

25 October 2022  
By E-mail

Six Hills Limited  
79 Duart Road  
Havelock North (4130)

**Attn: Marcus Hill**



**Forbes Ecology**

Dr. Adam Forbes

s 9(2)(a)

s 9(2)(a)

[www.forbesecology.co.nz](http://www.forbesecology.co.nz)

Dear Marcus,

## **Re: Proposal to Culvert part of the Wellwood Drain**

### **INTRODUCTION**

Forbes Ecology Limited was engaged to assess the requirements for positive effects to address the effects of a proposal to culvert a reach of the Wellwood Drain, in Flaxmere, Hastings District. The work assessed the ability to address the effects of culverting by conducting high quality ecological restoration on an adjacent reach of the Irongate Stream.

### **METHOD**

The Stream Ecological Valuation (SEV)<sup>1</sup> is a method of quantifying stream functions. It is a main method of calculating Environmental Compensation Ratios (ECR). ECRs can be applied to quantify specific positive effects required address losses in stream functional value.

Overall, the ECR requires the following steps to be taken:

**Step 1:** Establish the 'current' SEV values for the site that will be impacted and for the proposed environmental compensation site. (Note; do not include biotic functions (IFI and FFI) in this calculation because of the difficulty of predicting these outcomes).

**Step 2:** Determine the 'potential' SEV values for both the impact and environmental compensation sites by recalculating the variables using 'predicted' function scores assuming 'best-practice' remediation works have been carried out at both sites. Predictions are the best scores possible if the sites were to be restored as far as practical from present with current best-practice. (Note; do not include potential scores for biotic functions (IFI and FFI) in these calculations because of the difficulty of predicting these outcomes)

**Step 3:** Determine the SEV value at the impact site (SEVi-I) again using predicted function scores but now assuming that the proposed development works (e.g., piping, filling) have been carried out.

---

<sup>1</sup> See <https://knowledgeauckland.org.nz/publications/stream-ecological-valuation-sev-a-method-for-assessing-the-ecological-functions-of-auckland-streams/>

(Note; do not include potential scores for biotic functions (IFI and FFI) because of the difficulty of predicting these outcomes.

**Step 4:** Follow the formula for calculating an environmental compensation ratio below. This value will be the amount you have to multiply the area of the stream you are impacting by to determine how much area of stream needs to be restored.

$$ECR = [(SEVi-P - SEVi-I)/(SEVm-P - SEVm-C)] \times 1.5$$

A combination of existing and new SEV data were used to determine the balance the loss of stream functioning associated with a proposal to pipe 215 m of the Wellwood Drain (Fig. 1) with positive effects associated with ecological restoration on the Irongate Stream.



Figure 1. Typical character of the reach of the Wellwood Drain proposed for culverting.

## RESULTS AND DISCUSSION

### Levels of ecological stream function

The impact reach (Wellwood Drain reach proposed for piping) has an existing functional value of 0.2 SEV (Table 1). Applying best case restoration, it is expected this could be increased to 0.47 SEV. The Irongate Stream (restoration reach) has an existing SEV of 0.35 and with best case restoration it is expected the reach could be improved to achieve 0.69 SEV. Where the Wellwood Drain is piped, the functional value would decline to 0.15 SEV Table 1.

Table 1. Current and potential Stream Ecological Valuation results for the Wellwood Drain and Irongate Stream within the study area.

|                   | Current SEV                           |                                            | Potential SEV                         |                                            |                                             |
|-------------------|---------------------------------------|--------------------------------------------|---------------------------------------|--------------------------------------------|---------------------------------------------|
|                   | Impact reach <sup>1</sup><br>(SEVi-C) | Restoration reach <sup>2</sup><br>(SEVm-C) | Impact reach <sup>3</sup><br>(SEVi-P) | Restoration reach <sup>4</sup><br>(SEVm-P) | Impact reach piped <sup>5</sup><br>(SEVi-I) |
| Hydraulic         | 0.42                                  | 0.49                                       | 0.48                                  | 0.83                                       | 0.10                                        |
| Biogeochemical    | 0.19                                  | 0.43                                       | 0.55                                  | 0.67                                       | 0.39                                        |
| Habitat Provision | 0.06                                  | 0.18                                       | 0.20                                  | 0.41                                       | 0.10                                        |
| Biotic            | 0.13                                  | 0.29                                       | 0.65                                  | 0.85                                       | 0.00                                        |
| <b>SEV</b>        | <b>0.20</b>                           | <b>0.35</b>                                | <b>0.47</b>                           | <b>0.69</b>                                | <b>0.15</b>                                 |

Notes: Wellwood reach proposed for piping<sup>1</sup>. Irongate reach for restoration<sup>2</sup>. Potential value of Wellwood<sup>3</sup>. Potential value of Irongate with restoration<sup>4</sup>. Wellwood post piping<sup>5</sup>.

## Effects management

To achieve a no-net-loss position in ecological stream functioning following the piping of 215 m of the Wellwood Drain, high quality restoration would be required along 303 m of the Irongate Stream. The environmental compensation ratio is calculated as follows:

$$ECR = [(SEVi-P - SEVi-I)/(SEVm-P - SEVm-C)] \times 1.5$$

$$[(0.47 - 0.15)/(0.69 - 0.35)] \times 1.5 = ECR 1.41$$

$$ECR 1.41 \times 215 \text{ m} = 303 \text{ m of restoration along the Irongate stream}$$

High quality restoration would involve the following key interventions:

- Native riparian forest planting sufficient to achieve high levels of overhead cover at maturity,
- Native cover extending on average 20 m either side of the waterway,
- Bank recontouring to achieve significant areas of functional floodplains.

More detail on restoration requirements should be sought in due course.

## Closing

Please contact me if you have any questions on this advice.

Yours Sincerely,



Dr Adam Forbes  
**Principal Ecologist**  
**Forbes Ecology Limited**