

12 July 2019

Our Reference: 1479-3

G. Buchanan
C/o: Novasteel Limited
P O Box 55 136
Eastridge Auckland
Attention: Gary Swindale

Dear Gary

RE: ADDENDUM TO RESOURCE CONSENT ENGINEERING DESIGN REPORT FOR THE PROPOSED FREE-RANGE BROILER FARM DEVELOPMENT AT 69 KELLY ROAD, WAERENGA FOR G. BUCHANAN

Following the request for further information from council in the email provided by the client dated 28 June 2019 we reply regarding the culvert crossing as follows:

The existing farm race culvert crossing comprises 2 x 900mm diameter culverts. Any widening of the existing access road would involve extending these culverts.

Based on the data on the Waikato Regional Council GIS website we have calculated a catchment area for the existing culvert crossing of 46,277m² as shown in figure 1 below:

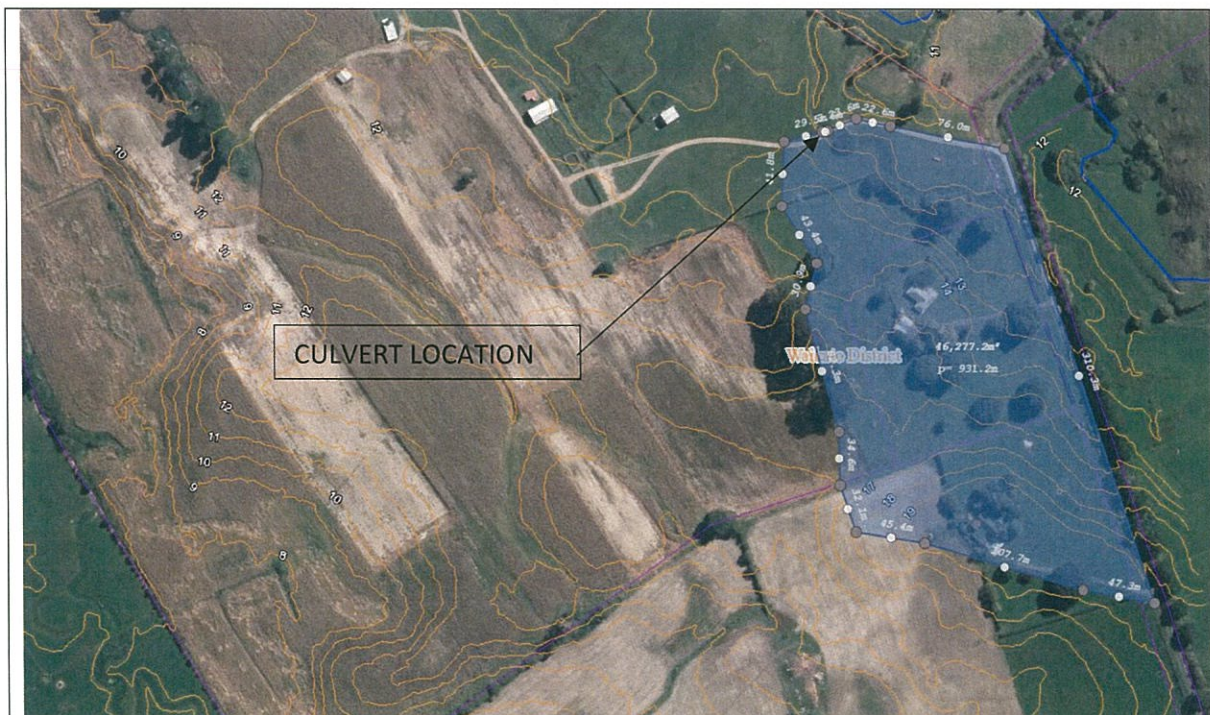


Fig. 1: GIS Aerial Photo with contours



The catchment area is under five hectares and complies with 4.2.9.1 as a permitted activity. The attached catchment calculations provide a discharge of $0.761\text{m}^3/\text{sec}$ for the 2% AEP (1 in 50-year ARI) storm event. A single 900mm diameter culvert will cater for this storm event without heading up. This also complies with 4.2.9.1 as a permitted activity.

We believe this report satisfies the request for further information. Please feel free to contact the undersigned if you have any questions.

Report prepared by:

A handwritten signature in blue ink, appearing to read "M. Jones".

M. Jones
ENGINEER
(NZCE Civil)

STORMWATER PIPE CALCULATOR



Job Number: 1479
Client: G. Buchanan
Site Details: Existing culvert crossing

Rational

C = 0.40
i = 148
A = 46277 m²
Q = 761.00 l/s

Waerenga from HiRDS Data

i₅₀ = 148 mm/hr

Note: 10 minute Duration

$$Q_{10} = \frac{C \times i \times A}{3600}$$

PIPE CAPACITY FORMULA (Full Flow)

Colebrook-White $V = -2\sqrt{(2gDS)} \log(ks/3.7D + 2.51\nu/(D\sqrt{(2gDS)}))$

$\nu =$ 1.141 x10⁶ kinematic viscosity of fluid
 (water at 15 degrees)

$k_s =$ 1.5 mm (effective roughness)

D= diameter

S= hydraulic gradient

R= d/4 (circ. pipes)

$Q = VA$

Capacity Check on Proposed 900mmØ RCRRJ Pipe @ 0.5%

Pipe Grade S(%)	Pipe Dia D (mm)	Pipe Vel'y (m/s)	PIPE CAP'Y (l/s)
0.500	900	1.98	1261.3

Existing 900mmØ @ 0.5% sufficient to accommodate contributing catchment area of 46,277m²

Figure 6: Headwater depth for circular pipes
Paragraphs 3.2.3 (a) and 4.1.4 (a)

