Calm Homes

THE PADDOCKS, BEAUSALE

Drainage Statement

LE20291 – TPB-LE-GEN-XX-RP-CE-DS01-Drainage Statement

October 2020

linkeng.co.uk

Calm Homes

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CONTENTS

1 INTRODUCTION

1.1 Background

1.1.1 Link were commissioned by Calm Homes to prepare a Drainage Statement in respect to a proposed residential development at The Paddocks, Beausale. As required by Warwick District Council, the Local Planning Authority, this statement has been prepared to provide a Sustainable Drainage Strategy (SUDS) and Drainage Management Plan in support of a full planning application. As the development is less than one hectare and in Flood Zone 1 (i.e. less than 1 in 1000 year annual probability of flooding), a full site specific Flood Risk Assessment (FRA) is not required to support this application.

1.1.2 The proposed scheme shall consist of the erection of 9No. residential dwellings and associated infrastructure. The proposed site plan is included within Appendix A.

1.2 Site Location

1.2.1 The proposed site is located off Honiley Road to the north of Beausale, Warwickshire, adjacent to the Y junction with Clattyland Lane and Church Road. The site is bounded by the highway to the east, existing residential dwellings to the south and open fields to the north and west.

- The Nearest Post Code is CV35 7AF.

1.3 Topography

1.3.1 A detailed topographical survey of the site has been completed and this is included at Appendix B of this statement. The site is predominantly occupied by a number of agricultural buildings and associated external areas of hardstanding.

1.3.2 The site slopes in a westerly direction from a high level of 122.79mAOD in the east to a low point of 120.68mAOD along the western boundary.

1.4 Ground conditions

1.4.1 Upon review of the publicly available BGS data, it was found that there is a recorded borehole in the vicinity of the site. This borehole recorded that the site was underlain by gravels to a depth of 35ft. The presence of these gravels suggests that a drainage network that utilises infiltration could be feasible on the site, however to date no further ground investigation works have been undertaken. The borehole log is included at Appendix C.

1.5 Watercourses

1.5.1 The closest watercourse to the site is the Inchford Brook that runs approximately 110m to the west of the site. There is also an unnamed tributary of the Inchford Brook approximately 600m to the east. It should be noted that the Inchford Brook is classed as a Main River and is controlled by the Environment Agency.

1.6 Existing Drainage

1.6.1 Severn Trent Water (STW) sewer records included within Appendix D, confirm that the nearest adopted foul water sewers are situated 400m to the south of the development site in Honiley road, on the edge of Beausale. These sewers are situated within the highway and drain to a pump station 550m to the southwest of the site. Although there are existing buildings within the site boundary it is not thought that there is any connectivity to these existing sewers.

1.6.2 No STW surface water sewers are located within the area.

1.7 Flood Zones and Vulnerability Classification

1.7.1 The formal flood maps for planning classify areas to appropriate Flood Zone based on their annual probability of flooding from fluvial or tidal sources without taking into account the presence of flood defences or structures such as culverts or minor watercourses. An extract of the mapping is included in Figure 1 overleaf; the site location is indicated with the yellow marker.

