliminary\MH\_10\_1\_MLP\_013A (Rural Lifestyle Area B).dgn



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SCALE: 1:4,000 (A1); 1:8,000 (A3)

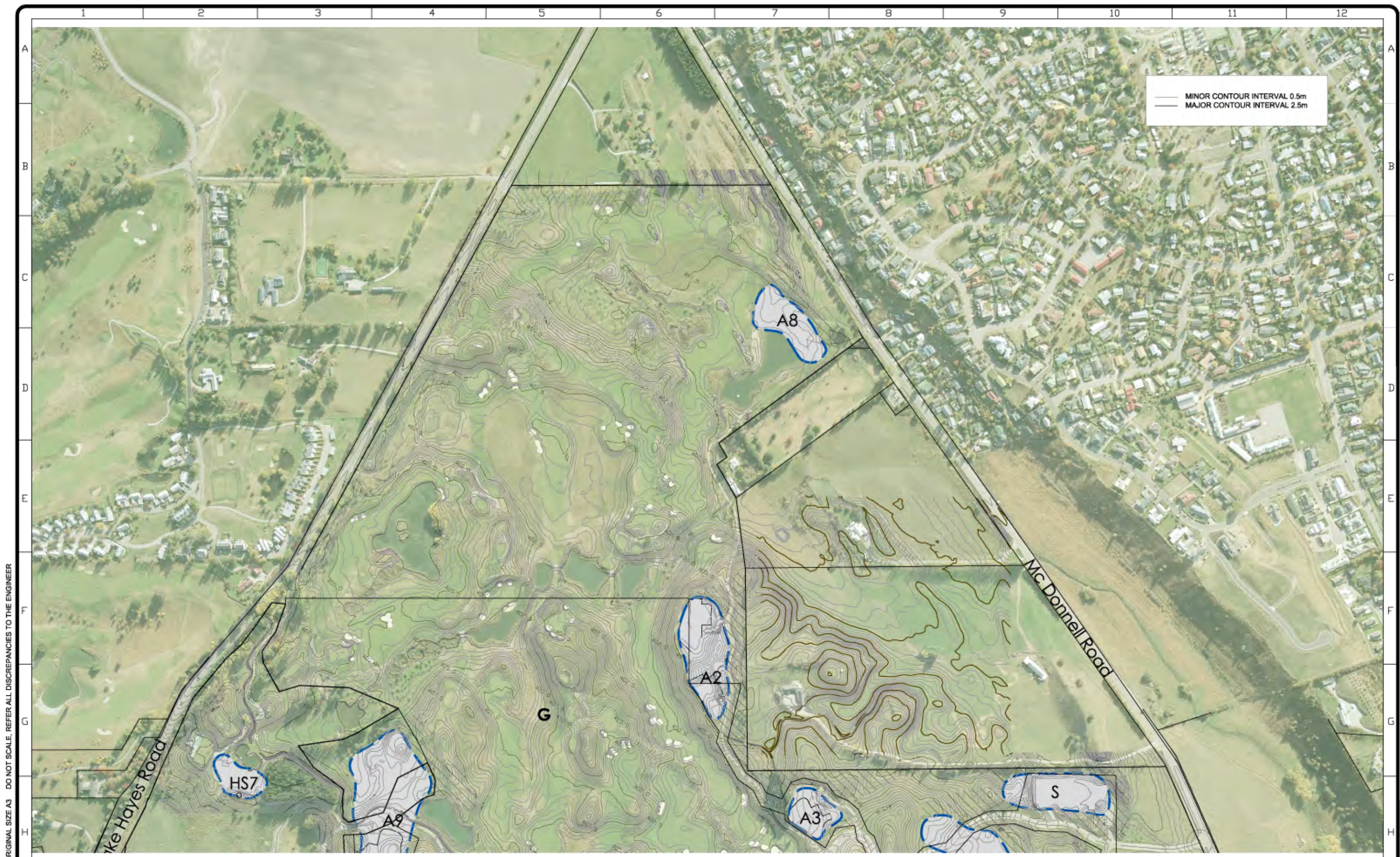


PLAN STATUS:  
**DP REVIEW**

**THE HILLS  
 PROPOSED RURAL LIFESTYLE AREA B**

DRAWN / REVIEWED: RT / JC  
 APPROVED: DT  
 DATE: 14.10.15

DRAWING NO:  
**MH\_10\_1\_MLP\_013A**



ORIGINAL SIZE A3 DO NOT SCALE, REFER ALL DISCREPANCIES TO THE ENGINEER

Notes:	Issue	Description	By	Date
	A	Preliminary Issue	JWPH	20.10.15

Project: **NATURAL HAZARD ASSESSMENT**

Title: **TOPOGRAPHIC SITE PLAN 1**

Client: **TROJAN HELMET LTD**

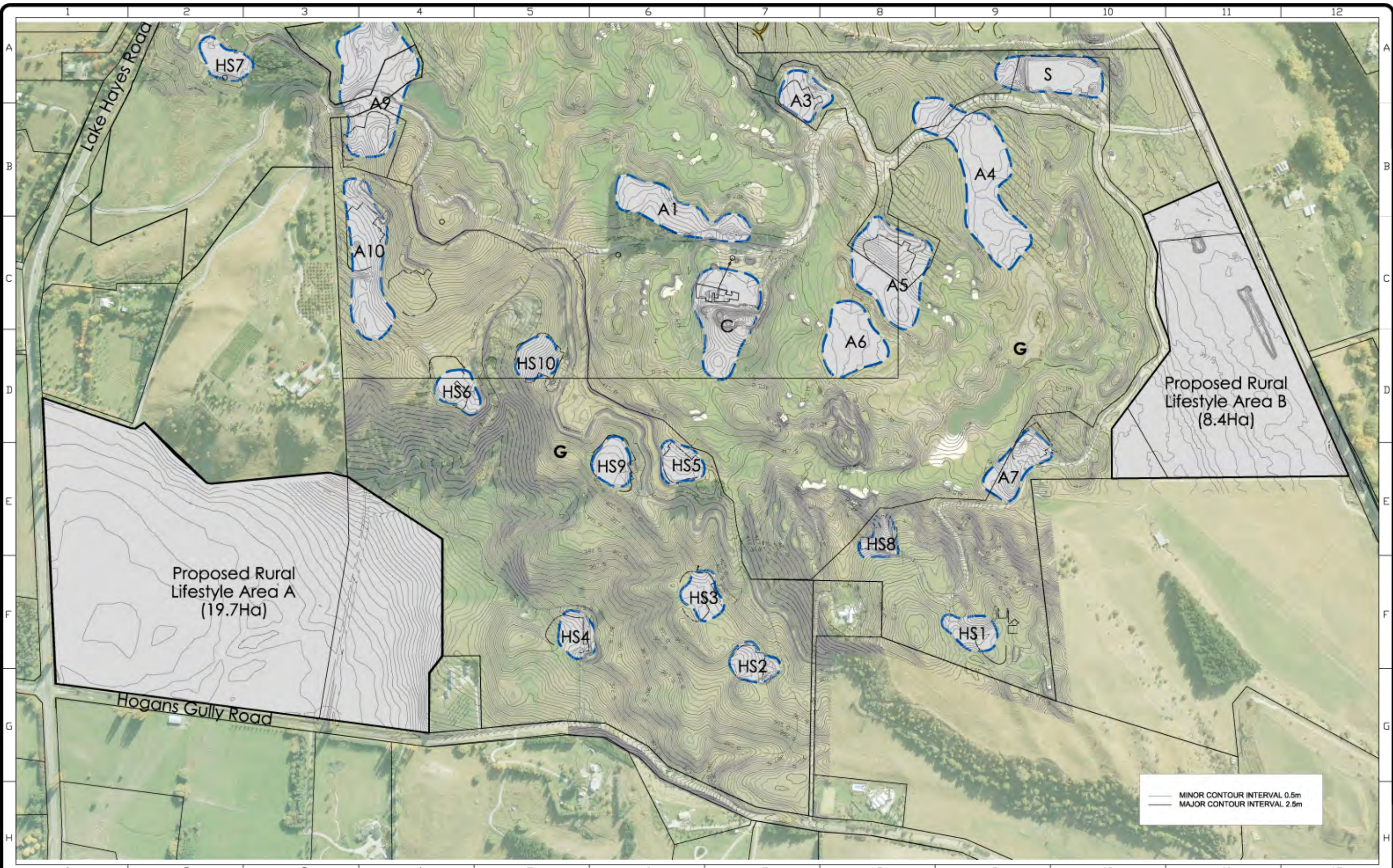
**hadley consultants LTD**  
CONSULTING CIVIL & STRUCTURAL ENGINEERS

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ORIGINAL SIZE A3 DO NOT SCALE, REFER ALL DISCREPANCIES TO THE ENGINEER




Issue	Description	By	Date
A	Preliminary Issue	JWPH	20.10.15

Project: **NATURAL HAZARD ASSESSMENT**

Title: **TOPOGRAPHIC SITE PLAN 2**

Client: **TROJAN HELMET LTD**

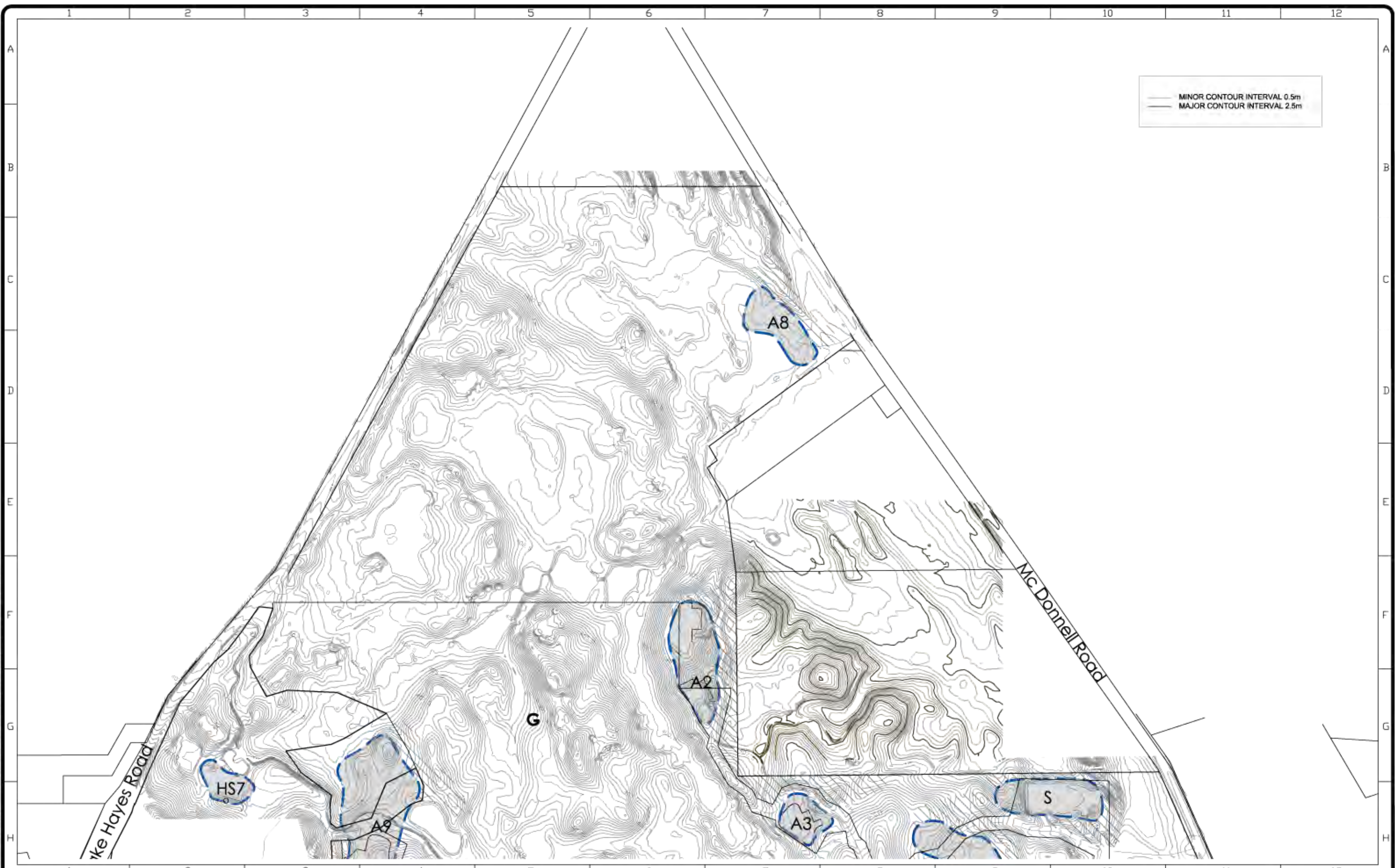

  
 CONSULTING CIVIL & STRUCTURAL ENGINEERS

44 Robins Road, PO Box 1556, Queenstown, New Zealand, P. +64 3 450 2141, F. +64 3 441 3513, W. www.hadleys.co.nz

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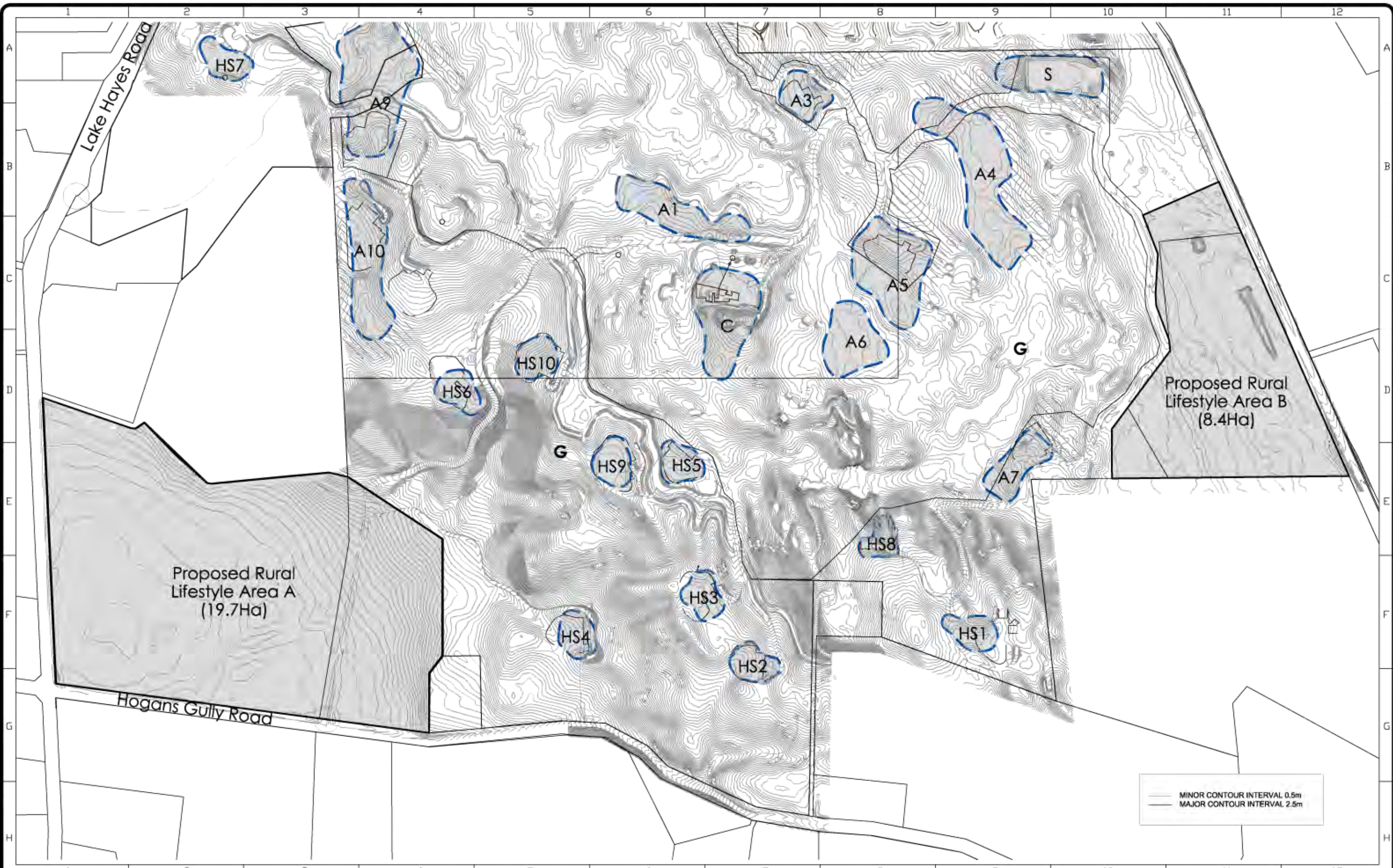
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ORIGINAL SIZE A3 DO NOT SCALE, REFER ALL DISCREPANCIES TO THE ENGINEER



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	A	Preliminary Issue	JWPH	20.10.15	<p><b>NATURAL HAZARD ASSESSMENT</b></p> <p><b>ACTIVITY AREA PLAN 1</b></p>			
					Title:	<p>Drawn: MU</p> <p>Checked: JWPH</p> <p>Scale: 1:5000 @ A3</p>	<p>Drawing Number: 152859</p> <p>Project: 152859</p>	<p>Sheet: S03</p> <p>Issue: A</p>

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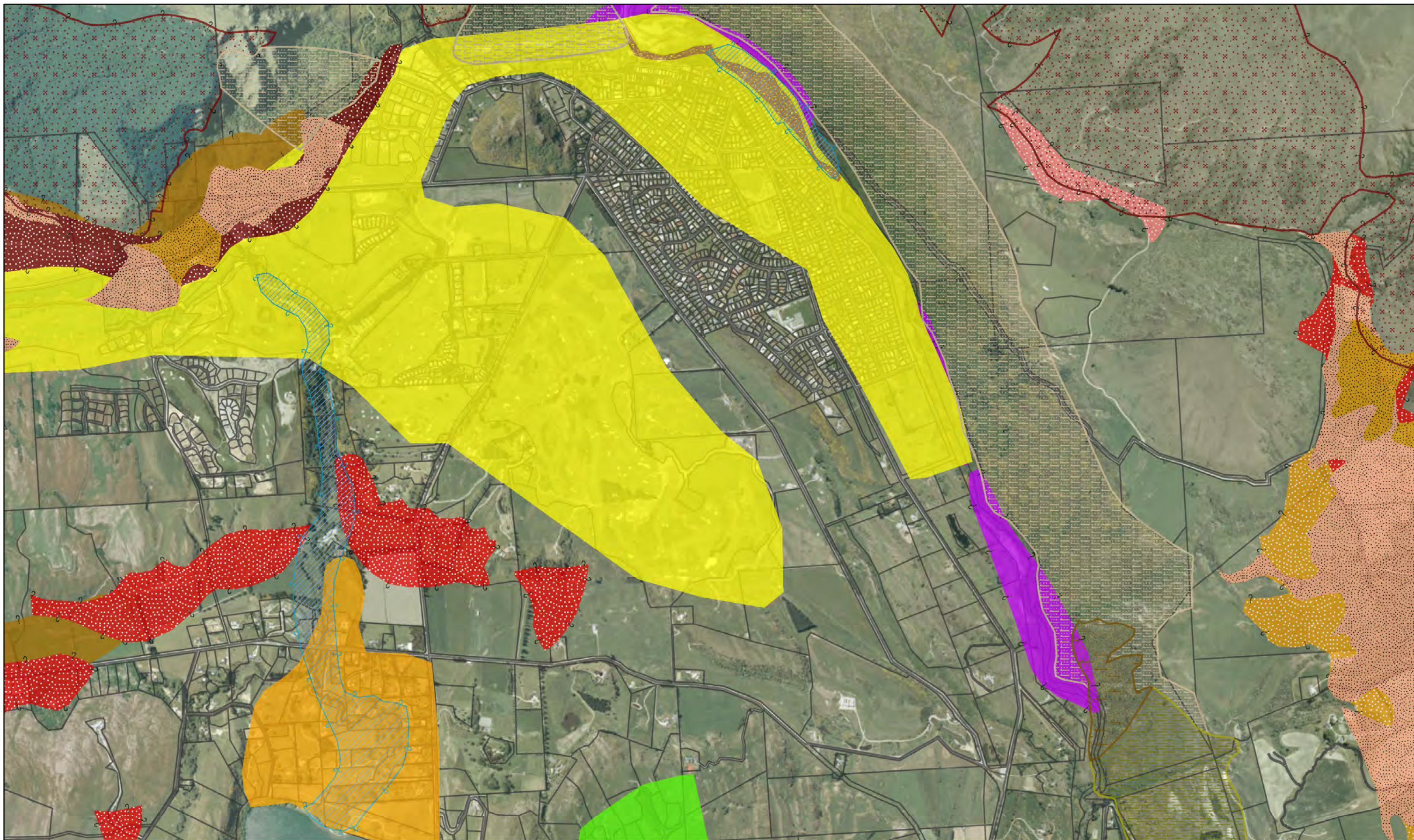
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Project:	NATURAL HAZARD ASSESSMENT
Title:	ACTIVITY AREA PLAN 2

Client:	TROJAN HELMET LTD
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Drawn:	Checked:	Scale:	Drawing Number:
MU	JWPH	1:5000 @ A3	Project: 152859 Sheet: S04 Issue: A

Appendix B  
QLDC Hazard Maps



The map is an approximate representation only and must not be used to determine the location or size of items shown, or to identify legal boundaries. To the extent permitted by law, the Queenstown Lakes District Council, their employees, agents and contractors will not be liable for any costs, damages or loss suffered as a result of the data or plan, and no warranty of any kind is given as to the accuracy or completeness of the information represented by the GIS data. While reasonable use is permitted and encouraged, all data is copyright reserved by Queenstown Lakes District Council. Cadastral information derived from Land Information New Zealand. CROWN COPYRIGHT RESERVED





# The Hills

## Legend

### Property Land


 Parcel Boundaries


### Property Address


 Roads


### Hazards


 Active Fault - Location approximate

 Inactive Fault - Location approximate


 Flooding due to Rainfall

 Flooding due to Damburst

 Landslide: Active Pre-existing Schist Debris Landslides

 Landslide: Pre-existing Schist Debris Landslides (Activity Unknown)

 Landslide: Dormant Pre-existing Schist Debris Landslides


 Landslide: Shallow Slips and Debris Flows in Colluvium


 Landslide: Debris Flow Hazards

 Landslide: Slope Failure Hazard in Superficial Deposits

 Landslide: Rockfall


 Landslide: Pre-existing or Potential Failure in Lake Sediments or Tertiary Sediments

 Landslide: Piping potential in the Artesian Zone of the Wanaka Aquifer


 Landslide: Potential Hazard - Debris Flood/Debris Flow


 Landslide Areas - non verified


 Erosion Areas


 Alluvial Fan - Incision Line


 Alluvial Fan - Channels


 Alluvial Fan - Source Area


 Alluvial Fan - Catchment Areas


 Alluvial Fan - Hazard Area


 Alluvial Fan - ORC: fan active bed


 Alluvial Fan - ORC: fan recently active


 Alluvial Fan - ORC: fan less recently active


 Alluvial Fan (Regional scale) Active, Composite

 Alluvial Fan (Regional scale) Active, Debris-dominated


 Alluvial Fan (Regional scale) Active, Floodwater-dominated


 Alluvial Fan (Regional scale) Inactive, Composite


 Alluvial Fan (Regional scale) Inactive, Debris-dominated


 Alluvial Fan (Regional scale) Inactive, Floodwater-dominated


 Avalanche Areas


 Liquefaction Risk: Nil to Low (T&T 2012)

 Liquefaction Risk: Probably Low (T&T 2012)

 Liquefaction Risk: Possibly Moderate (T&T 2012)

 Liquefaction Risk: Possibly High (T&T 2012)

 Liquefaction Risk: Possibly Susceptible (Opus 2002)

 Liquefaction Risk: Susceptible (Opus 2002)

Appendix C

Figure 2

**KEY:**

- Structure Plan Boundary
- Activity Area

**Activity Areas:**

- G: Golf course, open space and farming
- C: Clubhouse
- A: Visitor Accommodation / Residential
- HS: Homesite (3,000m<sup>2</sup>)
- F: Farm
- S: Resort Services & Staff Accommodation

Note: all activity areas include G: Golf course, open space and farming

**Overlays:**

- /// Landscape Protection Area

The Hills Structure Plan - Yield Schedule  
Sep-10

Activity Area	Size	Density (unit/Ha)		Lots	
		Low	High	Low	High
A1	0.9 Ha	1	8	1	7
A2	0.9 Ha	1	8	1	7
A3	0.4 Ha	1	8	1	3
A4	1.7 Ha	1	8	1	13
A5	1.2 Ha	1	8	1	10
A6	0.7 Ha	1	8	1	6
A7	0.5 Ha	1	8	1	4
A8	0.6 Ha	1	4	1	2
A9	1.7 Ha	1	8	1	13
A10	1.1 Ha	1	8	1	8
<b>Subtotal</b>				<b>10</b>	<b>74</b>
H1	0.3 Ha			1	1
H2	0.3 Ha			1	1
H3	0.3 Ha			1	1
H4	0.3 Ha			1	1
H5	0.3 Ha			1	1
H6	0.3 Ha			1	1
H7	0.3 Ha			1	1
H8	0.2 Ha			1	1
H9	0.3 Ha			1	1
H10	0.3 Ha			1	1
<b>Subtotal</b>				<b>10</b>	<b>10</b>
<b>Total</b>				<b>20</b>	<b>84</b>

<b>Total Structure Plan Area</b>	162.7 Ha		
<b>Ave. Lot size (per total land area)</b>		8.1 Ha	1.9 Ha

FOR DISCUSSION



**Fig.2**

QLDC hazard zonations. Depiction of liquefaction and alluvial fan hazards at site.



Liquefaction risk. Probably low



Alluvial fan. Active. Debris dominated.



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SCALE: 1:4,000 (A1) 1:8,000 (A3)



PLAN STATUS  
**DRAFT**

THE HILLS  
STRUCTURE PLAN

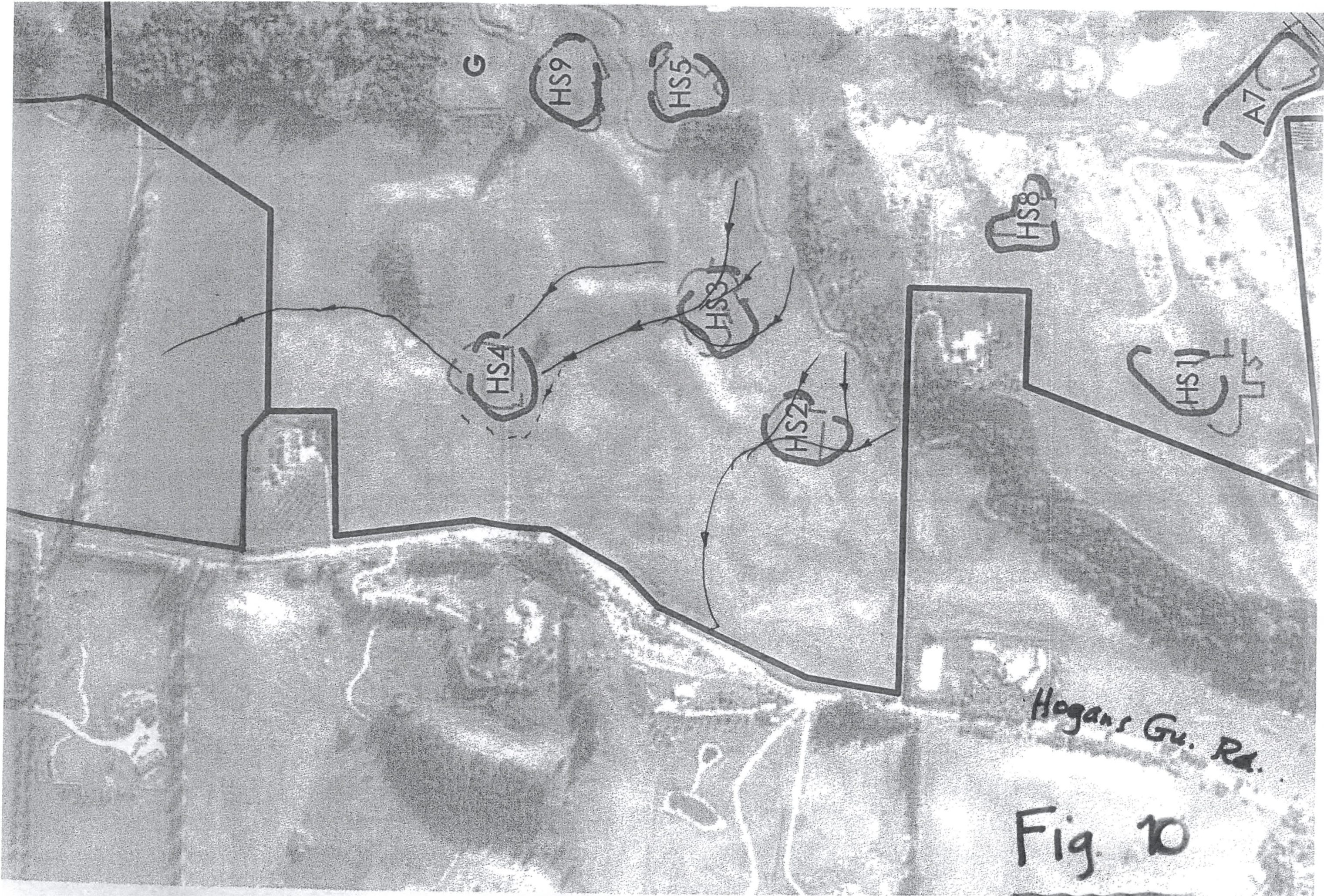
DRAWN / REVIEWED: RT / JC  
APPROVED: DT  
DATE: 14.09.15

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Appendix D

Figure 10



Trojan Helmet Ltd

**Hills Golf Course (including  
McDonnell Road Land) and  
Hogans Gully Road Land**

**Proposed District Plan Submission**

Natural Hazard Assessment

**Contact Details:**







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Responsible Engineer:  
James Hadley  
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**Document Status**

Revision	Author:		Reviewer:		
	Name	Signature	Name	Signature	Date
A (Initial Issue)	J. Hadley		J. McCartney		20 October 2015
B (For Submission)	J. Hadley		J. McCartney		21 October 2015
C (Final)	J. Hadley		J. McCartney		22 October 2015

**Limitations**

This report has been written for the particular brief to HCL from their client and no responsibility is accepted for the use of the report for any other purpose, or in any other context or by any third party without prior review and agreement.

In addition, this report contains information and recommendations based on information obtained by inspection, sampling or testing at specific times and locations with limited site coverage as outlined in this report. This report does not purport to completely describe all site characteristics and properties and it must be appreciated that the actual conditions encountered throughout the site may vary, particularly where ground conditions and continuity have been inferred between test locations. If conditions at the site are subsequently found to differ significantly from those described and/or anticipated in this report, HCL must be notified to advise and provide further interpretation.

## Contents

<b>1. Introduction</b>	<b>2</b>
<b>2. Nature of Proposed Development</b>	<b>3</b>
<b>3. Scope of Assessment</b>	<b>4</b>
<b>4. Site Description</b>	<b>5</b>
<b>5. QLDC Hazard Register and Previous Work</b>	<b>7</b>
<b>6. Geological Setting</b>	<b>8</b>
6.1 Physiography	8
6.2 Site Lithologies	8
<b>7. Specific Development Area Assessment</b>	<b>10</b>
7.1 General	10
7.2 Liquefaction Risk and Flood Hazard	10
7.3 Proposed Rural Lifestyle Area A	11
7.4 Proposed Rural Lifestyle Area B	11
7.5 Sites Requiring Little or No Mitigation	12
7.6 Site A8	12
7.7 Site A6	13
7.8 Site A10	13
7.9 Site A7	13
7.10 Site HS10	13
7.11 Site HS9	14
7.12 Sites HS2, HS3 and HS4	14
<b>8. Conclusions and Recommendations</b>	<b>15</b>

### Appendix A

Darby Partners and HCL Topographic Drawings

### Appendix B

QLDC Hazard Maps

### Appendix C

Figure 2

### Appendix D

Figure 10



# 1. Introduction

Trojan Helmet Ltd (THL) has engaged Hadley Consultants Limited (HCL) to conduct a natural hazards assessment of their land which comprises both the Hills Golf Course and an adjacent land holding which fronts Hogans Gully Road.

This report considers the relevant site conditions and natural hazard issues affecting the potential building development within possible development areas identified by others. Specifically, the natural hazard elements investigated and assessed are:

- Liquefaction hazard,
- Alluvial fan hazard, and
- Inundation and flood risk.

The purpose of this report is to provide a reference document to assess whether any natural hazard constraints exist in a global context which will adversely impact proposed development areas on the THL land holdings.

This report is intended to inform submissions made by THL on the Queenstown Lakes District Council's (QLDC) Proposed District Plan.

## 2. Nature of Proposed Development

The development proposed across the THL land comprises new zoned Rural Lifestyle Areas combined with a new Resort Zoning (the Hills Resort Zone) in which specific pockets of building development are identified for activities which include discrete Homesites, Visitor Accommodation, Farm and Resort Services and Staff Accommodation.

There are two primary Proposed Rural Lifestyle zones as follows;

- Proposed Rural Lifestyle Area A comprising a 19.7Ha block bounded by Hogans Gully Road to the south and Arrowtown – Lake Hayes Road to the west; and
- Proposed Rural Lifestyle Area B comprising an 8.4Ha block with frontage to McDonnell Road.

The remainder of the proposed development areas are located wholly within the existing Golf Course area (which will form the new Hills Resort Zone) and represent discrete pockets of development across the site.

The overall development sites and areas are indicated on the Darby Partners and HCL topographic drawings contained in Appendix A.

Some of the proposed development areas within the Golf Course site include building platforms previously consented under RM081223. Where relevant, previous work on these platforms has been considered in this more global evaluation of natural hazards impacting the land holding.

### 3. Scope of Assessment

The purpose of this report is to provide a global overview of the natural hazard issues which might affect development capability across the THL land holdings. In making this assessment, HCL have undertaken the following activities;

- Stereo pair photo analysis of geological features to identify potential areas of instability.
- Review of previous site investigation and assessment work by others for previous developments at the THL site. These investigations have been used to verify the HCL developed geological and geotechnical models adopted when assessing hazard.
- Detailed site walkover and geological mapping of all proposed development areas.
- Logging and mapping of open excavations and test pits across the site to confirm site lithologies.
- Review and consideration of QLDC Hazard Maps and their impact and relevance to the THL site following specific evaluation and verification of the geomorphology which exists.

It is intended that this document form a master Natural Hazards document for the THL land holdings which may be referred to when considering discrete planning submissions for the separate Rural Lifestyle A and B areas, and the other Activity Areas within the proposed Hills Resort Zone.

## 4. Site Description

The proposed development takes in the Hills Golf Course Land, located at 164 McDonnell Road approximately 1km south of Arrowtown and an area of land comprising 19.7Ha to the south of the Golf Course. This land, referred to as the Hogans Gully Land, is bounded by Hogans Gully Road to the south and Arrowtown – Lake Hayes Road to the west. The drawings included in Appendix A illustrate the site location and development areas.

The Golf Course is accessed from McDonnell Road which runs along the eastern boundary of the site and the Hogans Gully Land is accessed from Hogans Gully Road which runs along the southern site boundary.

Prior to the development of the golf course the THL land comprised farmland. The existing vegetative cover comprises a combination of long pasture, golf course green, landscaped areas and wooded areas. Vegetative cover on the Hogans Gully Land currently comprises farmland, paddocks and pasture.

The site includes several existing structures and these existing building sites have not been assessed as it is assumed they have been considered in detail as part of previous assessment work which allowed their construction.

Topographic contours of the site are shown on HCL Drawings 152859-S01 and S02 in Appendix A.

The site is undulating and ground levels typically vary between RL350m to RL430m. Slopes on the site are predominately gentle (5 to 15°); however, localised steep slopes are also present in some areas across the site.

Rock exposures also exist across the site, most notably on the Golf Course Land but also on the south facing flanks above the Hogans Gully Land.

There are a number of springs, gullies and manmade drainage features present across the site which will give rise to ephemeral flows during wet periods. The most significant drainage features include a stream which runs along the southern boundary of the THL land roughly parallel with Hogans Gully Road and an internal water race system which traverses the higher elevation Golf Course Land roughly west to east.

The site is primarily accessed from McDonnell Road, although additional farm track access is possible from Hogans Gully Road and from Arrowtown – Lake Hayes Road for existing private residences.

The site also includes a relatively complex system of internal roads, footpaths, cart paths and farm tracks that will impact local catchment boundaries and run off characteristics.

The land receives approximately 850mm of rainfall per annum and may be subject to drought conditions during the summer months.

## 5. QLDC Hazard Register and Previous Work

QLDC Hazard Maps (refer Appendix B) note that the site may be affected by;

- Liquefaction Hazard, assessed as provisionally LIC1.
- Alluvial Fan Hazard.

The liquefaction risk classification is shown to affect the majority of the Golf Course Land, whilst the Alluvial Fan Hazard is limited in its extent, taking in parts of the south facing slopes above the Hogans Gully Land.

In August 2006, Tonkin and Taylor Ltd (T&T) conducted a detailed investigation of the Golf Course area as part of a previous development proposal. This work by T&T included;

- Site evaluation,
- The excavation and logging of 12 test pits ranging in depth from 1.8m to 4.8m,
- Scala Penetrometer testing.

As part of their reporting T&T also provided soil parameters for foundation design and slope stability analysis.

T&T recorded that there was no evidence of slope instability recorded in the vicinity of the proposed building platforms, although some instability was observed in the oversteepened slopes above the Hogans Gully Land.

With regard to liquefaction, T&T noted that;

- i) Subgrade materials were expected to provide good bearing for shallow foundations.
- ii) Settlement of the subgrade materials under seismic loading is expected to be minimal.
- iii) For detailed design in accordance with NZS 1170.5:2004, subsoil Class C conditions could be assumed.
- iv) The regional groundwater table was not encountered and is expected to lie at a depth several metres below existing ground surface across the site.

Overall the T&T work did not identify any natural hazard issues (such as liquefaction) affecting any of the proposed Golf Course sites and concluded that building foundations were expected to be founded on glacial outwash and glacial sediment which should provide good bearing.

## 6. Geological Setting

### 6.1 Physiography

The site is located within the Wakatipu Basin, a feature formed by a series of glacial advances.

The most recent glacial advance occurred in the area between 10,000 and 20,000 years ago. This glacial activity has deposited glacial till, outwash and lake sediments over scoured bedrock.

Post glacial times were then dominated by erosion and deposition of alluvial gravels by local watercourses and river systems and during periods of high lake levels. This is relevant in the context of the Hogans Gully Land, where Shotover River derived alluvium is identified.

### 6.2 Site Lithologies

The predominant site lithologies across the site may be summarised as follows;

- i) **Schist.** Schist outcrops irregularly, and is particularly evident beneath the higher terrain towards the south above the Hogans Gully Land. No particular distress was observed (eg glacial shearing/plucking), nor was there any evidence of mass movement.
- ii) **Glacial Till.** Glacial Till dominates across the Golf Course Land, and is particularly notable by the presence of the hummocky terrain. Where visible in outcrop and suboutcrop, it is a lodgement till, comprising compact silt/sand, with subordinate gravel clasts, and generally rare cobbles with rare boulders.

There appear to be three different ages of tills, the oldest being a capping on schist in the vicinity of Sites HS1 and HS8, intermediate age tills form the hummocky terrain within the Golf Course proper, while the youngest till has intruded into the Hogans Gully Land. The latter is finer than the older type, but there isn't a marked difference in grading. Additional observations include;

- No mass movement noted in the till,
- Possible historic fill mounds sometimes hard to differentiate from insitu till.

- iii) **River Alluvium.** The presence of river alluvium is defined in different areas of the site as follows;

- **Within Proposed Rural Lifestyle Area A:** This area is assessed as Shotover derived alluvium sourced from the west. Of particular note are the finger-like beach deposits which accumulated at the surface of the river alluvium by long shore drift when the lake was high.
  - **Within Proposed Rural Lifestyle Area B:** Observations in a test pit near the western margin of this zone disclosed a well-bedded, river alluvium comprising well-graded sandy gravel to cobbly sandy gravel. Clasts appear to be Shotover sourced, hence it is likely that the sediments were deposited by a former Hayes Creek draining the basin south of Coronet Peak. Degradation has produced a stepped morphology, grading gently down towards McDonnell Road.
- iv) **Fans.** Small fans do grade out into the Proposed Rural Lifestyle Area A, but they do not appear to be active. A small, intra-course fan is present near Site A6 and there may be other fan elements around the site and away from proposed development areas. Due to their lack of activity these fan areas require consideration in any detailed design, but are not considered a high risk hazard.



## 7. Specific Development Area Assessment

### 7.1 General

Consideration of the Development Area as a whole has been separated as follows;

- i) Proposed Rural Lifestyle Area A,
- ii) Proposed Rural Lifestyle Area B,
- iii) Development Sites designated "HS" and "A" across the Golf Course area.

We note that due to the presence of existing structures the following sites were excluded from evaluation by HCL;

- Site S – the Resort Services Area,
- Site C – the Clubhouse,
- HS6 – An existing house site,
- HS7 – Existing loge.

We confirm that all other development areas indicated on the Darby Partners drawings contained in Appendix A have been assessed. To avoid repetition in reporting, we have grouped sites with common features.

### 7.2 Liquefaction Risk and Flood Hazard

We collectively address the Liquefaction Risk noted by QLDC as affecting Proposed Rural Lifestyle Area B and all of the HS and A development areas within the Golf Course Land.

HCL's assessment of the site lithologies is that the Golf Course Land is mantled by glacial till comprising compact sands and gravels with a regional groundwater level located at depth. Schist bedrock outcrops in several locations and neither the compact till or the bedrock are susceptible to liquefaction. Further, Proposed Rural Lifestyle Area B includes alluvial deposits, again with a significant depth of groundwater.

HCL's assessment is also verified by the previous reporting and site investigation work of T&T.

The confirmed presence of compact glacial tills and the absence of shallow groundwater allow us to confirm that liquefaction hazard is not a relevant risk for any of the proposed development areas.

A flood hazard is not recorded by QLDC and we confirm that subject to normal cut off drainage and catchment management, no large scale flood or inundation risk exists.

### 7.3 Proposed Rural Lifestyle Area A

Observations relevant to this area include;

- Greater than 50% of the proposed site is located on flat to gently sloping terrain comprising Shotover-derived alluvium.
- Some inactive fan elements encroach into the development area from the north and northeast mantling both glacial till and alluvial deposits in these areas. This is depicted in Figure 2 contained in Appendix C.
- Streams associated with the fan elements are small and assessed as ephemeral with minor source catchments.
- Former high level Lake Wakatipu storm benches are identifiable features in the central reaches of the site and are well drained.
- Based on field inspection and the small size of the streams and source catchments, we do not believe the QLDC classification of the fan elements as active and debris dominated to be correct.

In summary, we believe that the alluvial fan hazard risks associated with this development area are very low subject to;

- a) Provision of normal cut off drainage measures to control upslope runoff from ephemeral watercourses.
- b) Further test pitting as part of any resource consent application to confirm the age and activity of the fan deposition.

### 7.4 Proposed Rural Lifestyle Area B

The following observations were made with respect to Proposed Rural Lifestyle Area B;

- The area contains alluvial deposits and consists of low relief with terraces degrading to the east.
- The exposed cut in the western edge of the development area shows Shotover-derived alluvium circa 23,000 years old comprising sandy gravels.
- The lithology is consistent across the site with the depth to groundwater likely to exceed 10m.

In summary, and noting our earlier comment under Section 7.2 with regard to liquefaction and flood risk, we again believe that the natural hazard risks associated with this development area are very low.

## 7.5 Sites Requiring Little or No Mitigation

The following sites have been assessed and grouped as relatively benign with minimal mitigation required for building development. These sites are;

- A1,
- A2,
- A3,
- A4,
- A5,
- A9,
- HS1,
- HS5, and
- HS8.

Other than the southern extent of A4 where a small depression exists, all of these sites are well drained with competent subgrade conditions. The sites are considered very low risk with regard to natural hazard where normal building controls around verification of bearing capacities for foundation design along with the provision of positive surface drainage control will allow development of these sites.

## 7.6 Site A8

Site A8 at the northern end of the Golf Course Land occupies a low relief mound on the north east side of the low relief pond.

Concern exists that the building or development area could include uncertified fill as part of pond construction. The relative heights of the pond water level (controlled by its outlet) and likely subgrade levels for foundations increases the risk of saturated subgrade conditions.

The site is not subject to natural hazard, but should be the subject of a specific geotechnical investigation to confirm the presence or otherwise of uncertified fill prior to the construction of any building.

## **7.7 Site A6**

This site occupies a low relief localised fan which grades out from the hummocky till zone to the west. The site is located slightly above the creek level, suggesting a perched water table may be present in this area.

Some surface water control from the catchment to the west is required.

Again, the site is not subject to any natural hazard issues, but prior to construction of buildings the site should be subject to a specific geotechnical investigation to confirm the nature and extent of any fan materials and presence or otherwise of a perched water table which may require draining.

## **7.8 Site A10**

This site takes in a substantial area of saturated ground in a through-drainage depression heading south. There are also overland flow issues to be resolved from the steep terrain catchment to the east.

The site could be developed subject to specifically designed drainage and ground improvement works involving cut to waste, installation of piped stormwater reticulation including resolution of secondary overflow issues and import to fill to achieve positive drainage to the area and to provide suitable foundation conditions.

## **7.9 Site A7**

This site is currently constrained by existing services due to the presence of a pump shed, transformer and inspection panels.

There is also localised uncertainty regarding lithologies with the possible presence of fill due to the services modifications.

There are no natural hazard issues affecting the site, however we recommend a detailed geotechnical investigation to define fill areas prior to any building construction occurring.

## **7.10 Site HS10**

This site is affected by water race leakage concentrating in the slope comprising the house site area.

Prior to building development at this site it will be necessary to;

- Complete subsurface investigations to confirm the impact of the race leakage on overall slope stability.
- Pipe the water race for long term security of the site and provide for some form of diversion away from buildings in the event of a catastrophic pipe rupture.

### **7.11 Site HS9**

This site is located in a localised depression and it will be necessary to resolve drainage to the south to avoid a ponding risk.

Similar to HS10, it will be necessary to;

- Complete subsurface investigations to confirm the depth to competent bearing materials (till) in the base of the depression due to likely thick colluvium/soil layer accumulation in the natural basin.
- Pipe the water race for long term security of the site and provide for some form of diversion away from buildings in the event of a catastrophic pipe rupture in the race.

### **7.12 Sites HS2, HS3 and HS4**

These three sites are all located in the valley lines of ephemeral drainage systems. Consequently they are presently wet and saturated. Figure 10 included in Appendix D illustrates the location of the sites and how the channel and ephemeral gully systems affect each area.

It will be possible to develop Sites HS2, HS3 and HS4 if drainage, diversion and ground improvement work is completed, but we recommend that at the time detailed house designs are proposed, consideration is given to locating construction to higher relief ground within the respective Housesite areas. This will minimize the diversion and drainage works required.

All of HS2, HS3 and HS4 are subject to risk from a failure in the water race. Again, piping of the race and consideration of diversions in the event of a breach are recommended to mitigate this risk.

## 8. Conclusions and Recommendations

Based on our site evaluation and assessment work we have made the following conclusions with regard to Natural Hazards and how they impact the THL Golf Course Land (encompassing the proposed Hills Resort Zone and proposed Rural Lifestyle Area B Zone) and Hogans Gully Land (encompassing the proposed Rural Lifestyle Area A Zone);

### Natural Hazard Risks

- i) The Golf Course Land, including Proposed Rural Lifestyle Area B where alluvial deposits are identified, comprises competent and compact glacial till underlain by near surface schist bedrock. These materials are not susceptible to liquefaction and the risk of liquefaction is further reduced by low regional groundwater levels.
- ii) Based on our assessment and investigation of the Golf Course Land, the provisional classification of the site as an LIC1 liquefaction risk by QLDC is not valid. The risk of liquefaction impacting the site is assessed as very low and liquefaction does not constrain the site as a natural hazard.
- iii) The Proposed Rural Lifestyle Area A (Hogans Gully) Land comprises predominately alluvial material where the northern section of the Proposed Rural Lifestyle Area A may potentially be impacted by an alluvial fan hazard. Based on our assessment we don't believe the fan area is active and in the event it was active, its extent would be significantly reduced from that indicated by QLDC Hazard Maps. We have assessed any risk from alluvial fan hazard as low, recognising that if further investigation confirms activity, the risk can be mitigated through bunding protection and regrading at the time of resource consent.
- iv) None of the land areas or development areas are subject to regional flood or inundation hazard.

### Specific Development Site Controls

- v) Prior to any building construction occurring we recommend that sites A6, A7 and A8 require specific geotechnical investigation and design of foundations by a Chartered Professional Engineer. This investigation shall include rationalisation of cut off drainage to improve subgrade conditions and to address overland flow paths.
- vi) Sites HS9 and HS10 are impacted by the existing water race and potential leakage from this race. Prior to any building construction occurring we recommend that a specific geotechnical investigation be completed by a Chartered Professional Engineer to confirm the extent of potential soil accumulation in the depression on HS9 and slope stability impacts of the water race on HS10. Both sites will require piping of the water race and diversion design in the event of a catastrophic pipe breach.

vii) Development sites A10, HS2, HS3 and HS4 are more complex sites as a result of being sited across some natural drainage paths. The sites are not subject to large scale natural hazard risk, but to develop them will require specific design of works to cut off and divert existing flow paths to prevent site inundation, and to address hazards associated with the water race to the north. To ensure that these site development issues are properly addressed, we recommend that prior to any building construction occurring, specific engineering design of drainage and ground improvement works be completed by a Chartered Professional Engineer. We recommend consideration be given to refining the location of these development sites so that they take in higher ground within their respective activity areas, removed from natural drainage paths.

Appendix A  
Darby Partners and HCL  
Topographic Drawings



**KEY:**

— Structure Plan Boundary

- - - Activity Area

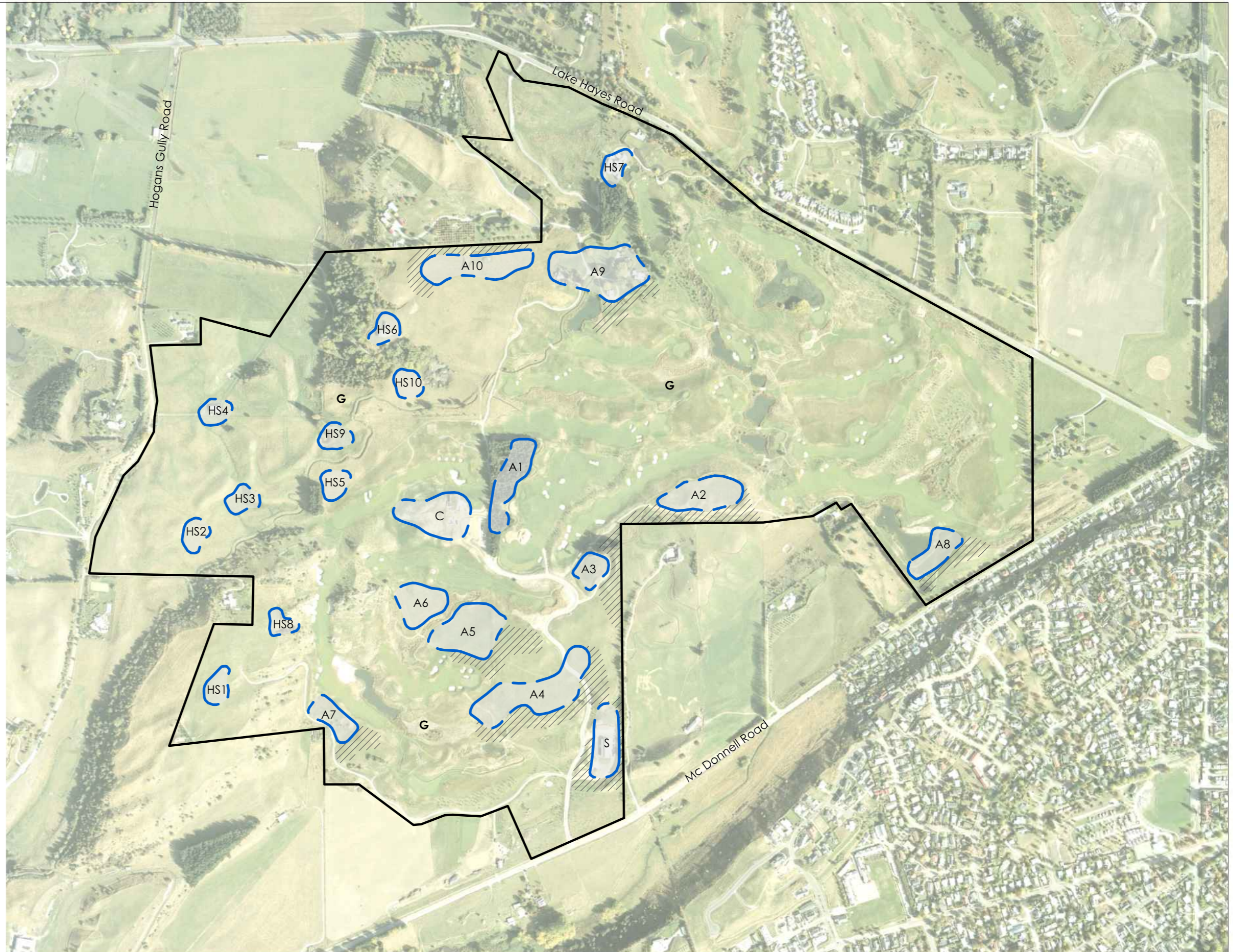
**Activity Areas:**

- G: Golf course, open space and farming
- C: Clubhouse
- A: Visitor Accommodation / Residential
- HS: Homesite (3,000m<sup>2</sup>)
- S: Resort Services & Staff Accommodation

Note: all activity areas include G: Golf course, open space and farming

**Overlays:**

/// Landscape Amenity Management Area



V:\MH\_The Hills\10\_Master\1\_Preliminary\MH\_10\_1\_MLP\_010F (Structure Plan).dgn



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PLAN STATUS:

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# THE HILLS STRUCTURE PLAN

DRAWN / REVIEWED: RT / JC  
 APPROVED: DT  
 DATE: 14.10.15

DRAWING NO:

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**KEY:**

— Structure Plan Boundary

- - - Activity Area

**Activity Areas:**

- G: Golf course, open space and farming
- C: Clubhouse
- A: Visitor Accommodation / Residential
- HS: Homesite (3,000m<sup>2</sup>)
- S: Resort Services & Staff Accommodation

*Note: all activity areas include G: Golf course, open space and farming*

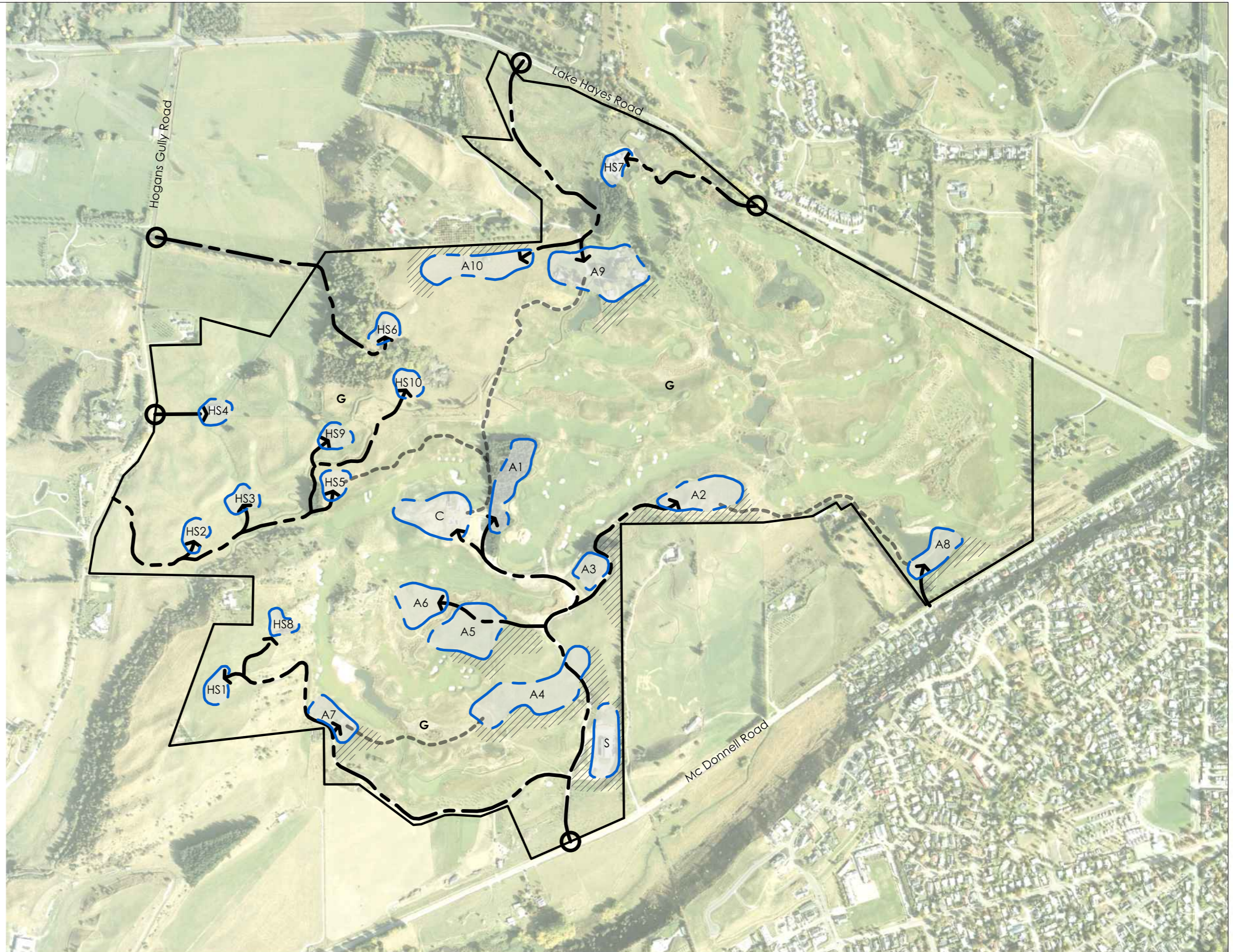
**Overlays:**

/// Landscape Amenity Management Area

○ Existing access point

— Road access

- - - Buggy / cart access

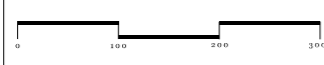


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PLAN STATUS:

**DP REVIEW**

**THE HILLS  
 STRUCTURE PLAN - ACCESS**

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 APPROVED: DT  
 DATE: 14.10.15

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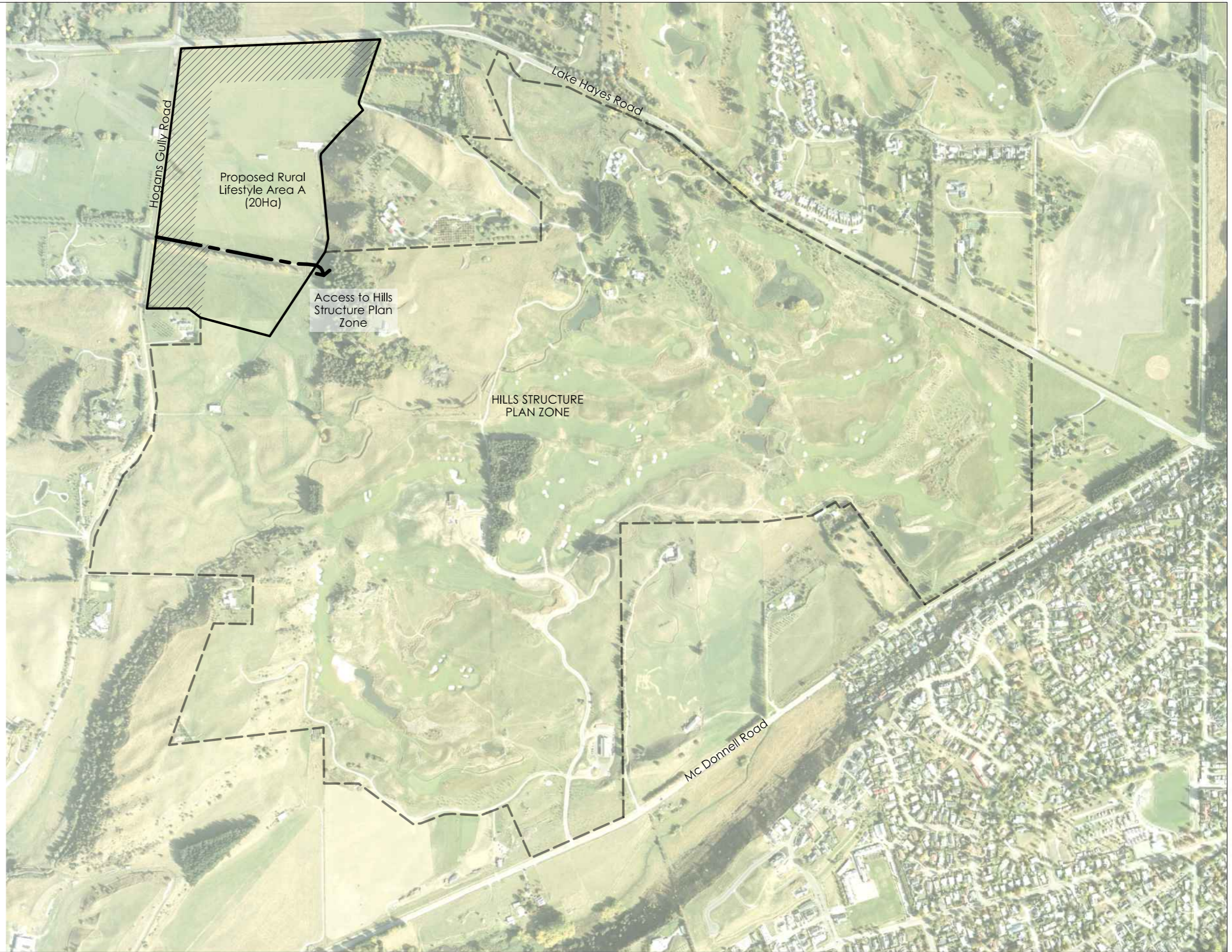
**MH\_10\_1\_MLP\_011B**

**KEY:**

- Hills Structure Plan Boundary
- Proposed zoning Areas

**Overlays:**

- /// Landscape Amenity Management Area:  
*Includes tree planting, sited to preserve views of surrounding landscape and partially screen proposed dwellings*



V:\MH\_The Hills\10\_Master1\_Preliminary\MH\_10\_1\_MLP\_012B (Rural Lifestyle Area A).dgn



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SCALE: 1:4,000 (A1); 1:8,000 (A3)



PLAN STATUS:  
**DP REVIEW**

# THE HILLS PROPOSED RURAL LIFESTYLE AREA A

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 APPROVED: DT  
 DATE: 14.10.15

DRAWING NO:  
 MH\_10\_1\_MLP\_012B

**KEY:**

- Hills Structure Plan Boundary
- Proposed zoning Areas



**Overlays:**

- /// Landscape Amenity Management Area:  
*Includes tree planting, sited to preserve views of surrounding landscape and partially screen proposed dwellings*



V:\MH\_The Hills\10\_Master1\_Preliminary\MH\_10\_1\_MLP\_013A (Rural Lifestyle Area B).dgn



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SCALE: 1:4,000 (A1); 1:8,000 (A3)



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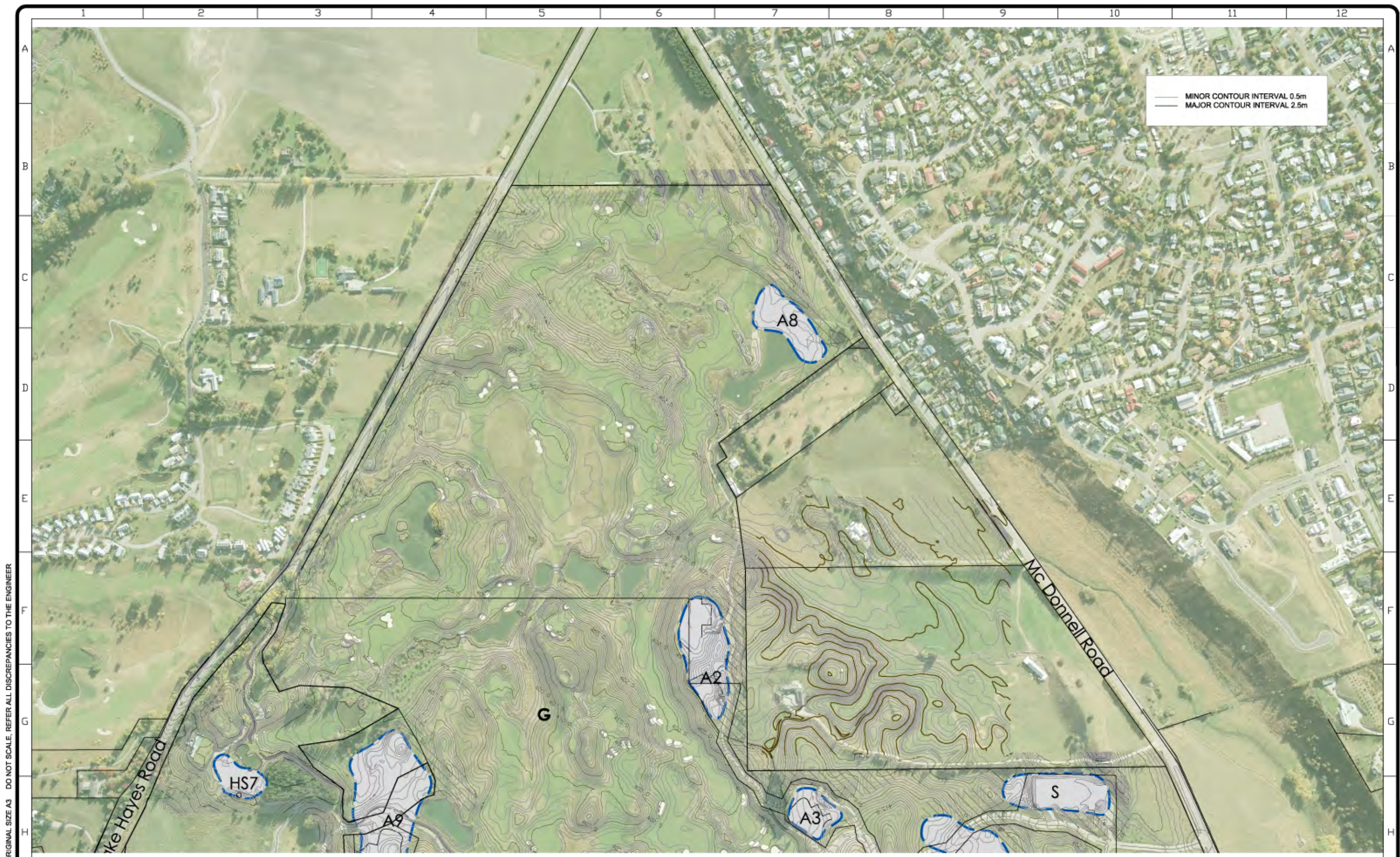
**DP REVIEW**

**THE HILLS  
 PROPOSED RURAL LIFESTYLE AREA B**

DRAWN / REVIEWED: RT / JC  
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ORIGINAL SIZE A3 DO NOT SCALE, REFER ALL DISCREPANCIES TO THE ENGINEER

Issue	Description	By	Date
A	Preliminary Issue	JWPH	20.10.15

Project: **NATURAL HAZARD ASSESSMENT**

Title: **TOPOGRAPHIC SITE PLAN 1**

Client: **TROJAN HELMET LTD**

**hadley consultants LTD**  
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Issue	Description	By	Date
A	Preliminary Issue	JWPH	20.10.15

Project: **NATURAL HAZARD ASSESSMENT**

Title: **TOPOGRAPHIC SITE PLAN 2**

Client: **TROJAN HELMET LTD**

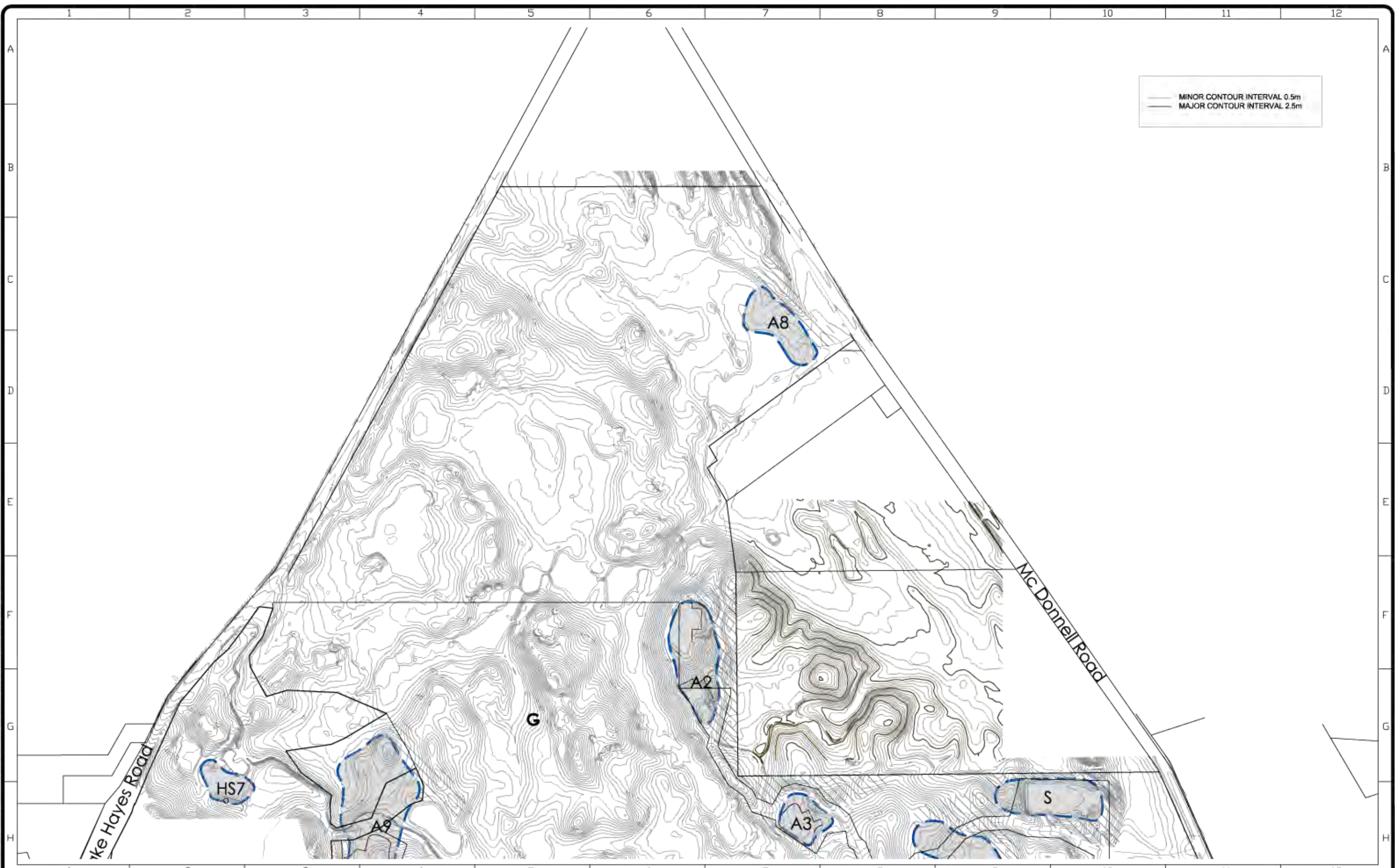

  
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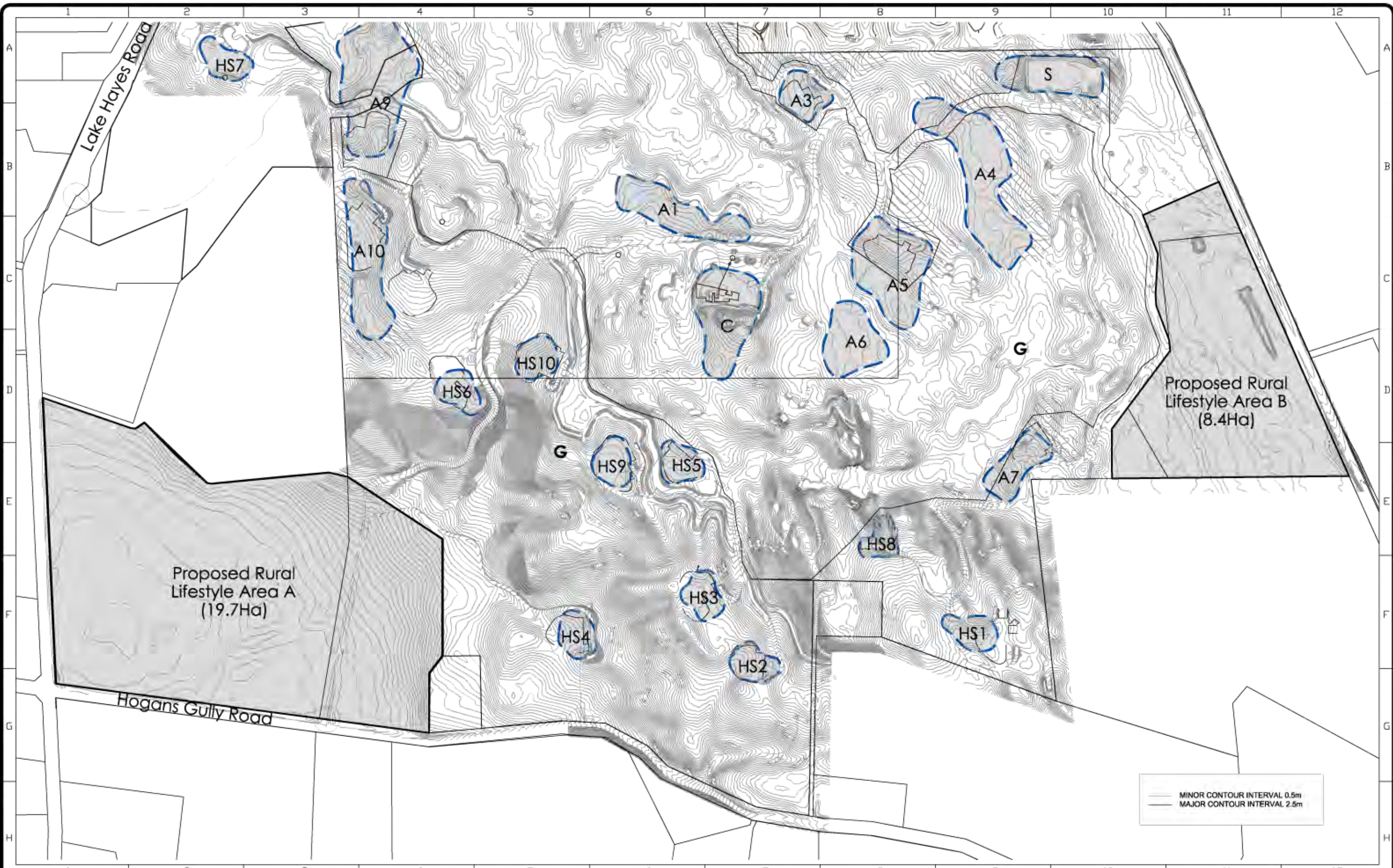
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	A	Preliminary Issue	JWPH	20.10.15	<p><b>NATURAL HAZARD ASSESSMENT</b></p> <p><b>ACTIVITY AREA PLAN 1</b></p>				<p><b>TROJAN HELMET LTD</b></p>			
					Title:	Drawn:	Checked:	Scale:	Drawing Number:	Project:	Sheet:	Issue:
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Notes:	Issue	Description	By	Date
	A	Preliminary Issue	JWPH	20.10.15

Project:	NATURAL HAZARD ASSESSMENT
Title:	ACTIVITY AREA PLAN 2

Client:	TROJAN HELMET LTD
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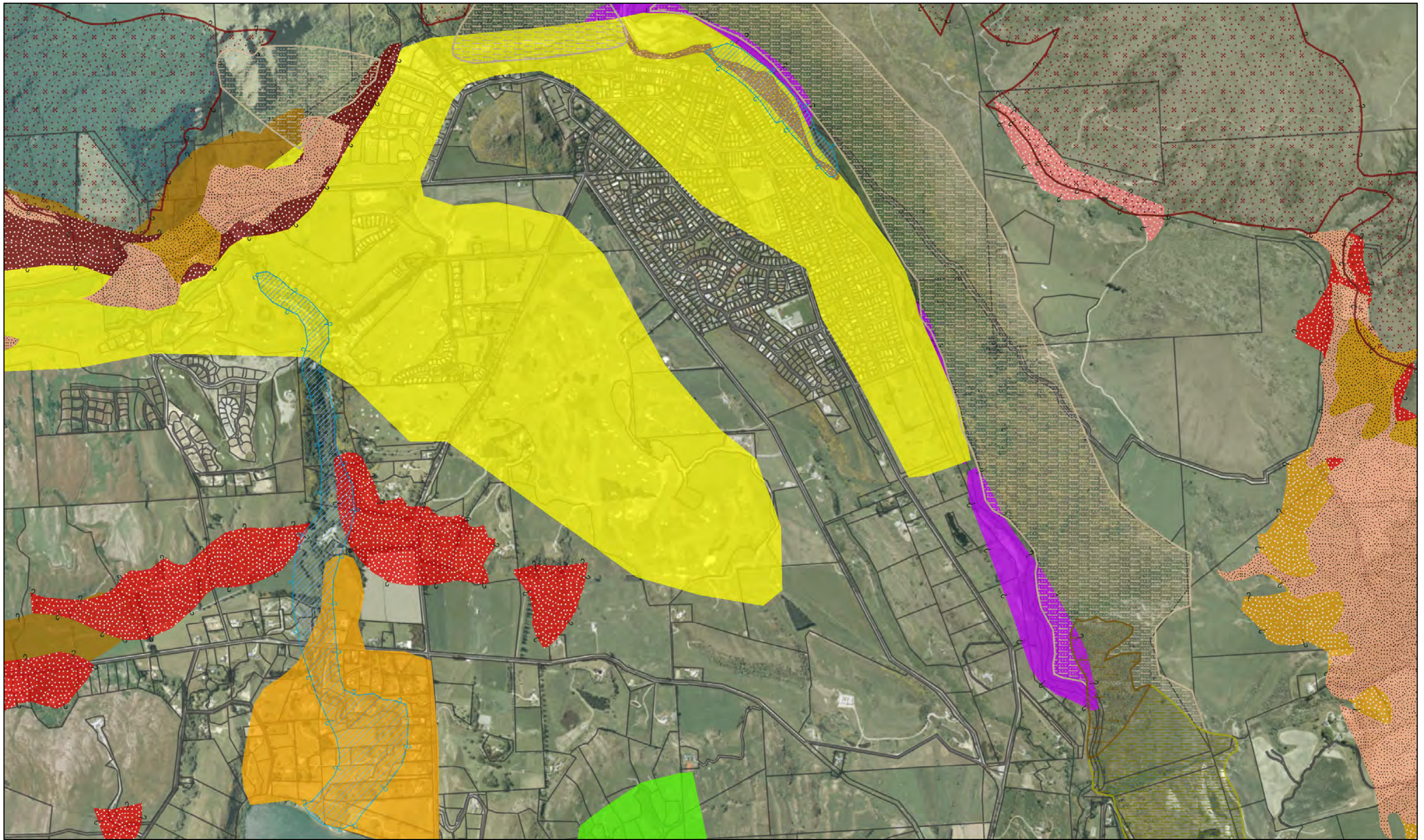
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MU	JWPH	1:5000 @ A3	Project: 152859

Sheet: S04 Issue: A

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Appendix B  
QLDC Hazard Maps



The map is an approximate representation only and must not be used to determine the location or size of items shown, or to identify legal boundaries. To the extent permitted by law, the Queenstown Lakes District Council, their employees, agents and contractors will not be liable for any costs, damages or loss suffered as a result of the data or plan, and no warranty of any kind is given as to the accuracy or completeness of the information represented by the GIS data. While reasonable use is permitted and encouraged, all data is copyright reserved by Queenstown Lakes District Council. Cadastral information derived from Land Information New Zealand. CROWN COPYRIGHT RESERVED

# The Hills

## Legend

### Property Land


 Parcel Boundaries


### Property Address


 Roads


### Hazards


 Active Fault - Location approximate

 Inactive Fault - Location approximate


 Flooding due to Rainfall

 Flooding due to Damburst

 Landslide: Active Pre-existing Schist Debris Landslides

 Landslide: Pre-existing Schist Debris Landslides (Activity Unknown)

 Landslide: Dormant Pre-existing Schist Debris Landslides


 Landslide: Shallow Slips and Debris Flows in Colluvium


 Landslide: Debris Flow Hazards

 Landslide: Slope Failure Hazard in Superficial Deposits

 Landslide: Rockfall


 Landslide: Pre-existing or Potential Failure in Lake Sediments or Tertiary Sediments

 Landslide: Piping potential in the Artesian Zone of the Wanaka Aquifer


 Landslide: Potential Hazard - Debris Flood/Debris Flow


 Landslide Areas - non verified


 Erosion Areas

 Alluvial Fan - Incision Line


 Alluvial Fan - Channels


 Alluvial Fan - Source Area


 Alluvial Fan - Catchment Areas


 Alluvial Fan - Hazard Area


 Alluvial Fan - ORC: fan active bed


 Alluvial Fan - ORC: fan recently active


 Alluvial Fan - ORC: fan less recently active


 Alluvial Fan (Regional scale) Active, Composite


 Alluvial Fan (Regional scale) Active, Debris-dominated


 Alluvial Fan (Regional scale) Active, Floodwater-dominated


 Alluvial Fan (Regional scale) Inactive, Composite


 Alluvial Fan (Regional scale) Inactive, Debris-dominated


 Alluvial Fan (Regional scale) Inactive, Floodwater-dominated


 Avalanche Areas


 Liquefaction Risk: Nil to Low (T&T 2012)

 Liquefaction Risk: Probably Low (T&T 2012)

 Liquefaction Risk: Possibly Moderate (T&T 2012)

 Liquefaction Risk: Possibly High (T&T 2012)

 Liquefaction Risk: Possibly Susceptible (Opus 2002)

 Liquefaction Risk: Susceptible (Opus 2002)

Appendix C

Figure 2

**KEY:**

- Structure Plan Boundary
- Activity Area

**Activity Areas:**

- G: Golf course, open space and farming
- C: Clubhouse
- A: Visitor Accommodation / Residential
- HS: Homesite (3,000m<sup>2</sup>)
- F: Farm
- S: Resort Services & Staff Accommodation

Note: all activity areas include G: Golf course, open space and farming

**Overlays:**

- /// Landscape Protection Area

The Hills Structure Plan - Yield Schedule  
Sep-10

Activity Area	Size	Density (unit/Ha)		Lots	
		Low	High	Low	High
A1	0.9 Ha	1	8	1	7
A2	0.9 Ha	1	8	1	7
A3	0.4 Ha	1	8	1	3
A4	1.7 Ha	1	8	1	13
A5	1.2 Ha	1	8	1	10
A6	0.7 Ha	1	8	1	6
A7	0.5 Ha	1	8	1	4
A8	0.6 Ha	1	4	1	2
A9	1.7 Ha	1	8	1	13
A10	1.1 Ha	1	8	1	8
<b>Subtotal</b>				<b>10</b>	<b>74</b>
H1	0.3 Ha			1	1
H2	0.3 Ha			1	1
H3	0.3 Ha			1	1
H4	0.3 Ha			1	1
H5	0.3 Ha			1	1
H6	0.3 Ha			1	1
H7	0.3 Ha			1	1
H8	0.2 Ha			1	1
H9	0.3 Ha			1	1
H10	0.3 Ha			1	1
<b>Subtotal</b>				<b>10</b>	<b>10</b>
<b>Total</b>				<b>20</b>	<b>84</b>

<b>Total Structure Plan Area</b>	162.7 Ha		
<b>Ave. Lot size (per total land area)</b>		8.1 Ha	1.9 Ha

FOR DISCUSSION



**Fig.2**

QLDC hazard zonations. Depiction of liquefaction and alluvial fan hazards at site.



Liquefaction risk, probably low



Alluvial fan, Active. Debris dominated.



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SCALE: 1:4,000 (A1) 1:8,000 (A3)



PLAN STATUS  
**DRAFT**

THE HILLS  
STRUCTURE PLAN

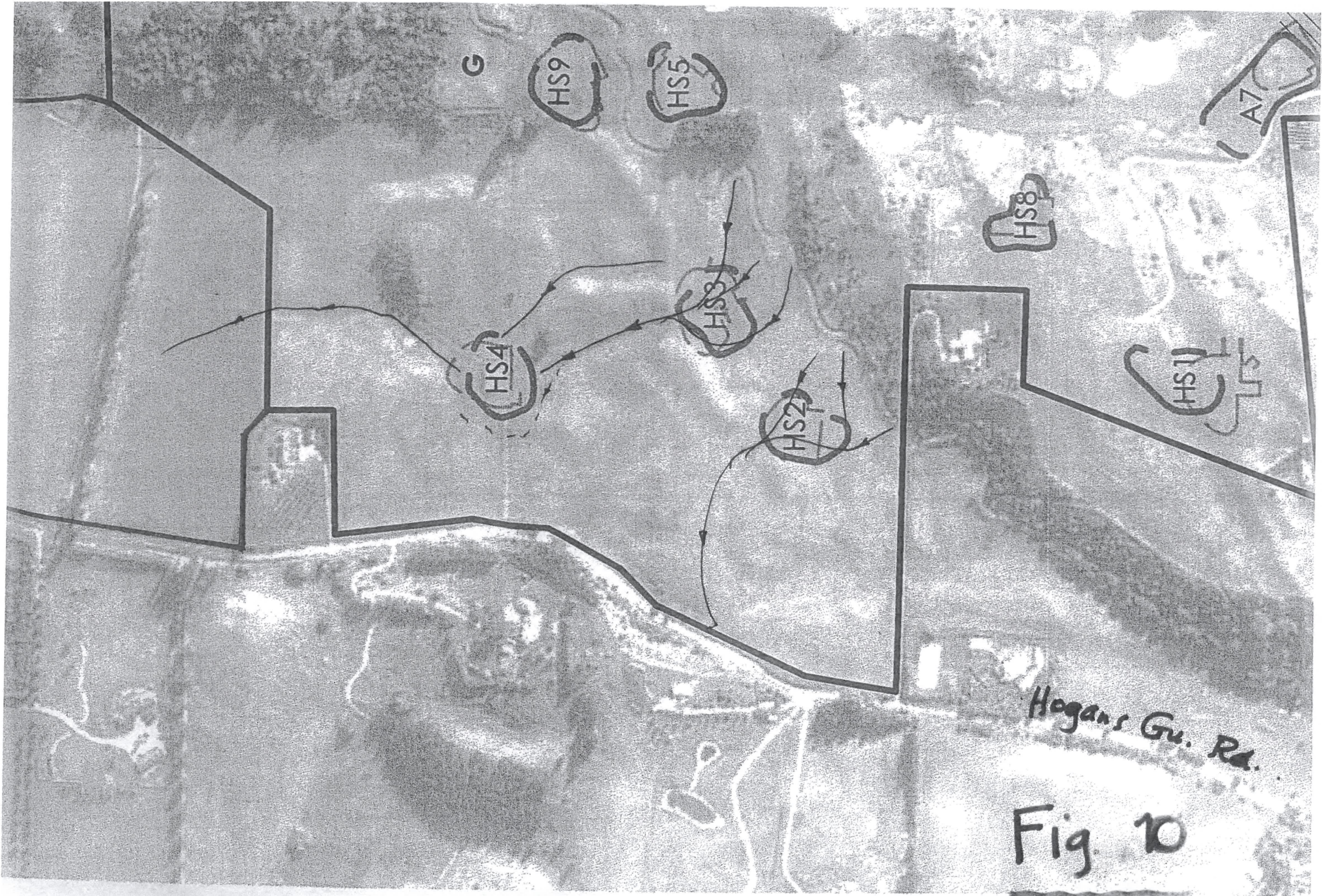
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APPROVED: DT  
DATE: 14.09.15

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Appendix D

Figure 10



Hogan's Gu. Rd.

Fig 10

# The Hills Special Zone Submission, Preliminary and Detailed Site Investigation

*For*

## Trojan Helmet Limited

*October 2015*



*Davis Consulting Group Limited  
Arrow Lane,  
Arrowtown 9302  
03 409 8664  
Document ID: 15063a*





**The Hills Special Zone District Plan Submission  
Preliminary and Detailed Site Investigation**

**Document Status**

<b>Version</b>	<b>Purpose of Document</b>	<b>Prepared By</b>	<b>Reviewer</b>	<b>Review Date</b>
A	Draft for Internal Review	FR	GD	19 Oct 2015
B	FINAL for Client Review	FR	GD	20 Oct 2015
O	Final Report	FR	GD	22 Oct 2015

## TABLE OF CONTENTS

	<b>Page No.</b>
<b>EXECUTIVE SUMMARY</b>	<b>III</b>
<b>1.0 INTRODUCTION</b>	<b>1</b>
1.1 Purpose	1
1.2 Scope of Work	1
1.3 Limitations	1
<b>2.0 SITE LOCATION AND DESCRIPTION</b>	<b>3</b>
2.1 Site Location and Description of the Activity	3
2.2 Site History	5
2.3 Site Condition and Surrounding Environment	6
2.4 Geology and Hydrogeology	9
2.4.1 Hydrogeology	9
2.4.2 Hydrology	9
2.5 Additional Site Information	10
2.6 Contaminants Commonly Associated with the Landuse	11
<b>3.0 SAMPLING AND ANALYSIS PLAN</b>	<b>13</b>
3.1 Data Quality Objectives	13
3.2 Sampling and Analysis Plan	13
3.3 Soil Sampling Methodology	14
3.4 Analytical Parameters	14
3.5 Soil Sample Field and Laboratory QA/QC	15
3.6 Soil Guideline Values	15
3.7 Soil Analytical Result Review	16
<b>4.0 INVESTIGATION RESULTS</b>	<b>17</b>
4.1 Analytical Results	17
4.1.1 Organochlorine and Multiresidue Pesticide Results	17
4.1.2 Heavy Metal Results	17
4.2 QA/QC Results	22
4.2.1 Field Duplicates	22
4.2.2 Laboratory Procedures	22

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<b>5.0</b>	<b>CONCLUSION</b>	<b>23</b>
<b>6.0</b>	<b>REFERENCES</b>	<b>24</b>

#### LIST OF FIGURES

<b>Figure No.</b>		<b>Page No.</b>
1	Site Location Plan	3
2	Proposed Structure Plan – Prepared by Darby Partners	4
3	Site Layout Plan	7
4	Water Features at The Hills golf course	10
5	Sample Location Plan	14

#### LIST OF TABLES

<b>Table No.</b>		<b>Page No.</b>
1	Products and Active Ingredients	12
2	Soil Guidelines	16
3	Activity Area Organochlorine Pesticides Results (mg/kg)	19
4	Housing Site Organochlorine Pesticides Results (mg/kg)	19
5	Activity Area Heavy Metal Results (mg/kg)	20
6	Housing Site Heavy Metal Results (mg/kg)	21
7	Duplicate Percentage Differences	22

#### LIST OF APPENDICES

<b>Appendix A</b>	Davis Consulting Group Contaminated Land Experience
<b>Appendix B</b>	Historic Certificate of Title
<b>Appendix C</b>	Soil Profile Log
<b>Appendix D</b>	Bore Search Information
<b>Appendix E</b>	Soil Sample and Analysis Summary Table
<b>Appendix F</b>	Laboratory analytical certificate and results, and chain of custody documentation.

## EXECUTIVE SUMMARY

Trojan Helmet Limited (THL) has prepared a submission to the district plan that seeks to establish 'The Hills Special Zone', which along with the existing golf course and ancillary facilities, would provide for residential housing and visitor accommodation activities. The proposal would result in subdivision, landuse change and earthworks activities, which trigger the National Environment Standard for Assessing and Managing Contaminants in Soil (NES).

In order to support the submission, THL commissioned Davis Consulting Group to consider the potential effect of historical activities on the soil quality of the site and undertake a review of risks to human health to meet the provisions of the NES.

The scope of work completed during the Preliminary Site Investigation (PSI) and Detailed Site Investigation (DSI) included:

- Review of the site history, including a review of the property file, certificate of title and historic photographs;
- Discussions with the staff from The Hills golf course;
- Completion of a site inspection to examine the condition of the property;
- Collection of soil samples across the site and analysis for heavy metals and organochlorine and multiresidue pesticides; and
- Consideration of the risk to human health based on a comparison of the adopted risk based soil guidelines values and detected soil contaminant concentrations.

Based on the findings of the PSI and DSI, the following conclusions are made:

- The Hills Golf Course has a number of historical and existing activities that have the potential to impact the soil quality of the site, including historic pastoral use of the site and more recently the operation of the golf course and ancillary facilities;
- The THL submission seeks to provide for a total of 10 house sites and 10 activity areas that may contain residential or visitor accommodation activities;
- The house sites and activity areas are separated from the golf course and are unlikely to be impacted by the use of chemicals on the fairways and greens;
- DCG concluded the risk to soil quality in the house sites and activity areas is associated with the possible historical application of the pesticides and fertilisers;
- Soil sampling was undertaken across all house sites and activity areas to support the assessment with a total of 129 soil samples collected;
- The soil samples were largely analysed for organochlorine pesticides and heavy metals that are associated with the broadacre application of pesticides and fertilisers; one soil sample

collected in close proximity to the golf course was also analysed for multiresidue pesticides to assess the possible impact from chemicals applied to the golf course;

- The analytical results show that the DDT was historically utilised on the site, but was detected at concentrations well below the risk based NES soil contaminant standard;
- Multiresidue pesticide concentrations (excluding DDT) in the sample collected nearest to the golf course in Activity Area 7 were reported below laboratory detection limits; and,
- Heavy metal results all returned concentrations below the adopted soil contaminant standards.

DCG conclude that the house sites and activity areas sought through the submission are suitable for rural residential and residential/visitor accommodation landuse and it is highly unlikely this development would present a risk to human health.

## **1.0 INTRODUCTION**

### **1.1 Purpose**

Trojan Helmet Limited (THL) has prepared a submission to the district plan that seeks to establish 'The Hills Special Zone', which along with the existing golf course and ancillary facilities, would provide for residential housing and visitor accommodation activities. The proposal would result in subdivision, landuse change and earthworks activities, which trigger the National Environment Standard for Assessing and Managing Contaminants in Soil (NES).

In order to support the submission, THL commissioned Davis Consulting Group to consider the potential effect of historical activities on the soil quality of the site and undertake a review of risks to human health to meet the provisions of the NES.

DCG's experience in the provision of contaminated land services is provided in Appendix A.

### **1.2 Scope of Work**

The scope of work completed during the Preliminary Site Investigation (PSI) and Detailed Site Investigation (DSI) included:

- Review of the site history, including a review of the property file, certificate of title and historic photographs;
- Discussions with the staff from The Hills golf course;
- Completion of a site inspection to examine the condition of the property;
- Collection of soil samples across the site and analysis for heavy metals and organochlorine and multiresidue pesticides;
- Consideration of the risk to human health based on a comparison of the adopted risk based soil guidelines values and detected soil contaminant concentrations; and
- Preparation of a PSI/DSI report in accordance with the requirements of the Contaminated Land Management Guidelines (CLMG) No. 1.

### **1.3 Limitations**

The findings of this report are based on the Scope of Work outlined above. DCG performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental science profession. No warranties, express or implied, are made. Subject to the Scope of Work, DCG's assessment is limited strictly to identifying the risk to human health based on the historical activities on the site. The confidence in the findings is limited by the Scope of Work.

The results of this assessment are based upon site inspections conducted by DCG personnel, information from interviews with people who have knowledge of site conditions. All conclusions and recommendations regarding the properties are the professional opinions of DCG personnel involved with the project, subject to the qualifications made above. While normal assessments of data reliability have been made, DCG assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside DCG, or developments resulting from situations outside the scope of this project.

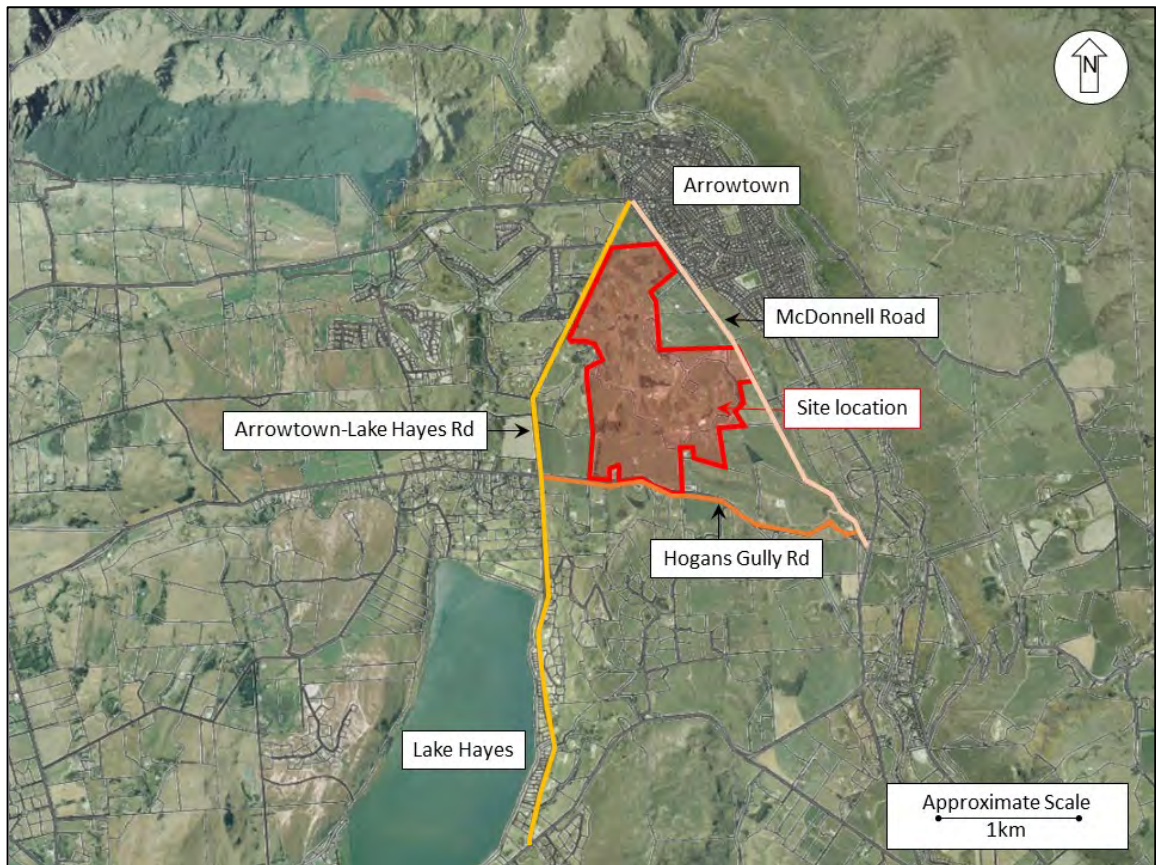


## 2.0 SITE LOCATION AND DESCRIPTION

### 2.1 Site Location and Description of the Activity

The site is located between McDonnell Road and Arrowtown-Lake Hayes Road and has the following legal description Lots 3, 4 and 7 DP 392663 (see Figure 1). The total area of the site is approximately 155.57 hectares and is situated southwest of Arrowtown. According to the Queenstown Lakes District Council (QLDC) District Plan, the property lies within the Rural General Zone.

Coordinates for the property are E 1271068, N 5013500.



**Figure 1:** Site Location Plan.

Figure 2 presents the layout of the proposed activities contained within the THL submission. In addition to the ongoing operation of the golf course and ancillary facilities, THL proposes the development of a number of new activity areas including:

- Ten areas (A1 – A10) for the purpose of visitor accommodation/residential activities; and
- Ten house sites (HS1 – HS10).

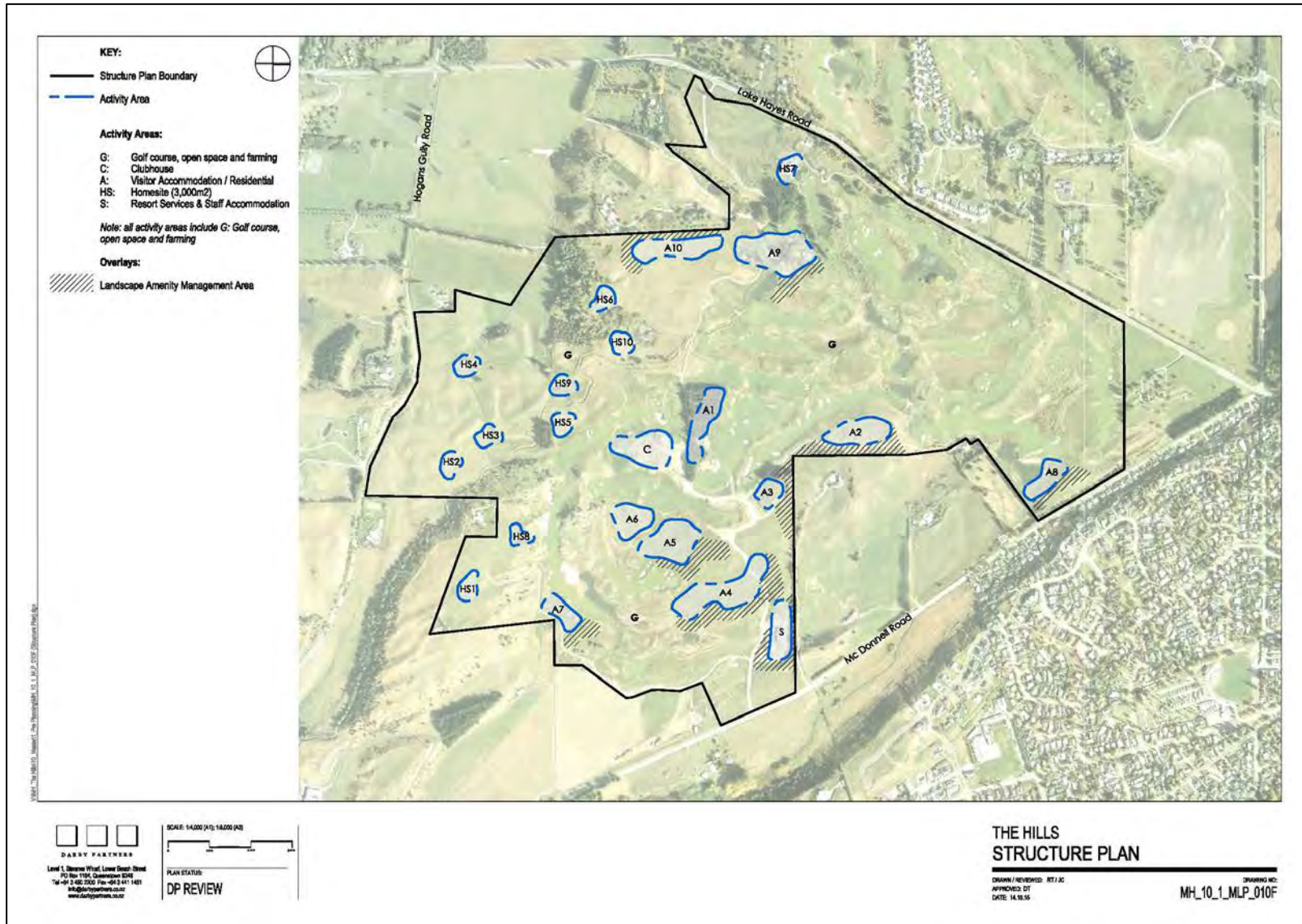


Figure 2: Proposed Structure Plan – Prepared by Darby Partners.

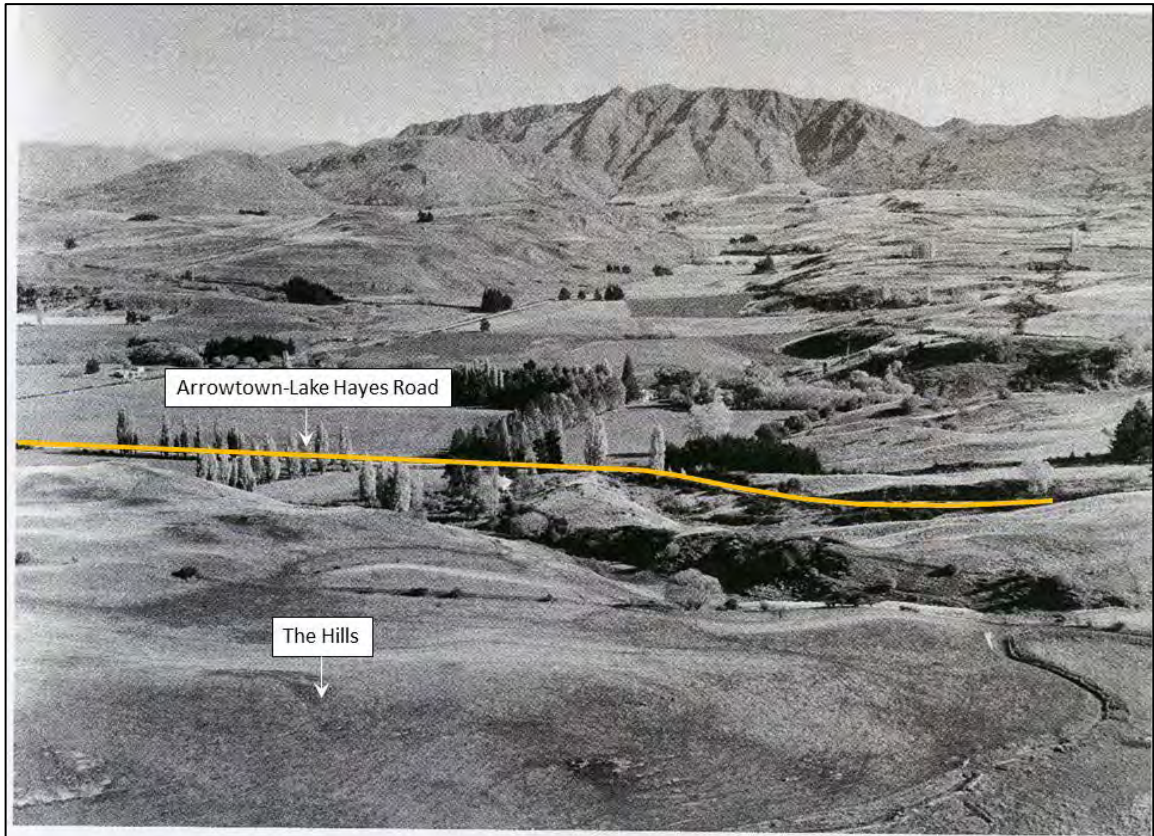
## 2.2 Site History

Prior to the development of a golf course on the subject site in 2003, the property had a long history of pastoral activity. Historic photographs obtained from the Lakes District Museum (accessed 15/10/2015) indicate the property was used for pastoral activity from circa 1910 (see Plate 1). A second historical photograph taken in 1954 (see Plate 2) indicates the area continued to be under pastoral management at this time.

DCG understands the site was part of the Bob Jenkins Farm in the 1930s. The property was subsequently purchased in the 1940s by brothers Jack and Lawson Summer who then sold it on to Jim Monk (McDonald, 2010). The current owners, THL, purchased the property in circa 1992 and commenced the development of The Hills golf course in 2003. The golf course was developed over a 4-year period, with the golf course opening for play in 2007. Golf has been the primary activity on the site since this time, however, the property also contains a number of residential properties, a golf clubhouse and golf maintenance shed. The historic certificate of title is provided in Appendix B.



**Plate 1:** Looking southwest over Arrowtown towards Lake Hayes 1910.



**Plate 2:** Looking west from above The Hills golf course, 1954.

### **2.3 Site Condition and Surrounding Environment**

Figure 3 presents a site plan showing the current layout of the site. The site currently consists of an 18 hole golf course, driving range, golf clubhouse, golf course maintenance compound and 5 residential houses. Plates 3 to 5 present the general characteristics of the proposed residential activity areas.

According to the QLDC Webmaps (<http://maps.qldc.govt.nz/qldcviewer/>) the property is currently zoned Rural General along with properties to the south and southeast. Neighbouring to the west is Millbrook which is zoned Resort. Arrowtown is situated to the northeast and is zoned Low Density Residential. The site is located within a 'probably low risk' liquefaction area (QLDC Webmaps).



Figure 3: Site Layout Plan.



Plate 3: Looking south across Activity Area A6.



**Plate 4:** Looking south across Activity Area A2.



**Plate 5:** Looking southeast across house site HS9.

## **2.4 Geology and Hydrogeology**

The southern half of the subject site is situated on a glacial till and the northern half is situated on polytropic schist, variably segregated, veined and foliated (Turnbull, 2000). According to the QLDC Webmap, the site has a 'probably low risk' of liquefaction. The surface soils were described during the collection of soil samples; see Appendix C for the soil profile logs.

### **2.4.1 Hydrogeology**

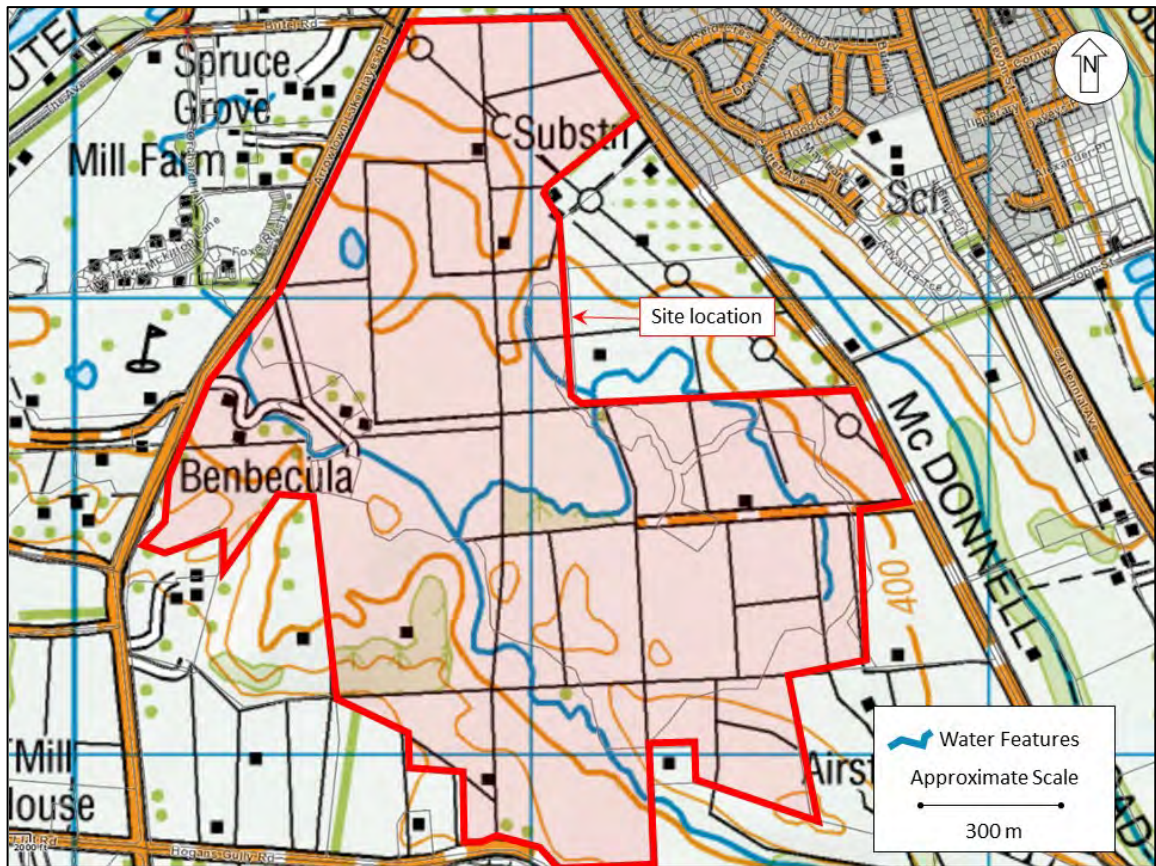
The site investigation did not include a groundwater assessment. The site is located within the Wakatipu Basin aquifer system, however, it is not situated above any identified aquifers. The Mid Mill Creek Aquifer is situated west of the subject site and north of Lake Hayes (ORC, 2014). The depth to groundwater on the site is unknown.

The location of groundwater bores within a 1 kilometre radius of the site (held by the ORC) is provided in Appendix D. A total of 9 consented bores have been installed within 1 kilometre of the site. The wells have been installed for a variety of purposes and are summarised as follows:

- 3 wells are used for domestic purposes;
- 3 wells are used for geological investigation;
- 2 wells are for scheme use;
- 1 well is disused; and
- 1 well has use unknown.

### **2.4.2 Hydrology**

There are surface water bodies found on site which include ponds and drains. The closest surface water bodies are an unnamed tributary of the Arrow River, located 130 m to the east of the property boundary, and Mill Creek located 360 m to the west of the property boundary. Figure 4 presents the water features on the subject site as seen on a topographical map.



**Figure 4:** Water features at The Hills golf course.

## 2.5 Additional Site Information

The CLMG No 1 requires information associated with fuel storage facilities, spill loss history, recorded discharges and onsite and offsite disposal locations. DCG requested a search of the Otago Regional Council (ORC) records, and examined the Queenstown Lakes District Council (QLDC) records, for Landuse and Site Contamination Status, Resource Consents, and Resource Management Act (RMA) incidents for the site. The ORC stated the following.

*There are no records held on the Otago Regional Council’s “Database of Selected Landuses” for the above site. The database identifies sites where activities have occurred that are known to have the potential to contaminate land. The record of a property in the database does not necessarily imply contamination. Similarly, the absence of available information does not necessarily mean that the property is uncontaminated; rather no information exists on the database.*

*Reference should be made to the Ministry for the Environment’s Hazardous Activities and Industries List. If any of these activities have occurred on the above site, then it may be considered potentially contaminated. As a golf course, the site could have been subject to persistent pesticide use.*



The ORC holds one discharge consent for the discharge of treated wastewater to land. The ORC do not hold any other records on their “Database of Selected Landuses” for the site, no records on the RMA incidents database regarding any spills or discharges, no resource consents associated with the site, and had no records of any on or off-site disposal locations.

Property files were obtained from the QLDC eDocs webpage (<https://edocs.qldc.govt.nz/>) for Lots 3, 4 and 7, DP 392663. The property file held information regarding consents ranging from 1992 to 2015 for building a house, erecting statues, earthworks for golf course development, permits for marquees, building a green keepers workshop, construction of the club house, residential platforms and installation of a water pump.

The following provides a summary of information that the CLMG No. 1 (MfE, 2003a) indicates should be included in a DSI report:

- Presence of Drums – No drums were recorded during the site visit.
- Wastes – No wastes were observed during the site visit.
- Fill Materials – Other than planting areas and golf course bunkers, no fill material was encountered.
- Odours – No odours were noted in the housing activity areas.
- Flood Risk – According to QLDC Hazard map the site is not at risk of flooding;
- Surface Water Quality – There are multiple ponds and drains located across the golf course site.
- Visible Signs of Contamination – No obvious stains or signs of contamination were noted during the fieldwork completed for the investigation.
- Local Sensitive Environments – There are multiple ponds across the golf course as well as a network of drains. The closest sensitive environments are an unnamed tributary of the Arrow River, located 130 m to the east of the property boundary, and Mill Creek located 360 m to the west of the property boundary.

## **2.6 Contaminants Commonly Associated with the Landuse**

Based on the Contaminated Land Management Guidelines Schedule B and our understanding of use to support pastoral activities and golf course maintenance, the hazardous substances that may have been utilised on the property include a range of organochlorine and multiresidue pesticides and heavy metals associated with the application of fertilisers. We note that the golf course maintenance compound includes the storage of fuel, chemicals and operation of the workshop. The maintenance compound is physically separated from the proposed residential areas by at least 100 metres and is also downgradient from the nearest area. While the maintenance compound would be considered a site with the potential to impact soil quality it is

highly unlikely this would extend to any housing areas. This area has therefore been excluded from any further analysis in this investigation.

A list of the pesticides and herbicides utilised by The Hills golf course is provided in Table 1. The Hills stated that pesticide and fertiliser use is largely confined to the golf course fairways and greens, with very few herbicide applications outside the main golf course corridor. There is some risk of spray drift, however, this is mitigated by the following:

- Use of a Toro Multipro designated spray rig with drift reducing air induction nozzles at < 3 bar pressure;
- Use of drift reducing spray additives such as Li1000; and,
- Application height is a maximum of 50 cm and only undertaken in calm conditions.

**Table 1: Products and Active Ingredients**

Products	Active Ingredients
Escort	Metsulfuron
Quantum	Diflufenican
Axall	Mecoprop, Bromoxynil, Ioxynil
Versatil	Clopyralid
Tordon Brushkiller	Triclopyr Butoxyethyl ester
MCPA	Benzenesulfonic acid, dodecyl, 2-Ethylhexanol

Based on the above discussion, it is our view that the contaminants of concern across the site are predominantly those associated with historic farming and agriculture landuse. Specifically, the broadacre application of persistent pesticides and fertilisers has the potential for organochlorine pesticides and heavy metals to accumulate in soils that may present a risk to human health.

## **3.0 SAMPLING AND ANALYSIS PLAN**

### **3.1 Data Quality Objectives**

The data quality objectives (DQOs) of the sampling and analysis plan were to:

- Characterise the nature of any contamination associated with the historical landuse of the site; and
- Determine the risk of any soil contamination encountered onsite to human health, based on the proposed residential and rural residential landuse scenarios proposed for the site.

### **3.2 Sampling and Analysis Plan**

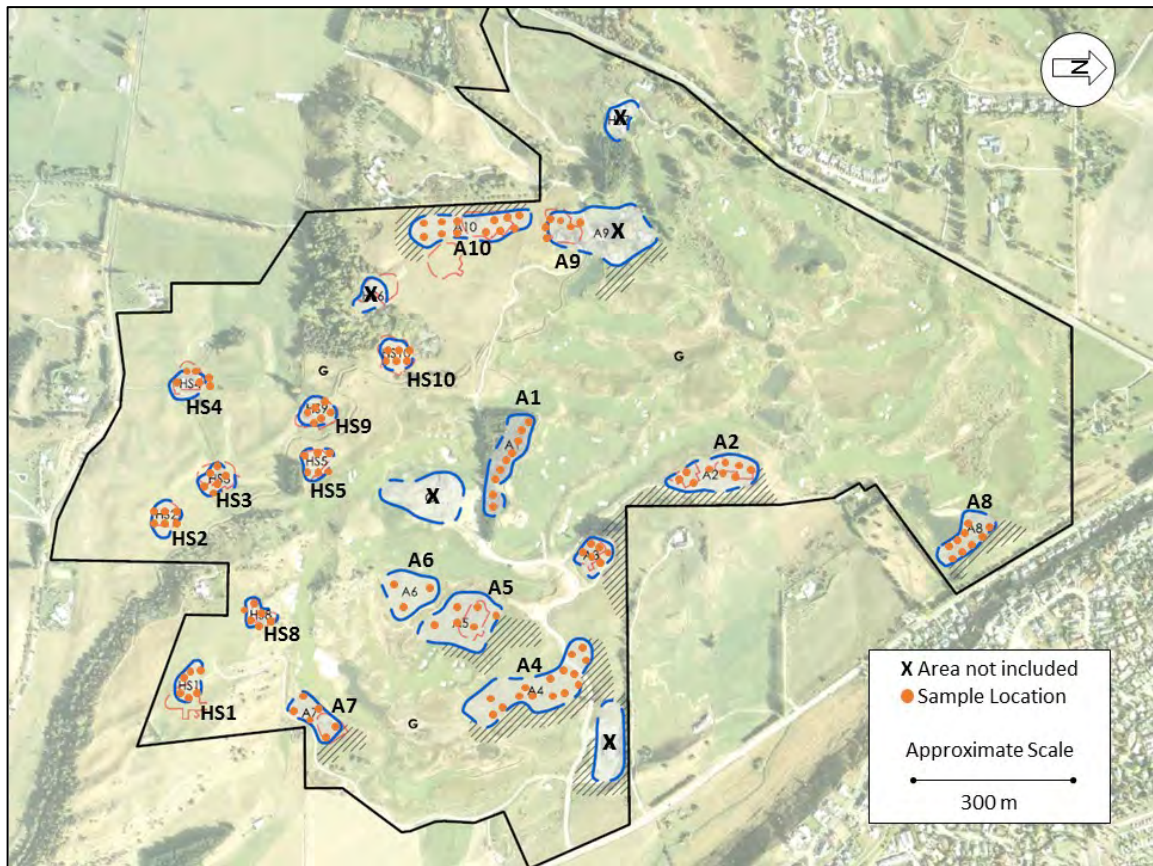
The sampling and analysis plan was designed to address the specific objectives, namely gain an understanding of contaminants associated with historic farming practices. In addition, soil samples were collected and analysed for multi-residue pesticides where residential activity areas are situated in close proximity to the golf course. This analysis was specifically confined to activity area A7.

Most of the sampling undertaken was systematic, with the number of samples for each Activity Area evenly spread across the activity area and house sites. We note that judgemental sampling was completed in house site HS4 in order to characterise soil contaminants that may have been associated with the cattle yards.

The average sampling density within the activity areas was approximately 1 sample per 120 square metres. Figure 5 presents the location of samples from each activity area and housing site. The sample IDs and coordinates are on the soil description log (see Appendix C).

Soil samples were composited into groups of three for the analysis of heavy metals. From each set of three samples, one sample was analysed for organochlorine pesticides. In addition, one sample was also analysed from Activity Area A7 for multiresidue pesticides. A total of 129 surface soil samples were collected from the site at a depth of 0 – 10 cm. We do however note some samples within A11, were recorded at a depth of between 0.05 and 0.15 m. This still represents a surface sample as there was a 0.05 layer of leaf litter at these locations. The sampling depth was considered appropriate due to the nature of the potential contaminants present, such as pesticides and heavy metals, which generally bind strongly to soils. Furthermore, the risk of exposure to people working and living on the site is associated with surface soils.

A soil sample and analysis summary table is provided in Appendix E.



**Figure 5:** Sample Location Plan.

### 3.3 Soil Sampling Methodology

Soil sampling was undertaken with the use of a spade. The following procedures were applied during the soil sampling process to gain representative samples:

- Field personnel wore a fresh pair of nitrile gloves between sampling events.
- Soil samples were transferred to 250 mL glass jars with teflon lids as supplied by Hill Laboratories.
- All soil samples were unambiguously marked in a clear and durable manner to permit clear identification of all samples in the laboratory.

### 3.4 Analytical Parameters

The laboratory analytical suite determined for the site investigation is in recognition of our understanding of the current and historical use of the subject site. DCG understands the site has had a history of agricultural activity and more recently a golf course. Based on these activities the following substances were included in the analytical suite:

- Organochlorine pesticides (including 4,4-DDE, 2,4-DDT and Dieldrin);
- Multiresidue Pesticides; and,
- Heavy metals.

The laboratory methods utilised for the analysis are provided in the laboratory report (see Appendix F).

### **3.5 Soil Sample Field and Laboratory QA/QC**

The field QA/QC procedures performed during the soil sampling are listed as follows:

- Use of standardised field sampling forms and methods;
- Samples were transferred under chain of custody procedures;
- All samples were labelled to show point of collection, project number, and date;
- Headspace in sample jars was avoided; and,
- The threads on the sampling jars were cleaned to avoid Volatile Organic Compound (VOC) loss.

All soil samples were couriered on ice to Hill Laboratories. Hill Laboratories is IANZ accredited for the analysis of heavy metals and pesticides. Hill Laboratories conduct internal QA/QC in accordance with IANZ requirements.

### **3.6 Soil Guideline Values**

Soil guideline values (SGVs) selected for application on this project are provided in Table 2. The selection of these guidelines is consistent with the principles of the Contaminated Land Management Guidelines No. 2: Hierarchy and Application in New Zealand of Environmental Guideline Values (MfE, 2003b).

The heavy metal, organochlorine pesticide and multiresidue pesticide SGVs adopted for the site assessment were based on either the NES Soil Contaminant Standards (MfE, 2012) or the National Environmental Protection Measure (NEPM, 2013). Guidelines for the rural residential and residential landuse scenarios as set out in the NES were adopted for the house sites and residential activity areas respectively.

**Table 2: Soil Guidelines**

Analyses	Guideline
Heavy Metals and Organochlorine and Multiresidue Pesticides.	<ol style="list-style-type: none"><li>1. Soil Contaminant Standards <i>in</i> New Zealand ‘Users’ Guide: NES for Assessing &amp; Managing Contaminants in Soil to Protect Human Health 2012 (MfE, 2012).</li><li>2. Guideline on the Investigation Levels for Soil and Groundwater <i>in</i> National Environment Protection (Assessment of Site Contamination) Measure 1999 - Volume # 2 (NEPC, 2013).</li></ol>

### 3.7 Soil Analytical Result Review

Following the receipt of laboratory data, a detailed review of the data was performed to determine its accuracy and validity. All laboratory data was checked for analytical and typographical errors.

Once the data quality was established, soil data was checked against the Sampling Program DQOs.

## 4.0 INVESTIGATION RESULTS

### 4.1 Analytical Results

The soil sample locations are provided in Figure 5 with GPS coordinates provided in Appendix C.

#### 4.1.1 Organochlorine and Multiresidue Pesticide Results

The organochlorine pesticide analytical results detected above the laboratory detection limit are provided in Tables 3 and 4. The remaining results are presented in the laboratory reports provided in Appendix F. Results can be summarised as follows:

- DDT concentrations ranging between 0.03 mg/kg and 0.142 mg/kg were detected in soil samples collected from Activity Areas A3, A4, A5, A6, A7 and A10;
- DDT concentrations ranging between 0.045 mg/kg to 0.174 mg/kg were detected in soil samples collected from house site HS4;
- All DDT concentrations detected are well below the NES soil contaminant standards of 45 mg/kg and 70 mg/kg for the rural residential and residential landuse scenarios respectively;
- Low concentrations of endosulfan sulphate were detected in soil samples collected from Activity Area A10; and,
- Multiresidue pesticide concentrations excluding DDT in Activity Area 7 were reported below laboratory detection limits.

The results indicate that DDT has been utilised across the property, most likely to control pests such as grass grub. Notwithstanding this finding, the concentrations are well below levels that present a risk to people working or living on the site.

#### 4.1.2 Heavy Metal Results

The heavy metal results are presented in Tables 5 and 6 and summarised as follows:

- Arsenic concentrations detected in the Activity Areas and House Sites range from 8 mg/kg to 19 mg/kg and are all below the adopted guideline of 20 mg/kg;
- Cadmium concentrations in all samples analysed are at or below the laboratory reporting limits; and,
- Chromium, Copper, Lead, Nickel and Zinc concentrations are all well below the adopted soil guidelines values in all Activity Areas.

The consistency of the results confirms that most of the heavy metal concentrations are representative of background concentrations. The only results contrary to this are associated with soil samples collected from Activity Area 8 which contain noticeably higher concentrations of arsenic, copper, chromium, lead, nickel and zinc. While the concentrations remain below the adopted guidelines the results may suggest that fertilisers or pesticides may have been historically stored in the vicinity of Activity Area 8.

Given the consistency of the results, the practice of adjusting the guideline value for composite samples is not considered necessary as it is unlikely that contaminant hotspots are present on the site that exceed the adopted guideline values.



**Table 3: Activity Area Organochlorine Pesticide Results (mg/kg)**

Sample Area	A3	A7	A7	A6	A5	A5	A4	A10	A9	
Sample ID	A3.5	A7.2	A7.5	A6.2	A5.1	A5.5	A4.2	A10-11	A9-5	Guideline
4,4'-DDE	0.017	0.096	0.091	0.087	0.065	0.107	0.045	< 0.010	0.044	-
2,4'-DDT	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	-
4,4'-DDT	0.014	0.036	0.023	0.013	0.019	0.025	0.022	< 0.010	0.015	-
Total DDT Isomers	0.041	0.142	0.124	0.11	0.094	0.142	0.077	0.03	0.069	70 <sup>1</sup>
Endosulfan sulphate	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.018	< 0.010	270 <sup>2</sup>
< denotes concentration below laboratory detection limits - Denotes no guideline value <sup>1</sup> Soil Contaminant Standards in New Zealand 'Users' Guide: NES for Assessing & Managing Contaminants in Soil to Protect Human Health 2012 (MfE, 2012). <sup>2</sup> National Environment Protection (Assessment of Site Contamination) Measure 2013 Volume 2 (NEPC, 2013).										

**Table 4: Housing Site Organochlorine Pesticide Results (mg/kg)**

Sample Area	HS4	HS4	HS4	HS4	
Sample ID	HS4-2	HS4-3	HS4-5	HS4-6	Guideline
4,4'-DDE	0.128	0.035	0.044	0.06	-
2,4'-DDT	< 0.010	< 0.010	< 0.010	< 0.010	-
4,4'-DDT	0.036	< 0.010	0.017	0.018	-
Total DDT Isomers	0.174	0.045	0.071	0.088	45 <sup>1</sup>
< denotes concentration below laboratory detection limits - Denotes no guideline value <sup>1</sup> Soil Contaminant Standards in New Zealand 'Users' Guide: NES for Assessing & Managing Contaminants in Soil to Protect Human Health 2012 (MfE, 2012).					

**Table 5: Activity Area Heavy Metal Results (mg/kg)**

Sample Area	A3	A3	A2	A2	A2	A8	A8	A8	A7	A7	A6	A5	
Composite #	1	2	3	4	5	6	7	8	9	10	11	12	Guideline
Arsenic	9	9	9	9	9	18	18	19	9	9	14	8	20 <sup>1</sup>
Cadmium	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	3 <sup>1</sup>
Chromium	7	7	7	7	7	12	13	13	8	7	7	7	>10,000 <sup>1</sup>
Copper	8	9	8	9	9	18	18	20	10	12	11	9	>10,000 <sup>1</sup>
Lead	12.9	12.2	12.8	11.9	11.6	26	23	24	12.8	12.7	17.2	10.9	210 <sup>1</sup>
Nickel	7	7	7	7	7	12	13	13	8	8	8	7	400 <sup>2</sup>
Zinc	36	33	34	33	36	60	62	62	39	38	35	33	7400 <sup>2</sup>
Sample Area	A5	A4	A4	A4	A4	A4	A1	A1	A1	A10	A10	A10	
Composite #	13	14	15	16	17	18	19	20	21	22	23	24	Guideline
Arsenic	8	9	8	10	9	9	10	11	11	8	9	11	20 <sup>1</sup>
Cadmium	< 0.10	< 0.10	0.11	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.11	3 <sup>1</sup>
Chromium	7	7	7	7	6	7	7	7	6	6	7	8	>10,000 <sup>1</sup>
Copper	9	12	10	10	10	10	10	12	12	7	8	12	>10,000 <sup>1</sup>
Lead	10.9	14.1	11.3	11.5	11.4	12.4	11.7	13.2	12.2	9.8	10	11.5	210 <sup>1</sup>
Nickel	7	8	8	7	7	7	7	8	8	7	7	8	400 <sup>2</sup>
Zinc	35	45	33	47	31	31	37	31	30	35	35	40	7400 <sup>2</sup>
Sample Area	A10	A9	A9										
Composite #	25	26	27	Guideline									
Arsenic	9	10	11	20 <sup>1</sup>									
Cadmium	< 0.10	< 0.10	< 0.10	3 <sup>1</sup>									
Chromium	8	7	8	>10,000 <sup>1</sup>									
Copper	8	9	10	>10,000 <sup>1</sup>									
Lead	10.2	10	14.4	210 <sup>1</sup>									
Nickel	7	7	7	400 <sup>2</sup>									
Zinc	33	35	39	7400 <sup>2</sup>									

< denotes concentration below laboratory detection limits

<sup>1</sup> Soil Contaminant Standards in New Zealand 'Users' Guide: NES for Assessing & Managing Contaminants in Soil to Protect Human Health 2012 (MfE, 2012).

<sup>2</sup> Guideline on the Investigation Levels for Soil and Groundwater in National Environment Protection (Assessment of Site Contamination) Measure 2013 Volume 2 (NEPC, 2013).

