INGENT
CONSULTING ENGINEERS

FLOOD RISK ASSESSMENTS

Flood Risk Assessment and Drainage Strategy

2108-607 – William Armes, Churchfield Road, Sudbury

October 2021

Author: Sean Madle Approved By: Richard Wigzell Date: March 2021 Revision: A

DOCUMENT CONTROL SHEET

REV	ISSUE PURPOSE	AUTHOR	CHECKED	APPROVED	DATE
DRAFT	Draft Submission to Client	RGW	SDM	RGW	25.10.21

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1. INTRODUCTION

1.1 Project

Ingent have been appointed to provide Flood Risk Assessment on proposed extension works to be undertaken on the existing William Armes commercial site located off Churchfield Road in Sudbury.

The existing site consists of an office building, warehousing and hardstandings and also car parking, landscaping and a SuDS surface water basin for attenuation. The proposals involve construction of a warehouse extension of approximately 430m2 with relocation of dock levellers, and also construction of new Loom Rooms of approximately 388m2. Both new extensions are to be constructed over what is currently reinforced concrete hardstanding areas.

The site area is approximately 1.77ha and the proposed site layout plan can be located in **Appendix A**.

1.2 Aims and Objectives

The purpose of this assessment is to review the proposed development and to consider the risk to it of flooding, and also the affect it may have on existing flood flows and flood storage within adjacent floodplains.

The risks of flooding and potential impact of alterations to the existing flood flow and storage regime and surface runoff characteristics are considered within the scope and parameters set out in the National Planning Policy Framework (NPPF). Consideration is also given to the ODPM document “Preparing for Floods”.

The Environment Agency flood mapping online service was accessed during this assessment. Please refer to **Appendix B** for flood mapping data.

1.3 Site Location and Characteristics

The site is located to the eastern edge of Sudbury and is accessed off Churchfield Road. The natural fall is approximately 7m from east to west across the site and this fall continues naturally to the River Stour around 1.6km south west.

The site is located outside of both Protected and Safeguard Zones for Drinking Water Groundwater but is within Drinking Water Safeguard Zone for Surface Water and Source Protection Zone 2. An explanation of Source Protection Zone 2 from the Government website, published by the Environment Agency can be found below:

“This zone is defined by the 400-day travel time from a point below the water table. Additionally, this zone has a minimum radius of 250 or 500 metres, depending on the size of the abstraction. The travel time is derived from consideration of the minimum time required to provide delay, dilution and attenuation of slowly degrading pollutants.”

In this case the site discharges surface water directly to an Anglian Water surface water sewer and infiltration Is not a viable consideration.

2. FLOOD ANALYSIS

2.1 Flood Level

The Environment Agency flood mapping (as shown in **Appendix B**) indicates that the proposed development lies in Flood Zone 1, outside any fluvial floodplain with <1in1,000yr probability of river or sea flooding.

As above the 1% flood level, the proposed development is not considered to have any impact on existing floodplain storage.

2.2 Flood Protection

Although within Flood Zone 1, consideration is also required of the flood risk presented from other potential sources such as overland water, groundwater, sewers and retained water features. The site has been assessed for these threats and the existing/proposed levels are such that in the event of large storm events, surface water flows would not threaten life or property. A detailed list of the flood risks considered is as follows:

Tidal/Fluvial Flooding:

The site has not been identified as an area at flood risk threat. No historic floods were found to have affected the site.

Surface Water:

The net rainfall falling on a surface (on or off the site) which acts as runoff which has not infiltrated into the ground or entered a drainage system.

As can be seen from Appendix B, the site has no threat from surface water flooding.

Reservoir Flooding:

The Environment Agency flood mapping for risk from reservoir flooding does not indicate any major risks within close proximity to the redevelopment site.

Details of the above three flood risks types have been assessed against the Environment Agency Flood Mapping, found on the government's website. Copies of the mapping can be found within **Appendix B** of this report.

Groundwater:

Where the water-table rises to such a height where flooding occurs. Most common in low-lying areas underlain by permeable ground (aquifers), usually due to extended periods of wet weather. Based on the ground make-up, assessment made from the British Geographic Survey data and anecdotal record of

water levels in the existing SuDS basin (generally very low or dry) over fifteen years, groundwater flooding is not considered to be significant for this development.

Sewer & Highway Drains:

Where the local drainage infrastructure and associated highway drains cannot cope with the capacity and intensity of heavy rainfall events. There is no record or evidence of any flood risk from this source, based on the fifteen years of operation.

Infrastructure Failure:

Where the existing private drainage infrastructure and features on-site, are unable to attenuate the volumes of the rainfall events. The current commercial facility was designed and built in 2005 with underground storage and a SuDS basin to store and attenuate surface water flows from the site. Anecdotal evidence is that the drainage system performs well with no record of flooding and as such the existing infrastructure is not considered to pose any flood risk to the site or it's proposed extensions.

2.3 Extreme Flood Events

Consideration is given to flood events over and above the 1 in 100-year rainfall event and exceedance flow routes assessed. All flows are generally directed away from the buildings, as indicated by the blue flow arrows shown on the general arrangement.

The existing drainage network has been remodelled and tested with current FEH rainfall data. In the critical 100 year storm plus a 20% allowance for climate change over commercial lifespan the system was found to fully contain stormwater other than very minor flooding of 1.5m3 from a single manhole located within a landscape area. This area is also served by a separate land drainage system installed to cut off any surface water from soft areas on the high side of the site.

The exceedance event is not therefore considered to pose any floodrisk to the buildings and construction of the proposed extensions will have no effect on the existing drainage system or current conclusions on flood risk or exceedance.

3. SURFACE WATER DRAINAGE

3.1 Existing Drainage

As noted above, the William Armes site was constructed in 2005 and drains surface water through a combination of underground positive drainage pipes, tanks and an open SuDS storage basin.

The site also harvests rainwater from a syphonic roof drainage system into a filtered 9,000L rainwater harvesting tank which is reused in the site's commercial processes.

Once attenuated the drainage network discharges surface water at a rate of 7.5 L/s into an Anglian Water surface water sewer that crosses the site. The discharge rate was agreed as greenfield runoff rate with the Environment Agency in 2005 and the proposed surface water drainage approved by them as part of the discharge of the planning conditions.

3.2 Site and Drainage Analysis

The building extensions proposed by the current planning application will both replace existing drained impermeable areas and as such will have no effect on the current operation of the surface water drainage, as designed.

As noted above, the existing drainage network has been remodelled to FEH standards of rainfall to check compliance with current standards and found to be satisfactory.

3.3 Surface Water Strategy

Following satisfactory testing of the existing drainage network to current standards, it Is not intended to make significant alterations to the existing drainage to accommodate the proposed extensions.

The contributing impermeable areas on the site will remain unchanged by the proposed works and as such the surface water drainage strategy will only involve the accommodation of existing chambers and pipework within the proposals and reconnection of roof area replacing hardstanding, into the network.

Details of the existing surface water drainage are shown on the appended general arrangement 2108-607-001 and 002 with the locations and drainage of the proposed extensions noted.

3.4 Pollution Mitigation \ SuDS Risk Assessment

The William Armes site currently has limited pollution mitigation measures with trapped gullies and an open SuDS basin providing some treatment to areas of low use car parking and hardstandings.

It is noted that the current application will reduce the pollution risk from the site due to the replacement of low pollution risk hardstanding areas with no pollution risk roof areas.

Despite the improvement that will result from the proposals, it is further proposed to retro-fit additional pollution mitigation within the existing network. The most effective means to achieve this without major reconstruction of the existing network is fit a wall arrangement of the Naylor Industry Smartsponge product into the existing final hydrobrake chamber, downstream of the hydrobrake.

The advantage of this system is that it is equally effective on turbulent flow and emulsified oil/hydrocarbons that would be less likely to be trapped by retrofitting conventional interceptors on a system of this nature – ie where the conveyance also forms part of the storage, likely to result in two way and turbulent flow.

A detail of the proposed Smartsponge retro-fitting is shown on the appended detail 2108-607-003. The Smartsponge pollution control measures will be maintained by the William Armes site management on a regular basis as part of routine site maintenance.

As a result of the measures proposed, it is therefore considered that the pollution risk arising from the site will be significantly reduced by the application put forward.

3.5 Flood Exceedance

As noted previously, flood exceedance is managed by the existing site falls and surface water drainage network and will be unaffected by the building extensions proposed.

3.6 Foul Water Strategy

Foul water drainage from the William Armes site is by gravity network connecting to the Anglian Water network and will be unaffected by the proposed building extensions.

4. CONCLUSION AND RECOMMENDATIONS

The proposed development site has been assessed for the risk to the site from fluvial and surface water flooding in accordance with the guidelines of the NPPF. Assessment has also been made of the impact of the proposed development on the existing floodplain storage at this location, and of the risk of pluvial flooding from storm water contribution from the development exacerbating downstream flooding, as directed by the guidance.

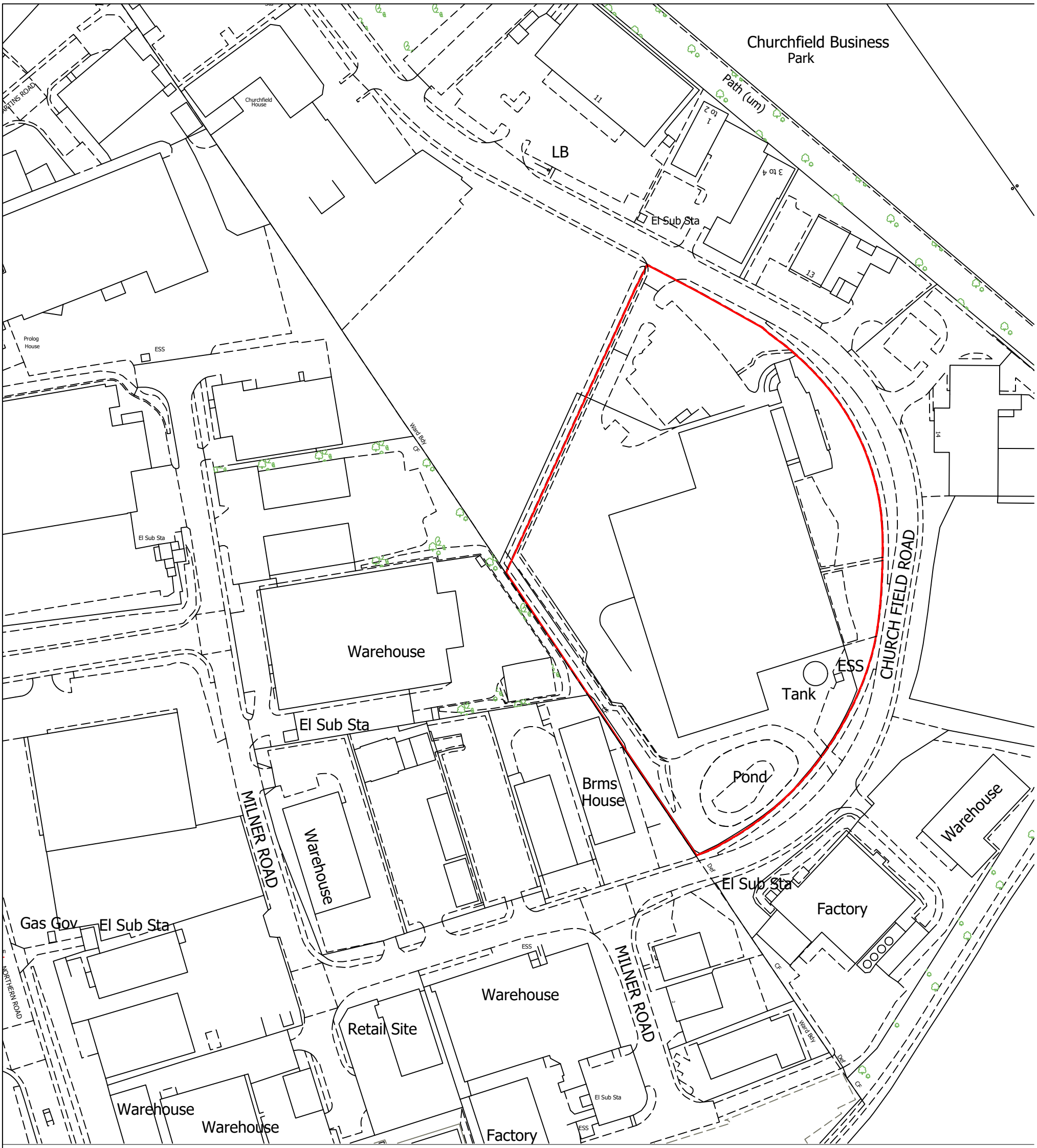
The proposed development lies within Flood Zone 1 and is therefore not considered to be at risk from fluvial flooding. The site has similarly been found to be outside any zone of overland surface water flood threat. Other sources of flooding have also been assessed and found to pose no threat to development on the site.

The proposals do not affect flood storage within the floodplain, nor will the proposals cause any surface water flooding – all hardstanding areas have been accounted for and drained by gravity to the desired point of discharge.

The existing site surface water drainage system has been found to be effective to current standards and additional pollution mitigation measures are proposed as part of the application.

It is considered from this assessment that the level of risk of flooding to and from the proposed development is of an acceptable level and in keeping with current policy.

