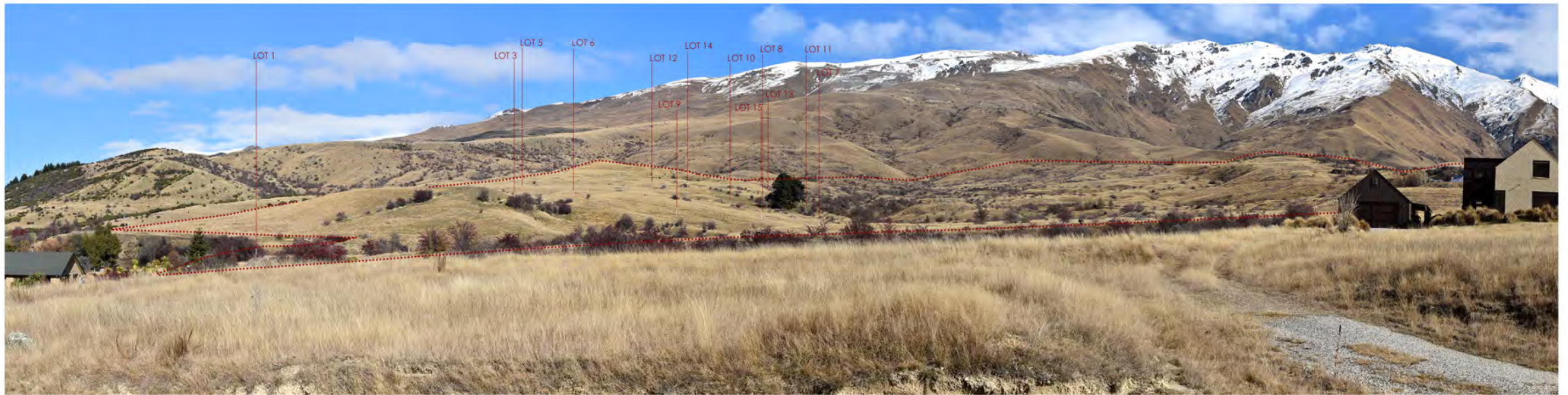




Location E - View from the corner of Curtis Road and Gin and Raspberry Lane - approximately 390m to the centre of proposed Lot 9 building platform



Location F - View from Gin and Raspberry Lane - approximately 410m to the centre of proposed Lot 9 building platform

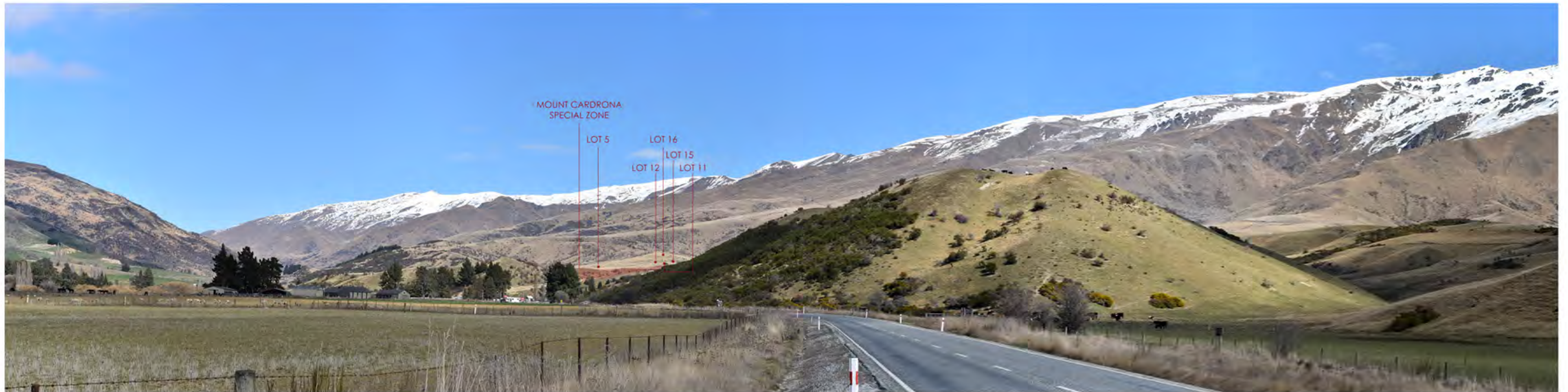




Location G - View from Cardrona Valley Road (south-west) - Entrance to Cardrona Distillery & Museum



Location H - View from Cardrona Valley Road (south-west) - approximately 2.3km to the centre of Lot 5 - Lots 5, 11, 12, 15, and 16





Location I - View from Cardrona Valley Road (south-west) - approximately 4.5km to the centre of Lot 12 - Lots 12, 14, 15, and 16 marked



Location J - Meg Hut Track - Department of Conservation controlled public track - approximately 2.3km to the centre of Lot 4





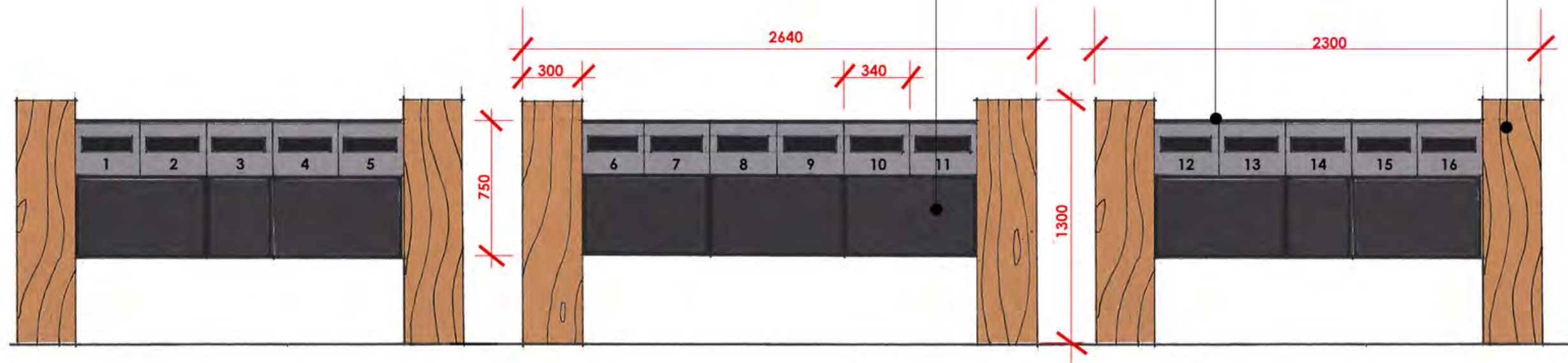


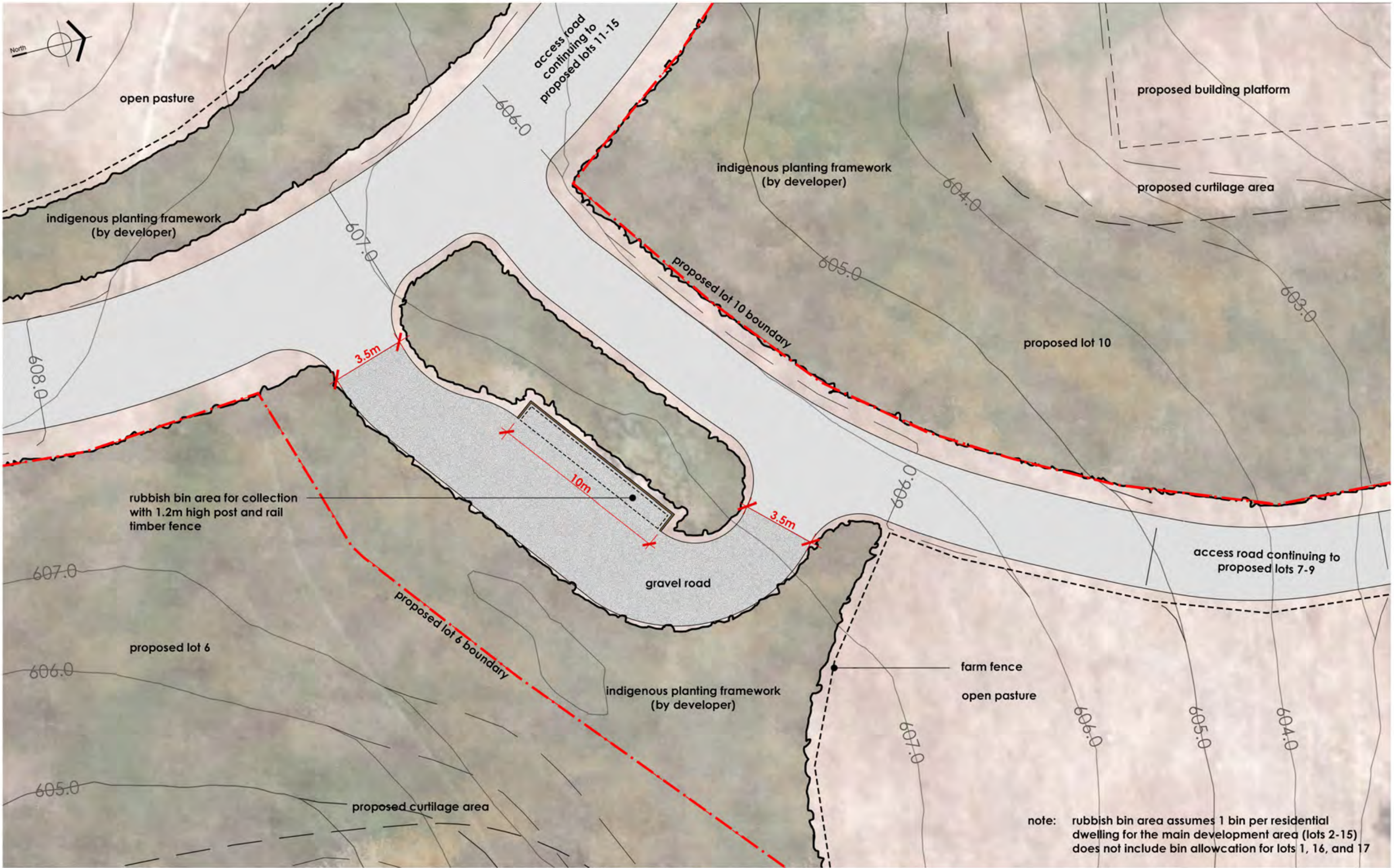


300 x 300 mm macrocarpa timber posts, rough sawn, left to weather (silver)

black steel capping and clad mailboxes

mild steel mailbox open box shelves for parcels (400mm deep)







Proposed Building and Landscape Controls:

Roberts Family Trust | **McDougall's Block**
Curtis Road, Cardrona Valley

January 2019

PROPOSED BUILDING AND LANDSCAPE CONTROLS:

Note: Lot 16 (as indicated on the Proposed Concept Masterplan (Attachment A)) will be excluded from the below design controls as this RBP is previously consented under RM090876.

Landscape Controls

1.1. Planting

Objectives:

- To create a consistent approach to planting across the development area lots.
- To visually integrate the residential curtilage areas into the wider development area.

Controls:

1.1.1. Plant species to be used within the lot landscaping area shall be limited to the following list;

Note: Any other indigenous species not included on this list below, but considered to be appropriate to the Cardrona Valley, shall be permitted.

Trees:

- *Plagianthus regius* (Ribbonwood)
- *Sophora microphylla* (South Island Kowhai)

Grasses/Sedges/Flax:

- *Chionochloa rigida* (Snow Tussock)
- *Phormium cookianum* (Wharariki/Mountain Flax)
- *Cortaderia richardii* (South Island Toe Toe)

Shrubs:

- *Coprosma propinqua* (Mingimingi)
- *Coprosma rugosa* (Needle-leaved mountain coprosma)
- *Coprosma virescens* (NZ Coprosma)
- *Corokia cotoneaster* (Korokio)
- *Discaria toumatou* (Matagouri)
- *Hebe cupressoides* (Cypress Leafed Hebe)
- *Hebe salicifolia* (Koromiko)
- *Olearia odorata* (Tree Daisy)
- *Olearia lineata* (Small-leaved Tree Daisy)
- *Olearia bullata*
- *Olearia hectorii* (Hectors Tree Daisy)
- *Ozothamnus vauvilliersii* (Mountain Cottonwood)

1.1.2. In order for planting to be visually contiguous with the species planted by the developer, each lot owner shall plant a minimum of 8 species from the above list within their curtilage areas.

1.1.3. No exotic trees or plants are permitted, except small contained vegetable and herb gardens.

1.1.4. Varieties of plant cultivar or colour are discouraged.

1.1.5. Plant numbers on slopes must be calculated for the actual surface area and not the plan area to ensure slopes will be sufficiently planted.

1.1.6. The lot owner shall ensure that the lot is kept free of noxious weeds and in a neat and tidy condition.

1.1.7. All plantings should be designed and located as to not impede on the visual amenity or solar gain of any neighbouring property except where permission from the adjoining landowner is provided.

1.1.8. Selected species to be sporadically planted to suit the wider context of the alpine and rural character.

1.2. Fencing

Objectives:

- To avoid an urban response to marking lot boundaries and instead achieve a seamless integration of common and private boundaries.

Controls:

1.2.1. Fences are permitted to mark property boundaries on road side and driveway entrances only for proposed lots 2-15. These can be constructed with traditional post and rail, and shall be no higher than 1m in height.

1.2.2. Fences to mark the property boundaries for proposed lots 1, and 16 are permitted and can be constructed with traditional post and rail fence on road side and driveway entrances. Traditional post and wire farm fencing is to be used to mark the remaining boundary.

1.2.3. Where fences are required for containment within the curtilage area for a pet, it shall be no higher than 1m in height and be constructed in traditional post and wire, or waratah and wire, or post and netting, or waratah and netting.

1.2.4. Fencing/walls/screens for the purpose of privacy and shelter (around courtyards for example) are permitted within the building platforms and shall be constructed in the materials specified for architectural wall claddings. Fencing/walls described shall not exceed 1.5m in height.

1.3. Driveways

Objectives:

- To create a singular typology of materiality and scale across the site that minimises the visual impact from external views.

Controls:

1.3.1. Gravel driveways to lot boundaries will be provided and lot owners shall use gravel, or concrete with an exposed aggregate finish only for all driveway and vehicle courtyards within the lot boundaries. Driveways are to be no wider than 3.5m.

1.3.2. Ornamental gates or entry features are permitted and to be designed in similar fashion to the traditional post and wire fence, not exceeding 1.0m in height and in timber only.

1.3.3. House letterboxes are located at the entrance to the development.

1.4. External Lighting

Objectives:

- To minimise external light spill and prioritise the natural environment over the built form.

Note: The controls below have been informed by the strategies and rules for outdoor lighting standards from the Mackenzie District Plan Section 12.

Controls:

1.4.1. All exterior lighting shall be restricted to down lighting only and only for the purpose of lighting private areas within the boundary setbacks.

1.4.2. Lighting should not create any light spill onto adjoining properties.

1.4.3. All exterior lighting not fixed to a residential or accessory building shall be no more than 1.2m in height and directed downward.

1.4.4. Light sources are to be LED, **incandescent, halogen, or other "white light"**, not sodium vapour or other coloured light.

1.5. Site Utilities & Exterior Service Areas

Objectives:

- To minimise adverse effects of service areas and utilities mounted, positioned, and arranged in individual dwellings.

Controls:

- 1.5.1. Exterior Service Areas to be appropriately screened with native planting from planting species list.
- 1.5.2. Air condition units, meter readers or any other electronic units relating to the house shall be painted to match house cladding or screened with planting if deemed appropriate to the unit.
- 1.5.3. Air conditioning units, or other units of any kind are not permitted to be mounted on the roof. These must be flush mounted where appropriate, and accessible for maintenance, readings etc.
- 1.5.4. All exterior service areas must be placed within the building platform allocated for each lot.
- 1.5.5. All site utilities such as gas supply, electrical supply, storm water piping, foul sewer, telecommunications, shall be underground or contained within the building structure.
- 1.5.6. Water tanks for the purposes of firefighting and potable water shall be concrete and buried.
- 1.5.7. If required, water tanks for the purposes of irrigation are to be buried.

1.6. Swimming & Spa Pools

Objectives:

- To locate swimming and/or spa pools appropriately in the allocated curtilage area where structures are permitted, to reduce adverse visual effects on the surrounding landscape.

Controls:

- 1.6.1. Swimming pools and spas are permitted but must be located within the curtilage areas where structures are permitted. The pool plant is to be housed inside the house, garage, or ancillary building and must be acoustically insulated.
- 1.6.2. Pool fencing is to comply with any applicable local authority and safety standards and integrate with the house and landscape design utilising dark colours and natural materials.

1.7. Paving

Objectives:

- To minimise visibility of hard surfaces into the sensitive rural character environment while promoting recessive materiality and colour combinations.

Controls:

1.7.1. Paved areas are permitted within the curtilage areas and restricted to mid to dark grey 'natural materials', such as schist paving, asphalt, exposed aggregate, granites, bluestone or similar.

1.7.2. Coloured concrete paving in colours other than those described above are not permitted.

1.8. Materiality

Objectives:

- To maintain a consistent colour and material palette throughout the development.

Controls:

1.8.1. Materials for other landscape features (e.g. fire pits, decking) are to compliment the architectural materiality outlined in the architecture design controls.

1.8.2. This is to ensure there is balance and continuity of materiality throughout the development. These materials must be complimentary of the landscape and architectural design.

1.9. Sculptures & Garden Art

Objectives:

- To select sculptures and garden art appropriate to the area.

Controls:

1.9.1. Sculptures and garden art shall be discrete and of an appropriate colour range as described in the controls and to be no higher than 1.5m.

Architectural Controls

2.1. General

- 2.1.1. All buildings, including ancillary buildings, must be located within the proposed residential building platforms.
- 2.1.2. All buildings must not extend beyond 4.5m of a specified datum floor level to the highest point of the roof.
- 2.1.3. All buildings must not exceed a site coverage of 50% of the building platform area.

2.2. Roofs

- 2.2.1. The main roof forms of the residential dwellings across lots 2-16 are to be gabled with the pitch of these roofs to be a minimum of 25% and maximum of 35%. 15% of the roof can be flat to allow for connections between gabled forms
- 2.2.2. Mono-pitched roof is permitted for Lot 1.
- 2.2.3. Hip roofs are not permitted. No gables shall run into one another.
- 2.2.4. Roof colours should have an LRV between 5% - 22%. Roof materials shall be restricted to one material from the following materials only:
 - Steel tray cladding/roof in Resene (or similar) **'Element', 'Grey Friars', 'Ironsand', 'Nocturnal', 'Charcoal', 'Cave Rock', 'Karakā', 'Windswept'**, with matte finish only
 - Profiled Steel in Resene (or similar) **'Element', 'Grey Friars', 'Ironsand', 'Nocturnal', 'Charcoal', 'Cave Rock', 'Karakā', 'Windswept'**, with matte finish only
Timber shingles dark stained to match an LRV of 5 - 22%.
- 2.2.5. The roof material for Lot 1, in addition to the above materials, shall also include the option for the roof to be grassed (green roof).

2.3. Wall Cladding and Colour

- 2.3.1. For Lots 2 - 16, the following materials shall be selected from the palette below to complement the natural environment. Materials shall be resilient and durable in nature.
 - Natural timber cladding, left to weather, or in dark browns or greys, including burnt larch;
 - Stained timber cladding, in dark stain to match a LRV 5 - 22%;
 - Stone: Random sized schist as cladding and landscape wall elements, laid horizontally, and locally sourced;
 - Profiled metal: Standing seam profile in dark colours, pre-weathered zinc, or mild steel;
 - All joinery to have low reflectance glazing with dark aluminium, steel, or timber frames.

- Concrete: low light reflection coefficient to be achieved through texture or oxide additives, or **textured concrete such as 'board-formed'**.
- Corten or mild steel: as wall cladding panels or landscaping features.

2.3.2. In addition to the materials listed above, Lot 1 can also include rammed earth as a wall cladding option.

2.3.3. All window and door joinery, gutters, and downpipes shall be coloured to match the roof and exterior wall cladding.

2.4. Glazing

2.4.1. All glazing is to be anti-reflective and recessed into wall profiles, or setback under the roof form.

2.4.2. Minor tinting may be considered appropriate.

2.5. Ancillary Buildings

2.5.1. Any ancillary building such as garage or shed is to be no higher than 4.5m of the specified datum floor level to the highest point of the roof.

