Ultima Furniture Systems Ltd

Proposed Industrial Extension
Parksprings Industrial Estate
Grimethorpe
Barnsley

Drainage Assessment

Prepared by EWE Associates Ltd
Draft Rev0 December 2021

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CLIENT DETAILS

Ultima Furniture Systems Ltd
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Pontefract
South Kirby
WF9 3NR

FAO Mr Stuart Hutchinson

CONTRACT

This report describes work commissioned by Ultima Furniture Systems Ltd during December 2021. Ultima Furniture Systems Ltd representative for the contract was Mr James Roberts of J R Planning. Lea Favill of EWE Associates Ltd carried out the work.

Date: 23rd December 2021

Prepared by: ……  …… Lea Favill
Director

REVISION HISTORY

Draft Report Rev0 issued 23rd December 2021
- 1No copy issued to Mr James Roberts

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1. INTRODUCTION

Terms of Reference

This report was commissioned by Ultima Furniture Systems Ltd to consider the surface water and foul water drainage systems for the proposed industrial extension at Parksprings Industrial Estate in Grimethorpe near Barnsley.

The proposal involves an extension to the existing industrial unit. The drainage issues are being considered as part of the current planning application.

Approach to the Assessment

For the purposes of this study, the following have been considered: -

- Site level information and proposed finished levels of the buildings and external works.
- Onsite constriction.
- Options available to developer.
- NPPF guidelines with regards to the control of runoff.
- PPG3 pollution prevention guidelines.
- Future adoption and management of drainage system.
- Drainage characteristic of subsoils.
- Discharge rates into sewer.
- Flood risk to adjacent land users.

Design Constraints

For the purposes of this study, the following constraints have been applied: -

- The design is based on the proposed layout provided by the client's representative. At this stage no modifications to the layout are proposed.
- The proposal is for a single extension within an area which is currently owned by the client as such any drainage features or attenuation structures will be maintained by the current owner and their maintenance company.
- SUDs features are to be recommended where practically possible.
- The existing industrial building drains both surface water and foul water to the Severn Trent Water public sewer located within the adjacent Springvale Road. There is a hydrobrake manhole directly upstream of the connection to the public sewer located within the development site. There is also approximately 150m of oversized pipe/box culvert upstream of the control manhole which provides attenuation for the existing development.

The size of the hydrobrake and attenuation structure are unknown. Also, the design standard of the existing drainage is unknown. It is proposed that part of the existing attenuation is built over by the new extension. It is recommended that additional protection is provided to the attenuation structure to be located under the new extension and the floor slab is constructed to allow sections to be easily removed if required. Access manhole into the attenuation structure is located outside of the building footprint which will allow access at all times to the structure.

- The site appears to be built up of made ground and the presence of a discharge connection to the STW sewer suggest that infiltration drainage is not a practical solution for this site.
- There is an existing point of connection into the STW public surface water sewer system. Water Authority adopts a minimum orifice size of 75mm which is generally equivalent to 3.5l/s. As such, a discharge rate of 3.5l/s has been proposed based on a practical minimum. Consenting will be required for the proposed discharge into the sewer.
- It is assumed that the minimum design standard is 1 in 100 years plus climate change (40%) as the site is less vulnerable.
- No on site above ground flooding will be acceptable up to and including 1 in 100 years plus climate change (40%) storm.

2. DESIGN OF PROPOSED SURFACE WATER DRAIANGE SYSTEM

Existing Drainage

The area proposed for the new industrial extension is a vegetated area with no roofed or paved areas. As such, the site is considered to be permeable. There is an existing connecting manhole from the site into the STW surface water sewer which is accessible and approximately 2m deep. The total site area has been estimated at 0.64 hectares in area and is generally flat.

Any discharge from the site into the STW sewer will require the consent of the appropriate water authority, as such, they will also need to be approached to agree the discharge restriction from the site.

