Title: FRA & Drainage Strategy Update

Date: 30th May 2025

1.0 Introduction

1.1 Jubb has been commissioned by Hallam Land Management Ltd to provide flood risk and drainage advice in relation to the proposed development of land to the west of the A10 and south of the A507 in Buntingford, Hertfordshire.

1.2 A planning application (Reference: 3/24/1255/OUT) was submitted in May 2024 for the following:

"Outline planning application for development of employment land (flexible use B2, B8, E(c) and E(g)), informal open space, associated works and infrastructure including new access from A507, within all matters reserved except for access."

1.3 A Flood Risk Assessment and Drainage Strategy (FRADS(S)-01_v3), dated 14th June 2024, was prepared by Jubb and submitted as part of the planning application.

1.4 Following the submission, Hertfordshire County Council (HCC) in its role as the Lead Local Flood Authority (LLFA) provided consultation responses in relation to the submitted flood risk and drainage information.

1.5 The proposals have been amended to reflect the comments received from the LLFA, with the latest response from the LLFA (dated 16th December 2024) confirming they have no objection to the application subject to conditions.

1.6 This technical note, which should be read in conjunction with FRADS(S)-01_v4, provides a summary of the updates and amendments made to the proposals in relation to flood risk and drainage matters since the original planning application was submitted.

2.0 Proposed Drainage Strategy

2.1 Principals & Outfall Arrangements

2.1.1 The overall principals of the proposed surface water drainage strategy have not changed since the original application.

2.1.2 It is proposed that generated surface water runoff from the development will be discharged at a restricted pre-development greenfield rate to an existing drainage ditch within the site, with flows attenuated onsite through the use of SuDS features.

2.1.3 The proposed drainage strategy aims to mimic the existing drainage regime of the greenfield site, with the design reflecting the existing greenfield nature and catchments of the site.

2.2 Downstream Connectivity

2.2.1 The existing site falls within the catchment of the River Rib, with flows from the site conveyed to the east and ultimately discharging to the River Rib as it runs through Buntingford, approximately 700m to the east of the site.

2.2.2 The topography of the existing field falls steadily in an easterly direction, with the majority of land falling towards the low point located in the southeastern corner of the site.

2.2.3 An existing drainage ditch runs along the eastern and southeastern site boundary, before being culverted beneath the A10 in the southeastern corner of the site.

2.2.4 The culvert conveys flows offsite beneath the A10 into an existing drainage ditch which continues to convey flows to the east before it joins the public surface water sewer network to the south of Baldock Road near Monks Walk. This network then continues in an easterly direction, where flows are ultimately discharged to the River Rib.

2.2.5 A revised drainage strategy plan, along with photographs of the existing ditch and culvert, were provided to establish the presence of the existing ditch/ outfall location and the offsite connectivity. A copy of the revised plan and photographs are included in **Appendix A & B** respectively.

2.3 Calculations

2.3.1 The drainage strategy proposes to discharge flows from the development at a restricted greenfield Qbar rate of 15.7 l/s, based on the developable area for all storm events up to the 1 in 100-year plus climate change event.

2.3.2 The proposed discharge rate, including an allowance for the area of the site which currently discharges to the ditch but will remain undeveloped, has been compared to the existing greenfield catchment which discharges to the existing ditch in the southeastern corner of the site. The proposed drainage strategy drawing has been revised to show the existing catchment which currently drains to the existing ditch in the southeastern corner of the site, a copy of the drawing is included in **Appendix A**.

2.3.3 To ensure that the total development discharge to the ditch remains less than the current existing greenfield catchment draining to the ditch for all return periods, the proposed hydrobrake unit has been changed to have a more linear discharge profile. The result of this change means that the discharge rate for the critical 100year +40% climate change event still does not exceed the greenfield Qbar rate, with the discharge for the remaining return periods shown to be less than the Qbar rate.

2.3.4 Consequently, the max outflow from the development parcel has been sufficiently reduced so that when combined with the remaining greenfield catchment discharging to the ditch, the total discharge is less than the existing greenfield catchment for all storm events.

2.3.5 The proposed discharge rates are well below the pipe capacity of the culvert beneath the A10. It has therefore been demonstrated that the A10 culvert has sufficient capacity to accommodate flows from the development including the remaining greenfield catchment.

2.3.6 During larger rainfall events, the discharge from the development is significantly lower than the existing greenfield rate. Consequently, the proposed development provides significant betterment compared to the existing greenfield scenario during these events.

2.3.7 It is therefore considered that the existing ditch and culvert have sufficient capacity to accommodate the development proposals, with the proposals providing betterment during a large number of storm events and therefore does not increase the risk of flooding downstream. Capacity calculations for the existing drainage ditch and A10 culvert are included in **Appendix C**.

2.3.8 The proposed drainage calculations have been revised with the revise hydrobrake arrangement and CV values set equal to 1 for the summer and winter events. On this basis, restricting the offsite surface water discharge rate to Qbar, an estimated storage volume of 3,200m^3 is required to accommodate the 1 in 100-year plus 40% climate change scenario.

