



Flood Risk & SuDS Assessment

Unit 19, Bolney Grange Business Park
Stairbridge Lane, Bolney, RH17 5PB

Client

Prospera Developments Ltd
8 School Hill
Findon
West Sussex, BN14 0TR
Ref: 13413
Date: December 2024

Consulting Engineers

GTA Civils & Transport Ltd
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Index

1	Introduction	2
2	Existing Site & Current Flood Risk	3
3	Development Proposals and SuDS Drainage Strategy	4

Schedule of Appendices

A	Site Location Map and Aerial Photo
B	Flow Accumulation Routes Map, Topographical Survey & Ditch Survey
C	Ditch Watercourse Survey
D	Proposed Site Layout and Drainage Strategy
E	Drainage Calculations

Issue	Issue date	Compiled	Checked
Preliminary Issue	23 December 2024	JP	MB / MR
1 st Issue	06 January 2025	JP	MB / MR

1 Introduction

- 1.1 This Flood Risk & SuDS Assessment has been prepared for Prospera Developments Ltd in relation to the proposed development at Unit 19, Bolney Grange Business Park, Stairbridge Lane, Bolney, RH17 5PB. No responsibility is accepted to any third party for all or part of this study in connection with this or any other development.
- 1.2 The objective of this assessment is to support a planning application to Mid Sussex District Council and an application for Ordinary Watercourse Consent to West Sussex County Council for the proposed extension of an industrial building at said site.
- 1.3 No responsibility is accepted to any third party for all or part of this study in connection with this or any other development.

2 Existing Site & Current Flood Risk

- 2.1 The application site, in the area administered by Mid Sussex District Council (MSDC), is part of Bolney Grange Business Park, which lies approximately 1km east of Hickstead. The site comprises an industrial building plus hardstanding to the front. Access is from the estate road to the south. A site location map and aerial photo are shown in Appendix A.
- 2.2 Hydrology: the east branch of the River Adur rises at Ditchling Common and passes the site approximately 65m to the north. There is a dry ditch on the north side of the unit, which issues at the NW corner of the adjacent site's demise (#18). It flows eastwards, broadly speaking, and then loops anti-clockwise NW depositing into the Eastern Adur some 200m northeast of the application site.
- 2.3 Topography: a topographical survey of the area where the extension is proposed is in Appendix B. The ground levels (which are to a site datum) range between approximate 10.7m and 9.3m.
- 2.4 Geology: BGS online maps show the solid geology in this area is dominated by Weald Clay Formation (mudstone), with no superficial deposits overlying. It is GTA C&T's experience of nearby sites overlying this geology that there is negligible chance of this soil type possessing a sufficiently high soakage rate for infiltration features to be viable.
- 2.5 Public sewers: There are no public sewers nearby.
- 2.6 Existing surface water drainage: the row of buildings starting at #18 extending eastwards are served by the watercourse described in section 2.2 above. Appendix B contains a 'Flow Accumulation Routes' map – derived from ScalgoLIVE (www.scalgo.com). This shows that this watercourse is clearly artificial, because the natural 'dry valley' runs along the first 4 buildings' south elevations and joins the watercourse only at 'Bakers Timber Buildings.' (It is likely that this drain was formed during the construction of the Business Park – to provide a watercourse to serve this row of buildings.) The information sheet listing the data sources used in this mapping layer has been added to this map.
- 2.7 The flood risk profile of this site is deemed to be 'low' – having examined the EA's online fluvial, pluvial and reservoir flood maps. The Environment Agency's Rivers and Seas Flood Map in Appendix C shows the site lies within fluvial Flood Zone 1, Low Risk.