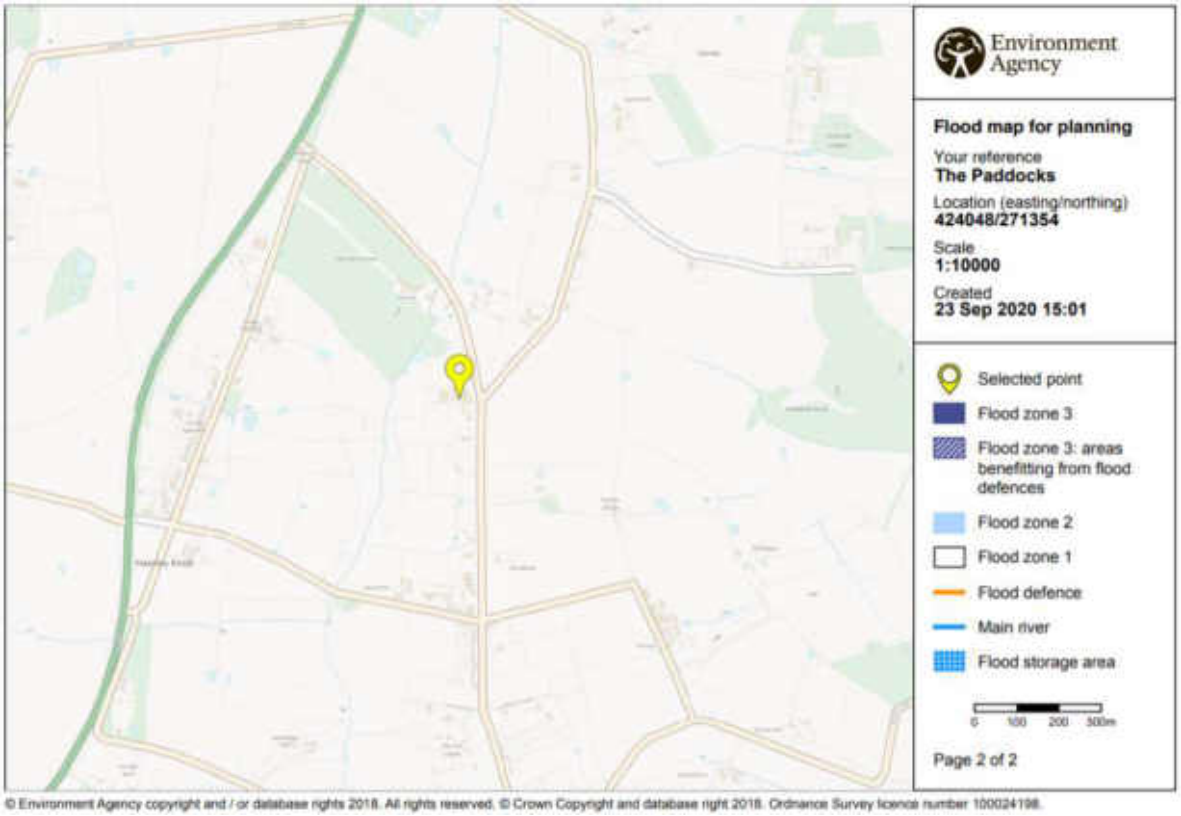

Figure 1: Flood Map for Planning

1.7.2 The formal flood zone mapping shows the site to be located entirely within Flood Zone 1. As such the site is deemed to be within an area at a low probability of flooding. Table 1 below indicates what uses of land are appropriate for each Flood Zone as set out within Table 3 – Flood risk vulnerability and Flood Zone 'compatibility' of the NPPF, reproduced below. The proposed use would be defined as More Vulnerable and as such is deemed appropriate.

	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test	✓	✓	✓
Zone 3a	Exception Test	✗	Exception Test	✓	✓
Zone 3b	Exception Test	✗	✗	✗	✓

Table 1 - Flood risk vulnerability and flood zone 'compatibility'

2 FLOOD RISK

2.1 Flood Risk from Rivers and Watercourses

2.1.1 The site is shown outside any recognised flood risk zone on the available maps, as demonstrated on Figure 2 below. The site is not considered to be at any risk of flooding from watercourses.

