Unit 2 ref P204572/F

Oakchurch Farm, Staunton-on-Wye

Mr Jeremy Price

Drainage and Water Management Statement

CTP-21-0255

COTSWOLD TRANSPORT PLANNING

1 Introduction

1.1 Cotswold Transport Planning (CTP) provide expert Transport Planning, Highways, Infrastructure and Flood Risk consultancy services throughout the UK.

1.2 CTP were appointed by Mr Jeremy Price to provide drainage consultancy in support of a planning application.

1.3 The development consists of the construction of an agricultural building (manure store) along with associated access and landscaping. This building is referred to as 'Unit 2'

1.4 An architectural layout is included within **Appendix A**.

1.5 This Drainage and Water Management Statement will cover the existing drainage arrangement, the proposed foul and surface water drainage arrangement, and demonstrate compliance with the principles of Sustainable Drainage Systems (SuDS).

2 Existing Site Conditions

Topography

2.1 Topographical mapping carried out in August 2020 shows the site to be generally falling from east to west in a planar fashion with a consistent slope throughout. Levels range from approximately 99.00mAOD in the eastern corner to 91.80mAOD in the western corner of the field to be developed.

2.2 A topographical survey is included in **Appendix B**.

Geology

2.3 Online mapping from the British Geological Survey indicates the site to be underlain by the Raglan Mudstone Formation with superficial glacial Devensian and deposits.

2.4 The Cranfield Soil and Agrifood Institute 'Soilscapes' online tool shows the site as being underlain with 'freely draining slightly acid loamy soils'.

2.5 Infiltration testing to BRE Digest 365 was carried out March 2021, at the lowest point of the site adjacent to an existing ditch.

2.6 A test pit was excavated to 3m below ground level to check for the presence of groundwater. No groundwater was observed in the pit over the course of testing.

2.7 A nearby test pit was excavated to a depth of 2.1m to prepare for infiltration testing. The pit displayed low infiltration characteristics before the test pit collapsed approximately 60 minutes after starting the test.

2.8 Photographs of the testing are shown in **Appendix C**.

2.9 Given the above, it is understood that infiltration is not a feasible method of complete surface water discharge for this development. However, a surface water solution involving partial infiltration may be viable.

Drainage

2.10 There are no public (Dwr Cymru Welsh Water) sewers in the vicinity of the site.

2.11 The development site is not understood to currently contain any man-made drainage, such as underground pipework or engineered surface conveyance features.

2.12 The site is understood to currently drain to the existing ditch along the northern boundary of the development, which runs from east to west.

3 Proposed Drainage Strategy

Surface Water

3.1 The CIRIA SuDS Manual C753 gives guidance for a SuDS approach to managing surface water runoff which has been tabulated below, along with the potential opportunities for use within this development:

Table 1 - CIRIA SuDS Manual approach to managing surface water runoff

Approach	Is it applicable?	Notes
Use surface water runoff as a resource	Yes	Rainwater harvesting may be used to provide a water source (for irrigation, for example)
Manage rainwater close to where it falls (at source)	Yes	Runoff can be controlled, and attenuation storage provided at source
Manage runoff on the surface (above ground)	Yes	There is plan area available for surface storage systems
Allow rainwater to soak into the ground (infiltration)	Maybe	Partial infiltration may be viable within surface attenuation features
Promote evapotranspiration	Yes	Careful selection of vegetation can promote evapotranspiration of runoff
Slow and store runoff to mimic natural runoff rates and volumes	Yes	Discharge will be restricted as closely as possible to modelled site greenfield rates
Reduce contamination of runoff through pollution prevention and by controlling the runoff at source	Yes	Runoff discharge will be restricted and excess flows stored on site
Treat runoff to reduce the risk of urban contaminants causing environmental pollution	Yes	Roof areas present a low risk of pollution. External areas of access shall be of permeable construction, providing a level of water treatment

3.2 The SuDS hierarchy is given below. Each method of discharge shall be investigated in order:

"Rainwater shall discharge to the following, listed in order of priority

- *To ground in an adequate soakaway or some other adequate infiltration system; where that is not reasonably practicable;*
- *A watercourse; or where that is not reasonably practicable*
- *A surface water sewer, highway drain, or other drainage; or where that is not reasonably practicable*
- *A combined sewer"*

Water Reuse

3.1 The proposed development provides an opportunity to reuse surface water through the provision of rainwater harvesting products.

