clive onions
consulting civil engineer

Blue Sky Botanics Ltd

Castle Farm, Upton Bishop, Ross-on-Wye, Herefordshire, HR9 7UW

Addendum to Flood Risk Assessment and Drainage Strategy

Planning Application 181523

Response to drainage comments made by Balfour Beatty Living Places on behalf of Herefordshire County Council

12th July 2018 V1

Contents

Appendices

Report prepared by Sam Rice – BSc (Hons)
Report approved by Clive Onions - BSc, CEng, FICE, FCIWEM, MIStructE, MCIHT
Process Treatment information from MS2A

Version history

Version	Date	Prepared by	Approved by	Comment
V1	12.07.18	CO	CO	Issued for approval

Issue history

Version	Date	Issued to	Method
V1	12.07.18	Wye Planning, Blue Sky Botanics	Email pdf

1. Introduction

Blue Sky Botanics is a leading manufacturer of natural botanical extracts and is based at its 200 acre award winning Organic Farm in Upton Bishop. The company is a member of the Union for Ethical BioTrade and is passionate about the importance of green processing methods, protecting the environment and supporting biodiversity in everything they do.

Blue Sky Botanics wishes to change the use of a grain store to a new production facility, construct an extension to the existing building to provide additional offices and R&D facilities, construct additional car parking and install a process waste water treatment plant at Castle Farm, Upton Bishop. A plannign application has been submitted accompanied by a Flood Risk Assessment and Drainage Strategy.

The existing site includes two ponds which intercept surface water runoff from the farmland, and a reed bed and willow bed which provide further polishing treatment of effluent from a well-maintained modern domestic sewage treatment plant for domestic flows, prior to discharge to the receiving watercourse. This shows the scale of effort which Blue Sky Botanics provides to protect their environment and the wider environment.

Balfour Beatty Living Places (BBLP) has commented on the Flood Risk Assessment and Drainage Strategy (FRADS) submitted by Clive Onions Ltd, confirming that it does not object to the proposed development and recommended suitably worded planning conditions.

This Addendum responds to the comments made by BBLP .

For completeness the BBPL response is included in Appendix 1, and the queries raised are as follows;

- Details required for the management of runoff from proposed roof in the 1 in 100 year + 40% climate change event
- Purpose of willow bed requested
- Clarification of discharge route of effluent from domestic treatment plant required
- Confirmation that the proposals are compliant with the Binding Rules
- Clarification of flow controls between ponds, beds and the watercourse

These points are answered in turn below.

This response should be read in conjunction with the FRADS submitted with the planning application, the pre-application submission which was made and the Drainage Officer's response which informed the FRADS (Ref: 172966/CE).

2. Management of Runoff

The Council has requested details of the runoff from the proposed extension.

The roof area has been provided by the Architect at 183m2.

The 1 in 30 year flow from the 183m2 roof is about 3.8 l/s. The capacity of a 100mm drain at a gradient of 1 in 60 is about 7.5 l/s, showing that this pipe size is adequate for draining the roof in normal and extreme events.

It has been decided to control the runoff rate from the roof to the lowest practical level of 1 l/s, using a *JFC Civils* flow control device (approved by water companies) which mobilises attenuation in a conventional crate-type tank.

Calculations have been prepared (see Appendix 2) which show that the attenuation volume required would be 4m3 to manage the 1 in 100 year event with 40% additional climate change allowance.

It is proposed to install a shallow crate system (5m x 3m x 0.3m deep) within the landscaped area to the south of Pond 1 which will be grassed over. The floor level of the building is 70.0m AOD and the outlet from Pond 1 is at 68.45m AOD, thus providing plenty of fall for effective drainage.

The tank will have a base level of 69.1m AOD, and the outlet will fall to discharge into the pond through a proprietary headwall at 69.0m AOD, 550mm above the outlet pipe from the pond.

The above description shows that the rate of runoff from the roof will be attenuated to the minimum controllable flow, with adequate falls etc, which can manage flows safely up to and beyond the 1 in 100 year event with climate change allowance. The interception of silt and maintenance is described in the FRADS.