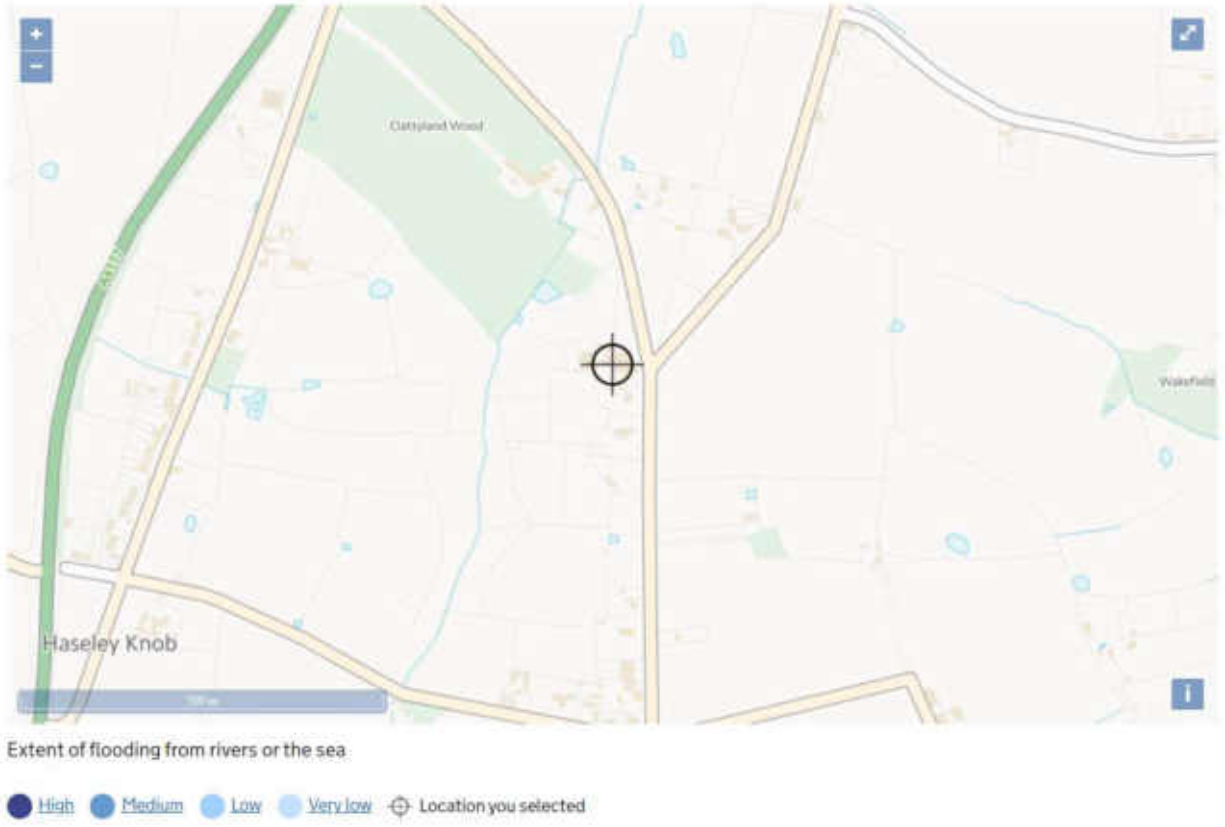

Figure 2: Flood Risk from Rivers or the Sea

2.2 Flooding from the Sea

2.2.1 The site is situated approximately 65km away from the closest tidal waters and as such is a considerable distance from the sea and at an elevation well above sea level to mitigate any risk of flooding from the sea.

2.3 Flooding from Land

2.3.1 A principal source of flood risk to the site is from surface water flooding created by the site itself or adjacent areas. Based on the Surface Water Maps available, the site is not shown to be influenced by surface water flooding. The surface water flood map reproduced in Figure 3 below confirms that the site is not at risk from this source.

2.3.2 The proposed development shall incorporate a positive surface water drainage system that shall intercept surface water run off from buildings and areas of hardstanding before conveying them offsite via a suitably selected outfall, further reducing the risk of flooding from this source. The proposed surface water drainage strategy is described further in Section 4 of this document.

