

HOLLINGWORTH ROAD, LITTLEBOROUGH
Drainage Statement
VISTRY PARTNERSHIP YORKSHIRE

Existing site

The approximately 5.5 ha site in Flood zone 1 is located to the west of Hollingworth Road in Littleborough and is centred around grid reference SD 93387 15718.

The site is bounded by the Rochdale Canal to the north, Hollingworth Road to the east, and an existing pond and undeveloped land to the south and west. The site formerly comprised the Akzo Nobel Chemical works and has been cleared and remediated. Before this, the site was used for mining and contains shafts which have been capped.

The site slopes from the south-east boundary towards the Rochdale Canal from around 163.3 to 145.2 m AOD at an average gradient of approximately 1 in 17. The fall across the western side of the site from the southern boundary to the Rochdale Canal is from around 157.7 to 145.2 m AOD at an average gradient of approximately 1 in 12.

Proposed development

It is proposed to redevelop the site with up to 127 residential dwellings and associated access, public open space and landscaping.

Existing drainage

United Utilities records show there is a 225 mm public combined sewer in Hollingworth Road to the east of the site which partly crosses into the site. This sewer is around 2 - 3m deep however Hollingworth Road is set at a higher level than the site so a foul connection to this sewer would require pumping for most of the site. Some plots close to Hollingworth Road may be able to drain by gravity.

A 300 mm public combined sewer is located to the north-west of the site to the north of Rochdale Canal. GPR survey of the site and subsequent investigation identified a culvert

crossing underneath the canal with an outfall to this public combined sewer. An existing foul sewer connection runs within this culvert crossing and outfalls to the public network. Surveys show this is approximately 8 m deep.

There is a 3050mm diameter by 8825mm deep manhole chamber (MH S14) within the site located close to the northern boundary roughly mid-way across the site. The manhole chamber has two inlets. Inlet A comes from the disused mineshafts and is a 1050mm high by 730mm wide masonry culvert. Inlet B is a smaller masonry culvert measuring 900mm high by 500mm wide and from an unknown source. The chamber was reconstructed in 1994 with the main inlet and outlet measuring 375mm in diameter for a short distance before turning in to the masonry culverts. The secondary inlet is 300mm in diameter for a short length before also turning into a masonry culvert. The masonry culvert which runs under the canal is 915mm high by 760mm wide and outfalls to a reed bed north of canal. The reed bed provides treatment for mine water and outfalls to the River Roch via another culvert that passes under the railway line. The manhole chamber is one of three former surface water outfalls from the Akzo Nobel site.

Brownfield runoff

A plan showing the areas of the site which formerly drained to MH S14 based on drawings of the former Akzo Nobel site is included in Appendix 1. Based on a previous drained area of 1.86 ha to MH S14 and 50mm/hr rainfall the brownfield 1 in 1 year runoff rate is calculated as follows:

$$Q = 2.78 \times 50\text{mm/hr} \times 1.86 = 258.5 \text{ l/s.}$$

Ground conditions

British Geological Survey mapping shows the underlying bedrock at the site is Mudstone, Siltstone, and Sandstone of the Pennine Lower Coal Measures Formation and Sandstone of the Milnrow Sandstone Formation. Superficial Devensian Till (Diamicton) deposits are shown to overly these.

The site was remediated following the demolition of the former Akzo Nobel chemical works and it is understood the ground underlying the remediated top layers consists of clay. As such, ground conditions are not suitable for infiltration-based SuDS such as soakaways.

Greenfield Calculations

Greenfield runoff is calculated using the ReFH2.3 statistical rainfall-runoff method with FEH 2013 rainfall data using the default catchment characteristics (Appendix 2). Table 1 below summarises the runoff rates for varying return periods. These figures relate to the 2.65 ha proposed impermeable area and runoff per unit area (hectare).

Greenfield runoff				
Catchment	Return period			
	1 in 1 yr	1 in 2 yr	1 in 30 yr	1 in 100 yr
Roch Irk Medlock	12.21 l/s	14.15 l/s	34.73 l/s	46.90 l/s
	4.61 l/s/ha	5.34 l/s/ha	13.11 l/s/ha	17.70 l/s/ha

Table 1: Greenfield runoff rates

Drainage hierarchy

Surface water disposal should be in accordance with the drainage hierarchy in Building Regulations Part H¹ and Planning Practice Guidance 'Reducing the causes and impacts of flooding', paragraph 80 reference ID 7-080-20150323. Disposal via SuDS methods should be considered as the first option. Disposal to the public sewer should be considered only when SuDS methods and disposal to the watercourse are shown to be unsuitable.

Sustainable Drainage Systems (SuDS)

SuDS methods include water infiltration systems such as soakaways, basins and filter strips, together with swales, pervious pavements, detention basins, ponds and other wetland solutions. The various methods are considered in detail in The SuDS Manual (CIRIA C753).

Infiltration type SuDS such as soakaways are not feasible due to impermeable ground conditions.

¹https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/442889/BR_PDF_AD_H_2015.pdf

Type C permeable paving will be provided for a minimum of 70% of private driveways to allow infiltration into the underlying construction material. Trapped gullies and linear channels will also be provided for silt removal in other private and shared areas and adopted highways. A filter drain will be included to drain the footway link adjacent to the canal.

Watercourse

The nearest watercourses are the Rochdale Canal which runs along the northern boundary of the site, and the River Roch which is located approximately 130m north-west of the site. An existing culverted watercourse runs from the site under the canal to the reed bed located between the canal and railway line. A second culvert carries flows from the reed bed under the railway line to outfall to the River Roch. Surface water discharge will be to the adjacent canal via a new headwall outfall with treatment train upstream.

Drainage proposals

Drainage layouts (Drg. 45466/002 Rev N & 45466/003 Rev P) are included in Appendix 3.

Surface Water

An application to discharge surface water to the Rochdale Canal has been submitted to the Canal and River Trust. The outfall will be submerged and directly into the canal. Outfall velocities into the canal must be restricted to 0.3 l/s. The velocities downstream of the flow control have been calculated to be higher than 0.3 l/s and therefore clarification is being sought from the Canal and River Trust on the preferred method of reducing velocities. A stilling chamber or baffles to the headwall may be required to achieve this.

Surface water from the site will be attenuated to 29.6 l/s as agreed by the LLFA.

Attenuation for the site will be located within the central public open space. The required storage volume has been calculated as 2116m³ for the 1 in 100yr plus 30% climate change event.

Foul

For the majority of the site, foul water will be pumped to the 225 mm public combined sewer in Hollingworth Road to the east of the site via an adoptable pumping station. Levels along the site frontage next to Hollingworth Road are to be lifted and it is proposed to connect plots in this area by gravity.

Pollution mitigation measures

Due to the site outfalling to the Rochdale Canal Special Area of Conservation (SAC) and SSSI, a designated site, additional measures have been considered following guidance from Natural England, CRT and the LLFA. Typical pollution hazard levels from a residential development fall into the low category as shown below in the extract from the SuDS Manual.

26.2 Pollution hazard indices for different land use classifications				
Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads and trunk roads/motorways ¹	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways ¹	High	0.8 ²	0.8 ²	0.9 ²

26.3 Indicative SuDS mitigation indices for discharges to surface waters			
Type of SuDS component	Mitigation Indices		
	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4 ²	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond ⁴	0.7 ³	0.7	0.5
Wetland	0.8 ³	0.8	0.8
Proprietary treatment systems ^{5,6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Tables from The SuDS Manual (C753), p568-569

For reference notes, please see the full manual: https://www.ciria.org/Memberships/The_SuDS_Manual_C753_Chapters.aspx

The first mechanism employed within the site is the inclusion of permeable paving to a minimum of 70% of private driveways. Below is an extract from Circa which shows the typical pollutant removal expected of permeable paved areas.

Percentage Removal of Pollutants	
Total suspended solids	60-95%
Hydrocarbons	70-90%
Total phosphorus	50-80%
Total nitrogen	65-80%
Heavy metals	60-95%
(source: CIRIA C609, 2004)	
Water Quality Treatment Potential	
Removal of total suspended solids	High
Removal of heavy metals	High
Removal of nutrients (phosphorus, nitrogen)	High
Removal of bacteria	High
Treatment of suspended sediments & dissolved pollutants	High
(source: CIRIA C697, 2007)	

The SuDS Manual C753 'Pollution hazard indices for different land use classification' (Table 26.2) identifies residential and non-residential car parking with infrequent change to be 'Low Pollution Hazards'. Permeable paving is shown to have a SuDS mitigation index (Table 26.3) greater than the pollution hazard of a car parking area. The proposed limestone granular surface and sub-base permeable paving therefore provides suitable filtration and treatment of any hydrocarbons and/or possible washdown of the cars.

The primary surface water network which shall drain the adoptable roads serving the residential development shall include trapped gullies spaced in accordance with Highway Authority requirements. These typically capture first flush runoff of silt and sediments. Cleaning out of highway gullies should be in accordance with national guidelines of a minimum of once every twelve months.

Further removal of suspended solids and sediment are achieved by the surface water flows from the whole development passing through a large attenuation tank with downstream flow control device. The flow control manhole has an inbuilt sump which provides an easy access point for inspection and removal of suspended solids. The

upstream pipework, tank and flow control is to be offered for adoption to a sewerage undertaker who would provide regular maintenance and silt removal.