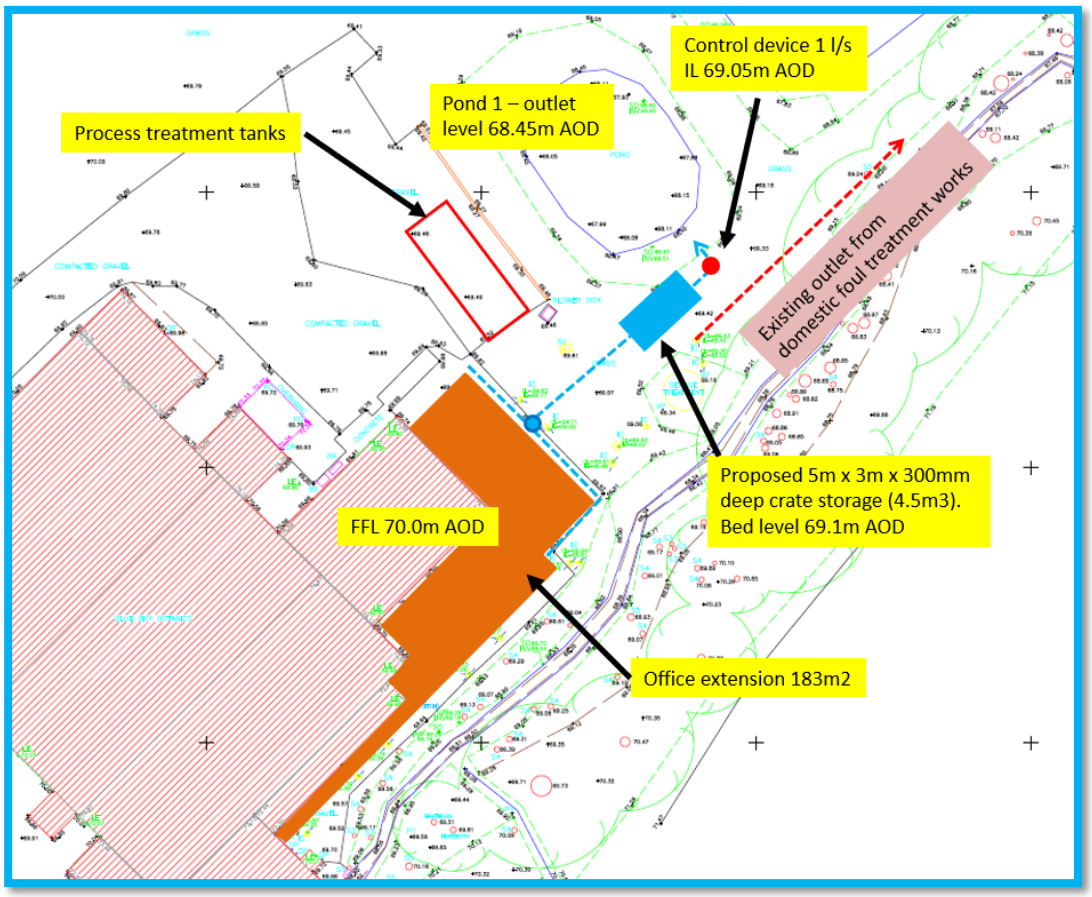

Fig 1 Schematic of surface water drainage system with relevant levels and sizes of features

3. Purpose of Willow Bed

The purpose of a willow bed is to provide a further treatment process after water has been treated by a treatment works and reed bed processes.

The willow grows quickly and transmits water by evaporation and evapotranspiration, thus reducing the total volume of runoff. Willows also provide a further opportunity to neutralise wastewater.

It is fair to say that the willow bed in this situation could be described as a luxury – it is not a requirement of the system, but results from the Company's passion for the environment. It provides varied habitat, further attenuates the foul flows, delayed already by the reed bed, and results in reduced occasions when discharges of the treated domestic flow from the offices enters the watercourse.

It therefore brings many virtues in terms of water quality entering the environment and water flow entering the watercourse, bringing betterment downstream.

4. Route of Treated Domestic Effluent

Domestic effluent from the kitchen and toilet facilities in the offices is drained by gravity to a package treatment works.

The treated effluent is then drained by gravity to the Reed Bed, then to the Willow Bed, and if there remains any flow which is not dispersed by evaporation and evapotranspiration the residual clean water runs into the watercourse.