2.5.2. All ancillary buildings to be clad in the same materiality and colour of the residential dwelling.



Curtis Road Cardrona Ecological Assessment

Roberts Family Trust

February 2020



Arrow Lane Arrowtown 9302

www.e3Scientific.co.nz

**Curtis Road Cardrona
Ecological Assessment**

Document Status

Version	Purpose of Document	Prepared By	Reviewer	Review Date
0.1	Draft for internal review	MJ	GD	30/10/2019
1.0	FINAL for client review	MJ	GD	31/10/2019
1.1	FINAL REPORT	MJ	GD	14/02/2019



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1 Introduction

1.1 Overview

Roberts Family Trust (RFT) is seeking resource consent to undertake a subdivision to form 16 residential lots off Curtis Road in Cardrona (see Figure 1). The development will require clearance of vegetation and earthworks for building platforms, associated curtilage and for access ways. To assess the potential impacts of the proposed vegetation clearance on the local ecological values, RFT commissioned e3Scientific Limited (e3s) to undertake an ecological assessment of the proposed areas to be developed. This ecological assessment describes the ecological values within the proposed house lots and reviews the ecological implications of the proposal.

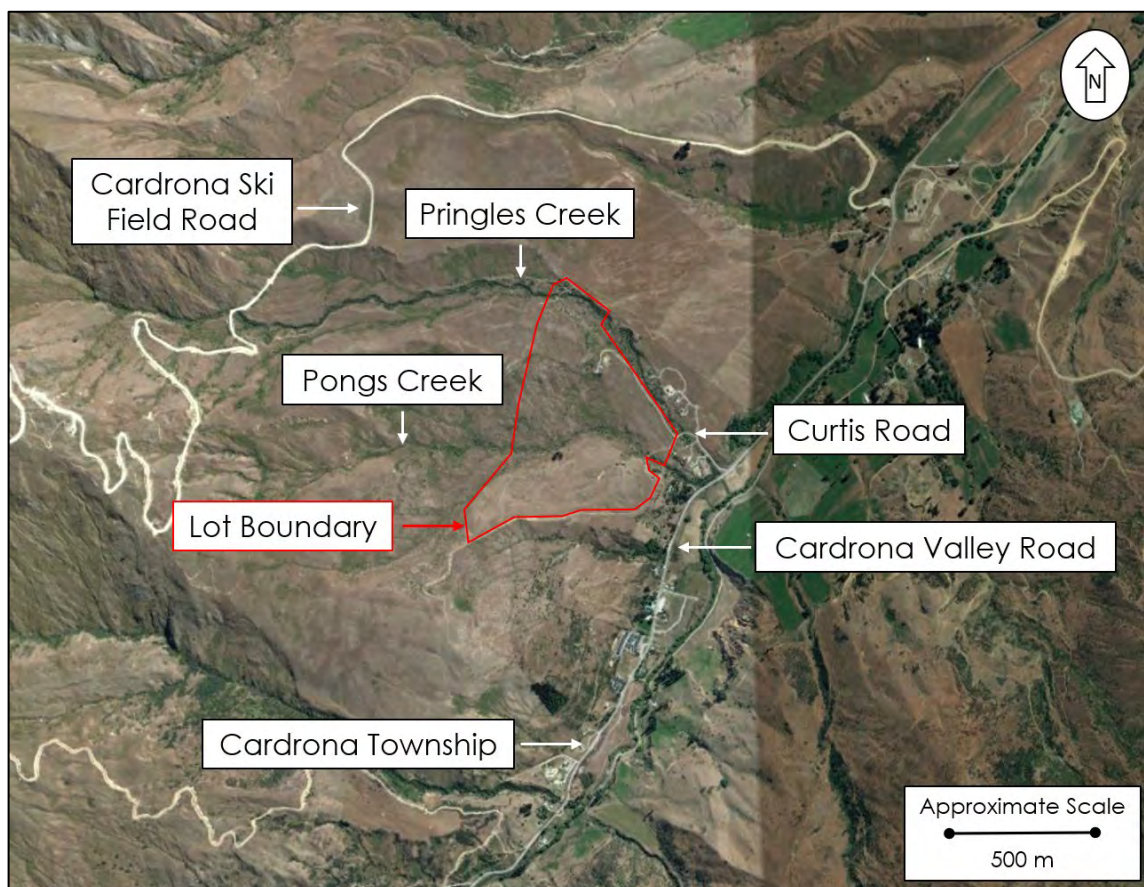


Figure 1: Site location plan.

Base map – Google Earth



1.2 Ecological Report Structure

The report is structured as follows:

- Section 2: Description of the environmental context and the proposed vegetation clearance and associated earthworks.
- Section 3: The methodology employed during the ecological assessment.
- Section 4: Description of the flora and faunal values present within the subject areas.
- Section 5: Assessment of the significance of the ecological values within the development footprint
- Section 6: Ecological Impact Assessment.
- Section 7: Conclusions and recommendations.

1.3 Limitations

e3s 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. The confidence in the findings is limited by the Scope of Work, and limited data due to the site visit being at one time of year. A full range of biota that are present at this site may not have been seen or recorded, however, desktop research was utilised to aid the assessment.

The results of this assessment are based upon site inspections conducted by e3s personnel, and information provided in scientific literature. All conclusions and recommendations regarding the properties are the professional opinions of e3s personnel involved with the project, subject to the qualifications made above. While normal assessments of data reliability have been made, e3s assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside e3s, or developments resulting from situations outside the scope of this project.



2 Description of the Activity and Existing Environment

2.1 Environmental Context

The proposed subdivision works are situated on an undulating terrace to the west of the Cardrona township. The house lots are predominately located to the south of Pongs Creek with the exception of the Lot 1 which is located on the eastern boundary to the north of Pongs Creek. All of the proposed lots are situated in the Shotover Ecological District within the Lakes Ecological Region (DOC, 2019). Under the operative Queenstown Lakes District Council District Plan the area is zoned Rural General (QLDC, 2017).



Figure 2: Study area showing the proposed house lots.

Source: Baxter Design

The area for the ecological review is presented in Figure 2 and henceforth referred to as 'the house lots', 'Pongs Creek', 'Pringles Creek' and collectively as the 'study area'. This Ecological Assessment only covers these identified areas, and not the whole area as shown by the property and lot boundary in Figure 1 and Figure 2. The study area occupies approximately 10 of the 54 hectares.



2.1.1 Physical Environment

The study areas are located on an undulating terrace, with gently sloping mounds between shallow overland flow paths that drain towards Pongs Creek (see Plate 1). The site is located at an elevation of approximately 570 m to 670 m above sea level. Based on the 1:250,000 Geological Map of New Zealand, the geology of the area is predominantly segregated psammitic schist with subordinate pelitic schist, rare greenschist and metachert. The site also contains undifferentiated Pleistocene - Holocene fan deposits of variably weathered, unsorted, locally derived, angular to rounded, sandy gravel in relatively older alluvial fans. Along Pringles Creek, Holocene river deposits of loose, commonly angular, boulders, gravel, sand, and silt forming alluvial fans are present. The NW Cardrona fault line is located within the study area (GNS Science, 2019).



Plate 1: Photos showing the topography and gently sloping nature of the site.

2.1.2 Biological Environment

Flora

The vegetation and habitats present within the study area consist predominantly of exotic pasture grasslands and scattered grey shrubland species, which are similar to those surrounding the study area and found throughout the Cardrona



Valley. The pre-European vegetation cover on the lower slopes would have consisted of fescue tussock grassland, with speargrass and groves of matagouri and *Carex* swamps. In the gully's woodland of kanuka, matagouri, small-leaved coprosmas and olearias, native broom and kowhai, with abundant lianes including *Rubus* and *Muehlenbeckia* would have been present, and at the higher elevations mountain beech and silver beech forest with species such as mountain totara and mountain toatoa likely present (Leathwick, *et al.*, 2003). The present-day vegetation has been highly modified and no longer represents the pre-European vegetation cover.

Fauna

The Conservation Resources Report for Branch Creek (DOC, 2006), which is located approximately 3 km to the north of the study area, found a range of invertebrates including ground beetles, cicada, moths, butterflies, grasshoppers and crickets which are commonly found within the Otago grasslands. This study also found a number of species which have a restricted distribution, however, these appear to be at higher elevations in the more alpine areas, than what is present within the study area.

The Branch Creek Conservation Resources Report found no lizards in the highly modified areas of lowland pasture or within 3 km of the Cardrona Valley Road (DOC, 2006).

Native avifauna species that were observed within the Branch Creek Station included grey warbler, harrier hawk, NZ falcon, pipit, Southern black-backed gull, silvereye, spur-winged plover and tomtit (DOC, 2006). These species are known to utilise habitat that is present within the study area.

2.2 Description of Activity

The proposed activity involves subdividing the property to create 16 residential lots with associated building platforms. The proposal will include 19,500 m³ of cut and 21,000 m³ of fill earthworks to create and upgrade accessways and recontour the land for building platforms. It is also proposed to upgrade and widen the access way over Pongs Creek and Pringle Creek to form a chip sealed road.



On site wastewater is proposed as no public system is available. A tertiary wastewater treatment plant with a communal disposal field is proposed to treat and dispose of wastewater generated by the 16 lots. No discharge from either of these dispersal fields will enter Pongs Creek above the perched culvert. Cut off drains will be used to ensure that any discharge from the communal waste field enters Pong Creek below the culvert. A 50 m buffer between the dispersal fields and both Pongs Creek and Pringles Creek will be maintained.

On site stormwater is also proposed as no public system or connection is available. A combination of soakage pits, swales and dispersal fields will be used. These systems will be designed to mimic the natural hydrology of the site and overland flow paths will be maintained.

Mass native plantings are proposed within each of the house lots. These plantings total approximately 4.6 hectares. Indigenous vegetation communities proposed to be cleared in the study area include grey shrubland and *Raoulia* cushion field. These communities are described in section 4.1



3 Methodology

The ecological assessment of effects for the proposed subdivision at Curtis Road in Cardrona is based on a desktop study, and a site visit completed on 31 May 2019.

3.1 Desktop Research and Site Visit

The desktop and site visit included:

- Review of existing ecological information to determine ecological habitats and species likely present on the site; and,
- A site visit to survey the vegetation communities and faunal habitats. The site survey involved walking through the study area that is proposed to be disturbed to record the species observed. Representative photographs of the proposed area were taken and are provided within this report.

3.2 Assessment of Information

An assessment of the species and ecological habitats present was conducted by undertaking the following steps:

- Establishing the representativeness of the ecological habitats present and significance through a site visit and a review of the expected pre-disturbance vegetation and Land Environments of New Zealand (LENZ) classification (Leathwick, *et al.*, 2003).
- Establishing the presence and significance of plant species through a site visit and the Department of Conservation's threat classification for New Zealand vascular plants (de Lange, *et al.*, 2018).
- Establishing the likely presence and significance of native avifauna species through a site visit, existing scientific knowledge and the Department of Conservation's threat classification for New Zealand birds (Robertson, *et al.*, 2017).
- Establishing the possible presence and significance of invertebrate and lizard species through a review of existing scientific knowledge.



4 Ecological Values

4.1 Vegetation

The main vegetation habitat present within the house lots and fill areas is highly modified exotic pasture grassland (see Plate 2). The main species present within these grasslands are brown top (*Agrostis capillaris*) and chewing's fescue (*Festuca rubra*), which form a thick cover over most of the study area. Other exotic species present where the grasses thin out include white clover (*Trifolium repens*), woolly mullein (*Verbascum thapsus*), thistles (*Cirsium* sp.), moth mullein (*Verbascum virgatum*), sheeps sorrel (*Rumex acetosella*), Yorkshire fog (*Holcus lanatus*), yarrow (*Achillea millefolium*), St John's wort (*Hypericum perforatum*) and mouse-ear hawkweed (*Pilosella officinarum*). Exotic shrubs that are present throughout the study area include hawthorn, English broom (*Cytisus scoparius*), sweet briar (*Rosa rubiginosa*), with scattered elderflower (*Sambucus nigra*). Native species include the At Risk – Declining matagouri (*Discaria toumatou*), which is located throughout the study areas, along with the occasional porcupine shrub (*Melicactus alpinus*) and hard tussock (*Festuca novae-zelandiae*).

In the damper areas, where there is overland flow occurring (see Plate 2), species such as *Juncus effusus* var. *compactus*, *Juncus tenuis*, *Carex leporina* and the native *Juncus edgariae* are present, as well as the species listed above.

A small patch of cushion field (see Plate 2) is located on proposed Lot 15. Species present amongst the heavily grazed grasses include *Raoulia subsericea*, *Raoulia tenuicaulis*, the At Risk – Declining *Raoulia australis* and the At Risk – Declining *Raoulia parkii*. This area is present due to rabbits keeping the pasture grass low.

The vegetation along Pongs Creek is similar to that on the house lots. The dominant vegetation is exotic pasture grasses, with numerous hawthorn, briar, broom and matagouri bushes (see Plate 2). Other species noted along the creek include *Carex coriacea*, prickly shield fern (*Polystichum vestitum*), golden spaniard (*Aciphylla aurea*) and one *Olearia odorata*. Additional species to those mentioned that are found along Pringles Creek include *Veronica salicifolia* and more *Olearia odorata* plants. Native species such as lancewood, kowhai, cabbage trees, mountain beech and *Olearia odorata* have been planted along



Pongs Creek and Pringles Creek. Exotic willow trees are present at the crossing of Pongs Creek.

Mature pine trees are present, along with seedlings of Douglas fir (*Pseudotsuga menziesii*) and contorta pine (*Pinus contorta*). Larch trees (*Larix decidua*) are present within the property boundary, but not within the study areas.

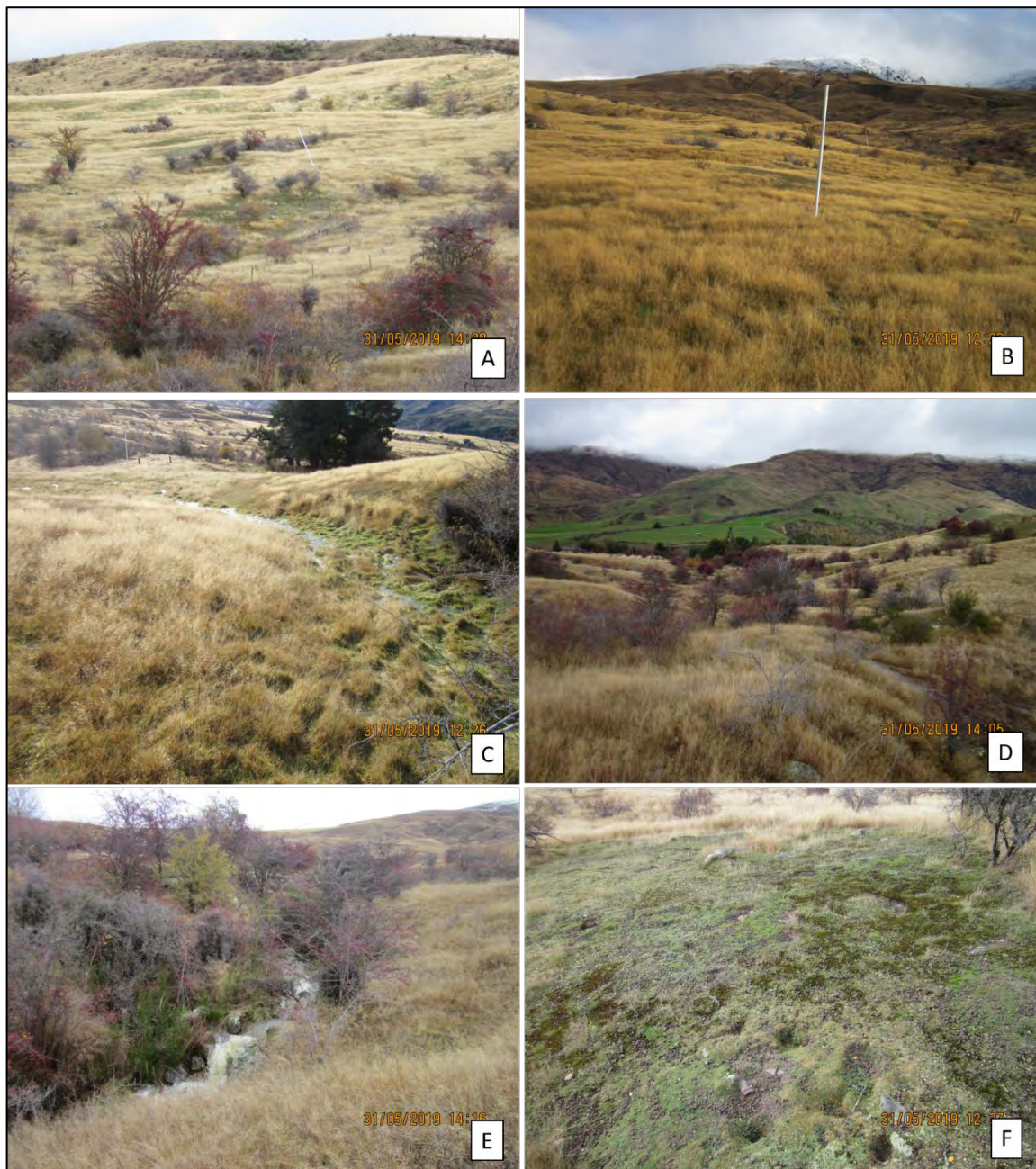


Plate 2: Examples of vegetation within the site. A & B – Exotic grasslands with scattered shrubs. C – Overland flow area. D & E – Pongs Creek. F – Area of cushion field.



4.2 Fauna

4.2.1 Avifauna

Native bird species that were observed during the site visit included harrier hawks (*Circus approximans*), silvereyes (*Zosterops lateralis lateralis*), grey warbler (*Gerygone igata*) and paradise shelduck (*Tadorna variegata*). These species have a conservation status of Not Threatened (Robertson *et al.*, 2017). Introduced and naturalised species that were recorded included Australian magpies (*Gymnorhina tibicen*), chaffinch (*Fringilla coelebs*), blackbirds (*Turdus merula*), greenfinch (*Carduelis chloris*) and yellow hammer (*Emberiza citrinella*).

4.2.2 Fish

Pongs Creek is a known, secure population of the Clutha flathead galaxias (Galaxias "species D") which has a conservation status of Threatened – Nationally Critical (Dunn *et al.*, 2018). Clutha flathead galaxias have a very limited distribution in waterways in Otago.

In April 2016 the Department of Conservation undertook an electric fishing survey of Pongs Creek in order to investigate the population of Clutha flathead galaxias. The survey methods and findings were documented in a Department of Conservation file note (see Appendix A). The investigation included 29 survey locations along the creek with a total of 68 galaxias captured.

The DOC investigation found a perched culvert downstream of the recorded galaxias population is a significant barrier to the movement of koaro and brown trout and this barrier has securely protected nearly 1 km of flathead galaxias habitat.

The New Zealand Freshwater Fish Database shows that the only species recorded in Pringles Creek is Brown Trout (*Salmo trutta*). The culvert present in Pringles Creek allows for fish passage.

4.2.3 Lizards

Based on previous lizard surveys within the surrounding Cardrona area (DOC, 2006) on habitat and in vegetation that is similar to that present within the study area, there is a low likelihood of lizards being present. The Branch Creek Conservation Resources Report found no lizard species in the highly modified



areas of lowland pasture or within 3 km of the Cardrona Valley Road. Lizards were found along ridgelines, tussock grassland or in rocky valley gorges (DOC, 2006). In order to confirm that lizards will not be disturbed during the construction phase of the development, a condition of consent is proposed for a lizard survey to be undertaken prior to the commencement of works.

4.3 Summary of Ecological Values

The existing ecological values within the proposed Curtis Road subdivision are predominantly associated with the matagouri, cushion fields and Pongs Creek. A summary of the ecological values on site are provided in Table 1 below.

Table 1: Summary of Ecological Values.

Ecological Value	Description
Matagouri and cushion fields	The study area contains scattered At Risk – Declining matagouri and one small area of the At Risk – Declining <i>Raoulia australis</i> and At Risk – Declining <i>Raoulia parkii</i> .
Presence of threatened fauna	Pongs Creek contains a population of the Threatened – Nationally Critical Clutha flathead galaxias.
Habitat for native bird species	The habitat present on site provides hunting, nesting and forging habitat for native bird species.



5 Ecological Significance and Value

The assessment of the significance of the ecological values associated with the study area are based on the following:

- The Operative QLDC District Plan Criteria for assessing ecological significance (QLDC, 2009);
- The Ecological Impact Assessment (EclA) EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems, 2nd edition (EIANZ, 2018); and,
- New Zealand's Department of Conservation threatened flora and fauna lists.

5.1 Queenstown Lakes District Plan Ecological Significance Criteria

5.1.1 Habitat Ecological Values

An assessment of the vegetation and habitat has been completed using both the EIANZ guidelines and the QLDC District Plan.



Table 2: Assessment of the indigenous vegetation and habitat using the ecological criteria in the EIANZ Guidelines and the QLDC District Plan.