3 Development Proposals and SuDS Drainage Strategy

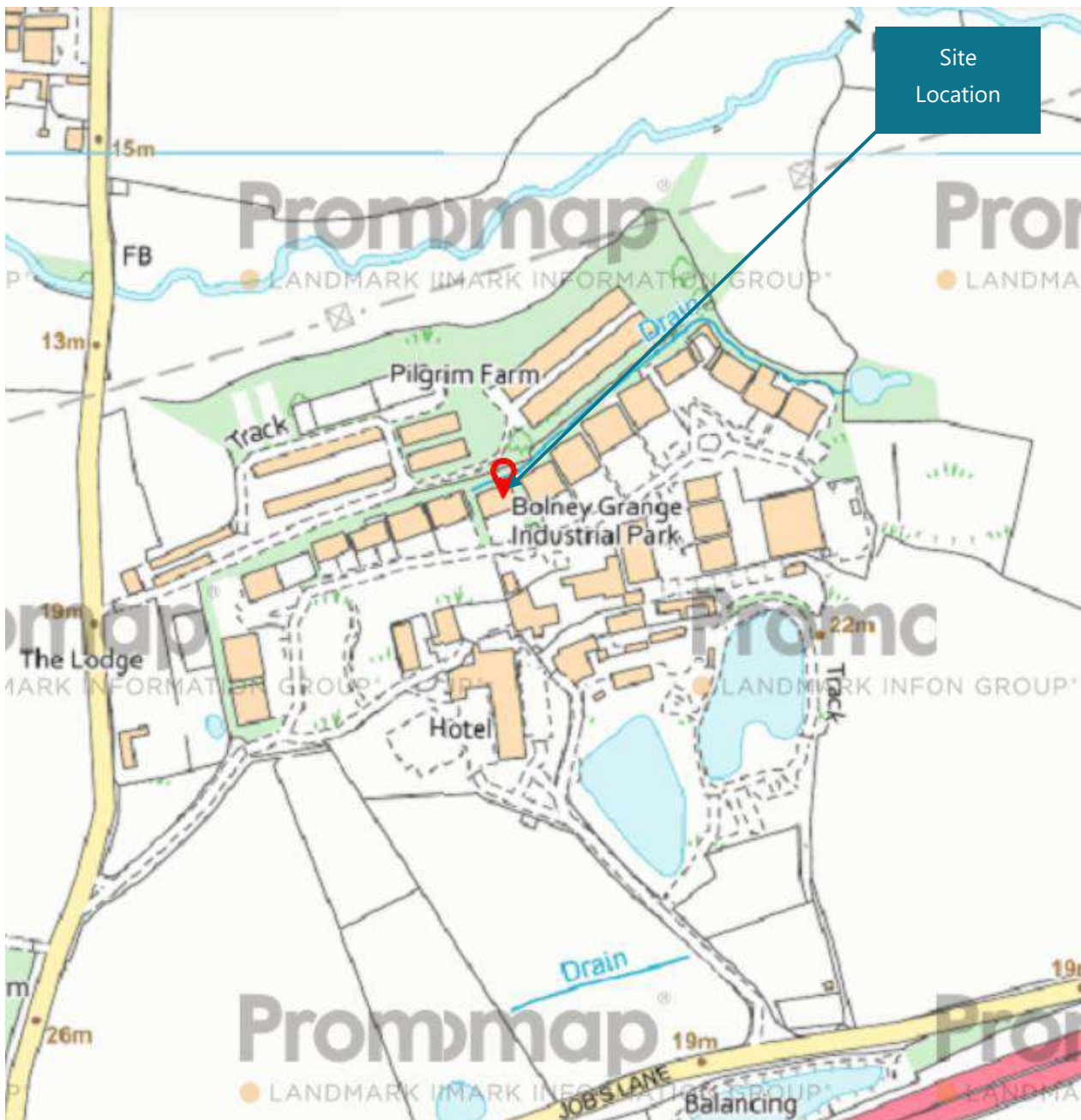
- 3.1 It is proposed to extend the industrial unit northwards - refer to the proposed layout in Appendix D. The extension's roofed area is 106m².
- 3.2 The watercourse will be culverted under the extension, even though no pipes were seen to outfall into this during a walkover ditch survey conducted immediately after rainfall during the wet period in October 2024 – refer to Appendix B.
- 3.3 The surface water runoff from the new roofed area will be directed to the ditch watercourse via a new outfall headwall on the north bank. A FreeFlush cellular attenuation tank and control chamber is placed on the north bank. This has been designed to hold the volume for all events up to and including the critical 1 in 100 year + 45% climate change event. The lowest 180mm will have standing water, to provide the ballast needed. The drainage strategy is included in Appendix D. The 18mm orifice will be screened. The 180mm depth of water will hold all debris. There is a valve at the tank's base level and flush feature for effective maintenance. The extension's rainwater downpipe(s) will be fitted with leaf ejector(s).
- 3.4 Surface water runoff will be attenuated to close to the greenfield QBAR rate as practical. The Qbar calculation for 0.012ha is 0.2 l/s. This is significantly less than the practical minimum limit for screened vortex devices (or orifice plates), which is 1l/s. The offsite flow rate will be restricted to 1l/s, therefore. The FreeFlush system includes has a screen protected 18mm diameter orifice, thus reducing the risk of debris blockage.
- 3.5 Exceedance flow will follow the existing topography of the site and flow due north – away from nearby buildings. These arrows are shown on the drainage layout in Appendix D.
- 3.6 Water Quality: only runoff from this extended roofed area has to be positively drained. There is no need for treatment, therefore.
- 3.7 Maintenance responsibilities for the surface water network will remain the landowner's responsibility.

