

## FILE RECORD

SUBJECT: Ayrburn Farms . Mill Stream  
Floodway . Preliminary  
Assessment

Job No.: 000178

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Date: 8/05/2015

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Copies To: Andrew Cavell

Reference: FR-15-05-07-GMD-  
000178.DOCX

### 1.0 Introduction

I have been through the photo data etc collected by Anthony Steel on site on Tuesday (5/05/2015). I have attached an annotated copy of the Draft Concept Plan Anthony used on site to record locations etc. for your information and reference for site Nos.

The Fluent Solutions letter dated 13 February 2015 also refers.

My comments, working from the northern boundary, see Site #1, downstream to the southern boundary, are set out below.

### 2.0 Site #1

The locality from the development plan is shown in Figure 1 below.



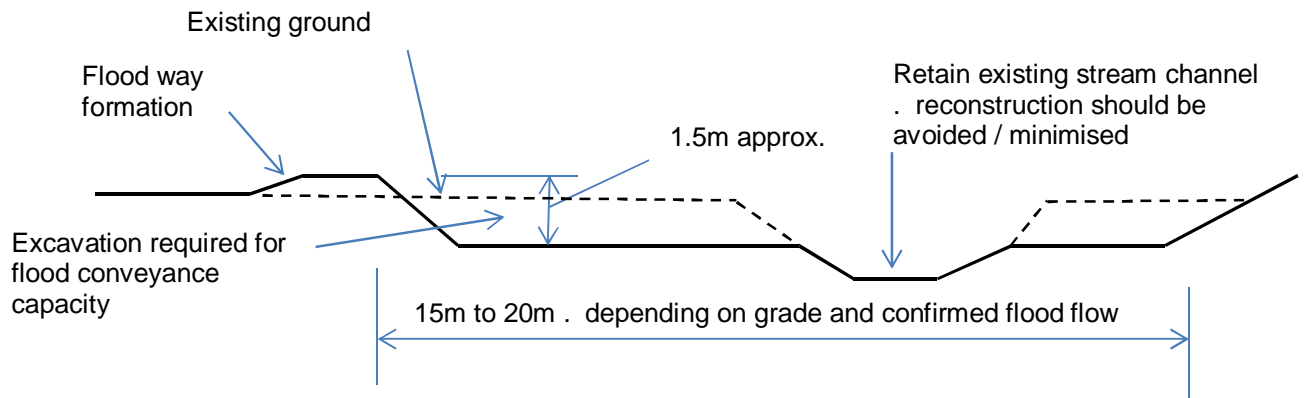
Figure 1: Site #1 – Start of flood management work

Currently, if a flood flow of the order of 100m<sup>3</sup>/s flowed through the site the water would quickly flow over the existing banks and spread out over the open areas of

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pasture. With the proposed residential development this would not be appropriate or allowable.

Where Mill Stream enters the site the existing channel is too narrow - a widening, probably in combination with a low bank to deflect water from flowing over the lots . a typical section is shown in Figure 2 below. Most of the floodway width could be used for walkways and selected planting such as grouped tall grasses, generally on the batters, with occasional trees provided / retained to enhance the aesthetic appearance. Species that are invasive and obstruct the floodway would be avoided.



**Figure 2: Indicative Typical Floodway Cross Section**

Option - Allow infrequent major flows to spread out as shallow flow over the public use area (Farmers Market and Central Village Greens) from the right bend here. This reduces the channel depth and width until the stream is confined again by lots on both sides downstream at the bridge at Site 5.



**Figure 3: Photo - Panarama at Site 1**

### 3.0 Site #4 - Bridge Crossings

Obviously providing 20m long bridges is expensive and therefore I anticipate the requirement would be as follows:

1. Primary Access - 20m long / 2 lane bridge with deck level approximately 2.5m above stream invert and spanning the width of the floodway. See Figures 4 and 5 below. A single primary bridge would be needed to provide all weather access from the west side of the development to Lake Hayes Arrowtown Road for emergency services and residents access during major flood events.
2. Secondary access . low level bridges very similar to the existing bridges across the stream channel with the deck level at existing top of bank level.

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Figure 4: Primary Bridge Site

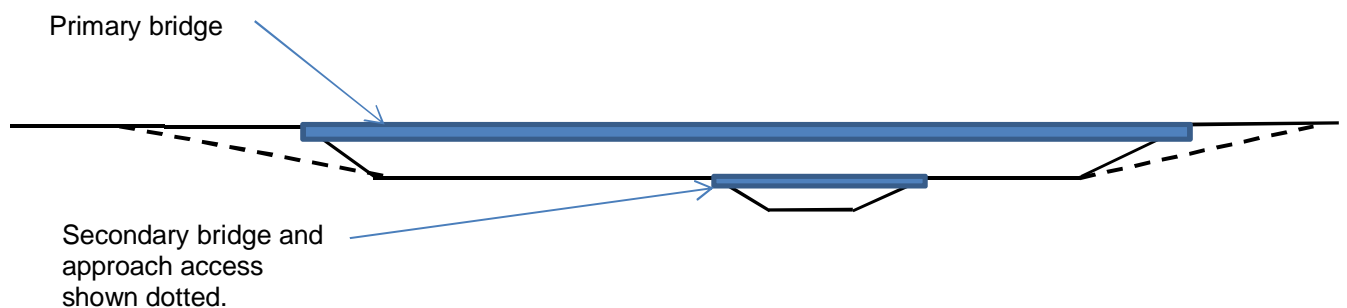


Figure 5: Primary and Secondary Bridge Options

#### 4.0 Residential Floodway

The Residential Floodway is shown in Figure 6.