Matter	Reasoning	Score (EIANZ, 2018)	QLDC Criteria Satisfied
Representativeness	The exotic pasture grasslands and riparian margin are no longer representative of the vegetation that would have been present in the Wanaka and Shotover Ecological Districts. The site has been highly modified and the indigenous vegetation that is present is patchy. The grey shrubland species are remnants of a low altitude shrubland community that has regenerated after historic disturbance.	Moderate - Low	No
Rarity/ distinctiveness	The study area contains the At Risk – Declining matagouri, <i>Raoulia australis</i> and <i>Raoulia parkii</i> . Pongs Creek supports a population of the Threatened – Nationally Critical Clutha flathead galaxias, which has a very limited distribution within Otago. This stretch of habitat is protected from predatory fish species by a perched culvert. Habitat which contains acutely and chronically threatened species is a National Priority 4 habitat.	High	Yes
Diversity and pattern	The native vegetation present within the study area has a low diversity, which is a result of the	Low	No



	habitat modification that has already occurred.		
Ecological context/Special ecological character	The highly modified open pasture habitat does not provide preferable habitat for native bird species. However, the perched culvert in Pongs Creek has provided a secure habitat for the Clutha flathead galaxias. This culvert has created a barrier to other fish species, creating a stretch of habitat where this fish is able to survive.	High	Yes
Size and Shape	The length of Pongs Creek on the site that is protected by the culvert is approximately 800 m, with more creek and tributaries further upstream of the property boundary. The highly modified nature of the catchment has resulted in this being a sensitive habitat that will have little buffer to change. However, this catchment without further modification, has the potential to continue to support this species. The native vegetation that is proposed to be cleared is scattered throughout the site.	N/A	Yes
Connectivity	The shrubland within the study area although scattered, provides a connection to the wider shrubland remnants that are found throughout the Cardrona Valley. Pongs Creek has high ecological value due to the lack of connectivity with the Cardrona	N/A	Yes



	River as a result of the perched culvert.		
Long Term Sustainability	<p>The vegetation within the study area is predominantly thick, exotic grassland, which will restrict the ability of native species to establish within the site.</p> <p>The riparian margin of Pongs Creek is highly modified. Changes in factors such as water flow paths and sediment levels are likely to affect the Clutha flathead galaxias. However, without modification in the study areas, this species is likely to continue to exist in stasis in this stretch of the creek.</p>	N/A	Yes

5.1.2 Fish Ecological Values

The Clutha flathead galaxias is present within Pongs Creek (DOC, 2016). This species has a conservation status of Threatened – Nationally Critical. This species has a restricted distribution in the Otago area, therefore the stretch of creek that this species inhabits has Very High ecological value.

5.1.3 Bird Ecological Values

The scattered native and exotic shrubs present amongst the pasture grassland habitat, generally provides poor quality habitat for native bird species. The bird species observed during the site visit have a conservation status of Not Threatened or Introduced and Naturalised (Robertson, *et al.*, 2017). Other species which are known to utilise habitat that is present within the study area and not observed during the site visit include NZ falcon, pipit, Southern black-backed gull, silvereye, spur-winged plover and tomtit (DOC, 2006). The pipit has a conservation status of At Risk – Declining and the falcon is At Risk – Recovering (Robertson, *et al.*, 2017). The assigned ecological value under the EIANZ (2018) guidelines for species that are At Risk – Declining is High and At Risk – Recovering is Moderate. All other bird species have a Low conservation status. The habitats that these species utilise are scattered throughout the wider Cardrona Valley.



5.2 Summary of Ecological Significance and Values

The ecological values within the proposed residential lots and Pongs Creek has been determined using the criteria outlined in the 2018 EIANZ Guidelines and the significance criteria in the QLDC District Plan. The overall ecological value of the terrestrial vegetation and habitat that is proposed to be disturbed is Moderate and the ecological value of Pongs Creek is Very High. The habitats within the study areas satisfies most of the QLDC significance criteria. The ecological value of the At Risk – Declining matagouri, pipit, *Raoulia australis* and *Raoulia parkii* species is High, the At Risk – Declining falcon is Moderate and the ecological value of the Threatened – Nationally Critical Clutha flathead galaxias is Very High. All other Not Threatened plant and fauna species are considered to have Low ecological value.



6 Ecological Impact Assessment

6.1 Ecological Impact Assessment Methodology

The ecological impact assessment follows the 2018 EIANZ Ecological Impact Assessment Guidelines for New Zealand. This assessment is based on the ecological values determined within the study area in Section 5, and the magnitude of effect of the proposed activity, which is then used to determine the ecological impact within the zone of influence, the wider context of individual species populations and the extent of remaining vegetation and habitat within the wider area. Ecological effects represent an effect on ecological or conservation values that may warrant avoidance, mitigation and potentially offsetting measures.

6.2 Direct Effects

The development of the proposed building platforms and associated curtilage areas will result in the removal of individual indigenous plants and very small area of indigenous vegetation that is estimated at less than 1000 square metres. The site contains scattered matagouri and porcupine shrubs and one patch of cushion field. The loss of these habitats and plants will be permanent. The magnitude of the effect of the proposed disturbance to this vegetation is low as the removal of scattered vegetation is minor in scale compared to the presence of these species and communities both onsite and within the wider environment. The vegetation removal proposed will there have a minor effect on the ecological values of the site.

The proposed development will provide considerable positive ecological effects to the terrestrial ecology through the planting of ecological restoration plantings proposed through the development. These plantings will provide shelter and a food resource for invertebrates and birds and will reintroduce plant species that are no longer present on the site or the wider area. The plantings may also encourage the movement of lizards into the area.

The proposed earthworks and recontouring of the topography of the study areas, will result in disruption to overland flow paths. However, the development is designed to maintain natural overland flow paths downgradient of the



development, and stormwater attenuation and retention features are designed to mimic the natural hydrology of the site.

The access to the proposed lots will be via the existing road alignment. Curtis Road crosses both Pringles Creek and Pongs Creek which flow through culverts under the road. This road will be required to be upgraded and widened to a chip sealed road, which may involve stream works. The detailed design of these works has not been finalised however e3s considers the existing culvert should be excluded from upgrade works, if possible, as it currently forms an effective barrier to trout migration into the upper reaches of Pongs Creek. Removing the risk of trout migration will be fundamental in the design of upgrade work.

6.3 Indirect Effects

In addition to the direct effect of the earthworks on the vegetation and habitat it is possible that the earthworks for the proposed building platforms, curtilage areas, fill areas, mounds and roading could result in the mobilisation of sediment into Pongs Creek and Pringles Creek. This effect is most prevalent during and immediately following the construction phase. The habitat that is the most sensitive to this potential effect is Pongs Creek and Pringles Creek as sediments have the potential to affect water quality and deposit onto the bed of the creek. The potential ecological impact of the sedimentation without management is Very High. This potential effect can be managed by requiring a specific sediment and erosion control management plan to mitigate the risk of runoff into overland flow paths and watercourses.

6.3.1 Stormwater and Wastewater Effects

Stormwater and wastewater from the residential dwellings have the potential to impact water quality, through increased pollutants and nutrients. This effect could be delayed, as it will take time for the pollutants to reach the creeks. The introduction of pollutants into the waterways could have a Very High magnitude of effect as there is the potential for a degradation of water quality. The ecological impact of wastewater and stormwater entering the creeks would be Very High. This effect can be managed through vigilant design and placement of the stormwater and wastewater treatment systems.



Tertiary treatment of wastewater is proposed, along with a communal disposal field. Cut off drains will be installed to ensure no discharge from the wastewater communal field will occur to Pongs Creek above the perched culvert. Therefore, the discharge of wastewater will not increase nutrient loads into the core flathead galaxias habitat.

Stormwater will be discharged to soakage pits, swales and above ground dispersal fields into vegetation. Stormwater discharge will not occur directly into Pongs Creek and is to mimic the natural hydrology of the site. Particular care of the stormwater placement on lot 11 is required due to the proximity of Pongs Creek (less than 50 m). Other lots in close proximity where stormwater dispersal field locations will require consideration to ensure no impact on Pongs Creek include lots 7, 8, 9, 13 and 15.

6.3.2 Effects on Hydrology

The subdivision requires the installation of cut of drains up hydraulic gradient from the building platforms in order to depress groundwater levels. The cutoff drains will collect water and discharge into the individual lot stormwater system.

The stormwater systems discharge to ground or soakage fields. All stormwater from the house sites will discharge into the Pongs Creek catchment. Therefore, the groundwater throughflow diversion will not result in a loss of water from the Pongs Creek catchment and there will be no reduction in groundwater recharge into Pongs Creek.

Based on the above commentary, the subdivision will not result in a reduction of stream flow in Pongs Creek.

6.3.3 Weeds

The introduction and spread of exotic weed species, in particular along the creek banks and in the riparian margin of Pongs Creek has the potential to impact the ecology of the area. The ecological impact of this, without management measures is Very High. The further introduction and spread of exotic weed species will result in competition for space and resources, resulting in a fundamental change in the ecology of the creek. This effect can be managed by ensuring that any machinery or equipment that is used during the proposed works is free of soil that could contain seeds or plants that could contaminate the area. Only clean



soil from outside the study area is to be brought onto the site, and no movement of machinery within the riparian margin of Pongs Creek is to occur. Restricting the movement of soil and machinery within the site will help to reduce the spread of exotic weed species, in particular the introduction of new weed species into Pongs and Pringles Creek.

6.4 Impact Management Measures

Very High and High ecological effects represent an effect on ecological or conservation values that warrants avoidance and/or extremely high intensity mitigation and remediation actions. Roberts Family Trust have proposed to take potable water from Pringles Creek rather than Pongs Creek to avoid further fluctuations in the flowrate of Pongs Creek, especially during the drier months. It is also proposed to undertake 4.6 hectares of native plantings in residential Lots 2 to 15 (see Appendix B).

To manage the effects of the proposal, e3s recommends the following consent conditions.

1. No works are to occur within Pongs Creek or within the riparian margin without an assessment of the proposed effects occurring by a suitably qualified ecologist.
2. Upgrading the road over Pongs and Pringles Creek shall be overseen by a suitably qualified freshwater ecologist to ensure no disturbance to the perched culvert.
3. The culvert design and installation in Pongs Creek is to be overseen by a suitably qualified and experienced freshwater ecologist, with expertise in fish passage and construction.
4. The alignment and associated installation methodology of the potable water supply line and wastewater main across Pongs Creek is to be assessed by a freshwater ecologist.
5. A sediment and erosion control management plan is to be prepared prior to works commencing to mitigate the risk of runoff and sedimentation into Pongs Creek, Pringles Creek and any overland flow paths.
6. To confirm the presence or absence of lizards within the site, a survey is to be carried out by a suitably qualified herpetologist prior to works commencing. Any recommendations provided, including an



application for a Wildlife Permit to the Department of Conservation are to be adhered to by the consent holder.

7. Prior to any machinery or equipment entering the study area, it must be cleaned and checked for soil that could potentially contain seeds or exotic plants that could further contaminate the site.
8. To reduce the spread of exotic weed species, in particular the introduction of new weed species into Pongs Creek only clean, screened soil, is to be brought onto site.
9. No stormwater discharge is to occur directly into Pongs Creek and all stormwater discharge is to mimic the natural hydrology of the site.
10. Detailed stormwater designed and placement on proposed Lot 7, 8, 9, 11, 13 and 15 is required due to the proximity of the Lots to Pongs Creek to ensure no impact on Pongs Creek occurs.
11. No wastewater is to be discharged to Pongs Creek above the perched culvert.
12. Ecological restoration plantings are to be installed in residential Lots 2 to 15 as set out in the development masterplan.

6.5 Summary

The proposed subdivision and creation of 16 residential lots has the potential to impact the surrounding environment. The proposed activities have the potential to impact Pongs Creek, which has a population of Clutha flathead galaxias. The proposed development will only remove a relatively small amount of native vegetation including At Risk – Declining matagouri and one patch of cushion plants, however substantial native replanting, which will improve habitat for the native fauna is proposed on the site.



7 Conclusions and Recommendations

Based on the ecological assessment the following conclusions are made:

1. Roberts Family Trust are seeking resource consent to undertake a subdivision to form 16 residential lots off Curtis Road in Cardrona.
2. The proposal will include 19,500 m³ of cut and 21,000 m³ of fill earthworks. It is also proposed to upgrade and widen the access way over Pongs Creek and Pringle Creek to form a chip sealed road.
3. The main vegetation habitat present within the house lots is highly modified exotic pasture grassland. The At Risk – Declining matagouri is scattered as individual plants through the site. A small patch of cushionfield which includes the At Risk – Declining *Raoulia australis* and *Raoulia parkii* is located on proposed Lot 15.
4. The development will require minor clearance of indigenous vegetation for building platforms, associated curtilage and for access ways. The indigenous vegetation clearance is estimated to be less than 1000 square metres and is permitted under the Operative District Plan.
5. A secure population of the Threatened – Nationally Critical Clutha flathead galaxias is present within Pongs Creek.
6. The overall ecological value of the vegetation that is proposed to be disturbed is Moderate and the overall ecological value of Pongs Creek is Very High.
7. Stormwater and wastewater disposal has been identified as a key risk to the Clutha flathead galaxias population in Pongs Creek. Design of these systems will ensure impact to the creek is avoided.
8. The development proposes extensive ecological restoration planting that can provide a positive ecological benefit through providing a food source and cover for native fauna and reintroducing indigenous species that are no long present on the site or within the wider environment.

In summary, the ecological investigation has identified a range of ecological values within the development site. e3s considers the development would result in a positive benefit to the terrestrial ecology of the site given the scale of the ecological restoration proposed. e3s also concludes that careful site design such as placement of the wastewater disposal field and construction management



can ensure the development can proceed without impacting the habitat of the Clutha flathead galaxias.



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Appendices

Appendix A:
Freshwater Survey Pongs Creek, Cardrona Valley, 19 April 2016

Freshwater Survey Pongs Creek, Cardrona Valley, 19 April 2016.

Report prepared by Daniel Jack, Dunedin Office, field assistance by Florence Gaud, Wanaka Office.

Introduction

Clutha flathead galaxias were first identified in the lower reaches of Pongs Creeks following survey work completed by the Department of Conservation in December 2015. The survey was instigated by the landowner, Martin Curtis, who had observed small fish residing in pools where the creek flows through his property. Brown trout and koaro appeared to be displacing Clutha flathead galaxias and they were only holding on in environmentally severe areas of habitat within the lower reaches of the creek (Jack 2015). Martin Curtis has had a walk through the upper reaches of Pongs Creek and observed fish occupying pools on the neighbouring property. Martin approached the owner of the neighbouring property and secured access for the Department of Conservation to survey the upper reaches of Pongs Creek. This file note presents the findings of that survey.



Map 1. An aerial view of the 29 surveyed sites (red circles), and perched culvert, Pongs Creek, Cardrona Valley, 19 April 2016.

Methods/Results

A total of 29 sites (Map 1) were electro-fished using Kainga backpack electric fishing machine (NIWA Instrument Systems). Each site fished covered approximately 10 m² of wetted stream area. Surveyors moved in an upstream direction. The instream habitat was predominantly a mixture of meandering riffle and long slow moving pool with the occasional steep rapid. Overhanging vegetation and large boulders and cobbles provided abundant fish refugia. Sedge and rush species comprised the riparian vegetation as well as rough pasture grasses (Fig 1). Clutha flathead galaxias were found throughout the upper reaches of Pongs Creek (Map 1) and occurred in a variety of size ranges from 42 – 126 mm (Fig.2, Table 1). No brown trout or koaro were observed in this area and some sites appeared to have no fish species. The presence of a large perched culvert appears to be acting as a barrier to brown trout and koaro (Fig. 3, Map 1). The culvert (NZTM 1284323 / 5023115) was approximately 1 m high, falling onto boulders. A single brown trout was present in the pool directly below the culvert.



Figure 1. Stream habitat above culvert, Pongs Creek, Cardrona Valley.



Figure 2. Martin Curtis measuring three *Clutha flathead galaxias*, Pongs Creek, Cardrona Valley.



Figure 3. Perched culvert in Pongs Creeks, Cardrona Valley (NZTM 1284323 / 5023115).

Discussion

The perched culvert prevents the upstream colonization of both koaro and brown trout into the upper reaches of Pongs Creek. This is a significant barrier, securely protecting nearly 1 km of Clutha flathead galaxias habitat. An additional advantage for this barrier is the absence of a plunge pool below the culvert which substantially reduces the chance that brown trout would be able to jump up during high surface flows.

Only one brown trout was observed just downstream of the culvert in a deep pool and a single Clutha flathead galaxias was observed in the section of creek flowing through Martin Curtis's property. High temperatures in addition to low water flows are lethal to brown trout (Elliot 2000) however galaxiid fishes may survive short periods of exposure to higher water temperatures provided refugia is available amongst the substratum (Dunn 2003). It appears the severe low surface flows during the 2015-16 summer have drastically reduced all fish species numbers within Martin's section of Pongs Creek. Sites surveyed in the upper catchment of Pongs Creek that had no fish species presence may also have been affected during this period. Despite the drought conditions in the Cardrona Valley the Clutha flathead galaxias in Pongs Creek above the culvert have survived the low surface flows.

This is the second documentation of a secure population of Clutha flathead galaxias in the Cardrona Valley. The use of perched culverts as a barrier in other tributaries containing Clutha flathead galaxias may be a viable tool of protection. This reinforces the necessity of site visits during the RMA consenting processes where threatened fish species occur to identify potential opportunities.

Table 1. Summary of sites surveyed, grid reference (NZTM), fish species, number captured and size range, Pongs Creek, 19 April 2016.

Easting	Northing	Species (n)	Size range (mm)
1284232	5023176	Clutha flathead galaxias (7)	65 - 81
1284212	5023208	No species	
1284191	5023210	Clutha flathead galaxias (1)	97
1284084	5023231	Clutha flathead galaxias (2)	88, 111
1284055	5023231	Clutha flathead galaxias (2)	84, 88
1284031	5023216	Clutha flathead galaxias (3)	74 - 90
1284009	5023210	Clutha flathead galaxias (3)	57 - 101
1283973	5023186	Clutha flathead galaxias (2)	78, 87
1283945	5023164	Clutha flathead galaxias (2)	85, 110
1283900	5023140	No species	
1283885	5023144	Clutha flathead galaxias (1)	53
1283868	5023136	Clutha flathead galaxias (1)	76
1283818	5023134	No species	
1283798	5023137	Clutha flathead galaxias (8)	53 - 93
1283752	5023119	Clutha flathead galaxias (1)	86
1283708	5023121	Clutha flathead galaxias (4)	60 - 91
1283671	5023126	Clutha flathead galaxias (1)	68
1283635	5023129	Clutha flathead galaxias (5)	55 - 73
1283587	5023129	Clutha flathead galaxias (1)	54
1283499	5023115	Clutha flathead galaxias (2)	42, 50
1283467	5023106	Clutha flathead galaxias (4)	42 - 86
1283442	5023107	Clutha flathead galaxias (2)	67, 80
1283339	5023116	Clutha flathead galaxias (3)	96 - 109
1283281	5023133	Clutha flathead galaxias (2)	78, 104
1283257	5023127	Clutha flathead galaxias (5)	50 - 104
1283230	5023117	Clutha flathead galaxias (3)	45 - 107
1283197	5023101	Clutha flathead galaxias (3)	91 - 126
1283176	5023095	No species	
1284323	5023115	Brown trout (1)	180

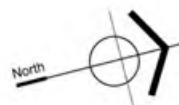
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**Appendix B:
Landscape Plans**



Consented building platform
25mx40m - 1000m²(RM090876)

Proposed Building platforms
32.6x23m - 750m²

Curtilage areas subject to design controls and common planting list

Native planting framework undertaken by developer (covenanted)

Driveways 3.5m wide

Proposed Lot boundaries

Rubbish Collection area refer to SK36

Pongs Creek Clutha Flathead Preservation Corridor fenced and protected from stock