Immediately downstream of the flow control device for the development will be a SPEL Puraceptor treatment device which will be sized to accommodate full restricted flows from the development to provide failsafe treatment to the site which can be easily accessed, maintained and monitored throughout the lifetime of the development.

This provides extremely high levels of treatment for TSS, Metals and Hydrocarbons should any of these reach this stage of the treatment train which are shown below and in Appendix 4.

SPEL Puraceptor ESR Range

Full Flow Treatment System

The **total** treatment solution for SuDS

The new SPEL Puraceptor ESR System is designed to treat the full flow from the catchment area and includes the important Automatic Closure Device (ACD). This device will close off the outlet of the separator when captured oil exceeds the maximum oil storage volume.

Fully certified to meet the CIRIA SuDS Mitigation Index, this system has been tested by WRc (for TSS and Metals) to the British Water Code of Practice for Manufactured Treatment Devices*, and by HR Wallingford to the British and European Standard BS EN 858.

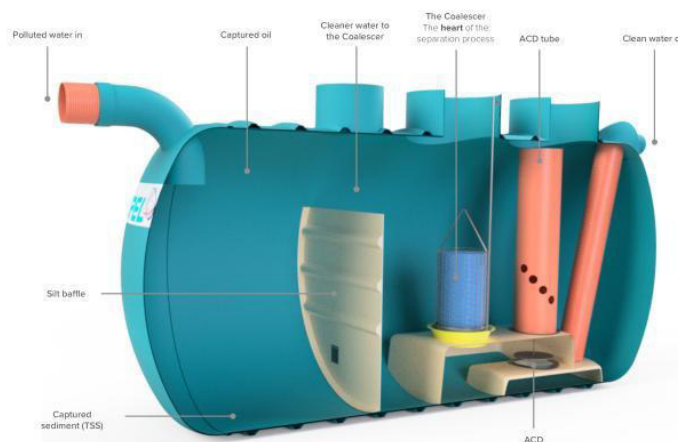
SPEL's ESR range is a total treatment system removing Hydrocarbons, Total Suspended Solids (TSS) and Metals (particulate) from stormwater. It's a highly efficient, single unit, SuDS water quality device.

SPEL ESR Puraceptor Certified Mitigation Index

TSS	0.8
Metals	0.6
Hydrocarbons	0.99*

*HR Wallingford test results to BS EN 858, tested to it's maximum designed flow rate

SPEL ESR Puraceptor



Reedbeds

It is proposed to introduce a section of reedbed swale immediately downstream of the Puraceptor which will provide a final 'polishing' treatment to the development surface water flows. This introduces a natural system prior to the canal outfall which also has ecological and wildlife benefits. The reedbeds will typically have a gravel matrix of 6 to 12 mm diameter clean washed stone, with a coarser surface gravel layer. The reedbeds will be 300 mm thick at the outfall end, reducing slightly towards the upstream end to suit the profile of the drain. Perforated pipes will extend from the outfall for 40% of the upstream reedbed length to collect and channel flows to the outfall pipe.

Wet Grassland

The areas around the reedbed will be profiled to form a relatively flat fall and planted with a wetland grass and pond grass mix. This will encourage ponding in the grassland areas, thus acting to retain soil moisture, promote bio-diversity and enhance water treatment in these zones.

Flow Restriction

The final outfall from development is located centrally along the northern boundary of the site with a connection to the Rochdale Canal. The flow control chamber will discharge a maximum permitted rate of flow of 29.6 l/s for the whole development. This shall pass through the Puraceptor and into the reedbed/swale at a controlled flow thus allowing treatment along this section prior to the outfall to canal.

Planting Plan

The assumption is for Common Reed (*Phragmites australis*) at a density of ten plug plants per m². The estimated total number of reeds is 857 plugs. This is based on a reedbed length of 30 m within the 3m channel at the specified planting density. The development build-out will take a period of 2 to 3 years with progressive increase in flows to the final outfall. Establishment of the reedbeds is to be phased to match the build-out.

Wet grassland areas will be planted with a mix of wetland grass species that can survive in high soil moisture conditions. This includes MG10 *Holcus lanatus* – *Juncus effuses* community.

Channel banks are to be seeded conventionally and/or by pre-seeded erosion mat necessary for inaccessible slopes. The planting mixes will be selected to include locally suitable plants which will complement the surrounding landscape.

Precise planting along with management and maintenance should be referred to Golby and Luck Drawings GL 1835-02 – 05 along with the maintenance responsibility plan.

Filter Drain

The proposed footway link adjacent to the canal will be drained by a filter drain to convey and filter surface water runoff from the footway.

Surrounding run-off from adjacent land

The existing site is currently served by a series of land drains which appear to intercept an element of natural runoff from the adjacent elevated land and currently discharge to the existing culvert below the canal and onwards to the island site. It is proposed that these shall remain and be re-routed where necessary within the development to the same discharge point. This shall mitigate any change in potential increased nutrient or phosphate entering the canal.

ppendix

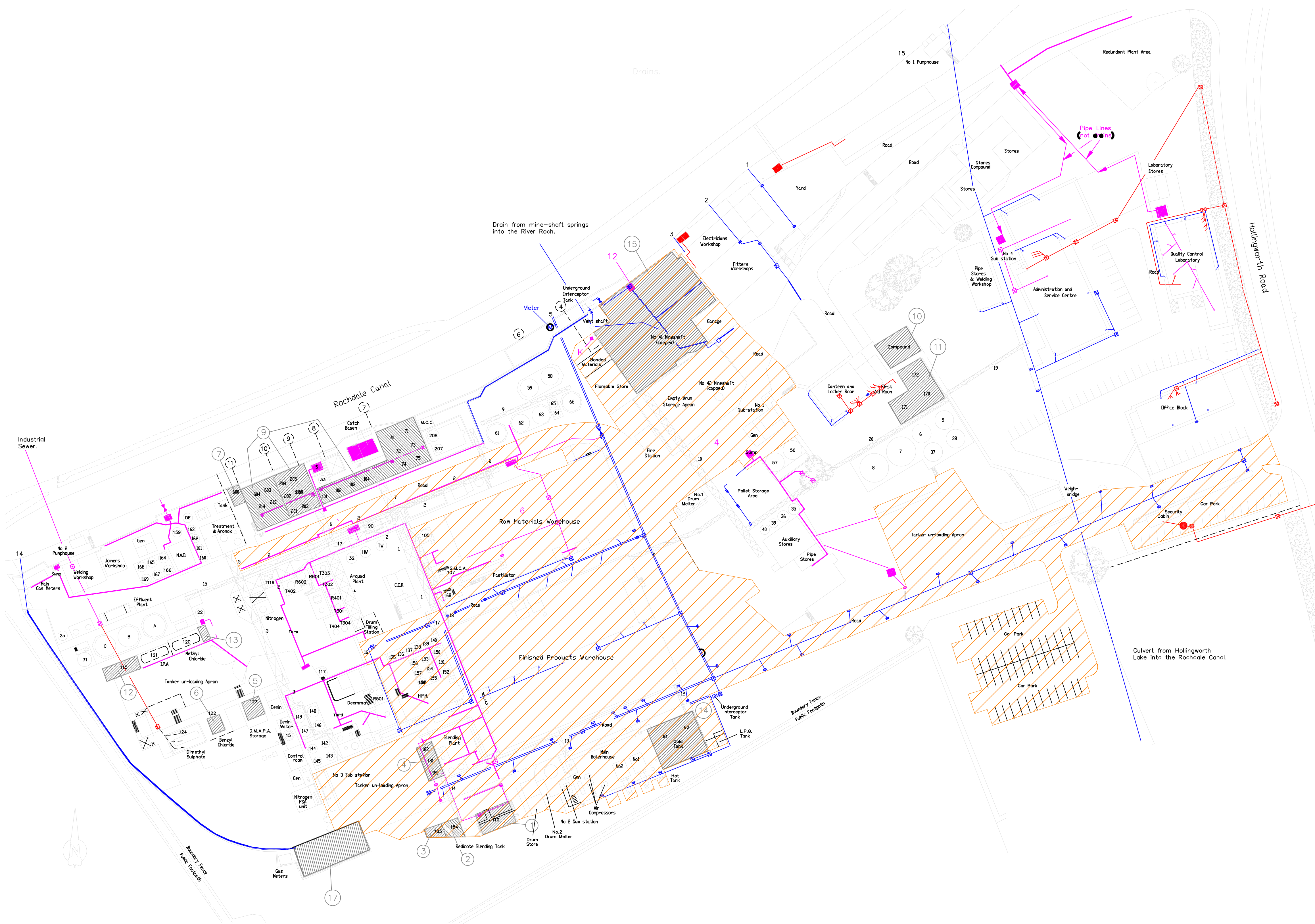
1. Eastwood & Partners – Former Drained Areas MH S14 (Drg. 45466/SK02 Rev A)
2. Eastwood & Partners – ReFH2 greenfield runoff rates
3. Eastwood & Partners - Drainage Layout (Drg. 45466/002 Rev N & 45466/003 Rev P)
4. SPEL Puraceptor information
5. Eastwood & Partners – Swale Cross Section (Drg. 45466/040 Rev C)

Appendix 1

Existing area draining to existing MHS14: 1.86ha
Brownfield Rate: 2.78 x 50 x 1.86 = 258l/s

INFORMATION WITHIN THIS DRAWING IS NOT NECESSARILY PRODUCED TO SCALE.
ALWAYS USE FIGURED DIMENSIONS AND CO-ORDINATES - IF IN DOUBT, ASK.