APPENDIX A – SITE LOCATION AND LAYOUT PLANS



w4architects ltd
The Old Vicarage
Shalford Essex CM7 5HH

client
Likewise Matting

project title
William Armes Ltd
Church Field Road,
Sudbury, CO10 2YA

drawing title
Location Plan

project ref	drawing #	revision #	file ref
107	PL 01	.	locatic
scale	date	drawn by	checked by
1:1250 @ A3	07 07 2021	RP	CW

NOTES

Finishes
Roof
Warehouse
Standing seam roof.
Roof and facia colour; Albatross 18B17

Wall Cladding
Type A - MR600 Microrib composite wall cladding system by Kingspan Ltd.
Type B - KS1000RW' composite wall cladding system by Kingspan Ltd.
Cladding colour; Albatross 18B17

Escape Stairs
Escape stairs as existing with facing brickwork side walls:
Baggeridge Blue Engineer class B to BS 921.
Bond: stretcher, Mortar: flush,

Loading Bays
New Loading Bay with Hydraulic leveller, Door and curtains all to match existing

EXISTING FOUL WATER SEWER
EXISTING SURFACE WATER SEWER
H/Thorn 3h
H/Thorn 5h
102100
New Dock Doors and Levellers
New Escape
20270
13350
5250
New Escape
Extended Recycle Skip Location
Pond
New Kerb Line
33410
Existing Loom Location
4000
4213
NEW WARE HOUSE EXTENSION
32000
New Retaining wall
Existing Warehouse
Existing Escape removed
Existing Dock Doors and Levellers removed removed
LOOM No 1
NEW LOOM ROOM
LOOM No 2
22500
Below Ground Rain Water Tank
Sprinkler Tank removed
New Retaining wall
Shrubs to be removed
3350
17500
6100
5500
5250
OFFICE
OFFICE
OFFICE
OFFICE
OFFICE
OFFICE
OUTSIDE SEATING
OFFICES
LIFT
RECEPTION
SHOWROOM
WC
BALCONY OVER
Churchfield Road
Churchfield Road
N
0
10m
20m
30m
40m
50m
Scale Bar

revisions

PLANNING

w4 architects ltd
The Old Vicarage Shalford
Essex CM7 5HH

Project Job Number 107
William Armes Ltd
Church Field Road, Sudbury, CO102YA

Client
Likewise Matting

Drawing Title Drawing Size A1
Proposed Warehouse Extensions
Proposed Site Layout

Drawn RP	Date July 2021	Scale 1:200@A1	Cadfile Proposed
Reviewed by CW	Drawing No. 107 PL 04		Rev.

APPENDIX B – ENVIRONMENT AGENCY FLOOD MAPPING

Flood map for planning

Your reference	Location (easting/northing)	Created
William Armes	**589059/241898**	**22 Oct 2021 10:04**

Your selected location is in flood zone 1, an area with a low probability of flooding.

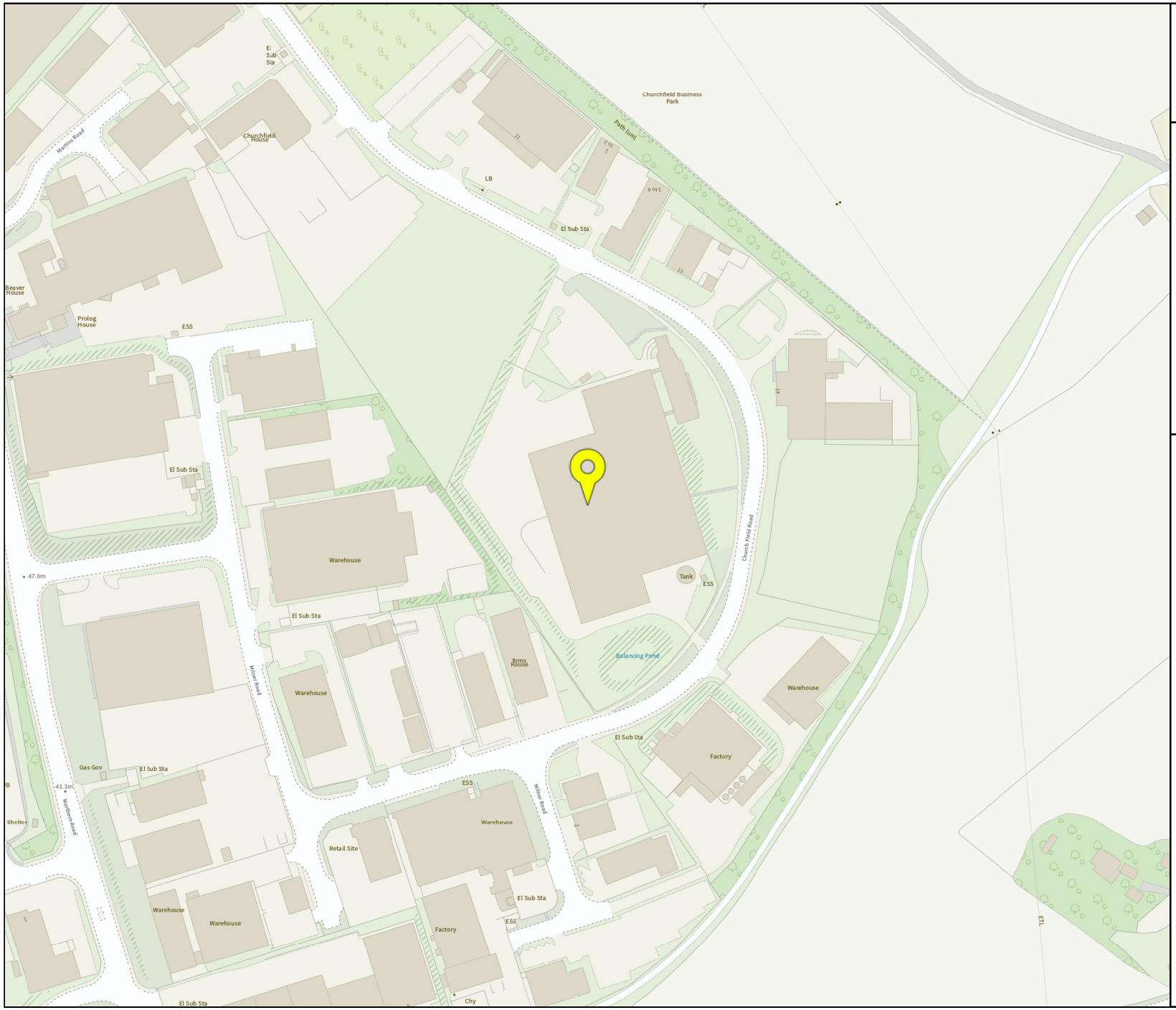
This means:

- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.



Environment Agency

Flood map for planning

Your reference
William Armes

Location (easting/northing)
589059/241898

Scale
1:2500

Created
22 Oct 2021 10:04

- Selected point
- Flood zone 3
- Flood zone 3: areas benefitting from flood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Flood storage area

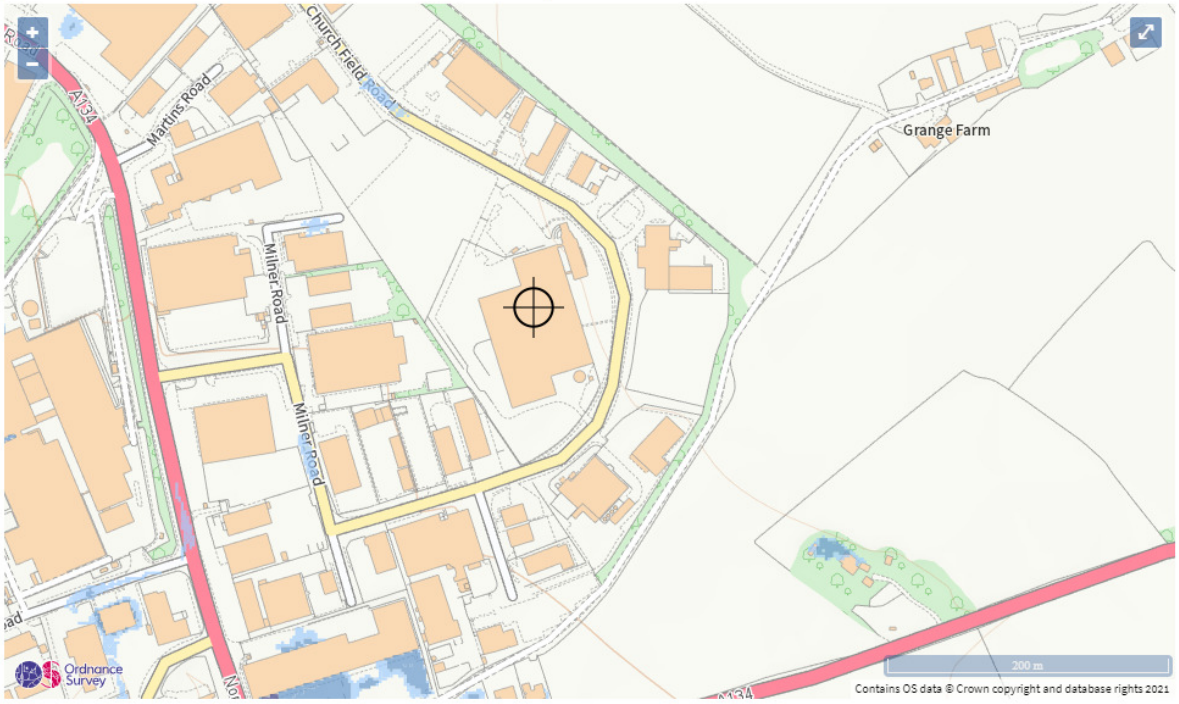
0 20 40 60m

Flood risk

High risk: depth

Location

Enter a place or postcode



Surface water flood risk: water depth in a high risk scenario

Flood depth (millimetres)

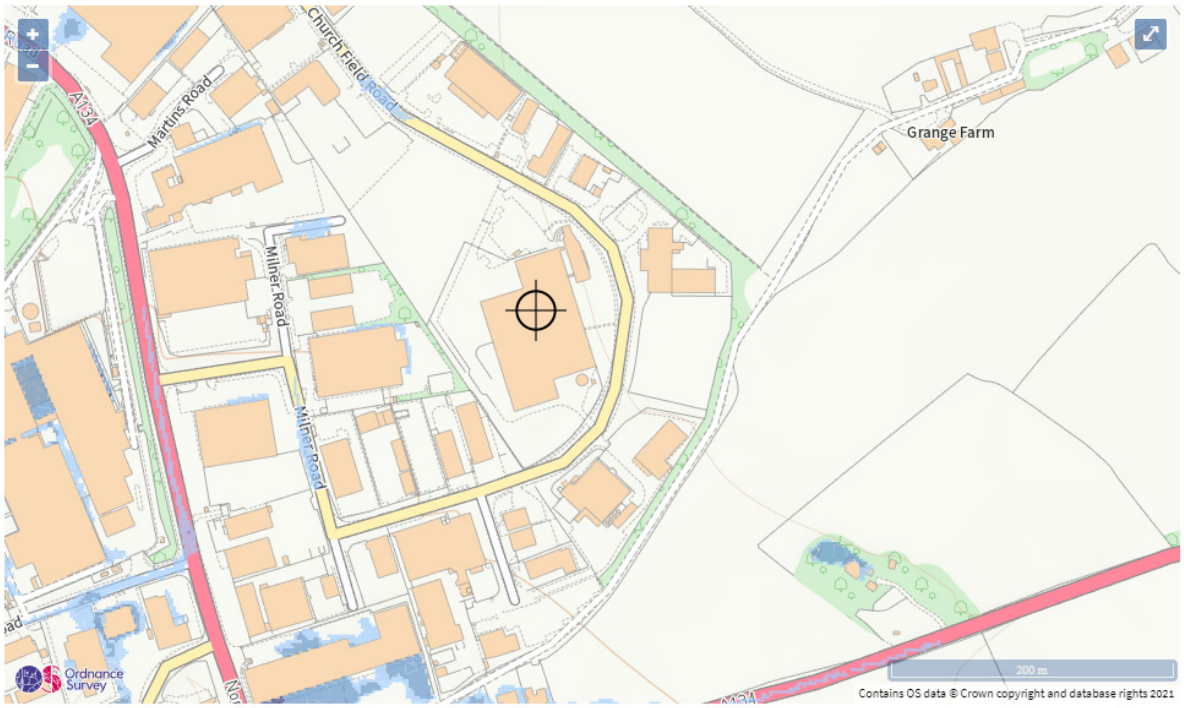
Over 900mm | 300 to 900mm | Below 300mm | Location you selected

Flood risk

Medium risk: depth

Location

Enter a place or postcode



Surface water flood risk: water depth in a medium risk scenario

Flood depth (millimetres)

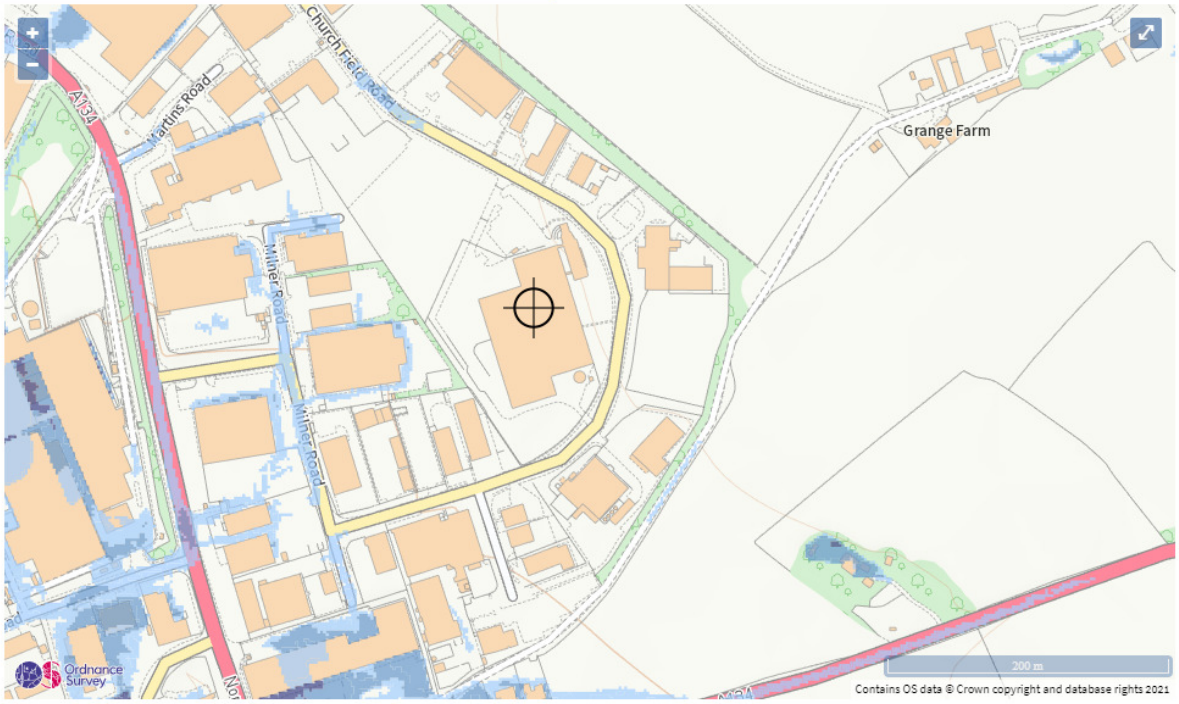
Over 900mm | 300 to 900mm | Below 300mm | Location you selected

Flood risk

Low risk: depth

Location

Enter a place or postcode



Surface water flood risk: water depth in a low risk scenario

Flood depth (millimetres)

Over 900mm | 300 to 900mm | Below 300mm | Location you selected

APPENDIX C – DRAINAGE STRATEGY DRAWINGS

GENERAL
1. DO NOT SCALE THIS DRAWING. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED. ANY DISCREPANCIES ARE TO BE RECORDED AND REPORTED TO THE ENGINEERS IMMEDIATELY.