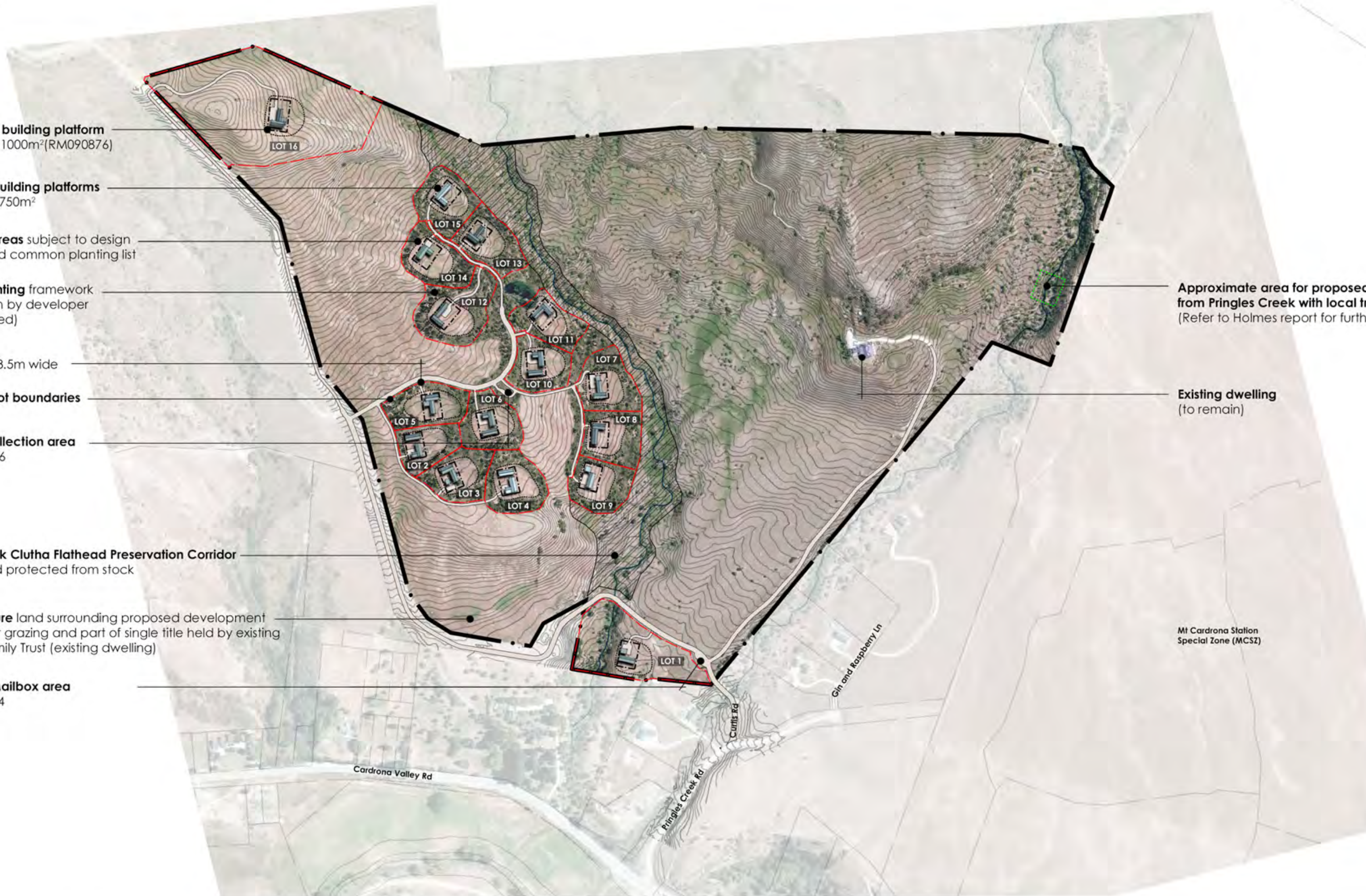
Open pasture land surrounding proposed development retained for grazing and part of single title held by existing Roberts Family Trust (existing dwelling)

Entry and Mailbox area refer to SK34

Approximate area for proposed water take from Pringles Creek with local treatment.
(Refer to Holmes report for further details)

Existing dwelling (to remain)

Mt Cardrona Station Special Zone (MCSZ)





- Notes:
- 1) Areas and dimensions are subject to survey.
 - 2) Lots 1 - 16 are subject to building platforms and curtilage areas as per Baxter Design Master Plan (See Sheets 104 and 105).
 - 3) ROW legal widths are as per the Infrastructure report dated 02/09/2019
 - 4) ROW on underlying Lot 6 DP 344432 is an easement to be cancelled.
 - 5) Refer to sheet 106 for details of proposed easements and land covenants, easements to be retained and easements to be cancelled.
 - 6) Subdivision is to be staged - refer to Sheet 103.

REVISION	DETAIL	DATE
B	remove lot 17	05/02/2020
C	edit preservation corridor	18/02/2020

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Project

**Roberts Family Trust
Cardrona Valley**

Title

**Scheme Plan
Overall**

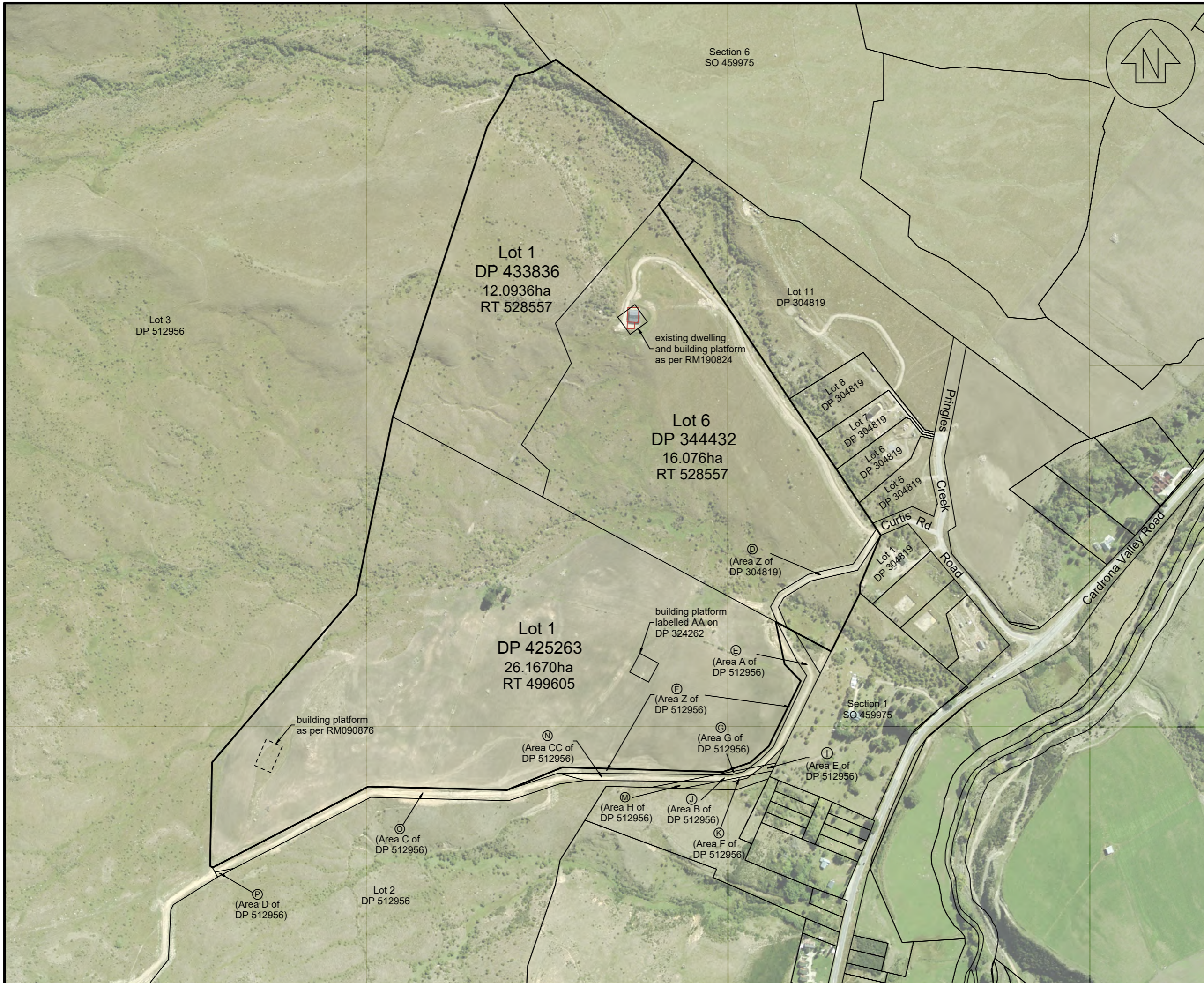
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Scale: 1:1000

Job No: 5890	Drawn By: TD	Lvl Datum: NZVD16	Coordinate System: Lindis 2000
Drawing No: W1184	Sheet No: 100	Revision: C	Date Created: December 2019



Section 6
SO 459975

Lot 3
DP 512956

Lot 1
DP 433836
12.0936ha
RT 528557

Lot 11
DP 304819

Lot 6
DP 344432
16.076ha
RT 528557

Lot 8
DP 304819

Lot 7
DP 304819

Lot 6
DP 304819

Lot 5
DP 304819

Lot 1
DP 304819

Lot 1
DP 425263
26.1670ha
RT 499605

Section 1
SO 459975

building platform
as per RM090876

building platform
labelled AA on
DP 324262

(P)
(Area D of
DP 512956)

Lot 2
DP 512956

(C)
(Area C of
DP 512956)

(N)
(Area CC of
DP 512956)

(M)
(Area H of
DP 512956)

(J)
(Area B of
DP 512956)

(K)
(Area F of
DP 512956)

(E)
(Area Z of
DP 512956)

(G)
(Area G of
DP 512956)

(I)
(Area E of
DP 512956)

(A)
(Area A of
DP 512956)

(Z)
(Area Z of
DP 304819)

existing dwelling
and building platform
as per RM190824



- Notes:
- 1) Areas and dimensions are subject to survey.
 - 2) All existing easements on Lot 2 DP 512956 are to be retained.
 - 3) Refer to sheet 106 for details of proposed easements and land covenants, easements to be retained and easements to be cancelled.

REVISION	DETAIL	DATE
B	remove lot 17	05/02/2020
C	edit preservation corridor	18/02/2020

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Drawing No: W1184	Sheet No: 101	Revision: C	Date Created: December 2019



Notes:
 1) Areas and dimensions are subject to survey.
 2) Refer to sheet 106 for details of proposed easements and land covenants, easements to be retained and easements to be cancelled.

REVISION	DETAIL	DATE
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C	edit preservation corridor	18/02/2020

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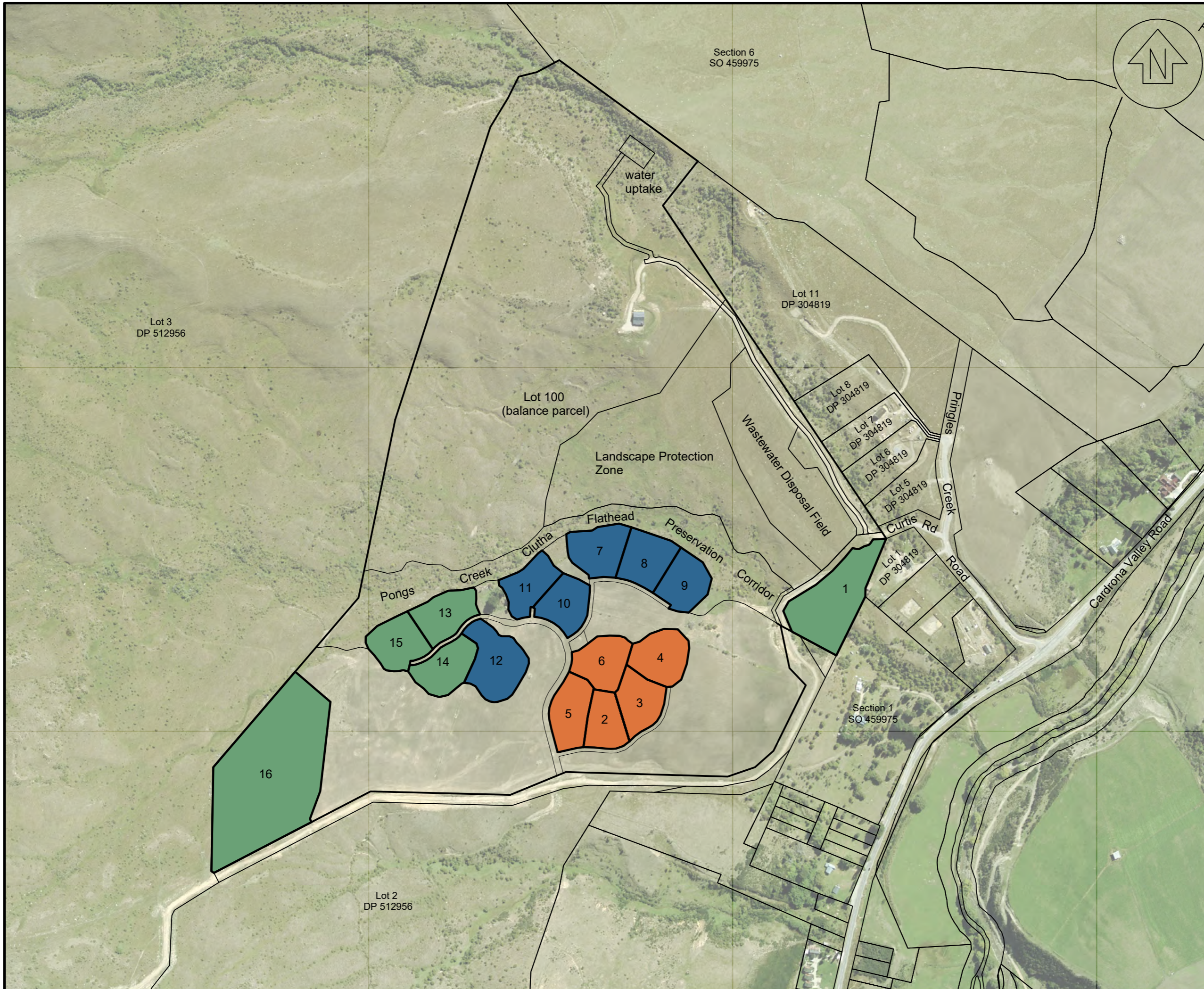
Title
Scheme Plan
Proposed Land Covenants
 for Resource Consent

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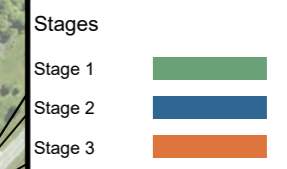
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Job No: 5890	Drawn By: TD	Lvl Datum: NZVD16	Coordinate System: Lindis 2000
Drawing No: W1184	Sheet No: 102	Revision: C	Date Created: December 2019



Notes:

- 1) Areas and dimensions are subject to survey.
- 2) Subdivision is to be completed in three separate stages. These are as follows:
 - Stage 1:
 - Lot 1
 - Lot 13
 - Lot 14
 - Lot 15
 - Lot 16
 - Land Covenants XX and YY
 - Stage 2:
 - Lot 7
 - Lot 8
 - Lot 9
 - Lot 10
 - Lot 11
 - Lot 12
 - Stage 3:
 - Lot 2
 - Lot 3
 - Lot 4
 - Lot 5
 - Lot 6
- 3) Easements shall be created for each individual stage as necessary to protect constructed services.
- 4) Refer to sheet 106 for details of proposed easements and land covenants, easements to be retained and easements to be cancelled.



REVISION	DETAIL	DATE
B	remove lot 17	05/02/2020
C	edit preservation corridor	18/02/2020

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Project

**Roberts Family Trust
Cardrona Valley**

Title

**Scheme Plan
Proposed Staging**
for Resource Consent

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Job No: 5890	Drawn By: TD	Lvl Datum: NZVD16	Coordinate System: Lindis 2000
Drawing No: W1184	Sheet No: 103	Revision: C	Date Created: December 2019



Notes:

- 1) Areas and dimensions are subject to survey.
- 2) Easements shall be created for each individual stage as necessary to protect constructed services.
- 3) Refer to sheet 106 for details of proposed easements and land covenants, easements to be retained and easements to be cancelled.

Key:

Building Platform ———

Curtilage Area - - - - -

REVISION	DETAIL	DATE
B	remove lot 17	05/02/2020
C	edit preservation corridor	18/02/2020

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Title

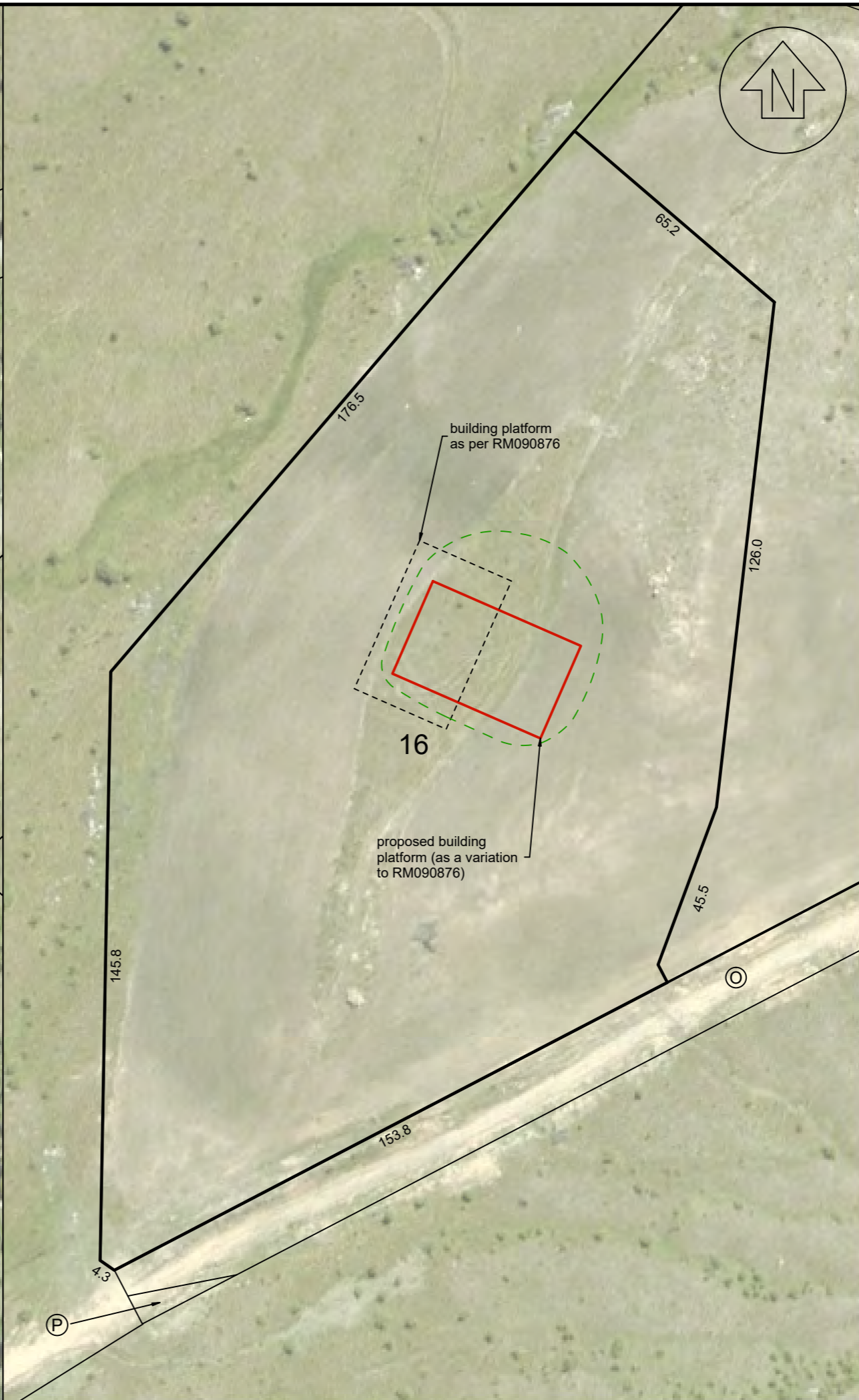
**Scheme Plan
Title Detail 1**
for Resource Consent

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Job No: 5890	Drawn By: TD	Lvl Datum: NZVD16	Coordinate System: Lindis 2000
Drawing No: W1184	Sheet No: 104	Revision: C	Date Created: December 2019



- Notes:
- 1) Areas and dimensions are subject to survey.
 - 2) Easements shall be created for each individual stage as necessary to protect constructed services.
 - 3) Refer to sheet 106 for details of proposed easements and land covenants, easements to be retained and easements to be cancelled.