3.2 Rainwater butts can be provided at suitable locations where feasible, to both reduce the volume of water entering the river network, and to reduce the demand on the water supply network.

3.3 Harvested rainwater may be used for irrigation and other applications where a pressurised hose connection is not required.

Infiltration

3.4 Infiltration testing carried out in March 2021 indicates infiltration as not being suitable as the sole method of surface water discharge from the development.

3.5 The preliminary design and sizing of SuDS features has been carried out assuming no infiltration takes place, providing a conservative approach. In reality, a small amount of infiltration may take place, which would reduce the overall volume of runoff entering the watercourse.

Discharge to Watercourse

3.6 Surface water runoff shall be collected from the proposed roofs through a system of gutters and downpipes.

3.7 External access areas shall be constructed with crusher run and drain directly to the underlying subsoil. The overall construction of external access areas shall be designed with an adequate depth of granular material to act as surface water storage.

3.8 It is proposed that surface water runoff is conveyed to the existing watercourse along the northern boundary of the site.

3.9 Although there is no topographical information currently available for the ditch, it was observed during a site visit that the water level was approximately 500mm below ground level at the field boundary at the point of proposed discharge. An invert level of 91.7mAOD has been taken forward for preliminary design.

3.10 The ditch levels should be confirmed via topographical surveying prior to detailed design.

3.11 Prior to discharge, surface water flows shall be restricted through use of an orifice. Upstream storage shall be provided in a shallow attenuation basin adjacent to the watercourse.

3.12 The depth of the attenuation basin is limited by existing ground levels, and the relatively small level difference between existing ground and the proposed ditch outfall level. The overall depth of the attenuation basin is 700mm.

3.13 This limitation also precludes the use of a vortex flow control device, as would often be specified as a method of limiting surface water discharge. It is understood that it would be infeasible to design and specify a vortex flow control device to suit such a shallow attenuation feature.

3.14 A 75mm orifice has been specified, which is generally accepted as the minimum orifice size to mitigate the risk of blockage. The orifice can be fitted directly to the outgoing pipework of the attenuation basin.

3.15 MicroDrainage calculations showing the required storage volume and discharge rates are shown in **Appendix D**.

3.16 Calculations show that approximately **130m^2** of surface water storage is required to accommodate excess flows in the 1 in 100yr (+40% climate change) design storm event. The maximum outflow from the basin is shown to be **9.5l/s**.

3.17 The impermeable catchment area **(2500m^2)** has been calculated from the roof area of both Unit 2 (this application) and Unit 1 (separate planning application) assuming that both units are eventually constructed.

3.18 It should be noted that should only one of the building units be constructed, the design storage provision could be reduced to reflect the smaller area of impermeable catchment. Calculations should be re-run by a competent drainage engineer if this is the case.

3.19 A drainage strategy layout plan is shown in **Appendix E**.

3.20 The outfall to the ditch shall be fitted with a non-return valve to ensure that high water levels in the watercourse do not back up into the proposed SuDS feature. Given the scale of the ditch and observation of the surrounding topography and catchment, high water levels are not expected.

3.21 Architectural plans indicate a proposed French drain adjacent to an area of earthworks along the southern and eastern edges of the site. If a French drain is constructed for the purpose of land drainage, it is understood that this can discharge directly to the watercourse with no flow restriction or attenuation. No proposed impermeable area shall therefore drain to any land drainage.