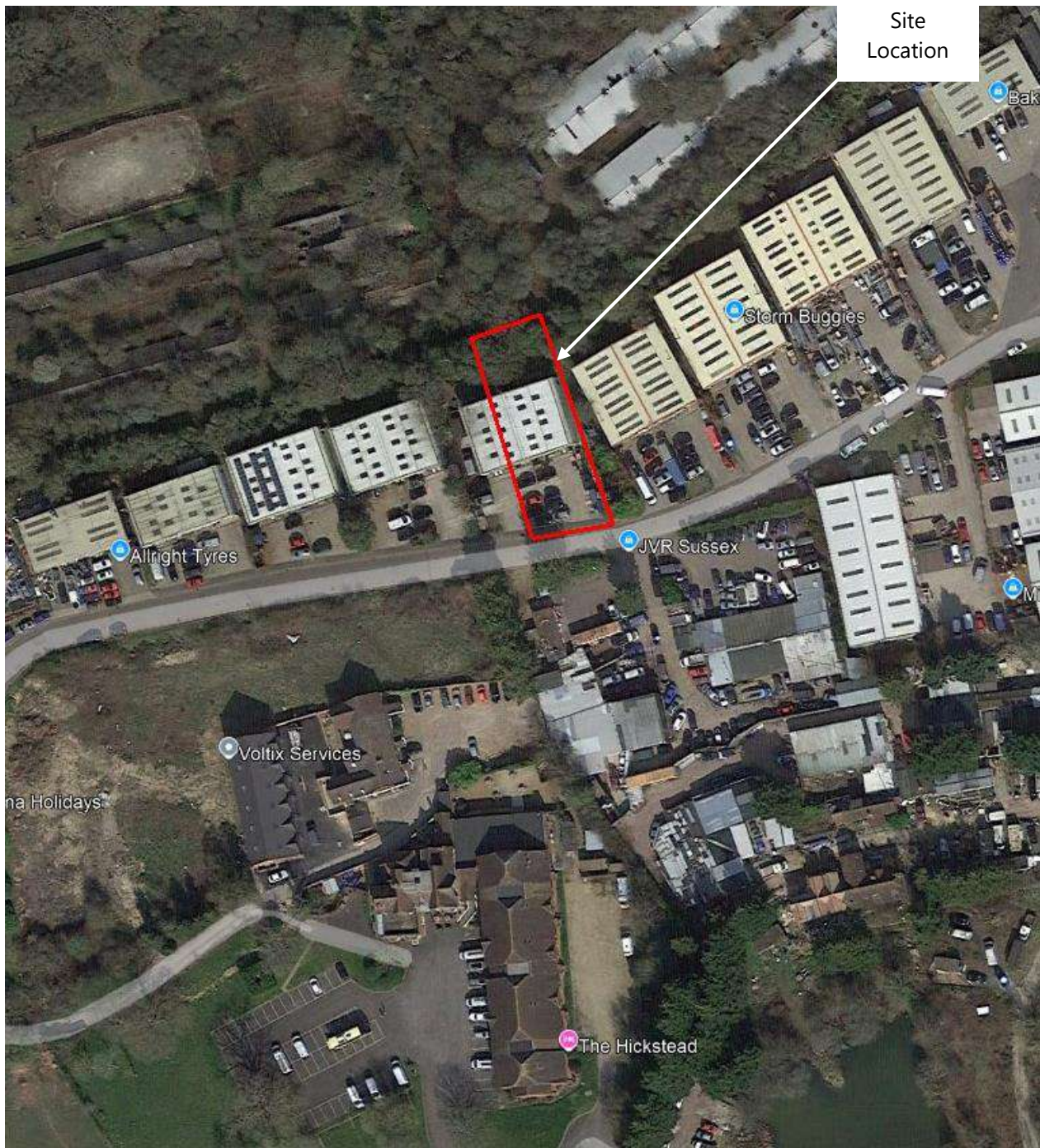
Conclusion: This FRA demonstrates that the proposed alterations to the unit will remain safe from Flood Risks over its lifetime, will not increase Flood Risk elsewhere, and therefore comply fully with NPPF and relevant planning practice guidance in terms of flood risk.