- Key:
- Building Platform ———
 - Curtilage Area - - - - -

REVISION	DETAIL	DATE
B	remove lot 17	05/02/2020
C	edit preservation corridor	18/02/2020

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Cardrona Valley**

Title

**Scheme Plan
Title Detail 2**
for Resource Consent

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Job No: 5890	Drawn By: TD	Lvl Datum: NZVD16	Coordinate System: Lindis 2000
Drawing No: W1184	Sheet No: 105	Revision: C	Date Created: December 2019

Schedule of Existing Appurtenant Easements

Purpose	Shown	Burdened Land / Servient Tenement	Benefitted Land / Dominant Tenement	Creating Document
right of way	E J N K	Lot 2 DP 512956	Lot 1 DP 433836 Lot 6 DP 344432 Lot 1 DP 425263	EI 6097426.5
right to transmit electricity				
right to transmit telecommunications				
right to convey water				
right to convey electricity	G J P I M	Lot 2 DP 512956	Lot 1 DP 19397	T 838333.3
right of way	E J N K F G O P	Lot 2 DP 512956	Lot 1 DP 425263	EI 8574798.5
right to convey water				
right to convey telecommunications & computer media				
right to convey electricity				
right of way	E J N K F G O P	Lot 2 DP 512956	Lot 3 DP 512956	EI 10872078.2

Existing Easements to be Cancelled

Purpose	Shown	Burdened Land / Servient Tenement	Affected Land	Creating Document
right of way	D (Z on DP 344432)	Lot 6 DP 344432	Part Lot 1 DP 300535 CT OT 19127	EI 6057313.3
right to transmit electricity				
right to transmit telecommunications				
right to convey water				
right of way	D (Z on DP 344432)	Lot 6 DP 344432	Lots 1 & 2 DP 512956	EI 6410003.4
right of way	D (Z on DP 344432)	Lot 6 DP 344432	Lot 3 DP 512956 Lot 5 DP 344432 Lot 1 & 2 DP 512956	EI 8574798.3
right to convey water				
right to convey telecommunications & computer media				
right to convey electricity				

Existing Easements in Gross to be Cancelled

Purpose	Shown	Burdened Land / Servient Tenement	Creating Document
right to convey electricity	D (Z on DP 344432)	Lot 6 DP 344432	EI 6378833.1

Memorandum of Easements

Purpose	Shown	Burdened Land / Servient Tenement	Benefitted Land / Dominant Tenement
right of way	C E F G H I J K L M N O P Q R	Lot 100	Lot 2 - 16
right of way	C	Lot 100	Lot 1
right of way	C	Lot 100	Lot 3 DP 512956 Lot 5 DP 344432 Lot 1 & 2 DP 512956
right to convey water			
right to convey telecommunications & computer media			
right to convey electricity			

Memorandum of Easements in Gross

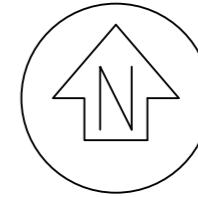
Purpose	Shown	Burdened Land / Servient Tenement	Benefitted Land / Dominant Tenement
right to convey electricity	A B C E F G H I J K L M N O P Q	Lot 100	Aurora Energy Ltd
right to convey telecommunications & computer media			Chorus New Zealand Ltd
right to convey water	A B C E F G H I J K L M N O P Q	Lot 100	Management Company
right to drain sewage	B C E F G H I J K L M N O P Q R Z Z	Lot 100	Management Company
right of way	A B C E F G H I J K L M N O P Q R Z Z	Lot 100	Management Company
right to take & store water	A	Lot 100	Management Company

*Area YY is a "Landscape Protection Zone" land covenant. This overlaps part of Area B and all of Area ZZ.

*Area XX is a land covenant for the "Pongs Creek Clutha Flathead Preservation Corridor".

*All existing easements and land covenants on Lot 2 DP 512956 are to be retained.

*Lots 1 - 16 are subject to building platforms and curtilage areas - see Sheets 104 and 105.



Notes:

- 1) Areas and dimensions are subject to survey.
- 2) Lots 1 - 16 are subject to building platforms and curtilage areas as per Baxter Design Master Plan (See Sheets 104 and 105)

REVISION	DETAIL	DATE
B	remove lot 17	05/02/2020
C	edit preservation corridor	18/02/2020

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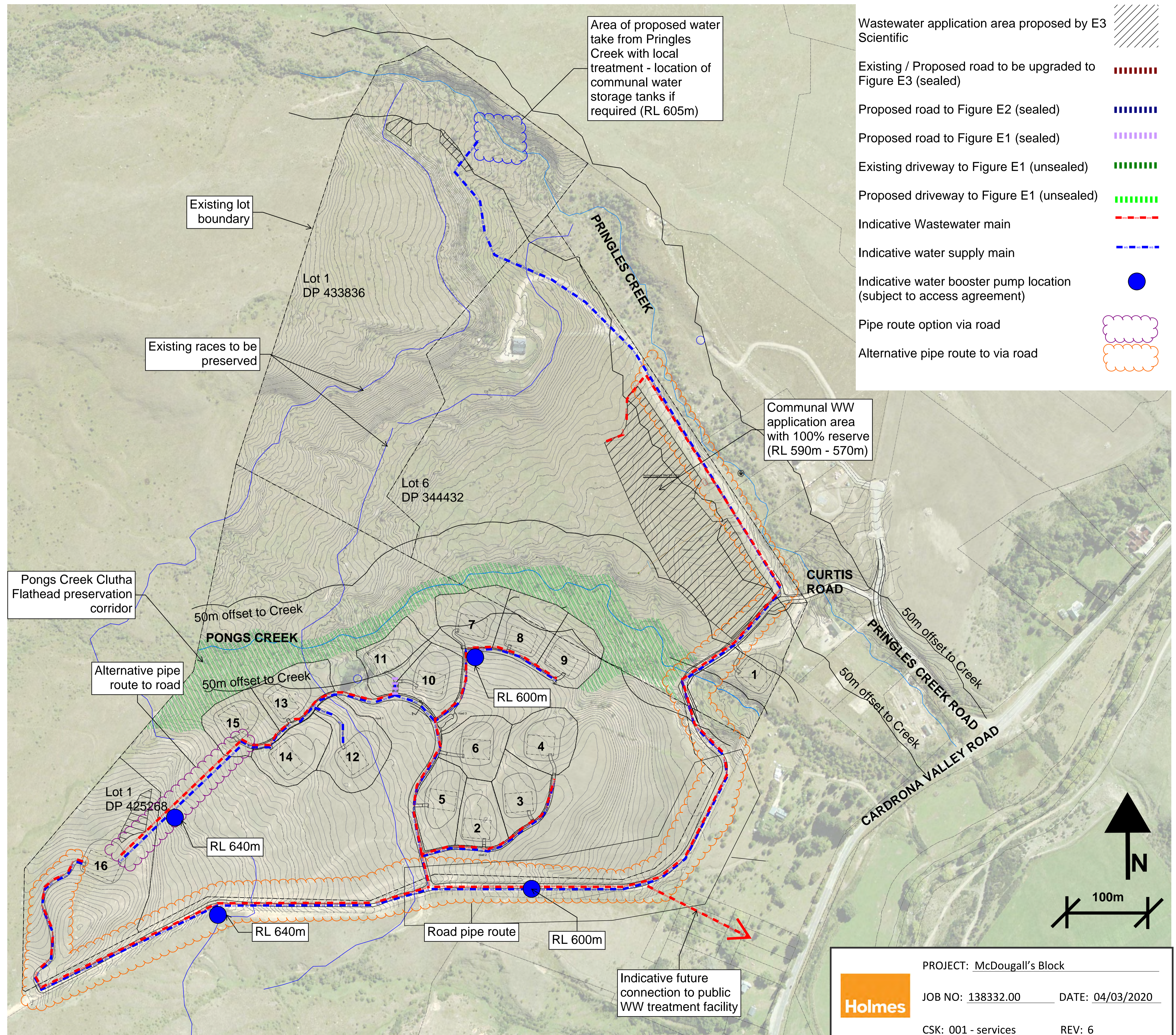
Title
Scheme Plan
Easement & Covenant Detail
 for Resource Consent

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Scale: 1:1000

Job No:	Drawn By:	Lvl Datum:	Coordinate System:
5890	TD	NZVD16	Lindis 2000
Drawing No:	Sheet No:	Revision:	Date Created:
W1184	106	C	December 2019



Area of proposed water take from Pringles Creek with local treatment - location of communal water storage tanks if required (RL 605m)

- Wastewater application area proposed by E3 Scientific
- Existing / Proposed road to be upgraded to Figure E3 (sealed)
- Proposed road to Figure E2 (sealed)
- Proposed road to Figure E1 (sealed)
- Existing driveway to Figure E1 (unsealed)
- Proposed driveway to Figure E1 (unsealed)
- Indicative Wastewater main
- Indicative water supply main
- Indicative water booster pump location (subject to access agreement)
- Pipe route option via road
- Alternative pipe route to via road

Existing lot boundary

Lot 1 DP 433836

Existing races to be preserved

Lot 6 DP 344432

Communal WW application area with 100% reserve (RL 590m - 570m)

Pongs Creek Clutha Flathead preservation corridor

50m offset to Creek
PONGS CREEK

Alternative pipe route to road

50m offset to Creek

RL 600m

CURTIS ROAD

50m offset to Creek
PRINGLES CREEK ROAD

50m offset to Creek
CARDRONA VALLEY ROAD

Lot 1 DP 425268

RL 640m

16

15

13

14

12

11

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7

8

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3

2

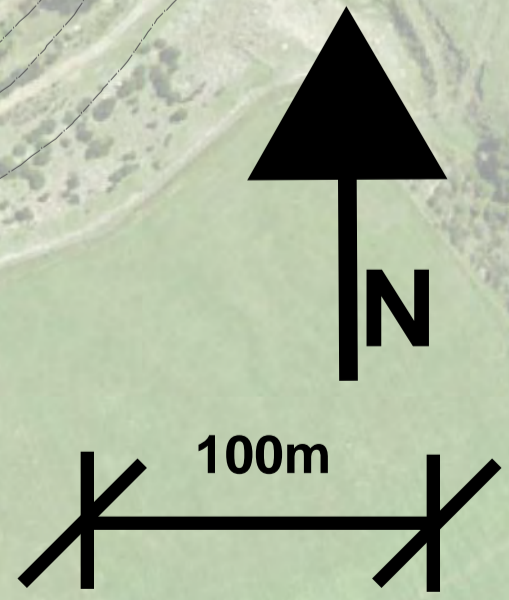
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RL 640m

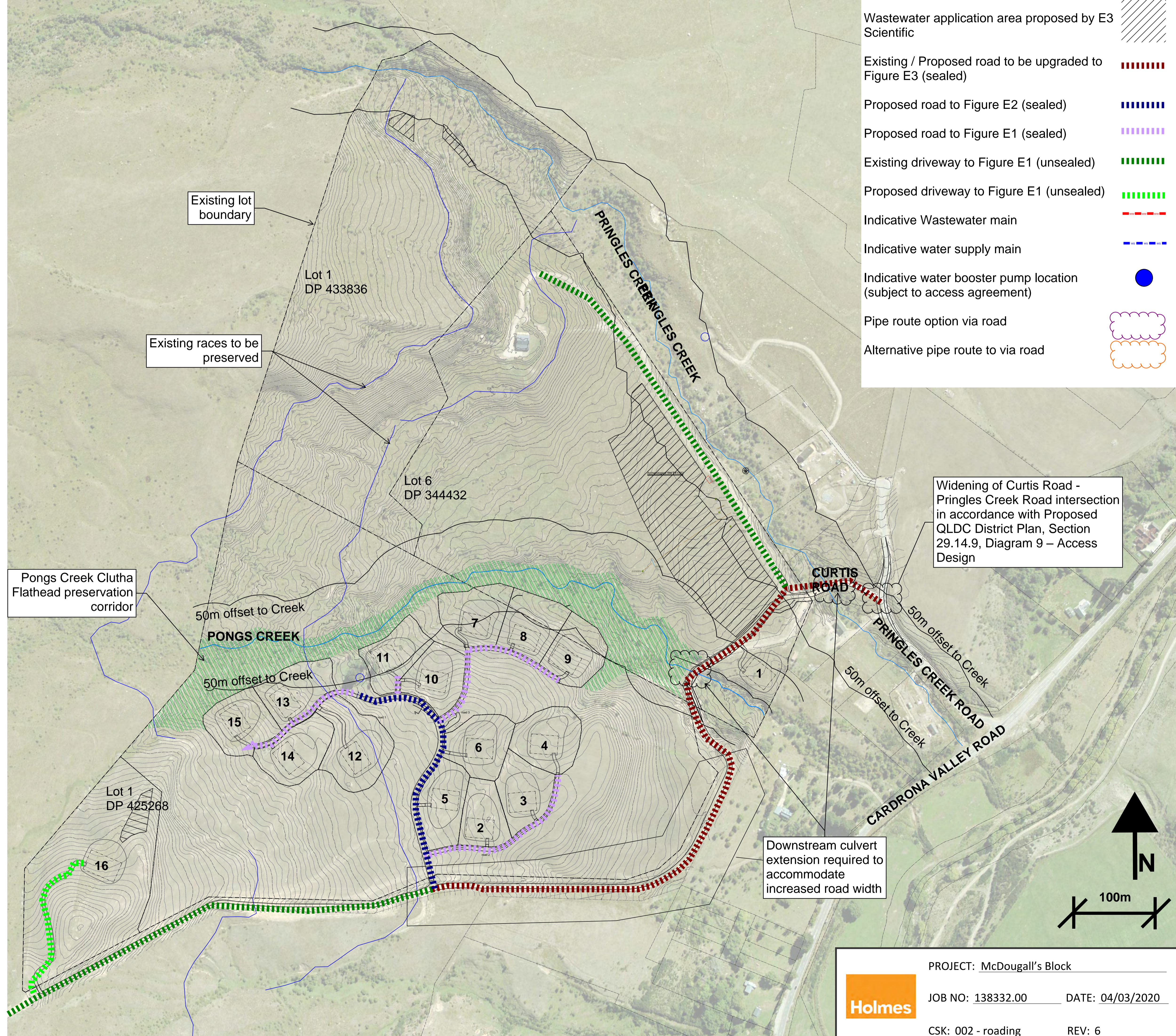
Road pipe route

RL 600m

Indicative future connection to public WW treatment facility



Holmes PROJECT: McDougall's Block
 JOB NO: 138332.00 DATE: 04/03/2020
 CSK: 001 - services REV: 6



- Wastewater application area proposed by E3 Scientific ▨▨▨▨▨▨
- Existing / Proposed road to be upgraded to Figure E3 (sealed) ▬▬▬▬▬▬
- Proposed road to Figure E2 (sealed) ▬▬▬▬▬▬
- Proposed road to Figure E1 (sealed) ▬▬▬▬▬▬
- Existing driveway to Figure E1 (unsealed) ▬▬▬▬▬▬
- Proposed driveway to Figure E1 (unsealed) ▬▬▬▬▬▬
- Indicative Wastewater main - - - - -
- Indicative water supply main - - - - -
- Indicative water booster pump location (subject to access agreement) ●
- Pipe route option via road ☁
- Alternative pipe route to via road ☁

Existing lot boundary

Lot 1
DP 433836

Existing races to be preserved

Lot 6
DP 344432

Pongs Creek Clutha Flathead preservation corridor

50m offset to Creek
PONGS CREEK

50m offset to Creek

Lot 1
DP 425268

16

15

13

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12

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CURTIS ROAD

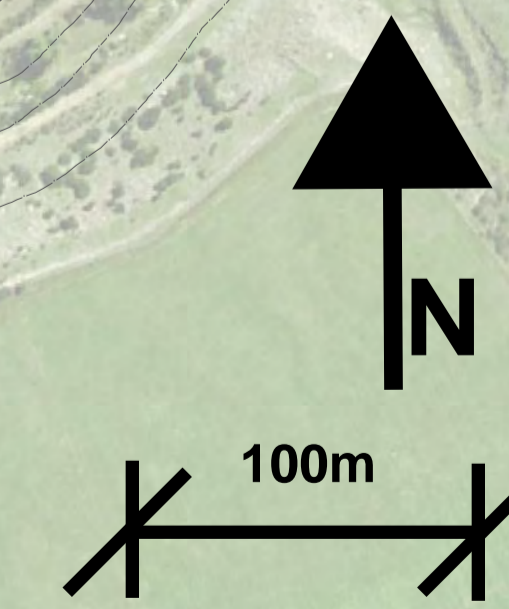
1

50m offset to Creek
PRINGLES CREEK ROAD
50m offset to Creek

CARDRONA VALLEY ROAD

Widening of Curtis Road - Pringles Creek Road intersection in accordance with Proposed QLDC District Plan, Section 29.14.9, Diagram 9 – Access Design

Downstream culvert extension required to accommodate increased road width



Holmes PROJECT: McDougall's Block

JOB NO: 138332.00 DATE: 04/03/2020

CSK: 002 - roading REV: 6

28 January 2020

Roberts Family Trust
C/- Maestro Projects Limited
PO Box 1625
Queenstown, 9348

Attention: Leon West

Dear Leon

Roberts, Curtis Road Subdivision Transport Assessment

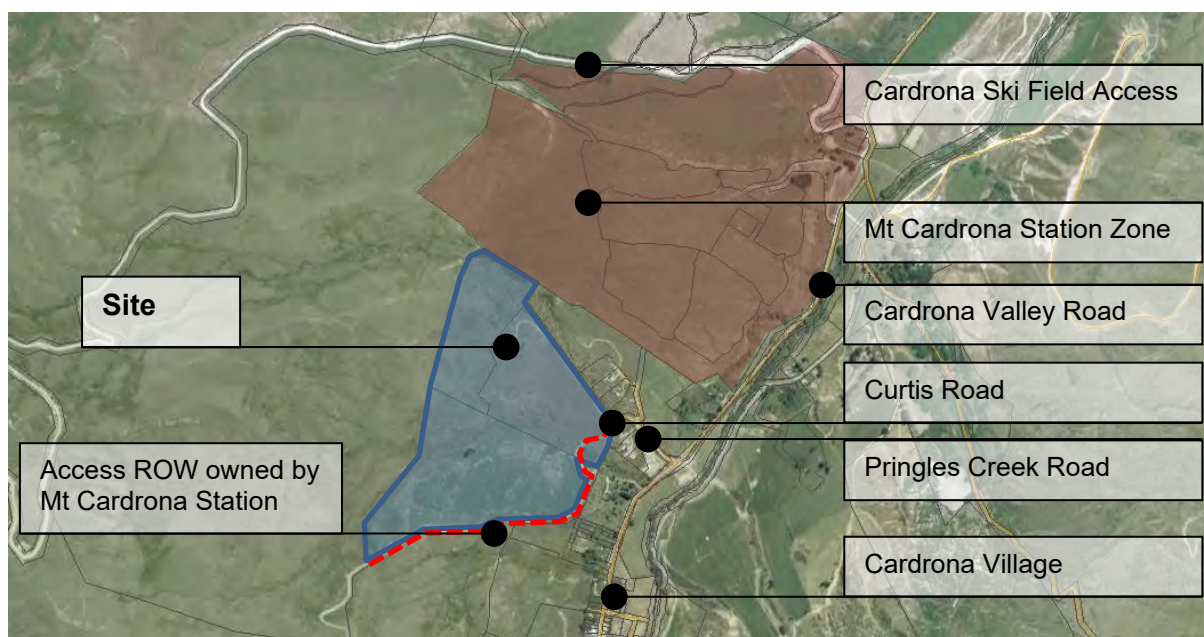
The purpose of this letter is to provide a transport assessment for a proposed subdivision at Curtis Road, Cardrona. This assessment focuses on access from the local road network and the on-site road network serving the proposed rural residential lots.

1 Introduction

1.1 Site Location

The proposed subdivision is at Lot 1 DP433836, Lot 6 DP 344432 & Lot 1 DP425263. For access the proposed subdivision relies on a Right of Way over land to the south which is owned by Mt Cardrona Station. The following Figure 1 shows the site.

Figure 1: Site, base aerial from QLDC WebMaps



1.2 Site Use and Zoning

The site and the surrounding land is used for pastoral farming and is in the Rural General zone within the Operative QLDC District Plan. This has been amended slightly in the Proposed QLDC District Plan to be zoned Rural.

To the south west of the site is the Cardrona Village. Land immediately to the north of the site has been subdivided to create a number of rural residential lots. Further to the North is the Mt Cardrona Station Zone which is land zoned to facilitate the development of a large alpine village which is likely to include a mixture of residential, visitor accommodation and other tourist activities.

1.3 Existing Transport Network

The site is accessed via Curtis Road, a narrow (one lane, 3m carriageway) local road. Curtis Road terminates at the site entrance. Curtis Road currently serves an existing on-site dwelling (Lot 6 DP 344432) and a consented on-site building platform (Lot 1 DP 425263, RM090876) which is accessed via the Right of Way (ROW) over the land to the south owned by others Mt Cardrona Station. Based on the QLDC Land Development and Subdivision Code of Practice the existing formation of Curtis Road would be capable of serving up to 6 residential dwellings as a lane¹.

Curtis Road is accessed from Pringles Creek Road. Pringles Creek Road serves a number of existing rural residential lots with approved dwellings or building platforms. The existing road appears to serve approximately 13 existing and potential residential dwellings. The legal road reserve for Pringles Creek Road extends to the Mt Cardrona Station Zone. This zone facilitates the development of a large alpine village. It is possible that Pringles Creek Road could be used to access a significant portion of this future development. Pringles Creek Road is a two lane road which generally has a sealed movement lane of 5.5m with shoulders. Based on the QLDC Land Development and Subdivision Code of Practice the movement lane would be capable of serving up to 150 residential dwellings² or approximately 1000vpd as a local road. The combination of the relatively narrow two-lane carriageway along with the horizontal and vertical alignment suggest that Pringles Creek Road would have an operating speed of approximately 50km/hr which is less than the posted 70km/hr speed limit.