The base of the attenuation basin may be deepened below the invert level of the outgoing pipework. This would provide additional storage volume, assuming a small amount of long-term infiltration and evapotranspiration. A permanent water level can also provide an amenity and biodiversity benefit.

Connection to Surface Water Sewer

3.22 A connection to watercourse is proposed. No connection to surface water sewer is required.

Foul Water

3.23 The development is not understood to generate any foul drainage.

4 SuDS/Drainage Management

4.1 Maintenance of SuDS features is essential to ensure that the surface water drainage system operates effectively and that flooding of the site and surrounding areas is prevented.

4.2 The responsibility of maintaining the drainage components would lie with the development landowner unless responsibility is delegated to an appointed external Management Company.

4.3 A full maintenance regime should be carried out to ensure that the drainage system remains operational over its lifetime. Table 1 summarises an initial maintenance plan for the drainage components proposed within this development. The SuDS Manual (CIRIA C753) and manufacturer's guidelines should be referred to for further maintenance information.

Drainage Component	Required Action	Typical Frequency
Pipework, manholes, chambers, catch pits and silt traps	Stabilise adjacent areas	As required
	Remove weeds	As required
	Clear any poor performing structures.	As required
	Inspect all structures for poor operation	Six monthly, 48 hours after large storms in first six months
	Monitor inspection chambers. Inspect silt accumulation rates and determine silt clearance frequencies	Annually
Surface Water Attenuation Basin	Inspect for sediment and debris in pre-treatment components and remove. Note rate of sediment accumulation.	As required
	Check basin to ensure emptying is occurring	Annually

Table 2 - Operation and Maintenance Summary

Appendix A

N

new native tree planting

cross section C

existing hedgerow

new native tree planting

Refer to Europaeus Land Management Services Ecolological appraisal survey report for all new native tree planting, new habitats recommended to enhance the site life value.

line of roof overhang at 2-500.

3 metre wide concrete apron

Dotted line indicates 2-5 roof over hang

light 3

cross section B

3metre wide concrete apron

RWD

grass ley to banks made up of a mixture of grasses, clover and herbs, see ecology report for specified species.

Post and wire fencing to top of banks

proposed pond

Storm water taken to the new pond created on site, there after piped in 90mm pipe following the natural contours of the ground. Downhill to the existing irrigation pond.

15m

RWD

Unit 1
Manure store
1728m²

RWD

3m

36m

36m

15m

RWD

6m

centre line of existing hedge

540m²

Unit 2
Multi purpose Agricultural and manure store.

RWD

RWD

New access road around buildings Made up of crusher run with Type one subbase.

floor level 95-00

existing hedgerow

grass ley to banks made up of a mixture of grasses, clover and herbs, see ecology report for specified species.

150mm French drain around site

light 2

New building min 3 m away from hedge root system

Floor level 94-00

See DAS for Specified Light range

Light 1

line of roof overhang at 2-500.

RWD

48m

cross section A

Post and wire fencing to top of banks

8m

existing poly tunnels

HEREFORDSHIRE COUNCIL
PLANNING SERVICES
DEVELOPMENT CONTROL
09 FEB 2021
To:
Ack'd: File:

4th February 2021 Revision B
Unit numbers changed to comply with planning requirements.