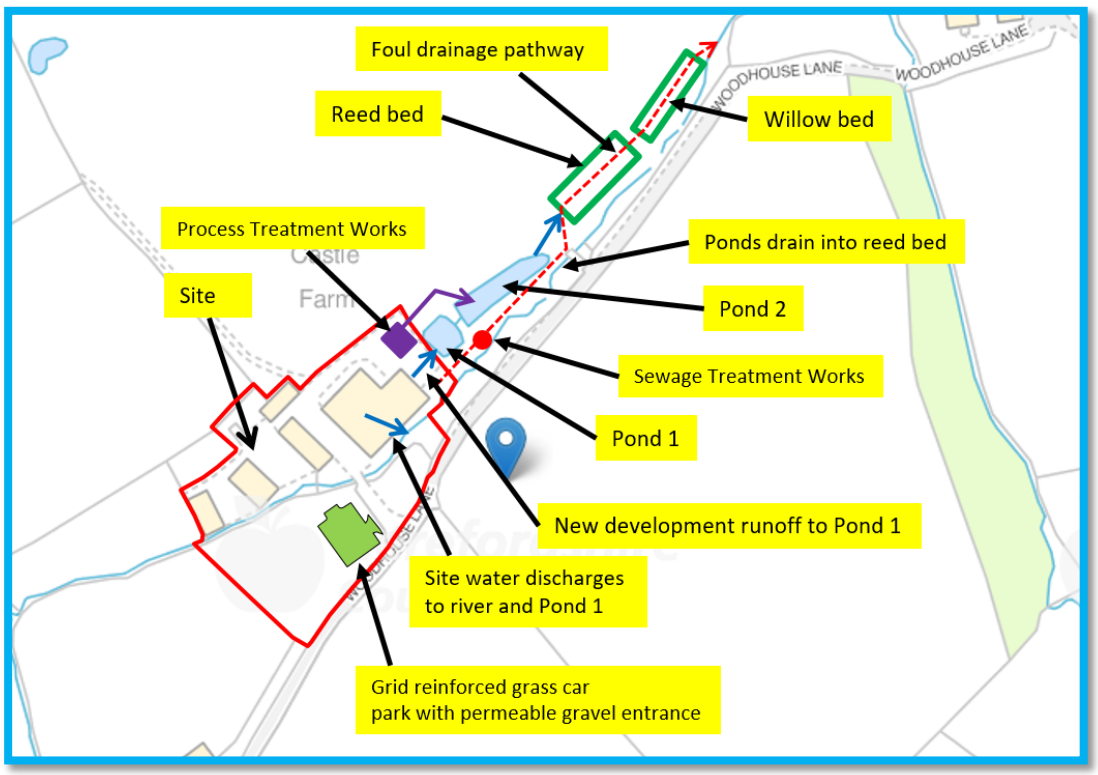

Fig 2 Fig 16 from FRADS showing route of domestic waste effluent in red broken line passing Ponds 1 and 2 in a pipe and then passing through the Reed Bed and Willow Bed before any residual flow is discharged into the watercourse.

5. Binding Rules related to Treatment Works

The capacity of the existing treatment works is described in the FRADS which shows that there is ample capacity in the existing works for the small increase in staff associated with the proposed development, giving a total flow of 1.2m3/day.

The applicable Binding Rules are described in the DEFRA website at the location given below. The flow is well below the maximum of 5m3/day and all the criteria set down in the rules are satisfied.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/397173/ssd-general-binding-rules.pdf

6. Flow Controls Between Ponds and Beds

There are no direct flows discharged into the ponds. The ponds receive natural rainfall and runoff from the adjacent farmland to the west, which is intercepted before it would have naturally entered the watercourse to the east.

There are therefore no controls between the ponds, other than the 100mm pipes between Ponds 1 and 2, and 2 and the Reed Bed, and the Reed Bed and Willow Bed, and then into the watercourse.

The ponds are not fulfilling any design attenuation function, so if for any reason the pipe flow is exceeded and the Ponds overflow, this is a natural process which can only serve to attenuate what would naturally have entered the watercourse.

Farmland runoff which enters the Reed Bed and Willow Bed will merely dilute the treated effluent and result in a positive effect.

The outlet pipe from the system into the watercourse enters a swale. At the time of inspection there was no flow from the system into the watercourse, and the swale included leaves etc illustrating very low usage. This confirms the beneficial effect of the virtues delivered by the Reed and Willow Beds through their natural processes.