Pringles Creek Road is accessed from Cardrona Valley which is an arterial road within the Council's road hierarchy providing a major transport link between Queenstown and Wanaka. At the intersection of Pringles Creek Road and Cardrona Valley Road the posted speed limit is 70km/hr which also applies to both Pringle Creek Road and Curtis Road.

2 Proposed Development

It is proposed to subdivide the site to include 16 rural residential lots to allow for a total development of 17 rural residential dwellings. This is a net increase of 15 residential dwelling over what is currently consented for the site.

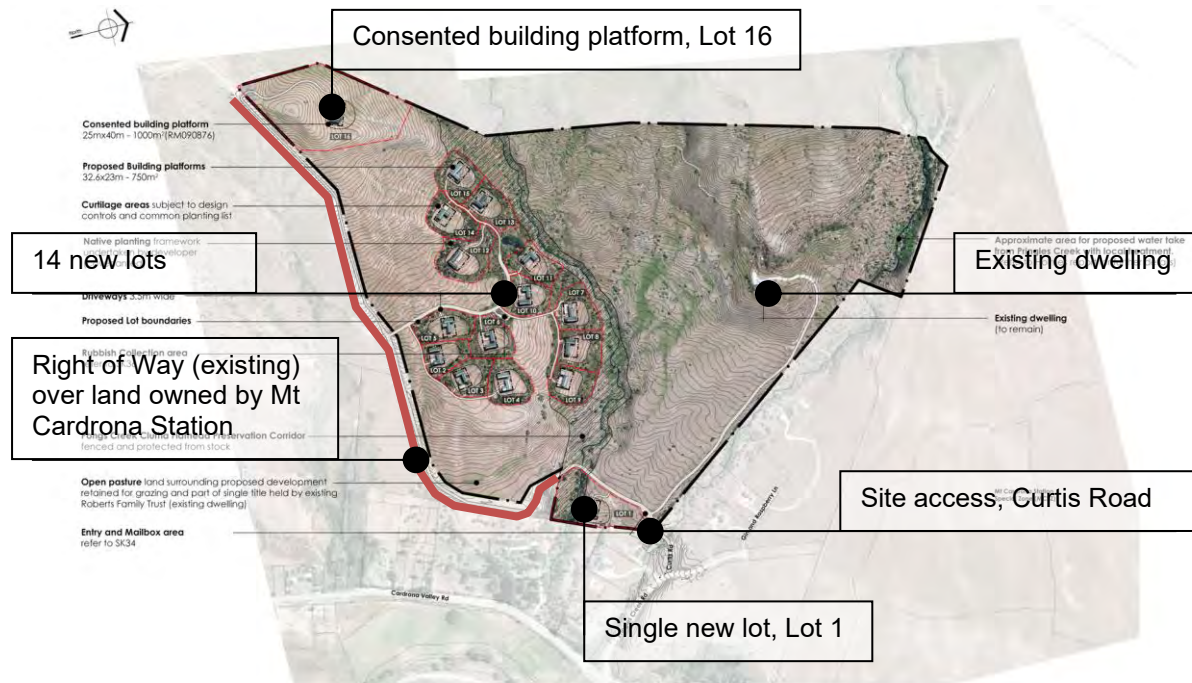
As a subdivision within the Rural General zone of the Operative District Plan, or Rural zone of the Proposed District Plan, it is anticipated that each lot will support a single dwelling unit as a compliant development.

¹ Based on QLDC Land Development and Subdivision Code of Practice, Table 3.2 – Road Design Standards, reference road type Figure E1, rural live and play lane.

² Based on QLDC Land Development and Subdivision Code of Practice, Table 3.2 – Road Design Standards, reference road type Figure E3, rural live and play local road.

Details of the proposed road infrastructure for review, Figure 1 below shows the masterplan layout. Other conceptual development drawings have been provided, these are listed in Appendix A.

Figure 1 –Proposed Subdivision Masterplan, from Baxter Design dated 6 January 2020.



It is possible that the proposed development will be undertaken in stages.

2.1 Traffic Generation

The proposed development will allow for a further 15 residential lots on-site which will increase the traffic flow on Curtis Road and Pringles Creek Road. The potential traffic flow increase will be approximately 152 vehicles per day (vpd) or 21 vehicles per hour (vph) during the peak period³. This is in addition to the potential traffic generation from the existing on-site dwelling and consented building platform.

At full development it is possible that the total traffic flow of Curtis Road would be approximately 172vpd with a peak period traffic flow of 24vph.

2.2 Site Access

The site will be accessed via Curtis Road. It is expected to extend Curtis Road to the south through the site and then continue in westerly direction utilising an existing ROW over land owned by Mt Cardrona Station.

The site access and existing section of Curtis Road would be upgraded to serve all 17 on-site residential lots. It is noted that Curtis Road also serves the pastoral land to the south of the site.

The existing Curtis Road formation is capable of serving up to 6 residential dwellings. The proposed development will increase the number of dwellings to be served by Curtis Road to

³ Based on NZTA Research Report 453 (RR453) Trips and parking related to land use, Table 7.4 Summary of design trip rates and parking demand in NZ in 2010. Using data for a Dwelling (rural) with a design traffic generation of 1.4vph/unit in the peak period and 10.1vpd/unit daily.

more than 6 residential dwellings (rural residential lots). To facilitate the full development Curtis Road and the access would be upgraded to a road type capable of serving the 17 possible dwellings on-site. Based on the QLDC Land Development and Subdivision Code of Practice the existing Curtis Road and site access should be upgraded to, as a minimum, a Figure E2 type road⁴. This road type is capable of serving up to 20 dwelling units.

The existing intersection of Curtis Road with Pringles Creek Road is formed as private access. The upgrade of Curtis Road will require that this intersection is upgraded to accommodate the potential traffic increase. To meet the current design guidance the intersection would include the installation of appropriate signs and markings (refer MOTSAM⁵) as well as creating an intersection layout to meet the minimum requirements of Austroads guidance. Based on Austroads guidance the intersection design should include:

- A rural basic left (BAL) turn treatment⁶ which includes minor widening to accommodate a left turning design vehicle (8m medium rigid truck) to Curtis Road, and
- A rural basic right (BAR) turn treatment⁷ which includes minor widening opposite Curtis Road to allow a vehicle to pass a stationary vehicle waiting on the centreline to turn right.

These turn treatments result in an intersection layout similar to the access requirements outlined in the Proposed QLDC District Plan, Section 29.14.9, Diagram 9 – Access Design.

2.3 Proposed Road Network

It is proposed to develop a road network to serve the proposed on-site development. This will include a road link to the south/east of the site within a ROW owned by others. The road network is based on the requirements of the QLDC Land Development and Subdivision Code of Practice⁸ and will remain in private/shared ownership. The road network will be managed in a similar manner as the other on-site infrastructure (water supply, sewerage etc.).

Curtis Road extension, minimum Figure E2 type road serving less than 20 dwellings. The extension of Curtis Road will serve all 17 on-site residential lots/dwellings and adjacent pastoral land. The extension of Curtis road will extend to the south through the site adjacent to proposed Lot 1. This road would then utilise an existing ROW adjacent to the site (land owned by Mt Cardrona Station) extending to the south and west. This road formation will end at an intersection with Road 1 an on-site lane to 14 proposed on-site lots (Lots 2 – 15). Beyond this intersection the extension of Curtis Road would formed as a driveway within the existing ROW servicing a single residential lot (Lot 16). Entry signage and mailboxes and area for turning is to be provided on-site, accessed immediately after the existing (public) section of Curtis Road.

Lane (Road 1), Figure E2 type road. This road will provide access to the main residential cluster of 14 residential lots (Lots 2 – 15). Road 1 will provide access to smaller lanes (Roads 2 & 3) as well as providing access to individual lots. Road 1 will provide access to the communal rubbish collection area which is located at the intersection of Roads 1 & 3.

⁴ Based on QLDC Land Development and Subdivision Code of Practice, Table 3.2 – Road Design Standards, rural live and play local road, Figure E2.

⁵ Refer NZTA Manual for Traffic Signs and Markings (MOTSAM), it is noted that some aspects of New Zealand road signs and markings is also covered under the NZTA Traffic Control Devices Manual (TCD Manual).

⁶ Refer Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections, Section 8.2.1 Rural Basic Left-turn Treatment (BAL).

⁷ Refer Austroads Guide to Road Design Part 4: Intersections and Crossings – General, Appendix A, Section A.16.5 Rural Right Turns – Undivided Roads.

⁸ Refer QLDC Land Development and Subdivision Code of Practice, Table 3.2 – Road Design Standards. Based on specific rural live and play local road road types Figure E1 & E2.

Minor lanes, there are a number of minor lanes providing access to groups of residential lots. These roads will all be Figure E1 type roads each providing access to less than 6 residential lots including:

- Road 2, access to Lots 2, 3 & 4,
- Road 3, access to Lot 7 and Road 4,
- Road 4, access to Lots 8 & 9, and
- Road 1 extension, access to Lots 12, 13, 14 & 15.

Driveways, there are a number of driveways that serve specific residential lots. These driveways will serve a maximum of two residential lots and will be generally similar to a Figure E1 type roads. These driveways, along with any departures include:

- Lot 10 & 11, shared driveway from Road 1 to serve two proposed lots,
- Lot 16 (existing building platform) this is an existing driveway utilising the ROW over Mt Cardrona Station land (Curtis Road extension). This is an existing access/track that will be retained with an extension (on-site) to from the driveway to the (consented) building platform. This driveway will meet the minimum requirements of a Figure E1 type road except the road surface will remain unsealed (gravel).
- Existing dwelling, the existing driveway will remain unchanged with an unsealed (gravel) surface.

The new road network to be formed within the rural environment will not have street lighting or pedestrian facilities (footpaths). These elements are not always considered necessary in a rural environment. It is noted that demand for pedestrian activity in this rural environment at night (during the hours of darkness) will be unlikely.

2.4 On-Site Parking

It is expected that any development within the proposed residential lots would be compliant with the minimum parking requirements of either the Proposed or Operative QLDC District Plans. This would require that each developed dwelling would include 2 on-site car park spaces.

It is not anticipated to provide any specific car parking within the proposed road network although it is noted that an area is provided for turning and parking whilst collecting (or delivering) mail at the mailbox area.

3 District Plan Requirements

3.1 Operative QLDC District Plan

The Operative QLDC District Plan provides a number of site standards to manage potential transport effects, these are provided in Section 14, Transport. A detailed assessment of the proposed on-site activity against the Operative QLDC District Plan access site standards (Section 14.2.4.2) has been undertaken, this assessment is provided in Appendix B.

The drawing provided is the conceptual masterplan which provides indicative assess roads and lot boundaries. The assessment identified a single breach of the access site standards from the Operative QLDC District Plan being 14.2.4.2 iv Minimum Sight Distances from Vehicle Access. This breach is a result of the reduced visibility sight distances at the access to each lot. The access roads have a target operating speed below the posted speed limit, 70km/hr. An appropriate consent condition is suggested to manage this breach during the detailed design of each vehicle crossings and accesses to each of the residential lots.

It is noted that the on-site access road including the extension of Curtis Road will serve up to 17 residential lots and allows access to adjacent pastoral land owned by Mt Cardrona Station. The proposed road network is to remain in private ownership. This is a breach of the on-site parking and loading site standards, refer 14.2.4.1 vi. It is anticipated that the road network will be managed with an appropriate maintenance agreement which will also include other community infrastructure including the water and sewerage systems.

3.2 Proposed QLDC District Plan

The Proposed QLDC District Plan Transport Chapter (Chapter 29) identifies the possible changes to the transport provisions and site standards. The Proposed QLDC District Plan provides guidance as to the future transport requirements for development activities. An assessment of the proposed on-site activity against the Proposed QLDC District Plan access site standards (Sections 29.5.14 to 29.5.24) has been undertaken, this assessment is provided in Appendix C.

A number of breaches of the Proposed QLDC District Plan site standards have been identified these are:

- 29.5.14 Access and Road Design, the proposed access road, the extension of Curtis Road, will serve more than 12 residential units. This road will remain in private/shared ownership and includes utilising an existing Right of Way over land owned by Mt Cardrona Station.
- 29.5.18 Minimum Sight Distances from Vehicle Access on all Roads other than State Highways, this is a result of the reduced visibility sight distances at the access to on-site lots. The access roads have target operating speeds below the 70km/hr posted speed limit.

Although technically not a breach of the site standard it is noted that the proposed development will include off-site works to upgrade of the existing Curtis Road and its intersection with Pringles Creek Road. The design of this intersection upgrade is based on Austroads design guidance. The proposed works will result in an intersection layout similar to a Diagram 9⁹ type intersection layout. Based on the likely total traffic flows (development traffic greater than 100vpd) the Proposed QLDC District Plan would require a Diagram 10¹⁰ layout for a vehicle crossing.

Appropriate consent conditions are to be suggested to manage the breaches of the site standards during the design stage.

4 Transport Effects

4.1 Off-Site Transport Effects

The effects of the proposed residential subdivision are likely to be a result of additional traffic within the local road network. This effect will be noticeable on the existing Curtis Road which has an existing formation which is appropriate for up to 6 residential dwellings based on the QLDC Code of Practice. Curtis Road currently serves a single developed residential dwelling, a consented building platform and pastoral farming activities.

To manage these off-site transport effects it is recommended that the existing Curtis Road is upgraded and widened to a two lane road. This will allow Curtis Road to accommodate the traffic generated by the proposed subdivision and adjacent pastoral farming. Curtis Road has a 70km/hr speed limit resulting from the current speed limit of Cardrona Valley Road. The

⁹ Refer Proposed QLDC District Plan, Section 29.14.9, Diagram 9 – Access Design.

¹⁰ Refer Proposed QLDC District Plan, Section 29.14.10, Diagram 10 – Access Design.

conceptual design alignment of Curtis Road suggests that Curtis and the proposed extension will have an operating speed of up to 70km/hr in places. This is in conflict with the suggested road design of Figure E2 (up to 20 dwellings) which has a target operating speed of only 30km/hr. It is therefore recommended that the upgrade of Curtis Road include a formed carriageway width which is appropriate for a higher operating speed, ie. a carriageway width of a Figure E3 type road including; 5.5m movement lane with total shoulder 1.0m, sealed shoulder 0.5m. This overall carriageway width will allow for a target operating speed of 70km/hr matching the speed limit and create a road formation similar to Pringles Creek Road.

The increased traffic at the intersection with Pringles Creek Road will require that this intersection is upgraded. Austroads guidance suggests that the intersection would require basic turn treatments which results in an intersection layout similar to the Proposed QLDC District Plan, Section 29.14.9, Diagram 9 – Access Design.

The existing Curtis Road formation is capable of serving up to 6 residential dwellings (rural residential lots). However, when the development increases the number of potential dwellings to be served by Curtis Road to more than 6 the existing legal road and the intersection with Pringles Creek Road will need to be upgraded to manage these off-site transport effects. The following consent condition is suggested.

That prior to any on-site construction which requires Curtis Road to serve more than 6 potential residential dwellings the existing Curtis Road and its intersection with Pringles Creek Road are to be upgraded. The design of these upgrade works within the existing local road network is to be provided to QLDC for review and approval. The design shall include:

- *The upgrade of the existing Curtis Road to meet the minimum requirements of QLDC Land Development and Subdivision Code of Practice Figure E2 type road with total shoulder width of 1.0m (sealed shoulder 0.5m) and a target operating speed of 70km/hr.*
- *The upgrade of the existing T-intersection of Curtis Road with Pringles Creek Road. The design of this upgrade is to be based on design guidance from Austroads Guide to Road Design, Part 4: Intersections and Crossings General and Part 4A: Unsignalised and Signalised Intersections. Unless determined otherwise the intersection design is to be based on a 50km operating speed and include a rural basic left (BAL) turn treatment and a rural basic right (BAR) turn treatment.*
- *Provide signage and road markings to meet the minimum requirements of NZTA Manual of Traffic Signs and Markings (MOTSAM) and the NZTA Traffic Control Devices (TCD) Manual. Unless determined otherwise the intersection design shall include a priority control (Give way or Stop as appropriate).*

It is considered that this consent condition will allow for an appropriate upgrade to the local road network to accommodate the proposed subdivision and manage potential transport effects to a point which is considered acceptable.

It is noted that if this intersection was to be treated as a vehicle crossing the Proposed QLDC District Plan would require a greater extent of road widening on Pringles Creek Road. The Proposed QLDC District Plan bases the access design on¹¹:

¹¹ Refer Proposed QLDC District Plan, Section 29.5.16, Design of Vehicle Crossing.

- Type of traffic using the access, there will be rubbish collection, recycle collection as well as home deliveries. There will be more than 1 heavy vehicle movements per week using Curtis Road.
- Volume of traffic using accessway, the total volume of traffic from 18 residential lots (dwellings) is likely to be approximately 172¹² vehicles per day. There will be 100+ vehicles using Curtis Road.
- Volume of traffic using road, Pringle Creek Road at the Curtis Road intersection serves 5 potential rural dwellings generating a traffic flow of only 51vpd approximately.

Based on the Proposed QLDC District Plan this would suggest that the intersection, if considered as a vehicle crossing, would require a layout based on Diagram 10.

The proposed design is similar to Diagram 9 and reflects current Austroads guidance which considers both traffic and safety requirements. In this location there will be minimal pedestrian or cycle traffic, it is considered that the intersection upgrade based on current Austroads guidance considers both the traffic capacity requirements with an appropriate level of road safety for the expected usage.

The current design of Pringles Creek Road and its intersection with Cardrona Valley Road includes shoulder widening opposite Pringles Creek Road and QLDC have proposed changes to the existing signage. This existing intersection is layout will have sufficient capacity to accommodate the additional 15 potential residential lots enabled by the proposed subdivision.

The QLDC street lighting strategy, Southern Light, allows for flag lighting at rural intersections. The need for flag lighting is based on any identified safety concerns. There are no night-time safety concerns at the intersections of; Cardrona Valley Road with Pringles Creek Road, or Pringles Creek Road with Curtis Road. Additional traffic as a result of the proposed subdivision is unlikely to create or exacerbate safety concerns. It is therefore considered that flag lighting at these intersections is not justified.

4.2 On-Site Road Network

The masterplan provides an on-site road network which has been conceptually developed by the designers. The plans provide a structure and context for the provision of an internal transport network although detail of this network has not yet been fully developed. It is expected that the on-site road network can be designed in accordance with the QLDC Land Development and Subdivision Code of Practice. The following Table 1 provides an overview of the proposed internal road network with comments regarding with its compliance with the QLDC Code of Practice and the District Plan.

¹² Based on NZTA Research Report 453 (RR453) Trips and parking related to land use, Table 7.4 Summary of design trip rates and parking demand in NZ in 2010. Using data for a Dwelling (rural) with a daily design traffic generation of 10.1vpd/unit.

Table 1 – Road Network, Compliance with QLDC District Plan and Code of Practice

Subdivision Road	Requirement	General Provision/Departures
<p>Curtis Road extension</p> <p>Provides access to all 17 on-site residential lots (dwellings).</p> <p>Provides a link between the local road network and intersection with Road 1.</p>	<p>Figure E2 road type</p> <p>Lane, serves up to 20 dwellings.</p>	<p>Increased carriageway width, 5.5m movement lane width with total shoulder width of 1.0m (sealed should 0.5m), akin to Figure E3 road type.</p> <p>Increased target operating speed of 70km/hr, akin to Figure E3 road type.</p> <p>Road is to remain in private/shared ownership passing through the site and utilising an existing ROW over land owned by others.</p> <p>Legal width as Right of Way to be confirmed. Width is to include movement lane and associated road infrastructure.</p> <p>An appropriate agreement is provided for the ongoing management and maintenance for the road.</p>
<p>Lane (Road 1)</p> <p>Provide access to the residential cluster of 14 residential lots, Lots 2 – 15.</p>	<p>Figure E2 road type</p> <p>Lane, serves up to 20 dwellings.</p>	<p>Road is to remain in private/shared ownership.</p> <p>Legal width as Right of Way to be confirmed. Width is to include movement lane and associated road infrastructure with minimum legal width to be 6.7m.</p> <p>An appropriate agreement is provided for the ongoing management and maintenance for the road.</p>
<p>Minor Lanes</p> <p>Provide access to multiple residential lots:</p> <ul style="list-style-type: none"> • Road 2 to Lots 2, 3 & 4, • Road 3 to Lot 7 and Road 4, • Road 4 to Lots 8 & 9, and • Road 1 extension to Lots 12, 13, 14 & 15. 	<p>Figure E1 road type</p> <p>Lane, serves up to 6 dwellings.</p>	<p>Road is to remain in private/shared ownership.</p> <p>Legal width as Right of Way to be confirmed. Width is to include movement lane and associated road infrastructure with minimum legal width to be 4.0m.</p> <p>An appropriate agreement is provided for the ongoing management and maintenance for the road.</p>
<p>Driveways</p> <ul style="list-style-type: none"> • Lot 10 & 11 from Road 1, • Lot 16 (existing building platform) as the extension of Curtis Road beyond Road 1, and • Existing dwelling. 	<p>Figure E1 road type</p> <p>Lane, serves up to 6 dwellings.</p>	<p>These driveways will remain in private ownership.</p> <p>Legal width as Right of Way to be confirmed. Width is to include movement lane and associated road infrastructure with minimum legal width to be 4.0m.</p> <p>An appropriate agreement is provided for the ongoing management and maintenance for the road.</p> <p>The driveways to Lots 16 (extension of Curtis Road), and the existing dwelling will remain unsealed.</p>

As a rural subdivision street lighting is not proposed within any of the proposed road network. Under the QLDC street lighting strategy, Southern Light, street lighting is only required in the Rural General zone where deemed necessary by Council. There may be environmental concerns if street lighting is to be provided in this rural location. The proposed development

is remote from pedestrian routes and is unlikely to have any pedestrian (or cycle) traffic at night (during hours of darkness). It is considered that street lighting is not required to protect vulnerable road users at night.