Scale bar

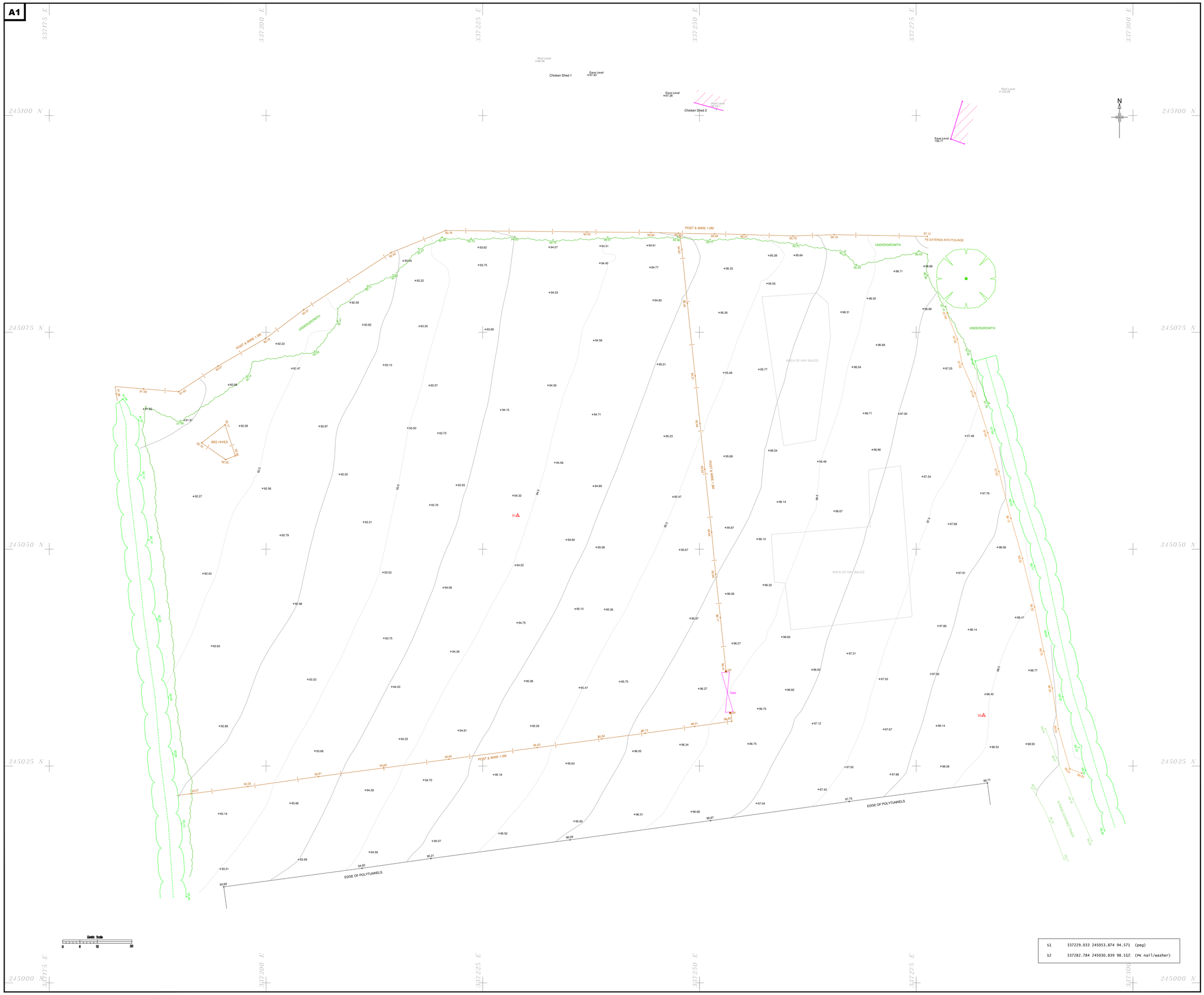
PROPOSED PLANS & SITE LAYOUT

Scale 1:200

Drwg No JP.7 B
Scale 1:200
Date 9th Oct 2020.
E M-J.