Former drained area to MH S14
(1.86 ha)



NOTES

REV	DESCRIPTION	SIG	CHK	DATE
A	First Issue.			

VISTRY PARTNERSHIPS

LITTLEBOROUGH

FORMER DRAINED AREAS TO MHS14

Eastwood & Partners
CONSULTING ENGINEERS

St. Andrew's House
23 Kingfield Road
Sheffield
S11 9AS
Tel 0114 255 4554
Fax 0114 255 4330
mail@eastwoodandpartners.com
www.eastwoodandpartners.com



SCALE WHEN PLOTTED AT A1
NTS

DRAWING STATUS
INFORMATION

DRAWN	CHECKED	DATE	DRAWING NUMBER	REV
CJH	CH	14.10.22	45466/033	A

Appendix 2

Eastwood & Partners Ltd	
Project	Littleborough
Job No	45466
Coordinates	501780, 426977

Return period (yrs)	As-rural peak flow (m ³ /s)	l/s	l/s/ha	l/s (Impermeable)
1	0.03	25.43	4.61	12.21
2	0.03	29.47	5.34	14.15
10	0.05	53.77	9.74	25.81
30	0.07	72.35	13.11	34.73
100	0.10	97.69	17.70	46.90

5.52	Site area (Hectares)
2.65	Site imp. area (Hectares)

UK Design Flood Estimation

Generated on Wednesday, May 5, 2021 2:08:43 PM by ihopkinson
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Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details

Checksum: 92A8-6C69

Site name: FEH_Point_Descriptors_393389_415713

Easting: 393389

Northing: 415713

Country: England, Wales or Northern Ireland

Catchment Area (km²): 0.06 [0.5]*

Using plot scale calculations: Yes

Model: 2.3

Site description: None

Model run: 1 year

Summary of results

Rainfall - FEH 2013 model (mm):	14.32	Total runoff (ML):	0.16
Total Rainfall (mm):	10.77	Total flow (ML):	0.59
Peak Rainfall (mm):	1.22	Peak flow (m ³ /s):	0.03

Parameters

Where the user has overridden a system-generated value, this original value is shown in square brackets after the value used.

** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	02:18:00	No
Timestep (hh:mm:ss)	00:06:00	No
SCF (Seasonal correction factor)	0.75	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	89.17	No
Cmax (mm)	349.58	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	1	No
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m ³ /s)	0	No
BL (hr)	31.03 [26.25]	Yes
BR	2.7	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km ²)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No
Exporting drained area (km ²)	0.00	Yes
Sewer capacity (m ³ /s)	0.00	Yes

Appendix

Catchment descriptors *

Name	Value	User-defined value used?
BFIHOST	0.39	No
BFIHOST19	0.48	No
PROPWET (mm)	0.57	No
SAAR (mm)	1208	No

Values in square brackets are the original values loaded from the FEH Web Service or FEH CD-ROM

UK Design Flood Estimation

Generated on Wednesday, May 5, 2021 2:08:56 PM by ihopkinson
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Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details

Checksum: 92A8-6C69

Site name: FEH_Point_Descriptors_393389_415713

Easting: 393389

Northing: 415713

Country: England, Wales or Northern Ireland

Catchment Area (km²): 0.06 [0.5]*

Using plot scale calculations: Yes

Model: 2.3

Site description: None

Model run: 2 year

Summary of results

Rainfall - FEH 2013 model (mm):	16.69	Total runoff (ML):	0.19
Total Rainfall (mm):	12.55	Total flow (ML):	0.69
Peak Rainfall (mm):	1.42	Peak flow (m ³ /s):	0.03

Parameters

Where the user has overridden a system-generated value, this original value is shown in square brackets after the value used.

** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	02:18:00	No
Timestep (hh:mm:ss)	00:06:00	No
SCF (Seasonal correction factor)	0.75	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	89.17	No
Cmax (mm)	349.58	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	1	No
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m ³ /s)	0	No
BL (hr)	31.03 [26.25]	Yes
BR	2.66	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km ²)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No
Exporting drained area (km ²)	0.00	Yes
Sewer capacity (m ³ /s)	0.00	Yes

Appendix

Catchment descriptors *

Name	Value	User-defined value used?
BFIHOST	0.39	No
BFIHOST19	0.48	No
PROPWET (mm)	0.57	No
SAAR (mm)	1208	No

Values in square brackets are the original values loaded from the FEH Web Service or FEH CD-ROM

UK Design Flood Estimation

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Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details

Checksum: 92A8-6C69

Site name: FEH_Point_Descriptors_393389_415713

Easting: 393389

Northing: 415713

Country: England, Wales or Northern Ireland

Catchment Area (km²): 0.06 [0.5]*

Using plot scale calculations: Yes

Model: 2.3

Site description: None

Model run: 10 year

Summary of results

Rainfall - FEH 2013 model (mm):	30.21	Total runoff (ML):	0.36
Total Rainfall (mm):	22.72	Total flow (ML):	1.25
Peak Rainfall (mm):	2.58	Peak flow (m ³ /s):	0.05

Parameters

Where the user has overridden a system-generated value, this original value is shown in square brackets after the value used.

** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	02:18:00	No
Timestep (hh:mm:ss)	00:06:00	No
SCF (Seasonal correction factor)	0.75	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	89.17	No
Cmax (mm)	349.58	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	1	No
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m ³ /s)	0	No
BL (hr)	31.03 [26.25]	Yes
BR	2.48	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km ²)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No
Exporting drained area (km ²)	0.00	Yes
Sewer capacity (m ³ /s)	0.00	Yes

Appendix

Catchment descriptors *

Name	Value	User-defined value used?
BFIHOST	0.39	No
BFIHOST19	0.48	No
PROPWET (mm)	0.57	No
SAAR (mm)	1208	No

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UK Design Flood Estimation

Generated on Wednesday, May 5, 2021 2:09:16 PM by ihopkinson
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Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details

Checksum: 92A8-6C69

Site name: FEH_Point_Descriptors_393389_415713

Easting: 393389

Northing: 415713

Country: England, Wales or Northern Ireland

Catchment Area (km²): 0.06 [0.5]*

Using plot scale calculations: Yes

Model: 2.3

Site description: None

Model run: 30 year

Summary of results

Rainfall - FEH 2013 model (mm):	39.81	Total runoff (ML):	0.49
Total Rainfall (mm):	29.94	Total flow (ML):	1.65
Peak Rainfall (mm):	3.40	Peak flow (m ³ /s):	0.07

Parameters

Where the user has overridden a system-generated value, this original value is shown in square brackets after the value used.

** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	02:18:00	No
Timestep (hh:mm:ss)	00:06:00	No
SCF (Seasonal correction factor)	0.75	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	89.17	No
Cmax (mm)	349.58	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	1	No
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m ³ /s)	0	No
BL (hr)	31.03 [26.25]	Yes
BR	2.36	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km ²)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No
Exporting drained area (km ²)	0.00	Yes
Sewer capacity (m ³ /s)	0.00	Yes

Appendix

Catchment descriptors *

Name	Value	User-defined value used?
BFIHOST	0.39	No
BFIHOST19	0.48	No
PROPWET (mm)	0.57	No
SAAR (mm)	1208	No

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UK Design Flood Estimation

Generated on Wednesday, May 5, 2021 2:09:27 PM by ihopkinson
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Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details

Checksum: 92A8-6C69

Site name: FEH_Point_Descriptors_393389_415713

Easting: 393389

Northing: 415713

Country: England, Wales or Northern Ireland

Catchment Area (km²): 0.06 [0.5]*

Using plot scale calculations: Yes

Model: 2.3

Site description: None

Model run: 100 year

Summary of results

Rainfall - FEH 2013 model (mm):	52.08	Total runoff (ML):	0.67
Total Rainfall (mm):	39.16	Total flow (ML):	2.16
Peak Rainfall (mm):	4.44	Peak flow (m ³ /s):	0.10

Parameters

Where the user has overridden a system-generated value, this original value is shown in square brackets after the value used.

** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	02:18:00	No
Timestep (hh:mm:ss)	00:06:00	No
SCF (Seasonal correction factor)	0.75	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	89.17	No
Cmax (mm)	349.58	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	1	No
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m ³ /s)	0	No
BL (hr)	31.03 [26.25]	Yes
BR	2.21	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km ²)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No
Exporting drained area (km ²)	0.00	Yes
Sewer capacity (m ³ /s)	0.00	Yes

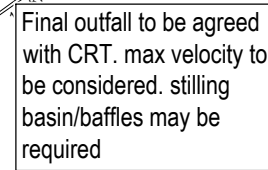
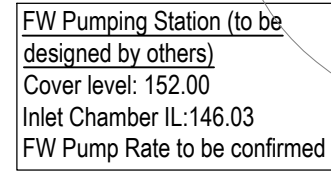
Appendix

Catchment descriptors *

Name	Value	User-defined value used?
BFIHOST	0.39	No
BFIHOST19	0.48	No
PROPWET (mm)	0.57	No
SAAR (mm)	1208	No

Values in square brackets are the original values loaded from the FEH Web Service or FEH CD-ROM

Appendix 3



NOTES

- KEY

- | | |
|---|--|
|  | Proposed adoptable surface water sewer |
|  | Proposed adoptable foul water sewer |
|  | Easement |
|  | Foul pumping main |
|  | Proposed attenuation tank |
|  | Filter drain to footway link |
|  | Indicative areas of permeable driveways (70% to be provided) |
|  | Trapped gully for silt removal |

N	Updated to show revised outfall to canal with rebedded option	GH	CH	27.01.23
M	Updated to show revised outfall to culvert below canal. discharge rate updated as agreed with LLFA. Latest planning layout shown	GH	CH	01.12.22
L	Updated to suit latest site layout. Pollution mitigation measures identified	CB	CH	26.08.22
K	Updated to suit latest site layout and clients comments	GH	CH	27.06.22
J	Updated to suit latest site layout	AS	GH	24.06.22
H	Updated to latest client comments.	CJH	GH	15.06.22
G	Updated to latest site layout. Drainage updated to suit.	CJH	GH	13.06.22
F	Updated to suit latest site layout. Swales introduced along western boundary. Storage tank included in central POS	GH	CH	03.05.22
E	Easement widths added to layout.	RB	CH	18.08.21
D	Updated to latest planning layout		CH	PR 28.07.21
C	Land drainage added to southern and western boundaries. Note on mine drainage expanded. Easement added to existing culvert.	RB	CH	01.07.21
B	Drainage updated to suit latest site layout. Attenuation basin and tank amended.	RB	CH	29.06.21
A	First Issue.			
REV	DESCRIPTION	SIG	CHK	DATE

LITTLEBOROUGH

DRAINAGE APPRAISAL
SHEET 1

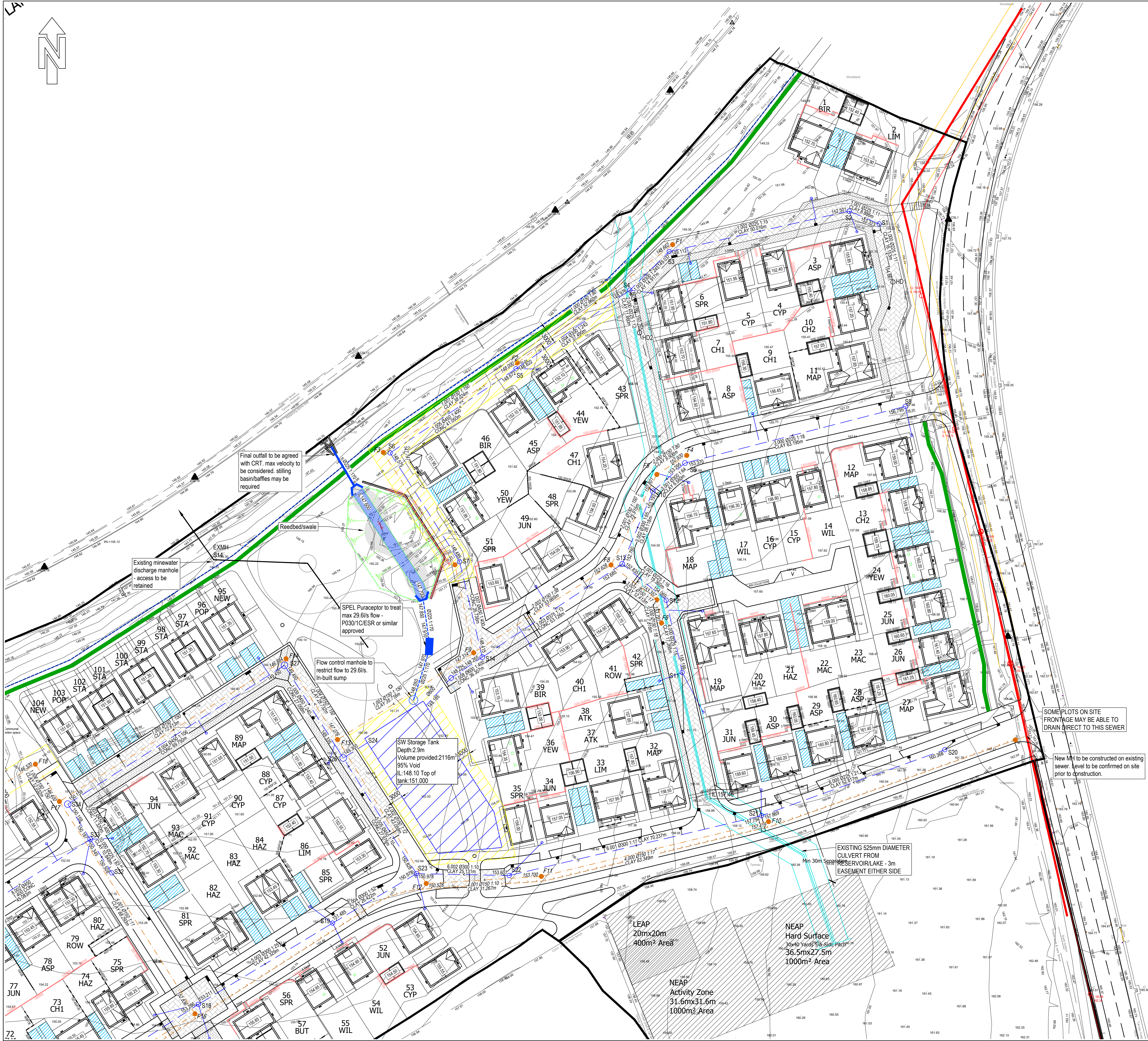
St. Andrew's House
23 Kingfield Road
Sheffield
S11 9AS
Tel 0114 255 4554
Fax 0114 255 4330

EOP

mail@eastwoodandpartners.com
www.eastwoodandpartners.com

EOP

SCALE WHEN PLOTTED AT A1 1:500			DRAWING STATUS PRELIMINARY	
DRAWN	CHECKED	DATE	DRAWING NUMBER	REV
RB	CH	26.11.20	45466/002	N



INFORMATION WITHIN THIS DRAWING IS NOT NECESSARILY PRODUCED TO SCALE. ALWAYS USE FIGURED DIMENSIONS AND CO-ORDINATES - IF IN DOUBT, ASK.

NOTES

1. This drawing is to be read in conjunction with all relevant Eastwood & Partners drawings prefixed 45466 as well as all relevant Vistry Partnerships planning layouts and house type drawings.
2. Levels in areas surrounding existing trees and on site boundaries are to be maintained as existing, unless noted otherwise.

KEY

- Proposed adoptable surface water sewer
- Proposed adoptable foul water sewer
- Easement
- Foul pumping main
- Proposed attenuation tank
- Filter drain to footway link
- Indicative areas of permeable driveways (70% to be provided)
- Trapped gully for silt removal

P	Updated to show revised outfall to canal with reedbed option	GH	CH	27.01.23
N	Updated to show revised outfall to culvert below canal, discharge rate updated as agreed with LLFA. Latest planning layout shown	GH	CH	01.12.22
M	S104 Submission	CJH	GH	14.10.22
L	Updated to suit latest site layout. Pollution mitigation measures identified	CB	CH	26.08.22
K	Updated to suit latest site layout	GH	CH	27.06.22
J	Updated to suit latest site layout	AS	GH	24.06.22
H	Updated to latest clients comments.	CJH	GH	14.06.22
G	Updated to latest site layout. Drainage updated to suit.	CJH	GH	13.06.22
F	Updated to suit latest site layout. Swales introduced along western boundary. Storage tank included in central POS	GH	CH	03.05.22
E	Easement widths added to layout.	RB	CH	18.08.21
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B	Drainage updated to suit latest site layout. Attenuation basin and tank amended.	RB	CH	29.06.21
A	First Issue.			
REV	DESCRIPTION	SIG	CHK	DATE

VISTRY PARTNERSHIP YORKSHIRE

LITTLEBOROUGH

DRAINAGE APPRAISAL
SHEET 2

Eastwood & Partners
CONSULTING ENGINEERS

St. Andrew's House
23 Kingfield Road
Sheffield
S11 9AS
Tel 0114 255 4554
Fax 0114 255 4330