**Table 6: Housing Site Heavy Metal Results (mg/kg)**

Sample Area	HS10	HS10	HS5	HS5	HS9	HS9	HS1	
Composite #	28	29	30	31	32	33	34	Guideline
Arsenic	8	10	13	10	11	10	9	17 <sup>1</sup>
Cadmium	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.8 <sup>1</sup>
Chromium	8	7	8	7	9	7	9	>10,000 <sup>1</sup>
Copper	11	11	12	10	10	11	13	>10,000 <sup>1</sup>
Lead	10.1	10.6	13.1	10.4	12.8	10.2	14.1	160 <sup>1</sup>
Nickel	8	8	9	7	8	8	10	400 <sup>2</sup>
Zinc	43	38	41	37	42	39	50	7,400 <sup>2</sup>
Sample Area	HS1	HS8	HS8	HS2	HS2	HS3	HS3	
Composite #	35	36	37	38	39	40	41	Guideline
Arsenic	9	11	11	9	9	10	10	17 <sup>1</sup>
Cadmium	< 0.10	0.12	< 0.10	0.11	0.1	0.14	< 0.10	0.8 <sup>1</sup>
Chromium	9	10	9	8	7	9	8	>10,000 <sup>1</sup>
Copper	11	14	14	10	10	12	14	>10,000 <sup>1</sup>
Lead	14	14.4	13.1	10.5	10.4	13.9	11.3	160 <sup>1</sup>
Nickel	8	10	10	8	8	9	8	400 <sup>2</sup>
Zinc	45	59	53	47	39	51	39	7,400 <sup>2</sup>
Sample Area	HS4	HS4	HS4	HS4	HS4	HS4		
Individual Analysis	HS4-1	HS4-2	HS4-3	HS4-4	HS4-5	HS4-6	Guideline	
Arsenic	14	12	13	14	10	10	17 <sup>1</sup>	
Cadmium	< 0.10	< 0.10	0.1	< 0.10	0.12	< 0.10	0.8 <sup>1</sup>	
Chromium	12	10	17	13	13	9	>10,000 <sup>1</sup>	
Copper	16	11	16	22	11	11	>10,000 <sup>1</sup>	
Lead	16.9	12.3	13.5	15.3	12.6	11.3	160 <sup>1</sup>	
Nickel	11	10	14	10	11	8	400 <sup>2</sup>	
Zinc	130	92	71	260	59	63	7,400 <sup>2</sup>	
< denotes concentration below laboratory detection limits <sup>1</sup> Soil Contaminant Standards in New Zealand 'Users' Guide: NES for Assessing & Managing Contaminants in Soil to Protect Human Health 2012 (MfE, 2012). <sup>2</sup> Guideline on the Investigation Levels for Soil and Groundwater in National Environment Protection (Assessment of Site Contamination) Measure 2013 Volume 2 (NEPC, 2013).								

## 4.2 QA/QC Results

### 4.2.1 Field Duplicates

Six field duplicate soil samples were collected during the site investigation and analysed to review the reproducibility of the laboratory analysis. The duplicates and the corresponding sample results are presented in Table 7 below.

**Table 7: Duplicate Percentage Differences**

Analyte	A3-5	Dup 1	%	A5-1	Dup 2	%
4,4'-DDE	0.017	< 0.010	51	0.065	0.061	6
2,4'-DDT	< 0.010	< 0.010	0	< 0.010	< 0.010	0
4,4'-DDT	0.014	< 0.010	33	0.019	0.019	0
Analyte	A1-3	Dup 3	%	HS9-3	Dup 4	%
4,4'-DDE	< 0.010	< 0.010	0	< 0.010	< 0.010	0
2,4'-DDT	< 0.010	< 0.010	0	< 0.010	< 0.010	0
4,4'-DDT	< 0.010	< 0.010	0	< 0.010	< 0.010	0
Analyte	HS9-1	Dup 5	%	HS2-6	Dup 6	%
4,4'-DDE	< 0.010	< 0.010	0	< 0.010	< 0.010	0
2,4'-DDT	< 0.010	< 0.010	0	< 0.010	< 0.010	0
4,4'-DDT	< 0.010	< 0.010	0	< 0.010	< 0.010	0

An acceptable percentage difference between duplication samples is less than 30 to 50 % (MfE, 2011). The highest relative percentage difference between the six samples was 51 % (for 4,4 DDE), which is just over what is considered acceptable for soil analysis. The QA/QC analysis indicates the sampling and analysis undertaken was reproducible.

### 4.2.2 Laboratory Procedures

Hill Laboratories did not complete specific in-house QA/QC analysis, such as spike recoveries or laboratory duplicates during the processing of the soil samples. The Chain of Custody form and the Hill Laboratory results are provided in Appendix F.

## 5.0 CONCLUSION

Based on the findings of the PSI and DSI, the following conclusions are made:

- The Hills Golf Course has a number of historical and existing activities that have the potential to impact the soil quality of the site, including historic pastoral use of the site and more recently the operation of the golf course and ancillary facilities;
- The THL submission seeks to provide for a total of 10 house sites and 10 activity areas that may contain residential or visitor accommodation activities;
- The house sites and activity areas are separated from the golf course and are unlikely to be impacted by the use of chemicals on the fairways and greens;
- DCG concluded the risk to soil quality in the house sites and activity areas is associated with the possible historical application of the pesticides and fertilisers;
- Soil sampling was undertaken across all house sites and activity areas to support the assessment with a total of 129 soil samples collected;
- The soil samples were largely analysed for organochlorine pesticides and heavy metals that are associated with the broadacre application of pesticides and fertilisers; one soil sample collected in close proximity to the golf course was also analysed for multiresidue pesticides to assess the possible impact from chemicals applied to the golf course;
- The analytical results show that the DDT was historically utilised on the site, but was detected at concentrations well below the risk based NES soil contaminant standard;
- Multiresidue pesticide concentrations (excluding DDT) in the sample collected nearest to the golf course in Activity Area 7 were reported below laboratory detection limits; and,
- Heavy metal results all returned concentrations below the adopted soil contaminant standards.

DCG conclude that the house sites and activity areas sought through the submission are suitable for rural residential and residential/visitor accommodation landuse and it is highly unlikely this development would present a risk to human health.

## 6.0 REFERENCES

McDonald, B. (2010) Queenstown's Farms and Sheep Stations. Families that farmed the land.

Ministry for the Environment (2003a) *Contaminated Land Management Guidelines No. 1: Reporting on Contaminated Sites in New Zealand*.

Ministry for the Environment (2003b) *Contaminated Land Management Guidelines No. 2: Hierarchy and Application in New Zealand of Environmental Guideline Values*.

Ministry for the Environment (2011) *Contaminated Land Management Guidelines No. 5: Site investigation and analysis of soils. Revised 2011*.

Ministry for the Environment (2012) *Users' Guide: National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health*. Wellington: Ministry for the Environment.

National Environment Protection Council (NEPC) (2013) *National Environment Protection (Assessment of Site Contamination) Measure - Schedule B (1) Guideline on Investigation Levels for Soil and Groundwater*. National Environment Protection Council.

Otago Regional Council (ORC), 2014. *Investigation into the Wakatipu Basin Aquifers, July 2014*. Report writer: Jens Rekker, Resource Scientist. Reviewed by: John Threlfall, Director of Environmental Science & Information.

Turnbull, I.M. (compiler) 2000. *Geology of the Wakatipu area*. Institute of Geological & Nuclear Sciences 1:250 000 geological map 18. 1 sheet + 72 p. Lower Hutt, New Zealand. Institute of Geological & Nuclear Sciences Limited

Queenstown Lakes District Council, 2009. *Queenstown Lakes District Plan*.

Lakes District Museum, 2015. Accessed 15/10/15

## Appendices

Appendix A

Davis Consulting Group Contaminated Land Experience





### **Davis Consulting Group Contaminated Land Experience**

Glenn Davis is the director of Davis Consulting Group and has over 15 years post graduate experience working as an Environmental Scientist. Glenn has accumulated a significant volume of work experience in the contaminated land field undertaking preliminary site investigations (PSIs), detailed site investigations (DSIs) and remediation projects in New Zealand, Australia, Asia, the United Kingdom and Ireland. The following provides a summary of Glenn Davis's experience.

**Davis Consulting Group (2007 – present):** Principal Environmental Scientist – completed multiple preliminary and detailed site investigations in Otago and Southland predominantly for the land development industry. In addition to undertaking investigation and remedial work DCG advises the Southland Regional Council on contaminated land matters including the review of consultant reports and consent applications. Key projects DCG has undertaken include:

- Review of groundwater contamination associated with the former Invercargill gasworks site including the completion of a groundwater investigation and completion of an environmental risk assessment report to support a discharge consent application;
- Completion of site investigations on former landfills in Invercargill to consider the suitability of the sites for commercial/industrial development;
- Management of the removal of an underground fuel tank in Gore and subsequent groundwater investigation; and
- Completion of a number of detailed site investigations in the Te Anau area to consider the suitability of former farm land for residential development.

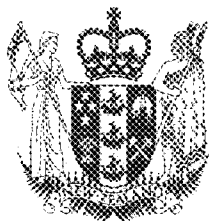
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**RPS Australia (2003 – 2006):** Supervising Environmental Scientist managing multiple detailed site investigations in the land development industrial and operated as an environmental specialist for Chevron on Barrow Island monitoring and managing a number of large contaminated groundwater plumes.

**URS Ireland ( 2001 – 2003):** - Senior Environmental Scientist undertaking multiple PSIs and DSIs on services stations and train station throughout Ireland. Glenn was also involved in the design and operation of a number of large scale remediation projects, predominantly associated with the removal of hydrocarbon contaminated soil and recovery of hydrocarbons impacting groundwater.

**ERM Australia (1998 – 2000)** – Working as a project level environmental scientist Glenn completed in excess of 30 detailed site investigations and remedial projects on service stations, concrete batching plants, and transport depots.

Appendix B  
Historic Certificate of Title



# COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952



R. W. Muir  
Registrar-General  
of Land

## Search Copy

**Identifier** 413072  
**Land Registration District** Otago  
**Date Issued** 05 August 2008

### Prior References

OT13A/734	OT15A/1076	OT17B/806
OT18B/1030	OT18B/991	OT18C/442

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**Estate** Fee Simple  
**Area** 101.5914 hectares more or less  
**Legal Description** Lot 7 Deposited Plan 392663

### Proprietors

Trojan Helmet Limited

### Interests

Subject to a right to convey water in gross over part marked g-h DP 392663 to Arrow Irrigation Company Limited created by Transfer 828083 -21.4.1993 at 9.23 am

X14968 Irrigation Agreement (affects part formerly Section 105 Block VII Shotover SD )

Part formerly Section 105 Block VII Shotover Survey District is Subject to Section 8 Mining Act 1971

Part formerly Section 105 Block VII Shotover Survey District is Subject to Section 5 Coal Mines Act 1979

Subject to Part IV A Conservation Act 1987 (affects Part formerly part Section 102 Block VII Shotover Survey District - herein)

Subject to Section 11 Crown Minerals Act 1991 (affects Part formerly part Section 102 Block VII Shotover Survey District - herein)

X14880 Irrigation Agreement (affects part formerly Section 105 Block VII Shotover SD)

Subject to a right of way over part marked AD DP 392663 created by Transfer 746961.17 - 1.2.1990 at 9:51 am

Subject to a right to convey water over part marked aa-ab,ab-ac,ac-ad,ad-ae,ae-au DP 392663 and right to take & convey water over part marked A DP 392663 created by Transfer 749789 - 12.3.1990 at 9:29 am

Subject to a right to convey water over part marked aa-ab,ab-ac,ac-ad,ad-ae,af-ag,ag-ai,aj-i,i-ak,al-am,ae-af DP 392663,right to take & convey water over part marked A DP 392663 and right to store & convey water over part marked B DP 392663 created by Transfer 773822.1 - 27.2.1991 at 9:12 am

Appurtenant to part formerly part lot 1 DP 21438 are rights to convey water created by Transfer 773822.1 - 27.2.1991 at 9:12 am

Subject to a right to convey water over part marked aj-i,i-ak,al-am DP 392663 and right to store & convey water over part marked B DP 392663 created by Transfer 773822.2 - 27.2.1991 at 9:12 am

Subject to a right to convey water in gross over part marked k-l,m-n,v-w DP 392663 to The Arrow Irrigation Company Limited created by Transfer 825040 - 4.3.1993 at 9:30 am

Subject to a right to convey water in gross over part marked h-i,i-j,j-k DP 392663 to The Arrow Irrigation Company Limited created by Transfer 834732 - 23.7.1993 at 9:32 am

Subject to a right to convey water in gross over part marked o-p,q-y DP 392663 to Arrow Irrigation Company Limited created by Transfer 840451 - 13.10.1993 at 9:51 am

Appurtenant to part formerly CT OT17B/806 is a right to pump water,a right to convey electricity and rights to convey water created by Transfer 915672.3 - 6.9.1996 at 2:49 pm

The easements created by Transfer 915672.3 are subject to Section 243 (a) Resource Management Act 1991

**Identifier****413072**

Appurtenant to part formerly CT OT17B/806 is a right to take water created by Transfer 953679.6 - 31.8.1998 at 10:56 am

The easements created by Transfer 953679.6 are subject to Section 243 (a) Resource Management Act 1991

Land Covenant in Deed 964442.3 - 23.3.1999 at 12.55 pm (affects part formerly CT OT17B/806)

7898685.3 Surrender of the right of way marked A,B SO 23066 created by Transfer 746961.17 as to land in CTs OT15A/1076,OT15D/881,OT17B/806,OT18B/991,OT18C/442 - 5.8.2008 at 9:00 am

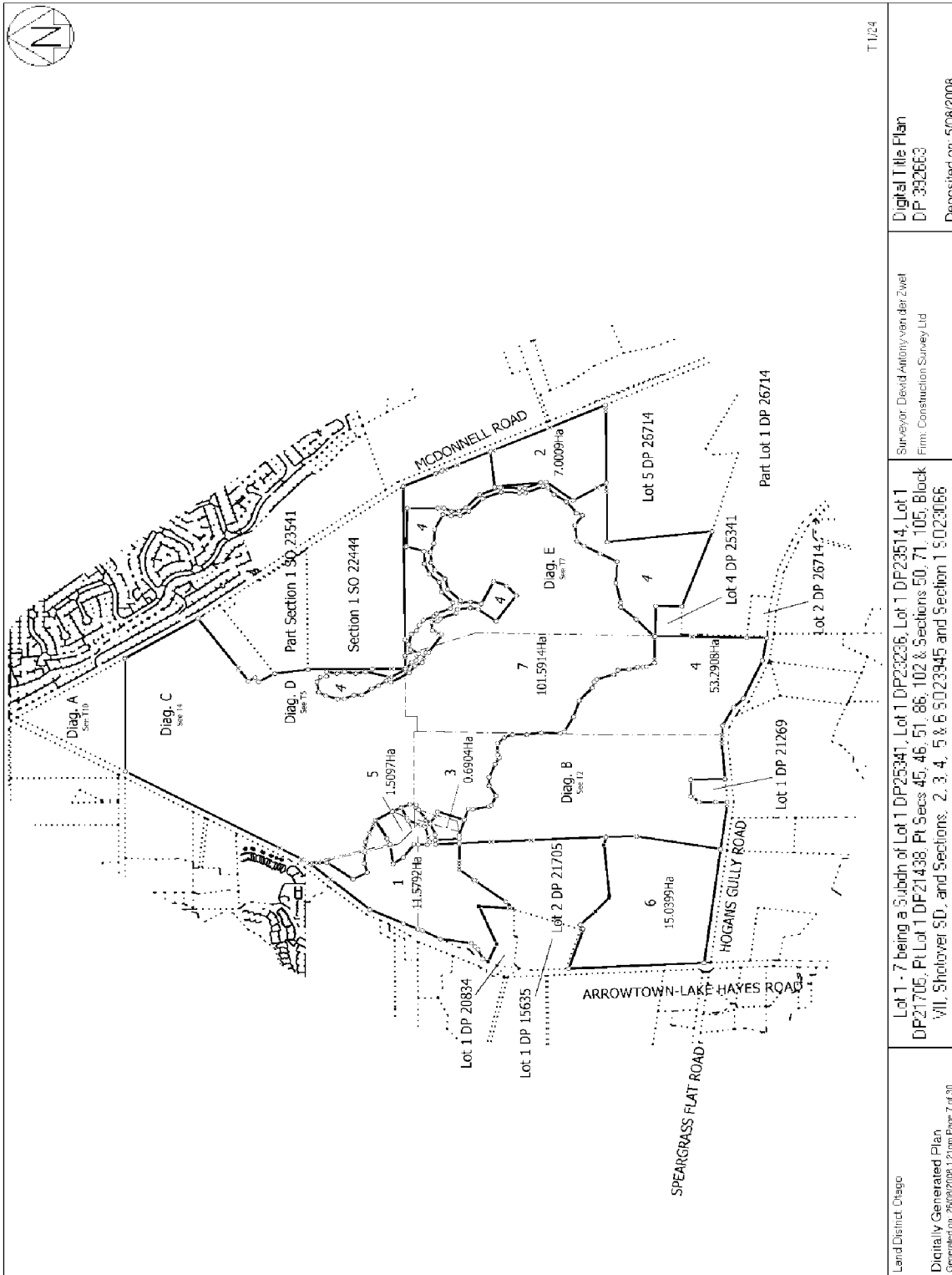
Subject to a right of way over part marked I,L DP 392663,right to convey telecommunications over part marked AB,AD,Q,AN DP 392663,right to convey electricity marked P,Q,R,AN DP 392663 and right to convey water marked AP,AQ,AR,AO,AN DP 392663 created by Easement Instrument 7898685.11 - 5.8.2008 at 9:00 am

The easements created by Easement Instrument 7898685.11 are subject to Section 243 (a) Resource Management Act 1991

8267348.1 Mortgage to Westpac New Zealand Limited - 28.8.2009 at 9:01 am

Subject to a right to convey electricity (in gross) over parts marked R, I, F, D, P, N, J, O & Q on DP 392663 and over parts marked A & B on DP 420440 and a right to transform electricity (in gross) over parts marked D, O & Q on DP 392663 and over part marked B on DP 420440 in favour of Aurora Energy Limited created by Easement Instrument 8735727.6 - 20.4.2011 at 2:52 pm

Subject to a right to convey water over part marked AQ on DP 392663 created by Easement Instrument 9136139.1 - 14.12.2012 at 1:49 pm



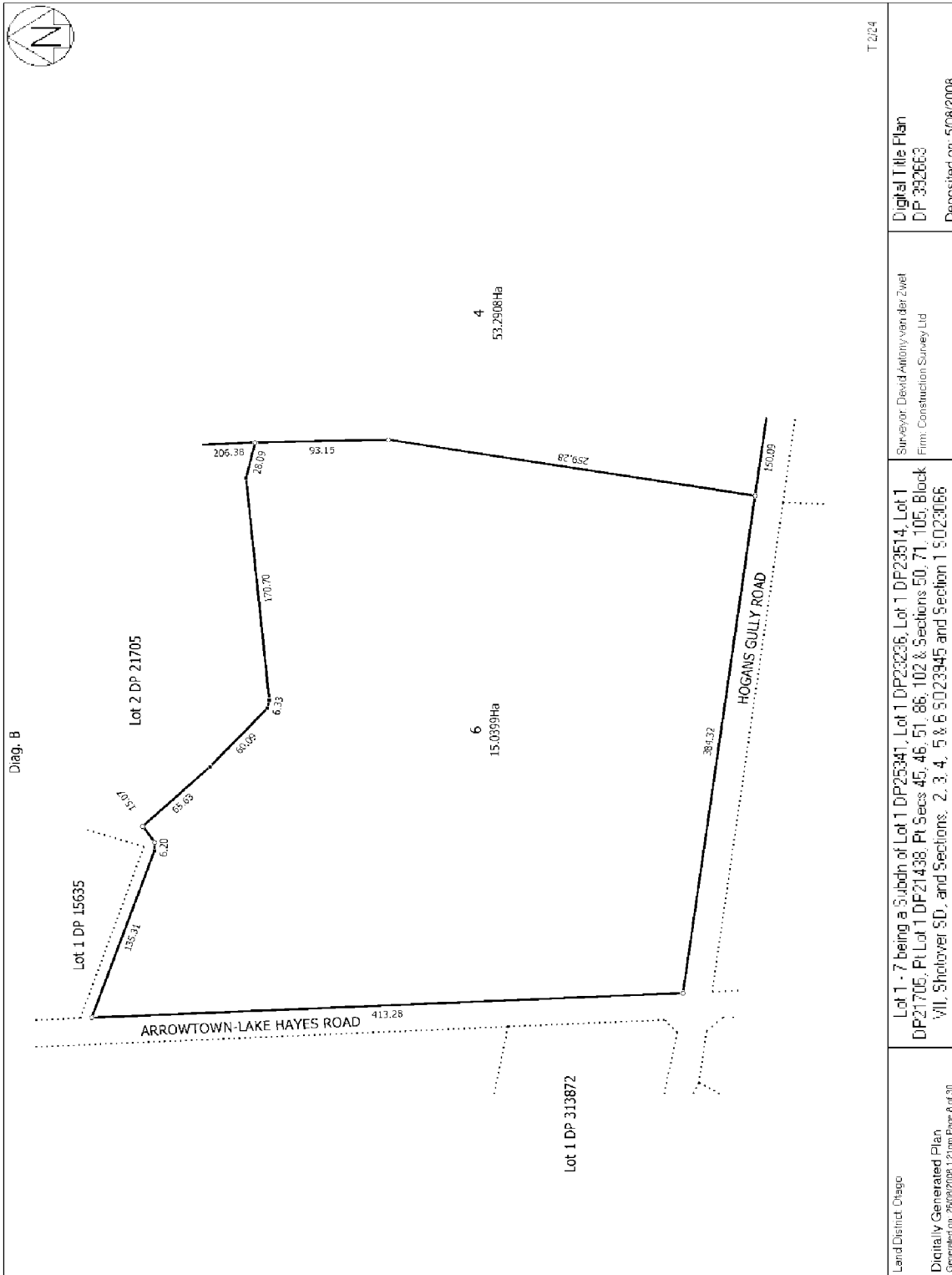
T 1/24

Digital Title Plan  
DP 332663  
Deposited on: 5/08/2008

Surveyor: David Anthony van der Zwet  
Firm: Construction Survey Ltd

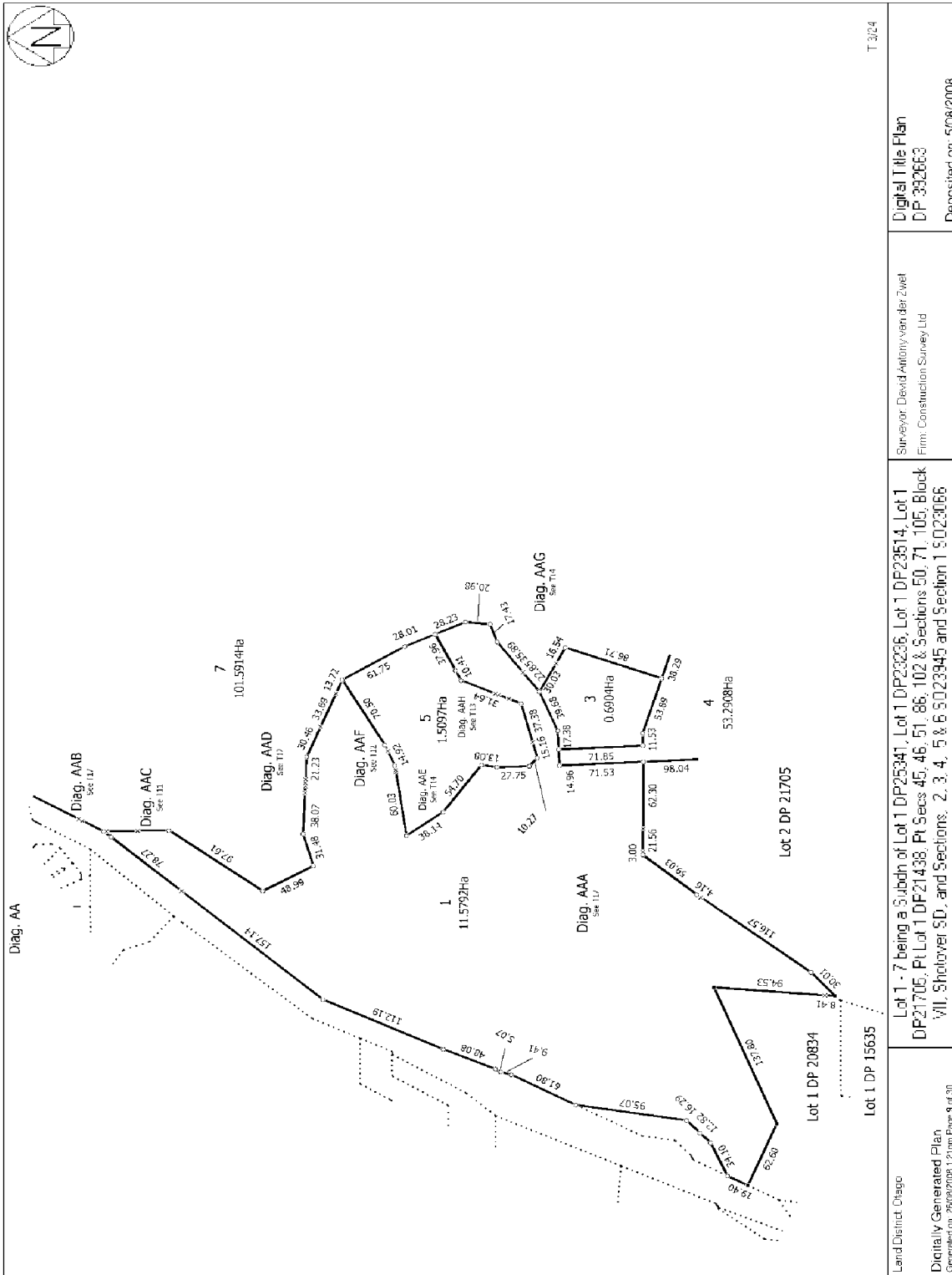
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T 2/24

<p>Land District: Otago</p> <p>Digitally Generated Plan</p> <p>Generated on: 26/09/2008 12:10pm Page 6 of 30</p>	<p>Lot 1 - 7 being a Subdn of Lot 1 DP25341, Lot 1 DP23236, Lot 1 DP23514, Lot 1 DP21705, Pt Lot 1 DP21438, Pt Secs 45, 46, 51, 86, 102 &amp; Sections 50, 71, 105, Block VII, Shotover SD, and Sections 2, 3, 4, 5 &amp; 6 SD23345 and Section 1 SD23066</p>	<p>Surveyor: David Anthony van der Zwet</p> <p>Firm: Construction Survey Ltd</p>	<p>Digital Title Plan</p> <p>DP 332663</p> <p>Deposited on: 5/08/2008</p>
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T 3/24

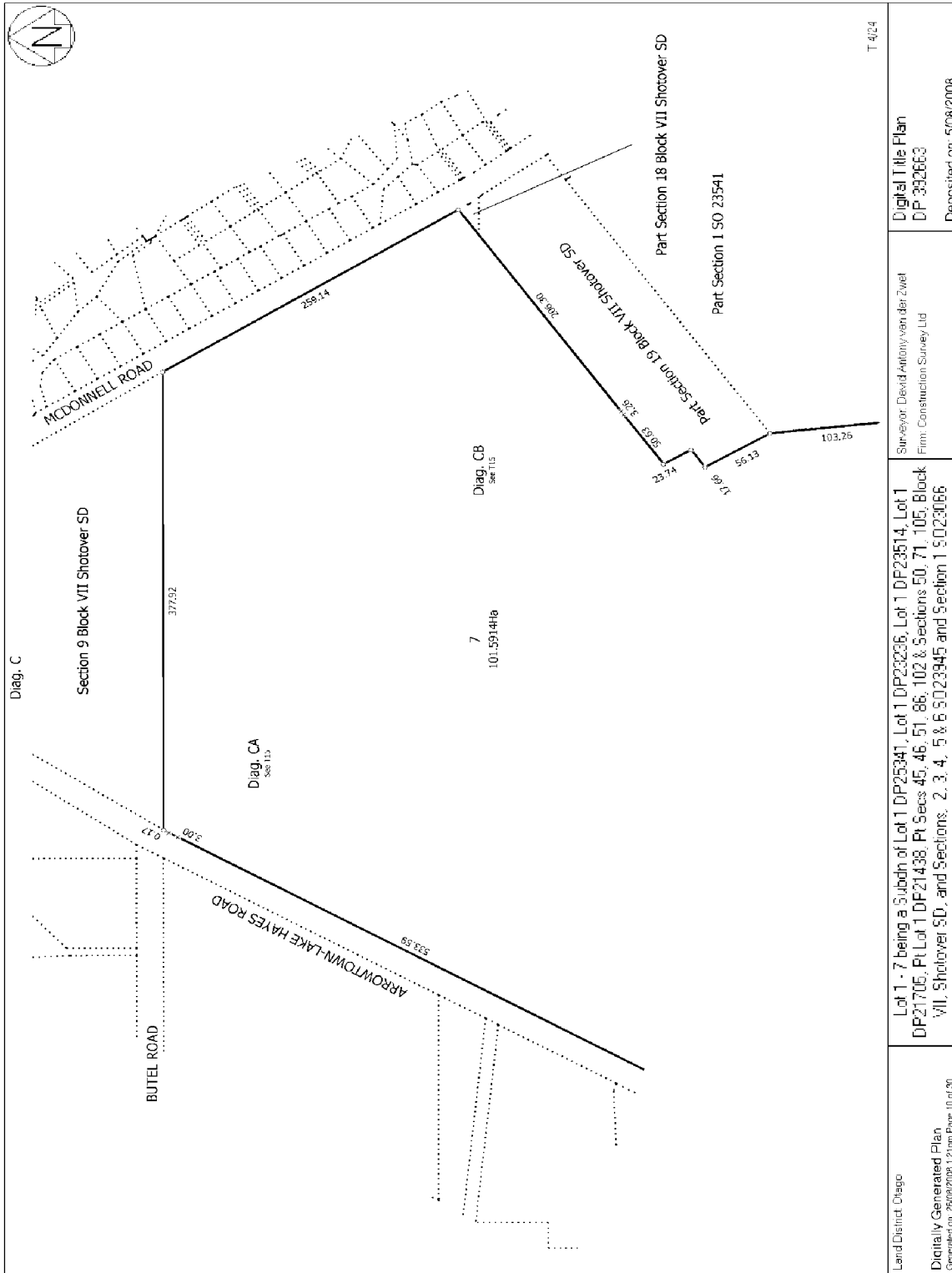
Surveyor: David Anthony van der Zwet  
 Firm: Construction Survey Ltd  
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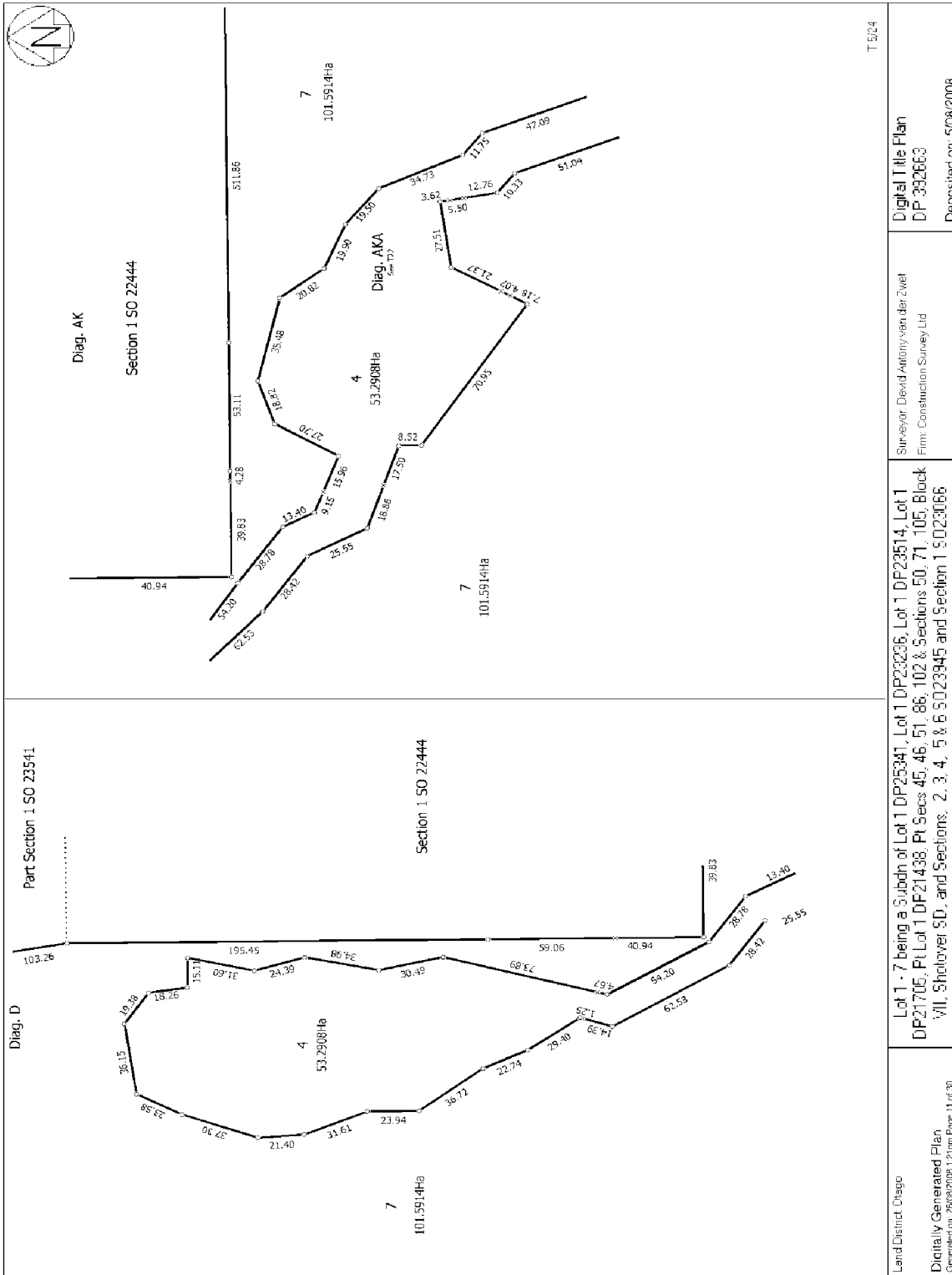
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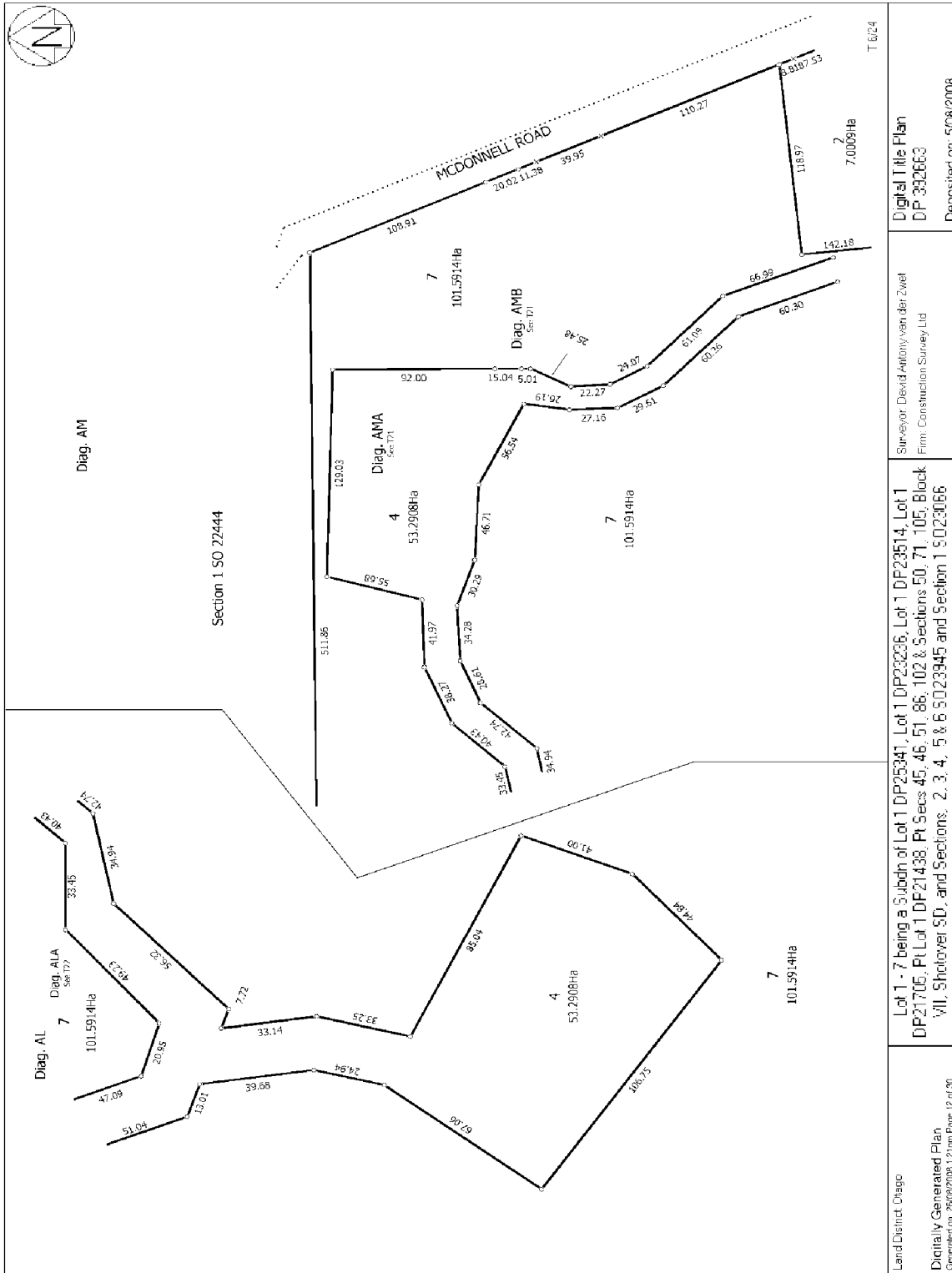
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Deposited on: 5/08/2008

Digital Title Plan  
DP 352663

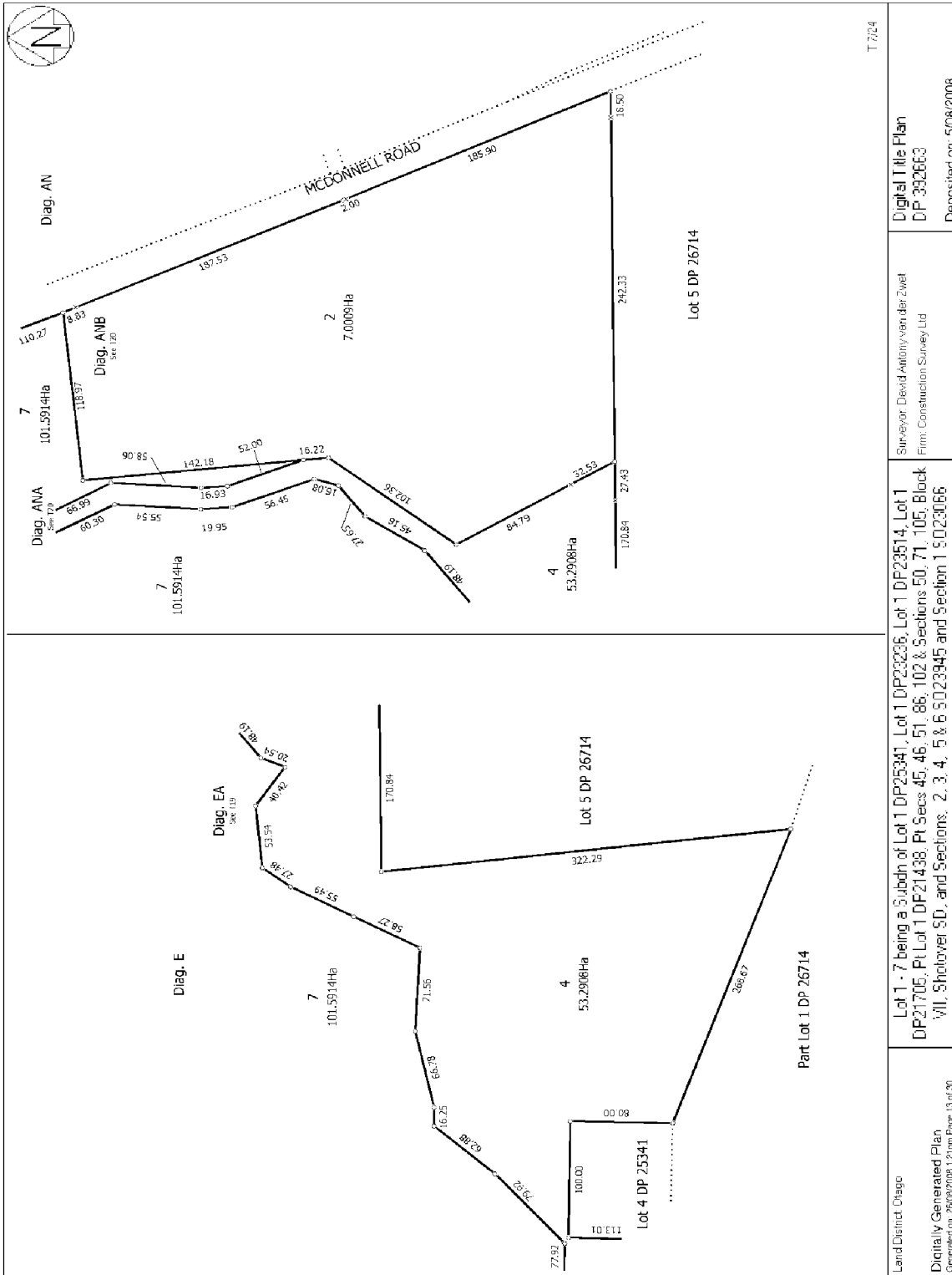
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Land District: Otago  
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Land District: Otago	Surveyor: David Anthony van der Zwet Firm: Construction Survey Ltd	Digital Title Plan DP 332663
Digitally Generated Plan Generated on: 26/08/2008 12:10 pm Page: 12 of 30	Lot 1 - 7 being a Subdn of Lot 1 DP25341, Lot 1 DP23236, Lot 1 DP23514, Lot 1 DP21705, Pt Lot 1 DP21438, Pt Secs 45, 46, 51, 86, 102 & Sections 50, 71, 105, Block VII, Shotover SD, and Sections 2, 3, 4, 5 & 6 SO23345 and Section 1 SO23066	Deposited on: 5/08/2008



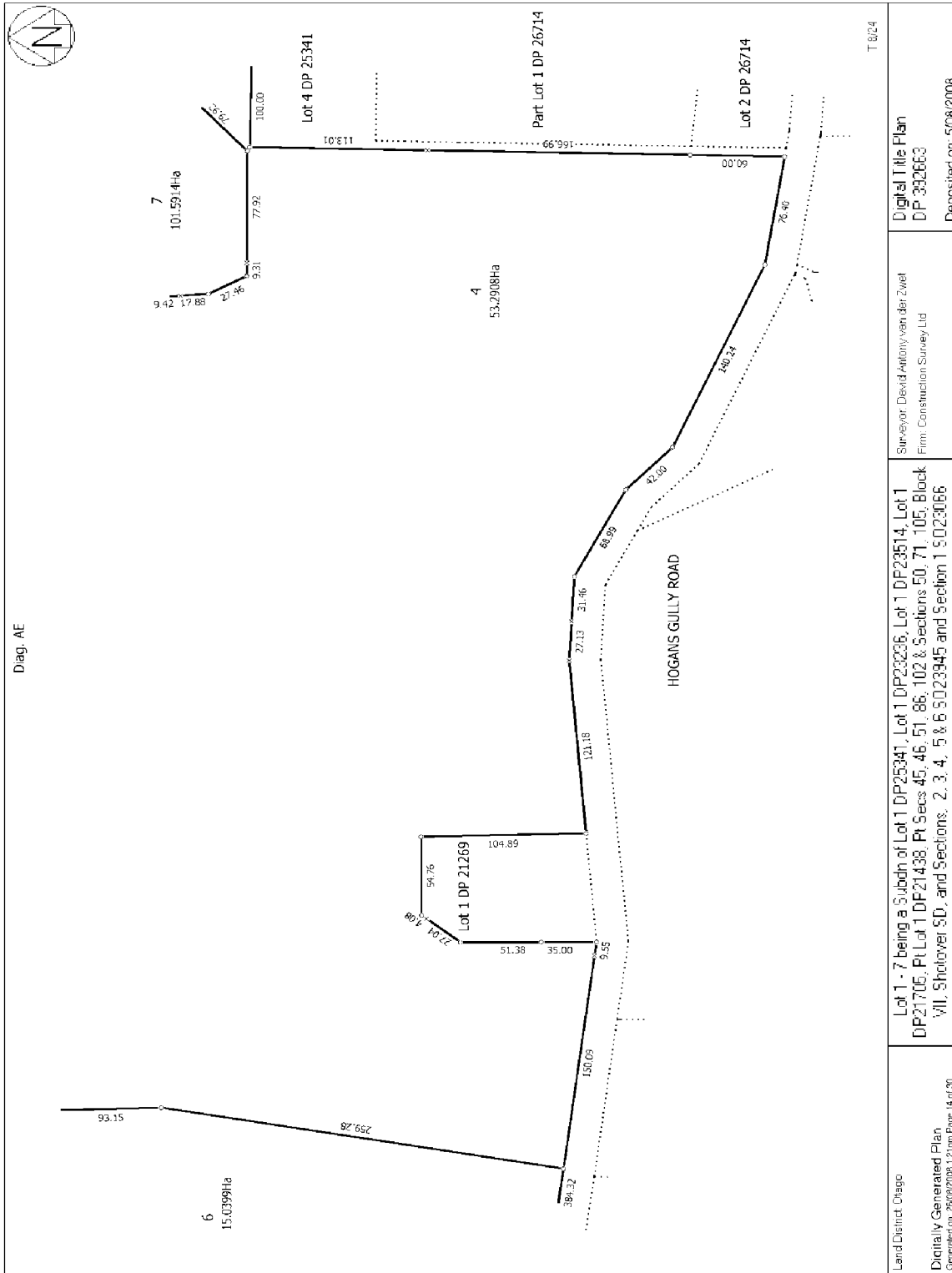
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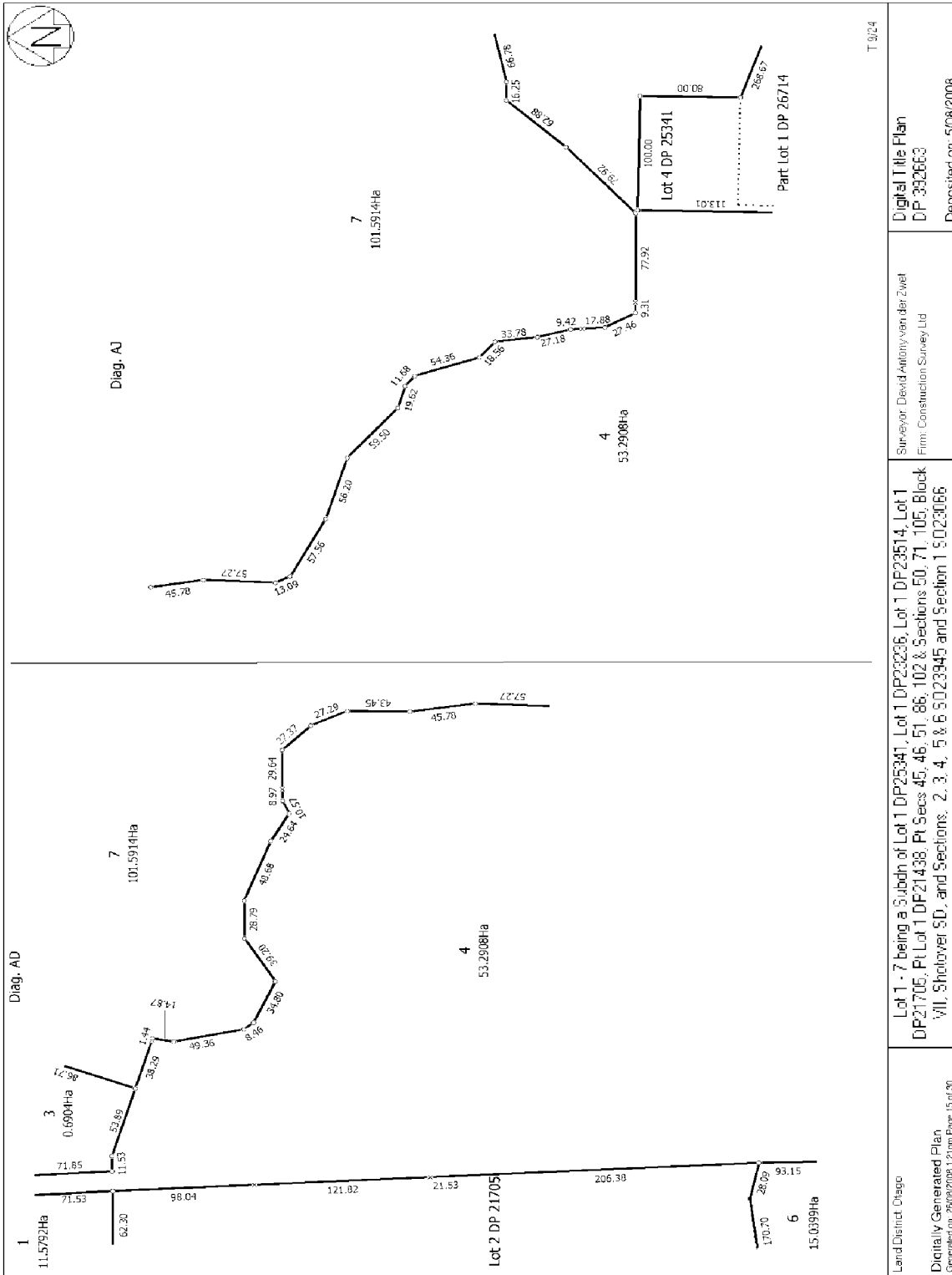
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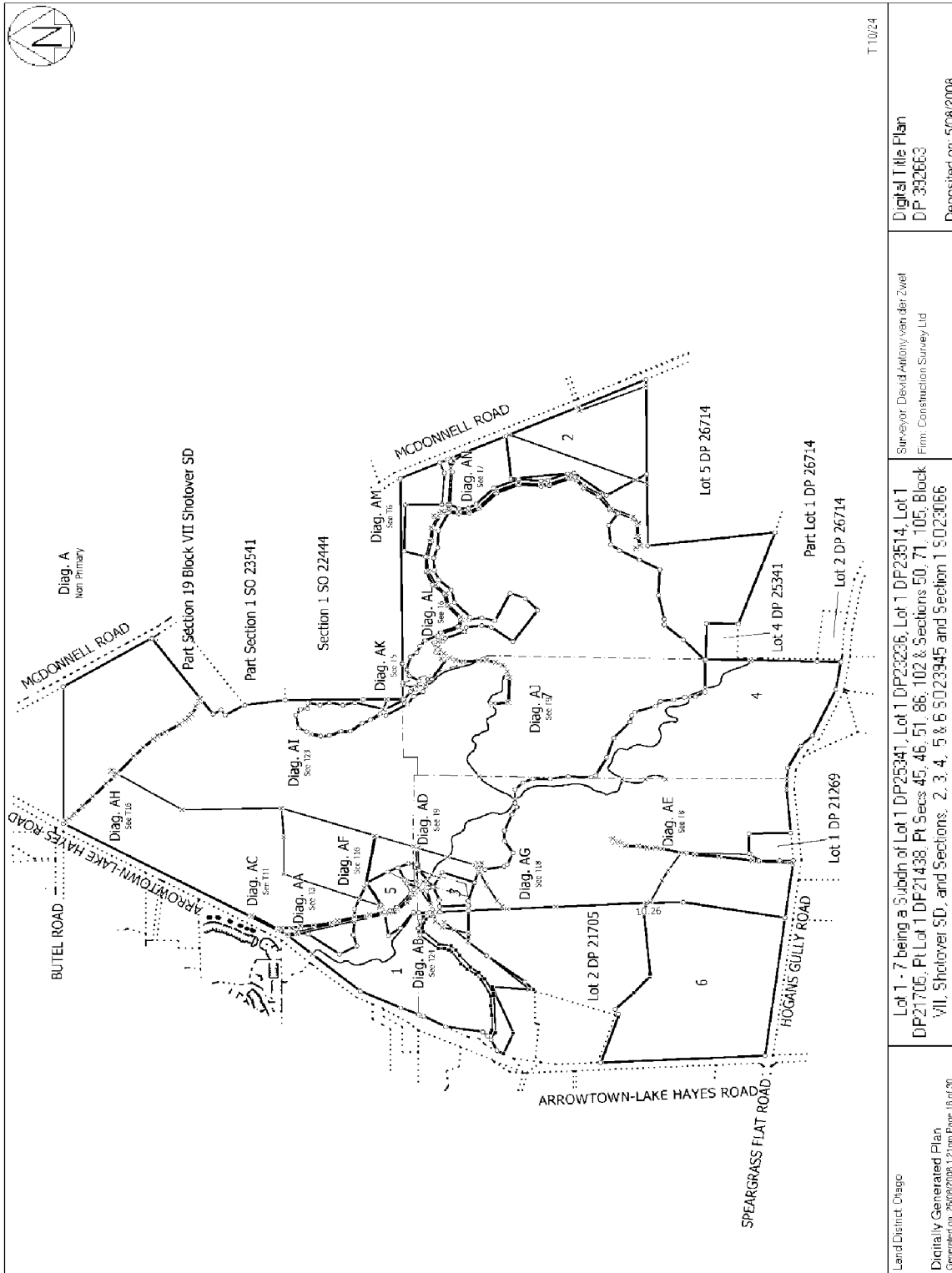
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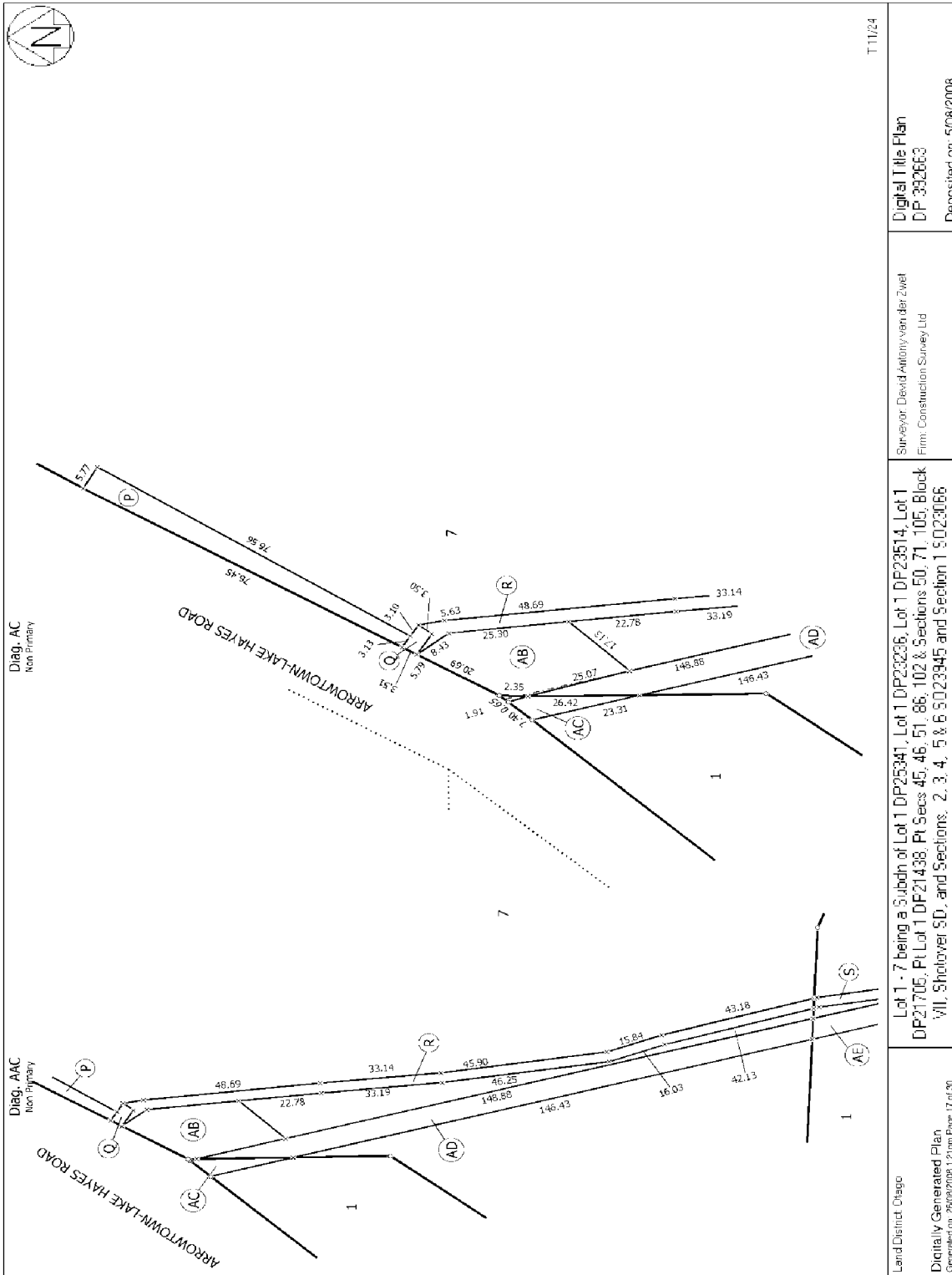
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T10/24

<p>Land District: Otago</p> <p>Digitally Generated Plan</p> <p>Generated on: 26/01/2008 12:11pm Page: 16 of 30</p>	<p>Lot 1 - 7 being a Subdivn of Lot 1 DP25341, Lot 1 DP23236, Lot 1 DP23514, Lot 1 DP21705, Pt Lot 1 DP21438, Pt Secs 45, 46, 51, 86, 102 &amp; Sections 50, 71, 105, Block VII, Shotover SD, and Sections 2, 3, 4, 5 &amp; 6 SO23945 and Section 1 SO23066</p>	<p>Surveyor: David Anthony van der Zwet</p> <p>Firm: Construction Survey Ltd</p>	<p>Digital Title Plan</p> <p>DP 332663</p> <p>Deposited on: 5/08/2006</p>
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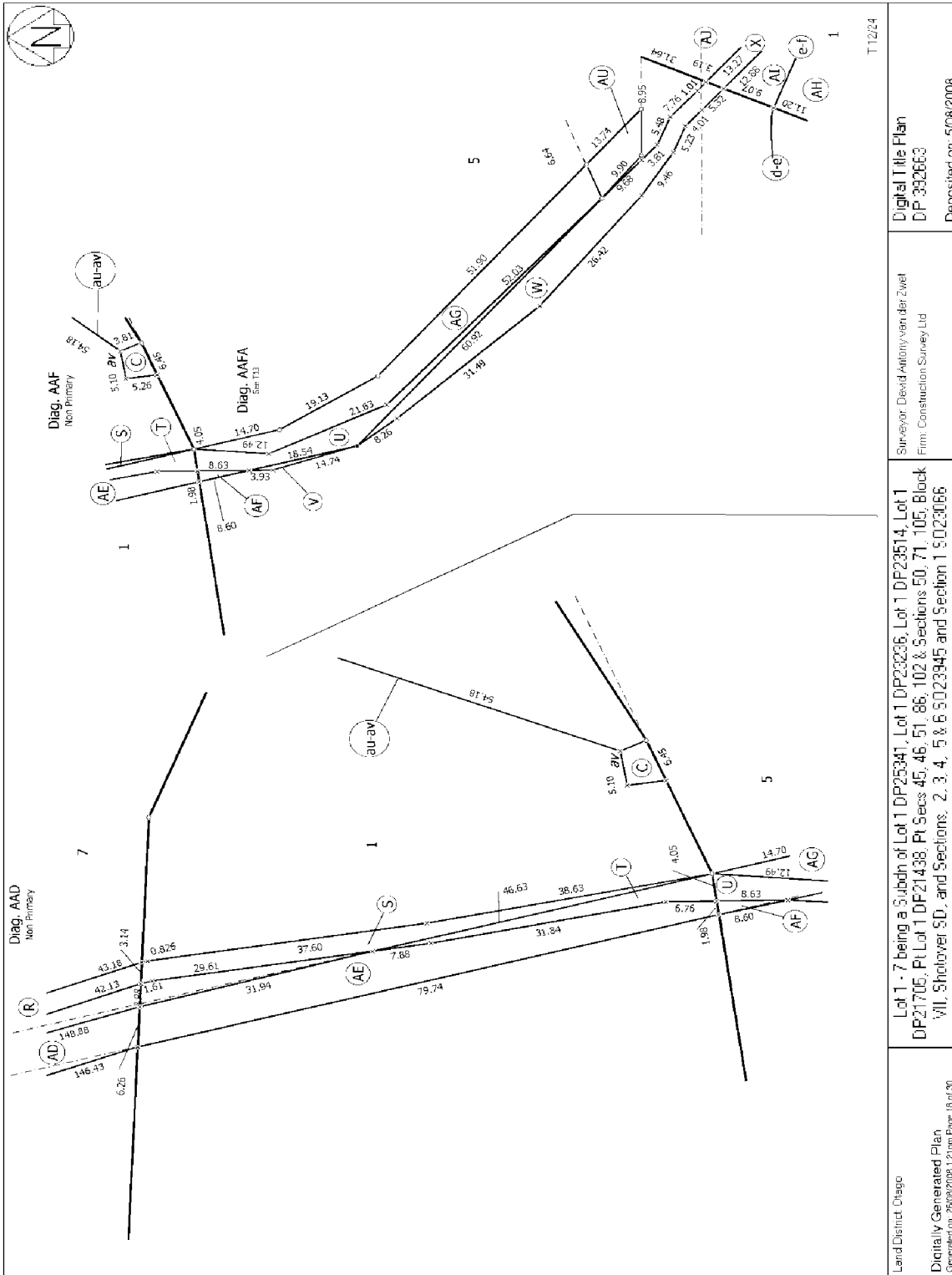
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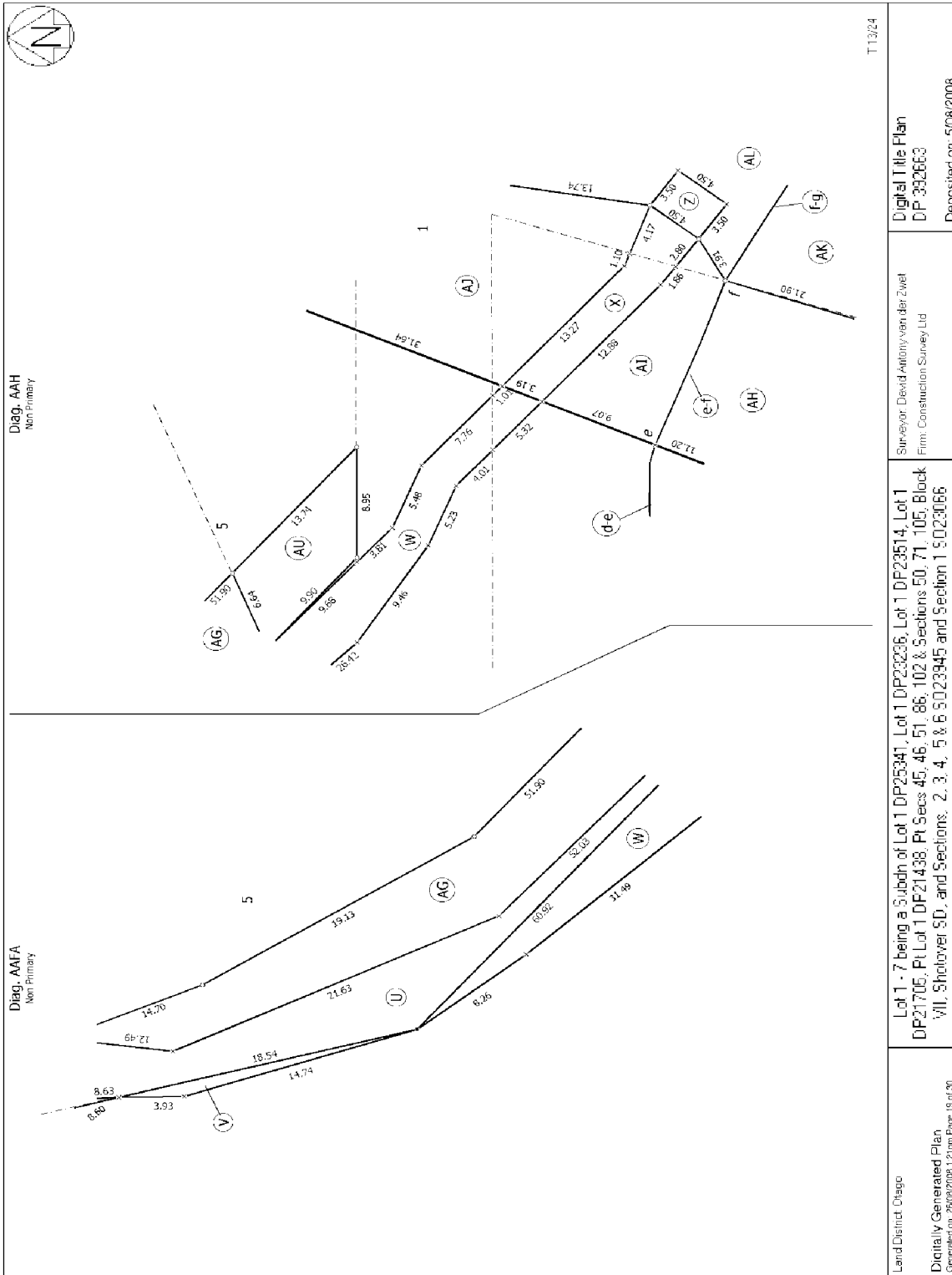
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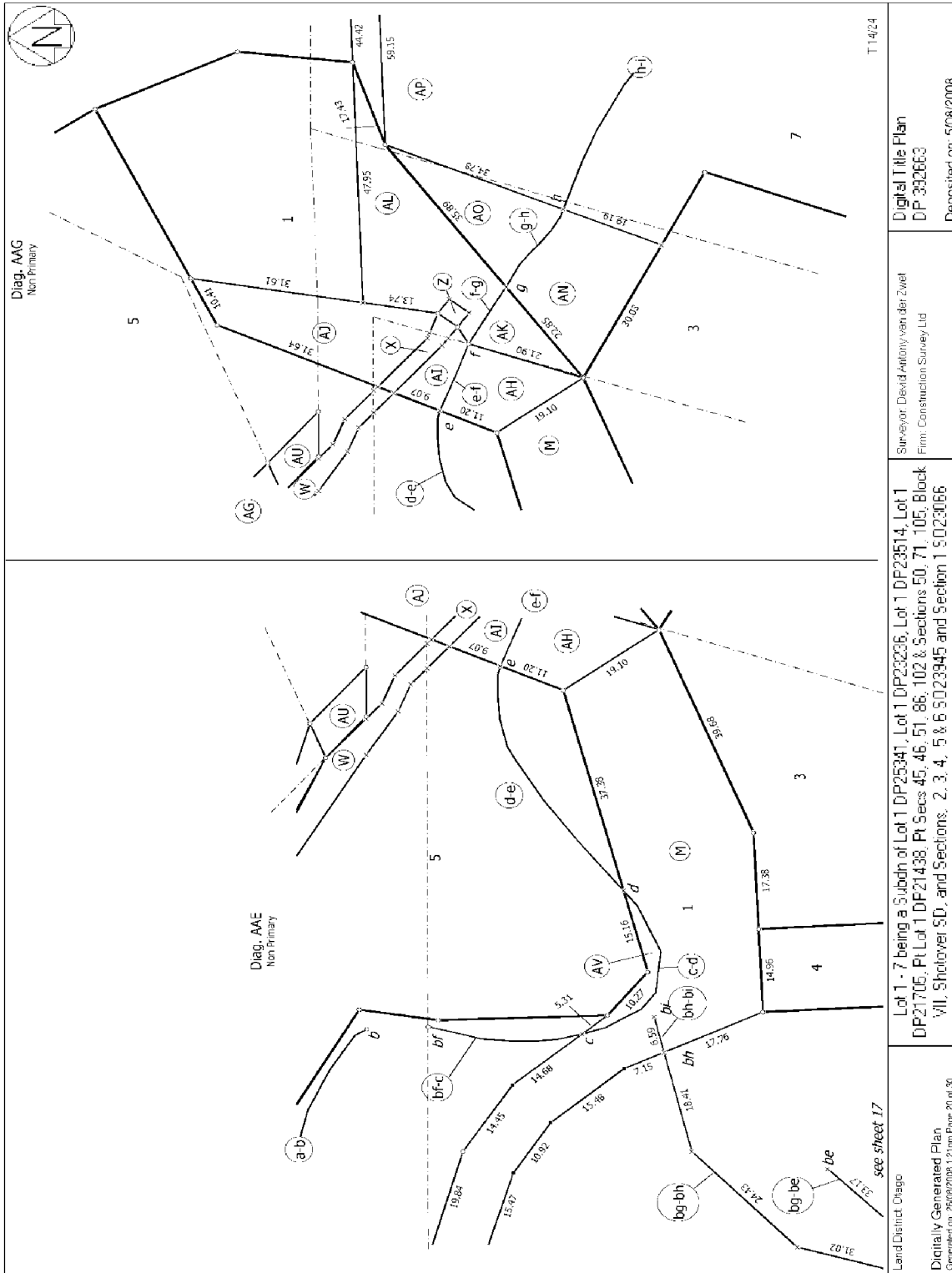
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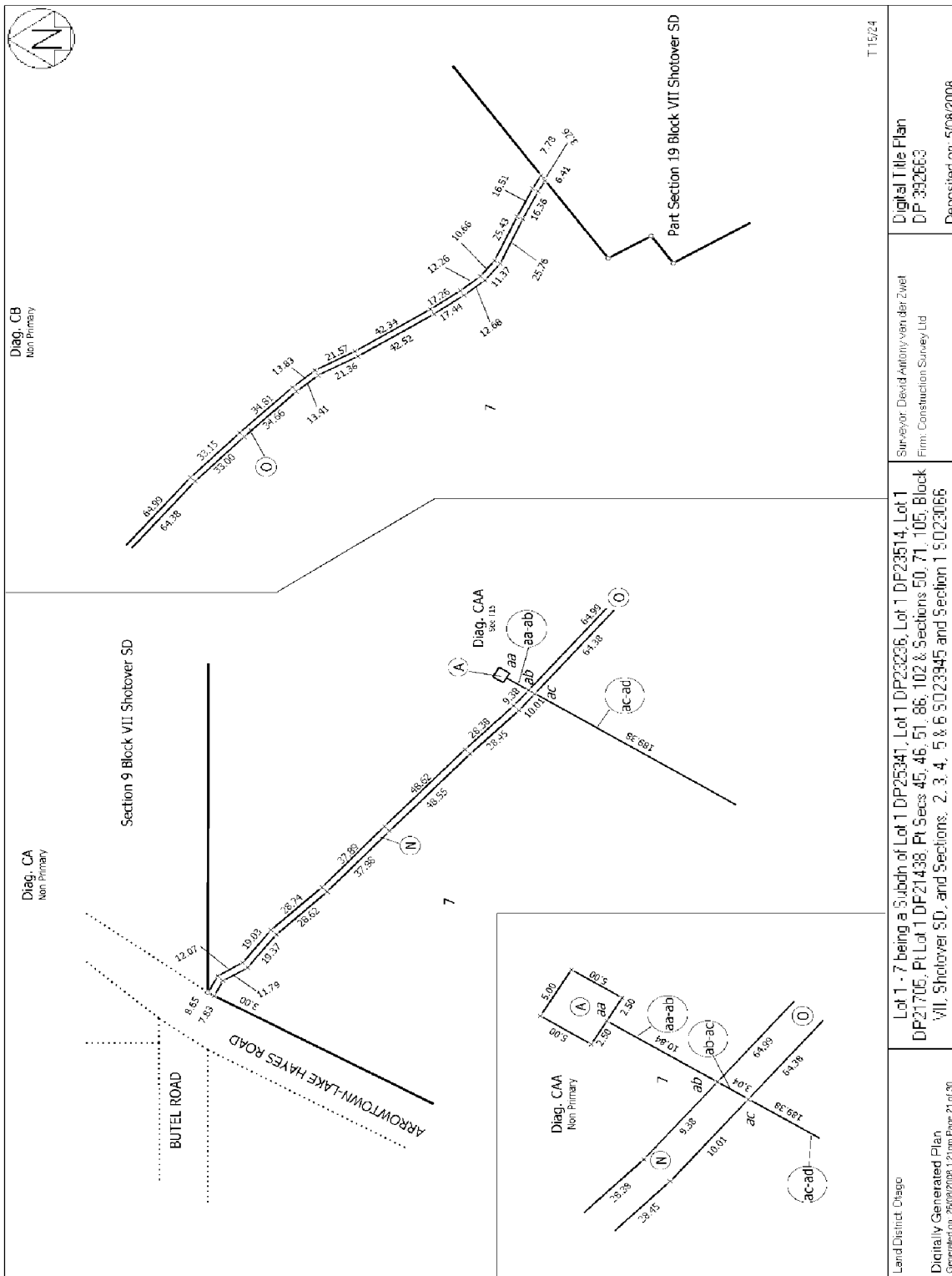
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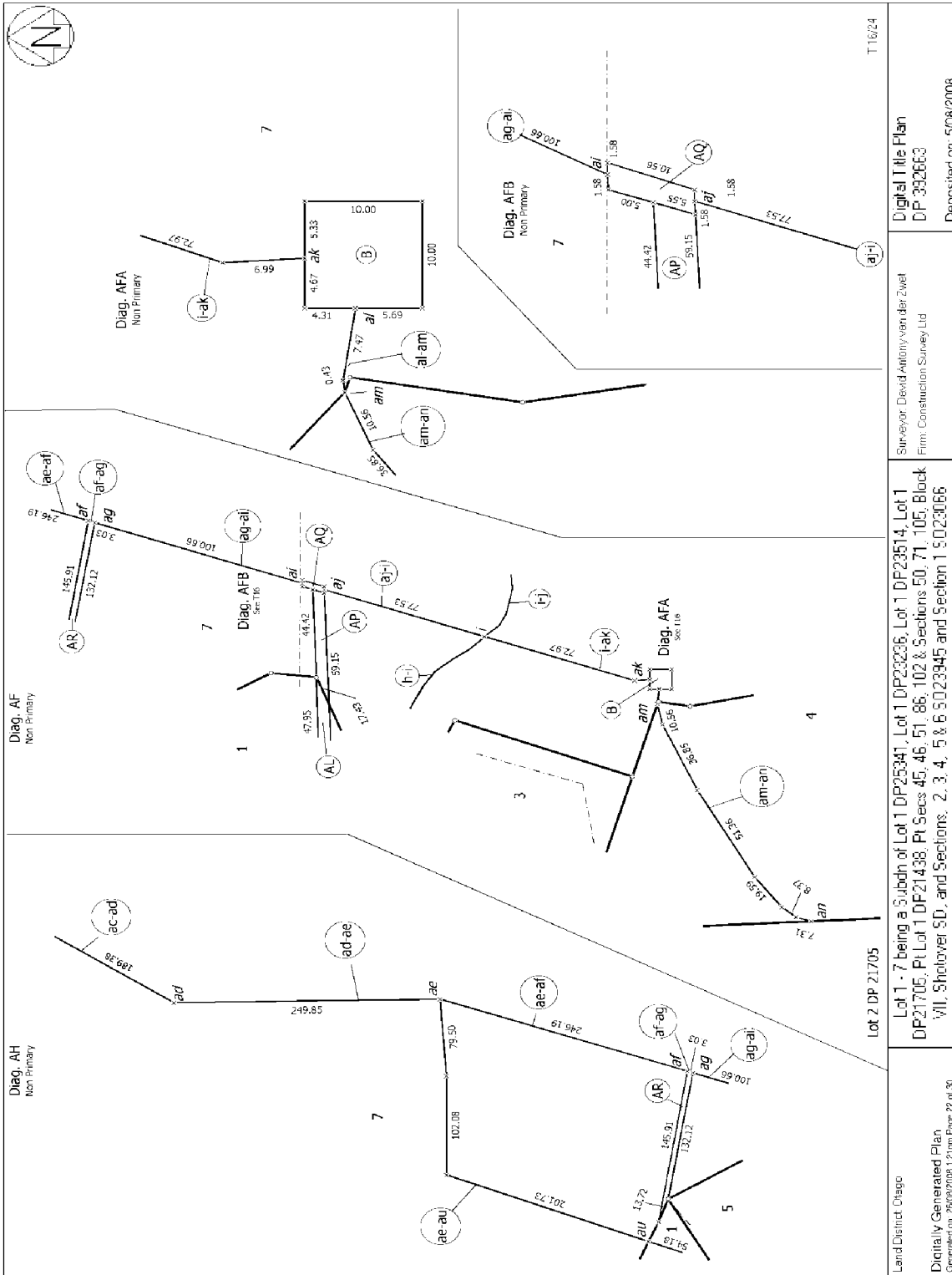


T15/24  
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Surveyor: David Anthony van der Zwet  
 Firm: Construction Survey Ltd

Lot 1 - 7 being a Subdn of Lot 1 DP25341, Lot 1 DP23236, Lot 1 DP23514, Lot 1 DP21705, Pt Lot 1 DP21438, Pt Secs 45, 46, 51, 86, 102 & Sections 50, 71, 105, Block VII, Shotover SD, and Sections 2, 3, 4, 5 & 6 SD23945 and Section 1 SD23066

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 Generated on: 26/01/2008 12:10pm Page 21 of 30



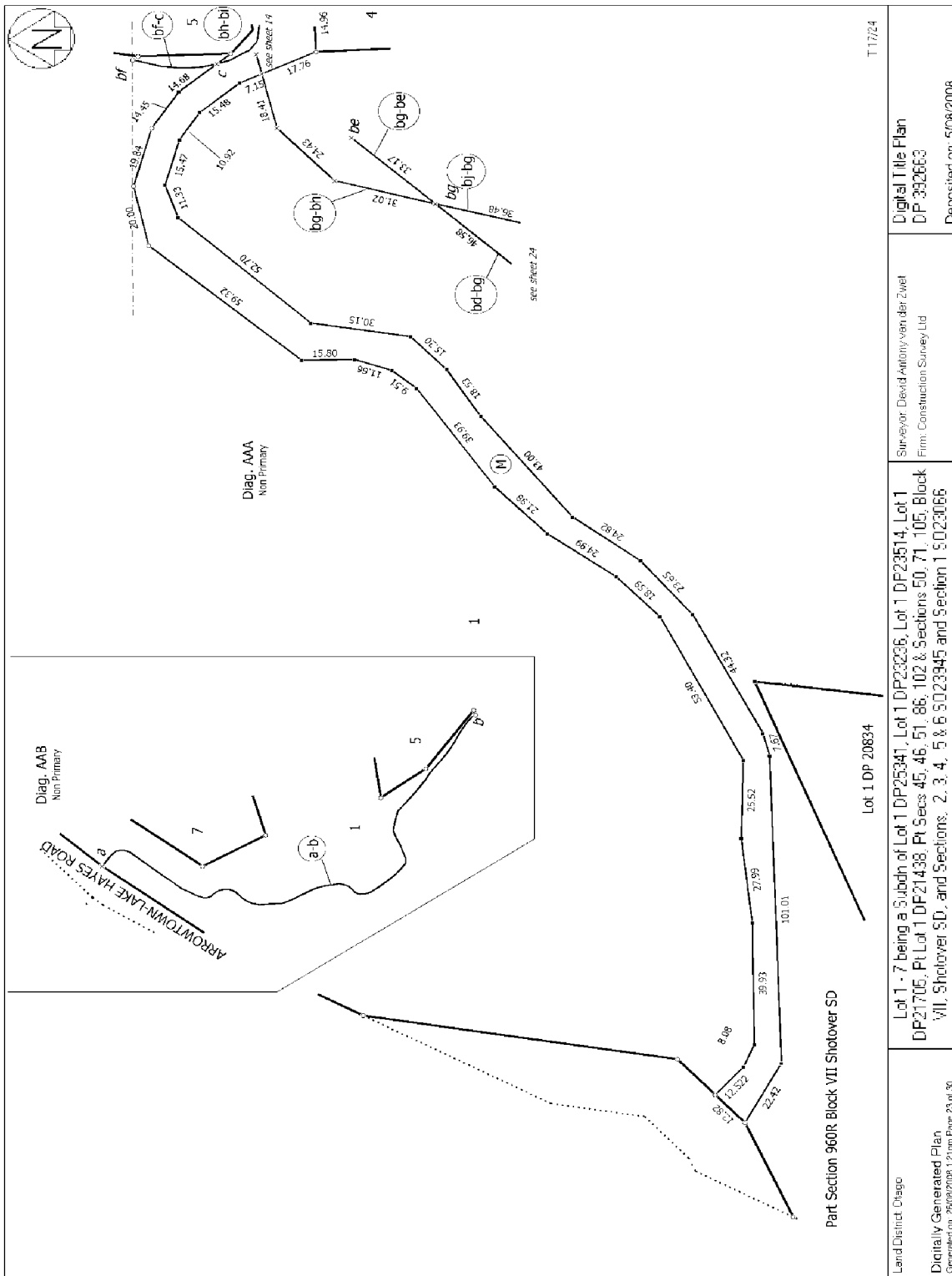
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Surveyor: David Anthony van der Zwet  
Firm: Construction Survey Ltd

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Land District: Diago  
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Digital Title Plan  
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Deposited on: 5/08/2006

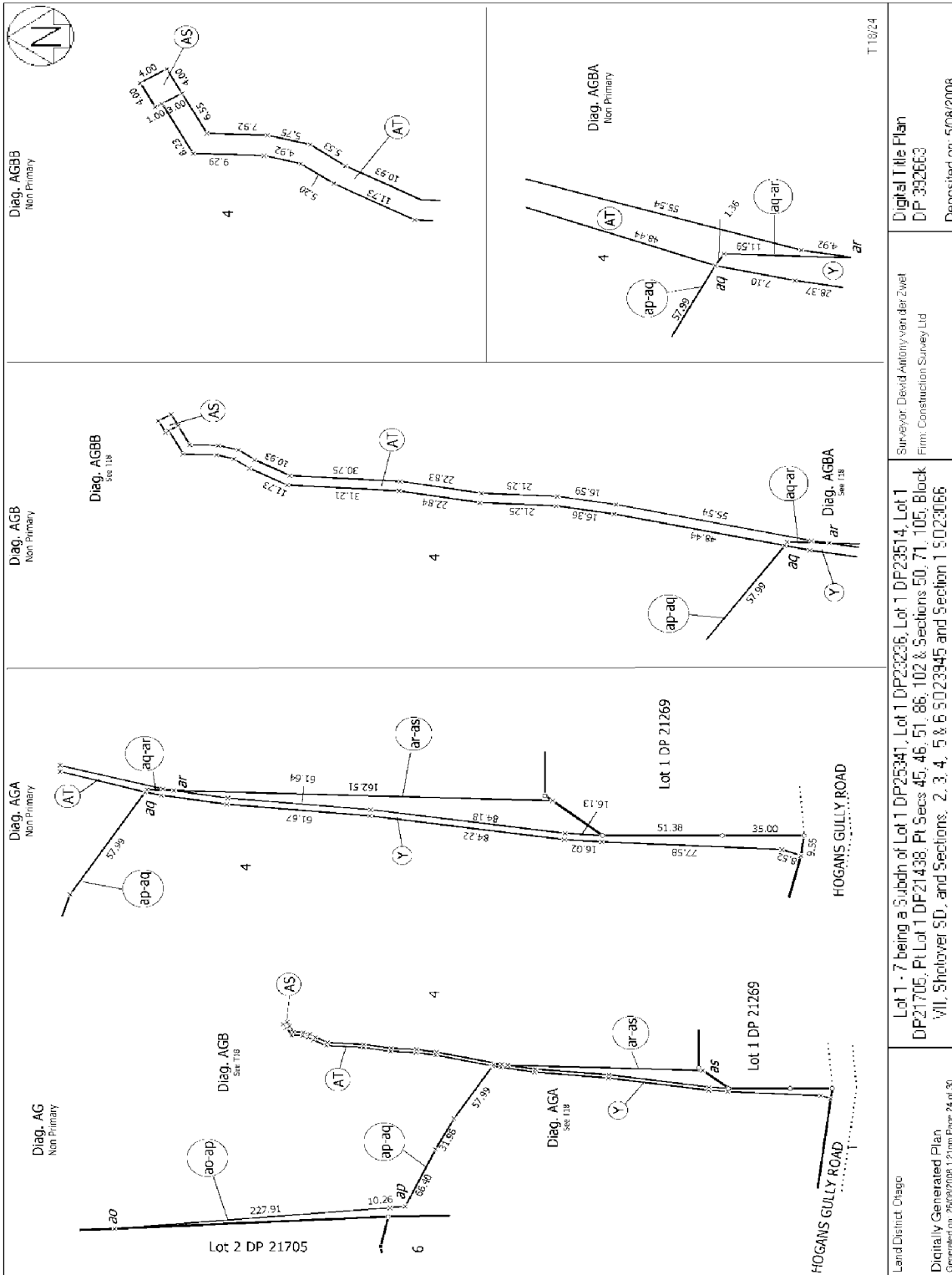


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Surveyor: David Anthony van der Zwet  
 Firm: Construction Survey Ltd

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Land District: Otago  
 Digitally Generated Plan  
 Generated on: 26/01/2008 12:11pm Page 23 of 30



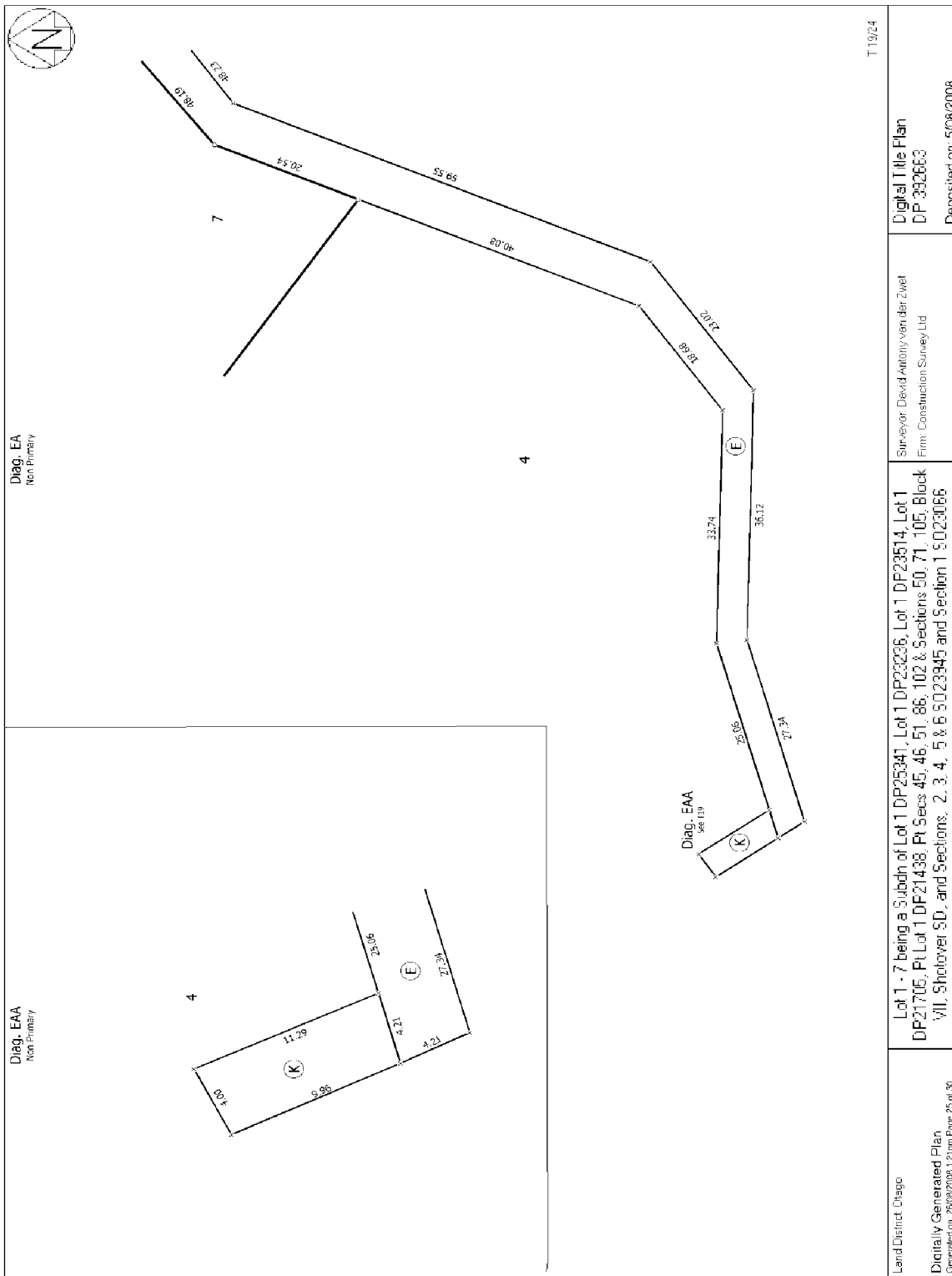
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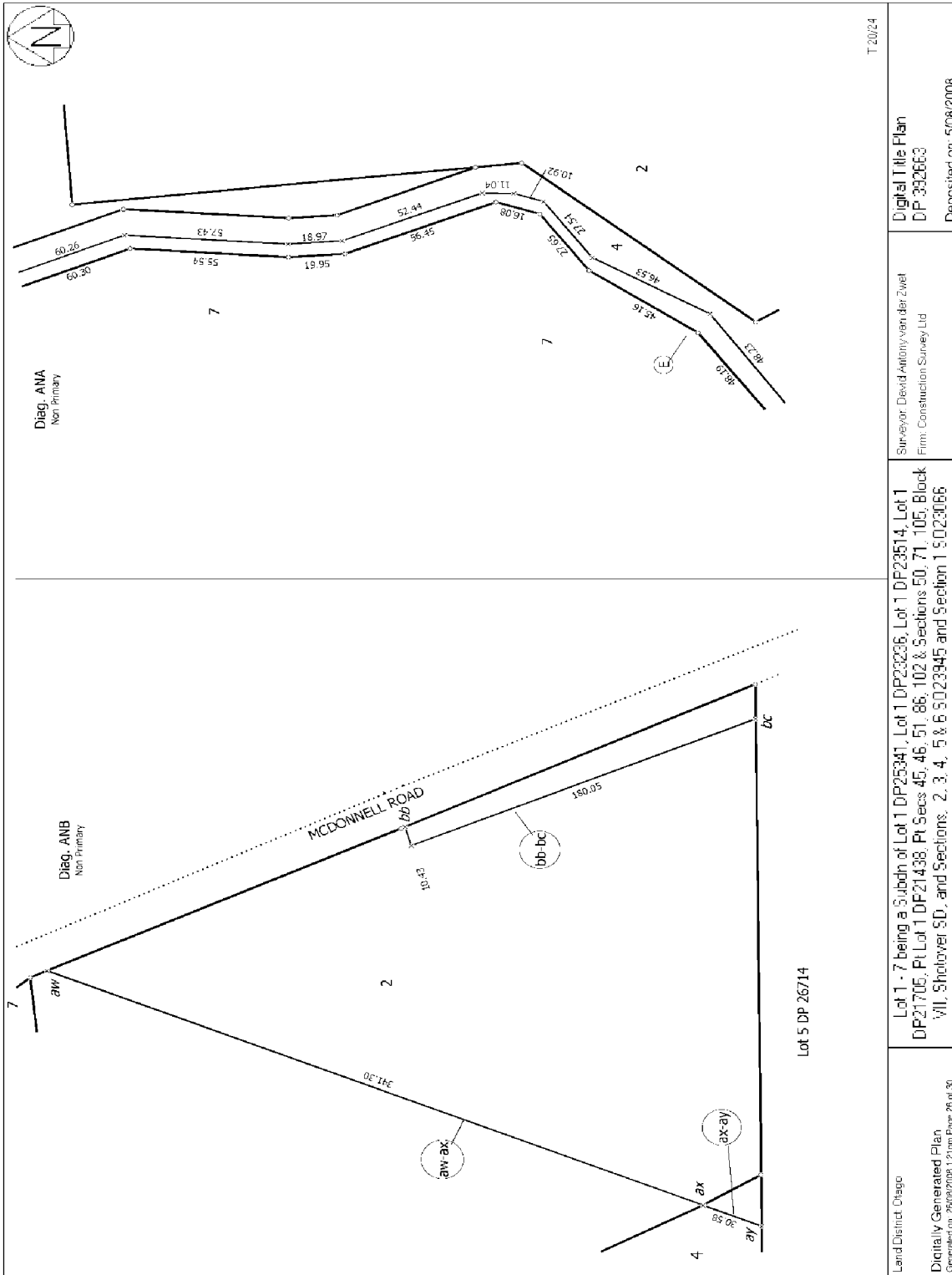
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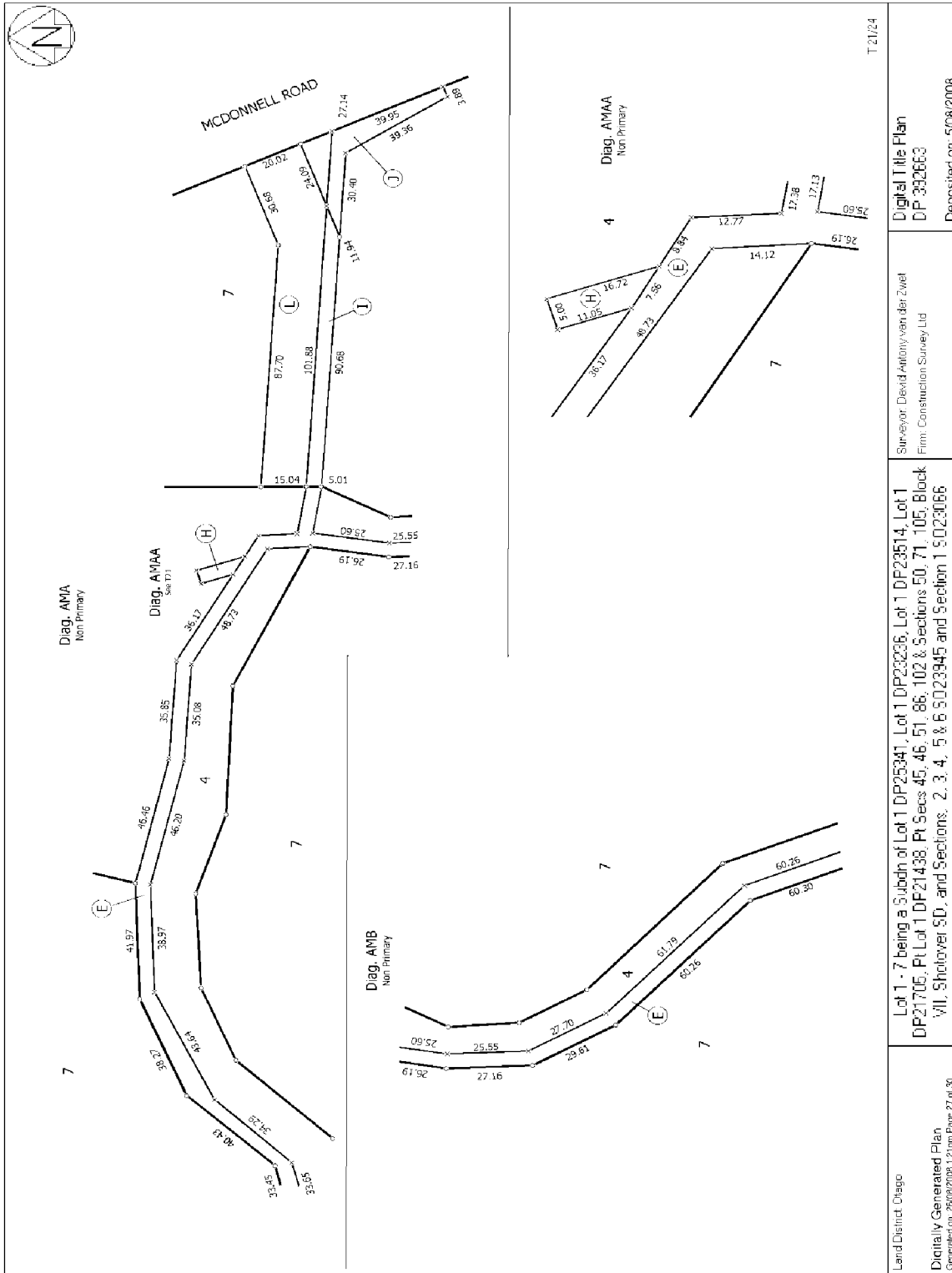
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Land District: Otago  
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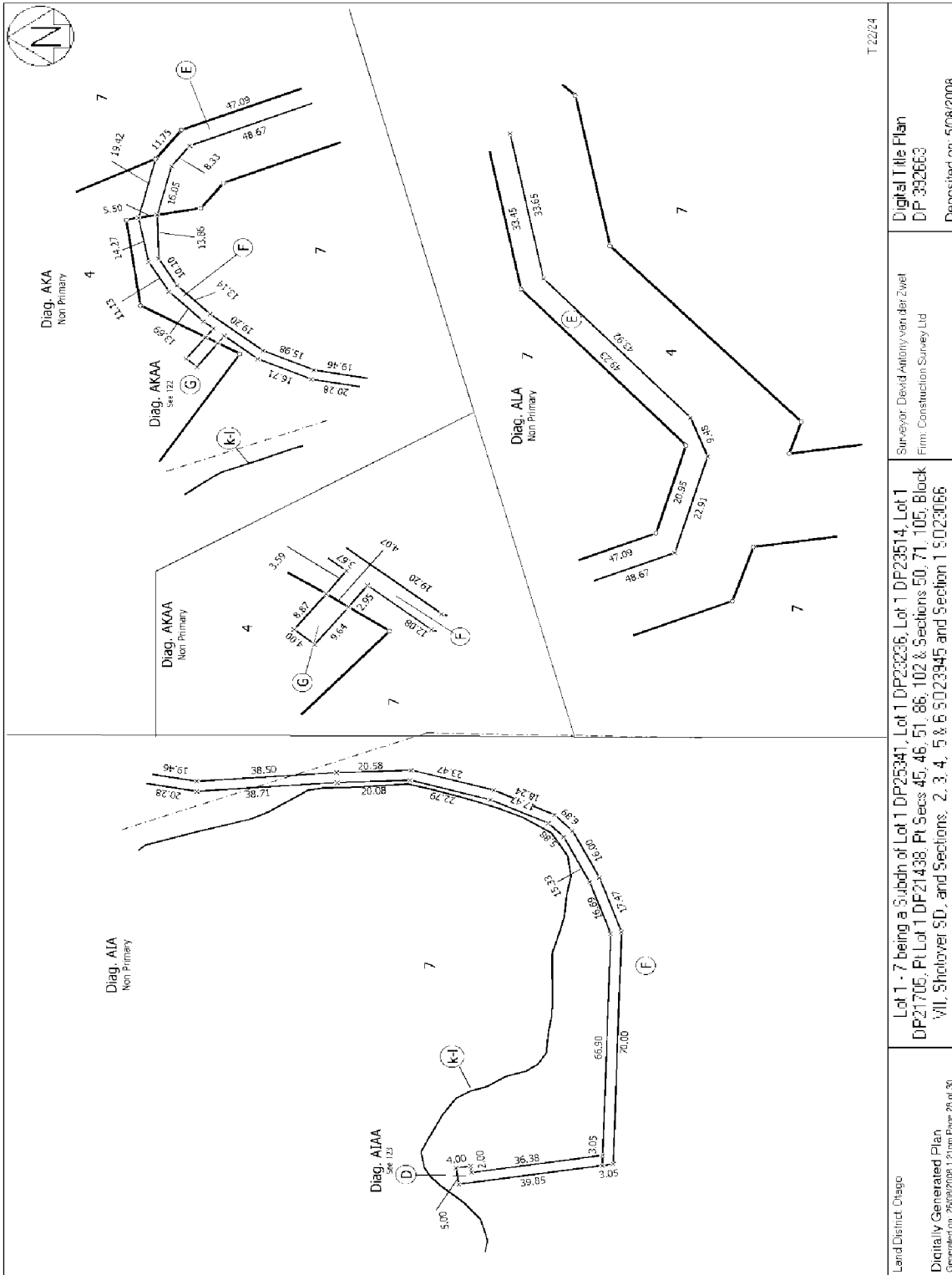


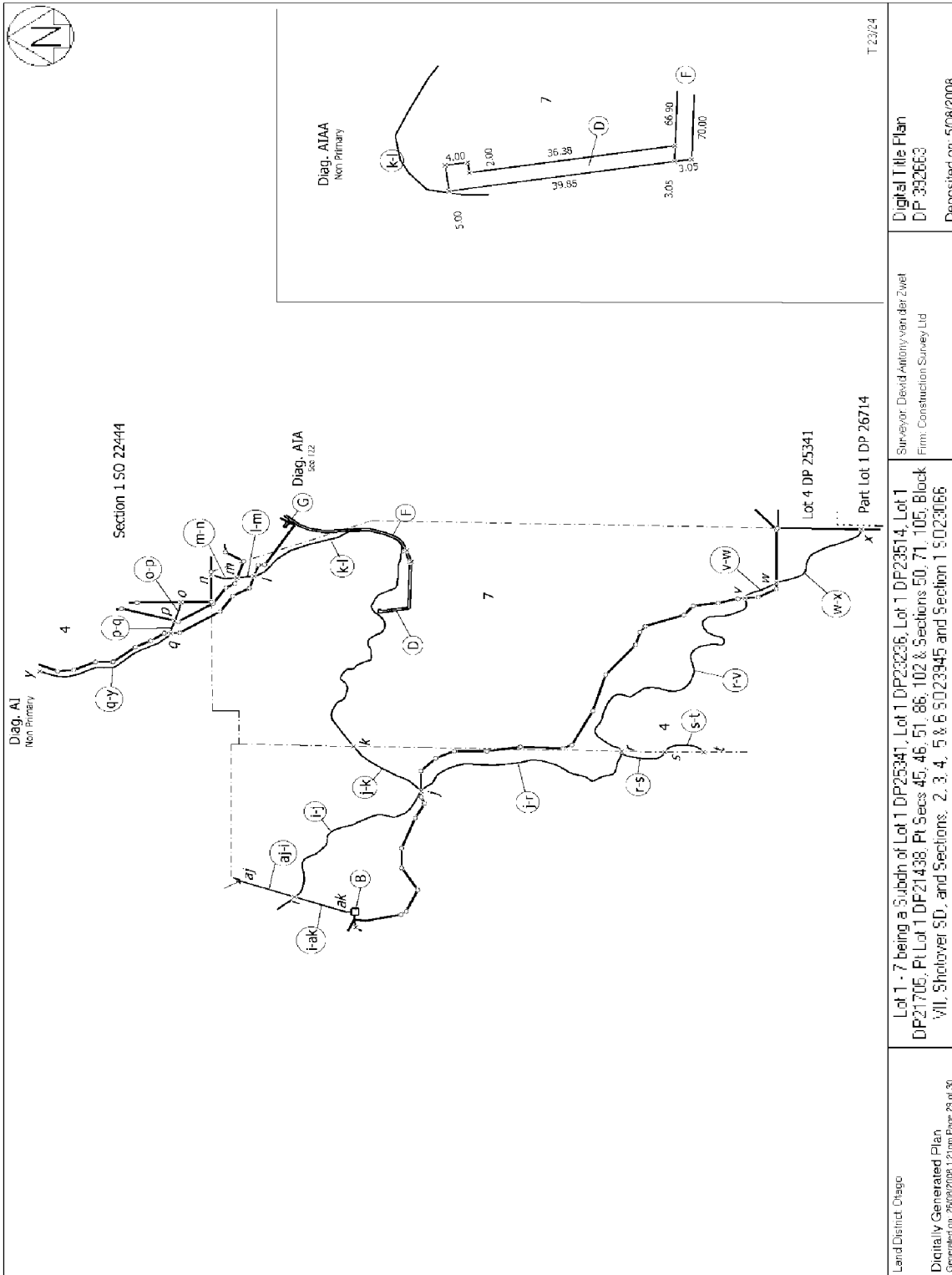






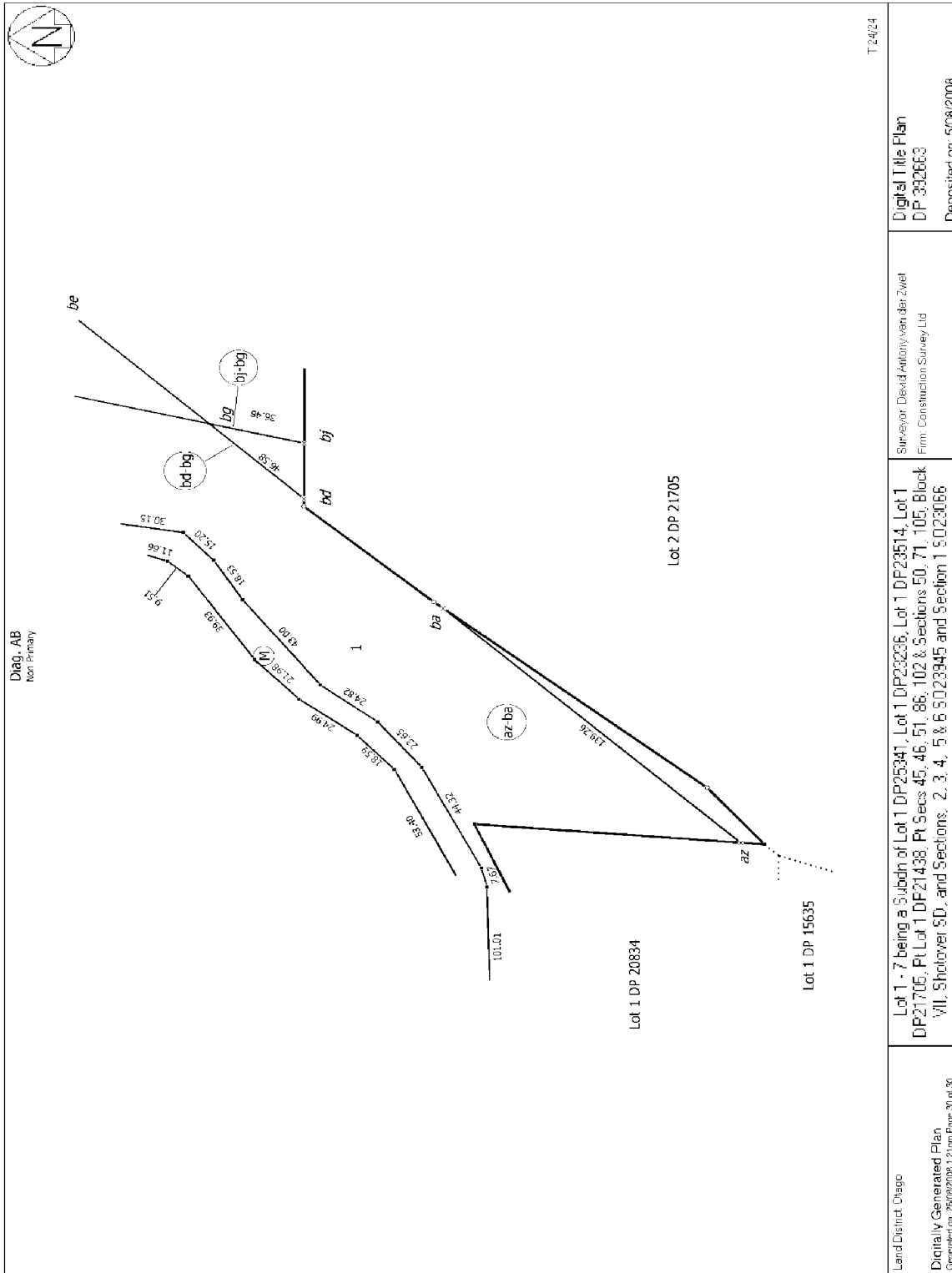
<p>Land District: Otago</p>	<p>Surveyor: David Anthony van der Zwet Firm: Construction Survey Ltd</p>	<p>Lot 1 - 7 being a Subdn of Lot 1 DP25341, Lot 1 DP23236, Lot 1 DP23514, Lot 1 DP21705, Pt Lot 1 DP21438, Pt Secs 45, 46, 51, 86, 102 &amp; Sections 50, 71, 105, Block VII, Shotover SD, and Sections 2, 3, 4, 5 &amp; 6 SD23945 and Section 1 SD23066</p>
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T 23/24

<p>Land District: Otago</p> <p>Digitally Generated Plan</p> <p>Generated on: 26/01/2008 12:11pm Page: 28 of 30</p>	<p>Lot 1 - 7 being a Subdn of Lot 1 DP25341, Lot 1 DP23236, Lot 1 DP23514, Lot 1 DP21705, Pt Lot 1 DP21438, Pt Secs 45, 46, 51, 86, 102 &amp; Sections 50, 71, 105, Block VII, Shotover SD, and Sections 2, 3, 4, 5 &amp; 6 SD23945 and Section 1 SD23066</p>	<p>Surveyor: David Anthony van der Zwet</p> <p>Firm: Construction Survey Ltd</p>	<p>Digital Title Plan</p> <p>DP 332663</p> <p>Deposited on: 5/08/2008</p>
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T 24/24

<p>Land District, Otago</p>	<p>Surveyor: David Anthony van der Zwet Firm: Construction Survey Ltd</p>	<p>Lot 1 - 7 being a Subdn of Lot 1 DP25341, Lot 1 DP23236, Lot 1 DP23514, Lot 1 DP21705, Pt Lot 1 DP21438, Pt Secs 45, 46, 51, 86, 102 &amp; Sections 50, 71, 105, Block VII, Shotover SD, and Sections 2, 3, 4, 5 &amp; 6 DP23345 and Section 1 DP23066</p>
<p>Digitally Generated Plan Generated on: 26/08/2008 12:11pm Page 30 of 30</p>	<p>Digital Title Plan DP 352663 Deposited on: 5/08/2006</p>	

Appendix C  
Soil Profile Logs



# SOIL PROFILE LOGS

PROJECT NUMBER: 15063  
 SITE NAME: The Hills Golf Course

FIELD STAFF: Fiona R and Rebecca T  
 METHOD: Spade

DATE: 24,25,28/9/2015  
 WEATHER: Fine and windy

Sample Location	Coordinates		Sample Depth (m)	Sample ID	Soil Lithology
A3-1	-44.953668	168.831457	0-0.1	A3-1 (0.1) 15063	Medium greyish brown LOAM with gravels and organic matter
A3-2	-44.953835	168.831510	0-0.1	A3-2 (0.1) 15063	Medium greyish brown LOAM with gravels and organic matter
A3-3	-44.953970	168.831552	0-0.1	A3-3 (0.1) 15063	Medium greyish brown LOAM with gravels and organic matter
A3-4	-44.953995	168.831353	0-0.1	A3-4 (0.1) 15063	Medium greyish brown LOAM with gravels and organic matter
A3-5	-44.953839	168.831282	0-0.1	A3-5 (0.1) 15063	Medium greyish brown LOAM with gravels and organic matter
A3-6	-44.953704	168.831248	0-0.1	A3-6 (0.1) 15063	Medium greyish brown LOAM with gravels and organic matter
A2-1	-44.952248	168.829444	0-0.1	A2-1 (0.1) 15063	Medium brown LOAM with fine gravels and organic matter
A2-2	-44.952175	168.829619	0-0.1	A2-2 (0.1) 15063	Medium brown LOAM with organic matter
A2-3	-44.952318	168.829634	0-0.1	A2-3 (0.1) 15063	Medium brown LOAM with organic matter
A2-4	-44.951990	168.829387	0-0.1	A2-4 (0.1) 15063	Medium brown LOAM with gravels and organic matter
A2-5	-44.951771	168.829472	0-0.1	A2-5 (0.1) 15063	Medium brown LOAM with gravels and organic matter
A2-6	-44.951561	168.829553	0-0.1	A2-6 (0.1) 15063	Medium brown LOAM with gravels and organic matter
A2-7	-44.951644	168.829276	0-0.1	A2-7 (0.1) 15063	Medium brown LOAM with gravels and organic matter
A2-8	-44.951444	168.829274	0-0.1	A2-8 (0.1) 15063	Medium brown LOAM with gravels and organic matter
A2-9	-44.951235	168.829287	0-0.1	A2-9 (0.1) 15063	Medium brown LOAM with gravels and organic matter
A8-1	-44.947848	168.831629	0-0.1	A8-1 (0.1) 15063	Medium brown clayey SILT with fine gravels
A8-2	-44.947711	168.831499	0-0.1	A8-2 (0.1) 15063	Medium brown clayey SILT with coarse gravels
A8-3	-44.947577	168.831411	0-0.1	A8-3 (0.1) 15063	Medium brown clayey SILT with fine to coarse gravels
A8-4	-44.947435	168.831273	0-0.1	A8-4 (0.1) 15063	Medium brown clayey SILT with fine to coarse gravels
A8-5	-44.947329	168.831179	0-0.1	A8-5 (0.1) 15063	Medium brown clayey SILT with fine to coarse gravels
A8-6	-44.947474	168.830918	0-0.1	A8-6 (0.1) 15063	Medium brown clayey SILT with fine gravels
A8-7	-44.947569	168.831119	0-0.1	A8-7 (0.1) 15063	Medium brown clayey SILT with fine gravels
A8-8	-44.947707	168.831225	0-0.1	A8-8 (0.1) 15063	Medium brown clayey SILT with fine gravels
A8-9	-44.947828	168.831324	0-0.1	A8-9 (0.1) 15063	Medium brown clayey SILT with fine gravels
A7-1	-44.958514	168.835761	0-0.1	A7-1 (0.1) 15063	Medium brown clayey SILT with organic matter
A7-2	-44.958823	168.835456	0-0.1	A7-2 (0.1) 15063	Medium brown clayey SILT with cobbles and organic matter
A7-3	-44.959060	168.835291	0-0.1	A7-3 (0.1) 15063	Medium brown clayey SILT with organic matter
A7-4	-44.958855	168.834986	0-0.1	A7-4 (0.1) 15063	Greyish brown LOAM with gravels, cobbles and organic matter
A7-5	-44.958668	168.835221	0-0.1	A7-5 (0.1) 15063	Medium brown clayey SILT with organic matter
A7-6	-44.958383	168.835514	0-0.1	A7-6 (0.1) 15063	Medium brown clayey SILT with gravels and organic matter
A6-1	-44.957233	168.832233	0-0.1	A6-1 (0.1) 15063	Medium brown clayey SILT with organic matter
A6-2	-44.956790	168.832294	0-0.1	A6-2 (0.1) 15063	Medium brown clayey SILT with organic matter

Sample Location	Coordinates		Sample Depth (m)	Sample ID	Soil Lithology
A6-3	-44.957045	168.832857	0-0.1	A6-3 (0.1) 15063	Medium brown clayey SILT with organic matter
A5-1	-44.955807	168.833495	0-0.1	A5-1 (0.1) 15063	Medium brown clayey SILT with organic matter
A5-2	-44.956240	168.833301	0-0.1	A5-2 (0.1) 15063	Medium brown clayey SILT with organic matter
A5-3	-44.956673	168.833189	0-0.1	A5-3 (0.1) 15063	Medium brown clayey SILT with organic matter
A5-4	-44.956309	168.832755	0-0.1	A5-4 (0.1) 15063	Medium brown clayey SILT with organic matter
A5-5	-44.955871	168.832863	0-0.1	A5-5 (0.1) 15063	Medium brown clayey SILT with organic matter
A5-6	-44.955586	168.832862	0-0.1	A5-6 (0.1) 15063	Medium brown clayey SILT with organic matter
A4-1	-44.955690	168.835327	0-0.1	A4-1 (0.1) 15063	Medium brown clayey SILT with gravels, cobbles and organic matter
A4-2	-44.956006	168.835100	0-0.1	A4-2 (0.1) 15063	Medium brown clayey SILT with organic matter
A4-3	-44.955667	168.834969	0-0.1	A4-3 (0.1) 15063	Medium brown clayey SILT with gravels and organic matter
A4-4	-44.955321	168.835028	0-0.1	A4-4 (0.1) 15063	Medium brown clayey SILT with organic matter
A4-5	-44.955217	168.834884	0-0.1	A4-5 (0.1) 15063	Medium brown LOAM with fine gravels and organic matter
A4-6	-44.955335	168.834701	0-0.1	A4-6 (0.1) 15063	Medium brown clayey SILT with gravels and organic matter
A4-7	-44.954172	168.834888	0-0.1	A4-7 (0.1) 15063	Medium brown LOAM with fine gravels and organic matter
A4-8	-44.954224	168.834564	0-0.1	A4-8 (0.1) 15063	Medium brown clayey SILT with organic matter
A4-9	-44.954365	168.834468	0-0.1	A4-9 (0.1) 15063	Medium brown clayey SILT with organic matter
A4-10	-44.954744	168.834722	0-0.1	A4-10 (0.1) 15063	Medium brown clayey SILT with gravels and organic matter
A4-11	-44.954820	168.835265	0-0.1	A4-11 (0.1) 15063	Medium brown clayey SILT with organic matter
A4-12	-44.954591	168.835174	0-0.1	A4-12 (0.1) 15063	Medium brown clayey SILT with organic matter
A4-13	-44.954107	168.833959	0-0.1	A4-13 (0.1) 15063	Medium brown clayey SILT with gravels, cobbles and organic matter
A4-14	-44.953946	168.833738	0-0.1	A4-14 (0.1) 15063	Medium brown clayey SILT with gravels and organic matter
A4-15	-44.953924	168.833929	0-0.1	A4-15 (0.1) 15063	Medium brown clayey SILT with organic matter
A1-1	-44.954958	168.828345	0-0.15	A1-1 (0.15) 15063	Medium greish brown clayey SILT with pine litter
A1-2	-44.955106	168.828588	0-0.15	A1-2 (0.15) 15063	Medium greish brown clayey SILT with gravels and pine litter
A1-3	-44.955221	168.828875	0-0.15	A1-3 (0.15) 15063	Medium greish brown clayey SILT with gravels and pine litter
A1-4	-44.955259	168.829018	0-0.15	A1-4 (0.15) 15063	Medium greish brown clayey SILT with gravels and pine litter
A1-5	-44.955465	168.829288	0-0.15	A1-5 (0.15) 15063	Medium greish brown clayey SILT with gravels and pine litter
A1-6	-44.955578	168.829575	0-0.15	A1-6 (0.15) 15063	Medium greish brown clayey SILT with gravels and pine litter
A1-7	-44.955586	168.829760	0-0.15	A1-7 (0.15) 15063	Friabel medium greish brown clayey SILT with gravels and pine litter
A1-8	-44.955614	168.830152	0-0.15	A1-8 (0.15) 15063	Medium greish brown clayey SILT with gravels and pine litter
A1-9	-44.955653	168.830382	0-0.15	A1-9 (0.15) 15063	Medium greish brown clayey SILT with pine litter
A10-1	-44.955033	168.823013	0-0.1	A10-1 (0.1) 15063	Medium brown clayey SILT with organic matter
A10-2	-44.955333	168.823038	0-0.1	A10-2 (0.1) 15063	Medium brown clayey SILT with organic matter
A10-3	-44.955647	168.823123	0-0.1	A10-3 (0.1) 15063	Medium brown clayey SILT with organic matter
A10-4	-44.955664	168.823496	0-0.1	A10-4 (0.1) 15063	Medium brown clayey SILT with organic matter
A10-5	-44.955412	168.823418	0-0.1	A10-5 (0.1) 15063	Medium brown clayey SILT with organic matter
A10-6	-44.955122	168.823285	0-0.1	A10-6 (0.1) 15063	Medium brown clayey SILT with organic matter
A10-7	-44.956763	168.823309	0-0.1	A10-7 (0.1) 15063	Medium brown clayey SILT with organic matter
A10-8	-44.956427	168.823278	0-0.1	A10-8 (0.1) 15063	Medium brown clayey SILT with organic matter
A10-9	-44.956144	168.823275	0-0.1	A10-9 (0.1) 15063	Medium brown clayey SILT with organic matter

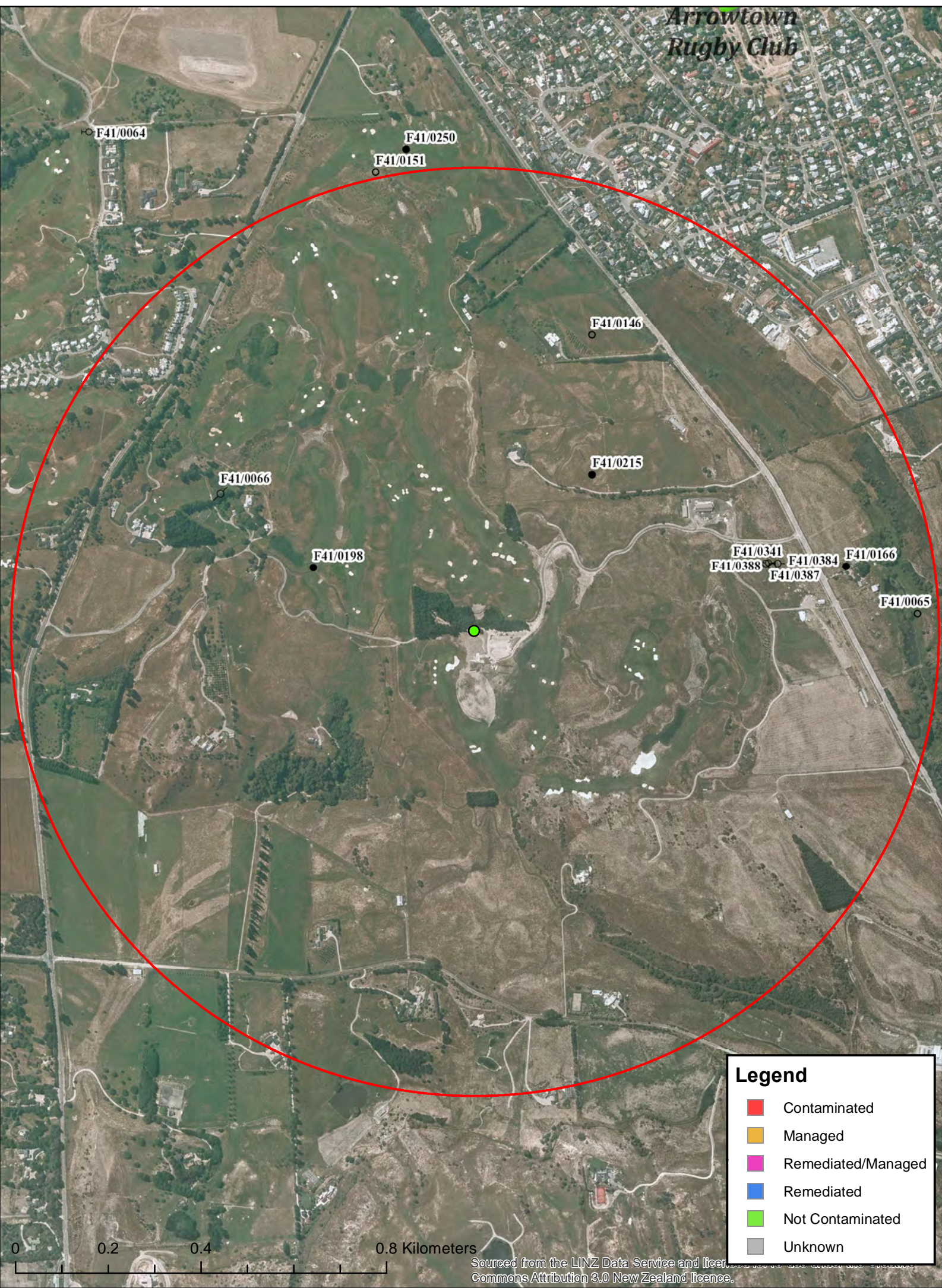


Sample Location	Coordinates		Sample Depth (m)	Sample ID	Soil Lithology
A10-10	-44.956121	168.823591	0-0.1	A10-10 (0.1) 15063	Medium brown clayey SILT with organic matter
A10-11	-44.956425	168.823663	0-0.1	A10-11 (0.1) 15063	Medium brown clayey SILT with organic matter
A10-12	-44.956729	168.823741	0-0.1	A10-12 (0.1) 15063	Medium brown clayey SILT with organic matter
A9-1	-44.954633	168.823664	0-0.1	A9-1 (0.1) 15063	Medium brown clayey SILT with organic matter
A9-2	-44.954564	168.823423	0-0.1	A9-2 (0.1) 15063	Medium brown clayey SILT with organic matter
A9-3	-44.954489	168.823343	0-0.1	A9-3 (0.1) 15063	Medium brown clayey SILT with organic matter
A9-4	-44.954154	168.823652	0-0.1	A9-4 (0.1) 15063	Medium brown clayey SILT with organic matter
A9-5	-44.954349	168.823505	0-0.1	A9-5 (0.1) 15063	Medium brown clayey SILT with organic matter
A9-6	-44.954126	168.823430	0-0.1	A9-6 (0.1) 15063	Medium brown clayey SILT with organic matter
HS10-1	-44.957237	168.826610	0-0.1	HS10-1 (0.1) 15063	Medium brown clayey SILT with organic matter
HS10-2	-44.957368	168.826526	0-0.1	HS10-2 (0.1) 15063	Medium brown clayey SILT with organic matter
HS10-3	-44.957455	168.826470	0-0.1	HS10-3 (0.1) 15063	Medium brown clayey SILT with organic matter
HS10-4	-44.957476	168.826727	0-0.1	HS10-4 (0.1) 15063	Medium brown clayey SILT with organic matter
HS10-5	-44.957371	168.826759	0-0.1	HS10-5 (0.1) 15063	Medium brown clayey SILT with organic matter
HS10-6	-44.957254	168.826893	0-0.1	HS10-6 (0.1) 15063	Medium brown clayey SILT with organic matter
HS5-1	-44.958729	168.829504	0-0.1	HS5-1 (0.1) 15063	Medium brown clayey SILT with organic matter
HS5-2	-44.958619	168.829401	0-0.1	HS5-2 (0.1) 15063	Medium brown clayey SILT with gravels and organic matter
HS5-3	-44.958713	168.829218	0-0.1	HS5-3 (0.1) 15063	Medium brown clayey SILT with organic matter
HS5-4	-44.958604	168.829136	0-0.1	HS5-4 (0.1) 15063	Medium brown clayey SILT with organic matter
HS5-5	-44.958445	168.829111	0-0.1	HS5-5 (0.1) 15063	Medium brown clayey SILT with organic matter
HS5-6	-44.958488	168.829321	0-0.1	HS5-6 (0.1) 15063	Medium brown clayey SILT with organic matter
HS9-1	-44.958347	168.828034	0-0.1	HS9-1 (0.1) 15063	Medium brown clayey SILT with organic matter
HS9-2	-44.958503	168.828061	0-0.1	HS9-2 (0.1) 15063	Medium brown clayey SILT with fine sand and organic matter
HS9-3	-44.958771	168.828020	0-0.1	HS9-3 (0.1) 15063	Medium brown clayey SILT with organic matter
HS9-4	-44.958834	168.828350	0-0.1	HS9-4 (0.1) 15063	Medium brown clayey SILT with organic matter
HS9-5	-44.958559	168.828370	0-0.1	HS9-5 (0.1) 15063	Medium brown clayey SILT with organic matter
HS9-6	-44.958317	168.828272	0-0.1	HS9-6 (0.1) 15063	Medium brown clayey SILT with organic matter
HS1-1	-44.960687	168.834866	0-0.1	HS1-1 (0.1) 15063	Medium brown clayey SILT with organic matter
HS1-2	-44.960735	168.834694	0-0.1	HS1-2 (0.1) 15063	Medium brown clayey SILT with organic matter
HS1-3	-44.960715	168.834485	0-0.1	HS1-3 (0.1) 15063	Medium brown clayey SILT with fine gravels and organic matter
HS1-4	-44.960548	168.834513	0-0.1	HS1-4 (0.1) 15063	Medium brown clayey SILT with organic matter
HS1-5	-44.960491	168.834695	0-0.1	HS1-5 (0.1) 15063	Medium brown clayey SILT with organic matter
HS1-6	-44.960471	168.834898	0-0.1	HS1-6 (0.1) 15063	Medium brown clayey SILT with organic matter
HS8-1	-44.959593	168.832855	0-0.1	HS8-1 (0.1) 15063	Medium brown clayey SILT with organic matter
HS8-2	-44.959633	168.833053	0-0.1	HS8-2 (0.1) 15063	Medium brown clayey SILT with organic matter
HS8-3	-44.959637	168.833244	0-0.1	HS8-3 (0.1) 15063	Medium brown clayey SILT with weathered schist rock and organic matter
HS8-4	-44.959459	168.833198	0-0.1	HS8-4 (0.1) 15063	Medium brown clayey SILT with weathered schist rock and organic matter
HS8-5	-44.959484	168.833022	0-0.1	HS8-5 (0.1) 15063	Medium brown clayey SILT with organic matter
HS8-6	-44.959533	168.832848	0-0.1	HS8-6 (0.1) 15063	Medium brown clayey SILT with weathered schist rock and organic matter
HS4-1	-44.960751	168.827166	0-0.1	HS4-1 (0.1) 15063	Medium greyish brown clayey sandy SILT with gravels, cobbles and organic matter

Sample Location	Coordinates		Sample Depth (m)	Sample ID	Soil Lithology
HS4-2	-44.960861	168.827169	0-0.1	HS4-2 (0.1) 15063	Medium greish brown clayey SILT with organic matter
HS4-3	-44.961099	168.827376	0-0.1	HS4-3 (0.1) 15063	Medium brownish grey claeys SILT with cobbles and organic matter
HS4-4	-44.960780	168.827446	0-0.1	HS4-4 (0.1) 15063	Medium brown silty clayey GRAVEL with organic matter
HS4-5	-44.960666	168.827293	0-0.1	HS4-5 (0.1) 15063	Medium brown clayey SILT with organic matter
HS4-6	-44.960639	168.827487	0-0.1	HS4-6 (0.1) 15063	Medium brown clayey SILT with organic matter
HS2-1	-44.961038	168.830664	0-0.1	HS2-1 (0.1) 15063	Medium brown clayey SILT with organic matter
HS2-2	-44.961203	168.830643	0-0.1	HS2-2 (0.1) 15063	Medium brown clayey SILT with organic matter
HS2-3	-44.961324	168.830596	0-0.1	HS2-3 (0.1) 15063	Medium brown clayey SILT with organic matter
HS2-4	-44.961304	168.830383	0-0.1	HS2-4 (0.1) 15063	Medium brown clayey SILT with organic matter
HS2-5	-44.961162	168.830403	0-0.1	HS2-5 (0.1) 15063	Medium brown clayey SILT with organic matter
HS2-6	-44.961003	168.830444	0-0.1	HS2-6 (0.1) 15063	Medium brown clayey SILT with organic matter
HS3-1	-44.960463	168.829568	0-0.1	HS3-1 (0.1) 15063	Medium brown clayey SILT with organic matter
HS3-2	-44.960371	168.829697	0-0.1	HS3-2 (0.1) 15063	Medium brown clayey SILT with gravels and organic matter
HS3-3	-44.960490	168.829759	0-0.1	HS3-3 (0.1) 15063	Medium brown clayey SILT with organic matter
HS3-4	-44.960253	168.829399	0-0.1	HS3-4 (0.1) 15063	Medium brown clayey SILT with gravels and organic matter
HS3-5	-44.960231	168.829573	0-0.1	HS3-5 (0.1) 15063	Medium brown clayey SILT with organic matter
HS3-6	-44.960094	168.829504	0-0.1	HS3-6 (0.1) 15063	Medium brown clayey SILT with organic matter

Appendix D  
Bore Search Information

# Land-use and Site Contamination Request - Arrowtown-Lake Hayes Road



*Arrowtown  
Rugby Club*

F41/0064

F41/0250

F41/0151

F41/0146

F41/0066

F41/0215

F41/0198

F41/0341

F41/0388  
F41/0387

F41/0384

F41/0166

F41/0065

## Legend

- Contaminated
- Managed
- Remediated/Managed
- Remediated
- Not Contaminated
- Unknown

0 0.2 0.4 0.8 Kilometers

Appendix E  
Soil Sample and Analysis Summary Table

Composite Analysis			
Area/House site	Sample ID	Sample Depth	Heavy Metals Composite
A3	A3-1	0-0.1	1
	A3-2	0-0.1	
	A3-3	0-0.1	
	A3-4	0-0.1	2
	A3-5	0-0.1	
	A3-6	0-0.1	
A2	A2-1	0-0.1	3
	A2-2	0-0.1	
	A2-3	0-0.1	
	A2-4	0-0.1	4
	A2-5	0-0.1	
	A2-6	0-0.1	
	A2-7	0-0.1	5
	A2-8	0-0.1	
	A2-9	0-0.1	
A8	A8-1	0-0.1	6
	A8-2	0-0.1	
	A8-3	0-0.1	
	A8-4	0-0.1	7
	A8-5	0-0.1	
	A8-6	0-0.1	
	A8-7	0-0.1	8
	A8-8	0-0.1	
	A8-9	0-0.1	
A7	A7-1	0-0.1	9
	A7-2	0-0.1	
	A7-3	0-0.1	
	A7-4	0-0.1	10
	A7-5	0-0.1	
	A7-6	0-0.1	
A6	A6-1	0-0.1	11
	A6-2	0-0.1	
	A6-3	0-0.1	
A5	A5-1	0-0.1	12
	A5-2	0-0.1	
	A5-3	0-0.1	
	A5-4	0-0.1	13
	A5-5	0-0.1	
	A5-6	0-0.1	
A4	A4-1	0-0.1	14
	A4-2	0-0.1	
	A4-3	0-0.1	
	A4-4	0-0.1	15
	A4-5	0-0.1	
	A4-6	0-0.1	
	A4-7	0-0.1	16
	A4-8	0-0.1	
	A4-9	0-0.1	

Area/House site	Sample ID	Sample Depth	Heavy Metals Composite
A4	A4-10	0-0.1	17
	A4-11	0-0.1	
	A4-12	0-0.1	
	A4-13	0-0.1	18
	A4-14	0-0.1	
	A4-15	0-0.1	
A1	A1-1	0.05-0.15	19
	A1-2	0.05-0.15	
	A1-3	0.05-0.15	
	A1-4	0.05-0.15	20
	A1-5	0.05-0.15	
	A1-6	0.05-0.15	
	A1-7	0.05-0.15	21
	A1-8	0.05-0.15	
	A1-9	0.05-0.15	
A10	A10-1	0-0.1	22
	A10-2	0-0.1	
	A10-3	0-0.1	
	A10-4	0-0.1	23
	A10-5	0-0.1	
	A10-6	0-0.1	
	A10-7	0-0.1	24
	A10-8	0-0.1	
	A10-9	0-0.1	
	A10-10	0-0.1	25
	A10-11	0-0.1	
	A10-12	0-0.1	
A9	A9-1	0-0.1	26
	A9-2	0-0.1	
	A9-3	0-0.1	
	A9-4	0-0.1	27
	A9-5	0-0.1	
	A9-6	0-0.1	
HS10	HS10-1	0-0.1	28
	HS10-2	0-0.1	
	HS10-3	0-0.1	
	HS10-4	0-0.1	29
	HS10-5	0-0.1	
	HS10-6	0-0.1	
HS5	HS5-1	0-0.1	30
	HS5-2	0-0.1	
	HS5-3	0-0.1	
	HS5-4	0-0.1	31
	HS5-5	0-0.1	
	HS5-6	0-0.1	
HS9	HS9-1	0-0.1	32
	HS9-2	0-0.1	
	HS9-3	0-0.1	
	HS9-4	0-0.1	33

Area/House site	Sample ID	Sample Depth	Heavy Metals Composite
HS9	HS9-5	0-0.1	33
	HS9-6	0-0.1	
HS1	HS1-1	0-0.1	34
	HS1-2	0-0.1	
	HS1-3	0-0.1	
	HS1-4	0-0.1	35
	HS1-5	0-0.1	
	HS1-6	0-0.1	
HS8	HS8-1	0-0.1	36
	HS8-2	0-0.1	
	HS8-3	0-0.1	
	HS8-4	0-0.1	37
	HS8-5	0-0.1	
	HS8-6	0-0.1	
HS2	HS2-1	0-0.1	38
	HS2-2	0-0.1	
	HS2-3	0-0.1	
	HS2-4	0-0.1	39
	HS2-5	0-0.1	
	HS2-6	0-0.1	
HS3	HS3-1	0-0.1	40
	HS3-2	0-0.1	
	HS3-3	0-0.1	
	HS3-4	0-0.1	41
	HS3-5	0-0.1	
	HS3-6	0-0.1	

Sample ID	Sample Depth	Individual Analysis
DUP1	0-0.1	Organochlorine Pesticides
DUP2	0-0.1	Organochlorine Pesticides
A3-2	0-0.1	Organochlorine Pesticides
A3-5	0-0.1	Organochlorine Pesticides
A2-2	0-0.1	Organochlorine Pesticides
A2-5	0-0.1	Organochlorine Pesticides
A2-8	0-0.1	Organochlorine Pesticides
A8-2	0-0.1	Organochlorine Pesticides
A8-5	0-0.1	Organochlorine Pesticides
A8-8	0-0.1	Organochlorine Pesticides
A7-2	0-0.1	Organochlorine Pesticides
A7-5	0-0.1	Multi-Residue pesticides
A6-2	0-0.1	Organochlorine Pesticides
A5-1	0-0.1	Organochlorine Pesticides
A5-5	0-0.1	Organochlorine Pesticides
A4-2	0-0.1	Organochlorine Pesticides
A4-5	0-0.1	Organochlorine Pesticides
A4-8	0-0.1	Organochlorine Pesticides
A4-11	0-0.1	Organochlorine Pesticides
A4-14	0-0.1	Organochlorine Pesticides
DUP3	0-0.1	Organochlorine Pesticides



Sample ID	Sample Depth	Individual Analysis
DUP4	0-0.1	Organochlorine Pesticides
DUP5	0-0.1	Organochlorine Pesticides
A1-3	0.05-0.15	Organochlorine Pesticides
A1-5	0.05-0.15	Organochlorine Pesticides
A1-8	0.05-0.15	Organochlorine Pesticides
A10-2	0-0.1	Organochlorine Pesticides
A10-5	0-0.1	Organochlorine Pesticides
A10-8	0-0.1	Organochlorine Pesticides
A10-11	0-0.1	Organochlorine Pesticides
A9-2	0-0.1	Organochlorine Pesticides
A9-5	0-0.1	Organochlorine Pesticides
HS10-2	0-0.1	Organochlorine Pesticides
HS10-5	0-0.1	Organochlorine Pesticides
HS5-2	0-0.1	Organochlorine Pesticides
HS5-5	0-0.1	Organochlorine Pesticides
HS9-3	0-0.1	Organochlorine Pesticides
HS9-5	0-0.1	Organochlorine Pesticides
HS1-2	0-0.1	Organochlorine Pesticides
HS1-5	0-0.1	Organochlorine Pesticides
HS8-1	0-0.1	Organochlorine Pesticides
HS8-5	0-0.1	Organochlorine Pesticides
DUP6	0-0.1	Organochlorine Pesticides
HS2-2	0-0.1	Organochlorine Pesticides
HS2-6	0-0.1	Organochlorine Pesticides
HS3-2	0-0.1	Organochlorine Pesticides
HS3-5	0-0.1	Organochlorine Pesticides
HS4-1	0-0.1	Heavy Metals and Organochlorine Pesticides
HS4-2	0-0.1	Heavy Metals and Organochlorine Pesticides
HS4-3	0-0.1	Heavy Metals and Organochlorine Pesticides
HS4-4	0-0.1	Heavy Metals and Organochlorine Pesticides
HS4-5	0-0.1	Heavy Metals and Organochlorine Pesticides
HS4-6	0-0.1	Heavy Metals and Organochlorine Pesticides

Appendix F

Laboratory analytical certificate and results, and chain of custody documentation.