2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER ENGINEERS AND ARCHITECTS DRAWINGS AND THE SPECIFICATION.

3. ANY EXISTING DETAILS WHICH ARE SHOWN ON THIS DRAWING ARE FOR GUIDANCE ONLY AND ARE TO BE CHECKED ON SITE BY THE CONTRACTOR. ANY VARIATIONS ARE TO BE RECORDED AND REPORTED TO THE ENGINEER IMMEDIATELY.

Extended Recycle Skip Location

LIGHTLY LANDSCAPED DISHED AREA TO RETAIN OVERFLOW FROM PEAK SUMMER STORMS.

FLOW RESTRICTED BY 75mm ORIFICE PLATE.

New Retaining wall

New Escape

NEW WARE HOUSE EXTENSION

POTENTIAL TUFFNELLS BOX

ALL EXISTING CHAMBERS ARE TO BE ACCOMMODATED WITHIN THE INTERNAL LAYOUT OF THE PROPOSED BUILDING EXTENSION AND COVERS RESET TO ANY CHANGES IN LEVEL.

RAINWATER DRAINAGE FROM NEW BUILDING EXTENSION IS TO BE CONNECTED TO EXISTING MANHOLES S7.

225mm DIAMETER SPUR FROM SURFACE WATER SEWER TO GRID LINE P5 TO RECEIVE SYPHONIC DRAINAGE DOWNPIPE. EXACT LOCATION AS DIRECTED BY FULLPIPE LTD.

40mm DRAINAGE STONE IN TERRAM LINED GRIP 600mm DEEP X 600mm WIDE AROUND PERIMETER OF BUILDING AS SHOWN, TO CATCH RUN OFF FROM SLOPES. GRIP MAY BE PIPED AROUND REAR OF RETAINING WALLS BUT INVERT MUST NOT RISE THROUGHOUT ITS LENGTH AND IS RUN ULTIMATELY INTO THE DESIGNATED BALANCING AREA.

New Dock Doors and Levellers

Existing Escape

Existing Doors and Levellers removed

S1 CL 49.350 IL 49.000
S2 CL 49.350 IL 48.567
S3 CL 49.350 IL 48.193
S4 CL 49.200 IL 48.051
S5 CL 47.000 IL 46.117
S6 CL 46.350 IL 45.250
S7 CL 44.770 IL 43.287 (225) IL 42.312 (1200)
S8 CL 44.690 IL 42.258 (1200)
S9 CL 45.000 IL 43.875
S10 CL 45.200 IL 43.629
S12 CL 47.200 IL 46.500
S13 CL 48.460 IL 47.500
S14 CL 46.700 IL 45.650
S15 CL 46.190 IL 44.840
S16 CL 45.200 IL 44.000
S17 CL 45.200 IL 43.829

FFL 46.500
FFL 49.500

SHOWROOM
RECEPTION
WC
OFFICE
OFFICES

CONTINUED ON SHEET 2

KEY

PROPOSED BUILDING EXTENSION	
EXISTING DRAINAGE	

Rev	Revision Notes	Dwn	Apvd	Date

INGENT
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Tel: 01473 598038 ---- www.ingent.co.uk ---- email: info@ingent.co.uk

smas worksafe consultant www.smasltd.com — SSIP SAFETY SCHEMES IN PROCUREMENT — CQMS Safety Scheme

PRELIMINARY

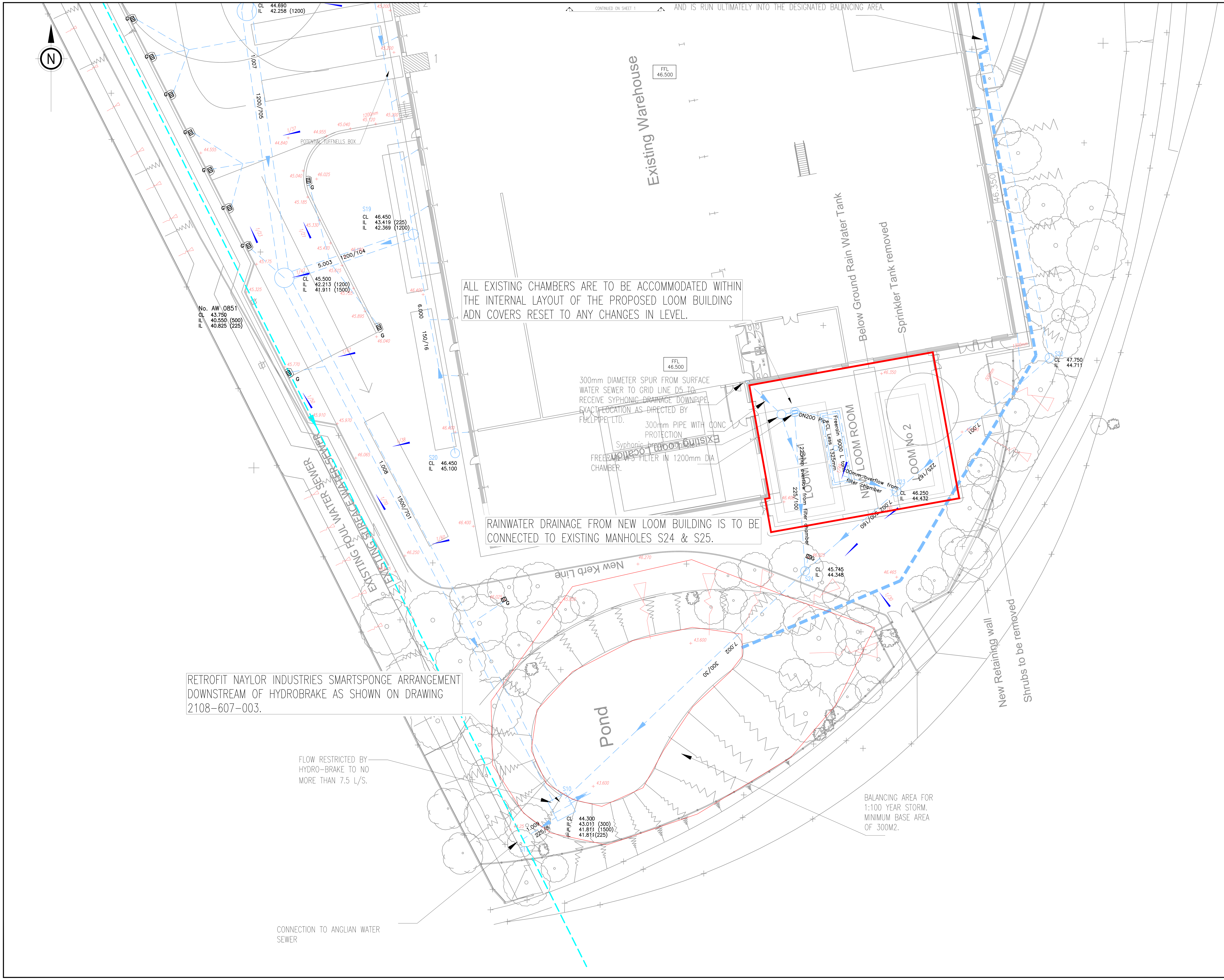
Project:
CHURCH FIELD ROAD, SUDBURY

Drawing Title:
EXISTING DRAINAGE AND PROPOSED EXTENSIONS

Client:			Date:
WILLIAM ARMES			OCT 2021
Drawn: LB	Designed: LB	Checked: RWG	Approved: RWG

Scale: 1:200 (5m 0m 5m 10m)

Project No:	Drawing No & Revision:	Size:
2108-607	001	A1



AND IS RUN ULTIMATELY INTO THE DESIGNATED BALANCING AREA.
Existing Warehouse
FFL 46.500
Below Ground Rain Water Tank
Sprinkler Tank removed
ALL EXISTING CHAMBERS ARE TO BE ACCOMMODATED WITHIN THE INTERNAL LAYOUT OF THE PROPOSED LOOM BUILDING ADN COVERS RESET TO ANY CHANGES IN LEVEL.
300mm DIAMETER SPUR FROM SURFACE WATER SEWER TO GRID LINE D5 TO RECEIVE SYPHONIC DRAINAGE DOWNPIPE. EXACT LOCATION AS DIRECTED BY FULLPIPE LTD.
300mm PIPE WITH CONC PROTECTION
FREERAIN WS FILTER IN 1200mm DIA CHAMBER.
RAINWATER DRAINAGE FROM NEW LOOM BUILDING IS TO BE CONNECTED TO EXISTING MANHOLES S24 & S25.
LOOM ROOM
LOOM No 2
New Kerb Line
Pond
EXISTING FOUL WATER SEWER
EXISTING SURFACE WATER SEWER
RETROFIT NAYLOR INDUSTRIES SMARTSPONGE ARRANGEMENT DOWNSTREAM OF HYDROBRAKE AS SHOWN ON DRAWING 2108-607-003.
FLOW RESTRICTED BY HYDRO-BRAKE TO NO MORE THAN 7.5 L/S.
BALANCING AREA FOR 1:100 YEAR STORM. MINIMUM BASE AREA OF 300M2.
CONNECTION TO ANGLIAN WATER SEWER
New Retaining wall
Shrubs to be removed
S19 CL 46.450 IL 43.419 (225) IL 42.369 (1200)
CL 45.500 IL 42.213 (1200) IL 41.911 (1500)
No. AW 0851 CL 43.750 IL 40.550 (500) IL 40.825 (225)
S20 CL 46.450 IL 45.100
CL 47.750 IL 44.711
CL 46.250 IL 44.432
CL 45.745 IL 44.348
CL 44.300 IL 43.011 (300) IL 41.811 (1500) IL 41.811(225)
CL 44.690 IL 42.258 (1200)

GENERAL

1. DO NOT SCALE THIS DRAWING. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED. ANY DISCREPANCIES ARE TO BE RECORDED AND REPORTED TO THE ENGINEERS IMMEDIATELY.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER ENGINEERS AND ARCHITECTS DRAWINGS AND THE SPECIFICATION.
3. ANY EXISTING DETAILS WHICH ARE SHOWN ON THIS DRAWING ARE FOR GUIDANCE ONLY AND ARE TO BE CHECKED ON SITE BY THE CONTRACTOR. ANY VARIATIONS ARE TO BE RECORDED AND REPORTED TO THE ENGINEER IMMEDIATELY.

KEY

PROPOSED BUILDING EXTENSION	(red line)
EXISTING DRAINAGE	(blue dashed line)

Rev	Revision Notes	Dwn	Apvd	Date

INGENT
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Unit 10 Brightwell Barns, Waldringfield Road, Brightwell, Suffolk, IP10 0BJ.
Tel: 01473 598038 ---- www.ingent.co.uk ---- email: info@ingent.co.uk

PRELIMINARY

Project: CHURCH FIELD ROAD, SUDBURY

Drawing Title: EXISTING DRAINAGE AND PROPOSED EXTENSIONS

Client: WILLIAM ARMES			Date: OCT 2021
Drawn: LB	Designed: LB	Checked: RWG	Approved: RWG

Scale: 1:200

Project No:	Drawing No & Revision:	Size:
2108-607	002	A1

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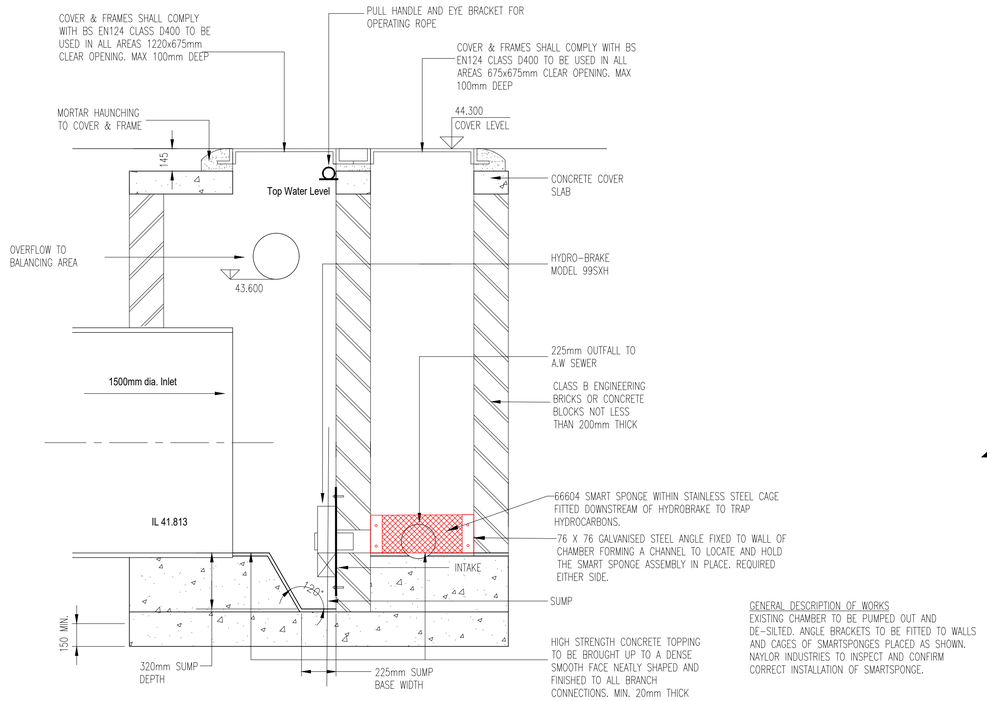
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER ENGINEERS AND ARCHITECTS DRAWINGS AND THE SPECIFICATION.

3. ANY EXISTING DETAILS WHICH ARE SHOWN ON THIS DRAWING ARE FOR GUIDANCE ONLY AND ARE TO BE CHECKED ON SITE BY THE CONTRACTOR. ANY VARIATIONS ARE TO BE RECORDED AND REPORTED TO THE ENGINEER IMMEDIATELY.