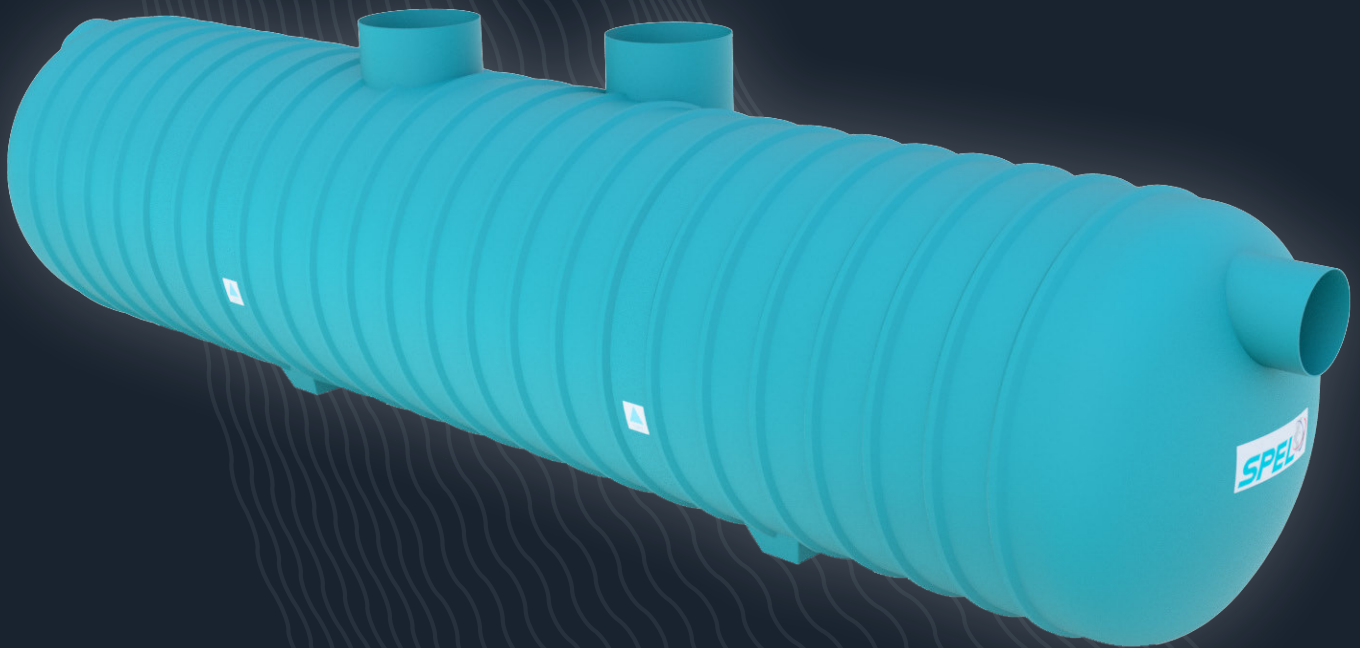
mail@eastwoodandpartners.com
www.eastwoodandpartners.com

SCALE WHEN PLOTTED AT A1			DRAWING STATUS		
1:500			PRELIMINARY		
DRAWN	CHECKED	DATE	DRAWING NUMBER	REV	
RB	CH	26.11.20	45466/003	P	

Appendix 4



The *safest answer* for *pollution control*
and our *environment*



SPEL Puraceptor

ESR (Enhanced Silt Retention)

Total Treatment SuDS Compliant ESR Range

SPEL Puraceptor ESR Range

Full Flow Treatment System

The **total** treatment solution for SuDS

The new SPEL Puraceptor ESR System is designed to treat the full flow from the catchment area and includes the important Automatic Closure Device (ACD). This device will close off the outlet of the separator when captured oil exceeds the maximum oil storage volume.

Fully certified to meet the CIRIA SuDS Mitigation Index, this system has been tested by WRc (for TSS and Metals) to the British Water Code of Practice for Manufactured Treatment Devices*, and by HR Wallingford to the British and European Standard BS EN 858.

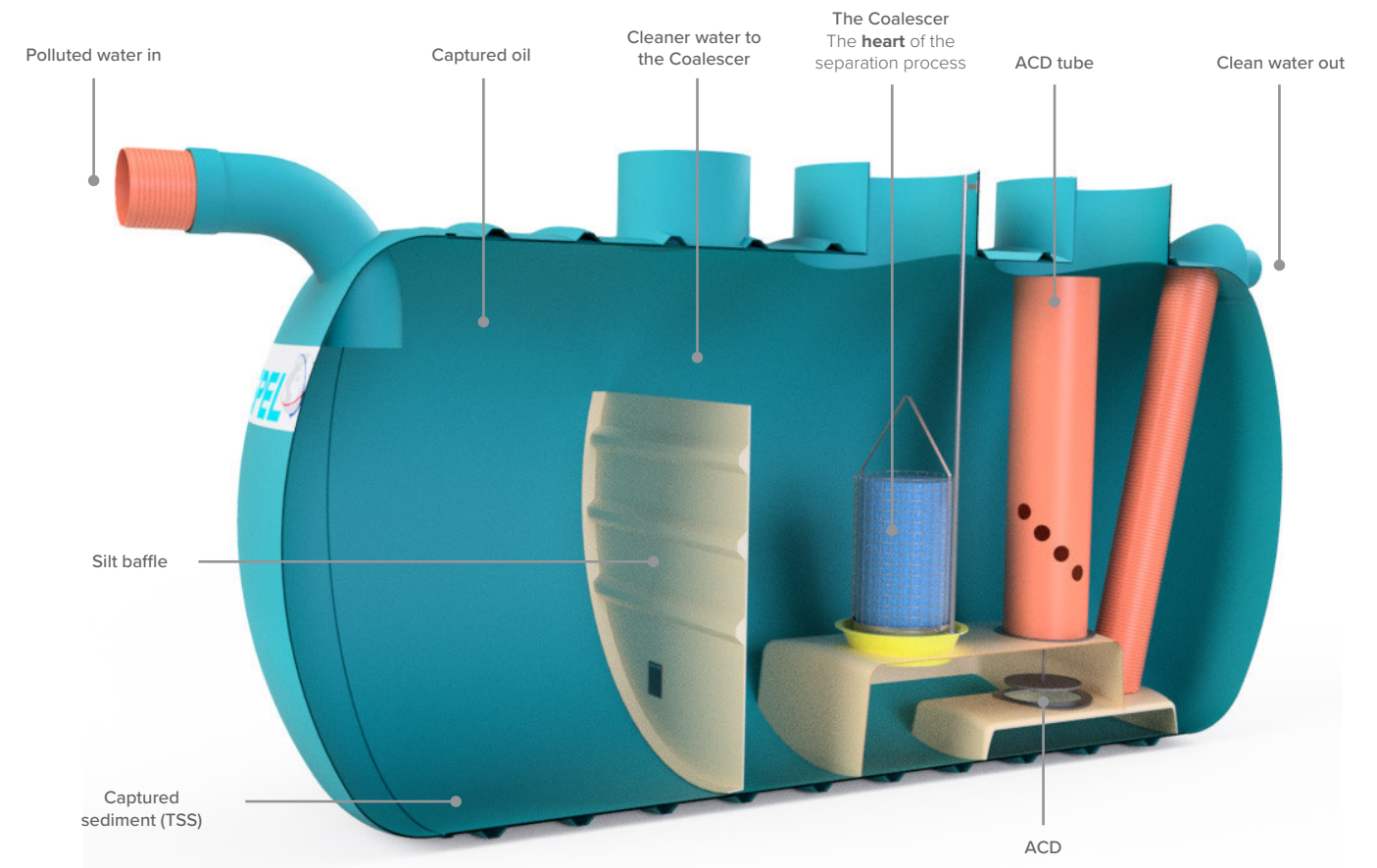
SPEL's ESR range is a total treatment system removing Hydrocarbons, Total Suspended Solids (TSS) and Metals (particulate) from stormwater. It's a highly efficient, single unit, SuDS water quality device.

SPEL ESR Puraceptor Certified Mitigation Index

TSS	0.8
Metals	0.6
Hydrocarbons	0.99*

**H R Wallingford test results to BS EN 858: tested to it's maximum designed flow rate*

SPEL ESR Puraceptor



SPEL Puraceptor ESR Range

Full Flow Treatment System



Surface Water Treatment Device Performance Declaration

Testing carried out according to British Water Code of Practice*

Product Details	Description
Manufacturer	SPEL Products
Treatment Device Name/Model	Puraceptor Type ESR P010/1C
General description	Full Retention Class 1 Separator with Silt Capacity
Envisaged application	Treatment of Surface Water Run-off
Pollutant(s) captured	Total Suspended Solids

Parameter	Value	Unit
Treatment device capacity	3200	litres
Sediment Storage capacity	1000	litres
Treatment Flow rate	10	l/s
Connected Area	1,333	m²
Pollution retention flow rate	10	l/s

Parameter	Value	Unit
Maximum capacity flow rate	10*	l/s
Device head loss (at treatment flowrate)	0.286	m
Device head loss (at maximum capacity treatment flowrate)	0.286*	m
TSS capture and retention efficiency (Milisil V4 test sediment)	80	%
Zinc capture efficiency (if tested)	Not tested for dissolved metals	%
Zinc retention efficiency (if tested)	Not tested for dissolved metals	%
Copper capture efficiency (if tested)	Not tested for dissolved metals	%
Copper retention efficiency (if tested)	Not tested for dissolved metals	%
Dissolved Metals reduction	0.0	%
Particulate metals reduction*	60.3*	%
Total Metals reduction*	60.3*	%

* Maximum test flow for a Full Retention device equates to the device maximum design flow.

* Extrapolated value in accordance with British Water How to Guide: Applying the CIRIA The SuDS Manual (C753) Simple Index Approach to Proprietary / Manufactured Stormwater Treatment Devices. Version 7, Section 4.3, (2021 - under pre-publication review).

Research and Development

Research and development is at the heart of what we do at SPEL, our passion as Zero Pollution Ambassadors is to be at the cutting edge of clean surface water technology.

Months of rigorous testing has resulted in the new SPEL ESR Treatment System, available in both by-pass or full flow.