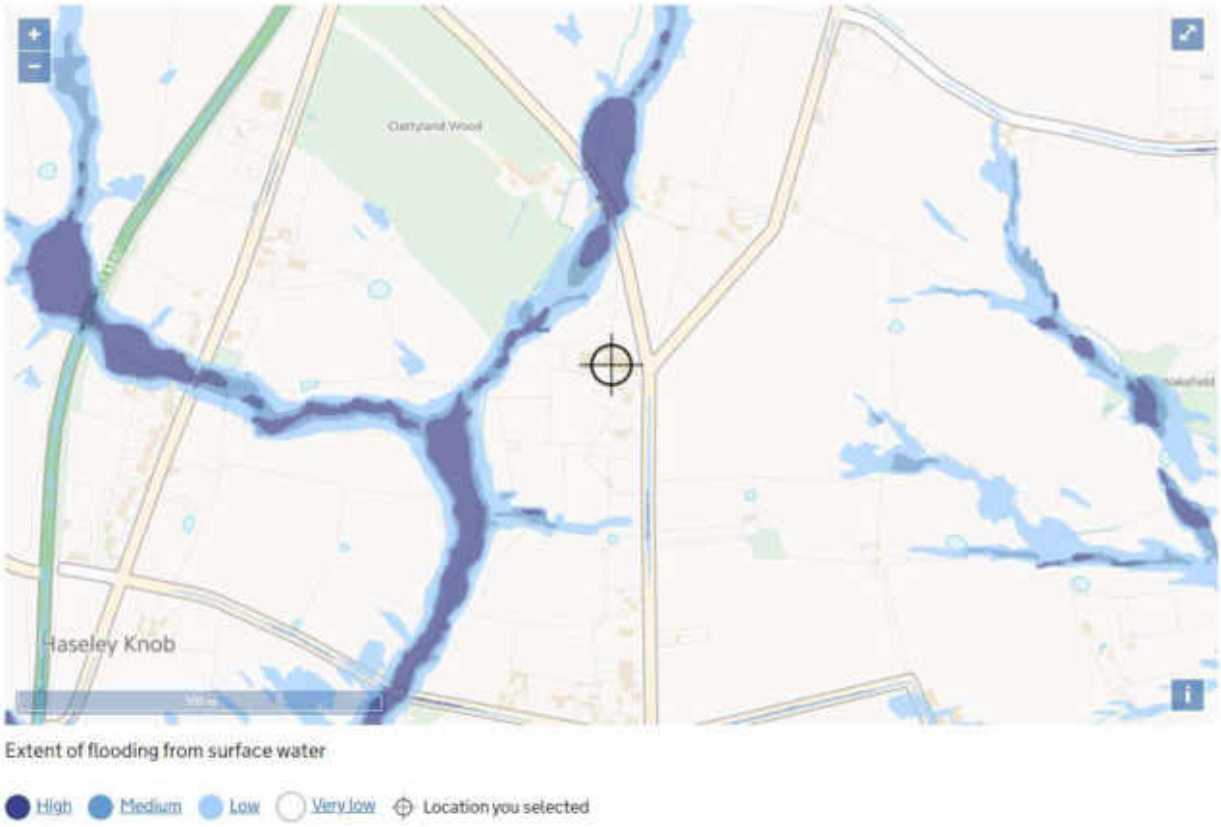

Figure 3: Flooding from Surface Water

2.4 Flooding from Groundwater

2.4.1 As part of the Level 1 SFRA for the Warwick District the Environment Agency confirmed that they were not aware of any specific incidences of groundwater flooding. Furthermore, the groundwater level was recorded to be 50ft below the surface on the BGS borehole record adjacent to the site. As such flooding from this source is considered low.

2.5 Flooding from Sewers

2.5.1 Flooding can occur from other sources such as blocked drains and sewers. The SFRA makes reference to sewer flooding events occurring in the district, however once reported these incidents are recorded by STW and funding is put in place to address the issues under their obligations as local water authority. There are no recorded sewers in the vicinity of the site and as such the risk of flooding from this source is considered low.

2.6 Flooding from Reservoirs, Canals and Other Artificial Sources

2.6.1 The reservoir flood map shown in Figure 4 shows the extent of flooding should a canal, reservoir or other artificial source breach upstream of the development. This shows that the site would not be at risk of flooding from this source and as such this source of flooding is not considered a risk.