Heavy Metals Composite9	A7-3	24/09/2015
	A7-4	
	A7-5	
Heavy Metals Composite10	A7-6	
	A6-1	
	A6-2	
Heavy Metals Composite11	A6-3	
	A5-1	
	A5-2	
Heavy Metals Composite12	A5-3	
	A5-4	
	A5-5	
Heavy Metals Composite13	A5-6	
	A4-1	
	A4-2	
Heavy Metals Composite14	A4-3	
	A4-4	
	A4-5	
Heavy Metals Composite15	A4-6	
	A4-7	
	A4-8	
Heavy Metals Composite16	A4-9	
	A4-10	
	A4-11	
Heavy Metals Composite17	A4-12	
	A4-13	
	A4-14	
Heavy Metals Composite18	A4-15	



Chain of Custody

Sheet 1 of

Laboratory use

Date Collected: 24/9/15

Sampling Conditions (brief description of weather conditions/flow rates etc)  
 Windy, Fine

Your Address: Davis Consulting Group Ltd.  
 Arrow Lane  
 Arrowtown 9302

Samples Filtered and/or Preserved?

Priority: HIGH  
 CoC to be emailed back: Yes

Phone Number: 03 409 8664

Email Address: Fiona@davisconsultinggroup.co.nz

Project No/Property Name: The Hills 15063

Who Sampled: Fiona + Rebecca

Samples Released By (Signature): JGR

Samples Received By (Signature): AM

Date and Time Released: 24/9/15 1630

Date and Time Received: 25/9/15

Sample ID	Date	Time	Matrix	Analytes			
				1			
A3-1 (0.1)	24/9/15	930	Soil				
A3-2 (0.1)	↓	935	Soil				
A3-3 (0.1)		940	Soil				
A3-4 (0.1)		946	Soil				
A3-5 (0.1)		950	Soil		HOLD		
A3-6 (0.1)		955	Soil		COLD		
A2-1 (0.1)			1000	Soil			
A2-2 (0.1)		1005	Soil				
A2-3 (0.1)		1000	Soil				
A2-4 (0.1)		1015	Soil				
A2-5 (0.1)		1020	Soil				
A2-6 (0.1)	↓	1025	Soil				

Temperature On Arrival

13.2 °C

Temperature was measured on arbitrarily chosen samples in this batch. The Microbiology sample temperature will be recorded at Melville Lab before testing.

Note:

Job No: 148 0301  
 Date Recv: 25-Sep-15 05:30  
 Received by: Jennifer Singlewood  
 3114803018



**Chain of Custody**

Laboratory use

Date Collected:	Sampling Conditions (brief description of weather conditions/flow rates etc)
-----------------	--

Your Address: Davis Consulting Group Ltd. Arrow Lane Arrowtown 9302	Samples Filtered and/or Preserved?	Priority:
		CoC to be emailed back:

Phone Number: 03 409 8664	Email Address: @davisconsultinggroup.co.nz
---------------------------	--

Project No/Property Name:	Who Sampled:
---------------------------	--------------

Samples Released By (Signature): Date and Time Released:	Samples Received By (Signature): Date and Time Received:
---	---

Sample ID	Date	Time	Matrix	Analytes							
						1					
AZ-7 (0.1)	24/1/15	1030	Soil								
AZ-8 (0.1)		1035	Soil								
AZ-9 (0.1)		1040	Soil								
DUP#1		951	Soil								
A8-1 (0.1)		1045	Soil								
A8-2 (0.1)		1050	Soil								
A8-3 (0.1)		1055	Soil								
A8-4 (0.1)		1100	Soil								
A8-5 (0.1)		1105	Soil								
A8-6 (0.1)		1110	Soil								
A8-7 (0.1)		1115	Soil								
A8-8 (0.1)		1120	Soil								

Note:



**Chain of Custody**

**Laboratory use**

Date Collected:	Sampling Conditions <i>(brief description of weather conditions/flow rates etc)</i>
-----------------	---

Your Address: Davis Consulting Group Ltd. Arrow Lane Arrowtown 9302	Samples Filtered and/or Preserved?	Priority:
		CoC to be emailed back:

Phone Number: 03 409 8664	Email Address: @davisconsultinggroup.co.nz
---------------------------	--

Project No/Property Name:	Who Sampled:
---------------------------	--------------

Samples Released By (Signature): Date and Time Released:	Samples Received By (Signature): Date and Time Received:
---	---

Sample ID	Date	Time	Matrix	Analytes							
A8-9 (0.1)	24/9/15	1125	Soil								
A7-1 (0.1)	↓	1130	Soil	}	HOLD	COLD					
A7-2 (0.1)		1135	Soil								
A7-3 (0.1)		1140	Soil								
A7-4 (0.1)		1145	Soil								
A7-5 (0.1)		1150	Soil								
A7-6 (0.1)		1155	Soil								
A6-1 (0.1)		1200	Soil								
A6-2 (0.1)		1205	Soil								
A6-3 (0.1)		1210	Soil								
A5-1 (0.1)		1215	Soil								
A5-2 (0.1)	1220	Soil									

Note:



**Chain of Custody**

**Laboratory use**

Date Collected:	Sampling Conditions <i>(brief description of weather conditions/flow rates etc)</i>
-----------------	---

Your Address: Davis Consulting Group Ltd. Arrow Lane Arrowtown 9302	Samples Filtered and/or Preserved?	Priority:
		CoC to be emailed back:

Phone Number: 03 409 8664	Email Address: @davisconsultinggroup.co.nz
---------------------------	--

Project No/Property Name:	Who Sampled:
---------------------------	--------------

Samples Released By (Signature): Date and Time Released:	Samples Received By (Signature): Date and Time Received:
---	---

Sample ID	Date	Time	Matrix	Analytes									
AS-3 (0.1)	24/9/15	1225	Soil										
AS-4 (0.1)		1230	Soil										
AS-5 (0.1)		1235	Soil										
AS-6 (0.1)		1240	Soil										
A4-1 (0.1)		1245	Soil										
A4-2 (0.1)		1250	Soil										
A4-3 (0.1)		1255	Soil										
A4-4 (0.1)		1300	Soil										
A4-5 (0.1)	1305	Soil											
A4-6 (0.1)	1310	Soil											
A4-7 (0.1)	1315	Soil											
A4-8 (0.1)	1320	Soil											

} HOLD  
{ COLD

Note:



**Chain of Custody**

Laboratory use

Date Collected:	Sampling Conditions (brief description of weather conditions/flow rates etc)
-----------------	--

Your Address: Davis Consulting Group Ltd. Arrow Lane Arrowtown 9302	Samples Filtered and/or Preserved?	Priority:
	CoC to be emailed back:	

Phone Number: 03 409 8664	Email Address: @davisconsultinggroup.co.nz
---------------------------	--

Project No/Property Name:	Who Sampled:
---------------------------	--------------

Samples Released By (Signature): Date and Time Released:	Samples Received By (Signature): Date and Time Received:
---	---

Sample ID	Date	Time	Matrix	Analytes							
A4-9 (0.1)	24/9/15	1325	Soil								
A4-10 (0.1)	↓	1330	Soil	}	HOLD	COLD					
A4-11 (0.1)		1335	Soil								
A4-12 (0.1)		1340	Soil								
A4-13 (0.1)		1345	Soil								
A4-14 (0.1)		1350	Soil								
A4-15 (0.1)		1355	Soil								
			Soil								
			Soil								
			Soil								
			Soil								
			Soil								

Note:



COMPOSITE SAMPLES		
Analysis	ID	Date
Heavy Metals Composite1	A3-1	24/09/2015
	A3-2	
	A3-3	
Heavy Metals Composite2	A3-4	
	A3-5	
	A3-6	
Heavy Metals Composite3	A2-1	
	A2-2	
	A2-3	
Heavy Metals Composite4	A2-4	
	A2-5	
	A2-6	
Heavy Metals Composite5	A2-7	
	A2-8	
	A2-9	
Heavy Metals Composite6	A8-1	
	A8-2	
	A8-3	
Heavy Metals Composite7	A8-4	
	A8-5	
	A8-6	
Heavy Metals Composite8	A8-7	
	A8-8	
	A8-9	
Heavy Metals Composite9	A7-1	
	A7-2	
	A7-3	
Heavy Metals Composite10	A7-4	
	A7-5	
	A7-6	
Heavy Metals Composite11	A6-1	
	A6-2	
	A6-3	
Heavy Metals Composite12	A5-1	
	A5-2	
	A5-3	
Heavy Metals Composite13	A5-4	
	A5-5	
	A5-6	
Heavy Metals Composite14	A4-1	
	A4-2	
	A4-3	
Heavy Metals Composite15	A4-4	
	A4-5	
	A4-6	
	A4-7	

Heavy Metals Composite16	A4-8	25/09/2015
	A4-9	
Heavy Metals Composite17	A4-10	
	A4-11	
	A4-12	
Heavy Metals Composite18	A4-13	
	A4-14	
	A4-15	
Heavy Metals Composite19	A1-1	
	A1-2	
	A1-3	
Heavy Metals Composite20	A1-4	
	A1-5	
	A1-6	
Heavy Metals Composite21	A1-7	
	A1-8	
	A1-9	
Heavy Metals Composite22	A10-1	
	A10-2	
	A10-3	
Heavy Metals Composite23	A10-4	
	A10-5	
	A10-6	
Heavy Metals Composite24	A10-7	
	A10-8	
	A10-9	
Heavy Metals Composite25	A10-10	
	A10-11	
	A10-12	
Heavy Metals Composite26	A9-1	
	A9-2	
	A9-3	
Heavy Metals Composite27	A9-4	
	A9-5	
	A9-6	
Heavy Metals Composite28	HS10-1	
	HS10-2	
	HS10-3	
Heavy Metals Composite29	HS10-4	
	HS10-5	
	HS10-6	
Heavy Metals Composite30	HS5-1	
	HS5-2	
	HS5-3	
Heavy Metals Composite31	HS5-4	
	HS5-5	
	HS5-6	
Heavy Metals	HS9-1	
	HS9-2	

Composite32	HS9-3	28/09/2015
Heavy Metals Composite33	HS9-4	
	HS9-5	
	HS9-6	
	HS1-1	
Heavy Metals Composite34	HS1-2	
	HS1-3	
	HS1-4	
Heavy Metals Composite35	HS1-5	
	HS1-6	
	HS8-1	
Heavy Metals Composite36	HS8-2	
	HS8-3	
	HS8-4	
Heavy Metals Composite37	HS8-5	
	HS8-6	
	HS2-1	
Heavy Metals Composite38	HS2-2	
	HS2-3	
	HS2-4	
Heavy Metals Composite39	HS2-5	
	HS2-6	
	HS3-1	
Heavy Metals Composite40	HS3-2	
	HS3-3	
	HS3-4	
Heavy Metals Composite41	HS3-5	
	HS3-6	

INDIVIDUAL SAMPLES		
Analysis	ID	Date
OCP	DUP1	24/09/2015
OCP	DUP2	
OCP	A3-2	
OCP	A3-5	
OCP	A2-2	
OCP	A2-5	
OCP	A2-8	
OCP	A8-2	
OCP	A8-5	
OCP	A8-8	
OCP	A7-2	
multi residue pesticides	A7-5	
OCP	A6-2	
OCP	A5-1	
OCP	A5-5	
OCP	A4-2	

OCP	A4-5	25/09/2015	
OCP	A4-8		
OCP	A4-11		
OCP	A4-14		
OCP	DUP3		
OCP	DUP4		
OCP	DUP5		
OCP	A1-3		
OCP	A1-5		
OCP	A1-8		
OCP	A10-2		
OCP	A10-5		
OCP	A10-8		
OCP	A10-11		
OCP	A9-2		
OCP	A9-5		
OCP	HS10-2		
OCP	HS10-5		
OCP	HS5-2		
OCP	HS5-5		
OCP	HS9-3		
OCP	HS9-5		
OCP	HS1-2		
OCP	HS1-5		
OCP	HS8-1		
OCP	HS8-5		
OCP	DUP6		28/09/2015
OCP	HS2-2		
OCP	HS2-6		
OCP	HS3-2		
OCP	HS3-5		
Heavy Metals and OCP	HS4-1		
Heavy Metals and OCP	HS4-2		
Heavy Metals and OCP	HS4-3		
Heavy Metals and OCP	HS4-4		
Heavy Metals and OCP	HS4-5		
Heavy Metals and OCP	HS4-6		

# 148 0301

Received by: Jennifer Singlewood



Davis Consulting Group Limited  
 Arrow Lane  
 Arrowtown  
 Phone: 03 409 8664  
 email: glenn.davis@davisconsultinggroup.co.nz

Sheet | of

Laboratory use

**Chain of Custody**

Date Collected: 25/9/15 + 26/9/15  
 Sampling Conditions (brief description of weather conditions/flow rates etc) fine  
 Your Address: Davis Consulting Group Ltd.  
 Arrow Lane  
 Arrowtown 9302  
 Priority: HIGH  
 CoC to be emailed back: Yes  
 Email Address: Fiona@davisconsultinggroup.co.nz  
 Who Sampled: Fiona

Phone Number: 03 409 8664  
 Project No/Property Name: 15063 The Hills  
 Samples Received By (Signature): [Signature]  
 Date and Time Released: 26/9/15 1630  
 Date and Time Received:

Sample ID	Date	Time	Matrix	Analytes
A1-1 (0.15)	25/9/15	950	Soil	
A1-2 (0.15)		955	Soil	
A1-3 (0.15)		1000	Soil	
A1-4 (0.15)		1005	Soil	Hold
A1-5 (0.15)		1010	Soil	Hold
A1-6 (0.15)		1015	Soil	
A1-7 (0.15)		1020	Soil	
A1-8 (0.15)		1025	Soil	
A1-9 (0.15)		1030	Soil	
A10-1 (0.1)		1035	Soil	
A10-2 (0.1)		1040	Soil	
A10-3 (0.1)		1045	Soil	

Temperature On Arrival  
 15.0 °C  
 Temperature was measured on arbitrarily chosen samples in this batch. The Microbiology sample temperature will be recorded at Melville Lab before testing.

Note:



Davis Consulting Group Limited  
 Arrow Lane  
 Arrowtown  
 Phone: 03 409 8664  
 email: glenn.davis@davisconsultinggroup.co.nz

**Chain of Custody**

Date Collected: \_\_\_\_\_  
 Sampling Conditions (brief description of weather conditions/flow rates etc) \_\_\_\_\_

Your Address: Davis Consulting Group Ltd.  
 Arrow Lane  
 Arrowtown 9302

Samples Filtered and/or Preserved? \_\_\_\_\_ Priority: \_\_\_\_\_  
 CoC to be emailed back: \_\_\_\_\_

Phone Number: 03 409 8664 Email Address: @davisconsultinggroup.co.nz  
 Project No/Property Name: \_\_\_\_\_ Who Sampled: \_\_\_\_\_

Samples Released By (Signature): \_\_\_\_\_  
 Date and Time Released: \_\_\_\_\_

Samples Received By (Signature): \_\_\_\_\_  
 Date and Time Received: \_\_\_\_\_

Sample ID	Date	Time	Matrix	Analytes
DUP 2	25/9/15	1001	Soil	
A10-4 (0.1)	↓	1050	Soil	
A10-5 (0.1)		1055	Soil	
A10-6 (0.1)		1100	Soil	
A10-7 (0.1)		1105	Soil	HCAD
A10-8 (0.1)		1110	Soil	COAD
A10-9 (0.1)		1115	Soil	
A10-10 (0.1)		1120	Soil	
A10-11 (0.1)		1125	Soil	
A10-12 (0.1)		1130	Soil	
A9-1 (0.1)		1135	Soil	
A9-2 (0.1)		1140	Soil	

Note: \_\_\_\_\_



Davis Consulting Group Limited  
 Arrow Lane  
 Arrowtown  
 Phone: 03 409 8664  
 email: glenn.davis@davisconsultinggroup.co.nz

Laboratory use

Chain of Custody

Date Collected: \_\_\_\_\_  
 Your Address: Davis Consulting Group Ltd.  
 Arrow Lane  
 Arrowtown 9302  
 Phone Number: 03 409 8664  
 Project No/Property Name: \_\_\_\_\_  
 Samples Released By (Signature): \_\_\_\_\_  
 Date and Time Released: \_\_\_\_\_

Weather Conditions \_\_\_\_\_  
 Samples Filtered and/or Preserved? \_\_\_\_\_  
 Priority: \_\_\_\_\_  
 CoC to be emailed back: \_\_\_\_\_  
 Email Address: @davisconsultinggroup.co.nz  
 Who Sampled: \_\_\_\_\_  
 Samples Received By (Signature): \_\_\_\_\_  
 Date and Time Received: \_\_\_\_\_

Sample ID	Date	Time	Matrix	Analytes	
				Hold Cold	
A9-3 (0.1)	18/9/18	1145	Soil	/	
A9-4 (0.1)		1150	Soil	/	
A9-5 (0.1)		1155	Soil	/	
A9-6 (0.1)		1200	Soil	/	
HS10-1 (0.1)		1205	Soil	/	
HS10-2 (0.1)		1210	Soil	/	
HS10-3 (0.1)		1215	Soil	/	
HS10-4 (0.1)		1220	Soil	/	
HS10-5 (0.1)		1225	Soil	/	
HS10-6 (0.1)		1230	Soil	/	
HS-1 (0.1)		1235	Soil	/	
HS-2 (0.1)		1240	Soil	/	
HS-3 (0.1)		1245	Soil	/	
HS-4 (0.1)		1250	Soil	/	
HS-5 (0.1)		1255	Soil	/	

Note:



Davis Consulting Group Limited  
 Arrow Lane  
 Arrowtown  
 Phone: 03 409 8664  
 email: glenn.davis@davisconsultinggroup.co.nz

Sheet 1 of  
 Laboratory use

**Chain of Custody**

Date Collected: \_\_\_\_\_

Your Address: Davis Consulting Group Ltd.  
 Arrow Lane  
 Arrowtown 9302

Weather Conditions \_\_\_\_\_

Samples Filtered and/or Preserved? \_\_\_\_\_ Priority: \_\_\_\_\_

CoC to be emailed back: \_\_\_\_\_

Phone Number: 03 409 8664

Email Address: @davisconsultinggroup.co.nz

Project No/Property Name: \_\_\_\_\_

Who Sampled: \_\_\_\_\_

Samples Released By (Signature): \_\_\_\_\_

Date and Time Released: \_\_\_\_\_

Samples Received By (Signature): \_\_\_\_\_

Date and Time Received: \_\_\_\_\_

Sample ID	Date	Time	Matrix	Analytes	
				Hold Cold	
HS9-6 (0.1)	25/9/16	1350	Soil	/	
HS9-1 (0.1)		1305	Soil	/	
HS9-2 (0.1)		1310	Soil	/	
HS9-3 (0.1)		1315	Soil	/	
HS9-4 (0.1)		1320	Soil	/	
HS9-5 (0.1)		1325	Soil	/	
HS9-6 (0.1)		1330	Soil	/	
DUPA		1316	Soil	/	
HS1-1 (0.1)		1335	Soil	/	
HS1-2 (0.1)		1340	Soil	/	
HS1-3 (0.1)		1345	Soil	/	
HS1-4 (0.1)		1350	Soil	/	
HS1-5 (0.1)		1355	Soil	/	
HS1-6 (0.1)		1400	Soil	/	
HS8-1 (0.1)		1405	Soil	/	

Note:





Davis Consulting Group Limited  
 Arrow Lane  
 Arrowtown  
 Phone: 03 409 8664  
 email: glenn.davis@davisconsultinggroup.co.nz

Sheet  $\phi$  of

Laboratory use

**Chain of Custody**

Date Collected: \_\_\_\_\_

Your Address: Davis Consulting Group Ltd.  
 Arrow Lane  
 Arrowtown 9302

Phone Number: 03 409 8664

Project No./Property Name: \_\_\_\_\_

Samples Released By (Signature): \_\_\_\_\_  
 Date and Time Released: \_\_\_\_\_

Weather Conditions \_\_\_\_\_

Samples Filtered and/or Preserved? \_\_\_\_\_

Priority: \_\_\_\_\_

CoC to be emailed back: @davisconsultinggroup.co.nz

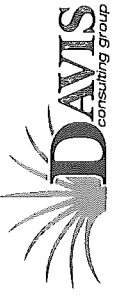
Email Address: \_\_\_\_\_

Who Sampled: \_\_\_\_\_

Samples Received By (Signature): \_\_\_\_\_  
 Date and Time Received: \_\_\_\_\_

Sample ID	Date	Time	Matrix	Analytes	
				Hold Cold	
H58-2 (0.1)	25/9/15	1410	Soil	✓	
DUPS		1406	Soil	✓	
H58-3 (0.1)		1415	Soil	✓	
H58-4 (0.1)		1410	Soil	✓	
H58-5 (0.1)		1415	Soil	✓	
H58-6 (0.1)		1430	Soil	✓	
H54-1	28/9/14	1255	Soil	✓	
H54-2		1300	Soil	✓	
H54-3		1205	Soil	✓	
H54-3		1310	Soil	✓	
H54-4		1315	Soil	✓	
H54-5		1320	Soil	✓	
H54-6		1325	Soil	✓	
H52-1		1330	Soil	✓	
H52-2		1335	Soil	✓	

Note:



Davis Consulting Group Limited  
 Arrow Lane  
 Arrowtown  
 Phone: 03 409 8664  
 email: glenn.davis@davisconsultinggroup.co.nz

Laboratory use

Chain of Custody

Date Collected: \_\_\_\_\_  
 Your Address: Davis Consulting Group Ltd.  
 Arrow Lane  
 Arrowtown 9302  
 Phone Number: 03 409 8664  
 Project No./Property Name: \_\_\_\_\_  
 Email Address: \_\_\_\_\_  
 Who Sampled: \_\_\_\_\_  
 Priority: \_\_\_\_\_  
 CoC to be emailed back: @davisconsultinggroup.co.nz

Samples Released By (Signature): \_\_\_\_\_  
 Date and Time Released: \_\_\_\_\_  
 Samples Received By (Signature): \_\_\_\_\_  
 Date and Time Received: \_\_\_\_\_

Sample ID	Date	Time	Matrix	Analytes	
				Hold Cold	
HS2-3 (0.1)	12/9/15	1335	Soil	✓	
HS2-4 (0.1)		1340	Soil	✓	
HS2-5 (0.1)		1345	Soil	✓	
HS2-6 (0.1)		1350	Soil	✓	
HS3-1 (0.1)		1355	Soil	✓	
HS3-2 (0.1)		1400	Soil	✓	
HS3-3 (0.1)		1405	Soil	✓	
HS3-4 (0.1)		1410	Soil	✓	
HS3-5 (0.1)		1415	Soil	✓	
HS3-6 (0.1)		1420	Soil	✓	
DUP6		1351	Soil	✓	
			Soil		
			Soil		
			Soil		
			Soil		

Note: \_\_\_\_\_



## Job Information Summary

<b>Client:</b>	Davis Consulting Group Limited	<b>Lab No:</b>	1480301
<b>Contact:</b>	Fiona Rowley C/- Davis Consulting Group Limited PO Box 2450 Wakatipu QUEENSTOWN 9349	<b>Date Registered:</b>	25-Sep-2015 9:50 am
		<b>Priority:</b>	High
		<b>Quote No:</b>	
		<b>Order No:</b>	
		<b>Client Reference:</b>	The Hills 15063
		<b>Add. Client Ref:</b>	
		<b>Submitted By:</b>	Fiona Rowley
		<b>Charge To:</b>	Davis Consulting Group Limited
		<b>Target Date:</b>	06-Oct-2015 4:30 pm

### Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	A3.1 (0.1) 24-Sep-2015 9:30 am	Soil	GSoil300	Composite Environmental Solid Samples
2	A3.2 (0.1) 24-Sep-2015 9:35 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
3	A3.3 (0.1) 24-Sep-2015 9:40 am	Soil	GSoil300	Composite Environmental Solid Samples
4	A3.4 (0.1) 24-Sep-2015 9:45 am	Soil	GSoil300	Composite Environmental Solid Samples
5	A3.5 (0.1) 24-Sep-2015 9:50 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
6	A3.6 (0.1) 24-Sep-2015 9:55 am	Soil	GSoil300	Composite Environmental Solid Samples
7	A2.1 (0.1) 24-Sep-2015 10:00 am	Soil	GSoil300	Composite Environmental Solid Samples
8	A2.2 (0.1) 24-Sep-2015 10:05 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
9	A2.3 (0.1) 24-Sep-2015 10:10 am	Soil	GSoil300	Composite Environmental Solid Samples
10	A2.4 (0.1) 24-Sep-2015 10:15 am	Soil	GSoil300	Composite Environmental Solid Samples
11	A2.5 (0.1) 24-Sep-2015 10:20 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
12	A2.6 (0.1) 24-Sep-2015 10:25 am	Soil	GSoil300	Composite Environmental Solid Samples
13	A2.7 (0.1) 24-Sep-2015 10:30 am	Soil	GSoil300	Composite Environmental Solid Samples
14	A2.8 (0.1) 24-Sep-2015 10:35 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
15	A2.9 (0.1) 24-Sep-2015 10:40 am	Soil	GSoil300	Composite Environmental Solid Samples
16	Dup#1 24-Sep-2015 9:51 am	Soil	GSoil300	Organochlorine Pesticides Screening in Soil
17	A8.1 (0.1) 24-Sep-2015 10:45 am	Soil	GSoil300	Composite Environmental Solid Samples
18	A8.2 (0.1) 24-Sep-2015 10:50 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
19	A8.3 (0.1) 24-Sep-2015 10:55 am	Soil	GSoil300	Composite Environmental Solid Samples
20	A8.4 (0.1) 24-Sep-2015 11:00 am	Soil	GSoil300	Composite Environmental Solid Samples
21	A8.5 (0.1) 24-Sep-2015 11:05 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
22	A8.6 (0.1) 24-Sep-2015 11:10 am	Soil	GSoil300	Composite Environmental Solid Samples
23	A8.7 (0.1) 24-Sep-2015 11:15 am	Soil	GSoil300	Composite Environmental Solid Samples
24	A8.8 (0.1) 24-Sep-2015 11:20 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
25	A8.9 (0.1) 24-Sep-2015 11:25 am	Soil	GSoil300	Composite Environmental Solid Samples
26	A7.1 (0.1) 24-Sep-2015 11:30 am	Soil	GSoil300	Composite Environmental Solid Samples
27	A7.2 (0.1) 24-Sep-2015 11:35 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
28	A7.3 (0.1) 24-Sep-2015 11:40 am	Soil	GSoil300	Composite Environmental Solid Samples
29	A7.4 (0.1) 24-Sep-2015 11:45 am	Soil	GSoil300	Composite Environmental Solid Samples
30	A7.5 (0.1) 24-Sep-2015 11:50 am	Soil	GSoil300	Composite Environmental Solid Samples; Multiresidue Pesticides in Soil samples by GCMS

## Samples

No	Sample Name	Sample Type	Containers	Tests Requested
31	A7.6 (0.1) 24-Sep-2015 11:55 am	Soil	GSoil300	Composite Environmental Solid Samples
32	A6.1 (0.1) 24-Sep-2015 12:00 pm	Soil	GSoil300	Composite Environmental Solid Samples
33	A6.2 (0.1) 24-Sep-2015 12:05 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
34	A6.3 (0.1) 24-Sep-2015 12:10 pm	Soil	GSoil300	Composite Environmental Solid Samples
35	A5.1 (0.1) 24-Sep-2015 12:15 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
36	A5.2 (0.1) 24-Sep-2015 12:20 pm	Soil	GSoil300	Composite Environmental Solid Samples
37	A5.3 (0.1) 24-Sep-2015 12:25 pm	Soil	GSoil300	Composite Environmental Solid Samples
38	A5.4 (0.1) 24-Sep-2015 12:30 pm	Soil	GSoil300	Composite Environmental Solid Samples
39	A5.5 (0.1) 24-Sep-2015 12:35 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
40	A5.6 (0.1) 24-Sep-2015 12:40 pm	Soil	GSoil300	Composite Environmental Solid Samples
41	A4.1 (0.1) 24-Sep-2015 12:45 pm	Soil	GSoil300	Composite Environmental Solid Samples
42	A4.2 (0.1) 24-Sep-2015 12:50 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
43	A4.3 (0.1) 24-Sep-2015 12:55 pm	Soil	GSoil300	Composite Environmental Solid Samples
44	A4.4 (0.1) 24-Sep-2015 1:00 pm	Soil	GSoil300	Composite Environmental Solid Samples
45	A4.5 (0.1) 24-Sep-2015 1:05 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
46	A4.6 (0.1) 24-Sep-2015 1:10 pm	Soil	GSoil300	Composite Environmental Solid Samples
47	A4.7 (0.1) 24-Sep-2015 1:15 pm	Soil	GSoil300	Composite Environmental Solid Samples
48	A4.8 (0.1) 24-Sep-2015 1:20 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
49	A4.9 (0.1) 24-Sep-2015 1:25 pm	Soil	GSoil300	Composite Environmental Solid Samples
50	A4.10 (0.1) 24-Sep-2015 1:30 pm	Soil	GSoil300	Composite Environmental Solid Samples
51	A4.11 (0.1) 24-Sep-2015 1:35 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
52	A4.12 (0.1) 24-Sep-2015 1:40 pm	Soil	GSoil300	Composite Environmental Solid Samples
53	A4.13 (0.1) 24-Sep-2015 1:45 pm	Soil	GSoil300	Composite Environmental Solid Samples
54	A4.14 (0.1) 24-Sep-2015 1:50 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
55	A4.15 (0.1) 24-Sep-2015 1:55 pm	Soil	GSoil300	Composite Environmental Solid Samples
56	Dup#2 24-Sep-2015 12:16 pm	Soil	GSoil300	Organochlorine Pesticides Screening in Soil
57	Composite of A3.1 (0.1), A3.2 (0.1) & A3.3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
58	Composite of A3.4 (0.1), A3.5 (0.1) & A3.6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
59	Composite of A2.1 (0.1), A2.2 (0.1) & A2.3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
60	Composite of A2.4 (0.1), A2.5 (0.1) & A2.6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
61	Composite of A2.7 (0.1), A2.8 (0.1) & A2.9 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
62	Composite of A8.1 (0.1), A8.2 (0.1) & A8.3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
63	Composite of A8.4 (0.1), A8.5 (0.1) & A8.6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
64	Composite of A8.7 (0.1), A8.8 (0.1) & A8.9 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
65	Composite of A7.1 (0.1), A7.2 (0.1) & A7.3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
66	Composite of A7.4 (0.1), A7.5 (0.1) & A7.6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
67	Composite of A6.1 (0.1), A6.2 (0.1) & A6.3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
68	Composite of A5.1 (0.1), A5.2 (0.1) & A5.3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
69	Composite of A5.4 (0.1), A5.5 (0.1) & A5.6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn

## Samples

No	Sample Name	Sample Type	Containers	Tests Requested
70	Composite of A4.1 (0.1), A4.2 (0.1) & A4.3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
71	Composite of A4.4 (0.1), A4.5 (0.1) & A4.6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
72	Composite of A4.7 (0.1), A4.8 (0.1) & A4.9 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
73	Composite of A4.10 (0.1), A4.11 (0.1) & A4.12 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
74	Composite of A4.13 (0.1), A4.14 (0.1) & A4.15 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
75	A1-1 (0.15) 25-Sep-2015 9:50 am	Soil	GSoil300	Composite Environmental Solid Samples
76	A1-2 (0.15) 25-Sep-2015 9:55 am	Soil	GSoil300	Composite Environmental Solid Samples
77	A1-3 (0.15) 25-Sep-2015 10:00 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
78	A1-4 (0.15) 25-Sep-2015 10:05 am	Soil	GSoil300	Composite Environmental Solid Samples
79	A1-5 (0.15) 25-Sep-2015 10:10 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
80	A1-6 (0.15) 25-Sep-2015 10:15 am	Soil	GSoil300	Composite Environmental Solid Samples
81	A1-7 (0.1) 25-Sep-2015 10:20 am	Soil	GSoil300	Composite Environmental Solid Samples
82	A1-8 (0.15) 25-Sep-2015 10:25 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
83	A1-9 (0.15) 25-Sep-2015 10:30 am	Soil	GSoil300	Composite Environmental Solid Samples
84	A10-1 (0.1) 25-Sep-2015 10:35 am	Soil	GSoil300	Composite Environmental Solid Samples
85	A10-2 (0.1) 25-Sep-2015 10:40 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
86	A10-3 (0.1) 25-Sep-2015 10:45 am	Soil	GSoil300	Composite Environmental Solid Samples
87	DUP3 25-Sep-2015 10:01 am	Soil	GSoil300	Organochlorine Pesticides Screening in Soil
88	A10-4 (0.1) 25-Sep-2015 10:50 am	Soil	GSoil300	Composite Environmental Solid Samples
89	A10-5 (0.1) 25-Sep-2015 10:55 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
90	A10-6 (0.1) 25-Sep-2015 11:00 am	Soil	GSoil300	Composite Environmental Solid Samples
91	A10-7 (0.1) 25-Sep-2015 11:05 am	Soil	GSoil300	Composite Environmental Solid Samples
92	A10-8 (0.1) 25-Sep-2015 11:10 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
93	A10-9 (0.1) 25-Sep-2015 11:15 am	Soil	GSoil300	Composite Environmental Solid Samples
94	A10-10 (0.1) 25-Sep-2015 11:20 am	Soil	GSoil300	Composite Environmental Solid Samples
95	A10-11 (0.1) 25-Sep-2015 11:25 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
96	A10-12 (0.1) 25-Sep-2015 11:30 am	Soil	GSoil300	Composite Environmental Solid Samples
97	A9-1 (0.1) 25-Sep-2015 11:35 am	Soil	GSoil300	Composite Environmental Solid Samples
98	A9-2 (0.1) 25-Sep-2015 11:40 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
99	A9-3 (0.1) 25-Sep-2015 11:45 am	Soil	GSoil300	Composite Environmental Solid Samples
100	A9-4 (0.1) 25-Sep-2015 11:50 am	Soil	GSoil300	Composite Environmental Solid Samples
101	A9-5 (0.1) 25-Sep-2015 11:55 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
102	A9-6 (0.1) 25-Sep-2015 12:00 pm	Soil	GSoil300	Composite Environmental Solid Samples
103	HS10-1 (0.1) 25-Sep-2015 12:05 pm	Soil	GSoil300	Composite Environmental Solid Samples
104	HS10-2 (0.1) 25-Sep-2015 12:10 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
105	HS10-3 (0.1) 25-Sep-2015 12:15 pm	Soil	GSoil300	Composite Environmental Solid Samples
106	HS10-4 (0.1) 25-Sep-2015 12:20 pm	Soil	GSoil300	Composite Environmental Solid Samples
107	HS10-5 (0.1) 25-Sep-2015 12:25 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
108	HS10-6 (0.1) 25-Sep-2015 12:30 pm	Soil	GSoil300	Composite Environmental Solid Samples
109	HS5-1 (0.1) 25-Sep-2015 12:35 pm	Soil	GSoil300	Composite Environmental Solid Samples

## Samples

No	Sample Name	Sample Type	Containers	Tests Requested
110	HS5-2 (0.1) 25-Sep-2015 12:40 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
111	HS5-3 (0.1) 25-Sep-2015 12:45 pm	Soil	GSoil300	Composite Environmental Solid Samples
112	HS5-4 (0.1) 25-Sep-2015 12:50 pm	Soil	GSoil300	Composite Environmental Solid Samples
113	HS5-5 (0.1) 25-Sep-2015 12:55 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
114	HS5-6 (0.1) 25-Sep-2015 1:00 pm	Soil	GSoil300	Composite Environmental Solid Samples
115	HS9-1 (0.1) 25-Sep-2015 1:05 pm	Soil	GSoil300	Composite Environmental Solid Samples
116	HS9-2 (0.1) 25-Sep-2015 1:10 pm	Soil	GSoil300	Composite Environmental Solid Samples
117	HS9-3 (0.1) 25-Sep-2015 1:15 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
118	HS9-4 (0.1) 25-Sep-2015 1:20 pm	Soil	GSoil300	Composite Environmental Solid Samples
119	HS9-5 (0.1) 25-Sep-2015 1:25 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
120	HS9-6 (0.1) 25-Sep-2015 1:30 pm	Soil	GSoil300	Composite Environmental Solid Samples
121	DUP4 25-Sep-2015 1:16 pm	Soil	GSoil300	Organochlorine Pesticides Screening in Soil
122	HS1-1 (0.1) 25-Sep-2015 1:35 pm	Soil	GSoil300	Composite Environmental Solid Samples
123	HS1-2 (0.1) 25-Sep-2015 1:40 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
124	HS1-3 (0.1) 25-Sep-2015 1:45 pm	Soil	GSoil300	Composite Environmental Solid Samples
125	HS1-4 (0.1) 25-Sep-2015 1:50 pm	Soil	GSoil300	Composite Environmental Solid Samples
126	HS1-5 (0.1) 25-Sep-2015 1:55 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
127	HS1-6 (0.1) 25-Sep-2015 2:00 pm	Soil	GSoil300	Composite Environmental Solid Samples
128	HS8-1 (0.1) 25-Sep-2015 2:05 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
129	HS8-2 (0.1) 25-Sep-2015 2:10 pm	Soil	GSoil300	Composite Environmental Solid Samples
130	DUP5 25-Sep-2015 2:06 pm	Soil	GSoil300	Organochlorine Pesticides Screening in Soil
131	HS8-3 (0.1) 25-Sep-2015 2:15 pm	Soil	GSoil300	Composite Environmental Solid Samples
132	HS8-4 (0.1) 25-Sep-2015 2:20 pm	Soil	GSoil300	Composite Environmental Solid Samples
133	HS8-5 (0.1) 25-Sep-2015 2:25 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
134	HS8-6 (0.1) 25-Sep-2015 2:30 pm	Soil	GSoil300	Composite Environmental Solid Samples
135	HS4-1 (0.1) 28-Sep-2015 12:55 pm	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine Pesticides Screening in Soil
136	HS4-2 (0.1) 28-Sep-2015 1:00 pm	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine Pesticides Screening in Soil
137	HS4-3 (0.1) 28-Sep-2015 1:05 pm	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine Pesticides Screening in Soil
138	HS4-4 (0.1) 28-Sep-2015 1:10 pm	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine Pesticides Screening in Soil
139	HS4-5 (0.1) 28-Sep-2015 1:15 pm	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine Pesticides Screening in Soil
140	HS4-6 (0.1) 28-Sep-2015 1:20 pm	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine Pesticides Screening in Soil
141	HS-1 (0.1) 28-Sep-2015 1:25 pm	Soil	GSoil300	Composite Environmental Solid Samples
142	HS2-2 (0.1) 28-Sep-2015 1:30 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
143	HS2-3 (0.1) 28-Sep-2015 1:35 pm	Soil	GSoil300	Composite Environmental Solid Samples
144	HS2-4 (0.1) 28-Sep-2015 1:40 pm	Soil	GSoil300	Composite Environmental Solid Samples
145	HS2-5 (0.1) 28-Sep-2015 1:45 pm	Soil	GSoil300	Composite Environmental Solid Samples
146	HS2-6 (0.1) 28-Sep-2015 1:50 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
147	HS3-1 (0.1) 28-Sep-2015 1:55 pm	Soil	GSoil300	Composite Environmental Solid Samples
148	HS3-2 (0.1) 28-Sep-2015 2:00 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
149	HS3-3 (0.1) 28-Sep-2015 2:05 pm	Soil	GSoil300	Composite Environmental Solid Samples
150	HS3-4 (0.1) 28-Sep-2015 2:10 pm	Soil	GSoil300	Composite Environmental Solid Samples

## Samples

No	Sample Name	Sample Type	Containers	Tests Requested
151	HS3-5 (0.1) 28-Sep-2015 2:15 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
152	HS3-6 (0.1) 28-Sep-2015 2:20 pm	Soil	GSoil300	Composite Environmental Solid Samples
153	DUP6 28-Sep-2015 1:51 pm	Soil	GSoil300	Organochlorine Pesticides Screening in Soil
154	Composite of A1-1 (0.15), A1-2 (0.15) & A1-3 (0.15)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
155	Composite of A1-4 (0.15), A1-5 (0.15) & A1-6 (0.15)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
156	Composite of A1-7 (0.1), A1-8 (0.15) & A1-9 (0.15)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
157	Composite of A10-1 (0.1), A10-2 (0.1) & A10-3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
158	Composite of A10-4 (0.1), A10-5 (0.1) & A10-6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
159	Composite of A10-7 (0.1), A10-8 (0.1) & A10-9 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
160	Composite of A10-10 (0.1), A10-11 (0.1) & A10-12 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
161	Composite of A9-1 (0.1), A9-2 (0.1) & A9-3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
162	Composite of A9-4 (0.1), A9-5 (0.1) & A9-6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
163	Composite of HS10-1 (0.1), HS10-2 (0.1) & HS10-3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
164	Composite of HS10-4 (0.1), HS10-5 (0.1) & HS10-6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
165	Composite of HS5-1 (0.1), HS5-2 (0.1) & HS5-3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
166	Composite of HS5-4 (0.1), HS5-5 (0.1) & HS5-6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
167	Composite of HS9-1 (0.1), HS9-2 (0.1) & HS9-3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
168	Composite of HS9-4 (0.1), HS9-5 (0.1) & HS9-6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
169	Composite of HS1-1 (0.1), HS1-2 (0.1) & HS1-3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
170	Composite of HS1-4 (0.1), HS1-5 (0.1) & HS1-6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
171	Composite of HS8-1 (0.1), HS8-2 (0.1) & HS8-3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
172	Composite of HS8-4 (0.1), HS8-5 (0.1) & HS8-6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
173	Composite of HS-1 (0.1), HS2-2 (0.1) & HS2-3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
174	Composite of HS2-4 (0.1), HS2-5 (0.1) & HS2-6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
175	Composite of HS3-1 (0.1), HS3-2 (0.1) & HS3-3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
176	Composite of HS3-4 (0.1), HS3-5 (0.1) & HS3-6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn

## SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	57-74, 135-140, 154-176
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	0.10 - 4 mg/kg dry wt	57-74, 135-140, 154-176
Multiresidue Pesticides in Soil samples by GCMS	Sonication extraction, GC-MS analysis. Tested on as received sample, then results corrected to a dry weight basis using the separate Dry Matter result.	0.003 - 0.06 mg/kg dry wt	30

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Organochlorine Pesticides Screening in Soil	Sonication extraction, SPE cleanup, dual column GC-ECD analysis (modified US EPA 8082).. Tested on dried sample	0.010 - 0.04 mg/kg dry wt	2, 5, 8, 11, 14, 16, 18, 21, 24, 27, 33, 35, 39, 42, 45, 48, 51, 54, 56, 77, 79, 82, 85, 87, 89, 92, 95, 98, 101, 104, 107, 110, 113, 117, 119, 121, 123, 126, 128, 130, 133, 135-140, 142, 146, 148, 151, 153
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	30
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	57-74, 135-140, 154-176
Composite Environmental Solid Samples	Individual sample fractions mixed together to form a composite fraction.	-	1-15, 17-55, 75-86, 88-120, 122-129, 131-134, 141-152



# ANALYSIS REPORT

Page 1 of 14

<b>Client:</b>	Davis Consulting Group Limited	<b>Lab No:</b>	1480301	SPv2
<b>Contact:</b>	Fiona Rowley C/- Davis Consulting Group Limited PO Box 2450 Wakatipu QUEENSTOWN 9349	<b>Date Registered:</b>	25-Sep-2015	
		<b>Date Reported:</b>	07-Oct-2015	
		<b>Quote No:</b>		
		<b>Order No:</b>		
		<b>Client Reference:</b>	The Hills 15063	
		<b>Submitted By:</b>	Fiona Rowley	

## Sample Type: Soil

Sample Name:	A3.2 (0.1) 24-Sep-2015 9:35 am	A3.5 (0.1) 24-Sep-2015 9:50 am	A2.2 (0.1) 24-Sep-2015 10:05 am	A2.5 (0.1) 24-Sep-2015 10:20 am	A2.8 (0.1) 24-Sep-2015 10:35 am
<b>Lab Number:</b>	1480301.2	1480301.5	1480301.8	1480301.11	1480301.14

### Organochlorine Pesticides Screening in Soil

Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	< 0.010	0.017	< 0.010	< 0.010	< 0.010
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	< 0.010	0.014	< 0.010	< 0.010	< 0.010
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Sample Name:	Dup#1 24-Sep-2015 9:51 am	A8.2 (0.1) 24-Sep-2015 10:50 am	A8.5 (0.1) 24-Sep-2015 11:05 am	A8.8 (0.1) 24-Sep-2015 11:20 am	A7.2 (0.1) 24-Sep-2015 11:35 am
<b>Lab Number:</b>	1480301.16	1480301.18	1480301.21	1480301.24	1480301.27

### Organochlorine Pesticides Screening in Soil

Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

**Sample Type: Soil**

<b>Sample Name:</b>		Dup#1 24-Sep-2015 9:51 am	A8.2 (0.1) 24-Sep-2015 10:50 am	A8.5 (0.1) 24-Sep-2015 11:05 am	A8.8 (0.1) 24-Sep-2015 11:20 am	A7.2 (0.1) 24-Sep-2015 11:35 am
<b>Lab Number:</b>		1480301.16	1480301.18	1480301.21	1480301.24	1480301.27
Organochlorine Pesticides Screening in Soil						
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	0.096
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	0.036
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

<b>Sample Name:</b>		A7.5 (0.1) 24-Sep-2015 11:50 am	A6.2 (0.1) 24-Sep-2015 12:05 pm	A5.1 (0.1) 24-Sep-2015 12:15 pm	A5.5 (0.1) 24-Sep-2015 12:35 pm	A4.2 (0.1) 24-Sep-2015 12:50 pm
<b>Lab Number:</b>		1480301.30	1480301.33	1480301.35	1480301.39	1480301.42

Individual Tests						
Dry Matter	g/100g as rcvd	85	-	-	-	-
Multiresidue Pesticides in Soil samples by GCMS						
Acetochlor	mg/kg dry wt	< 0.007	-	-	-	-
Alachlor	mg/kg dry wt	< 0.006	-	-	-	-
Aldrin	mg/kg dry wt	< 0.010	-	-	-	-
Atrazine	mg/kg dry wt	< 0.007	-	-	-	-
Atrazine-desethyl	mg/kg dry wt	< 0.007	-	-	-	-
Atrazine-desisopropyl	mg/kg dry wt	< 0.014	-	-	-	-
Azaconazole	mg/kg dry wt	< 0.004	-	-	-	-
Azinphos-methyl	mg/kg dry wt	< 0.014	-	-	-	-
Benalaxyl	mg/kg dry wt	< 0.004	-	-	-	-
Bendiocarb	mg/kg dry wt	< 0.007	-	-	-	-
Benodanil	mg/kg dry wt	< 0.014	-	-	-	-
alpha-BHC	mg/kg dry wt	< 0.010	-	-	-	-
beta-BHC	mg/kg dry wt	< 0.010	-	-	-	-
delta-BHC	mg/kg dry wt	< 0.010	-	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	-	-	-	-
Bifenthrin	mg/kg dry wt	< 0.004	-	-	-	-
Bitertanol	mg/kg dry wt	< 0.014	-	-	-	-
Bromacil	mg/kg dry wt	< 0.007	-	-	-	-
Bromophos-ethyl	mg/kg dry wt	< 0.007	-	-	-	-
Bromopropylate	mg/kg dry wt	< 0.007	-	-	-	-
Bupirimate	mg/kg dry wt	< 0.007	-	-	-	-
Buprofezin	mg/kg dry wt	< 0.007	-	-	-	-
Butachlor	mg/kg dry wt	< 0.007	-	-	-	-
Captafol	mg/kg dry wt	< 0.04	-	-	-	-
Captan	mg/kg dry wt	< 0.014	-	-	-	-
Carbaryl	mg/kg dry wt	< 0.007	-	-	-	-
Carbofenothion	mg/kg dry wt	< 0.007	-	-	-	-
Carbofuran	mg/kg dry wt	< 0.007	-	-	-	-

**Sample Type: Soil**

<b>Sample Name:</b>	A7.5 (0.1) 24-Sep-2015 11:50 am	A6.2 (0.1) 24-Sep-2015 12:05 pm	A5.1 (0.1) 24-Sep-2015 12:15 pm	A5.5 (0.1) 24-Sep-2015 12:35 pm	A4.2 (0.1) 24-Sep-2015 12:50 pm
<b>Lab Number:</b>	1480301.30	1480301.33	1480301.35	1480301.39	1480301.42

Multiresidue Pesticides in Soil samples by GCMS

Carboxin	mg/kg dry wt	< 0.007	-	-	-	-
cis-Chlordane	mg/kg dry wt	< 0.010	-	-	-	-
trans-Chlordane	mg/kg dry wt	< 0.010	-	-	-	-
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	-	-	-	-
Chlorfenvinphos	mg/kg dry wt	< 0.010	-	-	-	-
Chlorfluazuron	mg/kg dry wt	< 0.007	-	-	-	-
Chlorothalonil	mg/kg dry wt	< 0.007	-	-	-	-
Chlorpropham	mg/kg dry wt	< 0.014	-	-	-	-
Chlorpyrifos	mg/kg dry wt	< 0.007	-	-	-	-
Chlorpyrifos-methyl	mg/kg dry wt	< 0.007	-	-	-	-
Chlortoluron	mg/kg dry wt	< 0.014	-	-	-	-
Chlozolinat	mg/kg dry wt	< 0.007	-	-	-	-
Coumaphos	mg/kg dry wt	< 0.014	-	-	-	-
Cyanazine	mg/kg dry wt	< 0.007	-	-	-	-
Cyfluthrin	mg/kg dry wt	< 0.009	-	-	-	-
Cyhalothrin	mg/kg dry wt	< 0.007	-	-	-	-
Cypermethrin	mg/kg dry wt	< 0.018	-	-	-	-
Cyproconazole	mg/kg dry wt	< 0.014	-	-	-	-
Cyprodinil	mg/kg dry wt	< 0.007	-	-	-	-
2,4'-DDD	mg/kg dry wt	< 0.010	-	-	-	-
4,4'-DDD	mg/kg dry wt	< 0.010	-	-	-	-
2,4'-DDE	mg/kg dry wt	< 0.010	-	-	-	-
4,4'-DDE	mg/kg dry wt	0.091	-	-	-	-
2,4'-DDT	mg/kg dry wt	< 0.010	-	-	-	-
4,4'-DDT	mg/kg dry wt	0.023	-	-	-	-
Total DDT Isomers	mg/kg dry wt	0.11	-	-	-	-
Deltamethrin (including Tralomethrin)	mg/kg dry wt	< 0.007	-	-	-	-
Demeton-S-methyl	mg/kg dry wt	< 0.014	-	-	-	-
Diazinon	mg/kg dry wt	< 0.004	-	-	-	-
Dichlobenil	mg/kg dry wt	< 0.007	-	-	-	-
Dichlofenthion	mg/kg dry wt	< 0.007	-	-	-	-
Dichlofluanid	mg/kg dry wt	< 0.007	-	-	-	-
Dichloran	mg/kg dry wt	< 0.03	-	-	-	-
Dichlorvos	mg/kg dry wt	< 0.010	-	-	-	-
Dicofol	mg/kg dry wt	< 0.04	-	-	-	-
Dicrotophos	mg/kg dry wt	< 0.007	-	-	-	-
Dieldrin	mg/kg dry wt	< 0.010	-	-	-	-
Difenoconazole	mg/kg dry wt	< 0.010	-	-	-	-
Dimethoate	mg/kg dry wt	< 0.014	-	-	-	-
Dinocap	mg/kg dry wt	< 0.08	-	-	-	-
Diphenylamine	mg/kg dry wt	< 0.014	-	-	-	-
Disulfoton	mg/kg dry wt	< 0.007	-	-	-	-
Diuron	mg/kg dry wt	< 0.007	-	-	-	-
Endosulfan I	mg/kg dry wt	< 0.010	-	-	-	-
Endosulfan II	mg/kg dry wt	< 0.010	-	-	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.010	-	-	-	-
Endrin	mg/kg dry wt	< 0.010	-	-	-	-
Endrin aldehyde	mg/kg dry wt	< 0.010	-	-	-	-
Endrin ketone	mg/kg dry wt	< 0.010	-	-	-	-
EPN	mg/kg dry wt	< 0.007	-	-	-	-
Esfenvalerate	mg/kg dry wt	< 0.010	-	-	-	-
Ethion	mg/kg dry wt	< 0.007	-	-	-	-
Etrifos	mg/kg dry wt	< 0.007	-	-	-	-

**Sample Type: Soil**

<b>Sample Name:</b>	A7.5 (0.1) 24-Sep-2015 11:50 am	A6.2 (0.1) 24-Sep-2015 12:05 pm	A5.1 (0.1) 24-Sep-2015 12:15 pm	A5.5 (0.1) 24-Sep-2015 12:35 pm	A4.2 (0.1) 24-Sep-2015 12:50 pm
<b>Lab Number:</b>	1480301.30	1480301.33	1480301.35	1480301.39	1480301.42

Multiresidue Pesticides in Soil samples by GCMS

Famphur	mg/kg dry wt	< 0.007	-	-	-	-
Fenamiphos	mg/kg dry wt	< 0.007	-	-	-	-
Fenarimol	mg/kg dry wt	< 0.007	-	-	-	-
Fenitrothion	mg/kg dry wt	< 0.007	-	-	-	-
Fenpropathrin	mg/kg dry wt	< 0.007	-	-	-	-
Fenpropimorph	mg/kg dry wt	< 0.007	-	-	-	-
Fensulfothion	mg/kg dry wt	< 0.007	-	-	-	-
Fenthion	mg/kg dry wt	< 0.007	-	-	-	-
Fenvalerate	mg/kg dry wt	< 0.010	-	-	-	-
Fluazifop-butyl	mg/kg dry wt	< 0.007	-	-	-	-
Fluometuron	mg/kg dry wt	< 0.007	-	-	-	-
Flusilazole	mg/kg dry wt	< 0.007	-	-	-	-
Fluvalinate	mg/kg dry wt	< 0.006	-	-	-	-
Folpet	mg/kg dry wt	< 0.014	-	-	-	-
Furalaxyl	mg/kg dry wt	< 0.004	-	-	-	-
Haloxfop-methyl	mg/kg dry wt	< 0.007	-	-	-	-
Heptachlor	mg/kg dry wt	< 0.010	-	-	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.010	-	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.010	-	-	-	-
Hexaconazole	mg/kg dry wt	< 0.007	-	-	-	-
Hexazinone	mg/kg dry wt	< 0.004	-	-	-	-
Hexythiazox	mg/kg dry wt	< 0.04	-	-	-	-
Imazalil	mg/kg dry wt	< 0.04	-	-	-	-
Indoxacarb	mg/kg dry wt	< 0.007	-	-	-	-
Iodofenphos	mg/kg dry wt	< 0.007	-	-	-	-
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	mg/kg dry wt	< 0.04	-	-	-	-
Isazophos	mg/kg dry wt	< 0.007	-	-	-	-
Isofenphos	mg/kg dry wt	< 0.004	-	-	-	-
Kresoxim-methyl	mg/kg dry wt	< 0.004	-	-	-	-
Leptophos	mg/kg dry wt	< 0.007	-	-	-	-
Linuron	mg/kg dry wt	< 0.007	-	-	-	-
Malathion	mg/kg dry wt	< 0.007	-	-	-	-
Metalaxyl	mg/kg dry wt	< 0.007	-	-	-	-
Methacrifos	mg/kg dry wt	< 0.007	-	-	-	-
Methamidophos	mg/kg dry wt	< 0.04	-	-	-	-
Methidathion	mg/kg dry wt	< 0.007	-	-	-	-
Methiocarb	mg/kg dry wt	< 0.007	-	-	-	-
Methoxychlor	mg/kg dry wt	< 0.010	-	-	-	-
Metolachlor	mg/kg dry wt	< 0.006	-	-	-	-
Metribuzin	mg/kg dry wt	< 0.007	-	-	-	-
Mevinphos	mg/kg dry wt	< 0.014	-	-	-	-
Molinate	mg/kg dry wt	< 0.014	-	-	-	-
Myclobutanil	mg/kg dry wt	< 0.007	-	-	-	-
Naled	mg/kg dry wt	< 0.04	-	-	-	-
Nitrofen	mg/kg dry wt	< 0.014	-	-	-	-
Nitrothal-isopropyl	mg/kg dry wt	< 0.007	-	-	-	-
Norflurazon	mg/kg dry wt	< 0.014	-	-	-	-
Omethoate	mg/kg dry wt	< 0.04	-	-	-	-
Oxadiazon	mg/kg dry wt	< 0.007	-	-	-	-
Oxychlorane	mg/kg dry wt	< 0.004	-	-	-	-
Oxyfluorfen	mg/kg dry wt	< 0.004	-	-	-	-
Paclobutrazol	mg/kg dry wt	< 0.007	-	-	-	-
Parathion-ethyl	mg/kg dry wt	< 0.007	-	-	-	-
Parathion-methyl	mg/kg dry wt	< 0.007	-	-	-	-

Sample Type: Soil						
Sample Name:	A7.5 (0.1) 24-Sep-2015 11:50 am	A6.2 (0.1) 24-Sep-2015 12:05 pm	A5.1 (0.1) 24-Sep-2015 12:15 pm	A5.5 (0.1) 24-Sep-2015 12:35 pm	A4.2 (0.1) 24-Sep-2015 12:50 pm	
Lab Number:	1480301.30	1480301.33	1480301.35	1480301.39	1480301.42	
Multiresidue Pesticides in Soil samples by GCMS						
Penconazole	mg/kg dry wt	< 0.007	-	-	-	-
Pendimethalin	mg/kg dry wt	< 0.007	-	-	-	-
Permethrin	mg/kg dry wt	< 0.003	-	-	-	-
Phorate	mg/kg dry wt	< 0.014	-	-	-	-
Phosmet	mg/kg dry wt	< 0.007	-	-	-	-
Phosphamidon	mg/kg dry wt	< 0.007	-	-	-	-
Pirimicarb	mg/kg dry wt	< 0.007	-	-	-	-
Pirimiphos-methyl	mg/kg dry wt	< 0.007	-	-	-	-
Prochloraz	mg/kg dry wt	< 0.04	-	-	-	-
Procymidone	mg/kg dry wt	< 0.007	-	-	-	-
Prometryn	mg/kg dry wt	< 0.004	-	-	-	-
Propachlor	mg/kg dry wt	< 0.007	-	-	-	-
Propanil	mg/kg dry wt	< 0.03	-	-	-	-
Propazine	mg/kg dry wt	< 0.004	-	-	-	-
Propetamphos	mg/kg dry wt	< 0.007	-	-	-	-
Propham	mg/kg dry wt	< 0.007	-	-	-	-
Propiconazole	mg/kg dry wt	< 0.006	-	-	-	-
Prothiofos	mg/kg dry wt	< 0.007	-	-	-	-
Pyrazophos	mg/kg dry wt	< 0.007	-	-	-	-
Pyrifenox	mg/kg dry wt	< 0.010	-	-	-	-
Pyrimethanil	mg/kg dry wt	< 0.007	-	-	-	-
Pyriproxyfen	mg/kg dry wt	< 0.007	-	-	-	-
Quintozene	mg/kg dry wt	< 0.014	-	-	-	-
Quizalofop-ethyl	mg/kg dry wt	< 0.007	-	-	-	-
Simazine	mg/kg dry wt	< 0.007	-	-	-	-
Simetryn	mg/kg dry wt	< 0.007	-	-	-	-
Sulfentrazone	mg/kg dry wt	< 0.04	-	-	-	-
Sulfotep	mg/kg dry wt	< 0.007	-	-	-	-
TCMTB [2-(thiocyanomethylthio) benzothiazole, Busan]	mg/kg dry wt	< 0.014	-	-	-	-
Tebuconazole	mg/kg dry wt	< 0.007	-	-	-	-
Tebufenpyrad	mg/kg dry wt	< 0.004	-	-	-	-
Terbacil	mg/kg dry wt	< 0.007	-	-	-	-
Terbufos	mg/kg dry wt	< 0.007	-	-	-	-
Terbumeton	mg/kg dry wt	< 0.007	-	-	-	-
Terbuthylazine	mg/kg dry wt	< 0.004	-	-	-	-
Terbuthylazine-desethyl	mg/kg dry wt	< 0.007	-	-	-	-
Terbutryn	mg/kg dry wt	< 0.007	-	-	-	-
Tetrachlorvinphos	mg/kg dry wt	< 0.007	-	-	-	-
Thiabendazole	mg/kg dry wt	< 0.04	-	-	-	-
Thiobencarb	mg/kg dry wt	< 0.007	-	-	-	-
Thiometon	mg/kg dry wt	< 0.014	-	-	-	-
Tolyfluanid	mg/kg dry wt	< 0.004	-	-	-	-
Triadimefon	mg/kg dry wt	< 0.007	-	-	-	-
Triazophos	mg/kg dry wt	< 0.007	-	-	-	-
Trifluralin	mg/kg dry wt	< 0.007	-	-	-	-
Vinclozolin	mg/kg dry wt	< 0.007	-	-	-	-
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010

**Sample Type: Soil**

<b>Sample Name:</b>		A7.5 (0.1) 24-Sep-2015 11:50 am	A6.2 (0.1) 24-Sep-2015 12:05 pm	A5.1 (0.1) 24-Sep-2015 12:15 pm	A5.5 (0.1) 24-Sep-2015 12:35 pm	A4.2 (0.1) 24-Sep-2015 12:50 pm
<b>Lab Number:</b>		1480301.30	1480301.33	1480301.35	1480301.39	1480301.42
Organochlorine Pesticides Screening in Soil						
trans-Chlordane	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	-	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	-	0.087	0.065	0.107	0.045
2,4'-DDT	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	-	0.013	0.019	0.025	0.022
Dieldrin	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010

<b>Sample Name:</b>		A4.5 (0.1) 24-Sep-2015 1:05 pm	A4.8 (0.1) 24-Sep-2015 1:20 pm	A4.11 (0.1) 24-Sep-2015 1:35 pm	A4.14 (0.1) 24-Sep-2015 1:50 pm	Dup#2 24-Sep-2015 12:16 pm
<b>Lab Number:</b>		1480301.45	1480301.48	1480301.51	1480301.54	1480301.56

Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	0.061
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	0.019
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

<b>Sample Name:</b>		Composite of A3.1 (0.1), A3.2 (0.1) & A3.3 (0.1)	Composite of A3.4 (0.1), A3.5 (0.1) & A3.6 (0.1)	Composite of A2.1 (0.1), A2.2 (0.1) & A2.3 (0.1)	Composite of A2.4 (0.1), A2.5 (0.1) & A2.6 (0.1)	Composite of A2.7 (0.1), A2.8 (0.1) & A2.9 (0.1)
<b>Lab Number:</b>		1480301.57	1480301.58	1480301.59	1480301.60	1480301.61

Sample Type: Soil						
<b>Sample Name:</b>		Composite of A3.1 (0.1), A3.2 (0.1) & A3.3 (0.1)	Composite of A3.4 (0.1), A3.5 (0.1) & A3.6 (0.1)	Composite of A2.1 (0.1), A2.2 (0.1) & A2.3 (0.1)	Composite of A2.4 (0.1), A2.5 (0.1) & A2.6 (0.1)	Composite of A2.7 (0.1), A2.8 (0.1) & A2.9 (0.1)
<b>Lab Number:</b>		1480301.57	1480301.58	1480301.59	1480301.60	1480301.61
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	9	9	9	9	9
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	7	7	7	7	7
Total Recoverable Copper	mg/kg dry wt	8	9	8	9	9
Total Recoverable Lead	mg/kg dry wt	12.9	12.2	12.8	11.9	11.6
Total Recoverable Nickel	mg/kg dry wt	7	7	7	7	7
Total Recoverable Zinc	mg/kg dry wt	36	33	34	33	36
<b>Sample Name:</b>		Composite of A8.1 (0.1), A8.2 (0.1) & A8.3 (0.1)	Composite of A8.4 (0.1), A8.5 (0.1) & A8.6 (0.1)	Composite of A8.7 (0.1), A8.8 (0.1) & A8.9 (0.1)	Composite of A7.1 (0.1), A7.2 (0.1) & A7.3 (0.1)	Composite of A7.4 (0.1), A7.5 (0.1) & A7.6 (0.1)
<b>Lab Number:</b>		1480301.62	1480301.63	1480301.64	1480301.65	1480301.66
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	18	18	19	9	9
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	12	13	13	8	7
Total Recoverable Copper	mg/kg dry wt	18	18	20	10	12
Total Recoverable Lead	mg/kg dry wt	26	23	24	12.8	12.7
Total Recoverable Nickel	mg/kg dry wt	12	13	13	8	8
Total Recoverable Zinc	mg/kg dry wt	60	62	62	39	38
<b>Sample Name:</b>		Composite of A6.1 (0.1), A6.2 (0.1) & A6.3 (0.1)	Composite of A5.1 (0.1), A5.2 (0.1) & A5.3 (0.1)	Composite of A5.4 (0.1), A5.5 (0.1) & A5.6 (0.1)	Composite of A4.1 (0.1), A4.2 (0.1) & A4.3 (0.1)	Composite of A4.4 (0.1), A4.5 (0.1) & A4.6 (0.1)
<b>Lab Number:</b>		1480301.67	1480301.68	1480301.69	1480301.70	1480301.71
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	14	8	8	9	8
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	0.11
Total Recoverable Chromium	mg/kg dry wt	7	7	7	7	7
Total Recoverable Copper	mg/kg dry wt	11	9	9	12	10
Total Recoverable Lead	mg/kg dry wt	17.2	10.9	10.9	14.1	11.3
Total Recoverable Nickel	mg/kg dry wt	8	7	7	8	8
Total Recoverable Zinc	mg/kg dry wt	35	33	35	45	33
<b>Sample Name:</b>		Composite of A4.7 (0.1), A4.8 (0.1) & A4.9 (0.1)	Composite of A4.10 (0.1), A4.11 (0.1) & A4.12 (0.1)	Composite of A4.13 (0.1), A4.14 (0.1) & A4.15 (0.1)	A1-3 (0.15) 25-Sep-2015 10:00 am	A1-5 (0.15) 25-Sep-2015 10:10 am
<b>Lab Number:</b>		1480301.72	1480301.73	1480301.74	1480301.77	1480301.79
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	10	9	9	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Total Recoverable Chromium	mg/kg dry wt	7	6	7	-	-
Total Recoverable Copper	mg/kg dry wt	10	10	10	-	-
Total Recoverable Lead	mg/kg dry wt	11.5	11.4	12.4	-	-
Total Recoverable Nickel	mg/kg dry wt	7	7	7	-	-
Total Recoverable Zinc	mg/kg dry wt	47	31	31	-	-
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	-	-	-	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	-	-	-	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	-	-	-	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	-	-	-	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	-	-	-	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	-	-	-	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	-	-	-	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	-	-	-	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	-	-	-	< 0.010	< 0.010

**Sample Type: Soil**

<b>Sample Name:</b>	Composite of A4.7 (0.1), A4.8 (0.1) & A4.9 (0.1)	Composite of A4.10 (0.1), A4.11 (0.1) & A4.12 (0.1)	Composite of A4.13 (0.1), A4.14 (0.1) & A4.15 (0.1)	A1-3 (0.15) 25-Sep-2015 10:00 am	A1-5 (0.15) 25-Sep-2015 10:10 am
<b>Lab Number:</b>	1480301.72	1480301.73	1480301.74	1480301.77	1480301.79

Organochlorine Pesticides Screening in Soil						
4,4'-DDD	mg/kg dry wt	-	-	-	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	-	-	-	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	-	-	-	< 0.010	< 0.010
2,4'-DDT	mg/kg dry wt	-	-	-	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	-	-	-	< 0.010	< 0.010
Dieldrin	mg/kg dry wt	-	-	-	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	-	-	-	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	-	-	-	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	-	-	-	< 0.010	< 0.010
Endrin	mg/kg dry wt	-	-	-	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	-	-	-	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	-	-	-	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	-	-	-	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	-	-	-	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	-	-	-	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	-	-	-	< 0.010	< 0.010

<b>Sample Name:</b>	A1-8 (0.15) 25-Sep-2015 10:25 am	A10-2 (0.1) 25-Sep-2015 10:40 am	DUP3 25-Sep-2015 10:01 am	A10-5 (0.1) 25-Sep-2015 10:55 am	A10-8 (0.1) 25-Sep-2015 11:10 am
<b>Lab Number:</b>	1480301.82	1480301.85	1480301.87	1480301.89	1480301.92

Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

<b>Sample Name:</b>	A10-11 (0.1) 25-Sep-2015 11:25 am	A9-2 (0.1) 25-Sep-2015 11:40 am	A9-5 (0.1) 25-Sep-2015 11:55 am	HS10-2 (0.1) 25-Sep-2015 12:10 pm	HS10-5 (0.1) 25-Sep-2015 12:25 pm
<b>Lab Number:</b>	1480301.95	1480301.98	1480301.101	1480301.104	1480301.107

Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010



**Sample Type: Soil**

<b>Sample Name:</b>	A10-11 (0.1) 25-Sep-2015 11:25 am	A9-2 (0.1) 25-Sep-2015 11:40 am	A9-5 (0.1) 25-Sep-2015 11:55 am	HS10-2 (0.1) 25-Sep-2015 12:10 pm	HS10-5 (0.1) 25-Sep-2015 12:25 pm
<b>Lab Number:</b>	1480301.95	1480301.98	1480301.101	1480301.104	1480301.107

Organochlorine Pesticides Screening in Soil						
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	0.044	< 0.010	< 0.010
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	0.015	< 0.010	< 0.010
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	0.018	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

<b>Sample Name:</b>	HS5-2 (0.1) 25-Sep-2015 12:40 pm	HS5-5 (0.1) 25-Sep-2015 12:55 pm	HS9-3 (0.1) 25-Sep-2015 1:15 pm	HS9-5 (0.1) 25-Sep-2015 1:25 pm	DUP4 25-Sep-2015 1:16 pm
<b>Lab Number:</b>	1480301.110	1480301.113	1480301.117	1480301.119	1480301.121

Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Sample Type: Soil						
Sample Name:	HS1-2 (0.1) 25-Sep-2015 1:40 pm	HS1-5 (0.1) 25-Sep-2015 1:55 pm	HS8-1 (0.1) 25-Sep-2015 2:05 pm	DUP5 25-Sep-2015 2:06 pm	HS8-5 (0.1) 25-Sep-2015 2:25 pm	
Lab Number:	1480301.123	1480301.126	1480301.128	1480301.130	1480301.133	
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Sample Name:	HS4-1 (0.1) 28-Sep-2015 12:55 pm	HS4-2 (0.1) 28-Sep-2015 1:00 pm	HS4-3 (0.1) 28-Sep-2015 1:05 pm	HS4-4 (0.1) 28-Sep-2015 1:10 pm	HS4-5 (0.1) 28-Sep-2015 1:15 pm	
Lab Number:	1480301.135	1480301.136	1480301.137	1480301.138	1480301.139	
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	14	12	13	14	10
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	0.10	< 0.10	0.12
Total Recoverable Chromium	mg/kg dry wt	12	10	17	13	13
Total Recoverable Copper	mg/kg dry wt	16	11	16	22	11
Total Recoverable Lead	mg/kg dry wt	16.9	12.3	13.5	15.3	12.6
Total Recoverable Nickel	mg/kg dry wt	11	10	14	10	11
Total Recoverable Zinc	mg/kg dry wt	130	92	71	260	59
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	< 0.010	0.128	0.035	< 0.010	0.044
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	< 0.010	0.036	< 0.010	< 0.010	0.017
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

**Sample Type: Soil**

<b>Sample Name:</b>	HS4-1 (0.1) 28-Sep-2015 12:55 pm	HS4-2 (0.1) 28-Sep-2015 1:00 pm	HS4-3 (0.1) 28-Sep-2015 1:05 pm	HS4-4 (0.1) 28-Sep-2015 1:10 pm	HS4-5 (0.1) 28-Sep-2015 1:15 pm
<b>Lab Number:</b>	1480301.135	1480301.136	1480301.137	1480301.138	1480301.139

Organochlorine Pesticides Screening in Soil					
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010

<b>Sample Name:</b>	HS4-6 (0.1) 28-Sep-2015 1:20 pm	HS2-2 (0.1) 28-Sep-2015 1:30 pm	HS2-6 (0.1) 28-Sep-2015 1:50 pm	HS3-2 (0.1) 28-Sep-2015 2:00 pm	HS3-5 (0.1) 28-Sep-2015 2:15 pm
<b>Lab Number:</b>	1480301.140	1480301.142	1480301.146	1480301.148	1480301.151

Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn					
Total Recoverable Arsenic	mg/kg dry wt	10	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	-	-	-
Total Recoverable Chromium	mg/kg dry wt	9	-	-	-
Total Recoverable Copper	mg/kg dry wt	11	-	-	-
Total Recoverable Lead	mg/kg dry wt	11.3	-	-	-
Total Recoverable Nickel	mg/kg dry wt	8	-	-	-
Total Recoverable Zinc	mg/kg dry wt	63	-	-	-

Organochlorine Pesticides Screening in Soil					
Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	0.060	< 0.010	< 0.010	< 0.010
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	0.018	< 0.010	< 0.010	< 0.010
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010

<b>Sample Name:</b>	DUP6 28-Sep-2015 1:51 pm	Composite of A1-1 (0.15), A1-2 (0.15) & A1-3 (0.15)	Composite of A1-4 (0.15), A1-5 (0.15) & A1-6 (0.15)	Composite of A1-7 (0.1), A1-8 (0.15) & A1-9 (0.15)	Composite of A10-1 (0.1), A10-2 (0.1) & A10-3 (0.1)
<b>Lab Number:</b>	1480301.153	1480301.154	1480301.155	1480301.156	1480301.157

Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn					
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**Sample Type: Soil**

<b>Sample Name:</b>	DUP6 28-Sep-2015 1:51 pm	Composite of A1-1 (0.15), A1-2 (0.15) & A1-3 (0.15)	Composite of A1-4 (0.15), A1-5 (0.15) & A1-6 (0.15)	Composite of A1-7 (0.1), A1-8 (0.15) & A1-9 (0.15)	Composite of A10-1 (0.1), A10-2 (0.1) & A10-3 (0.1)
<b>Lab Number:</b>	1480301.153	1480301.154	1480301.155	1480301.156	1480301.157

Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	-	10	11	11	8
Total Recoverable Cadmium	mg/kg dry wt	-	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	-	7	7	6	6
Total Recoverable Copper	mg/kg dry wt	-	10	12	12	7
Total Recoverable Lead	mg/kg dry wt	-	11.7	13.2	12.2	9.8
Total Recoverable Nickel	mg/kg dry wt	-	7	8	8	7
Total Recoverable Zinc	mg/kg dry wt	-	37	31	30	35

**Organochlorine Pesticides Screening in Soil**

Aldrin	mg/kg dry wt	< 0.010	-	-	-	-
alpha-BHC	mg/kg dry wt	< 0.010	-	-	-	-
beta-BHC	mg/kg dry wt	< 0.010	-	-	-	-
delta-BHC	mg/kg dry wt	< 0.010	-	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	-	-	-	-
cis-Chlordane	mg/kg dry wt	< 0.010	-	-	-	-
trans-Chlordane	mg/kg dry wt	< 0.010	-	-	-	-
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	-	-	-	-
2,4'-DDD	mg/kg dry wt	< 0.010	-	-	-	-
4,4'-DDD	mg/kg dry wt	< 0.010	-	-	-	-
2,4'-DDE	mg/kg dry wt	< 0.010	-	-	-	-
4,4'-DDE	mg/kg dry wt	< 0.010	-	-	-	-
2,4'-DDT	mg/kg dry wt	< 0.010	-	-	-	-
4,4'-DDT	mg/kg dry wt	< 0.010	-	-	-	-
Dieldrin	mg/kg dry wt	< 0.010	-	-	-	-
Endosulfan I	mg/kg dry wt	< 0.010	-	-	-	-
Endosulfan II	mg/kg dry wt	< 0.010	-	-	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.010	-	-	-	-
Endrin	mg/kg dry wt	< 0.010	-	-	-	-
Endrin aldehyde	mg/kg dry wt	< 0.010	-	-	-	-
Endrin ketone	mg/kg dry wt	< 0.010	-	-	-	-
Heptachlor	mg/kg dry wt	< 0.010	-	-	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.010	-	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.010	-	-	-	-
Methoxychlor	mg/kg dry wt	< 0.010	-	-	-	-

<b>Sample Name:</b>	Composite of A10-4 (0.1), A10-5 (0.1) & A10-6 (0.1)	Composite of A10-7 (0.1), A10-8 (0.1) & A10-9 (0.1)	Composite of A10-10 (0.1), A10-11 (0.1) & A10-12 (0.1)	Composite of A9-1 (0.1), A9-2 (0.1) & A9-3 (0.1)	Composite of A9-4 (0.1), A9-5 (0.1) & A9-6 (0.1)
<b>Lab Number:</b>	1480301.158	1480301.159	1480301.160	1480301.161	1480301.162

Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	9	11	9	10	11
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.11	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	7	8	8	7	8
Total Recoverable Copper	mg/kg dry wt	8	12	8	9	10
Total Recoverable Lead	mg/kg dry wt	10.0	11.5	10.2	10.0	14.4
Total Recoverable Nickel	mg/kg dry wt	7	8	7	7	7
Total Recoverable Zinc	mg/kg dry wt	35	40	33	35	39

<b>Sample Name:</b>	Composite of HS10-1 (0.1), HS10-2 (0.1) & HS10-3 (0.1)	Composite of HS10-4 (0.1), HS10-5 (0.1) & HS10-6 (0.1)	Composite of HS5-1 (0.1), HS5-2 (0.1) & HS5-3 (0.1)	Composite of HS5-4 (0.1), HS5-5 (0.1) & HS5-6 (0.1)	Composite of HS9-1 (0.1), HS9-2 (0.1) & HS9-3 (0.1)
<b>Lab Number:</b>	1480301.163	1480301.164	1480301.165	1480301.166	1480301.167

Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	8	10	13	10	11
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Sample Type: Soil						
<b>Sample Name:</b>	Composite of HS10-1 (0.1), HS10-2 (0.1) & HS10-3 (0.1)	Composite of HS10-4 (0.1), HS10-5 (0.1) & HS10-6 (0.1)	Composite of HS5-1 (0.1), HS5-2 (0.1) & HS5-3 (0.1)	Composite of HS5-4 (0.1), HS5-5 (0.1) & HS5-6 (0.1)	Composite of HS9-1 (0.1), HS9-2 (0.1) & HS9-3 (0.1)	
<b>Lab Number:</b>	1480301.163	1480301.164	1480301.165	1480301.166	1480301.167	
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Chromium	mg/kg dry wt	8	7	8	7	9
Total Recoverable Copper	mg/kg dry wt	11	11	12	10	10
Total Recoverable Lead	mg/kg dry wt	10.1	10.6	13.1	10.4	12.8
Total Recoverable Nickel	mg/kg dry wt	8	8	9	7	8
Total Recoverable Zinc	mg/kg dry wt	43	38	41	37	42
<b>Sample Name:</b>	Composite of HS9-4 (0.1), HS9-5 (0.1) & HS9-6 (0.1)	Composite of HS1-1 (0.1), HS1-2 (0.1) & HS1-3 (0.1)	Composite of HS1-4 (0.1), HS1-5 (0.1) & HS1-6 (0.1)	Composite of HS8-1 (0.1), HS8-2 (0.1) & HS8-3 (0.1)	Composite of HS8-4 (0.1), HS8-5 (0.1) & HS8-6 (0.1)	
<b>Lab Number:</b>	1480301.168	1480301.169	1480301.170	1480301.171	1480301.172	
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	10	9	9	11	11
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	0.12	< 0.10
Total Recoverable Chromium	mg/kg dry wt	7	9	9	10	9
Total Recoverable Copper	mg/kg dry wt	11	13	11	14	14
Total Recoverable Lead	mg/kg dry wt	10.2	14.1	14.0	14.4	13.1
Total Recoverable Nickel	mg/kg dry wt	8	10	8	10	10
Total Recoverable Zinc	mg/kg dry wt	39	50	45	59	53
<b>Sample Name:</b>	Composite of HS-1 (0.1), HS2-2 (0.1) & HS2-3 (0.1)	Composite of HS2-4 (0.1), HS2-5 (0.1) & HS2-6 (0.1)	Composite of HS3-1 (0.1), HS3-2 (0.1) & HS3-3 (0.1)	Composite of HS3-4 (0.1), HS3-5 (0.1) & HS3-6 (0.1)		
<b>Lab Number:</b>	1480301.173	1480301.174	1480301.175	1480301.176		
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	9	9	10	10	-
Total Recoverable Cadmium	mg/kg dry wt	0.11	0.10	0.14	< 0.10	-
Total Recoverable Chromium	mg/kg dry wt	8	7	9	8	-
Total Recoverable Copper	mg/kg dry wt	10	10	12	14	-
Total Recoverable Lead	mg/kg dry wt	10.5	10.4	13.9	11.3	-
Total Recoverable Nickel	mg/kg dry wt	8	8	9	8	-
Total Recoverable Zinc	mg/kg dry wt	47	39	51	39	-

## SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	57-74, 135-140, 154-176
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	0.10 - 4 mg/kg dry wt	57-74, 135-140, 154-176
Multiresidue Pesticides in Soil samples by GCMS	Sonication extraction, GC-MS analysis. Tested on as received sample, then results corrected to a dry weight basis using the separate Dry Matter result.	0.003 - 0.06 mg/kg dry wt	30

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Organochlorine Pesticides Screening in Soil	Sonication extraction, SPE cleanup, dual column GC-ECD analysis (modified US EPA 8082).. Tested on dried sample	0.010 - 0.04 mg/kg dry wt	2, 5, 8, 11, 14, 16, 18, 21, 24, 27, 33, 35, 39, 42, 45, 48, 51, 54, 56, 77, 79, 82, 85, 87, 89, 92, 95, 98, 101, 104, 107, 110, 113, 117, 119, 121, 123, 126, 128, 130, 133, 135-140, 142, 146, 148, 151, 153
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	30
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	57-74, 135-140, 154-176
Composite Environmental Solid Samples*	Individual sample fractions mixed together to form a composite fraction.	-	1-15, 17-55, 75-86, 88-120, 122-129, 131-134, 141-152

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

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Carole Rodgers-Carroll BA, NZCS  
Client Services Manager - Environmental Division



## Queenstown Lakes District Council

### Form 6

## Proposed District Plan – Further Submission

In support, or in opposition to, a submission of the Proposed District Plan.

Clause 8 of First Schedule, Resource Management Act 1991

To: Queenstown Lakes District Council  
Private Bag 50072  
Queenstown

**1. Name of Further Submitter:**

**Trojan Helmet Limited:**

Address for Service: C/- Brown & Company Planning Group,  
PO Box 1467,  
QUEENSTOWN

Email: [office@brownandcompany.co.nz](mailto:office@brownandcompany.co.nz)

Contact Person: A Hutton / Jeff Brown

Phone: 03 4092258

**2. This is a further submission in support of or opposition to various original submissions on the Proposed Queenstown Lakes District Plan (Proposed Plan)**

**3. Status of Further Submitter:**

Trojan Helmet Limited has an interest in the Proposed Plan and the submissions to which this further submission relates that is greater than the interest the general public has, for the following reasons:

- Trojan Helmet Limited owns land in the Queenstown Lakes District that is directly affected by the Proposed Plan and the submissions; and
- Trojan Helmet Limited has made original submissions on the Proposed Plan (Submissions 437, 443 and 452) that address the same subject matter as is addressed in the submissions to which this further submission relates; and/or
- The decisions sought in the original submissions to which this further submission relates will directly affect Trojan Helmet Limited's ability to undertake activities on and develop its land.



4. Trojan Helmet Limited makes the further submissions set out in the following table:

Original Submitter	Submission Number	Plan Provision	Support/Oppose	Reasons for Submission	Decision Sought by Trojan Helmet Limited
Elizabeth Hanan	10	Chapters 3, 6, 14, 21 and 27	Oppose	Trojan Helmet Limited has made original submissions on the Proposed Plan seeking a bespoke Resort Zoning for its land which currently contains The Hills golf course. This Resort Zone will cater for additional residential development and which provide for golf and golf related activities, within appropriate parameters and that contribute to tourism and community wellbeing. The development sought to be enabled by the Resort Zoning is not urban in nature, but will enable residential development to an average density of approximately 1.9ha. The development proposed to be enabled has been carefully and thoroughly considered and assessed, including in terms of its potential effects on the existing rural landscape and amenity.	That the submission is rejected.

Original Submitter	Submission Number	Plan Provision	Support/Oppose	Reasons for Submission	Decision Sought by Trojan Helmet Limited
				<p>Trojan Helmet Limited has also made original submissions seeking the rezoning of land on McDonnell Road and Hogan's Gully Road to Rural Lifestyle Zone. These proposed rezoning's have also been subject to a rigorous and considered analysis as to potential effects on the rural landscape character and amenity.</p> <p>The submission is opposed in its entirety, particularly to the extent that it is inconsistent with Trojan Helmet's original submissions, including to the extent it seeks new residential development to be contained within the UGBs, that the existing zoning of all rural is retained with no further subdivision, and that the Hills Golf Course be retained as a buffer.</p>	
John Murray Hanan	18	Not stated	Oppose	The submission is opposed to the extent it seeks there be no substantial growth changes to the existing growth boundaries	That the submission be rejected.

Original Submitter	Submission Number	Plan Provision	Support/Oppose	Reasons for Submission	Decision Sought by Trojan Helmet Limited
				<p>and that current rural zones outside of the urban area be retained.</p> <p>Trojan Helmet Limited has made original submissions on the Proposed Plan seeking a bespoke Resort Zoning for its land which currently contains The Hills golf course. The Resort Zone will cater for additional residential development and provide for golf and golf related activities, within appropriate parameters, and which contribute to tourism and community wellbeing. The development sought to be enabled by the Resort Zoning is not urban in nature, but will enable residential development to an average density of approximately 1.9ha. The development proposed to be enabled has been carefully and thoroughly considered and assessed, including in terms of its potential effects on the existing rural landscape character and amenity.</p>	

Original Submitter	Submission Number	Plan Provision	Support/Oppose	Reasons for Submission	Decision Sought by Trojan Helmet Limited
				Trojan Helmet Limited has also made original submissions seeking the rezoning of land on McDonnell Road and Hogan's Gully Road to Rural Lifestyle Zone. These proposed rezonings have also been subject to a rigorous and considered analysis as to potential effects on the rural landscape character and amenity.	
NZIA and Architecture and Women Southern (NZIA)	238	Chapter 3, Strategic Direction	Oppose	The use of land for tourism is important and while diversification is supported, so too is the recognition of the importance of the land resource to provide for tourism activities.	That the submission is rejected to the extent it is inconsistent with Trojan Helmet Limited's original submissions.
NZIA and Architecture and Women Southern (NZIA)	238	Chapter 21, Rural Zone	Oppose	The submission is opposed to the extent it opposes the creation of new Rural Lifestyle Zones. New zonings and/or rural residential and lifestyle development should be assessed on a case by case basis and include an assessment of the ability, or	That the submission be rejected.

Original Submitter	Submission Number	Plan Provision	Support/Oppose	Reasons for Submission	Decision Sought by Trojan Helmet Limited
				otherwise, of the land to be farmed as an economic unit.	
NZIA	238	Chapter 22, Rural Residential and Rural Lifestyle	Oppose	It is not appropriate that all new development be located in urban areas. In some cases visitors may want to appreciate what the rural land can offer in terms of other uses, such as golf for example. It is appropriate that these other activities, which require a rural environment, but do not use the land in a traditional "productive" sense, be provided for. It is also appropriate that areas for lower density living be provided for in rural areas, as not all landowners seek or need to live in urban areas.	That the submission be rejected.
NZIA	238	Chapter 27, Subdivision and Development	Oppose	Distinctive edges between urban and rural areas may be appropriate in some, but not all cases. For instance, Arrowtown has an UGB but Millbrook is outside of that and still contributes to Arrowtown and does not detract from the rural environment. The proposed Hills Resort Zone and the proposed Rural Lifestyle	That the submission be rejected.

Original Submitter	Submission Number	Plan Provision	Support/Oppose	Reasons for Submission	Decision Sought by Trojan Helmet Limited
				zoning of Trojan Helmet Limited's McDonnell Road and Hogan's Gully Road land are comparable examples.	
NZIA	238	Chapter 14, Arrowtown Town Centre	Oppose	Trojan Helmet Limited has made an original submission seeking a bespoke Resort Zoning for the Hills Golf Course, and Rural Lifestyle Zoning for land it owns on McDonnell Road and Hogan's Gully Road. The proposed rezonings have been rigorously considered and thoroughly assessed in the expert's reports lodged with and forming part of the submissions. The nature and scale of the development sought to be enabled by the rezonings is not urban in nature and will not erode the character of Arrowtown or undermine the urban boundary.	That the submission is rejected, to the extent it is inconsistent with Trojan Helmet Limited's original submissions.
NZIA		Chapter 30, Energy and Utilities	Oppose	The decision is opposed to the extent it seeks a new policy that restricts urban development outside UGBs.  Trojan Helmet Limited has made original submissions	That the submission is rejected, to the extent it is inconsistent with Trojan Helmet Limited's original submissions.

Original Submitter	Submission Number	Plan Provision	Support/Oppose	Reasons for Submission	Decision Sought by Trojan Helmet Limited
				<p>seeking a bespoke Resort Zoning for the Hills Golf Course, and Rural Lifestyle Zoning for land it owns on McDonnell Road and Hogan's Gully Road.</p> <p>The proposed rezonings have been rigorously considered and thoroughly assessed in the reports lodged with and forming part of the original submissions. The nature and scale of the development sought to be enabled by the rezonings is not urban in nature and will not erode the character of Arrowtown or undermine the urban boundary.</p>	
Upper Clutha Environmental Society	145	Chapters 1 (clause 1.7.6 in particular)	Oppose	In respect of Chapter 1, clause 1.7.6, buildings are anticipated in the Rural Residential Zone and Rural Lifestyle zones on lots. Building poles are not necessary unless an applicant wishes to breach the rules of the zone in terms of bulk of a building.	That the submission be rejected.
Sue Bradley	146	Chapter 22, Rule 22.5.1.1	Support	Support the submission in relation to Rule 22.5.1.1 that the colours are too restrictive,	That the submission point be accepted.

Original Submitter	Submission Number	Plan Provision	Support/Oppose	Reasons for Submission	Decision Sought by Trojan Helmet Limited
				for the reasons stated in the submission.	
Aurum Survey Consultants	166	Chapter 27, Rule 27.4.1	Support	Trojan Helmet Limited agrees that, under Rule 27.4.1 subdivision should be a controlled activity where the subdivision is in keeping with the objectives of the zone, for the reasons stated in the submission.	That the submission point be accepted.
Aurum Survey Consultants	166	Chapter 27, Rule 27.4.3(a)	Support	Trojan Helmet Limited agrees that under Rule 27.4.3(a), subdivision should be a controlled activity where the subdivision is undertaken in accordance with a structure plan or spatial layout plan, for the reasons stated in the submission.	That the submission point be accepted.
Aurum Survey Consultants	166	Chapter 22, Rule 22.5.12.3	Support	Reject the 4ha cap to calculate the average, for the reasons stated in this submission.	That the submission point be accepted.
Jane and Mark Taylor	444	Chapter 22, Rule 22.5, Table 2	Support	The submission in relation to Rule 22.5, Table 2, which seeks the standard for building size is deleted and the former controlled activity status is retained, which is supported, for the reasons stated in the submission.	That the submission point be accepted.



Original Submitter	Submission Number	Plan Provision	Support/Oppose	Reasons for Submission	Decision Sought by Trojan Helmet Limited
Wayne Evans, G W Stalker Family Trust, Mike Henry	534	Chapter 22, Rule 22.5	Support in part	The submission in relation to Rule 22.5, which seeks clarification and amendment to the Building Materials and Colours rule, including that the former 36% reflectivity LRV is reinstated, which is supported for the reasons stated in the submission	The submission point be accepted to the extent it is not inconsistent with the Trojan Helmet Limited's original submission.
Wayne Evans, G W Stalker Family Trust, Mike Henry	534	Chapter 22, Rule 22.5.3	Support	The submission that Rule 22.5.3 be deleted is supported, for the reasons stated in the submission. There is no need for a maximum building footprint rule when there is already a building coverage rule.	That the submission point be accepted.
Wayne Evans, G W Stalker Family Trust, Mike Henry	534	Chapter 27, New Rule 27.5.5	Support	The submission seeking a new rule be included in the Proposed Plan that provides for boundary adjustments as a controlled activity is supported for the reasons stated in the submission	That the submission point be accepted.
Jane Shearer	29	Chapter 22, Rule 22.5, Table 2	Support in part	The submission seeking amendments to policy and/or other provisions which explain differences in glossy and matte surfaces in reflecting light and consider more analysis is made of the rules.	That the submission point be accepted.

Original Submitter	Submission Number	Plan Provision	Support/Oppose	Reasons for Submission	Decision Sought by Trojan Helmet Limited
Anna-Marie Chin Architects and Phil Vautier	368	Chapter 22, Rule 22.5.3	Support	The submission seeking Rule 22.5.3 be deleted is supported for the reasons stated in the submission and in Trojan Helmet Limited's original submission. The deletion of the rule is appropriate as the platform size has already defined the area to build on.	That the submission point be accepted.
Anna-Marie Chin Architects and Phil Vautier	368	Chapter 22, Rule 22.5, Table 2	Support	The submission seeking that reflective values of building surfaces for walls and roofs be increased back to 36% is supported for the reasons stated in the submission.	That the submission point be accepted.

5. Trojan Helmet Limited **DOES** wish to be heard in support of this further submission; and
6. If others make a similar submission, Trojan Helmet Limited **WILL** consider presenting a joint case with them at the hearing.

TROJAN HELMET LIMITED

A A Hutton / J A Brown



Authorised to sign on behalf of Trojan Helmet Limited

Dated: 18 December 2015





# Queenstown Lakes District Council

## Proposed District Plan Stage 2 - Submission

Clause 6 of First Schedule, Resource Management Act 1991  
FORM 2

Correspondence to:  
Attn: Submission Team  
Queenstown Lakes District Council  
Private Bag 50072  
QUEENSTOWN 9348

For office use only

Submission No:

Receipt Date:

### 1. Submitter details:

**Full Name of Submitter:** TROJAN HELMET LIMITED (THL)

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QUEENSTOWN

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**Contact Person:** A Hutton / J Brown  
R Wolt

### 2. Scope of submission

**2.1 This is a submission on the Queenstown Lakes District Proposed District Plan (PDP) Stage 2, notified 23 November 2017**

**2.2 Summary and Purpose of submission:**

THL **OPPOSES** the inclusion of the land between Lake Hayes – Arrowtown Road, McDonnell Road and Hogans Gully Road as shown in **Figure 1** (attached) in the Wakatipu Basin Rural Amenity Zone (**WBRAZ**) and seeks a bespoke resort zoning for the land, or a similarly enabling zoning, or that the provisions of the WBRAZ be amended in so far as they apply to the land so as to enable residential development in appropriate locations and commercial golf courses including all associated and ancillary activities.

THL seeks various modifications to the WBRAZ and Wakatipu Basin Lifestyle Precinct (**WBLP**) provisions to enable more efficient use of the land.

The details of the submission and the reasons for the submission are set out below.

**2.3 The specific provisions that THL's submission relates to include:**

- (a) Proposed Planning maps and the location of the WBRAZ
- (b) Chapter 24 – Wakatipu Basin
- (c) Chapter 45 – Resort Zones

- (d) Chapter 25 – Earthworks
- (e) Chapter 27 – Subdivision
- (e) Chapters 3 and 6 (Stage 1) and Chapter 6, Rule 6.4.1.3 (Variation)
- (f) Any other provisions relevant to the purpose of this submission described in Parts 3 – 8 below.

### 3. Submission

#### 3.1 Planning Maps 26 and 27 and the Wakatipu Basin Rural Amenity Zone

THL **OPPOSES** the inclusion of the land between Lake Hayes – Arrowtown Road, McDonnell Road and Hogans Gully Road in the WBRAZ as shown on **Figure 1** attached and seeks alternative zonings as described below.

#### 3.2 The reasons for the submission include:

- (a) The land already contains:
  - two golf courses (one is an international standards championship course that frequently hosts the New Zealand Golf Open) along with various associated buildings, accessways, and carparks);
  - several dwellings and associated buildings and activities;
  - a large dwelling that is used as a visitor accommodation lodge;
  - a sculpture park and associated small scale craft industry; and
  - a subdivision consent to create 18 new rural residential titles and land use consents to construct a dwelling on each of these new titles.

The existing open space / golf landscape will inevitably change because of the consented development.

- (b) The land has varied topography and degrees of visibility when viewed from outside the site and has significant potential for further development that can be located and designed in a manner that does not adversely affect the landscape and visual amenity values of the land or of the wider surrounding environment.
- (c) This potential for additional, appropriate development is reflected in the notified Chapter 24's Landscape Classification Unit 22 (The Hills) (**LCU22**). This describes the potential landscape opportunities and benefits associated with additional development as:
  - *Relatively visually discreet nature of the location (due to landform and, to a lesser degree, vegetation patterns).*
  - *Integration potential of landform pattern.*
  - *Riparian restoration potential.*
  - *Integration of walkways / cycleways.*
  - *Close proximity to Arrowtown.*
  - *Large-scaled lots suggest potential for subdivision.*

In LCU22, the environmental characteristics and visual amenity values to be maintained and enhanced include:

- *Locating buildings so that they are visually discreet.*
- *Integration of buildings with landform and planting.*
- *Set back of buildings from the ridgeline crests to the eastern edges of the unit.*

Based on this assessment, the notified Chapter 24 rates the LCU22's capability to absorb additional development as "Moderate".

- (d) The "Moderate" development absorption capacity rating applies to only two other parts of the Wakatipu Basin. One of these is the Millbrook Resort Zone (Chapter 43) area that contains (like the Hills land) golf courses, but also contains large areas of development that is urban in scale and character. The Millbrook Zone is not included in the notified Chapter 24 -Wakatipu Basin Zone.
- (e) The LCU22 area with its "Moderate" development absorption capacity rating is considerably different to many other areas in the Basin. In particular, it is different to many of the areas that have a "Moderate-Low", "Low" and "Very Low" absorption capacity rating. The differences are in the respective areas' topographical features, degree of visibility when viewed from other areas, proximity to outstanding natural landscapes or features, and overall degree of absorption capability.
- (f) Despite the many and very obvious differences in their characters, all of the land within the "Moderate", "Moderate-Low", "Low" and "Very Low" categories are subject to exactly the same WBRAZ objectives, policies and rules. Most notably, this includes the rules that provide for minimum lot sizes for subdivision in the WBRAZ.
- (g) This "blanket" approach to subdivision, and subsequent development, is inconsistent with the higher order objectives and policies of the PDP in that some areas, including The Hills under LCU22, can comfortably absorb well-located and designed subdivision and development that is entirely consistent with all the objectives and policies in 24.2.1 – 24.2.4. Such development would be a significantly greater density than the blanket 1 dwelling per 80ha minimum proposed in the notified Chapter 24.

### 3.3 Accordingly, THL seeks the following:

- (a) Given the "Moderate" development absorption capacity rating, the WBRAZ zoning of The Hills land should be deleted and replaced with a more appropriate, bespoke zoning that recognises the existing physical resources of the golf courses and related buildings and activities, the existing dwellings and associated rural living activities, the existing consents, and the area's natural resources that include some areas that are topographically confined and where greater development is able to be easily absorbed. The bespoke **The Hills Resort Zone** provisions, including an objective, policies, rules and a bespoke Structure Plan that are proposed to apply to the land are addressed in **Part 4** below, along with supporting expert reports and a section 32 evaluation.
- (b) As a less preferred alternative, if the Resort Zone for the land is not accepted, areas within The Hills land that are suitable for development, as identified on the proposed Resort Zone Structure Plan, should be included within the Wakatipu Basin Lifestyle Precinct, with provision made for a minimum subdivision lot size area of 2000m<sup>2</sup> in these areas. Other modifications are sought to the Precinct provisions that would apply to these development areas, along with modifications the WBRAZ zone provisions that would apply to the land not within the Precinct development areas, as set out in **Part 5** below.

- (c) As a least preferred alternative, if the above submissions are rejected and the zoning of the land remains WBRAZ, the WBRAZ objectives, policies and rules should be modified so that areas with the “Moderate” LCU development absorption capacity are subject to a discretionary regime for subdivision, akin to the legacy Rural General Zone’s discretionary regime and using the LCU22 provisions as part of the assessment of new subdivision proposals. This discretionary regime would not be subject to a minimum lot size and would replace the notified Chapter 24 subdivision regime of 1 lot per 80ha minimum lot size (with non-complying status for breach). Modifications to other WBRAZ provisions are required to ensure that appropriate development of the land is not unduly restricted. The modifications necessary for this relief are set out in **Part 6** below.
- (d) For any one or combination of the reliefs, the general submissions in **Part 7** below are also relevant.

#### 4. The Hills Resort Zone – inclusion of new resort zone in Chapter 45

##### 4.1 Planning maps 26 and 27

For the land shown in **Figure 1**, delete the proposed WBRAZ zoning of the land and replace with the Resort Zone.

##### 4.2 Chapter 45 – The Hills Resort Zone

- (a) Add a new resort zone as “**Chapter 45: The Hills Resort Zone**” as per **Annexure A** (including objective, policies, rules and structure plan, along with necessary and consequential changes to other chapters of the Proposed plan that would apply to the new Zone) that provides for, in summary a golf course and related resort activities and facilities, including, notably:
  - (i) Golf course and practice green, provisions for a driving range
  - (ii) Golf club house, with restaurant, café, and associated commercial activities;
  - (iii) Maintenance and service facilities;
  - (iv) Residential / visitor accommodation in areas that are nestled into the landscape;
  - (v) Worker accommodation;
  - (vi) Amenity landscaping.
- (c) The facilities are to be located in accordance with a Structure Plan that provides for activity areas for different land uses, access, landscaping areas and so on.
- (d) The proposed The Hills Resort zone will achieve the purpose of the Act and the overarching objectives of the Plan through well managed and located development carried out in a responsible manner;
- (e) The Hills Resort Zone is supported by the following reports which are attached to and form part of this submission:

**Annexure A:** The Hills Resort Zone - Proposed Provisions

**Annexure B:** Section 32 “The Hills Resort Zone” prepared by Brown & Company Group, dated 23 February 2018;



- Annexure C:** The Hills Resort Zone, Master Planning report, prepared by Darby Partners, dated 21 February 2018;
- Annexure D:** The Hills, Resort Zone for the Hills, Assessment of Landscape and Visual effects, prepared by Boffa Miskell, dated February 2018;
- Annexure E:** The Hills Rezoning, Helicopter Noise Assessment, prepared by Marshall Day Acoustics, 12 October 2015;
- Annexure F:** The Hills Resort Zone, Transportation Assessment Report, prepared by Traffic Design Group, dated October 2015
- Annexure G:** The Hills Golf Course Land, Infrastructure Feasibility. Prepared by Hadley Consultants Limited, dated 21 October 2015
- Annexure H:** Hills Golf Course Land (including McDonnell Road Land) and Hogans Gully Land, Natural Hazard Assessment, prepared by Hadley Consultants Limited, dated 21 October 2015
- Annexure I:** The Hills Special Zone Submission, Preliminary and Detailed Site Investigations, prepared by Davis Consulting Limited, Dated 21/10/2015

## **5. Alternative Zoning (Less Preferred): apply the Wakatipu Basin Lifestyle Precinct in the development areas identified on the proposed Structure Plan**

### **5.1 Planning maps 26 and 27**

- (a) An alternative, less preferred relief to the relief sought in Part 4 above, THL seeks to include within the WBLP the parts of the land that have a greater potential to absorb development, being the various activity areas shown on the proposed Structure Plan for The Hills Resort Zone.
- (b) The minimum lot size in these development/WBLP areas (under notified Rule 27.5.1), should be 2000m<sup>2</sup>. Bespoke rules can be included in the WBLP which address the land and require dwellings to be grouped in the areas of the land that are able to absorb the zone that is most appropriate for development. A structure plan will show these areas, as well as the area for ecological protection and enhancement and areas to be utilised only for farming, golf or other appropriate purposes.

### **5.2 Modifications to the WBLP**

The modifications required to the WBLP provisions that are to apply to the WBLP development areas shown on the Structure Plan include the following:

#### **5.2.1 Part 24.1: Zone Purpose**

Modify the Zone Purpose as follows:

...

*In the Precinct ~~a limited opportunity for~~ subdivision is provided for, with a range of minimum lot sizes to suit the locational attributes of the particular part of the Precinct of 6000 in conjunction with an average lot size of one hectare (10,000m<sup>2</sup>). Controls on the location, nature and visual effects of buildings are used to provide a flexible and design led response to the landscape character and visual amenity qualities of the Precinct.*

...

The reasons for this modification are:

- (a) The words "... *limited opportunity for subdivision* ..." should be deleted because the primary purpose of the WBLP is rural residential living, and therefore the opportunity for subdivision for this purpose should be encouraged and enabled;
- (b) The minimum lot size of 6000m<sup>2</sup> and average lot size of 1ha will not enable a "*flexible and design led response* ..." as is intended by the purpose statement. Rather, the similarity in the minimum and average lots sizes would yield a standard, uniform, "cookie-cutter" subdivision outcome, across the WBLP, with lots generally between 6000m<sup>2</sup> and 1.4ha. This range may not be the best fit for the particular natural features, landscape character or amenity values of a particular area;
- (c) Across the WBLP there is a wide variety of locational attributes, topographies, and degrees of potential visibility. The most appropriate intensity in some areas may be a 6000m<sup>2</sup> minimum lot size / 1ha average, but in other areas this may not be the case; a smaller minimum lot size, and perhaps no average, may be more appropriate, to achieve:
  - greater flexibility and innovation in subdivision design; and
  - design that integrates lots and development with the natural features, landscape character or amenity values of a site and wider surrounds;
- (d) Areas within which new development is able to be absorbed into the landscape without adverse effects on the wider landscape values of the Basin – as generally delineated by the WBLP – are, collectively, a finite resource. More efficient use of these areas, for the WBLP's primary purpose of rural residential development, should be enabled; the provisions should generally promote a greater intensity of rural residential lots while maintaining development standards to appropriately manage external effects;
- (e) There is no clear section 32 evaluation that justifies the 6000m<sup>2</sup> / 1ha regime across the entire WBLP.

#### 5.2.2 Objective 24.2.5

Modify this objective as follows:

**24.2.5**      ***Objective – The landscape character and visual amenity values of the Precinct are maintained and enhanced in conjunction with enabling rural residential living opportunities. Enable rural residential living opportunities while managing effects of subdivision and development on the landscape character and visual amenity values of the Precinct.***

The reason for the modification is:

- (a) the premise of the notified objective is flawed because the WBLP is intended to provide for rural residential living which will inevitably change the landscape character and visual amenity of a site (and, potentially, the wider surrounding area). The wording of the notified objective could be interpreted to mean that landscape character and visual amenity values should not change. In particular, “maintain” implies “do not change”, and “enhance” implies “improve”. The premise of the objective should be reversed, in that the purpose of the Precinct – having found to have moderate-high or high capacity for absorption of development – is rural residential living, enabled in a way that effects on landscape character and visual amenity values are properly managed;
- (b) As in (a) above, the purpose of the WBLP is rural living; the Precinct applies in locations (with moderate-high or high capacity for absorption of development) where rural living can, subject to the relevant activity rules and standards, occur without adverse effects on the landscape and visual amenity values. The reversal of the objective as promoted in the submission makes it clear that the objective is to enable rural living while managing its effects. The words “maintain” and “enhance” are deleted for the reasons set out in (b) above;

### 5.2.3 Policies 24.2.5.1 – 24.2.5.6

Modify the policies as follows:

<b>Policies</b>	<b>24.2.5.1</b>	<i>Provide for rural residential subdivision, use and development <del>only where it protects, maintains or enhances</del> <u>while taking into account and avoiding, remedying or mitigating any potential adverse effects on the landscape character and visual amenity values as described within the landscape character unit as defined in Schedule 24.8.</u></i>
	<b>24.2.5.2</b>	<i>Promote design-led and innovative patterns of subdivision and development that <del>maintain and enhance</del> <u>take into account</u> the landscape character and visual amenity values <del>of the Wakatipu Basin overall</del> <u>as defined in Schedule 24.8.</u></i>
	<b>24.2.5.3</b>	<i>Provide for non-residential activities, including restaurants, visitor accommodation, and commercial recreation activities while ensuring these are appropriately located and of a scale and intensity that ensures that the amenity, quality and character of the Precinct is retained.</i>
	<b>24.2.5.4</b>	<i>Implement <del>minimum and average</del> lot size standards in conjunction with <del>building coverage and height standards</del> <u>development standards</u> so that the landscape character and visual amenity qualities <del>of the Precinct</del> <u>as defined in Schedule 24.8</u> are not compromised by cumulative adverse effects of development.</i>
	<b>24.2.5.5</b>	<i>Maintain and enhance a distinct and visible edge between the Precinct and the Zone.</i>
	<b>24.2.5.6</b>	<i>Retain vegetation where this contributes to landscape character and visual amenity values of the Precinct and is integral to the maintenance of the established character of the Precinct.</i>

The reasons for the modifications are:

- (a) The modification to Policy 24.2.5.1 is necessary to reflect the changes to the objective, as discussed in 3.2.2 above, and for the same reason as the changes to the objective.
- (b) The modifications to Policy 24.2.5.2 are necessary for the reasons set out above in relation to the objective: subdivision and development for rural residential living purposes will inevitably change landscape character and visual amenity values. The words “maintain” and “enhance” imply, respectively, “do not change”, and “improve”, which may be interpreted to be contrary to the WBLP’s primary purpose of rural residential living. Rather, change should be anticipated and properly managed, and development should be required to take into account the specific values of the landscape character units, as recorded in Schedule 24.8;
- (c) The modifications to Policy 24.2.5.4 are necessary, as follows:
  - (i) Given the wide variety of locational attributes, topographies, and degrees of potential visibility from other areas, the “one size fits all” approach, with a minimum and average area, is not appropriate for the WBLP. Some areas may be able to absorb smaller sites, some not, and in some areas an average may be appropriate. Accordingly, the words “minimum and average” are deleted from the policy;
  - (ii) “Building coverage” and “height standards” are only two of the relevant standards that play a role in regulating development for the purpose of managing effects on landscape and visual amenity values. Setbacks from roads and other properties are also relevant standards. The policy should take into account all of the relevant standards, and the modification reflects this;
  - (iii) The words “... of the Precinct ...” are deleted because landscape and visual amenity values are not constant across all areas within the Precinct; there is a wide variety of locational attributes, topographies, and degrees of potential visibility. Each area within the Precinct is addressed in the Landscape Character Unit descriptions in Schedule 24.8, and it is appropriate that these descriptions, rather than an assumed generic set of values are the subject of the Policy.

**5.2.4 Table 24.2:**

Modify Table 24.2 as follows:

Table 24.2	Activities in the Wakatipu Basin Lifestyle Precinct	Activity Status
<b>24.4.1</b>	Any activity not listed in Tables 24.1 to 24.3	NG <u>D</u>
...		
<b><u>24.4.25</u></b>	<p><u>The construction of new residential buildings and the exterior alteration to existing buildings located within an existing approved/registered building platform area.</u></p> <p><u>Control is restricted to:</u></p> <ul style="list-style-type: none"> <li>• <u>Building scale and form.</u></li> <li>• <u>External appearance including materials and colours.</u></li> <li>• <u>Accessways.</u></li> <li>• <u>Servicing and site works including earthworks.</u></li> </ul>	<u>C</u>

	<ul style="list-style-type: none"> <li>• <u>Retaining structures.</u></li> <li>• <u>Infrastructure (e.g. water tanks).</u></li> <li>• <u>Fencing and gates.</u></li> <li>• <u>External lighting.</u></li> <li>• <u>Landform modification, landscaping and planting (existing and proposed).</u></li> <li>• <u>Natural hazards.</u></li> </ul> <p><u>Excludes farm buildings as provided for in Rule 24.4.8</u></p>	
<b>24.2.26</b>	<u>The construction of new residential buildings not located within an existing approved/registered building platform area</u>	<u>NC</u>
[renumber accordingly]	...	
24.4.29	<p><del>Clearance, works within the root protection zone or significant trimming of native and/or exotic vegetation. <u>that is of a height greater than 4 metres.</u></del></p> <p>Discretion is restricted to:</p> <ul style="list-style-type: none"> <li><del>— The extent of clearance</del></li> <li><del>— Trimming and works within the root protection zone</del></li> </ul>	<b>RD P</b>

The reasons for the modifications are:

*In relation to the status of activities not listed in the Tables:*

- (a) The discretionary status is more appropriate for activities that are unintentionally left out of the table, including, for example, in proposed Rule 24.4.29 – works within root protection zone or trimming of exotic vegetation of a height that is greater than 4m. The status of such works for trees less than 4m would be non-complying, which is not the intention. The alternative is to ensure that the tables list the status of a breach for all relevant activities, such as those where a dimension is included as part of the rule. If that is adequately addressed then the overall non-complying default status for “activities not listed” is appropriate.

A further alternative is that, if the above cannot be accommodated, the rules should be redrafted so that all activities not listed or otherwise provide for in the Tables are permitted activities (in the same manner as the structure of the operative plan

*In relation to the status of buildings:*

- (b) The subdivision rules require (or should require) that a residential building platform (**RBP**) is nominated on a scheme plan at the time of subdivision so that the consent authority and other parties can assess the likely effects of a future dwelling on the new lot. The location and effects of a future dwelling, along with other associated works such as access and landscaping, will be sufficiently apparent, at the time of subdivision, to allow certainty of the right for a future dwelling and to preclude any need for subsequent Council discretion to refuse an application for a dwelling<sup>1</sup>;
- (c) The Restricted Discretionary Activity (**RDA**) status for a dwelling within a RBP creates too much uncertainty for property owners and is unnecessary, particularly so in the WBLP because the purpose of the WBLP is to create lots for rural residential purposes;

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<sup>1</sup> Provided other appropriate development standards are met

- (d) The controlled activity status is more appropriate because it provides certainty for landowners while still allowing the Council to manage the effects of a dwelling within the RBP, and associated works, through imposing conditions in relation to the matters of control, as set out in the rule;
- (e) The planning method of creating a RBP at the time of the discretionary activity / restricted discretionary subdivision, with controlled activity status for subsequent buildings within the RBP, is well-established in the District, and there is no evidence or section 32 evaluation suggesting that the method has generated adverse effects and is inappropriate;
- (f) The default status of non-complying is appropriate for any proposed building not located within an existing approved/registered building platform area because it sets clear guidance on the expected density of dwellings in the WBLP and enables rigorous assessment of the effects of any building not within the RBP.

*In relation to clearance of exotic vegetation of a height greater than 4m*

- (g) Requiring consent to remove, trim or undertake works in the root protection zone is unwarranted. If protection of trees in the WBLP is required to screen buildings this should be protected by a consent condition on a development or as specific protected items in the District Plan. A blanket rule is inefficient and this approach is not necessary and should be deleted.

**5.2.5 Part 24.5: Rules – Standards – Table 24.3**

Modify Table 24.3 as follows:

	<b>Table 24.3 – Standards</b>	<b>Non-compliance Status</b>
<b>24.5.1</b>	<p><b>Building coverage</b></p> <p>The maximum building coverage for all buildings shall be:</p> <p><b>For lots 4000m<sup>2</sup> or greater:</b> 15% of lot area, or 500 <b>1000m<sup>2</sup></b> gross floor area whichever is the lesser.</p> <p><b>For lots less than 4000m<sup>2</sup>: 25% of lot area</b></p> <p>Discretion is restricted to ...</p>	RD
...		
<b>24.5.3</b>	<p><b>Building height</b></p> <p>The maximum height of any building shall be <b>6.8</b> m.</p> <p>Discretion is restricted to ...</p>	RD
...		
<b>24.5.15</b>	<p><del><b>Residential visitor accommodation</b></del></p> <p><del>The commercial letting of one residential unit or residential flat per site for up to 3 lets not exceeding a cumulative total of 28 nights per 12 month period</del></p>	⊘
<b>24.5.16</b>	<p><del><b>Homestay</b></del></p> <p><del>a. May occur within either an occupied residential unit or an occupied residential flat on a site, and shall not occur within both on a site.</del></p> <p><del>b. Shall not exceed 5 paying guests per night.</del></p>	⊘

The reasons for the modification are:

- (a) In relation to Rule 24.5.1:

- (i) The reference to “gross floor area” (**GFA**) is redundant as the rule is targeting a limit on building footprint, not GFA;
  - (ii) The maximum allowed size of a RBP is 1000m<sup>2</sup> so this should be the maximum coverage, including dwelling and accessory buildings, or 15% of lot area, for lots 4000m<sup>2</sup> or larger. The effects of the location of these buildings within the RBP will have been addressed at the time of subdivision, and there is no further need to address effects of the location of the building;
  - (iii) For lots smaller than 4000m<sup>2</sup>, 15% coverage may be too small to comfortably accommodate a dwelling and accessory buildings, therefore a 25% coverage limit is proposed.
- (b) In relation to Rule 24.5.3:
- (i) The building height of 6m is too restrictive and may only enable 1 – 1.5 floors in a dwelling;
  - (ii) A building height of 8m is more appropriate as it enables two levels. The 8m height limit has existed for many decades without significant problems;
  - (iii) If at the time of subdivision any potential adverse effects arising from the height of a building in a specific location are identified (as addressed in the assessment of the RBP location) then a specific height limit can be imposed by way of consent notice on the title of the lot. This is well-established practice.
- (c) In relation to Standards 24.5.15 and 24.5.16:
- (i) The rules should be deleted because they are a significant market intervention without environmental justification;
  - (ii) The notified provisions are a significant and unjustified intervention into the residential and visitor accommodation market in the District;
  - (iii) The information relied upon in the s32 justification for the visitor accommodation variation states that a significant number of listings (such as in Airbnb) comprise properties that are likely to be used “exclusively” for VA purposes<sup>2</sup>. This is not justified. Most owners, and/or their family and friends, would use the properties even if only occasionally for short term stays. Many use their properties frequently as a second home and prefer the convenience of letting their homes for short term VA while they are absent.
  - (iv) There is no evidence to suggest that the rules will result in home owners leasing their properties to long term tenants.
  - (v) The proposed rule ignores the fact that many owners prefer short term VA rentals rather than long term open leasing because:
    - It allows the owner(s) and/or their families and friends the freedom to stay at their property whenever they wish by temporarily taking the property out of the VA “pool”. This freedom is in most cases not available to the owners if the property is leased to long term tenants; and

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<sup>2</sup> See para 6.19 of the s32 dated 2 November 2017

- The financial rewards are likely to be higher from short term VA leasing; and
  - Short term VA leasing is usually accompanied by property up-keep and regular cleaning, which is not always guaranteed if the property is occupied by long term tenants.
- (vi) The ability to enable short term VA leasing assists the District in fulfilling its continued and growing demand for VA accommodation, especially for families and other groups of more than 2 people who may not be able to afford multiple hotel or motel rooms, who do not wish to stay at a backpacker operation, and who would prefer the comforts of a home during their stay.
- (vii) There is no evidence that short term VA leasing will cause greater adverse effects on residential amenity than long term rentals. For example, the District has by nature a large “transient” or seasonal sector of the population. Long term tenants will include late shift workers (restaurants, bars, hotel staff) who arrive home very late at night, which can disrupt residential amenity on a more regular basis than short term VA tenants.
- (viii) There is little difference between the “permanent” effects of the use of a property by long term tenants than the less frequent, temporary effects of the use by short term VA tenants.
- (ix) The natural attributes and economy of the District are such that the District has high numbers of holiday homes, high numbers of short term visitors, and high numbers of transient workers in tourism-related industries. The juxtaposition of all of these has created the circumstances where short term VA leasing of private residences is practicable, viable and necessary. Intervention into this aspect of the economy is perilous, and other methods of increasing housing availability and reducing affordability should be contemplated on a wider basis rather than through the mechanisms proposed in the Variation.
- (x) The section 32 evaluation identifies that only 2.2% of the visitor accommodation is provided in rural areas, and therefore the alleged adverse impacts on residential cohesion and character are not relevant in the rural areas;
- (xi) For these reasons in the WBRAZ, the standards for Residential Visitor Accommodation and Homestays should not apply and should be deleted.

#### 5.2.6 Rule 24.7: Assessment matters – Restricted Discretionary Activities

Modify the rule as follows:

#### **24.7 Assessment Matters – Controlled and Restricted Discretionary Activities**

**24.7.1** In considering whether or not to grant consent and/or to impose conditions on a resource consent, regard shall be had to the assessment matters set out at 24.7.3 to 24.7.13.

**24.7.2** All proposals for restricted discretionary activities will also be assessed as to whether they are consistent with the relevant objectives and policies for ~~the Zone or Precinct as well as those in Chapters 3 Strategic Direction; Chapter 4 Urban Development; Chapter 6 Landscapes and Chapter 28- Natural Hazards.~~



The reason for the modification to 24.7.1 is: the modification is a consequential amendment arising from the submission in 6.2.2 above, in relation to the status of dwellings within a RBP.

The reason for the modification to 24.7.2 is: it is inappropriate to require assessment of an RDA against the higher order objectives and policies of the Plan, as this opens up the discretion to practically any matter, rather than restricting it to the matters for which the rule is designed and is akin to the assessment required for a non-complying activity. The costs to the applicant and the Council of requiring such an assessment would be unreasonably high. The only reasonable exception is the provisions for natural hazards.

**5.2.7 Rule 24.7.3 Assessment matters**

Modify Rule 24.7.3 as follows:

	<b>Assessment matters</b>
<b>24.7.3</b>	<p>New buildings (and alterations of existing buildings) <b><u>within a residential building platform</u></b>, residential flat, building coverage and building height infringements:</p> <p><b>Landscape and visual amenity</b></p> <p>a. Whether the <del>location</del>, form, scale, design and finished materials including colours of the building(s) adequately responds to the identified landscape character and visual amenity qualities of the landscape character units set out in Schedule 24.8 and the criteria set out below.</p> <p>b. The extent to which the <del>location and</del> design of buildings and ancillary elements and the landscape treatment complement the existing landscape character and visual amenity values, including consideration of:</p> <p>...</p> <ul style="list-style-type: none"> <li>• Design, <del>and</del> size <del>and location</del> of accessory buildings</li> </ul> <p>...</p>
...	

The reason for the submission is that the location of buildings will have been addressed at the time of subdivision.

**5.2.8 Variation to Stage 1 Subdivision and Development Chapter 27 Rule 27.5.1**

Modify Rule 27.5.1 as follows:

<b>Zone</b>		<b>Minimum Lot Area</b>
<b>Rural</b>	...	
	Wakatipu Basin Lifestyle Precinct	<p>...</p> <p><b><u>In the Hills area (LCU22): minimum 2000m<sup>2</sup> / no average lot size requirement</u></b></p>

The reasons for the opposition and the modification are as follows:

- (a) The reasons set out in 5.2.1 above;
- (b) The rigidity of the 6000m<sup>2</sup> / 1ha average subdivision configuration, and the non-complying status for breaching these minima, would inhibit an innovative design

approach and would likely lead to an inferior environmental outcome, for the future lot owners and neighbours;

- (c) The 6000m<sup>2</sup> / 1ha average rules are contrary to the various provisions seeking flexible and innovative subdivision design, for example:
- Policy 24.2.5.2: “Promote design-led and innovative patterns of subdivision and development ...”;
  - Assessment matters for subdivision, such as Rule 27.7.6.2(f): “Whether clustering of future buildings would offer a better solution for maintaining a sense of openness and spaciousness, or the integration of development with existing landform and vegetation patterns.”
- (d) For the THL land at the Hills, a 2000m<sup>2</sup> min lot size, with no average lot size requirement, is appropriate as it enables, within the varied topography and features of the land, an innovative subdivision response that can provide rural residential development that takes into account:
- the topography;
  - views;
  - neighbouring properties and their various land uses;

**5.2.9** Under the Part 5 relief scenario, modifications are required to the WBRAZ as that Zone would apply to all of THL’s land not located within any of the development areas identified on the Proposed Structure Plan. The modifications required to the WBRAZ are generally detailed in Part 6 of this submission, below. The modifications detailed in Part 7 are also relevant.

**6. Alternative Zoning (Least Preferred): if the zoning of the land in Figure 1 remains WBRAZ, apply a discretionary activity regime with no minimum lot size for subdivision in the LCU areas with “Moderate” development absorption capacity, and further modify the WBRAZ:**

**6.1 Planning Maps 26 and 27**

Apply a hatch or other similar notation outlining the LCU22, with a label “Moderate Development Absorption Capacity” in the legend;

**6.2 Chapter 24: Wakatipu Basin**

**6.2.1 Part 24.2 – Objectives and policies**

Insert a new objective and policies that, for the areas marked “Moderate Development Absorption Capacity” on the planning maps, exempt the areas from the subdivision minimum lot size for the WBRAZ in Chapter 27, Rule 27.5.1; and provide for subdivision as a discretionary activity.

**6.2.2 Part 24.4 – Rules**

Modify Table 24.1 as follows:

Table 24.1	Activities in the Wakatipu Basin Rural Amenity Zone	Activity Status
...		
24.4.1	Any activity not listed in Tables 24.1 to 24.3	<b>NC</b> <b><u>D</u></b>
24.4.5	The construction of <u>residential</u> buildings including exterior alteration to existing buildings <del>including buildings</del> located within an approved/registered building platform area.  Control is restricted to: <ul style="list-style-type: none"> <li>• Building <del>location</del> scale and form.</li> <li>• ...</li> </ul>	<b>RD</b> <b><u>C</u></b>
<b><u>24.4.6</u></b>	<u>The identification of a residential building platform or the construction of new residential buildings and the exterior alteration to existing buildings located outside an approved building platform area.</u>	<b><u>D</u></b>
[renumber accordingly]	...	

The reasons for the modifications are:

*In relation to the status of activities not listed in the Tables:*

- (a) The discretionary status is more appropriate for activities that are unintentionally left out of the table, including, for example, in Rule 24.4.29 – works within root protection zone or trimming of exotic vegetation of a height that is greater than 4m. The status of such works for trees less than 4m would be non-complying, which is not the intention. The alternative is to ensure that the tables list the status of a breach for all relevant activities, such as those where a dimension is included as part of the rule. If that is adequately addressed then the overall non-complying default status for “activities not listed” is appropriate.
- (b) A further alternative is that, if the above cannot be accommodated, the rules should be redrafted so that all activities not listed or otherwise provide for in the Tables are permitted activities (in the same manner as the structure of the operative plan).

*In relation to the status of buildings:*

- (b) The WBRAZ removes land use and subdivision rights established through existing legacy zonings and previous consent processes. This does not enable the landowners directly affected to provide for their social and economic well-being as they have made and continue to make significant economic decisions based on those zonings and consents. Landowners have made significant capital investment in their properties. The change of zoning to the WBRAZ introduces considerable uncertainty for owners, particularly those who have not exercised the entitlements afforded by the existing zonings, including the construction of a dwelling, or subdivision;
- (c) Where a residential building platform (**RBP**) has previously been approved, the likely effects of a future dwelling on the new lot will have been assessed. The location and effects of a future dwelling, along with other associated works such as access and landscaping, will have been sufficiently apparent, at the time of

approval, to allow certainty of the right for a future dwelling and to preclude any need for Council discretion to refuse an application for a dwelling<sup>3</sup>;

- (d) The Restricted Discretionary Activity (**RDA**) status for a dwelling within a RBP creates too much uncertainty for property owners and is unnecessary, particularly so in the WBLP because the purpose of the WBLP is to create lots for rural residential purposes;
- (e) The Controlled activity status is more appropriate because it provides certainty for landowners while still allowing the Council to manage the effects of a dwelling within the RBP, and associated works, through imposing conditions in relation to the matters of control, as set out in the rule;
- (f) The planning method of creating a RBP at the time of the discretionary activity / restricted discretionary subdivision, with controlled activity status for subsequent buildings within the RBP, is well-established in the District, and there is no evidence or section 32 evaluation suggesting that the method has generated adverse effects and is inappropriate;
- (g) For the identification of a new RBP or for buildings outside an RBP the discretionary status is appropriate (as is the case in the operative rural zone and the Rural Zone in Stage 1 of the PDP), and if necessary the same or similar assessment matters from the Rural Zone should be adopted for the WBRAZ, to enable rigorous assessment of the effects of any building not within the RBP.

