

**Residential Development at Kingsley Farm,
Harrogate.**

**Revised Surface Water
Drainage Strategy.**

April 2014

Ref: 2014-4-2 re01

Document Control Sheet

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Report Title *Revised Surface Water Drainage Strategy.*

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Leathley House, New Street, Clifton, Brighouse, West Yorkshire, HD6 4HN.
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Consultation response dated 10 February 2014.

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1 Introduction

1.1 Background

Chippindale Foods Ltd wish to redevelop their site at Kingsley Farm, Harrogate for residential use, and have submitted a planning application (ref: 14/00128/OUTMAJ) to Harrogate Borough Council (HBC). Accompanying the planning application is a Flood Risk Assessment (FRA) report by Beam Consulting (ref:04-08-DOC-001A dated 3 April 2013), in which is the proposed Surface Water Drainage Strategy (at section 4.0 of the document).

In response to the formal Consultation on the planning application, Harrogate Borough Council's Land Drainage Department issued a memo on 10 February 2014 indicating that they had concerns about the proposed surface water drainage strategy. HBC's Land Drainage Department's Consultation response is attached at Appendix A.

This report is intended to satisfy the comments by HBC Land Drainage Department, and is based upon further discussions with Mike Wickens of HBC Land Drainage Department. It supersedes section 4.0 of the FRA which covered surface water drainage strategy.

2 Revised Surface Water Drainage Strategy.

2.1 Original Design and Strategy.

The original surface water drainage design and strategy was put forward by Beam Consulting in the FRA. It was based on certain assumptions on the impermeable areas etc of the existing site, and a calculation of the run-off from the proposed development.

These original calculations have been replicated by EJSA (based on the assumptions used by beam Consulting) and are attached at Appendix B. They show a storage requirement of 298m³.

2.2 HBC's Land Drainage Department's Response.

Looking in detail at the Consultation response from the Land Drainage Department, there are 5 distinct points:

2.2.1 *Flooding on Star Beck.*

The response notes:

Significant complaints of flooding have been received downstream of the proposed development. Particularly to the rear of Olive Walk/Former County Council Offices on Station View and the rear of Camwall Road due to capacity issues with Star Beck.

Surface water discharge from this proposed development must not be allowed to increase the potential risk of additional surface water flooding to downstream land or property. It is likely that a proportion of the surface water from the agricultural area of the site is currently lost through natural means and may not ever reach Star Beck.

HBC's concern not to increase flooding on Star Beck is understandable, and forms the central core of the response.

2.2.2 *Existing Site Run-off.*

The response notes:

It would appear from the proposed site plan that the majority of new housing is to be developed on the area of the site which is mostly Greenfield permeable surfaces. National guidance on the expected scale of reduction of peak discharge from existing brownfield sites is not clear. DEFRA's "Interim Code Of practice For Sustainable Drainage Systems" says it is preferable for Brownfield solutions to provide similar run-off characteristics to Greenfield development (6.2.8)

In addition to the above, the existing hard standing areas are largely uneven granular materials, which will retain a large proportion of surface water on site. I would also question whether some of the agricultural buildings are drained to a positive outfall.

HBC's view is that the whole of the existing site run-off may be at Greenfield rates. Whilst this may be regarded as an extreme view, without any evidence to prove that the buildings do positively drain to Star Beck (for example), HBC's concerns could be valid. Mike Wickens agreed that this matter, in his view, should require the whole of the existing site to be considered at Greenfield run-off rates in the calculations.

2.2.3 *Oil interceptors.*

The response notes:

Any new drainage design for the site should include surface water from vehicle parking and hard standing areas shall be passed through an oil interceptor of adequate capacity prior to its discharge to the watercourse.

The revised drawing, showing the revised drainage strategy should note this.

2.2.4 *Revised Strategy.*

The response notes:

Therefore for the reasons stated above, the surface water strategy for this site should be calculated at Greenfield rates of discharge via on site storage. The existing retained building drainage must also pass through the onsite attenuation system as part of the surface water discharge rate for the site in its entirety.

Whilst the run-off from the existing site can be re-calculated based on 100% Greenfield run-off rates, it would be a serious case of double counting to have the retained buildings positively draining into the new, attenuated system. If the retained buildings are to be regarded as running-off at Greenfield rates in the existing system then they should be similarly regarded in the proposed system.