Certificates of compliance from WRc and HR Wallingford for the SPEL Puraceptor ESR Range

CERTIFICATE

LIGHT LIQUID SEPARATOR TEST PERFORMANCE CERTIFICATE
Compliance with Clause 8.3.3 of BS EN 858

Separator make and model number: **SPEL PURACEPTOR P030/1CSC NS30**
As detailed in SPEL Drawing SSP 9080

The separator tested complied with the drawing provided by the manufacturer and no additional features were noticed

Test date: **3 August 2006**

Designated/nominal flow rate, Q_n (litres/second): **30 litres/s**
Net capacity of separator (excluding any allowance for silt storage), V_k (litres): **7368 litres**

Total duration of test (minutes): **21.4 min**
Running-in period (≥ 15 minutes): **16.4 min**
Sampling period (minutes): **5 minutes common to all tests**

Oil flow rate (based on 0.5% of water flowrate, litres/second): **0.15 litres/s**

Temperature of oil (°C): **15.0**
Temperature of water (°C): **15.8**
Temperature of air (°C): **14.0**

Analysis of samples by IR spectroscopy carried out by: **Intertek Caleb Brett Testing Services***
Date of results: **11/08/06**

Sample	Oil concentration (mg/l)**	Name	Date
1	0.2		
2	0.1		
3	0.1		
4	0.3		
5	1.7		
Resulting average:	0.5	<i>Harold Lawrence</i>	15/08/06

For and behalf of HR Wallingford Limited

* NAMAS accredited laboratory
** Value of baseline concentration deducted



SPEL's Head of Technical Development alongside the WRc testing officer.

SPEL Puraceptor ESR Range Full Flow System

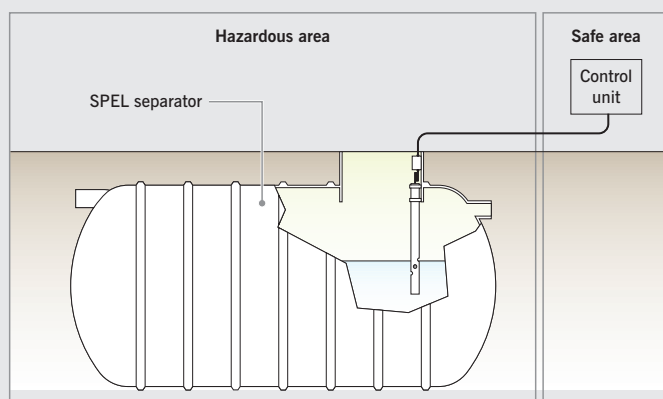
Specification Chart

Full flow devices must be sized on modelled flow rate



IMPORTANT: It is essential to cross-check the catchment-based flow rate from the chart below with the modelled flow rate to ensure the separator is correctly sized to treat the peak flow without causing restriction or overstressing the system.

Model	Series	Max. Flow	Catchment Area	Overall length (mm)	Oil storage (L)	Silt capacity (L)	Overall diameter (mm)	Inlet Invert (mm)	Base to inlet (mm)	Base to outlet (mm)	Max in/out pipe diameter (mm)	Number of access shafts (dia. mm)			
		(l/s)	Based on 65mm/hr					A	B	C		600	750	900	1200
P004/1C/ESR	200	4	222	1,720	40	400	1,225	630	1,110	1,050	160	-	1	-	-
P006/1C/ESR	200	6	333	2,310	60	600	1,225	630	1,110	1,050	160	-	1	-	-
P010/1C/ESR	200	10	556	3,410	100	1,000	1,225	630	1,110	1,050	160	-	1	-	-
P015/1C/ESR	300	15	833	3,200	150	1,500	1,875	350	1,800	1,740	225	-	1	-	-
P020/1C/ESR	300	20	1,111	3,540	200	2,000	1,875	350	1,800	1,740	225	1	1	-	-
P030/1C/ESR	300	30	1,667	4,420	300	3,000	1,875	390	1,760	1,700	300	1	-	1	-
P040/1C/ESR	300	40	2,222	5,760	400	4,000	1,875	390	1,760	1,700	300	1	-	1	-
P050/1C/ESR	300	50	2,778	7,060	500	5,000	1,875	390	1,760	1,700	300	1	-	1	-
P065/1C/ESR	400	65	3,611	4,810	650	6,500	2,700	425	2,625	2,525	300	1	-	2	-
P080/1C/ESR	400	80	4,444	5,700	800	8,000	2,700	425	2,625	2,525	300	1	-	2	-
P100/1C/ESR	400	100	5,555	7,400	1,000	10,000	2,700	475	2,575	2,475	450	1	-	2	-
P125/1C/ESR	400	125	6,944	8,580	1,250	12,500	2,700	475	2,575	2,475	450	-	1	2	-
P150/1C/ESR	400	150	8,333	10,180	1,500	15,000	2,700	475	2,575	2,475	450	-	1	2	-
P165/1C/ESR	400	165	9,166	11,200	1,650	16,500	2,700	500	2,550	2,450	450	2	1	1	-
P200/1C/ESR	400	200	11,110	13,710	2,000	20,000	2,700	660	2,390	2,290	600	2	1	1	-
P250/1C/ESR	400	250	13,888	16,750	2,500	25,000	2,700	660	2,390	2,290	600	2	1	2	-
P300/1C/ESR	500	300	16,665	12,410	3,000	30,000	3,650	805	3,070	2,970	750	1	2	2	-
P400/1C/ESR	500	400	22,220	15,760	4,000	40,000	3,650	805	3,070	2,970	750	2	2	2	-
P500/1C/ESR	500	500	27,775	20,530	5,000	50,000	3,650	955	2,920	2,820	900	2	2	1	1
P500/1C/ESR	600	500	27,775	16,260	5,000	50,000	4,150	925	3,250	3,150	900	2	2	1	1
P600/1C/ESR	600	600	33,330	19,080	6,000	60,000	4,150	925	3,250	3,150	900	2	2	-	2
P700/1C/ESR	600	700	38,888	22,270	7,000	70,000	4,150	925	3,250	3,150	900	3	2	3	-
P800/1C/ESR	600	800	44,440	23,020	8,000	80,000	4,150	925	3,250	3,150	900	3	2	2	1
P900/1C/ESR	600	900	49,846	24,660	9,000	90,000	4,150	925	3,250	3,150	900	3	2	-	3



Full SPELGuard Maintenance contracts available

Alarm Options:

1. Oil Alarm (BS858 Compliant)
2. Silt Alarm
3. High Level

Options Available:

1. Beacon/Audible alarm
2. As one plus single volt free BMS connection
3. As one plus multiple volt free BMS connection
4. Solar powered system with optional SMS available

All alarms are IP65 rated.

Protecting our environment for over 45 years

The SuDS Manual is leading good practise in drainage design, SPEL are endorsing this with the new SPEL Purceptor ESR range

Total Suspended Solids (TSS)	Metals	Hydrocarbons
0.8	0.6	0.99*

*H R Wallingford test results to BS EN 858

Added to these class-leading Mitigation Indices, the ESR range benefits from:

- British/European Standard BS EN 858-1 2002 certification.
- The SPEL 25 year shell Warranty.
- 50 year+ life expectancy.
- ISO9001 quality assurance.
- ISO14001 committed to environmental improvement
- Generously sized for high performance and low maintenance over a long life span.

26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads and trunk roads/motorways ¹	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways ¹	High	0.8 ²	0.8 ²	0.9 ²

26.3 Indicative SuDS mitigation indices for discharges to surface waters

Type of SuDS component	Mitigation Indices		
	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4 ²	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond ⁴	0.7 ³	0.7	0.5
Wetland	0.8 ³	0.8	0.8
Proprietary treatment systems ^{5,6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Tables from The SuDS Manual (C753), p568-569

For reference notes, please see the full manual: https://www.ciria.org/Memberships/The_SuDs_Manual_C753_Chapters.aspx

SPEL Automatic Closure Device (ACD)

Protection in an event of a major spillage

The purpose of the automatic closure device (ACD) is to close the separator off automatically when the maximum oil storage capacity is attained.

The ACD ensures that in the event of a major spillage, pollutants do not enter the drainage system, however the ACD should not be regarded as a substitute for an automatic alarm/monitoring system.

Commissioning

SPEL Puraceptor® Class 1 Separators
single chamber models
Models P004/1C/ESR to P050/1C/ESR

After the tank has been installed, leave the water in.

1. Remove the ACD from the packing box, taking care not to cause damage.
2. Remove the retaining cap from the top of the retaining tube in the separator.
3. Insert the ACD into the retaining tube using the lifting eye provided. Allow it to sink to the bottom. The stainless steel retaining plate should seat on the base flange and the ACD attain its operating position as shown in the open position.
4. Replace the retaining cap. This is to safeguard against the removal of the float by unauthorised persons or rising above the tube under abnormal conditions.

Note: If the tank's invert depth exceeds 1m it is advisable to remove the retaining cap prior to installation and only replace after inserting the ACD, if it is possible to do so from ground level.