### **6.2.3 Standards – Table 24.3**

Modify Table 24.3 as set out in 5.2.5 above, for the same reasons.

### **6.2.4 Rule 24.7: Assessment matters – Restricted Discretionary Activities**

Modify the rule as set out in Part 5.2.6 above, for the same reasons.

### **6.2.5 Rule 24.7.3 Assessment matters**

Modify Rule 24.7.3 as set out in Part 5.2.7 above, for the same reasons.

## **6.3 Chapter 27: Subdivision**

Insert new rules that:

- (a) Exempt the land identified in **Figure 1** from the subdivision minimum lot size for the WBRAZ in Chapter 27, Rule 27.5.1; and
- (b) Provide for subdivision of the land as a discretionary activity, with no minimum lot size, using the landscape assessment matters from the Rural Zone, and inserting the LCU22 provisions as part of the assessment matters for the Council's discretion.

## **7. General Submissions**

### **7.1 Schedule 24.8 – Landscape Classification Unit 22 – The Hills**

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<sup>3</sup> Provided other appropriate development standards are met

If the relief sought in Part 4 of this submission is accepted, then THL seeks the deletion of LCU 22 from Schedule 24.8, as it will no longer be necessary or serve any purpose in the Proposed Plan. If any of THL's alternative or other relief is accepted then THL generally supports the LCU22 description in proposed Schedule 24.8, subject to the following modifications (in tracked change):

Modify Schedule 24.8 as follows:

22: The Hills

<b>Landscape Character Unit</b>	<b>22: The Hills</b>
<b>Landform patterns</b>	Elevated moraine landform with hummocky hills, plateaus, and remnant kettle lakes, with the latter converted to amenity ponds.
<b>Vegetation patterns</b>	Exotic amenity plantings throughout the golf course and around rural residential dwellings. Native plantings around pond, stream, and wetland features. Isolated pockets of bush and woodlot plantings. Extensive roadside plantings to Arrowtown Lake Hayes Road.
<b>Hydrology</b>	Several streams, ponds, and wetland areas.
<b>Proximity to ONL/ONF</b>	Unit does not adjoin ONL or ONF; however, mid to long-range views to surrounding ONL mountain context.
<b>Character Unit boundaries</b>	North: cadastral boundary. East: McDonnell Road, toe of hummocky hill landform pattern. South: toe of hummocky hill landform pattern, stream pattern. West: Arrowtown Lake Hayes Road.
<b>Land use</b>	Golf course and rural residential.
<b>Settlement patterns</b>	Scattered dwellings throughout, primarily located around water features. <del>Numerous consented but unbuilt platforms (18).</del> Gated entrances requiring security codes. <del>Typical lot sizes: large lot single ownership 50-500ha range.</del>
<b>Proximity to key route</b>	Located on Arrowtown Lake Hayes Road which is a popular route between Queenstown and Arrowtown. Also located on McDonnell Road which is a popular route between Arrowtown and SH6 / Arrow Junction.
<b>Heritage features</b>	Two heritage buildings/features identified in PDP.
<b>Recreation features</b>	No walkways/cycleways through the unit.
<b>Infrastructure features</b>	Reticulated sewer. No reticulated water or stormwater.
<b>Visibility/prominence</b>	The area is visible from the elevated streets along the western edge of Arrowtown. The relatively close proximity and (reasonably) similar elevation means that <u>part of the unit is prominent in the outlook while the hummocky terrain limits visibility to other parts.</u> Roadside plantings limit views from Arrowtown Lake Hayes Road. Eastern edges of the unit are visible from McDonnell Road. The unit is also visible from the western edges of the Crown Terrace, the tracks throughout the ONL to the east (Mt Beetham environs) and the zigzag lookout. The diminishing influences of distance and relative elevation in conjunction with the relative unimportance (visually) of the unit within the wider panorama reduces the unit's prominence.
<b>Views</b>	Key views relate to the view out over the <del>area unit</del> from the tracks throughout the ONL to the east (Mt Beetham environs) and the zig zag lookout. In these views the <del>area unit</del> reads as a part of the swathe of relatively low lying, undulating rural/rural residential land flanking Arrowtown. The outlook from McDonnell Road and the western margins of Arrowtown comprises a relatively attractive, golf course / parkland landscape on the edge of Arrowtown. The recently approved Arrowtown South SHA comprising a distinctly urban three storey high density retirement village development will also be visible in each of these outlooks (albeit to a varying degree depending on location). <u>The Arrow South Special Zone appears in the foreground of most views from western Arrowtown.</u> <u>From within the unit, key views are expected to relate to the attractive long-range views to the surrounding ONL mountain setting.</u>

Landscape Character Unit	22: The Hills
<b>Enclosure/ openness</b>	Landform and vegetation create a variable sense of openness and enclosure.
<b>Complexity</b>	Generally, a relatively complex landscape as a consequence of the landform and vegetation patterns.
<b>Coherence</b>	The underlying golf course landscape lends a coherence to the unit.
<b>Naturalness</b>	Generally, a low level of naturalness as a consequence of the distinctly modified character of the golf course setting.
<b>Sense of Place</b>	Generally, the area reads as a distinctly private, highly modified golf course parkland landscape in which rural residential development is an established component. The unit forms part of the swathe of golf courses that <u>'contain' extend along the</u> western and southern edges of Arrowtown. <del>effectively functioning as a green belt to the village.</del>
<b>Potential landscape issues and constraints associated with additional development</b>	<del>Private golf course and previous (recent) resource consent processes suggests limited further capability for development.</del> Accessways and large-scale buildings have the potential to compromise the distinctive hummocky landform pattern <u>if sited inappropriately.</u>
<b>Potential landscape opportunities and benefits associated with additional development</b>	Relatively visually discreet nature of the location (due to landform and, to a lesser degree, vegetation patterns). <u>Golf course landscape potentially suited to accommodation a reasonably high level of development (e.g. Millbrook).</u> Integration potential of landform pattern <u>Well sited buildings can be absorbed due to the undulating landform and varied vegetation.</u> Riparian restoration potential. Integration of walkways / cycleways. Close proximity to Arrowtown. <del>Large scaled lots suggest potential for subdivision.</del>
<b>Environmental characteristics and visual amenity values to be maintained and enhanced</b>	<u>Locating buildings to avoid visual prominence in views from Arrowtown and adjacent roads. so that they are visually discreet.</u> Integration of buildings with landform and planting. Set back of buildings from the ridgeline crests to the eastern edges of the unit.
<b>Capability to absorb additional development</b>	<b>Moderate</b>

The modifications are necessary to:

- ensure that the evaluation of the LCU accurately reflects the existing environment, including zonings and consents;
- ensure that surrounding topographical features are accurately taken into account.
- correct errors in the terminology of activities and operations;
- ensure it provides for the landscape character as it is anticipated to and will likely change under the relevant (proposed) zoning. The LCU's purpose should be to set 'bottom lines', rather than provide a snapshot in time (2017) of the landscape of each unit when that snapshot does not account for and may disenable appropriate development that is otherwise anticipated by the unit's

zoning. The mark ups are one way in which this might be achieved, but there may be others.

**7.3 Chapter 25: Earthworks**

(a) Modify Chapter 25 Table 25.5 as follows:

Table 25.2	Maximum Volume	Maximum Total Value Volume
...		
<b>25.5.4</b>	...	
	Wakatipu Basin Rural Amenity Zone and Precinct	400m <sup>3</sup> <b><u>1000m<sup>3</sup></u></b>
...		
<b>25.5.10</b>	<b><u>The Hills – golf course construction and maintenance</u></b>	<b><u>No maximum</u></b>
...		

- (b) The reason for change to Rule 25.5.4 is so that if WBRAZ remains on the land the earthworks maximum is consistent with the operative rural zone maximum.
- (b) Whatever the zoning, The Hills (LCU22) should be exempted from any limit on maximum volume, as is the case for Jacks Point, and this is the reason for the insertion of new Rule 25.5.11, so that all earthworks related to the construction and on-going maintenance of The Hills golf courses is recognised and provided for.

**7.4 Variation to Stage 1 Landscapes – Chapter 6 – Rule 6.4.1.3**

Modify the rule as follows:

- 6.4.1.3** *The landscape categories assessment matters do not apply to the following within the Rural Zones:*
- a. *Ski Area Activities within the Ski Area Sub Zones.*
  - b. *The area of the Frankton Arm located to the east of the Outstanding Natural Landscape line as shown on the District Plan maps.*
  - c. ~~*The Gibbston Character Zone.*~~ **The Gibbston Character Zone**
  - d. ~~*The Rural Lifestyle Zone.*~~ **The Rural Lifestyle Zone**
  - e. ~~*The Rural Residential Zone.*~~ **The Rural Residential Zone**
  - f. **The Wakatipu Basin Lifestyle Precinct**

The reasons for the submission are:

- (a) The zones that have been deleted from the exemptions for assessment under the landscape categories in Chapter 6 (Gibbston Character, Rural Lifestyle and Rural Residential) should be reinstated in the list of exemptions because:
- these zones have already been determined to have certain landscape values and ability to absorb certain activities and development densities; and



- the zones have their own sets of objectives, policies, rules and assessment matters, formulated for the specific attributes and circumstances of those zones. The matters of discretion and assessment matters are sufficient to properly guide the determination on specific applications;
  - there is no adequate justification for removing these zones from the exemptions.
- (b) The WBLP should be added to the list of exemptions for the same reason as in (a) above – the WBLP zones has its own set of objectives, policies, rules and assessment matters, formulated for the specific attributes and circumstances of the zone and precinct.

## 8. Part 2 and section 32 of the Act

### 8.1 Section 5

Taking into account the attributes of The Hills land, the most appropriate way to achieve the purpose of the Act is to delete the WBRAZ and to adopt The Hills Resort Zone.

The Resort Zone achieves the sustainable management purpose of the Act by enabling appropriate activities and development, and accordingly social and economic well-being, in a manner that: sustains the potential of the natural and physical resources of the site and the wider Wakatipu Basin, for future generations; will continue to safeguard the life-supporting capacity of air, water, soil, and ecosystems; and will avoid or mitigate potential adverse effects including effects on landscape and visual amenity values.

### 8.2 Section 7

The modifications sought in this submission are directly relevant to achieving the following matters to which particular regard must be given:

- (b) *the efficient use and development of natural and physical resources;*
- (ba) *the efficiency of the end use of energy;*
- (c) *the maintenance and enhancement of amenity values;*
- (f) *maintenance and enhancement of the quality of the environment;*
- (g) *any finite characteristics of natural and physical resources;*

The Resort Zoning over the subject land is the most efficient use and development of the natural and physical resources of the THL land given the existing physical infrastructure (including the golf courses and related amenities and facilities) in close proximity to existing services and amenities and taking into account the landscape values of the site and the wider area.

The Resort Zone provisions will maintain and enhance the amenity values and the quality of the environment, because of the location and design of the activities promoted in the Zone.

Land that has the various attributes of The Hills land is a finite resource in the Basin and the zoning should reflect these attributes.

### 8.3 Summary – Part 2 of the Act

For the land shown in [Figure 1](#) The Hills Resort Zone will best achieve the purpose and principles of the Act, for the reasons set out above, than the WBRAZ. The WBLP, subject to the modifications sought in this submission, will better achieve the purpose of the Act than the WBRAZ.

#### 8.4 Section 32

Further grounds for the submission points outlined in the above table are that:

- (a) The Council's section 32 evaluation does not establish that the objectives of the WBRAZ are the most appropriate to achieve the purpose of the Act, in respect of the THL land;
- (b) The benefits and costs of the WBRAZ provisions have not been appropriately assessed or quantified in accordance with section 32 of the RMA, nor have they been assessed with regards to their suitability for giving effect to the relevant objectives;
- (c) Alternative zone provisions for the land subject of this submission have not been adequately assessed;
- (d) The Chapter 45 – The Hills Resort Zone promoted in this submission, has an objective that is more appropriate for achieving the purpose of the Act than the WBRAZ for the THL land and is the most appropriate way to achieve the higher order objectives of the PDP;
- (e) The methods (policies and rules) of the Resort Zone are the most effective and efficient for achieving the relevant objectives;
- (f) The WBLP provisions with modifications promoted in this submission for the THL land are more appropriate for achieving the purpose of the Act than the WBRAZ, for the THL land, and are more appropriate for achieving the higher order objectives of the PDP;
- (g) The methods (policies and rules) of the WBLP are more effective and efficient for achieving the relevant objectives than the WBRAZ
- (h) The reasons given in the section 32 evaluation provided at [Annexure B](#)

#### 9. THL seeks the following decision from the Queenstown Lakes District Council:

- 9.1 That the relief set out in Parts 3 – 7 of this submission; or
- 9.2 That the Proposed Plan be amended in a similar or such other way including any such other combination of plan provisions, objectives, policies, rules and standards so as to address the matters raised in and achieve the intent of this submission; and
- 9.3 Any consequential amendments or other decisions necessary to address the matters raised in this submission.

THL **DOES** wish to be heard in support of this submission.

If others make a similar submission, THL will consider presenting a joint case with them at a hearing.

Signature of Submitter



J A Brown  
*Authorised to sign on behalf of Trojan Helmet Ltd.*

Date: 23 February 2018

Telephone: 03 409 2258 / 021 529 745

**Notes to person making submission:**

If you make your submission by electronic means, the email address from which you send the submission will be treated as an address for service.

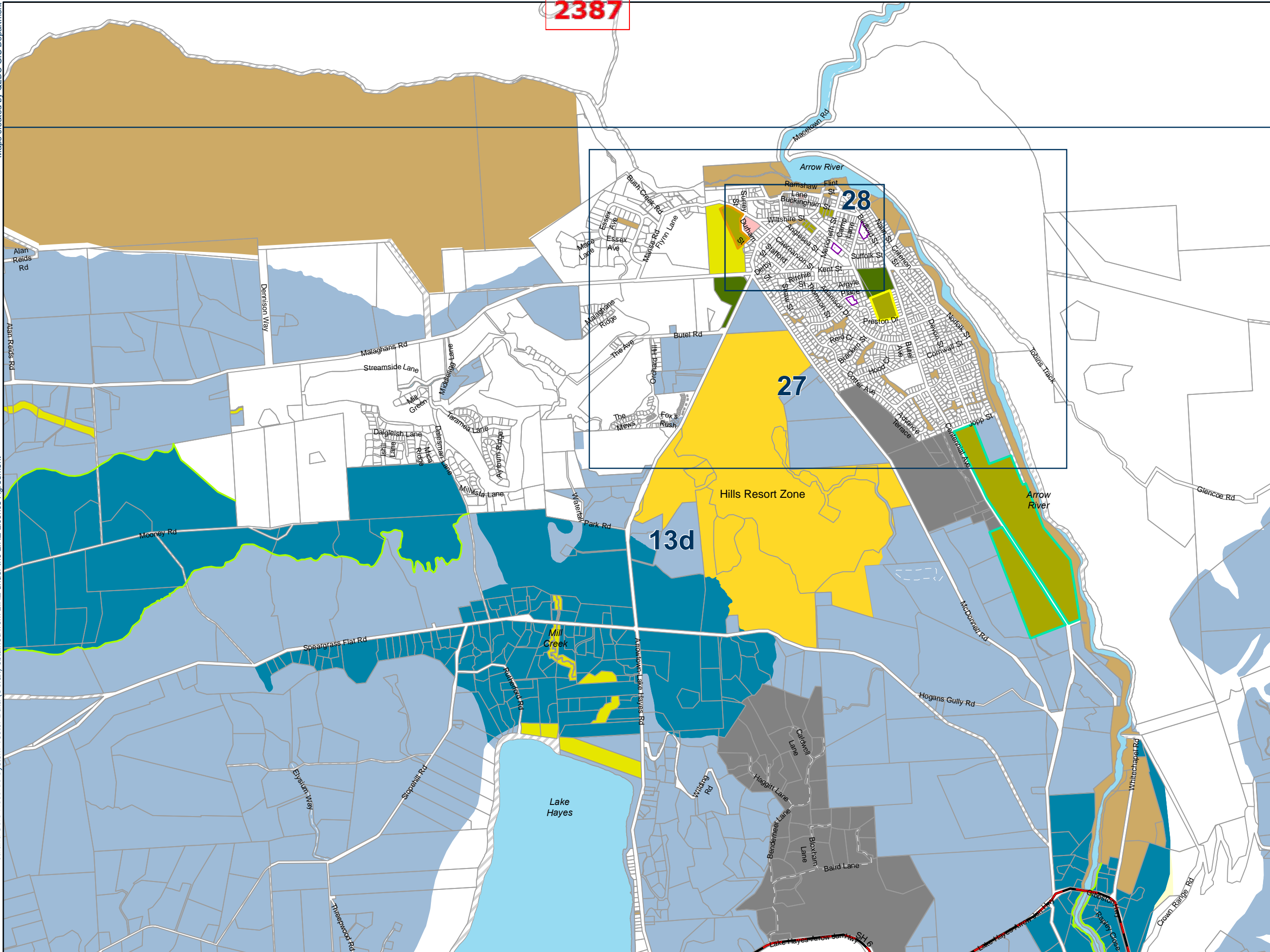
If you are a person who could gain an advantage in trade competition through the submission, your right to make a submission may be limited by clause 6 (4) of Schedule 1 of the Resource Management Act 1991.

**The submitter could NOT gain an advantage in trade competition through this submission**

**ATTACHMENTS:**

- Figure 1:** Planning Maps 26 identifying the land addressed by the submission
- Annexure A:** The Hills Resort Zone – Proposed Provisions and Structure Plan
- Annexure B:** Section 32 “The Hills Resort Zone” prepared by Brown & Company Group, dated 23 February 2018;
- Annexure C:** The Hills Resort Zone, Master Planning report, prepared by Darby Partners, dated 21 February 2018;
- Annexure D:** The Hills, Resort Zone for the Hills, Assessment of Landscape and Visual effects, prepared by Boffa Miskell, dated February 2018;
- Annexure E:** The Hills Rezoning, Helicopter Noise Assessment, prepared by Marshall Day Acoustics, 12 October 2015;
- Annexure F:** The Hills Resort Zone, Transportation Assessment Report, prepared by Traffic Design Group, dated October 2015
- Annexure G:** The Hills Golf Course Land, Infrastructure Feasibility. Prepared by Hadley Consultants Limited, dated 21 October 2015
- Annexure H:** Hills Golf Course Land (including McDonnell Road Land) and Hogans Gully Land, Natural Hazard Assessment, prepared by Hadley Consultants Limited, dated 21 October 2015
- Annexure I:** The Hills Special Zone Submission, Preliminary and Detailed Site Investigations, prepared by Davis Consulting Limited, Dated 21/10/2015

2387



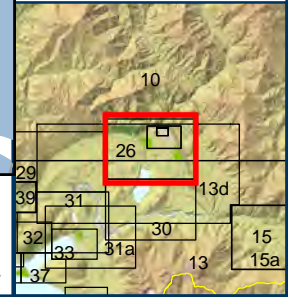
- Legend**
- Parcel/Road Boundary
  - Landscape Feature
  - State Highway
  - Unformed Roads
  - Visitor Accommodation Sub-Zone
  - Water (zoned Rural unless otherwise shown)
  - Zones excluded from Stages 1 and 2 of the District Plan Review
  - Community Purpose - Campground
  - Community Purpose - Cemetery
  - Community Purpose - Golf Course
  - Active Sports and Recreation
  - Civic Spaces
  - Community Purposes
  - Informal Recreation
  - Nature Conservation
  - Wakatipu Basin Rural Amenity Zone
  - Wakatipu Basin Lifestyle Precinct
  - Rural

All Stage 1 and Stage 2 land is subject to the District Wide Earthworks Chapter 25, Transport Chapter 29 and Signs Chapter 31.

The District Wide Annotations notified in Stage 1 remain applicable to all Stage 1 and Stage 2 land. Refer to the Proposed District Plan Maps for the location of the District Wide annotations. Specifically the Open Space and Recreation Zoned land that was not notified in Stage 1 is subject to the District Wide annotations and submissions can be made on a District Wide annotation that affects this land.

The Council has identified where the proposed Visitor Accommodation Sub Zones are to be located. Any person may make a submission on the location and extent of Visitor Accommodation Sub Zones as it relates to Stage 1 and Stage 2 land.

26



## 44 The Hills Resort Zone

### 44.1 Resort Zone Purpose

The purpose of the Zone is to enable high quality resort facilities. The Zone provides for outdoor recreation, including two golf courses (one being an 18 hole championship golf course), visitor accommodation and residential activities, a small commercial area and sculpture park, which all complement the amenities of the golf courses. A small area of staff accommodation is also provided.

A Structure Plan applies to the Zone, as well as standards for buildings and landscaping to ensure that the development is appropriately located and well integrated with the golf course and the local and wider landscape setting.

The Zone provides for development in appropriate areas and will be landscaped to mitigate the adverse effects of built form.

The Zone can also play host to national and international golfing events that showcase the District and contribute to the economy.

### 44.2 Objectives and Policies

**44.2.1 Objective - A resort style development containing residential, visitor accommodation, commercial and commercial recreation activities, an evolving sculpture park, and ancillary worker accommodation, within the context of a premier golf course, while managing the effects of development on the landscape and on amenity values of the site and the surrounding environment.**

#### Policies

- 44.2.1.1 Provide for the development, operation and maintenance of golf courses.
- 44.2.1.2 Provide for visitor accommodation and residential activities, including staff accommodation within identified areas.
- 44.2.1.3 Provide for an evolving sculpture park.
- 44.2.1.4 Provide for large scale golf-related temporary events that contribute to the District’s economy provided that effects are appropriately managed.
- 44.2.1.5 Provide for the take-off and landing of helicopters while ensuring that adverse effects on neighbours’ amenity are mitigated.
- 44.2.1.6 Provide for commercial activities within the Clubhouse Activity Area that are related to the purpose of the Zone.
- 44.2.1.7 Avoid other commercial, industrial and similar activities that are not related to the purpose of the Zone.
- 44.2.1.8 Require that all development be located in accordance with a Structure Plan so as to ensure that:
  - (a) Development integrates with the golf courses; and

- (b) Development is located only where the landform has potential to absorb development, and
- (c) Any potential adverse effects on landscape and amenity values are avoided or appropriately mitigated.

- 44.2.1.9 Require the establishment of Landscape Amenity Management Areas (LAMA) to mitigate the adverse effects of buildings and to contribute to the enhancement of the amenity of the Zone.
- 44.2.1.10 Require planting within the Zone to enhance the amenity of the Zone and to integrate with and complement the character of the surrounding environment.
- 44.2.1.11 Ensure that the character of the Zone and the wider landscape is maintained by managing building height, coverage, external appearance, and landscaping.

**44.3 Other Provisions and Rules**

**44.3.1 District Wide**

Attention is drawn to the following District Wide Chapters.

Introduction	Definitions	Strategic Directions
Urban Development	Tangata Whenua	Landscapes
Signs (ODP)	Earthworks	Historic Heritage
Subdivision	Natural hazards	Transport
Utilities and Renewable Energy	Hazardous Substances	Protected Trees
Indigenous Vegetation	Wilding Exotic trees	Temporary Activities and Relocatable Buildings, except as provided for in this zone.
Noise	Designations	Planning Maps

**44.3.2 Clarification**

Where an activity does not comply with a Standard listed in the Standards table at 44.5 the activity status identified by the “Non Compliance Status” column shall apply. Where an activity breaches more than one Standard, the most restrictive status shall apply to the Activity.

The following abbreviations are used within this Chapter:

P	Permitted	C	Controlled
RD	Restricted Discretionary	D	Discretionary
NC	Non Complying	PR	Prohibited

**44.4 Rules – Activities**

	Activities –The Hills Resort Zone	Status
<b>44.4.1</b>	<b>Any outdoor art installations</b> not visible from McDonnell Road, Lake Hayes-Arrowtown Road, Hogans Gully Road – including those that are defined as a <i>Building</i> because of their size.	P
<b>44.4.2</b>	<b>Any rural activities</b>	P
<b>44.4.3</b>	<b>Any Earthworks</b> associated with the development of the golf courses, landscaping, water storage and reticulation for irrigation, the formation of internal roads and	P

	Activities –The Hills Resort Zone	Status
	access ways, or subdivision and development of home sites or activity areas, including the Clubhouse and Resort Services and Staff Accommodation areas.	
44.4.4	<p><b>Structure Plan – Permitted Activities</b></p> <p><b>44.4.4.1</b> In all activity areas as shown on the Structure Plan:</p> <ul style="list-style-type: none"> <li>▪ Development, operation and maintenance of golf courses, including associated green keeping, driving ranges, administrative offices, sales and commercial instruction, and sheds for utilities, service and accessory buildings, or buildings associated with golf course management, operation and maintenance of up to 50m<sup>2</sup> in gross floor area.</li> <li>▪ Access ways as shown on the Structure plan (+/- 30m)</li> </ul> <p><b>44.4.4.2</b> In Activity Areas A1 – A9 (Visitor accommodation / Residential) as shown on the Structure Plan:</p> <ul style="list-style-type: none"> <li>▪ Residential activities,</li> <li>▪ Managed Apartments, Timeshares, Lodges, Residential Visitor Accommodation (up to 365 nights per year with unlimited number of short-stay leases)</li> <li>▪ Commercial Recreation Activities</li> <li>▪ Metalwork and industrial activities for the purpose of creating art and sculpture in Activity Area A9</li> <li>▪ Licensed premises <ul style="list-style-type: none"> <li>i. To any person who is residing (permanently or temporarily) in the Zone;</li> <li>ii. Mini bars within Homestays and Residential Visitor Accommodation in the resort.</li> </ul> </li> </ul> <p><b>44.4.4.3</b> In Activity Area G (Golf Course, Open Space and Farming Activity Area) as shown on the Structure Plan:</p> <ul style="list-style-type: none"> <li>▪ Open space and farming activities including ancillary buildings</li> <li>▪ Art installations</li> <li>▪ Art and Sculpture tours</li> <li>▪ Temporary events</li> <li>▪ Licensed Premises in association with temporary events</li> </ul> <p><b>44.4.4.4</b> In Activity Area C (Clubhouse Activity Area) as shown on the Structure Plan:</p> <ul style="list-style-type: none"> <li>▪ Golf Club houses, restaurants, bars, beauty spas, gymnasiums, theatres, pools and conference facilities, including ancillary office and administration activities</li> <li>▪ Licensed premises <ul style="list-style-type: none"> <li>i. To any person who is residing (permanently or temporarily) on the resort;</li> <li>ii. To any person who is present on the premises for the purposes of dining up to 12am;</li> </ul> </li> <li>▪ Commercial recreation activities</li> <li>▪ The takeoff and landing of helicopters.</li> </ul> <p><b>44.4.4.5</b> In Activity Area HS (Home Sites HS2-HS6) as shown on the Structure Plan:</p> <ul style="list-style-type: none"> <li>▪ Single Residential units that can be used for Managed Apartments, Timeshares, Residential Visitor Accommodation (up to 365 nights per year with unlimited number of short-stay leases)</li> <li>▪ Lodges</li> </ul> <p>In Activity Area HS1 (Existing lodge) as shown on the Structure Plan:</p>	P

	Activities –The Hills Resort Zone	Status
	<ul style="list-style-type: none"> <li>▪ Single residential units that can be used for Residential, Homestay, Lodges or Residential Visitor Accommodation (up to 365 nights per year with unlimited number of short-stay lets) activities.</li> <li>▪ Licensed premises <ul style="list-style-type: none"> <li>iii. To any person who is residing (permanently or temporarily) in the Zone;</li> <li>iv. Mini bars within Homestays, Lodges and Residential Visitor Accommodation in the resort.</li> </ul> </li> </ul> <p><b>44.4.4.6</b> In Activity Area S (Resort Services and Staff Accommodation Activity Area) as shown on the Structure Plan:</p> <ul style="list-style-type: none"> <li>▪ Servicing activities related to the development, operation and maintenance of the resort or ancillary to approved or permitted activities within the zone</li> <li>▪ Staff accommodation for employees of the resort and their families</li> </ul>	
44.4.5	<p><b>Buildings</b> in Activity Areas A2, A3, A4, A5, A7, A8, A9, HS 5 and S where the adjacent LAMA has been established, and buildings in Activity Areas A1, A6, C and HS 1, HS 2, HS 3, HS 4 and HS 6, except those provided for under Rule 44.4.1.</p> <p>The exercise of the Council’s is control limited to:</p> <ul style="list-style-type: none"> <li>i. Infrastructure provision</li> </ul> <p>For the purpose of this rule “will be established” means that planting and any earthworks will be approved and undertaken prior to, or at the same time as construction of the building.</p>	C
44.4.6	<p><b>Landscape Amenity Landscape Area (LAMA)</b></p> <p>The establishment of LAMA identified on the Structure Plan</p> <p>The exercise of the Council’s control is limited to:</p> <ul style="list-style-type: none"> <li>i. The size, volume and batter of earthworks</li> <li>ii. The mix and location of vegetation and its size at planting and maturity</li> <li>iii. Requirements to ensure that the landscaping is provided for in perpetuity and replaced when diseased or damaged</li> <li>iv. Irrigation methods, including any reticulation</li> <li>v. The extent to which the earthworks are congruous with the landscape</li> <li>vi. The extent to which the LAMA will provide mitigation of and visual relief from buildings and development in the adjacent activity area or for any neighbouring properties.</li> </ul>	C
44.4.7	<p><b>Temporary events</b>, including golf tournaments and concerts, provided that:</p> <ul style="list-style-type: none"> <li>a. The event does not exceed 14 consecutive calendars days (excluding set up and pack down)</li> <li>b. The event does not operate outside the hours of 0600 to 2200. Set up and pack down outside of these hours is permitted, provided it complies with the noise limits for the Zone.</li> <li>c. There shall be no more than 10 temporary events per calendar year</li> <li>d. All structures and equipment is removed from the zone within 10 working days of the completion of the event</li> <li>e. For the purpose of this rule the relevant noise standards for the Zone shall not apply within the hours of 6am to 10pm</li> <li>f. A Traffic Management Plan is provided that details how traffic effects are to be managed</li> <li>g. An Operations Plan is provided that details how the event is to be managed</li> <li>h. Adequate sanitation for event attendees is provided</li> <li>i. Waste minimisation measures are implemented</li> </ul>	C



	Activities –The Hills Resort Zone	Status
	<p>The exercise of the Council’s control is limited to:</p> <ul style="list-style-type: none"> <li>i. Traffic effects and the measures promoted in the Traffic Management Plan to manage these effects</li> <li>ii. Waste minimisation and management measures</li> <li>iii. Adequate sanitation for event attendees</li> <li>iv. Operations Plan for the event to manage effects</li> </ul>	
<b>44.4.8</b>	<p><b>Any outdoor art installations</b> visible from McDonnell Road, Lake Hayes-Arrowtown Road, and Hogans Gully Road– including those that are defined as a <i>Building</i> because of their size.</p> <p>The exercise of the Council’s discretion is limited to:</p> <ul style="list-style-type: none"> <li>i. Siting of the art installation</li> <li>ii. Colours and materials</li> <li>iii. Traffic safety</li> </ul>	RD
<b>44.4.9</b>	<p><b>Buildings where adjacent LAMA is not established</b> - Where a building is proposed in Activity Area A2, A3, A4, A5, A7, A8, A9, S and HS5 and the adjacent LAMA shown on the Structure Plan has not been established.</p> <p>For the purpose of this rule “will be established” means that planting and any earthworks will be approved and undertaken prior to, or at the same time as construction of the building”.</p> <p>The exercise of the Council’s discretion is limited to:</p> <ul style="list-style-type: none"> <li>a. The visual effects of buildings from viewpoints outside of the Zone</li> <li>b. Landscaping (existing or proposed) to mitigate the effects of the buildings</li> </ul>	RD
<b>44.4.10</b>	<b>Buildings</b> in Activity Area G (Golf Course, Open Space and Farming Activity Area) except for those provided for by Rule 44.4.4.1	D
<b>44.4.11</b>	<b>Residential activity</b> in Activity Area S (Resort Services and Staff Accommodation Activity Area) and Activity Area G (Golf Course, Open Space and Farming Activity Area), except for: <ul style="list-style-type: none"> <li>▪ Staff accommodation as provided for by Rule 44.4.4.6</li> </ul>	D
<b>44.4.12</b>	<b>Commercial Activities</b> except for those provided for by Rule 44.4.4.1	D
<b>44.4.13</b>	<b>Commercial Recreation Activities</b> , except for those provided for by Rule 44.4.4.1 and 44.4.4.4	D
<b>44.4.14</b>	<b>Mining</b>	NC
<b>44.4.15</b>	<b>Service Activities</b> , except for those provided for by Rule 44.4.4	NC
<b>44.4.16</b>	<b>Any other activity in an activity area not provided for by any rule</b>	NC
<b>44.4.17</b>	<b>Industrial Activities</b> ; except for those provided for by Rule 44.4.4.	NC
<b>44.4.18</b>	<b>Panelbeating, spray painting, motor vehicle repair or dismantling</b> except for activities directly related to other approved or permitted activities within the Zone and located within the Resort Services Activity Area.	PR
<b>44.4.19</b>	<b>Forestry Activities</b>	PR
<b>44.4.20</b>	<b>Fibreglassing, sheet metal work, bottle or scrap storage, motorbody building or wrecking, fish or meat processing (excluding that which is ancillary to a retail premises such as a butcher, fishmonger or supermarket), or any activity requiring an Offensive Trade Licence under the Health Act 1956.</b>	PR

	Activities –The Hills Resort Zone	Status
44.4.21	<b>Factory Farming</b>	PR

#### 44.5 Standards – The Hills Resort Zone

	Standards – The Hills Resort Zone	Non-compliance status
44.5.1	<p><b>Setbacks</b></p> <p>No building or structure shall be located closer than 6m to the Zone boundary, and in addition:</p> <p>No building shall be located closer than 10m from McDonnell Road or the Arrowtown Lake Hayes Road</p>	RD
44.5.2	<p><b>Building Materials and Colours</b></p> <p><b>To ensure that they are visually recessive within the surrounding landscape all new, relocated, altered, reclad or repainted buildings, including any structure larger than 5m<sup>2</sup>, are subject to the following:</b></p> <p>Exterior-of buildings:</p> <p><b>44.5.1.1</b> All exterior surfaces (excluding windows) shall be coloured in the range of black, browns, greens or greys;</p> <p><b>44.5.1.2</b> Pre-painted steel, and all roofs shall have a light reflective value of not greater than 20%</p> <p><b>44.5.1.3</b> Surface finishes shall have a reflective value not greater than 30%</p> <p><b>44.5.1.4</b> Natural materials such as locally sourced schist and unstained cedar may be used</p> <p>Discretion is restricted to all of the following:</p> <ol style="list-style-type: none"> <li>i. Whether the building will be visually prominent, especially in the context of the wider landscape and as viewed from neighbouring properties</li> <li>ii. Whether the proposed colour and/or material is appropriate given the existence of established or proposed screening or in the case of alterations, if the proposed colour and/or material is already present on an established building</li> <li>iii. The size and height of the building where the proposed colours and/or materials would be used</li> </ol>	RD
44.5.3	<p><b>Residential Density</b></p> <p>The maximum number of residential units shall be 150 in the Zone.</p>	NC

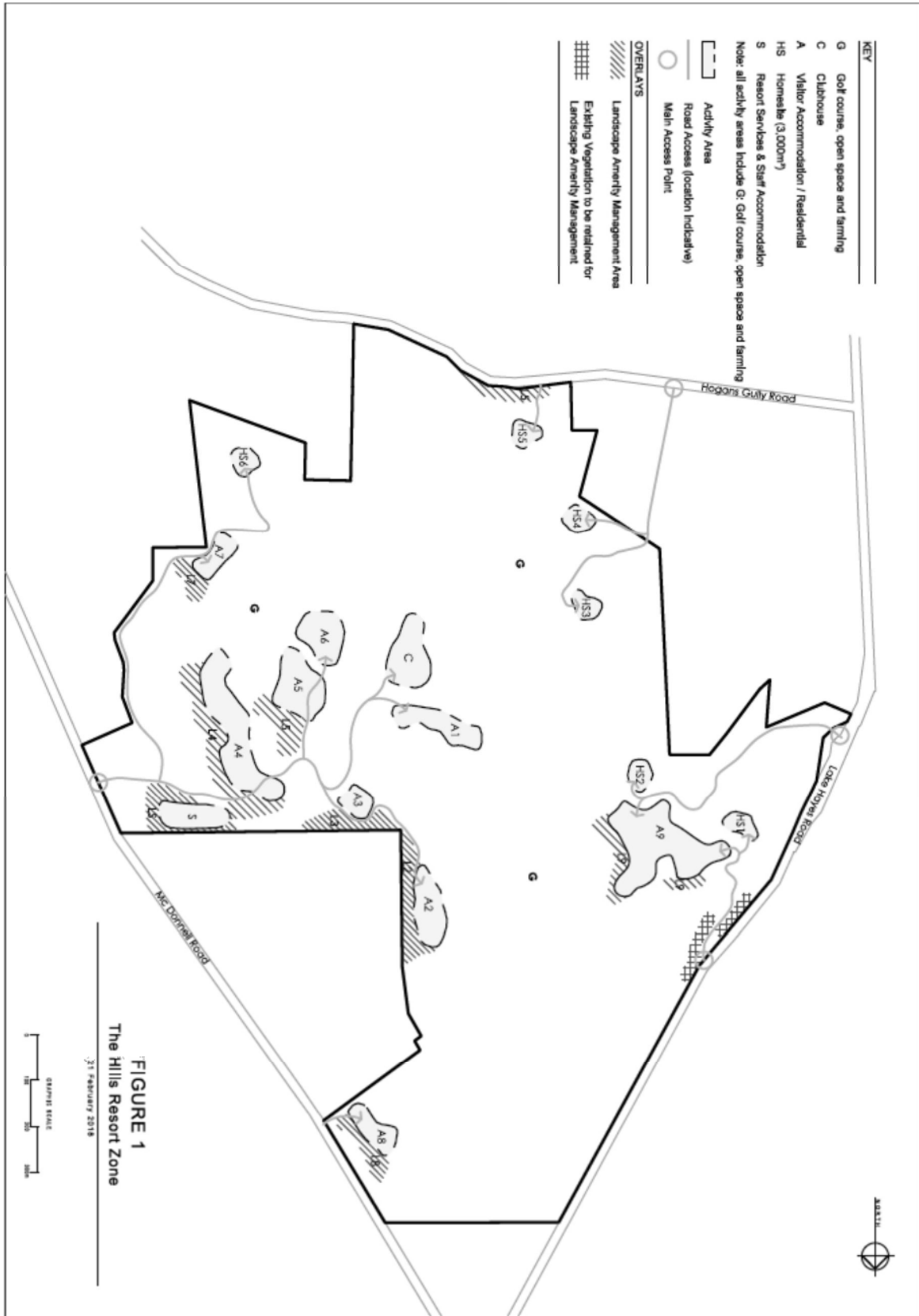
	Standards – The Hills Resort Zone	Non-compliance status
<b>44.5.4</b>	<p><b>Building Maximum Height and Roof Pitch</b></p> <ul style="list-style-type: none"> <li>- Activity Area A1                      RL418.5 masl – 8m</li> <li>- Activity Area A2                      RL416masl – 8m</li> <li>- Activity Area A3                      RL421 masl – 8m</li> <li>- Activity Area A4                      RL418 masl – 8m</li> <li>- Activity Area A5                      RL419.5 masl -8m</li> <li>- Activity Area A6                      RL419.5 masl- 8m</li> <li>- Activity Area A7                      RL414 masl – 8m</li> <li>- Activity Area A8                      RL402.5 masl – 6.7m</li> <li>- Activity Area A9                      RL417.5 masl – 8m</li>   <li>- Activity Area HS1                      RL419 – 8m masl</li> <li>- Activity Area HS2                      RL421.5 masl – 8m</li> <li>- Activity Area HS3                      RL408 masl - 8m</li> <li>- Activity Area HS4                      RL374.5 masl – 8m</li> <li>- Activity Area HS5                      RL370 masl – 8m</li> <li>- Activity Area HS6                      RL 4.3.7.5 masl– 5.5m</li>   <li>- Filming towers    12m</li> <li>- Activity Area C (Clubhouse Activity Area)    8m</li> <li>- Activity Area S (Resort Services and Staff Accommodation Activity Area)    8m</li> <li>- All other buildings and structures (except in Activity Areas A1-A9)    5.5m</li> <li>- Any building in Activity Areas A4 and A5 with a height limit above 6m shall have a roof pitch of a minimum of 30 degrees</li> <li>- All marquees and structures permitted as Temporary Events are exempt from these height restrictions.</li> </ul>	NC
<b>44.5.6</b>	<p>Maximum Site Coverage – Activity Areas A4 and A5</p> <p>Maximum Site Coverage – 40%</p> <p>AA4: Total area – 2.2ha AA5: Total area – 1.2ha</p> <p>No other Activity Areas or Home Sites have a maximum site coverage.</p>	D
<b>44.5.7</b>	<p><b>Glare</b></p> <p>44.5.4.1    All fixed lighting shall be directed away from adjacent roads and properties with low light spill to areas located outside of the Zone.</p> <p>44.5.4.2    Any building or fence that will be highly visible from a public road that is constructed or clad in metal, or material with reflective surfaces shall be painted or otherwise coated with a non-reflective finish.</p> <p>44.5.4.3    No activity shall result in a greater than 3.0 lux spill, (horizontal and vertical), of light onto any property located outside of the Zone, as measured at any point inside the boundary of the adjoining property.</p>	D

	<b>Standards – The Hills Resort Zone</b>	<b>Non-compliance status</b>
<b>44.5.8</b>	<p><b>Retail Sales</b></p> <p>Goods or services displayed, sold or offered for sale within the Zone shall be limited to:</p> <ul style="list-style-type: none"> <li>a. Goods grown, reared or produced within the Zone;</li> <li>b. Delicatessen style or convenience retail for temporary or permanent residents, or visitors to the resort</li> <li>c. Within Activity Area C (Clubhouse Activity Area), in addition to a. and b above, goods and services associated with, and ancillary to the permitted or approved activities</li> <li>d. Retail associated with a Temporary Activity (event) taking place.</li> </ul>	NC
<b>44.5.9</b>	<p><b>Fire Fighting</b></p> <p>A firefighting reserve of water shall be maintained. The storage shall meet the New Zealand Fire Service Firefighting Water Supplies Code of Practice 2008.</p>	NC
<b>44.5.10</b>	<p><b>Take off and Landing of Helicopters</b></p> <p>Noise from helicopter operations shall not exceed 50 dB <math>L_{dn}</math> at the notional boundary of any dwelling, The day night average noise level (<math>L_{dn}</math>) shall be averaged over any consecutive seven day period and shall not exceed 53 dB <math>L_{dn}</math> on any one day.</p> <p>Assessment should be undertaken in accordance with NZS 6807: 1994 “<i>Noise Management and Land Use Planning for Helicopter Landing Areas</i>”</p>	NC

## **4.6 Non-Notification of Applications**

- 44.6.1 Except as provided for by the Act, all applications for controlled activities and restricted discretionary activities will be considered without public notification or the need to obtain the written approval of or serve notice on affected persons.**

4.7 Hills Resort Zone Structure Plan



Make the following consequential amendments to other parts of the Proposed and Operative District Plans:

### Chapter 36 – Noise

Add: The Hills Resort Zone” to Rule 36.5.3 so it reads as follows

Table 2	General Standards				Non Compliance Status
	Activity or Sounds Source	Assessment Location	Time	Noise Limits	NC
36.5.3	Millbrook Resort Zone	Any point within the Residences/Residential Activity Areas	0800h to 2000h	50 dB L <sub>Aeq</sub> (15 min)	
	Jacks Point Resort Zone  (see also 36.5.17)  The Hills Resort Zone		2000h to 0800h	40 DB L <sub>Aeq</sub> (15 min)  75 dB L <sub>AFmax</sub>	

### Chapter 27 – Subdivision

Make the following amendments to Chapter 27 to provide for subdivision as a Controlled Activity in the Hills Resort Zone:

#### 27.4.4 (new) The following shall be controlled activities:

- a. Subdivision in the development areas in the Hills Resort Zone Structure Plan. Control is limited to the following:
  - (a) Lot sizes, averages and dimensions, including whether the lot is of sufficient size and dimensions to effectively fulfil the intended purpose of the land use;
  - (b) Property access and roading;
  - (c) Natural hazards;
  - (d) Fire fighting water supply;
  - (e) Water supply;
  - (f) Stormwater disposal;

- (g) Sewage treatment and disposal;
- (h) Energy supply and telecommunications;
- (i) Easements.

Add the following to Table 27.5.1

Zone		Minimum Lot Area
...		
The Hills Resort Zone		No Minimum
...		

# The Hills Resort Zone

## Section 32 Evaluation Report

February 2018

  
**BROWN & COMPANY**  
P L A N N I N G G R O U P



## 1. Strategic Context

Section 32(1)(a) of the Resource Management Act 1991 ('the Act') requires that a Section 32 evaluation report must examine the extent to which the proposed objectives are the most appropriate way to achieve the purpose of the Act.

The purpose of the Act requires an integrated planning approach and direction:

### *Section 5 – Purpose*

- (1) *The purpose of this Act is to promote the sustainable management of natural and physical resources.*
- (2) *In this Act, sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while—*
  - (a) *sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
  - (b) *safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*
  - (c) *avoiding, remedying, or mitigating any adverse effects of activities on the environment.*

In terms of the evaluation required in relation to the proposed Hills Resort Zone, section 32(3) clarifies that the assessment under section 32(1)(b) must relate to:

- The provisions and objectives of the proposed new zone (i.e. the Hills Resort Zone);
- The objectives of the Proposed Plan to the extent that they are:
  - Relevant to the objectives of the proposed Hills Resort Zone; and
  - Would remain if the proposed Hills Resort Zone were to take effect.

## 2. Regional Planning Documents

The Regional Policy Statement 1998 [~~RPS~~] has been reviewed. Decisions have been issued and appealed, and these are being resolved at present.

The District Plan must *give effect to* the operative RPS and must *have regard to* any proposed RPS.

This Proposed Regional Policy Statement has significance under Section 75 of the Act. Its overview states:

*“Continued prosperity and wellbeing is essential to ensuring the community is equipped to face the environmental, economic, cultural and social changes of the 21st century, and to provide opportunities for all people to realise their aspirations. A thriving and healthy natural environment is vital to sustaining our wellbeing”.*

The operative RPS contains a number of objectives that are relevant to this proposal, including:

- 4.4.1 to 4.4.5 (Manawhenua Perspective)
- 5.4.1 to 5.4.5 (Land)
- 6.4.2 to 6.4.7, 6.57 (Water)
- 7.4.1 (Air)
- 9.4.1 to 9.4.3 (Built Environment)
- 10.4.1 (Biota)

Each objective has related policies which have also been considered.

The proposed plan change provisions are consistent with, and give effect to, the relevant operative RPS provisions.

A District Plan must not be inconsistent with a Regional Plan.

The Regional Plan . Water for Otago is relevant to this proposal. The following objectives in particular are identified:

- 7.A.1 to 7.A.3. (In relation to the maintenance of water quality).

There are a number of related policies which have also been considered. Overall, it is assessed that this submission is consistent with relevant regional plans.

### 3. Proposed Queenstown Lakes District Plan – Strategic Direction

The following goals and objectives from the Strategic Directions chapter of the proposed District Plan are relevant to this assessment:

**Table 1 – Assessment against the Goals and Objectives of the Proposed Strategic Direction Chapter**

Strategic Directions Chapter	Assessment
<p><i>Goal 3.2.1: To develop a prosperous, resilient and economy</i></p> <p><i>Objective - To enable the development of innovative and sustainable enterprises that contribute to diversification of the District's economic base and create employment opportunities.</i></p>	<p>The Hills Golf Course has already contributed significantly to the economy of the District. It has supported the diversification of the District's tourism base, by providing a world class golf course. The hosting of the New Zealand Open as strengthened Queenstown's scenic beauty (tourism) as well as highlighting Queenstown as a destination for golf tourism.</p> <p>The proposed rezoning will ensure the ongoing economic viability of the golf course and its contribution to the district's economy.</p> <p>The proposed rezoning seeks to provide for carefully considered and sensitively sited innovative and sustainable development that will create numerous employment opportunities related to the golf course development and maintenance, visitor accommodation and related services, hospitality, events and commercial recreation.</p>
<p><i>Objective 3.2.1.4 – Recognise the potential for rural areas to diversify their land use beyond the strong productive value of farming, provided a sensitive approach is taken to rural amenity, landscape character, healthy ecosystems, and Ngai Tahu values, rights and interests.</i></p>	<p>The Hills Golf Course has not been farmed for some 10 years, it has been developed as a world class golf course, as such does not contribute to the strong productive value of farming.</p> <p>The proposed rezoning has been sensitively designed to take into account of and maintain existing rural/semi-rural amenity values of the site and wider area.</p>
<p><i>Goal 3.2.3: A quality built environment taking into account the character of individual communities</i></p> <p><i>Objective - To protect the District's cultural heritage</i></p>	<p>The Structure Plan for the development has been created through the undertaking of a detailed landscape analysis as to the appropriate siting of buildings in parts of the proposed zone that can absorb development.</p>

Strategic Directions Chapter	Assessment
<p><i>values and ensure development is sympathetic to them.</i></p>	<p>Buildings will be subject to a controlled activity status and are proposed to be constructed in conjunction with the establishment of the Landscape Amenity Management Areas. All buildings are subject to standards for external appearance.</p> <p>Areas that require landscaping to decrease their visibility are shown on the Structure Plan along with the size and shape of the landscaping required via the Landscape Amenity Management Areas (LAMA). This will further mitigate any potential adverse effects of the development.</p> <p>The proposed Resort Zone will not affect the existing character of Arrowtown, some development may be viewed from the higher points in Arrowtown but the development will be seen in the context of a golf course resort as an adjacent development and will not present as urban development.</p> <p>The character in the general location of The Hills golf course has changed considerably over the past 10 years. <b>Appendix 2</b> outlines some of the consents issues recently, including the SHA on McDonnell Road.</p>
<p><i>Goal 3.2.4 The protection of our natural environmental and ecosystems</i></p> <p><i>Objective 3.2.4.1 Promote development and activities that sustain or enhance life-supporting capacity of air, water, soil and ecosystems.</i></p>	<p>The land within the Golf Course contains a mixture of exotic and native species, most have been planted recently to contribute to the landscaping of the golf course. There will not be any effects on the life-supporting capacity of air, water, soil and ecosystems.</p>
<p><i>Goal 3.2.5: Our distinctive landscapes are protected from inappropriate development.</i></p> <p><i>Objective - To direct new subdivision, use or development to occur in those areas that have potential to absorb change without detracting from landscape and visual amenity values.</i></p> <p><i>Objective - To recognise there is a finite capacity for residential activity in rural areas if the qualities of our landscape are to be maintained.</i></p> <p><i>Objective - To recognise that agricultural land use is fundamental to the character of our landscapes.</i></p>	<p>The Structure Plan process has enabled a thorough investigation of the appropriate locations within the site that can absorb development without detracting from the scenic qualities that the golf course contributes to the wide landscape. A landscape analysis forms part of this investigation.</p> <p>The Hills golf course is already a highly modified environment and has the characteristics of the neighbouring Millbrook Resort Zone, as opposed to a farmed rural environment. The site is mostly manicured and landscaped.</p> <p>The Hills has a moderate capacity to absorb growth as a Landscape Character Unit (the same category as the adjoining Millbrook Landscape Character Unit). The analysis notes that there is generally a low level of naturalness as a consequence of the distinctly modified character of the golf course setting.</p> <p>It is recognized that there are other land uses that can be enabled in the Rural Zone that contribute to the landscape as well as farming. A golf course is a perfect example, it contributes to the economy as well as the landscape.</p>
<p><i>Goal 3.2.7: - Council will act in accordance with the principles of the Treaty of Waitangi and in partnership with Ngai Tahu.</i></p>	<p>Consultation has not been undertaken with Ngai Tahu in the drafting of this submission. However it is considered the proposal will not give rise to any</p>

Strategic Directions Chapter	Assessment
<p>Objective - Protect Ngai Tahu values, rights and interests, including taonga species and habitats, and wahi tupuna.</p> <p>Objective . Enable the expression of kaitiakitanga by providing for meaningful collaboration with Ngai Tahu in resource management decision making and implementation</p>	<p>adverse effects Iwi or the values and principles of the Treaty of Waitangi.</p>

#### 4. Commissioned Reports

A number of expert and technical reports were commissioned to support the Stage 1 submission which are still relevant for the proposed zoning promoted by this submission to Stage 2. The reports in essence undertake an assessment of environmental effects to assist with and provide context for this Section 32 evaluation.

The reports (where relevant, names used from hereon in the rest of this report are in brackets):

**Landscape:** the proposed zoning, in conjunction with the controls contained in the proposed District Plan provisions and the Structure Plan, will not give rise to adverse effects on landscape character and amenity, or to adverse visual effects. With the proposed controls in place such as the requirements for LAMA to be established, the development enabled by the new zoning is appropriate for the environment within which it is located and will ensure its special landscape characteristics are maintained.

*The Hills Resort Zone Master Planning report, prepared by Darby Partners/Site Landscape Architects, dated 21 February 2018*

*The Hills, Resort Zone for the Hills, Assessment of Landscape and Visual effects, Prepared by Boffa Miskell, dated February 2018.*

**Traffic:** the surrounding roading network can accommodate the increase in traffic that will arise as a result of development enabled by the rezoning, and accessways to the new zone can be appropriately and safely designed.

*Transportation Assessment Report, TDG, dated October 2015*

**Natural Hazards:** the proposed zone is not subject to any natural hazard risk.

*Hills Golf Course (including McDonnell Road Land and Hogans Gully Road Land, Hadley Consultants Limited, dated 22 October 2015*

**Servicing and Infrastructure:** the development enabled by the rezoning can be appropriately serviced, and infrastructure is/can be made available/appropriately designed in terms of water supply, wastewater and stormwater.

*Hills Golf Course Land, Hadley Consultants Limited, dated 22 October 2015*

**Noise:** Noise associated with temporary events (e.g. golf tournaments such as the NZ Open), including helicopter activities, can be appropriately managed so as not to give rise to adverse noise and amenity effects.

*The Hills Rezoning Helicopter Noise Assessment, dated 12 October 2015*

**Contamination:** It is concluded that the house sites and activity areas sought through the submission are suitable for rural residential and residential/visitor accommodation landuse and it is highly unlikely this development would present a risk to human health.

*The Hills Special Zone Submission, Preliminary and Detailed Site Investigation, for Trojan Helmet Limited, October 2015*

## 5. Key Issues

The key resource management issues that are consider to arise in relation to the proposal relate to:

- Landscape and Amenity
- Access
- Infrastructure Provision

These issues are addressed later in this evaluation.

## 6. Options

This section outlines options considered to address the issues identified in section 5 (above), and makes recommendations as to the most appropriate course of action in each case.

The options considered are as follows:

1. Status Quo (i.e. retain proposed Wakatipu Basin Rural Amenity Zone - **WBRAZ**)
2. Rezone to create a ~~Resort Zone~~ based around golf (i.e. Hills Resort Zone)

The following tables outline the Benefits, Costs, Efficiently, Effectiveness and the Risk of Acting or not acting for each option.

<b>Option 1: Status Quo (WBRAZ)</b>	
Benefits	<ul style="list-style-type: none"> <li>○ Preserves the land for another land use in the future (which may or may not be residential or rural in nature)</li> </ul>
Costs	<ul style="list-style-type: none"> <li>○ The Hills is already a World Class Golf Course and hosts large scale events such as the New Zealand Golf Open, it is not used for rural or farming purposes. Retaining the rural zoning does not reflect that.</li> <li>○ Works associated with the existing golf course and related/ancillary activity (eg art and sculpture) may require resource consents, which is costly and inefficient.</li> <li>○ The proposed WBRAZ does not allow for the comprehensive and integrated development of the golf course and related activities</li> <li>○ The WBRAZ zoning does not allow for residential or resort development without a plan change/variation/District Plan review submission process.</li> <li>○ The WBRAZ zoning does not reflect the findings of the Wakatipu Basin Land Use Study which notes that the site has a medium potential to absorb development.</li> <li>○ Does not recognize or provide for existing activities and uses</li> <li>○ Potential for ad-hoc development if the future aspirations of the landowner are undertaken by land use resource consent.</li> </ul>
Efficiency	<ul style="list-style-type: none"> <li>○ Does not take advantage of the District Plan Review process, where the Council must consider the zoning of land within the District.</li> <li>○ Does not take into account the findings of the Wakatipu Basin Landuse Study which concluded that the Hills had a moderate capacity to absorb growth.</li> </ul>
Effectiveness	<ul style="list-style-type: none"> <li>○ This option is not effective and does not assist in providing a framework for events and development that has been undertaken with the benefit of significant analysis (landscape, visibility, infrastructure)</li> </ul>
Risk of Acting (or not acting)	<ul style="list-style-type: none"> <li>○ Lost opportunity to align zoning with actual/existing land uses and activities and provide for future compatible uses</li> <li>○ Lost opportunity to utilise the District Plan review process for the above.</li> </ul>

Option 2 Rezone to Create a Resort Zone based around Golf	
Benefits	<ul style="list-style-type: none"> <li>○ Would create a resort zone based around the existing golf course.</li> <li>○ Gives security to the owners that events such as the New Zealand Golf Open can be held without a large resource consenting burden (See <b>Appendix 1</b> which lists the consents previously required and granted for such events).</li> <li>○ Aligns zoning with actual land use, reducing the consenting burden (refer <b>Appendix 1</b>)</li> <li>○ Would allow the opportunity for a structure planned development to be created that is integrated with the golf course, including comprehensive analysis of appropriate places for development so adverse visual effects can be minimized.</li> <li>○ Provides choice for accommodation for residents and visitors to the District</li> <li>○ Provides opportunities for employment, and contributes to the District's economy</li> <li>○ Provides for the ongoing use and development of the golf course and related activities as a high quality asset that contributes to the District's tourism appeal</li> </ul>
Costs	<ul style="list-style-type: none"> <li>○ Large up-front cost to undertake and support a submission of this nature, extensive study as to appropriate locations for development within the proposed zone.</li> </ul>
Efficiency	<ul style="list-style-type: none"> <li>○ A resort zone centered around golf, residential and visitor accommodation is not uncommon in the Queenstown Lakes District, there are templates that can be used from Millbrook and Jacks Point to create a resort zone (with site specific changes)</li> </ul>
Effectiveness	<ul style="list-style-type: none"> <li>○ Creating a resort zone is an effective way to facilitate development around a structure plan.</li> <li>○ The new District Plan splits out the Resort Zone (Millbrook, Jacks Point and Waterfall Park), previously they were all in one <del>Resort Zone</del>; this would have been an efficient option.</li> </ul>
Risk of Acting (or not acting)	<ul style="list-style-type: none"> <li>○ Should a resort zone not be enabled the owners may pursue other ad-doc development options for their land.</li> </ul>

Ranking:

Option 1: Status Quo – Rural General Zoning (2)

Option 2: Rezone to a Create a Resort Zone based around Golf (1)

Based on the above analysis, Option 2 is ranked the most appropriate.

## 7. Purpose of the Proposed Hills Resort Zone

The proposed purpose of the Hills Resort Zone is as follows:

“The purpose of the Zone is to enable high quality resort facilities. The Zone provides for outdoor recreation, including two golf courses (one being an 18 hole championship golf course), visitor accommodation and residential activities, a small commercial area and sculpture park, which all complement the amenities of the golf courses. A small area of staff accommodation is also provided.

A Structure Plan applies to the Zone, as well as standards for buildings and landscaping to ensure that the development is appropriately located and well integrated with the golf course and the local and wider landscape setting.

The Zone provides for development in appropriate areas and will be landscaped to mitigate the adverse effects of built form.

The Zone can also play host to national and international golfing events that showcase the District and contribute to the economy. “

## 8. Scale and Significance Evaluation

The level of detail contained in this evaluation has been determined by an assessment of the scale and significance of the effects that are anticipated if the proposed Hills Resort zone is approved. In making this assessment, regard has been had to whether the proposed objective, policies and rules:

- Have effects on matters of national importance.
- Adversely affect those with specific interests, e.g., Tangata Whenua, neighbours
- Involve effects that have been considered implicitly or explicitly by higher order planning documents
- Impose increased costs or restrictions on individuals, communities or businesses.

## 9. Evaluation of proposed Objective [S32 (1) (a)]

**44.2.1 Objective-** **A resort style development containing residential, visitor accommodation, commercial and commercial recreation activities, an evolving sculpture park, and ancillary worker accommodation, within the context of a premier golf course, while managing the effects of development on the landscape and on amenity values of the site and the surrounding environment.**

The above objective is considered appropriate to address the key resource management issues identified in section 5 because:

- The objective undertakes to outline the main activities anticipated within the zone, namely residential, visitor accommodation, commercial, commercial recreation, an evolving sculpture park, along with ancillary worker accommodation which are to be provided for within the context of a premier golf course.
- The golf course has already been developed and is an asset for the Queenstown Lakes District. The New Zealand Open has put New Zealand on the map as a world class destination for premier golf.



- The landscape of the golf course is already modified to create the golf course, however the physical attributes of the course have been designed to showcase the natural environment.
- Careful design and the use of a structure plan and design controls and associated rules can ensure that development has appropriate regard to the landscape and amenity values of the site and the wider environment.
- The potential effects of the development on the landscape is managed by Landscape Amenity Landscape Areas (LAMA) which mitigate such effects.
- Proposed development will be in some cases viewable from Arrowtown and other public places, however the design and placement of buildings within the landscape will not detract from the wider landscape or the manicured and landscaped golf course.

## 10. Evaluation of the proposed provisions S32 (1) (b)

The below table considers whether the proposed provisions are the most appropriate way to achieve the relevant objectives. In doing so, it considers the costs and benefits of the proposed provisions. (See also Table 1- Broad options considered, in Section 4 above.)

**Table 5 – Evaluation of proposed policies**

<b>Policy Number</b>	<b>Policy</b>	<b>Is the policy the most appropriate way to support the Objective? Is it efficient and effective? Does it support the objectives in the Proposed District Plan?</b>
44.2.1.1	Provide for the development, operation and maintenance of golf courses.	<p>The Hills has operated as a private golf course for some time now and it is recognised nationally and internationally. It is appropriate that the development, operation and maintenance of the golf courses are maintained over time.</p> <p>At present the site is zoned Rural which does not reflect the activities that are currently occurring, which have been enabled through the resource consents granted for the land. The Hills is already a world class golf course, as evidenced by its hosting of prestigious golfing events such as The New Zealand Open.</p> <p>The proposed rezoning provides the landowner with the opportunity to further develop the golfing experience while having the security of a more suitable and appropriate underlying zoning.</p> <p>The policy also supports The Council's proposed Goal 3.2.1 and its objective; golf tourism is an important part of the District's economy.</p>
44.2.1.2	Provide for visitor accommodation and residential activities, including staff accommodation within identified areas.	<p>The proposed Resort Zone provides for residential and visitor accommodation, and as with the other resorts zones, (namely Millbrook and Jacks Point) it is centered on a golf course.</p> <p>Given the undulating topography of the golf course there are opportunities for sensitively located visitor accommodation and residential development.</p> <p>The structure plan provides security for both the landowner and the Council that the location of development has been through the rigors of the 1<sup>st</sup> Schedule process to ensure it complements the landscapes in which it is sited.</p>

<b>Policy Number</b>	<b>Policy</b>	<b>Is the policy the most appropriate way to support the Objective? Is it efficient and effective? Does it support the objectives in the Proposed District Plan?</b>
		<p>Accordingly, the policy supports Stage 1 Goal 3.2.1 and its objective, as golf tourism is an important part of the District's economy.</p> <p>A hindrance to businesses expanding in the District at present is the availability of accommodation for workers. For The Hills to continue to develop the resort it needs workers with skills such as green keeping and hospitality. It is recognised that providing for the on-site accommodation of workers will enable The Hills to further develop the zone efficiently and effectively . removing the need to compete in a difficult housing market.</p> <p>The policy supports Stage 1 Goal 3.2.6 and its objectives- especially the provision of access to housing that is more affordable.</p>
44.2.1.3	Provide for an evolving sculpture park.	<p>A sculpture park has, for some time, been developed within, and as part of the Golf Course environment. This has been the subject of resource consents for buildings within the Rural Zone as a discretionary activity creating uncertainty and inefficiencies in terms consenting requirements.</p> <p>The policy supports the proposed objective and the evolution of the sculpture park where changes can be made over time to introduce new sculptural elements into the landscape</p> <p>The policy supports Stage 1 Goal 3.2.1 and 3.2.4.</p>
44.2.1.4	Provide for large scale golf-related temporary events that contribute to the District's economy provided that effects are appropriately managed.	<p>The Hills Golf Course has hosted a number of events in recent years including the New Zealand Open. These events contribute greatly to the economy both in terms of visitor spending and showcasing the golf course and surrounding landscape in the media worldwide. The landowner has a good track record for running events and to ensure these events can continue, including within the tight timeframes that often apply, it is important and appropriate that there are minimal consenting requirements. This may encourage more investment in the events.</p> <p>It is therefore efficient and effective to provide for temporary activities within the proposed Resort Zone.</p>

<b>Policy Number</b>	<b>Policy</b>	<b>Is the policy the most appropriate way to support the Objective? Is it efficient and effective? Does it support the objectives in the Proposed District Plan?</b>
		The policy supports Stage 1 Goal 3.2.1 and its objectives, especially Objective 3.2.1.3 in the development of innovative and sustainable enterprises that contribute to the diversification of the District's economic base.
44.2.1.5	Provide for the take-off and landing of helicopters while ensuring that adverse effects on neighbours' amenity are mitigated.	<p>It is common for helicopters to be used as a method of transport in resort environments. It is important that the effects of these are mitigated accordingly. As shown by the noise assessment by Marshall Day the typical daily usage of helicopters and their increased usage during temporary events will not give rise to adverse noise effects, nor will the amenity of the surrounding environment and neighboring properties be compromised.</p> <p>The policy supports Stage 1 Goal 3.2.1.</p>
44.2.1.6	Provide for commercial activities within the Clubhouse Activity Area that are related to the purpose of the Zone.	<p>The Club house area of the Zone is mostly developed via resource consents obtained under the operative Rural General provisions. The proposed clubhouse activity area provides for the commercial hub for the zone and anchored by the Clubhouse with established restaurant, pro shop, gym and beauty spa. It is appropriate that commercial activities which relate to the zone (supporting golf and residential and visitor accommodation are provided for in this activity area.</p> <p>This policy supports Stage 1 Goal 3.2.1</p>
44.2.1.7	Avoid other commercial, industrial and similar activities that are not related to the purpose of the Zone.	<p>It is proposed to create a world class golfing and resort environment, accordingly there is no place for unrelated commercial, industrial and other activities that detract from that goal.</p> <p>It is efficient and effective for these activities (unless directly relating to the Resort Zone or existing activities (e.g. an art and sculpture workshop)) to be avoided within the proposed zone.</p> <p>The policy supports Stage 1 Goal 3.2.5.</p>
44.2.1.8	Require that all development be located in accordance with a Structure Plan so as to ensure that: (a) Development integrates with the golf courses; and (b) Development is located only	As shown by the analysis accompanying the structure plan, there has been a great deal of research into the landscape characteristics of the site and its potential to absorb additional development.

<b>Policy Number</b>	<b>Policy</b>	<b>Is the policy the most appropriate way to support the Objective? Is it efficient and effective? Does it support the objectives in the Proposed District Plan?</b>
	<p>where the landform has potential to absorb development, and</p> <p>(c) Any potential adverse effects on landscape and amenity values are avoided or appropriately mitigated.</p>	<p>This is an effective process in that it requires all of the information about the zone to be assessed in a comprehensive manner.</p> <p>A structure planning process provides increased certainty to both the community (where and how development can occur) and the land owner (where development can occur and the consenting process required to achieve it). If alternative development options are considered desirable in the future they can then be considered through a consenting regime.</p> <p>The process has resulted in determining the maximum number of dwellings that is appropriate for the site, both for the potential for development to be absorbed in the landscape and for the ability of the dwellings to be serviced.</p> <p>Accordingly, the policy supports the objective, and provides for the best use of the land.</p>
44.2.1.9	<p>Require the establishment of Landscape Amenity Management Areas (LAMA) to mitigate the adverse effects of buildings and to contribute to the enhancement of the amenity of the Zone.</p>	<p>It is important than when considering any rezoning proposal in the rural area which seeks to provide for development of a greater density than is provided for by the existing zoning, the context of the wider landscape is considered.</p> <p>The structure plan is an important part of the proposed zone in that it sets out the parameters for future development. The creation of the structure plan has been informed by the visual and landscape assessment. It is efficient that this assessment is undertaken during the zoning change, as under any new zoning the development envelope for the future is set. In the future all that is required is a regulatory framework to ensure that the design and appearance of buildings enabled by the rezoning can be assessed.</p> <p>Accordingly, the policy supports Stage 1 Goal 3.2.5 and its objective, as a landscape analysis has been undertaken to ensure that development is only located in activity areas or home sites that can absorb development.</p>
44.2.1.10	<p>Require planting within the Zone to enhance the amenity of the Zone and to integrate with and complement the</p>	<p>The Hills already has a modified landscape with extensive mature trees and planting. The landscape analysis undertaken for the Proposed Resort Zone promotes areas suitable for accommodating development in some cases benefit from additional planting. In this way</p>

<b>Policy Number</b>	<b>Policy</b>	<b>Is the policy the most appropriate way to support the Objective? Is it efficient and effective? Does it support the objectives in the Proposed District Plan?</b>
	character of the surrounding environment.	<p>the rules structure provides for the use of Landscape Amenity Management Areas (LAMA) as shown on the structure plan. These are required by rules in the structure plan to ensure that activity areas and home sites that would benefit from additional planting at the time of development are landscaped appropriately.</p> <p>The policy supports the management of the effects of development on the landscape of the Hills Resort Zone.</p>
44.2.1.11	Ensure that the character of the Zone and the wider landscape is maintained by managing building height, coverage, external appearance, and landscaping.	<p>Buildings and structures within the Zone have the potential to have adverse effects, it is therefore appropriate to control aspects such as height and building control through the use of standards. This combined with the Structure Plan (where development must be within the activity areas or home sites) ensures that the character of the zone is maintained.</p> <p>Accordingly the policy supports the objective in that character of the zone is maintained.</p>

## 11. Efficiency and effectiveness of the provisions.

In electing the preferred options regard has been had to their potential effectiveness and efficiency.

Overall, it is considered that the proposed Hills Resort Zone:

- Provides for residential and visitor accommodation in a way that does not detract from the landscape characteristics of wider environment within which it is sited;
- Will enable the efficient consenting and running of large scale events such as the New Zealand Open which make a significant contribution to the District's economy;
- Is appropriately sited to ensure that the amenity of the zone (as viewed from outside of the zone) is appropriately maintained;
- Provides for workers accommodation to support the development of the Zone;
- Supports the development and maintenance of the Hills Golf Course ;
- Achieves the purpose of the Act and the overarching objectives of the Plan through well managed and carefully located development.

## 12. Conclusions

The proposed changes to the District Plan to create a 'Resort Zone' will meet the purpose of the Act in that it supports sustainable management. The Hills Golf Course already contributes to the social, economic and cultural wellbeing of the owners as well as the Arrowtown and wider Queestown community.

The Council is promoting the diversification of the economy. The Hills Resort Zone supports the enhancement and development of the economy in that Golf tourism is a rapidly growing sector of the tourism industry in the District.

The Resort zoning will enable a number of activities that are already undertaken as part of the Golf Course and its development as well as providing for residential and visitor accommodation in parts of the Zone that can absorb development. This has been established through the extensive reports appended to the submission addressing landscape, infrastructure provisions, masterplanning, possible contamination, natural hazards and noise.

## Appendix 1: List of Resource Consents – The Hills

RC number	Date of Issue	Lapse date if stated/Current Status	Type of consent	Summary of what was consented
RM010864	15/01/2002		Land use	Undertake Earthworks For The Construction Of Additions To A Private Golf Course
RM021019	9/12/2002		Land use	Construct A Pump Shed
RM030160	24/09/2003	Variation Decision Issued	Land use	Construct A Greenkeepers Workshop For The Private Golf Course
RM020696	15/10/2004	Extended	Land use	Undertake Additional Earthworks For An Existing Golf Course
RM020797	15/10/2004	Extended	Land use	Construct An Additional 9 Hole Golf Course & Access Roads By Way Of Earthworks
RM041043	10/02/2005		Land use	Commercially Operate A Newly Constructed Golf Course And Construct A Clubhouse And Golf Cart Storage
RM040658	17/02/2005	Withdrawn	Land use	Erect A Sculpture
RM050226	21/04/2005		Variation	Application For Variation To Resource Consent Rm020797 - Construct An Additional 9 Hole Golf Course & Access Roads By Way Of Earthworks
RM051093	24/03/2006		Land use	Erect An Implement Shed On Property
RM051232	29/03/2006			Variation To Resource Consent Rm041043 To Construct And Operate A Golf Course At Property Which Is Assessed
RM050589	14/08/2006	FIR	Land use	Retrospective Consent To Erect Two Sculptures And Consent To Erect A Further Six Sculptures
RM060862	13/10/2006		Subdivision	Undertake A Boundary Adjustment Subdivision
RM060862	13/10/2006		Variation to RM041043	Undertake A Boundary Adjustment Subdivision
RM070530	15/06/2007	FIR		Establish 17 Residential Dwellings With Associated Earthworks And Visitor Accommodation
RM070603	29/10/2007	29/10/2010	Temporary land use	Host A Temporary Event Being The New Zealand Golf Open On An Annual Basis For A Three Year Period
RM070604	17/01/2008		Variation Of Rm041043 & Rm051232	Increase The Commercial Operation Of The Existing Golf Course From 20 Players Per Day To 16 Players Per Hour And Alteration To On-Site Car-Parking
RM080793	26/08/2008		Variation To Rm 070603	Nominate Sculpture Platforms Until May 2010



RC number	Date of Issue	Lapse date if stated/Current Status	Type of consent	Summary of what was consented
RM071229	5/09/2008		Variation of RM041043	Boundary Adjustment To Re-Arrange The Overall Title Structure Of The Site
RM081223	16/06/2009		Subdivision	Subdivide To Create 17 Allotments And Identify 16 Residential Building Platforms And Undertake Associated Works
RM081224	16/06/2009		Land use	Identify 17 Residential Building Platforms, Construct 17 Dwellings For Both Residential & Visitor Accommodation Purposes And Undertake Associated Earthworks.
RM090714	9/10/2009		Variation To Rm070603	To Enable Alternate Dates For A Golfing Event
RM100270	9/06/2010		Variation To Rm070603	To Allow Signage Platforms To Remain In Place For An Additional 5 Years
RM120041	21/03/2012		Land use	To host the PGA tournament for a further 10 years and the retention of the sculpture platforms on the course.
RM120394	30/08/2013		Land use	Construct two separate toilets on the hills golf course
RM130850	17/01/2014	2016	Land use	To hold an event (NZ golf open tournament) at the Hills and Millbrook resort golf courses for one week per year for three years, to undertake associated helicopter landings, to erect event signage
RM150314	27 May 2015		Land use	Undertake earthworks and landscaping on the Hills
RM150763	4 February 2016		Land use	Consent to remove an existing dwelling and replace a new dwelling on a site within the Hills (Blackberry Trust Limited)
RM160609	14 September 2016		Land use	Consent to remove an existing dwelling and replace a new dwelling on a site within the Hills. (M & M Hill)
RM161284	3 April 2017		Land use	Establishment of a 9 hole golf course
RM170064	8 March 2017	2021	Land Use	Consent to hold a temporary event – being the Golf Open, once per year for 5 years at the Hills and Millbrook Resort.

**Appendix 2 - Consented and proposed developments in the area**

**McDonnell Road Special Housing Area**

Resource consent has been granted for the Arrowtown Lifestyle Retirement Village SHA on McDonnell Road. It is proposed to consist of 120 villas, 75 apartments and a 100-bed care home. The first stage of the development will include 28 villas and lifestyle facilities. This is expected to commence in late 2017 as resource consents have been granted.



**RM150660 E and C Lamont**

A subdivision consent was granted in June 2016 to subdivide two existing allotments (Lots 1 and 2 Deposited Plan 435914) into a total of six allotments and to establish four new building platforms at Mt Soho. Land use consent was granted to erect a residential dwelling on each of the platforms, breach the setback of buildings from waterbodies and to undertake associated landscaping and earthworks.

In terms of discussing density on site the Commissioners noted the following:

*We have also considered the matter of the proposed density of development on the site. We are satisfied that while the development will result in additional domestication on the site, we note that this is spread across the 40-odd hectare site, and that not all dwellings will be visible from any one vantage point at any one time. We are satisfied that the topography of the site and the proposed design controls are appropriate to ensure that the adverse effects of the proposal are appropriately absorbed in the site. We record, however, that we agree with Ms Mellisop's assessment that granting the consent will bring the site to a threshold beyond which any further development could give rise to adverse cumulative effects on the surrounding landscape, and result in an over domestication of the site.*

The Lamonts have also requested that their land be rezoned to provide for a total of 6 residential lots with an existing winery via a submission on Stage 1 of the Proposed District Plan (Submission 123).

**RM140382 I & S Todd**

The applicants received consent for subdivision of the site into seven lots and the identification of five residential building platforms.

In their decision the commissioners stated that the subdivision of the application site will have the effect of infilling an area of land that is already part of a wider area which has been relatively intensively subdivided, and that to some extent, the pattern of development which has evolved could be loosely described as a situation of the horse having bolted. They did not think the proposed development resulted in an anomalous extension of intensive rural development into an area which would otherwise be regarded as possessing an open pastoral character:

*It is however fortuitous for the applicant in this case that the rolling topography of their property enables building platforms to be developed, albeit with some 'assistance' from earthworks and planting, which enables the visual impact of development as seen beyond the site to be relatively benign. We note that at worst, the landscape assessments indicate that development would have a moderate effect on landscape, which while resulting in a density which is not typical of a pastoral landscape, is not inconsistent with the Arcadian landscape that one would expect in this part of the Wakatipu Basin.*

The Todds have also requested that their land be rezoned to a mixture of Rural Lifestyle and Rural Visitor zoning via a submission on the Proposed District Plan Stage 1 (Submission 680). This would recognise the potential for diversification and the establishment of rural lifestyle

and rural visitor opportunities in the future.

### ***Ayrburn Farms***

Ayrburn Farms made a submission on Stage 1 of the Proposed District Plan seeking rezoning of their land for residential development (subject to a structure plan) and rural residential style development. They also made a separate request for development under the SHA legislation which was declined by the Council.

### ***Waterfall Park Developments Limited***

The landuse consent was lodged with the Council on 17 November 2017. It covers the construction of the road and bridge up to the boundary of the Waterfall Park Resort Zone. The consent is being processed as a Discretionary resource consent and was publically notified on 7 February 2018 and the closing date for this being 7 March 2018.

### ***Willowburn Arrowtown – 219 McDonnell Road***

RM140648 . Willowburn Arrowtown was granted subdivision consent to create six allotments and establish four residential building platforms, to breach the road boundary setback and to undertake earth works and landscaping. Consent was granted on 26 January 2016.

### ***Arrowtown South***

The Environment Court in February 2015 approved private plan change for Arrowtown South. The proponents of the plan change originally applied for around 215 residential units. In his decision on the boundary issue, Judge Jon Jackson concluded, after weighing all relevant matters, "including the undoubted positive effects of the appellant's proposal", that neither option was "preferable, but something in-between, although closer to the council's view":

*Overall, we find that the PC29 urban boundary better represents sustainable development than that proposed by the appellant, with one relatively small exception at the northwestern end of Arrow South, being an extension of the McDonnell Rd urban area.*

That area would allow about 12 additional sections to be developed, provided some conditions were met, including fencing of a waterway and tree planting to "soften the domestication of the landscape".

Judge Jackson said a "soft edge" to the southern boundary of Arrowtown "does not have to be within the urban boundary".

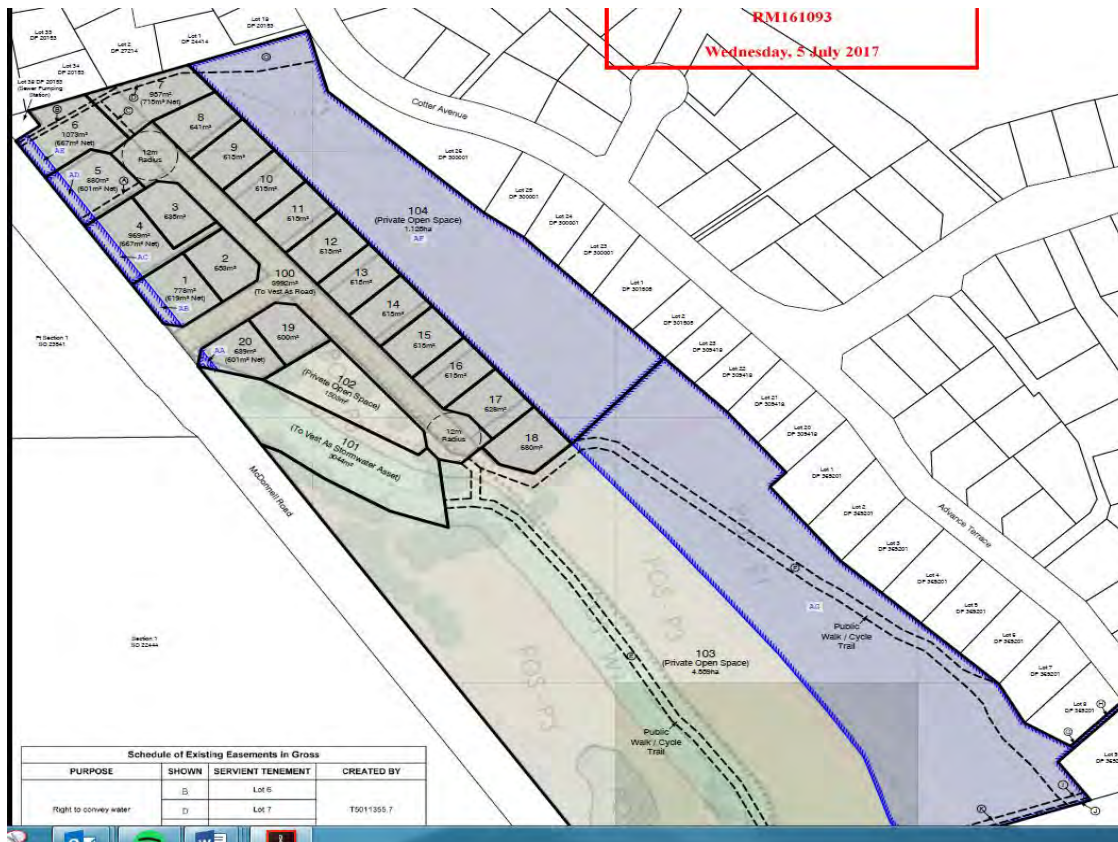
*"Indeed, given the rather wide landscape provisions and high densities of the residential zones it seems preferable to us that most of the land inside Arrow South be outside the urban growth boundary."*

The following resources consent have been lodged in respect of this development:

RM150771 . Undertake 150 sqm of earthworks being the extraction of rock

RM161093 . Arrowsouth Properties . 25 lot subdivision . 20 residential lots, 1 road, and 1 stormwater lot and 3 private open space allotments.

Plans for the subdivision are located on the following page.



# The Hills Resort Zone

Masterplanning Report  
Prepared for District Plan Review

21 February 2018

Initial Report by Darby Partners 20.10.15  
Updated by SITE Landscape Architects 21.02.18



## Document Quality Assurance

<b>Document:</b> SITE Landscape Architects 2018. <i>The Hills Resort Zone: Masterplanning Report</i> . Report prepared by SITE Landscape Architects for District Plan Review.		
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# CONTENTS

1.0	The Hills Resort Zone – Vision Statement	1
2.0	Anticipated Environmental Outcomes	1
3.0	Landscape Context	2
4.0	Previous Consent	3
5.0	Visibility Analysis	3
5.1	Visibility Assessment	3
6.0	Proposed Structure Plan	4
6.1	Activity Area Summary	5
6.2	Zone Density & Site Coverage	5
6.3	Building Colours, Materials and Height	6
6.4	Landscape Amenity Management Areas (LAMA)	7
6.5	Activity Areas	8
7.0	Summary	16
8.0	Appendices	16



## 1.0 The Hills Resort Zone – Vision Statement

The Hills currently features a world class championship golf course, high quality hospitality and a constantly changing sculpture park set amongst a stunning landscape of rolling hills and schist rock outcrops. It is the home to the ISPS Honda New Zealand open golf tournament – the largest golf event in NZ.

The intention of the Hills Resort Zone is to provide a framework for long term growth and management of the golf course and surrounds - catering for a range of existing and anticipated activities / outcomes while ensuring that open space and natural landscape character are maintained and enhanced.

The zone will foster the on-going vision of an exclusive world of golf, art, architecture and landscape where you can 'escape' from daily life and be at one with the outdoor environment.

It is anticipated that architecture will exhibit a modern sustainable approach in harmony with the landscape to ensure natural character predominates. The style will draw on the unique rural vernacular of central Otago buildings, with a simplistic approach to form and siting. All built form will provide spectacular views of the surrounding landscape, with privacy / seclusion from neighbours and connection with golf, art and other passive outdoor recreation.

Within the defined activity areas buildings will be sited and spaced to allow the landscape to flow freely through and interact with the activity areas identified for use, management and development. Landscape treatment will be in character with surrounding landform and planting with a minimisation of defined boundaries to integrate with the landscape.

## 2.0 Anticipated Environmental Outcomes

The aim is for the Hills Resort zone to remain consistent with the existing Millbrook zone to the northwest in order to help maintain a predominantly semi-rural border around Arrowtown.

The Zone will allow for visitor accommodation and residential activities in areas capable of absorbing change in the landscape, or around areas where existing development exists or is already consented. These activities will be complementary to the golf course, supporting the growing stay and play philosophy of golf worldwide.

Proposed development will be subservient to the landscape, sited in locations which are visually recessive and allowing for long term management of the land to protect the rural outlook from nearby Arrowtown and other public viewpoints.

## 3.0 Landscape Context

The geology of the floor of the Wakatipu basin is made up of glacial tills from the early Pleistocene era, interspersed with areas of Pelitic schist. These rock outcrops have been overrun by glaciers and created the rolling landform evident today.

Historically the area has undergone significant change from predominantly native forest to barren, open pasture with pockets of scrub. During the past 10 – 20 years a reversal of this trend has begun towards a seasonal forested landscape interspersed with areas of farmland, largely associated with on-going development of the rural landscape. This change is part of the modern cultural landscape of the Basin.

The Hills property generally contains gently hummocky terrain with a network of gully systems interspersed by small lakes, wetlands and tussock planting. There are schist rock outcrops towards the interior of the property which make up the unique character of the Hills Golf Course.

There are two main catchments separated by a crest running through the middle of the property in a north-west / south-east direction. The crest includes a series of hillocks - the highest in the south eastern corner of the property where the ground rises to RL 438m.

The first is defined as the McDonnell Road Catchment, the location of the Hills Golf Course. From the crest the ground slopes gently towards McDonnell Road with a series of hill, gully systems and small lakes. Beyond the property to the other side of McDonnell Road lies the Cotter Ave Terrace, a defined landscape feature.

To the south-west of the property is the Hogans Gully Road Catchment. From the crest the ground slopes towards a semi-defined terrace, more defined towards the north. At the base of the terrace the flatter low lying valley floor gently slopes towards the Hogans Gully / Arrowtown – Lake Hayes Road corner, and the lowest part of the property.

The historic Arrow Irrigation Water race generally follows the crest of the property in a north-west to south-east direction from Lake Hayes Road to the south west towards Hogans Gully Road. The race takes a sinuous path through the property at a fixed grade following the gently undulating topography.

Vegetation includes a mix of matagouri and wild rose to the south eastern and recently unmodified parts of the property. In and around the golf course there are large swathes of tussock planting and Poplar, Willow, Pine and other exotic tree species. The boundaries along Arrowtown – Lake Hayes Road and McDonnell Road are mostly planted with a mix of evergreen conifer and deciduous tree species.

## 4.0 Previous Consent

The property holds consent for the establishment of 17 Lots including a series of guest units / dwellings. Each unit was specifically designed and proposed to be dug in to the ground with green roofs. A similar visibility analysis was undertaken to determine recessive topography appropriate for dwellings.

Most of the Activity Areas in the Proposed Structure Plan are sited close to or in the same location as these previously consented dwellings.

## 5.0 Visibility Analysis

Building on visibility mapping that was undertaken for the 17 Lot consent, an updated study was undertaken to clearly understand visibility from key viewpoints outside of the property to determine appropriate areas for development. – Refer Figures 1 & 2.

Significant stands of existing vegetation within the property were mapped and included with the existing terrain as a basis for the ray analysis. Views from Cotter Ave are considered relevant being static viewpoints (from private residences or public places).

Visibility mapping was undertaken from the following locations:

- Arrowtown-Lake Hayes Road @ 75m intervals – (moving)
- McDonnell Road @ 75m intervals – (moving)
- Hogans Gully Road @ 75m intervals – (moving)
- Cotter Ave @ 3 key viewpoints – (static)

The resulting visibility map highlights areas that are recessive with respect to topography and landform to inform appropriate pattern of development, and to ensure that rural amenity is maintained through protection of prominent landform / slopes.

### 5.1 Visibility Assessment

Due to planting within the boundary of the property there are limited or no views in to the property from Arrowtown – Lake Hayes Road and the north-eastern end of McDonnell Road. The most visible parts of the property are the exposed slopes facing Hogans Gully Road, and parts of the McDonnell Road Catchment visible from Cotter Ave.

Several folds and undulations on the elevated ground to the south of the property are highlighted as not visible or with low visibility, supporting potential single home sites / dwellings nestled into the landform. Large swathes of the internal parts of the property are not visible or with low visibility.

The resulting areas of visibility are summarised on the analysis plans as high to no visibility. This in combination with an assessment of landscape character derives the ability of various parts of the property to absorb change. Generally the internal parts of the property have a high ability to absorb change. Some of the more peripheral or open parts of the property to the Cotter Ave Terrace are seen to have a lower ability to absorb change, and rely on visual softening by way of landform and planting to further integrate buildings in to the landscape. These areas have been defined on the proposed Structure Plan as Landscape Amenity Management Areas (LAMA) – explained in section 6.1 of this report.

During further detailed Site and Landscape Assessment it was determined Activity Areas A4, A5 and HS 6 are the most exposed when viewed from Advance Terrace. In response to this further controls are proposed, as detailed in Sections 6.2 & 6.3 of this report. During the process of developing these controls a photomontage was developed to assist the project team understand how a likely development scenario might appear. This is attached as Figures 4 – 7 of this report.

The proposed Structure Plan generally discourages development unless:

- It occurs in areas that have the ability to absorb change, or where there will be enhancement of landscape features to increase the ability to absorb change;
- It ensures retention of open space;
- The development is in harmony with the topography / landscape;
- It achieves visual coherence;
- It comprises comprehensive and sympathetic development;
- It avoids sprawl.

## 6.0 Proposed Structure Plan

The proposed Hills Structure Plan provides for ongoing management and development of the property to achieve anticipated environmental outcomes. Activity Areas are sited in response to visibility assessment and landscape features and build on the following concepts:

- The clubhouse as a node for the resort;
- A central cluster of hamlets close to the clubhouse to foster a social village atmosphere;
- A series of homesites throughout the property to cater for retreat style guest accommodation;
- Provision for development of the central clubhouse area to support future growth within the Activity Areas;
- The landscape as an important asset for the golf course;
- Consideration of rural amenity when viewing the property from outside of the property;
- Access routes located to minimise impact on the functionality of the golf course;
- Internal cart paths for access to the clubhouse and golf course to discourage through roads across the property.

## 6.1 Activity Area Summary

A broad description of each type of Activity Area is as follows:

### **G: Golf Course, open space and farming**

Provides for open space, golf course activities and land management practises such as grazing. A range of activities associated with the golf course tournaments or other public events is anticipated within this area, and it fosters the ongoing development of the golf course and a world class sculpture park.

### **C: Clubhouse**

Includes the existing clubhouse with associated facilities such as day spa, gym, theatre, pools and conference facilities and the location of the temporary hospitality tent during the Hills Open Golf Tournament.

### **A: Visitor Accommodation / Residential**

Defines the zones in which clusters of visitor accommodation or residential units can be located including features such as garaging, courtyards, domestic planting and outdoor living.

### **HS: Homesite**

Sites of single dwellings including associated features such as garaging, courtyards, domestic planting and outdoor living.

### **S: Resort Services**

Designated area for resort servicing including worker accommodation. The existing maintenance shed is located in this area.

### **Landscape Amenity Management Area (LAMA)**

The purpose of this overlay is to identify an area where landscaping is required to soften built form in the landscape so that buildings are not directly visible or prominent from neighbouring properties and public places.

*(Refer Section 6.4 for detailed explanation of this Area)*

## 6.2 Zone Density & Site Coverage

The Structure Plan ensures that less than approximately 5% of the zone is built on to maintain a rural amenity and predominance of open space.

Within the Visitor Accommodation / Residential Areas ('A1 – A7', and 'A9' on the Structure Plan) density is proposed to be between 1 and 13 units per Hectare. This allows a minimum average Lot size of roughly 500m<sup>2</sup> (assuming 35% of Activity Areas are taken up with open space and road access). This allows for a range of building typologies to be developed from larger stand alone dwellings to compact terrace style development. Building typologies will be developed with a high standard of architectural integrity and landscaping.

Homesite Areas ('HS' on the Structure Plan) are limited to a principle dwelling and are each approximately 3,000m<sup>2</sup> in size.

In response to Landscape Assessment, a further range of density and Site coverage controls are proposed to limit visibility of built form:

- Area A8 is proposed to have 2 dwellings at a density of 4 units per Hectare, owing to its close proximity to views from Arrowtown;
- Areas A4 & A5 are proposed to have a maximum Site coverage of 40% of Activity Area, with these being more exposed to views from Advance Terrace.

If maximum yield (150 residential units) is maintained throughout the zone the average Lot size would be 1.1Ha (*being the Total Zone Area divided by number of Units*). With the Structure Plan enabling clustered development to appropriately sited nodes this density will appear much lower for the bulk of the Site.

### 6.3 Building Colours, Materials and Height

Buildings will be subject to controls on exterior colours, materials, light reflectance and values.

To ensure that built form is nestled in to the landform a reduced level maximum height has been nominated for each Activity Area.

Heights were selected by:

- Nominating a ground contour to ensure that development is set in to the ground rather than sitting proud, in particular where ground rises or towards the higher edge of an area;
- From the nominated contour adding the operative Rural General Standard for height as the maximum RL. Underneath this RL height will follow the operative Rural General Standard rolling height plane, with a set height following existing ground.

This process enables the standard 8m rolling height plane to be adopted, but ensures that buildings are cut in where ground rises or for isolated high points within each Activity Area. In Activity Area 8 a 6.7m height limit is proposed to apply. This will enable a two storey building with a second storey loft. Any earth cut to achieve the height limits as described above can be used as fill to accentuate or heighten existing landform within the proposed LAMA areas.

Nominated maximum heights are described for each Activity Area in the following section.

In response to Landscape Assessment, a further range of height controls are proposed to limit visibility and extent of built form:

- In Activity Areas 4 and 5 buildings over 6m in height are to have a roof pitch of at least 30 degrees, with these being more exposed to views from Advance Terrace;
- In Activity Area 8 a reduced height limit of 6.7 m is proposed to address potential views from Arrowtown;
- HS 6 is limited to built height of 4.5m, (measured for each individual pavilion, can be stepped with contours), owing to its more elevated location.

The more restrictive controls proposed for buildings in A4, A5 and H56 are intended to reduce visibility from viewpoints external to the property.

## 6.4 Landscape Amenity Management Areas (LAMA)

LAMA will be undertaken in the areas identified on the Proposed Structure Plan by way of additional landform and vegetation planting to build on existing landscape features. Terrain modification shall read as a continuation of existing hummocky topography around the property, and vegetation planting is to blend with surrounding areas.

Vegetation planting will include a combination of evergreen beech and exotic deciduous trees laid out in naturalistic clusters consistent with the rural character of the basin. The combination of evergreen and deciduous species will enable year round visual functionality whilst allowing seasonal interest throughout the property.

Trees may include a combination of Mountain Beech, Lombardy Poplar, Ash, Oak, Maple or other appropriate species.

All landform modification will be at a gentle grade and re-grassed to blend with surrounding areas of the golf course.

## 6.5 Activity Areas

**A1:**

This area is sited on gently sloping ground above the existing driving range, within a stand of large pine trees. The area could accommodate a series of accommodation units nestled into the trees facing the driving range. The existing water race runs along the front of the trees defining the northern extent of the Activity Area.



The maximum height is set at RL 418.5, 8m above a contour towards the mid - front of the area running perpendicular to the existing water race. This is generally the same height as rising ground to the rear of the Area (and location of the existing clubhouse building), allowing a backdrop of landform when viewed from the north and east.

**A2:**

The area is sited on a plateau above the 13<sup>th</sup> hole, offering views of the course to the west. There are two depressions formed in the topography, each a location of homesites from the 17 lot consent. It is anticipated that the entire area would be flattened to nestle proposed buildings into the topography, and the resulting earth be used to build on existing landform directly to the east to minimise views from the neighbouring property. (Noted on the structure plan as LAMA).





The maximum height is set at RL 416, 8m above a contour sitting at the base of the small depressions to ensure proposed buildings are nestled in to the ground at a low elevation, and not prominent from the neighbouring house to the east.

**A3:**

A3 includes a small flat area contained within hummocky terrain that is suitable for buildings. An existing stand of pine trees sits to the north. Several of these trees on the southern end of the stand could be removed to allow views of the driving range to the west. Existing landform directly to the north of the area could be accentuated to minimise views from the neighbouring property (Noted on the structure plan as LAMA).



The maximum height is set at RL 421, 8m above a contour towards the base of the small flat area to keep proposed building low and reduce prominence from the neighbouring house to the north.

**A4:**

A4 covers a large flat bench contained by gently hummocky landform to the west, and stands of existing tree planting to the east. There is extensive space available for the LAMA to include construction of rolling landform and evergreen tree planting such as beech trees to further provide visual containment from the north-east.



The maximum height is set at RL 418, 8m above a contour running through the flat bench, and limits building height at the northern end of the area where ground gently rises up to a small hillock.

**A5 / A6:**

A5 and A6 are located internally to the golf course and suitable for a small hamlet of accommodation. It is anticipated that the buildings could face the golf course, with internal road access courtyards. To the east of A5 is rising hummocky landform that limits views from Cotter Ave Terrace, and can be built on as part of the wider landscaping and LAMA area. Between the two areas is a gully / waterway with red tussock planting providing a natural separation for the two activity areas.



The maximum height is set at RL 419.5, 8m above a contour towards the base of a subtle bench in a south facing slope within the A5 Area. The hillock to the north of the Area rises to RL 418 at its highest point. It is anticipated that this hillock be accentuated / extended to protect views from Cotter Ave.

**A7:**

A7 is situated on the eastern side of the 17<sup>th</sup> hole in a small depression near the dog-leg of the hole. A small hummock to the north-east of the area could be enhanced with planting and landform to provide additional visual softening of the proposed dwellings if required when viewed at a distance from Cotter Ave Terrace and the 17<sup>th</sup> tee block.



The maximum height is set at RL 414, 8m above a contour running through the middle of the Area. The height of the existing hillock to the north east of the Area is RL 412.5 at its highest point.

**A8:**

A8 is sited on a low lying part of the McDonnell Road catchment adjacent to a small lake. Views of the lake and course beyond are offered towards the west to south west. Adjacent to McDonnell Road is a small hill with evergreen planting buffering views in to the property. This area could be built on to provide additional screening if required depending on the height and location of proposed dwellings.



The maximum height is set at RL 402.7, 6.7m above the contour following the edge of the existing lake. This allows a flat building site be formed by cutting in to sloping ground towards McDonnell Road, and using the fill to accentuate existing landform as required. This height is generally consistent with the existing 6.5m height limit to the other side of McDonnell Road, and enables two storey loft style buildings to be constructed.

**A9:**

A9 includes two existing dwellings and is located internally to the property on flattish terrain. A large hill lies to the south-east of the area providing visual backdrop and shelter. Two small lakes are to the east and north which could be expanded to provide a focal point for buildings in this area.



The maximum height is set at RL 417.5, 8m above rising ground at the edge of the Area.

**HS1:**

HS1 is the site of the existing Hills Lodge, located amongst mature trees towards the western end of the property.



The maximum height is set at RL 419, 8m above the finished floor of the existing building.

**HS2:**

HS2 is the site of an existing dwelling, located at the base of the rising landform on a small knoll.



The maximum height is set at RL 421.5, 8m above the finished floor of the existing building.

**HS3:**

HS3 is the site of an existing dwelling, located on the edge of the southern terrace. Mature trees line the scarp face towards Hogans Gully Road.



The maximum height is set at RL 408, 8m above the finished floor of the existing building.

**HS4:**

HS4 is located at the base of the southern terrace scarp, with views of the rural land to the south-west.



The maximum height is set at RL 374.5, 8m above a contour towards the middle to lower extent of the platform.

**HS5:**

HS5 is located on the raised ground directly south of the existing barn building. This site could form a small farm from the portion of land running along Hogans Gully road.



The maximum height is set at RL 370, 8m above a small gully between knoll and rising landform to the east.

**HS6:**

HS6 is located on a northward sloping gully towards the higher part of the property with views of the golf course and valley to the north.



The maximum height is set at RL 437.5, 5.5m above a contour sited at the lower part of the homesite area. The intention is to encourage excavating into the gully so built form reads as a continuation of the landform, and within the context of the gully. The ground rises to RL 441 to the west.

Owing to the elevated aspect of the homesite, overall built form is limited to 4.5m (can be stepped with contour) to reduce visible built form.

## 7.0 Summary

The proposed Structure Plan provides a framework for long term growth and management of the golf course and surrounds - catering for a range of existing and anticipated activities / outcomes. It protects the main asset of the property – the landscape and enables sculpture as an on-going positive addition to the landscape.

The Landscape Amenity Management Areas will focus landscape treatment to soften and integrate new buildings into the landscape, ensuring that landscape amenity and outlook is protected from outside of the property. It is intended that these areas are well designed, and blend with other areas of the property.

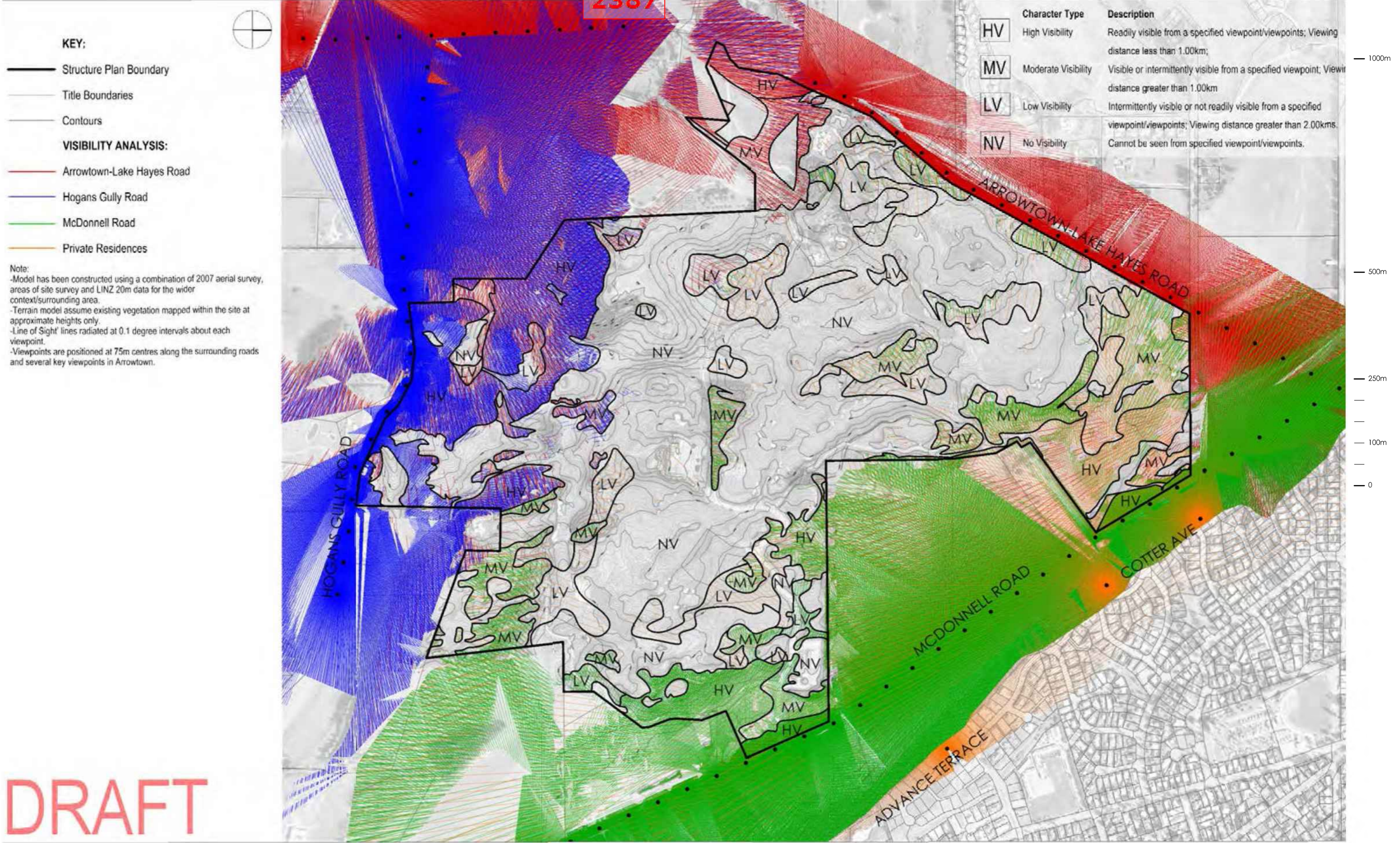
The proposed Hills Resort Zone will maintain consistency with the existing Millbrook zone to the northwest in order to help maintain a predominantly rural border around Arrowtown.

It will foster the on-going vision of an exclusive world of golf, art, architecture and landscape where you can 'escape' from daily life and be at one with the outdoor environment.

## 8.0 Appendices

Figure 1	Visibility Analysis
Figure 2	Visibility / Structure Plan Overlay
Figure 3	The Hills Resort Zone Structure Plan (District Plan version)
Figure 4	The Hills Structure Plan (Annotated)
Figure 5	Photomontage Location
Figure 6	View from Advance Terrace – Existing
Figure 7	View from Advance Terrace – Proposed
Figure 8	3d Model of Proposal



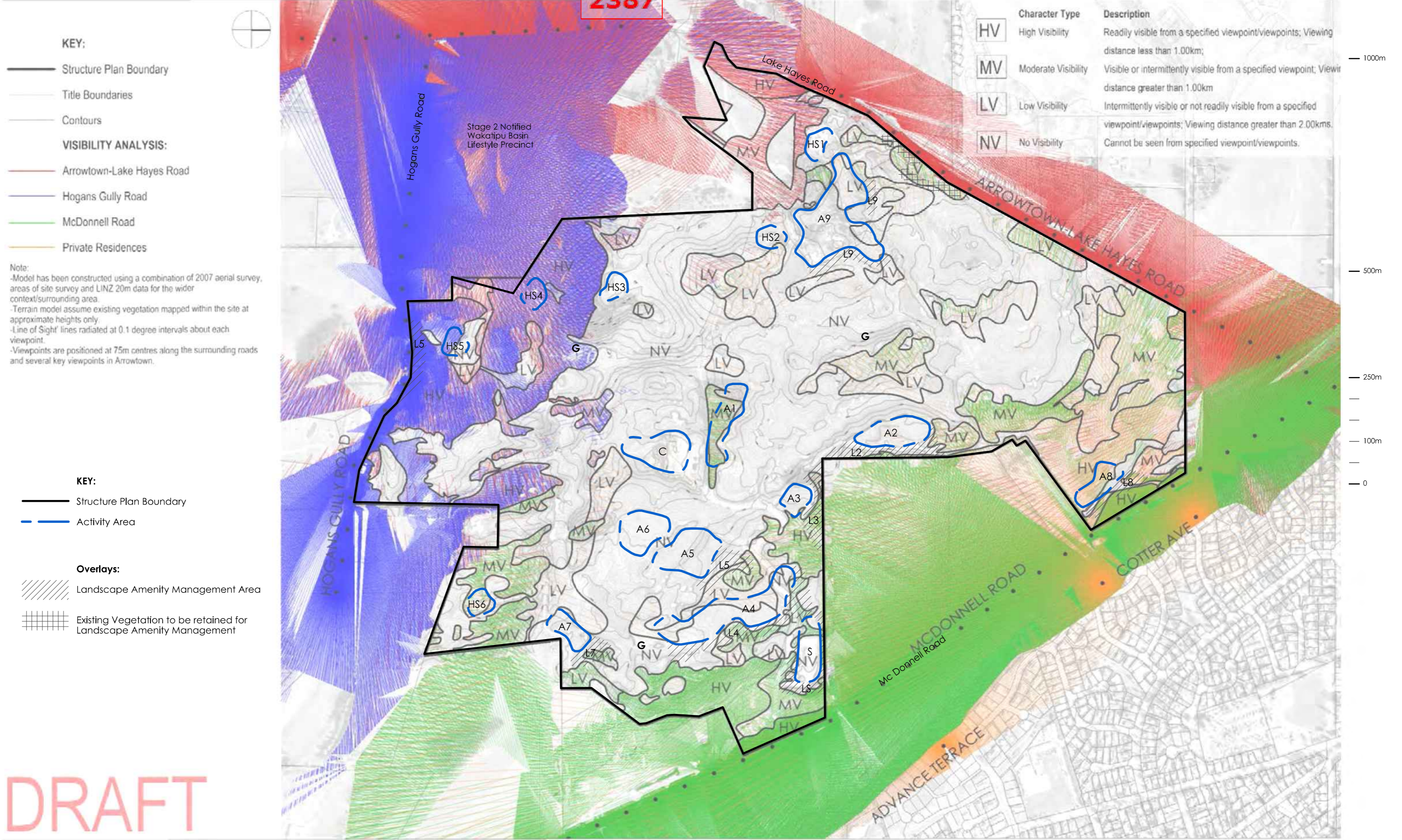


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Visibility Analysis supplied by Darby Partners

FIGURE 1: VISIBILITY ANALYSIS

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**KEY:**

- Structure Plan Boundary
- Title Boundaries
- Contours
- VISIBILITY ANALYSIS:**
- Arrowtown-Lake Hayes Road
- Hogans Gully Road
- McDonnell Road
- Private Residences

Note:  
 -Model has been constructed using a combination of 2007 aerial survey, areas of site survey and LINZ 20m data for the wider context/surrounding area.  
 -Terrain model assume existing vegetation mapped within the site at approximate heights only.  
 -Line of Sight' lines radiated at 0.1 degree intervals about each viewpoint.  
 -Viewpoints are positioned at 75m centres along the surrounding roads and several key viewpoints in Arrowtown.

Character Type	Description
HV	High Visibility Readily visible from a specified viewpoint/viewpoints; Viewing distance less than 1.00km;
MV	Moderate Visibility Visible or intermittently visible from a specified viewpoint; Viewing distance greater than 1.00km
LV	Low Visibility Intermittently visible or not readily visible from a specified viewpoint/viewpoints; Viewing distance greater than 2.00kms.
NV	No Visibility Cannot be seen from specified viewpoint/viewpoints.

**KEY:**

- Structure Plan Boundary
- - - Activity Area

**Overlays:**

- ▨ Landscape Amenity Management Area
- ▧ Existing Vegetation to be retained for Landscape Amenity Management

DRAFT

Visibility Analysis supplied by Darby Partners

FIGURE 2: VISIBILITY / Structure Plan Overlay



KEY

- G Golf course, open space and farming
- C Clubhouse
- A Visitor Accommodation / Residential
- HS Homesite (3,000m<sup>2</sup>)
- S Resort Services & Staff Accommodation

Note: all activity areas include G: Golf course, open space and farming

- Activity Area
- Road Access (location indicative)
- Main Access Point

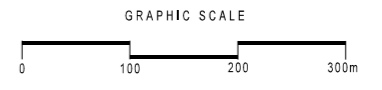
OVERLAYS

- Landscape Amenity Management Area
- Existing Vegetation to be retained for Landscape Amenity Management



**FIGURE 3**  
The Hills Resort Zone

21 February 2018



2387

**KEY:**

- Structure Plan Boundary
- Activity Area

**Activity Areas:**

- G: Golf course, open space and farming
- C: Clubhouse
- A: Visitor Accommodation / Residential
- HS: Homesite (3,000m<sup>2</sup>)
- S: Resort Services & Staff Accommodation

Note: all activity areas include G: Golf course, open space and farming

**Overlays:**

- Landscape Amenity Management Area
- Existing Vegetation to be retained for Landscape Amenity Management

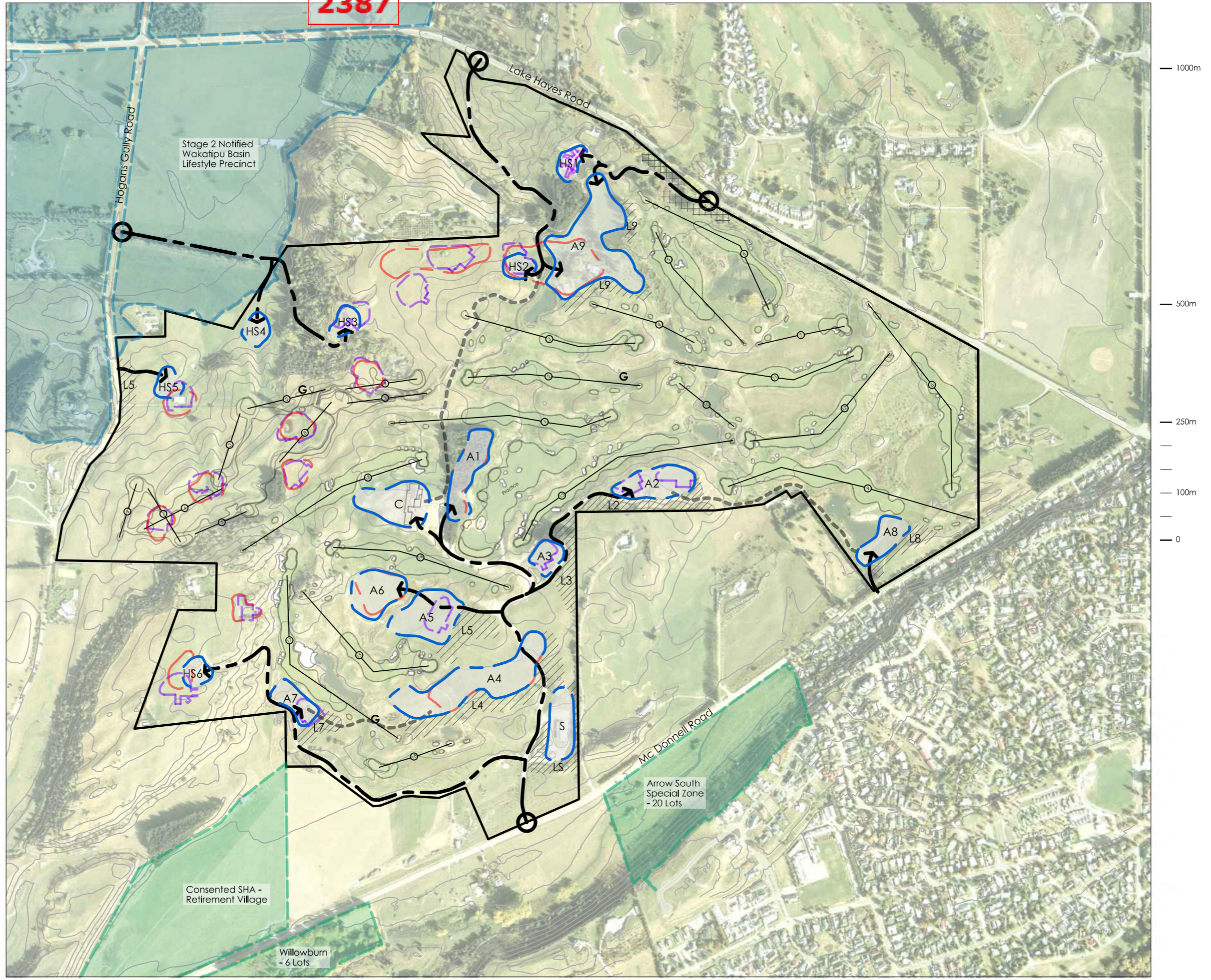
**Context:**

- Existing access point
- Road access
- Buggy / cart access
- Stage 2 Notified Wakatipu Basin Lifestyle Precinct
- Other Consented Development
- Oct 2015 Submission Activity Area
- Previously consented homesites & Hills Lodge

**The Hills Structure Plan - Area Schedule**  
21.02.18

Activity Area	Size
A1	0.9 Ha
A2	0.9 Ha
A3	0.4 Ha
A4	2.2 Ha
A5	1.2 Ha
A6	0.9 Ha
A7	0.5 Ha
A8	0.6 Ha
A9	2.7 Ha
H1	0.3 Ha
H2	0.3 Ha
H3	0.3 Ha
H4	0.3 Ha
H5	0.3 Ha
H6	0.3 Ha
S	0.77 Ha
C	1.1 Ha

Structure Plan Area	162.3 Ha
Total Activity Area (Excl Clubhouse)	12.8 Ha



**FIGURE 4: Annotated Structure Plan**

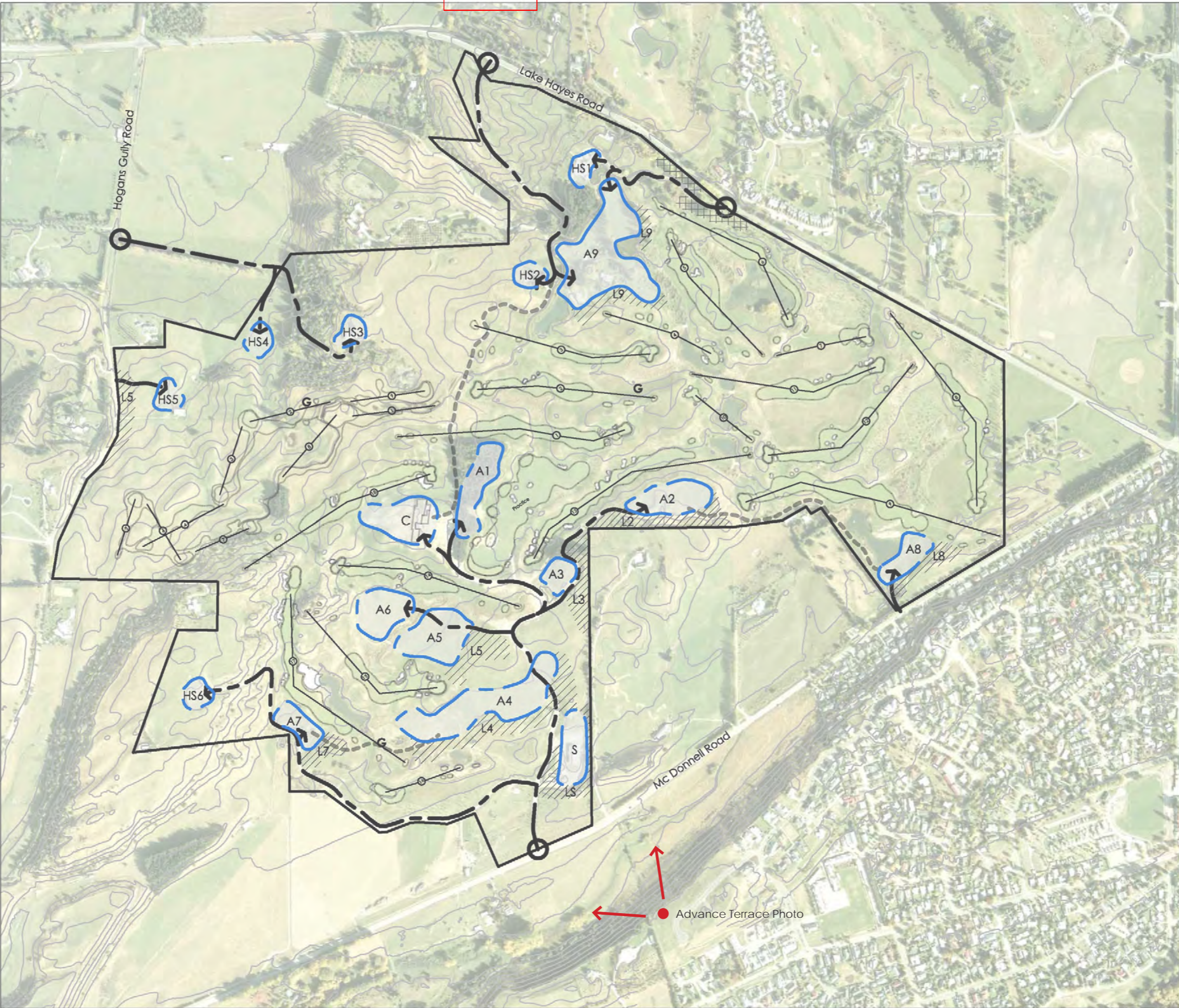


FIGURE 5: Photomontage Location

Consented SHA

Arrow South  
Special Zone



**Simulation Notes:**

Image taken with Iphone 7 panorama (28mm focal length), cropped to 50mm focal length equivalent; Horizontal view extent is 78 degrees; Viewer to hold image aprox. 500mm from page to replicate real life view from same viewpoint.

FIGURE 6: View from Advance Terrace - Existing

Consented SHA

Arrow South  
Special Zone

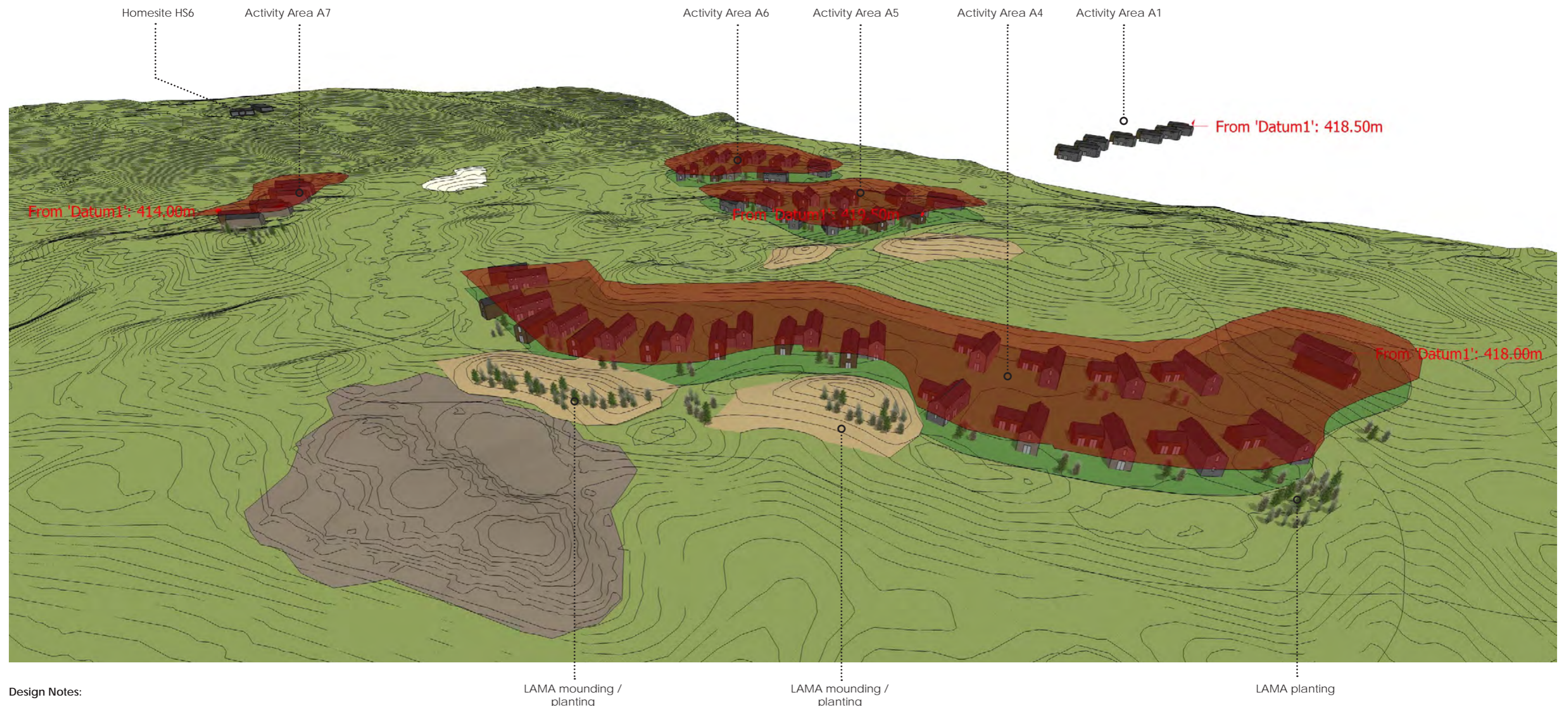


**Simulation Notes:**

Image taken with Iphone 7 panorama (28mm focal length), cropped to 50mm focal length equivalent;  
Horizontal view extent is 78 degrees;  
Viewer to hold image aprox. 500mm from page to replicate real life view from same viewpoint.

Proposal with existing features modelled in sketchup & overlaid in photoshop.  
Foreground features are layered in front of sketchup model.

**FIGURE 7: View from Advance Terrace - Proposed**



**Design Notes:**

Buildings are 8m high (6m with 2m high gable) sitting just under 8m rolling height plane (red shape), and max. height for each activity area (noted in red text);

Buildings are a mix of 250 & 170m<sup>2</sup> footprints at a density of 8 units per Hectare (towards the mid-range of allowable density);

Design is indicative only and representative of a possible development scenario;

Mounding is 1 - 3m high, tree planting shown at 5 - 6m high (anticipated 5 - 10 years growth from large grade planting)

FIGURE 8: 3d Model of Proposal





Trojan Helmet Limited  
Proposed Hills Resort Zone  
Assessment of Landscape and Visual Effects

February 2018



Boffa Miskell

## Contents

Background and Summary of Approach .....	3
Description of the Existing Environment .....	4
Site Location .....	4
Existing Landscape Character and Values .....	4
Proposal Description .....	5
Assessment of Landscape and Visual Effects .....	6
Assessment Methodology .....	6
Assessment of Landscape and Visual Effects on Values by Activity Area .....	8
Visitor Accommodation/ Residential Activity Areas within Resort Zone: .....	8
Clubhouse and Resort Services Area .....	13
Homesites within Resort Zone.....	14
Conclusion on Visual and Landscape Effects .....	15
Statutory Assessment .....	17
Part II of the RMA .....	17
Proposed District Plan .....	17
Proposed Hills Resort Zone Provisions .....	20
Conclusion.....	22

## Background and Summary of Approach

Boffa Miskell Limited (BML) has been commissioned to prepare a landscape and visual assessment of the development that would be enabled under the proposed Hills Resort zoning for the Hills golf course near Arrowtown.

The proposed Hills Resort zoning and related structure plan covers the approximately 162ha site currently occupied by The Hills golf course near Arrowtown. This assessment addresses this proposed rezoning only, while separate reports have been prepared for two separate parcels of land also owned by the Hills, adjacent to McDonnell Road and Hogans Gully Road. The reports have been prepared following the notification of Stage 2 of the Proposed District Plan (PDP) including proposed Chapter 24 (Wakatipu Basin) and respond to the landscape related issues addressed by the Chapter, including the Landscape Character Unit descriptions contained in proposed Schedule 24.8. The reports also take into account recent changes to the landscape of and in the vicinity of the site brought about by development that has been approved or constructed since the original report was prepared. This recent development includes the Arrow South Special Zone and the SHA Retirement Village (224 McDonnell Rd).

The purpose of the assessment contained in this report is to assess the landscape effects, including the visual effects, of the proposed Hills Resort rezoning, including the individual development areas shown on the Structure Plan, and where the potential for adverse landscape/visual effects is identified, to consider and make recommendations on whether/how those effects can be mitigated. It is noted that BML provided advice on these issues during the formulation of the structure plan and associated Hills Resort Zone rules, including in respect to building location, height, colours and materials, and landscaping to ensure that any potential landscape and visual effects can be minimised. In this assessment I will also assess the effectiveness of these proposed mitigation measures, as they have been carried through into the proposed zone rules.

The assessment contained in this report is based on the proposed Structure Plan for the Hills Resort Zone (see graphic attachment Figure 2) and the Masterplanning Report prepared by Site Landscape Architects dated February 2018. Several site visits were undertaken between 2015 and 2017 to assess the existing landscape on and surrounding the site, as well as the potential visibility of the proposal in relation to existing development and public viewpoints. The photographic record from these site visits forms part of the landscape assessment (see graphic attachment Figure 5-8). I note that the Masterplanning Report contains photomontages that illustrate views of the proposal from Arrowtown.

A description of the existing landscape character of the site and surrounding landscape, including the land cover and existing development forms the first part of the landscape assessment contained in this report.

A visibility analysis of the maximum level of development that would be enabled under the proposed Hills Resort zoning is then undertaken. This part of the assessment also includes a short description of the landscape's potential to absorb change. An overall conclusion is then reached as to the potential visual and landscape effects of the proposed development.

An assessment of the proposal against the relevant proposed District Plan provisions relating to landscape is provided. Finally, an assessment of the proposed Hills Resort zone provisions is undertaken to ascertain whether appropriate landscape outcomes are ensured and will be achieved by the proposed rezoning.

## Description of the Existing Environment

### Site Location

The Site is located on the south western side of Arrowtown Township. The former deer farm has been developed into an international 18 hole golf course (the Hills) over the past decade based on a design provided by Darby Partners. A nine hole short course was added recently on the western side of the Clubhouse.

The Site is part of a larger triangular shaped landholding encompassing approximately 190 hectares in total and extends between Arrowtown-Lake Hayes Road in the west to McDonnell Road in the east, and Hogans Gully Road in the south. The proposed Hills Resort zoning applies to only part of this property (approximately 162ha), with Wakatipu Basin Lifestyle Precinct zoning being sought by the landowner for the remainder, which is assessed in separate reports.

### Existing Landscape Character and Values

The surrounding topography of this north eastern corner of Wakatipu Basin is varied and of high visual diversity. Arrowtown Township is contained to the east by the slopes of the Crown Range Terrace and to the north by Brow Peak/German Hill. The township is nestled below the slopes along the Arrow River, which enters the Wakatipu Basin at this point. The small-scale glacial landform of Feehly Hill, with its popular scenic reserve, lies to the north of the Site, adjacent to the developed areas of Arrowtown.

The existing Millbrook Resort and golf course is located on the western side of Arrowtown-Lake Hayes Road. The design of the landscaping within the Millbrook Resort has similarities to the Site and the rolling terrain provides similarly manicured but diverse landscape characteristics.

The Arrowtown escarpment extends along the township and along its southern part it forms the current urban boundary. This prominent landscape feature contains urban development along the northern 900 metres of McDonnell Road. Intensive development extends along the McDonnell Road and creates a strong residential character along this stretch of road. The Arrow South Special Zone extends along another 500m along McDonnell Road with 20 building sites located on the western half of the Zone (a total of 45 residential units throughout the whole zone). South of this intensively developed section the road extends through a more rural landscape, with views to prominent dwellings along the top edge of the escarpment. A number of individual buildings are located on the flats adjacent to McDonnell Road to the south, including an existing maintenance shed on the Hills property near the entrance way to the Hills golf course.

The south western corner of the larger Hills landholding, along McDonnell Road, is currently occupied by a driving range associated with the Hills golf course. This area contains flat modified pasture and, therefore provides distinctively different landscape characteristics to the remainder of the property, which is comprised of more undulating terrain and more visual diversity. For this 8.4 hectare landholding a Wakatipu Basin Lifestyle Precinct Zoning is sought by the landowner, which is addressed in a separate report (see Landscape assessment for Wakatipu Basin Lifestyle Precinct (WBLP Area B)). Immediately adjacent to this area, and further south along McDonnell Road, a retirement village has been consented as a Special Housing Area (SHA) comprising 120 villas, 75 apartments and a 100 bed care home. Construction of the retirement village development has

commenced in late 2017, and will significantly change the currently open rural character of this southern part of McDonnell Road to a densely developed residential area.

The Site itself comprises the Hills golf course and contains varied terrain with clusters of exotic and native trees, areas of tussock grassland, sand bunkers and small ponds interspersed between the holes. The setting is of high aesthetic quality and designed and maintained to the highest standards. While significant earthworks have occurred as part of the establishment of the golf course, the appearance of the Site provides a high level of visual amenity and a semi-rural outlook for Arrowtown residences located along the western escarpment of the township (Cotter Ave and Advance Terrace), although it is noted that in future this outlook will also comprise the neighbouring retirement village SHA, as well as the zoned Arrow South development in the foreground.

The Site also contains existing buildings on its southern and eastern sides. These buildings are predominantly set within well-established clusters of vegetation and are difficult, if not impossible to see from outside the Site. These nodes of existing development are also proposed to form part of the Hills Resort Zone.

