Surface water drainage calculations

Proposed Surface Water Drainage
Middle Farm
Main Street
Bilton
EAST RIDING OF YORKSHIRE

Client   JM GUTHRIE 1965 SETTLEMENT

Date   9th February 2021

East Riding Consultants Ltd

60 ALL HALLOWS ROAD, WALKINGTON, BEVERLEY, HU17 8SJ
☎ **01482 871019**

Document Control

Revision	Remarks	Date
_	First Issue	9/2/21
A	Minor errors corrected	10/2/21

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1. Introduction

East Riding Consultants Ltd have been commissioned to prepare a surface water drainage design report for extension of former agricultural barns to form dwellings at Middle Farm, Main Street, Bilton.

The report is required: -
a) To supplement the planning application for the proposed surface water drainage system to serve the proposed for the development and discharge a drainage condition on the Planning Approval

2. Scope of Report

This report will:

- Set out preliminary surface water drainage of the site.
- Set out recommendations that the applicant should consider

3. Sources of Data and Site Information

3.1 Location

The development is situated on a brownfield site at Middle Farm, Main Street, Bilton

3.2 Description of Proposed Development

Alterations and extension of former agricultural barns to form dwellings at Middle Farm, Main Street, Bilton.

4. Detailed Analysis of proposed drainage

4.1 *FOUL - Site drainage proposals*

It is proposed to connect foul drainage to the existing on site drain that discharges to the main public sewer.

4.4 *Surface Water drainage proposals*

The proposed roof drainage will be captured and stored on site with a controlled discharge into the existing watercourse located to the south of the site. The system will discharge at a rate of 5L/s.

Proposed roof areas = 921.76m^2
All drives, access road and parking will be constructed using pervious material.

Run off for a 1 in 1 year event using 50mm rainfall
$$Q = 2.78 \times A \times R$$
$$= 2.78 \times 0.092176 \times 50$$
$$= 12.812 \text{ L/s}$$

4.5   *Storage required.*

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The storage required, restricting discharge to 5L/s

A = 0.0921Ha (Impervious area of proposed roof   = 2025 m^2

N = 100 years

P = 5L/s   0.005 m^3/s (discharge rate)

S = $\dfrac{8.02 \times 0.0.0921^{1.5} \times 100^{0.5}}{0.005^{0.5}}$

S = $\dfrac{8.02 \times 0.0279 \times 10}{0.0707}$

=31.65 m^3

Adding 30% for climate change

Storage required = 41.1 m^3

To control the outflow it is recommended that an orifice plate is installed.

The actual design of the plate will depend on the head of water within the storage system above the invert of the outlet. It has been assumed that the crates will be installed in a double layer 800mm deep

Using the equation below:-

Hole Dia   = $\left(\dfrac{4 \times Q}{\prod CD(2GH)^{1/2}} = \right)^{0.5}$

Q= 13.13 L/s

H = 0.8m

Results in an orifice plate with a hole at the invert level of 65mm

5. Conclusion

The surface water drainage system for the proposed development must include 41.1 m^3 of storage within the site. It is proposed to install a 40 m^3 GRP tank 2.5m Dia 8.9m long. The outlet will be connected to a Package Pump Station. This will pump through an 80mm pump main to a stilling chamber located 10 m from the bank top of the watercourse. This will allow maintenance of the watercourse without overrunning the chamber. A PC headwall will be installed in the bank of

the watercourse so that it does not project beyond the bank profile to allow weed cutting of the bank without obstruction. The 150mm outlet must have a non return valve fitted to avoid back flow through the system if water level rise above the outlet. Stone pitching will be installed to the bank below the outlet to avoid any scour of the bank.

Consent to the outfall must be obtained from the South Holderness IDB prior to any works commencing on the site.

Report End