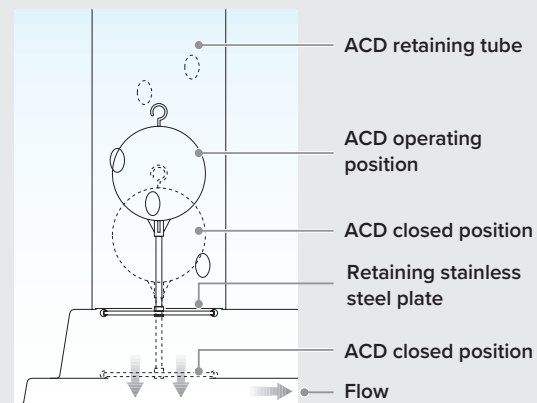
Larger Models

Where the ACD is already positioned in the unit, proceed as follows:

1. Before putting any water in the tank, lift rope attached to ACD up to the next knot and hang it from the rope hook. This is now in the 'operating position'.
2. As soon as the water level in the tank is above the ACD, the rope must be removed altogether and the rope hook must be unbolted. Do not leave the rope hook attached to the shaft. Ensure the ACD automatically remains in the 'operating position'.
3. Tape up or fill the hole(s) in the shaft where the rope hook was attached to prevent any backfill seeping into the shaft.

Maintenance - SPELGuard

Dependent upon site conditions it is advisable to remove the ACD periodically taking care not to raise it too quickly and damage the plastic/copper float. Clean from debris/silt to prevent premature closing. Check the seating in the base unit is free of debris/silt that could prevent proper closing in an emergency.



Installation

SPEL Separators can be installed with a concrete or pea gravel surround, dependent upon ground conditions and water table level. Detailed installation instructions are provided with each unit 'SPEL Tankstor and separator installation instructions'.

Site access and conditions

It is the responsibility of the contractor to ensure suitable access to good hard ground that is safe and suitable for off-loading.

Off-loading/handling

The contractor is responsible for off-loading. The tank must be handled with care to prevent accidental damage from impact or contact with sharp objects.

Tanks should be lifted using slings, not chains or wire ropes. Do not drag tanks along the ground for any distance and avoid jarring or bumps. Do not lift with water in the tank.

Health and safety

Installation should be carried out by a competent contractor in accordance with Health & Safety at Work legislation and good building practice.

A warning notice should be visible at the top of each access shaft – 'danger, harmful fumes' and 'respirators must be worn in this tank'. Before entering persons must be qualified in accordance with 'confined space' requirements.

Optional extras

SPEL coalescer unit guide rail systems

To facilitate easy insertion of coalescer units, the SPEL guide rail system manufactured in stainless steel can be incorporated into SPEL Puraceptors and class 1 Stormceptors.

Brackets fixed to the top and bottom of the coalescer unit simply engage the stainless steel guide rail fixed to the top of the stub access shaft. The coalescer unit is then lowered in the normal way, being guided at the correct angle into the conical base.

Lifting chains are available for the larger coalescer units and where extension shafts are fitted.

Extension guide rails can be incorporated into SPEL extension shafts to suit.

SPEL coalescer unit lifting, locating and locking system

The SPEL lifting, locating and locking system is manufactured in stainless steel and replaces the standard coalescer unit handle.

The locating/locking handle ensures the coalescer unit is seated and locked in its correct position after maintenance.

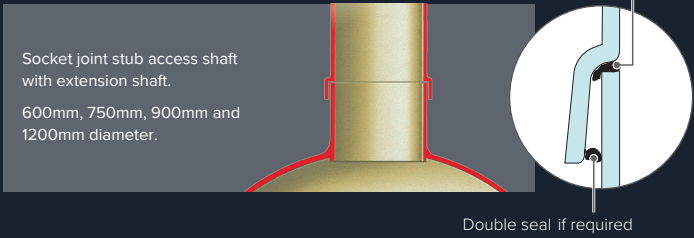


Above left: Lifting, locating and locking system with guide rail system.

Above right: The SPEL coalescer unit with lifting chain.

SPEL extension access shafts

Extension access shafts are available for deep invert applications.



Tank shell specifications

The 'standard' specification is normally adequate for most installations but heavier specifications are available depending upon the burial depth and water table level, in winter. The concern is when the system is emptied completely and remains empty for a period of time.

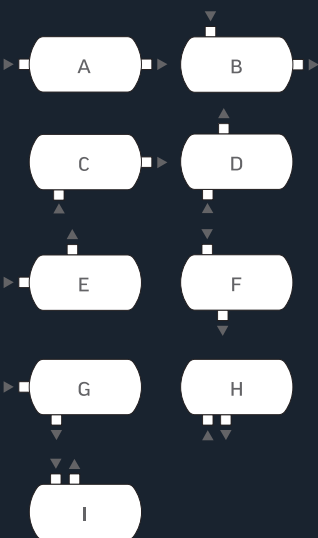
Standard tanks			Heavy tanks		
Series	WT (m)	D (m)	Series	WT (m)	D (m)
100/200	1.0	4.0	100/200	2.0	6.0
300	0.9	4.0	300	2.8	5.6
400	1.3	5.0	400	3.5	6.0
500	1.9	5.7	500	4.5	7.25
600	2.4	6.2	600	4.7	7.3

WT depth of water table	D maximum depth	WT depth of water table	D maximum depth
High water table	Well drained ground	High water table	Well drained ground

*Based on installation in concrete with concrete surround
For pea gravel surround, see SPEL Data Manual p13.5*

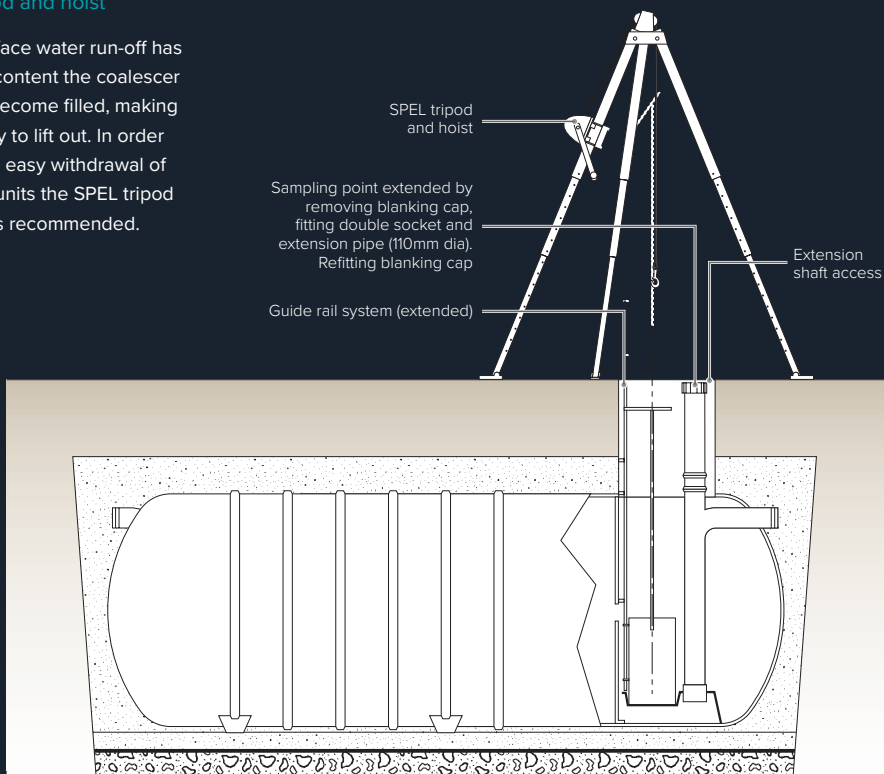
SPEL ESR Range – Inlet/outlet orientation

Dependent upon model and diameter of connections, these nine different orientations are available. However on the larger models it is important to check with our technical department.



SPEL tripod and hoist

Where surface water run-off has a high silt content the coalescer units can become filled, making them heavy to lift out. In order to facilitate easy withdrawal of coalescer units the SPEL tripod and hoist is recommended.



SPEL

Quality that protects the environment the **safest way**



The SPEL underground tanks have been designed with reference to BS EN 13121

SPEL Tank shells carry a 25 year Warranty and have a life expectancy of over 50 years

Rigorous quality control procedures at all stages of manufacture for each serial numbered tank, ISO 9001.

SPEL is an environmentally accredited company to ISO 14001.

Certificate No: FM 35174 UVDB/Achilles accredited – Supplier No. 88611.