Appendix B

A1



S1	337229.033	245053.874 94.571 (peg)
S2	337282.784	245030.839 98.512 (PK nail/washer)

ABBREVIATIONS

AC - AIR CON UNIT
AV - AIR VALVE
BEL - BELISHA BEACON
BL - BOLLARD
BM -BENCH MARK
BH - BOREHOLE
BT - TELECOM COVER
BS - BUS STOP
CAM - CAMERA
CB - CONTROL BOX/CABINET
C-LIGHT - CELLAR LIGHT
COL - STEEL COLUMN
CTV - CABLE TV COVER
DP - DOWN PIPE
EB - ELECTRIC BOLLARD
EH - ELECTRIC HOOKUP
EIC - ELECTRIC INSPECTION
EMKR - ELECTRIC MARKER
EP - ELECTRICITY POLE
ER - EARTH ROD
FDL - FLOODLIGHT
FH - FIRE HYDRANT
FL - FLOOR LEVEL
GAS - GAS PIPE/GAS BOX
GP - GATE POST
GV - GAS VALVE
GY - GULLEY
IC - INSPECTION COVER
IL - INVERT LEVEL
JB - JUNCTION BOX
KO - KERB OUTLET
LB - LITTER BIN
L/BOL - LIGHTING BOLLARD
LP - LAMP POST
MH - MANHOLE
MKR - MARKER POST
MP/1 - MONITORING POINT
MS - MILESTONE
NP - NAMEPLATE
PI - PIPE INVERT
PO - POST
PUMP - FUEL PUMP
RE - RODDING EYE
RS - ROAD SIGN
RSJ - STEEL JOIST
RW- RETAINING WALL
SAP - SAPLING
SC - STOP COCK
SD - SLOT DRAIN
SP - SIGN POST
ST - STOP TAP
SV - STOP VALVE
SY - STAY
TAC - TACTILE PAVING
TCB - TELEPHONE CALL BOX

TREE (TO SCALE)
TREE CANOPY
BUSH - (TO SCALE)
FOLIAGE LINE
SURVEY STATION
GATE
CB
CLOSE BOARD FENCE
PW
POST AND WIRE FENCE
PR
POST AND RAIL FENCE
IR
IRON RAILINGS
OVERHEAD TELEPHONE CABLES
OVERHEAD ELECTRICITY CABLES
FOUL WATER DRAIN
FOUL WATER DRAIN ASSUMED
STORM WATER DRAIN
STORM WATER DRAIN ASSUMED

TH - TRIALHOLE
TL - TRAFFIC LIGHTS
TLB - TRAFFIC LIGHT BOX
TP - TELEGRAPH POLE
TS - TRAFFIC SENSOR
VP - VENT PIPE
WM - WATER METER
WO - WASH OUT POINT
YG - YARD GULLEY

NOTES

Survey contents are correct as of date of survey
Kerb levels where shown are channel levels
Dimensional accuracy is commensurate with scale of survey
There will be no man entry into any manhole chambers. Pipe depths and diameters are measured from the surface.
Tree spreads are measured to the nearest metre and are shown concentric to the trunk, girths are measured 1 metre up from the ground. A qualified arboculturalist should be consulted to verify tree species and condition.

ORDNANCE SURVEY GRID & LEVELS (OSTN15)

CLIENT

MJ DESIGNS

JOB TITLE

PLOT OF LAND AT OAK-CHURCH FARM
STAUNTON-ON-WYE
HEREFORDSHIRE

DRAWING TITLE

TOPOGRAPHIC SURVEY

SCALE 1:200		**DRG No**	K1081-1
DATE 11/08/2020	**DRAWN BY** A.E.	**CHKd**	D.M.

INVAR MAPPING SURVEYS

PROVIDING SURVEYING SERVICES TO THE DESIGN, CONSTRUCTION AND PROPERTY INDUSTRIES FOR OVER FORTY YEARS

1 STIPERSTONES, MINSTERLEY, SHREWSBURY, SHROPSHIRE, SY5 0LZ
Tel: 01743 792545 Fax: 01743 791977
Email: info@invarmapping.co.uk Web: www.invarmapping.co.uk