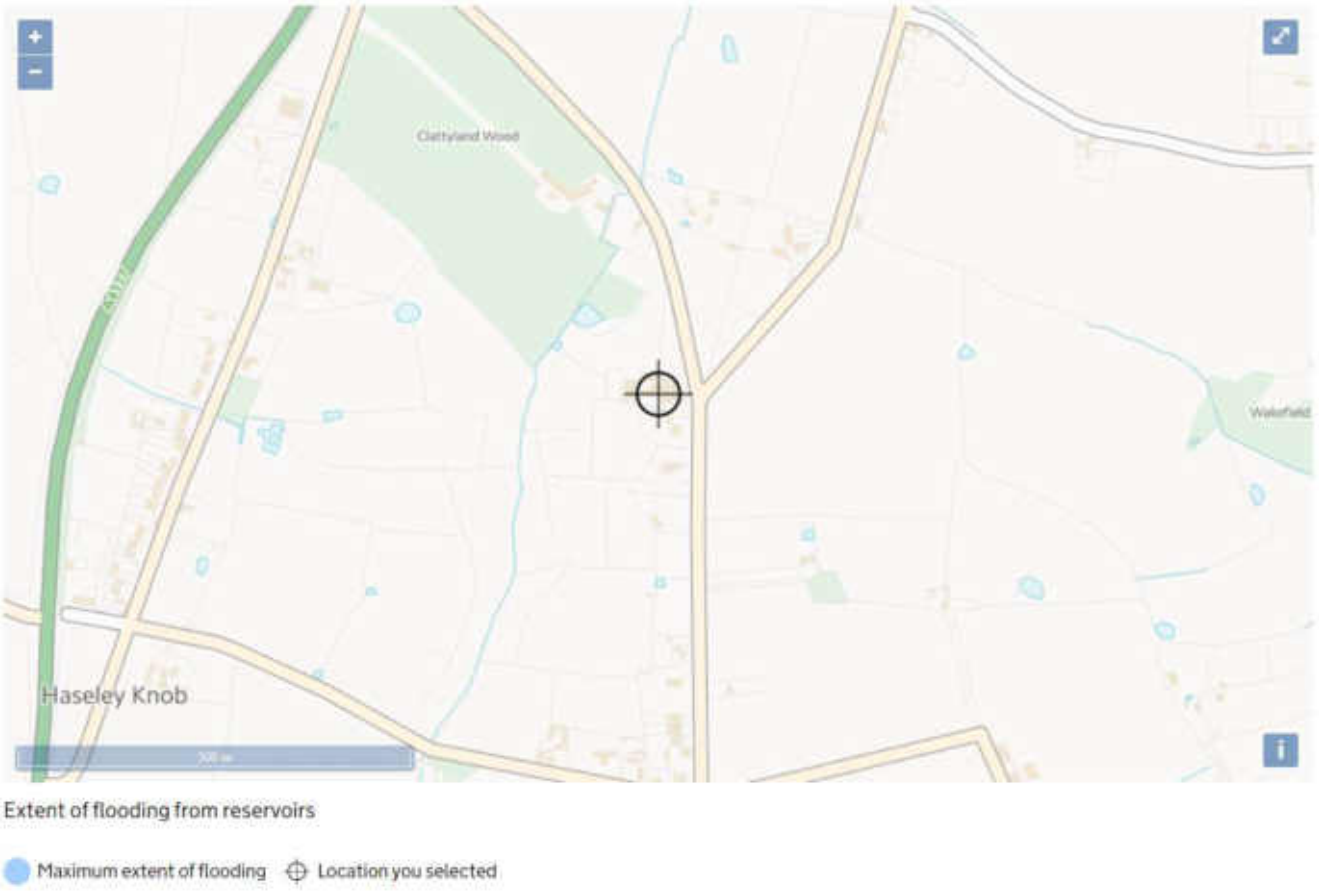

Figure 4: Flooding from Reservoirs

3 MITIGATIONS

3.1 Flood Risk Management

3.1.1 It is suggested that the following flood risk management measures are considered to mitigate the risks identified above:

- It is recommended that the development finished floor levels are set above the proposed surrounding external levels.
- Wherever possible, the external ground profile around the buildings will ensure that surface water is directed away from the dwellings.
- The proposed development will incorporate a positive surface water drainage system, described further in Section 4, which will intercept runoff from roofs and paved areas before discharging flows to ground or offsite at a rate that does not increase flood risk to the development or surrounding area.

3.2 Residual Risks

3.2.1 Residual risks are the risks that remain once the flood risk management measures described above have been implemented. These are typically associated with extreme events that overwhelm drainage systems exceeding the flood levels used to design any mitigation measures. The primary residual risks that will affect this development are:

- An extreme rainfall event which exceeds the capacity of the proposed surface water drainage system to both intercept and convey the flows. During such an event, water that is unable to enter the formal drainage system will flow over the ground through the development. The risk can be reduced by designing site levels to direct any runoff towards the highways or other corridors running through the site; and,
- A rainfall event that exceeds the capacity of surrounding off-site drainage networks could also result in runoff entering the site via routes other than the highways.

4 PROPOSED DRAINAGE STRATEGY

4.1 Outfall Assessment

4.1.1 As required by Part H of Building Regulations the required Drainage Hierarchy has been considered in the development of this strategy as summarised in Table 2 below.

Outfall Option	Available Option	Comment
Infiltration Drainage	✘	The use of infiltration could be explored further at the detailed design stage to confirm whether this offers a feasible design solution.
Watercourse	✓	There is an existing 225mm surface water outfall to a ditch to the west of the site that ultimately outfalls to the Inchford Brook. As such this has been chosen as the appropriate outfall solution for the site.
Storm Sewer	✘	As a watercourse is deemed to be a feasible means of disposal, discharge to a sewer has been discounted.

Table 2 – Outfall Assessment

4.1.2 The Qbar greenfield discharge rate for the development has been calculated to be 2.1l/s. Planning Policy FW2 – Sustainable Drainage states that developments shall be restricted to this discharge rate for storm events up to and including the 1 in 100 year return period storm including a 30% allowance for climate change.