7. Conclusions & Recommendations

Blue Sky Botanics is an ethical company which places fundamental importance on protecting the environment and supporting biodiversity in everything they do.

They have adopted a structured approach to planning an expansion of their facilities, have gone through a pre-application process, and used the response to inform their planning application which has been submitted accompanied by a Flood Risk Assessment and Drainage Strategy (FRADS).

The Council's Drainage Consultants confirmed that they did not object to the proposed development as described in the FRADS, and responded recommending that suitably worded planning conditions are included related to surface water drainage flow management and the method of foul drainage treatment.

This Addendum responds to the comments made in the Council's response and shows that the development will be safe for its lifetime and does not adversely affect the watercourse.

Appendix 1

From: Blair, Ruth [mailto:Ruth.Blair@balfourbeatty.com]
Sent: 04 June 2018 15:16
To: Brace, Carl
Cc: Hockenhull, Joel
Subject: 181523 - Castle Farm, Upton Bishop, Ross-On-Wye, HR9 7UW comments

Hi Carl,

Please find attached our response for application 181523

If you have any further questions, please do not hesitate to contact me or Joel

Regards,

Ruth Blair BSc (Hons)
Graduate Civil Engineer | Balfour Beatty Living Places

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Date of Response: 4 June 2018 181523-Rev1.0

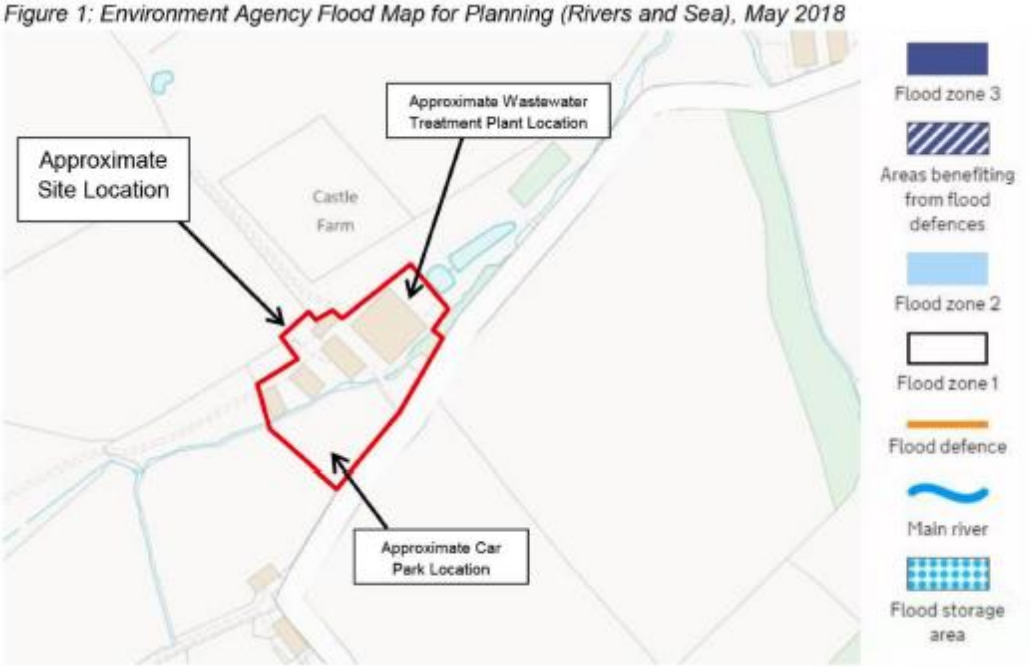
SITE:	Castle Farm, Upton Bishop, Ross-On-Wye, Herefordshire HR9 7UW
TYPE:	Planning Permission
DESCRIPTION:	Proposed extension and expansion of existing B1 facility comprising of:|1) Change of use of grain store to new production facility|2) Extension to provide additional office space and research and development facilities|3) Additional car parking provision|4) Production waters treatment plant
APPLICATION NO:	181523
GRID REFERENCE:	OS 365166, 228795
APPLICANT:	Mr & Mrs Lambe
AGENT:	Mrs Vicky Simpson

Our knowledge of the development proposals has been obtained from the following sources:

- Application Form for Planning Permission;
- Location Plan (Ref: 510-PL05);
- Proposed Car Park (Ref: 510-PL04);
- Proposed Floor Plans (Ref: 510-PL01);
- Treatment Plant Plans (Ref: 510-PL03);
- Topographical Survey (Ref: MG1222_S1-4);
- Flood Risk Assessment and Drainage Strategy (dated 24th April 2018).