A further conversation was held with Mike Wickens on 8 April 2014 to resolve this issue, and it was agreed that if the existing buildings were considered to be at Greenfield run-off rates for the existing situation, they should remain unconnected to the attenuation system in the proposed situation. Therefore, the revised drainage strategy does not connect them in to the new system, as this would be a serious over-provision.

However, all hardstandings etc associated with the proposed new dwellings will be connected to the attenuation system (via interceptors as necessary).

2.2.5 *Agreement.*

The response notes:

Outline surface water drainage details should be agreed in principle prior to any planning consent being granted.

That is the purpose of this report.

2.3 **Revised Calculations.**

The set of revised calculations, based on the matters as noted above, are attached at Appendix C. They show a new storage volume of 690m³.

**Appendix A - Harrogate Borough Council's Land Drainage Department's Consultation
response dated 10 February 2014.**

Working for you

FROM Director of Development Services
TO H.B.C Land Drainage
DDS Forward Planning

OUR REF DCECONME 6.79.1554.R.OUTMAJ 14/00128/OUTMAJ
DATE 17 January 2014
ORIGINATOR -

PLANNING CONSULTATION

APPLICATION TYPE: Outline application - Major
APPLICATION NO: 6.79.1554.R.OUTMAJ 14/00128/OUTMAJ
PROPOSAL: Outline application for residential development with access and scale considered (site area 3.31ha)
LOCATION: Kingsley Farm Kingsley Road Harrogate North Yorkshire HG1 4RF
GRID REF: E 432087 N 456392
APPLICANT: Mr N Chippindale

I enclose the consultation letter for the above proposal and the link details to Public Access. If you have any observations I would be grateful to receive these by 7 February 2014.

<http://uniformonline.harrogate.gov.uk/online-applications/applicationDetails.do?activeTab=summary&keyVal=MZ73YRHY64000>

Please be aware that in a small minority of cases some documents will only be available 24 hours after the issue of this letter, therefore please do not formulate your response until you have been able to access all the information.

Guidance on [using Adobe pdf measuring tools](#) is available on our [website](#).

If by that date I do not receive your observations or hear that you intend to make observations, I propose to proceed on the assumption that you have no objections to the proposal. You can submit your comments via email to planningconsultation@harrogate.gov.uk. **If possible can you submit the email as a Word 97-2003 doc or a pdf and not in a docx format.**

G Bell

Chief Planner

REPLY FROM: H.B.C Land Drainage
Circle A, B,C or D as appropriate:

BEFORE: 7 February 2014

- A. No objections.
- B. Object on the grounds set out below. xxx
- C. No objections but wish to make comments or seek safeguards as set out below.
- D. No objections subject to the following conditions:

DCECONME 14/00128/OUTMAJ

My Ref. 2014,Harrogate, Kingsley Farm, Kingsley Road, 14/00128/OUTMAJ.10.02.14

Significant complaints of flooding have been received downstream of the proposed development. Particularly to the rear of Olive Walk/Former County Council Offices on Station View and the rear of Camwall Road due to capacity issues with Star Beck.

Surface water discharge from this proposed development must not be allowed to increase the potential risk of additional surface water flooding to downstream land or property. It is likely that a proportion of the surface water from the agricultural area of the site is currently lost through natural means and may not ever reach Star Beck.

It would appear from the proposed site plan that the majority of new housing is to be developed on the area of the site which is mostly Greenfield permeable surfaces. National guidance on the expected scale of reduction of peak discharge from existing brownfield sites is not clear. DEFRA's "Interim Code Of practice For Sustainable Drainage Systems" says it is preferable for Brownfield solutions to provide similar run-off characteristics to Greenfield development (6.2.8)

In addition to the above, the existing hard standing areas are largely uneven granular materials, which will retain a large proportion of surface water on site. I would also question whether some of the agricultural buildings are drained to a positive outfall.

Any new drainage design for the site should include surface water from vehicle parking and hard standing areas shall be passed through an oil interceptor of adequate capacity prior to its discharge to the watercourse.

Therefore for the reasons stated above, the surface water strategy for this site should be calculated at Greenfield rates of discharge via on site storage. The existing retained building drainage must also pass through the onsite attenuation system as part of the surface water discharge rate for the site in its entirety.

Outline surface water drainage details should be agreed in principle prior to any planning consent being granted.



Please call me on ext

Signed Mike Wickens

Date 10/02/14

DCECONME 14/00128/OUTMAJ

RETURN TO Planning Services
(when replying separately, please still return with this document)

Appendix B - Original Calculations replicated by EJSA.