The south eastern corner of the larger landholding, on the intersection of Arrowtown-Lake Hayes Road and Hogans Gully Road, contains a block of land that is visually separated from the remainder of the golf course by a distinctive change in elevation. The terrace edge that contains Speargrass Flat Valley steps up along Arrowtown-Lake Hayes Road and forms a series of small, visually contained terraces. These terraces currently contain residential dwellings that are largely out of view from the road due to the screening landform. The block of land at the low-lying intersection is currently farmed and does not contain buildings, unlike the immediately adjacent property along Hogans Gully Road. A Wakatipu Basin Lifestyle Precinct Zone is proposed by QLDC across this 19.71 hectare area as shown in Chapter 24 which was notified as part of State 2 of the PDP.

## Proposal Description

In summary, the proposed Hills Resort Zone comprises a 162 hectare area of land that is currently occupied by the existing Hills golf course and residential dwellings owned by the Hills family members. The proposed Resort Zone is based on a structure plan, prepared by Site LA (see Figure 2), that identifies areas suitable for development within the Zone. The location of the activity areas and home sites shown in the structure plan has been chosen based on the high ability of these areas to absorb change due to their generally low visibility from outside the property.

The structure plan identifies 9 areas as suitable for residential and/or visitor accommodation activities, that could accommodate clusters of buildings for these purposes. Additionally, some of the currently consented<sup>1</sup> 18 home sites on the property are proposed to be carried over into the structure plan in some of the locations. It is proposed that five of these consented home sites be absorbed into the proposed residential/visitor accommodation activity areas shown on the structure plan (Areas A2, A3, A5 and A7), with five of the remaining home sites proposed for individual residential homes (i.e. single residential units) and one new homesite to be created (HS4).

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<sup>1</sup> RM081223 and RM081224.

An objective, policies and rules have been developed for the proposed Resort Zone, which generally enable development within the activity areas identified on the structure plan, provided specified standards are met. Standards relating to building levels/heights, roof pitch (30 degrees for buildings higher than 6m in A4 and A5), site coverage (maximum site coverage of 40% in A4 and A5), colours and materials are proposed to apply to development in each activity area, along with extensive landscaping requirements, in order to ensure future development is well integrated with the landscape of the Site and surrounding area and to maintain an overall low visibility of buildings throughout the Site and when viewed from beyond. The master planning report prepared by Richard Tyler of Site LA contains more detailed description of the vision and anticipated design outcomes proposed for the Site.

All fixed lighting will be directed away from adjacent roads and properties with low light spill to areas located outside of the Zone.

## Assessment of Landscape and Visual Effects

The following sections of this assessment address the potential landscape and visual effects of development in each of the proposed activity areas. The assessment:

- Provides a description of each of the proposed activity area's ability to absorb change based on existing landform and vegetation;
- Provides an analysis of potential visibility from public and private places;
- Recommends mitigation and enhancement measures, where necessary, to mitigate any potential landscape and visual effects that might arise from the proposed development;
- Reaches conclusions about the anticipated landscape effects of development as a whole.

### Assessment Methodology

#### Assessment of Effects on Landscape Values

Landscape and visual impacts result from natural or induced change in the components, character or quality of the landscape. Usually these are the result of landform or vegetation modification or the introduction of new structures, facilities or activities. All these impacts must be assessed to determine the effects of a proposal on landscape character and quality, rural amenity and on public and private views. In this assessment the potential effects are based on a combination of the landscape's sensitivity and visibility and the nature and scale of the development proposal.

#### Landscape's Ability to Absorb Change

The assessment of the landscape's ability to absorb change is based on its existing character sensitivity and visual sensitivity.

The analysis of landscape character sensitivity/its ability to absorb change is based on judgments about sensitivity of aspects most likely to be affected. These aspects cover natural and cultural factors, quality/condition of the landscape and aesthetic factors.

Visual sensitivity covers the visibility of an activity area as well as the nature and extent of population likely to visually experience the area (eg private/ public viewpoints).

It is worth noting that the landscape character of the Site has been substantially modified through the existing golf course development, which has created a manicured landscape appearance. While the landscape is aesthetically pleasant and well maintained, the landform and vegetation within the site are of a low naturalness. The openness of the landscape is generally aligned with rural landscapes, but the character differs from that of rural land with productive land uses.

The landscape's ability to absorb change is identified as follows:

- High: change can be readily absorbed due to low visibility of the proposed development and because it will not cause any adverse effects on landscape character
- Medium: the area can absorb some change due to medium visibility of the proposed development and moderately sensitive landscape character within the golf course
- Low: high visibility of an area combined with moderate or high landscape character sensitivity within the golf course

### Visibility Analysis

The analysis of potential visibility includes an assessment from viewpoints on surrounding public roads and reserves, in particular from Arrowtown and the roads adjacent to the Site.

Two representative elevated viewpoints around Arrowtown (Feehly Hill and top of Tobins Track on Crown Terrace) are assessed. Conclusions about visibility from private properties are drawn based on an assessment from nearby public viewpoints, such as roads.

The assessment of visibility is framed in the following way:

Viewpoint distances:

- Long distance: more than 1.0 km (eg top of Tobins Track and Feehly Hill)
- Mid distance: 500m – 1.0km (eg southern edge of Arrowtown)
- Short distance: less than 500m (eg McDonnell Road, Arrowtown-Lake Hayes Road)

Visibility:

- Low: viewed from mid to long distance, partly visible (less than half of the building)
- Medium: viewed from mid distance, partly visible (more than half of the building)
- High: viewed from short to mid distance, partly or fully visible (more than half of the building)

It is important to note that the methodology above is based on a factual assessment as to whether a building is visible, and does not include a consideration of whether a building can be made less visible by landscaping, colours and materials etc. These matters are taken into account when assessing visual effects however.

The visibility analysis is also informed by the mapping of the Zone of Visual Influence (ZVI), prepared by Darby Partners and the photo montages by Mr Tyler/ Site LA (refer graphic attachment to Master Planning Report). However, the on-site investigations carried out for the assessment (07/09/2015) form the main basis for the analysis.

Findings from the visibility analysis form the basis for the assessment of visual effects.

### Recommended mitigation and enhancement

A number of measures are recommended to mitigate the visual and landscape effects of the proposed development, and/or to enhance landscape outcomes. These measures are proposed to form part of/be ensured by the rules that apply to the new Zone. The measures include restrictions on the location of buildings, vegetation planting and earth contouring for screening, restrictions on building heights and roof pitch (30 degrees for buildings higher than 6m in A4 and A5), site coverage (40% maximum in A4 and A5) and on colours and materials used on buildings. The implementation of these measures has been taken into account when reaching a conclusion on the visual and landscape effects of the proposal.

### Assessment of Landscape and Visual Effects on Values by Activity Area

The following section provides an assessment of the visual effects of the proposed development for each activity area within the Proposed Hills Resort zone, including a short description of the area's ability to absorb change, an assessment of visibility based on the site investigations and recommended measures to appropriately mitigate any landscape and/or visual effects.

#### Visitor Accommodation/ Residential Activity Areas within Resort Zone:

##### Activity Area A1:

- Ability to Absorb Change: MEDIUM. Activity Area 1 is located near the centre of the golf course in close proximity to the existing clubhouse, which forms a node of built development along with the existing adjacent car parks. The higher-lying, southern part of the activity area is visible from parts of Arrowtown, but overall the area has a medium ability to absorb change due to the existing vegetation in the form of mature pine trees and the small scale terrain variation that creates a low-lying bowl overlooking the adjacent holes of the golf course. The area has a low visibility from public roads outside the property due to its location at a distance of over 750m. Views from the western edge of Arrowtown can be gained towards the higher part of the existing pine trees.
- Potential Visibility: MEDIUM. Buildings proposed in this central part of the golf course have a medium potential to be seen from long distance external viewpoints. The viewpoints most likely to be affected would be high-lying areas to the east, such as Feehly Hill and the Crown Terrace. The visibility from Arrowtown would be medium to low, provided buildings are kept off the rising ridgeline to the west, by appropriate choice of finished building height (RL). The internally facing area is located to the west of a number of low ridges with linear mature vegetation that would provide screening even from elevated viewpoints along the Arrowtown escarpment. The existing dwelling and planting on the neighbouring McDonnell Road property would form the foreground to this view, as well as development within the Arrow South Zone from the southern part of the Arrowtown escarpment. The activity area is located next to a stand of mature pine trees that would provide a backdrop to buildings in this area when viewed from the east.
- Recommended Mitigation and Enhancement Measures: The exact height of buildings would determine the extent of visibility from Arrowtown, and therefore a finished floor level of RL 418.5 masl, which is below the elevation of the pine trees to the southwest, is



recommended for this area, meaning that buildings of up to 8 meters can be accommodated, without giving rise to adverse visual effects. Enhancement options for the area could include further planting on the ridge to the east, identified in the LAMA along the eastern property boundary.

#### Activity Area A2:

- Ability to Absorb Change: HIGH. Activity Area 2 contains two consented building platforms facing the interior of the golf course oriented to the west. The area is well screened by an existing ridgeline to the east. Currently a small spur separates the two consented platforms from each other. In order to accommodate a greater level of development proposed for this area, this small spur will need to be removed to create a larger low-lying area, backed by the screening ridge to the east.
- Potential Visibility: LOW. The area is low lying in relation to the surrounding terrain and low in visibility due to the existing ridgeline to the east. It may be visible from the neighbouring property located approximately 200 meters to the east however. The views from Arrowtown are unlikely to be affected by development in this activity area, as it is oriented in a westerly direction, backed by intervening landform. From Advance Terrace the recently consented Arrow South Special Zone would form the foreground of views, which means that the currently rural outlook from this part of Arrowtown will be modified in the future. Any built development within the proposed Hills Resort Zone, which forms the mid ground of views, would therefore be less conspicuous than under the existing conditions prior to construction of the Arrow South Zone.
- Recommended Mitigation and Enhancement Measures: To ensure potential adverse visual effects on the neighbouring property are avoided, a low floor level (RL 416masl) is recommended for the buildings in this activity area. Planting of vegetation and/or land contouring within the LAMA area identified on the structure plan adjacent to this activity area may be required to soften the development in the event that the existing landform is not sufficient to fully screen it when viewed from the neighbouring dwelling and potentially from Arrowtown.

#### Activity Area A3:

- Ability to Absorb Change: HIGH. An individual building platform is consented in this activity area, which is proposed to be incorporated into the slightly larger activity area. The area is visually well contained by landform that wraps around the area on the northern and eastern sides. Existing mature vegetation along the Hills property boundary to the north provides further screening.
- Potential Visibility: MEDIUM to LOW. This small activity area is located in a discrete part of the golf course and is well screened from views from Arrowtown. The landform separating this activity area from the neighbouring property will help to block most of the views, but it is possible that the tops of the proposed buildings may be visible. A row of young conifers has been planted along the northern boundary of the Site, which will provide additional screening on the existing landform over time.
- Recommended Mitigation and Enhancement Measures: Existing landform and planting of vegetation in the LAMA shown on the structure plan adjacent to this activity area would

provide screening if necessary. Buildings at RL 421masl are likely protrude above the existing landform, but for lower buildings existing screening may be sufficient to block all outside views into the area, in particular views from the immediately adjacent property. Consideration should be given to the extent and nature of surrounding landscaping and earthworks required to screen or soften the building, and the final building design and location, to ensure that landscape effects are minimised.

#### Activity Area A4:

- Ability to Absorb Change: MEDIUM-LOW. Currently this Activity Area is not as well contained by landform as the areas previously discussed. A large flat part of the golf course expands in a north-south direction at a distance of around 350m from McDonnell Road adjacent to the entrance drive. Parts of the area are contained by low ridges to the east, while others, in particular those adjacent to the entrance way, are open.
- Potential Visibility: MEDIUM. This relatively large area is visually quite exposed to the east and views from parts of the Arrowtown escarpment, in particular from Advance Terrace, extend across parts of this activity area. Depending on the screening and exact location of buildings it is likely that some of the buildings would be visible from a mid distance of around 500 metres, in particular from parts of the Arrowtown escarpment. From Advance Terrace development in the Arrow South Special Zone would form part of the foreground of views. This reduces any potential visual effects of buildings that would partially be visible in the mid ground within the Hills Resort Zone.
- Recommended Mitigation and Enhancement Measures: With the proposed RL 418masl, buildings would require some additional screening to reduce their visibility from Arrowtown. It is recommended that the existing terrain undulation on the east side of and adjacent to this activity area is contoured further to provide more landform screening. The landform could also be planted on, preferably with evergreen indigenous trees (eg beech) to provide further screening. The proposed LAMA shown on the structure plan adjacent to the activity area provides an appropriate means by which to achieve these outcomes. Consideration should be given to the extent and nature of surrounding landscaping and earthworks required to soften the buildings, and the building location and design to ensure that landscape effects can be appropriately mitigated and minimised. A maximum site coverage of 40% is proposed for this activity area to ensure that large areas of open space are maintained between the built form. In order to reduce the bulk of potentially visible parts of buildings (ie upper storey), a roof pitch of at least 30 degrees is proposed for buildings higher than 6m in this activity area.

#### Activity Area A5:

- Ability to Absorb Change: HIGH. Area A5 is located in the central part of the Site, in proximity to the existing golf course development of the access road and Clubhouse. A consented residential building platform occupies part of this area, which would be absorbed into the activity area as part of this proposal. The low-lying area is adjacent to a small waterway and forms an amphitheatre shaped oval, generally out of view from outside of the Site. Due to its internal location this activity area is at a considerable distance (around 800m) from Advance Terrace in Arrowtown, and has a high potential to absorb buildings. In addition, from Advance Terrace the recently consented Arrow South Special Zone would form part of the foreground of views. Views to the area can only be gained from high-lying viewpoints in the

east, such as the Crown Terrace, but not from Arrowtown. Some of the eastern part of the area is currently elevated towards an internal ridgeline and buildings in this part of the activity area would need to be accommodated low in the terrain, with landform screening to the east, to ensure appropriate landscape outcomes. A small cluster of existing conifers can be found within the area adjacent to the existing access road, which would provide a screening function for views from Arrowtown.

- Potential Visibility: LOW. This internal area faces into the central part of the golf course and is visually well contained. Due to the existing landform to the east, views to this area from Arrowtown are screened as long as buildings are located within low lying buildings platforms, off the eastern ridgeline that confines this area. It is anticipated that buildings up to 8 metres in height could be accommodated in this area, if sited at the proposed RL of 419.5masl, which would allow for full screening through planting or contouring in the LAMA adjacent to the northeast, if necessary.
- Recommended Mitigation and Enhancement Measures: A low-lying floor level that enables a balance of cut and fill is recommended for this area, in particular RL 419.5masl, meaning that buildings of up to 8m may be accommodated within the area. If additional mitigation is needed to fully screen views from the east, planting can be implemented on the eastern ridgeline, which would be highly effective for views from the Arrowtown escarpment. The LAMA shown on the structure plan appropriately provides for this. In addition, a maximum site coverage of 40% is proposed for this activity area to ensure that large areas of open space are maintained between the built form. In order to reduce the bulk of potentially visible parts of buildings (ie upper storey), a roof pitch of at least 30 degrees is proposed for buildings higher than 6m in this activity area.

#### Activity Area A6:

- Ability to Absorb Change: HIGH. Similar to activity area A5, A6 faces the internal part of the Site in a low-lying area near the Clubhouse. This circular area is contained by ridgelines on all sides. Due to the surrounding terrain, no or minimal additional mitigation would be needed to accommodate development in this area without causing adverse effects on external views.
- Potential Visibility: LOW. Similar to A5, this internal area faces into the central part of the golf course, is relatively low lying and is visually well contained. Due to its internal location, the activity area is at a considerable distance (about 900m) from Advance Terrace in Arrowtown, with existing landform to the east of the activity area screening views to the area, provided buildings are located on low lying buildings platforms. In addition, from Advance Terrace the recently consented Arrow South Special Zone would form part of the foreground of views.
- Recommended Mitigation and Enhancement Measures: Development in this activity area is likely to be screened from views from Arrowtown by existing landform and vegetation, meaning buildings of up to 8m can be accommodated without adverse visual or landscape effects. No other mitigation measures are required.

#### Activity Area A7:

- Ability to Absorb Change: HIGH. This relatively small activity area expands the site of a consented building platform. The landform surrounding this area is made up of undulating terrain to the north east with a cluster of willows, and a rising terrace to the south that form the southern boundary of the Hills property. Due to its secluded and contained location at a distance of over 800 metres from Arrowtown's Advance Terrace, this area could accommodate a small cluster of buildings. The consented SHA lies in close proximity to this activity area, which increases the Site's ability to absorb further change in this location, as it would be subservient in scale in comparison to the consented large-scale retirement village.
- Potential Visibility: LOW. This contained area, including the future development, has low visibility from outside the Site, although some care needs to be taken to ensure that views from Advance Terrace are successfully blocked by the intervening ridgelines in the golf course. The area is contained by existing landform and deciduous trees to the east, and lends itself to a small cluster of buildings.
- Recommended Mitigation and Enhancement Measures: This area is well screened by existing landform and vegetation. Additional screening, if required, can be implemented in the LAMA shown on the structure plan. Fixed floor levels (RL414masl) are recommended to ensure views to the area from Advance Terrace are blocked. Any views to the area would be gained in combination with the adjacent SHA, which means that any visual effects would not be perceived as adverse.

#### Activity Area A8:

- Ability to Absorb Change: MEDIUM- LOW. This small activity area is located near the north eastern boundary of the Site, along McDonnell Road. This area is considered to be the visually most sensitive, since it is located in the immediate vicinity of the existing Arrowtown township. At a distance approximately 150m its proximity to the elevated residential dwellings along Cotter Avenue in Arrowtown and the intervening landform, which is restricted to a low bund along the Hills' property boundary, makes this areas more susceptible to views from these elevated viewpoints. However, existing vegetation in the form of a shelterbelt of young conifers along the property boundary and mature poplars and willows add a degree of visual separation between Activity Area A8 and existing dwellings along the Arrowtown escarpment. Other rural residential buildings on neighbouring sites are also visible from various viewpoints along Cotter Avenue, so development within this relatively small activity area would not be out of character with the surrounding landscape.
- Potential Visibility: HIGH. The elevated escarpment of Arrowtown (Cotter Ave and parts of Advance Terrace) have direct views to the area despite the existing landform (a bund) and vegetation (a shelterbelt) along the Site boundary. The outlook to the Site/Hills golf course from these elevated properties currently provides a high level of amenity to those properties. Due to the elevated position of these existing dwellings, it would be difficult to fully screen development in this activity area, even with mature vegetation. It is anticipated however that a small number of buildings could be accommodated in this area amongst the vegetation along the lake edge, if appropriate height limits are imposed.
- Recommended Mitigation and Enhancement Measures: The rural outlook across this area and the character of the area could be maintained if building heights are restricted to 6.5

metres (at RL 402.5masl), a maximum of two buildings are established, and they are carefully sited along the frontage of the existing pond and between existing mature vegetation. Some additional planting along the Site boundary could also further assist in blending/softening the buildings into the surroundings without restricting the outlook beyond. The LAMA identified on the structure plan appropriately provides for this planting. With these measures in place, the outlook and visual amenity from elevated Arrowtown residences would not be adversely affected by development in the activity area.

#### Activity Area A9:

- Ability to Absorb Change: HIGH. This activity area, is located around a cluster of existing buildings and mature trees. The existing development in this area includes two residential dwellings, set in a visually enclosed part of the property, as well as an additional consented building platform. The trees surrounding the existing dwellings form an attractive amenity setting. Views into the area from the Arrowtown- Lake Hayes Road are blocked by a dense row of shelterbelts, and long-distance views from the Arrowtown escarpment (at over 1km) are obscured by several intervening ridges and vegetation.
- Potential Visibility: LOW. This comparatively large activity area is barely visible from outside the property, as it is located amongst a cluster of existing buildings and mature trees. It is visually separated from roads and existing residential dwellings, including those on the Arrowtown escarpment, by both landform and existing vegetation. If glimpses to the area are possible, buildings would be hardly detectable at viewing distances of over 1km.
- Recommended Mitigation and Enhancement Measures: Due to the existing screening, buildings of up to 8m could be located in this area without adverse visual effects if the mature vegetation is maintained for screening purposes. Should any additional screening be required for this activity area, planting could be implemented within the LAMA to the east of this area, where it would blend in with the existing vegetation.

#### Clubhouse and Resort Services Area

- Ability to Absorb Change: The proposed service area for the golf course is located near the entrance to the Site off McDonnell Road. This service area currently contains a large maintenance shed that is well screened from the road with mounding and vegetation. Due to the existing level of development in this area and the existing screening around it this area is considered to provide a high ability to absorb further change with buildings of a similar height.

The existing clubhouse is located in a central location of the Site at a distance of at 700 metres from the nearest road. The clubhouse has been developed to a very high design standard with a low-lying building platform and both the clubhouse and adjacent car park are well screened by vegetation and landform from viewpoints outside the Site. The area to the south of the clubhouse is located within undulating terrain and the low-lying parts of this area have a high potential to absorb change.

- Potential Visibility: While glimpses to the service area are possible from the golf course entrance at McDonnell Road and some parts of the Arrowtown escarpment, effective screening is already in place for this area to ensure that visibility of existing and potential future structures is low.

The existing clubhouse has very low visibility due to its low profile and surrounding landform and vegetation, in particular the cluster of pine trees to the north. Parts of the ridgeline immediately south of the existing clubhouse are visually more exposed to views from the southern Arrowtown escarpment (Advance Terrace), so future development in this area should be kept off the main ridgeline. However, it is of some relevance to note that from Advance Terrace the recently consented Arrow South Special Zone would form part of the foreground of views.

- Recommended Mitigation and Enhancement: The service area is well screened from most viewpoints and any potential mitigation would be required along the private property boundary to the north, where deciduous trees are already established.

The currently developed clubhouse area is screened by the cluster of existing pine trees. Buildings within the proposed clubhouse extension area to the south could be screened or softened, if required by planting immediately adjacent to buildings on the eastern boundary of the proposed area.

#### Homesites within Resort Zone

- Ability to Absorb Change: The proposed homesites are located in visually discrete areas that are separated from each other by landform and are proposed to each cater for an individual dwelling. These homesites are generally located on sites that have been previously consented for residential dwellings. In particular, five of the proposed homesites are located on previously consented sites (HS 1, 2, 3, 5, and 6). Dwellings have already been constructed on HS 1, HS 2 and HS 3. Proposed HS4 is not the site of a previously consented dwelling and is located in a low-lying area off Hogans Gully Road. Five of the previously consented dwellings/building platforms are not being pursued as part of this proposal because a 9 hole/short course has recently been established in the high-lying part of the Site near the edge of the eastern Speargrass Flat escarpment where they were to be located. A further separately located previously consented dwelling/building platform is not being pursued via this proposal due to its potential visibility from McDonnell Road and Arrowtown. Proposed HS 6 is located in the general location of a previously consented dwelling, although it has been moved in a northerly direction from the consented location to avoid its appearance on the ridgeline.
- It is considered positive landscape outcomes that fit with the character of the Site can be achieved by careful design and siting of future buildings on the homesites, and that a visually cohesive development that integrates well with the landscape can be achieved.
- Potential Visibility: The location of the homesites has been undertaken with care and it is expected that buildings can be absorbed well in these areas. HS 1 and HS 3 are already built on, and are located on top of the escarpment, oriented towards Speargrass Flat with low visibility from Hogans Gully Road. The proposed buildings on HS 4 and HS 5 will be at least partially visible tucked against rising landform from Hogans Gully Road at a distance of around 150- 350m. However, the buildings would be seen in the context of a number of existing dwellings along this road and potentially also the Wakatipu Basin Lifestyle Precinct area which is proposed for the nearby Hogans Gully land under notified Chapter 24 of the PDP.

HS 6 is located on the north facing terrace in the south eastern corner of the Site. HS 6 is in a dip within the landform of the rocky escarpment along the southern boundary of the Site, which will lead to a medium visibility from viewpoints to the east, such as McDonnell Road and Arrowtown. While the frontage of this building would be visible from parts of McDonnell Road and the Arrowtown escarpment, a suitable building platform can be achieved in relation to the terrain by partly cutting it into the slope on the southern side of the building. In combination with dark colours and low reflectivity, buildings in this area are not going to appear visually prominent from Arrowtown, which is at a distance of over 1km away. In views from Advance Terrace the recently consented Arrow South Special Zone would form part of the foreground and the consented SHA located a similar distance would be visually dominant in comparison to the individual dwelling on HS 6. Visibility of HS 6 from McDonnell Road would be restricted to glimpses between existing conifers along the eastern boundary of the property.

- Recommended Mitigation: For HS 6, the building design and colour is of importance to ensure that the structures can be successfully integrated into the landscape. A design that allows for these buildings to be cut into the back slope would avoid their appearance on the skyline and a maximum building height of 5.5m is proposed for this site.

### Conclusion on Visual and Landscape Effects

The above visibility analysis provides an individual assessment of views that would likely be gained to the proposed activity areas, homesites, the Clubhouse and resort services area. In this section overall conclusions are drawn on the visual effects that would be experienced by viewers on public and private land surrounding the property.

The visibility of activity areas and homesites on the eastern part of the Site, including the clubhouse and resort services areas, would be largely restricted to the Arrowtown escarpment (Cotter Avenue and Advance Terrace) with few glimpses possible from McDonnell Road and some of the neighbouring properties. The landscape viewed from these viewpoints will also include the consented developments of Arrow South Special Zone and the retirement village SHA on McDonnell Road, which will change the currently experienced landscape character and openness in this area. The implementation of additional mounding and screen planting within the proposed LAMAs, in combination with low-lying, fixed building platforms would ensure that significant adverse visual effects can be avoided. The proposed colours for the buildings would mean that at viewing distances of more than 500 metres (apart from A8 at 200 metres) would not dominate the landscape when viewed from these private residences.

The remainder of the proposed development areas in the central and western part of the Site are generally focussed internally with low visibility from outside the Site. The steeply rising terrain along Hogans Gully Road and parts of Arrowtown-Lakes Hayes Road almost entirely blocks views from a south-westerly direction. There is very limited need to implement additional screening within this part of the Site, as visual effects are expected to be low from public viewpoints.

From long-distance elevated viewpoints the majority of the proposed Resort Zone would be visible, but at viewing distances of over 1km, the buildings would form a very small component of the view

and would be perceived together with numerous existing buildings, such as Arrowtown and Millbrook Resort, as well the recently consented SHA development next to the site. The visual effects from these elevated viewpoints are, therefore, not considered to be adverse.

The domestication that has taken place within the Site over the past decade, as the golf course has been established, has led to a change from its original rural characteristics. While the golf course still provides open space and amenity values, these values differ significantly from rural areas that contain productive agricultural land uses.

The proposed activity areas are sited in confined areas, with only some areas visually connected to each other, and therefore cumulative visual effects within the site would only occur between activity areas A4, A5 and A6 where buildings would be partially visible in the same viewshaft. In order to reduce any visual effects from buildings, additional design controls are proposed in activity areas A4 and A5. A roof pitch of at least 30 degrees for buildings over 6m in height and a 40% site coverage limit within these areas will help to reduce the bulk of buildings and to maintain open space between built form.

While a number of buildings may be partially visible from Arrowtown, the clusters would form a small component of the view across the open golf course, as they are at considerable distance from the township.

The proposed mitigation within the Site will build on existing landform and planting patterns and the landscape change from the mitigation will not be readily detectable from outside the golf course. Few activity areas are located close to the property boundaries and for those areas that are mitigation is proposed to ensure that adverse visual effects of buildings on neighbouring properties can be avoided as described in the assessment.

As part of the Structure Plan design particular emphasis was placed on maintaining the current visual coherence of the golf course by placing the proposed activity areas and home sites in areas where they are in harmony with the line and form of the landscape. The small scale terrain of the Site and the landform variation allows the buildings to be sited so that adverse effects of the structures on the internal ridges and slopes can be avoided. Due to the existing screening from low-lying viewpoints, such as roads, appearance of buildings on the skyline is avoided. The development setbacks from public roads in combination with existing landform and vegetation screening will ensure that amenity values associated with the views from public roads are maintained. The variable sense of openness and enclosure will be utilised to site buildings in visually discreet locations within the hummocky terrain.



## Statutory Assessment

In accordance with Section 32 of the Resource Management Act 1991 ('RMA'), this part of the report addresses assesses the proposal against the following statutory documents, as relevant:

- Part II of the RMA
- The objectives of the Proposed Queenstown Lakes District Plan;
- The provisions of the proposed Hills Resort Zone.

### Part II of the RMA

Part II of the RMA sets out the purpose and principles of the Act (**Sections 6-8**).

**Section 6** requires the matters listed in the section be recognised and provided for as “matters of national importance”. The only section 6 matter potentially of relevance to this proposal and landscape assessment is “(b) *the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development.*”

There are no outstanding natural landscapes or features within or close to the Hills’ property. Therefore there are no matters of national importance relevant to this assessment.

*Section 7 RMA identifies “other matters” to which particular regard must be had by the council when assessing this proposal.*

The section 7 matters considered potentially relevant to this proposal are:

- (b) *The efficient use and development of natural and physical resources.*
- (c) *The maintenance and enhancement of amenity values.*
- (f) *Maintenance and enhancement of the quality of the environment.*

These matters are discussed below within the assessment of the objectives and policies of the Proposed Plan as notified, and the provisions of the proposed Hills Resort Zone.

### Proposed District Plan

#### Chapter 3 Strategic Direction:

#### Relevant objectives and policies under 3.2.5 Goal - Our distinctive landscapes are protected from inappropriate development

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

*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.*

The Hills golf course differs in character from rural and productive farm land in the basin. It is considered that the golf course can absorb the resort style development proposed under the Resort Zone without adverse effects on the amenity of the area. Within the Site discrete areas are chosen

for development that can absorb change without detracting from existing landscape and visual amenity values or causing cumulative effects in terms of the inherent landscape character.

The existing landscape within the Site contains a golf course to a high design standard. While this manicured landscape provides high amenity values, it is in reality highly modified. It provides a pleasant outlook for a number of residents in Arrowtown, but the landscape and visual amenity values are not considered vulnerable to degradation due to the degree of human intervention that has taken place in the past. Within the Site care has been taken under the preparation of the structure plan for the Hills Resort Zone to locate the proposed activity areas and home sites within areas that have a greater potential to absorb change. The activity areas are all located in parts of the Site where they will not adversely affect the landscape and visual amenity values currently provided in the golf course. The location of buildings has taken into account the local small scale topography and existing vegetation of the Site to ensure that the proposed buildings can be successfully accommodated within significant visual effects on viewpoints located outside the property.

## **Chapter 6 Landscape:**

*6.3.1.8 Ensure that the location and direction of lights does not cause glare to other properties, roads, and public places or the night sky.*

*6.3.1.11 Recognise the importance of protecting the landscape character and visual amenity values, particularly as viewed from public places.*

For external lighting down lights are proposed to minimise visibility. While lights from some of the buildings will be seen from outside the Site, including Arrowtown, the impact in the context of the township is considered to be minimal.

It is considered that the landscape character and visual amenity of the property, when viewed from surrounding viewpoints, including public and private places, can be maintained under this particular proposal.

*6.3.2 Objective - Avoid adverse cumulative effects on landscape character and amenity values caused by incremental subdivision and development.*

*6.3.2.2 Allow residential subdivision and development only in locations where the District's landscape character and visual amenity would not be degraded.*

*6.3.2.4 Have particular regard to the potential adverse effects on landscape character and visual amenity values from infill within areas with existing rural lifestyle development or where further subdivision and development would constitute sprawl along roads.*

*6.3.2.5 Ensure incremental changes from subdivision and development do not degrade landscape quality, character or openness as a result of activities associated with mitigation of the visual effects of proposed development such as screening planting, mounding and earthworks.*

It is proposed to change the existing operative rural zoning (and proposed Wakatipu Basin Rural Amenity Zone) to the Hills Resort zone, which is considered appropriate for the existing and proposed landscape character of the golf course, which provides low landscape character values generally associated with rural land. The absence of productive farming land uses differentiates the golf course on the Site from other rural land in the district. However, within the context of the present landscape the visual coherence of the landscape will be preserved by ensuring that proposed buildings will be located in areas with the potential to absorb change, as described in detail in the assessment of activity areas.

It is noted that in Schedule 24.8 of the recently notified Chapter 24 of the PDP, the Site, which forms a separate Landscape Character Unit (LCU 22- The Hills), is described as providing generally a low level of naturalness as a consequence of the distinctly modified character of the golf course setting. The rural residential dwellings and the 18 consented building platforms are also acknowledged. It is considered that the proposed Resort Zoning is generally consistent with the description contained in the LCU and would maintain the identified existing values, with the Site acting as a greenbelt extension to Millbrook on the western side of Arrowtown. The proposed activity areas are all located in visually discreet locations, set back from public and private view points to ensure that they can be integrated with the landform. Existing and proposed planting throughout the golf course (including the proposed LAMAs) will ensure that the visual coherence of the Site can be maintained, while utilising the complexity of the landform and vegetation to avoid cumulative effects and adverse effects on the openness/ open space values of the 'greenbelt'.

In terms of landscape outcomes it is considered preferable to provide for this style of development, encompassing clustered residential and visitor accommodation, within a specific resort zone, as compared with ad hoc residential development in rural areas. The proposed Resort Zone would not constitute sprawl of conventional residential development. The proposed residential activity areas are clustered in central parts of the Site, which avoids sprawl along the roads. As part of the proposal very specific areas have been identified for mitigation measures, where screen planting and mounding would visually form part of the existing golf course environment without impacting on the openness of the site.

*6.3.5 Objective – Ensure subdivision and development does not degrade landscape character and diminish visual amenity values of the Rural Landscapes (RLC)6.3.5.2 Avoid adverse effects from subdivision and development that are:*

- *Highly visible from public places and other places which are frequented by members of the public generally (except any trail as defined in this Plan); and*

- *Visible from public roads.*

*6.3.5.3 Avoid planting and screening, particularly along roads and boundaries, which would degrade openness where such openness is an important part of the landscape quality or character.*

*6.3.5.4 Encourage any landscaping to be sustainable and consistent with the established character of the area.*

*6.3.5.5 Encourage development to utilise shared accesses and infrastructure, to locate within the parts of the site where they will be least visible, and have the least disruption to the landform and rural character.*

*6.3.5.6 Have regard to the adverse effects from subdivision and development on the open landscape character where it is open at present.*

It is understood that the proposed rezoning does not need to be assessed under this objective and its associated policies because if the rezoning is granted the Rural Landscape classification in the Proposed Plan will no longer apply. Nonetheless it is considered the proposal achieves these provisions. The Site in general is not highly visible from the adjacent roads due to existing landform and vegetation screening. The topography of the terrain within the Site is highly variable and a number of internally oriented spaces have been created that can absorb development without being visible from public roads. From high-lying public viewpoints, such as Feehly Hill and Tobins Track, large parts of the proposed development would be visible, but seen in the context of Arrowtown Township, including the Arrow South Special Zone and retirement village SHA, and Millbrook Resort.

No additional screen planting along the roads is proposed as part of the Structure Plan, and therefore, no loss of openness or views from public roads is expected under the proposal. The design of the proposed development will be in character with the Hills golf course to provide high amenity. The proposed Resort Zone would be in character with the existing land use and would be perceived as a logical extension to the tourism and recreation experience provided within the Site. The Zone would provide for a much lower density than what is provided for in the consented retirement village on the neighbouring site.

The design of the golf course with a mix of manicured greens, areas of native grasses and clusters of exotic trees and shrubs allows for the small pods of development to integrate among the undulating landform of the Site. The creation of unnatural lines and incongruous appearance of development will be avoided in order to maintain the internal amenity of the Site, as well as the outlook of adjacent residents. The access tracks between activity areas and homesites will be shared, which reduces the need for additional internal roads.

### Proposed Hills Resort Zone Provisions

A specific range of development is proposed to be enabled under in the Hills Resort Zoning, provided specified standards are met, including in relation to building heights and locations, roof pitch (30 degrees for building higher than 6m in A4 and A5), site coverage (40% maximum coverage in A4 and A5), colours, materials, and reflectivity. In addition, areas of mitigation landscaping and planting (LAMAs) are shown on the structure plan and rules are proposed which require landscaping in these areas to be undertaken before development in the adjacent activity area is completed. These planting areas will help to ensure appropriate landscape outcomes will be achieved, and buildings are screened or softened (whichever is required for the particular area). Together, these measures will ensure that buildings and development within the new zone is appropriate for and well integrated with its location and the character of the site and the wider environment.

The proposed rules for the new zone include a rule which requires that the LAMA adjacent to an activity area be established before buildings in the activity area are constructed, otherwise a restricted discretionary resource consent for the buildings is required. This control applies to buildings within Activity Areas A2, A3, A4, A5, A7, A8, A9, HS5 and S and provides an opportunity for council to assess the visual effects of the buildings and the adequacy of any mitigation planting/measures proposed if the LAMA is not established. With established LAMAs the buildings would be controlled. The establishment of LAMAs is also proposed as a controlled activity to enable council to assess the proposed earthworks and planting (in terms of plant selection, irrigation and mitigation function) to ensure it appropriately mitigates or provides visual relief from the effects of development in the adjacent activity area.

The design of the structure plan has been undertaken with input from the landscape assessment. As part of this the building locations, height and activity status are specifically tailored for each activity area and home site to ensure that landscape outcomes without adverse effects on the wider landscape can be achieved. The proposed Structure Plan provides certainty around the comprehensive design of the individual areas of development. The location of activity areas and home sites responds to the site characteristics and is considered a sympathetic development within the modified environment of the golf course.

Three of the proposed activity areas are considered visually more sensitive (A3, A4, A8), principally due to the potential views that can be gained to these areas from Arrowtown, or for A3, from the neighbouring property.

The restricted discretionary activity status and matters of discretion specified for buildings where the adjacent LAMA has not been established means that the potential visual effects of buildings can be assessed prior to construction. This approach will ensure that the Site will be developed in a way that adverse visual effects on private and public views can be avoided. The openness of the site, perceived from Arrowtown and adjacent roads, would not be changed and through landscaping, which will be consistent with the established character of the property, the overall landscape quality and character of the Hills golf course can be maintained.

It is proposed that for all buildings in the Resort Zone, the colours and materials used be restricted to a range of black, browns, greens or greys; pre-painted steel; and that all roofs must have a reflective value not greater than 20% and surface finishes a value not greater than 30%. These measures mean that buildings will not be visually prominent, even if parts of buildings are visible from various viewpoints. With a roof pitch of a minimum of 30 degrees for buildings higher than 6m in A4 and A5, the bulk of the upper storey of the built form in these activity areas can be reduced to minimise visibility from elevated viewpoints, including the Arrowtown escarpment. Additionally, a maximum site coverage of 40% is proposed for A4 and A5 to ensure that the built development of these larger, more visible areas is broken up, providing for sufficient areas of open space within the activity areas.

A reduced level (RL) maximum height has been nominated for most activity areas, meaning that buildings of up to 8 metres can be built in all activity areas (other than A8), including the Clubhouse, Resort Services and Homesites areas. For those areas where an RL is nominated, buildings may need to be cut into the ground in order to achieve this maximum height, which will ensure they are appropriately nestled into the landform. For A8, which is located in close proximity to the Arrowtown escarpment, a lower building height of 6.7 metres is proposed which will ensure that the openness and views across the site can be maintained without adverse effects on the visual amenity experienced by residents in Arrowtown. For HS6 a 5.5 metre building height is proposed to avoid visual prominence on the north-east facing ridgeline. In general, the approach to building heights is considered appropriate, since visibility from surrounding roads to the internally located individual house sites is very low and long distance views from Arrowtown (over 1km) will only be affected to a minor extent.

The development proposed under the proposed Hills Resort zoning is not urban or rural lifestyle/residential in character. The Zone provides for a sensitively designed resort style development instead. The structure plan aims to maintain large areas of open space in the golf course activity area with confined nodes of built development where they can be absorbed in the landscape. The design builds on the existing land use pattern and will not adversely affect landscape or visual amenity values. The primary driver behind the design is to maintain the operation and aesthetic value of the golf course and to develop accommodation in a complementary style. The activities to be provided within the club house and resort services areas are considered complementary to the existing land use and appropriate in the context of the golf course.

## Conclusion

This assessment of landscape and visual effects of the development that would be enabled by the proposed Hills Resort Zoning provides an analysis of the proposed residential/ visitor accommodation activity areas (A1-9) and home sites (HS1-6), as well as the club house and resort services area.

The structure plan for the proposed Resort Zone has been developed following a detailed analysis of the Site, and having particular regard to the parts of the Site with high potential to absorb change and development.

Development within the activity areas identified on the structure plan can generally occur, provided specified standards relating to building design, height and landscaping etc are met. These standards will ensure that buildings and development is in character with the surrounding local and wider environment, is not visually prominent or dominant but is recessive in appearance to blend into the landscape, and will not give rise to significant adverse landscape or visual effects.

Areas for development are located within internal parts of the Site, where landscape and visual effects will be minor when viewed from surrounding roads as well as from the residential areas of Arrowtown.

The comprehensive development proposal has been tailored specifically for this Site, with its current recreational/golf uses and high design and maintenance standards. The proposed rules for the zone will ensure that the significant majority of the Site will be maintained as open space which is appropriate given its current recreational uses and location in proximity to Arrowtown.

The existing golf course on the Site currently provides high visual diversity in terms of landform and land cover. The visual amenity of the Site is high, due primarily to its manicured character. Despite its operative Rural Zoning, given it is used as a golf course, it does not currently provide rural landscape values relating to productive land uses. The existing landscape character lends itself to the proposed development, and due to the low visibility of the proposed activity areas, in combination with the proposed restrictions on building design, heights, colours and materials etc, and landscaping requirements, as detailed above, adverse effects on landscape character and values can be avoided.

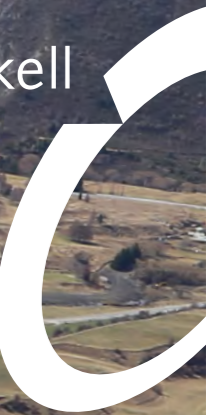
# The Hills Resort Zone

## QLDC DPR Submission

Graphic Supplement for Landscape and Visual Amenity Assessment  
February 2018



Boffa Miskell



# The Hills Resort Zone QLDC DPR Submission

Graphic Supplement for Landscape and Visual Amenity Assessment  
February 2018

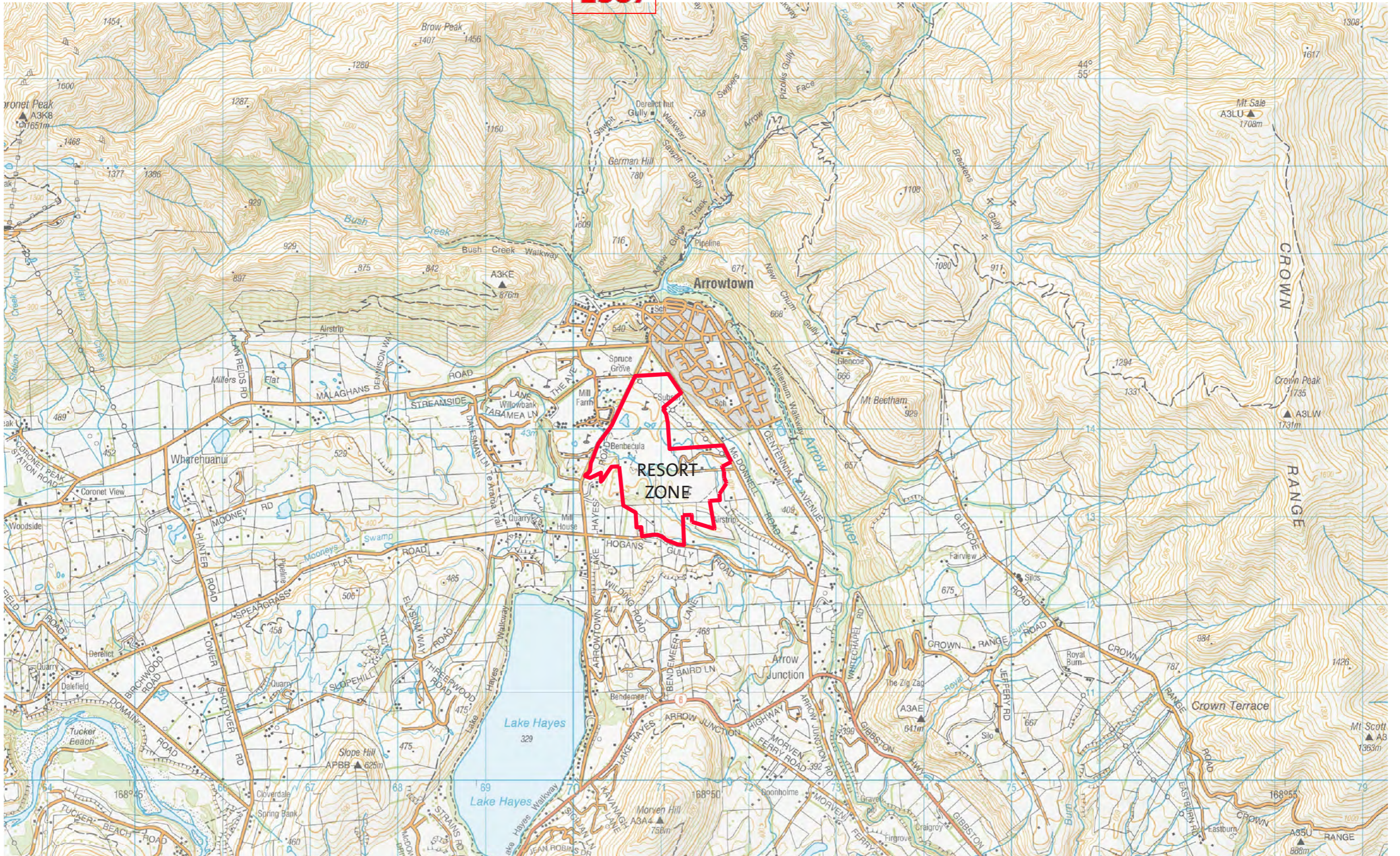
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## Contents

Figure 1: Site Location	3
Figure 2: Proposed Resort Zone Plan	4
Figure 3: Activity Areas and Home Sites	5
Figure 4: Site Context Photograph Locations	6
Figure 5: Site Context Photographs 1, 2	7
Figure 6: Site Context Photographs 3, 4	8
Figure 7: Site Context Photographs 5, 6	9
Figure 8: Site Context Photographs 7, 8	10



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0 1km

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Data Sources: Map sourced from Topo50 Map series. Crown Copyright Reserved

Projection: NZGD 2000 New Zealand Transverse Mercator.

Legend

 Proposed Resort Zone

THE HILLS RESORT ZONE, QLCD DPR SUBMISSION

Figure 1: Site Location

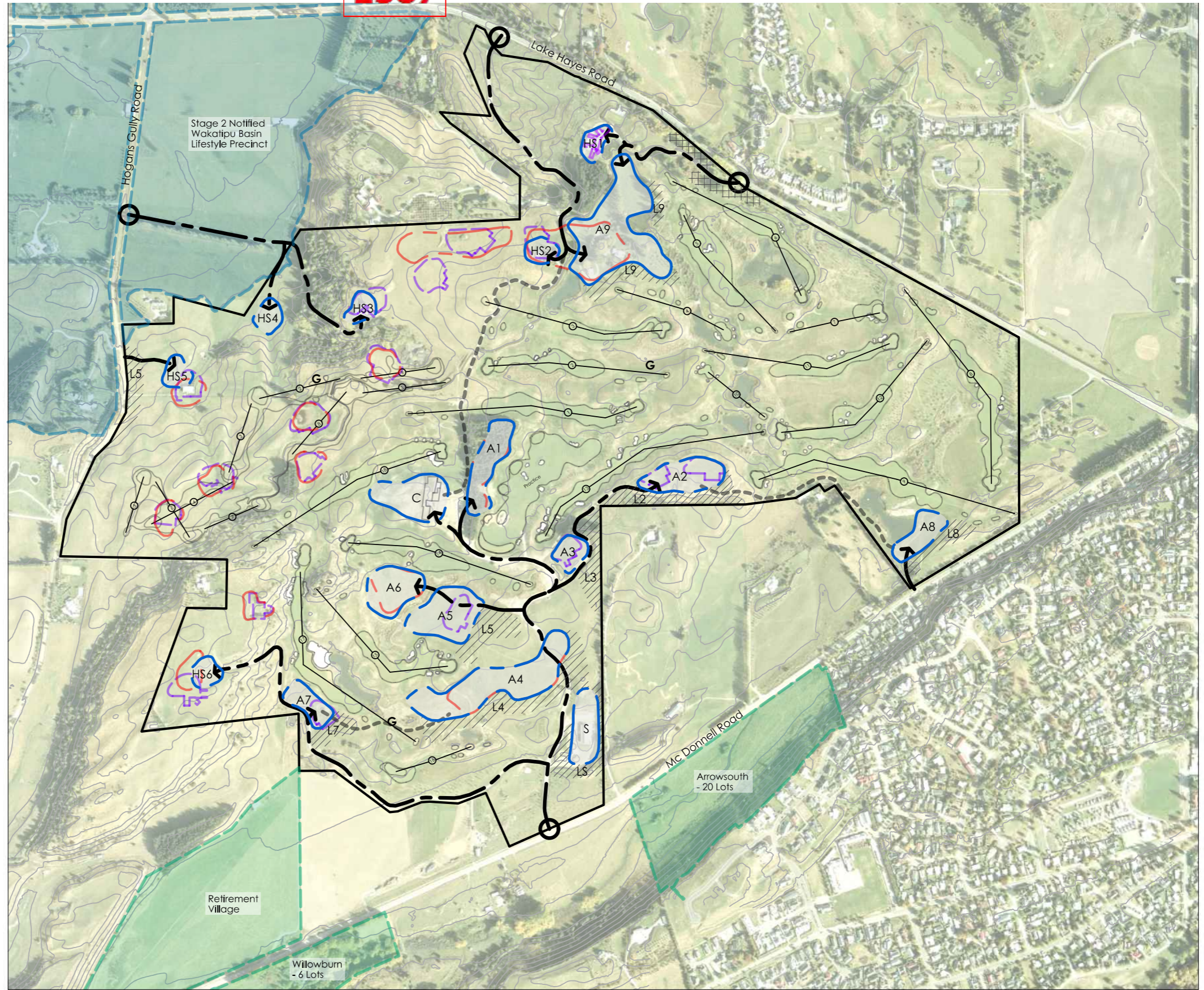
| Date: February 2018 | Revision: 1 |

Plan prepared by Boffa Miskell Limited

Project Manager: Yvonne.Pfluger@boffamiskell.co.nz | Drawn: YPF | Checked: YPF

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- Structure Plan Boundary
  - Activity Area
- Activity Areas:**
- G: Golf course, open space and farming
  - C: Clubhouse
  - A: Visitor Accommodation / Residential
  - HS: Homesite (3,000m<sup>2</sup>)
  - S: Resort Services & Staff Accommodation
- Note: all activity areas include G: Golf course, open space and farming
- Overlays:**
- ▨ Landscape Amenity Management Area
  - ▧ Existing Vegetation to be retained for Landscape Amenity Management
  - Existing access point
  - Road access
  - - - Buggy / cart access
- Context:**
- ▭ Stage 2 Notified Wakatipu Basin Lifestyle Precinct
  - ▭ Other Consented Development
  - - - Oct 2015 Submission Activity Area
  - - - Previously consented homesites & Hills Lodge



**The Hills Structure Plan - Area Schedule**  
21.02.18

Activity Area	Size
A1	0.9 Ha
A2	0.9 Ha
A3	0.4 Ha
A4	2.2 Ha
A5	1.2 Ha
A6	0.9 Ha
A7	0.5 Ha
A8	0.6 Ha
A9	2.7 Ha
H1	0.3 Ha
H2	0.3 Ha
H3	0.3 Ha
H4	0.3 Ha
H5	0.3 Ha
H6	0.3 Ha
S	0.77 Ha
C	1.1 Ha

Structure Plan Area	162.3 Ha
Total Activity Area	12.8 Ha

(Excl Clubhouse)

**The Hills**  
21.02.18 . 1:8000 @ A3

www.sitela.co.nz . rt@sitela.co.nz . 021 838 855 . 128\_SK-102 Figure 3 Hills Structure Plan

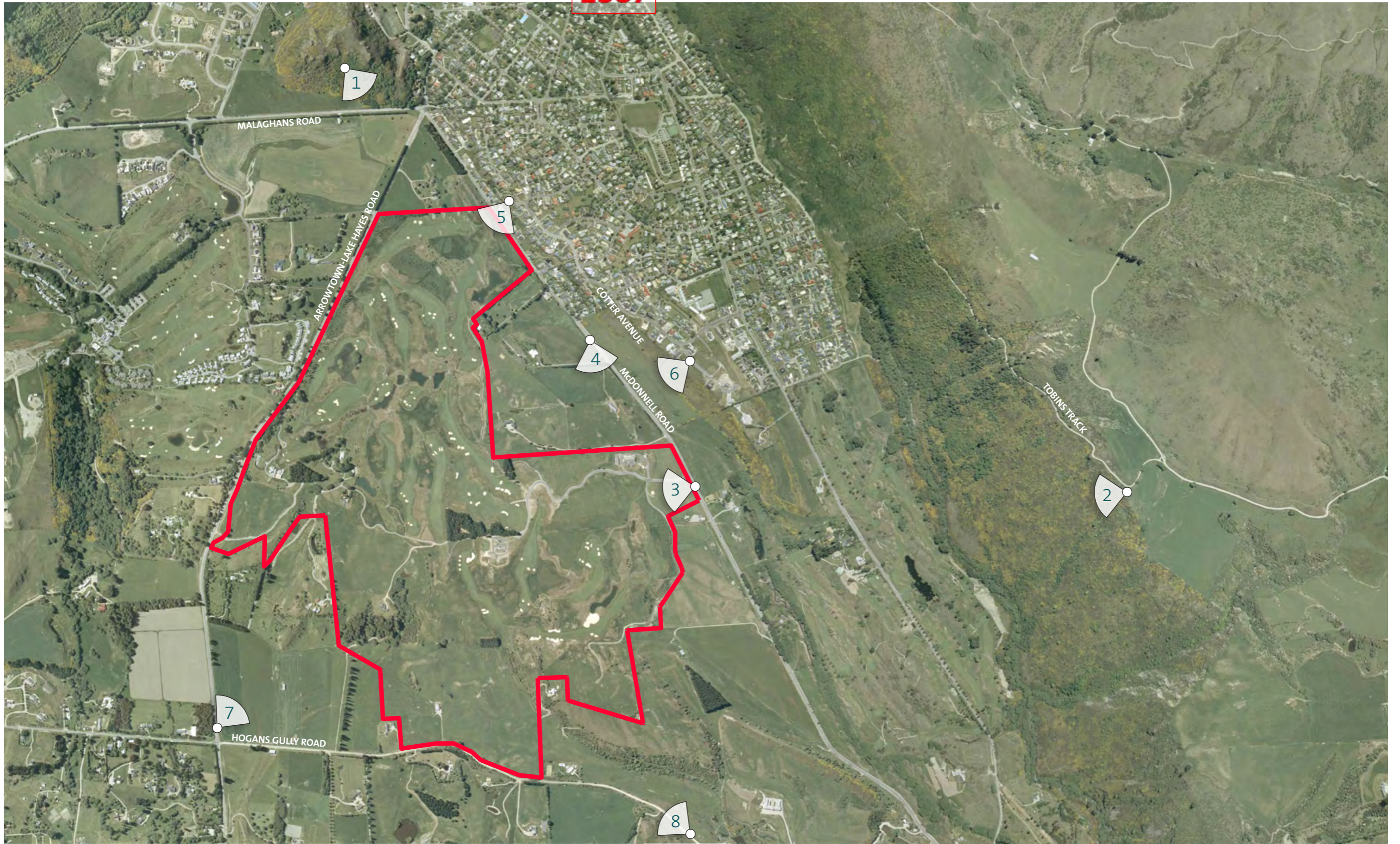
**Structure Plan**

**SITE**





Aerial photograph showing the approximate locations of activity areas and home sites.



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Arrow South Special Zone

Cotter Avenue

McDonnell Road

Consented SHA

The Site

Arrowtown-Lake Hayes Road

Lake Hayes



Site Context Photograph 1: View from Feehlys Hill, in Arrowtown, looking in a southerly direction towards the Site.

Consented SHA

McDonnell Road

Lake Wakatipu

Lake Hayes

Southern boundary of Site

Eastern boundary of Site

Arrow South Special Zone  
Arrowtown



Site Context Photograph 2: Photograph taken from a location near the top of Tobins Track looking in a southwesterly direction towards the Site





3

Site Context Photograph 3: View from McDonnell Road looking in a westerly direction toward the Site.



4

Site Context Photograph 4: View from McDonnell Road looking in a southwesterly direction toward the Site.



Site Context Photograph 5: View from Arrowtown escarpment (walkway to Cotter Avenue) looking in a westerly direction toward the Site.



Site Context Photograph 6: View from Cotter Avenue looking in a westerly direction toward the Site. The Arrow South Special Zone is located on the flats below the view point on the right side of the image.



Site Context Photograph 7: View from Arrowtown-Lake Hayes Road looking northeast toward the Site.



Site Context Photograph 8: View from Hogans Gully road looking west toward the Site.





MARSHALL DAY  
Acoustics 

THE HILLS REZONING  
HELICOPTER NOISE ASSESSMENT

Rp001 R01 2015564C | 12 October 2015

Project: **THE HILLS REZONING**

Prepared for: **Boxer Hill Trust  
C/- Lane Neave  
P O Box 701  
Queenstown 9348**

Attention: **Rebecca Wolt**

Report No.: **Rp001 R02 2015564C**

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#### Document Control

Status:	Rev:	Comments	Date:	Author:	Reviewer:
Client Draft			8 October 2015	Steve Peakall	
	R01	Internal Review	12 October 2015	Steve Peakall	Laurel Smith
	R02	Legal Review	15 October 2015	Steve Peakall	

## TABLE OF CONTENTS

1.0	INTRODUCTION .....	4
2.0	PROPOSAL.....	4
2.1	Proposed Activity .....	5
2.2	Existing Environment .....	5
3.0	NOISE PERFORMANCE STANDARDS.....	5
3.1	Operative Queenstown Lakes District Plan.....	6
3.2	Proposed (Notified District Plan Review) .....	6
3.3	New Zealand Standard 6807:1994 .....	6
3.4	Recommended Performance Standards.....	7
4.0	PREDICTED NOISE LEVELS .....	7
4.1	Noise Modelling Methodology .....	7
4.2	Measured Sound levels .....	8
4.3	Predicted Noise Levels.....	8
4.4	Assessment of Noise Effects.....	9
5.0	CONCLUSION .....	9

APPENDIX A GLOSSARY OF TERMINOLOGY

APPENDIX B FIGURES

## 1.0 INTRODUCTION

Marshall Day Acoustics has been engaged by the Boxer Hill Trust (the Trust) to undertake an assessment of helicopter noise effects from helicopter movements using a private helicopter landing area on the Hills golf course, located at 164 McDonnell Road, Arrowtown.

Noise emissions from the proposed helicopter operations have been predicted using the Integrated Noise Model (INM) software. Predicted noise levels are considered in relation to the noise rules of the Operative Queenstown Lakes District Plan and the relevant text of the notified Proposed District Plan.

Noise performance standards have been recommended based on the Operative and Proposed District Plan noise provisions and New Zealand Standard NZS 6807: 1994 “*Noise Management and Land Use Planning for Helicopter Landing Areas*”.

This report presents the findings of the noise assessment. A glossary of terminology is presented in Appendix A.

## 2.0 PROPOSAL

It is proposed by the Boxer Hill Trust to formalise a helicopter landing area at the Hills Golf Course in Arrowtown for private transportation to and from the site.

The golf course is located at 164 McDonnell Road, Arrowtown. The total land area of the site is approximately 162 Hectares. The proposed helicopter landing area is located just to the south of the existing clubhouse associated with the golf course and is currently used on an informal basis for helicopter movements.

Figure 1 shows the location of the proposed helicopter landing area.

**Figure 1: Proposed Helicopter Landing Area**



## 2.1 Proposed Activity

Typically the landing site has been used infrequently with approximately five movements per week on average. The landing zone has also been used historically for a higher number of movements on special event days at the golf course, an example of which is the New Zealand Golf Open.

The Trust is seeking to rezone its land to provide for resort style development, including visitor accommodation, residential activity, worker accommodation and ancillary commercial activity. In association with these activities the Trust is also seeking to formally allow for a number of helicopter movements to and from the site, for both special event days and for typical everyday usage.

For typical activity, the helicopter landing area would be used for not more than 12 movements (6 landings and 6 take-offs) in any consecutive seven day period. Helicopter movements would take place between the hours of 7.00 am and 10.00 pm Monday to Sunday

The type of helicopter would vary but is likely to be a Eurocopter EC130 or other type that is equivalent or lower in noise emissions. The helicopters would approach and depart the site generally to the south-east; and would not directly overfly any building or when below 500 ft in altitude.

For special event days it is envisaged that up to 20 helicopter movements could occur on any given day. MDA understand that special event days would only occur for up to ten days per year. The noise effects of consecutive special event days are discussed in more detail in section 4.3.

## 2.2 Existing Environment

Surrounding the site are several dwellings at various distances. Most are located over one kilometre from the proposed helipad, the closest being 500m away to the south. The receivers used in the assessment are shown on Figure 1, Appendix B.

It is noted that Receiver E is a wood shed and therefore not a noise sensitive receiver and that Receiver I, L, M and N are associated with the site and therefore not considered to be affected by helicopter noise for the purposes of this assessment. These have been excluded from our assessment.

Marshall Day Acoustics has visited the general area of the site on a number of occasions and observed the vicinity of the site and surrounding environs to be typical of a rural environment. The golf course is expected to be reasonably similar to a typical rural environment, and for extended periods of time may be noticeably quieter. Whilst, at the time of writing this report, no specific noise measurements on-site have occurred, the noise environment is expected to be relatively quiet, with natural sounds such as wind, birds in trees and trees rustling the main noise sources on-site.

Occasional heavy vehicles using the nearby road would be audible, as would aircraft activity associated with Queenstown Airport. The area is also subject to a moderate degree of existing helicopter activity, serving the various tourist operations that are common in the Queenstown Lakes District.

## 3.0 NOISE PERFORMANCE STANDARDS

General noise performance standards are not suitable for controlling noise from helicopter operations which involve high noise levels for short intermittent periods of time.

Helicopter noise emissions involve periods of relatively high noise levels for short periods, followed by periods where no noise is occurring, as the helicopter has either departed and left, or has been shut down. The general noise performance standards do not allow for or recognise that helicopters are inherently noisy, but also that noise occurs over a relatively short timeframe, with significant periods of respite between events where no noise is occurring.

New Zealand Standards published NZS 6807:1994 “*Noise Management and Land Use Planning for Helicopter Landing Areas*” (NZS 6807) to provide a standard approach to managing the effects of helicopter noise on sensitive receivers (e.g. dwellings). Some district plans throughout the country reference NZS 6807 directly, whereas others apply the principles of the Standard but with modified noise limits. The approach taken in the Operative Proposed Queenstown Lakes District Plan is described below.

### 3.1 Operative Queenstown Lakes District Plan

The site is currently zoned Rural General in the Queenstown Lakes District Plan. Helicopter landing areas are not provided for explicitly in the Operative District Plan, and helicopter noise emissions would be controlled by the general noise rules of the zone.

We understand that a helicopter landing area in the General Rural zone is a Discretionary Activity. For reference the general noise limits for the General Rural Zone are contained in Rule 8.2.4.2 (iii) (a) and are as follows:

**Table 1: Noise from non-residential activities received within the Notional Boundary in Rural General Zone**

Noise Limits dBA $L_{eq}$ (15mins)	
Daytime 8.00am – 8.00pm	Night-time 8.00pm – 8.00am
50	40 and 70 dBA $L_{AFmax}$

As mentioned, general noise limits are not considered suitable for controlling noise from helicopter operations. In addition, the District Plan specifically refers, in rule 5.3.5.2 (v) (a), to New Zealand Standard NZS 6802:2008 “*Acoustics - Environmental Noise*” for the assessment of environmental noise emissions. This standard specifically defines helicopter noise emissions as requiring special assessment techniques outside the general scope of that standard.

Therefore the Operative Plan (to the extent it is relevant) acknowledges that helicopter noise requires special consideration, but does not provide any express guidance as to how it should be assessed.

### 3.2 Proposed (Notified District Plan Review)

The notified text of the Queenstown Lakes Proposed District Plan recognises helicopter noise emissions as requiring special consideration by proposing a specific rule (Proposed District Plan, Chapter 36, Rule 36.5 Table 3 – Specific Standards, 36.5.13) , as outlined below:

“*Table 3 Specific Standards*

*36.5.13 – Helicopters: Sound from any helicopter landing area must be measured and assessed in accordance with NZ 6807:1994 Noise Management and Land Use Planning for Helicopter Landing Areas. Sound from helicopter landing areas must comply with the limits of acceptability set out in Table 1 of NZS 6807. For the avoidance of doubt this rule does not apply to designated airports.”*

The rule also specifies a noise limit of 50 dB  $L_{dn}$  for residential sites, which is consistent with NZS 6807.

### 3.3 New Zealand Standard 6807:1994

NZS 6807:1994 “*Noise Management and Land Use Planning for Helicopter Landing Areas*” has been written to provide territorial authorities guidance on the control of noise from helicopter landing areas by way of resource consents or rules in the District Plan. The Standard recognises that general

community noise controls are not appropriate for managing the noise effects of helicopter operations.

NZS 6807 is intended for helicopter landing areas used for ten or more movements in any month or where flight movements are likely to result in a maximum sound level exceeding 70 dB  $L_{AFmax}$  at night or 90 dB  $L_{AFmax}$  during the day in any residential zone or notional boundary of any rural dwelling. It is not intended to apply to infrequently used helicopter landing areas or emergency operations. Given that under the proposed re-zoning of the Trust's land there may be more than 10 flight movements per month, it is appropriate to apply the NZS 6807 in this case.

The Standard sets out the following limits of acceptability for helicopter noise for a range of receivers:

**Table 2: NZS 6807 Limits of Acceptability**

Affected Land Use	$L_{dn}$ day-night average sound level (dB)	$L_{Amax}$ night-time maximum sound level (dB)
i. Industrial	75	n/a
ii. Commercial	65	n/a
iii. Residential	50	70
iv. Rural (at notional boundary)	50	70
v. Residential (internal)	40	55

The hours for night-time  $L_{max}$  shall be defined by the local authority. In the absence of any specific definition by the local authority for helicopter landing areas, the hours of 10.00pm to 7.00am the following day shall be defined as night-time for the purposes of the Standard.

The Standard defines an acceptable limit of 50 dB  $L_{dn}$  and an additional night-time limit of 70 dB  $L_{Amax}$  for residential and rural receivers.  $L_{dn}$  is the day night average noise level where helicopter noise between 10pm and 7am is penalised by ten decibels to account for the extra sensitivity at night. The Standard states the  $L_{dn}$  may be averaged over seven days provided that the level on any one day does not exceed 53 dB  $L_{dn}$ .  $L_{AFmax}$  is the maximum noise level received during a helicopter movement. It applies at night to protect against sleep disturbance.

### 3.4 Recommended Performance Standards

The proposed activity is for helicopter operations during the day time only. Based on the provisions of NZS 6807 and the Proposed District Plan we recommend the following noise limits apply to helicopter operations from the site in the (newly formed) zone:

Noise from helicopter operations shall not exceed 50 dB  $L_{dn}$  at the notional boundary of any dwelling. The day night average noise level ( $L_{dn}$ ) shall be averaged over any consecutive seven day period and shall not exceed 53 dB  $L_{dn}$  on any one day.

## 4.0 PREDICTED NOISE LEVELS

### 4.1 Noise Modelling Methodology

Aircraft noise modelling software called the Integrated Noise Model (INM) has been used to predict  $L_{dn}$  noise emissions from the proposed helicopter operations. The INM is produced by the Federal Aviation Administration (FAA) of the United States and is widely used internationally for modelling noise emissions from airports and heliports.

We understand the proposed helicopter landing area would be approached and departed from the south east, although other routes may be flown depending on prevailing meteorological conditions on any given day.

We understand that either a Eurocopter EC130 or AS350 Squirrel helicopter or an alternative that is equivalent or quieter will be operated to and from the proposed helipad. Noise levels have been predicted using the EC130 (which has a similar noise footprint to a AS350 Squirrel) in the INM and using the model's standard approach and departure profiles which include time on the ground with the engine and rotor operating before a departure and after an arrival.

#### 4.2 Measured Sound levels

MDA has measured noise emissions from a Eurocopter EC130 in general accordance with the New Zealand noise measurement standard NZS6801:2008. Detailed sound exposure level ( $L_{AE}$  or SEL) measurements of these helicopters arriving, departing and flying at 500 feet were performed. These measurements have been used to verify the INM modelling. In general the INM modelling is accurate for the helicopter types under investigation on centreline of the flight paths, but the model tends to over-predict noise levels off axis from the helicopter flight path, in some cases by up to 5 decibels. Therefore the noise modelling presented in this report is considered to be conservative.

#### 4.3 Predicted Noise Levels

Four scenarios have been modelled:

<b>(A) Existing Activity</b>	<b>5 movements per week</b>
<b>(B) Future Typical Activity</b>	<b>12 movements per week</b>
<b>(C) Special Event Days</b>	<b>20 movements per day</b>
<b>(D) Cumulative Noise level</b>	<b>The cumulative noise level averaged over 7 days from the future typical activity and three consecutive days of Special Event activity</b>

The predicted noise levels for each receiver shown in Appendix B are shown in Table 3 below. Note that for Scenario (A), (B) and (D) the noise levels have been averaged over 7 days in accordance with NZS 6807. For Scenario (C) the noise level is for a single day of activity has been calculated to assess whether the single daytime  $L_{dn}$  exceeds a noise level of 53 dB  $L_{dn}$  on any one day.

**Table 3: Predicted Noise Levels**

Assessment Location	Predicted Noise Levels			
	(A) Existing Activity	(B) Future Typical Activity	(C) Special Event Days	(D) Cumulative Noise level
	(dB $L_{dn}$ 7day)	(dB $L_{dn}$ 7day)	(dB $L_{dn}$ )	(dB $L_{dn}$ 7day)
Receiver A	<30	<30	31	<30
Receiver B	<30	<30	37	34
Receiver C	<30	<30	38	35
Receiver D	<30	32	43	40
Receiver F	<30	33	43	40
Receiver G	34	37	48	45
Receiver H	31	35	46	43
Receiver J	<30	33	44	41
Receiver K	<30	<30	39	36



The results show that for all scenarios the proposed noise control of 50 dB  $L_{dn, 7\text{day}}$  at the notional boundary of all surrounding dwellings can be readily complied with. This applies for typical activity and also for weeks where up to 3 special event days occur in any 7 day period.

For the worst case “Special Event Day” where up to twenty movements occur on any day, the noise levels are predicted to be no greater than 48 dB  $L_{dn}$  at the notional boundary of all dwellings. This ensures that on any one day the maximum noise level does not exceed 53 dB  $L_{dn}$  and is therefore compliant with NZS 6807. If there were to be more than three special event days in any 7 day period noise levels may exceed the criterion to a small extent.

Noise contours for the three scenarios are shown in Figure 2, Appendix B. It can be seen that terrain effects have some influence on the shape of the contours in some locations, but that generally the noise level is higher along the flight path, with noise emissions from the ground idle and flight idle components of each movement contributing to noise levels in close proximity to the helipad.

#### 4.4 Assessment of Noise Effects

Based on the predicted noise levels presented above, noise from helicopter operations would typically be at a low level at nearby residences. For special event days, noise would approach the upper limit of acceptability for helicopter noise emissions, but still fall within the proposed maximum noise control by some margin. Because there are only envisaged to be a small handful of such days per year, we consider that helicopter movements as presented in this report would result in noise effects that are reasonable.

#### 5.0 CONCLUSION

Marshall Day Acoustics has assessed noise emissions from proposed typical helicopter activity and special event days at the Hills golf course, Arrowtown.

The assessment has been carried out generally in accordance with the provisions of New Zealand Standard NZS 6807:1994 “*Noise Management and Land Use Planning for Helicopter Landing Areas*”, as required in the Proposed Queenstown Lakes District Plan.

Our predictions show that in both cases noise emissions can readily comply with a noise control of 50 dB  $L_{dn}$  at all nearby sensitive receivers. In addition, on any one day the predicted noise levels would not exceed the criterion by more than 3 decibels, which would be compliant with the provisions of NZS 6807. On this basis we recommend the new zone rules should limit helicopter use so that:

- Helicopter noise emissions do not exceed 50 dB  $L_{dn}$  at the notional boundary of any dwelling (averaged over seven days) and shall not exceed 53 dB  $L_{dn}$  on any one day, when assessed in accordance with New Zealand Standard NZS 6807:1994 “*Noise Management and Land Use Planning for Helicopter Landing Areas*”

It is considered that the noise effects from the proposed helicopter operations on noise sensitive receivers would be reasonable where emissions are below the recommended performance standards in Section 3.3.

**APPENDIX A GLOSSARY OF TERMINOLOGY**

<b>Noise</b>	A sound that is unwanted by, or distracting to, the receiver.
<b>Ambient</b>	The ambient noise level is the noise level measured in the absence of the intrusive noise or the noise requiring control. Ambient noise levels are frequently measured to determine the situation prior to the addition of a new noise source.
<b>dB</b>	<u>Decibel</u> The unit of sound level.  Expressed as a logarithmic ratio of sound pressure P relative to a reference pressure of $P_r=20 \mu\text{Pa}$ i.e. $\text{dB} = 20 \times \log(P/P_r)$
<b>A-weighting</b>	The process by which noise levels are corrected to account for the non-linear frequency response of the human ear.
<b>Notional Boundary</b>	In the Queenstown Lakes District, means a line 20m from the façade of any residential unit or the legal boundary whichever is closer to the residential unit.
<b><math>L_{Aeq}(t)</math></b>	The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the average noise level.  The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.
<b><math>L_{A90}(t)</math></b>	The A-weighted noise level equalled or exceeded for 90% of the measurement period. This is commonly referred to as the background noise level.  The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.
<b><math>L_{dn}</math></b>	The day night noise level which is calculated from the 24 hour $L_{Aeq}$ with a 10 dB penalty applied to the night-time (2200-0700 hours) $L_{Aeq}$ .
<b>SEL or <math>L_{AE}</math></b>	<u>Sound Exposure Level</u> The sound level of one second duration which has the same amount of energy as the actual noise event measured.  Usually used to measure the sound energy of a particular event, such as a train pass-by or an aircraft flyover
<b>NZS 6801:2008</b>	New Zealand Standard NZS 6801:2008 <i>"Acoustics – Measurement of environmental sound"</i>
<b>NZS 6802:2008</b>	New Zealand Standard NZS 6802:2008 <i>"Acoustics – Environmental Noise"</i>
<b>NZS 6805:1992</b>	New Zealand Standard NZS 6805:1992 <i>"Airport Noise Management and Land Use Planning"</i>
<b>NZS 6807:1994</b>	New Zealand Standard NZS 6807:1994 <i>"Noise Management and Land Use Planning for Helicopter Landing Areas"</i>

## APPENDIX B FIGURES

Figure 1 – Receiver Locations

Figure 2 – Predicted Noise Levels

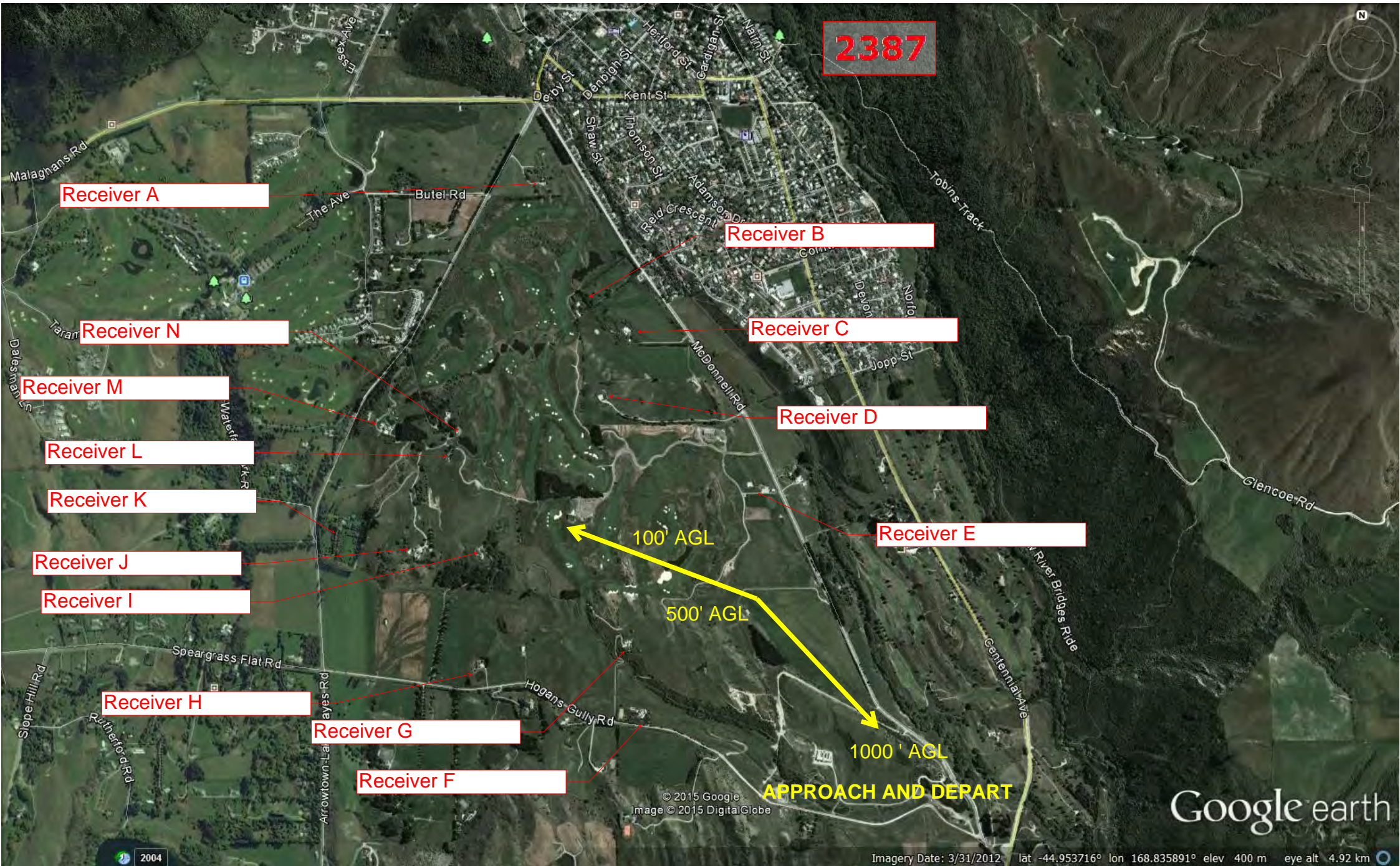


Figure 1 - Receiver Locations

2387



**Map Legend**

**Predicted Noise Levels**

- Existing (5 p/week) (dB Ldn 7day)
- Typical Weekly movements (12 p/week) (dB Ldn 7day)
- Special Event Day Movements (20 p/day) (dB Ldn)

Path: Z:\Jobs\2015\2015564C\06 Drawings\Out\GIS001 2005564C 151008 Figure 1.mxd





## **The Hills Resort Zone**

Queenstown Lakes District Plan  
Review

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## **Transportation Assessment Report**

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October 2015

## The Hills Resort Zone

### Queenstown Lakes District Plan Review

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## Transportation Assessment Report Quality Assurance Statement

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Prepared by:

**Cameron Bradley**

Transportation Planner



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Reviewed by:

**Tony Penny**

Principal Consultant

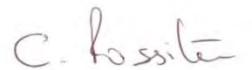


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Approved for Issue by:

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Status: Final report

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## Table of Contents

1.	Introduction .....	1
2.	Existing Transport Infrastructure .....	2
2.1	Site Location .....	2
2.2	Roading Network .....	2
2.3	Roading Form.....	2
3.	Current and Future Travel Patterns .....	8
3.1	Traffic Volumes .....	8
3.2	Provision of Public Transport.....	8
3.3	Travel to Work .....	8
3.4	Road Safety .....	9
4.	Future Changes .....	10
4.1	Queenstown Lakes District Council .....	10
4.2	The Arrowtown Plan .....	10
4.3	Wakatipu Trails .....	10
5.	Levels of Service .....	12
5.1	Vehicles .....	12
5.2	Road Safety .....	12
6.	The Proposal .....	13
6.1	Development .....	13
6.2	Events .....	13
7.	Traffic Generation and Distribution .....	17
7.1	Existing Site Traffic Generation .....	17
7.2	Additional Site Traffic Generation .....	17
7.3	Total Traffic Generation of the Site .....	18
7.4	Construction Traffic Generation .....	18
7.5	Trip Distribution.....	18
8.	Assessment of Rezoning Effects.....	20
8.1	Effects on Rooding Network .....	20
8.2	Buses, Cyclists and Pedestrians .....	20
8.3	Access Arrangements .....	21
8.4	Internal Rooding .....	22
9.	Compliance with Planning Requirements.....	24
9.1	District Plan Requirements .....	24
10.	Summary and Conclusions .....	25



## 1. Introduction

It is proposed to create a Resort Zone around The Hills golf course as part of the Queenstown Lakes District Plan review. The proposed zone will provide for limited residential and visitor accommodation in areas of the golf course that are able to absorb development. The zone also provides for the on-going development and maintenance of the championship golf course, hosting events, ancillary commercial activity and a sculpture park.

The report provides a description of the existing transport infrastructure in the vicinity of the golf course and existing travel patterns. This is followed by a description of the transport components of the proposed development and the expected traffic generation of the development enabled by the rezoning. This forms the basis of the assessment of traffic effects and the assessment against the transport rules of the District Plan.

## 2. Existing Transport Infrastructure

### 2.1 Site Location

The location of the proposed zone is indicated in Figure 1 to the south of the Arrowtown urban area and is bounded by McDonnell Road to the north-east, Arrowtown-Lakes Hayes Road to the west and Hogans Gully Road to the south.

The Operative Queenstown Lakes District Plan (“District Plan”) includes this land within the Rural General Zone. The site currently contains two dwellings, the Hills Golf Course and associated buildings.

Figure 1 also shows the location of the site in relation to the road hierarchy as defined in the District Plan.

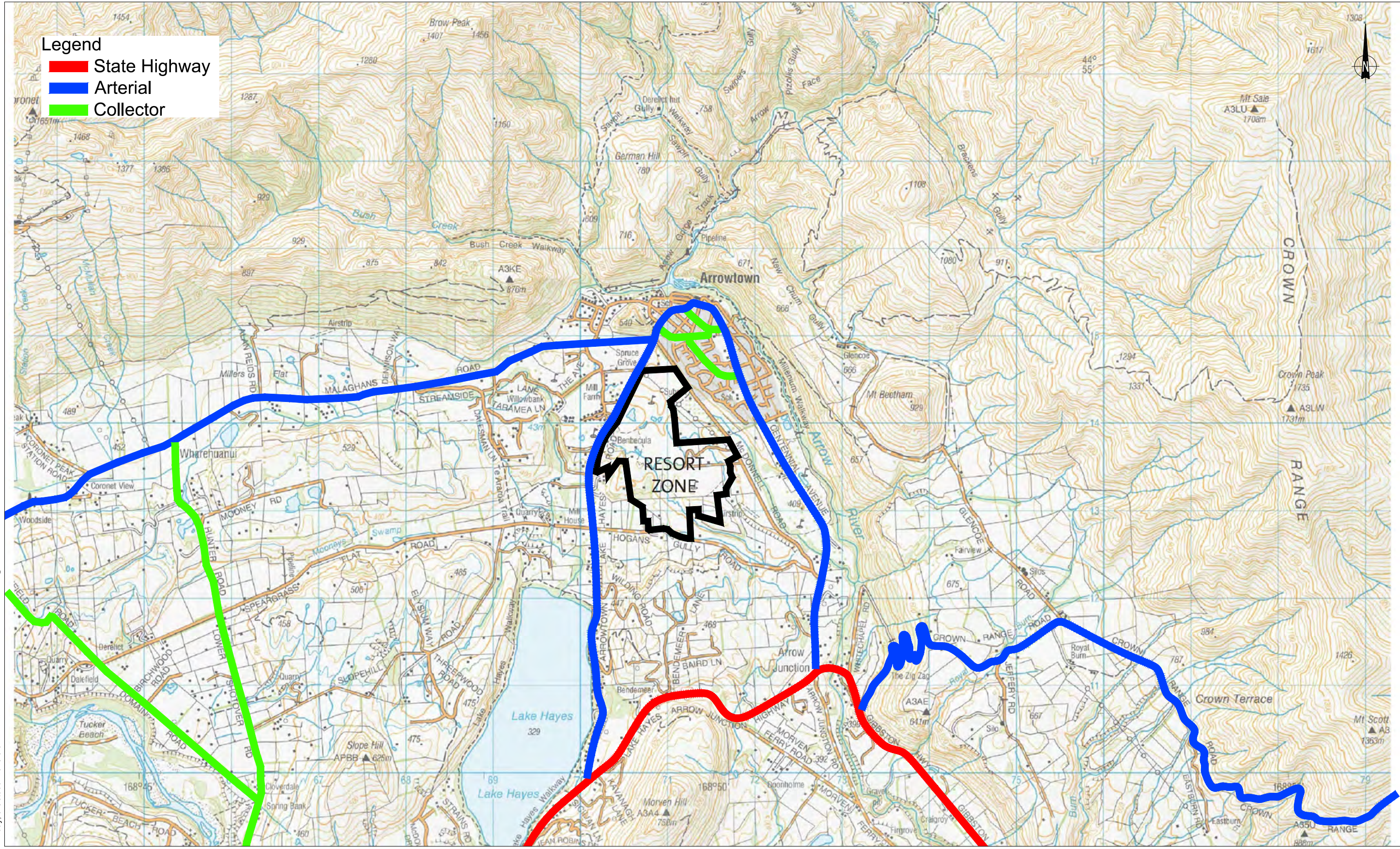
### 2.2 Roding Network

On the west side of the site, Arrowtown-Lake Hayes Road is classified as an Arterial Road with a role of being a dominant element in the road network, connecting the major settlements with the District. The District Plan states that arterial roads will be managed to minimise their local access function. McDonnell Road runs in a generally northwest-southeast direction and is defined as a local road in the vicinity of the site. Local roads are described by the District Plan as functioning almost entirely as accessways to properties and are not intended to act as through-routes for vehicle travel. Hogans Gully Road along the southern side of the site is also a local road.

### 2.3 Roding Form

In the vicinity of the site, Arrowtown-Lake Hayes Road has a seal width of 8.0m to 8.5m. No footpaths are provided in this location.

The speed limit along the section of Arrowtown-Lake Hayes Road near the site is 70 km/h, except near its intersections with McDonnell Road (to the north) where the speed limit changes to 50km/h.



Friday, 9 October 2015 5:07:24 PM 0 20mm@A3

REV	DATE	DRN	CHK	DESCRIPTION
A	09.10.15	CTM		Base Boffa Miskell : The Hills Resort Zone, QLDC DPR Submission (Sept2015)

The Hills Golf Course QLDC Planning Review  
 Site Location  
 ---



DRAWN: CTM	---	---
DATE: 09.10.15	STATUS: ---	
SCALE: NTS		
DWG NO: 13470A2A		





**Photograph 1: Arrowtown-Lake Hayes Road, Looking North Past Hogans Gully Road**

At its northern end, Arrowtown-Lake Hayes Road intersects with McDonnell Road and Malaghans Road. This intersection is in the form of a 'GIVE WAY' priority-controlled, cross-road intersection, with priority given to Arrowtown-Lake Hayes Road.



**Photograph 2: Arrowtown-Lake Hayes Road Looking South Past McDonnell Road**

McDonnell Road in the vicinity of the site access has a seal width of approximately 7.0m, with unsealed shoulders of between 2.2m and 2.5m on both sides of the carriageway. It has a speed limit of 80 km/h except for 1 km of the northern section within the urban area where the speed limit is 50 km/h. In this section of McDonnell Road speed humps have been installed with an advisory negotiation speed of 25 km/h.



***Photograph 3: McDonnell Road, Looking North at Existing Golf Course Entrance***



***Photograph 4: McDonnell Road, Looking South at Existing Golf Course Entrance***

No sealed footpaths are provided on McDonnell Road in the vicinity of site. An unsealed track is provided on the western side of McDonnell Road separated from the sealed carriageway, from the northern end of the site through to the intersection with Hogans Gully Road. In the vicinity of the Hogans Gully Road intersection this walking track switches to the eastern side of McDonnell Road, before extending further south through to the intersection with Centennial Avenue.



**Photograph 5: McDonnell Road, Looking North at Existing Golf Course Access with the Unsealed Walking Track on the Western Side**



**Photograph 6: Hogans Gully Road, Looking East**

At the southern boundary of the site, Hogans Gully Road runs in a generally east-west direction. At its western end it intersects with Arrowtown-Lake Hayes Road and Speargrass Flat Road. To the east Hogans Gully road terminates at a T-intersection with McDonnell Road. Both the intersections with Arrowtown-Lake Hayes Road and McDonnell Road are priority controlled, with Hogans Gully Road being restricted in both cases by a “GIVE WAY” control.



**Photograph 7: Hogans Gully Road, Looking Towards Intersection with McDonnell Road**

Hogans Gully Road has an 80 km/h speed limit. It is unsealed and has a formed width of about 5.2m. In the vicinity of Arrowtown-Lake Hayes Road there are grass verges of 6.2m and 1.7m on the southern and northern side of the road respectively. Further east the road winds over a hilly section and the verges vary in width. Footpaths are not provided on either side of Hogans Gully Road.



**Photograph 8: Hogans Gully Road, Looking Towards Intersection with Arrowtown-Lake Hayes Road**

It is understood that Queenstown Lakes District Council has no plans for the sealing of Hogans Gully Road.

### 3. Current and Future Travel Patterns

#### 3.1 Traffic Volumes

Table 1 shows the most recent daily traffic count data for roads in the vicinity of the site collected from records held by the Queenstown Lakes District Council.

Road Section	ADT (vpd)	Count Date
Arrowtown-Lake Hayes Rd, north of Hogans Gully Rd	3,157	November 2010
Arrowtown-Lake Hayes Rd, south of McDonnell Rd	2,978	June 2005
Malaghans Rd, west of Arrowtown-Lake Hayes Rd	1,522	November 2011
McDonnell Rd, east of Arrowtown-Lake Hayes Rd	847	February 2013
McDonnell Rd, east of Arrowtown-Lake Hayes Rd	403	April 2005
McDonnell Rd, north of Hogans Gully Rd	257	February 2004
Hogans Gully Rd, west of McDonnell Rd	133	March 2012
Hogans Gully Rd, east of Arrowtown-Lake Hayes Rd	137	May 2005

**Table 1: Daily Traffic Counts**

The traffic volumes to the south-west of Arrowtown show the strength of the town’s relationship with Queenstown. The other roads surrounding the site have relatively low traffic counts. However a significant amount of growth can be seen on McDonnell Road traffic in the past 10 years.

#### 3.2 Provision of Public Transport

Connectabus runs the Number 10 route from Arrowtown to Queenstown which operates 13 times a day between 7:35am and 9:35pm. Six of these services run via Arthurs Point, the other seven travel down Arrowtown-Lake Hayes Road and through Frankton down State Highway 6 to Queenstown. Passengers may interchange onto Kelvin Heights, Sunshine Bay, Fernhill, Quail Rise, Wanaka or a number of other places including Remarkables Park and the airport. Connectabus also runs a service to Wanaka twice daily.

There are several smaller operators targeted towards tourists who offer services from Queenstown to Arrowtown and vice versa, often allowing stops along the way. There is also a school bus which operates down Hogans Gully Road.

#### 3.3 Travel to Work

It has been identified from the 2013 census, that there were 2,445 people living in Arrowtown and 699 jobs there. Of these jobs 261 were taken by employees who commute to Arrowtown from a different area, primarily Queenstown and Frankton, while the remaining 438 jobs were taken by residents of Arrowtown. There were 741 people who commute out of Arrowtown for work, again mainly to Queenstown and Frankton. The largest percentage commuting increase from 2006 to 2013 was people commuting to



Arrowtown, which increased by 55% or 93 people. However the number commuting out of Arrowtown also increased by 17%, or 103 people. Further increases in these commuting patterns will lead to increases, primarily in the peak hour, of traffic volumes using Arrowtown-Lake Hayes Road, and particularly the intersection with Malaghans and McDonnell Roads.

Of those who travelled to work on the census day in 2013, the overwhelming majority, (84% or 867 people) drove a vehicle to get there. This number remained relatively consistent with 2006, where 852 people drove. Cycling's share of travel choice has had an increase of 3% between 2006 and 2013 (33 people), but walking remained the second most popular mode of travel to get to work with 84 commuters (8%) choosing this method. There was also an increase of 40% in people who work from home, jumping from 105 in 2006 to 147 in 2013.

### 3.4 Road Safety

The New Zealand Transport Association Crash Analysis System (CAS) has been used to identify all reported accidents on Arrowtown-Lake Hayes Road, McDonnell Road, and Hogans Gully Road, between and inclusive of their respective intersections. The search covered all reported crashes for the period between 2008 and the present.

A total of 18 crashes were reported within this area, with six crashes resulting in minor injuries. There have been no crashes which resulted in fatal or serious injuries in this area since 2008.

Eleven of these crashes occurred on Arrowtown-Lake Hayes Road, three of these causing minor injuries. Two of these injury crashes were the result of drivers failing to give way at the intersection of McDonnell Road and the other at the intersection of McDonnell Road was caused by following too closely.

Four crashes on Arrowtown-Lake Hayes Road had rain, snow, frost or ice as a factor in the cause, with two of these located 100m and 500m north of Waterfall Park Road. Neither of these crashes involved injuries.

There were four recorded crashes on Hogans Gully Road, all due to loss of control from the unsealed road, frost or ice or speed. The speed related crash resulted in a head on collision, but no injuries. Three crashes were recorded on McDonnell Road, with two of these caused by intoxicated drivers hitting parked vehicles.

Overall seven of the 18 crashes recorded were affected by environmental factors, made up of narrow, unsealed, frosty or icy roads. Three crashes were attributed down to alcohol and six to driver error at intersections. Three of these occurred at the intersection of Arrowtown-Lake Hayes Road / McDonnell Road and three at the intersection of Arrowtown-Lake Hayes Road / Hogans Gully Road.

No crashes occurred at existing driveways to The Hills property or adjacent properties.

## 4. Future Changes

### 4.1 Queenstown Lakes District Council

On 30 June 2015 Queenstown Lakes District Council (QLDC) adopted their 10 year land transport plan (2015-2025). There are no specific changes to the transportation network around Arrowtown planned. However, the report did have a key objective to reduce growth in vehicle use by promoting greater use of other transport modes. This will be achieved by:

- Increasing affordability and convenience of public transport; and
- Making cycling and walking easier and safer.

### 4.2 The Arrowtown Plan

A Strategic Planning document outlining the future growth and community planning proposals for Arrowtown has been prepared. This Plan resulted from a community planning workshop carried out in February 2003 with the aim of reviewing and updating Arrowtown planning. It should be noted that this document does not have formal statutory status, but is a statement of community desire. Amongst the issues outlined in this Plan was traffic management, and the comments relating to relevant sections of the road network are referenced below:

- McDonnell Road was installed as a heavy traffic route being described as providing a logical bypass to the town and good access to the industrial area;
- In time, the Malaghans / Arrowtown-Lake Hayes / McDonnell intersection may need improvement. However, a threshold treatment involving planting is envisaged to assist in speed management. There was not full support for a roundabout solution;
- From Arrowtown-Lake Hayes Road adequate signage and encouragement is needed to ensure heavy traffic is routed along Malaghans Road to the industrial area.

It is noted that McDonnell Road has since been sealed and speed humps installed. However no other actions have evolved that have a confirmed timeframe.

### 4.3 Wakatipu Trails

The Wakatipu Trails Strategy, released in May 2004 was prepared to guide development of an integrated network of walking and cycling trails and cycle-ways in the Wakatipu Basin. Preparation of the strategy was initiated by the Wakatipu Trails Trust in association with Transfund and Queenstown Lakes District Council. The Strategy identified a series of desired outcomes with those relevant to The Hills site listed below:

- Construction of a premier walking and cycling trail linking Queenstown to Arrowtown via Lake Hayes;
- Improvements to rural roads to accommodate horse riding and road cycling;
- New trail signs, publications and information on trails.

An extensive range of walking and cycling tracks have now been developed within the Queenstown and Arrowtown area. One of the routes constructed links Arrowtown with the Historic Shotover Bridge. This follows Manse Road from Arrowtown and passes through the Millbrook resort to Lake Hayes and does not cross any part of The Hills golf course land.

## 5. Levels of Service

### 5.1 Vehicles

The AUSTRROADS Guide to Traffic Engineering Practice Part 2 ('Roadway Capacity') provides a generalised measure for the capacity and performance of a route. This concept of level of service indicates that with the existing traffic flows, Arrowtown-Lake Hayes Road, McDonnell Road and Hogans Gully Road retain a condition of free flow in which individual drivers are virtually unaffected by the presence of other vehicles in the traffic stream, have freedom to select their own desired speeds and generally experience high levels of comfort and convenience.

### 5.2 Road Safety

Based upon the information from the Land Transport New Zealand Crash Analysis System (CAS), it does not appear that there are any underlying road safety issues on Arrowtown-Lake Hayes Road. Since McDonnell Road has been sealed, the number of loss of control crashes on this road has reduced. If Hogans Gully Road were to be sealed, this would also yield a reduction in this type of crash. The traffic effects of the proposal are not considered to be sufficient reason for sealing because the expected volume changes on Hogans Gully Road will be minimal.

## 6. The Proposal

### 6.1 Development

The proposal to create a Resort Zone centred on The Hills Golf Course could allow for a total of up to 100 residential / visitor accommodation units including 10 home sites. These would be developed in conjunction with the existing golf course in a manner similar to that indicated on the concept structure plan presented as Figure 2. The proposal would also enable development of some ancillary commercial activity as part of the Clubhouse facilities.

The concept structure plan shows the potential locations for permanent dwellings. HS7 and HS6 are existing dwellings. Resource consent is currently being sought to replace HS6. The HS6 replacement will obtain access via an existing access point to Hogans Gully Road and HS7 has existing access to Arrowtown-Lake Hayes Road as indicated in Figure 3.

The new dwelling HS4 would gain access from an existing driveway off Hogans Gully Road while HS2, HS3, HS5, HS9 and HS10 would require a new shared driveway from Hogans Gully Road. HS1 and HS8 will have access off the existing main entrance to the golf course on McDonnell Road.

Activity Areas (A1-A7) will provide for the visitor accommodation and may contain about 50 lots, all of which will have access via the existing main entrance to the golf course. Activity Area A8 will have a new access formed to McDonnell Road.

Activity areas A9 and A10 could accommodate about 20 lots and will have access from an existing driveway to Arrowtown-Lake Hayes Road.

The McDonnell Road driveway will continue to provide the main access to the clubhouse area and other areas of the golf course.

### 6.2 Events

The proposal also seeks provision for “temporary events” including golf tournaments and concerts as a controlled activity subject to the following conditions:

- The duration of the temporary events does not exceed 14 consecutive calendar days (excluding set up and pack down);
- The event does not operate outside the hours of 0600 to 2200. Set up and pack down outside of these hours are permitted but cannot breach the noise limits for the Zone;
- There shall be no more than 10 temporary events per calendar year;
- All structures and equipment is removed from the zone within 10 working days of the completion of the event;
- For the purpose of this rule the relevant noise standards of the Zone shall not apply.

It is proposed that Council’s control is limited to:

- (i) A Traffic Management Plan
- (ii) The ability to minimise and manage waste from the event
- (iii) The provision of adequate sanitation for event attendees
- (iv) The acceptance of an Operations Plan for the event
- (v) Signs located off-site on public or private land

This proposal would facilitate the hosting of events such as the NZ Open and smaller charity golf tournaments.

2387

KEY:

— Structure Plan Boundary

- - - Activity Area

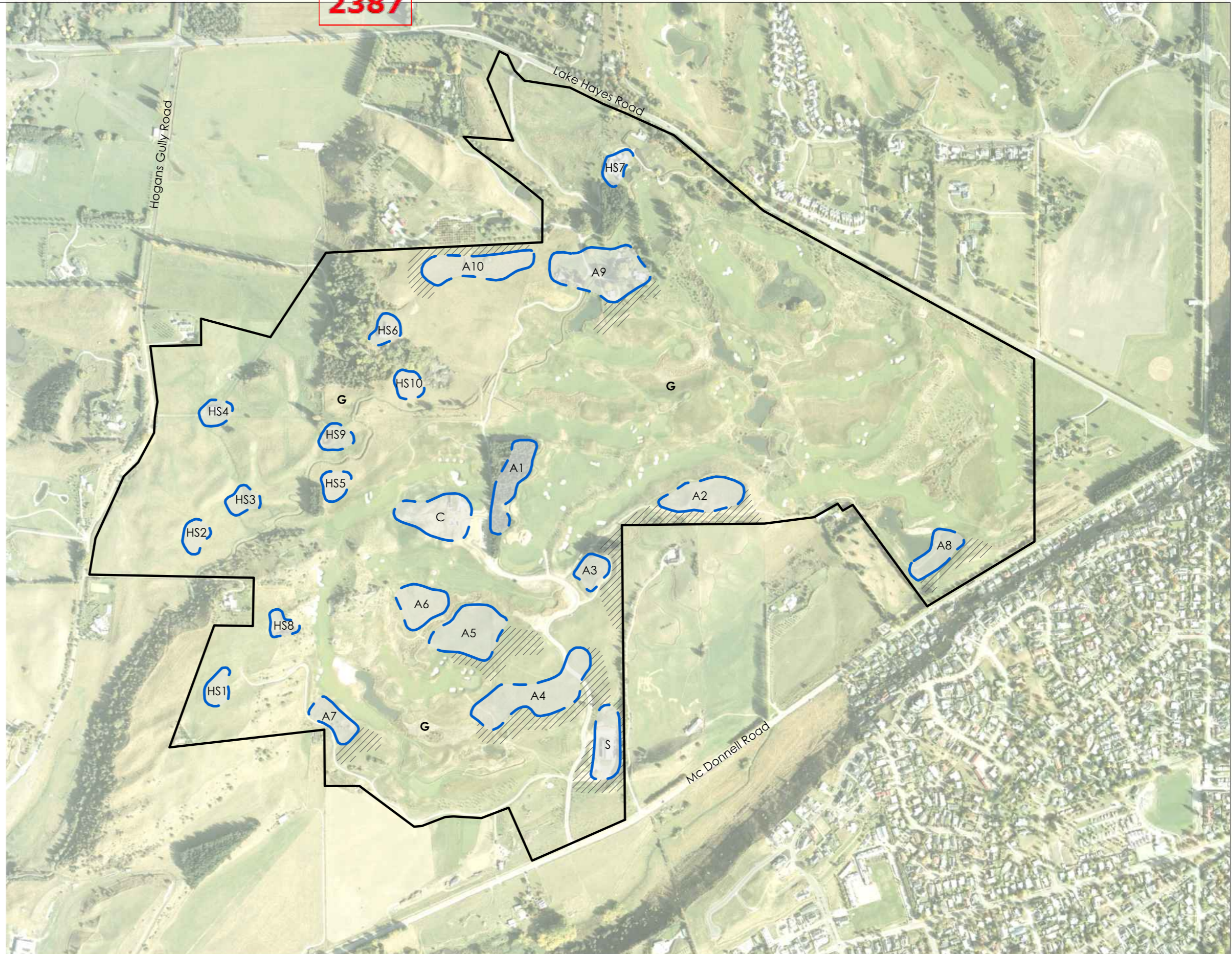
Activity Areas:

- G: Golf course, open space and farming
- C: Clubhouse
- A: Visitor Accommodation / Residential
- HS: Homesite (3,000m<sup>2</sup>)
- S: Resort Services & Staff Accommodation

Note: all activity areas include G: Golf course, open space and farming

Overlays:

/// Landscape Amenity Management Area



V:\MH\_The Hills\10\_Master\1\_Preliminary\MH\_10\_1\_MLP\_010F (Structure Plan).dgn



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SCALE: 1:4,000 (A1); 1:8,000 (A3)



PLAN STATUS:

DP REVIEW

# THE HILLS STRUCTURE PLAN

DRAWN / REVIEWED: RT / JC  
 APPROVED: DT  
 DATE: 14.10.15

DRAWING NO:

MH\_10\_1\_MLP\_010F

2387

KEY:

- Structure Plan Boundary
- - - Activity Area

Activity Areas:

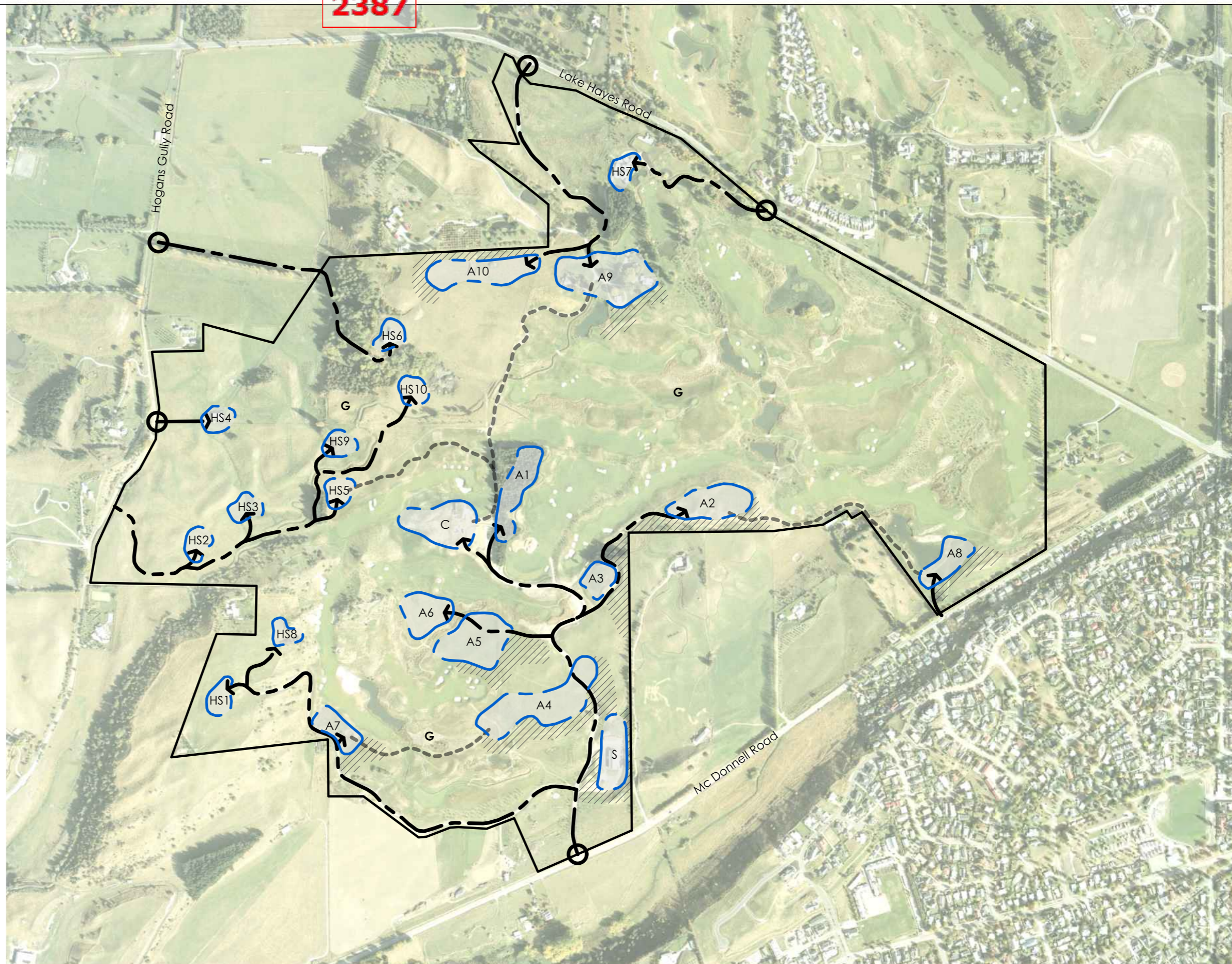
- G: Golf course, open space and farming
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- HS: Homesite (3,000m<sup>2</sup>)
- S: Resort Services & Staff Accommodation

Note: all activity areas include G: Golf course, open space and farming

Overlays:

- /// Landscape Amenity Management Area

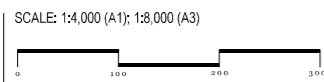
- Existing access point
- Road access
- - - Buggy / cart access



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PLAN STATUS:  
 DP REVIEW

# THE HILLS STRUCTURE PLAN - ACCESS

DRAWN / REVIEWED: RT / DT  
 APPROVED: DT  
 DATE: 14.10.15

DRAWING NO:  
 MH\_10\_1\_MLP\_011B



## 7. Traffic Generation and Distribution

### 7.1 Existing Site Traffic Generation

The proposed zone area currently contains a golf course, clubhouse, dwellings, a large implement shed, farmland and a farm building.

The Transfund NZ Research Report 209: "Trips and Parking Related to Land Use" includes daily rates of between 6 and 9 vehicles per day (vpd) (IN+OUT) for rural residential subdivisions. It notes that these rates are lower than for urban residences and "reflect the increased trip linking which occurs when the primary employment trip is longer, eg greater than 20 minutes, as with rural lifestyle properties located on the outskirts of an urban area". For the purposes of this assessment, a rate of 8vpd per unit has been adopted. On this basis, the two existing dwellings would currently generate 16vpd on average.

Residential activity typically generates a high proportion of outbound movements during the morning peak period (80%) with a more balanced pattern in the evening, 35% outbound and 65% inbound. While visitor accommodation will not usually have a high traffic generation during the morning peak period, the pattern of movements in the evening peak is expected to be comparable to residential activity.

The golf course operation is limited through resource consent conditions to a maximum of 16 commercial players per hour. Adopting the rates of traffic generation previously used, this equates to a traffic generation of between 200 and 350 vpd for the golf course.

Two special charity tournament events per year are currently permitted at which approximately 100 persons per day may attend. It could be expected that these charity tournament occasions would generate around 200 vpd. During the tournaments, the tee times will be closer together resulting in a higher number of players on the course at any one time.

The golf course has also secured the rights to host the New Zealand Golf Open. This is a major event which can attract significant numbers of spectators. However it is an infrequent occurrence (annual) and there is no guarantee that the rights will be extended indefinitely. Consequently it has been disregarded for the purposes of this assessment and because a specific traffic management plan is prepared for this event.

### 7.2 Additional Site Traffic Generation

It is anticipated that up to 100 residential / visitor accommodation units will be developed within the resort zone. Residential dwellings or visitor accommodation units in this location are expected to generate between 6 and 9 vpd. The traffic generation of the resort accommodation will be at the lower end of this range with residential accommodation being at the upper end of the range. Again, to ensure a robust analysis, an average traffic generation rate of 8 vpd per unit has been adopted. Based on this rate, the expected additional traffic generation for this development is as follows:

DEVELOPMENT	NUMBER OF UNITS	TRIP VOLUMES (Vehicle Movements)								
		Morning Peak Hour			Evening Peak Hour			Daily		
		In	Out	Total	In	Out	Total	In	Out	Total
Residential / Visitor Accommodation Units	100	20	80	100	65	35	100	400	400	800

**Table 2: Additional Trip Generation of the Proposed Residential / Visitor Accommodation Units**

### 7.3 Total Traffic Generation of the Site

The total future traffic generating activities for the proposed resort zone will consist of 100 dwellings which will generate about 800 vpd and the golf course operation (200-350vpd).

The typical daily traffic generation is expected to be in the range 1,000 to 1,150vpd.

### 7.4 Construction Traffic Generation

Previous survey work by TDG has indicated that the construction phase of a single residential dwelling could generate up to some 20vpd. The simultaneous construction of all dwellings would not result in this daily traffic generation for all dwellings due to the number of common trips to several dwellings and to dwellings being at different stages of construction. Moreover, it is considered extremely unlikely that all new dwellings would be constructed simultaneously. In fact it is expected that individual dwellings or groups of dwellings will be constructed over a long period and by their nature, construction traffic movements for each site would occur only over a short timeframe.

### 7.5 Trip Distribution

The design of the proposed development allows all of the proposed visitor accommodation dwellings in A1 – A10, except those in A9 and A10 (and possibly A8) to access the external road network via the existing McDonnell Road access. Homesites HS1 and HS8 will also use this access. The clubhouse and other golf course facilities will continue using the McDonnell Road access. HS2-HS6 and HS9-HS10 will use the Hogans Gully Road accesses. A9-A10 and HS7 will use two existing driveways on the Arrowtown-Lake Hayes Road. Based on 100 dwellings being constructed, this broadly represents about ten dwellings using the Hogans Gully Road access, about 25 using Arrowtown-Lake Hayes Road for access, and about 65 dwellings using the McDonnell Road access. Currently there is one dwelling with access off Hogans Gully Road and one with access off Arrowtown-Lake Hayes Road.

The distribution of additional trips generated by the site is summarised in the following table:

ACCESS LOCATION	TRIP DISTRIBUTION								
	Morning Peak Hour			Evening Peak Hour			Daily		
	In	Out	Total	In	Out	Total	In	Out	Total
McDonnell Road	13	52	65	42	23	65	260	260	520
Hogans Gully Road	2	8	10	7	3	10	40	40	80
Arrowtown-Lake Hayes Road	5	20	25	16	9	25	100	100	200
<b>Total</b>	<b>20</b>	<b>80</b>	<b>100</b>	<b>65</b>	<b>35</b>	<b>100</b>	<b>400</b>	<b>400</b>	<b>800</b>

**Table 3: Trips Generated by the Proposal – Distribution**

With this level of development, it is expected that about 520 new vehicle movements per day will occur at the McDonnell Road access. Approximately 80 vehicle movements per day will occur at the Hogans Gully Road accesses and a further 200 vehicle movements per day will be made to / from Arrowtown-Lake Hayes Road.

## 8. Assessment of Rezoning Effects

### 8.1 Effects on Roothing Network

The AUSTRROADS Guide to Traffic Management Part 3 (“Traffic Studies and Analysis”) currently recommends that unsignalised intersections are evaluated using SIDRA intersection analysis software or an equivalent tool. This advice supersedes previous recommendations that detailed analysis of low volume driveways was not normally required because capacity was unlikely to be a critical factor.

The following table shows the traffic volume thresholds previously adopted by Austroads below which detailed analysis was not considered necessary and the expected traffic volumes at the resort zone access points. The peak hour traffic volumes on the frontage roads have been estimated as 105 of the average daily traffic volumes.

Intersection	Major Road Flow (vph)	Minor Road Flow (vph)
AUSTRROADS Guide to Traffic Management	400	250
Two-lane Road	500	200
Peak Hour Capacity Combinations	650	100
McDonnell Road / Site Access	80	65
Arrowtown-Lake Hayes Road / Site Access	300	25
Hogans Gully Road / Site Access	15	10

**Table 4: Intersection Capacity – Uninterrupted Flow Conditions (PM Peak)**

Since the expected traffic volumes on each of the access points are well below the thresholds previously adopted by Austroads, no further analysis has been undertaken to evaluate levels of service because there are no capacity issues. On this basis, the proposed development is not expected to have any adverse effect on the road network at these locations.

Although the peak hour traffic volumes at the temporary events will be higher than on a typical day, they will remain below 100vph and again it is considered unlikely that there would be any noticeable effects on the local road network. In the event that higher flows were anticipated, then this would be addressed by the proposed condition requiring a traffic management plan.

### 8.2 Buses, Cyclists and Pedestrians

The increase of traffic flow due to the proposal is not expected to affect the level of service provided to cyclists and pedestrians. The increase in traffic volume represents about one extra vehicle every minute which not be noticeable.

While it is also anticipated that the demand for public transport services would only increase marginally as a result of this proposal, equally the proposed zone would not adversely affect existing or possible future services.

### 8.3 Access Arrangements

The activities proposed with the new zone will obtain access via five existing access points and two new accesses, one located off McDonnell Road and one off Hogans Gully Road. It is intended that the Hogans Gully Road access point will not have a physical connection with the existing formed internal road network within the golf course.

The existing access from Hogans Gully Road provides a sight distance of 200m to the east, while sight distance to the west allows visibility right through to the intersection with Arrowtown-Lake Hayes Road. The District Plan requires access points on an 80km/h road to provide 115m sight distance if they serve a residential activity. The available sight distance at the existing Hogans Gully Road access exceeds the requirements in both instances and is therefore considered entirely appropriate.

The other existing access on Hogans Gully Road provides sight distance to the west in excess of the required 115m. However the sight distance available to the east is only about 90m. There are mitigating circumstances as this section of Hogans Gully Road has a winding alignment to the east which dictates a speed environment of less than 80 km/h. Furthermore it is an existing driveway and it is proposed that the driveway will continue to only serve one residence.

The proposed new access on Hogan's Gully Road will serve three new home sites. It will have a sight distance of more than 115m to the west but the sight distance to the east could be constrained by the local topography to less than 115m. Although the speed limit of Hogans Gully Road is 80km/h, it is considered that the topography, road surface and winding alignment create a speed environment of less than 80km/h and a lower sight distance requirement is acceptable. On this basis, it is considered that an access can be constructed that provides adequate sight distance for the speed environment.

The access on Arrowtown-Lake Hayes Road for HS7 will not have any extra traffic and therefore retains existing use rights.

The other existing access on Arrowtown-Lake Hayes Road is expected to carry an additional 20 vph at peak times associated with visitor accommodation or residential use. Visibility to the north (right) is well in excess of 180m, but to the south it is restricted to about 160m by the bend in the road. While the speed limit on this stretch of road is 70 km/h, the prevailing speed of vehicles, even those travelling uphill from the south, is in excess of 70 km/h. The Austroads Guide to Road Design Part 4A "Unsignalised and Signalised Intersections" recommends that a Safe Intersection Sight Distance of 181m is provided for a road with a design speed of 80km/h and 151m at 70km/h. On this basis, the available sight distance is considered to be adequate. However, it has been noted that installation of signage to alert drivers to the access would provide improved safety.

It is proposed that the Hogans Gully Road accesses will be constructed in accordance with Appendix 7, Diagram 2 of the District Plan, as required for a private access. This standard does not require any localised road widening. Hogans Gully Road has a formed width of approximately 5.2m in the vicinity of the accesses, which would generally be considered somewhat narrow for an access that is providing ingress and egress for both left and right turns. However, in this instance it is considered that few vehicles will turn right into the site accesses or left out onto Hogans Gully Road and therefore the current width is considered suitable for the projected turning volumes.

Similarly it is not considered necessary to modify the two existing accesses on Arrowtown-Lake Hayes Road.

The existing main golf course access from McDonnell Road provides a sight distance in excess of 200m in each direction. As non-residential traffic currently uses this access and will continue to do so under the proposal, the District Plan requires that a minimum sight distance of 170m be provided in an 80km/h area such as this. Accordingly this access also fully complies with the District Plan sight distance requirements.

The existing McDonnell Road access has been constructed as a private property access with no widening of the McDonnell Road shoulders. With the increased volume of movements at the driveway, it is recommended that the driveway is upgraded to comply with the design requirements of Austroads Guide to Road Design Part 4A. This involves widening of the carriageway shoulder to provide sufficient space for through traffic to pass a vehicle that has stopped to turn right.

## 8.4 Internal Roding

The District Plan requires that all vehicular access shall be in accordance with the standards contained in NZS4404. For the purposes of this analysis, the 2004 version of NZS4404 plus Council amendments has been used to assess the proposed roadway widths.

The policy standards relating to “rural general” areas are shown as follows:

Type	Number of Lots	Number of Traffic Lanes	Carriageway Width (m)	Shoulder Width (m)	Maximum Longitudinal Grade	Minimum Road Reserve Width (m)	Type of Surface
Private Right of Way	Less than 5 Lots	1	3.5	None	16.7%	6	Metal
Private Right of Way	5-10 Lots	1 or 2	3.5+ (1 lane), 5.5 (2 lanes)	0.5 Grass	12.5%	10	Seal
Public Cul-de-sac	Less than 15 Lots	2	5.5	0.5 Grass	10%	20	Seal
Public Local	Less than 250 vpd	2	6.25	0.5 Grass	10%	20	Seal

**Table 5: Council Subdivision Guidelines (Rural General, Rolling Topography)**

As such, several different geometric standards will be relevant to the assessment and design of the various internal roads within the development. It is proposed that those roads serving less than five lots will be constructed to the Private Right of Way (less than 5 Lots) standard given above (3.5m carriageway).

The 2005 Subdivision Policy guideline does not provide guidance as to when to provide 1 or 2 lanes for a Private Right of Way (5-10 lots) for rolling terrain. Only one lane (3.5m+) with passing bays would be required if the topography was deemed to be mountainous, while flat terrain would require two lanes (5.5m).

The internal road that provides a link through the development from the McDonnell Road access through to the clubhouse operates over a combination of terrain classified initially as flat from the main access and mountainous as it rises towards the accommodation and clubhouse areas.

Access to the section of this road between the McDonnell Road access and the clubhouse will be restricted to use by visitors to the clubhouse and traffic associated with residential / worker and visitor accommodation units through the use of electronic pin control gates. This section of road could provide access for up to 65 dwellings and will therefore meet the standard set down for a public local road.

The existing section of road to the clubhouse will provide for the golf course traffic as well as the new dwellings. The existing level of construction exceeds that required for a Public Local road and is therefore considered appropriate for the projected traffic volumes. It is also considered suitable for the higher peak hour volumes associated with temporary events at the Golf Course.

In order to maintain the 'rural' look of the existing rural environment, it is considered that the provision of a 3.5m one lane road, with 5.5m passing bays at regular intervals is appropriate for the access roads to individual accommodation blocks.

Compliance with the 2005 Subdivision Policy guideline would be achieved by construction of the accesses from the Hogans Gully Road at 5.5m for any flat sections and the 3.5m mountainous section as it rises towards the dwellings. This would allow continuous passing opportunities where driver inter-visibility is good and restrict passing opportunities where driver inter-visibility is not so good. It is considered more appropriate to construct the whole section with a consistent treatment with periodic passing opportunities over both the flat and mountainous sections so that drivers have a consistent experience of viewing approaching vehicles at places where passing opportunities are available.

The treatment proposed for the access road off Arrowtown-Lake Hayes Road at D6 to serve the visitor accommodation units is recommended to match the public cul-de-sac standard (5.5m width) even though the limit is indicated to be 15 units. The reduced width will encourage slower speeds with consequential road safety benefits.

The remaining sections of new internal roading serve fewer than five lots or are in mountainous terrain and the lower standards of a 3.5m width in the 2005 Subdivision Policy are appropriate.

## 9. Compliance with Planning Requirements

### 9.1 District Plan Requirements

The site currently lies within the Rural General Zone in the District Plan. The District Plan sets out a number of rules relating to the transport related elements of any development proposal which are relevant to the proposed rezoning because of the details included in the proposed structure plan. The relevant rules are set out below for the additional visitor accommodation and residential dwelling units associated with the proposed rezoning.

Criterion
<p><b>Rule 14.2.4.1 (i) (Table 1, Page 14/14)</b> <i>Residential units require 2 spaces per unit, while visitor accommodation units require 1 space per unit (2 spaces per unit Plan Change 8), plus one staff space per 10 units, plus one coach space per 30 units.</i></p>
<p><b>Rule 14.2.4.1 (iv)</b> <i>All vehicular access shall be in accordance with the standards contained in NZS4404:1981 including updates.</i></p>
<p><b>Rule 14.2.4.2 (ii)</b> <i>Vehicle crossings providing access to a road in a Rural Zone shall comply with the Appendix 7, Diagram 2 (Private Access) or Diagram 4 (Commercial Access).</i></p>
<p><b>Rule 14.2.4.2 (iv)</b> <i>The minimum sight distance for an access in an 80km/h zone serving a residential activity is 115m, or 170m for a non-residential activity. The minimum sight distance in a 100km/h zone is 170m for a residential activity or 250m for a non-residential activity.</i></p>
<p><b>Rule 14.2.4.2 (v)</b> <i>Maximum number of vehicle crossings for a site frontage greater than 100m and onto a local road is three (or two onto an Arterial).</i></p>
<p><b>Rule 14.2.4.2 (vi)</b> <i>The minimum distance between any vehicle access onto an arterial road and an intersection with a local road shall be 100m (100 km/h speed limit). For a vehicle crossing on a local road the minimum distance from an intersection with an arterial or local road is 25m (80 km/h speed limit).</i></p>

**Table 6: Existing Relevant Rules of the District Plan**

With the exception of the proposed new access on Hogans Gully Road, it is considered that all other access points will meet the sight distance requirements of the District Plan. The available sight distance at the proposed new access on Hogans Gully Road will depend upon its location which remains the subject of detailed design. In the event that the required sight distance cannot be achieved, this will trigger a requirement for an assessment of safety and the effects of the road geometry. This is considered appropriate to ensure that the new access operates safely. On this basis, no additional transport rules are considered necessary because all new roads and vehicle crossing locations are subject to existing rules to ensure that they can operate safely.



## 10. Summary and Conclusions

This Transport Assessment has identified, evaluated and assessed the various transport and access elements of the residential / visitor accommodation activities that are associated with the proposal for The Hills Resort Zone. It is considered that the traffic that would be generated by the proposed land use activities would be accommodated without adversely affecting the level of service or road safety on Arrowtown-Lake Hayes Road, McDonnell Road and Hogans Gully Road, and at their intersections.

Having due regard to the provision made for road users, it is considered that the proposed rezoning will have no discernible adverse effects upon the adjacent transport networks or adjacent properties.

Trojan Helmet Ltd

**Hills Golf Course Land**

**Proposed District Plan Submission**

Infrastructure Feasibility Report

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	Name	Signature	Name	Signature	Date
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B (For Submission)	J. McCartney		J. Hadley		22 October 2015

**Limitations**

This report has been written for the particular brief to HCL and no responsibility is accepted for the use of the report for any other purpose, or in any other context or by any third party without prior review and agreement.

In addition, this report contains information and recommendations based on information obtained by inspection, sampling or testing at specific times and locations with limited site coverage as outlined in this report. This report does not purport to completely describe all site characteristics and properties and it must be appreciated that the actual conditions encountered throughout the site may vary, particularly where ground conditions and continuity have been inferred between test locations. If conditions at the site are subsequently found to differ significantly from those described and/or anticipated in this report, HCL must be notified to advise and provide further interpretation.

## Contents

<b>1. Introduction</b>	<b>1</b>
<b>2. Nature of Proposed Development</b>	<b>2</b>
<b>3. Site Description</b>	<b>3</b>
<b>4. Water Supply</b>	<b>5</b>
4.1 General	5
4.2 Water Demand Assessment	5
4.3 Fire Fighting Demand	5
4.4 Water Supply - Option 1	6
4.5 Water Supply - Option 2	7
4.6 Conclusions and Recommendations	8
<b>5. Wastewater Disposal</b>	<b>9</b>
5.1 General	9
5.2 Demand Assessment	9
5.3 Wastewater Drainage – Option 1 – Council Reticulated Scheme	9
5.4 Wastewater Drainage – Option 2 – Communal System	11
5.5 Conclusions and Recommendations	12
<b>6. Stormwater Disposal</b>	<b>14</b>
6.1 General	14
6.2 Planning Rules and Regulations	14
6.3 Stormwater Quantities	15
6.4 Conclusions and Recommendations	16
<b>7. Natural Hazards</b>	<b>17</b>
<b>8. Conclusions and Recommendations</b>	<b>18</b>

### Appendix 1

Structure Plan

### Appendix 2

HCL Natural Hazards Assessment Report

# 1. Introduction

This report has been prepared to support a Submission to Queenstown Lakes District Council's (QLDC) Proposed District Plan Review to re-zone approximately 163 hectares of land near Arrowtown from Rural General to a new zone ("the site"). The site is referred to as "The Hills". The Submission is to be made by Trojan Helmet Limited (THL) as the land owner.

The site is located within the triangle formed by McDonnell Road, Hogans Gully Road and Arrowtown – Lake Hayes Road. The site is contained in various parcels held by various entities and is currently zoned Rural General under the Queenstown Lakes District Plan.

QLDC's Proposed District Plan Review seeks the re-zoning of the site to give effect to a resort style zoning enabling residential development of up to 100 new dwellings.

THL has engaged Hadley Consultants Limited (HCL) to investigate and report on the feasibility of providing utility services and the necessary development infrastructure for the development of the site.

This report considers the nature of the proposed development, the site conditions affecting the implementation of the necessary utility services and development infrastructure and describes the proposed implementation of the following elements:

- Water supply reticulation,
- Wastewater reticulation,
- Stormwater control, and
- Natural Hazards.

## 2. Nature of Proposed Development

THL proposes to develop the existing site near Arrowtown. The site, located to the south of Arrowtown and covering 162.7 hectares will cover land legally described as:

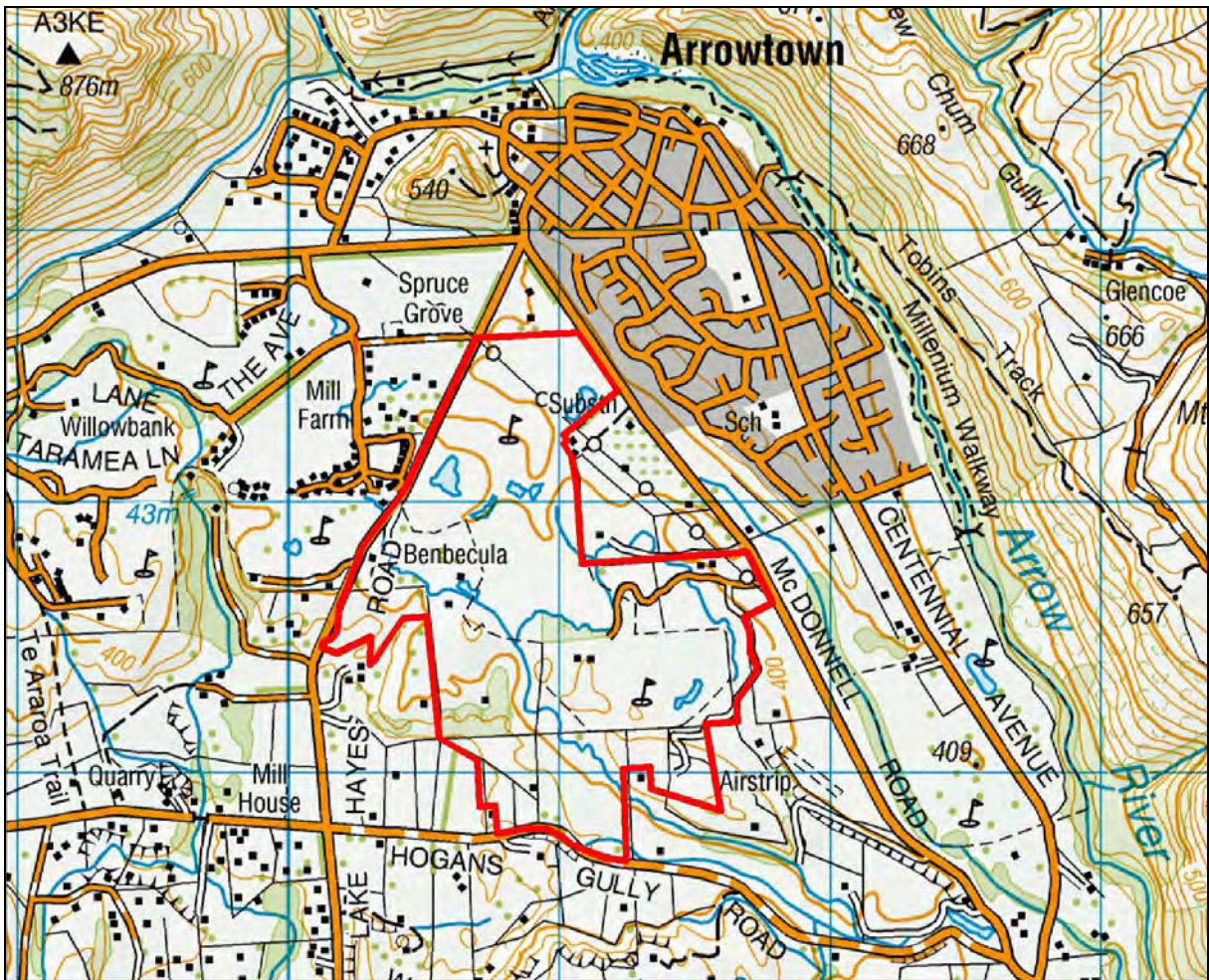
- Lot 7 Deposited Plan 392663, comprising 101.5914 ha, owned by Trojan Helmet Limited.
- Part of Lot 4 Deposited Plan 392663, comprising 53.2908 ha, owned by Trojan Helmet Limited.
- Lot 1 Deposited Plan 392663, comprising 11.5792 ha, owned by Richard Michael Hill and Ann Christine Hill.
- Lot 5 Deposited Plan 392663, comprising 1.5097 ha, owned by Richard Michael Hill, Ann Christine Hill and Veritas Limited.
- Lot 3 Deposited Plan 392663, comprising 0.6904 ha, owned by Trojan Helmet Limited.