Site Location

Figure 1: Environment Agency Flood Map for Planning (Rivers and Sea), May 2018



Overview of the Proposal

The Applicant proposes the following:

- Change of use of grain store to new production facility (not commented on as this is not relevant to drainage and/or flood risk)
- Extension to provide additional offices and Research and development facilities (includes the addition of WCs)
- Additional car parking provision (14 additional spaces – surfaced with grasscrete – no impact on surface water runoff)
- Waste water treatment plant (proposing 2 above ground tanks and third tank to be buried underground – removes the need for overhead pipework bridge).

Date of Response: 4 June 2018 181523-Rev1.0

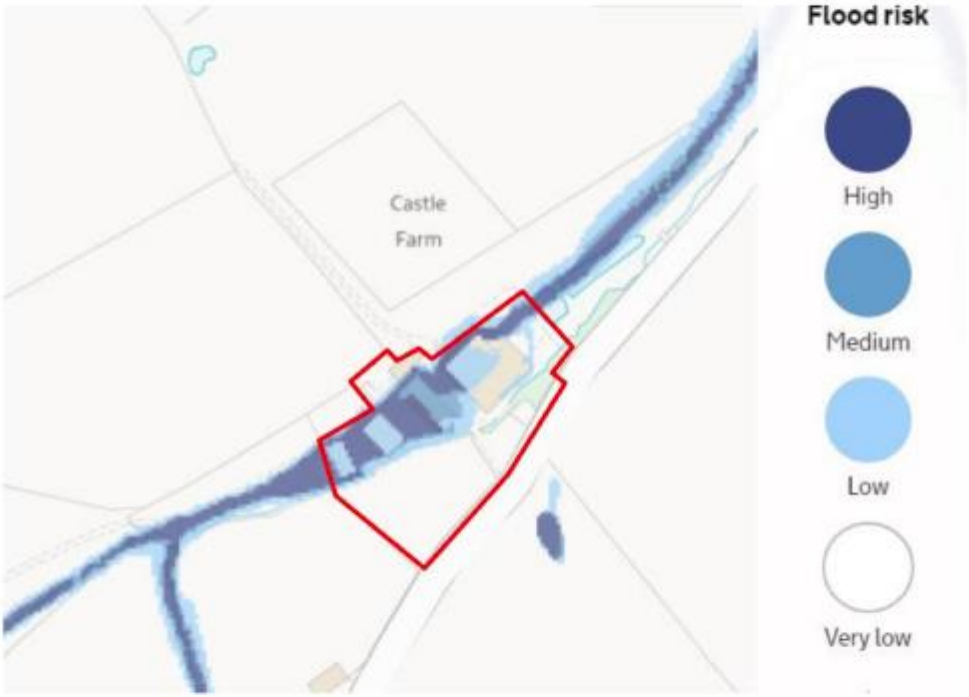
The site covers an area of approx. 0.59ha. An ordinary watercourse flows through the site. The topography of the site is relatively flat.

Flood Risk

Review of the Environment Agency's Flood Map for Planning (Figure 1) indicates that the site is located within the low risk Flood Zone 1.

The planning permission has been supported by a Flood Risk Assessment (FRA). The FRA addresses the Risk of Surface Water Flooding. The topographical survey demonstrates that the land falls towards the south of the site to the watercourse channel.

Figure 2: Environment Agency Surface Water Flood Map



Other Considerations and Sources of Flood Risk

The EA Flood Map for Planning does not consider watercourses with small catchments and therefore it may happen that the site is identified as located in Flood Zone 1 on the EA map but there may be a risk of fluvial flooding from the watercourse located along the south-western boundary of the proposed development site.

Surface Water Drainage

The use of grasscrete will not impact on surface water runoff or flooding, so the proposals for the car parking are acceptable.

The proposed extension area (183m^2) and the concrete areas for the treatment plant will be directed into pond 1 to follow the existing 'treatment train'.