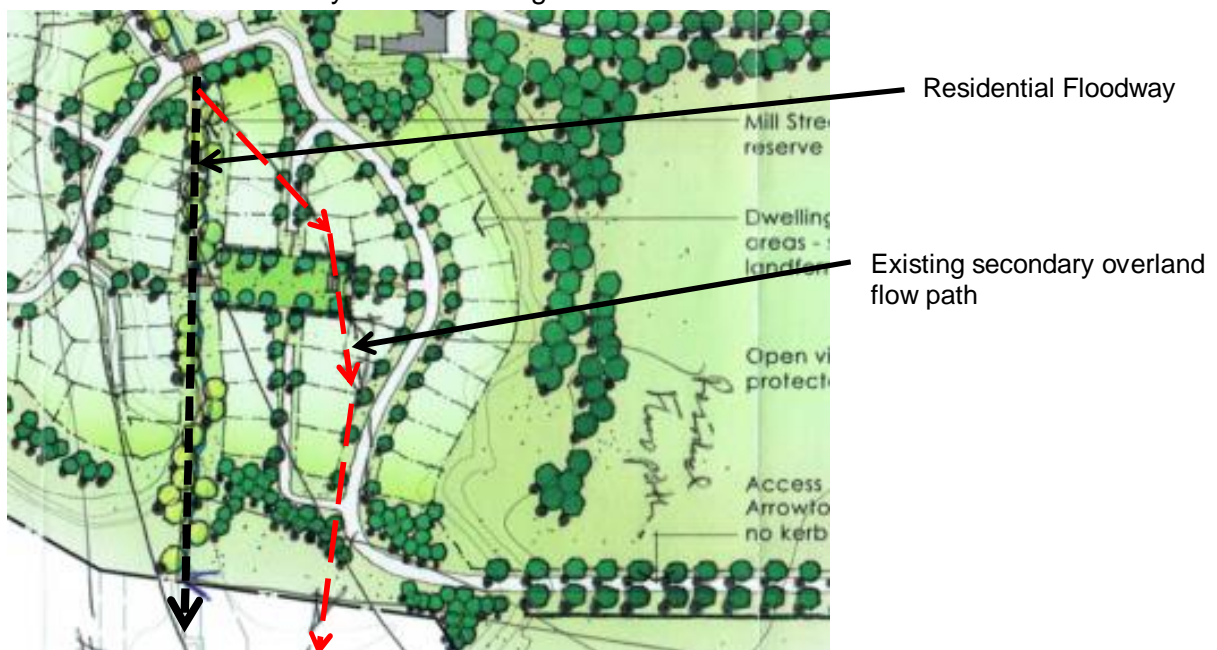


Figure 6: Residential Floodway

The residential floodway would be constructed in a similar form to that indicated in Figure 2. The secondary overland flow path in Figure 6 would be cut off and all flow confined to the residential floodway. Picking up all the overland flows off the common area for the farmers market and village greens would be a component of the design for the Primary bridge site.

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When the water reaches the southern boundary the floodway would be carrying the combined flow from upstream and therefore a transition back to the existing broad overland flow regime that exists at present would require some consideration at the boundary where it enters the neighbour's land downstream.

## 5.0 Stormwater Management

We have reviewed the stormwater management plan prepared by Clark Fortune MacDonald and Associates (CFM) as part of their Ayrburn Farm Developments Infrastructure Assessment Report (not dated) received from Winton Partners on 27 May 2015.

The proposed stormwater conveyance and treatment network would discharge to the Mill Creek conveyance channel through the Ayrburn Farms development area for flood flows from the Mill Stream catchment upstream of the development area. The 100 year Average Return Interval (ARI) peak stormwater discharge to Mill Stream from the development area is estimated by CFM to be 0.21m<sup>3</sup>/s. The 100yr ARI flood flow from the upper Mill Stream catchment could be of the order of 100m<sup>3</sup>/s and therefore runoff from the site would have a negligible effect on Mill Stream **if the flood peaks coincided**.

The time of concentration from the development area however is a fraction of that from the Mill Stream catchment upstream and therefore **the peak flow from the development area does not coincide** with the peak flow in Mill Stream. The controlled discharge from the development area would therefore have no significant adverse capacity effect on the stream channel downstream.