The structure plan for the development indicates areas of open space and specific areas for dwelling development. The maximum number of dwellings in the proposed zone is limited to 100. This is made up of ten individual house sites and a further ten activity areas. These house sites and activity areas are laid out around the existing golf course and there is also golf course club house and associated services areas to be included in the proposed zone. A copy of the Structure Plan used to carry out the feasibility reporting is included in Appendix 1.

We note that the assessment of the necessary development infrastructure provided below is limited to consideration of the scale of the development as it is currently proposed and excludes consideration of specific stages and the specific locations of future dwellings and infrastructure within the site.

### 3. Site Description

The area of the proposed rezoning is located on 163 ha of land to the west of the Arrowtown – Lake Hayes Road between McDonnell Road and Hogans Gully Road. There are current accesses to the site from the Arrowtown – Lake Hayes Road, McDonnell Road and Hogans Gully Road. There is existing QLDC infrastructure for water supply and wastewater located along Arrowtown – Lake Hayes Road, McDonnell Road and Hogans Gully Road.



**Figure 1 - Topographical Map Excerpt Showing Subject Site**

The site comprises gently to moderately undulating land with some locally steeper slopes particularly in the southern areas. The overall topography of the site is gently falling to the north east.

Based upon the published geological information (Institute of Geological and Nuclear Sciences (IGNS), 1:250,000 Geological Map 18, Geology of the Wakatipu) and geological examination carried out by others the underlying geological materials within the site are comprised of

outwash gravels and till and morainic deposits. These soils overlie schist bedrock that can be seen as outcropping in various locations across the site.

The existing land use at the site comprises mainly a landscaped golf course with some grazing occurring in the southern areas. Vegetation covering the area is mainly that associated with golf courses and pasture. There are areas of landscape plantings across the site along with significant mature tree plantations.

There are areas of standing water such as streams, ponds and landscape features. It is expected that ephemeral watercourses may be formed in some of the topographic depressions on site during periods of high precipitation.

The proposed development site and surrounding Arrowtown area experience generally cold winters with severe frosts at times and hot dry summers. Strong north-westerly winds are also a climatic characteristic of the area. The land receives approximately 850mm of rainfall per annum and may be subject to drought conditions during the summer months.



## 4. Water Supply

### 4.1 General

The site is located between the QLDC water supply schemes of Arrowtown and Lake Hayes with infrastructure from both schemes being in road frontages of the site. In addition, the existing buildings and dwellings on the site are currently serviced by existing on site water bore supplies. The Arrow Irrigation Company irrigation water race runs through the site and provides existing landscaping irrigation and meets water feature water demand.

### 4.2 Water Demand Assessment

Peak water demand would be expected during the summer months when seasonal populations are at their peak and irrigation usage will be at its highest. The following design figures have been adopted.

Demand Item	Potable Demand (litres/day)	No.	Total (litres/day)
Dwelling (average day)	2,100	100	210,000

The additional average daily water supply demand of 210 m<sup>3</sup> per day equates to 2.43 litres per second average flow over twenty four hours.

From the QLDC Land Development and Subdivision Code of Practice the peaking factors for either the Arrowtown or Lake Hayes water supply schemes are as follows:

Item	Peaking Factor
Average daily flow to peak daily flow	3.3
Average daily flow to peak hourly flow	6.6

Using the QLDC peaking factor, the peak hour flow is estimated at 16.04 litres per second.

### 4.3 Fire Fighting Demand

In accordance with *SNZ PAS 4509:2008 New Zealand Fire Service Firefighting Water Supplies Code of Practice*, the usage for the developed site is expected to fall into the "Housing: includes single family dwellings, multi-unit dwellings but excludes multi storey apartment blocks" category. This will result in a fire fighting water supply classification of FW2. An FW2 classification requires 12.5

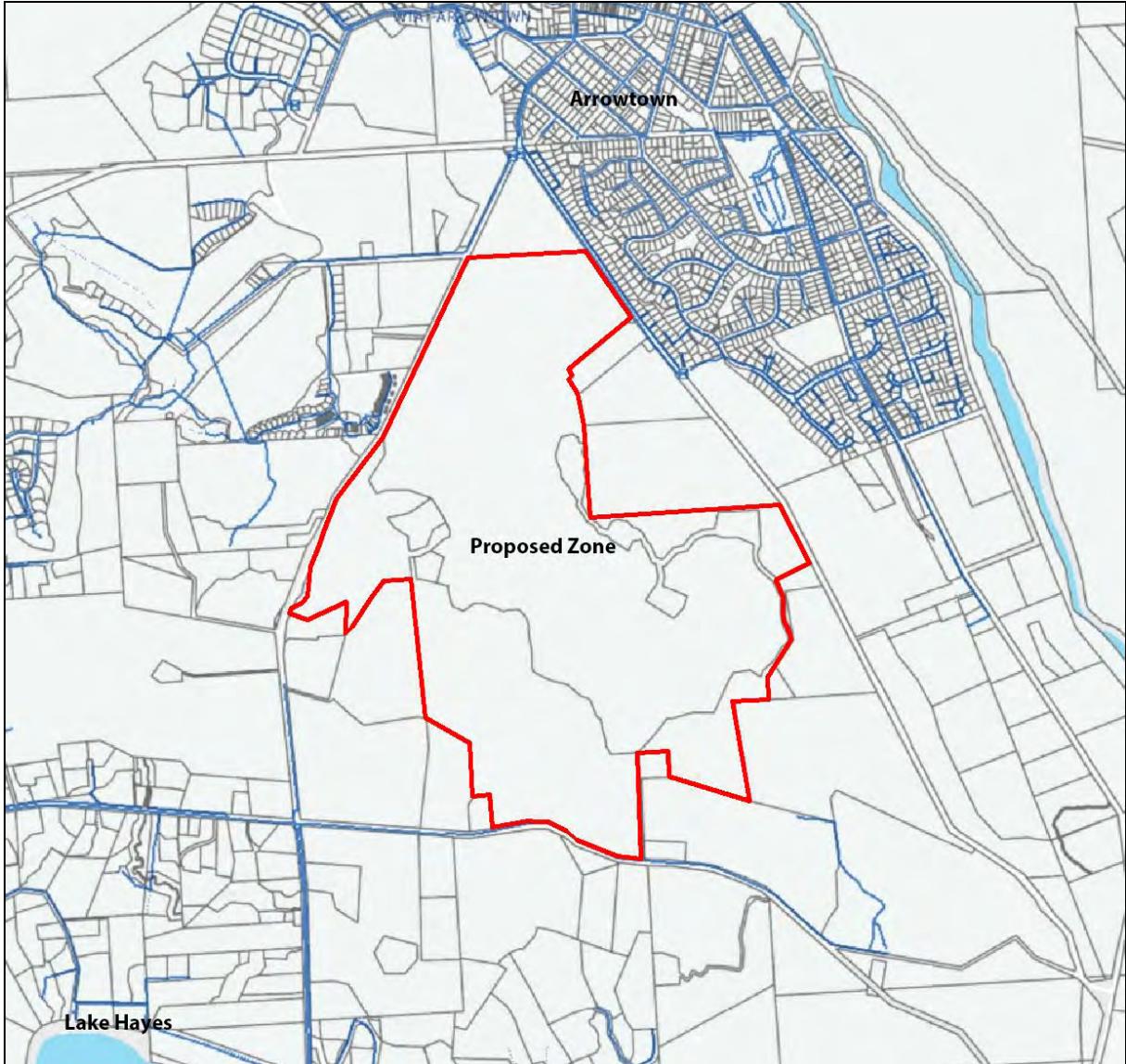
l/s of water flow available within a distance of 135 metres and an additional 12.5 l/s of water flow available within a distance of 270 metres.

#### **4.4 Water Supply - Option 1**

The first option to provide a water supply to the proposed zone, is to connect to an existing QLDC water supply scheme. Given the relative elevations and proximity to site, it would be most appropriate to connect to the Arrowtown water supply scheme.

No network modelling has been undertaken due to time constraints. However, it would appear that the relatively modest levels of flow required would be able to be accommodated. This would be by way of either a direct connection to the existing infrastructure or via some on site buffering to reduce the peak demands on the existing water supply scheme. If buffering was required, it is expected that booster pumping will be required to then reticulate water to the development areas around the site.

In order to connect to the QLDC Water Supply Scheme, approval of Council would be required to extend the water supply scheme boundary to include the proposed zone. In addition, Development Contributions would need to be paid for each dwelling connected. Council may include other conditions for extending the water supply scheme to include the proposed zone which may result in additional upgrade costs being borne by the developer. Early liaison with Council will be required in order to determine exact Council requirements and potential cost liabilities.



**Figure 2 - Map Showing Existing QLDC Water Supply Infrastructure.**

This option would also require the construction and installation of fire hydrants in proximity to the future dwellings in order to meet the fire fighting water supply requirements.

#### **4.5 Water Supply - Option 2**

The second option for providing a water supply for the development would be to use either a new water bore or an existing bore (or a combination of the two) to supply the proposed zone with potable water. This would mean that the zone would have a standalone water supply that was separate from any Council reticulation.

The basic components of such a system would include the water bore intakes and pumps, rising main and storage reservoir as well as a water treatment system sufficient to bring the supply in line with Drinking Standards for New Zealand 2005 (Revised 2008) (DWSNZ).

The water supply storage reservoir for the proposed zone, based upon Council reservoir requirements would be approximately 200 m<sup>3</sup>. As there is no significant high point with suitable elevation above the highest proposed area of development, it is likely that a water pressure boosting pump station would be required to provide domestic and firefighting pressures.

As well as the physical construction issues involved with this option a number of consenting and maintenance matters would also need to be addressed. A resource consent will be required to construct any new bore and it is likely that a further consent will be required for the water take itself as both the calculated total daily demand and the peak hourly flow exceed the permitted water take rates set out in the Otago Regional Council's Regional Plan for Water. Land use and building consents may also be required for the reservoir and water treatment facilities.

There are existing productive bores on the site and on neighbouring sites. Two bores are currently used for servicing the site with both potable and irrigation water. It is likely that these two bores would provide sufficient water for the potable demand for the proposed zone. However, this may reduce the amount of water available for irrigation of the associated golf course and landscaping and this would need to be assessed at the time development proceeded to ensure there was sufficient water for all purposes across the site.

The main issue to be considered with regards to this option would be the on-going maintenance and management of the water supply and treatment system. One option would see the system vested with Council. Alternatively, the water supply could be owned by a lot owners association (or similar) responsible for the on-going management and maintenance of the infrastructure. A similar system to this has been used at Jacks Point near Queenstown.

#### **4.6 Conclusions and Recommendations**

Both of the two options outlined above to supply water to the subject site are feasible. Further investigation, consultation with Council and cost analysis will be necessary to establish the final methodology used.

## 5. Wastewater Disposal

### 5.1 General

A Council reticulated sewerage scheme exists adjacent to the site including an existing rising main that runs through the site. In addition, there is the possibility of constructing a standalone communal treatment and disposal system to cater for the wastewater drainage from the development of the proposed zone.

Both of these options are considered further below.

### 5.2 Demand Assessment

Peak wastewater generation is expected to coincide with peak water demand. The following design figures have been adopted:

Wastewater Generation Item	Wastewater Generation (litres/day)	No.	Total (litres/day)
Dwelling (average day)	1,050	100	105,000

The additional average daily wastewater generation of 105 m<sup>3</sup> per day equates to 1.22 litres per second average flow over twenty four hours.

From the QLDC amendments to NZS4404:2004 Land Development and Subdivision Engineering, the peaking factors for the wastewater network are as follows:

Item	Peaking Factor
Dry weather diurnal peak flow	2.5
Wet weather dilution/infiltration factor	2

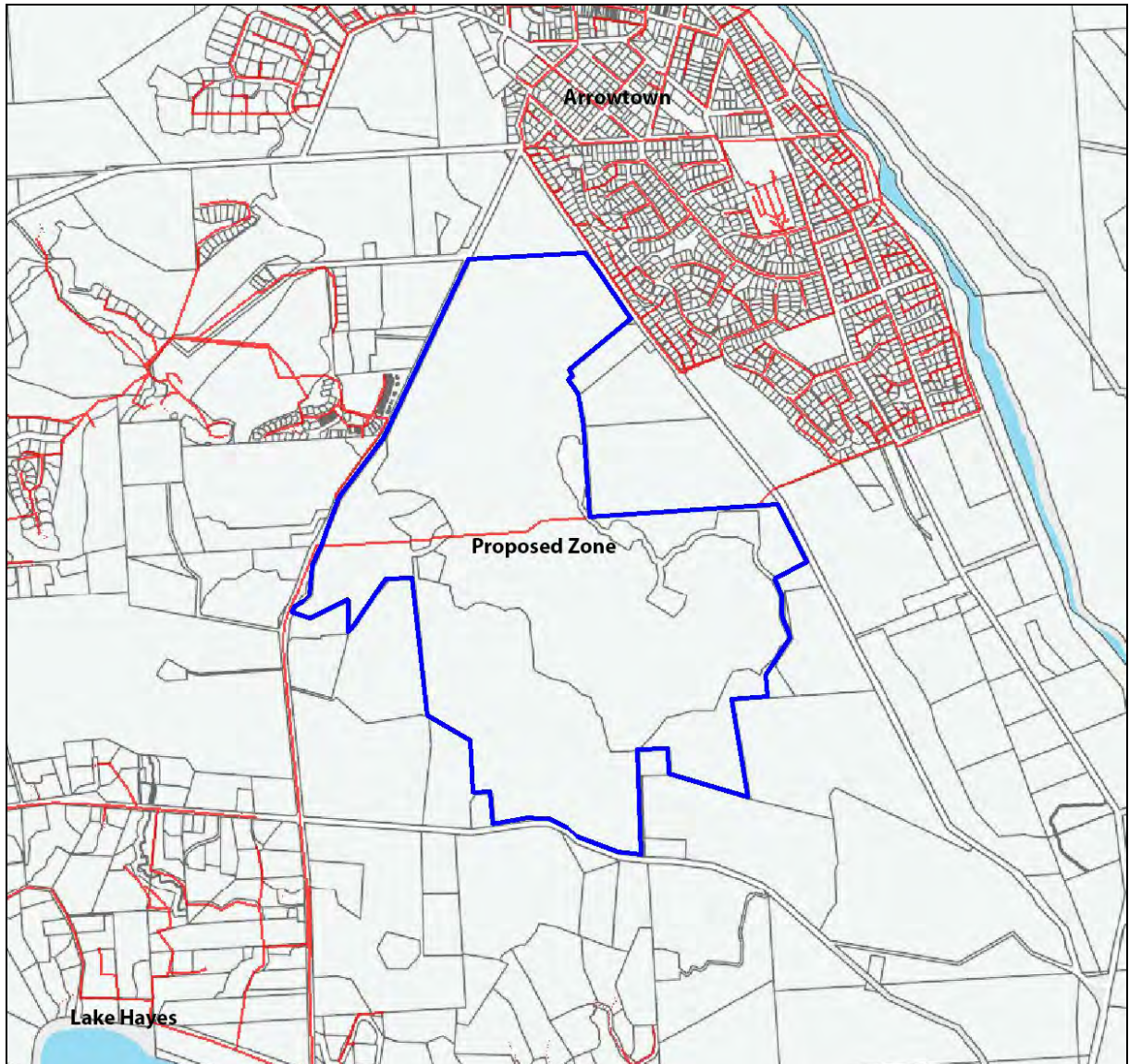
Using the QLDC peaking factors, during the wet weather peak flow is estimated at 6.08 litres per second.

### 5.3 Wastewater Drainage – Option 1 – Council Reticulated Scheme

This option involves connecting to the existing Council reticulation that runs through and adjacent to the site. An existing Council rising main runs through the site, this becomes

gravity reticulation near the Arrowtown – Lake Hayes Road. There is also Council reticulation in McDonnell Road adjacent to the proposed zone.

HCL have previously been engaged in order to connect the existing golf clubhouse to the nearby QLDC wastewater reticulation. This has been done by way of a small pump station with a rising main connection to the first gravity manhole after the Council rising main that runs through the site. QLDC formally approved this connection to their scheme.



**Figure 3 - Map Showing Existing QLDC Wastewater Drainage Infrastructure.**

As previously stated, the site is undulating. It is anticipated that much of the site will be able to be drained using standard trunk and lateral gravity pipelines. These will drain to a central primary pump station that will then pump to a suitable discharge point in the Council network.

To address topographical variation, it is possible that some home sites may require a small package grinder pump and small bore rising main to connect to the new internal reticulation.

The primary pump station would be able to be designed and constructed in such a fashion to enable buffering to reduce flows into the existing Council infrastructure at peak times.

In order to connect to the QLDC Wastewater Drainage Scheme, approval of Council would be required to extend the wastewater scheme boundary to include the proposed zone. In addition, Development Contributions would need to be paid for each dwelling connected. Council may include other conditions for extending the wastewater scheme to include the proposed zone which may result in additional upgrade costs being borne by the developer. Early liaison with Council will be required in order to determine exact Council requirements and potential cost liabilities.

#### **5.4 Wastewater Drainage – Option 2 – Communal System**

This option involves constructing a new communal wastewater treatment and disposal system at a suitable location on site and treating all wastewater flows from the proposed development prior to discharge to land.

It is envisaged that a package plant system similar to that used at Jacks Point could be accommodated to service the Golf Course Land and, if desired, this system could be designed to provide for future expansion to allow inclusion of adjacent development areas. The system would involve the primary treatment of wastewater at each individual dwelling or block of dwellings by way of a septic tank to remove solids. Primary treated effluent from each septic tank is then pumped or drained to the communal package treatment facility where it undergoes secondary and possibly tertiary treatment prior to disposal to land.

This type of system has a number of positive attributes including:

- The ability to stage expansion of the treatment plant to cater for staged development of the zone.
- No pond based treatment.
- Possible reuse of water for irrigation purposes.

The system would be made up of the following components:

1. Each dwelling would drain wastewater flows to a septic tank located close by. This septic tank would be installed at the time the dwelling was constructed. Depending on

the location and topography, the tank would be fitted with a pump and rising main to reticulate flows to gravity reticulation or would simply connect via gravity to nearby reticulation. The septic tanks will require routine inspections and maintenance. This will mostly involve pumping out the solid wastes from time to time. The inspections and maintenance would be managed by a lot owners association or similar. If dwellings were to consist of units or terraced residences, a communal septic tank would be used for that group of dwellings. This would require specific design at the time, but the tank's function would be similar to that for a single dwelling.

2. It is likely that a mix of gravity and pumped mains will reticulate flows to a suitably located treatment facility. In the case of pumped mains, individual tanks would connect to this via a non-return valve kit.
3. At this stage, a package treatment plant is anticipated to be located near the existing service area. This will receive all wastewater flows into a buffer tank and then treat it using a proprietary treatment system. This system would be a package treatment plant from a proprietary manufacturer/supplier. The actual process adopted will be the subject of detailed design and procurement evaluation. For some guidance, the system used at Jacks Point involves the use of textile packed bed reactors. If deemed necessary at the time of detailed design, tertiary treatment such as UV disinfection could be included to further treat the effluent.
4. The final treated effluent would be reticulated to a suitable disposal location. If suitable tertiary treatment is included, it is likely that this treated effluent could be used for shallow subsurface irrigation around the site. This would need to be carefully considered at the time of detailed design to ensure freezing pipes and public access were appropriately managed.

Similar to the water supply system, one of the main issues to be considered with regards to this option would be the on-going maintenance and management of the wastewater treatment and disposal system. One option would see the system vested with Council. Alternatively, the wastewater drainage and treatment system could be owned by a lot owners association (or similar) responsible for the on-going management and maintenance of the infrastructure. A similar approach to this has been adopted at Jacks Point near Queenstown and accepted by QLDC.

## 5.5 Conclusions and Recommendations

It is recommended that the wastewater generated from the proposed development be disposed of by way of connection to either the QLDC reticulated scheme or a new purpose built communal treatment and disposal facility on site. The feasibility of the chosen



wastewater option will need further detailed analysis, consultation and consenting prior to implementation.

## 6. Stormwater Disposal

### 6.1 General

Generally, it is proposed to maintain the runoff characteristics of the existing catchment. However the proposed development on the site will alter the existing stormwater run off patterns and will serve to increase the peak flow runoff. We recommend to collect and control the stormwater runoff and dispose via connection to local water courses or to dispose of on site using stormwater infiltration and soakage features.

### 6.2 Planning Rules and Regulations

Rule 12.5.1.1 of the Regional Plan: Water for Otago states that the discharge of drainage water to water (or onto land where it might enter water) from any drain is a permitted activity so long as certain conditions are met. The conditions of particular relevance to the discharge of stormwater from the proposed new roads and domestic allotments are as follows:

*12.5.1.1 (b) The discharge, after reasonable mixing, does not give rise to all or any of the following effects in the receiving water:*

- (i) The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials; or*
- (ii) Any conspicuous change in the colour or visual clarity; or*
- ...*
- (v) Any significant adverse effects on aquatic life.*

It is further stated that:

*The discharge of drainage water under Rule 12.5.1.1 will have no more than minor adverse effects on the natural and human use values supported by water bodies, or on any other person. This rule is adopted to enable drainage water to be discharged while providing protection for those values and the interests of those people. Any other activity involving the discharge of drainage water is a restricted discretionary activity in order that any adverse effects can be assessed.*

Contaminants associated with vehicular traffic can include oils, rubber, heavy metals and sediments. In large amounts these contaminants can greatly decrease the natural and human use values of bodies of water. As the stormwater from the site will likely be discharging either directly into local water courses or to ground, appropriate protections will need to be installed in the on-site drainage system in order to remove such contaminants

from the stormwater. The aim of stormwater quality treatment used at the site would be to ensure that the runoff from the new development is in a similar condition to that being achieved before the development. Of particular concern are the "first flush" flows that carry the highest pollutant loadings.

Appropriate technologies to separate contaminants from the stormwater flows might include the use of mud-tanks located in the on-site drainage sumps and a vortex separator mechanism such as a Hynds Downstream Defender which provide high removal efficiencies of suspended solids and floatables over a wide range of flow rates.

Careful design of the stormwater reticulation for the site will ensure that the requirements set out in the Regional Plan: Water for Otago are met.

### 6.3 Stormwater Quantities

At this early stage in the development of the proposed zone, it is difficult to determine the increase in storm water runoff from the site. Initial calculations have been undertaken and these indicate that for a 10 minute rain event with an average reoccurrence interval (ARI) of 10 years the development is expected to increase the storm water flow rate by approximately 1 m<sup>3</sup> per second. This will vary depending upon the density of the development and the permeability of the site.

This level of increase in runoff would result in very large infrastructure if the traditional approach of reticulating all the flows from the site was adopted. If a single point of discharge was developed, the required outlet pipe would be approximately 675 mm in diameter. This level of infrastructure would be expensive and can be mitigated using a Low Impact Design (LID) approach.

From NZS4404:2010 Land Development and Infrastructure:

*Low impact design aims to use natural processes such as vegetation and soil media to provide stormwater management solutions as well as adding value to urban environments. The main principles of low impact design are reducing stormwater generation by reducing impervious areas, minimising site disturbance, and avoiding discharge of contaminants. Stormwater should be managed as close to the point of origin as possible to minimise collection and conveyance. Benefits include limiting discharges of silt, suspended solids, and other pollutants into receiving waters, and protecting and enhancing natural waterways.*

And:

*Low impact design is a type of storm water system that aims to minimise environmental impacts by:*

- (a) Reducing peak flow discharges by attenuation;*
- (b) Eliminating or reducing discharges by infiltration or soakage;*
- (c) Improving water quality by filtration;*
- (d) Installing detention devices for beneficial reuse.*

The types of low impact devices and practices that could be included in the zone include the following:

- Detention Ponds;
- Vegetated swales;
- Rain gardens;
- Rainwater tanks;
- Soakage pits and soak holes;
- Filter strips; and
- Infiltration trenches/basins.

Subdivision urban design principles may also assist in mitigating runoff from the site. These include clustering development to increase open area around developed areas and decreasing road setbacks in order to decrease the likely impervious areas.

In addition to reducing the peak discharge from the site, LID approaches may also improve the quality of the runoff from the site.

It is noted that due to the local topography, the area in the southwest corner of the site drains off site and through private land. The storm water runoff solutions in this area will need to ensure that the post development runoff is no greater than the pre-existing development runoff. It is expected that the use of specific soakage and attenuation devices will be used to meet this requirement.

## **6.4 Conclusions and Recommendations**

We consider that the collection and subsequent disposal of stormwater from the proposed development is entirely feasible via collecting and controlling the stormwater runoff and disposing by draining to the local water courses passing the site.

Dependent upon the overall design approach for the subdivision, the storm water runoff leaving the site could be greatly reduced by the introduction of low impact design approaches including the use of attenuation and filtration devices.

## 7. Natural Hazards

Natural Hazards have been separately assessed by HCL as part of a global Natural Hazards Assessment for THL land holdings.

The HCL Natural Hazards Assessment report is included as Appendix 2 and confirms there are no natural hazard constraints applying to the Golf Course Land.

## 8. Conclusions and Recommendations

The subject site and the proposed development have been assessed to determine the suitability for development in relation to infrastructure services. No significant constraints have been identified and the Golf Course Land is suitable for the proposed development from an infrastructure servicing viewpoint.

The key findings are summarised as follows;

- i. There are two options for supplying water to the site. The first option would be to utilise the QLDC reticulated water supply. This would likely require the construction of water storage and water pressure boosting to achieve buffering and firefighting flows. The second option would be to install a new, private water bore intake and treatment along with a new reservoir and a water supply boosting pump station. The final decision on which methodology to use will be decided at a later point following further investigation, consultation and cost analysis.
- ii. Wastewater drainage reticulation from the site will be able to be catered for with either connection to the existing QLDC reticulation or construction of a proposed wastewater reticulation and treatment and disposal system. The majority of the site will be able to be reticulated by the construction of gravity sewer pipes. However, it is anticipated that parts of the development site will require pump stations in order to convey flows to either the existing QLDC infrastructure or the new treatment plant.
- iii. Stormwater runoff from the site can be satisfactorily disposed of by the construction of necessary reticulation with disposal to local water courses. It is recommended that in order to reduce the peak runoff and to improve runoff quality, low impact design approaches are adopted.
- iv. Based on the global Natural Hazard Assessment prepared by HCL, no natural hazard issues exist which constrain development on the Golf Course Land.

Overall, we confirm that there are no significant impediments to development of the site with respect to Infrastructure Services or Natural Hazard.

We recommend that the timing and scale of the proposed infrastructure upgrades be further assessed once the layout of the proposed zone has been further progressed and staging of development has been confirmed.

Appendix 1  
Structure Plan

2387

KEY:

- Structure Plan Boundary
- - - Activity Area



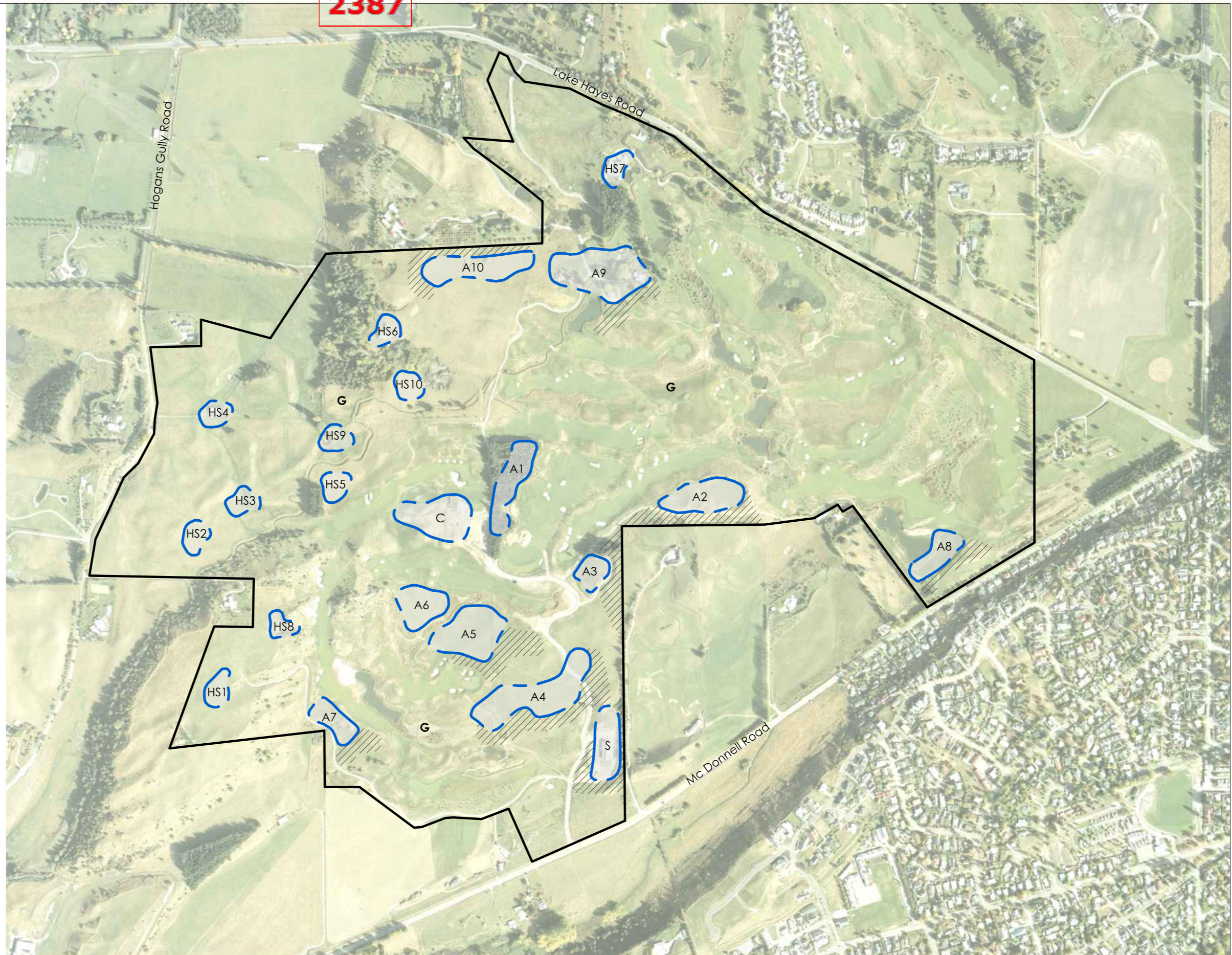
Activity Areas:

- G: Golf course, open space and farming
- C: Clubhouse
- A: Visitor Accommodation / Residential
- HS: Homesite (3,000m2)
- S: Resort Services & Staff Accommodation

Note: all activity areas include G: Golf course, open space and farming

Overlays:

- /// Landscape Amenity Management Area

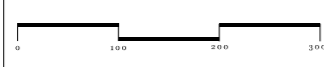


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SCALE: 1:4,000 (A1); 1:8,000 (A3)



PLAN STATUS:  
DP REVIEW

# THE HILLS STRUCTURE PLAN

DRAWN / REVIEWED: RT / JC  
 APPROVED: DT  
 DATE: 14.10.15

DRAWING NO:  
 MH\_10\_1\_MLP\_010F



2387

KEY:

— Structure Plan Boundary

- - - Activity Area

Activity Areas:

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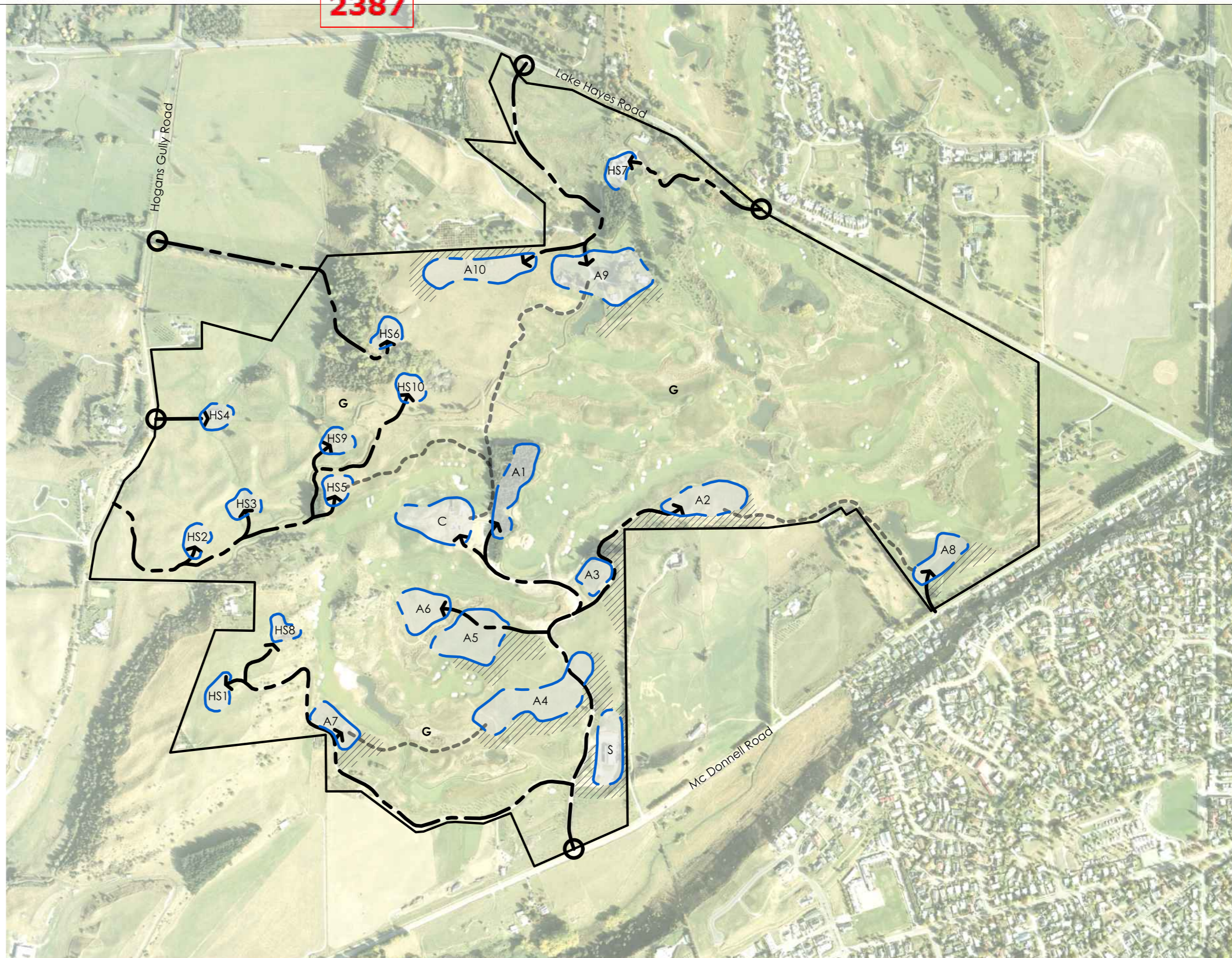
Overlays:

/// Landscape Amenity Management Area

○ Existing access point

— Road access

- - - Buggy / cart access

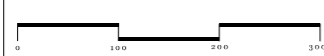


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SCALE: 1:4,000 (A1); 1:8,000 (A3)



PLAN STATUS:

DP REVIEW

# THE HILLS STRUCTURE PLAN - ACCESS

DRAWN / REVIEWED: RT / DT  
APPROVED: DT  
DATE: 14.10.15

DRAWING NO:  
MH\_10\_1\_MLP\_011B

Appendix 2  
HCL Natural Hazards  
Assessment Report

Trojan Helmet Ltd

**Hills Golf Course (including  
McDonnell Road Land) and  
Hogans Gully Road Land**

**Proposed District Plan Submission**

Natural Hazard Assessment

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Responsible Engineer:  
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Document Status

Revision	Author:		Reviewer:		
	Name	Signature	Name	Signature	Date
A (Initial Issue)	J. Hadley		J. McCartney		20 October 2015
B (For Submission)	J. Hadley		J. McCartney		21 October 2015
C (Final)	J. Hadley		J. McCartney		22 October 2015

Limitations

This report has been written for the particular brief to HCL from their client and no responsibility is accepted for the use of the report for any other purpose, or in any other context or by any third party without prior review and agreement.

In addition, this report contains information and recommendations based on information obtained by inspection, sampling or testing at specific times and locations with limited site coverage as outlined in this report. This report does not purport to completely describe all site characteristics and properties and it must be appreciated that the actual conditions encountered throughout the site may vary, particularly where ground conditions and continuity have been inferred between test locations. If conditions at the site are subsequently found to differ significantly from those described and/or anticipated in this report, HCL must be notified to advise and provide further interpretation.

## Contents

<b>1. Introduction</b>	<b>2</b>
<b>2. Nature of Proposed Development</b>	<b>3</b>
<b>3. Scope of Assessment</b>	<b>4</b>
<b>4. Site Description</b>	<b>5</b>
<b>5. QLDC Hazard Register and Previous Work</b>	<b>7</b>
<b>6. Geological Setting</b>	<b>8</b>
6.1 Physiography	8
6.2 Site Lithologies	8
<b>7. Specific Development Area Assessment</b>	<b>10</b>
7.1 General	10
7.2 Liquefaction Risk and Flood Hazard	10
7.3 Proposed Rural Lifestyle Area A	11
7.4 Proposed Rural Lifestyle Area B	11
7.5 Sites Requiring Little or No Mitigation	12
7.6 Site A8	12
7.7 Site A6	13
7.8 Site A10	13
7.9 Site A7	13
7.10 Site HS10	13
7.11 Site HS9	14
7.12 Sites HS2, HS3 and HS4	14
<b>8. Conclusions and Recommendations</b>	<b>15</b>

### Appendix A

Darby Partners and HCL Topographic Drawings

### Appendix B

QLDC Hazard Maps

### Appendix C

Figure 2

### Appendix D

Figure 10

# 1. Introduction

Trojan Helmet Ltd (THL) has engaged Hadley Consultants Limited (HCL) to conduct a natural hazards assessment of their land which comprises both the Hills Golf Course and an adjacent land holding which fronts Hogans Gully Road.

This report considers the relevant site conditions and natural hazard issues affecting the potential building development within possible development areas identified by others. Specifically, the natural hazard elements investigated and assessed are:

- Liquefaction hazard,
- Alluvial fan hazard, and
- Inundation and flood risk.

The purpose of this report is to provide a reference document to assess whether any natural hazard constraints exist in a global context which will adversely impact proposed development areas on the THL land holdings.

This report is intended to inform submissions made by THL on the Queenstown Lakes District Council's (QLDC) Proposed District Plan.

## 2. Nature of Proposed Development

The development proposed across the THL land comprises new zoned Rural Lifestyle Areas combined with a new Resort Zoning (the Hills Resort Zone) in which specific pockets of building development are identified for activities which include discrete Homesites, Visitor Accommodation, Farm and Resort Services and Staff Accommodation.

There are two primary Proposed Rural Lifestyle zones as follows;

- Proposed Rural Lifestyle Area A comprising a 19.7Ha block bounded by Hogans Gully Road to the south and Arrowtown – Lake Hayes Road to the west; and
- Proposed Rural Lifestyle Area B comprising an 8.4Ha block with frontage to McDonnell Road.

The remainder of the proposed development areas are located wholly within the existing Golf Course area (which will form the new Hills Resort Zone) and represent discrete pockets of development across the site.

The overall development sites and areas are indicated on the Darby Partners and HCL topographic drawings contained in Appendix A.

Some of the proposed development areas within the Golf Course site include building platforms previously consented under RM081223. Where relevant, previous work on these platforms has been considered in this more global evaluation of natural hazards impacting the land holding.

### 3. Scope of Assessment

The purpose of this report is to provide a global overview of the natural hazard issues which might affect development capability across the THL land holdings. In making this assessment, HCL have undertaken the following activities;

- Stereo pair photo analysis of geological features to identify potential areas of instability.
- Review of previous site investigation and assessment work by others for previous developments at the THL site. These investigations have been used to verify the HCL developed geological and geotechnical models adopted when assessing hazard.
- Detailed site walkover and geological mapping of all proposed development areas.
- Logging and mapping of open excavations and test pits across the site to confirm site lithologies.
- Review and consideration of QLDC Hazard Maps and their impact and relevance to the THL site following specific evaluation and verification of the geomorphology which exists.

It is intended that this document form a master Natural Hazards document for the THL land holdings which may be referred to when considering discrete planning submissions for the separate Rural Lifestyle A and B areas, and the other Activity Areas within the proposed Hills Resort Zone.



## 4. Site Description

The proposed development takes in the Hills Golf Course Land, located at 164 McDonnell Road approximately 1km south of Arrowtown and an area of land comprising 19.7Ha to the south of the Golf Course. This land, referred to as the Hogans Gully Land, is bounded by Hogans Gully Road to the south and Arrowtown – Lake Hayes Road to the west. The drawings included in Appendix A illustrate the site location and development areas.

The Golf Course is accessed from McDonnell Road which runs along the eastern boundary of the site and the Hogans Gully Land is accessed from Hogans Gully Road which runs along the southern site boundary.

Prior to the development of the golf course the THL land comprised farmland. The existing vegetative cover comprises a combination of long pasture, golf course green, landscaped areas and wooded areas. Vegetative cover on the Hogans Gully Land currently comprises farmland, paddocks and pasture.

The site includes several existing structures and these existing building sites have not been assessed as it is assumed they have been considered in detail as part of previous assessment work which allowed their construction.

Topographic contours of the site are shown on HCL Drawings 152859-S01 and S02 in Appendix A.

The site is undulating and ground levels typically vary between RL350m to RL430m. Slopes on the site are predominately gentle (5 to 15°); however, localised steep slopes are also present in some areas across the site.

Rock exposures also exist across the site, most notably on the Golf Course Land but also on the south facing flanks above the Hogans Gully Land.

There are a number of springs, gullies and manmade drainage features present across the site which will give rise to ephemeral flows during wet periods. The most significant drainage features include a stream which runs along the southern boundary of the THL land roughly parallel with Hogans Gully Road and an internal water race system which traverses the higher elevation Golf Course Land roughly west to east.

The site is primarily accessed from McDonnell Road, although additional farm track access is possible from Hogans Gully Road and from Arrowtown – Lake Hayes Road for existing private residences.

The site also includes a relatively complex system of internal roads, footpaths, cart paths and farm tracks that will impact local catchment boundaries and run off characteristics.

The land receives approximately 850mm of rainfall per annum and may be subject to drought conditions during the summer months.

## 5. QLDC Hazard Register and Previous Work

QLDC Hazard Maps (refer Appendix B) note that the site may be affected by;

- Liquefaction Hazard, assessed as provisionally LIC1.
- Alluvial Fan Hazard.

The liquefaction risk classification is shown to affect the majority of the Golf Course Land, whilst the Alluvial Fan Hazard is limited in its extent, taking in parts of the south facing slopes above the Hogans Gully Land.

In August 2006, Tonkin and Taylor Ltd (T&T) conducted a detailed investigation of the Golf Course area as part of a previous development proposal. This work by T&T included;

- Site evaluation,
- The excavation and logging of 12 test pits ranging in depth from 1.8m to 4.8m,
- Scala Penetrometer testing.

As part of their reporting T&T also provided soil parameters for foundation design and slope stability analysis.

T&T recorded that there was no evidence of slope instability recorded in the vicinity of the proposed building platforms, although some instability was observed in the oversteepened slopes above the Hogans Gully Land.

With regard to liquefaction, T&T noted that;

- i) Subgrade materials were expected to provide good bearing for shallow foundations.
- ii) Settlement of the subgrade materials under seismic loading is expected to be minimal.
- iii) For detailed design in accordance with NZS 1170.5:2004, subsoil Class C conditions could be assumed.
- iv) The regional groundwater table was not encountered and is expected to lie at a depth several metres below existing ground surface across the site.

Overall the T&T work did not identify any natural hazard issues (such as liquefaction) affecting any of the proposed Golf Course sites and concluded that building foundations were expected to be founded on glacial outwash and glacial sediment which should provide good bearing.

## 6. Geological Setting

### 6.1 Physiography

The site is located within the Wakatipu Basin, a feature formed by a series of glacial advances.

The most recent glacial advance occurred in the area between 10,000 and 20,000 years ago. This glacial activity has deposited glacial till, outwash and lake sediments over scoured bedrock.

Post glacial times were then dominated by erosion and deposition of alluvial gravels by local watercourses and river systems and during periods of high lake levels. This is relevant in the context of the Hogans Gully Land, where Shotover River derived alluvium is identified.

### 6.2 Site Lithologies

The predominant site lithologies across the site may be summarised as follows;

- i) **Schist.** Schist outcrops irregularly, and is particularly evident beneath the higher terrain towards the south above the Hogans Gully Land. No particular distress was observed (eg glacial shearing/plucking), nor was there any evidence of mass movement.
- ii) **Glacial Till.** Glacial Till dominates across the Golf Course Land, and is particularly notable by the presence of the hummocky terrain. Where visible in outcrop and suboutcrop, it is a lodgement till, comprising compact silt/sand, with subordinate gravel clasts, and generally rare cobbles with rare boulders.

There appear to be three different ages of tills, the oldest being a capping on schist in the vicinity of Sites HS1 and HS8, intermediate age tills form the hummocky terrain within the Golf Course proper, while the youngest till has intruded into the Hogans Gully Land. The latter is finer than the older type, but there isn't a marked difference in grading. Additional observations include;

- No mass movement noted in the till,
- Possible historic fill mounds sometimes hard to differentiate from insitu till.

- iii) **River Alluvium.** The presence of river alluvium is defined in different areas of the site as follows;

- **Within Proposed Rural Lifestyle Area A:** This area is assessed as Shotover derived alluvium sourced from the west. Of particular note are the finger-like beach deposits which accumulated at the surface of the river alluvium by long shore drift when the lake was high.
  - **Within Proposed Rural Lifestyle Area B:** Observations in a test pit near the western margin of this zone disclosed a well-bedded, river alluvium comprising well-graded sandy gravel to cobbly sandy gravel. Clasts appear to be Shotover sourced, hence it is likely that the sediments were deposited by a former Hayes Creek draining the basin south of Coronet Peak. Degradation has produced a stepped morphology, grading gently down towards McDonnell Road.
- iv) **Fans.** Small fans do grade out into the Proposed Rural Lifestyle Area A, but they do not appear to be active. A small, intra-course fan is present near Site A6 and there may be other fan elements around the site and away from proposed development areas. Due to their lack of activity these fan areas require consideration in any detailed design, but are not considered a high risk hazard.

## 7. Specific Development Area Assessment

### 7.1 General

Consideration of the Development Area as a whole has been separated as follows;

- i) Proposed Rural Lifestyle Area A,
- ii) Proposed Rural Lifestyle Area B,
- iii) Development Sites designated "HS" and "A" across the Golf Course area.

We note that due to the presence of existing structures the following sites were excluded from evaluation by HCL;

- Site S – the Resort Services Area,
- Site C – the Clubhouse,
- HS6 – An existing house site,
- HS7 – Existing loge.

We confirm that all other development areas indicated on the Darby Partners drawings contained in Appendix A have been assessed. To avoid repetition in reporting, we have grouped sites with common features.

### 7.2 Liquefaction Risk and Flood Hazard

We collectively address the Liquefaction Risk noted by QLDC as affecting Proposed Rural Lifestyle Area B and all of the HS and A development areas within the Golf Course Land.

HCL's assessment of the site lithologies is that the Golf Course Land is mantled by glacial till comprising compact sands and gravels with a regional groundwater level located at depth. Schist bedrock outcrops in several locations and neither the compact till or the bedrock are susceptible to liquefaction. Further, Proposed Rural Lifestyle Area B includes alluvial deposits, again with a significant depth of groundwater.

HCL's assessment is also verified by the previous reporting and site investigation work of T&T.

The confirmed presence of compact glacial tills and the absence of shallow groundwater allow us to confirm that liquefaction hazard is not a relevant risk for any of the proposed development areas.

A flood hazard is not recorded by QLDC and we confirm that subject to normal cut off drainage and catchment management, no large scale flood or inundation risk exists.

### **7.3 Proposed Rural Lifestyle Area A**

Observations relevant to this area include;

- Greater than 50% of the proposed site is located on flat to gently sloping terrain comprising Shotover-derived alluvium.
- Some inactive fan elements encroach into the development area from the north and northeast mantling both glacial till and alluvial deposits in these areas. This is depicted in Figure 2 contained in Appendix C.
- Streams associated with the fan elements are small and assessed as ephemeral with minor source catchments.
- Former high level Lake Wakatipu storm benches are identifiable features in the central reaches of the site and are well drained.
- Based on field inspection and the small size of the streams and source catchments, we do not believe the QLDC classification of the fan elements as active and debris dominated to be correct.

In summary, we believe that the alluvial fan hazard risks associated with this development area are very low subject to;

- a) Provision of normal cut off drainage measures to control upslope runoff from ephemeral watercourses.
- b) Further test pitting as part of any resource consent application to confirm the age and activity of the fan deposition.

### **7.4 Proposed Rural Lifestyle Area B**

The following observations were made with respect to Proposed Rural Lifestyle Area B;

- The area contains alluvial deposits and consists of low relief with terraces degrading to the east.
- The exposed cut in the western edge of the development area shows Shotover-derived alluvium circa 23,000 years old comprising sandy gravels.
- The lithology is consistent across the site with the depth to groundwater likely to exceed 10m.

In summary, and noting our earlier comment under Section 7.2 with regard to liquefaction and flood risk, we again believe that the natural hazard risks associated with this development area are very low.

## **7.5 Sites Requiring Little or No Mitigation**

The following sites have been assessed and grouped as relatively benign with minimal mitigation required for building development. These sites are;

- A1,
- A2,
- A3,
- A4,
- A5,
- A9,
- HS1,
- HS5, and
- HS8.

Other than the southern extent of A4 where a small depression exists, all of these sites are well drained with competent subgrade conditions. The sites are considered very low risk with regard to natural hazard where normal building controls around verification of bearing capacities for foundation design along with the provision of positive surface drainage control will allow development of these sites.

## **7.6 Site A8**

Site A8 at the northern end of the Golf Course Land occupies a low relief mound on the north east side of the low relief pond.

Concern exists that the building or development area could include uncertified fill as part of pond construction. The relative heights of the pond water level (controlled by its outlet) and likely subgrade levels for foundations increases the risk of saturated subgrade conditions.

The site is not subject to natural hazard, but should be the subject of a specific geotechnical investigation to confirm the presence or otherwise of uncertified fill prior to the construction of any building.



## **7.7 Site A6**

This site occupies a low relief localised fan which grades out from the hummocky till zone to the west. The site is located slightly above the creek level, suggesting a perched water table may be present in this area.

Some surface water control from the catchment to the west is required.

Again, the site is not subject to any natural hazard issues, but prior to construction of buildings the site should be subject to a specific geotechnical investigation to confirm the nature and extent of any fan materials and presence or otherwise of a perched water table which may require draining.

## **7.8 Site A10**

This site takes in a substantial area of saturated ground in a through-drainage depression heading south. There are also overland flow issues to be resolved from the steep terrain catchment to the east.

The site could be developed subject to specifically designed drainage and ground improvement works involving cut to waste, installation of piped stormwater reticulation including resolution of secondary overflow issues and import to fill to achieve positive drainage to the area and to provide suitable foundation conditions.

## **7.9 Site A7**

This site is currently constrained by existing services due to the presence of a pump shed, transformer and inspection panels.

There is also localised uncertainty regarding lithologies with the possible presence of fill due to the services modifications.

There are no natural hazard issues affecting the site, however we recommend a detailed geotechnical investigation to define fill areas prior to any building construction occurring.

## **7.10 Site HS10**

This site is affected by water race leakage concentrating in the slope comprising the house site area.

Prior to building development at this site it will be necessary to;

- Complete subsurface investigations to confirm the impact of the race leakage on overall slope stability.
- Pipe the water race for long term security of the site and provide for some form of diversion away from buildings in the event of a catastrophic pipe rupture.

### **7.11 Site HS9**

This site is located in a localised depression and it will be necessary to resolve drainage to the south to avoid a ponding risk.

Similar to HS10, it will be necessary to;

- Complete subsurface investigations to confirm the depth to competent bearing materials (till) in the base of the depression due to likely thick colluvium/soil layer accumulation in the natural basin.
- Pipe the water race for long term security of the site and provide for some form of diversion away from buildings in the event of a catastrophic pipe rupture in the race.

### **7.12 Sites HS2, HS3 and HS4**

These three sites are all located in the valley lines of ephemeral drainage systems. Consequently they are presently wet and saturated. Figure 10 included in Appendix D illustrates the location of the sites and how the channel and ephemeral gully systems affect each area.

It will be possible to develop Sites HS2, HS3 and HS4 if drainage, diversion and ground improvement work is completed, but we recommend that at the time detailed house designs are proposed, consideration is given to locating construction to higher relief ground within the respective Housesite areas. This will minimize the diversion and drainage works required.

All of HS2, HS3 and HS4 are subject to risk from a failure in the water race. Again, piping of the race and consideration of diversions in the event of a breach are recommended to mitigate this risk.

## 8. Conclusions and Recommendations

Based on our site evaluation and assessment work we have made the following conclusions with regard to Natural Hazards and how they impact the THL Golf Course Land (encompassing the proposed Hills Resort Zone and proposed Rural Lifestyle Area B Zone) and Hogans Gully Land (encompassing the proposed Rural Lifestyle Area A Zone);

### Natural Hazard Risks

- i) The Golf Course Land, including Proposed Rural Lifestyle Area B where alluvial deposits are identified, comprises competent and compact glacial till underlain by near surface schist bedrock. These materials are not susceptible to liquefaction and the risk of liquefaction is further reduced by low regional groundwater levels.
- ii) Based on our assessment and investigation of the Golf Course Land, the provisional classification of the site as an LIC1 liquefaction risk by QLDC is not valid. The risk of liquefaction impacting the site is assessed as very low and liquefaction does not constrain the site as a natural hazard.
- iii) The Proposed Rural Lifestyle Area A (Hogans Gully) Land comprises predominately alluvial material where the northern section of the Proposed Rural Lifestyle Area A may potentially be impacted by an alluvial fan hazard. Based on our assessment we don't believe the fan area is active and in the event it was active, its extent would be significantly reduced from that indicated by QLDC Hazard Maps. We have assessed any risk from alluvial fan hazard as low, recognising that if further investigation confirms activity, the risk can be mitigated through bunding protection and regrading at the time of resource consent.
- iv) None of the land areas or development areas are subject to regional flood or inundation hazard.

### Specific Development Site Controls

- v) Prior to any building construction occurring we recommend that sites A6, A7 and A8 require specific geotechnical investigation and design of foundations by a Chartered Professional Engineer. This investigation shall include rationalisation of cut off drainage to improve subgrade conditions and to address overland flow paths.
- vi) Sites HS9 and HS10 are impacted by the existing water race and potential leakage from this race. Prior to any building construction occurring we recommend that a specific geotechnical investigation be completed by a Chartered Professional Engineer to confirm the extent of potential soil accumulation in the depression on HS9 and slope stability impacts of the water race on HS10. Both sites will require piping of the water race and diversion design in the event of a catastrophic pipe breach.

vii) Development sites A10, HS2, HS3 and HS4 are more complex sites as a result of being sited across some natural drainage paths. The sites are not subject to large scale natural hazard risk, but to develop them will require specific design of works to cut off and divert existing flow paths to prevent site inundation, and to address hazards associated with the water race to the north. To ensure that these site development issues are properly addressed, we recommend that prior to any building construction occurring, specific engineering design of drainage and ground improvement works be completed by a Chartered Professional Engineer. We recommend consideration be given to refining the location of these development sites so that they take in higher ground within their respective activity areas, removed from natural drainage paths.

Appendix A  
Darby Partners and HCL  
Topographic Drawings

2387

KEY:

- Structure Plan Boundary
- - - Activity Area



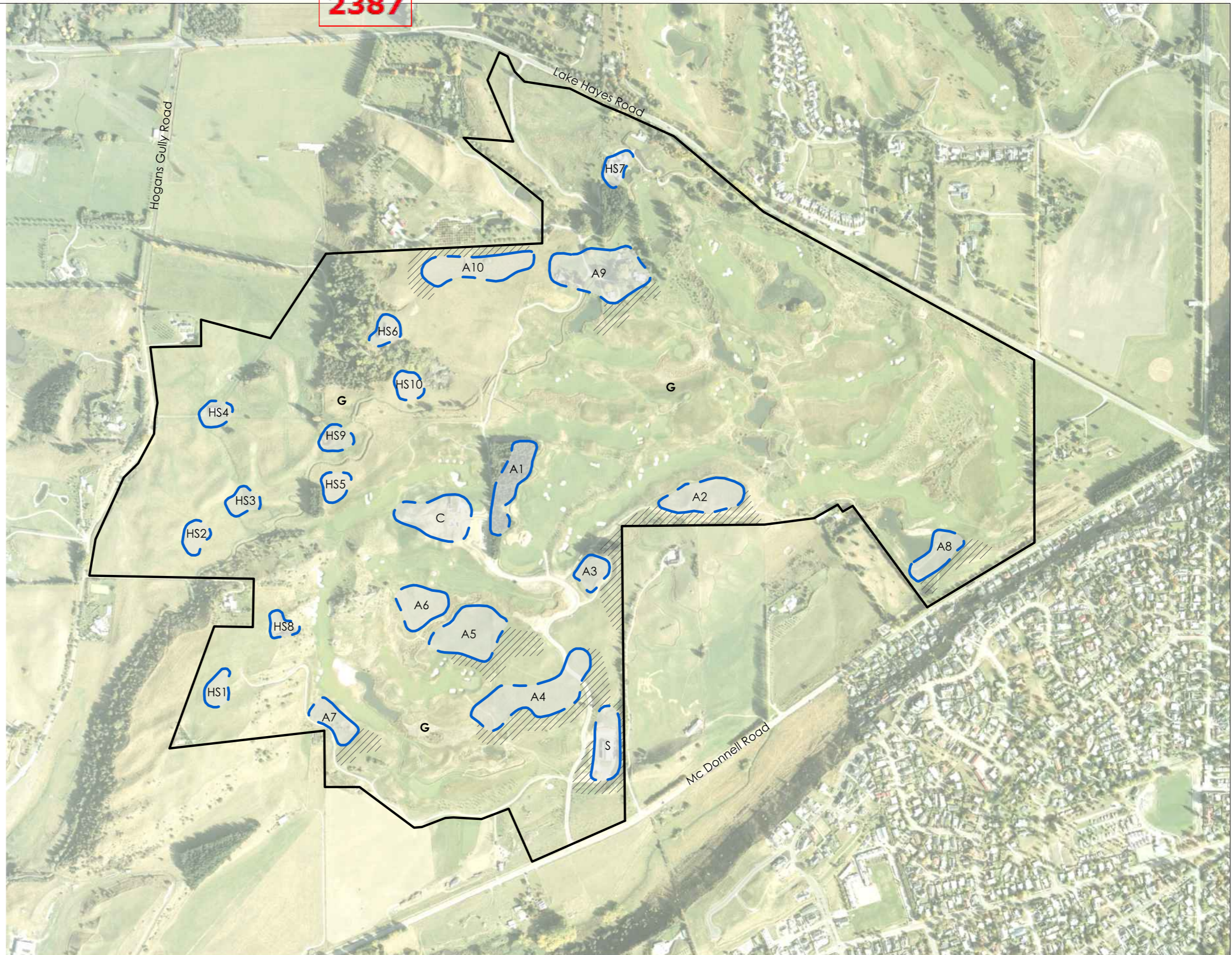
Activity Areas:

- G: Golf course, open space and farming
- C: Clubhouse
- A: Visitor Accommodation / Residential
- HS: Homesite (3,000m2)
- S: Resort Services & Staff Accommodation

Note: all activity areas include G: Golf course, open space and farming

Overlays:

- /// Landscape Amenity Management Area

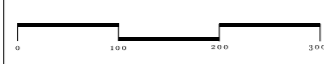


V:\MH\_The Hills\10\_Master\1\_Preliminary\MH\_10\_1\_MLP\_010F (Structure Plan).dgn



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 info@darbypartners.co.nz  
 www.darbypartners.co.nz

SCALE: 1:4,000 (A1); 1:8,000 (A3)



PLAN STATUS:  
DP REVIEW

# THE HILLS STRUCTURE PLAN

DRAWN / REVIEWED: RT / JC  
 APPROVED: DT  
 DATE: 14.10.15

DRAWING NO:  
 MH\_10\_1\_MLP\_010F

**KEY:**

- Structure Plan Boundary
- - - Activity Area

**Activity Areas:**

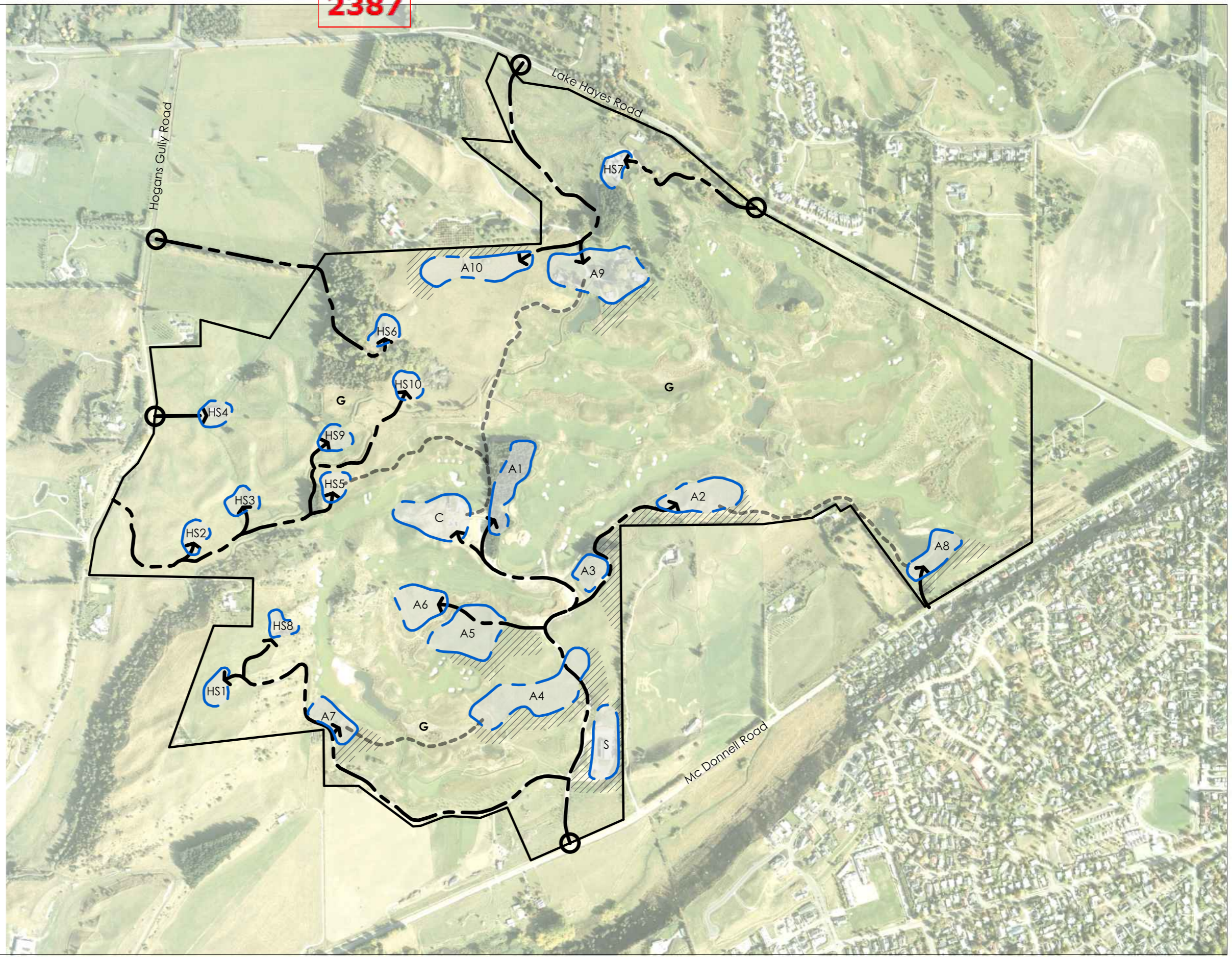
- G: Golf course, open space and farming
- C: Clubhouse
- A: Visitor Accommodation / Residential
- HS: Homesite (3,000m<sup>2</sup>)
- S: Resort Services & Staff Accommodation

*Note: all activity areas include G: Golf course, open space and farming*

**Overlays:**

- /// Landscape Amenity Management Area

- Existing access point
- Road access
- - - Buggy / cart access



V:\MH\_The Hills\10\_Master\1\_Plan\10\_1\_MLP\_011B (Structure Plan - Access).dgn



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PLAN STATUS:  
**DP REVIEW**

**THE HILLS  
 STRUCTURE PLAN - ACCESS**

DRAWN / REVIEWED: RT / DT  
 APPROVED: DT  
 DATE: 14.10.15

DRAWING NO:  
**MH\_10\_1\_MLP\_011B**

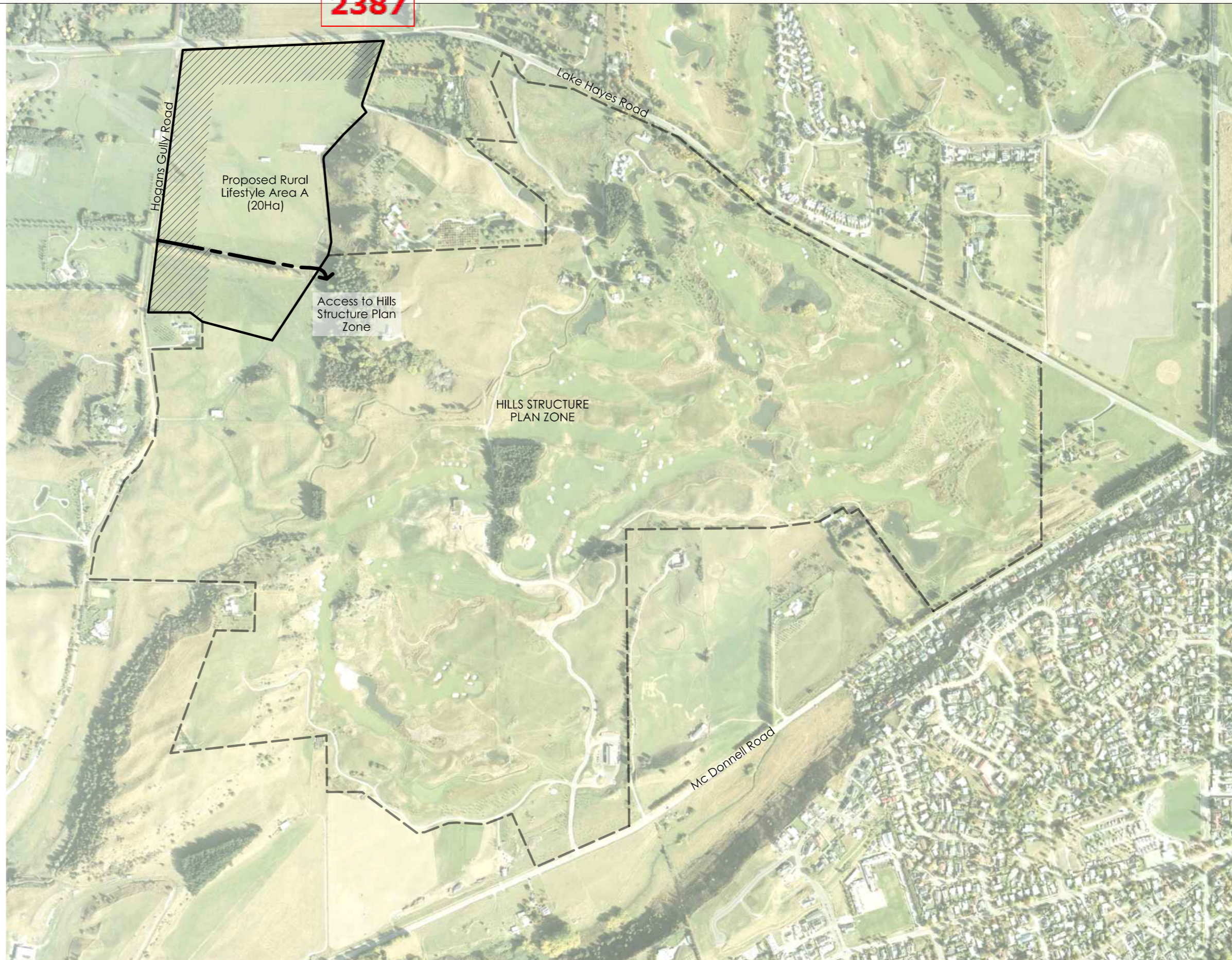
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KEY:

- Hills Structure Plan Boundary
- Proposed zoning Areas

Overlays:

- /// Landscape Amenity Management Area:  
*Includes tree planting, sited to preserve views of surrounding landscape and partially screen proposed dwellings*

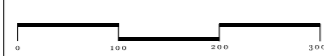


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PLAN STATUS:  
DP REVIEW

# THE HILLS PROPOSED RURAL LIFESTYLE AREA A

DRAWN / REVIEWED: RT / JC  
 APPROVED: DT  
 DATE: 14.10.15

DRAWING NO:  
 MH\_10\_1\_MLP\_012B



2387

**KEY:**

- Hills Structure Plan Boundary
- Proposed zoning Areas

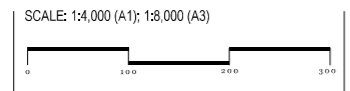


**Overlays:**

- /// Landscape Amenity Management Area:  
*Includes tree planting, sited to preserve views of surrounding landscape and partially screen proposed dwellings*



V:\MH\_The Hills\10\_Master1\_Preliminary\MH\_10\_1\_MLP\_013A (Rural Lifestyle Area B).dgn



PLAN STATUS:  
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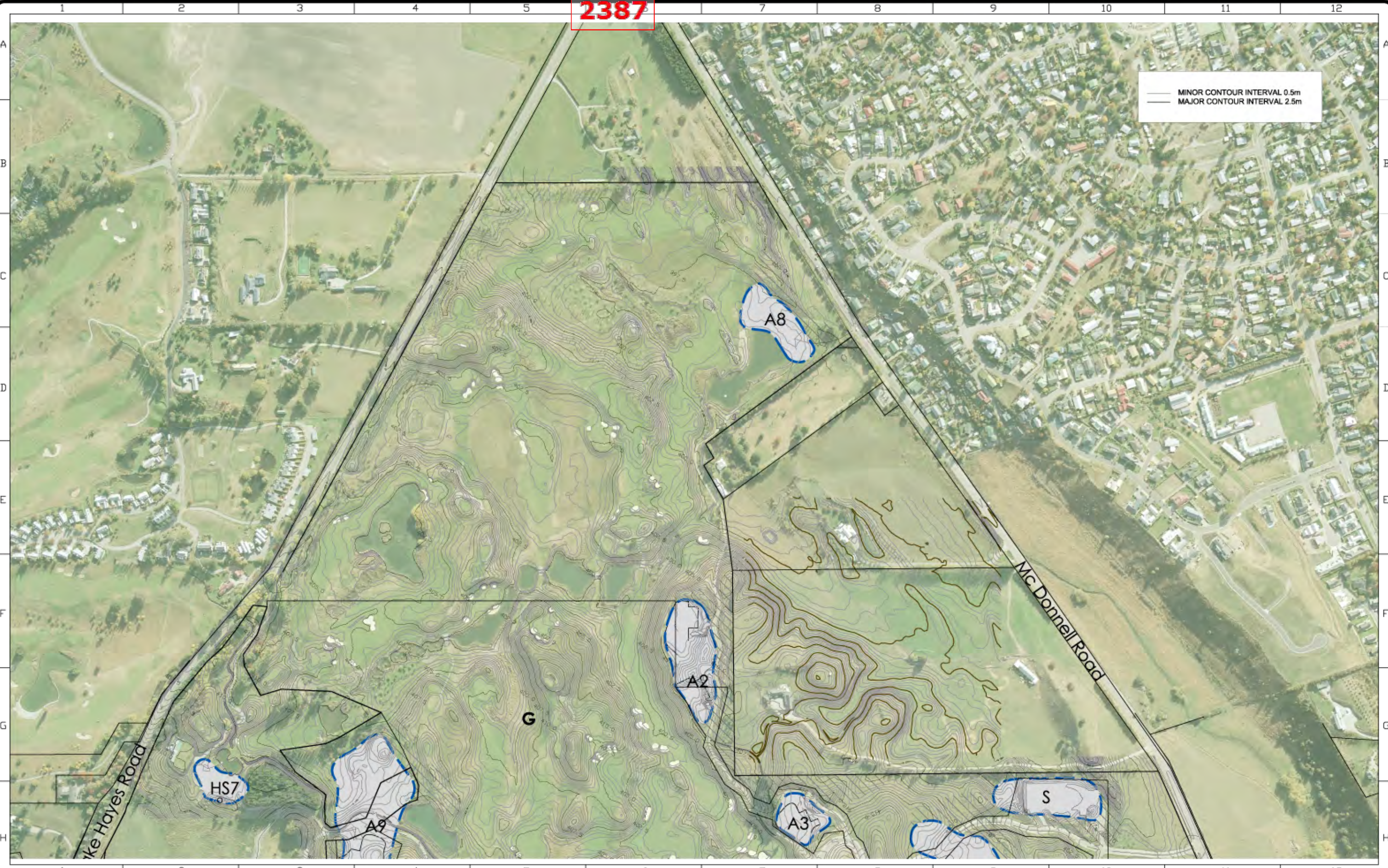
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 PROPOSED RURAL LIFESTYLE AREA B**

DRAWN / REVIEWED: RT / JC  
 APPROVED: DT  
 DATE: 14.10.15

DRAWING NO:  
 MH\_10\_1\_MLP\_013A

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MINOR CONTOUR INTERVAL 0.5m  
MAJOR CONTOUR INTERVAL 2.5m



ORIGINAL SIZE A3 DO NOT SCALE, REFER ALL DISCREPANCIES TO THE ENGINEER

Issue	Description	By	Date
A	Preliminary Issue	JWPH	20.10.15

Project: **NATURAL HAZARD ASSESSMENT**

Title: **TOPOGRAPHIC SITE PLAN 1**

Client: **TROJAN HELMET LTD**

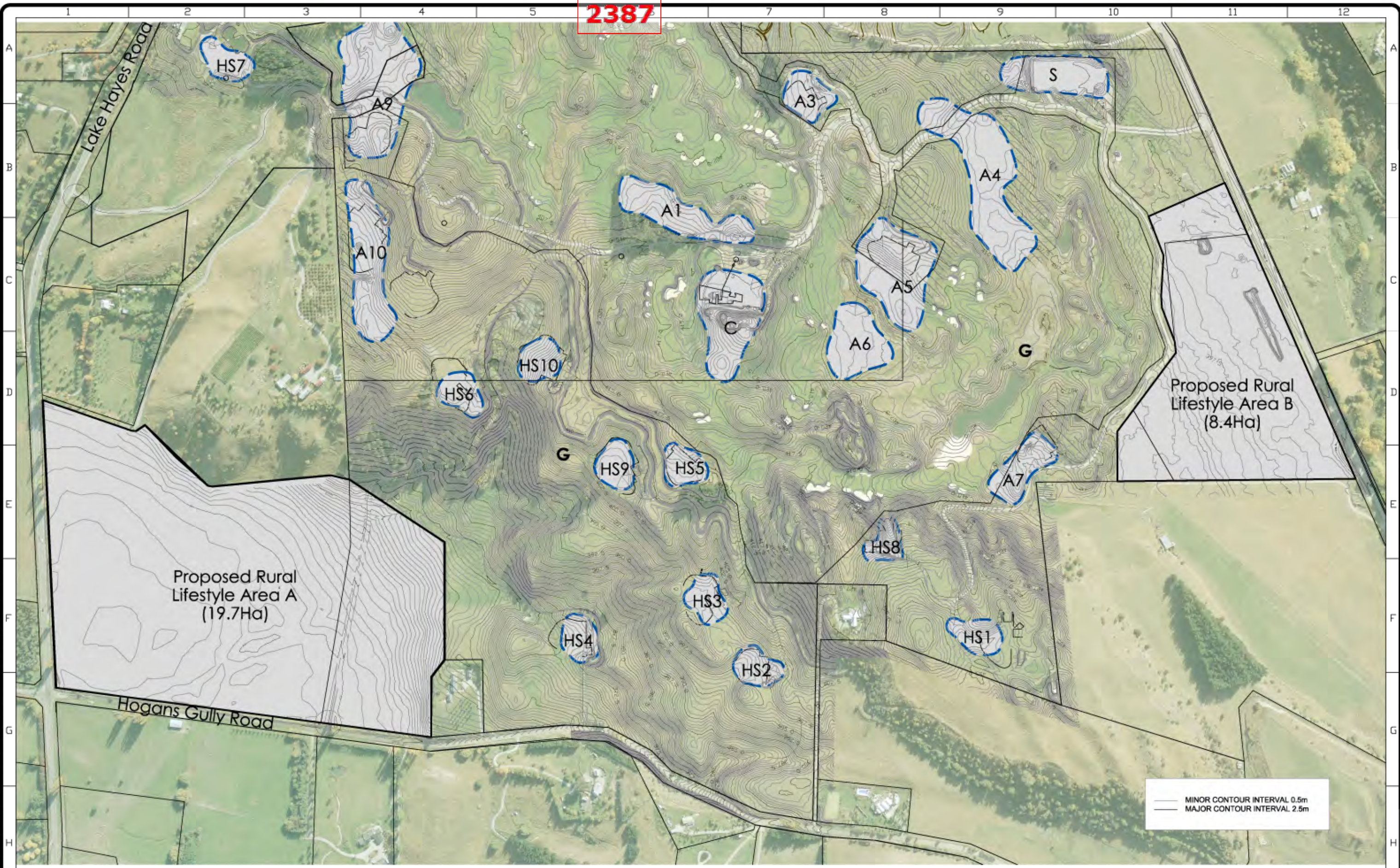
**hadley consultants LTD**  
CONSULTING CIVIL & STRUCTURAL ENGINEERS

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Drawn: MU    Checked: JWPH    Scale: 1:5000 @ A3    Drawing Number: 152859    Project: 152859    Sheet: S01    Issue: A

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Issue	Description	By	Date
A	Preliminary Issue	JWPH	20.10.15

Project: **NATURAL HAZARD ASSESSMENT**

Title: **TOPOGRAPHIC SITE PLAN 2**

Client: **TROJAN HELMET LTD**

**hadley consultants LTD**  
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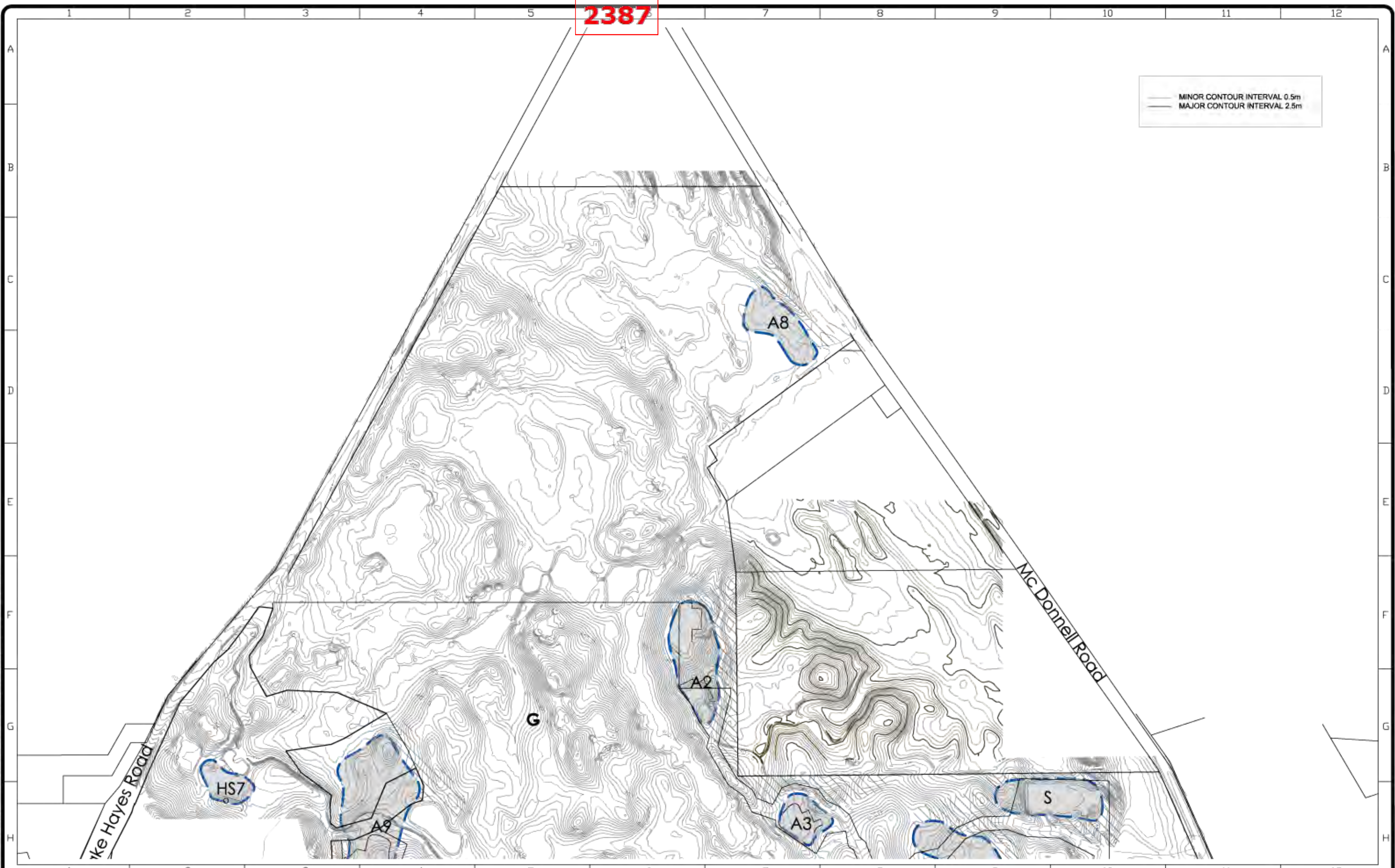
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MINOR CONTOUR INTERVAL 0.5m  
MAJOR CONTOUR INTERVAL 2.5m

ORIGINAL SIZE A3 DO NOT SCALE, REFER ALL DISCREPANCIES TO THE ENGINEER



Issue	Description	By	Date
A	Preliminary Issue	JWPH	20.10.15

Project:  
**NATURAL HAZARD ASSESSMENT**

Title:  
**ACTIVITY AREA PLAN 1**

Client:  
**TROJAN HELMET LTD**

Drawn: MU  
Checked: JWPH  
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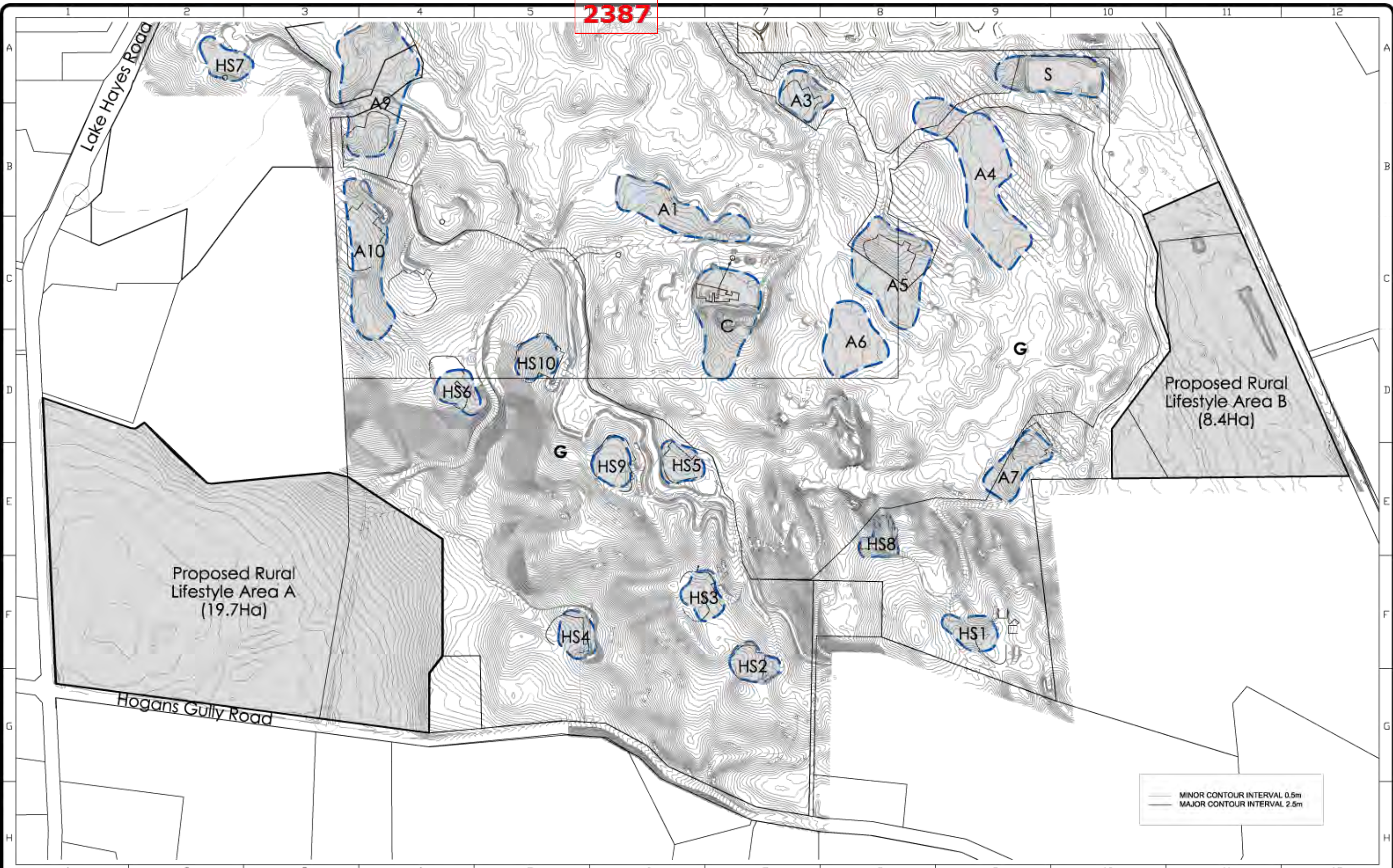
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Project: 152859

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Issue: A



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ORIGINAL SIZE A3 DO NOT SCALE, REFER ALL DISCREPANCIES TO THE ENGINEER

Notes:	Issue	Description	By	Date
	A	Preliminary Issue	JWPH	20.10.15

Project: **NATURAL HAZARD ASSESSMENT**

Title: **ACTIVITY AREA PLAN 2**

Client: **TROJAN HELMET LTD**

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CONSULTING CIVIL & STRUCTURAL ENGINEERS

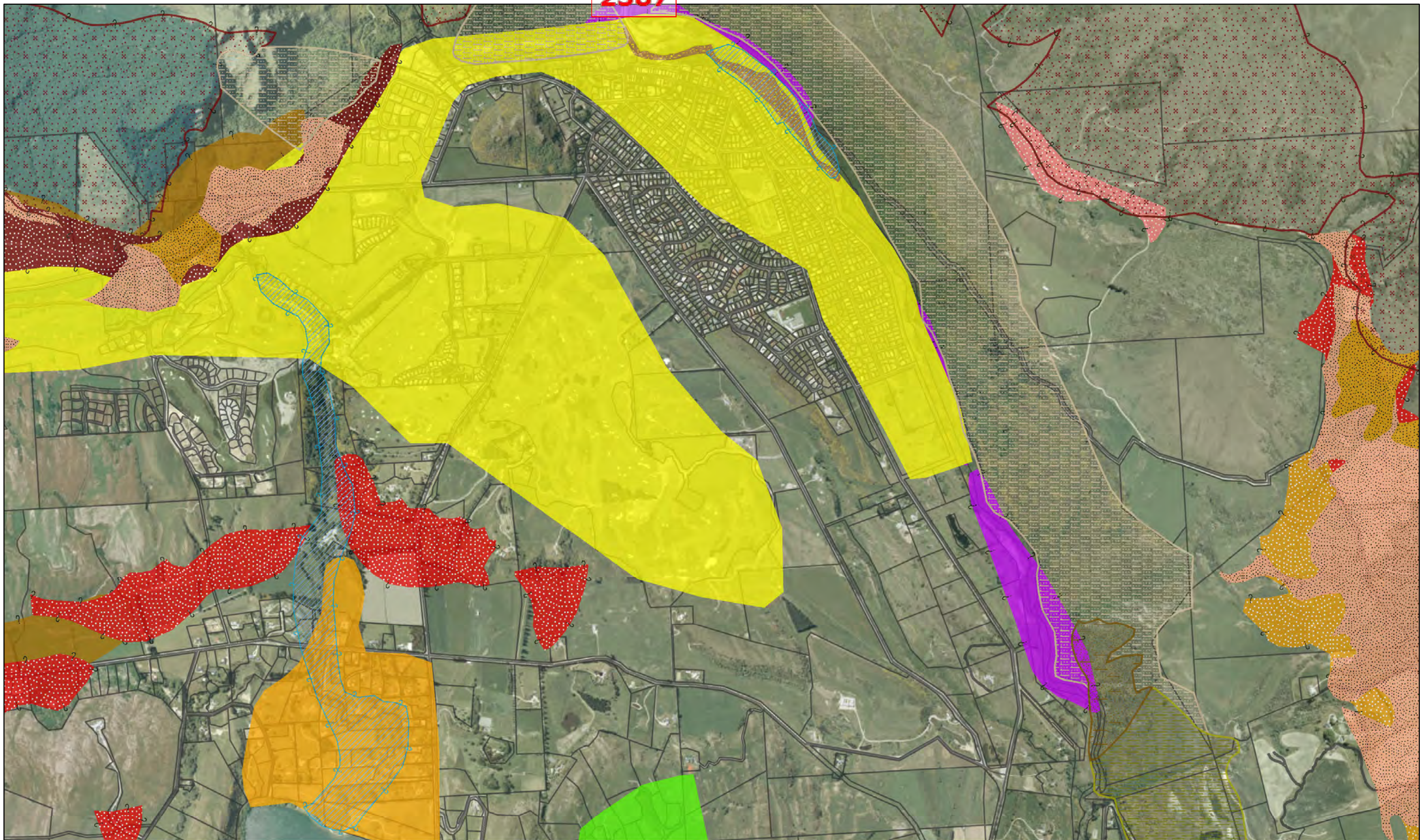
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Appendix B  
QLDC Hazard Maps

2387



The map is an approximate representation only and must not be used to determine the location or size of items shown, or to identify legal boundaries. To the extent permitted by law, the Queenstown Lakes District Council, their employees, agents and contractors will not be liable for any costs, damages or loss suffered as a result of the data or plan, and no warranty of any kind is given as to the accuracy or completeness of the information represented by the GIS data. While reasonable use is permitted and encouraged, all data is copyright reserved by Queenstown Lakes District Council. Cadastral information derived from Land Information New Zealand. CROWN COPYRIGHT RESERVED

# The Hills

## Legend

### Property Land


 Parcel Boundaries


### Property Address


 Roads


### Hazards


 Active Fault - Location approximate

 Inactive Fault - Location approximate


 Flooding due to Rainfall

 Flooding due to Damburst

 Landslide: Active Pre-existing Schist Debris Landslides

 Landslide: Pre-existing Schist Debris Landslides (Activity Unknown)

 Landslide: Dormant Pre-existing Schist Debris Landslides


 Landslide: Shallow Slips and Debris Flows in Colluvium


 Landslide: Debris Flow Hazards

 Landslide: Slope Failure Hazard in Superficial Deposits

 Landslide: Rockfall

 Landslide: Pre-existing or Potential Failure in Lake Sediments or Tertiary Sediments

 Landslide: Piping potential in the Artesian Zone of the Wanaka Aquifer


 Landslide: Potential Hazard - Debris Flood/Debris Flow


 Landslide Areas - non verified


 Erosion Areas

 Alluvial Fan - Incision Line


 Alluvial Fan - Channels


 Alluvial Fan - Source Area


 Alluvial Fan - Catchment Areas


 Alluvial Fan - Hazard Area


 Alluvial Fan - ORC: fan active bed


 Alluvial Fan - ORC: fan recently active


 Alluvial Fan - ORC: fan less recently active


 Alluvial Fan (Regional scale) Active, Composite

 Alluvial Fan (Regional scale) Active, Debris-dominated


 Alluvial Fan (Regional scale) Active, Floodwater-dominated


 Alluvial Fan (Regional scale) Inactive, Composite


 Alluvial Fan (Regional scale) Inactive, Debris-dominated


 Alluvial Fan (Regional scale) Inactive, Floodwater-dominated


 Avalanche Areas


 Liquefaction Risk: Nil to Low (T&T 2012)

 Liquefaction Risk: Probably Low (T&T 2012)

 Liquefaction Risk: Possibly Moderate (T&T 2012)

 Liquefaction Risk: Possibly High (T&T 2012)

 Liquefaction Risk: Possibly Susceptible (Opus 2002)

 Liquefaction Risk: Susceptible (Opus 2002)



Appendix C  
Figure 2

2387

**KEY:**

- Structure Plan Boundary
- - - Activity Area

**Activity Areas:**

- G: Golf course, open space and farming
- C: Clubhouse
- A: Visitor Accommodation / Residential
- HS: Homesite (3,000m<sup>2</sup>)
- F: Farm
- S: Resort Services & Staff Accommodation

Note: all activity areas include G: Golf course, open space and farming

**Overlays:**

- /// Landscape Protection Area

The Hills Structure Plan - Yield Schedule  
Sep-10

Activity Area	Size	Density (unit/Ha)		Lots	
		Low	High	Low	High
A1	0.9 Ha	1	8	1	7
A2	0.9 Ha	1	8	1	7
A3	0.4 Ha	1	8	1	3
A4	1.7 Ha	1	8	1	13
A5	1.2 Ha	1	8	1	10
A6	0.7 Ha	1	8	1	6
A7	0.5 Ha	1	8	1	4
A8	0.6 Ha	1	4	1	2
A9	1.7 Ha	1	8	1	13
A10	1.1 Ha	1	8	1	8
<b>Subtotal</b>				<b>10</b>	<b>74</b>
H1	0.3 Ha			1	1
H2	0.3 Ha			1	1
H3	0.3 Ha			1	1
H4	0.3 Ha			1	1
H5	0.3 Ha			1	1
H6	0.3 Ha			1	1
H7	0.3 Ha			1	1
H8	0.2 Ha			1	1
H9	0.3 Ha			1	1
H10	0.3 Ha			1	1
<b>Subtotal</b>				<b>10</b>	<b>10</b>
<b>Total</b>				<b>20</b>	<b>84</b>

<b>Total Structure Plan Area</b>	162.7 Ha		
<b>Ave. Lot size (per total land area)</b>		8.1 Ha	1.9 Ha

FOR DISCUSSION



**Fig.2**

QLDC hazard zonations. Depiction of liquefaction and alluvial fan hazards at site.



Liquefaction risk. Probably low



Alluvial fan. Active. Debris dominated.



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SCALE: 1:4,000 (A1) 1:8,000 (A3)



PLAN STATUS  
**DRAFT**

THE HILLS  
STRUCTURE PLAN

DRAWN / REVIEWED: RT / JC  
APPROVED: DT  
DATE: 14.09.15

DRAWING NO:  
MH\_10\_1\_MLP\_010E

Appendix D  
Figure 10



Trojan Helmet Ltd

**Hills Golf Course (including  
McDonnell Road Land) and  
Hogans Gully Road Land**

**Proposed District Plan Submission**

Natural Hazard Assessment

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Document Status

Revision	Author:		Reviewer:		
	Name	Signature	Name	Signature	Date
A (Initial Issue)	J. Hadley		J. McCartney		20 October 2015
B (For Submission)	J. Hadley		J. McCartney		21 October 2015
C (Final)	J. Hadley		J. McCartney		22 October 2015

Limitations

This report has been written for the particular brief to HCL from their client and no responsibility is accepted for the use of the report for any other purpose, or in any other context or by any third party without prior review and agreement.

In addition, this report contains information and recommendations based on information obtained by inspection, sampling or testing at specific times and locations with limited site coverage as outlined in this report. This report does not purport to completely describe all site characteristics and properties and it must be appreciated that the actual conditions encountered throughout the site may vary, particularly where ground conditions and continuity have been inferred between test locations. If conditions at the site are subsequently found to differ significantly from those described and/or anticipated in this report, HCL must be notified to advise and provide further interpretation.

## Contents

<b>1. Introduction</b>	<b>2</b>
<b>2. Nature of Proposed Development</b>	<b>3</b>
<b>3. Scope of Assessment</b>	<b>4</b>
<b>4. Site Description</b>	<b>5</b>
<b>5. QLDC Hazard Register and Previous Work</b>	<b>7</b>
<b>6. Geological Setting</b>	<b>8</b>
6.1 Physiography	8
6.2 Site Lithologies	8
<b>7. Specific Development Area Assessment</b>	<b>10</b>
7.1 General	10
7.2 Liquefaction Risk and Flood Hazard	10
7.3 Proposed Rural Lifestyle Area A	11
7.4 Proposed Rural Lifestyle Area B	11
7.5 Sites Requiring Little or No Mitigation	12
7.6 Site A8	12
7.7 Site A6	13
7.8 Site A10	13
7.9 Site A7	13
7.10 Site HS10	13
7.11 Site HS9	14
7.12 Sites HS2, HS3 and HS4	14
<b>8. Conclusions and Recommendations</b>	<b>15</b>

### Appendix A

Darby Partners and HCL Topographic Drawings

### Appendix B

QLDC Hazard Maps

### Appendix C

Figure 2

### Appendix D

Figure 10

# 1. Introduction

Trojan Helmet Ltd (THL) has engaged Hadley Consultants Limited (HCL) to conduct a natural hazards assessment of their land which comprises both the Hills Golf Course and an adjacent land holding which fronts Hogans Gully Road.

This report considers the relevant site conditions and natural hazard issues affecting the potential building development within possible development areas identified by others. Specifically, the natural hazard elements investigated and assessed are:

- Liquefaction hazard,
- Alluvial fan hazard, and
- Inundation and flood risk.

The purpose of this report is to provide a reference document to assess whether any natural hazard constraints exist in a global context which will adversely impact proposed development areas on the THL land holdings.

This report is intended to inform submissions made by THL on the Queenstown Lakes District Council's (QLDC) Proposed District Plan.



## 2. Nature of Proposed Development

The development proposed across the THL land comprises new zoned Rural Lifestyle Areas combined with a new Resort Zoning (the Hills Resort Zone) in which specific pockets of building development are identified for activities which include discrete Homesites, Visitor Accommodation, Farm and Resort Services and Staff Accommodation.

There are two primary Proposed Rural Lifestyle zones as follows;

- Proposed Rural Lifestyle Area A comprising a 19.7Ha block bounded by Hogans Gully Road to the south and Arrowtown – Lake Hayes Road to the west; and
- Proposed Rural Lifestyle Area B comprising an 8.4Ha block with frontage to McDonnell Road.

The remainder of the proposed development areas are located wholly within the existing Golf Course area (which will form the new Hills Resort Zone) and represent discrete pockets of development across the site.

The overall development sites and areas are indicated on the Darby Partners and HCL topographic drawings contained in Appendix A.

Some of the proposed development areas within the Golf Course site include building platforms previously consented under RM081223. Where relevant, previous work on these platforms has been considered in this more global evaluation of natural hazards impacting the land holding.

### 3. Scope of Assessment

The purpose of this report is to provide a global overview of the natural hazard issues which might affect development capability across the THL land holdings. In making this assessment, HCL have undertaken the following activities;

- Stereo pair photo analysis of geological features to identify potential areas of instability.
- Review of previous site investigation and assessment work by others for previous developments at the THL site. These investigations have been used to verify the HCL developed geological and geotechnical models adopted when assessing hazard.
- Detailed site walkover and geological mapping of all proposed development areas.
- Logging and mapping of open excavations and test pits across the site to confirm site lithologies.
- Review and consideration of QLDC Hazard Maps and their impact and relevance to the THL site following specific evaluation and verification of the geomorphology which exists.

It is intended that this document form a master Natural Hazards document for the THL land holdings which may be referred to when considering discrete planning submissions for the separate Rural Lifestyle A and B areas, and the other Activity Areas within the proposed Hills Resort Zone.

## 4. Site Description

The proposed development takes in the Hills Golf Course Land, located at 164 McDonnell Road approximately 1km south of Arrowtown and an area of land comprising 19.7Ha to the south of the Golf Course. This land, referred to as the Hogans Gully Land, is bounded by Hogans Gully Road to the south and Arrowtown – Lake Hayes Road to the west. The drawings included in Appendix A illustrate the site location and development areas.

The Golf Course is accessed from McDonnell Road which runs along the eastern boundary of the site and the Hogans Gully Land is accessed from Hogans Gully Road which runs along the southern site boundary.

Prior to the development of the golf course the THL land comprised farmland. The existing vegetative cover comprises a combination of long pasture, golf course green, landscaped areas and wooded areas. Vegetative cover on the Hogans Gully Land currently comprises farmland, paddocks and pasture.

The site includes several existing structures and these existing building sites have not been assessed as it is assumed they have been considered in detail as part of previous assessment work which allowed their construction.

Topographic contours of the site are shown on HCL Drawings 152859-S01 and S02 in Appendix A.

The site is undulating and ground levels typically vary between RL350m to RL430m. Slopes on the site are predominately gentle (5 to 15°); however, localised steep slopes are also present in some areas across the site.

Rock exposures also exist across the site, most notably on the Golf Course Land but also on the south facing flanks above the Hogans Gully Land.

There are a number of springs, gullies and manmade drainage features present across the site which will give rise to ephemeral flows during wet periods. The most significant drainage features include a stream which runs along the southern boundary of the THL land roughly parallel with Hogans Gully Road and an internal water race system which traverses the higher elevation Golf Course Land roughly west to east.

The site is primarily accessed from McDonnell Road, although additional farm track access is possible from Hogans Gully Road and from Arrowtown – Lake Hayes Road for existing private residences.

The site also includes a relatively complex system of internal roads, footpaths, cart paths and farm tracks that will impact local catchment boundaries and run off characteristics.

The land receives approximately 850mm of rainfall per annum and may be subject to drought conditions during the summer months.

## 5. QLDC Hazard Register and Previous Work

QLDC Hazard Maps (refer Appendix B) note that the site may be affected by;

- Liquefaction Hazard, assessed as provisionally LIC1.
- Alluvial Fan Hazard.

The liquefaction risk classification is shown to affect the majority of the Golf Course Land, whilst the Alluvial Fan Hazard is limited in its extent, taking in parts of the south facing slopes above the Hogans Gully Land.

In August 2006, Tonkin and Taylor Ltd (T&T) conducted a detailed investigation of the Golf Course area as part of a previous development proposal. This work by T&T included;

- Site evaluation,
- The excavation and logging of 12 test pits ranging in depth from 1.8m to 4.8m,
- Scala Penetrometer testing.

As part of their reporting T&T also provided soil parameters for foundation design and slope stability analysis.

T&T recorded that there was no evidence of slope instability recorded in the vicinity of the proposed building platforms, although some instability was observed in the oversteepened slopes above the Hogans Gully Land.

With regard to liquefaction, T&T noted that;

- i) Subgrade materials were expected to provide good bearing for shallow foundations.
- ii) Settlement of the subgrade materials under seismic loading is expected to be minimal.
- iii) For detailed design in accordance with NZS 1170.5:2004, subsoil Class C conditions could be assumed.
- iv) The regional groundwater table was not encountered and is expected to lie at a depth several metres below existing ground surface across the site.

Overall the T&T work did not identify any natural hazard issues (such as liquefaction) affecting any of the proposed Golf Course sites and concluded that building foundations were expected to be founded on glacial outwash and glacial sediment which should provide good bearing.

## 6. Geological Setting

### 6.1 Physiography

The site is located within the Wakatipu Basin, a feature formed by a series of glacial advances.

The most recent glacial advance occurred in the area between 10,000 and 20,000 years ago. This glacial activity has deposited glacial till, outwash and lake sediments over scoured bedrock.

Post glacial times were then dominated by erosion and deposition of alluvial gravels by local watercourses and river systems and during periods of high lake levels. This is relevant in the context of the Hogans Gully Land, where Shotover River derived alluvium is identified.

### 6.2 Site Lithologies

The predominant site lithologies across the site may be summarised as follows;

- i) **Schist.** Schist outcrops irregularly, and is particularly evident beneath the higher terrain towards the south above the Hogans Gully Land. No particular distress was observed (eg glacial shearing/plucking), nor was there any evidence of mass movement.
- ii) **Glacial Till.** Glacial Till dominates across the Golf Course Land, and is particularly notable by the presence of the hummocky terrain. Where visible in outcrop and suboutcrop, it is a lodgement till, comprising compact silt/sand, with subordinate gravel clasts, and generally rare cobbles with rare boulders.

There appear to be three different ages of tills, the oldest being a capping on schist in the vicinity of Sites HS1 and HS8, intermediate age tills form the hummocky terrain within the Golf Course proper, while the youngest till has intruded into the Hogans Gully Land. The latter is finer than the older type, but there isn't a marked difference in grading. Additional observations include;

- No mass movement noted in the till,
- Possible historic fill mounds sometimes hard to differentiate from insitu till.

- iii) **River Alluvium.** The presence of river alluvium is defined in different areas of the site as follows;

- **Within Proposed Rural Lifestyle Area A:** This area is assessed as Shotover derived alluvium sourced from the west. Of particular note are the finger-like beach deposits which accumulated at the surface of the river alluvium by long shore drift when the lake was high.
  - **Within Proposed Rural Lifestyle Area B:** Observations in a test pit near the western margin of this zone disclosed a well-bedded, river alluvium comprising well-graded sandy gravel to cobbly sandy gravel. Clasts appear to be Shotover sourced, hence it is likely that the sediments were deposited by a former Hayes Creek draining the basin south of Coronet Peak. Degradation has produced a stepped morphology, grading gently down towards McDonnell Road.
- iv) **Fans.** Small fans do grade out into the Proposed Rural Lifestyle Area A, but they do not appear to be active. A small, intra-course fan is present near Site A6 and there may be other fan elements around the site and away from proposed development areas. Due to their lack of activity these fan areas require consideration in any detailed design, but are not considered a high risk hazard.

## 7. Specific Development Area Assessment

### 7.1 General

Consideration of the Development Area as a whole has been separated as follows;

- i) Proposed Rural Lifestyle Area A,
- ii) Proposed Rural Lifestyle Area B,
- iii) Development Sites designated "HS" and "A" across the Golf Course area.

We note that due to the presence of existing structures the following sites were excluded from evaluation by HCL;

- Site S – the Resort Services Area,
- Site C – the Clubhouse,
- HS6 – An existing house site,
- HS7 – Existing loge.

We confirm that all other development areas indicated on the Darby Partners drawings contained in Appendix A have been assessed. To avoid repetition in reporting, we have grouped sites with common features.

### 7.2 Liquefaction Risk and Flood Hazard

We collectively address the Liquefaction Risk noted by QLDC as affecting Proposed Rural Lifestyle Area B and all of the HS and A development areas within the Golf Course Land.

HCL's assessment of the site lithologies is that the Golf Course Land is mantled by glacial till comprising compact sands and gravels with a regional groundwater level located at depth. Schist bedrock outcrops in several locations and neither the compact till or the bedrock are susceptible to liquefaction. Further, Proposed Rural Lifestyle Area B includes alluvial deposits, again with a significant depth of groundwater.

HCL's assessment is also verified by the previous reporting and site investigation work of T&T.

The confirmed presence of compact glacial tills and the absence of shallow groundwater allow us to confirm that liquefaction hazard is not a relevant risk for any of the proposed development areas.



A flood hazard is not recorded by QLDC and we confirm that subject to normal cut off drainage and catchment management, no large scale flood or inundation risk exists.

### **7.3 Proposed Rural Lifestyle Area A**

Observations relevant to this area include;

- Greater than 50% of the proposed site is located on flat to gently sloping terrain comprising Shotover-derived alluvium.
- Some inactive fan elements encroach into the development area from the north and northeast mantling both glacial till and alluvial deposits in these areas. This is depicted in Figure 2 contained in Appendix C.
- Streams associated with the fan elements are small and assessed as ephemeral with minor source catchments.
- Former high level Lake Wakatipu storm benches are identifiable features in the central reaches of the site and are well drained.
- Based on field inspection and the small size of the streams and source catchments, we do not believe the QLDC classification of the fan elements as active and debris dominated to be correct.

In summary, we believe that the alluvial fan hazard risks associated with this development area are very low subject to;

- a) Provision of normal cut off drainage measures to control upslope runoff from ephemeral watercourses.
- b) Further test pitting as part of any resource consent application to confirm the age and activity of the fan deposition.

### **7.4 Proposed Rural Lifestyle Area B**

The following observations were made with respect to Proposed Rural Lifestyle Area B;

- The area contains alluvial deposits and consists of low relief with terraces degrading to the east.
- The exposed cut in the western edge of the development area shows Shotover-derived alluvium circa 23,000 years old comprising sandy gravels.
- The lithology is consistent across the site with the depth to groundwater likely to exceed 10m.

In summary, and noting our earlier comment under Section 7.2 with regard to liquefaction and flood risk, we again believe that the natural hazard risks associated with this development area are very low.

## **7.5 Sites Requiring Little or No Mitigation**

The following sites have been assessed and grouped as relatively benign with minimal mitigation required for building development. These sites are;

- A1,
- A2,
- A3,
- A4,
- A5,
- A9,
- HS1,
- HS5, and
- HS8.

Other than the southern extent of A4 where a small depression exists, all of these sites are well drained with competent subgrade conditions. The sites are considered very low risk with regard to natural hazard where normal building controls around verification of bearing capacities for foundation design along with the provision of positive surface drainage control will allow development of these sites.

## **7.6 Site A8**

Site A8 at the northern end of the Golf Course Land occupies a low relief mound on the north east side of the low relief pond.

Concern exists that the building or development area could include uncertified fill as part of pond construction. The relative heights of the pond water level (controlled by its outlet) and likely subgrade levels for foundations increases the risk of saturated subgrade conditions.

The site is not subject to natural hazard, but should be the subject of a specific geotechnical investigation to confirm the presence or otherwise of uncertified fill prior to the construction of any building.

## **7.7 Site A6**

This site occupies a low relief localised fan which grades out from the hummocky till zone to the west. The site is located slightly above the creek level, suggesting a perched water table may be present in this area.

Some surface water control from the catchment to the west is required.

Again, the site is not subject to any natural hazard issues, but prior to construction of buildings the site should be subject to a specific geotechnical investigation to confirm the nature and extent of any fan materials and presence or otherwise of a perched water table which may require draining.

## **7.8 Site A10**

This site takes in a substantial area of saturated ground in a through-drainage depression heading south. There are also overland flow issues to be resolved from the steep terrain catchment to the east.

The site could be developed subject to specifically designed drainage and ground improvement works involving cut to waste, installation of piped stormwater reticulation including resolution of secondary overflow issues and import to fill to achieve positive drainage to the area and to provide suitable foundation conditions.

## **7.9 Site A7**

This site is currently constrained by existing services due to the presence of a pump shed, transformer and inspection panels.

There is also localised uncertainty regarding lithologies with the possible presence of fill due to the services modifications.

There are no natural hazard issues affecting the site, however we recommend a detailed geotechnical investigation to define fill areas prior to any building construction occurring.

## **7.10 Site HS10**

This site is affected by water race leakage concentrating in the slope comprising the house site area.

Prior to building development at this site it will be necessary to;

- Complete subsurface investigations to confirm the impact of the race leakage on overall slope stability.
- Pipe the water race for long term security of the site and provide for some form of diversion away from buildings in the event of a catastrophic pipe rupture.

### **7.11 Site HS9**

This site is located in a localised depression and it will be necessary to resolve drainage to the south to avoid a ponding risk.

Similar to HS10, it will be necessary to;

- Complete subsurface investigations to confirm the depth to competent bearing materials (till) in the base of the depression due to likely thick colluvium/soil layer accumulation in the natural basin.
- Pipe the water race for long term security of the site and provide for some form of diversion away from buildings in the event of a catastrophic pipe rupture in the race.

### **7.12 Sites HS2, HS3 and HS4**

These three sites are all located in the valley lines of ephemeral drainage systems. Consequently they are presently wet and saturated. Figure 10 included in Appendix D illustrates the location of the sites and how the channel and ephemeral gully systems affect each area.

It will be possible to develop Sites HS2, HS3 and HS4 if drainage, diversion and ground improvement work is completed, but we recommend that at the time detailed house designs are proposed, consideration is given to locating construction to higher relief ground within the respective Housesite areas. This will minimize the diversion and drainage works required.

All of HS2, HS3 and HS4 are subject to risk from a failure in the water race. Again, piping of the race and consideration of diversions in the event of a breach are recommended to mitigate this risk.

## 8. Conclusions and Recommendations

Based on our site evaluation and assessment work we have made the following conclusions with regard to Natural Hazards and how they impact the THL Golf Course Land (encompassing the proposed Hills Resort Zone and proposed Rural Lifestyle Area B Zone) and Hogans Gully Land (encompassing the proposed Rural Lifestyle Area A Zone);

### Natural Hazard Risks

- i) The Golf Course Land, including Proposed Rural Lifestyle Area B where alluvial deposits are identified, comprises competent and compact glacial till underlain by near surface schist bedrock. These materials are not susceptible to liquefaction and the risk of liquefaction is further reduced by low regional groundwater levels.
- ii) Based on our assessment and investigation of the Golf Course Land, the provisional classification of the site as an LIC1 liquefaction risk by QLDC is not valid. The risk of liquefaction impacting the site is assessed as very low and liquefaction does not constrain the site as a natural hazard.
- iii) The Proposed Rural Lifestyle Area A (Hogans Gully) Land comprises predominately alluvial material where the northern section of the Proposed Rural Lifestyle Area A may potentially be impacted by an alluvial fan hazard. Based on our assessment we don't believe the fan area is active and in the event it was active, its extent would be significantly reduced from that indicated by QLDC Hazard Maps. We have assessed any risk from alluvial fan hazard as low, recognising that if further investigation confirms activity, the risk can be mitigated through bunding protection and regrading at the time of resource consent.
- iv) None of the land areas or development areas are subject to regional flood or inundation hazard.

### Specific Development Site Controls

- v) Prior to any building construction occurring we recommend that sites A6, A7 and A8 require specific geotechnical investigation and design of foundations by a Chartered Professional Engineer. This investigation shall include rationalisation of cut off drainage to improve subgrade conditions and to address overland flow paths.
- vi) Sites HS9 and HS10 are impacted by the existing water race and potential leakage from this race. Prior to any building construction occurring we recommend that a specific geotechnical investigation be completed by a Chartered Professional Engineer to confirm the extent of potential soil accumulation in the depression on HS9 and slope stability impacts of the water race on HS10. Both sites will require piping of the water race and diversion design in the event of a catastrophic pipe breach.

- vii) Development sites A10, HS2, HS3 and HS4 are more complex sites as a result of being sited across some natural drainage paths. The sites are not subject to large scale natural hazard risk, but to develop them will require specific design of works to cut off and divert existing flow paths to prevent site inundation, and to address hazards associated with the water race to the north. To ensure that these site development issues are properly addressed, we recommend that prior to any building construction occurring, specific engineering design of drainage and ground improvement works be completed by a Chartered Professional Engineer. We recommend consideration be given to refining the location of these development sites so that they take in higher ground within their respective activity areas, removed from natural drainage paths.