4.1.3 However, as per DEFRA report WT1505 – Final Surface Water Drainage Report, in order to ensure that flow control devices are not at risk of blockage where the design control discharge rate is less than 5l/s, then a minimum of 5 l/s is applied. This is applied to all runoff return periods as the mean annual maximum flood flow is less than 5l/s.

4.1.4 Furthermore, it is now required to incorporate a 40% allowance for climate change for residential use.

4.1.5 As such it is proposed to restrict the discharge from the proposed development to 5l/s for all storm events up to and including the 1 in 100 year plus 40% climate change return period storm.

4.1.6 By restricting the offsite discharge rate to this rate with the appropriate level of attenuation being provided, the development will offer a betterment to the wider catchment when compared to the existing scenario.

4.2 SUDS Assessment

4.2.1 As part of the surface water drainage strategy for the site a number of Sustainable Drainage Systems where considered. Table 3 below provides a list of the options considered and a justification for their inclusion or omission.

SUDS System	Used	Justification
Rainwater Harvesting System	No	The use of rainwater harvesting is not considered economically viable on this site considering installation and operational costs.
Green Roofs	No	Green roofs have not been proposed for this site as there is insufficient access to roof areas for maintenance and as such the system could not be effectively maintained to ensure long term performance.
Infiltration Systems	No	No ground investigation works have been undertaken on site to determine whether an appropriate infiltration rate can be achieved for the development and as such this has been discounted.
Proprietary Treatment Systems	No	The use of proprietary treatment systems are not considered economically viable or necessary on this site considering installation and operational costs.
Filter Strips	No	Filter strips have not been considered the most effective proposal for this site due to the lack of available landscape areas.
Filter Drains	No	Filter Drains have not been considered the most effective proposal for this site due to the proposed site layout.
Swales	No	Swales are not suitable for this scheme due to available space.
Bioretention Systems	No	Bioretention Systems have not been considered the most effective proposal for this site due to the lack of available landscape areas. However, the developer should review opportunities to provide rainwater gardens within landscaping and planting areas.
Porous Pavements	No	Porous paving have not been considered to be an economical option for this scheme and concerns over long term maintenance of the surfacing could lead to ineffective functionality in the future.
Oversized pipe attenuation	No	No oversized pipes shall be required as the infiltration basin has sufficient capacity to provide the required attenuation volume.
Detention Basins	No	The infiltration basin shall provide sufficient attenuation volume as such a detention basin shall not be required.
Underground Tanks	Yes	Due to site constraints and the limited space available, underground tanks have been proposed to attenuate the surface water flows from the development.
Ponds and Wetlands	No	The proposed infiltration basin shall act as a pond in the temporary state during storm events.

Table 3 – SUDS Assessment

4.2.2 The proposed drainage system shall incorporate an underground attenuation tank under the main courtyard of the site. This tank shall provide the necessary attenuation volume before discharging the surface water to the outfall at the agreed greenfield rate.

4.3 Proposed Surface Water Drainage Strategy

4.3.1 A new drainage system comprising gutters, down pipes, channels, gullies and pipes shall intercept all rainwater on the site from the proposed buildings and areas of hardstanding.

4.3.2 As per Section 4.1.2 previous, it is proposed to discharge this surface water to the watercourse via the existing 225mm outfall pipe. This discharge to the watercourse shall be restricted to 5l/s via a vortex flow control device. Attenuation shall be provided in the form of an attenuation tank underneath the courtyard of the development. The drainage network shall be designed to attenuate the surface water flows from the development up to and including the 1 in 100 year return period storm event plus a 40% allowance for climate change.

4.3.3 To support this statement a Drainage Strategy Drawing No. TPB-LE-GEN-XX-DR-CE-500 has been prepared and this is included at Appendix E along with the supporting calculations demonstrating the systems performance at Appendix F.

4.3.4 In addition to that provided by the SUDS features, the following surface water treatment measures are included within the surface water drainage system which will improve water quality prior to discharge offsite.

- Trapped gullies/linear drains;
- Sediment sump at inlet to the attenuation tank;

4.4 Exceedance Flows

4.4.1 As demonstrated by the surface water drainage calculations, the surface water from the development is retained within the attenuation tank for all storm events up to and including the critical 1 in 100 year + 40% climate change rainfall event.