- End of Report -

Appendix A

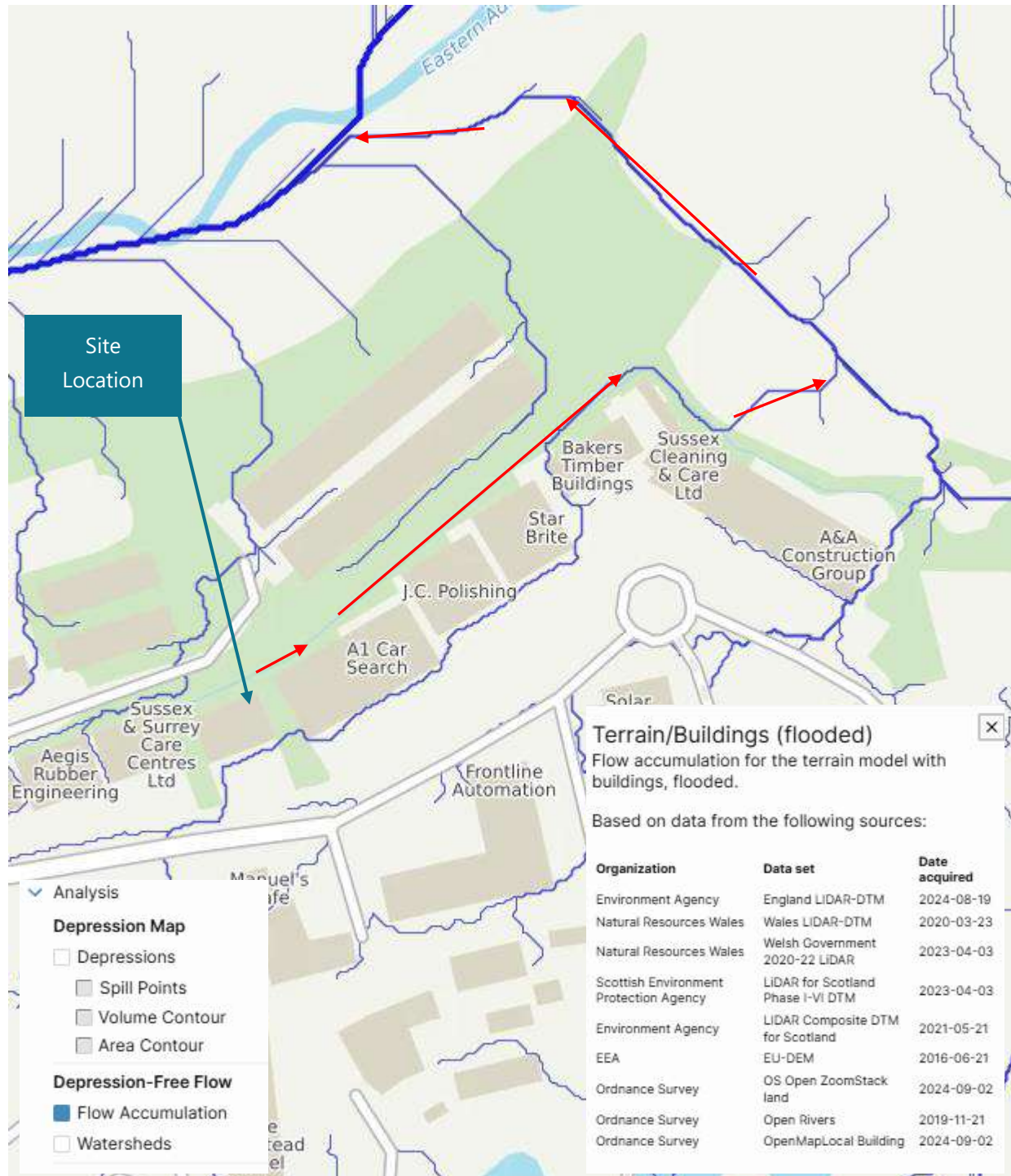
Site Location Map and Aerial Photo



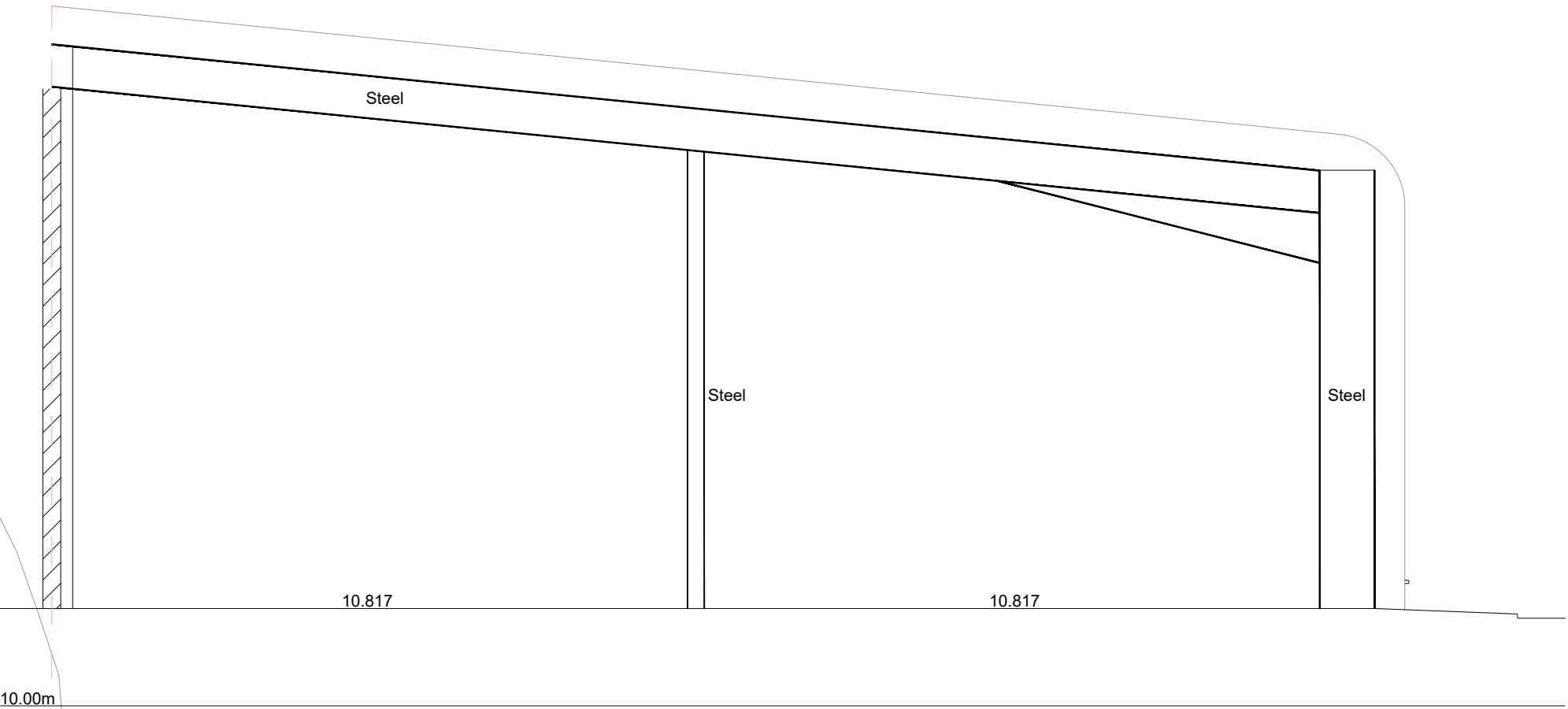


Appendix B

Flow Accumulation Routes Map, Topographical Survey & Ditch Survey

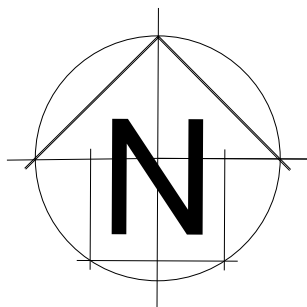


Map Extract from ScalgoLive showing Flow Accumulation Layer



SECTION

- ## Notes
1. The Survey Grid and Datum are based on Arbitrary values.
 2. Fences shown are not necessarily legal boundaries.
 3. Dimensions should not be scaled. All dimensions should be checked on site before any fabrication / construction.
 4. Copyright of all data produced by MNA shall remain with MNA unless otherwise specifically agreed.
 5. Information provided should not be altered or modified in any way. It should not be used for any purpose other than for which it was intended and should not be issued to other parties without prior agreement of MNA.
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 7. If the AutoCAD drawing is being read by any system other than AutoCAD it should be checked against a hard copy.
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Grid 5.00m A1 @1:50