To manage the provision of the proposed road network the following consent condition is suggested.

That prior to any on-site construction which allow for more than 6 potential residential dwellings the existing road network is to be upgraded. The design of the upgraded road network is to be provided to QLDC for review and approval. The road network is to be design in accordance with QLDC Land Development and Subdivision Code of Practice and shall include:

- *The design of the Curtis Road extension providing access to the 18 on-site residential dwellings. This road shall be designed to meet the minimum requirements of QLDC Land Development and Subdivision Code of Practice Figure E2 type road with total shoulder width of 1.0m (sealed should 0.5m) and a target operating speed of 70km/hr. The road design is to identify the overall legal width of the road Right of Way and is to provide an area for turning and mailboxes near to the site entrance.*
- *The design of Road 1 serving Lots 2-15. This road shall be designed in accordance with a Figure E2 type road from the QLDC Land Development and Subdivision Code of Practice. The road design is to identify the overall legal width of the road Right of Way with a minimum width of 6.7m. This road design is to include an area and turning facility for refuse collection.*
- *The design of Roads 2, 3, 4 and 1 extension (serving Lots 12, 13, 14 & 15 only). This road shall be designed in accordance with a Figure E1 type road from the QLDC Land Development and Subdivision Code of Practice. The road design is to identify the overall legal width of the road Right of Way with a minimum width of 4.0m.*
- *The design of driveway to Lots 16. This driveway design is to provide details of the proposed unsealed road carriageways and shall have a minimum legal width of 4.0m with passing opportunities provided at a minimum spacing of 100m.*
- *The proposed agreement for the ongoing management and maintenance of any roads in private/shared ownership. This agreement may form part of an overall management and maintenance agreement for all community infrastructure.*

It is considered that this consent condition will allow for an appropriate on-site road network for the proposed subdivision and manage potential transport effects to a point which is considered acceptable.

4.3 Property Access

The proposed development will form vehicle crossings to individual residential lots accessed from the Curtis Road extension and Road 1. These accesses will not meet the minimum visibility requirements of the QLDC District Plan and will breach the site standard. This is a result of the road design which limits forward visibility through alignment to achieve a lower target operating speed of 30km/hr or 20km/hr. To achieve appropriate sight distance at lot accesses it is recommended that sight distance is based LTSA (now NZTA) Guide to visibility at driveways (RTS 6). This document bases the minimum sight distance to any access on the operating speed of the adjacent (frontage) road. The sight distance required is approximately

equivalent to the Austroads desirable minimum Stopping Sight Distance (SSD)¹³ on the frontage road based on the assessed operating speed of that road. The sight line (approaching drivers' line of sight) shall be measured along the centre of the approaching lane as per RTS 6 refer Figure 1.

It is recommended that given the reduced operating speed of the development roads that visibility sight distances is managed to maintain a safe driving environment at the property accesses, the following consent condition is suggested.

That prior to any on-site construction the designs for residential lot accesses is to be provided to QLDC for review and approval. The visibility sight distance at each property access shall be based on LTSA (now NZTA) Guide to visibility at driveways (RTS 6). The minimum sight distance to any access is to be equivalent to the Austroads Stopping Sight Distance (SSD) on the frontage road based on the assessed operating speed of that road.

An operating speed and sight distance assessment can be undertaken for accesses during the design stage which allows consideration of the frontage roads horizontal and vertical alignments. This consent condition will mean that each residential lot will have an access with acceptable sight distance based on the designed road environment.

5 Summary

It is proposed to undertake a rural residential subdivision of Lot 1 DP433836, Lot 6 DP 344432 & Lot 1 DP425263 which will create a total of 17 rural residential lots. This is a net increase of 15 potential residential dwellings within the site.

The site is accessed from Curtis Road which is a local road within the Council's road network, it is proposed to extend Curtis Road onto the site as a private road. It is noted that the existing formation of Curtis Road, and its intersection with Pringles Creek Road, is capable of serving up to 6 residential dwellings. At the time that the proposed subdivision will create more than 6 potential residential dwellings Curtis Road and its intersection with Pringles Creek Road will need to be upgraded.

To serve the full subdivision of up to 17 residential dwellings/lots Curtis Road is to be extended in a southerly direction through the site and then will continue in a generally westerly direction within an existing Right of Way over land owned by Mt Cardrona Station. A new access road (Road 1) would serve the main cluster of residential lots to be created within the site. It is expected that the proposed road network can be designed and constructed to meet the requirements of the QLDC Land Development and Subdivision Code of Practice, current Austroads Guidance and the QLDC District Plan. A number of consent conditions are suggested to manage the design of the proposed road network. This includes any minor departures from either the QLDC Land Development and Subdivision Code of Practice and/or the QLDC District Plan. This will include the upgrade of the existing Curtis Road and its intersection with Pringles Creek Road.

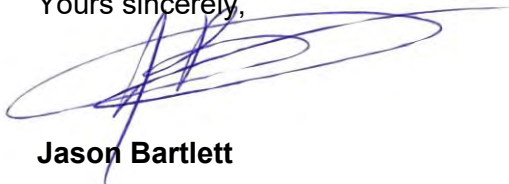
As a private road network an appropriate management and maintenance agreement will be required. This is likely to be part of an overall agreement for the management and maintenance of community infrastructure including water supply, wastewater collection, treatment and disposal. A consent condition is suggested to manage the provision of an appropriate management and maintenance agreement.

¹³ Refer Austroads Guide to Road Design Part 3: Geometric Design, Section 5.3 Stopping Sight Distance (SSD).

I consider that with the suggested consent conditions the proposed subdivision can be appropriately designed and constructed. I consider that the subdivision will have minimal transport effects on the surrounding transport network.

Should you require any further information please contact me.

Yours sincerely,



Jason Bartlett

CEng MICE, MEngNZ
Transport Engineer

Appendix A Development Drawings

The following development drawings have been reviewed when undertaking this assessment:

- Baxter Design drawing, Concept Masterplan, dated 6 January 2019, and
- Holmes Consulting drawing, McDougall's Block, 002 – roading, revision 5, dated 23/01/2019.

Appendix B Operative QLDC District Plan, Compliance Assessment

The table provided below outlines the proposed development's compliance against the Access (14.2.4.2) section of the Transportation Site Standards for the Rural General Zone under the Operative QLDC District Plan (Section 14, Transport).

Table – Operative QLDC District Plan Assessment

Rule	Requirement	Provided	Compliance
14.2.4.2 i	Length of Vehicle Crossings 3m and 6m for residential.	Each residential lot will have a 3.5m access width based on the masterplan. The subdivision access will be created by upgrading the existing Curtis Road which will extend into the site. This will be a Figure E3 type road with a 5.5m movement lane and 0.5m total sealed shoulder width, ie. 6m total sealed width.	Yes
14.2.4.2 ii	Design of Vehicle Crossings The access crosses the property boundary at an angle of 90° +/- 15° and intersects the carriageway between 45° and 90°.	Each residential lot will have an access at 90° to the boundary. Curtis Road currently meets the site boundary at 90°. The extension of Curtis Road as the site access will cross the boundary at 90°.	Yes
14.2.4.2 iii	Maximum Gradient for Vehicle Access Maximum Access gradient is 1 in 6.	The maximum access gradient will not be greater than 1 in 6.	Yes
14.2.4.2 iv	Minimum Sight Distances from Vehicle Access Minimum sight distance of 85m for residential for the existing 70km/hr speed limit.	It is likely that the residential lots will not achieve the minimum visibility sight distance requirements as the accesses are from roads which, by design, will have an operating speed less than the 70km/hr speed limit. The subdivision access is formed as an extension of Curtis Road where sight distance is not considered.	No Consent condition suggested for residential lots.
14.2.4.2 v	Maximum Number of Vehicle Crossings The frontage length of residential lots is likely to allow 2 vehicle crossings.	The subdivision has a single vehicle crossing as the extension of Curtis Road. Each residential lot is to have a single vehicle crossing.	Yes

Rule	Requirement	Provided	Compliance
14.2.4.2 vi	Distances of Vehicle Crossings from Intersections Requires a minimum separation distance of 25m.	Subdivision vehicle crossing or residential lot vehicle crossings are not within 25m of an intersection.	Yes
14.2.4.2 vii	Service Stations	Not a service station.	N/A
14.2.4.2 viii	Minimum distance between Vehicle Crossing onto State Highways	No accesses from state highway.	N/A

Appendix C Proposed QLDC District Plan, Compliance Assessment

The table provided below outlines the proposed development's compliance against the Access standards (Sections 29.5.14 to 29.5.24) of the Transportation Site Standards for the rural zone, under the Proposed QLDC District Plan (refer Chapter 29, Transport, Table 29.3 – Decision Version).

Table – Proposed QLDC District Plan Assessment

Rule	Requirement	Provided	Compliance
29.5.14	<p>Access and Road Design</p> <p>Access to unit title shall be in accordance with QLDC Code of Practice.</p> <p>No private access shall serve a site with the potential to accommodate more than 12 units.</p>	<p>The on-site accesses are to be constructed to meet the minimum requirements of the QLDC Code of Practice.</p> <p>The accesses are to remain in private/shared ownership and serve up to 17 possible residential units with links to adjacent land which may be developed in the future.</p>	<p>No</p> <p>Access roads to remain in private/shared ownership.</p>
29.5.15	Width and Design of Vehicle Crossings – Urban Zones	Not Urban Zone, Refer 29.5.16.	N/A
29.5.16	<p>Width and Design of Vehicle Crossings – Other Zones</p> <p>Access to subdivision requires design based on Diagram 10.</p> <p>Access to residential units to be Diagram 8.</p>	<p>Each residential access serving up to 3 residential units will comply with Diagram 8.</p> <p>The subdivision access is provided by the extension of Curtis Road into the site.</p> <p>The upgrade of Curtis Road includes works at the intersection with Pringles Creek Road. it is recommended that the intersection layout is upgraded as per Austroads guidance which would result in an intersection layout similar to a Diagram 9.</p>	<p>Yes</p> <p>Note intersection upgrade consent condition for upgrade of Curtis Road intersection with Pringles Creek Road.</p>
29.5.17	<p>Maximum Gradient for Vehicle Access</p> <p>Maximum Access gradient is 1 in 6 and meets appropriate breakover angles.</p>	The maximum access gradient will not be greater than 1 in 6.	Yes

Rule	Requirement	Provided	Compliance
29.5.18	<p>Minimum Sight Distances from Vehicle Access on all Roads other than State Highways</p> <p>Minimum sight distance of 85m for residential for the existing 70km/hr speed limit.</p>	<p>It is likely that the residential lots will not achieve the minimum visibility sight distance requirements as the accesses are from roads which, by design, will have an operating speed less than the 70km/hr speed limit.</p> <p>The subdivision access is formed as an extension of Curtis Road where sight distance is not considered.</p>	<p>No</p> <p>Consent condition suggested for residential lots.</p>
29.5.19	Minimum Sight Distances from Vehicle Access onto State Highways	No accesses from state highway.	N/A
29.5.20	<p>Maximum Number of Vehicle Crossings</p> <p>The frontage length of residential lots is likely to allow 2 vehicle crossings.</p>	<p>The subdivision has a single vehicle crossing as the extension of Curtis Road.</p> <p>Each residential lot is to have a single vehicle crossing.</p>	Yes
29.5.21	Minimum Distance Between Vehicle Crossings onto State Highways	No accesses from state highway.	N/A
29.5.22	<p>Distances of Vehicle Crossings from Intersections</p> <p>Requires a minimum separation distance of 25m.</p>	Subdivision vehicle crossing or residential lot vehicle crossings are not within 25m of an intersection.	Yes
29.5.23	Minimum distances of Vehicle Crossings from Intersections onto State Highways	No accesses from state highway.	N/A
29.5.24	Service Stations	Not a service station.	N/A



**McDOUGALL'S BLOCK PROJECT
ROBERTS FAMILY TRUST
QUEENSTOWN**

Drawing Index

C00-00 cover

C00-01 index and project notes

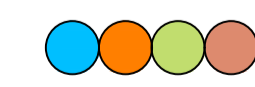
C10-01 existing site and contour plan

C21-01 enabling earthworks cut fill and volumes plan

Project Notes

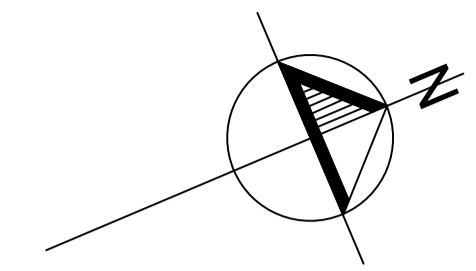
- 1 The contractor shall obtain all applicable codes, licenses, standards, specifications, etc. which are necessary to perform the proposed work at no additional cost to the owner.
- 2 Construction specifications issued with this project must be used in conjunction with these drawings. Specifications take precedence over drawings if there is a discrepancy between them.
- 3 The contractor shall maintain one copy of the current and approved construction plans, specifications, resource consent and building consent at the job site at all times.
- 4 The contractor shall notify the Design Engineer immediately upon discovering any conflicts or other problems in conforming to the approved construction drawings, specifications or details for any element of the proposed improvements prior to proceeding with its construction.
- 5 Offsite and adjacent site data is for information purpose only.
- 6 Otago LiDAR 1m DEM (2016) elevations were obtained from Land Information New Zealand (<https://data.linz.govt.nz>)
- 7 Proposed site plan (including accessibility requirements and car park configuration) designed and provided to Holmes Consulting, Ltd by: Baxter Design, drawing reference number 2738 dated 18 February 2020
- 8 Contractor shall reference "Geotechnical Report by Geosolve Ltd, dated July 2019."
- 9 Access to all adjacent properties and facilities shall be maintained at all times.
- 10 If hazardous material or suspect material is encountered the contractor shall notify the Client, Project Manager, and Design Engineer before continuing work.
- 11 All existing underground utility information (public and private) is indicative only and shown according to the best information available to the Design Engineer. The contractor shall contact all utility owners prior to beginning excavation or site grading. It shall be the contractor's responsibility for locating and protecting all utilities during construction and for coordinating with the appropriate utility company for any utility crossings required.
- 12 The contractor shall be responsible for the coordination of the installation or relocation of all utilities above and below grade (water, wastewater, stormwater, street lights, gas, electric, telecommunications, etc.).
- 13 Permission for any contractor or client proposed use, disturbance or access of offsite property, permanent or temporary, shall be obtained by the contractor in advance of the work.
- 14 The contractor shall provide written copy of any agreement or permit to use offsite property to the client prior to any use. The contractor shall not obligate the client to any stipulations unless the client becomes a party to the agreement.
- 15 Property boundaries shall be clearly indicated in order to delineate allowable limits of construction. No offsite disturbance allowed without adjacent property owner approval.
- 16 Boundary lines and easements indicated hereon reflect information proved by Baxter Design as part of their Masterplan. This plan may not include all information of record.
- 17 All work located within the road reserve shall be in accordance with the latest edition of the QLDC LDSC.
- 18 All site work to be in accordance with the New Zealand Building Code and all other relevant standards.
- 19 All abandoned water, wastewater, and stormwater mains, manholes, stubs and accessories shall be abandoned per Council specifications.
- 20 The contractor shall provide all required temporary traffic control in accordance with Council and NZTA standards.
- 21 Contractor shall be responsible for temporary erosion and sediment control during construction.
- 22 Contractor to check all set out dimensions and coordinate with the appropriate discipline.
- 23 All landscaping and revegetation requirements by others.
- 24 All areas disturbed by construction and not paved at the completion of construction shall be reinstated to original conditions.

All dimensions to be verified on site before making any shop drawings or commencing any work

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<table border="1"> <tr> <td>4</td> <td>2020-03-04</td> <td>GWF</td> <td>Consent</td> </tr> <tr> <td>Rev</td> <td>Date</td> <td>Appd</td> <td>Reason</td> </tr> </table>				4	2020-03-04	GWF	Consent	Rev	Date	Appd	Reason	<p>Consultants</p> <p>Baxter Design Group Ltd Landscape Architect</p> <p>Geosolve Ltd Geotech</p> <p>Origin Consultants Ltd Archaeological</p> <p>Environmental Associates Ltd Water Supply</p> <p>Bartlett Consulting Traffic</p> <p>E3 Scientific Contamination and Ecology</p>	 <p>Maestro Project Delivery maestroprojects.co.nz</p>	 <p>Holmes</p> <p>Holmes Consulting 39 Market Place Auckland 1010 New Zealand HolmesConsulting.co.nz T: +64 9 965 4789</p>	<p>McDOUGALL'S BLOCK PROJECT ROBERTS FAMILY TRUST QUEENSTOWN</p>	<p>Sheet Title</p> <p>drawing index and project notes</p>	<p>Drawn JAV- Scale r1ts (at A1)</p> <p>Filename 138332.00 P - C00 Cover sheet and drawing index.d</p> <p>Job No Sheet No Rev</p> <p>138332.00 C00-01 4</p>
4	2020-03-04	GWF	Consent														
Rev	Date	Appd	Reason														



notes:
1. contours at 1m intervals

- legend:
- Contours major (existing)
 - - - Contours minor (existing)
 - Lot boundary (existing)
 - - - Adjacent lot boundary (existing)
 - - - Subdivision lot boundaries (proposed)
 - - - Building platforms (proposed)
 - - - Curtilage Areas (proposed)

All dimensions to be verified on site before making any shop drawings or commencing any work

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Rev	Date	Appd	Reason
3	2020-01-22	TS	consent (Omit Lot 17)