The existing peak runoff rate from the site based on Qbar is 2.4l/s. This is considered to be impractically low and therefore a discharge restriction of 3.5l/s has been recommended in line with current water authority practices. The existing runoff calculation sheet is provided at Appendix A.

Proposed Drainage Strategy

A peak discharge rate from the site of 3.5 l/s has been recommended. An assessment of the required balance volume has been made using the estimated post development impermeable area of 4970m². Using WinDes Source Control software developed by Microdrainage the required attenuation has been calculated for the 1 in 100 year plus climate change (40%) event.

Reference should be made to Appendix C where the calculation sheets are provided. The attenuation size has been tabulated below in Table 1. It is estimated that during the 1 in 100 year plus climate change (40%) event that 382.9m³ of storage will be required. This will be provided within a 130m long box culvert which is 2.4m wide and 1.2m deep internally. Part of the box culvert will be located under the new extension. It is recommended that additional protection is provided to the attenuation structure to be located under the new extension and the floor slab is constructed to allow sections to be easily removed if required. Access manhole into the attenuation structure will be located outside of the building footprint which will allow access at all times to the structure.

The drainage strategy drawing provided at Appendix B shows the drainage strategy for the site which includes a box culvert within the site. The location of the box culvert can be modified to suit on site constraints.

Table 1: WinDes 1 in 100 year+CC Storage Volume

Return Period	Required Attenuation	Approx Volume (m³)
1 in 100 year + CC	130m of box culvert 2.4m wide by 1.2m deep	372.0

Adoption & Maintenance

It is considered that the drainage systems and attenuation structure will be maintained by private land owners.

3. DESIGN OF PROPOSED FOUL WATER DRAINAGE SYSTEM

There is a STW public foul sewer located in the adjacent Springvale Road which has an existing connection from the site which is illustrated on the drainage drawing at Appendix C.

It is proposed that any domestic foul discharge from the new extension connects into this manhole.

Appendix A: - ICPSUDs Runoff Calculation

EWE Associates Ltd		Page 1
Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 21/12/2021 16:10 File	Designed By Lea Checked By	
Micro Drainage	Source Control W.12.4	