Appendix A  
Darby Partners and HCL  
Topographic Drawings

2387

KEY:

- Structure Plan Boundary
- - - Activity Area



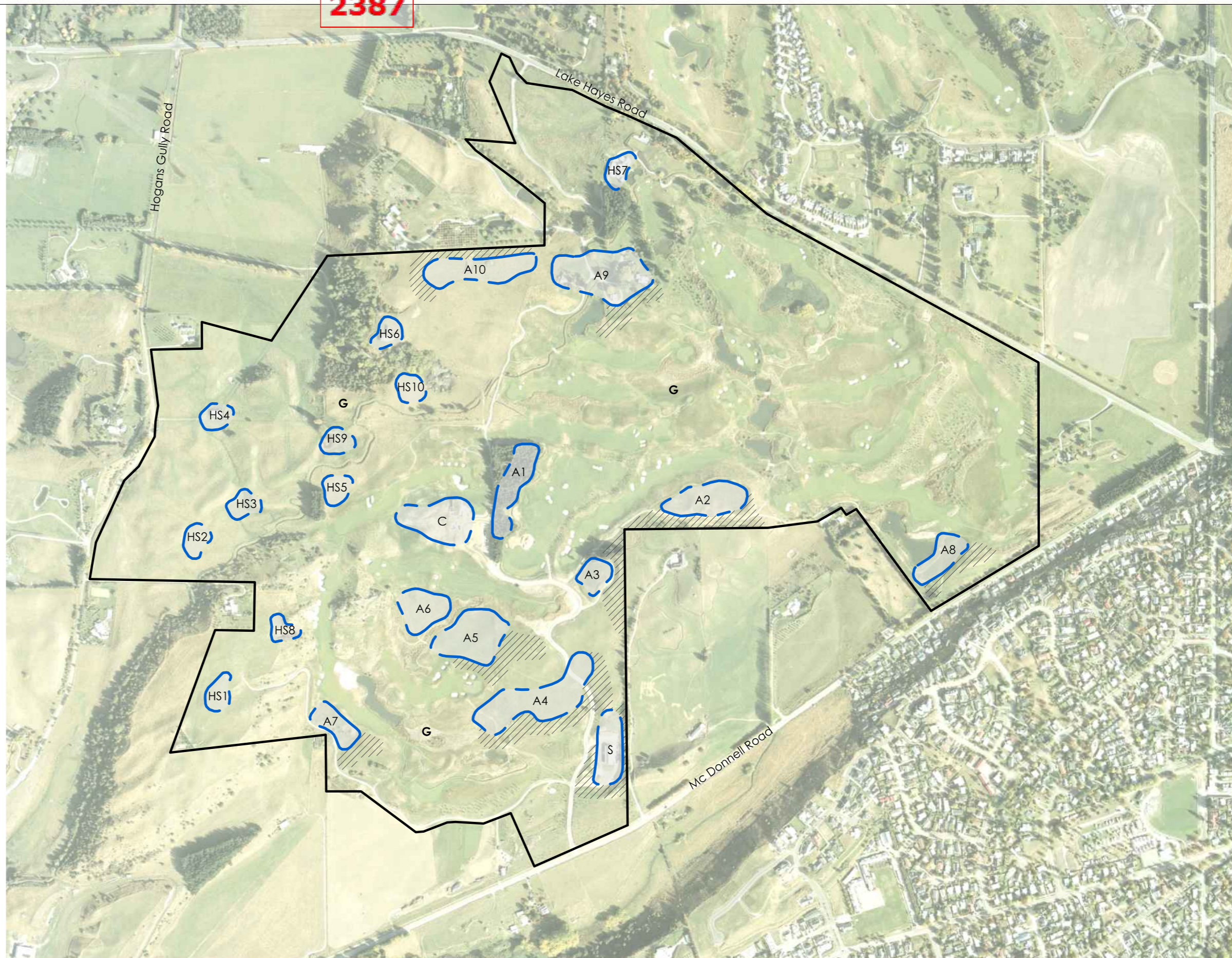
Activity Areas:

- G: Golf course, open space and farming
- C: Clubhouse
- A: Visitor Accommodation / Residential
- HS: Homesite (3,000m2)
- S: Resort Services & Staff Accommodation

Note: all activity areas include G: Golf course, open space and farming

Overlays:

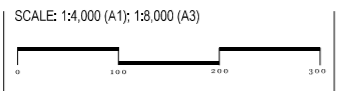
- /// Landscape Amenity Management Area



V:\MH\_The Hills\10\_Master\1\_Preliminary\MH\_10\_1\_MLP\_010F (Structure Plan).dgn



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PLAN STATUS:  
DP REVIEW

# THE HILLS STRUCTURE PLAN

DRAWN / REVIEWED: RT / JC  
 APPROVED: DT  
 DATE: 14.10.15

DRAWING NO:  
 MH\_10\_1\_MLP\_010F



2387

KEY:

— Structure Plan Boundary

- - - Activity Area

Activity Areas:

- G: Golf course, open space and farming
- C: Clubhouse
- A: Visitor Accommodation / Residential
- HS: Homesite (3,000m<sup>2</sup>)
- S: Resort Services & Staff Accommodation

Note: all activity areas include G: Golf course, open space and farming

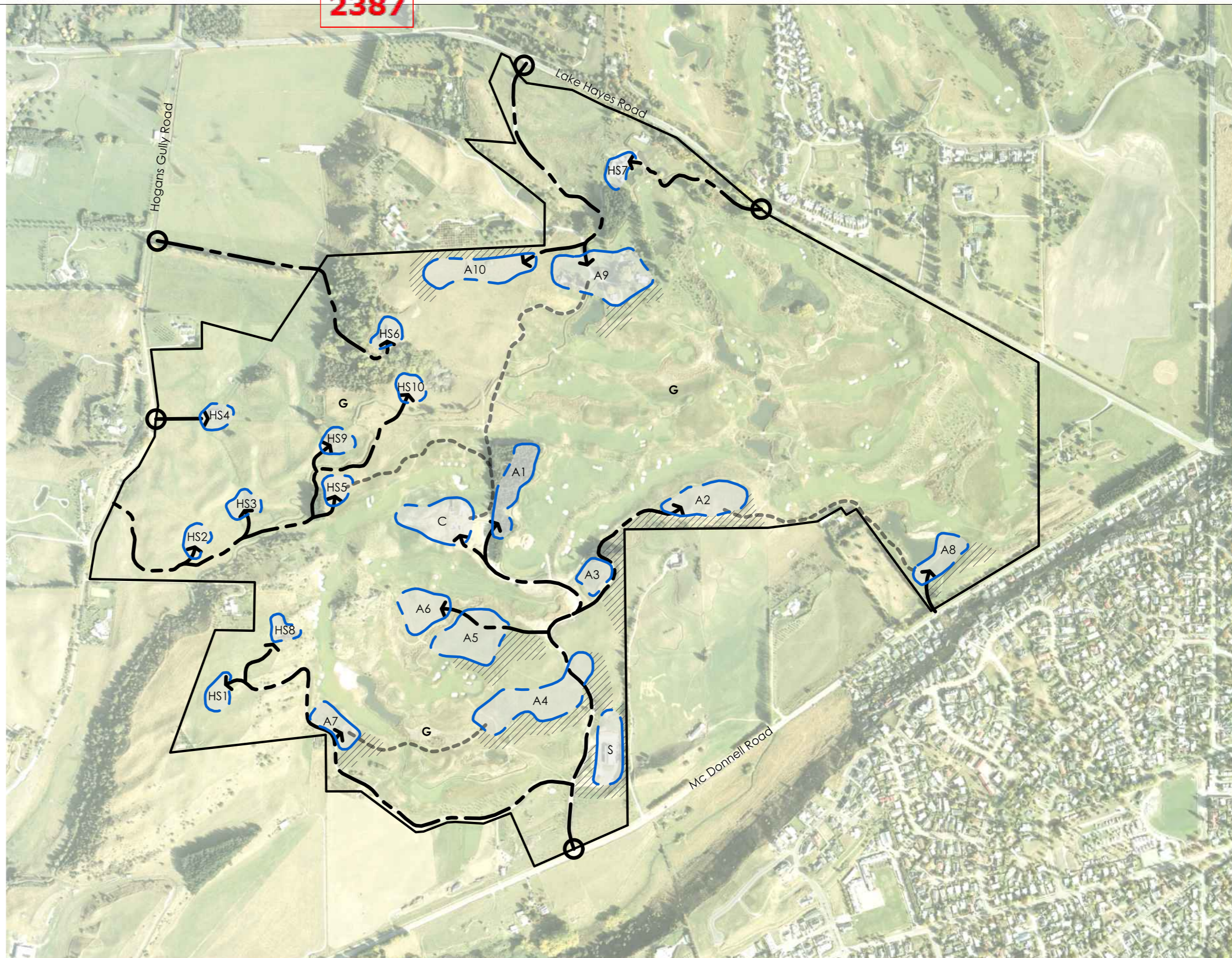
Overlays:

/// Landscape Amenity Management Area

○ Existing access point

— Road access

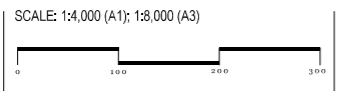
- - - Buggy / cart access



V:\MH\_The Hills\10\_Master\1\_Plan\10\_1\_MLP\_011B (Structure Plan - Access).dgn



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PLAN STATUS:  
DP REVIEW

# THE HILLS STRUCTURE PLAN - ACCESS

DRAWN / REVIEWED: RT / DT  
 APPROVED: DT  
 DATE: 14.10.15

DRAWING NO:  
MH\_10\_1\_MLP\_011B

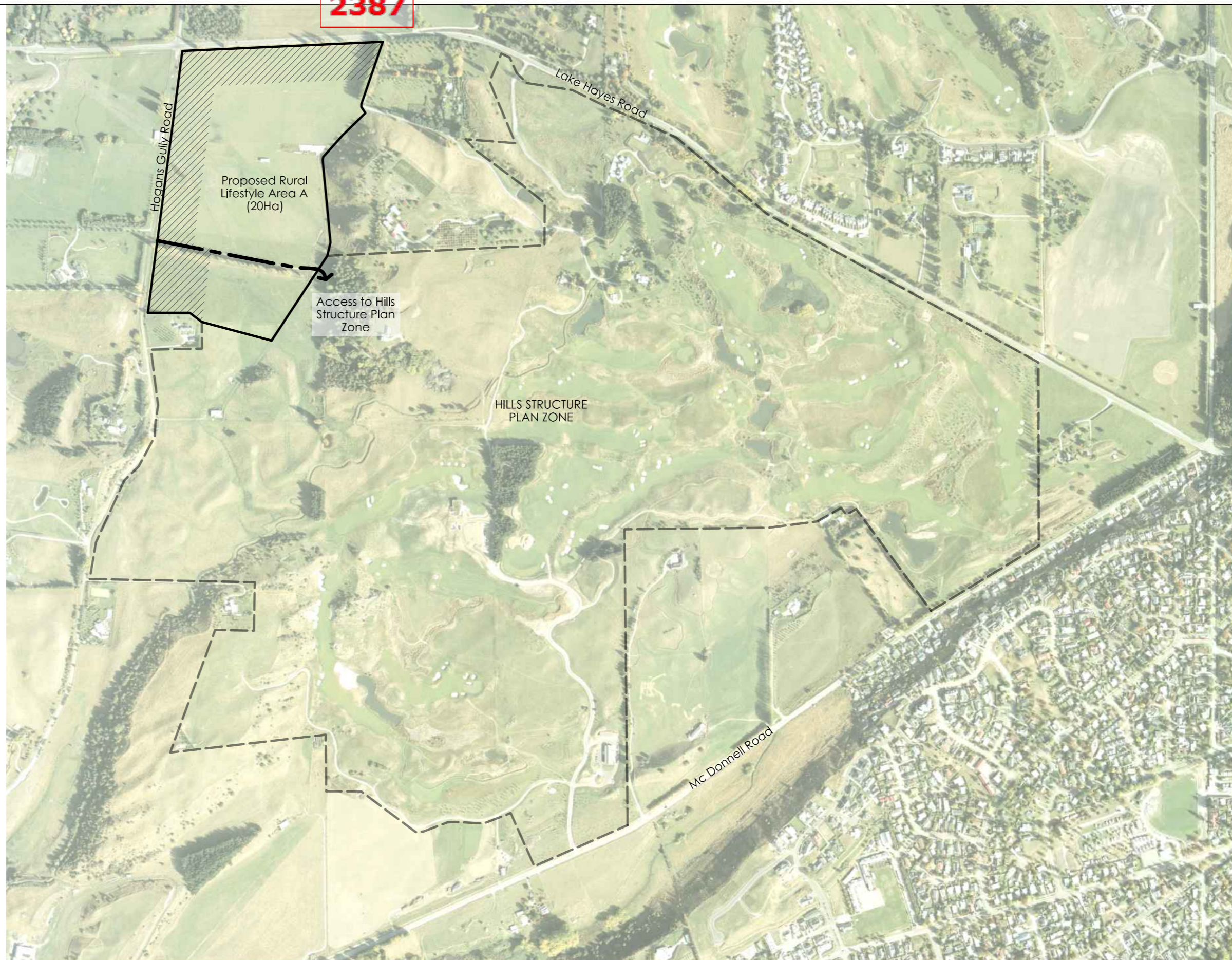
2387

KEY:

- Hills Structure Plan Boundary
- Proposed zoning Areas

Overlays:

- /// Landscape Amenity Management Area:  
*Includes tree planting, sited to preserve views of surrounding landscape and partially screen proposed dwellings*

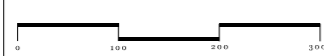


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SCALE: 1:4,000 (A1); 1:8,000 (A3)



PLAN STATUS:  
DP REVIEW

# THE HILLS PROPOSED RURAL LIFESTYLE AREA A

DRAWN / REVIEWED: RT / JC  
 APPROVED: DT  
 DATE: 14.10.15

DRAWING NO:  
 MH\_10\_1\_MLP\_012B

2387

KEY:

- Hills Structure Plan Boundary
- Proposed zoning Areas



Overlays:

- /// Landscape Amenity Management Area:  
*Includes tree planting, sited to preserve views of surrounding landscape and partially screen proposed dwellings*

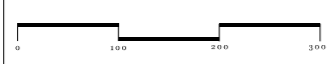


V:\MH\_The Hills\10\_Master\1\_Preliminary\MH\_10\_1\_MLP\_013A (Rural Lifestyle Area B).dgn



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SCALE: 1:4,000 (A1); 1:8,000 (A3)



PLAN STATUS:  
DP REVIEW

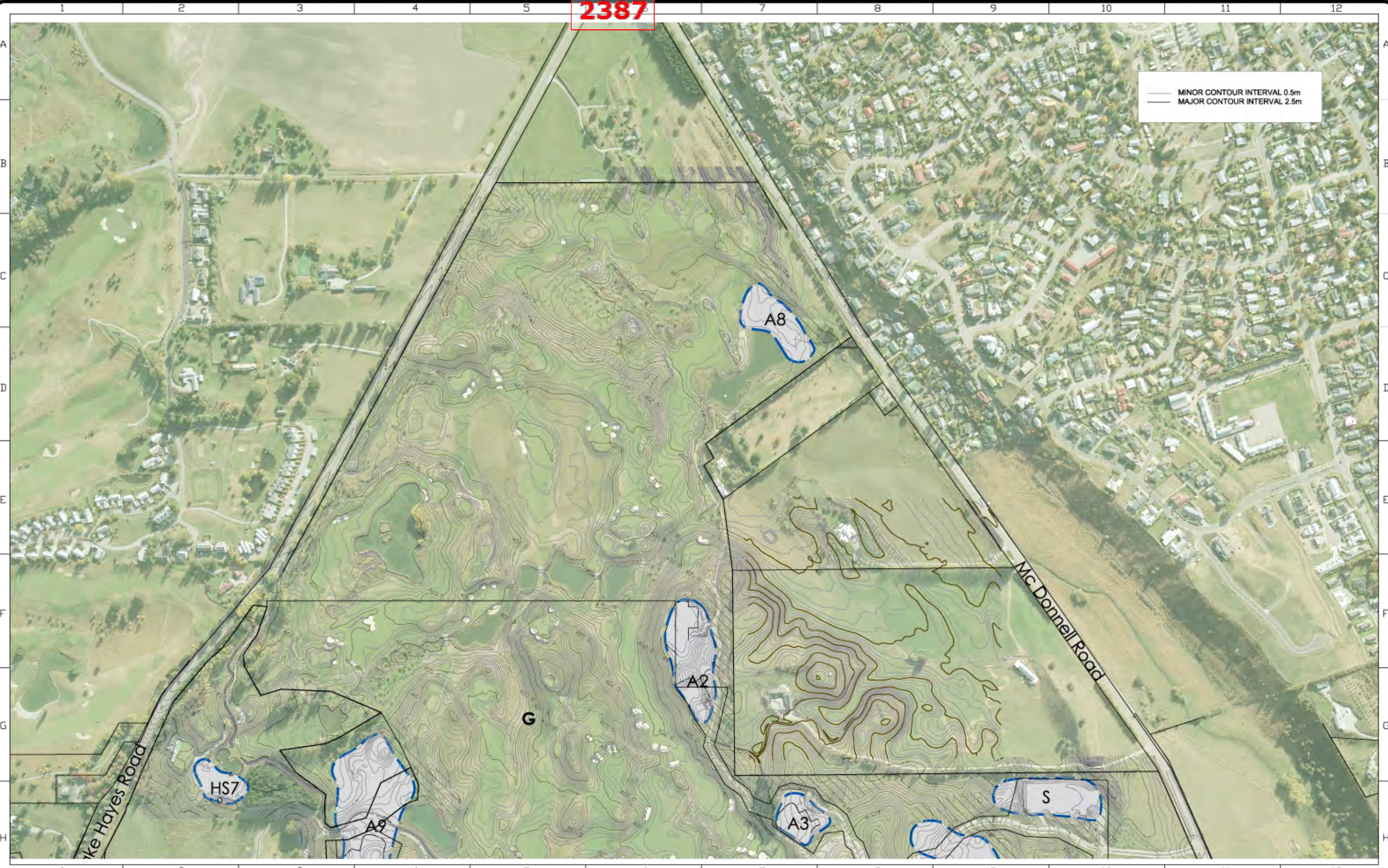
# THE HILLS PROPOSED RURAL LIFESTYLE AREA B

DRAWN / REVIEWED: RT / JC  
 APPROVED: DT  
 DATE: 14.10.15

DRAWING NO:  
 MH\_10\_1\_MLP\_013A

2387

MINOR CONTOUR INTERVAL 0.5m  
MAJOR CONTOUR INTERVAL 2.5m



ORIGINAL SIZE A3 DO NOT SCALE, REFER ALL DISCREPANCIES TO THE ENGINEER

Issue	Description	By	Date
A	Preliminary Issue	JWPH	20.10.15

Project: **NATURAL HAZARD ASSESSMENT**

Title: **TOPOGRAPHIC SITE PLAN 1**

Client: **TROJAN HELMET LTD**

**hadley consultants LTD**  
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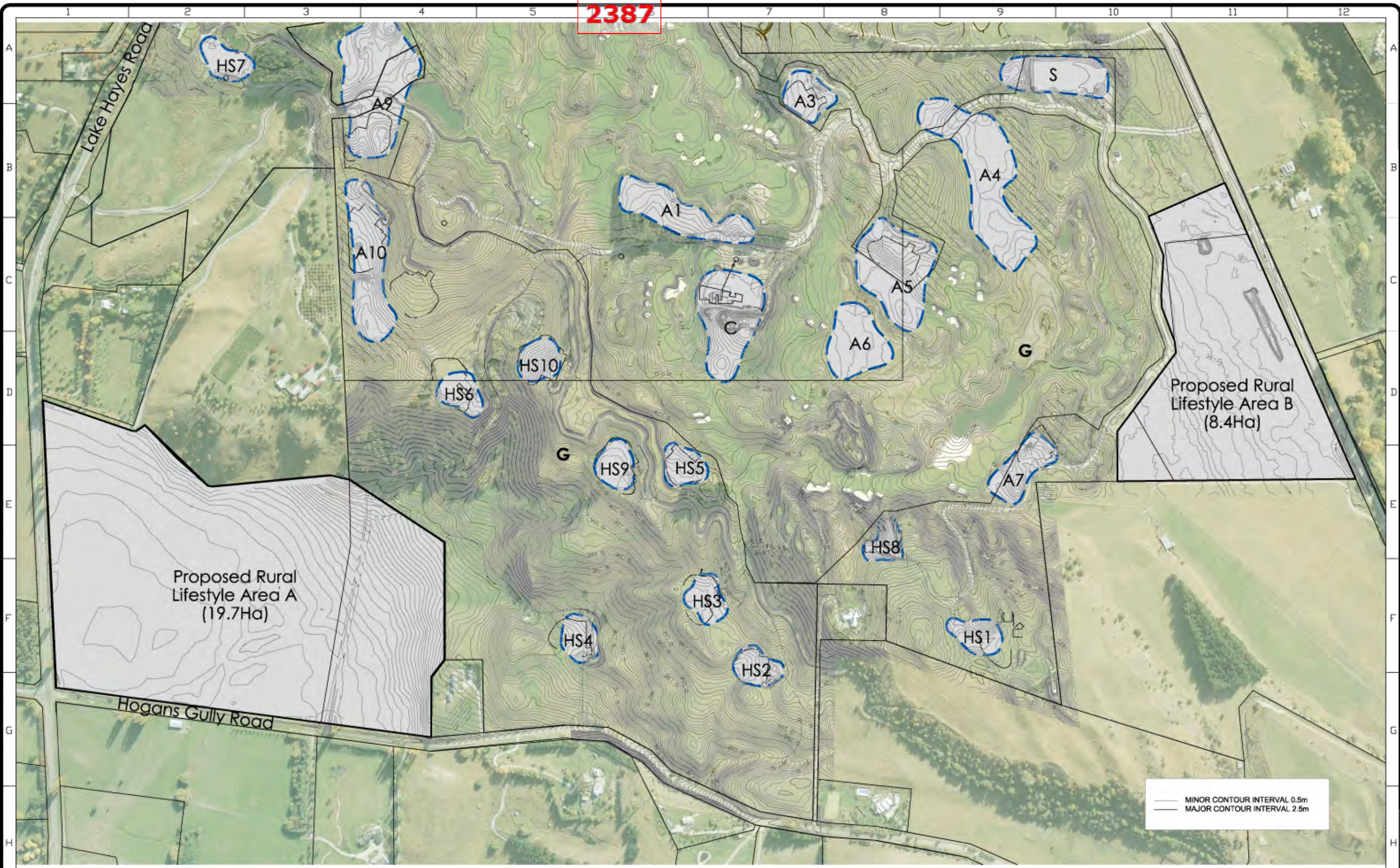
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Sheet: **S01**    Issue: **A**

2387



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Issue	Description	By	Date
A	Preliminary Issue	JWPH	20.10.15

Project: **NATURAL HAZARD ASSESSMENT**

Title: **TOPOGRAPHIC SITE PLAN 2**

Client: **TROJAN HELMET LTD**

**hadley consultants LTD**  
CONSULTING CIVIL & STRUCTURAL ENGINEERS

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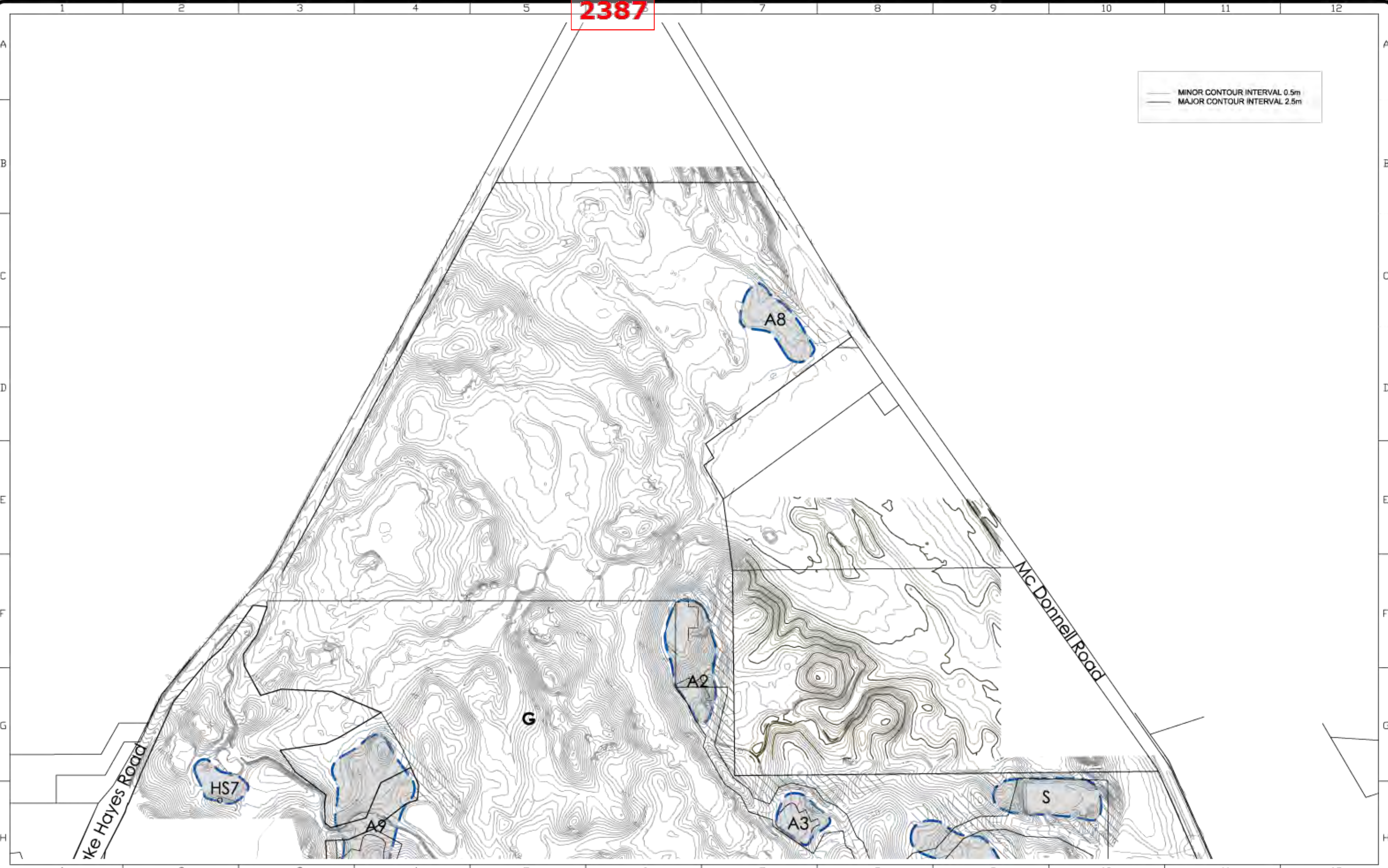
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MAJOR CONTOUR INTERVAL 2.5m

ORIGINAL SIZE A3 DO NOT SCALE, REFER ALL DISCREPANCIES TO THE ENGINEER



Notes:

Issue	Description	By	Date
A	Preliminary Issue	JWPH	20.10.15

Project:	NATURAL HAZARD ASSESSMENT
Title:	ACTIVITY AREA PLAN 1

Client:	TROJAN HELMET LTD
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Drawn:	Checked:	Scale:	Drawing Number:
MU	JWPH	1:5000 @ A3	Project: 152859

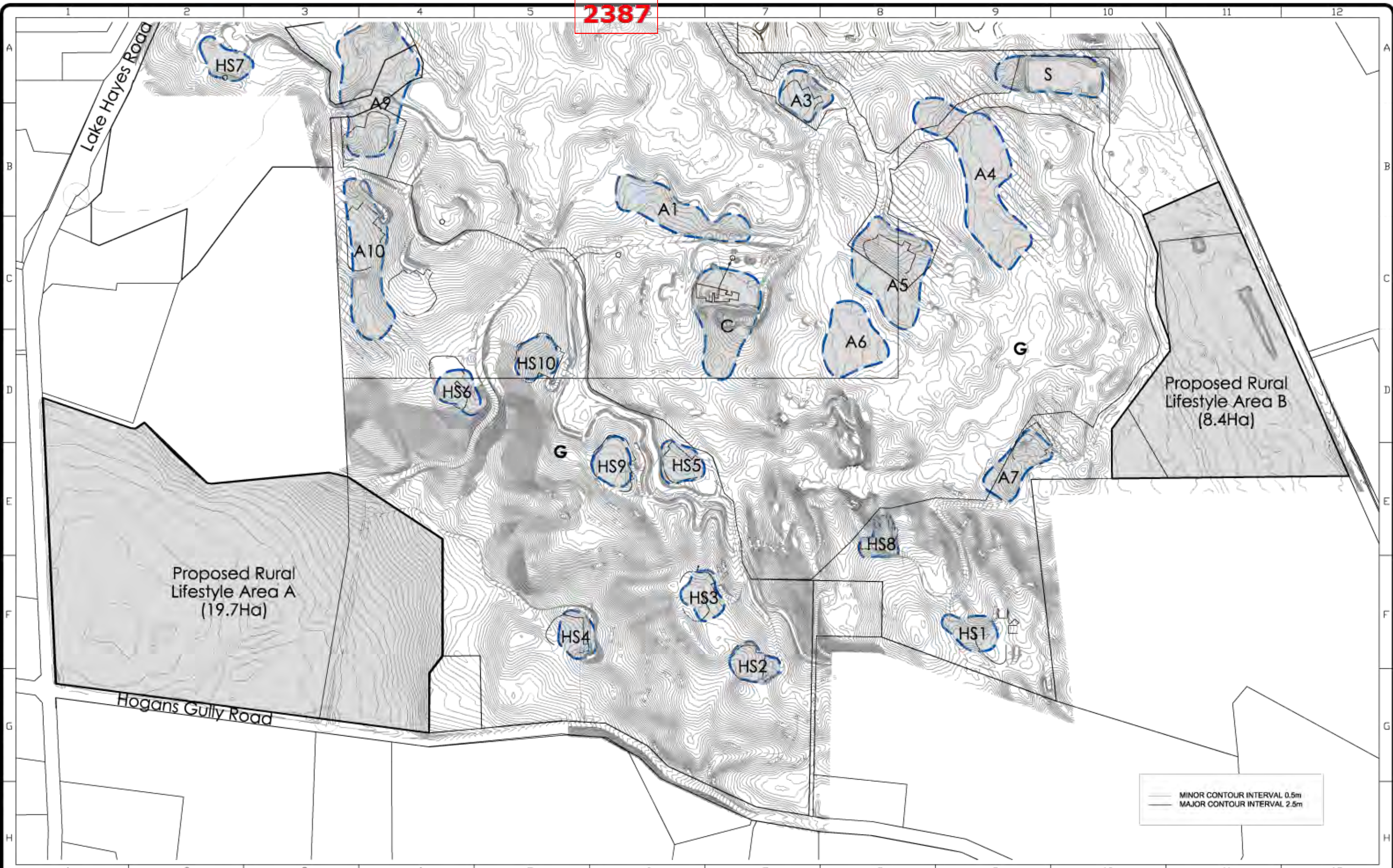
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Notes:	Issue	Description	By	Date
	A	Preliminary Issue	JWPH	20.10.15

Project:	NATURAL HAZARD ASSESSMENT
Title:	ACTIVITY AREA PLAN 2

Client:	TROJAN HELMET LTD
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Drawn:	Checked:	Scale:	Drawing Number:
MU	JWPH	1:5000 @ A3	Project: 152859

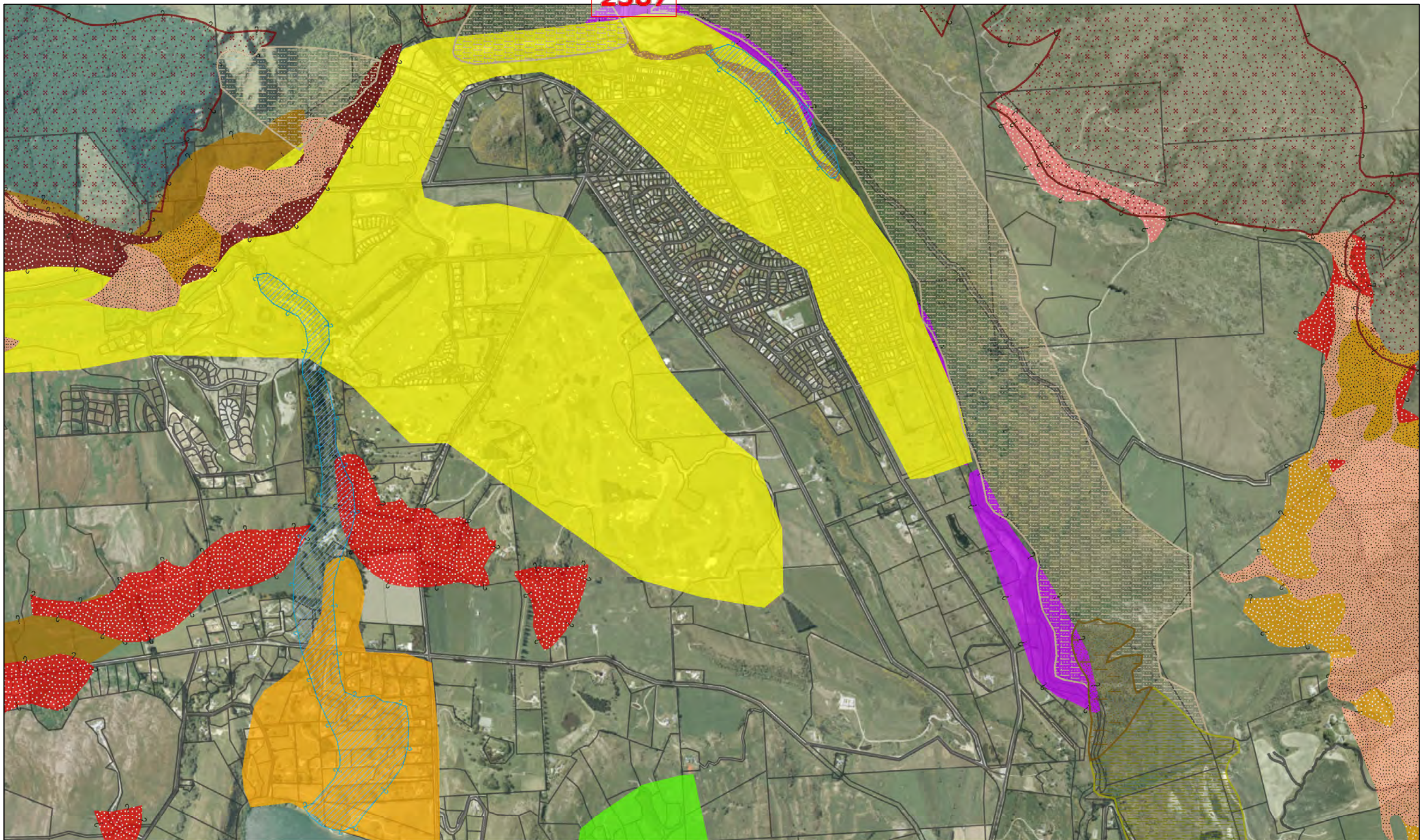
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Appendix B  
QLDC Hazard Maps



2387



The map is an approximate representation only and must not be used to determine the location or size of items shown, or to identify legal boundaries. To the extent permitted by law, the Queenstown Lakes District Council, their employees, agents and contractors will not be liable for any costs, damages or loss suffered as a result of the data or plan, and no warranty of any kind is given as to the accuracy or completeness of the information represented by the GIS data. While reasonable use is permitted and encouraged, all data is copyright reserved by Queenstown Lakes District Council. Cadastral information derived from Land Information New Zealand. CROWN COPYRIGHT RESERVED

# The Hills

## Legend

### Property Land


 Parcel Boundaries


### Property Address


 Roads


### Hazards


 Active Fault - Location approximate

 Inactive Fault - Location approximate


 Flooding due to Rainfall

 Flooding due to Damburst

 Landslide: Active Pre-existing Schist Debris Landslides

 Landslide: Pre-existing Schist Debris Landslides (Activity Unknown)

 Landslide: Dormant Pre-existing Schist Debris Landslides


 Landslide: Shallow Slips and Debris Flows in Colluvium


 Landslide: Debris Flow Hazards

 Landslide: Slope Failure Hazard in Superficial Deposits

 Landslide: Rockfall

 Landslide: Pre-existing or Potential Failure in Lake Sediments or Tertiary Sediments

 Landslide: Piping potential in the Artesian Zone of the Wanaka Aquifer


 Landslide: Potential Hazard - Debris Flood/Debris Flow


 Landslide Areas - non verified


 Erosion Areas


 Alluvial Fan - Incision Line


 Alluvial Fan - Channels


 Alluvial Fan - Source Area


 Alluvial Fan - Catchment Areas


 Alluvial Fan - Hazard Area


 Alluvial Fan - ORC: fan active bed


 Alluvial Fan - ORC: fan recently active


 Alluvial Fan - ORC: fan less recently active


 Alluvial Fan (Regional scale) Active, Composite

 Alluvial Fan (Regional scale) Active, Debris-dominated


 Alluvial Fan (Regional scale) Active, Floodwater-dominated


 Alluvial Fan (Regional scale) Inactive, Composite


 Alluvial Fan (Regional scale) Inactive, Debris-dominated


 Alluvial Fan (Regional scale) Inactive, Floodwater-dominated


 Avalanche Areas


 Liquefaction Risk: Nil to Low (T&T 2012)

 Liquefaction Risk: Probably Low (T&T 2012)

 Liquefaction Risk: Possibly Moderate (T&T 2012)

 Liquefaction Risk: Possibly High (T&T 2012)

 Liquefaction Risk: Possibly Susceptible (Opus 2002)

 Liquefaction Risk: Susceptible (Opus 2002)

Appendix C  
Figure 2

2387

**KEY:**

- Structure Plan Boundary
- - - Activity Area

**Activity Areas:**

- G: Golf course, open space and farming
- C: Clubhouse
- A: Visitor Accommodation / Residential
- HS: Homesite (3,000m<sup>2</sup>)
- F: Farm
- S: Resort Services & Staff Accommodation

Note: all activity areas include G: Golf course, open space and farming

**Overlays:**

- /// Landscape Protection Area

The Hills Structure Plan - Yield Schedule  
Sep-10

Activity Area	Size	Density (unit/Ha)		Lots	
		Low	High	Low	High
A1	0.9 Ha	1	8	1	7
A2	0.9 Ha	1	8	1	7
A3	0.4 Ha	1	8	1	3
A4	1.7 Ha	1	8	1	13
A5	1.2 Ha	1	8	1	10
A6	0.7 Ha	1	8	1	6
A7	0.5 Ha	1	8	1	4
A8	0.6 Ha	1	4	1	2
A9	1.7 Ha	1	8	1	13
A10	1.1 Ha	1	8	1	8
<b>Subtotal</b>				<b>10</b>	<b>74</b>
H1	0.3 Ha			1	1
H2	0.3 Ha			1	1
H3	0.3 Ha			1	1
H4	0.3 Ha			1	1
H5	0.3 Ha			1	1
H6	0.3 Ha			1	1
H7	0.3 Ha			1	1
H8	0.2 Ha			1	1
H9	0.3 Ha			1	1
H10	0.3 Ha			1	1
<b>Subtotal</b>				<b>10</b>	<b>10</b>
<b>Total</b>				<b>20</b>	<b>84</b>

<b>Total Structure Plan Area</b>	162.7 Ha		
<b>Ave. Lot size (per total land area)</b>		8.1 Ha	1.9 Ha

FOR DISCUSSION



**Fig.2**

QLDC hazard zonations. Depiction of liquefaction and alluvial fan hazards at site.



Liquefaction risk. Probably low



Alluvial fan. Active. Debris dominated.



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SCALE: 1:4,000 (A1) 1:8,000 (A3)



PLAN STATUS  
**DRAFT**

THE HILLS  
STRUCTURE PLAN

DRAWN / REVIEWED: RT / JC  
APPROVED: DT  
DATE: 14.09.15

DRAWING NO:  
MH\_10\_1\_MLP\_010E

Appendix D  
Figure 10



# The Hills Special Zone Submission, Preliminary and Detailed Site Investigation

*For*

## Trojan Helmet Limited

*October 2015*



*Davis Consulting Group Limited  
Arrow Lane,  
Arrowtown 9302  
03 409 8664  
Document ID: 15063a*





**The Hills Special Zone District Plan Submission  
Preliminary and Detailed Site Investigation**

**Document Status**

<b>Version</b>	<b>Purpose of Document</b>	<b>Prepared By</b>	<b>Reviewer</b>	<b>Review Date</b>
A	Draft for Internal Review	FR	GD	19 Oct 2015
B	FINAL for Client Review	FR	GD	20 Oct 2015
O	Final Report	FR	GD	22 Oct 2015

## TABLE OF CONTENTS

	<b>Page No.</b>
<b>EXECUTIVE SUMMARY</b>	<b>III</b>
<b>1.0 INTRODUCTION</b>	<b>1</b>
1.1 Purpose	1
1.2 Scope of Work	1
1.3 Limitations	1
<b>2.0 SITE LOCATION AND DESCRIPTION</b>	<b>3</b>
2.1 Site Location and Description of the Activity	3
2.2 Site History	5
2.3 Site Condition and Surrounding Environment	6
2.4 Geology and Hydrogeology	9
2.4.1 Hydrogeology	9
2.4.2 Hydrology	9
2.5 Additional Site Information	10
2.6 Contaminants Commonly Associated with the Landuse	11
<b>3.0 SAMPLING AND ANALYSIS PLAN</b>	<b>13</b>
3.1 Data Quality Objectives	13
3.2 Sampling and Analysis Plan	13
3.3 Soil Sampling Methodology	14
3.4 Analytical Parameters	14
3.5 Soil Sample Field and Laboratory QA/QC	15
3.6 Soil Guideline Values	15
3.7 Soil Analytical Result Review	16
<b>4.0 INVESTIGATION RESULTS</b>	<b>17</b>
4.1 Analytical Results	17
4.1.1 Organochlorine and Multiresidue Pesticide Results	17
4.1.2 Heavy Metal Results	17
4.2 QA/QC Results	22
4.2.1 Field Duplicates	22
4.2.2 Laboratory Procedures	22

<b>5.0</b>	<b>CONCLUSION</b>	<b>23</b>
<b>6.0</b>	<b>REFERENCES</b>	<b>24</b>

**LIST OF FIGURES**

<b>Figure No.</b>		<b>Page No.</b>
1	Site Location Plan	3
2	Proposed Structure Plan – Prepared by Darby Partners	4
3	Site Layout Plan	7
4	Water Features at The Hills golf course	10
5	Sample Location Plan	14

**LIST OF TABLES**

<b>Table No.</b>		<b>Page No.</b>
1	Products and Active Ingredients	12
2	Soil Guidelines	16
3	Activity Area Organochlorine Pesticides Results (mg/kg)	19
4	Housing Site Organochlorine Pesticides Results (mg/kg)	19
5	Activity Area Heavy Metal Results (mg/kg)	20
6	Housing Site Heavy Metal Results (mg/kg)	21
7	Duplicate Percentage Differences	22

**LIST OF APPENDICES**

<b>Appendix A</b>	Davis Consulting Group Contaminated Land Experience
<b>Appendix B</b>	Historic Certificate of Title
<b>Appendix C</b>	Soil Profile Log
<b>Appendix D</b>	Bore Search Information
<b>Appendix E</b>	Soil Sample and Analysis Summary Table
<b>Appendix F</b>	Laboratory analytical certificate and results, and chain of custody documentation.

## EXECUTIVE SUMMARY

Trojan Helmet Limited (THL) has prepared a submission to the district plan that seeks to establish 'The Hills Special Zone', which along with the existing golf course and ancillary facilities, would provide for residential housing and visitor accommodation activities. The proposal would result in subdivision, landuse change and earthworks activities, which trigger the National Environment Standard for Assessing and Managing Contaminants in Soil (NES).

In order to support the submission, THL commissioned Davis Consulting Group to consider the potential effect of historical activities on the soil quality of the site and undertake a review of risks to human health to meet the provisions of the NES.

The scope of work completed during the Preliminary Site Investigation (PSI) and Detailed Site Investigation (DSI) included:

- Review of the site history, including a review of the property file, certificate of title and historic photographs;
- Discussions with the staff from The Hills golf course;
- Completion of a site inspection to examine the condition of the property;
- Collection of soil samples across the site and analysis for heavy metals and organochlorine and multiresidue pesticides; and
- Consideration of the risk to human health based on a comparison of the adopted risk based soil guidelines values and detected soil contaminant concentrations.

Based on the findings of the PSI and DSI, the following conclusions are made:

- The Hills Golf Course has a number of historical and existing activities that have the potential to impact the soil quality of the site, including historic pastoral use of the site and more recently the operation of the golf course and ancillary facilities;
- The THL submission seeks to provide for a total of 10 house sites and 10 activity areas that may contain residential or visitor accommodation activities;
- The house sites and activity areas are separated from the golf course and are unlikely to be impacted by the use of chemicals on the fairways and greens;
- DCG concluded the risk to soil quality in the house sites and activity areas is associated with the possible historical application of the pesticides and fertilisers;
- Soil sampling was undertaken across all house sites and activity areas to support the assessment with a total of 129 soil samples collected;
- The soil samples were largely analysed for organochlorine pesticides and heavy metals that are associated with the broadacre application of pesticides and fertilisers; one soil sample

collected in close proximity to the golf course was also analysed for multiresidue pesticides to assess the possible impact from chemicals applied to the golf course;

- The analytical results show that the DDT was historically utilised on the site, but was detected at concentrations well below the risk based NES soil contaminant standard;
- Multiresidue pesticide concentrations (excluding DDT) in the sample collected nearest to the golf course in Activity Area 7 were reported below laboratory detection limits; and,
- Heavy metal results all returned concentrations below the adopted soil contaminant standards.

DCG conclude that the house sites and activity areas sought through the submission are suitable for rural residential and residential/visitor accommodation landuse and it is highly unlikely this development would present a risk to human health.

## 1.0 INTRODUCTION

### 1.1 Purpose

Trojan Helmet Limited (THL) has prepared a submission to the district plan that seeks to establish 'The Hills Special Zone', which along with the existing golf course and ancillary facilities, would provide for residential housing and visitor accommodation activities. The proposal would result in subdivision, landuse change and earthworks activities, which trigger the National Environment Standard for Assessing and Managing Contaminants in Soil (NES).

In order to support the submission, THL commissioned Davis Consulting Group to consider the potential effect of historical activities on the soil quality of the site and undertake a review of risks to human health to meet the provisions of the NES.

DCG's experience in the provision of contaminated land services is provided in Appendix A.

### 1.2 Scope of Work

The scope of work completed during the Preliminary Site Investigation (PSI) and Detailed Site Investigation (DSI) included:

- Review of the site history, including a review of the property file, certificate of title and historic photographs;
- Discussions with the staff from The Hills golf course;
- Completion of a site inspection to examine the condition of the property;
- Collection of soil samples across the site and analysis for heavy metals and organochlorine and multiresidue pesticides;
- Consideration of the risk to human health based on a comparison of the adopted risk based soil guidelines values and detected soil contaminant concentrations; and
- Preparation of a PSI/DSI report in accordance with the requirements of the Contaminated Land Management Guidelines (CLMG) No. 1.

### 1.3 Limitations

The findings of this report are based on the Scope of Work outlined above. DCG performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental science profession. No warranties, express or implied, are made. Subject to the Scope of Work, DCG's assessment is limited strictly to identifying the risk to human health based on the historical activities on the site. The confidence in the findings is limited by the Scope of Work.

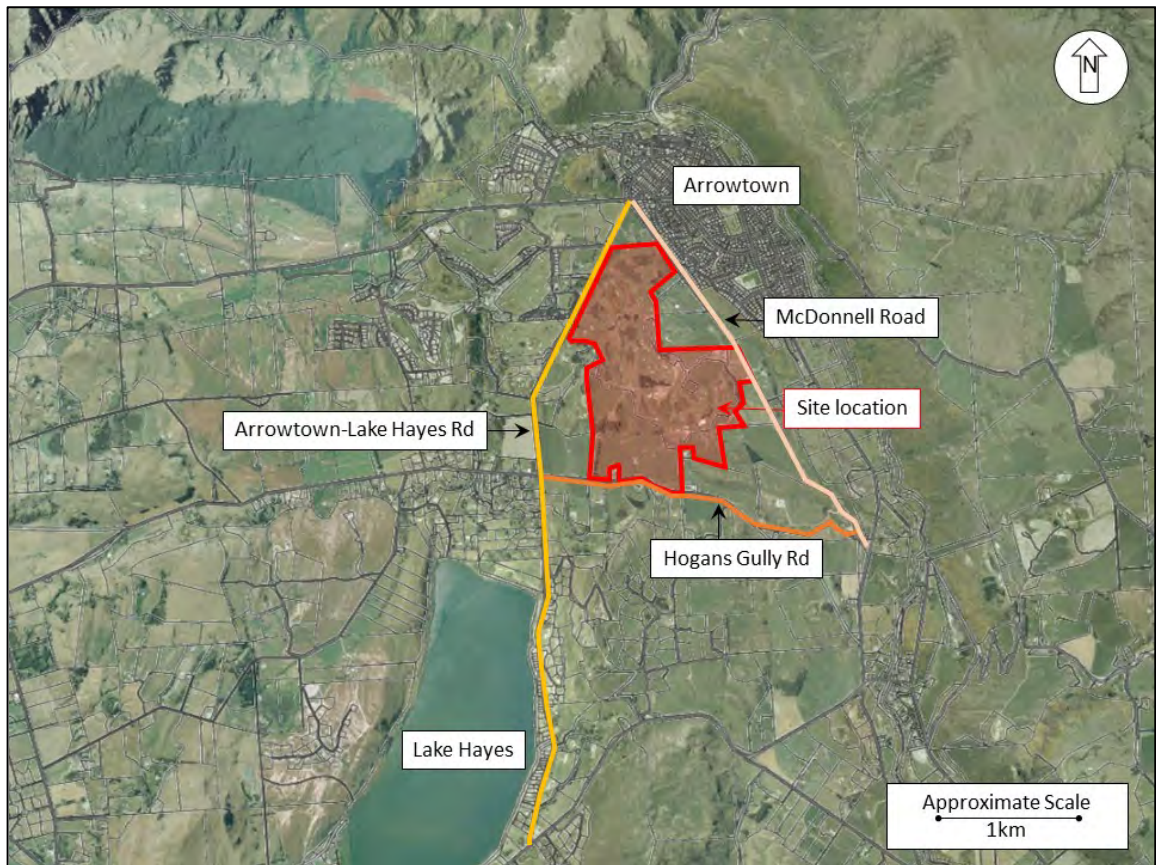
The results of this assessment are based upon site inspections conducted by DCG personnel, information from interviews with people who have knowledge of site conditions. All conclusions and recommendations regarding the properties are the professional opinions of DCG personnel involved with the project, subject to the qualifications made above. While normal assessments of data reliability have been made, DCG assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside DCG, or developments resulting from situations outside the scope of this project.

## 2.0 SITE LOCATION AND DESCRIPTION

### 2.1 Site Location and Description of the Activity

The site is located between McDonnell Road and Arrowtown-Lake Hayes Road and has the following legal description Lots 3, 4 and 7 DP 392663 (see Figure 1). The total area of the site is approximately 155.57 hectares and is situated southwest of Arrowtown. According to the Queenstown Lakes District Council (QLDC) District Plan, the property lies within the Rural General Zone.

Coordinates for the property are E 1271068, N 5013500.



**Figure 1:** Site Location Plan.

Figure 2 presents the layout of the proposed activities contained within the THL submission. In addition to the ongoing operation of the golf course and ancillary facilities, THL proposes the development of a number of new activity areas including:

- Ten areas (A1 – A10) for the purpose of visitor accommodation/residential activities; and
- Ten house sites (HS1 – HS10).



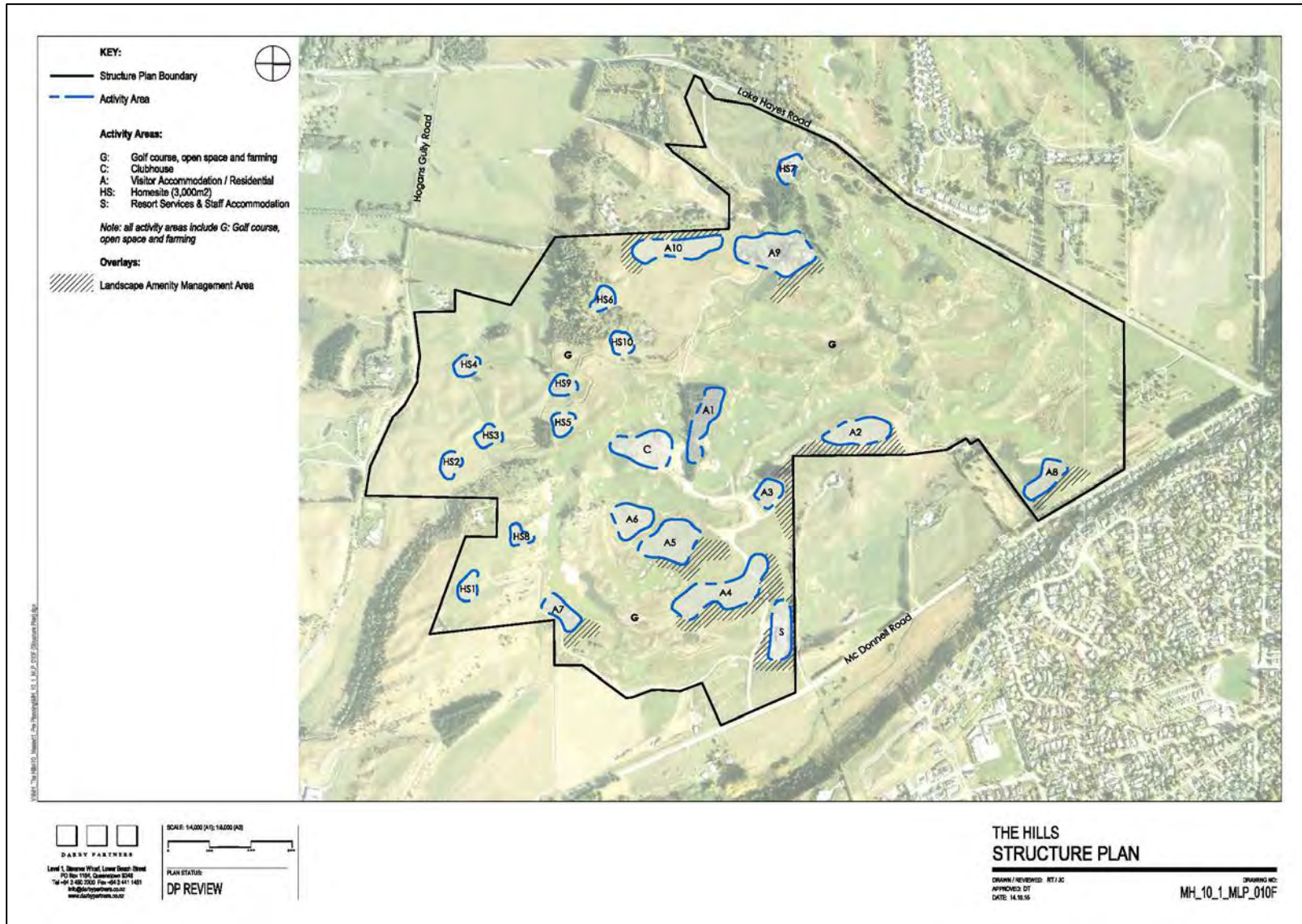


Figure 2: Proposed Structure Plan – Prepared by Darby Partners.

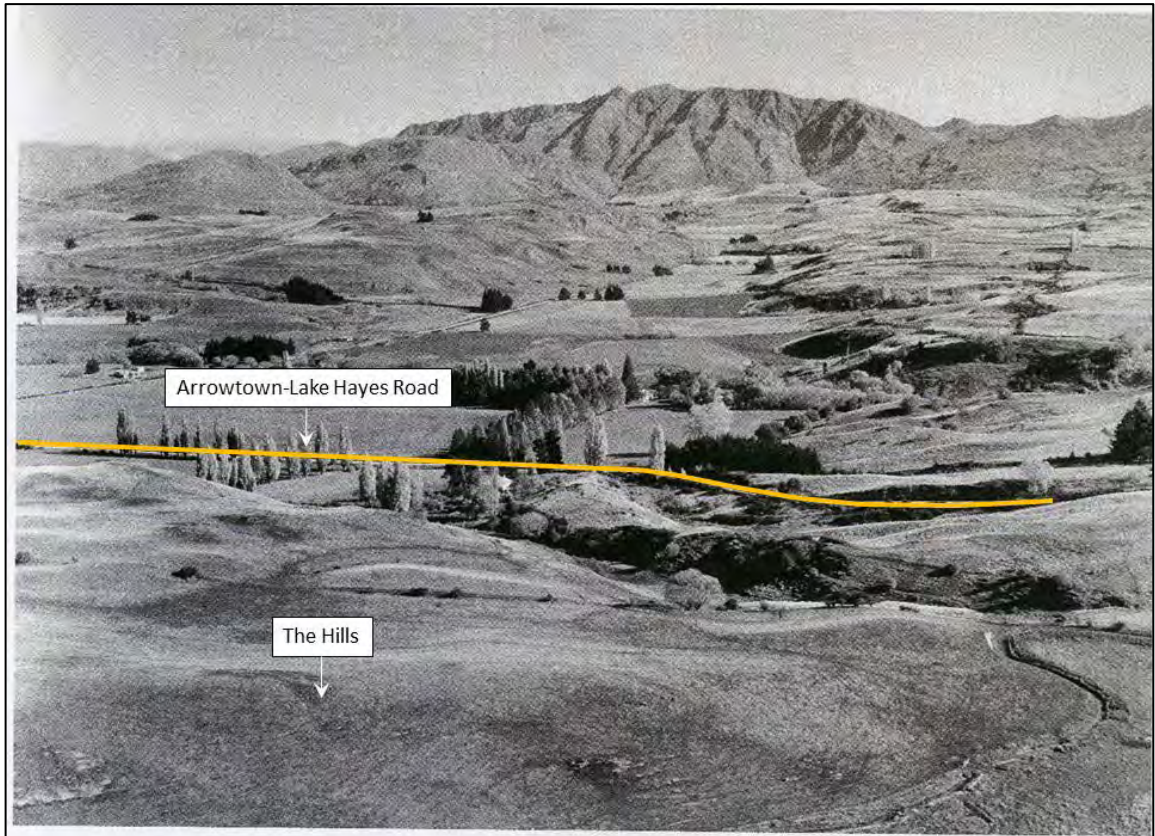
## 2.2 Site History

Prior to the development of a golf course on the subject site in 2003, the property had a long history of pastoral activity. Historic photographs obtained from the Lakes District Museum (accessed 15/10/2015) indicate the property was used for pastoral activity from circa 1910 (see Plate 1). A second historical photograph taken in 1954 (see Plate 2) indicates the area continued to be under pastoral management at this time.

DCG understands the site was part of the Bob Jenkins Farm in the 1930s. The property was subsequently purchased in the 1940s by brothers Jack and Lawson Summer who then sold it on to Jim Monk (McDonald, 2010). The current owners, THL, purchased the property in circa 1992 and commenced the development of The Hills golf course in 2003. The golf course was developed over a 4-year period, with the golf course opening for play in 2007. Golf has been the primary activity on the site since this time, however, the property also contains a number of residential properties, a golf clubhouse and golf maintenance shed. The historic certificate of title is provided in Appendix B.



**Plate 1:** Looking southwest over Arrowtown towards Lake Hayes 1910.



**Plate 2:** Looking west from above The Hills golf course, 1954.

### **2.3 Site Condition and Surrounding Environment**

Figure 3 presents a site plan showing the current layout of the site. The site currently consists of an 18 hole golf course, driving range, golf clubhouse, golf course maintenance compound and 5 residential houses. Plates 3 to 5 present the general characteristics of the proposed residential activity areas.

According to the QLDC Webmaps (<http://maps.qldc.govt.nz/qldcviewer/>) the property is currently zoned Rural General along with properties to the south and southeast. Neighbouring to the west is Millbrook which is zoned Resort. Arrowtown is situated to the northeast and is zoned Low Density Residential. The site is located within a 'probably low risk' liquefaction area (QLDC Webmaps).



**Figure 3:** Site Layout Plan.



**Plate 3:** Looking south across Activity Area A6.



**Plate 4:** Looking south across Activity Area A2.



**Plate 5:** Looking southeast across house site HS9.

## 2.4 Geology and Hydrogeology

The southern half of the subject site is situated on a glacial till and the northern half is situated on polytropic schist, variably segregated, veined and foliated (Turnbull, 2000). According to the QLDC Webmap, the site has a 'probably low risk' of liquefaction. The surface soils were described during the collection of soil samples; see Appendix C for the soil profile logs.

### 2.4.1 Hydrogeology

The site investigation did not include a groundwater assessment. The site is located within the Wakatipu Basin aquifer system, however, it is not situated above any identified aquifers. The Mid Mill Creek Aquifer is situated west of the subject site and north of Lake Hayes (ORC, 2014). The depth to groundwater on the site is unknown.

The location of groundwater bores within a 1 kilometre radius of the site (held by the ORC) is provided in Appendix D. A total of 9 consented bores have been installed within 1 kilometre of the site. The wells have been installed for a variety of purposes and are summarised as follows:

- 3 wells are used for domestic purposes;
- 3 wells are used for geological investigation;
- 2 wells are for scheme use;
- 1 well is disused; and
- 1 well has use unknown.

### 2.4.2 Hydrology

There are surface water bodies found on site which include ponds and drains. The closest surface water bodies are an unnamed tributary of the Arrow River, located 130 m to the east of the property boundary, and Mill Creek located 360 m to the west of the property boundary. Figure 4 presents the water features on the subject site as seen on a topographical map.

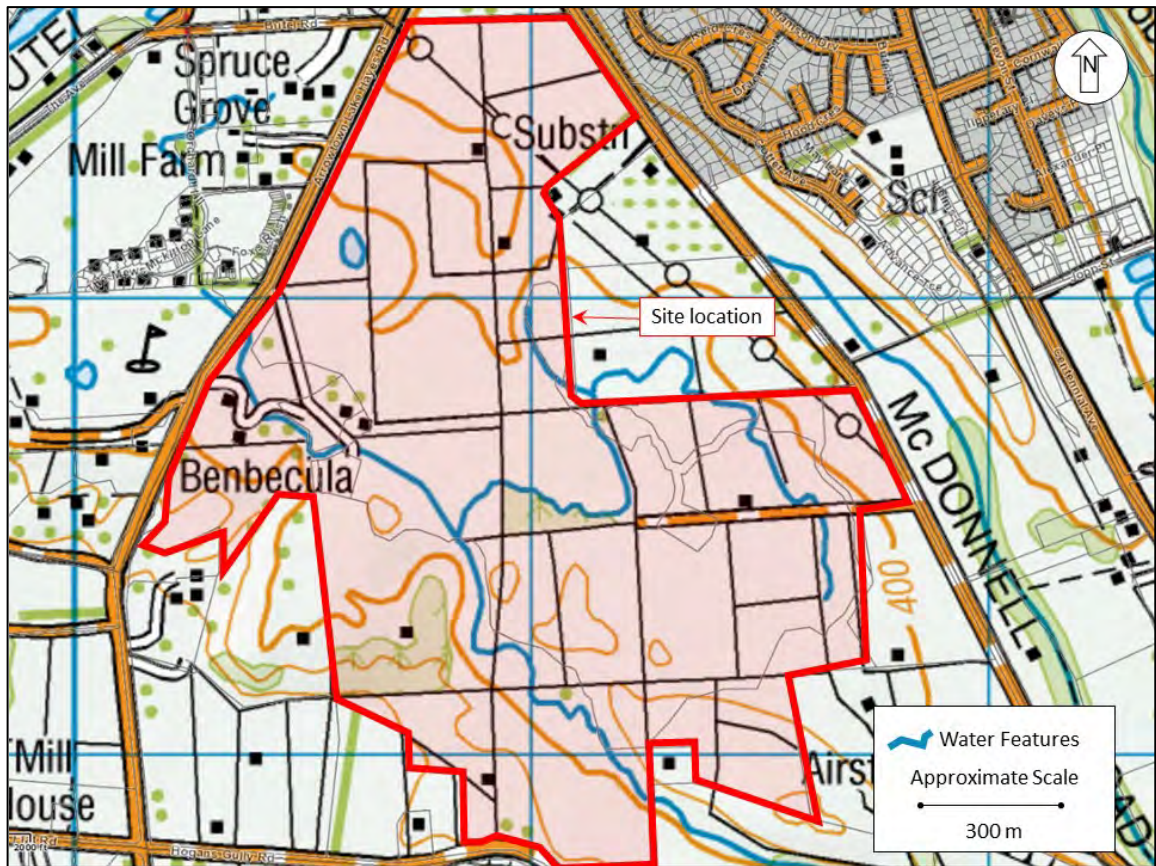


Figure 4: Water features at The Hills golf course.

## 2.5 Additional Site Information

The CLMG No 1 requires information associated with fuel storage facilities, spill loss history, recorded discharges and onsite and offsite disposal locations. DCG requested a search of the Otago Regional Council (ORC) records, and examined the Queenstown Lakes District Council (QLDC) records, for Landuse and Site Contamination Status, Resource Consents, and Resource Management Act (RMA) incidents for the site. The ORC stated the following.

*There are no records held on the Otago Regional Council's "Database of Selected Landuses" for the above site. The database identifies sites where activities have occurred that are known to have the potential to contaminate land. The record of a property in the database does not necessarily imply contamination. Similarly, the absence of available information does not necessarily mean that the property is uncontaminated; rather no information exists on the database.*

*Reference should be made to the Ministry for the Environment's Hazardous Activities and Industries List. If any of these activities have occurred on the above site, then it may be considered potentially contaminated. As a golf course, the site could have been subject to persistent pesticide use.*

The ORC holds one discharge consent for the discharge of treated wastewater to land. The ORC do not hold any other records on their “Database of Selected Landuses” for the site, no records on the RMA incidents database regarding any spills or discharges, no resource consents associated with the site, and had no records of any on or off-site disposal locations.

Property files were obtained from the QLDC eDocs webpage (<https://edocs.qldc.govt.nz/>) for Lots 3, 4 and 7, DP 392663. The property file held information regarding consents ranging from 1992 to 2015 for building a house, erecting statues, earthworks for golf course development, permits for marquees, building a green keepers workshop, construction of the club house, residential platforms and installation of a water pump.

The following provides a summary of information that the CLMG No. 1 (MfE, 2003a) indicates should be included in a DSI report:

- Presence of Drums – No drums were recorded during the site visit.
- Wastes – No wastes were observed during the site visit.
- Fill Materials – Other than planting areas and golf course bunkers, no fill material was encountered.
- Odours – No odours were noted in the housing activity areas.
- Flood Risk – According to QLDC Hazard map the site is not at risk of flooding;
- Surface Water Quality – There are multiple ponds and drains located across the golf course site.
- Visible Signs of Contamination – No obvious stains or signs of contamination were noted during the fieldwork completed for the investigation.
- Local Sensitive Environments – There are multiple ponds across the golf course as well as a network of drains. The closest sensitive environments are an unnamed tributary of the Arrow River, located 130 m to the east of the property boundary, and Mill Creek located 360 m to the west of the property boundary.

## **2.6 Contaminants Commonly Associated with the Landuse**

Based on the Contaminated Land Management Guidelines Schedule B and our understanding of use to support pastoral activities and golf course maintenance, the hazardous substances that may have been utilised on the property include a range of organochlorine and multiresidue pesticides and heavy metals associated with the application of fertilisers. We note that the golf course maintenance compound includes the storage of fuel, chemicals and operation of the workshop. The maintenance compound is physically separated from the proposed residential areas by at least 100 metres and is also downgradient from the nearest area. While the maintenance compound would be considered a site with the potential to impact soil quality it is



highly unlikely this would extend to any housing areas. This area has therefore been excluded from any further analysis in this investigation.

A list of the pesticides and herbicides utilised by The Hills golf course is provided in Table 1. The Hills stated that pesticide and fertiliser use is largely confined to the golf course fairways and greens, with very few herbicide applications outside the main golf course corridor. There is some risk of spray drift, however, this is mitigated by the following:

- Use of a Toro Multipro designated spray rig with drift reducing air induction nozzles at < 3 bar pressure;
- Use of drift reducing spray additives such as Li1000; and,
- Application height is a maximum of 50 cm and only undertaken in calm conditions.

**Table 1: Products and Active Ingredients**

Products	Active Ingredients
Escort	Metsulfuron
Quantum	Diflufenican
Axall	Mecoprop, Bromoxynil, Ioxynil
Versatil	Clopyralid
Tordon Brushkiller	Triclopyr Butoxyethyl ester
MCPA	Benzenesulfonic acid, dodecyl, 2-Ethylhexanol

Based on the above discussion, it is our view that the contaminants of concern across the site are predominantly those associated with historic farming and agriculture landuse. Specifically, the broadacre application of persistent pesticides and fertilisers has the potential for organochlorine pesticides and heavy metals to accumulate in soils that may present a risk to human health.

### **3.0 SAMPLING AND ANALYSIS PLAN**

#### **3.1 Data Quality Objectives**

The data quality objectives (DQOs) of the sampling and analysis plan were to:

- Characterise the nature of any contamination associated with the historical landuse of the site; and
- Determine the risk of any soil contamination encountered onsite to human health, based on the proposed residential and rural residential landuse scenarios proposed for the site.

#### **3.2 Sampling and Analysis Plan**

The sampling and analysis plan was designed to address the specific objectives, namely gain an understanding of contaminants associated with historic farming practices. In addition, soil samples were collected and analysed for multi-residue pesticides where residential activity areas are situated in close proximity to the golf course. This analysis was specifically confined to activity area A7.

Most of the sampling undertaken was systematic, with the number of samples for each Activity Area evenly spread across the activity area and house sites. We note that judgemental sampling was completed in house site HS4 in order to characterise soil contaminants that may have been associated with the cattle yards.

The average sampling density within the activity areas was approximately 1 sample per 120 square metres. Figure 5 presents the location of samples from each activity area and housing site. The sample IDs and coordinates are on the soil description log (see Appendix C).

Soil samples were composited into groups of three for the analysis of heavy metals. From each set of three samples, one sample was analysed for organochlorine pesticides. In addition, one sample was also analysed from Activity Area A7 for multiresidue pesticides. A total of 129 surface soil samples were collected from the site at a depth of 0 – 10 cm. We do however note some samples within A11, were recorded at a depth of between 0.05 and 0.15 m. This still represents a surface sample as there was a 0.05 layer of leaf litter at these locations. The sampling depth was considered appropriate due to the nature of the potential contaminants present, such as pesticides and heavy metals, which generally bind strongly to soils. Furthermore, the risk of exposure to people working and living on the site is associated with surface soils.

A soil sample and analysis summary table is provided in Appendix E.

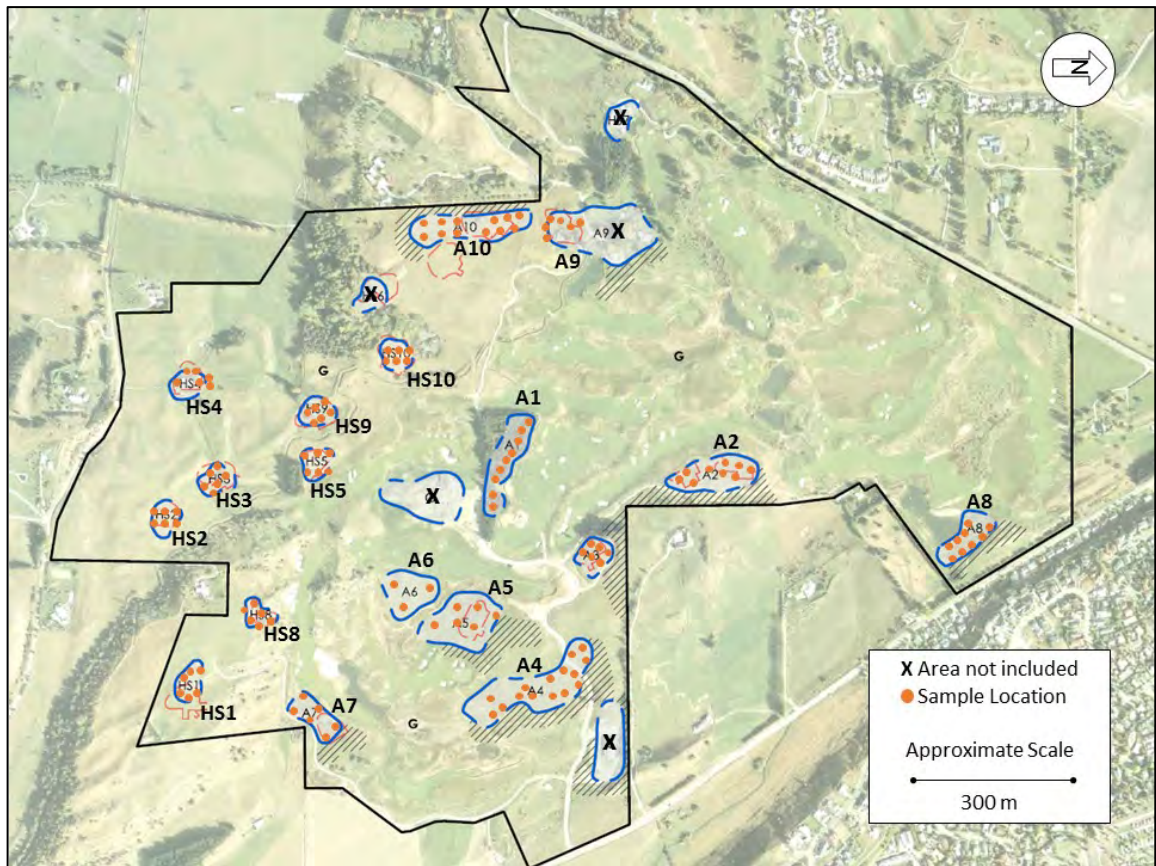


Figure 5: Sample Location Plan.

### 3.3 Soil Sampling Methodology

Soil sampling was undertaken with the use of a spade. The following procedures were applied during the soil sampling process to gain representative samples:

- Field personnel wore a fresh pair of nitrile gloves between sampling events.
- Soil samples were transferred to 250 mL glass jars with teflon lids as supplied by Hill Laboratories.
- All soil samples were unambiguously marked in a clear and durable manner to permit clear identification of all samples in the laboratory.

### 3.4 Analytical Parameters

The laboratory analytical suite determined for the site investigation is in recognition of our understanding of the current and historical use of the subject site. DCG understands the site has had a history of agricultural activity and more recently a golf course. Based on these activities the following substances were included in the analytical suite:

- Organochlorine pesticides (including 4,4-DDE, 2,4-DDT and Dieldrin);
- Multiresidue Pesticides; and,
- Heavy metals.

The laboratory methods utilised for the analysis are provided in the laboratory report (see Appendix F).

### **3.5 Soil Sample Field and Laboratory QA/QC**

The field QA/QC procedures performed during the soil sampling are listed as follows:

- Use of standardised field sampling forms and methods;
- Samples were transferred under chain of custody procedures;
- All samples were labelled to show point of collection, project number, and date;
- Headspace in sample jars was avoided; and,
- The threads on the sampling jars were cleaned to avoid Volatile Organic Compound (VOC) loss.

All soil samples were couriered on ice to Hill Laboratories. Hill Laboratories is IANZ accredited for the analysis of heavy metals and pesticides. Hill Laboratories conduct internal QA/QC in accordance with IANZ requirements.

### **3.6 Soil Guideline Values**

Soil guideline values (SGVs) selected for application on this project are provided in Table 2. The selection of these guidelines is consistent with the principles of the Contaminated Land Management Guidelines No. 2: Hierarchy and Application in New Zealand of Environmental Guideline Values (MfE, 2003b).

The heavy metal, organochlorine pesticide and multiresidue pesticide SGVs adopted for the site assessment were based on either the NES Soil Contaminant Standards (MfE, 2012) or the National Environmental Protection Measure (NEPM, 2013). Guidelines for the rural residential and residential landuse scenarios as set out in the NES were adopted for the house sites and residential activity areas respectively.

**Table 2: Soil Guidelines**

Analyses	Guideline
Heavy Metals and Organochlorine and Multiresidue Pesticides.	<ol style="list-style-type: none"><li>1. Soil Contaminant Standards <i>in</i> New Zealand 'Users' Guide: NES for Assessing &amp; Managing Contaminants in Soil to Protect Human Health 2012 (MfE, 2012).</li><li>2. Guideline on the Investigation Levels for Soil and Groundwater <i>in</i> National Environment Protection (Assessment of Site Contamination) Measure 1999 - Volume # 2 (NEPC, 2013).</li></ol>

### 3.7 Soil Analytical Result Review

Following the receipt of laboratory data, a detailed review of the data was performed to determine its accuracy and validity. All laboratory data was checked for analytical and typographical errors.

Once the data quality was established, soil data was checked against the Sampling Program DQOs.

## 4.0 INVESTIGATION RESULTS

### 4.1 Analytical Results

The soil sample locations are provided in Figure 5 with GPS coordinates provided in Appendix C.

#### 4.1.1 Organochlorine and Multiresidue Pesticide Results

The organochlorine pesticide analytical results detected above the laboratory detection limit are provided in Tables 3 and 4. The remaining results are presented in the laboratory reports provided in Appendix F. Results can be summarised as follows:

- DDT concentrations ranging between 0.03 mg/kg and 0.142 mg/kg were detected in soil samples collected from Activity Areas A3, A4, A5, A6, A7 and A10;
- DDT concentrations ranging between 0.045 mg/kg to 0.174 mg/kg were detected in soil samples collected from house site HS4;
- All DDT concentrations detected are well below the NES soil contaminant standards of 45 mg/kg and 70 mg/kg for the rural residential and residential landuse scenarios respectively;
- Low concentrations of endosulfan sulphate were detected in soil samples collected from Activity Area A10; and,
- Multiresidue pesticide concentrations excluding DDT in Activity Area 7 were reported below laboratory detection limits.

The results indicate that DDT has been utilised across the property, most likely to control pests such as grass grub. Notwithstanding this finding, the concentrations are well below levels that present a risk to people working or living on the site.

#### 4.1.2 Heavy Metal Results

The heavy metal results are presented in Tables 5 and 6 and summarised as follows:

- Arsenic concentrations detected in the Activity Areas and House Sites range from 8 mg/kg to 19 mg/kg and are all below the adopted guideline of 20 mg/kg;
- Cadmium concentrations in all samples analysed are at or below the laboratory reporting limits; and,
- Chromium, Copper, Lead, Nickel and Zinc concentrations are all well below the adopted soil guidelines values in all Activity Areas.

The consistency of the results confirms that most of the heavy metal concentrations are representative of background concentrations. The only results contrary to this are associated with soil samples collected from Activity Area 8 which contain noticeably higher concentrations of arsenic, copper, chromium, lead, nickel and zinc. While the concentrations remain below the adopted guidelines the results may suggest that fertilisers or pesticides may have been historically stored in the vicinity of Activity Area 8.

Given the consistency of the results, the practice of adjusting the guideline value for composite samples is not considered necessary as it is unlikely that contaminant hotspots are present on the site that exceed the adopted guideline values.

**Table 3: Activity Area Organochlorine Pesticide Results (mg/kg)**

Sample Area	A3	A7	A7	A6	A5	A5	A4	A10	A9	
Sample ID	A3.5	A7.2	A7.5	A6.2	A5.1	A5.5	A4.2	A10-11	A9-5	Guideline
4,4'-DDE	0.017	0.096	0.091	0.087	0.065	0.107	0.045	< 0.010	0.044	-
2,4'-DDT	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	-
4,4'-DDT	0.014	0.036	0.023	0.013	0.019	0.025	0.022	< 0.010	0.015	-
Total DDT Isomers	0.041	0.142	0.124	0.11	0.094	0.142	0.077	0.03	0.069	70 <sup>1</sup>
Endosulfan sulphate	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.018	< 0.010	270 <sup>2</sup>
< denotes concentration below laboratory detection limits - Denotes no guideline value <sup>1</sup> Soil Contaminant Standards in New Zealand 'Users' Guide: NES for Assessing & Managing Contaminants in Soil to Protect Human Health 2012 (MfE, 2012). <sup>2</sup> National Environment Protection (Assessment of Site Contamination) Measure 2013 Volume 2 (NEPC, 2013).										

**Table 4: Housing Site Organochlorine Pesticide Results (mg/kg)**

Sample Area	HS4	HS4	HS4	HS4	
Sample ID	HS4-2	HS4-3	HS4-5	HS4-6	Guideline
4,4'-DDE	0.128	0.035	0.044	0.06	-
2,4'-DDT	< 0.010	< 0.010	< 0.010	< 0.010	-
4,4'-DDT	0.036	< 0.010	0.017	0.018	-
Total DDT Isomers	0.174	0.045	0.071	0.088	45 <sup>1</sup>
< denotes concentration below laboratory detection limits - Denotes no guideline value <sup>1</sup> Soil Contaminant Standards in New Zealand 'Users' Guide: NES for Assessing & Managing Contaminants in Soil to Protect Human Health 2012 (MfE, 2012).					



**Table 5: Activity Area Heavy Metal Results (mg/kg)**

Sample Area	A3	A3	A2	A2	A2	A8	A8	A8	A7	A7	A6	A5	
Composite #	1	2	3	4	5	6	7	8	9	10	11	12	Guideline
Arsenic	9	9	9	9	9	18	18	19	9	9	14	8	20 <sup>1</sup>
Cadmium	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	3 <sup>1</sup>
Chromium	7	7	7	7	7	12	13	13	8	7	7	7	>10,000 <sup>1</sup>
Copper	8	9	8	9	9	18	18	20	10	12	11	9	>10,000 <sup>1</sup>
Lead	12.9	12.2	12.8	11.9	11.6	26	23	24	12.8	12.7	17.2	10.9	210 <sup>1</sup>
Nickel	7	7	7	7	7	12	13	13	8	8	8	7	400 <sup>2</sup>
Zinc	36	33	34	33	36	60	62	62	39	38	35	33	7400 <sup>2</sup>
Sample Area	A5	A4	A4	A4	A4	A4	A1	A1	A1	A10	A10	A10	
Composite #	13	14	15	16	17	18	19	20	21	22	23	24	Guideline
Arsenic	8	9	8	10	9	9	10	11	11	8	9	11	20 <sup>1</sup>
Cadmium	< 0.10	< 0.10	0.11	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.11	3 <sup>1</sup>
Chromium	7	7	7	7	6	7	7	7	6	6	7	8	>10,000 <sup>1</sup>
Copper	9	12	10	10	10	10	10	12	12	7	8	12	>10,000 <sup>1</sup>
Lead	10.9	14.1	11.3	11.5	11.4	12.4	11.7	13.2	12.2	9.8	10	11.5	210 <sup>1</sup>
Nickel	7	8	8	7	7	7	7	8	8	7	7	8	400 <sup>2</sup>
Zinc	35	45	33	47	31	31	37	31	30	35	35	40	7400 <sup>2</sup>
Sample Area	A10	A9	A9										
Composite #	25	26	27	Guideline									
Arsenic	9	10	11	20 <sup>1</sup>									
Cadmium	< 0.10	< 0.10	< 0.10	3 <sup>1</sup>									
Chromium	8	7	8	>10,000 <sup>1</sup>									
Copper	8	9	10	>10,000 <sup>1</sup>									
Lead	10.2	10	14.4	210 <sup>1</sup>									
Nickel	7	7	7	400 <sup>2</sup>									
Zinc	33	35	39	7400 <sup>2</sup>									

< denotes concentration below laboratory detection limits

<sup>1</sup> Soil Contaminant Standards in New Zealand 'Users' Guide: NES for Assessing & Managing Contaminants in Soil to Protect Human Health 2012 (MfE, 2012).

<sup>2</sup> Guideline on the Investigation Levels for Soil and Groundwater in National Environment Protection (Assessment of Site Contamination) Measure 2013 Volume 2 (NEPC, 2013).

**Table 6: Housing Site Heavy Metal Results (mg/kg)**

Sample Area	HS10	HS10	HS5	HS5	HS9	HS9	HS1	
Composite #	28	29	30	31	32	33	34	Guideline
Arsenic	8	10	13	10	11	10	9	17 <sup>1</sup>
Cadmium	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.8 <sup>1</sup>
Chromium	8	7	8	7	9	7	9	>10,000 <sup>1</sup>
Copper	11	11	12	10	10	11	13	>10,000 <sup>1</sup>
Lead	10.1	10.6	13.1	10.4	12.8	10.2	14.1	160 <sup>1</sup>
Nickel	8	8	9	7	8	8	10	400 <sup>2</sup>
Zinc	43	38	41	37	42	39	50	7,400 <sup>2</sup>
Sample Area	HS1	HS8	HS8	HS2	HS2	HS3	HS3	
Composite #	35	36	37	38	39	40	41	Guideline
Arsenic	9	11	11	9	9	10	10	17 <sup>1</sup>
Cadmium	< 0.10	0.12	< 0.10	0.11	0.1	0.14	< 0.10	0.8 <sup>1</sup>
Chromium	9	10	9	8	7	9	8	>10,000 <sup>1</sup>
Copper	11	14	14	10	10	12	14	>10,000 <sup>1</sup>
Lead	14	14.4	13.1	10.5	10.4	13.9	11.3	160 <sup>1</sup>
Nickel	8	10	10	8	8	9	8	400 <sup>2</sup>
Zinc	45	59	53	47	39	51	39	7,400 <sup>2</sup>
Sample Area	HS4	HS4	HS4	HS4	HS4	HS4		
Individual Analysis	HS4-1	HS4-2	HS4-3	HS4-4	HS4-5	HS4-6	Guideline	
Arsenic	14	12	13	14	10	10	17 <sup>1</sup>	
Cadmium	< 0.10	< 0.10	0.1	< 0.10	0.12	< 0.10	0.8 <sup>1</sup>	
Chromium	12	10	17	13	13	9	>10,000 <sup>1</sup>	
Copper	16	11	16	22	11	11	>10,000 <sup>1</sup>	
Lead	16.9	12.3	13.5	15.3	12.6	11.3	160 <sup>1</sup>	
Nickel	11	10	14	10	11	8	400 <sup>2</sup>	
Zinc	130	92	71	260	59	63	7,400 <sup>2</sup>	
< denotes concentration below laboratory detection limits <sup>1</sup> Soil Contaminant Standards in New Zealand 'Users' Guide: NES for Assessing & Managing Contaminants in Soil to Protect Human Health 2012 (MfE, 2012). <sup>2</sup> Guideline on the Investigation Levels for Soil and Groundwater in National Environment Protection (Assessment of Site Contamination) Measure 2013 Volume 2 (NEPC, 2013).								

## 4.2 QA/QC Results

### 4.2.1 Field Duplicates

Six field duplicate soil samples were collected during the site investigation and analysed to review the reproducibility of the laboratory analysis. The duplicates and the corresponding sample results are presented in Table 7 below.

**Table 7: Duplicate Percentage Differences**

Analyte	A3-5	Dup 1	%	A5-1	Dup 2	%
4,4'-DDE	0.017	< 0.010	51	0.065	0.061	6
2,4'-DDT	< 0.010	< 0.010	0	< 0.010	< 0.010	0
4,4'-DDT	0.014	< 0.010	33	0.019	0.019	0
Analyte	A1-3	Dup 3	%	HS9-3	Dup 4	%
4,4'-DDE	< 0.010	< 0.010	0	< 0.010	< 0.010	0
2,4'-DDT	< 0.010	< 0.010	0	< 0.010	< 0.010	0
4,4'-DDT	< 0.010	< 0.010	0	< 0.010	< 0.010	0
Analyte	HS9-1	Dup 5	%	HS2-6	Dup 6	%
4,4'-DDE	< 0.010	< 0.010	0	< 0.010	< 0.010	0
2,4'-DDT	< 0.010	< 0.010	0	< 0.010	< 0.010	0
4,4'-DDT	< 0.010	< 0.010	0	< 0.010	< 0.010	0

An acceptable percentage difference between duplication samples is less than 30 to 50 % (MfE, 2011). The highest relative percentage difference between the six samples was 51 % (for 4,4' DDE), which is just over what is considered acceptable for soil analysis. The QA/QC analysis indicates the sampling and analysis undertaken was reproducible.

### 4.2.2 Laboratory Procedures

Hill Laboratories did not complete specific in-house QA/QC analysis, such as spike recoveries or laboratory duplicates during the processing of the soil samples. The Chain of Custody form and the Hill Laboratory results are provided in Appendix F.

## 5.0 CONCLUSION

Based on the findings of the PSI and DSI, the following conclusions are made:

- The Hills Golf Course has a number of historical and existing activities that have the potential to impact the soil quality of the site, including historic pastoral use of the site and more recently the operation of the golf course and ancillary facilities;
- The THL submission seeks to provide for a total of 10 house sites and 10 activity areas that may contain residential or visitor accommodation activities;
- The house sites and activity areas are separated from the golf course and are unlikely to be impacted by the use of chemicals on the fairways and greens;
- DCG concluded the risk to soil quality in the house sites and activity areas is associated with the possible historical application of the pesticides and fertilisers;
- Soil sampling was undertaken across all house sites and activity areas to support the assessment with a total of 129 soil samples collected;
- The soil samples were largely analysed for organochlorine pesticides and heavy metals that are associated with the broadacre application of pesticides and fertilisers; one soil sample collected in close proximity to the golf course was also analysed for multiresidue pesticides to assess the possible impact from chemicals applied to the golf course;
- The analytical results show that the DDT was historically utilised on the site, but was detected at concentrations well below the risk based NES soil contaminant standard;
- Multiresidue pesticide concentrations (excluding DDT) in the sample collected nearest to the golf course in Activity Area 7 were reported below laboratory detection limits; and,
- Heavy metal results all returned concentrations below the adopted soil contaminant standards.

DCG conclude that the house sites and activity areas sought through the submission are suitable for rural residential and residential/visitor accommodation landuse and it is highly unlikely this development would present a risk to human health.

## 6.0 REFERENCES

McDonald, B. (2010) Queenstown's Farms and Sheep Stations. Families that farmed the land.

Ministry for the Environment (2003a) *Contaminated Land Management Guidelines No. 1: Reporting on Contaminated Sites in New Zealand*.

Ministry for the Environment (2003b) *Contaminated Land Management Guidelines No. 2: Hierarchy and Application in New Zealand of Environmental Guideline Values*.

Ministry for the Environment (2011) *Contaminated Land Management Guidelines No. 5: Site investigation and analysis of soils. Revised 2011*.

Ministry for the Environment (2012) *Users' Guide: National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health*. Wellington: Ministry for the Environment.

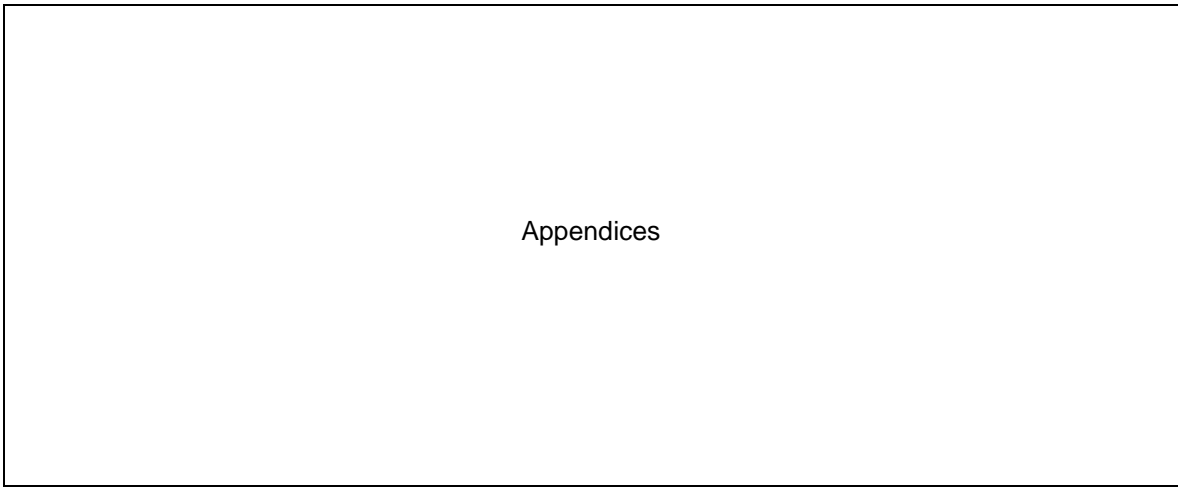
National Environment Protection Council (NEPC) (2013) *National Environment Protection (Assessment of Site Contamination) Measure - Schedule B (1) Guideline on Investigation Levels for Soil and Groundwater*. National Environment Protection Council.

Otago Regional Council (ORC), 2014. *Investigation into the Wakatipu Basin Aquifers, July 2014*. Report writer: Jens Rekker, Resource Scientist. Reviewed by: John Threlfall, Director of Environmental Science & Information.

Turnbull, I.M. (compiler) 2000. *Geology of the Wakatipu area*. Institute of Geological & Nuclear Sciences 1:250 000 geological map 18. 1 sheet + 72 p. Lower Hutt, New Zealand. Institute of Geological & Nuclear Sciences Limited

Queenstown Lakes District Council, 2009. *Queenstown Lakes District Plan*.

Lakes District Museum, 2015. Accessed 15/10/15



Appendices

Appendix A  
Davis Consulting Group Contaminated Land Experience



### **Davis Consulting Group Contaminated Land Experience**

Glenn Davis is the director of Davis Consulting Group and has over 15 years post graduate experience working as an Environmental Scientist. Glenn has accumulated a significant volume of work experience in the contaminated land field undertaking preliminary site investigations (PSIs), detailed site investigations (DSIs) and remediation projects in New Zealand, Australia, Asia, the United Kingdom and Ireland. The following provides a summary of Glenn Davis's experience.

**Davis Consulting Group (2007 – present):** Principal Environmental Scientist – completed multiple preliminary and detailed site investigations in Otago and Southland predominantly for the land development industry. In addition to undertaking investigation and remedial work DCG advises the Southland Regional Council on contaminated land matters including the review of consultant reports and consent applications. Key projects DCG has undertaken include:

- Review of groundwater contamination associated with the former Invercargill gasworks site including the completion of a groundwater investigation and completion of an environmental risk assessment report to support a discharge consent application;
- Completion of site investigations on former landfills in Invercargill to consider the suitability of the sites for commercial/industrial development;
- Management of the removal of an underground fuel tank in Gore and subsequent groundwater investigation; and
- Completion of a number of detailed site investigations in the Te Anau area to consider the suitability of former farm land for residential development.



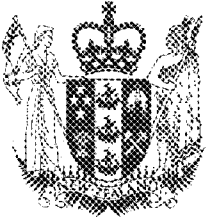
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**RPS Australia (2003 – 2006):** Supervising Environmental Scientist managing multiple detailed site investigations in the land development industrial and operated as an environmental specialist for Chevron on Barrow Island monitoring and managing a number of large contaminated groundwater plumes.

**URS Ireland ( 2001 – 2003):** - Senior Environmental Scientist undertaking multiple PSIs and DSIs on services stations and train station throughout Ireland. Glenn was also involved in the design and operation of a number of large scale remediation projects, predominantly associated with the removal of hydrocarbon contaminated soil and recovery of hydrocarbons impacting groundwater.

**ERM Australia (1998 – 2000)** – Working as a project level environmental scientist Glenn completed in excess of 30 detailed site investigations and remedial projects on service stations, concrete batching plants, and transport depots.

Appendix B  
Historic Certificate of Title



**COMPUTER FREEHOLD REGISTER  
UNDER LAND TRANSFER ACT 1952**



R. W. Muir  
Registrar-General  
of Land

**Search Copy**

**Identifier**                    **413072**  
**Land Registration District** **Otago**  
**Date Issued**                05 August 2008

**Prior References**

OT13A/734	OT15A/1076	OT17B/806
OT18B/1030	OT18B/991	OT18C/442

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**Estate**                    Fee Simple  
**Area**                    101.5914 hectares more or less  
**Legal Description** Lot 7 Deposited Plan 392663

**Proprietors**

Trojan Helmet Limited

---

**Interests**

Subject to a right to convey water in gross over part marked g-h DP 392663 to Arrow Irrigation Company Limited created by Transfer 828083 -21.4.1993 at 9.23 am

X14968 Irrigation Agreement (affects part formerly Section 105 Block VII Shotover SD )

Part formerly Section 105 Block VII Shotover Survey District is Subject to Section 8 Mining Act 1971

Part formerly Section 105 Block VII Shotover Survey District is Subject to Section 5 Coal Mines Act 1979

Subject to Part IV A Conservation Act 1987 (affects Part formerly part Section 102 Block VII Shotover Survey District - herein)

Subject to Section 11 Crown Minerals Act 1991 (affects Part formerly part Section 102 Block VII Shotover Survey District - herein)

X14880 Irrigation Agreement (affects part formerly Section 105 Block VII Shotover SD)

Subject to a right of way over part marked AD DP 392663 created by Transfer 746961.17 - 1.2.1990 at 9:51 am

Subject to a right to convey water over part marked aa-ab,ab-ac,ac-ad,ad-ae,ae-au DP 392663 and right to take & convey water over part marked A DP 392663 created by Transfer 749789 - 12.3.1990 at 9:29 am

Subject to a right to convey water over part marked aa-ab,ab-ac,ac-ad,ad-ae,af-ag,ag-ai,aj-i,i-ak,al-am,ae-af DP 392663, right to take & convey water over part marked A DP 392663 and right to store & convey water over part marked B DP 392663 created by Transfer 773822.1 - 27.2.1991 at 9:12 am

Appurtenant to part formerly part lot 1 DP 21438 are rights to convey water created by Transfer 773822.1 - 27.2.1991 at 9:12 am

Subject to a right to convey water over part marked aj-i,i-ak,al-am DP 392663 and right to store & convey water over part marked B DP 392663 created by Transfer 773822.2 - 27.2.1991 at 9:12 am

Subject to a right to convey water in gross over part marked k-l,m-n,v-w DP 392663 to The Arrow Irrigation Company Limited created by Transfer 825040 - 4.3.1993 at 9:30 am

Subject to a right to convey water in gross over part marked h-i,i-j,j-k DP 392663 to The Arrow Irrigation Company Limited created by Transfer 834732 - 23.7.1993 at 9:32 am

Subject to a right to convey water in gross over part marked o-p,q-y DP 392663 to Arrow Irrigation Company Limited created by Transfer 840451 - 13.10.1993 at 9:51 am

Appurtenant to part formerly CT OT17B/806 is a right to pump water,a right to convey electricity and rights to convey water created by Transfer 915672.3 - 6.9.1996 at 2:49 pm

The easements created by Transfer 915672.3 are subject to Section 243 (a) Resource Management Act 1991

**Identifier**                      **413072**

Appurtenant to part formerly CT OT17B/806 is a right to take water created by Transfer 953679.6 - 31.8.1998 at 10:56 am

The easements created by Transfer 953679.6 are subject to Section 243 (a) Resource Management Act 1991

Land Covenant in Deed 964442.3 - 23.3.1999 at 12.55 pm (affects part formerly CT OT17B/806)

7898685.3 Surrender of the right of way marked A,B SO 23066 created by Transfer 746961.17 as to land in CTs OT15A/1076,OT15D/881,OT17B/806,OT18B/991,OT18C/442 - 5.8.2008 at 9:00 am

Subject to a right of way over part marked I,L DP 392663,right to convey telecommunications over part marked AB,AD,Q,AN DP 392663,right to convey electricity marked P,Q,R,AN DP 392663 and right to convey water marked AP,AQ,AR,AO,AN DP 392663 created by Easement Instrument 7898685.11 - 5.8.2008 at 9:00 am

The easements created by Easement Instrument 7898685.11 are subject to Section 243 (a) Resource Management Act 1991

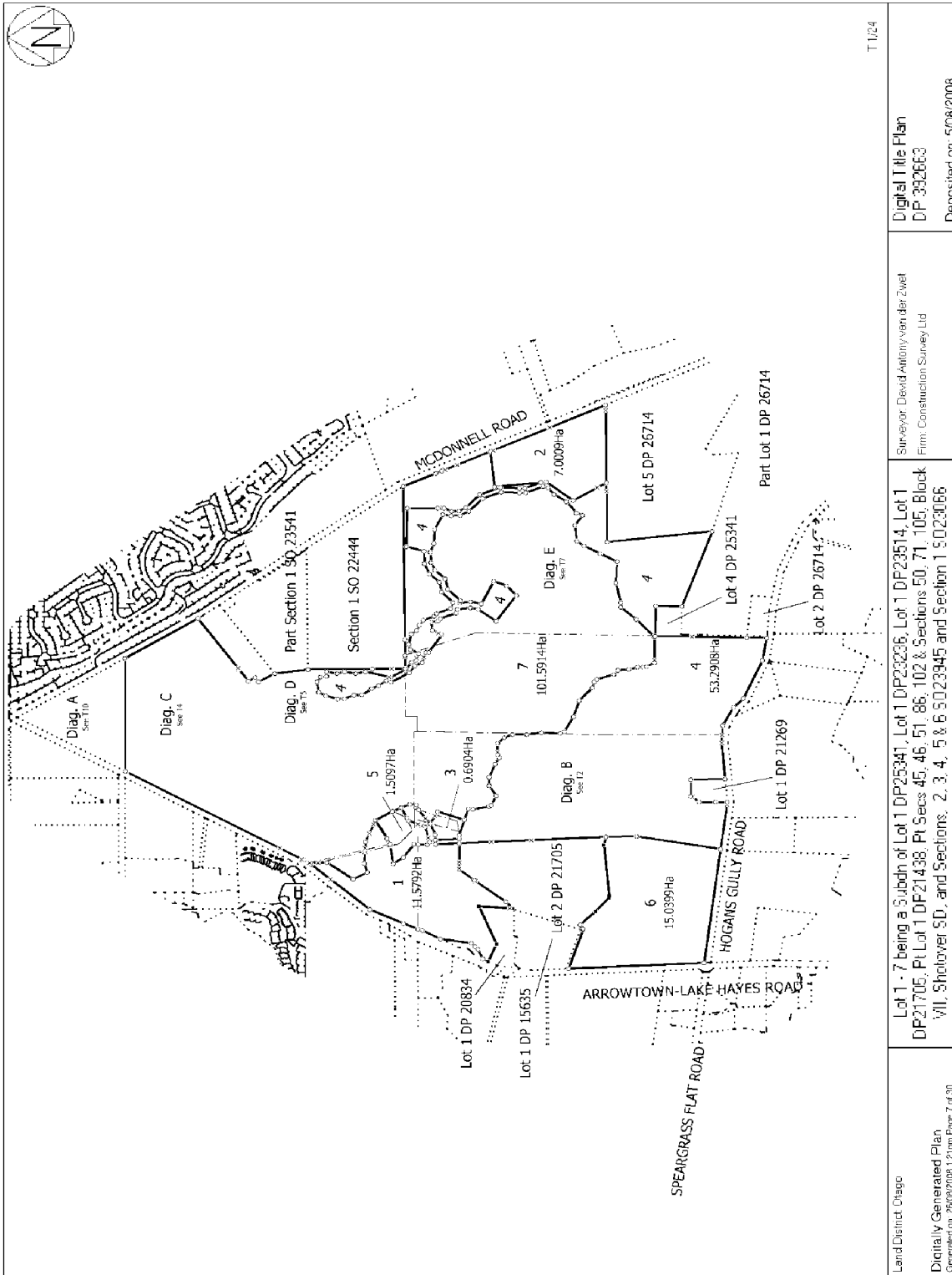
8267348.1 Mortgage to Westpac New Zealand Limited - 28.8.2009 at 9:01 am

Subject to a right to convey electricity (in gross) over parts marked R, I, F, D, P, N, J, O & Q on DP 392663 and over parts marked A & B on DP 420440 and a right to transform electricity (in gross) over parts marked D, O & Q on DP 392663 and over part marked B on DP 420440 in favour of Aurora Energy Limited created by Easement Instrument 8735727.6 - 20.4.2011 at 2:52 pm

Subject to a right to convey water over part marked AQ on DP 392663 created by Easement Instrument 9136139.1 - 14.12.2012 at 1:49 pm

Identifier

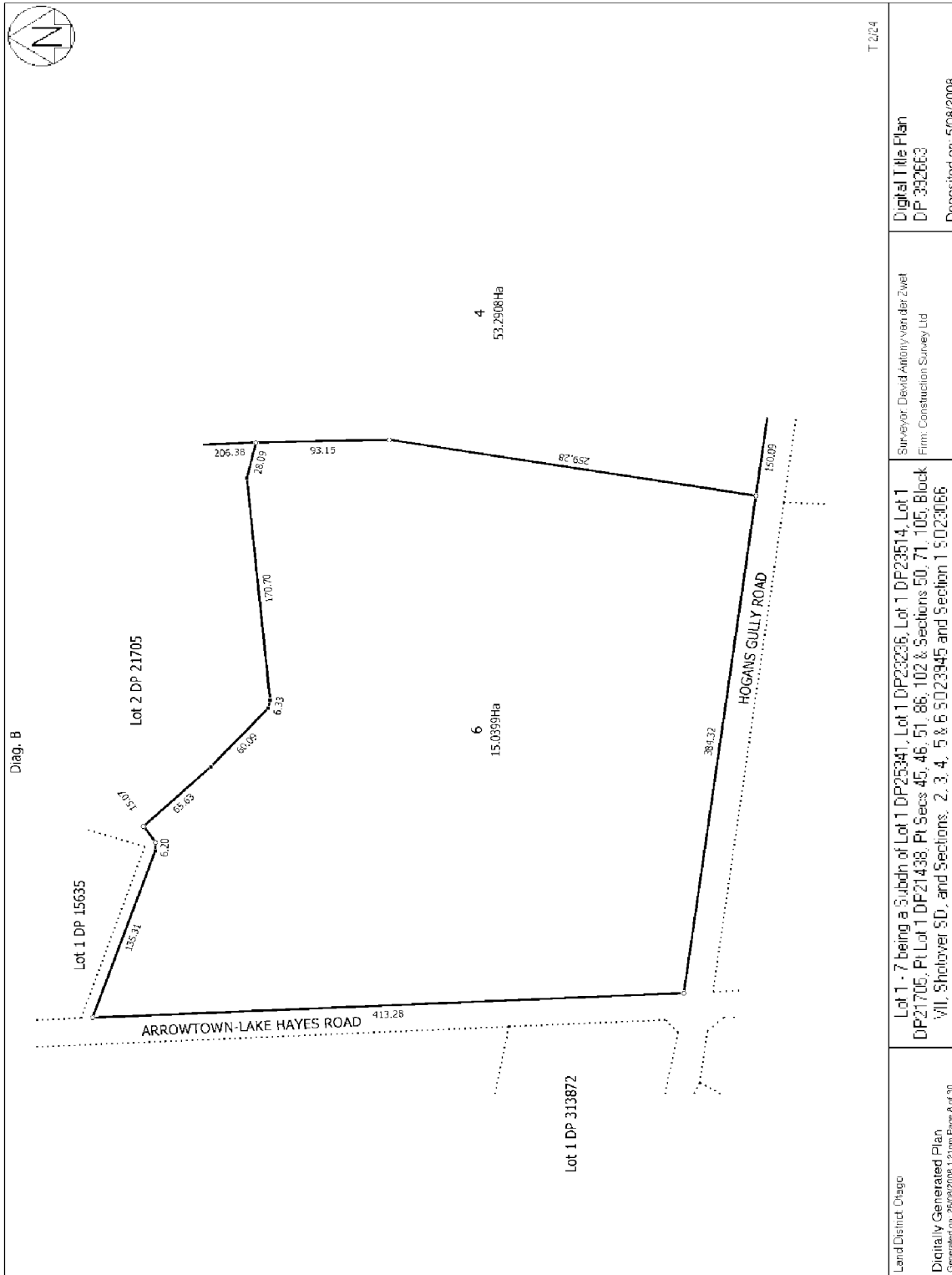
413072



<p>Land District: Otago</p>	<p>Surveyor: David Anthony van der Zwet Firm: Construction Survey Ltd</p>	<p>Lot 1 - 7 being a Subdn of Lot 1 DP25341, Lot 1 DP23236, Lot 1 DP23514, Lot 1 DP21705, Pt Lot 1 DP21438, Pt Secs 45, 46, 51, 86, 102 &amp; Sections 50, 71, 105, Block VII, Shotover SD, and Sections 2, 3, 4, 5 &amp; 6 SO23345 and Section 1 SO23066</p>
<p>Digitally Generated Plan Generated on: 26/01/2008 12:11pm Page: 7 of 30</p>	<p>Digital Title Plan DP 332663</p>	<p>Deposited on: 5/08/2008</p>

Identifier

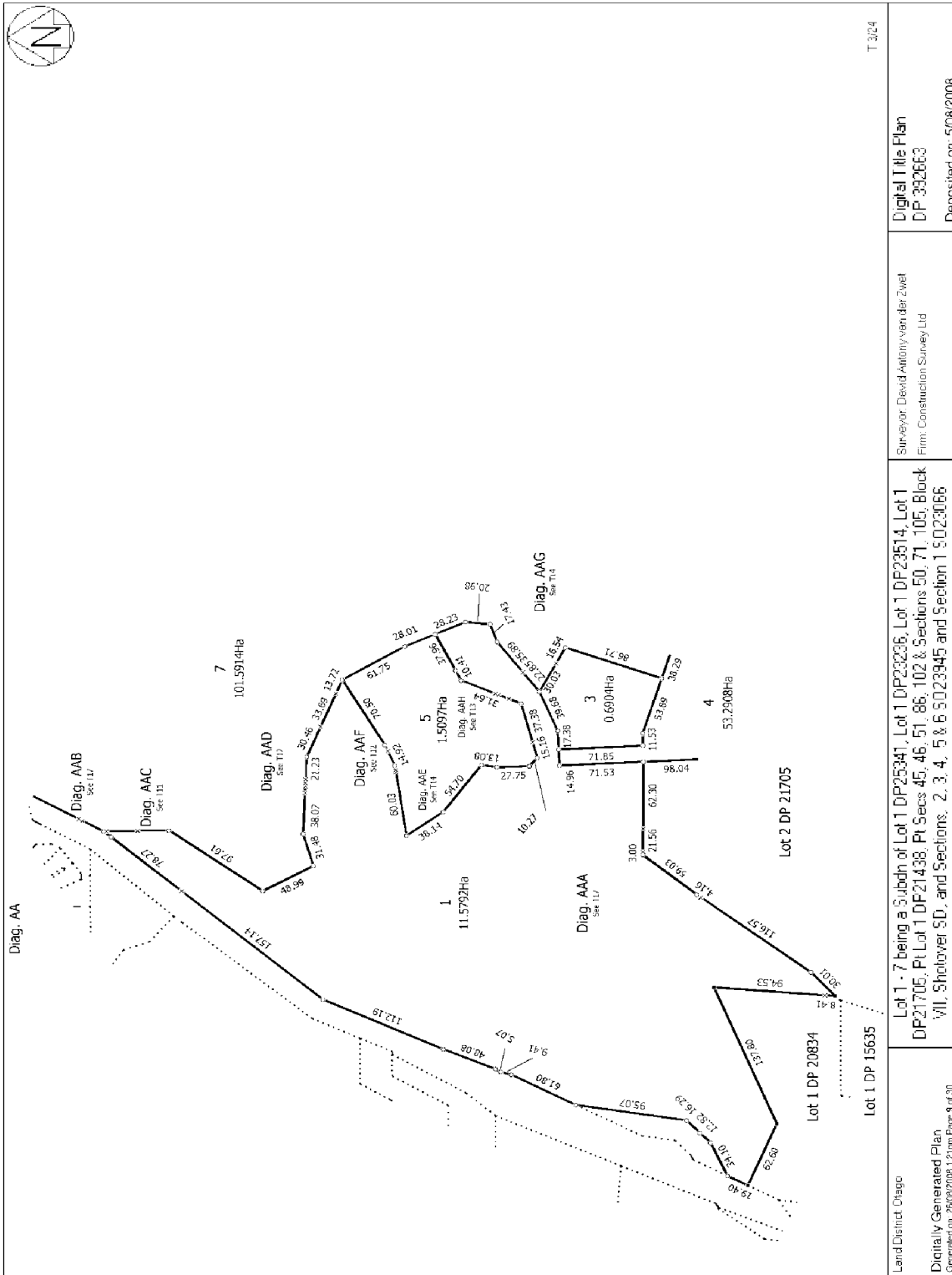
413072



Land District: Otago	Surveyor: David Anthony van der Zwet Firm: Construction Survey Ltd	Digital Title Plan DP 332663 Deposited on: 5/08/2008
Digitally Generated Plan Generated on: 26/01/2008 12:11pm Page 4 of 30	Lot 1 - 7 being a Subdn of Lot 1 DP25341, Lot 1 DP23236, Lot 1 DP23514, Lot 1 DP21705, Pt Lot 1 DP21438, Pt Secs 45, 46, 51, 86, 102 & Sections 50, 71, 105, Block VII, Shotover SD, and Sections 2, 3, 4, 5 & 6 SD23345 and Section 1 SD23066	

Identifier

413072



T 3/24

Digital Title Plan  
DP 332663  
Deposited on: 5/08/2006

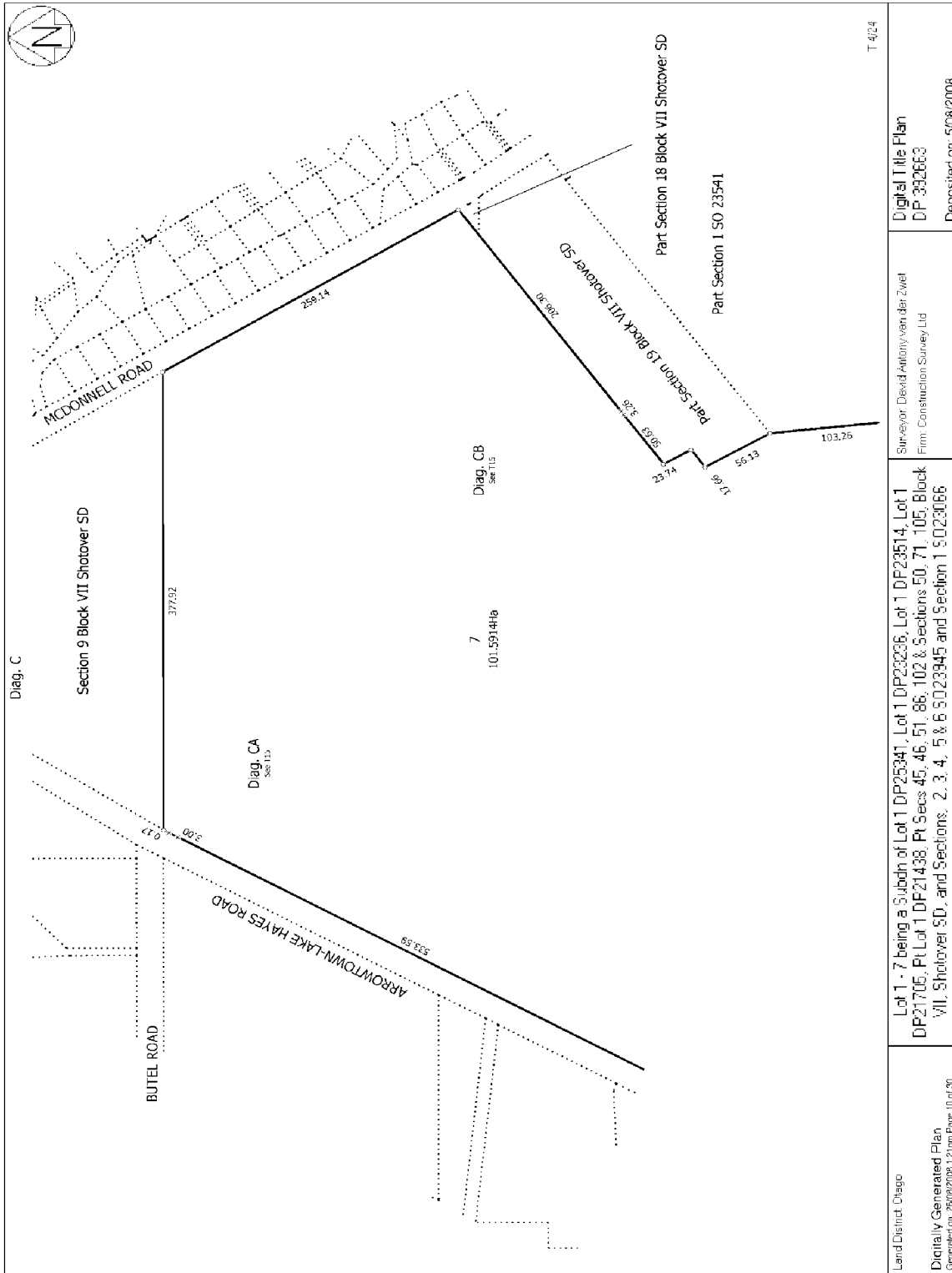
Surveyor: David Anthony van der Zwet  
Firm: Construction Survey Ltd

Lot 1 - 7 being a Subdivn of Lot 1 DP25341, Lot 1 DP23236, Lot 1 DP23514, Lot 1 DP21705, Pt Lot 1 DP21438, Pt Secs 45, 46, 51, 86, 102 & Sections 50, 71, 105, Block VII, Shotover SD, and Sections 2, 3, 4, 5 & 6 S023945 and Section 1 S023066

Land District: Otago  
Digitally Generated Plan  
Generated on: 26/09/2008 12:21pm Page 9 of 30

Identifier

413072



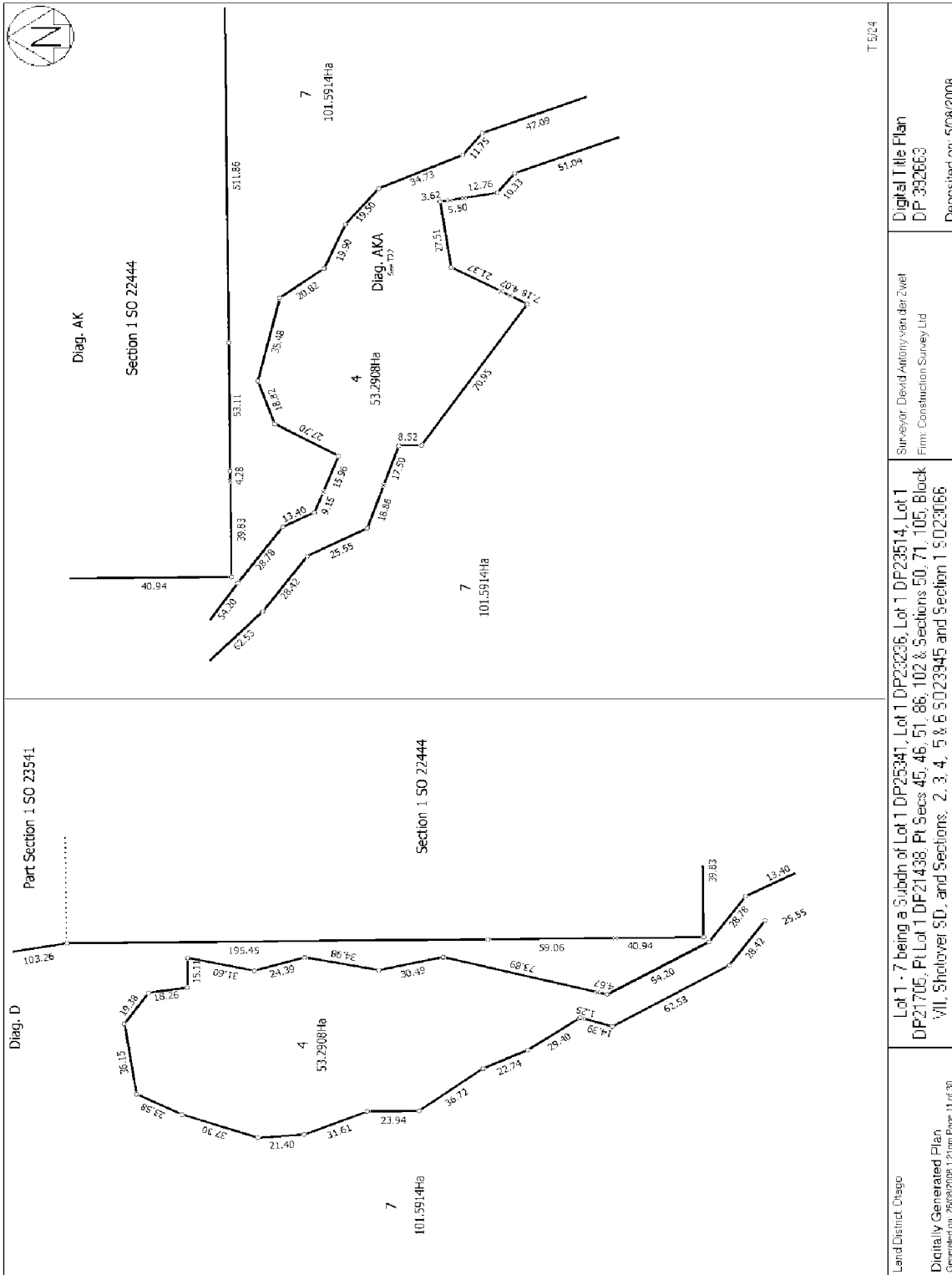
T 4/24

<p>Land District: Otago Digitally Generated Plan Generated on: 26/08/2008 12:10pm Page: 10 of 30</p>	<p>Lot 1 - 7 being a Subdn of Lot 1 DP25341, Lot 1 DP23236, Lot 1 DP23514, Lot 1 DP21705, Pt Lot 1 DP21438, Pt Secs 45, 46, 51, 86, 102 &amp; Sections 50, 71, 105, Block VII, Shotover SD, and Sections: 2, 3, 4, 5 &amp; 6 SO23945 and Section 1 SO23066</p>	<p>Surveyor: David Anthony van der Zwet Firm: Construction Survey Ltd</p>	<p>Digital Title Plan DP 352663 Deposited on: 5/08/2008</p>
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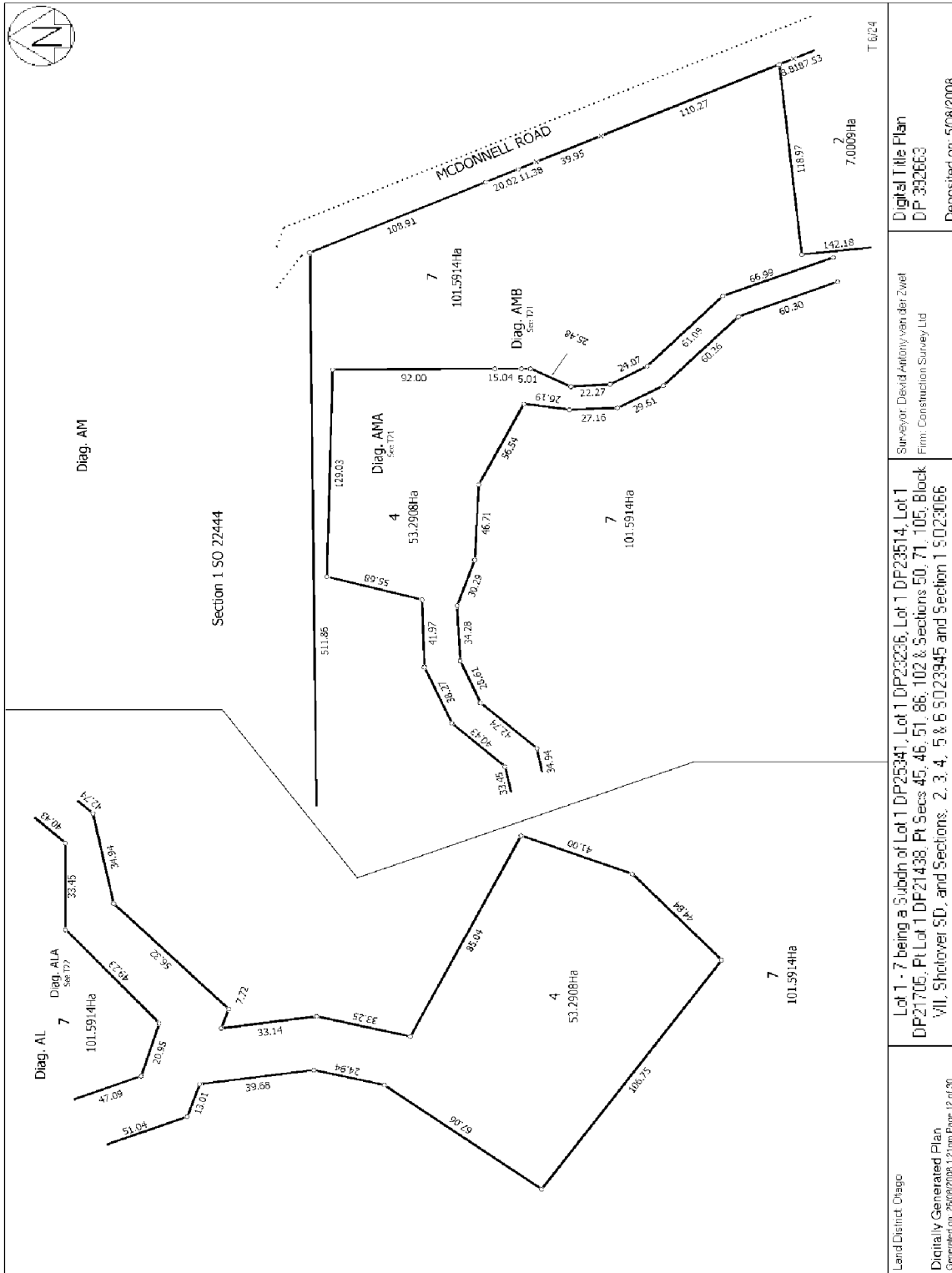
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<p>Land District: Diago</p>	<p>Surveyor: David Anthony van der Zwet Firm: Construction Survey Ltd</p>	<p>Lot 1 - 7 being a Subdn of Lot 1 DP23236, Lot 1 DP23514, Lot 1 DP21705, Pt Lot 1 DP21438, Pt Secs 45, 46, 51, 86, 102 &amp; Sections 50, 71, 105, Block VII, Sholover SD, and Sections 2, 3, 4, 5 &amp; 6 SO23345 and Section 1 SO23066</p>
<p>Digitally Generated Plan Generated on: 26/01/2008 12:11 pm Page: 11 of 30</p>	<p>Digital Title Plan DP 332663</p>	<p>Deposited on: 5/08/2008</p>

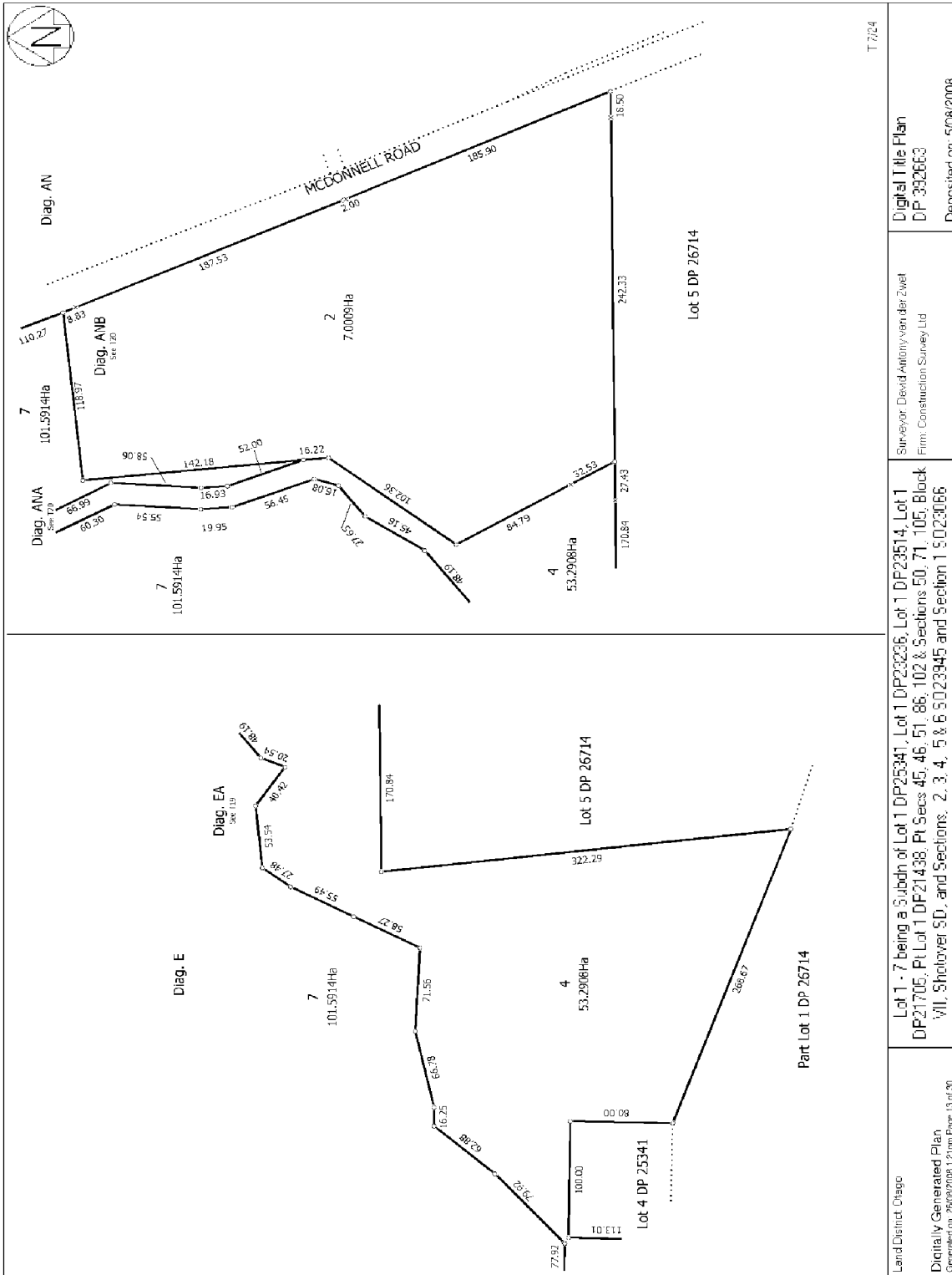
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Identifier

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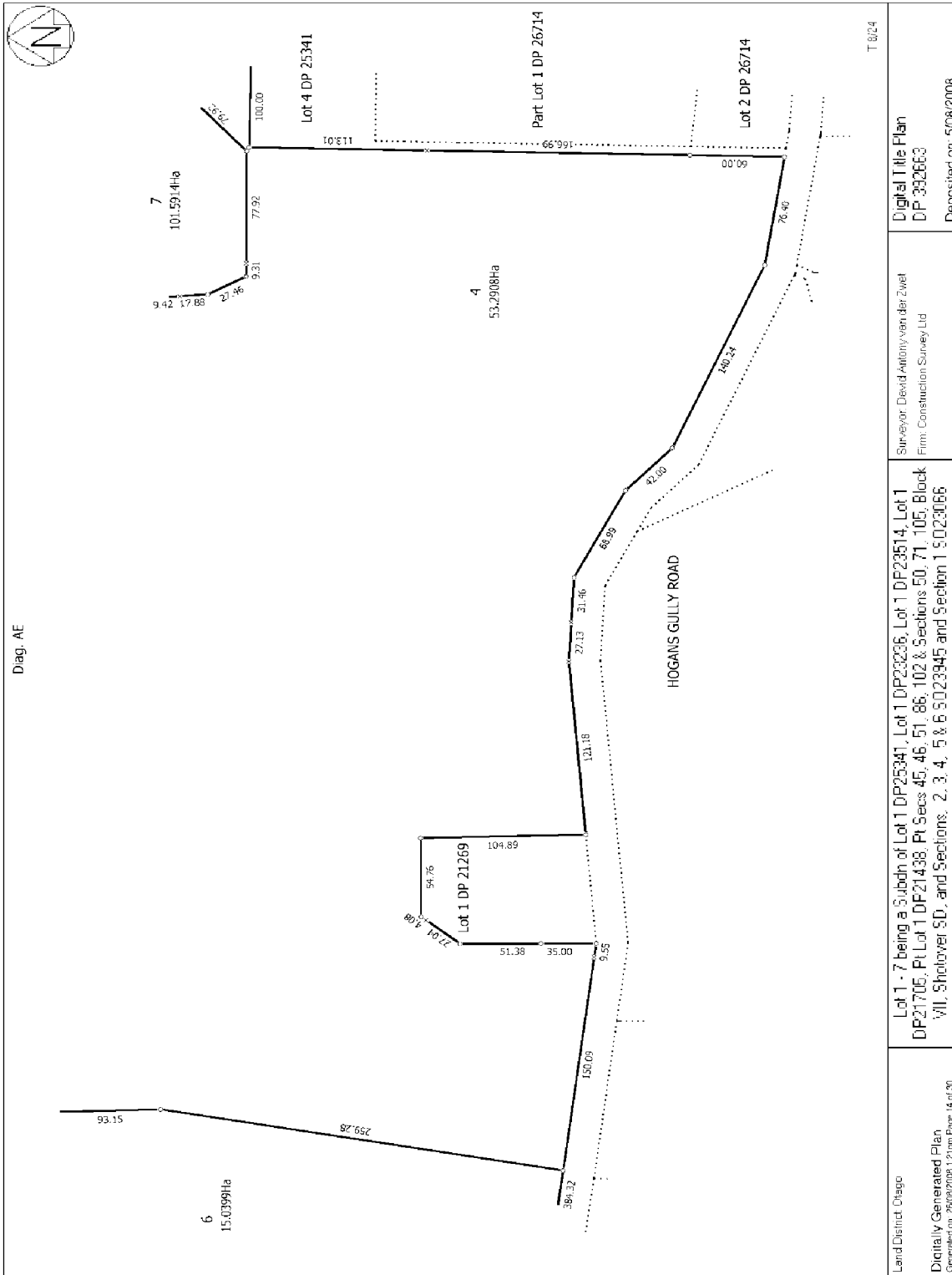


T 7/24

Land District: Diago	Surveyor: David Anthony van der Zwet Firm: Construction Survey Ltd	Digital Title Plan DP 332663
Digitally Generated Plan Generated on: 26/01/2008 12:11pm Page: 13 of 30	Lot 1 - 7 being a Subdn of Lot 1 DP23236, Lot 1 DP23514, Lot 1 DP21705, Pt Lot 1 DP21438, Pt Secs 45, 46, 51, 86, 102 & Sections 50, 71, 105, Block VII, Sholover SD, and Sections 2, 3, 4, 5 & 6 DP23345 and Section 1 DP23066	Deposited on: 5/08/2008

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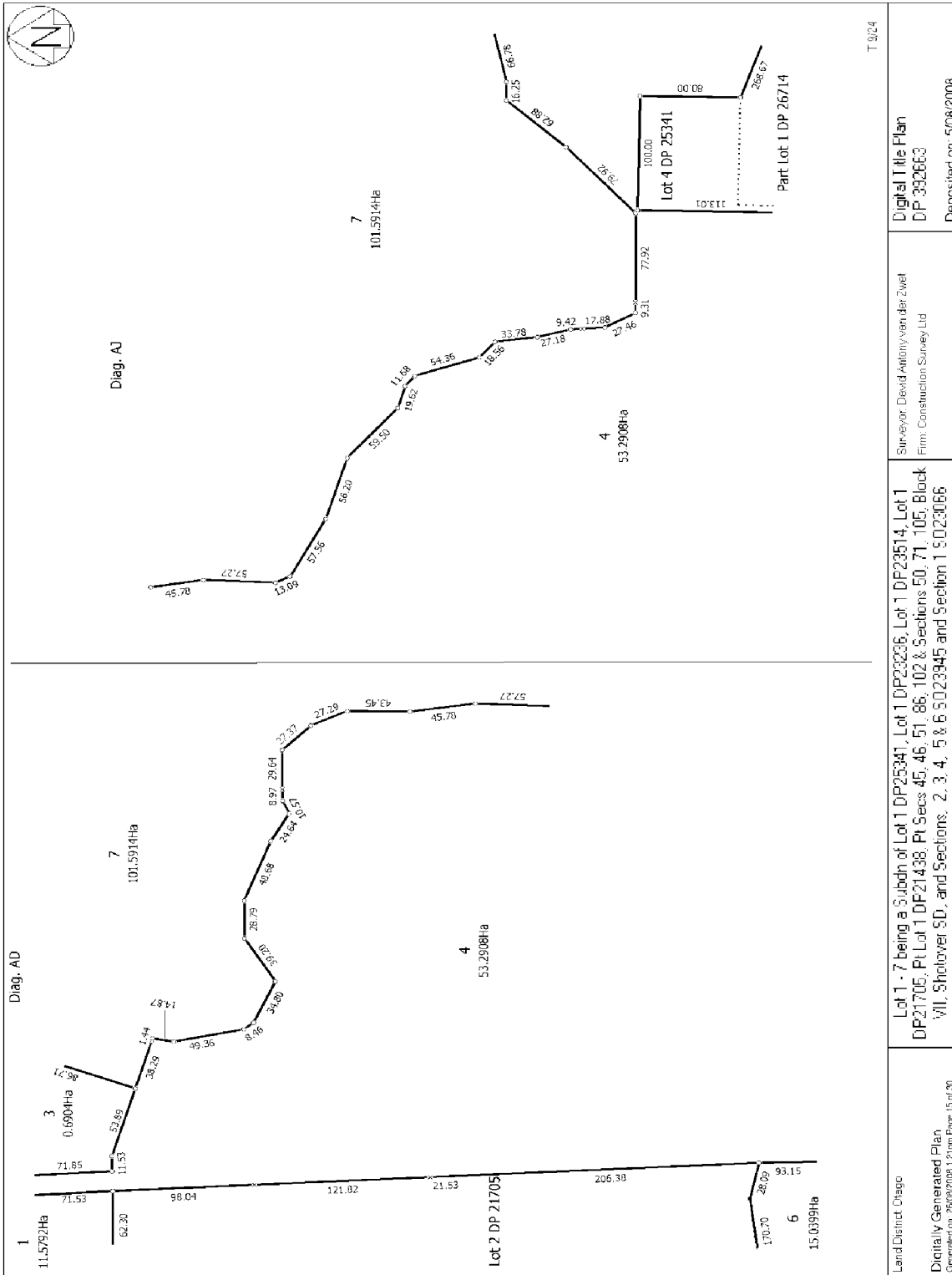
413072



Land District: Otago	Surveyor: David Anthony van der Zwet Firm: Construction Survey Ltd	Lot 1 - 7 being a Subdn of Lot 1 DP25341, Lot 1 DP23236, Lot 1 DP23514, Lot 1 DP21705, Pt Lot 1 DP21438, Pt Secs 45, 46, 51, 86, 102 & Sections 50, 71, 105, Block VII, Shotover SD, and Sections 2, 3, 4, 5 & 6 SD23945 and Section 1 SD23066
Digitally Generated Plan Generated on: 26/01/2008 12:11pm Page: 14 of 30	Digital Title Plan DP 332663	Deposited on: 5/08/2008

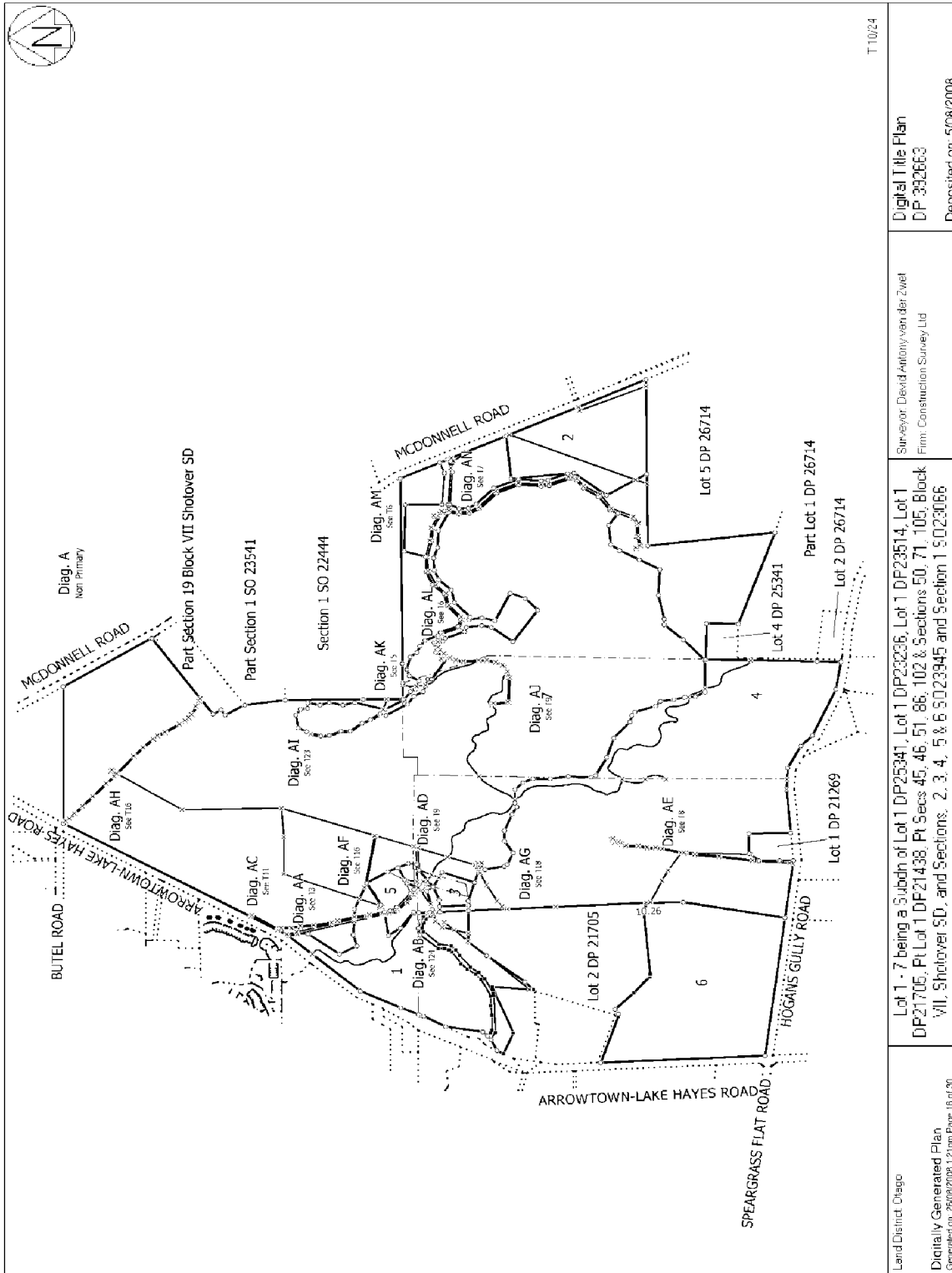
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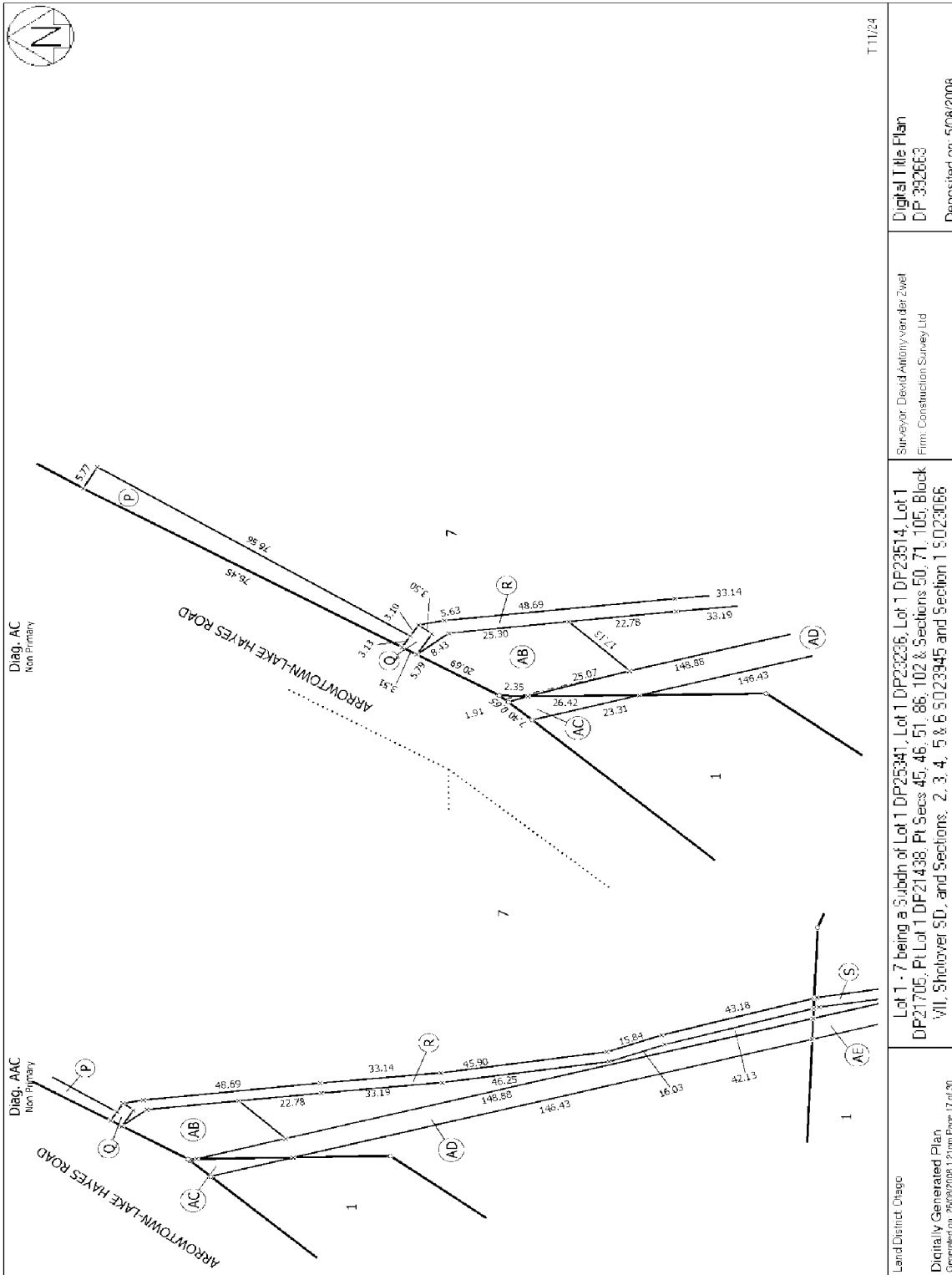


T10/24

<p>Land District: Otago</p> <p>Digitally Generated Plan</p> <p>Generated on: 26/01/2008 12:11pm Page: 16 of 30</p>	<p>Lot 1 - 7 being a Subdivn of Lot 1 DP25341, Lot 1 DP23236, Lot 1 DP23514, Lot 1 DP21705, Pt Lot 1 DP21438, Pt Secs 45, 46, 51, 86, 102 &amp; Sections 50, 71, 105, Block VII, Shotover SD, and Sections 2, 3, 4, 5 &amp; 6 SD23945 and Section 1 SD23066</p>	<p>Surveyor: David Anthony van der Zwet</p> <p>Firm: Construction Survey Ltd</p>	<p>Digital Title Plan</p> <p>DP 332663</p> <p>Deposited on: 5/08/2008</p>
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Identifier

413072



T11/24

Digital Title Plan  
DP 332663  
Deposited on: 5/08/2006

Surveyor: David Anthony van der Zwet  
Firm: Construction Survey Ltd

Lot 1 - 7 being a Subdn of Lot 1 DP25347, Lot 1 DP23236, Lot 1 DP23514, Lot 1 DP21705, Pt Lot 1 DP21438, Pt Secs 45, 46, 51, 86, 102 & Sections 50, 71, 105, Block VII, Shotover SD, and Sections 2, 3, 4, 5 & 6 SD23945 and Section 1 SD23066

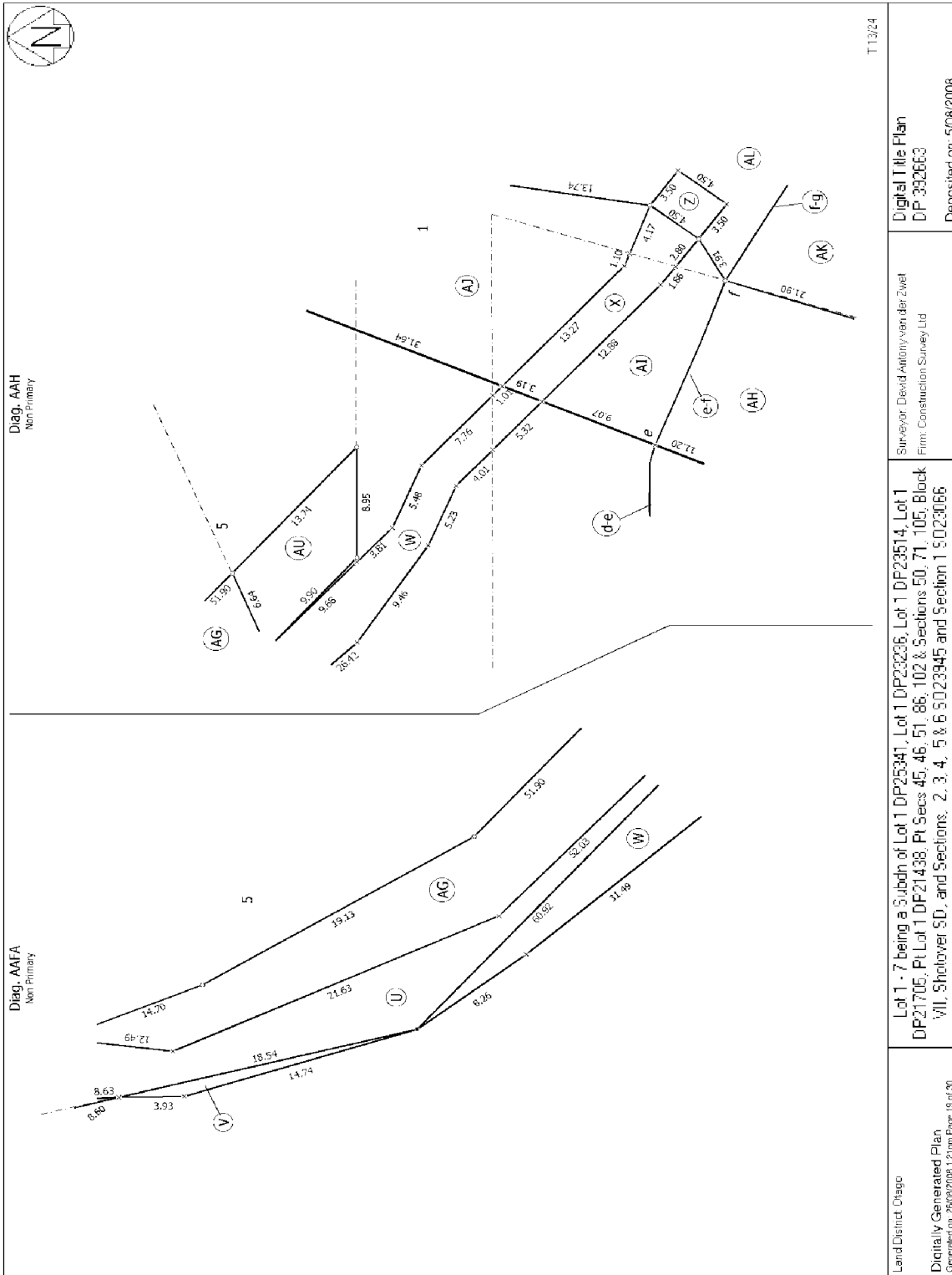
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Generated on: 26/01/2008 12:10pm Page: 17 of 30