Date of Response: 4 June 2018 181523-Rev1.0

The Applicant should provide further information in regards to the restriction devices used between ponds, beds and the watercourse. The drainage strategy must demonstrate that the ponds hold sufficient capacity to cope with the 1 in 100 year + 40% event. It appears that the ponds are often at full capacity. It may be necessary to raise the banks of the ponds to provide additional storage to ensure that there is no increased risk of flooding to the site or downstream of the site as a result of development between the 1 in 1 year event and up to the 1 in 100 year event and allowing for the potential effects of climate change.

The drainage system should be designed to ensure no flooding from the drainage system (which can include on-the-ground conveyance features) in all events up to the 1 in 30 year event. Surface water should either be managed within the site boundary or directed to an area of low vulnerability. Guidance for managing extreme events can be found within CIRIA C635: Designing for exceedance in urban drainage: Good practice.

Foul Water Drainage

The site has a treatment train of 2 ponds, a reed bed, willow bed (the Applicant should clarify what the purpose of a Willow Bed is) and final outfall to the watercourse.

Section 7. of the FRA states that the effluent from the package treatment plant is directed to the reed bed and then to the willow bed (this should be clarified). This is not reflected in the drawing on page 14 as it is shown to enter pond 2 prior to the reed bed. This should be clarified.

The Applicant should demonstrate that the proposals are compliant with the general Binding Rules and are in accordance with the Building Regulations Part H Drainage and Waste Disposal.

Other

In principle, we do not object to the proposed development, however we recommend that the following information is provided within suitably worded planning conditions:

- A surface water drainage strategy with supporting calculations to demonstrate that the ponds have sufficient capacity to store and attenuate the surface water runoff and effluent between the 1 in 1 and 1 in 100 year + climate change event. This strategy should also include clarification of the flow controls between ponds, beds and the watercourse;
- Clarification on the method of disposal of the treated effluent (as mentioned in the Foul Water Drainage section).

Appendix 2 Attenuation Calculations

MasterDrain SW

Civil Engineering Services

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Nailsea, Nr Bristol
BS48 1BY
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email: paulsouthcott2@aol.com

Job No.	Sheet no.	Date	By	Checked	Reviewed
17217	1	29/06/18	PJS		

Project: CASTLE FARM EXT UPTON BISHOP

Title: Peak flow storage calcs for Fownhope

Data:-

FSR Hydrology:-

Location	= Fownhope	Grid reference	= SO5734
M5-60 (mm)	= 18.9	r	= 0.38
Soil index	= 0.30	SAAR (mm/yr)	= 700
Return period	= 100	WRAP	= 2
UCWI	= 74.5	Climate change	= 40

i) Very permeable soils with shallow ground water;
ii) Permeable soils over rock or fragipan, commonly on slopes in western Britain associated with smaller areas of less permeable wet soils; The layer is low in organic matter, mottled and (fragipan – a natural subsurface horizon having a higher bulk density than the solum above. Seemingly cemented when dry but showing moderate to weak brittleness when moist. Slowly or very slowly permeable to water. It is found in profiles of either cultivated or virgin soils but not in calcareous material).
iii) Moderately permeable soils, some with slowly permeable subsoils.

Runoff factor (RF) = 76.0, calculated from:-

Runoff factor = (0.829*PIMP)+(25*SOIL)+(0.078*UCWI)-20.7
where
PIMP = Impervious Area*100/(Impervious Area+Pervious Area)
UCWI = Calculated value for Wetness Index

Design data:-

Imperv. area	= 183 m²	Pervious area	= 0 m²
Total area (TA)	= 183 m²	Equiv area	= 139 m² (TA x RF).
Allowed discharge rate	= 1.000 l/s	Areal reduction factor	= 0.996
Additional flow	= 0.00 l/s	Climate change factor	= 40

Calculated data:-

Time to max	= 36.0 mins	Calculated storage volume	= 4.0 m³
Rainfall at max	= 75.13 mm/hr	Allowed discharge rate	= 1.000 l/s
Pipeline storage	= 0.0 m³	Available MH storage	= 0.0 m³
Offline storage	= 0.0 m³		

Fixed 6 hour data:-

Rainfall event	= 6 hours	Calculated storage volume	= 0.0 m³
Rainfall rate	= 14.00 mm/hr	Allowed discharge rate	= 1.000 l/s