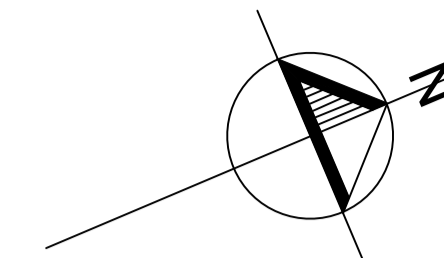
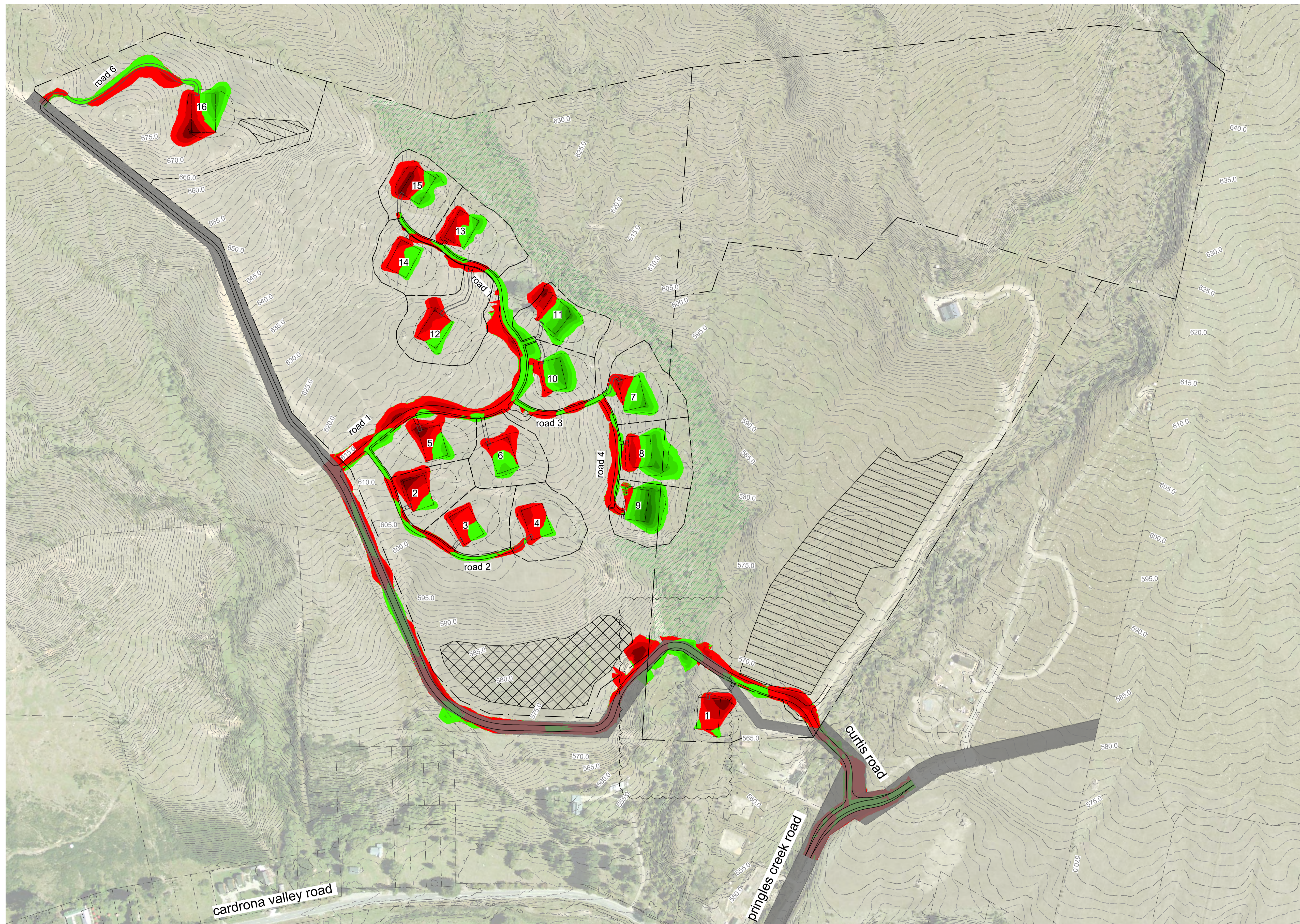
Consultants	
Baxter Design Group Ltd Landscape Architect	Environmental Associates Ltd Water Supply
Geosolve Ltd Geotech	Bartlett Consulting Traffic
Origin Consultants Ltd Archaeological	E3 Scientific Contamination and Ecology



McDOUGALL'S BLOCK PROJECT
ROBERTS FAMILY TRUST
QUEENSTOWN

Sheet Title
existing site and contour plan

Job No	Sheet No	Rev
138332.00 P - C10 Existing conditions.dwg	138332.00 C10-01	3



- notes:**
1. earthwork volumes shown are to final platform and road levels
 2. cut and fill batter slopes are 3H:1V
 3. no bulking factors are included in cut fill volumes
 4. contours at 1m intervals

- legend:**
- Contours major (existing)
 - Contours minor (existing)
 - Lot boundary (existing)
 - Adjacent lot boundary (existing)
 - - - Proposed subdivision lot boundaries
 - - - Building platforms (proposed)
 - - - Curtilage Areas
 - ▨ Disturbed areas (proposed)
 - ☁ Pongs Creek Clutha Flathead Preservation Corridor
 - ▬ Existing right of way
 - ▨ Potential fill area

Surface Analysis: Elevation Ranges

Number	Color	Minimum Elevation (m)	Maximum Elevation (m)
1	Dark Red	-4.000	-3.000
2	Red	-3.000	-2.000
3	Red	-2.000	-1.000
4	Red	-1.000	0.000
5	Light Green	0.000	1.000
6	Light Green	1.000	2.000
7	Light Green	2.000	3.000
8	Light Green	3.000	4.000
9	Light Green	4.000	5.000

Cut/Fill Summary

Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
Combined Volume	1.000	1.000	55000sq.m	20880 Cu. M.	17600 Cu. M.	3334 Cu. M.<Cut>
Totals			55000sq.m	20880 Cu. M.	17600 Cu. M.	3334 Cu. M.<Cut>

All dimensions to be verified on site before making any shop drawings or commencing any work

Rev	Date	Appd	Reason
5	2020-03-04	GWF	Consent

Consultants
 Baxter Design Group Ltd
 Landscape Architect
 Geosolve Ltd
 Geotech
 Origin Consultants Ltd
 Archaeological

Environmental Associates Ltd
 Water Supply
 Bartlett Consulting
 Traffic
 E3 Scientific
 Contamination and Ecology



McDOUGALL'S BLOCK PROJECT
ROBERTS FAMILY TRUST
QUEENSTOWN

Sheet Title
enabling earthworks
cut fill and volumes plan

Drawn JAV	Scale 1:2000	(at A1)
Filename 138332.00 P - C20 Enabling works.dwg		
Job No	Sheet No	Rev
138332.00 C21-01		5

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2 September 2019

Thomas Shenton
Holmes Consulting LP
P O Box 90745
Auckland

Sent via email only: Thomas.shenton@holmesconsulting.co.nz

Dear Thomas,

**ELECTRICITY SUPPLY AVAILABILITY FOR PROPOSED 17 LOT SUBDIVISION.
10 CURTIS ROAD, WANAKA. LOT 1 DP 433836, LOT 1 DP 425268, LOT 6 DP 344432.**

Thank you for your inquiry outlining the above proposed development.

Subject to technical, legal and commercial requirements, Aurora Energy can make a Point of Supply¹ (PoS) available for this development.

Disclaimer

This letter confirms that a PoS **can** be made available. This letter **does not** imply that a PoS is available now, or that Aurora Energy will make a PoS available at its cost.

Next Steps

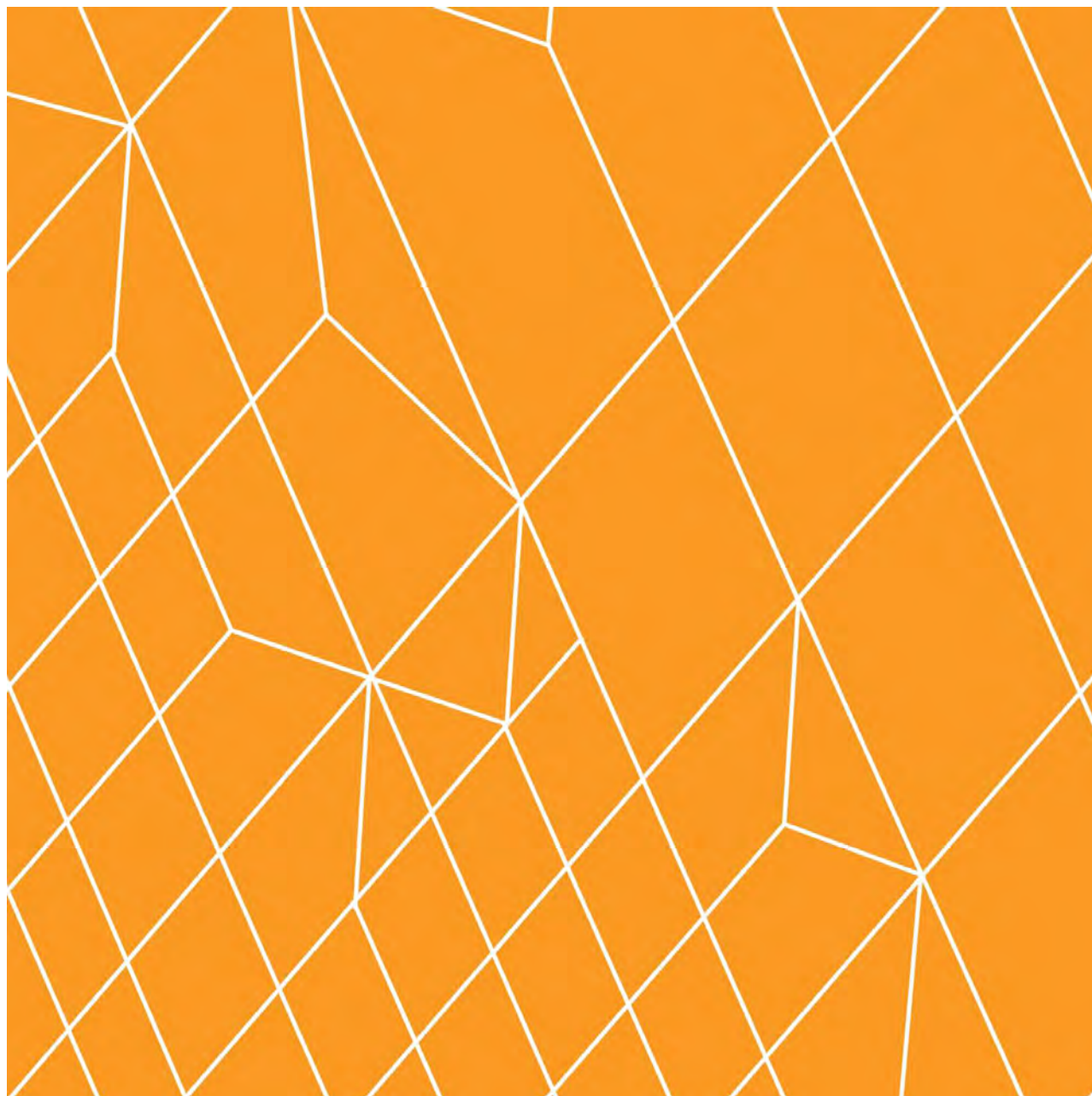
To arrange an electricity connection to the Aurora Energy network, a connection application will be required. General and technical requirements for electricity connections are contained in Aurora Energy's Network Connection Standard. Connection application forms and the Network Connection Standard are available from www.auroraenergy.co.nz.

Yours sincerely



Richard Starkey
COMMERCIAL MANAGER

¹ Point of Supply is defined in section 2(3) of the Electricity Act 1993.



Infrastructure Report McDougall's Block

10 Curtis Road
Cardrona
New Zealand

V5

Report

McDougall's Block

Prepared For:
Roberts Family Trust

Date: 04 March 2020
Project No: 138332.00
Version No: 5

Prepared By:



Billy Langhenry
CIVIL ENGINEER
Holmes Consulting LP

Reviewed By:



Gerhard Fourie
PROJECT ENGINEER
Holmes Consulting LP

DATE	VER. NO.	REASON FOR ISSUE
02/09/19	1	Draft report for project team review
16/10/19	2	Updated report following project team review
10/12/19	3	Removed option for trenchless crossing of Creek as per PMI from Leon West
23/01/20	4	Omit Lot 17 as per PMI from Leon West
04/03/20	5	Revise Pongs Creek Clutha Flathead preservation corridor as per PMI from Leon West

Limitations

Findings presented as a part of this project are for the sole use of Roberts Family Trust and Queenstown Lakes District Council in their evaluation of the subject properties. The findings are not intended for use by other parties and may not contain sufficient information for the purposes of other parties or other uses. Our professional services are performed using a degree of care and skill normally exercised, under similar circumstances, by reputable consultants practicing in this field at this time. No other warranty, expressed or implied, is made as to the professional advice presented in this report.

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Table of Acronyms and Abbreviations

Item	Expanded acronym or abbreviation
AEP	Annual Exceedance Probability
CAD	Computer Aided Design
CoP	Code of Practice
DWF	Dry Weather Flow
HIRDS	High Intensity Rainfall Design System
LDSC	Land Development and Subdivision Code of Practice (QLDC)
LiDAR	Light Detection and Ranging
ORC	Otago Regional Council
QLDC	Queenstown Lakes District Council
STEP	Septic Tank Effluent Pump

1 EXECUTIVE SUMMARY

1.1 Overview

Holmes Consulting has prepared this infrastructure feasibility report on behalf of Roberts Family Trust to support the proposed formation of 16 lots (one of which will contain a previously consented building platform under RM090876), including the establishment of 15 additional residential building platforms. The proposed development is located west of Cardrona Valley Road off Pringles Creek Road, east of the Cardrona Ski Field and south of the Pringles Creek subdivision.

The development envisioned will follow a low impact design philosophy to maintain its inherent rural and rustic character. The associated infrastructure shall be sympathetic to the natural environment limiting visual and environmental impacts.

1.2 Wastewater

There is no available public wastewater system to connect the development to, so options for wastewater treatment are either on-site or communal. Due to the proposed lot layout and a perched water table across much of the site, it is not possible for each lot to have its own on-site wastewater application area to dispose treated effluent to land, so a communal one is needed.

The on-site treatment option would involve an on-site wastewater system providing primary, secondary and potentially tertiary treatment before the effluent is pumped into a small-bore low-pressure community main that conveys flows to the communal wastewater application area. The effluent would be applied to the land via subsoil drip irrigation.

The communal treatment option would involve wastewater or primary treated effluent (collected via a septic tank effluent pump (STEP) system) being collected via a small bore low-pressure community main that conveys flows to a communal wastewater treatment plant where flows would be treated to the required standard before effluent is discharged to the application area via subsoil drip irrigation.

Future expansion within Cardrona Valley is forthcoming and a new public wastewater network will likely be constructed. Consideration during detailed design should be made to allow for a connection point from the low-pressure community main to this future system.

1.3 Stormwater

There is no available public stormwater system to connect the development to, so options for stormwater disposal include soakage and above ground dispersal. On-site rainwater harvesting tanks will also offer retention of flow.

The proposed development will create a small increase in impervious area, resulting in a small increase in stormwater runoff. The increased impermeable area is from the roofs of the new buildings, associated paved areas within the lots and upgrade of Curtis Road. Increase in peak stormwater discharge resulting from the development will be mitigated through attenuation and retention features that mimic the natural hydrology of the site. Natural overland flow paths will be maintained throughout the development that will also deal with exceedance flows from the stormwater disposal devices.

Stormwater runoff from the new roads will be collected in roadside swales which will offer attenuation of flow before discharge to the ground via soakage.

1.4 Water

There is no available public water supply system to connect the development to, so a new water take from Pringles Creek is proposed to provide the required domestic, irrigation and firefighting water requirements or the development.

There are onsite and communal storage options for provision of a potable water supply to meet the peak domestic demand and static reserve firefighting requirements of the development. The most flexible, and preferred, option is to have on-site storage of domestic and firefighting water topped up by a communal trickle feed main distributing treated water from the new Pringles Creek surface water take.

Future expansion within Cardrona Valley is forthcoming and there may be an opportunity to recognise some synergies with this development. A future point of connection should be considered during detailed design and incorporated.

1.5 Access

Access to the proposed development will continue to be via Cardrona Valley Road and Pringles Creek Road.

The proposed road layout is shown on the masterplan. The specific design of the roads will be undertaken during the detailed design phase of the project. All road geometry and construction will conform to the requirements of the Queenstown Lakes District Council (QLDC) Land Development and Subdivision Code of Practice (LDSC).

The unsealed section of Curtis Road, just past its junction with Pringles Creek Road to the main residential cluster, will be upgraded to a Type E3 road.

The initial section of roading within the main residential cluster will be road type E2 road.

The other internal roads which serve less than 6 dwellings would be a type E1 road.

1.6 Bulk Enabling Earthworks

Bulk earthwork calculations have been completed to illustrate the volumes and grading required for the proposed development. The total cut/fill on the site requires a net approx. 3,334m³ of cut.

1.7 Other services

Gas infrastructure does not extend to the development boundary and any gas use on site will require individual gas bottle supply.

Aurora Energy's grid is near the development and confirmation has been received that their network can accommodate the project demands.

Chorus telecommunication grid is near the development and confirmation has been received that their network can accommodate the project demands.

2 INTRODUCTION

Holmes Consulting Limited Partnership has been engaged by Roberts Family Trust to prepare an infrastructure report to support a resource application for the proposed 16 lot Development at 10 Curtis Road in the Cardrona Valley. A summary of the possible arrangement can be seen in Figure 1.

Throughout this report the following terms are used:

- **Property** – 10 Curtis Road, a 55.4 ha property (lots in question affect a total area of 1.6 ha) within: Lot 1 Deposited Plan 433836, Lot 6 Deposited Plan 34432 and Lot 1 Deposited Plan 425263. The property is within the jurisdiction of QLDC and Otago Regional Council.
- **Site** – the proposed lot, e.g. on-site would be within the individual lot
- **Communal** – outside of a lot, but inside the property, a centralised system

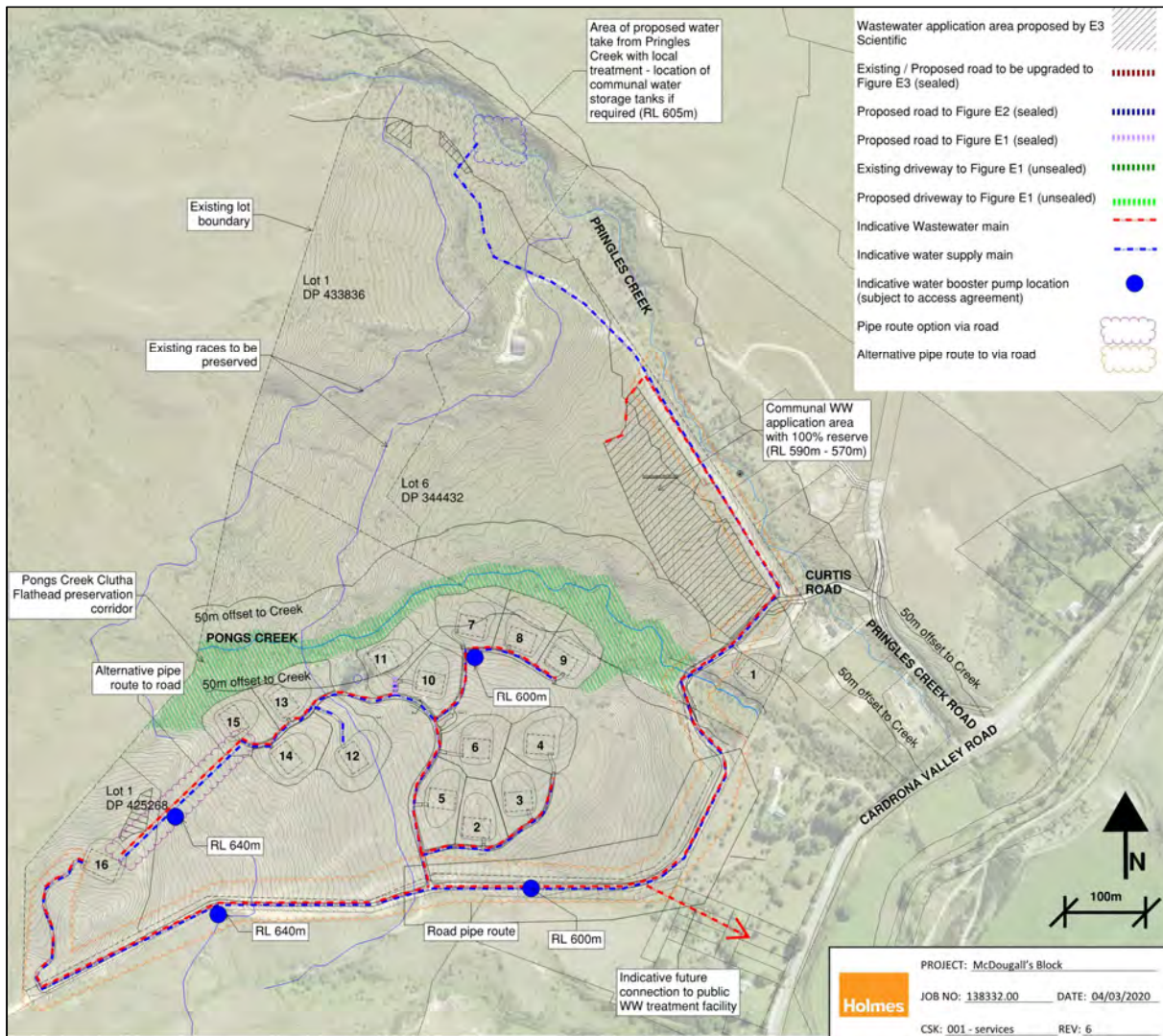


Figure 1 Overview of potential wastewater and water supply infrastructure

3 PROJECT INPUTS

This study relies on the proposed development masterplan dated 18th February 2020 by Baxter Design, shown in Figure 2 and other information presented in Table 1.



Figure 2- Proposed Masterplan

Each of the proposed building platforms are approx. 750m². Four bedroom dwellings have been assumed for each building platform. In accordance with AS/NZS 1547:2012 this would equate to a population of six to seven people.