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Site

Unit 19
Bolney Grange Business Park
Bolney

Drawing Title

Site plan

Scale

1:50

Surveyed MF

Drawn MPN

Checked
GLN

Project No

207

ing No

1024/207/01

Date _____

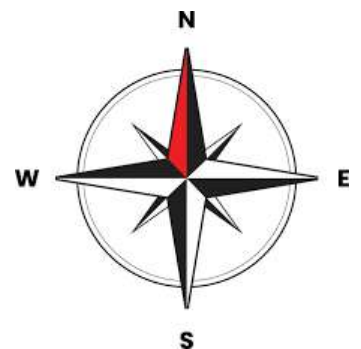
17/10/2024

Photographic Survey of the Ditch to the rear of Unit 19 After Rainfall

Bolney Grange Business Park, Stairbridge Lane, Haywards Heath, RH17 5PB

These pictures were taken on 22/10/24. It is worth noting that there had been rain on 20th ,21st and 22nd of October and there was no flowing water in the ditch to the rear of Unit19 on the 22nd.

Indeed, observing the ditch after previous heavy rainfalls we have never observed “flowing” water in the ditch directly behind this unit. At most there has been 1” puddling before dispersal.



Ditch location

Approaching Ditch from South East side of the ware house:



Drain outlet is on Unit 19 boundary - it is assumed this is an outlet for warehouse gutters. The water flows North East AWAY from Unit 19



View behind Unit 19



View North East behind Unit 20



View of outlet after heavy rain. Note the water flows North East away from Unit 19 behind Unit 20



Alternate view of the outlet, notice the fall off towards North East (away from unit 19)



View in the ditch looking South West behind Unit 19. Note - no stream, no outfalls and no water flow even after heavy rain



View walking in the ditch South West behind Unit 19, no drainage water observed.



Continuing South West behind Unit 19, still no water in the ditch and no outfalls.



The end of the ditch South West behind Unit 19- note not water in ditch after heavy rain fall



View of ditch behind Unit 18 continuing South West. No Water flow.
The banks of the dry length of ditch were surveyed for evidence of outfalls but no features were noticed either behind Unit 19 or Unit 18.



Further images behind Unit 18 South West. It is impossible to walk in the ditch from here due to overgrowth of vegetation however it is evident no outfalls are present.



As above, ditch behind Unit 18, there is no water or outfalls observed at all.



Alternative view of ditch behind Unit 18 South West of Unit 19, no flowing water or outfalls.



As above.



In summary.

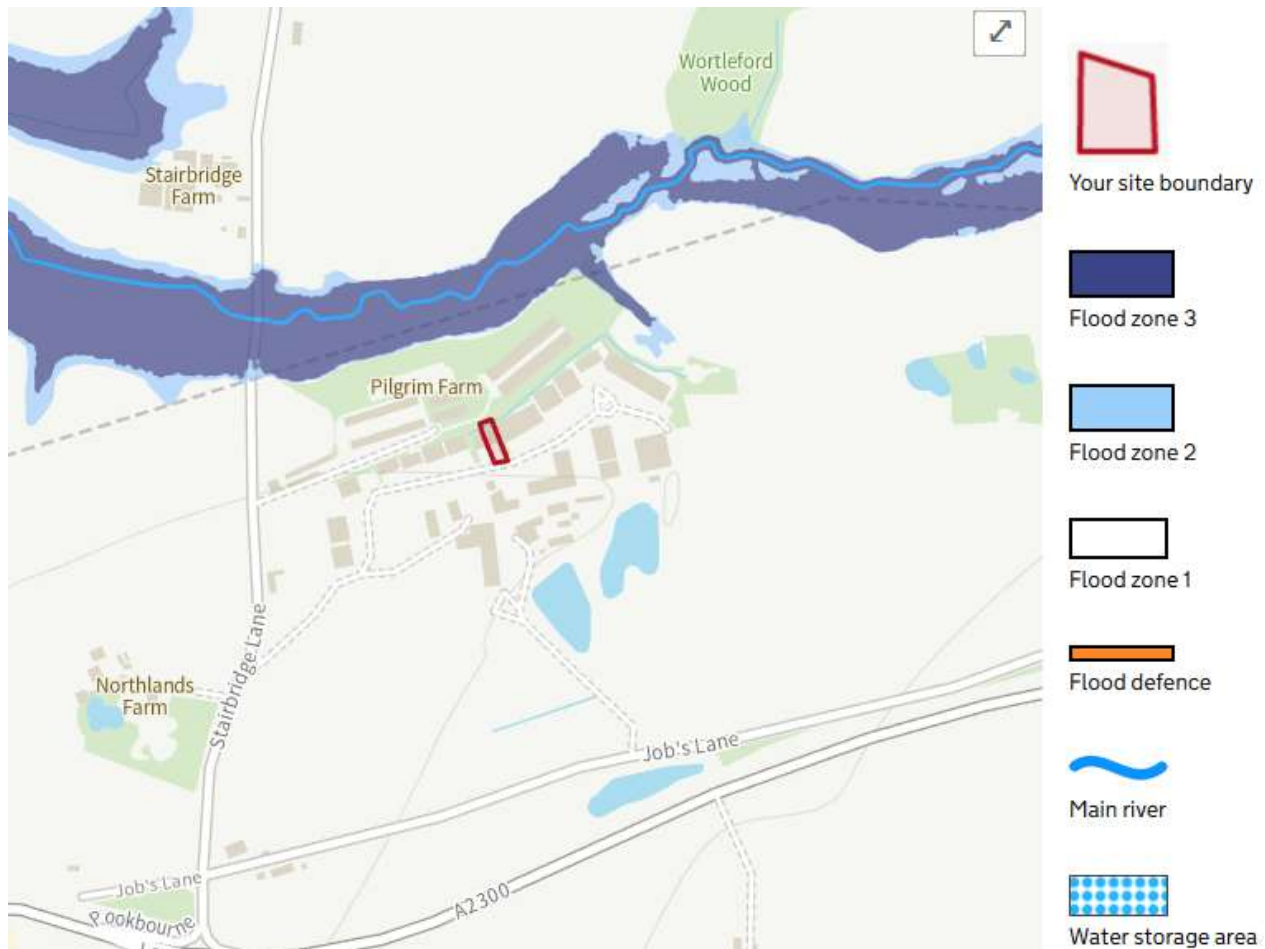
On the 22/10/ after 2 consecutive days of rain a photographic survey was done to observe if any outfalls or flowing water were present in the ditch immediately to the rear of Unit 19 Bolney Grange business park.