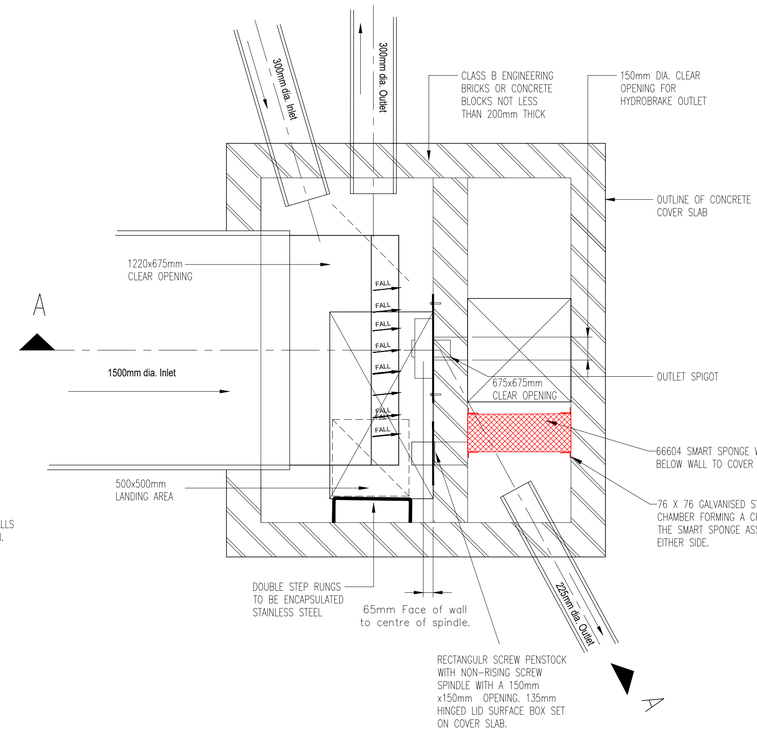
NOTE:
HYDROBRAKE FLOW CONTROL DEVICE AS SHOWN ON THIS DRAWING IS TO BE INSTALLED STRICTLY IN ACCORDANCE WITH THE MANUFACTURERS INSTRUCTIONS.



GENERAL DESCRIPTION OF WORKS
EXISTING CHAMBER TO BE PUMPED OUT AND DE-SILTED. ANGLE BRACKETS TO BE FITTED TO WALLS AND CAGES OF SMARTSPONGES PLACED AS SHOWN. NAYLOR INDUSTRIES TO INSPECT AND CONFIRM CORRECT INSTALLATION OF SMARTSPONGE.

HYDROBRAKE MANHOLE S10 (SECTION A-A)

SCALE 1:20



Rev	Revision Notes	Dwn	Apvd	Date

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Unit 10 Brightwell Barns, Waldringfield Road, Brightwell, Suffolk, IP10 0BJ.
Tel: 01473 598038 ---- www.ingent.co.uk ---- email: info@ingent.co.uk

PRELIMINARY

Project:
CHURCH FIELD ROAD, SUDBURY

Drawing Title:
POLLUTION MITIGATION RETROFITTED TO HYDROBRAKE CHAMBER

Client:			Date:
WILLIAM ARMES			OCT 2021
Drawn: LB	Designed: LB	Checked: RWG	Approved: RWG

Scale: 1:20 (0.5m 0m 0.5m 1m)

Project No:	Drawing No & Revision:	Size:
2108-607	003	A1

APPENDIX D – SURFACE WATER CALCULATIONS

Design Settings

Rainfall Methodology	FEH-13	Minimum Velocity (m/s)	0.75
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	0.0		

Circular Link Type

Shape	Circular	Auto Increment (mm)	75
Barrels	1	Follow Ground	x

Available Diameters (mm)

100 | 150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.010	5.00	49.300	1050	994.718	1477.707	0.300
2	0.010	5.00	49.300	1050	992.482	1494.865	0.733
3			49.300	1050	985.438	1516.140	1.107
4			49.200	1050	979.368	1522.128	1.149
12	0.014	5.00	47.200	1050	937.976	1536.891	0.700
5	0.086	5.00	47.000	1050	949.837	1520.846	0.883
13	0.034	5.00	48.580	1050	970.560	1504.330	1.080
14			46.700	1050	943.937	1500.587	1.050
6			45.000	1050	925.363	1503.961	1.125
15	0.029	5.00	46.190	1050	917.519	1516.834	1.350
7			44.770	1800	907.105	1490.927	2.458
8	0.113	5.00	44.690	1800	899.014	1453.671	2.432
16	0.028	5.00	45.250	1050	939.868	1496.141	1.250
17	0.111	5.00	45.250	1050	942.724	1478.720	1.421
18	0.073	5.00	45.250	1050	911.284	1472.540	1.621
20	0.065	5.00	46.450	1050	923.707	1401.714	1.350
19			46.450	1800	918.789	1427.503	4.081
9	0.045	5.00	45.500	1800	903.432	1422.229	3.589
21	0.158	5.00	46.300	1050	978.824	1498.461	1.050
22			47.750	1200	993.703	1412.951	3.039
23	0.155	5.00	46.070	1050	963.191	1401.198	1.638
24			46.030	1050	964.910	1387.836	1.682
10			43.600	1800	935.964	1360.206	1.789
11			44.056		931.669	1356.270	2.302

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	1	2	17.304	0.600	49.000	48.567	0.433	40.0	100	5.24	0.0
1.001	2	3	22.410	0.600	48.567	48.193	0.374	59.9	100	5.61	0.0
1.002	3	4	8.530	0.600	48.193	48.051	0.142	60.1	100	5.75	0.0
1.003	4	5	29.560	0.600	48.051	46.617	1.434	20.6	100	6.04	0.0
2.000	12	5	19.950	0.600	46.500	46.167	0.333	59.9	100	5.33	0.0
1.004	5	6	29.730	0.600	46.117	43.950	2.167	13.7	150	6.22	0.0
3.000	13	14	26.890	0.600	47.500	45.650	1.850	14.5	100	5.22	0.0
3.001	14	6	18.880	0.600	45.650	44.000	1.650	11.4	100	5.36	0.0
1.005	6	7	22.430	0.600	43.875	43.287	0.588	38.1	225	6.40	0.0
4.000	15	7	27.921	0.600	44.840	43.362	1.478	18.9	150	5.20	0.0
1.006	7	8	38.130	0.600	42.312	42.258	0.054	706.1	1200	6.85	0.0
1.007	8	9	31.750	0.600	42.258	42.211	0.047	675.5	1200	7.22	0.0
5.000	16	17	17.650	0.600	44.000	43.829	0.171	103.2	225	5.23	0.0
5.001	17	18	32.040	0.600	43.829	43.629	0.200	160.2	225	5.75	0.0
5.002	18	19	45.660	0.600	43.629	43.344	0.285	160.2	225	6.49	0.0
6.000	20	19	26.250	0.600	45.100	43.419	1.681	15.6	150	5.17	0.0
5.003	19	9	16.240	0.600	42.369	42.213	0.156	104.1	1200	6.56	0.0
1.008	9	10	70.040	0.600	41.911	41.811	0.100	700.4	1500	7.95	0.0
7.000	21	22	86.790	0.600	45.250	44.711	0.539	161.0	225	6.41	0.0
7.001	22	23	32.700	0.600	44.711	44.507	0.204	160.3	225	6.94	0.0
7.002	23	24	13.470	0.600	44.432	44.348	0.084	160.4	300	7.12	0.0
7.003	24	10	40.016	0.600	44.348	43.011	1.337	29.9	300	7.35	0.0
1.009	10	11	5.830	0.600	41.811	41.754	0.057	102.3	225	8.02	0.0

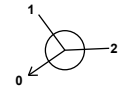
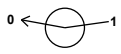
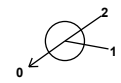
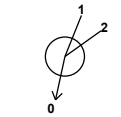
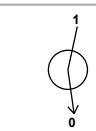
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.000	1.223	9.6	0.0	0.200	0.633	0.010	0.0
1.001	0.997	7.8	0.0	0.633	1.007	0.020	0.0
1.002	0.995	7.8	0.0	1.007	1.049	0.020	0.0
1.003	1.708	13.4	0.0	1.049	0.283	0.020	0.0
2.000	0.997	7.8	0.0	0.600	0.733	0.014	0.0
1.004	2.734	48.3	0.0	0.733	0.900	0.120	0.0
3.000	2.037	16.0	0.0	0.980	0.950	0.034	0.0
3.001	2.297	18.0	0.0	0.950	0.900	0.034	0.0
1.005	2.124	84.5	0.0	0.900	1.258	0.154	0.0
4.000	2.328	41.1	0.0	1.200	1.258	0.029	0.0
1.006	1.400	1583.2	0.0	1.258	1.232	0.183	0.0
1.007	1.431	1619.0	0.0	1.232	2.089	0.296	0.0
5.000	1.286	51.1	0.0	1.025	1.196	0.028	0.0
5.001	1.030	41.0	0.0	1.196	1.396	0.139	0.0
5.002	1.030	41.0	0.0	1.396	2.881	0.212	0.0
6.000	2.562	45.3	0.0	1.200	2.881	0.065	0.0
5.003	3.666	4146.4	0.0	2.881	2.087	0.277	0.0
1.008	1.613	2849.9	0.0	2.089	0.289	0.618	0.0
7.000	1.027	40.9	0.0	0.825	2.814	0.158	0.0
7.001	1.030	40.9	0.0	2.814	1.338	0.158	0.0
7.002	1.239	87.6	0.0	1.338	1.382	0.313	0.0
7.003	2.884	203.9	0.0	1.382	0.289	0.313	0.0
1.009	1.292	51.4	0.0	1.564	2.077	0.931	0.0

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	17.304	40.0	100	Circular	49.300	49.000	0.200	49.300	48.567	0.633
1.001	22.410	59.9	100	Circular	49.300	48.567	0.633	49.300	48.193	1.007
1.002	8.530	60.1	100	Circular	49.300	48.193	1.007	49.200	48.051	1.049
1.003	29.560	20.6	100	Circular	49.200	48.051	1.049	47.000	46.617	0.283
2.000	19.950	59.9	100	Circular	47.200	46.500	0.600	47.000	46.167	0.733
1.004	29.730	13.7	150	Circular	47.000	46.117	0.733	45.000	43.950	0.900
3.000	26.890	14.5	100	Circular	48.580	47.500	0.980	46.700	45.650	0.950
3.001	18.880	11.4	100	Circular	46.700	45.650	0.950	45.000	44.000	0.900
1.005	22.430	38.1	225	Circular	45.000	43.875	0.900	44.770	43.287	1.258
4.000	27.921	18.9	150	Circular	46.190	44.840	1.200	44.770	43.362	1.258
1.006	38.130	706.1	1200	Circular	44.770	42.312	1.258	44.690	42.258	1.232
1.007	31.750	675.5	1200	Circular	44.690	42.258	1.232	45.500	42.211	2.089
5.000	17.650	103.2	225	Circular	45.250	44.000	1.025	45.250	43.829	1.196
5.001	32.040	160.2	225	Circular	45.250	43.829	1.196	45.250	43.629	1.396
5.002	45.660	160.2	225	Circular	45.250	43.629	1.396	46.450	43.344	2.881
6.000	26.250	15.6	150	Circular	46.450	45.100	1.200	46.450	43.419	2.881
5.003	16.240	104.1	1200	Circular	46.450	42.369	2.881	45.500	42.213	2.087
1.008	70.040	700.4	1500	Circular	45.500	41.911	2.089	43.600	41.811	0.289
7.000	86.790	161.0	225	Circular	46.300	45.250	0.825	47.750	44.711	2.814
7.001	32.700	160.3	225	Circular	47.750	44.711	2.814	46.070	44.507	1.338
7.002	13.470	160.4	300	Circular	46.070	44.432	1.338	46.030	44.348	1.382
7.003	40.016	29.9	300	Circular	46.030	44.348	1.382	43.600	43.011	0.289
1.009	5.830	102.3	225	Circular	43.600	41.811	1.564	44.056	41.754	2.077

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1050	Manhole	Adoptable	2	1050	Manhole	Adoptable
1.001	2	1050	Manhole	Adoptable	3	1050	Manhole	Adoptable
1.002	3	1050	Manhole	Adoptable	4	1050	Manhole	Adoptable
1.003	4	1050	Manhole	Adoptable	5	1050	Manhole	Adoptable
2.000	12	1050	Manhole	Adoptable	5	1050	Manhole	Adoptable
1.004	5	1050	Manhole	Adoptable	6	1050	Manhole	Adoptable
3.000	13	1050	Manhole	Adoptable	14	1050	Manhole	Adoptable
3.001	14	1050	Manhole	Adoptable	6	1050	Manhole	Adoptable
1.005	6	1050	Manhole	Adoptable	7	1800	Manhole	Adoptable
4.000	15	1050	Manhole	Adoptable	7	1800	Manhole	Adoptable
1.006	7	1800	Manhole	Adoptable	8	1800	Manhole	Adoptable
1.007	8	1800	Manhole	Adoptable	9	1800	Manhole	Adoptable
5.000	16	1050	Manhole	Adoptable	17	1050	Manhole	Adoptable
5.001	17	1050	Manhole	Adoptable	18	1050	Manhole	Adoptable
5.002	18	1050	Manhole	Adoptable	19	1800	Manhole	Adoptable
6.000	20	1050	Manhole	Adoptable	19	1800	Manhole	Adoptable
5.003	19	1800	Manhole	Adoptable	9	1800	Manhole	Adoptable
1.008	9	1800	Manhole	Adoptable	10	1800	Manhole	Adoptable
7.000	21	1050	Manhole	Adoptable	22	1200	Manhole	Adoptable
7.001	22	1200	Manhole	Adoptable	23	1050	Manhole	Adoptable
7.002	23	1050	Manhole	Adoptable	24	1050	Manhole	Adoptable
7.003	24	1050	Manhole	Adoptable	10	1800	Manhole	Adoptable
1.009	10	1800	Manhole	Adoptable	11		Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	994.718	1477.707	49.300	0.300	1050		0 1.000	49.000	100
2	992.482	1494.865	49.300	0.733	1050		1 1.000 0 1.001	48.567 48.567	100 100
3	985.438	1516.140	49.300	1.107	1050		1 1.001 0 1.002	48.193 48.193	100 100
4	979.368	1522.128	49.200	1.149	1050		1 1.002 0 1.003	48.051 48.051	100 100
12	937.976	1536.891	47.200	0.700	1050		0 2.000	46.500	100
5	949.837	1520.846	47.000	0.883	1050		1 2.000 2 1.003 0 1.004	46.167 46.617 46.117	100 100 150
13	970.560	1504.330	48.580	1.080	1050		0 3.000	47.500	100
14	943.937	1500.587	46.700	1.050	1050		1 3.000 0 3.001	45.650 45.650	100 100
6	925.363	1503.961	45.000	1.125	1050		1 3.001 2 1.004 0 1.005	44.000 43.950 43.875	100 150 225
15	917.519	1516.834	46.190	1.350	1050		0 4.000	44.840	150
7	907.105	1490.927	44.770	2.458	1800		1 4.000 2 1.005 0 1.006	43.362 43.287 42.312	150 225 1200
8	899.014	1453.671	44.690	2.432	1800		1 1.006 0 1.007	42.258 42.258	1200 1200
16	939.868	1496.141	45.250	1.250	1050		0 5.000	44.000	225