4.4.2 Should a storm event exceed this critical storm event, the onsite drainage system may become overwhelmed. It is therefore proposed that site levels are designed to direct water to the courtyard before guiding the water through the development towards the watercourse. The proposed levels should be designed to guide water away from the dwellings.

4.5 Foul Water Drainage Strategy

4.5.1 STW have confirmed the location of the nearest public foul sewer, sewer records included at Appendix D. This sewer is situated a significant distance from the development and as such it is not economical to connect onto it. As such an alternative foul water outfall shall need to be established. It is therefore proposed to discharge the foul water from the development to a package treatment works.

4.5.2 Based on 9No. residential dwellings with an average occupancy of 3No. people per dwelling this would provide a load of 27 people. As such a package treatment works would need to be designed to accommodate the level of flows anticipated from this level of occupancy. A suitable product that is available and can provide that level of capacity is the Klargester BioFicent 6, technical brochure included at Appendix G. This product is designed to take the foul flows from up to 30 people and is approved in line with BS EN 12566.

4.5.3 This package treatment works would treat the foul flows from the development removing the solids and pollutants such that the water quality exiting the system would be of a suitable quality to discharge to the watercourse. The system would be required to be fitted with an alarm with an appropriate management company appointed such that if it were to fail, appropriate emergency repairs could be undertaken. Maintenance access shall be provided to the treatment work via the onsite access road.

5 Drainage Management Plan

5.1 Responsibility

5.1.1 The proposed developer, Calm Homes, shall be responsible for the continued maintenance of the proposed Sustainable Drainage System and may choose to appoint a Management Company to undertake these duties on there behalf at the appropriate time.

5.2 Maintenance of Pipe Networks

5.2.1 Maintenance and management of main storm sewers and chambers inclusive of pipework from paved areas and buildings (but excluding internal building drainage) should be visually inspected and jetted/cleaned as required. As a minimum, this should be carried out every 5 years. Methods of inspection to give indications of blockages etc. may include:

- Pulling a mandrel through the pipe to identify physical faults (e.g. disjointed pipes).
- Flushing/jetting.
- CCTV.
- Measurement of water depths in pipe entries, catchpits or interceptors along a drain run may identify potentially blocked pipes.

5.2.2 Gully gratings, manhole gratings and channel gratings shall be visually inspected at least once every year and replaced or re-set if damaged or dislodged. Gullies should be inspected at least once every year, ideally during spring time as the autumn and winter seasons produce the most detritus build up in the form of leaves, litter and silt. This material should be removed from the channels and disposed of at a licensed tip. This material should not be tipped in other areas of the development as it may pose a pollution threat to the surrounding drainage system.

5.2.3 Jetting should only be carried out after removal of the silt and debris, as jetting alone will simply wash the debris further downstream without removing the problem.

5.2.4 The attenuation tank should be kept clear of debris and silt in order to maintain the capacity of the tank. The attenuation tank should be maintained in accordance with the recommendations made in Table 21.3, Chapter 21 of the SUDS Manual, reproduced overleaf.

TABLE 21.3 Operation and maintenance requirements for attenuation storage tanks

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/ or internal forebays	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

6 CONCLUSION

6.1.1 This site specific Drainage Statement has been prepared in accordance with Building Regulations, NPPF guidance and local policy on Flood Risk. The government approved flood mapping shows the site to be located within Flood Zone 1 with a low risk to flooding from both fluvial and pluvial sources on the site. Further to this the proposed levels on the site shall be set such that in the unlikely event of these systems failing all properties on the site will remain protected.

6.1.2 The drainage strategy demonstrates that an appropriate drainage system for both foul and surface water can be provided on the site with appropriate outfalls identified. Subject to the mitigation measures proposed, the development may proceed without being subject to significant flood risk to the development itself or surrounding properties. Moreover, the development will not significantly increase flood risk to the wider surface water catchment area.