Water was observed gently flowing out of an outlet that borders Unit 19's boundaries, however this water flows North East "away" from Unit 19 to the rear of unit 20.

The ditch to rear of Unit 19 remains water free despite rainfall. When approaching the end of the dry ditch to observe the ditch behind Unit 18 it is found to be severely overgrown, however despite the rain there is still no evidence of outfalls or flowing water from this section of the ditch which is located South West of Unit 19.

Appendix C

EA Rivers and Seas Flood Map

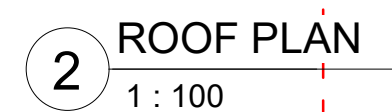
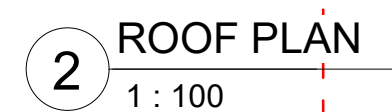


EA's Online Flood Map for Planning (Rivers and Seas)

The site lies wholly within Flood Zone 1 (FZ1)

Appendix D

Proposed Site Layout and Drainage Strategy



**KRONA
DESIGN**

ARCHITECTURAL DESIGN & DRAFTING

4 Union Place | Worthing | BN11 1LG
info@kronadesign.co.uk | kronadesign.co.uk
Tel: 01903 256150 Mob: 07827 994111

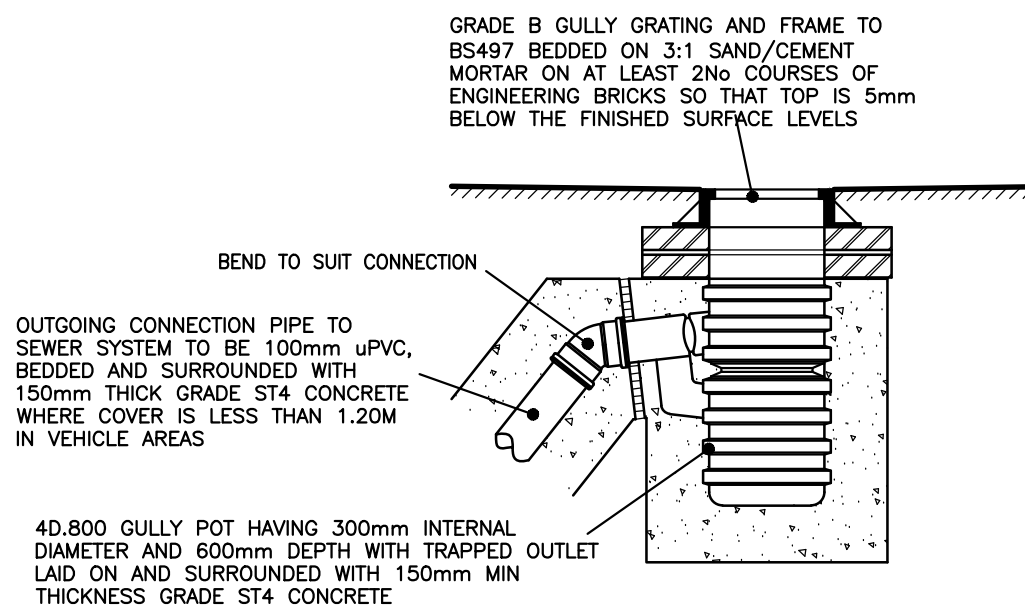
Proposed Extension

TITLE	Proposed Plans
-------	----------------

DRAWN JLB	STATUS Planning	DATE 01/11/24
--------------	--------------------	------------------

DRAWING NUMBER	REV
A.101	B

© KRONA DESIGN



Water level and depth of ditch/stream varies. Refer to drawing 1101 for outfall invert level.

70° Max

Steel spikes to hook over top of bagwork.

Pipe cut to profile of ditch

Outlet pipe

10

8

70° Max

50 - 100mm thick PCC paving slab laid on class 3 mortar bed

Backfill behind bagwork to be placed and tamped as work proceeds

Unsuitable material in foundation to be excavated and backfilled with S4 concrete