## 6.0 Conclusion

From a flood management construction perspective there is a need for the following:

- i. Earthworks for forming the floodway including re-grassing.
- ii. Care in the farmers market and village green areas to cope with overland flow paths and attention to building floor levels and all weather access.
- iii. Construction of a primary bridge and additional secondary bridges if required in new locations.
- iv. In addition there would be a need for some additional scour protection on bends for the stream channel. Some bank erosion was noted on site.
- v. Landscape treatments for the batters of the floodways, again particularly on the bends, would provide scour resistance.
- vi. The proposed controlled stormwater discharge from the development area is consistent with and would therefore have no adverse effect on the proposed Mill Stream flood conveyance works within or downstream of the site.

Prepared by

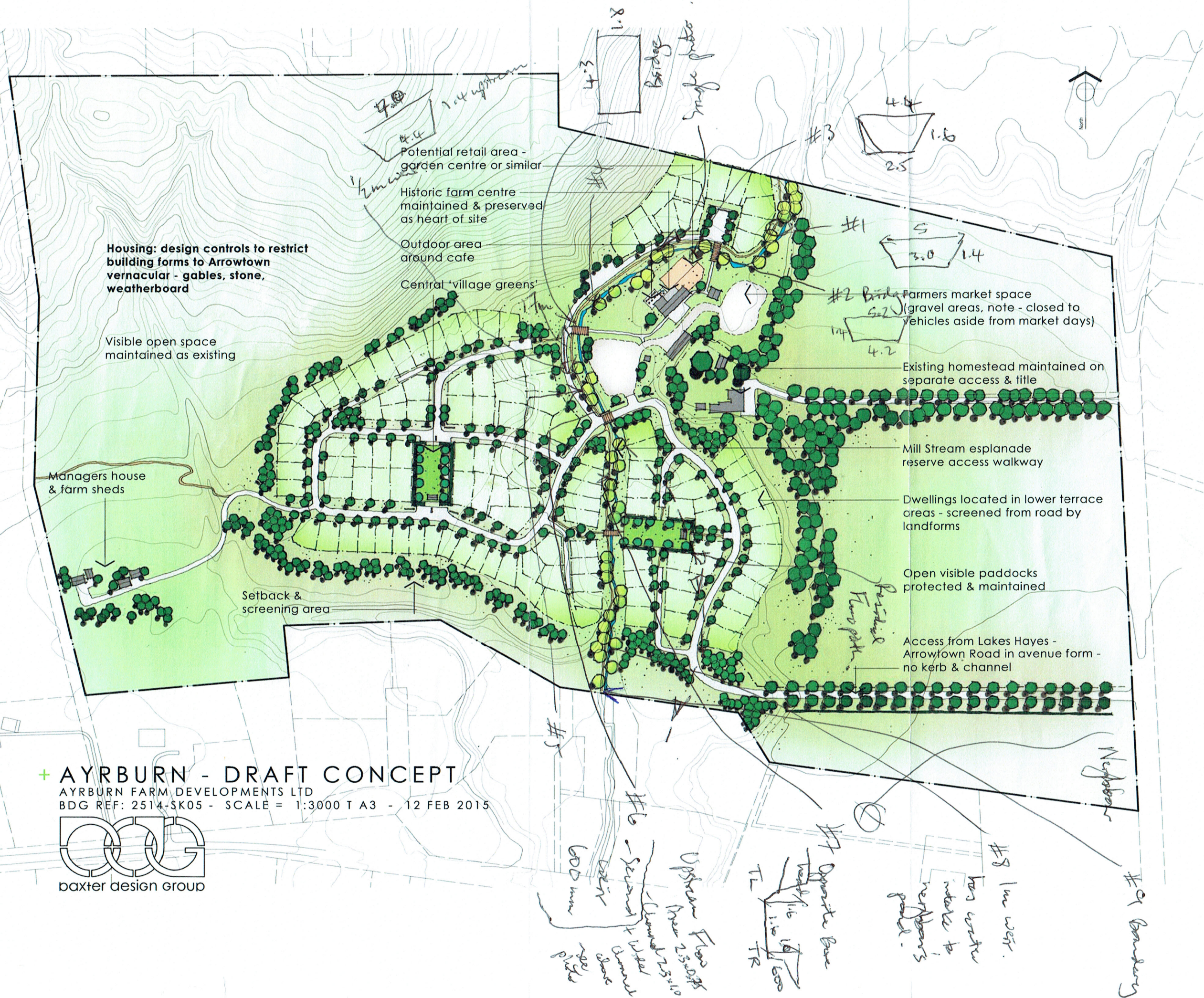
Gary Dent

### Attachment:

- Annotated copy of the Ayrburn Draft Concept+plan

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**+ AYRBURN - DRAFT CONCEPT**  
AYRBURN FARM DEVELOPMENTS LTD  
BDG REF: 2514-SK05 - SCALE = 1:3000 T A3 - 12 FEB 2015