Drainage Calculation

Project: Kingsley Farm
Date: 24 March 2014
Ref: 2014-4-2

EJS Associates
Consulting Engineers

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Existing Site:

Surface Water Discharge for 1 in 1 year Rainfall Return Period

Design Data:

| | |
|---|-----------|
| Site Location: | Harrogate |
| Rainfall Intensity I (l/s): | 50 |
| Impermeable Area A_i (m ²): | 11635 |
| Greenfield Area A_g (m ²): | 39450 |
| Total Site Area A_t (m ²): | 51085 |
| Routing Coefficient C_r : | 1 |
| Volumetric Run-off Coefficient C_v : | 1 |

Impermeable Area:

$$\begin{aligned}\text{Rate of Run-off } Q_i &= A_i \times I \times C_r \times C_v \times 2.78 \\ Q_i &= 161.73 \quad \text{l/s}\end{aligned}$$

Permeable Area:

Based on 5 l/s/ha discharge from the site Greenfield Area

$$Q_p = \frac{A_g \times 5}{10000} \quad Q_p = 19.725 \quad \text{l/s}$$

Results:

Surface Water Discharge from the Existing Site:

| | | | |
|--------------------|---------|---------------|-----|
| Impermeable Area = | $Q_i =$ | 161.73 | l/s |
| Permeable Area = | $Q_p =$ | 19.725 | l/s |
| Total (QE) = | | <u>181.45</u> | l/s |

Proposed Site:

SW Discharge for 1 in 1 year Rainfall Return Period = Existing - 30%

$$\text{Proposed Site Allowable Discharge} = Q_{EA} = \underline{\underline{127.02}} \quad \text{l/s}$$

Note: Surface water storage design is in accordance with the Wallingford Procedure -
Design and Analysis of Urban Drainage: Volume 1 Principles, Methods and Practice;
and Volume 4 Modified Rational Method.

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Drainage Calculation

Project: Kingsley Farm
Date: 24 March 2014
Ref: 2014-4-2

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Consulting Engineers

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Proposed Site:

Surface Water Attenuation at 1 in 100 year Event

Design Data:

| | |
|---|-----------|
| Site Location: | Harrogate |
| M5-60 Rainfall Ratio (mm): | 20 |
| 60 min Rainfall Ratio to 2 day rainfalls of 5 year return period r: | 0.35 |
| Impermeable Area A_i (m ²): | 12767 |
| Total Site Area A_t (m ²): | 51085 |
| Allowable Discharge Rate QE_A (l/s): | 127 |
| Allowance for Climate Change (%) = | 30 |

Results:

| Duration D | 15 | 30 | 60 | 120 | 240 | 360 | 600 | 1440 | 2880 |
|----------------------------------|--------|--------|--------|---------|---------|----------|----------|----------|-----------|
| Z1 | 0.64 | 0.79 | 1.00 | 1.20 | 1.44 | 1.63 | 1.85 | 2.35 | 2.81 |
| M5-D | 12.80 | 15.80 | 20.00 | 24.00 | 28.80 | 32.60 | 37.00 | 47.00 | 56.20 |
| Z2 | 1.94 | 2.00 | 2.03 | 2.01 | 1.98 | 1.95 | 1.92 | 1.86 | 1.79 |
| M100-D | 24.83 | 31.60 | 40.60 | 48.24 | 57.02 | 63.57 | 71.04 | 87.42 | 100.60 |
| i (mm/hr) | 99.33 | 63.20 | 40.60 | 24.12 | 14.26 | 10.60 | 7.10 | 3.64 | 2.10 |
| i+climate change % | 129.13 | 82.16 | 52.78 | 31.36 | 18.53 | 13.77 | 9.24 | 4.74 | 2.72 |
| QP (l/s) | 458.30 | 291.60 | 187.33 | 111.29 | 65.78 | 48.89 | 32.78 | 16.81 | 9.67 |
| Balancing Q | 331.30 | 164.60 | 60.33 | -15.71 | -61.22 | -78.11 | -94.22 | -110.19 | -117.33 |
| Storage Volume (m ³) | 298.17 | 296.29 | 217.18 | -113.12 | -881.61 | -1687.28 | -3392.00 | -9520.72 | -20274.63 |

Results:

Maximum Storage Volume for Proposed Site = 298.17 m³

Note: Surface water storage design is in accordance with the Wallingford Procedure -
Design and Analysis of Urban Drainage: Volume 1 Principles, Methods and Practice;
and Volume 4 Modified Rational Method.