GENERAL NOTES

5. The location, size, depth and identification of existing services that may be shown or referred to on this drawing have been assessed from non-destructive methods, such as ground penetrating radar, utility cameras, record drawings or the like. The contractor shall be responsible for confirming the location and depth of services. The contractor shall safely carry out intrusive investigations, trial holes or soundings prior to commencing work to satisfy himself that it is safe to proceed and that the assessments are accurate. Any discrepancies shall be notified to gta prior to commencing work.
6. Tender or billing drawings shall not be used for construction or the ordering of materials.
7. Do not scale. All dimensions and levels to be site confirmed.
8. This drawing shall be read in conjunction with all relevant architect's consultants drawings and specifications, together with H&S plan requirements.
9. Copyright: This drawing must not be copied, amended nor reproduced without the prior written agreement of gta.
10. All drawings specifications and recommendations made by gta are subject to Local Planning Authorities and other relevant Statutory Authorities approval. Any works or services made abortive due to the client proceeding prior to these approvals is considered wholly at the Client's risk; gta holds no responsibility for resulting abortive works or costs.
11. If, when issuing this drawing as an Autocad file (.dwg) in digital format then it is done so with this Disclaimer due to the fact that it can be altered and modified by the user. gta CTV & Transport and therefore, gta does not accept any alteration or modification of DWG data files provided by gta CTV & Transport, by you or a third party, without gta CTV & Transport's express written approval. It is done so entirely at your own risk. Modifications to the drawing (i.e. not limited to turning layers on and off, unfreezing layers and reloading, turning on and off print functions and the unloading xrefs.
12. Your attention is also drawn to the fact that the information contained within this file may be subject to alteration at any time, pending technical approval from an approving authority or at the client's instruction. It is therefore strongly recommended that multiple and regular check checks are made to ensure that the drawing is up to date.
13. It is your responsibility to ensure that the correct issue or revision of the DWG data file is being used and requests for updated information made accordingly.
14. Should any apparent discrepancies between the data contained within the DWG file and the current contract drawings become evident, it must be reported back to gta CTV & Transport as soon as reasonably practicable. The drawings shall not be given to the current contract drawings (PDF) unless approved otherwise.

KEY

- | | |
|---|-----------------------------|
| | Private surface water drain |
|  | Above Ground Attenuation |
|  RWP | Rainwater Pipe |
|  YG | Yard Gully |
|  | Exceedance flow route |

DESIGN NOTES

1. STORAGE DESIGN BASED ON 1 IN 100 YR STORM + 45%.
3. DRAIN POINTS AND LOCATIONS TO BE CONFIRMED BY ARCHITECT
4. CONTRACTOR TO ESTABLISH LOCATIONS OF ALL EXISTING SERVICES PRIOR TO COMMENCING.
5. EXISTING TREES TO BE PROTECTED WHERE EXCAVATIONS RUN CLOSE.
6. ORDINARY WATERCOURSE CONSENT TO BE GAINED FROM WSCC FOR DETAILED DESIGN CONNECTION TO EXISTING DITCH PRIOR TO WORKS COMMENCING.

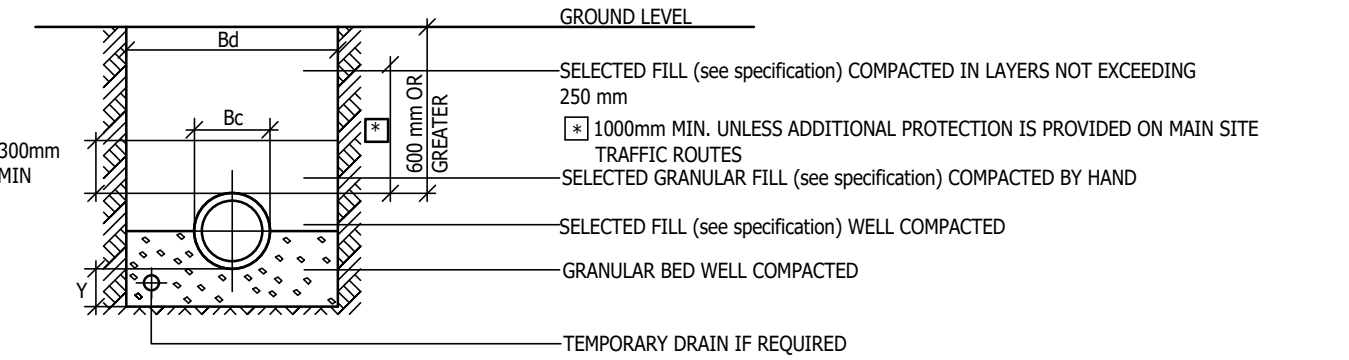


Diagram illustrating the concrete surround for pipes in areas liable to penetration of tree roots. The diagram shows a cross-section of a pipe with diameter 'D' and a concrete surround of thickness 'Bc'. The concrete is shown in two layers: an inner layer of 150mm and an outer layer of 375mm. The total concrete thickness is 525mm. The diagram also shows a 100mm gap between the concrete and the ground level. The concrete is labeled 'CONCRETE' and the ground level is labeled 'GROUND LEVEL'.

150 mm SURROUNDED UP TO 300 mm DIA PIPE (200mm SURROUND ON 375 mm AND ABOVE) OF C20/25 CONCRETE. SHAPED FORMERS OF 25 mm POLYSTYRENE OF PITCH IMPREGATED FIBRE BOARD TO BE INSTALLED ON EACH JOINT ON ROCKER PIPES AT MANHOLES ETC. AND EVERY THIRD JOINT (NOT EXCEEDING 5 METRES) ON RUNS OF DRAIN

DIMENSION Y =

- IN ROCK, CONCRETE OR MIXED SOLIDS CONTAINING ROCK BANDS, Boulders, Large Flints or Stones or Other Irregular Hard Spots that Result in Uneven Trench Bottom Y=1/4 B or 200 mm which ever is the Greater, But Not Less Than 50mm under Collars

NOTES

- IN SOLS THAT PERMIT AN EVEN TRENCH BOTTOM TO BE EXCAVATED Y=1/6 B; Or 150 mm WHICH EVER IS GREATER, BUT NOT LESS Than 50 mm under COLLARS