Scan code with a QR reader to launch our website: spelproducts.co.uk

#ZeroPollutionAmbassadors

SPEL 07/22

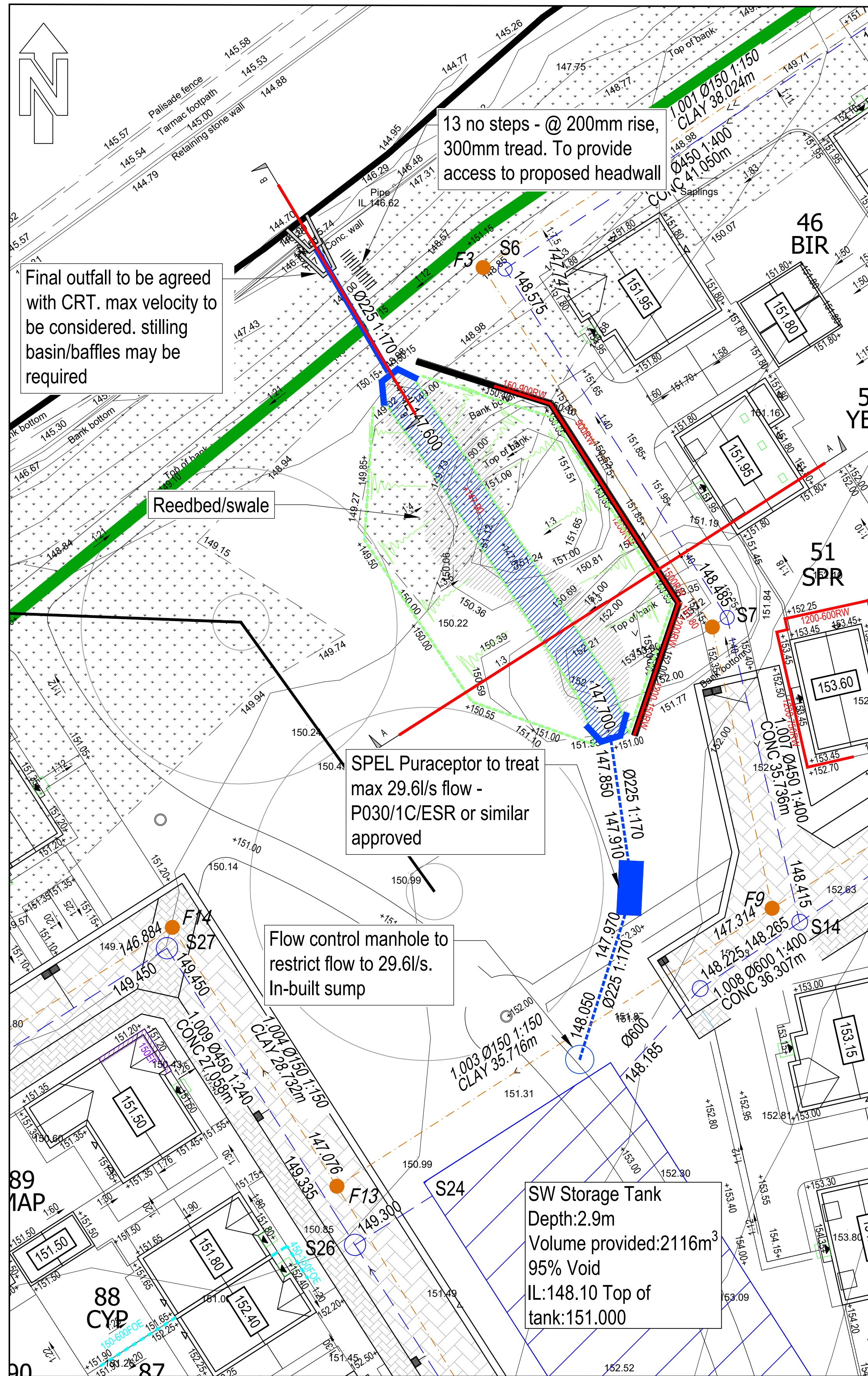
SPEL spelproducts.co.uk
+44 (0)1743 445 200

SPEL Products
Lancaster Road
Shrewsbury, Shropshire
SY1 3NQ, England.

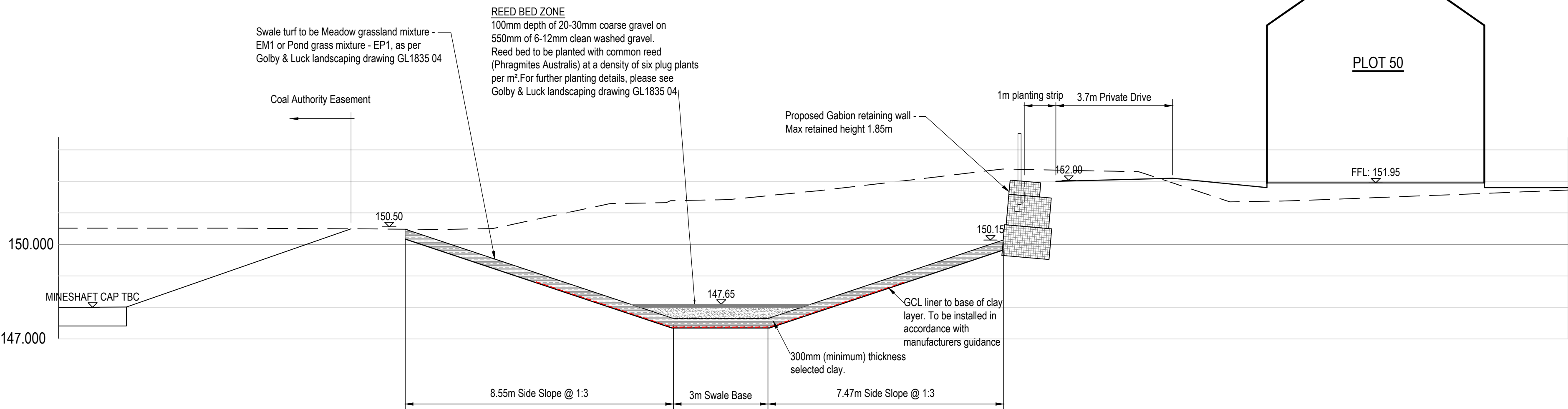
T. +44 (0)1743 445200
E. info@spelproducts.co.uk
E. sales@spelproducts.co.uk

Appendix 5

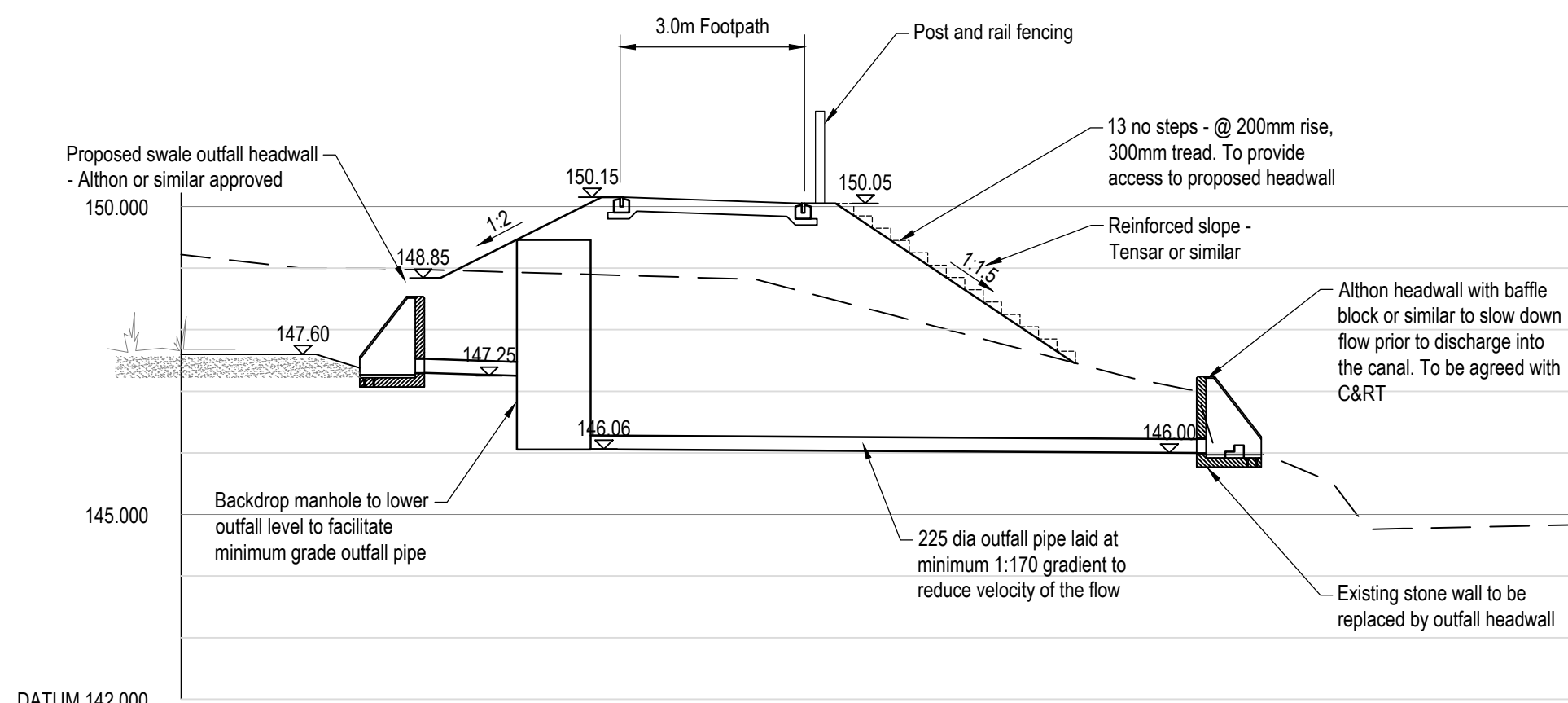
CU



SWALE PLAN
SCALE 1:250



SECTION A-A
SCALE 1:100



SECTION B-B
SCALE 1:100

C	Updated following meeting with client.	GH	CH	06.02.23
B	Section lines added	GH	CH	02.02.23
A	First Issue.			
REV	DESCRIPTION	SIG	CHK	DATE

VISTRY PARTNERSHIPS YORKSHIRE

LITTLEBOROUGH

INDICATIVE WETLANDS AND REED
BEDS SECTIONS AND DETAILS

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EOP

SCALE WHEN PLOTTED AT A1		DRAWING STATUS	
AS SPECIFIED		PRELIMINARY	
DRAWN	CHECKED	DATE	DRAWING NUMBER
GH	CH	31.01.23	45466/040
			REV
			C