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
17	942.724	1478.720	45.250	1.421	1050	1	5.000	43.829	225
						0	5.001	43.829	225
18	911.284	1472.540	45.250	1.621	1050	1	5.001	43.629	225
						0	5.002	43.629	225
20	923.707	1401.714	46.450	1.350	1050	0	6.000	45.100	150
19	918.789	1427.503	46.450	4.081	1800	1	6.000	43.419	150
						2	5.002	43.344	225
						0	5.003	42.369	1200
9	903.432	1422.229	45.500	3.589	1800	1	5.003	42.213	1200
						2	1.007	42.211	1200
						0	1.008	41.911	1500
21	978.824	1498.461	46.300	1.050	1050	0	7.000	45.250	225
22	993.703	1412.951	47.750	3.039	1200	1	7.000	44.711	225
						0	7.001	44.711	225
23	963.191	1401.198	46.070	1.638	1050	1	7.001	44.507	225
						0	7.002	44.432	300
24	964.910	1387.836	46.030	1.682	1050	1	7.002	44.348	300
						0	7.003	44.348	300
10	935.964	1360.206	43.600	1.789	1800	1	7.003	43.011	300
						2	1.008	41.811	1500
						0	1.009	41.811	225
11	931.669	1356.270	44.056	2.302		1	1.009	41.754	225

Simulation Settings

Rainfall Methodology	FEH-13	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	0.750	Drain Down Time (mins)	240	Check Discharge Volume	x
Analysis Speed	Normal	Additional Storage (m³/ha)	20.0		

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	20	0	0

Node 6 Online Orifice Control

Flap Valve	x	Invert Level (m)	43.875	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Diameter (m)	0.075		

Node 10 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	41.811	Product Number	CTL-SHE-0113-7500-2000-7500
Design Depth (m)	2.000	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	7.5	Min Node Diameter (mm)	1200

Node 10 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	42.900
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	305.0	0.0	0.400	505.0	0.0	0.800	705.0	0.0	1.200	1005.0	0.0
0.200	405.0	0.0	0.600	605.0	0.0	1.000	905.0	0.0	1.400	1005.0	0.0

Node 6 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	44.700
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	23

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	95.0	0.0	0.300	95.0	0.0

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 99.48%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	49.050	0.050	4.9	0.0773	0.0000	OK
15 minute summer	2	12	48.803	0.236	9.8	0.2692	0.0000	SURCHARGED
15 minute summer	3	12	48.329	0.136	8.2	0.1179	0.0000	SURCHARGED
15 minute summer	4	13	48.107	0.056	8.1	0.0485	0.0000	OK
15 minute summer	12	12	46.995	0.495	6.9	0.6262	0.0000	FLOOD RISK
15 minute summer	5	12	46.896	0.779	52.7	2.1913	0.0000	FLOOD RISK
15 minute summer	13	12	47.659	0.159	16.7	0.2379	0.0000	SURCHARGED
15 minute summer	14	13	45.968	0.318	16.2	0.2755	0.0000	SURCHARGED
30 minute summer	6	27	44.951	1.076	55.0	24.8027	0.0000	FLOOD RISK
15 minute summer	15	10	44.902	0.062	14.2	0.0806	0.0000	OK
240 minute summer	7	248	43.308	0.996	14.8	2.5344	0.0000	OK
240 minute summer	8	248	43.307	1.049	36.9	3.6437	0.0000	OK
15 minute summer	16	12	45.206	1.206	13.7	1.5853	0.0000	FLOOD RISK
15 minute summer	17	12	45.192	1.363	59.4	3.3089	0.0000	FLOOD RISK
15 minute summer	18	12	44.790	1.161	84.3	2.0523	0.0000	SURCHARGED
15 minute summer	20	10	45.197	0.097	31.9	0.1775	0.0000	OK
240 minute summer	19	248	43.305	0.936	37.1	2.3824	0.0000	OK
240 minute summer	9	248	43.305	1.394	86.0	3.8962	0.0000	OK
15 minute summer	21	11	46.300	1.050	77.5	4.0688	1.5058	FLOOD
15 minute summer	22	11	45.260	0.549	54.8	0.6210	0.0000	SURCHARGED
15 minute summer	23	11	44.838	0.406	126.7	1.1195	0.0000	SURCHARGED
15 minute summer	24	11	44.529	0.181	126.9	0.1567	0.0000	OK
240 minute summer	10	244	43.302	1.491	118.3	167.0366	0.0000	FLOOD RISK
15 minute summer	11	1	41.754	0.000	6.9	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	4.9	0.763	0.505	0.1019	
15 minute summer	2	1.001	3	8.2	1.072	1.049	0.1753	
15 minute summer	3	1.002	4	8.1	1.252	1.030	0.0526	
15 minute summer	4	1.003	5	8.1	1.742	0.601	0.1823	
15 minute summer	12	2.000	5	6.9	0.947	0.878	0.1561	
15 minute summer	5	1.004	6	43.4	2.468	0.899	0.5234	
15 minute summer	13	3.000	14	16.2	2.230	1.010	0.2104	
15 minute summer	14	3.001	6	14.2	1.827	0.790	0.1477	
30 minute summer	6	Orifice	7	12.0				
15 minute summer	15	4.000	7	14.1	2.077	0.342	0.1891	
15 minute summer	7	1.006	8	-101.7	0.340	-0.064	24.7039	
15 minute summer	8	1.007	9	115.8	0.789	0.072	22.3680	
15 minute summer	16	5.000	17	13.5	0.371	0.264	0.7020	
15 minute summer	17	5.001	18	53.3	1.341	1.302	1.2743	
15 minute summer	18	5.002	19	81.9	2.060	2.000	1.7976	
15 minute summer	20	6.000	19	31.6	2.698	0.698	0.3074	
15 minute summer	19	5.003	9	128.3	1.420	0.031	10.3047	
30 minute summer	9	1.008	10	206.8	0.354	0.073	104.9665	
30 minute summer	21	7.000	22	55.5	1.395	1.358	3.4517	
15 minute summer	22	7.001	23	58.5	1.473	1.429	1.3005	
15 minute summer	23	7.002	24	126.9	1.985	1.449	0.7733	
15 minute summer	24	7.003	10	126.4	2.962	0.620	1.7076	
240 minute summer	10	Hydro-Brake®	11	6.9				179.7

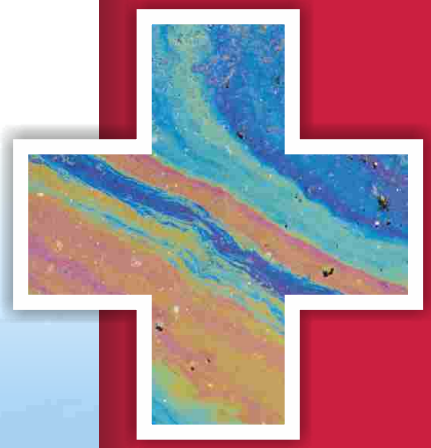
APPENDIX E – FURTHER DOCUMENTS AND INFORMATION

NAYLOR
ENVIRONMENTAL

SMART sponge®

Oil Filtration & Pathogen Reduction Products

Solutions for Water Framework Directive Compliance



The smarter solution to deal with hydrocarbon pollution and comply with the Water Framework Directive

- Treats stormwater & urban run-off
- Removes hydrocarbons
- Destroys bacteria
- Filters heavy metals
- Allows solid waste recycling
- Complies with the Water Framework Directive
- Complies with Bathing Water Directive

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HUMAN CAPITAL AWARDS
Winners - Growing Business

MX 2008
The MANUFACTURING EXCELLENCE Awards
Winner - Best SME

BSI REGISTERED

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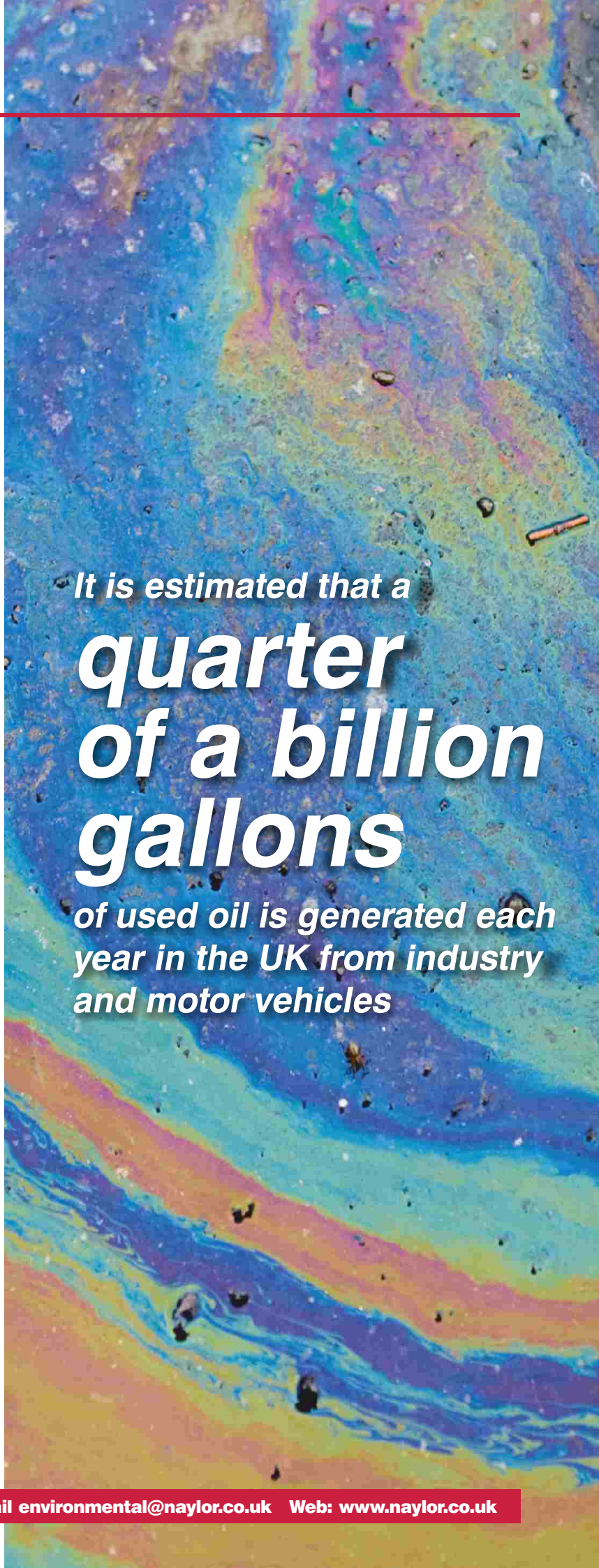
SMART sponge®

Used Oil Facts

- It is estimated that a quarter of a billion gallons of used oil is generated each year in the UK from industry and motor vehicles
- The fate of much of this used oil is unknown but a large proportion is presumably disposed of improperly
- 1 in 5 households carry out a do-it-yourself oil change
- The oil from a single oil change (1 gallon) can contaminate 1 million gallons of drinking water - a year's supply of water for 50 people
- Oil contributes to 20% of all UK water pollution incidents
- Used oil is a useful substance that, when recovered, can be used as a fuel and saves resources

Used Oils Impact on the Environment

- 10 litres of oil from one car can pollute a lake the size of two football pitches
- Used motor oil contains toxic substances such as toluene, lead, cadmium and benzene
- Oil films prevent replenishment of dissolved oxygen, impair photosynthesis and block sunlight
- Sump oil accounts for 40% of oil pollution of the nation's harbours and waterways
- Concentrations of 50 to 100 parts per million of used oil can foul sewage treatment plants
- Oil dumped on land reduces soil productivity
- Many industrialised countries, worldwide, recover a greater portion of their used oil as fuel and lubricants than the United Kingdom



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THE SMARTER SOLUTION TO:

Treat surface water pollution

"A revolutionary new product that is taking the global surface water market by storm"

Smart Sponge®

- Treats stormwater & urban run-off
- Removes hydrocarbons
- Destroys bacteria
- Filters heavy metals & sediment

Smart Sponge® was developed for the oil industry, the Smart Sponge® is based on patented polymer technologies and is the only non-toxic, fully recyclable filtration system that destroys bacteria and absorbs hydrocarbons on contact. Contaminated stormwater run-off, known as 'non-point source pollution', is a major source of contamination for lakes, streams, rivers, estuaries, coastal waters and even groundwater and forms part of the focus for the Water Framework Directive and Bathing Water Directive.

Smart Sponge® is a proprietary combination of synthetic polymers with a unique molecular structure that is chemically selective to hydrocarbons. Smart Sponge® fully encapsulates recovered oil, preventing absorbed oil from leaching and is also capable of removing low levels of oil from water, thereby successfully removing sheen. The spent product is able to be used within a Waste for Energy process as it produces between 10,000 - 18,000 BTU per pound, thereby creating a closed-loop solution with no resultant waste product.

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THE SMARTER SOLUTION TO:
Spill kits

The Smart Sponge® technology, Smart Sponge® is NOT a spill kit

"Smart Sponge® has the capacity to absorb up to five times its own weight (depending on the type of oil contaminant) and remove up to 95% of the hydrocarbons present in stormwater run-off."