ICP SUDS Mean Annual Flood

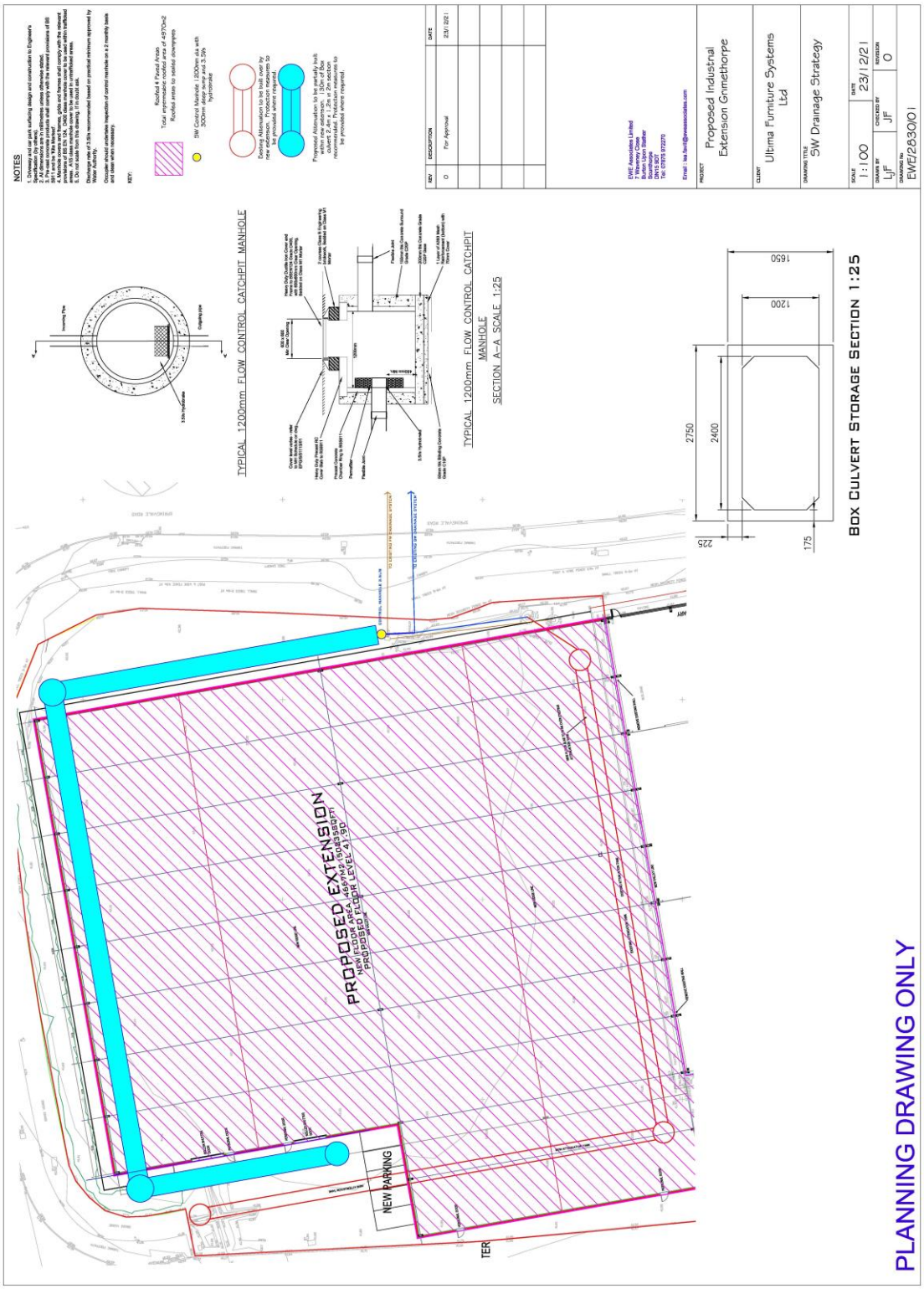
Input

Return Period (years)	1	Soil	0.450
Area (ha)	0.640	Urban	0.000
SAAR (mm)	620	Region Number	Region 3

Results	l/s
QBAR Rural	2.4
QBAR Urban	2.4
Q1 year	2.1
Q1 year	2.1
Q30 years	4.3
Q100 years	5.1

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Appendix B: - Drainage Drawing



Appendix C: - 1 in 100 year+CC WinDes Calculation Sheets

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Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 23/12/2021 15:09 File 100yr+CC40% tank ...	Designed By Lea Checked By	
Micro Drainage	Source Control W.12.4	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	40.754	0.554	2.0	153.3	O K
30 min Summer	40.839	0.639	2.1	179.6	O K
60 min Summer	40.933	0.733	2.2	209.3	O K
120 min Summer	41.036	0.836	2.4	241.2	O K
180 min Summer	41.096	0.896	2.5	260.1	O K
240 min Summer	41.137	0.937	2.5	272.9	O K
360 min Summer	41.188	0.988	2.6	288.9	O K
480 min Summer	41.216	1.016	2.6	297.8	O K
600 min Summer	41.231	1.031	2.7	302.6	O K
720 min Summer	41.238	1.038	2.7	304.6	O K
960 min Summer	41.262	1.062	2.7	312.2	O K
1440 min Summer	41.287	1.087	2.7	319.9	O K
2160 min Summer	41.294	1.094	2.7	322.2	O K
2880 min Summer	41.287	1.087	2.7	319.8	O K
4320 min Summer	41.162	0.962	2.6	281.0	O K
5760 min Summer	41.064	0.864	2.4	250.2	O K
7200 min Summer	40.981	0.781	2.3	224.2	O K
8640 min Summer	40.909	0.709	2.2	201.6	O K
10080 min Summer	40.845	0.645	2.1	181.6	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	166.570	34
30 min Summer	98.127	49
60 min Summer	57.807	78
120 min Summer	34.055	136
180 min Summer	24.989	194
240 min Summer	20.062	252
360 min Summer	14.721	370
480 min Summer	11.818	486
600 min Summer	9.967	604
720 min Summer	8.672	722
960 min Summer	7.118	884
1440 min Summer	5.389	1130
2160 min Summer	4.080	1528
2880 min Summer	3.349	1948
4320 min Summer	2.350	2772
5760 min Summer	1.828	3584
7200 min Summer	1.504	4400
8640 min Summer	1.283	5192
10080 min Summer	1.121	5952