RICS CHARTERED SURVEYORS

Appendix C

Appendix D

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	92.220	0.420	7.3	69.9	Flood Risk
30 min Summer	92.323	0.523	8.2	90.6	Flood Risk
60 min Summer	92.406	0.606	8.9	108.2	Flood Risk
120 min Summer	92.427	0.627	9.0	113.0	Flood Risk
180 min Summer	92.420	0.620	9.0	111.5	Flood Risk
240 min Summer	92.406	0.606	8.9	108.2	Flood Risk
360 min Summer	92.368	0.568	8.5	100.0	Flood Risk
480 min Summer	92.328	0.528	8.2	91.6	Flood Risk
600 min Summer	92.291	0.491	7.9	84.1	Flood Risk
720 min Summer	92.258	0.458	7.6	77.3	Flood Risk
960 min Summer	92.201	0.401	7.1	66.2	Flood Risk
1440 min Summer	92.116	0.316	6.2	50.6	O K
2160 min Summer	92.037	0.237	5.2	36.8	O K
2880 min Summer	91.989	0.189	4.6	28.7	O K
4320 min Summer	91.936	0.136	3.7	20.3	O K
5760 min Summer	91.911	0.111	3.2	16.4	O K
7200 min Summer	91.900	0.100	2.8	14.7	O K
8640 min Summer	91.893	0.093	2.5	13.6	O K
10080 min Summer	91.888	0.088	2.3	12.8	O K
15 min Winter	92.264	0.464	7.7	78.6	Flood Risk
30 min Winter	92.378	0.578	8.6	102.1	Flood Risk
60 min Winter	92.470	0.670	9.3	122.7	Flood Risk
120 min Winter	92.497	0.697	9.5	128.8	Flood Risk
180 min Winter	92.485	0.685	9.4	126.0	Flood Risk
240 min Winter	92.465	0.665	9.3	121.4	Flood Risk
360 min Winter	92.413	0.613	8.9	109.8	Flood Risk
480 min Winter	92.359	0.559	8.5	98.1	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	160.427	0.0	74.6	21
30 min Summer	107.373	0.0	100.1	35
60 min Summer	68.560	0.0	128.3	62
120 min Summer	40.772	0.0	152.6	104
180 min Summer	29.518	0.0	165.7	134
240 min Summer	23.300	0.0	174.4	168
360 min Summer	16.534	0.0	185.7	236
480 min Summer	12.890	0.0	193.0	304
600 min Summer	10.608	0.0	198.6	370
720 min Summer	9.041	0.0	203.1	436
960 min Summer	7.025	0.0	210.4	562
1440 min Summer	4.927	0.0	221.2	810
2160 min Summer	3.484	0.0	235.0	1168
2880 min Summer	2.748	0.0	247.1	1528
4320 min Summer	2.002	0.0	269.8	2248
5760 min Summer	1.625	0.0	292.5	2944
7200 min Summer	1.402	0.0	315.3	3672
8640 min Summer	1.254	0.0	338.3	4400
10080 min Summer	1.149	0.0	361.5	5136
15 min Winter	160.427	0.0	83.6	21
30 min Winter	107.373	0.0	112.1	35
60 min Winter	68.560	0.0	143.7	62
120 min Winter	40.772	0.0	170.9	114
180 min Winter	29.518	0.0	185.7	144
240 min Winter	23.300	0.0	195.4	182
360 min Winter	16.534	0.0	208.0	256
480 min Winter	12.890	0.0	216.2	328

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
600 min Winter	92.309	0.509	8.1	87.7	Flood Risk
720 min Winter	92.264	0.464	7.7	78.6	Flood Risk
960 min Winter	92.189	0.389	7.0	63.9	O K
1440 min Winter	92.082	0.282	5.8	44.6	O K
2160 min Winter	91.992	0.192	4.6	29.3	O K
2880 min Winter	91.944	0.144	3.8	21.5	O K
4320 min Winter	91.903	0.103	2.9	15.1	O K
5760 min Winter	91.889	0.089	2.4	13.0	O K
7200 min Winter	91.881	0.081	2.1	11.8	O K
8640 min Winter	91.876	0.076	1.9	11.0	O K
10080 min Winter	91.872	0.072	1.7	10.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
600 min Winter	10.608	0.0	222.4	396
720 min Winter	9.041	0.0	227.5	464
960 min Winter	7.025	0.0	235.7	592
1440 min Winter	4.927	0.0	247.8	840
2160 min Winter	3.484	0.0	263.2	1192
2880 min Winter	2.748	0.0	276.7	1552
4320 min Winter	2.002	0.0	302.3	2208
5760 min Winter	1.625	0.0	327.6	2936
7200 min Winter	1.402	0.0	353.1	3648
8640 min Winter	1.254	0.0	378.9	4376
10080 min Winter	1.149	0.0	405.0	5104