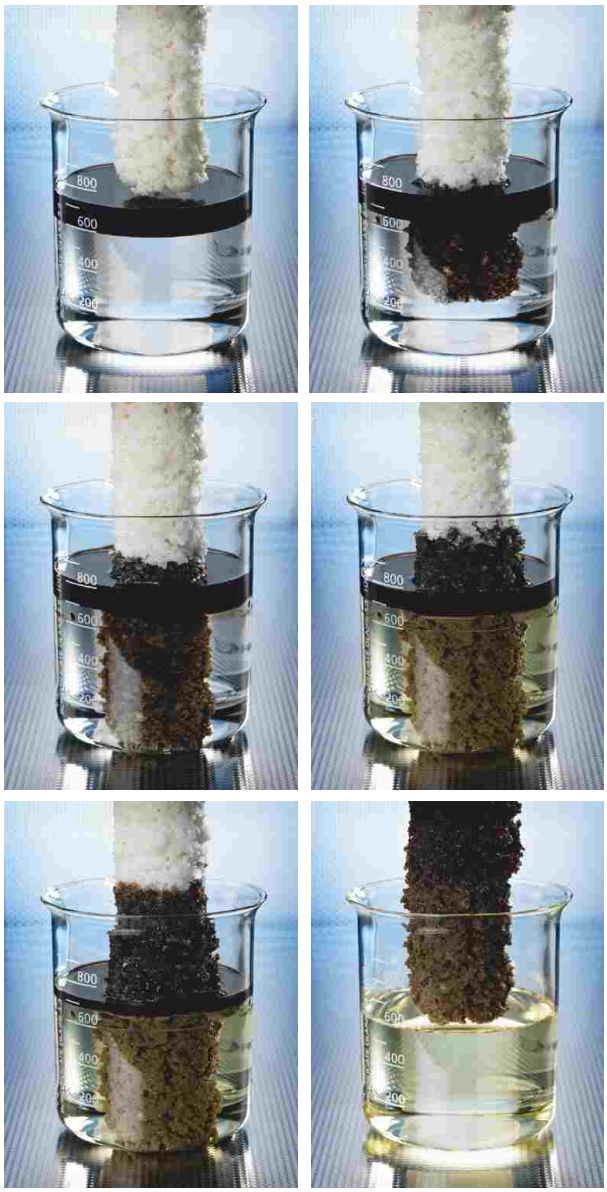
Absorbent VS Adsorbent

The Smart Sponge® proprietary blend of polymers is oleophilic – an absorbent, which means that hydrocarbons are bonded within its chemical matrix. Therefore, absorption is permanent and saturated product cannot be washed off, squeezed out, or leached from the material during subsequent rain events.

Once absorbed, those pollutants are transformed into a stable solid for easy recycling, providing a closed-loop solution to water pollution. Traditional adsorbents lack this absorbent characteristic. Instead they feature an adsorbent capability that merely attracts hydrocarbons to their surface, but cannot prevent them from leaching back into the environment.

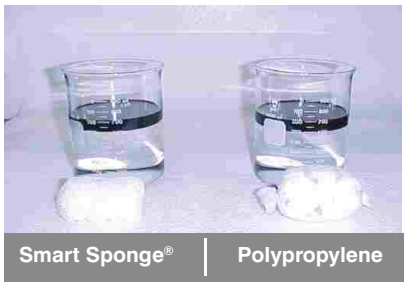
Smart Sponge® Key Features:

- Chemically selective to hydrocarbons
- Removes surface sheen
- Transforms pollutants into a stable solid
- Non-leaching
- Fully recyclable



Smart Sponge® - a proprietary polymer technology unique in its ability to effectively remove, absorb and retain hydrocarbons from flowing or static water. Smart Sponge® technology maximises the effectiveness of its oil-absorbing polymers by forming them into an extremely porous structure that allows effective, long-lasting absorption, without clogging or chanelling, which is common among any other filtration media in a powder, particulate or fibre form.

Oil contributes to 20% of all UK water pollution incidents.



Smart Sponge® | Polypropylene

The Smart Sponge® polymers are also hydrophobic and oleophilic - allowing water to pass through while hydrocarbons are absorbed. The structure is so effective, that even as it swells with contaminants, high flow rates and filtering capabilities are still maintained. Field and laboratory tests have confirmed the Smart Sponge® capacity to absorb 2-4 times its own weight or more (depending on the type of oil contaminant) and remove up to 95% of the hydrocarbons present in stormwater run-off.

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THE SMARTER SOLUTION TO:

Support infrastructure

Wiltshire Council Gully Trials Case Study

"Wiltshire Council is always seeking ways of improving its service to the community while at the same time remaining as kind to the environment as possible. So when Wiltshire Council was introduced to the Smart Sponge® technology (SST) with its synthetic polymers used for removing hydrocarbons and oil derivatives from surface water, we decided to trial the product.

The various tests demonstrated just how the technology built into the Smart Sponge® system offered an easy solution to the problem many local authorities face when dealing with gullywaste and the ever-increasing costs associated with its disposal. Currently Wiltshire Council disposes of gully waste by way of landfill, which has environmental and cost implications.

Wiltshire Council undertook its own year long trials that clearly show that financial savings can be made by reducing the volume of contaminated waste as the Smart Sponge® transforms captured pollutants into a solid waste for recycling as a Waste to Fuel energy or as landfill waste. In addition this also had a significant reduction in environmental impact!

Water quality samples and weight of SS were taken every three months from each test gully over a 12 month period. Eight road gullies and one interceptor had PAH values averaging 8500ppm. **The PAH levels have decreased over this 12 month period to under 1ppm**. To date, the trial has clearly proven that SS reduces the level of PAH in contaminated surface water run-off, far exceeding EU legislations criteria. In the future, Wiltshire Council is aiming to recycle the spent SS as a waste to fuel energy, which burns at 10 - 18,000 BTU per pound. In the immediate future we are installing Smart Sponge technology in all of the depots we use to tip out gully waste.

Wiltshire Council
Where everybody matters

Brian Lanham
Weather and Drainage Manager

"Working alongside the Smart Sponge® team whilst investigating this product has made the decision making so much easier, and I believe we have chosen the right product for the right job."

Sarah Peterson
Technical Assistant

"Smart Sponge® has shown excellent results throughout our entire trial. I have been impressed with every aspect of Smart Sponge,® especially the ease of using and maintaining the product. I am very much looking forward to the next developments involving the use of Smart Sponge® within Wiltshire."

West Lothian River Protection Trials Case Study

In February 2012, West Lothian Council decided to trial the Smart Sponge® Ultra Urban Filters at the downpipes for the A899 Road Bridge a four-lane carriageway over 700 metres long which drains runoff directly into the River Almond through four 225mm diameter pipes to see how much hydrocarbon pollution could be prevented from entering the river.

They decided to trial the Naylor Smart Sponge® Ultra Urban Filters (UUF) positioned at the base of the down pipes from the bridge - this is one of several Smart Sponge® bridge solutions that is available and was chosen to allow ground level easy access for monitoring and changeover purposes.

Four UUF units were installed in February 2012 and monitored by SAC Consulting Limited under an Environmental Monitoring Contract with West Lothian Council as part of their remit to monitor various water courses. The four units were removed in October 2013 and found to have absorbed over 48 litres of hydrocarbons from the run off into the river as well as high levels of silt & sedimentation changing the liquid contaminant into a solid waste.

The project has successfully demonstrated the ability of Smart Sponge® to absorb hydrocarbons from the runoff from the bridge and of the three treatment options available from Smart Sponge® the Ultra Urban Filter provides the greatest absorption rates whilst also intercepting detritus from the bridge deck.

West Lothian Council

Graeme Hedger
Officer with West Lothian Council

"The pilot scheme has tested Smart Sponge® products in a variety of challenging locations. Evidence from the monitored trial suggests that the products are effective at intercepting and locking up hydrocarbons in runoff preventing pollution from reaching receiving watercourses helping the council meet its obligations under the European Water Framework Directive. The use of Smart Sponge® products is to be continued beyond duration of the pilot scheme in a number of the locations included in the pilot scheme."

THE SMARTER SOLUTION TO:

Remove pathogens from stormwater

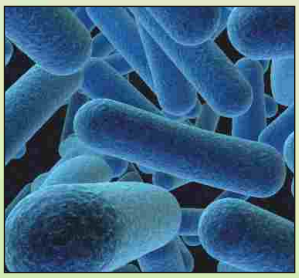
"The presence of bacteria in stormwater is a serious problem and poses significant health risks that increasingly result in the contamination of water bodies."

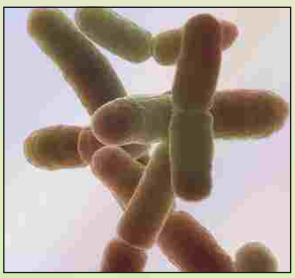
Roger Goulding - National Advisor, EA.
"We've looked at the capability of Smart Sponge® Plus to remove bacteria from urban streams and drainage affecting bathing waters. Following dramatic successes in the laboratory, field trials have shown potential for it to work....."

Smart Sponge® PLUS

Apart from the standard Smart Sponge® there is also Smart Sponge® PLUS which has all the features of being able to remove hydrocarbons as well as being the only non-toxic, fully recyclable filtration system that destroys bacteria at street level.

The presence of bacteria in stormwater is a serious problem and poses significant health risks that increasingly result in the contamination of water bodies. The greatest opportunity to reduce this bacterial count is during rain events through the control and treatment of stormwater run-off. This can be achieved by the Smart Filter® system fitted with Smart Sponge® PLUS which can also be adapted and used as part of a full treatment system for Combined Sewer Overflows (CSO's)





Smart Sponge® Plus's
ability to remove E.coli, Enterococci, Salmonella and many more pathogens from moving water makes it the ideal solution.

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THE SMARTER SOLUTION TO:

Remove pathogens from stormwater

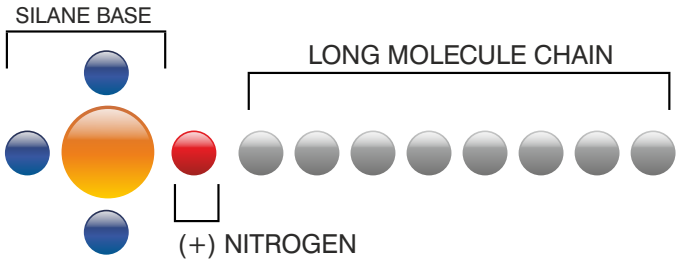
Smart Sponge® PLUS technology

Smart Sponge® PLUS for Hydrocarbons Plus Bacteria

- Smart Sponge® **PLUS** dramatically reduces coliform bacteria found in stormwater, industrial wastewater and municipal wastewater
- Smart Sponge® **PLUS** can be engineered using controlled test parameters (such as modifying flow rates and coliform bacteria concentration) to meet your performance requirements
- Smart Sponge® **PLUS** is designed to assist water systems to meet Total Maximium Daily Load Limits (TMDLs) for coliform bacteria
- When properly installed and maintained Smart Sponge® **PLUS** provides a significant reduction in coliform bacteria

Smart Sponge® **PLUS** – has all the features of standard Smart Sponge® as well as the dual action capability of destroying disease-causing micro-organisms from surface water such as:

- Aspergillus Niger • Trichophyton Mentagrophytes • Penicillium Pinophilum
- Chaetomium Globosum • Trichoderma Virens • Aureobasidium Pullulans
- Escherichia Coli • Salmonella • Streptococcus • Enterococci



Environment Agency laboratory tests confirmed a 99.9% removal of E. Coli and 99.5% reduction for Enterococci with a Smart Sponge® Plus treatment train, clearly demonstrating its effectiveness in achieving Log 1 and Log 2 reduction levels.

Roger Goulding - National Advisor, EA

"We've looked at the capability of Smart Sponge® Plus to remove bacteria from urban streams and drainage affecting bathing waters. Following dramatic successes in the laboratory, field trials have shown potential for it to work, if silt and sediment can be successfully removed before the treatment train."

Anti-microbial agent

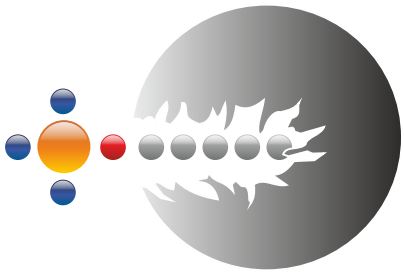
In the Smart Sponge® **PLUS**, the anti-microbial agent is chemically and permanently bound to the polymer surface and serves to control fungi, static odour and mildew.

The anti-microbial mechanism is based on the agent's electromagnetic interaction with the micro-organism cell membrane, causing the micro-organism disruption but no chemical or physical change in the agent.

Anti-microbial activity does not reduce the agent capability or cause its depletion and, therefore, maintains long-term effectiveness. Test results demonstrated the maximum bacterial removal rates of Smart Sponge® **PLUS** in both dry and wet weather sampling for fecal coliform ranged from 89.4 to 99.6 percent; and for Enterococcus, 96.2 to 99.9 percent.

Contaminants	Concentration Range	P.S.D d50	Performance	Filter bed depth
Oil & Grease	> 100ppm	-	>95%	> 100mm
	< 100ppm	-	>75%	> 100mm
Bacteria				
E.coli	$1x10^3$ CFU*/100ml	-	>90%	>1.5m
Fecal Coliform	$1x10^3$ CFU*/100ml	-	>90%	>0.9m
Enterococcus	$1x10^4$ CFU*/100ml	-	>90%	>0.9m
Total Coliforms	$1x10^4$ CFU*/100ml	-	>90%	>1.5m
TSS	100-300ppm	>15μ	>80%	>1.5m
TSS	>100ppm	>100μ	>80%	>0.6m
T. Phosphorous		>15μ	>40%	>1.5m

* Colony Forming Units



Physical inactivation of Bacteria - Rupture of the Cell Wall

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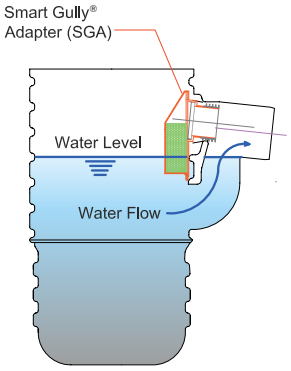
THE SMARTER SOLUTION TO:

Remove hydrocarbons from carriageway run-off

"In tests, Wiltshire County Council reduced hydrocarbon concentrations in their road gullies from 8,000ppm to 1ppm"



Naylor Smart Gully® Showing SGA inserted into rodding eye, resulting in no reduction in flow.