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Appendix C - Revised Calculations by EJSA.

Drainage Calculation

Project: Kingsley Farm
Date: 3 April 2014
Ref: 2014-4-2

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Existing Site:

Surface Water Discharge for 1 in 1 year Rainfall Return Period

Design Data:

| | |
|---|-----------|
| Site Location: | Harrogate |
| Rainfall Intensity I (l/s): | 50 |
| Impermeable Area A_i (m ²): | 0 |
| Greenfield Area A_g (m ²): | 51085 |
| Total Site Area A_t (m ²): | 51085 |
| Routing Coefficient C_r : | 1 |
| Volumetric Run-off Coefficient C_v : | 1 |

Impermeable Area:

$$\text{Rate of Run-off } Q_i = A_i \times I \times C_r \times C_v \times 2.78$$
$$Q_i = 0.00 \quad \text{l/s}$$

Permeable Area:

Based on 5 l/s/ha discharge from the site Greenfield Area

$$Q_p = \frac{A_g \times 5}{10000} \quad Q_p = 25.5425 \quad \text{l/s}$$

Results:

Surface Water Discharge from the Existing Site:

| | | | |
|--------------------|---------|--------------|-----|
| Impermeable Area = | $Q_i =$ | 0.00 | l/s |
| Permeable Area = | $Q_p =$ | 25.54 | l/s |
| Total (QE) = | | <u>25.54</u> | l/s |

Proposed Site:

SW Discharge for 1 in 1 year Rainfall Return Period = Existing - 30%

$$\text{Proposed Site Allowable Discharge} = Q_{E_A} = \underline{\underline{17.88}} \quad \text{l/s}$$

Note: Surface water storage design is in accordance with the Wallingford Procedure -
Design and Analysis of Urban Drainage: Volume 1 Principles, Methods and Practice;
and Volume 4 Modified Rational Method.

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Drainage Calculation

Project: Kingsley Farm
Date: 3 April 2014
Ref: 2014-4-2

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Proposed Site:

Surface Water Attenuation at 1 in 100 year Event

Design Data:

| | |
|---|-----------|
| Site Location: | Harrogate |
| M5-60 Rainfall Ratio (mm): | 20 |
| 60 min Rainfall Ratio to 2 day rainfalls of 5 year return period r: | 0.35 |
| Impermeable Area A_i (m ²): | 12767 |
| Total Site Area A_t (m ²): | 51085 |
| Allowable Discharge Rate QE_A (l/s): | 17.88 |
| Allowance for Climate Change (%) = | 30 |

Results:

| Duration D | 15 | 30 | 60 | 120 | 240 | 360 | 600 | 1440 | 2880 |
|----------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|----------|
| Z1 | 0.64 | 0.79 | 1.00 | 1.20 | 1.44 | 1.63 | 1.85 | 2.35 | 2.81 |
| M5-D | 12.80 | 15.80 | 20.00 | 24.00 | 28.80 | 32.60 | 37.00 | 47.00 | 56.20 |
| Z2 | 1.94 | 2.00 | 2.03 | 2.01 | 1.98 | 1.95 | 1.92 | 1.86 | 1.79 |
| M100-D | 24.83 | 31.60 | 40.60 | 48.24 | 57.02 | 63.57 | 71.04 | 87.42 | 100.60 |
| i (mm/hr) | 99.33 | 63.20 | 40.60 | 24.12 | 14.26 | 10.60 | 7.10 | 3.64 | 2.10 |
| i+climate change % | 129.13 | 82.16 | 52.78 | 31.36 | 18.53 | 13.77 | 9.24 | 4.74 | 2.72 |
| QP (l/s) | 458.30 | 291.60 | 187.33 | 111.29 | 65.78 | 48.89 | 32.78 | 16.81 | 9.67 |
| Balancing Q | 440.42 | 273.72 | 169.45 | 93.41 | 47.90 | 31.01 | 14.90 | -1.07 | -8.21 |
| Storage Volume (m ³) | 396.38 | 492.70 | 610.01 | 672.55 | 689.72 | 669.71 | 536.32 | -92.75 | -1418.69 |

Results:

Maximum Storage Volume for Proposed Site = 689.72 m³

Note: Surface water storage design is in accordance with the Wallingford Procedure -
Design and Analysis of Urban Drainage: Volume 1 Principles, Methods and Practice;
and Volume 4 Modified Rational Method.

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