Rainfall intensities calculated using the Wallingford Procedure

Storage lengths for initial calculation (x 1.1, 1.2, 1.3 or 1.5 as above if required) :-

Diam	Len	Diam	Len	Ovoid	Len	Box culvert	Len
100	512.8	1125	4.1	400 x 600	22.4	500 x 500	16.1
150	227.9	1200	3.6	600 x 900	9.7	500 x 750	10.7
225	101.3	1275	3.2	800 x 1200	5.5	500 x 1000	8.1
300	57.0	1350	2.8			750 x 1000	5.4
375	36.5	1425	2.5			750 x 1200	4.5
450	25.3	1500	2.3			750 x 1500	3.6
525	18.6	1575	2.1			1000 x 1000	4.0
600	14.2	1650	1.9			1000 x 1200	3.4
675	11.3	1725	1.7			1000 x 1500	2.7
750	9.1	1800	1.6			1000 x 1800	2.2
825	7.5	1875	1.5			1000 x 2000	2.0
900	6.3	1950	1.3			1500 x 1500	1.8
975	5.4	2025	1.3			1500 x 1800	1.5
1050	4.7	2100	1.2			1500 x 2000	1.3

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MasterDrain SW

Job No.	Sheet no.	Date	By	Checked	Reviewed
17217	2	29/06/18	PJS		

Project: CASTLE FARM EXT UPTON BISHOP

Title: Peak flow storage calcs for Fownhope

Data:-

Time (mins)	Rain mm/hr	Inflow (m3)	Outflow (m3)	Balance (m3)
10	157.0	3.594	0.600	2.994
20	108.0	4.947	1.200	3.747
30	84.0	5.794	1.800	3.994
40	70.0	6.417	2.400	4.017
50	60.0	6.913	3.000	3.913
60	53.0	7.327	3.600	3.727
70	48.0	7.682	4.200	3.482
80	44.0	7.993	4.800	3.193
90	40.0	8.271	5.400	2.871
100	37.0	8.521	6.000	2.521
110	35.0	8.749	6.600	2.149
120	33.0	8.958	7.200	1.758
130	31.0	9.151	7.800	1.351
140	29.0	9.330	8.400	0.930
150	28.0	9.498	9.000	0.498
160	26.0	9.654	9.600	0.054
170	25.0	9.802	10.200	0.000
180	24.0	9.941	10.800	0.000
190	23.0	10.072	11.400	0.000
200	22.0	10.197	12.000	0.000
210	21.0	10.316	12.600	0.000
220	21.0	10.428	13.200	0.000
230	20.0	10.536	13.800	0.000
240	19.0	10.638	14.400	0.000
250	19.0	10.737	15.000	0.000
260	18.0	10.831	15.600	0.000
270	18.0	10.921	16.200	0.000
280	17.0	11.008	16.800	0.000
290	17.0	11.091	17.400	0.000
300	16.0	11.171	18.000	0.000
310	16.0	11.248	18.600	0.000
320	15.0	11.328	19.200	0.000
330	15.0	11.407	19.800	0.000
340	15.0	11.484	20.400	0.000
350	14.0	11.559	21.000	0.000
360	14.0	11.632	21.600	0.000
370	14.0	11.704	22.200	0.000
380	14.0	11.773	22.800	0.000
390	13.0	11.842	23.400	0.000
400	13.0	11.909	24.000	0.000
410	13.0	11.974	24.600	0.000
420	13.0	12.039	25.200	0.000
430	12.0	12.101	25.800	0.000
440	12.0	12.163	26.400	0.000
450	12.0	12.224	27.000	0.000
460	12.0	12.283	27.600	0.000
470	11.0	12.341	28.200	0.000
480	11.0	12.399	28.800	0.000
490	11.0	12.455	29.400	0.000
500	11.0	12.510	30.000	0.000
510	11.0	12.565	30.600	0.000
520	11.0	12.618	31.200	0.000
530	10.0	12.671	31.800	0.000
540	10.0	12.723	32.400	0.000
550	10.0	12.774	33.000	0.000
560	10.0	12.824	33.600	0.000
570	10.0	12.873	34.200	0.000
580	10.0	12.922	34.800	0.000
590	10.0	12.970	35.400	0.000
600	9.0	13.018	36.000	0.000

Storage volume (m^3) = 4.0 m^3