Smart Gully® Range

The clever push fit design incorporates a finned rubber gasket ensuring a snug fit replacing the rodding bung ensuring no loss of hydraulic capacity or engineering design. Smart Gully® incorporates the unique Smart Sponge® technology that removes hydrocarbons from stormwater.

The Smart Gullies® have a Smart Gully Adaptor® already fitted and are supplied complete with a purpose designed Smart Pak® already installed and are available for both plastic and concrete gullies.

Range table (Complete Smart Gully® units)

Prod No.	Description	Dims (mm)
SGCO2	Concrete Smart Gully®	375 ID 900 deep
SGCO3	Concrete Smart Gully®	450 ID 750 deep
SGCO4	Concrete Smart Gully®	450 ID 900 deep
SGCO5	Concrete Smart Gully®	450 ID 1050 deep
SGP67004	Plastic Smart Gully®	450 ID 900 deep x 160 outlet
SGP67005	Plastic Smart Gully®	450 ID 750 deep x 160 outlet
SGP67003	Plastic Smart Gully®	450 ID 900 deep x 178 outlet
SGP67009	Plastic Smart Gully®	450 ID 750 deep x 178 outlet
SGP67002	Plastic Smart Gully®	375 ID 750 deep x 178 outlet
SGV07536	Vitrified Clay Smart Gully®	300 ID 610 deep x 100 outlet
SGV07537	Vitrified Clay Smart Gully®	300 ID 610 deep x 150 outlet
SGV07545	Vitrified Clay Smart Gully®	375 ID 760 deep x 150 outlet
SGV07556	Vitrified Clay Smart Gully®	450 ID 915 deep x 150 outlet

* all Smart Gullys® c/w 1 x Adaptor.

The special Smart Gully Adaptors® (SGA) are also available for retrofitting in existing gullies:

SGA - Backplate

SGA - Frontplate

Range table (Smart Gully Adaptor® units & spares)

Prod No.	Description	Dims (mm)
SGA01 - 12	Smart Gully Adaptor® (body only)	H260 x W160 x D75 Not including spigot
SGA02 - 12	Smart Gully Adaptor® c/w Smart Pak & seal	H260 x W160 x D75 Not including spigot
SGS01	Smart Seal for SGA (spare)	100 x 110 dia
SMPK66-2.5	Smart Sponge® Smart Pak refill	150 x 150 x 62.5

Smart Sponge® technology is based on its proprietary blend of synthetic polymers aimed at removal of hydrocarbons and oil derivatives from surface water.

This unique process creates a very porous structure with hydrophobic and oleophilic characteristics capable of selectively removing hydrocarbons while allowing high flow through rates for water.

As hydrocarbons are absorbed into its structure, the Smart Sponge® swells and maintains porosity and filtering capabilities.

The Smart Sponge® unique molecular structure is based on innovative polymer technologies that are chemically selective to hydrocarbons.

The SGA's have a purpose designed Smart Pak® fitted to absorb the hydrocarbons - it is specially designed to last 12 months in a worst case scenario and maintenance is simplicity itself and takes just a few seconds.

The Smart Sponge® technology transforms the pollutants into a stable solid waste for easy recycling.

Smart Sponge® waste to energy finalises the closed-loop solution with the spent Smart Sponge® creating 10,000-18,000 BTU per pound with no resulting waste product.

Smart Sponge® can also be used as an anti-microbial technology capable of destroying disease causing micro-organisms from surface water such as E.coli, Streptococcus and Enterococci to name but a few.

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THE SMARTER SOLUTION TO:

Remove hydrocarbons from oil water interceptors

In recent tests carried out on a 'typical' MOD facility, it was shown that a 64% saving in maintenance costs could be achieved together with a 99% saving in the volume of environmental waste

Passive Skimmer / Interceptor Enhancer Range

The Smart Sponge® Passive Skimmers are installed within existing interceptors/separators (OWI's) to dramatically increase the effectiveness of the OWI (from typically 45% removal to 95% removal) whilst at the same time reducing annual maintenance costs by up to 64%.

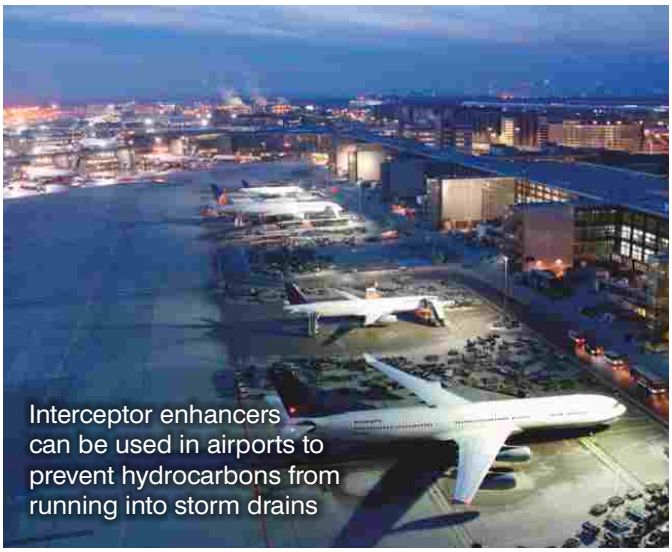
The regulations controlling the maintenance of interceptors/separators (OWI's) advise six monthly inspections and emptying and recharging with clean water when required. A new method of reducing both maintenance costs and environmental waste when servicing OWI's by the use of the Smart Sponge® Interceptor Enhancers has shown dramatic results.

The Smart Sponge® absorbs the hydrocarbon contamination and locks it into the molecular structure of the polymer, transferring the hydrocarbons into a solid waste suitable for either controlled disposal or for use as an alternative fuel. This unique ability means that instead of disposing of tonnes of contaminated liquid waste it is now possible to reduce this dramatically to a few kilos of solid waste, thus achieving dramatic savings in both cost and environmental benefits.

Range table (Interceptor Enhancers/Passive Skimmers)

Prod No.	Description	Dims (mm)
PS1313-40	Small Passive Skimmer	330 X 330
PS1818-20	Medium Passive Skimmer	457 X 457
PS2727-10	Large Passive Skimmer	686 X 686

Pack sizes: Small - 40pk, Medium - 20pk, Large - 10pk



Interceptor enhancers can be used in airports to prevent hydrocarbons from running into storm drains

Traditionally, maintenance of an OWI would consist of a tanker with a 2 man gang extracting the whole volume of the OWI (in the case of even a medium sized OWI this could amount to 110,000 litres or 110 tonnes) which would take many trips plus the disposal costs of the contaminated waste. The tanker would then have to re-charge the OWI to bring it back to operating condition.

Taking the same OWI as an example and now using a Smart Sponge® Passive Skimmer as a solution, this would transform the 116 tonnes of liquid waste into just 145 kg of solid waste and the maintenance procedure becomes just a 2 man job with a van. The cost and environmental benefits of this new system are obvious, particularly when many such OWI's can be serviced in a typical day.

In recent tests carried out on a 'typical' MOD facility, it was shown that a 64% saving in maintenance costs could be achieved together with a 99% saving in the volume of environmental waste – and even this 1% of remaining waste can be used as an alternative fuel as part of the Waste for Energy initiative creating a truly closed-loop system of maintenance where everyone benefits.

Deployment Guidance (Oil Water Interceptors)

		No of PS to absorb hydrocarbon		
NSB*	Area Drained	PS1313	PS1818	PS2727
1.5S	833	10	6	3
3.0S	1,666	19	11	5
4.5S	2,499	28	16	8
6.0S	3,332	38	22	10
10S	5,553	NA	36	17
12S	6,670	NA	43	20
15S	8,330	NA	NA	25
20S	11,106	NA	NA	34
25S	13,883	NA	NA	42

* Nominal Size Bypass

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The Smart Sponge® Family

Smart Filter®, Smart Brake® & Smart Stop® Range

The Smart Filter®:

Specifically designed for end of pipe applications and installations through which contaminated or polluted water flows. The unique design allows the Smart Filter® to either sit inside or outside the pipe connection and will absorb hydrocarbons that pass through the system during normal conditions. The Smart Filter® is available in 2 different standard sizes and will accommodate standard pipe sizes.
Flow rates are catered for through the design of the Smart Filter®, sized to take the first flush effect plus a safety factor of 2x with any excess passing through the bypass facilty.

Smart Filter®

Orifice Plate

The Smart Brake®:

Is a collaboration of design from the Smart Filter® and houses the Smart Paks within a more confined area which allows normal flow through the system. The Smart Brake's® unique design works during an event and slows the flow rate whilst absorbing any hydrocarbons present, allowing the final outfall flow to disperse reducing flooding, resulting in the contaminated flow from travelling further along a water course. The Smart Brake® will also absorb any hydrocarbons present within a normal flow, effectively acting as a Smart Filter®.

Unit showing overflow connection

The Smart Stop®:

Uses the basic principles of the Smart Filter® but houses the Smart Paks within a more confined area which allows normal flow through the system. The Smart Stop's® unique design works during an event where more hydrocarbons are present within the resulting flow and the volume of hydrocarbons are quickly absorbed within the Smart Paks which swell into the defined cage and seal the outfall pipe providing the contaminated flow from travelling further along a water course. The contaminated water is then stopped at source enabling the hydrocarbon clean up to be targeted in one area reducing the impact to the environment. The Smart Brake® will also absorb any hydrocarbons present within a normal flow, effectively acting as a Smart Filter®.

N.B. A suitable silt trap device is recommended prior to the Smart Filter® chamber to prolonge the life of the Smart Sponge®. If this is impractical a silt sump is recommended within the Smart Filter® chamber.

Smart Filter® Standard Range

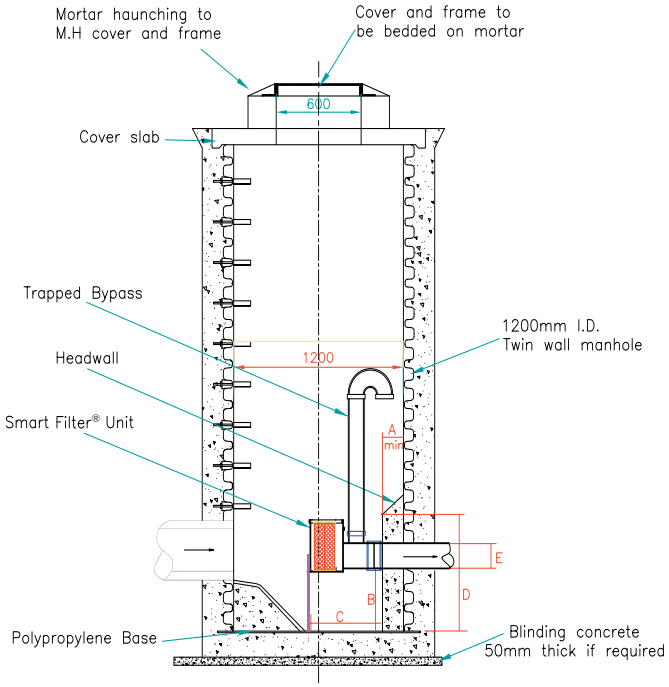
Prod No.	Description	Dims (mm)	Qty
SF01-30302	Smart Filter® c/w 2 No. 305 x 305 Std Smart Paks. 150 dia outlet for flow up to 14 l/s	360 x 330 x 330	1
SF02-38382	Smart Filter® c/w 2 No. 380 x 380 Std Smart Paks. 150 dia outlet for flow up to 22 l/s	400 x 400 x 400	1
SF01-30302P	Smart Filter® c/w 2 No. 305 x 305 Plus Smart Paks. 150 dia outlet for flow up to 14 l/s	360 x 330 x 330	1
SF02-38382P	Smart Filter® c/w 2 No. 380 x 380 Plus Smart Paks. 150 dia outlet for flow up to 22 l/s	400 x 400 x 400	1

Smart Brake® Range

Prod No.	Description	Dims (mm)	Qty
SB01-30302	Smart Brake® c/w 2 No. 305 x 305 Std Smart Paks. Specify orifice size for desired flow	360 x 330 x 330	1
SB02-38382	Smart Brake® c/w 2 No. 380 x 380 Std Smart Paks. Specify orifice size for desired flow	400 x 400 x 400	1

Smart Stop® Range

Prod No.	Description	Dims (mm)	Qty
SS01-30302	Smart Stop® c/w 2 No. 305 x 305 Std Smart Paks. 150 dia outlet for flow up to 14 l/s	360 x 330 x 330	1
SS02-38382	Smart Stop® c/w 2 No. 380 x 380 Std Smart Paks. 150 dia outlet for flow up to 22 l/s	400 x 400 x 400	1



Typical Installation showing overflow connection and silt trap.

The Smart Sponge® Family

Smart Filter® Chamber Range

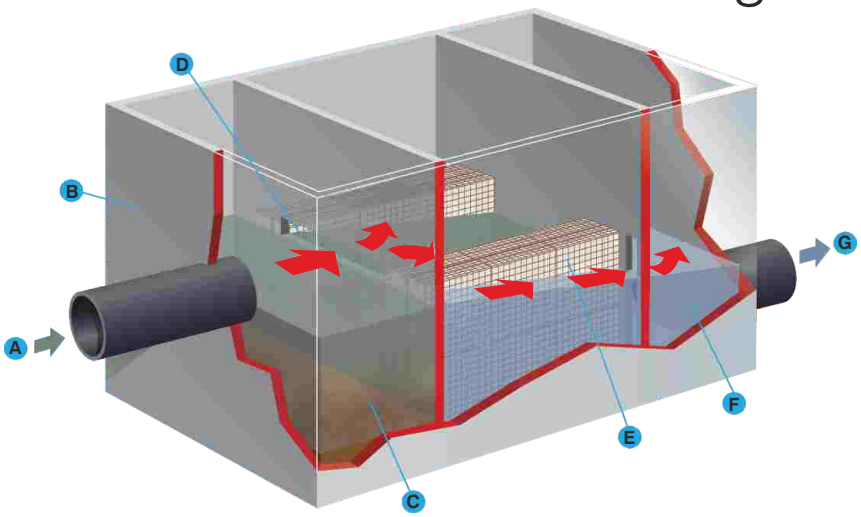


Diagram Key

A. Inflow

B. Lightweight composite chamber with vehicle loading capability

C. Chamber with weir to trap sediment

D. Flow passes through Smart Paks and through side orifices

E. Smart Paks to absorb hydrocarbons

F. Collection chamber with outlet to sewer

G. Outflow

Note: Arrows show direction of water flow

Smart Filters® for Highways, Large Catchment Areas etc:

Specifically designed for extreme storm events and larger flow situations, the basic principles of the smaller Smart Filters® can be adapted to virtually any flow and also adapted to site restrictions.