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Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Winter	40.814	0.614	2.1	171.9	O K
30 min Winter	40.909	0.709	2.2	201.6	O K
60 min Winter	41.016	0.816	2.4	235.1	O K
120 min Winter	41.133	0.933	2.5	271.8	O K
180 min Winter	41.203	1.003	2.6	293.6	O K
240 min Winter	41.251	1.051	2.7	308.7	O K
360 min Winter	41.314	1.114	2.8	328.3	O K
480 min Winter	41.350	1.150	2.8	339.8	O K
600 min Winter	41.372	1.172	2.8	346.7	O K
720 min Winter	41.385	1.185	2.9	350.5	O K
960 min Winter	41.423	1.223	2.9	361.8	O K
1440 min Winter	41.459	1.259	2.9	369.5	O K
2160 min Winter	41.475	1.275	3.0	372.0	O K
2880 min Winter	41.442	1.242	2.9	366.4	O K
4320 min Winter	41.265	1.065	2.7	313.2	O K
5760 min Winter	41.129	0.929	2.5	270.5	O K
7200 min Winter	41.015	0.815	2.4	234.7	O K
8640 min Winter	40.917	0.717	2.2	204.1	O K
10080 min Winter	40.833	0.633	2.1	177.8	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Winter	166.570	34
30 min Winter	98.127	48
60 min Winter	57.807	76
120 min Winter	34.055	134
180 min Winter	24.989	190
240 min Winter	20.062	248
360 min Winter	14.721	362
480 min Winter	11.818	478
600 min Winter	9.967	590
720 min Winter	8.672	702
960 min Winter	7.118	920
1440 min Winter	5.389	1174
2160 min Winter	4.080	1632
2880 min Winter	3.349	2104
4320 min Winter	2.350	2992
5760 min Winter	1.828	3864
7200 min Winter	1.504	4688
8640 min Winter	1.283	5472
10080 min Winter	1.121	6272

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
Site Location	440700 408750 SE 40700 08750
C (1km)	-0.024
D1 (1km)	0.347
D2 (1km)	0.424
D3 (1km)	0.237
E (1km)	0.296
F (1km)	2.359
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time / Area Diagram

Total Area (ha) 0.500

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.100	4-8	0.100	8-12	0.100	12-16	0.100	16-20	0.100

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Date 23/12/2021 15:09	Designed By Lea	
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Micro Drainage	Source Control W.12.4	

Model Details

Storage is Online Cover Level (m) 42.200

Box Culvert Structure

Height (m) 1.200 Length (m) 130.000
Width (m) 2.400 Downstream Invert (m) 40.200
Slope (1:X) 1000.000

Hydro-Brake® Outflow Control

Design Head (m) 1.900 Hydro-Brake® Type Md4 Invert Level (m) 40.200
Design Flow (l/s) 3.5 Diameter (mm) 58

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.5	1.200	2.8	3.000	4.5	7.000	6.8
0.200	1.3	1.400	3.1	3.500	4.8	7.500	7.1
0.300	1.4	1.600	3.3	4.000	5.2	8.000	7.3
0.400	1.6	1.800	3.5	4.500	5.5	8.500	7.5
0.500	1.8	2.000	3.7	5.000	5.8	9.000	7.8
0.600	2.0	2.200	3.8	5.500	6.1	9.500	8.0
0.800	2.3	2.400	4.0	6.000	6.3		
1.000	2.6	2.600	4.2	6.500	6.6		

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