Rainfall Details

Rainfall Model	FEH	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
FEH Rainfall Version	2013	Cv (Winter)	0.840
Site Location	GB 337200 245069 SO 37200 45069	Shortest Storm (mins)	15
Data Type	Point	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.250

Time From: (mins)	To: (mins)	Area (ha)	Time From: (mins)	To: (mins)	Area (ha)
0	4	0.125	4	8	0.125

Model Details

Storage is Online Cover Level (m) 92.500

Tank or Pond Structure

Invert Level (m) 91.800

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	141.0	0.700	233.0

Orifice Outflow Control

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 91.800

Appendix E

ORIFICE FLOW CONTROL ON BASIN OUTLET
ORIFICE DIAMETER 75mm
ORIFICE INVERT LEVEL 91.800mAOD

ORIFICE TO BE FITTED DIRECTLY ON OUTGOING PIPE

SURFACE WATER OUTFALL INTO WATERCOURSE
ELEVATION INFORMATION NOT AVAILABLE BUT INVERT LEVEL ASSUMED TO BE APPROXIMATELY 91.7mAOD BASED ON SITE VISIT OBSERVATION

PIPE TO BE FITTED WITH NON-RETURN VALVE (TIDEFLEX OR SIMILAR)

SURFACE WATER ATTENUATION BASIN
INVERT LEVEL 91.800mAOD
TOP OF BANK LEVEL 92.500mAOD
TOTAL DEPTH 700mm
TOTAL CAPACITY 130m^3 (APPROX)
SIDE SLOPES 1:2

SIZED TO ACCOMMODATE EXCESS FLOWS IN 100yr(+40%) DESIGN STORM EVENT

AREA OF ROOF OVERHANG

FRENCH DRAIN TO DISCHARGE TO DITCH UNATTENUATED (DESIGN BY OTHERS)

UNIT 1
95.000

UNIT 2
94.000

AREA OF ROOF OVERHANG

ACCESS ROADS (NOT SHOWN) TO BE CRUSHER RUN CONSTRUCTION AND DRAIN DIRECTLY TO SUBSOIL

APPROXIMATE LOCATION AND EXTENTS OF EARTHWORKS

S1 337229.033 245053.874 94.571 (peg)
S2 337282.784 245030.839 98.517 (PK nail/washer)

INDICATIVE

NOTES:

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5. DIAMETERS AND GRADIENTS OF PIPEWORK SHALL BE DETERMINED AT DETAILED DESIGN FOLLOWING CONFIRMATION OF PROPOSED SITE LEVELS.

KEY:

- RWP — RAINWATER DOWNPIPE (POSITIONS APPROXIMATE)
- SURFACE WATER RODDING EYE
- SURFACE WATER INSPECTION CHAMBER/MANHOLE
- SURFACE WATER DRAIN

Rev	Date	Details	Drawn by	Checked by
-	-	-	-	-

COTSWOLD TRANSPORT PLANNING

CLIENT: MR JEREMY PRICE

PROJECT: OAKCHURCH FARM STAUNTON-ON-WYE

TITLE: DRAINAGE STRATEGY

STATUS: INFORMATION

SCALE @ A1:	DATE:	DRAWN:	CHECKED:	APPROVED:
1:200	APR '21	DM	-	-

JOB NO:	DRAWING NO:	REVISION:
CTP-21.0255	C001	-