- 1) FOR PIPES EXCEEDING 600 mm DIA REFER TO ENGINEER
- 2) IN WET OR SOFT GROUND SEEK GUIDANCE FROM ENGINEER
- 3)THE BEDDINGS MAY BE MODIFIED FOR CERTAIN SUB-SOIL CONDITIONS AT THE ENGINEERS DISCRETION
- 4) THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ADDITIONAL PROTECTION IN AREAS SUBJECT TO LOADS FROM SITE TRAFFIC. THE CONTRACTOR SHALL IDENTIFY THESE ZONES AND RESTRICT TRAFFIC ELSEWHERE
- 5) SEE ALSO BS 8301
- 6) FOR GREATER TRENCH WIDTHS SEEK GUIDANCE FROM ENGINEER

PIPE SIZE	Bd TRENCH WIDTH
100 mm	0.6 m
150 mm	0.6 m
225 mm	0.7 m
300 mm	0.8 m
375 mm	1.1 m
400 mm	1.1 m
450 mm	1.2 m
500 mm	1.2 m
600 mm	1.4 m

BEDDING DETAILS IN LANDSCAPE AREAS

PI	INITIAL ISSUE	23.12.24	MB	MR	
Rev	Amendments	Date	Dsn	Chk	
Status					
PRELIMINARY					
Client					
PROSPERA DEVELOPMENTS LTD					
Architect					
Project					
UNIT 19 , BOLNEY GRANGE BUSINES PARK					
Title					
DRAINAGE STRATEGY					
Date		Scale @ A1 1 : 100/NTS			
NOVEMBER 2024					
Clients Ref.		Project Ref.			
 Civils & Transport Maple House, 192-198 London Road, Burgess Hill, West Sussex, RH15 9RD Tel.01444 871444 Web: www.gtacivils.co.uk					
Drawing Number				Rev.	
13413/1101				P1	

Appendix E

Drainage Calculations

GTA Civils Ltd		Page 1
Gloucester House 66a Church Walk Burgess Hill RH15 9AS	Bolney Grange Business Park 13413 QBar	
Date 20/12/2024 09:15 File	Designed by AElsir Checked by	
Micro Drainage		Source Control 2020.1.3

ICP SUDS Mean Annual Flood

Input

Return Period (years) 100 SAAR (mm) 810 Urban 0.000
Area (ha) 0.012 Soil 0.470 Region Number Region 7

Results 1/s

QBAR Rural 0.1
QBAR Urban 0.1

Q100 years 0.2

Q1 year 0.1
Q30 years 0.2
Q100 years 0.2

Design Settings

Rainfall Methodology	FEH-22	Maximum Time of Concentration (mins)	30.00	Preferred Cover Depth (m)	1.200
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0	Include Intermediate Ground	✓
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00	Enforce best practice design rules	✓
CV	0.750	Connection Type	Level Soffits		
Time of Entry (mins)	5.00	Minimum Backdrop Height (m)	1.000		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Easting (m)	Northing (m)	Depth (m)
STORAGE	0.012	5.00	11.900	506.826	503.215	1.850
SCP			9.950	509.674	503.859	0.530
HEADWALL			9.687	510.866	498.709	0.337

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	STORAGE	SCP	2.920	0.600	10.050	9.420	0.630	4.6	100	5.01	50.0
1.001	SCP	HEADWALL	5.286	0.600	9.420	9.350	0.070	75.5	100	5.11	50.0

**Σ Area
(ha)**
0.012
0.012

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	0.840	Drain Down Time (mins)	240	Check Discharge Volume	x

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440 | 2160 | 2880 | 4320 | 5760 | 7200 | 8640

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0	100	45	0	0
30	0	0	0				

Node STORAGE Online Orifice Control

Flap Valve	x	Invert Level (m)	10.050	Design Flow (l/s)	1.0	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Depth (m)	1.800	Diameter (m)	0.018		

Node STORAGE Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	10.050
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.80	Time to half empty (mins)	65

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	2.8	0.0	1.850	2.8	0.0

Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	STORAGE	44	10.333	0.283	0.9	0.6778	0.0000	SURCHARGED
60 minute winter	SCP	45	9.436	0.016	0.4	0.0025	0.0000	OK
60 minute winter	HEADWALL	45	9.365	0.015	0.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	STORAGE	Orifice	SCP	0.4				
60 minute winter	SCP	1.001	HEADWALL	0.4	0.459	0.051	0.0041	1.3

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	STORAGE	47	10.928	0.878	2.3	2.1063	0.0000	SURCHARGED
60 minute winter	SCP	47	9.441	0.021	0.6	0.0033	0.0000	OK
60 minute winter	HEADWALL	47	9.370	0.020	0.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	STORAGE	Orifice	SCP	0.6				
60 minute winter	SCP	1.001	HEADWALL	0.6	0.541	0.091	0.0062	3.4

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	STORAGE	50	11.862	1.812	4.3	4.3460	0.0000	FLOOD RISK
60 minute winter	SCP	50	9.445	0.025	0.9	0.0040	0.0000	OK
60 minute winter	HEADWALL	50	9.374	0.024	0.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	STORAGE	Orifice	SCP	0.9				
60 minute winter	SCP	1.001	HEADWALL	0.9	0.599	0.130	0.0080	6.3

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	STORAGE	50	11.712	1.812	4.3	4.3460	0.0000	FLOOD RISK
60 minute winter	SCP	50	9.445	0.025	0.9	0.0040	0.0000	OK
60 minute winter	HEADWALL	50	9.374	0.024	0.9	0.0000	0.0000	OK

Link Event (Velocity)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	STORAGE	Orifice	SCP	0.9				
60 minute winter	SCP	1.001	HEADWALL	0.9	0.599	0.130	0.0080	6.3



Civil Engineering - Transport Planning - Flood Risk

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