2.3.9 A copy of the updated drainage calculations is included in **Appendix D**.

2.4 SuDS

2.4.1 It is proposed to incorporate a variety of SuDS features as part of the site wide drainage strategy, with additional features such as permeable paving, raingardens and swales etc to supplement the attenuation basins.

2.4.2 The operation and maintenance requirements for the proposed SuDS features have been considered based on Chapter 32 of Ciria C753. Section 8 of the FRA (FRADS(S)-01_v4) includes further details on the specific maintenance activities relating to each drainage component

Appendix A: Proposed Drainage Strategy Plan

N

INDICATIVE NORTH

Drainage requirements for proposed employment areas based on an assumed percentage of impermeable area
Additional on-plot attenuation could be provided if necessary - subject to detail design.

(A)
Existing catchment which drains to existing ditch on south-east boundary

Proposed Basin
- Attenuation Storage: 3200m^3 (As shown on plan)
- Depth: 1.2m with 0.3m Freeboard
- Size, shape & position subject to detailed design

Drainage ditch connection to existing Thames Water public sewer

Drainage ditch runs to the rear of Longmead properties

Existing ditch culverted beneath the A10

Proposed outfall to existing ditch

(B)
Existing offsite catchment which drains to existing ditch on south-east boundary

Outfall to River Rib

Legend

- Proposed Attenuation Basin with Associated Grading (1 in 100yr + 40% climate change)
- Proposed Foul Pumping Station
- Existing Ordinary Watercourse Corridor
- Flood Zone 2
- Flood Zone 3
- Existing SW Sewer
- Existing Foul Water Sewer
- Existing Drainage Ditch
- Off site Drainage Ditch
- Environment Agency Main River
- (A) Existing Drainage Ditch Catchment - Within Site
- (B) Existing Drainage Ditch Catchment - Beyond Site

Notes:
1. Do not scale from this drawing.
2. The location of existing sewers and other features are shown indicatively based on utility companies asset plans. The location and details of any existing apparatus/features should be further investigated prior to commencement of works onsite.
3. Fluvial flood zones and surface water flood risk zones shown based on EA flood maps. These zones are subject to change following further investigation of EA flood data.
4. No detailed ground investigation information data is available for the site.
5. BGS data shows the site is underlain with Chalk of the Lewes Nodular Chalk Formation and Seaford Chalk Formation, which may be suitable for infiltration. Full infiltration testing in accordance with BRE Digest 365 guidance is required onsite to check infiltration feasibility.
6. If infiltration is found not to be a viable option, the preferred drainage strategy for the development is to discharge to the existing watercourses/ public sewer within the site and surrounding area, subject to approval from the LLFA, with surface water run-off from the development restricted to a pre-development greenfield Qbar rate.
7. The indicative attenuation basin shown has been sized to contain the 1 in 100 year including 40% CC allowance event.
8. The proposed basins are shown indicatively with grading shown tying into existing levels. The size, shape and position is subject to detail design.
9. An indicative overview of the drainage strategy is shown based on currently available information. This is subject to change and further assessment as the site is taken forward and more detailed information becomes available.
10. There is a considerable level difference in parts of the site, proposed basins have been shown to try to reflect the existing topography. However, significant earthworks may be required in the construction of the basins.
11. Due to the existing topography of the site, it is anticipated that foul flows will be discharged to the existing foul sewer network through a gravity connection.
12. For the attenuation option, it is anticipated that surface flows from the development will be conveyed to a suitable point of connection to the existing public sewer network or a local watercourse located within close proximity to the site. This is subject to approval with Thames Water/ LLFA.

Rev	Date	Description	By	Apvd
P6	21:11:24	Revised hydrobrake change	LE	LE
P5	15:10:24	Further info on ditch catchment	LE	LE
P4	28.08.24	Updated to LLFA comments	RJ	LE
P3	12.06.24	Updated site boundary	LE	LE
P2	26.04.24	Updated site boundary	LE	LE
P1	15.02.24	Preliminary Issue	MD	LE

PROJECT:
LAND SOUTH OF BALDOCK ROAD, BUNTINGFORD

TITLE:
PRELIMINARY DRAINAGE LAYOUT

CLIENT:
HALLAM LAND MANAGEMENT

SCALE@A1:
1:2000

PROJECT REF:
23161

DRAWING No: SK-C-008

REV: P6

Revision Referencing
P = Preliminary A = Approval T = Tender C = Construction

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Appendix B: Drainage Ditch Photographs





Appendix C: Capacity Calculations

Greenfield Comparison Calculations

Existing Part of Site Discharging to Ditch: (Area A on drainage plan)	5.7 Ha	Note: The total area of the development proposals is larger than the existing area discharging to the ditch due to the full extents of the development parcel being discharged to the existing ditch. Currently some of the development parcel falls within an area of the site that does not discharge to the ditch.
Development Proposals		
Development Parcel:	4.6 Ha	
Remaining Greenfield Area of Ex. Ditch Catchment:	2.4 Ha	

Discharge Rate Comparison:

	Catchment				
Discharge Rate (L/s)	**Ex Ditch Catchment (Area A)**	**Max Outflow Development Parcel Only**	**Remaining Greenfield Area of Ex. Ditch Catchment**	**Development Parcel + Remaining Greenfield Catchment**	**Difference**
Q1	16.49	8.1	6.94	15.04	-1.45
Qbar	19.4	8.6	8.17	16.77	-2.63
Q30	44.63	11.6	18.79	30.39	-14.24
Q100	61.9	12.9	26.06	38.96	-22.94
Q100+40%cc	86.66	15.7	36.48	52.184	-34.48
Q200	72.57	13.9	30.56	44.46	-28.11

Conclusions:

This comparison shows that for all rainfall events, the discharge from the developed site is less than the existing greenfield discharge from the proportion of the site which discharges to the ditch, with significant betterment provided in the larger rainfall events compared to the existing greenfield scenario.
The calculations below show that the proposed post development discharge from the site is well below the capacity of the existing culvert for all storm events.

A10 Capacity Calculations

	Discharge Rate (l/s)					
Catchment Description	Q1	Qbar	Q30	Q100	Q100+40% CC	Q200
Offsite greenfield catchment (Area B)	12.59	14.81	34.06	47.24	66.136	55.38
Remaining onsite greenfield catchment	6.94	8.17	18.79	26.06	36.484	30.56
Development discharge	8.1	8.6	11.6	12.9	15.7	13.9
Total	**27.63**	**31.58**	**64.45**	**86.2**	**118.32**	**99.84**
Culvert capacity (Based on 2x 300mm Dia. Pipes @1:30 Gradient)	411.2	411.2	411.2	411.2	411.2	411.2
Capacity Check	ok	ok	ok	ok	ok	ok

Conclusions:

It can be seen from the table above that the existing culvert has sufficient capacity to accommodate the flows from the greenfield catchment and development parcel.

Appendix D: Proposed Attenuation Calculations

Project:	Date: 18/07/2024		
	Designed by:	Checked by:	Approved By:
Report Details: Type: Inflows Storm Phase: Phase	Company Address:		

Pond - TAD 1

Type : Catchment Area

Area (ha)	3.68

Dynamic Sizing

Runoff Method	Time Area Diagram
Summer Volumetric Runoff Coefficient	1.000
Winter Volumetric Runoff Coefficient	1.000
Percentage Impervious (%)	100

Time (mins)	Area (ha)
4	1.00
8	1.00
12	1.68

Project:	Date: 18/07/2024		
	Designed by:	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address:		

Pond Type : Pond

Dimensions

Exceedance Level (m)	1.500
Depth (m)	1.500
Base Level (m)	0.000
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	0.00
Total Volume (m³)	4800.000

Depth (m)	Area (m²)	Volume (m³)
0.000	3200.00	0.000
1.000	3200.00	3200.000

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Pond - TAD 1
Bypass Destination	(None)
Capacity Type	No Restriction

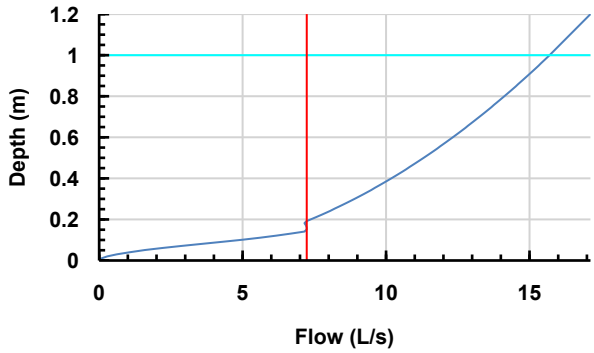
Outlets

Outlet

Outgoing Connection	(None)
Outlet Type	Hydro-Brake®

Invert Level (m)	0.000
Design Depth (m)	1.000
Design Flow (L/s)	15.7
Objective	Linear Discharge Profile
Application	Surface Water Only
Sump Available	☑

Unit Reference	SCU-0125-1570-1000-1570



Advanced

Perimeter	Circular
Length (m)	50.000
Friction Scheme	Manning's n
n	0.04

Project:	Date: 18/07/2024		
	Designed by:	Checked by:	Approved By:
Report Title: Rainfall Analysis Criteria	Company Address:		

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	0
Perform No Discharge Analysis	☐

Rainfall

Rainfall Details FEH

Type: FEH

Site Location	GB 536400 228400 TL 36400 28400
Rainfall Version	2013
Data Type	Catchment
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
30.0	0.000
100.0	40.000
2.0	0.000
200.0	0.000
100.0	0.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
180	360
240	480
360	720
480	960
600	1200
720	1440
960	1920
1440	2880
2160	4320
2880	5760
4320	8640
5760	11520

Project:	Date: 18/07/2024		
	Designed by:	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address:		

Rainfall Details FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Pond	Rainfall Details FEH: 100 years: +40 %: 960 mins: Winter	0.999	0.998	0.999	0.998	164.9	3192.568	0.000	0.000	15.7	1410.140	33.488	OK