The Smart Filters® come in several standard modular chamber sizes but can also be manufactured bespoke to suit specific site conditions. Contaminated wastewater enters the system into a settlement chamber and passes through an orifice into a distribution chamber and then is passed through the Smart Sponge® units (Paks) which removes up to 95% of all hydrocarbons. The cleaned water then passes through purpose designed side orifices to exit the treatment chamber via the outlet pipe.

Smaller Smart Filter® being lowered into position

Smart Filter's® Advantages:

- Treats 100% of the storm flow
- Removes 95% of hydrocarbons
- Removes heavy metals & silts
- Can cope with extreme conditions
- Shallow excavations
- Low head drop
- Modular design
- Virtually any flow catered for
- Waste product 100% recyclable
- Easy maintenance procedure

Prod No.	Description	Dimensions WxLxH	Treated Flow (l/s)	Max Flow (l/s)	380 x 380 Smart Paks	Pak Height (no.)	Aux Silt Capacity	Max Oil Capacity	Head Drop across unit
SF03.1A	Smart Filter® 44 l/s Flow, c/w 200mm dia pipes	0.8 x 1.2 x 1.2	10.9	44	4	1	190 litres	48 litres	380mm
SF03.1B	Smart Filter® 88 l/s Flow, c/w 300mm dia pipes	0.8 x 1.2 x 1.2	21.7	88	8	1	75 litres	96 litres	380mm
SF03.2A	Smart Filter® 130 l/s Flow, c/w 300mm dia pipes	1.2 x 1.8 x 2.0	32.6	130	12	1	210 litres	144 litres	380mm
SF03.2B	Smart Filter® 265 l/s Flow, c/w 300mm dia pipes	1.2 x 1.8 x 2.0	70.4	265	24	2	420 litres	288 litres	760mm
SF03.2C	Smart Filter® 350 l/s Flow, c/w 300mm dia pipes	1.2 x 1.8 x 2.0	94	350	32	2	75 litres	384 litres	760mm
SF03.3A	Smart Filter® 400 l/s Flow, c/w 300mm dia pipes	1.2 x 1.8 x 2.0	117	425	40	2	275 litres	480 litres	760mm

N.B. A suitable hydrodynamic separator (HDS) should be utilised prior to the Smart Filter® to remove the majority of silt from entering the filter. An auxilary silt storage, is provided as a fail safe on all units. Treated Flow calculations are calculated according to first flush effect for typical storms.

The Smart Sponge® Family

Ultra-Urban® Filter Range

The **Ultra-Urban® Filter** with **Smart Sponge®** is an innovative low-cost BMP that helps meet anti-pollution requirements with effective filtration, efficient application and moderate maintenance. The **Ultra-Urban® Filter** absorbs oil and grease and captures trash and sediment from stormwater run-off before it enters the storm drain system. The **Ultra-Urban® Filter** is ideal for commercial, industrial and construction applications. The filter is available in two standard designs; one designed to clip onto the side of a catch basin in a row according to the flow (CO) and the other which is a single unit designed for typical drop-in catch basins and gullies (DI).

The **Ultra-Urban® Filter,** made of a high strength corrugated recycled content plastic, is designed for use in surface water drains that experience oil and grease pollution accompanied by sediment and debris. Rubbish and sediment accumulate in the upper basket chamber while oil and grease are absorbed in the filtration media.

Code	Max Flow (l/s)	Area Drained (m^2)	Oil Capacity (litres)	Silt Capacity (cm^3)	Typical Life (Years)	Media Life (Years)	Head Drop (mm)
DI1414N	17.7	1,275	21	425	2.3	1-3	790
DI1414H	12.0	860	13	230	2.1	1-3	560
DI1616N	22.7	1,635	25	510	2.1	1-3	790
DI1616H	17.0	1,225	19	285	2.1	1-3	560
DI2020N	31.5	2,260	31	850	1.9	1-3	790
DI2020H	23.3	1,675	24	480	1.9	1-3	560

N.B. The above drained areas and Min Life calculations are based on a typical 50mm rainfall with an anticipated worse case hydrocarbon contamination level of 30mg/100ml (a more typical level would be 10mg for normal use).

Sectional view of UUF showing Smart Sponge®

Performance

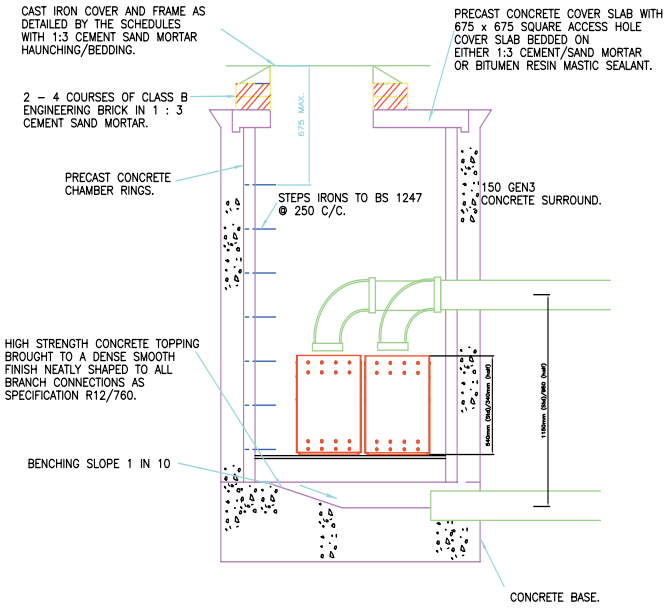
Field and laboratory tests have confirmed the capability of the Smart Sponge® to absorb, depending on the type of oil contaminant, up to 2-3 times its own weight and remove 70% to 95% of the hydrocarbons present in stormwater run-off, typically in the range of 5 to 30 mg/litre (ppm). The captured oil is permanently bound within the Smart Sponge,® eliminating leaching and allowing for easy disposal of the filtration media. Flow rates through the DI1616H filters exceed 17 l/s.

Installation

The **Ultra-Urban® Filter** is easily installed and installation time varies depending upon mounting devices selected. A single mounting bracket made of 16 gauge galvanised steel is required for the installation of the CO series of UUF. The **Ultra-Urban® Filter** should not be installed where modules obstruct the drain pipe outlet. The size of the drain should allow room for stormwater overflow. The Drain Inlet (DI) series **Ultra-Urban® Filter** will suspend from the drain into the catch basin through a structural plastic mount and funnel mechanism (see drawings).

Maintenance

The**Ultra-Urban® Filter** should be serviced as needed to remove sediment and debris, according to expected debris accumulation. The sediment and debris can be quickly vacuumed out of the modules through the opening of the drain with conventional maintenance equipment. For example, a CO installation with four to five **Ultra-Urban® Filter** modules can be typically serviced in 10 minutes or less. Under normal operating conditions the **Ultra-Urban® Filter** should be replaced every 1-3 years.



Twin Ultra Urban® Filters installed in typical chamber

Design

The Ultra-Urban® Filters can be positioned within a chamber to take run-off from any area and require a difference in invert according to the drawing above. There is a range of sizes to choose from according to the area to be drained, with additional units able to be positioned alongside one another to increase the flow capability. Units should be emptied with a standard vacuum pipe on a regular basis and changed when they weigh approximately twice the installation weight.

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The Smart Sponge® Family

Line Skimmers

Line Skimmers are ideal for creating lines of hydrocarbon protection in areas such as ponds and streams as well as clarifying wells and marinas. Installation is carried out by placing the line skimmers across the water course, tied off to fixed points. The line skimmers can also be tied to one another to create longer protection booms as required. Smart Sponge® Line Skimmers are non leaching so cannot contaminate the water during replacement

Prod No.	Dry Weight	Spent Weight	Litres
LS104-10 (1.2m)	0.7kg	2.8kg	2.4Ltr
LS110-04 (3m)	1.9kg	7.6kg	9.0Ltr
LS304-04 (1.2m)	2.2kg	8.8kg	6.5Ltr
LS308-04 (2.4m)	4.4kg	17.6kg	13.0Ltr
LS408-04 (2.4m)	5.9kg	23.6kg	17.0Ltr

Line Skimmer weights before and after application

Applications

- Preserving Ecologically Sensitive Areas
- Coastal Marshlands
- Estuaries
- Grass Flats
- Fishing and Breeding Grounds
- Boat Docks and Marinas
- Marine Fueling Locations
- Clarifying Wells

Line Skimmers deployed at Linlithgow Loch

Disposal Options

As local conditions, product use and exposure can vary widely, the end user must determine the most appropriate disposal method for a spent Smart Sponge® or Smart Sponge® Plus product. However Smart Sponge® samples saturated with hydrocarbons both in the lab and in the field have been tested according to the USA EPA's Toxicity Characteristic Leaching Procedure ("TCLP"). These tests show that Smart Sponge® is a "non-leaching" (i.e., non-detect or "N.D.") product. As a result, Smart Sponge® technology can afford many cost effective and environmentally friendly disposal options. The following waste disposal and resource recovery systems are available for disposal and/or recycling of the spent Smart Sponge® products.

Waste to Energy Facilities

This is a specialised segment of the solid waste industry and within the USA this is a recognised route for used spent Smart Sponge® as an alternative fuel in the production of electricity. The spent Smart Sponge® generates between 10,000 – 18,000BTU per pound (0.45kg).

Cement Kilns

This industry has used the spent Smart Sponge® as an alternative fuel in the production process of Portland Cement. This process is considered a beneficial re-use of waste products. The BTU value of spent Smart Sponge® is consistently above the average acceptable levels set for this high temperature process.

Landfills

As mentioned above, spent Smart Sponge® products have been classified as a solid waste within the USA and have been accepted at Subtitle D Landfills. Discussions are ongoing with the Environment Agency to establish similar classification for the UK.

THE SMARTER SOLUTION TO:
Quick Installation & Maintenance

Passive Skimmers

It is intended that proactive checks are completed on a six monthly basis, any remedial work will be managed reactively.

1. Fix a tether rope to the absorbent Passive Skimmer and record the weight in Kg
2. Fix the tether so that the Passive Skimmers can be recovered but allowing the skimmer to float freely.
3. Every 6 months withdraw the Passive Skimmer, shake off excess water and check and record weight. If weight is above trigger value replace skimmer.

Passive Skimmers are deemed spent if their weights are greater than:

Size	Dry Weight	Spent Weight
PS1313 (Small)	0.5kg	2.0kg (approx. 2.4 litres)
PS1818 (Medium)	0.9kg	3.6kg (approx. 4.2 litres)
PS2727 (Large)	1.9kg	7.6kg (approx. 9.0 litres)

Passive Skimmers are available in Small, Medium and Large packs
PS1313 (Small) shown

Smart Gully Adaptor®

Smart Gully Adaptor® Instructions for SGA Installation and Maintenance.

Insert the back plate into the rodding eye of the gully

Slide the front plate with Smart Pak in down onto the back plate

Back plate will lock into position on the tabs provided

Remove the front plate by sliding upward

Weigh the unit with Smart Pak in

Remove and replace spent Smart Pak

Install new Smart Pak and refit

Size	Dry Weight	Spent Weight
SMPK (150X150X62.5)	0.5kg	1.2kg (approx. 1.4 litres)

Smart Paks - Smart Filters®

It is intended that proactive checks are completed on a six monthly basis, any remedial work will be managed reactively.

1. Open the top of the Smart Filter® & using the plastic ties lift out the wire cage containing the Smart Paks, snip the plastic ties & remove the individual Smart Pak, shake off excess water & weigh the Smart Pak and record this on the maintenance schedule.
2. If the recorded weight is greater than twice the dry weight, replace the Smart Paks accordingly with new ones. If less than twice the weight, a changeover date can be calculated based on the relative weights.
3. Relace the Smart Paks back in the wire cages, renewing any plastic ties to hold the cages closed and slide the cage back into

Size	Dry Weight	Spent Weight	Size	Dry Weight	Spent Weight
SMPK1212-2.5	1.95kg	4.6kg	SMPK1515-2.5	2.9kg	7.2kg
SMPK1212-3	2.22kg	5.5kg	SMPK 1515-3	3.5kg	8.7kg

Smart Pak weights before and after application (assumes a non confined unit).

THE SMARTER SOLUTION TO:
Quick Installation & Maintenance

Ultra-Urban® Filters

The Ultra-Urban® Filters can be installed as a drop in unit with a collar or as a slot in system secured to the side of the gully or inlet with brackets.




The Ultra-Urban® Filter Is Easily Installed

Installation time varies depending upon mounting devices selected. A single mounting bracket made of 16-gauge galvanised steel is required for the installation of the Curb Opening (CO) series. The Ultra-Urban ® Filter should not be installed where modules obstruct the drain pipe outlet. The size of the drain should allow room for stormwater over flow. The Drain Inlet (DI) series Ultra-Urban® Filter will suspend from the drain into the catch basin through a structural plasic mount and funnel mechanism.

Low Maintenance

The Ultra-Urban® Filter should be serviced as needed to remove sediment and debris, according to expected debris accumulation. The sediment and debris can be quickly vacuumed out of the modules through the opening of the drain with conventional maintenance equipment. Under normal operating conditions the Ultra-Urban® Filter should be replaced every 1-3 years.

Prod No.	Dry Weight	Spent Weight	Litres
UUF1414N	9.1kg	27kg	21Ltr
UUF1414H	5.9kg	17kg	13Ltr
UUF1616N	10.9kg	32kg	25Ltr
UUF1616H	8.2kg	24kg	19Ltr
UUF2020N	13.6kg	40kg	31Ltr
UUF2020H	10kg	30kg	24Ltr

Solutions for Water Framework Directive Compliance

Smart Sponge® & Smart Sponge® **PLUS** technology effectively and efficiently reduces the amount of coliform bacteria, debris and hydrocarbons, to keep the UK's beaches, marinas, airports regulations in compliance with Bathing Water Directive and Stormwater regulations.

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