Identifier

413072







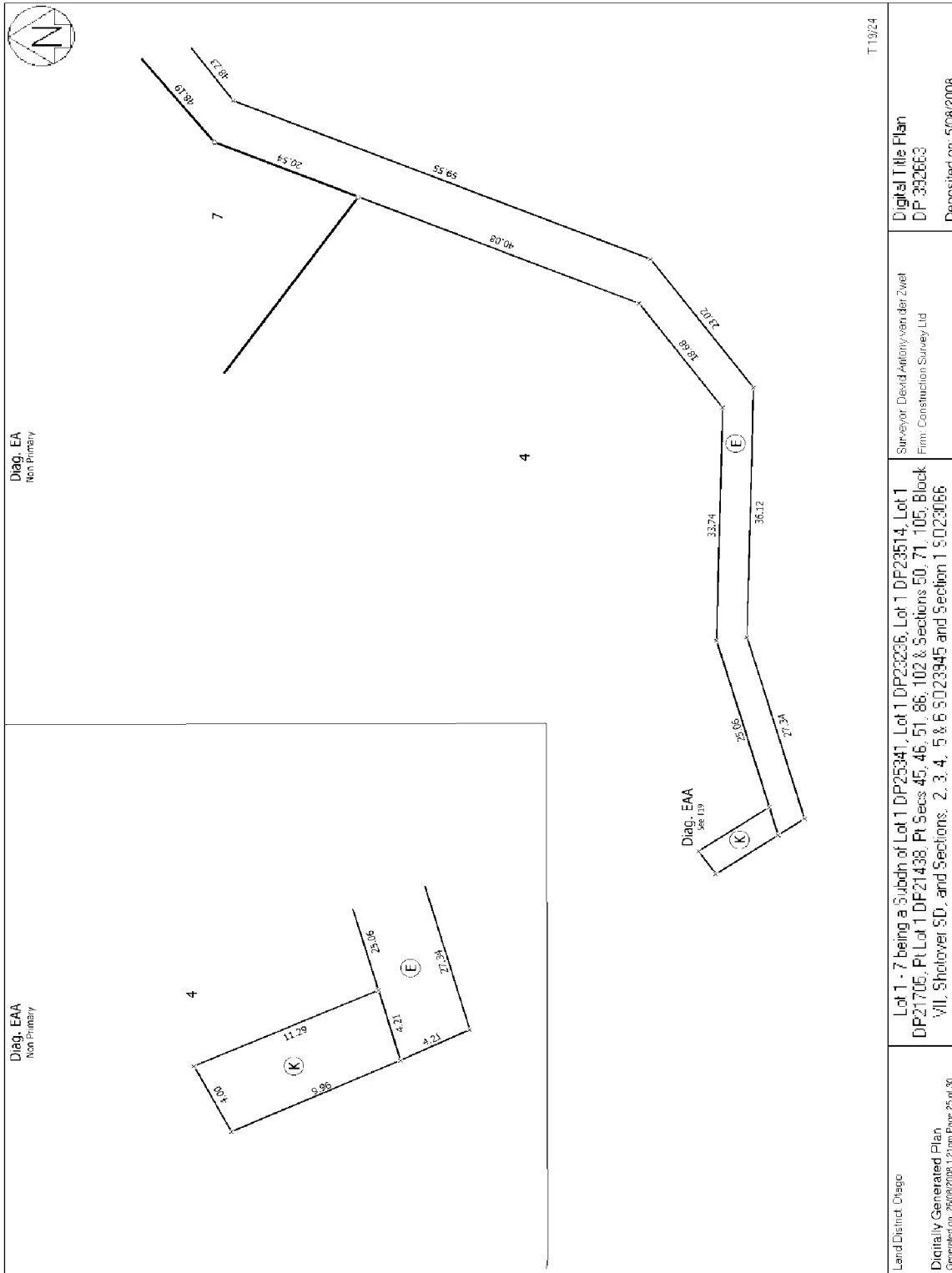






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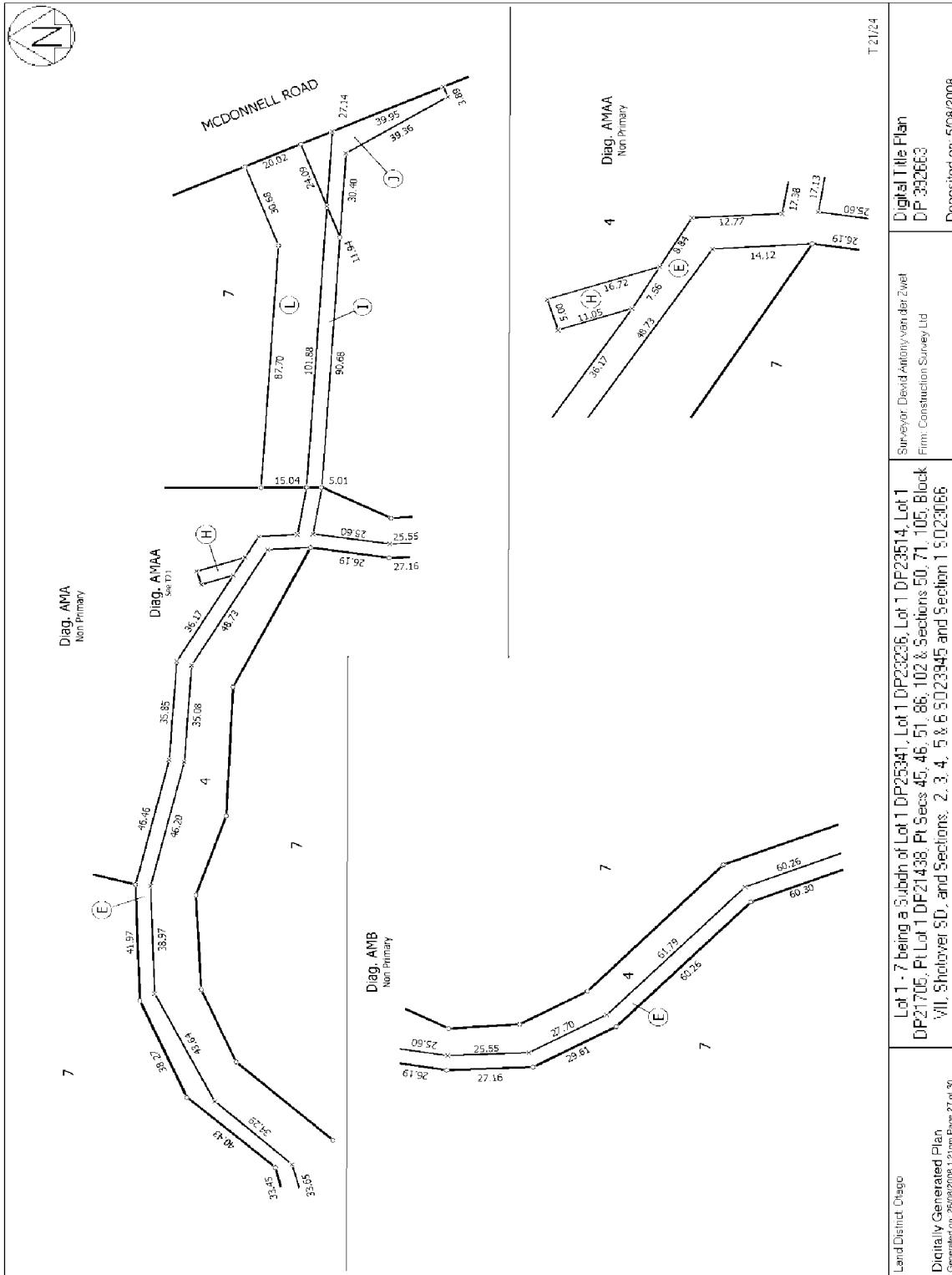






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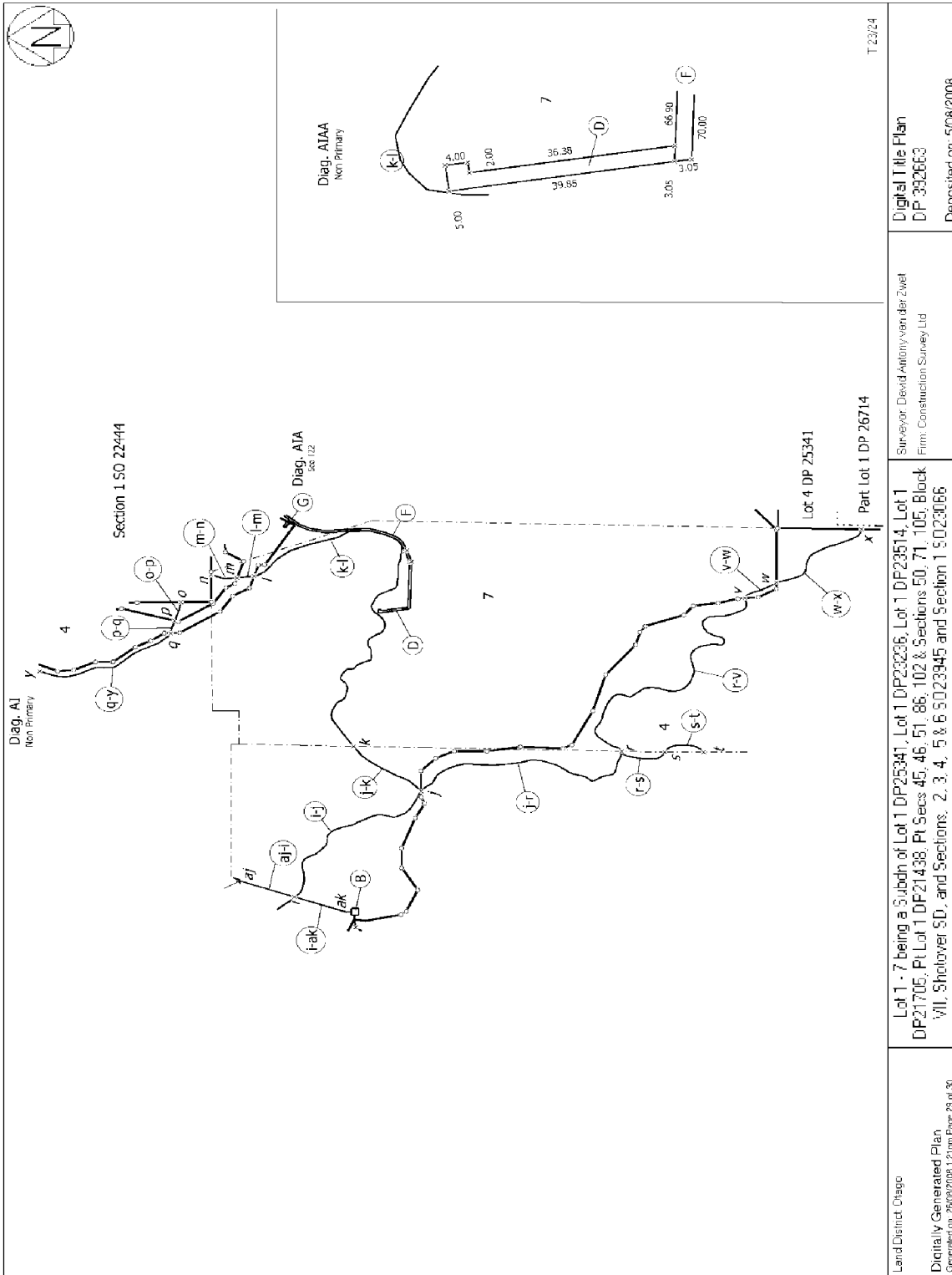
413072





Identifier

413072



T 23/24

Digital Title Plan  
DP 332663  
Deposited on: 5/08/2008

Surveyor: David Anthony van der Zwet  
Firm: Construction Survey Ltd

Lot 1 - 7 being a Subdn of Lot 1 DP25341, Lot 1 DP23236, Lot 1 DP23514, Lot 1 DP21705, Pt Lot 1 DP21438, Pt Secs 45, 46, 51, 86, 102 & Sections 50, 71, 105, Block VII, Shotover SD, and Sections 2, 3, 4, 5 & 6 SD23945 and Section 1 SD23066

Land District: Otago  
Digitally Generated Plan  
Generated on: 26/01/2008 12:11pm Page: 28 of 30



Appendix C  
Soil Profile Logs

**2387**

## SOIL PROFILE LOGS

PROJECT NUMBER: 15063  
 SITE NAME: The Hills Golf Course

FIELD STAFF: Fiona R and Rebecca T  
 METHOD: Spade

DATE: 24,25,28/9/2015  
 WEATHER: Fine and windy

Sample Location	Coordinates		Sample Depth (m)	Sample ID	Soil Lithology
A3-1	-44.953668	168.831457	0-0.1	A3-1 (0.1) 15063	Medium greyish brown LOAM with gravels and organic matter
A3-2	-44.953835	168.831510	0-0.1	A3-2 (0.1) 15063	Medium greyish brown LOAM with gravels and organic matter
A3-3	-44.953970	168.831552	0-0.1	A3-3 (0.1) 15063	Medium greyish brown LOAM with gravels and organic matter
A3-4	-44.953995	168.831353	0-0.1	A3-4 (0.1) 15063	Medium greyish brown LOAM with gravels and organic matter
A3-5	-44.953839	168.831282	0-0.1	A3-5 (0.1) 15063	Medium greyish brown LOAM with gravels and organic matter
A3-6	-44.953704	168.831248	0-0.1	A3-6 (0.1) 15063	Medium greyish brown LOAM with gravels and organic matter
A2-1	-44.952248	168.829444	0-0.1	A2-1 (0.1) 15063	Medium brown LOAM with fine gravels and organic matter
A2-2	-44.952175	168.829619	0-0.1	A2-2 (0.1) 15063	Medium brown LOAM with organic matter
A2-3	-44.952318	168.829634	0-0.1	A2-3 (0.1) 15063	Medium brown LOAM with organic matter
A2-4	-44.951990	168.829387	0-0.1	A2-4 (0.1) 15063	Medium brown LOAM with gravels and organic matter
A2-5	-44.951771	168.829472	0-0.1	A2-5 (0.1) 15063	Medium brown LOAM with gravels and organic matter
A2-6	-44.951561	168.829553	0-0.1	A2-6 (0.1) 15063	Medium brown LOAM with gravels and organic matter
A2-7	-44.951644	168.829276	0-0.1	A2-7 (0.1) 15063	Medium brown LOAM with gravels and organic matter
A2-8	-44.951444	168.829274	0-0.1	A2-8 (0.1) 15063	Medium brown LOAM with gravels and organic matter
A2-9	-44.951235	168.829287	0-0.1	A2-9 (0.1) 15063	Medium brown LOAM with gravels and organic matter
A8-1	-44.947848	168.831629	0-0.1	A8-1 (0.1) 15063	Medium brown clayey SILT with fine gravels
A8-2	-44.947711	168.831499	0-0.1	A8-2 (0.1) 15063	Medium brown clayey SILT with coarse gravels
A8-3	-44.947577	168.831411	0-0.1	A8-3 (0.1) 15063	Medium brown clayey SILT with fine to coarse gravels
A8-4	-44.947435	168.831273	0-0.1	A8-4 (0.1) 15063	Medium brown clayey SILT with fine to coarse gravels
A8-5	-44.947329	168.831179	0-0.1	A8-5 (0.1) 15063	Medium brown clayey SILT with fine to coarse gravels
A8-6	-44.947474	168.830918	0-0.1	A8-6 (0.1) 15063	Medium brown clayey SILT with fine gravels
A8-7	-44.947569	168.831119	0-0.1	A8-7 (0.1) 15063	Medium brown clayey SILT with fine gravels
A8-8	-44.947707	168.831225	0-0.1	A8-8 (0.1) 15063	Medium brown clayey SILT with fine gravels
A8-9	-44.947828	168.831324	0-0.1	A8-9 (0.1) 15063	Medium brown clayey SILT with fine gravels
A7-1	-44.958514	168.835761	0-0.1	A7-1 (0.1) 15063	Medium brown clayey SILT with organic matter
A7-2	-44.958823	168.835456	0-0.1	A7-2 (0.1) 15063	Medium brown clayey SILT with cobbles and organic matter
A7-3	-44.959060	168.835291	0-0.1	A7-3 (0.1) 15063	Medium brown clayey SILT with organic matter
A7-4	-44.958855	168.834986	0-0.1	A7-4 (0.1) 15063	Greyish brown LOAM with gravels, cobbles and organic matter
A7-5	-44.958668	168.835221	0-0.1	A7-5 (0.1) 15063	Medium brown clayey SILT with organic matter
A7-6	-44.958383	168.835514	0-0.1	A7-6 (0.1) 15063	Medium brown clayey SILT with gravels and organic matter
A6-1	-44.957233	168.832233	0-0.1	A6-1 (0.1) 15063	Medium brown clayey SILT with organic matter
A6-2	-44.956790	168.832294	0-0.1	A6-2 (0.1) 15063	Medium brown clayey SILT with organic matter

Sample Location	Coordinates		Sample Depth (m)	Sample ID	Soil Lithology
A6-3	-44.957045	168.832857	0-0.1	A6-3 (0.1) 15063	Medium brown clayey SILT with organic matter
A5-1	-44.955807	168.833495	0-0.1	A5-1 (0.1) 15063	Medium brown clayey SILT with organic matter
A5-2	-44.956240	168.833301	0-0.1	A5-2 (0.1) 15063	Medium brown clayey SILT with organic matter
A5-3	-44.956673	168.833189	0-0.1	A5-3 (0.1) 15063	Medium brown clayey SILT with organic matter
A5-4	-44.956309	168.832755	0-0.1	A5-4 (0.1) 15063	Medium brown clayey SILT with organic matter
A5-5	-44.955871	168.832863	0-0.1	A5-5 (0.1) 15063	Medium brown clayey SILT with organic matter
A5-6	-44.955586	168.832862	0-0.1	A5-6 (0.1) 15063	Medium brown clayey SILT with organic matter
A4-1	-44.955690	168.835327	0-0.1	A4-1 (0.1) 15063	Medium brown clayey SILT with gravels, cobbles and organic matter
A4-2	-44.956006	168.835100	0-0.1	A4-2 (0.1) 15063	Medium brown clayey SILT with organic matter
A4-3	-44.955667	168.834969	0-0.1	A4-3 (0.1) 15063	Medium brown clayey SILT with gravels and organic matter
A4-4	-44.955321	168.835028	0-0.1	A4-4 (0.1) 15063	Medium brown clayey SILT with organic matter
A4-5	-44.955217	168.834884	0-0.1	A4-5 (0.1) 15063	Medium brown LOAM with fine gravels and organic matter
A4-6	-44.955335	168.834701	0-0.1	A4-6 (0.1) 15063	Medium brown clayey SILT with gravels and organic matter
A4-7	-44.954172	168.834888	0-0.1	A4-7 (0.1) 15063	Medium brown LOAM with fine gravels and organic matter
A4-8	-44.954224	168.834564	0-0.1	A4-8 (0.1) 15063	Medium brown clayey SILT with organic matter
A4-9	-44.954365	168.834468	0-0.1	A4-9 (0.1) 15063	Medium brown clayey SILT with organic matter
A4-10	-44.954744	168.834722	0-0.1	A4-10 (0.1) 15063	Medium brown clayey SILT with gravels and organic matter
A4-11	-44.954820	168.835265	0-0.1	A4-11 (0.1) 15063	Medium brown clayey SILT with organic matter
A4-12	-44.954591	168.835174	0-0.1	A4-12 (0.1) 15063	Medium brown clayey SILT with organic matter
A4-13	-44.954107	168.833959	0-0.1	A4-13 (0.1) 15063	Medium brown clayey SILT with gravels, cobbles and organic matter
A4-14	-44.953946	168.833738	0-0.1	A4-14 (0.1) 15063	Medium brown clayey SILT with gravels and organic matter
A4-15	-44.953924	168.833929	0-0.1	A4-15 (0.1) 15063	Medium brown clayey SILT with organic matter
A1-1	-44.954958	168.828345	0-0.15	A1-1 (0.15) 15063	Medium greish brown clayey SILT with pine litter
A1-2	-44.955106	168.828588	0-0.15	A1-2 (0.15) 15063	Medium greish brown clayey SILT with gravels and pine litter
A1-3	-44.955221	168.828875	0-0.15	A1-3 (0.15) 15063	Medium greish brown clayey SILT with gravels and pine litter
A1-4	-44.955259	168.829018	0-0.15	A1-4 (0.15) 15063	Medium greish brown clayey SILT with gravels and pine litter
A1-5	-44.955465	168.829288	0-0.15	A1-5 (0.15) 15063	Medium greish brown clayey SILT with gravels and pine litter
A1-6	-44.955578	168.829575	0-0.15	A1-6 (0.15) 15063	Medium greish brown clayey SILT with gravels and pine litter
A1-7	-44.955586	168.829760	0-0.15	A1-7 (0.15) 15063	Friabel medium greish brown clayey SILT with gravels and pine litter
A1-8	-44.955614	168.830152	0-0.15	A1-8 (0.15) 15063	Medium greish brown clayey SILT with gravels and pine litter
A1-9	-44.955653	168.830382	0-0.15	A1-9 (0.15) 15063	Medium greish brown clayey SILT with pine litter
A10-1	-44.955033	168.823013	0-0.1	A10-1 (0.1) 15063	Medium brown clayey SILT with organic matter
A10-2	-44.955333	168.823038	0-0.1	A10-2 (0.1) 15063	Medium brown clayey SILT with organic matter
A10-3	-44.955647	168.823123	0-0.1	A10-3 (0.1) 15063	Medium brown clayey SILT with organic matter
A10-4	-44.955664	168.823496	0-0.1	A10-4 (0.1) 15063	Medium brown clayey SILT with organic matter
A10-5	-44.955412	168.823418	0-0.1	A10-5 (0.1) 15063	Medium brown clayey SILT with organic matter
A10-6	-44.955122	168.823285	0-0.1	A10-6 (0.1) 15063	Medium brown clayey SILT with organic matter
A10-7	-44.956763	168.823309	0-0.1	A10-7 (0.1) 15063	Medium brown clayey SILT with organic matter
A10-8	-44.956427	168.823278	0-0.1	A10-8 (0.1) 15063	Medium brown clayey SILT with organic matter
A10-9	-44.956144	168.823275	0-0.1	A10-9 (0.1) 15063	Medium brown clayey SILT with organic matter

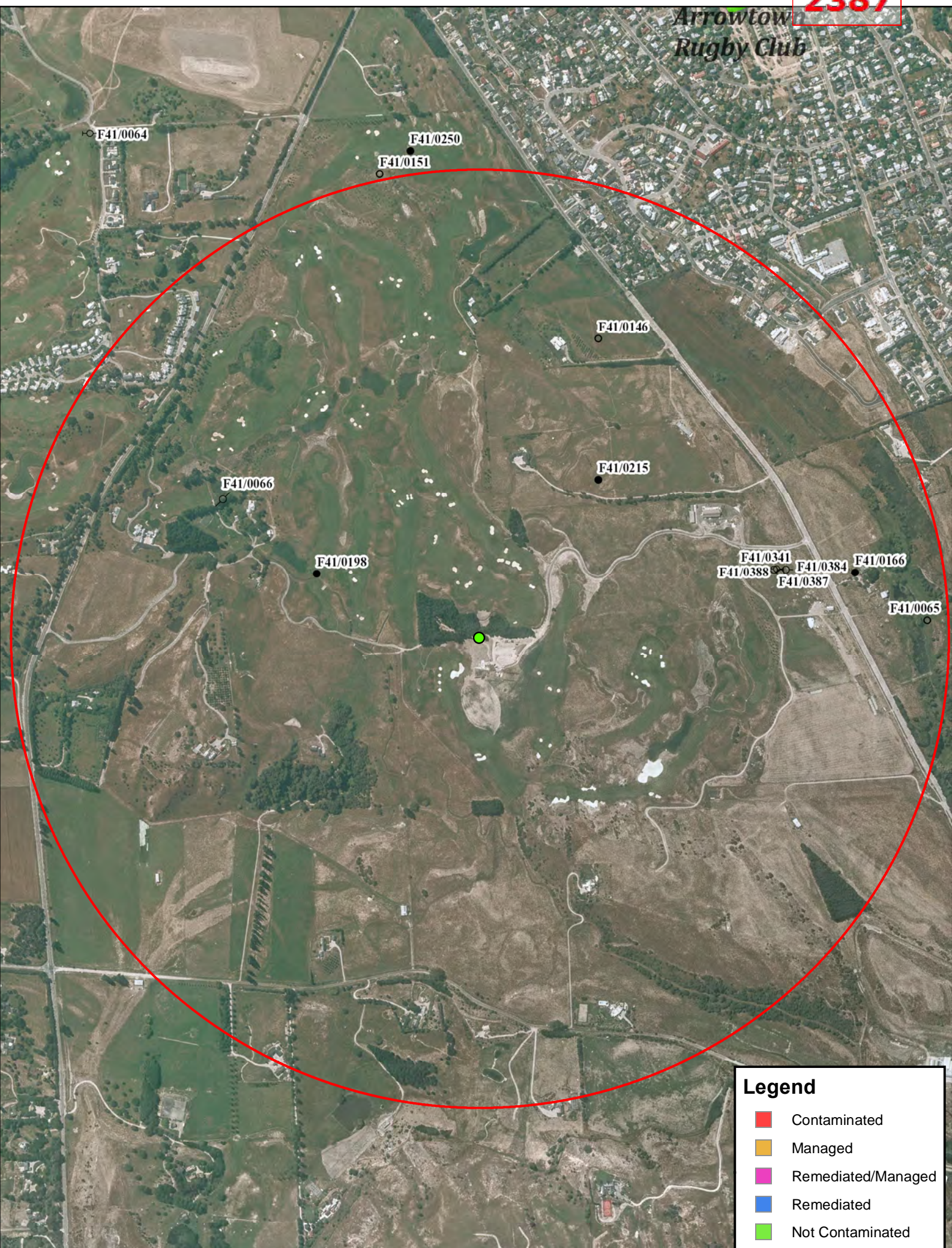
Sample Location	Coordinates		Sample Depth (m)	Sample ID	Soil Lithology
A10-10	-44.956121	168.823591	0-0.1	A10-10 (0.1) 15063	Medium brown clayey SILT with organic matter
A10-11	-44.956425	168.823663	0-0.1	A10-11 (0.1) 15063	Medium brown clayey SILT with organic matter
A10-12	-44.956729	168.823741	0-0.1	A10-12 (0.1) 15063	Medium brown clayey SILT with organic matter
A9-1	-44.954633	168.823664	0-0.1	A9-1 (0.1) 15063	Medium brown clayey SILT with organic matter
A9-2	-44.954564	168.823423	0-0.1	A9-2 (0.1) 15063	Medium brown clayey SILT with organic matter
A9-3	-44.954489	168.823343	0-0.1	A9-3 (0.1) 15063	Medium brown clayey SILT with organic matter
A9-4	-44.954154	168.823652	0-0.1	A9-4 (0.1) 15063	Medium brown clayey SILT with organic matter
A9-5	-44.954349	168.823505	0-0.1	A9-5 (0.1) 15063	Medium brown clayey SILT with organic matter
A9-6	-44.954126	168.823430	0-0.1	A9-6 (0.1) 15063	Medium brown clayey SILT with organic matter
HS10-1	-44.957237	168.826610	0-0.1	HS10-1 (0.1) 15063	Medium brown clayey SILT with organic matter
HS10-2	-44.957368	168.826526	0-0.1	HS10-2 (0.1) 15063	Medium brown clayey SILT with organic matter
HS10-3	-44.957455	168.826470	0-0.1	HS10-3 (0.1) 15063	Medium brown clayey SILT with organic matter
HS10-4	-44.957476	168.826727	0-0.1	HS10-4 (0.1) 15063	Medium brown clayey SILT with organic matter
HS10-5	-44.957371	168.826759	0-0.1	HS10-5 (0.1) 15063	Medium brown clayey SILT with organic matter
HS10-6	-44.957254	168.826893	0-0.1	HS10-6 (0.1) 15063	Medium brown clayey SILT with organic matter
HS5-1	-44.958729	168.829504	0-0.1	HS5-1 (0.1) 15063	Medium brown clayey SILT with organic matter
HS5-2	-44.958619	168.829401	0-0.1	HS5-2 (0.1) 15063	Medium brown clayey SILT with gravels and organic matter
HS5-3	-44.958713	168.829218	0-0.1	HS5-3 (0.1) 15063	Medium brown clayey SILT with organic matter
HS5-4	-44.958604	168.829136	0-0.1	HS5-4 (0.1) 15063	Medium brown clayey SILT with organic matter
HS5-5	-44.958445	168.829111	0-0.1	HS5-5 (0.1) 15063	Medium brown clayey SILT with organic matter
HS5-6	-44.958488	168.829321	0-0.1	HS5-6 (0.1) 15063	Medium brown clayey SILT with organic matter
HS9-1	-44.958347	168.828034	0-0.1	HS9-1 (0.1) 15063	Medium brown clayey SILT with organic matter
HS9-2	-44.958503	168.828061	0-0.1	HS9-2 (0.1) 15063	Medium brown clayey SILT with fine sand and organic matter
HS9-3	-44.958771	168.828020	0-0.1	HS9-3 (0.1) 15063	Medium brown clayey SILT with organic matter
HS9-4	-44.958834	168.828350	0-0.1	HS9-4 (0.1) 15063	Medium brown clayey SILT with organic matter
HS9-5	-44.958559	168.828370	0-0.1	HS9-5 (0.1) 15063	Medium brown clayey SILT with organic matter
HS9-6	-44.958317	168.828272	0-0.1	HS9-6 (0.1) 15063	Medium brown clayey SILT with organic matter
HS1-1	-44.960687	168.834866	0-0.1	HS1-1 (0.1) 15063	Medium brown clayey SILT with organic matter
HS1-2	-44.960735	168.834694	0-0.1	HS1-2 (0.1) 15063	Medium brown clayey SILT with organic matter
HS1-3	-44.960715	168.834485	0-0.1	HS1-3 (0.1) 15063	Medium brown clayey SILT with fine gravels and organic matter
HS1-4	-44.960548	168.834513	0-0.1	HS1-4 (0.1) 15063	Medium brown clayey SILT with organic matter
HS1-5	-44.960491	168.834695	0-0.1	HS1-5 (0.1) 15063	Medium brown clayey SILT with organic matter
HS1-6	-44.960471	168.834898	0-0.1	HS1-6 (0.1) 15063	Medium brown clayey SILT with organic matter
HS8-1	-44.959593	168.832855	0-0.1	HS8-1 (0.1) 15063	Medium brown clayey SILT with organic matter
HS8-2	-44.959633	168.833053	0-0.1	HS8-2 (0.1) 15063	Medium brown clayey SILT with organic matter
HS8-3	-44.959637	168.833244	0-0.1	HS8-3 (0.1) 15063	Medium brown clayey SILT with weathered schist rock and organic matter
HS8-4	-44.959459	168.833198	0-0.1	HS8-4 (0.1) 15063	Medium brown clayey SILT with weathered schist rock and organic matter
HS8-5	-44.959484	168.833022	0-0.1	HS8-5 (0.1) 15063	Medium brown clayey SILT with organic matter
HS8-6	-44.959533	168.832848	0-0.1	HS8-6 (0.1) 15063	Medium brown clayey SILT with weathered schist rock and organic matter
HS4-1	-44.960751	168.827166	0-0.1	HS4-1 (0.1) 15063	Medium greyish brown clayey sandy SILT with gravels, cobbles and organic matter



Sample Location	Coordinates		Sample Depth (m)	Sample ID	Soil Lithology
HS4-2	-44.960861	168.827169	0-0.1	HS4-2 (0.1) 15063	Medium greish brown clayey SILT with organic matter
HS4-3	-44.961099	168.827376	0-0.1	HS4-3 (0.1) 15063	Medium brownish grey claeys SILT with cobbles and organic matter
HS4-4	-44.960780	168.827446	0-0.1	HS4-4 (0.1) 15063	Medium brown silty clayey GRAVEL with organic matter
HS4-5	-44.960666	168.827293	0-0.1	HS4-5 (0.1) 15063	Medium brown clayey SILT with organic matter
HS4-6	-44.960639	168.827487	0-0.1	HS4-6 (0.1) 15063	Medium brown clayey SILT with organic matter
HS2-1	-44.961038	168.830664	0-0.1	HS2-1 (0.1) 15063	Medium brown clayey SILT with organic matter
HS2-2	-44.961203	168.830643	0-0.1	HS2-2 (0.1) 15063	Medium brown clayey SILT with organic matter
HS2-3	-44.961324	168.830596	0-0.1	HS2-3 (0.1) 15063	Medium brown clayey SILT with organic matter
HS2-4	-44.961304	168.830383	0-0.1	HS2-4 (0.1) 15063	Medium brown clayey SILT with organic matter
HS2-5	-44.961162	168.830403	0-0.1	HS2-5 (0.1) 15063	Medium brown clayey SILT with organic matter
HS2-6	-44.961003	168.830444	0-0.1	HS2-6 (0.1) 15063	Medium brown clayey SILT with organic matter
HS3-1	-44.960463	168.829568	0-0.1	HS3-1 (0.1) 15063	Medium brown clayey SILT with organic matter
HS3-2	-44.960371	168.829697	0-0.1	HS3-2 (0.1) 15063	Medium brown clayey SILT with gravels and organic matter
HS3-3	-44.960490	168.829759	0-0.1	HS3-3 (0.1) 15063	Medium brown clayey SILT with organic matter
HS3-4	-44.960253	168.829399	0-0.1	HS3-4 (0.1) 15063	Medium brown clayey SILT with gravels and organic matter
HS3-5	-44.960231	168.829573	0-0.1	HS3-5 (0.1) 15063	Medium brown clayey SILT with organic matter
HS3-6	-44.960094	168.829504	0-0.1	HS3-6 (0.1) 15063	Medium brown clayey SILT with organic matter

Appendix D  
Bore Search Information

Arrowtown  
Rugby Club



**Legend**

- Contaminated
- Managed
- Remediated/Managed
- Remediated
- Not Contaminated
- Unknown

0 0.2 0.4 0.8 Kilometers

Appendix E  
Soil Sample and Analysis Summary Table

Composite Analysis			
Area/House site	Sample ID	Sample Depth	Heavy Metals Composite
A3	A3-1	0-0.1	1
	A3-2	0-0.1	
	A3-3	0-0.1	
	A3-4	0-0.1	2
	A3-5	0-0.1	
	A3-6	0-0.1	
A2	A2-1	0-0.1	3
	A2-2	0-0.1	
	A2-3	0-0.1	
	A2-4	0-0.1	4
	A2-5	0-0.1	
	A2-6	0-0.1	
	A2-7	0-0.1	5
	A2-8	0-0.1	
	A2-9	0-0.1	
A8	A8-1	0-0.1	6
	A8-2	0-0.1	
	A8-3	0-0.1	
	A8-4	0-0.1	7
	A8-5	0-0.1	
	A8-6	0-0.1	
	A8-7	0-0.1	8
	A8-8	0-0.1	
	A8-9	0-0.1	
A7	A7-1	0-0.1	9
	A7-2	0-0.1	
	A7-3	0-0.1	
	A7-4	0-0.1	10
	A7-5	0-0.1	
	A7-6	0-0.1	
A6	A6-1	0-0.1	11
	A6-2	0-0.1	
	A6-3	0-0.1	
A5	A5-1	0-0.1	12
	A5-2	0-0.1	
	A5-3	0-0.1	
	A5-4	0-0.1	13
	A5-5	0-0.1	
	A5-6	0-0.1	
A4	A4-1	0-0.1	14
	A4-2	0-0.1	
	A4-3	0-0.1	
	A4-4	0-0.1	15
	A4-5	0-0.1	
	A4-6	0-0.1	
	A4-7	0-0.1	16
	A4-8	0-0.1	
	A4-9	0-0.1	

Area/House site	Sample ID	Sample Depth	Heavy Metals Composite
A4	A4-10	0-0.1	17
	A4-11	0-0.1	
	A4-12	0-0.1	
	A4-13	0-0.1	18
	A4-14	0-0.1	
	A4-15	0-0.1	
A1	A1-1	0.05-0.15	19
	A1-2	0.05-0.15	
	A1-3	0.05-0.15	
	A1-4	0.05-0.15	20
	A1-5	0.05-0.15	
	A1-6	0.05-0.15	
	A1-7	0.05-0.15	21
	A1-8	0.05-0.15	
	A1-9	0.05-0.15	
A10	A10-1	0-0.1	22
	A10-2	0-0.1	
	A10-3	0-0.1	
	A10-4	0-0.1	23
	A10-5	0-0.1	
	A10-6	0-0.1	
	A10-7	0-0.1	24
	A10-8	0-0.1	
	A10-9	0-0.1	
	A10-10	0-0.1	25
	A10-11	0-0.1	
	A10-12	0-0.1	
A9	A9-1	0-0.1	26
	A9-2	0-0.1	
	A9-3	0-0.1	
	A9-4	0-0.1	27
	A9-5	0-0.1	
	A9-6	0-0.1	
HS10	HS10-1	0-0.1	28
	HS10-2	0-0.1	
	HS10-3	0-0.1	
	HS10-4	0-0.1	29
	HS10-5	0-0.1	
	HS10-6	0-0.1	
HS5	HS5-1	0-0.1	30
	HS5-2	0-0.1	
	HS5-3	0-0.1	
	HS5-4	0-0.1	31
	HS5-5	0-0.1	
	HS5-6	0-0.1	
HS9	HS9-1	0-0.1	32
	HS9-2	0-0.1	
	HS9-3	0-0.1	
	HS9-4	0-0.1	33

Area/House site	Sample ID	Sample Depth	Heavy Metals Composite
HS9	HS9-5	0-0.1	33
	HS9-6	0-0.1	
HS1	HS1-1	0-0.1	34
	HS1-2	0-0.1	
	HS1-3	0-0.1	
	HS1-4	0-0.1	35
	HS1-5	0-0.1	
	HS1-6	0-0.1	
HS8	HS8-1	0-0.1	36
	HS8-2	0-0.1	
	HS8-3	0-0.1	
	HS8-4	0-0.1	37
	HS8-5	0-0.1	
	HS8-6	0-0.1	
HS2	HS2-1	0-0.1	38
	HS2-2	0-0.1	
	HS2-3	0-0.1	
	HS2-4	0-0.1	39
	HS2-5	0-0.1	
	HS2-6	0-0.1	
HS3	HS3-1	0-0.1	40
	HS3-2	0-0.1	
	HS3-3	0-0.1	
	HS3-4	0-0.1	41
	HS3-5	0-0.1	
	HS3-6	0-0.1	

Sample ID	Sample Depth	Individual Analysis
DUP1	0-0.1	Organochlorine Pesticides
DUP2	0-0.1	Organochlorine Pesticides
A3-2	0-0.1	Organochlorine Pesticides
A3-5	0-0.1	Organochlorine Pesticides
A2-2	0-0.1	Organochlorine Pesticides
A2-5	0-0.1	Organochlorine Pesticides
A2-8	0-0.1	Organochlorine Pesticides
A8-2	0-0.1	Organochlorine Pesticides
A8-5	0-0.1	Organochlorine Pesticides
A8-8	0-0.1	Organochlorine Pesticides
A7-2	0-0.1	Organochlorine Pesticides
A7-5	0-0.1	Multi-Residue pesticides
A6-2	0-0.1	Organochlorine Pesticides
A5-1	0-0.1	Organochlorine Pesticides
A5-5	0-0.1	Organochlorine Pesticides
A4-2	0-0.1	Organochlorine Pesticides
A4-5	0-0.1	Organochlorine Pesticides
A4-8	0-0.1	Organochlorine Pesticides
A4-11	0-0.1	Organochlorine Pesticides
A4-14	0-0.1	Organochlorine Pesticides
DUP3	0-0.1	Organochlorine Pesticides

Sample ID	Sample Depth	Individual Analysis
DUP4	0-0.1	Organochlorine Pesticides
DUP5	0-0.1	Organochlorine Pesticides
A1-3	0.05-0.15	Organochlorine Pesticides
A1-5	0.05-0.15	Organochlorine Pesticides
A1-8	0.05-0.15	Organochlorine Pesticides
A10-2	0-0.1	Organochlorine Pesticides
A10-5	0-0.1	Organochlorine Pesticides
A10-8	0-0.1	Organochlorine Pesticides
A10-11	0-0.1	Organochlorine Pesticides
A9-2	0-0.1	Organochlorine Pesticides
A9-5	0-0.1	Organochlorine Pesticides
HS10-2	0-0.1	Organochlorine Pesticides
HS10-5	0-0.1	Organochlorine Pesticides
HS5-2	0-0.1	Organochlorine Pesticides
HS5-5	0-0.1	Organochlorine Pesticides
HS9-3	0-0.1	Organochlorine Pesticides
HS9-5	0-0.1	Organochlorine Pesticides
HS1-2	0-0.1	Organochlorine Pesticides
HS1-5	0-0.1	Organochlorine Pesticides
HS8-1	0-0.1	Organochlorine Pesticides
HS8-5	0-0.1	Organochlorine Pesticides
DUP6	0-0.1	Organochlorine Pesticides
HS2-2	0-0.1	Organochlorine Pesticides
HS2-6	0-0.1	Organochlorine Pesticides
HS3-2	0-0.1	Organochlorine Pesticides
HS3-5	0-0.1	Organochlorine Pesticides
HS4-1	0-0.1	Heavy Metals and Organochlorine Pesticides
HS4-2	0-0.1	Heavy Metals and Organochlorine Pesticides
HS4-3	0-0.1	Heavy Metals and Organochlorine Pesticides
HS4-4	0-0.1	Heavy Metals and Organochlorine Pesticides
HS4-5	0-0.1	Heavy Metals and Organochlorine Pesticides
HS4-6	0-0.1	Heavy Metals and Organochlorine Pesticides



Appendix F  
Laboratory analytical certificate and results, and chain of custody documentation.

Heavy Metals Composite9	A7-3	24/09/2015
	A7-4	
	A7-5	
Heavy Metals Composite10	A7-6	
	A6-1	
	A6-2	
Heavy Metals Composite11	A6-3	
	A5-1	
	A5-2	
Heavy Metals Composite12	A5-3	
	A5-4	
	A5-5	
Heavy Metals Composite13	A5-6	
	A4-1	
	A4-2	
Heavy Metals Composite14	A4-3	
	A4-4	
	A4-5	
Heavy Metals Composite15	A4-6	
	A4-7	
	A4-8	
Heavy Metals Composite16	A4-9	
	A4-10	
	A4-11	
Heavy Metals Composite17	A4-12	
	A4-13	
	A4-14	
Heavy Metals Composite18	A4-15	

2387

Davis Consulting Group Limited  
Arrow Lane  
Arrowtown  
Phone: 03 409 8664  
email: glenn.davis@davisconsultinggroup.co.nz



Chain of Custody

Sheet 1 of

Laboratory use

Date Collected: 24/9/15

Sampling Conditions (brief description of weather conditions/flow rates etc)  
windy, fine

Your Address: Davis Consulting Group Ltd.  
Arrow Lane  
Arrowtown 9302

Samples Filtered and/or Preserved?

Priority: HIGH  
CoC to be emailed back: Yes

Phone Number: 03 409 8664

Email Address: Fiona@davisconsultinggroup.co.nz

Project No/Property Name: The Hills 15063

Who Sampled: Fiona + Rebecca

Samples Released By (Signature): JGR

Samples Received By (Signature): AM

Date and Time Released: 24/9/15 1630

Date and Time Received: 25/9/15

Sample ID	Date	Time	Matrix	Analytes			
				1			
A3-1 (0.1)	24/9/15	930	Soil				
A3-2 (0.1)		935	Soil				
A3-3 (0.1)		940	Soil				
A3-4 (0.1)		946	Soil				
A3-5 (0.1)		950	Soil		HOLD		
A3-6 (0.1)		955	Soil		COLD		
A2-1 (0.1)		1000	Soil				
A2-2 (0.1)		1005	Soil				
A2-3 (0.1)		1000	Soil				
A2-4 (0.1)		1015	Soil				
A2-5 (0.1)		1020	Soil				
A2-6 (0.1)		1025	Soil				

Temperature On Arrival

13.2 °C

Temperature was measured on arbitrarily chosen samples in this batch. The Microbiology sample temperature will be recorded at Melville Lab before testing.

Note:



Received by: Jennifer Singlewood

Job No: 148 0301  
Date Recv: 25-Sep-15 05:30

Davis Consulting Group Limited  
 Arrow Lane  
 Arrowtown  
 Phone: 03 409 8664  
 email: glenn.davis@davisconsultinggroup.co.nz



**Chain of Custody**

Laboratory use

Date Collected:	Sampling Conditions <i>(brief description of weather conditions/flow rates etc)</i>
-----------------	---

Your Address: Davis Consulting Group Ltd. Arrow Lane Arrowtown 9302	Samples Filtered and/or Preserved?	Priority:  CoC to be emailed back:
---	------------------------------------	--

Phone Number: 03 409 8664	Email Address: @davisconsultinggroup.co.nz
---------------------------	--

Project No/Property Name:	Who Sampled:
---------------------------	--------------

Samples Released By (Signature): Date and Time Released:	Samples Received By (Signature): Date and Time Received:
---	---

Sample ID	Date	Time	Matrix	Analytes						
						1				
AZ-7 (0.1)	24/1/15	1030	Soil	} HOLD (0.1)						
AZ-8 (0.1)		1035	Soil							
AZ-9 (0.1)		1040	Soil							
DUP#1		951	Soil							
A8-1 (0.1)		1045	Soil							
A8-2 (0.1)		1050	Soil							
A8-3 (0.1)		1055	Soil							
A8-4 (0.1)		1100	Soil							
A8-5 (0.1)		1105	Soil							
A8-6 (0.1)		1110	Soil							
A8-7 (0.1)		1115	Soil							
A8-8 (0.1)	v	1120	Soil							

Note:

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 Arrow Lane  
 Arrowtown  
 Phone: 03 409 8664  
 email: glenn.davis@davisconsultinggroup.co.nz



**Chain of Custody**

**Laboratory use**

Date Collected:	Sampling Conditions <i>(brief description of weather conditions/flow rates etc)</i>
-----------------	---

Your Address: Davis Consulting Group Ltd. Arrow Lane Arrowtown 9302	Samples Filtered and/or Preserved?	Priority:
	CoC to be emailed back:	

Phone Number: 03 409 8664	Email Address: @davisconsultinggroup.co.nz
---------------------------	--

Project No/Property Name:	Who Sampled:
---------------------------	--------------

Samples Released By (Signature): Date and Time Released:	Samples Received By (Signature): Date and Time Received:
---	---

Sample ID	Date	Time	Matrix	Analytes						
A8-9 (0-1)	24/9/15	1125	Soil							
A7-1 (0-1)		1130	Soil							
A7-2 (0-1)		1135	Soil							
A7-3 (0-1)		1140	Soil							
A7-4 (0-1)		1145	Soil			HOLD				
A7-5 (0-1)		1150	Soil			COLD				
A7-6 (0-1)		1155	Soil							
A6-1 (0-1)		1200	Soil							
A6-2 (0-1)		1205	Soil							
A6-3 (0-1)		1210	Soil							
A5-1 (0-1)		1215	Soil							
A5-2 (0-1)		1220	Soil							

Note:

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 Arrow Lane  
 Arrowtown  
 Phone: 03 409 8664  
 email: glenn.davis@davisconsultinggroup.co.nz



**Chain of Custody**

**Laboratory use**

Date Collected:	Sampling Conditions <i>(brief description of weather conditions/flow rates etc)</i>
-----------------	---

Your Address: Davis Consulting Group Ltd. Arrow Lane Arrowtown 9302	Samples Filtered and/or Preserved?	Priority:
	CoC to be emailed back:	

Phone Number: 03 409 8664	Email Address: @davisconsultinggroup.co.nz
---------------------------	--

Project No/Property Name:	Who Sampled:
---------------------------	--------------

Samples Released By (Signature): Date and Time Released:	Samples Received By (Signature): Date and Time Received:
---	---

Sample ID	Date	Time	Matrix	Analytes									
AS-3 (0.1)	24/9/15	1225	Soil										
AS-4 (0.1)		1230	Soil										
AS-5 (0.1)		1235	Soil										
AS-6 (0.1)		1240	Soil										
A4-1 (0.1)		1245	Soil										
A4-2 (0.1)		1250	Soil										
A4-3 (0.1)		1255	Soil										
A4-4 (0.1)		1300	Soil										
A4-5 (0.1)	1305	Soil											
A4-6 (0.1)	1310	Soil											
A4-7 (0.1)	1315	Soil											
A4-8 (0.1)	1320	Soil											

Note:

}

HOLD  
COLD

Davis Consulting Group Limited  
 Arrow Lane  
 Arrowtown  
 Phone: 03 409 8664  
 email: glenn.davis@davisconsultinggroup.co.nz



**Chain of Custody**

Laboratory use

Date Collected:	Sampling Conditions <i>(brief description of weather conditions/flow rates etc)</i>
-----------------	---

Your Address: Davis Consulting Group Ltd. Arrow Lane Arrowtown 9302	Samples Filtered and/or Preserved?	Priority:  CoC to be emailed back:
---	------------------------------------	--

Phone Number: 03 409 8664	Email Address: @davisconsultinggroup.co.nz
---------------------------	--

Project No/Property Name:	Who Sampled:
---------------------------	--------------

Samples Released By (Signature): Date and Time Released:	Samples Received By (Signature): Date and Time Received:
---	---

Sample ID	Date	Time	Matrix	Analytes							
A4-9 (0.1)	24/9/15	1325	Soil	}							
A4-10 (0.1)	↓	1330	Soil								
A4-11 (0.1)		1335	Soil								
A4-12 (0.1)		1340	Soil			HOLD					
A4-13 (0.1)		1345	Soil			COLD					
A4-14 (0.1)		1350	Soil								
A4-15 (0.1)			1355	Soil							
			Soil								
			Soil								
			Soil								
			Soil								
			Soil								

Note:

COMPOSITE SAMPLES		
Analysis	ID	Date
Heavy Metals Composite1	A3-1	24/09/2015
	A3-2	
	A3-3	
Heavy Metals Composite2	A3-4	
	A3-5	
	A3-6	
Heavy Metals Composite3	A2-1	
	A2-2	
	A2-3	
Heavy Metals Composite4	A2-4	
	A2-5	
	A2-6	
Heavy Metals Composite5	A2-7	
	A2-8	
	A2-9	
Heavy Metals Composite6	A8-1	
	A8-2	
	A8-3	
Heavy Metals Composite7	A8-4	
	A8-5	
	A8-6	
Heavy Metals Composite8	A8-7	
	A8-8	
	A8-9	
Heavy Metals Composite9	A7-1	
	A7-2	
	A7-3	
Heavy Metals Composite10	A7-4	
	A7-5	
	A7-6	
Heavy Metals Composite11	A6-1	
	A6-2	
	A6-3	
Heavy Metals Composite12	A5-1	
	A5-2	
	A5-3	
Heavy Metals Composite13	A5-4	
	A5-5	
	A5-6	
Heavy Metals Composite14	A4-1	
	A4-2	
	A4-3	
Heavy Metals Composite15	A4-4	
	A4-5	
	A4-6	
	A4-7	



Heavy Metals Composite16	A4-8	25/09/2015
	A4-9	
Heavy Metals Composite17	A4-10	
	A4-11	
	A4-12	
Heavy Metals Composite18	A4-13	
	A4-14	
	A4-15	
Heavy Metals Composite19	A1-1	
	A1-2	
	A1-3	
Heavy Metals Composite20	A1-4	
	A1-5	
	A1-6	
Heavy Metals Composite21	A1-7	
	A1-8	
	A1-9	
Heavy Metals Composite22	A10-1	
	A10-2	
	A10-3	
Heavy Metals Composite23	A10-4	
	A10-5	
	A10-6	
Heavy Metals Composite24	A10-7	
	A10-8	
	A10-9	
Heavy Metals Composite25	A10-10	
	A10-11	
	A10-12	
Heavy Metals Composite26	A9-1	
	A9-2	
	A9-3	
Heavy Metals Composite27	A9-4	
	A9-5	
	A9-6	
Heavy Metals Composite28	HS10-1	
	HS10-2	
	HS10-3	
Heavy Metals Composite29	HS10-4	
	HS10-5	
	HS10-6	
Heavy Metals Composite30	HS5-1	
	HS5-2	
	HS5-3	
Heavy Metals Composite31	HS5-4	
	HS5-5	
	HS5-6	
Heavy Metals	HS9-1	
	HS9-2	

Composite32	HS9-3	28/09/2015
Heavy Metals Composite33	HS9-4	
	HS9-5	
	HS9-6	
	HS1-1	
Heavy Metals Composite34	HS1-2	
	HS1-3	
	HS1-4	
Heavy Metals Composite35	HS1-5	
	HS1-6	
	HS8-1	
Heavy Metals Composite36	HS8-2	
	HS8-3	
	HS8-4	
Heavy Metals Composite37	HS8-5	
	HS8-6	
	HS2-1	
Heavy Metals Composite38	HS2-2	
	HS2-3	
	HS2-4	
Heavy Metals Composite39	HS2-5	
	HS2-6	
	HS3-1	
Heavy Metals Composite40	HS3-2	
	HS3-3	
	HS3-4	
Heavy Metals Composite41	HS3-5	
	HS3-6	

INDIVIDUAL SAMPLES		
Analysis	ID	Date
OCP	DUP1	24/09/2015
OCP	DUP2	
OCP	A3-2	
OCP	A3-5	
OCP	A2-2	
OCP	A2-5	
OCP	A2-8	
OCP	A8-2	
OCP	A8-5	
OCP	A8-8	
OCP	A7-2	
multi residue pesticides	A7-5	
OCP	A6-2	
OCP	A5-1	
OCP	A5-5	
OCP	A4-2	

OCP	A4-5	25/09/2015
OCP	A4-8	
OCP	A4-11	
OCP	A4-14	
OCP	DUP3	
OCP	DUP4	
OCP	DUP5	
OCP	A1-3	
OCP	A1-5	
OCP	A1-8	
OCP	A10-2	
OCP	A10-5	
OCP	A10-8	
OCP	A10-11	
OCP	A9-2	
OCP	A9-5	
OCP	HS10-2	
OCP	HS10-5	
OCP	HS5-2	
OCP	HS5-5	
OCP	HS9-3	
OCP	HS9-5	
OCP	HS1-2	
OCP	HS1-5	
OCP	HS8-1	
OCP	HS8-5	
OCP	DUP6	
OCP	HS2-2	
OCP	HS2-6	
OCP	HS3-2	
OCP	HS3-5	
Heavy Metals and OCP	HS4-1	
Heavy Metals and OCP	HS4-2	
Heavy Metals and OCP	HS4-3	
Heavy Metals and OCP	HS4-4	
Heavy Metals and OCP	HS4-5	
Heavy Metals and OCP	HS4-6	



Davis Consulting Group Limited  
 Arrow Lane  
 Arrowtown  
 Phone: 03 409 8664  
 email: glenn.davis@davisconsultinggroup.co.nz

Sheet | of

Laboratory use

Chain of Custody

Date Collected: 25/9/15 + 26/9/15  
 Sampling Conditions (brief description of weather conditions/flow rates etc) fine  
 Your Address: Davis Consulting Group Ltd.  
 Arrow Lane  
 Arrowtown 9302  
 Priority: HIGH  
 CoC to be emailed back: Yes  
 Email Address: Fiona@davisconsultinggroup.co.nz  
 Who Sampled: Fiona

Phone Number: 03 409 8664  
 Project No/Property Name: 15063 The Hills  
 Samples Received By (Signature): [Signature]  
 Date and Time Released: 26/9/15 1630  
 Date and Time Received:

Sample ID	Date	Time	Matrix	Analytes
A1-1 (0.15)	25/9/15	950	Soil	
A1-2 (0.15)		955	Soil	
A1-3 (0.15)		1000	Soil	
A1-4 (0.15)		1005	Soil	Hold
A1-5 (0.15)		1010	Soil	Hold
A1-6 (0.15)		1015	Soil	
A1-7 (0.15)		1020	Soil	
A1-8 (0.15)		1025	Soil	
A1-9 (0.15)		1030	Soil	
A10-1 (0.1)		1035	Soil	
A10-2 (0.1)		1040	Soil	
A10-3 (0.1)		1045	Soil	

Temperature On Arrival

15.0 °C

Temperature was measured on arbitrarily chosen samples in this batch. The Microbiology sample temperature will be recorded at Melville Lab before testing.

Note:

Job No: Date Recv: 25-Sep-15 05:30  
**2387**  
**148 0301**  
 Received by: Jennifer Singlewood  
 3114803018



Davis Consulting Group Limited  
 Arrow Lane  
 Arrowtown  
 Phone: 03 409 8664  
 email: glenn.davis@davisconsultinggroup.co.nz

Sheet 1 of 2

Laboratory use

Chain of Custody

Date Collected: \_\_\_\_\_ Sampling Conditions (brief description of weather conditions/flow rates etc)

Your Address: Davis Consulting Group Ltd.  
 Arrow Lane  
 Arrowtown 9302

Samples Filtered and/or Preserved? \_\_\_\_\_ Priority: \_\_\_\_\_  
 CoC to be emailed back: \_\_\_\_\_

Phone Number: 03 409 8664 Email Address: @davisconsultinggroup.co.nz

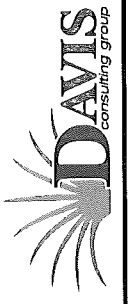
Project No/Property Name: \_\_\_\_\_ Who Sampled: \_\_\_\_\_

Samples Released By (Signature): \_\_\_\_\_  
 Date and Time Released: \_\_\_\_\_

Samples Received By (Signature): \_\_\_\_\_  
 Date and Time Received: \_\_\_\_\_

Sample ID	Date	Time	Matrix	Analytes
DUP 2	25/9/15	1001	Soil	
A10-4 (0.1)	↓	1050	Soil	
A10-5 (0.1)		1055	Soil	
A10-6 (0.1)		1100	Soil	
A10-7 (0.1)		1105	Soil	HQND
A10-8 (0.1)		1110	Soil	COVD
A10-9 (0.1)		1115	Soil	
A10-10 (0.1)		1120	Soil	
A10-11 (0.1)		1125	Soil	
A10-12 (0.1)		1130	Soil	
A9-1 (0.1)		1135	Soil	
A9-2 (0.1)		1140	Soil	

Note:



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 Arrow Lane  
 Arrowtown  
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 email: glenn.davis@davisconsultinggroup.co.nz

Laboratory use

Chain of Custody

Date Collected: \_\_\_\_\_  
 Your Address: Davis Consulting Group Ltd.  
 Arrow Lane  
 Arrowtown 9302  
 Phone Number: 03 409 8664  
 Project No/Property Name: \_\_\_\_\_  
 Samples Released By (Signature): \_\_\_\_\_  
 Date and Time Released: \_\_\_\_\_

Weather Conditions \_\_\_\_\_  
 Samples Filtered and/or Preserved? \_\_\_\_\_  
 Priority: \_\_\_\_\_  
 CoC to be emailed back: \_\_\_\_\_  
 Email Address: @davisconsultinggroup.co.nz  
 Who Sampled: \_\_\_\_\_

Samples Received By (Signature): \_\_\_\_\_  
 Date and Time Received: \_\_\_\_\_

Sample ID	Date	Time	Matrix	Analytes	
				Hold Cold	
A9-3 (0.1)	18/9/18	1145	Soil	/	
A9-4 (0.1)		1150	Soil	/	
A9-5 (0.1)		1155	Soil	/	
A9-6 (0.1)		1200	Soil	/	
HS10-1 (0.1)		1205	Soil	/	
HS10-2 (0.1)		1210	Soil	/	
HS10-3 (0.1)		1215	Soil	/	
HS10-4 (0.1)		1220	Soil	/	
HS10-5 (0.1)		1225	Soil	/	
HS10-6 (0.1)		1230	Soil	/	
HS-1 (0.1)		1235	Soil	/	
HS-2 (0.1)		1240	Soil	/	
HS-3 (0.1)		1245	Soil	/	
HS-4 (0.1)		1250	Soil	/	
HS-5 (0.1)		1255	Soil	/	

Note:



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 Arrow Lane  
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 email: glenn.davis@davisconsultinggroup.co.nz

Sheet 17 of  
 Laboratory use

**Chain of Custody**

Date Collected: \_\_\_\_\_

Your Address: Davis Consulting Group Ltd.  
 Arrow Lane  
 Arrowtown 9302

Weather Conditions \_\_\_\_\_

Samples Filtered and/or Preserved? \_\_\_\_\_ Priority: \_\_\_\_\_

CoC to be emailed back: \_\_\_\_\_

Phone Number: 03 409 8664

Email Address: @davisconsultinggroup.co.nz

Project No/Property Name: \_\_\_\_\_

Who Sampled: \_\_\_\_\_

Samples Released By (Signature): \_\_\_\_\_

Samples Received By (Signature): \_\_\_\_\_

Date and Time Released: \_\_\_\_\_

Date and Time Received: \_\_\_\_\_

Sample ID	Date	Time	Matrix	Analytes	
				Hold Cold	
HS9-6 (0.1)	25/9/16	1350	Soil	/	
HS9-1 (0.1)		1305	Soil	/	
HS9-2 (0.1)		1310	Soil	/	
HS9-3 (0.1)		1315	Soil	/	
HS9-4 (0.1)		1320	Soil	/	
HS9-5 (0.1)		1325	Soil	/	
HS9-6 (0.1)		1330	Soil	/	
DUPA		1316	Soil	/	
HS1-1 (0.1)		1335	Soil	/	
HS1-2 (0.1)		1340	Soil	/	
HS1-3 (0.1)		1345	Soil	/	
HS1-4 (0.1)		1350	Soil	/	
HS1-5 (0.1)		1355	Soil	/	
HS1-6 (0.1)		1400	Soil	/	
HS8-1 (0.1)		1405	Soil	/	

Note:



Davis Consulting Group Limited  
 Arrow Lane  
 Arrowtown  
 Phone: 03 409 8664  
 email: glenn.davis@davisconsultinggroup.co.nz

Sheet 2 of

Laboratory use

Chain of Custody

Date Collected: \_\_\_\_\_

Your Address: Davis Consulting Group Ltd.  
 Arrow Lane  
 Arrowtown 9302

Phone Number: 03 409 8664

Project No./Property Name: \_\_\_\_\_

Samples Released By (Signature): \_\_\_\_\_  
 Date and Time Released: \_\_\_\_\_

Weather Conditions \_\_\_\_\_

Samples Filtered and/or Preserved? \_\_\_\_\_

Priority: \_\_\_\_\_

CoC to be emailed back: @davisconsultinggroup.co.nz

Email Address: \_\_\_\_\_

Who Sampled: \_\_\_\_\_

Samples Received By (Signature): \_\_\_\_\_  
 Date and Time Received: \_\_\_\_\_

Sample ID	Date	Time	Matrix	Analytes	
				Hold Cold	
H58-2 (0.1)	25/9/15	1410	Soil	✓	
DUPS		1406	Soil	✓	
H58-3 (0.1)		1415	Soil	✓	
H58-4 (0.1)		1410	Soil	✓	
H58-5 (0.1)		1415	Soil	✓	
H58-6 (0.1)		1430	Soil	✓	
H54-1	28/9/14	1255	Soil	✓	
H54-2		1300	Soil	✓	
H54-3		1205	Soil	✓	
H54-3		1310	Soil	✓	
H54-4		1315	Soil	✓	
H54-5		1320	Soil	✓	
H54-6		1325	Soil	✓	
H52-1		1330	Soil	✓	
H52-2		1335	Soil	✓	

Note:





Davis Consulting Group Limited  
 Arrow Lane  
 Arrowtown  
 Phone: 03 409 8664  
 email: glenn.davis@davisconsultinggroup.co.nz

Sheet 6 of 6

Laboratory use

Chain of Custody

Date Collected: \_\_\_\_\_  
 Your Address: Davis Consulting Group Ltd.  
 Arrow Lane  
 Arrowtown 9302  
 Phone Number: 03 409 8664  
 Project No./Property Name: \_\_\_\_\_  
 Email Address: \_\_\_\_\_  
 Who Sampled: \_\_\_\_\_  
 Priority: \_\_\_\_\_  
 CoC to be emailed back: @davisconsultinggroup.co.nz

Samples Released By (Signature): \_\_\_\_\_  
 Date and Time Released: \_\_\_\_\_  
 Samples Received By (Signature): \_\_\_\_\_  
 Date and Time Received: \_\_\_\_\_

Sample ID	Date	Time	Matrix	Analytes	
				Hold Cold	
HS1-3 (0.1)	12/9/15	1335	Soil	/	
HS1-4 (0.1)		1340	Soil	/	
HS1-5 (0.1)		1345	Soil	/	
HS1-6 (0.1)		1350	Soil	/	
HS3-1 (0.1)		1355	Soil	/	
HS3-2 (0.1)		1400	Soil	/	
HS3-3 (0.1)		1405	Soil	/	
HS3-4 (0.1)		1410	Soil	/	
HS3-5 (0.1)		1415	Soil	/	
HS3-6 (0.1)		1420	Soil	/	
DUP6		1351	Soil	/	
			Soil		
			Soil		
			Soil		
			Soil		

Note: \_\_\_\_\_



## Job Information Summary

Page 1 of 6

<b>Client:</b>	Davis Consulting Group Limited	<b>Lab No:</b>	1480301
<b>Contact:</b>	Fiona Rowley C/- Davis Consulting Group Limited PO Box 2450 Wakatipu QUEENSTOWN 9349	<b>Date Registered:</b>	25-Sep-2015 9:50 am
		<b>Priority:</b>	High
		<b>Quote No:</b>	
		<b>Order No:</b>	
		<b>Client Reference:</b>	The Hills 15063
		<b>Add. Client Ref:</b>	
		<b>Submitted By:</b>	Fiona Rowley
		<b>Charge To:</b>	Davis Consulting Group Limited
		<b>Target Date:</b>	06-Oct-2015 4:30 pm

### Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	A3.1 (0.1) 24-Sep-2015 9:30 am	Soil	GSoil300	Composite Environmental Solid Samples
2	A3.2 (0.1) 24-Sep-2015 9:35 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
3	A3.3 (0.1) 24-Sep-2015 9:40 am	Soil	GSoil300	Composite Environmental Solid Samples
4	A3.4 (0.1) 24-Sep-2015 9:45 am	Soil	GSoil300	Composite Environmental Solid Samples
5	A3.5 (0.1) 24-Sep-2015 9:50 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
6	A3.6 (0.1) 24-Sep-2015 9:55 am	Soil	GSoil300	Composite Environmental Solid Samples
7	A2.1 (0.1) 24-Sep-2015 10:00 am	Soil	GSoil300	Composite Environmental Solid Samples
8	A2.2 (0.1) 24-Sep-2015 10:05 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
9	A2.3 (0.1) 24-Sep-2015 10:10 am	Soil	GSoil300	Composite Environmental Solid Samples
10	A2.4 (0.1) 24-Sep-2015 10:15 am	Soil	GSoil300	Composite Environmental Solid Samples
11	A2.5 (0.1) 24-Sep-2015 10:20 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
12	A2.6 (0.1) 24-Sep-2015 10:25 am	Soil	GSoil300	Composite Environmental Solid Samples
13	A2.7 (0.1) 24-Sep-2015 10:30 am	Soil	GSoil300	Composite Environmental Solid Samples
14	A2.8 (0.1) 24-Sep-2015 10:35 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
15	A2.9 (0.1) 24-Sep-2015 10:40 am	Soil	GSoil300	Composite Environmental Solid Samples
16	Dup#1 24-Sep-2015 9:51 am	Soil	GSoil300	Organochlorine Pesticides Screening in Soil
17	A8.1 (0.1) 24-Sep-2015 10:45 am	Soil	GSoil300	Composite Environmental Solid Samples
18	A8.2 (0.1) 24-Sep-2015 10:50 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
19	A8.3 (0.1) 24-Sep-2015 10:55 am	Soil	GSoil300	Composite Environmental Solid Samples
20	A8.4 (0.1) 24-Sep-2015 11:00 am	Soil	GSoil300	Composite Environmental Solid Samples
21	A8.5 (0.1) 24-Sep-2015 11:05 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
22	A8.6 (0.1) 24-Sep-2015 11:10 am	Soil	GSoil300	Composite Environmental Solid Samples
23	A8.7 (0.1) 24-Sep-2015 11:15 am	Soil	GSoil300	Composite Environmental Solid Samples
24	A8.8 (0.1) 24-Sep-2015 11:20 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
25	A8.9 (0.1) 24-Sep-2015 11:25 am	Soil	GSoil300	Composite Environmental Solid Samples
26	A7.1 (0.1) 24-Sep-2015 11:30 am	Soil	GSoil300	Composite Environmental Solid Samples
27	A7.2 (0.1) 24-Sep-2015 11:35 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
28	A7.3 (0.1) 24-Sep-2015 11:40 am	Soil	GSoil300	Composite Environmental Solid Samples
29	A7.4 (0.1) 24-Sep-2015 11:45 am	Soil	GSoil300	Composite Environmental Solid Samples
30	A7.5 (0.1) 24-Sep-2015 11:50 am	Soil	GSoil300	Composite Environmental Solid Samples; Multiresidue Pesticides in Soil samples by GCMS

## Samples

No	Sample Name	Sample Type	Containers	Tests Requested
31	A7.6 (0.1) 24-Sep-2015 11:55 am	Soil	GSoil300	Composite Environmental Solid Samples
32	A6.1 (0.1) 24-Sep-2015 12:00 pm	Soil	GSoil300	Composite Environmental Solid Samples
33	A6.2 (0.1) 24-Sep-2015 12:05 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
34	A6.3 (0.1) 24-Sep-2015 12:10 pm	Soil	GSoil300	Composite Environmental Solid Samples
35	A5.1 (0.1) 24-Sep-2015 12:15 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
36	A5.2 (0.1) 24-Sep-2015 12:20 pm	Soil	GSoil300	Composite Environmental Solid Samples
37	A5.3 (0.1) 24-Sep-2015 12:25 pm	Soil	GSoil300	Composite Environmental Solid Samples
38	A5.4 (0.1) 24-Sep-2015 12:30 pm	Soil	GSoil300	Composite Environmental Solid Samples
39	A5.5 (0.1) 24-Sep-2015 12:35 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
40	A5.6 (0.1) 24-Sep-2015 12:40 pm	Soil	GSoil300	Composite Environmental Solid Samples
41	A4.1 (0.1) 24-Sep-2015 12:45 pm	Soil	GSoil300	Composite Environmental Solid Samples
42	A4.2 (0.1) 24-Sep-2015 12:50 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
43	A4.3 (0.1) 24-Sep-2015 12:55 pm	Soil	GSoil300	Composite Environmental Solid Samples
44	A4.4 (0.1) 24-Sep-2015 1:00 pm	Soil	GSoil300	Composite Environmental Solid Samples
45	A4.5 (0.1) 24-Sep-2015 1:05 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
46	A4.6 (0.1) 24-Sep-2015 1:10 pm	Soil	GSoil300	Composite Environmental Solid Samples
47	A4.7 (0.1) 24-Sep-2015 1:15 pm	Soil	GSoil300	Composite Environmental Solid Samples
48	A4.8 (0.1) 24-Sep-2015 1:20 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
49	A4.9 (0.1) 24-Sep-2015 1:25 pm	Soil	GSoil300	Composite Environmental Solid Samples
50	A4.10 (0.1) 24-Sep-2015 1:30 pm	Soil	GSoil300	Composite Environmental Solid Samples
51	A4.11 (0.1) 24-Sep-2015 1:35 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
52	A4.12 (0.1) 24-Sep-2015 1:40 pm	Soil	GSoil300	Composite Environmental Solid Samples
53	A4.13 (0.1) 24-Sep-2015 1:45 pm	Soil	GSoil300	Composite Environmental Solid Samples
54	A4.14 (0.1) 24-Sep-2015 1:50 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
55	A4.15 (0.1) 24-Sep-2015 1:55 pm	Soil	GSoil300	Composite Environmental Solid Samples
56	Dup#2 24-Sep-2015 12:16 pm	Soil	GSoil300	Organochlorine Pesticides Screening in Soil
57	Composite of A3.1 (0.1), A3.2 (0.1) & A3.3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
58	Composite of A3.4 (0.1), A3.5 (0.1) & A3.6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
59	Composite of A2.1 (0.1), A2.2 (0.1) & A2.3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
60	Composite of A2.4 (0.1), A2.5 (0.1) & A2.6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
61	Composite of A2.7 (0.1), A2.8 (0.1) & A2.9 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
62	Composite of A8.1 (0.1), A8.2 (0.1) & A8.3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
63	Composite of A8.4 (0.1), A8.5 (0.1) & A8.6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
64	Composite of A8.7 (0.1), A8.8 (0.1) & A8.9 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
65	Composite of A7.1 (0.1), A7.2 (0.1) & A7.3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
66	Composite of A7.4 (0.1), A7.5 (0.1) & A7.6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
67	Composite of A6.1 (0.1), A6.2 (0.1) & A6.3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
68	Composite of A5.1 (0.1), A5.2 (0.1) & A5.3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
69	Composite of A5.4 (0.1), A5.5 (0.1) & A5.6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn

## Samples

No	Sample Name	Sample Type	Containers	Tests Requested
70	Composite of A4.1 (0.1), A4.2 (0.1) & A4.3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
71	Composite of A4.4 (0.1), A4.5 (0.1) & A4.6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
72	Composite of A4.7 (0.1), A4.8 (0.1) & A4.9 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
73	Composite of A4.10 (0.1), A4.11 (0.1) & A4.12 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
74	Composite of A4.13 (0.1), A4.14 (0.1) & A4.15 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
75	A1-1 (0.15) 25-Sep-2015 9:50 am	Soil	GSoil300	Composite Environmental Solid Samples
76	A1-2 (0.15) 25-Sep-2015 9:55 am	Soil	GSoil300	Composite Environmental Solid Samples
77	A1-3 (0.15) 25-Sep-2015 10:00 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
78	A1-4 (0.15) 25-Sep-2015 10:05 am	Soil	GSoil300	Composite Environmental Solid Samples
79	A1-5 (0.15) 25-Sep-2015 10:10 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
80	A1-6 (0.15) 25-Sep-2015 10:15 am	Soil	GSoil300	Composite Environmental Solid Samples
81	A1-7 (0.1) 25-Sep-2015 10:20 am	Soil	GSoil300	Composite Environmental Solid Samples
82	A1-8 (0.15) 25-Sep-2015 10:25 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
83	A1-9 (0.15) 25-Sep-2015 10:30 am	Soil	GSoil300	Composite Environmental Solid Samples
84	A10-1 (0.1) 25-Sep-2015 10:35 am	Soil	GSoil300	Composite Environmental Solid Samples
85	A10-2 (0.1) 25-Sep-2015 10:40 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
86	A10-3 (0.1) 25-Sep-2015 10:45 am	Soil	GSoil300	Composite Environmental Solid Samples
87	DUP3 25-Sep-2015 10:01 am	Soil	GSoil300	Organochlorine Pesticides Screening in Soil
88	A10-4 (0.1) 25-Sep-2015 10:50 am	Soil	GSoil300	Composite Environmental Solid Samples
89	A10-5 (0.1) 25-Sep-2015 10:55 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
90	A10-6 (0.1) 25-Sep-2015 11:00 am	Soil	GSoil300	Composite Environmental Solid Samples
91	A10-7 (0.1) 25-Sep-2015 11:05 am	Soil	GSoil300	Composite Environmental Solid Samples
92	A10-8 (0.1) 25-Sep-2015 11:10 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
93	A10-9 (0.1) 25-Sep-2015 11:15 am	Soil	GSoil300	Composite Environmental Solid Samples
94	A10-10 (0.1) 25-Sep-2015 11:20 am	Soil	GSoil300	Composite Environmental Solid Samples
95	A10-11 (0.1) 25-Sep-2015 11:25 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
96	A10-12 (0.1) 25-Sep-2015 11:30 am	Soil	GSoil300	Composite Environmental Solid Samples
97	A9-1 (0.1) 25-Sep-2015 11:35 am	Soil	GSoil300	Composite Environmental Solid Samples
98	A9-2 (0.1) 25-Sep-2015 11:40 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
99	A9-3 (0.1) 25-Sep-2015 11:45 am	Soil	GSoil300	Composite Environmental Solid Samples
100	A9-4 (0.1) 25-Sep-2015 11:50 am	Soil	GSoil300	Composite Environmental Solid Samples
101	A9-5 (0.1) 25-Sep-2015 11:55 am	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
102	A9-6 (0.1) 25-Sep-2015 12:00 pm	Soil	GSoil300	Composite Environmental Solid Samples
103	HS10-1 (0.1) 25-Sep-2015 12:05 pm	Soil	GSoil300	Composite Environmental Solid Samples
104	HS10-2 (0.1) 25-Sep-2015 12:10 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
105	HS10-3 (0.1) 25-Sep-2015 12:15 pm	Soil	GSoil300	Composite Environmental Solid Samples
106	HS10-4 (0.1) 25-Sep-2015 12:20 pm	Soil	GSoil300	Composite Environmental Solid Samples
107	HS10-5 (0.1) 25-Sep-2015 12:25 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
108	HS10-6 (0.1) 25-Sep-2015 12:30 pm	Soil	GSoil300	Composite Environmental Solid Samples
109	HS5-1 (0.1) 25-Sep-2015 12:35 pm	Soil	GSoil300	Composite Environmental Solid Samples

## Samples

No	Sample Name	Sample Type	Containers	Tests Requested
110	HS5-2 (0.1) 25-Sep-2015 12:40 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
111	HS5-3 (0.1) 25-Sep-2015 12:45 pm	Soil	GSoil300	Composite Environmental Solid Samples
112	HS5-4 (0.1) 25-Sep-2015 12:50 pm	Soil	GSoil300	Composite Environmental Solid Samples
113	HS5-5 (0.1) 25-Sep-2015 12:55 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
114	HS5-6 (0.1) 25-Sep-2015 1:00 pm	Soil	GSoil300	Composite Environmental Solid Samples
115	HS9-1 (0.1) 25-Sep-2015 1:05 pm	Soil	GSoil300	Composite Environmental Solid Samples
116	HS9-2 (0.1) 25-Sep-2015 1:10 pm	Soil	GSoil300	Composite Environmental Solid Samples
117	HS9-3 (0.1) 25-Sep-2015 1:15 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
118	HS9-4 (0.1) 25-Sep-2015 1:20 pm	Soil	GSoil300	Composite Environmental Solid Samples
119	HS9-5 (0.1) 25-Sep-2015 1:25 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
120	HS9-6 (0.1) 25-Sep-2015 1:30 pm	Soil	GSoil300	Composite Environmental Solid Samples
121	DUP4 25-Sep-2015 1:16 pm	Soil	GSoil300	Organochlorine Pesticides Screening in Soil
122	HS1-1 (0.1) 25-Sep-2015 1:35 pm	Soil	GSoil300	Composite Environmental Solid Samples
123	HS1-2 (0.1) 25-Sep-2015 1:40 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
124	HS1-3 (0.1) 25-Sep-2015 1:45 pm	Soil	GSoil300	Composite Environmental Solid Samples
125	HS1-4 (0.1) 25-Sep-2015 1:50 pm	Soil	GSoil300	Composite Environmental Solid Samples
126	HS1-5 (0.1) 25-Sep-2015 1:55 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
127	HS1-6 (0.1) 25-Sep-2015 2:00 pm	Soil	GSoil300	Composite Environmental Solid Samples
128	HS8-1 (0.1) 25-Sep-2015 2:05 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
129	HS8-2 (0.1) 25-Sep-2015 2:10 pm	Soil	GSoil300	Composite Environmental Solid Samples
130	DUP5 25-Sep-2015 2:06 pm	Soil	GSoil300	Organochlorine Pesticides Screening in Soil
131	HS8-3 (0.1) 25-Sep-2015 2:15 pm	Soil	GSoil300	Composite Environmental Solid Samples
132	HS8-4 (0.1) 25-Sep-2015 2:20 pm	Soil	GSoil300	Composite Environmental Solid Samples
133	HS8-5 (0.1) 25-Sep-2015 2:25 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
134	HS8-6 (0.1) 25-Sep-2015 2:30 pm	Soil	GSoil300	Composite Environmental Solid Samples
135	HS4-1 (0.1) 28-Sep-2015 12:55 pm	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine Pesticides Screening in Soil
136	HS4-2 (0.1) 28-Sep-2015 1:00 pm	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine Pesticides Screening in Soil
137	HS4-3 (0.1) 28-Sep-2015 1:05 pm	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine Pesticides Screening in Soil
138	HS4-4 (0.1) 28-Sep-2015 1:10 pm	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine Pesticides Screening in Soil
139	HS4-5 (0.1) 28-Sep-2015 1:15 pm	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine Pesticides Screening in Soil
140	HS4-6 (0.1) 28-Sep-2015 1:20 pm	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine Pesticides Screening in Soil
141	HS-1 (0.1) 28-Sep-2015 1:25 pm	Soil	GSoil300	Composite Environmental Solid Samples
142	HS2-2 (0.1) 28-Sep-2015 1:30 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
143	HS2-3 (0.1) 28-Sep-2015 1:35 pm	Soil	GSoil300	Composite Environmental Solid Samples
144	HS2-4 (0.1) 28-Sep-2015 1:40 pm	Soil	GSoil300	Composite Environmental Solid Samples
145	HS2-5 (0.1) 28-Sep-2015 1:45 pm	Soil	GSoil300	Composite Environmental Solid Samples
146	HS2-6 (0.1) 28-Sep-2015 1:50 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
147	HS3-1 (0.1) 28-Sep-2015 1:55 pm	Soil	GSoil300	Composite Environmental Solid Samples
148	HS3-2 (0.1) 28-Sep-2015 2:00 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
149	HS3-3 (0.1) 28-Sep-2015 2:05 pm	Soil	GSoil300	Composite Environmental Solid Samples
150	HS3-4 (0.1) 28-Sep-2015 2:10 pm	Soil	GSoil300	Composite Environmental Solid Samples

## Samples

No	Sample Name	Sample Type	Containers	Tests Requested
151	HS3-5 (0.1) 28-Sep-2015 2:15 pm	Soil	GSoil300	Composite Environmental Solid Samples; Organochlorine Pesticides Screening in Soil
152	HS3-6 (0.1) 28-Sep-2015 2:20 pm	Soil	GSoil300	Composite Environmental Solid Samples
153	DUP6 28-Sep-2015 1:51 pm	Soil	GSoil300	Organochlorine Pesticides Screening in Soil
154	Composite of A1-1 (0.15), A1-2 (0.15) & A1-3 (0.15)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
155	Composite of A1-4 (0.15), A1-5 (0.15) & A1-6 (0.15)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
156	Composite of A1-7 (0.1), A1-8 (0.15) & A1-9 (0.15)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
157	Composite of A10-1 (0.1), A10-2 (0.1) & A10-3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
158	Composite of A10-4 (0.1), A10-5 (0.1) & A10-6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
159	Composite of A10-7 (0.1), A10-8 (0.1) & A10-9 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
160	Composite of A10-10 (0.1), A10-11 (0.1) & A10-12 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
161	Composite of A9-1 (0.1), A9-2 (0.1) & A9-3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
162	Composite of A9-4 (0.1), A9-5 (0.1) & A9-6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
163	Composite of HS10-1 (0.1), HS10-2 (0.1) & HS10-3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
164	Composite of HS10-4 (0.1), HS10-5 (0.1) & HS10-6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
165	Composite of HS5-1 (0.1), HS5-2 (0.1) & HS5-3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
166	Composite of HS5-4 (0.1), HS5-5 (0.1) & HS5-6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
167	Composite of HS9-1 (0.1), HS9-2 (0.1) & HS9-3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
168	Composite of HS9-4 (0.1), HS9-5 (0.1) & HS9-6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
169	Composite of HS1-1 (0.1), HS1-2 (0.1) & HS1-3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
170	Composite of HS1-4 (0.1), HS1-5 (0.1) & HS1-6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
171	Composite of HS8-1 (0.1), HS8-2 (0.1) & HS8-3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
172	Composite of HS8-4 (0.1), HS8-5 (0.1) & HS8-6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
173	Composite of HS-1 (0.1), HS2-2 (0.1) & HS2-3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
174	Composite of HS2-4 (0.1), HS2-5 (0.1) & HS2-6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
175	Composite of HS3-1 (0.1), HS3-2 (0.1) & HS3-3 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
176	Composite of HS3-4 (0.1), HS3-5 (0.1) & HS3-6 (0.1)	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn

## SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	57-74, 135-140, 154-176
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	0.10 - 4 mg/kg dry wt	57-74, 135-140, 154-176
Multiresidue Pesticides in Soil samples by GCMS	Sonication extraction, GC-MS analysis. Tested on as received sample, then results corrected to a dry weight basis using the separate Dry Matter result.	0.003 - 0.06 mg/kg dry wt	30

## Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Organochlorine Pesticides Screening in Soil	Sonication extraction, SPE cleanup, dual column GC-ECD analysis (modified US EPA 8082).. Tested on dried sample	0.010 - 0.04 mg/kg dry wt	2, 5, 8, 11, 14, 16, 18, 21, 24, 27, 33, 35, 39, 42, 45, 48, 51, 54, 56, 77, 79, 82, 85, 87, 89, 92, 95, 98, 101, 104, 107, 110, 113, 117, 119, 121, 123, 126, 128, 130, 133, 135-140, 142, 146, 148, 151, 153
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	30
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	57-74, 135-140, 154-176
Composite Environmental Solid Samples	Individual sample fractions mixed together to form a composite fraction.	-	1-15, 17-55, 75-86, 88-120, 122-129, 131-134, 141-152



## ANALYSIS REPORT

Page 1 of 14

<b>Client:</b>	Davis Consulting Group Limited	<b>Lab No:</b>	1480301	SPv2
<b>Contact:</b>	Fiona Rowley C/- Davis Consulting Group Limited PO Box 2450 Wakatipu QUEENSTOWN 9349	<b>Date Registered:</b>	25-Sep-2015	
		<b>Date Reported:</b>	07-Oct-2015	
		<b>Quote No:</b>		
		<b>Order No:</b>		
		<b>Client Reference:</b>	The Hills 15063	
		<b>Submitted By:</b>	Fiona Rowley	

### Sample Type: Soil

Sample Name:	A3.2 (0.1) 24-Sep-2015 9:35 am	A3.5 (0.1) 24-Sep-2015 9:50 am	A2.2 (0.1) 24-Sep-2015 10:05 am	A2.5 (0.1) 24-Sep-2015 10:20 am	A2.8 (0.1) 24-Sep-2015 10:35 am
<b>Lab Number:</b>	1480301.2	1480301.5	1480301.8	1480301.11	1480301.14

#### Organochlorine Pesticides Screening in Soil

Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	< 0.010	0.017	< 0.010	< 0.010	< 0.010
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	< 0.010	0.014	< 0.010	< 0.010	< 0.010
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Sample Name:	Dup#1 24-Sep-2015 9:51 am	A8.2 (0.1) 24-Sep-2015 10:50 am	A8.5 (0.1) 24-Sep-2015 11:05 am	A8.8 (0.1) 24-Sep-2015 11:20 am	A7.2 (0.1) 24-Sep-2015 11:35 am
<b>Lab Number:</b>	1480301.16	1480301.18	1480301.21	1480301.24	1480301.27

#### Organochlorine Pesticides Screening in Soil

Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010



**Sample Type: Soil**

<b>Sample Name:</b>		Dup#1 24-Sep-2015 9:51 am	A8.2 (0.1) 24-Sep-2015 10:50 am	A8.5 (0.1) 24-Sep-2015 11:05 am	A8.8 (0.1) 24-Sep-2015 11:20 am	A7.2 (0.1) 24-Sep-2015 11:35 am
<b>Lab Number:</b>		1480301.16	1480301.18	1480301.21	1480301.24	1480301.27
<b>Organochlorine Pesticides Screening in Soil</b>						
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	0.096
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	0.036
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

<b>Sample Name:</b>		A7.5 (0.1) 24-Sep-2015 11:50 am	A6.2 (0.1) 24-Sep-2015 12:05 pm	A5.1 (0.1) 24-Sep-2015 12:15 pm	A5.5 (0.1) 24-Sep-2015 12:35 pm	A4.2 (0.1) 24-Sep-2015 12:50 pm
<b>Lab Number:</b>		1480301.30	1480301.33	1480301.35	1480301.39	1480301.42

<b>Individual Tests</b>						
Dry Matter	g/100g as rcvd	85	-	-	-	-
<b>Multiresidue Pesticides in Soil samples by GCMS</b>						
Acetochlor	mg/kg dry wt	< 0.007	-	-	-	-
Alachlor	mg/kg dry wt	< 0.006	-	-	-	-
Aldrin	mg/kg dry wt	< 0.010	-	-	-	-
Atrazine	mg/kg dry wt	< 0.007	-	-	-	-
Atrazine-desethyl	mg/kg dry wt	< 0.007	-	-	-	-
Atrazine-desisopropyl	mg/kg dry wt	< 0.014	-	-	-	-
Azaconazole	mg/kg dry wt	< 0.004	-	-	-	-
Azinphos-methyl	mg/kg dry wt	< 0.014	-	-	-	-
Benalaxyl	mg/kg dry wt	< 0.004	-	-	-	-
Bendiocarb	mg/kg dry wt	< 0.007	-	-	-	-
Benodanil	mg/kg dry wt	< 0.014	-	-	-	-
alpha-BHC	mg/kg dry wt	< 0.010	-	-	-	-
beta-BHC	mg/kg dry wt	< 0.010	-	-	-	-
delta-BHC	mg/kg dry wt	< 0.010	-	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	-	-	-	-
Bifenthrin	mg/kg dry wt	< 0.004	-	-	-	-
Bitertanol	mg/kg dry wt	< 0.014	-	-	-	-
Bromacil	mg/kg dry wt	< 0.007	-	-	-	-
Bromophos-ethyl	mg/kg dry wt	< 0.007	-	-	-	-
Bromopropylate	mg/kg dry wt	< 0.007	-	-	-	-
Bupirimate	mg/kg dry wt	< 0.007	-	-	-	-
Buprofezin	mg/kg dry wt	< 0.007	-	-	-	-
Butachlor	mg/kg dry wt	< 0.007	-	-	-	-
Captafol	mg/kg dry wt	< 0.04	-	-	-	-
Captan	mg/kg dry wt	< 0.014	-	-	-	-
Carbaryl	mg/kg dry wt	< 0.007	-	-	-	-
Carbofenothion	mg/kg dry wt	< 0.007	-	-	-	-
Carbofuran	mg/kg dry wt	< 0.007	-	-	-	-

**Sample Type: Soil**

<b>Sample Name:</b>		A7.5 (0.1) 24-Sep-2015 11:50 am	A6.2 (0.1) 24-Sep-2015 12:05 pm	A5.1 (0.1) 24-Sep-2015 12:15 pm	A5.5 (0.1) 24-Sep-2015 12:35 pm	A4.2 (0.1) 24-Sep-2015 12:50 pm
<b>Lab Number:</b>		1480301.30	1480301.33	1480301.35	1480301.39	1480301.42
<b>Multiresidue Pesticides in Soil samples by GCMS</b>						
Carboxin	mg/kg dry wt	< 0.007	-	-	-	-
cis-Chlordane	mg/kg dry wt	< 0.010	-	-	-	-
trans-Chlordane	mg/kg dry wt	< 0.010	-	-	-	-
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	-	-	-	-
Chlorfenvinphos	mg/kg dry wt	< 0.010	-	-	-	-
Chlorfluazuron	mg/kg dry wt	< 0.007	-	-	-	-
Chlorothalonil	mg/kg dry wt	< 0.007	-	-	-	-
Chlorpropham	mg/kg dry wt	< 0.014	-	-	-	-
Chlorpyrifos	mg/kg dry wt	< 0.007	-	-	-	-
Chlorpyrifos-methyl	mg/kg dry wt	< 0.007	-	-	-	-
Chlortoluron	mg/kg dry wt	< 0.014	-	-	-	-
Chlozolinatate	mg/kg dry wt	< 0.007	-	-	-	-
Coumaphos	mg/kg dry wt	< 0.014	-	-	-	-
Cyanazine	mg/kg dry wt	< 0.007	-	-	-	-
Cyfluthrin	mg/kg dry wt	< 0.009	-	-	-	-
Cyhalothrin	mg/kg dry wt	< 0.007	-	-	-	-
Cypermethrin	mg/kg dry wt	< 0.018	-	-	-	-
Cyproconazole	mg/kg dry wt	< 0.014	-	-	-	-
Cyprodinil	mg/kg dry wt	< 0.007	-	-	-	-
2,4'-DDD	mg/kg dry wt	< 0.010	-	-	-	-
4,4'-DDD	mg/kg dry wt	< 0.010	-	-	-	-
2,4'-DDE	mg/kg dry wt	< 0.010	-	-	-	-
4,4'-DDE	mg/kg dry wt	0.091	-	-	-	-
2,4'-DDT	mg/kg dry wt	< 0.010	-	-	-	-
4,4'-DDT	mg/kg dry wt	0.023	-	-	-	-
Total DDT Isomers	mg/kg dry wt	0.11	-	-	-	-
Deltamethrin (including Tralomethrin)	mg/kg dry wt	< 0.007	-	-	-	-
Demeton-S-methyl	mg/kg dry wt	< 0.014	-	-	-	-
Diazinon	mg/kg dry wt	< 0.004	-	-	-	-
Dichlobenil	mg/kg dry wt	< 0.007	-	-	-	-
Dichlofenthion	mg/kg dry wt	< 0.007	-	-	-	-
Dichlofluanid	mg/kg dry wt	< 0.007	-	-	-	-
Dichloran	mg/kg dry wt	< 0.03	-	-	-	-
Dichlorvos	mg/kg dry wt	< 0.010	-	-	-	-
Dicofol	mg/kg dry wt	< 0.04	-	-	-	-
Dicrotophos	mg/kg dry wt	< 0.007	-	-	-	-
Dieldrin	mg/kg dry wt	< 0.010	-	-	-	-
Difenoconazole	mg/kg dry wt	< 0.010	-	-	-	-
Dimethoate	mg/kg dry wt	< 0.014	-	-	-	-
Dinocap	mg/kg dry wt	< 0.08	-	-	-	-
Diphenylamine	mg/kg dry wt	< 0.014	-	-	-	-
Disulfoton	mg/kg dry wt	< 0.007	-	-	-	-
Diuron	mg/kg dry wt	< 0.007	-	-	-	-
Endosulfan I	mg/kg dry wt	< 0.010	-	-	-	-
Endosulfan II	mg/kg dry wt	< 0.010	-	-	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.010	-	-	-	-
Endrin	mg/kg dry wt	< 0.010	-	-	-	-
Endrin aldehyde	mg/kg dry wt	< 0.010	-	-	-	-
Endrin ketone	mg/kg dry wt	< 0.010	-	-	-	-
EPN	mg/kg dry wt	< 0.007	-	-	-	-
Esfenvalerate	mg/kg dry wt	< 0.010	-	-	-	-
Ethion	mg/kg dry wt	< 0.007	-	-	-	-
Etrinfos	mg/kg dry wt	< 0.007	-	-	-	-

**Sample Type: Soil**

<b>Sample Name:</b>		A7.5 (0.1) 24-Sep-2015 11:50 am	A6.2 (0.1) 24-Sep-2015 12:05 pm	A5.1 (0.1) 24-Sep-2015 12:15 pm	A5.5 (0.1) 24-Sep-2015 12:35 pm	A4.2 (0.1) 24-Sep-2015 12:50 pm
<b>Lab Number:</b>		1480301.30	1480301.33	1480301.35	1480301.39	1480301.42
<b>Multiresidue Pesticides in Soil samples by GCMS</b>						
Famphur	mg/kg dry wt	< 0.007	-	-	-	-
Fenamiphos	mg/kg dry wt	< 0.007	-	-	-	-
Fenarimol	mg/kg dry wt	< 0.007	-	-	-	-
Fenitrothion	mg/kg dry wt	< 0.007	-	-	-	-
Fenpropathrin	mg/kg dry wt	< 0.007	-	-	-	-
Fenpropimorph	mg/kg dry wt	< 0.007	-	-	-	-
Fensulfothion	mg/kg dry wt	< 0.007	-	-	-	-
Fenthion	mg/kg dry wt	< 0.007	-	-	-	-
Fenvalerate	mg/kg dry wt	< 0.010	-	-	-	-
Fluazifop-butyl	mg/kg dry wt	< 0.007	-	-	-	-
Fluometuron	mg/kg dry wt	< 0.007	-	-	-	-
Flusilazole	mg/kg dry wt	< 0.007	-	-	-	-
Fluvalinate	mg/kg dry wt	< 0.006	-	-	-	-
Folpet	mg/kg dry wt	< 0.014	-	-	-	-
Furalaxyl	mg/kg dry wt	< 0.004	-	-	-	-
Haloxypop-methyl	mg/kg dry wt	< 0.007	-	-	-	-
Heptachlor	mg/kg dry wt	< 0.010	-	-	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.010	-	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.010	-	-	-	-
Hexaconazole	mg/kg dry wt	< 0.007	-	-	-	-
Hexazinone	mg/kg dry wt	< 0.004	-	-	-	-
Hexythiazox	mg/kg dry wt	< 0.04	-	-	-	-
Imazalil	mg/kg dry wt	< 0.04	-	-	-	-
Indoxacarb	mg/kg dry wt	< 0.007	-	-	-	-
Iodofenphos	mg/kg dry wt	< 0.007	-	-	-	-
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	mg/kg dry wt	< 0.04	-	-	-	-
Isazophos	mg/kg dry wt	< 0.007	-	-	-	-
Isofenphos	mg/kg dry wt	< 0.004	-	-	-	-
Kresoxim-methyl	mg/kg dry wt	< 0.004	-	-	-	-
Leptophos	mg/kg dry wt	< 0.007	-	-	-	-
Linuron	mg/kg dry wt	< 0.007	-	-	-	-
Malathion	mg/kg dry wt	< 0.007	-	-	-	-
Metalaxyl	mg/kg dry wt	< 0.007	-	-	-	-
Methacrifos	mg/kg dry wt	< 0.007	-	-	-	-
Methamidophos	mg/kg dry wt	< 0.04	-	-	-	-
Methidathion	mg/kg dry wt	< 0.007	-	-	-	-
Methiocarb	mg/kg dry wt	< 0.007	-	-	-	-
Methoxychlor	mg/kg dry wt	< 0.010	-	-	-	-
Metolachlor	mg/kg dry wt	< 0.006	-	-	-	-
Metribuzin	mg/kg dry wt	< 0.007	-	-	-	-
Mevinphos	mg/kg dry wt	< 0.014	-	-	-	-
Molinate	mg/kg dry wt	< 0.014	-	-	-	-
Myclobutanil	mg/kg dry wt	< 0.007	-	-	-	-
Naled	mg/kg dry wt	< 0.04	-	-	-	-
Nitrofen	mg/kg dry wt	< 0.014	-	-	-	-
Nitrothal-isopropyl	mg/kg dry wt	< 0.007	-	-	-	-
Norflurazon	mg/kg dry wt	< 0.014	-	-	-	-
Omethoate	mg/kg dry wt	< 0.04	-	-	-	-
Oxadiazon	mg/kg dry wt	< 0.007	-	-	-	-
Oxychlorane	mg/kg dry wt	< 0.004	-	-	-	-
Oxyfluorfen	mg/kg dry wt	< 0.004	-	-	-	-
Paclobutrazol	mg/kg dry wt	< 0.007	-	-	-	-
Parathion-ethyl	mg/kg dry wt	< 0.007	-	-	-	-
Parathion-methyl	mg/kg dry wt	< 0.007	-	-	-	-

**Sample Type: Soil**

<b>Sample Name:</b>		A7.5 (0.1) 24-Sep-2015 11:50 am	A6.2 (0.1) 24-Sep-2015 12:05 pm	A5.1 (0.1) 24-Sep-2015 12:15 pm	A5.5 (0.1) 24-Sep-2015 12:35 pm	A4.2 (0.1) 24-Sep-2015 12:50 pm
<b>Lab Number:</b>		1480301.30	1480301.33	1480301.35	1480301.39	1480301.42
<b>Multiresidue Pesticides in Soil samples by GCMS</b>						
Penconazole	mg/kg dry wt	< 0.007	-	-	-	-
Pendimethalin	mg/kg dry wt	< 0.007	-	-	-	-
Permethrin	mg/kg dry wt	< 0.003	-	-	-	-
Phorate	mg/kg dry wt	< 0.014	-	-	-	-
Phosmet	mg/kg dry wt	< 0.007	-	-	-	-
Phosphamidon	mg/kg dry wt	< 0.007	-	-	-	-
Pirimicarb	mg/kg dry wt	< 0.007	-	-	-	-
Pirimiphos-methyl	mg/kg dry wt	< 0.007	-	-	-	-
Prochloraz	mg/kg dry wt	< 0.04	-	-	-	-
Procymidone	mg/kg dry wt	< 0.007	-	-	-	-
Prometryn	mg/kg dry wt	< 0.004	-	-	-	-
Propachlor	mg/kg dry wt	< 0.007	-	-	-	-
Propanil	mg/kg dry wt	< 0.03	-	-	-	-
Propazine	mg/kg dry wt	< 0.004	-	-	-	-
Propetamphos	mg/kg dry wt	< 0.007	-	-	-	-
Propham	mg/kg dry wt	< 0.007	-	-	-	-
Propiconazole	mg/kg dry wt	< 0.006	-	-	-	-
Prothiofos	mg/kg dry wt	< 0.007	-	-	-	-
Pyrazophos	mg/kg dry wt	< 0.007	-	-	-	-
Pyrifenox	mg/kg dry wt	< 0.010	-	-	-	-
Pyrimethanil	mg/kg dry wt	< 0.007	-	-	-	-
Pyriproxyfen	mg/kg dry wt	< 0.007	-	-	-	-
Quintozene	mg/kg dry wt	< 0.014	-	-	-	-
Quizalofop-ethyl	mg/kg dry wt	< 0.007	-	-	-	-
Simazine	mg/kg dry wt	< 0.007	-	-	-	-
Simetryn	mg/kg dry wt	< 0.007	-	-	-	-
Sulfentrazone	mg/kg dry wt	< 0.04	-	-	-	-
Sulfotep	mg/kg dry wt	< 0.007	-	-	-	-
TCMTB [2-(thiocyanomethylthio) benzothiazole, Busan]	mg/kg dry wt	< 0.014	-	-	-	-
Tebuconazole	mg/kg dry wt	< 0.007	-	-	-	-
Tebufenpyrad	mg/kg dry wt	< 0.004	-	-	-	-
Terbacil	mg/kg dry wt	< 0.007	-	-	-	-
Terbufos	mg/kg dry wt	< 0.007	-	-	-	-
Terbumeton	mg/kg dry wt	< 0.007	-	-	-	-
Terbuthylazine	mg/kg dry wt	< 0.004	-	-	-	-
Terbuthylazine-desethyl	mg/kg dry wt	< 0.007	-	-	-	-
Terbutryn	mg/kg dry wt	< 0.007	-	-	-	-
Tetrachlorvinphos	mg/kg dry wt	< 0.007	-	-	-	-
Thiabendazole	mg/kg dry wt	< 0.04	-	-	-	-
Thiobencarb	mg/kg dry wt	< 0.007	-	-	-	-
Thiometon	mg/kg dry wt	< 0.014	-	-	-	-
Tolyfluanid	mg/kg dry wt	< 0.004	-	-	-	-
Triadimefon	mg/kg dry wt	< 0.007	-	-	-	-
Triazophos	mg/kg dry wt	< 0.007	-	-	-	-
Trifluralin	mg/kg dry wt	< 0.007	-	-	-	-
Vinclozolin	mg/kg dry wt	< 0.007	-	-	-	-
<b>Organochlorine Pesticides Screening in Soil</b>						
Aldrin	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010

**Sample Type: Soil**

<b>Sample Name:</b>		A7.5 (0.1) 24-Sep-2015 11:50 am	A6.2 (0.1) 24-Sep-2015 12:05 pm	A5.1 (0.1) 24-Sep-2015 12:15 pm	A5.5 (0.1) 24-Sep-2015 12:35 pm	A4.2 (0.1) 24-Sep-2015 12:50 pm
<b>Lab Number:</b>		1480301.30	1480301.33	1480301.35	1480301.39	1480301.42
Organochlorine Pesticides Screening in Soil						
trans-Chlordane	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	-	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	-	0.087	0.065	0.107	0.045
2,4'-DDT	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	-	0.013	0.019	0.025	0.022
Dieldrin	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	-	< 0.010	< 0.010	< 0.010	< 0.010

<b>Sample Name:</b>		A4.5 (0.1) 24-Sep-2015 1:05 pm	A4.8 (0.1) 24-Sep-2015 1:20 pm	A4.11 (0.1) 24-Sep-2015 1:35 pm	A4.14 (0.1) 24-Sep-2015 1:50 pm	Dup#2 24-Sep-2015 12:16 pm
<b>Lab Number:</b>		1480301.45	1480301.48	1480301.51	1480301.54	1480301.56

Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	0.061
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	0.019
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

<b>Sample Name:</b>		Composite of A3.1 (0.1), A3.2 (0.1) & A3.3 (0.1)	Composite of A3.4 (0.1), A3.5 (0.1) & A3.6 (0.1)	Composite of A2.1 (0.1), A2.2 (0.1) & A2.3 (0.1)	Composite of A2.4 (0.1), A2.5 (0.1) & A2.6 (0.1)	Composite of A2.7 (0.1), A2.8 (0.1) & A2.9 (0.1)
<b>Lab Number:</b>		1480301.57	1480301.58	1480301.59	1480301.60	1480301.61

## Sample Type: Soil

<b>Sample Name:</b>	Composite of A3.1 (0.1), A3.2 (0.1) & A3.3 (0.1)	Composite of A3.4 (0.1), A3.5 (0.1) & A3.6 (0.1)	Composite of A2.1 (0.1), A2.2 (0.1) & A2.3 (0.1)	Composite of A2.4 (0.1), A2.5 (0.1) & A2.6 (0.1)	Composite of A2.7 (0.1), A2.8 (0.1) & A2.9 (0.1)
<b>Lab Number:</b>	1480301.57	1480301.58	1480301.59	1480301.60	1480301.61
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn					
Total Recoverable Arsenic	mg/kg dry wt	9	9	9	9
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	7	7	7	7
Total Recoverable Copper	mg/kg dry wt	8	9	8	9
Total Recoverable Lead	mg/kg dry wt	12.9	12.2	12.8	11.9
Total Recoverable Nickel	mg/kg dry wt	7	7	7	7
Total Recoverable Zinc	mg/kg dry wt	36	33	34	33
<b>Sample Name:</b>	Composite of A8.1 (0.1), A8.2 (0.1) & A8.3 (0.1)	Composite of A8.4 (0.1), A8.5 (0.1) & A8.6 (0.1)	Composite of A8.7 (0.1), A8.8 (0.1) & A8.9 (0.1)	Composite of A7.1 (0.1), A7.2 (0.1) & A7.3 (0.1)	Composite of A7.4 (0.1), A7.5 (0.1) & A7.6 (0.1)
<b>Lab Number:</b>	1480301.62	1480301.63	1480301.64	1480301.65	1480301.66
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn					
Total Recoverable Arsenic	mg/kg dry wt	18	18	19	9
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	12	13	13	8
Total Recoverable Copper	mg/kg dry wt	18	18	20	10
Total Recoverable Lead	mg/kg dry wt	26	23	24	12.8
Total Recoverable Nickel	mg/kg dry wt	12	13	13	8
Total Recoverable Zinc	mg/kg dry wt	60	62	62	39
<b>Sample Name:</b>	Composite of A6.1 (0.1), A6.2 (0.1) & A6.3 (0.1)	Composite of A5.1 (0.1), A5.2 (0.1) & A5.3 (0.1)	Composite of A5.4 (0.1), A5.5 (0.1) & A5.6 (0.1)	Composite of A4.1 (0.1), A4.2 (0.1) & A4.3 (0.1)	Composite of A4.4 (0.1), A4.5 (0.1) & A4.6 (0.1)
<b>Lab Number:</b>	1480301.67	1480301.68	1480301.69	1480301.70	1480301.71
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn					
Total Recoverable Arsenic	mg/kg dry wt	14	8	8	9
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	7	7	7	7
Total Recoverable Copper	mg/kg dry wt	11	9	9	12
Total Recoverable Lead	mg/kg dry wt	17.2	10.9	10.9	14.1
Total Recoverable Nickel	mg/kg dry wt	8	7	7	8
Total Recoverable Zinc	mg/kg dry wt	35	33	35	45
<b>Sample Name:</b>	Composite of A4.7 (0.1), A4.8 (0.1) & A4.9 (0.1)	Composite of A4.10 (0.1), A4.11 (0.1) & A4.12 (0.1)	Composite of A4.13 (0.1), A4.14 (0.1) & A4.15 (0.1)	A1-3 (0.15) 25-Sep-2015 10:00 am	A1-5 (0.15) 25-Sep-2015 10:10 am
<b>Lab Number:</b>	1480301.72	1480301.73	1480301.74	1480301.77	1480301.79
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn					
Total Recoverable Arsenic	mg/kg dry wt	10	9	9	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-
Total Recoverable Chromium	mg/kg dry wt	7	6	7	-
Total Recoverable Copper	mg/kg dry wt	10	10	10	-
Total Recoverable Lead	mg/kg dry wt	11.5	11.4	12.4	-
Total Recoverable Nickel	mg/kg dry wt	7	7	7	-
Total Recoverable Zinc	mg/kg dry wt	47	31	31	-
Organochlorine Pesticides Screening in Soil					
Aldrin	mg/kg dry wt	-	-	-	< 0.010
alpha-BHC	mg/kg dry wt	-	-	-	< 0.010
beta-BHC	mg/kg dry wt	-	-	-	< 0.010
delta-BHC	mg/kg dry wt	-	-	-	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	-	-	-	< 0.010
cis-Chlordane	mg/kg dry wt	-	-	-	< 0.010
trans-Chlordane	mg/kg dry wt	-	-	-	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	-	-	-	< 0.04
2,4'-DDD	mg/kg dry wt	-	-	-	< 0.010

**Sample Type: Soil**

<b>Sample Name:</b>	Composite of A4.7 (0.1), A4.8 (0.1) & A4.9 (0.1)	Composite of A4.10 (0.1), A4.11 (0.1) & A4.12 (0.1)	Composite of A4.13 (0.1), A4.14 (0.1) & A4.15 (0.1)	A1-3 (0.15) 25-Sep-2015 10:00 am	A1-5 (0.15) 25-Sep-2015 10:10 am
<b>Lab Number:</b>	1480301.72	1480301.73	1480301.74	1480301.77	1480301.79

Organochlorine Pesticides Screening in Soil						
4,4'-DDD	mg/kg dry wt	-	-	-	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	-	-	-	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	-	-	-	< 0.010	< 0.010
2,4'-DDT	mg/kg dry wt	-	-	-	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	-	-	-	< 0.010	< 0.010
Dieldrin	mg/kg dry wt	-	-	-	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	-	-	-	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	-	-	-	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	-	-	-	< 0.010	< 0.010
Endrin	mg/kg dry wt	-	-	-	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	-	-	-	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	-	-	-	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	-	-	-	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	-	-	-	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	-	-	-	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	-	-	-	< 0.010	< 0.010

<b>Sample Name:</b>	A1-8 (0.15) 25-Sep-2015 10:25 am	A10-2 (0.1) 25-Sep-2015 10:40 am	DUP3 25-Sep-2015 10:01 am	A10-5 (0.1) 25-Sep-2015 10:55 am	A10-8 (0.1) 25-Sep-2015 11:10 am
<b>Lab Number:</b>	1480301.82	1480301.85	1480301.87	1480301.89	1480301.92

Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

<b>Sample Name:</b>	A10-11 (0.1) 25-Sep-2015 11:25 am	A9-2 (0.1) 25-Sep-2015 11:40 am	A9-5 (0.1) 25-Sep-2015 11:55 am	HS10-2 (0.1) 25-Sep-2015 12:10 pm	HS10-5 (0.1) 25-Sep-2015 12:25 pm
<b>Lab Number:</b>	1480301.95	1480301.98	1480301.101	1480301.104	1480301.107

Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

**Sample Type: Soil**

<b>Sample Name:</b>		A10-11 (0.1) 25-Sep-2015 11:25 am	A9-2 (0.1) 25-Sep-2015 11:40 am	A9-5 (0.1) 25-Sep-2015 11:55 am	HS10-2 (0.1) 25-Sep-2015 12:10 pm	HS10-5 (0.1) 25-Sep-2015 12:25 pm
<b>Lab Number:</b>		1480301.95	1480301.98	1480301.101	1480301.104	1480301.107
Organochlorine Pesticides Screening in Soil						
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	0.044	< 0.010	< 0.010
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	0.015	< 0.010	< 0.010
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	0.018	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

<b>Sample Name:</b>		HS5-2 (0.1) 25-Sep-2015 12:40 pm	HS5-5 (0.1) 25-Sep-2015 12:55 pm	HS9-3 (0.1) 25-Sep-2015 1:15 pm	HS9-5 (0.1) 25-Sep-2015 1:25 pm	DUP4 25-Sep-2015 1:16 pm
<b>Lab Number:</b>		1480301.110	1480301.113	1480301.117	1480301.119	1480301.121
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010



**Sample Type: Soil**

<b>Sample Name:</b>	HS1-2 (0.1) 25-Sep-2015 1:40 pm	HS1-5 (0.1) 25-Sep-2015 1:55 pm	HS8-1 (0.1) 25-Sep-2015 2:05 pm	DUP5 25-Sep-2015 2:06 pm	HS8-5 (0.1) 25-Sep-2015 2:25 pm
<b>Lab Number:</b>	1480301.123	1480301.126	1480301.128	1480301.130	1480301.133

Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

<b>Sample Name:</b>	HS4-1 (0.1) 28-Sep-2015 12:55 pm	HS4-2 (0.1) 28-Sep-2015 1:00 pm	HS4-3 (0.1) 28-Sep-2015 1:05 pm	HS4-4 (0.1) 28-Sep-2015 1:10 pm	HS4-5 (0.1) 28-Sep-2015 1:15 pm
<b>Lab Number:</b>	1480301.135	1480301.136	1480301.137	1480301.138	1480301.139

Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	14	12	13	14	10
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	0.10	< 0.10	0.12
Total Recoverable Chromium	mg/kg dry wt	12	10	17	13	13
Total Recoverable Copper	mg/kg dry wt	16	11	16	22	11
Total Recoverable Lead	mg/kg dry wt	16.9	12.3	13.5	15.3	12.6
Total Recoverable Nickel	mg/kg dry wt	11	10	14	10	11
Total Recoverable Zinc	mg/kg dry wt	130	92	71	260	59

Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	< 0.010	0.128	0.035	< 0.010	0.044
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	< 0.010	0.036	< 0.010	< 0.010	0.017
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

**Sample Type: Soil**

<b>Sample Name:</b>	HS4-1 (0.1) 28-Sep-2015 12:55 pm	HS4-2 (0.1) 28-Sep-2015 1:00 pm	HS4-3 (0.1) 28-Sep-2015 1:05 pm	HS4-4 (0.1) 28-Sep-2015 1:10 pm	HS4-5 (0.1) 28-Sep-2015 1:15 pm
<b>Lab Number:</b>	1480301.135	1480301.136	1480301.137	1480301.138	1480301.139

Organochlorine Pesticides Screening in Soil						
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

<b>Sample Name:</b>	HS4-6 (0.1) 28-Sep-2015 1:20 pm	HS2-2 (0.1) 28-Sep-2015 1:30 pm	HS2-6 (0.1) 28-Sep-2015 1:50 pm	HS3-2 (0.1) 28-Sep-2015 2:00 pm	HS3-5 (0.1) 28-Sep-2015 2:15 pm
<b>Lab Number:</b>	1480301.140	1480301.142	1480301.146	1480301.148	1480301.151

Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	10	-	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	-	-	-	-
Total Recoverable Chromium	mg/kg dry wt	9	-	-	-	-
Total Recoverable Copper	mg/kg dry wt	11	-	-	-	-
Total Recoverable Lead	mg/kg dry wt	11.3	-	-	-	-
Total Recoverable Nickel	mg/kg dry wt	8	-	-	-	-
Total Recoverable Zinc	mg/kg dry wt	63	-	-	-	-

Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDE	mg/kg dry wt	0.060	< 0.010	< 0.010	< 0.010	< 0.010
2,4'-DDT	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
4,4'-DDT	mg/kg dry wt	0.018	< 0.010	< 0.010	< 0.010	< 0.010
Dieldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

<b>Sample Name:</b>	DUP6 28-Sep-2015 1:51 pm	Composite of A1-1 (0.15), A1-2 (0.15) & A1-3 (0.15)	Composite of A1-4 (0.15), A1-5 (0.15) & A1-6 (0.15)	Composite of A1-7 (0.1), A1-8 (0.15) & A1-9 (0.15)	Composite of A10-1 (0.1), A10-2 (0.1) & A10-3 (0.1)
<b>Lab Number:</b>	1480301.153	1480301.154	1480301.155	1480301.156	1480301.157

Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
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**Sample Type: Soil**

<b>Sample Name:</b>	DUP6 28-Sep-2015 1:51 pm	Composite of A1-1 (0.15), A1-2 (0.15) & A1-3 (0.15)	Composite of A1-4 (0.15), A1-5 (0.15) & A1-6 (0.15)	Composite of A1-7 (0.1), A1-8 (0.15) & A1-9 (0.15)	Composite of A10-1 (0.1), A10-2 (0.1) & A10-3 (0.1)
<b>Lab Number:</b>	1480301.153	1480301.154	1480301.155	1480301.156	1480301.157

Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	-	10	11	11	8
Total Recoverable Cadmium	mg/kg dry wt	-	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	-	7	7	6	6
Total Recoverable Copper	mg/kg dry wt	-	10	12	12	7
Total Recoverable Lead	mg/kg dry wt	-	11.7	13.2	12.2	9.8
Total Recoverable Nickel	mg/kg dry wt	-	7	8	8	7
Total Recoverable Zinc	mg/kg dry wt	-	37	31	30	35

Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	-	-	-	-
alpha-BHC	mg/kg dry wt	< 0.010	-	-	-	-
beta-BHC	mg/kg dry wt	< 0.010	-	-	-	-
delta-BHC	mg/kg dry wt	< 0.010	-	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	-	-	-	-
cis-Chlordane	mg/kg dry wt	< 0.010	-	-	-	-
trans-Chlordane	mg/kg dry wt	< 0.010	-	-	-	-
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	-	-	-	-
2,4'-DDD	mg/kg dry wt	< 0.010	-	-	-	-
4,4'-DDD	mg/kg dry wt	< 0.010	-	-	-	-
2,4'-DDE	mg/kg dry wt	< 0.010	-	-	-	-
4,4'-DDE	mg/kg dry wt	< 0.010	-	-	-	-
2,4'-DDT	mg/kg dry wt	< 0.010	-	-	-	-
4,4'-DDT	mg/kg dry wt	< 0.010	-	-	-	-
Dieldrin	mg/kg dry wt	< 0.010	-	-	-	-
Endosulfan I	mg/kg dry wt	< 0.010	-	-	-	-
Endosulfan II	mg/kg dry wt	< 0.010	-	-	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.010	-	-	-	-
Endrin	mg/kg dry wt	< 0.010	-	-	-	-
Endrin aldehyde	mg/kg dry wt	< 0.010	-	-	-	-
Endrin ketone	mg/kg dry wt	< 0.010	-	-	-	-
Heptachlor	mg/kg dry wt	< 0.010	-	-	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.010	-	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.010	-	-	-	-
Methoxychlor	mg/kg dry wt	< 0.010	-	-	-	-

<b>Sample Name:</b>	Composite of A10-4 (0.1), A10-5 (0.1) & A10-6 (0.1)	Composite of A10-7 (0.1), A10-8 (0.1) & A10-9 (0.1)	Composite of A10-10 (0.1), A10-11 (0.1) & A10-12 (0.1)	Composite of A9-1 (0.1), A9-2 (0.1) & A9-3 (0.1)	Composite of A9-4 (0.1), A9-5 (0.1) & A9-6 (0.1)
<b>Lab Number:</b>	1480301.158	1480301.159	1480301.160	1480301.161	1480301.162

Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	9	11	9	10	11
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.11	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	7	8	8	7	8
Total Recoverable Copper	mg/kg dry wt	8	12	8	9	10
Total Recoverable Lead	mg/kg dry wt	10.0	11.5	10.2	10.0	14.4
Total Recoverable Nickel	mg/kg dry wt	7	8	7	7	7
Total Recoverable Zinc	mg/kg dry wt	35	40	33	35	39

<b>Sample Name:</b>	Composite of HS10-1 (0.1), HS10-2 (0.1) & HS10-3 (0.1)	Composite of HS10-4 (0.1), HS10-5 (0.1) & HS10-6 (0.1)	Composite of HS5-1 (0.1), HS5-2 (0.1) & HS5-3 (0.1)	Composite of HS5-4 (0.1), HS5-5 (0.1) & HS5-6 (0.1)	Composite of HS9-1 (0.1), HS9-2 (0.1) & HS9-3 (0.1)
<b>Lab Number:</b>	1480301.163	1480301.164	1480301.165	1480301.166	1480301.167

Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	8	10	13	10	11
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

**Sample Type: Soil**

<b>Sample Name:</b>	Composite of HS10-1 (0.1), HS10-2 (0.1) & HS10-3 (0.1)	Composite of HS10-4 (0.1), HS10-5 (0.1) & HS10-6 (0.1)	Composite of HS5-1 (0.1), HS5-2 (0.1) & HS5-3 (0.1)	Composite of HS5-4 (0.1), HS5-5 (0.1) & HS5-6 (0.1)	Composite of HS9-1 (0.1), HS9-2 (0.1) & HS9-3 (0.1)	
<b>Lab Number:</b>	1480301.163	1480301.164	1480301.165	1480301.166	1480301.167	
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Chromium	mg/kg dry wt	8	7	8	7	9
Total Recoverable Copper	mg/kg dry wt	11	11	12	10	10
Total Recoverable Lead	mg/kg dry wt	10.1	10.6	13.1	10.4	12.8
Total Recoverable Nickel	mg/kg dry wt	8	8	9	7	8
Total Recoverable Zinc	mg/kg dry wt	43	38	41	37	42

<b>Sample Name:</b>	Composite of HS9-4 (0.1), HS9-5 (0.1) & HS9-6 (0.1)	Composite of HS1-1 (0.1), HS1-2 (0.1) & HS1-3 (0.1)	Composite of HS1-4 (0.1), HS1-5 (0.1) & HS1-6 (0.1)	Composite of HS8-1 (0.1), HS8-2 (0.1) & HS8-3 (0.1)	Composite of HS8-4 (0.1), HS8-5 (0.1) & HS8-6 (0.1)	
<b>Lab Number:</b>	1480301.168	1480301.169	1480301.170	1480301.171	1480301.172	
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	10	9	9	11	11
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	0.12	< 0.10
Total Recoverable Chromium	mg/kg dry wt	7	9	9	10	9
Total Recoverable Copper	mg/kg dry wt	11	13	11	14	14
Total Recoverable Lead	mg/kg dry wt	10.2	14.1	14.0	14.4	13.1
Total Recoverable Nickel	mg/kg dry wt	8	10	8	10	10
Total Recoverable Zinc	mg/kg dry wt	39	50	45	59	53

<b>Sample Name:</b>	Composite of HS-1 (0.1), HS2-2 (0.1) & HS2-3 (0.1)	Composite of HS2-4 (0.1), HS2-5 (0.1) & HS2-6 (0.1)	Composite of HS3-1 (0.1), HS3-2 (0.1) & HS3-3 (0.1)	Composite of HS3-4 (0.1), HS3-5 (0.1) & HS3-6 (0.1)		
<b>Lab Number:</b>	1480301.173	1480301.174	1480301.175	1480301.176		
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	9	9	10	10	-
Total Recoverable Cadmium	mg/kg dry wt	0.11	0.10	0.14	< 0.10	-
Total Recoverable Chromium	mg/kg dry wt	8	7	9	8	-
Total Recoverable Copper	mg/kg dry wt	10	10	12	14	-
Total Recoverable Lead	mg/kg dry wt	10.5	10.4	13.9	11.3	-
Total Recoverable Nickel	mg/kg dry wt	8	8	9	8	-
Total Recoverable Zinc	mg/kg dry wt	47	39	51	39	-

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

**Sample Type: Soil**

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	57-74, 135-140, 154-176
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	0.10 - 4 mg/kg dry wt	57-74, 135-140, 154-176
Multiresidue Pesticides in Soil samples by GCMS	Sonication extraction, GC-MS analysis. Tested on as received sample, then results corrected to a dry weight basis using the separate Dry Matter result.	0.003 - 0.06 mg/kg dry wt	30

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Organochlorine Pesticides Screening in Soil	Sonication extraction, SPE cleanup, dual column GC-ECD analysis (modified US EPA 8082).. Tested on dried sample	0.010 - 0.04 mg/kg dry wt	2, 5, 8, 11, 14, 16, 18, 21, 24, 27, 33, 35, 39, 42, 45, 48, 51, 54, 56, 77, 79, 82, 85, 87, 89, 92, 95, 98, 101, 104, 107, 110, 113, 117, 119, 121, 123, 126, 128, 130, 133, 135-140, 142, 146, 148, 151, 153
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	30
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	57-74, 135-140, 154-176
Composite Environmental Solid Samples*	Individual sample fractions mixed together to form a composite fraction.	-	1-15, 17-55, 75-86, 88-120, 122-129, 131-134, 141-152

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

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Carole Rodgers-Carroll BA, NZCS  
Client Services Manager - Environmental Division



## **Queenstown Lakes District Council – Proposed District Plan Stage 2**

### **Further Submission**

In support, or in opposition to, submissions to the Proposed District Plan under Clause 8 of First Schedule, Resource Management Act 1991

To: Queenstown Lakes District Council  
Private Bag 50072  
Queenstown

Attention: Planning Policy

#### **1. Submitters' details:**

<b>Name of Further Submitters:</b>	<b>Trojan Helmet Limited (THL)</b>
<b>Address for Service:</b>	C/- Brown & Company Planning Group, PO Box 1467, QUEENSTOWN
<b>and</b>	c/- Lane Neave, PO Box 701, QUEENSTOWN
<b>Email:</b>	office@brownandcompany.co.nz rebecca.wolt@laneneave.co.nz
<b>Contact Person:</b>	<b>A Hutton / J Brown</b>  <b>R Wolt</b>

#### **2. Further Submitters' status**

THL has an interest in the Proposed District Plan (**PDP**) . Stage 2 that is greater than the interest of the general public, because THL owns land that is included within, and affected by, the Wakatipu Basin Rural Amenity Zone (**WBRAZ**) provisions proposed by Stage 2 of the PDP, and because THL made an original submission on Stage 2 of the PDP (Submission 2387).

#### **3. The Further Submitters make the further submissions set out in the following table:**

Original Submitter	Original Submission Number	Further Submission Support or Oppose?	Reasons for the Further Submission	The Further Submitters seek the following:
<p><b>A Feeley, E Borrie &amp; LP Trustees Limited</b></p>	<p>2397</p>	<p><b>SUPPORT</b></p>	<p>The submitter seeks to rezone its land from WBRAZ to Low Density Residential Zone. Development of the land is to be undertaken in accordance with a structure plan and the Low Density Residential Zone rules.</p> <p>The submitter's land adjoins the boundary of the Hills+golf course.</p> <p>THL agrees that the submitters land generally lends itself to further residential development as it is bordered by existing residential development along its eastern boundary and is located within close proximity to Arrowtown town centre, parks, schools and public transportation routes.</p> <p>The submitter's proposal focuses residential activity along the boundary of McDonnell Road while lower density is provided throughout the remainder of the site (a maximum of five residential units), which THL considers is generally appropriate.</p> <p>THL agrees that the notified WBRAZ zoning of the submitter's land is illogical and does not reflect the recommendations contained in the WBLUS.</p> <p>THL considers that the proposed WBRAZ restriction of one dwelling per 80 hectares is unreasonable and effectively prevents any further development of the site and fails to recognise that productive agricultural use of the site is unviable.</p> <p>THL therefore supports the submission. The support is subject to appropriate standards in respect of building location, height, internal boundary setbacks, colours,</p>	<p>That the submission be accepted, subject to appropriate standards or controls in respect of building location, setbacks, height, external appearance (including materials and colours), and landscaping (including landform modification and planting, existing and proposed), particularly for those lots that share a boundary with the Hills golf course.</p>



Original Submitter	Original Submission Number	Further Submission Support or Oppose?	Reasons for the Further Submission	The Further Submitters seek the following:
			<p>materials, and landscaping, particularly for those lots that share a boundary with the Hills golf course so as to maintain the amenity of users of the golf course. THL acknowledges that the submission intends for the LDR standards to generally apply to the land, however notes that at the time of filing, these standards are unresolved. THL also notes that more tailored standards may be appropriate for the 5 larger lots that are proposed.</p>	
<p><b>Roger Monk</b></p>	<p><b>2281 2281.1 – 2281.10</b></p>	<p><b>SUPPORT in so far as it relates to LCU24, except in relation to the relief sought in respect of Rule 24.5.2.</b></p>	<p>THL considers that as notified Chapter 24 does not take into account the existing landuse patterns in the Wakatipu Basin, including in LCU24 in particular.</p> <p>For this reason, the submitter seeks a number of changes to the provisions that apply to LCU 24 which are generally supported by THL except the change sought in respect of internal boundary setback requirements.</p>	<p>That the submission is accepted, except in relation to the relief sought in respect of Rule 24.5.2.</p>

Original Submitter	Original Submission Number	Further Submission Support or Oppose?	Reasons for the Further Submission	The Further Submitters seek the following:
<p><b>Arrowtown Retirement Village Joint Venture</b></p>	<p><b>2505</b> 2505.1 – 2505.56, including Appendix 1 and 2.</p>	<p><b>SUPPORT</b></p>	<p>The submitter seeks that the land that is subject to SH16014, which gives consent for the Arrowtown Lifestyle Retirement Village, be rezoned so that the zone reflects the consented activities and achieves an efficient and integrated planning outcome. In the alternative, the submitter seeks a WBLP zoning, subject to amendments to the WBLP provisions.</p> <p>THL agrees that the notified WBRAZ of the submitters' land is illogical and does not reflect the historical and existing character area and the site or LCU 24. Nor does it reflect the findings and recommendations in the Wakatipu Basin Land Use Study (WBLUS).</p> <p>THL agrees that the notified WBRAZ of the site, and LCU 24 in general, is not supported by an adequate section 32 analysis.</p> <p>THL agrees with the changes sought by the submitter to Chapter 24 and considers they better reflect the character of the Wakatipu Basin and make appropriate provision for further development.</p>	<p>That the relief sought in the submission be accepted.</p>
<p><b>Banco Trustees Limited, McCulloch Trustees 2004 Limited and Others</b></p>	<p><b>2400.3</b></p>	<p><b>SUPPORT</b></p>	<p>The notified WBRAZ zoning of LCU24, which includes the submitters' land, does not take account of the existing and consented land use patterns of that the LCU and is inappropriate.</p> <p>The WBLUS identifies LCU24, which includes the submitters' land, as suitable for residential development and THL considers</p>	<p>That the submission be accepted, subject to appropriate controls or standards in respect of buildings (setbacks, heights, external appearance, etc. and landscaping %appropriate controls-), which may include the Council restricting its control in respect of buildings to:</p> <ul style="list-style-type: none"> <li>- Building scale and form;</li> <li>- External appearance including materials and colours;</li> <li>- Access ways;</li> <li>- Servicing and site works including earthworks;</li> <li>- Retaining structures;</li> </ul>

Original Submitter	Original Submission Number	Further Submission Support or Oppose?	Reasons for the Further Submission	The Further Submitters seek the following:
			<p>that given the land's proximity to Arrowtown it lends itself to such development.</p> <p>THL supports the submission, subject to appropriate controls or standards on building height, colours, materials, setbacks and landscaping etc so as to ensure appropriate amenity outcomes are achieved within the WBLP, and so as to maintain the amenity of the users of the Hills golf course.</p>	<ul style="list-style-type: none"> <li>- Infrastructure (e.g. water tanks);</li> <li>- Fencing and gates;</li> <li>- External lighting;</li> <li>- Landform modification, landscaping and planting (existing and proposed); and</li> <li>- Natural hazards.</li> </ul>
<p><b>Peter John Dennison and Stephen John Grant</b></p>	<p><b>2301 2301.1 – 2301.18</b></p>	<p><b>SUPPORT in so far as it relates to the WBRAZ and/or the WBLP</b></p>	<p>The submitter makes a number of submission points relating to the form and function of the WBRAZ and the WBLP, which are generally considered appropriate by THL and are supported.</p>	<p>That the submission be accepted in so far as it seeks amendments to Chapter 24 that accord with the intent of and are no less enabling than THL's original submission 2387.</p>
<p><b>Crown Investment Trust</b></p>	<p><b>2307</b></p>	<p><b>SUPPORT</b></p>	<p>The submitter seeks a number of changes to the PDP, including the Strategic Directions Chapters and the WBRAZ and WBLP provisions which are generally supported by THL because they will ensure the better integration of Chapter 24 with the Strategic Directions Chapters, and provide an appropriate basis for managing subdivision, use and development of the land within the WBRAZ and WBLP.</p>	<p>That the relief sought in the submission be accepted in so far as it accords with the intent of and is no less enabling than the relief sought in THL's original submission 2587. .</p>

- 4. The Submitters DO wish to be heard in support of this further submission.**
- 5. If others make a similar submission, the Submitters WILL consider presenting a joint case with them at the hearing.**

Signed: A Hutton / J Brown

Dated: 27 April 2018