APPENDICES

APPENDIX A – Proposed Site Plan

Station	Easting	Northing	Level
C1	424034.474	271340.616	121.983
C2	424088.805	271339.188	122.700
C3	424064.889	271398.771	122.409
C4	424051.163	271367.341	122.132
C5	424026.247	271371.589	121.398
C6	424021.393	271335.424	121.176
C1A	424056.348	271353.755	122.505
C5A	423998.687	271387.751	120.545

0 1 5 10 20 40

Disclaimer

Revisions

- - -

Contact + Location

T 07974 834305
E kristian@lfarchitects.co.uk

Lawrence & Finley Architects Ltd.
27 Templar Road,
Ashby-De-La-Zouch,
Leicestershire, LE65 2AD

Details

Client	Calm Homes
Job Title	The Paddocks, Honiley Road, Beausale
Job Type	New Residential Development
Drawing Title	Proposed Site Plan
Job Number	102
Drawing Number	10
Scale	1:200 A1
Status	PLANNING

LAWRENCE | FINLEY ARCHITECTS

APPENDIX B – Topographical Survey

0 1 5 10 20 40

Disclaimer

Revisions

- - -

Contact + Location

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E kristian@lfarchitects.co.uk

Lawrence & Finley Architects Ltd.
27 Templar Road,
Ashby-De-La-Zouch,
Leicestershire, LE65 2AD

Details

Client	Calm Homes
Job Title	The Paddocks, Honiley Road, Beausale
Job Type	New Residential Development
Drawing Title	Existing Site Plan
Job Number	102
Drawing Number	02
Scale	1:200 A1
Status	PLANNING

LAWRENCE | FINLEY ARCHITECTS

APPENDIX C – BGS Borehole Log

RECORD OF WELL (SHAFT OR BORE)

2407 7137.

1-inch Map Registered No. **183/42**

At The Paddocks Farm.

Town or Village Beausale.

County Warwicks. Six-inch quarter sheet 25 SE.E

For Mr. Hugh Green.

Exact site of well _____ Attach a tracing from a map, or a sketch-map, if possible.

Level of ground surface above sea-level (O.D.) 123.4m C405. ft. If well-top is not at ground level, state how far ... {above; below; _____ ft.

SHAFT _____ ft.; diameter _____ ft. Details of headings _____

BORE 204 ft.; diameter of bore: at top 7 ins.; at bottom 6 ins. Lengths, diameters, perforations, etc., of lining tubes 50ft. 7" plain, 150ft. perforated 6" steel tube.

Water struck at depths below well top, of (feet) 50ft. and 160ft. below surface.

Rest-level of water 5.0 ft. ~~above~~ below, surface well-top. Suction at - ft. Yield on 3 hours' ~~days~~ pumping, 480 gal. per hour with depression to nil ~~ft. below well-top.~~ Capacity of pump dipper test g.p.h. Recovery to rest level in _____ mins. / hours Date of measurements 30th July, 47 Date of well 9/30 July, 47.

Quality of water (*attach copy of analysis if available*) -

Well made by G. Lines & Sons, Ltd., 2, Lode Lane, Solihull.

Information from "

Additional notes in space overleaf.

(For Survey use only) Geological Classification	Nature of Strata	Thickness Feet	Thickness Ins.	Depth Feet	Depth Ins.
	If measurements start below ground surface, e.g., from bottom of an existing shaft, state how far				
	Top Soil	2	-	2	-
	Gravel	33	-	35	10-67m
	Marl	85	-	120	36.58m
	Rock Marl	46	-	166	50.60m
	Marl	38	-	204	62.18m. -
	Continued over leaf				

Geological Survey and Museum, South Kensington, London, S.W.7.	Date received	Correspondence File No.	1" N.S. Map No.	1" O.S. Map No.	Site marked (use symbol) on 1" Map	Site marked (use symbol) on 6" Map
	20.12.47		183		O	O

APPENDIX D – Severn Trent Water Developers Enquiry Response

WONDERFUL ON TAP

SEVERN TRENT

Severn Trent Water Ltd
Leicester Water Centre
Gorse Hill
Anstey
Leicester
LE7 7GU

Tel: 024 777 16843

www.stwater.co.uk
net.dev.east@severntrent.co.uk

Contact: Asset Protection East (waste water)

Our Ref: 8426846

Link Engineering
Lombard House
145, Great Charles Street
Birmingham
B3 3LP

FAO: Matt Clutton

14th September 2020

Dear Sir / Madam,

Honiley Road, Beausale, nr Kenilworth, Warwicks, CV35 7AF
Proposed 7 dwellings (424056, 271354)

I refer to your 'Development Enquiry Request' in respect of the above named site. Please find enclosed the sewer records that are included in the fee together with the Supplementary Guidance Notes (SGN) which refer to surface water disposal from development sites.

Protective Strips

There are no public sewers in the vicinity of the proposed development site the nearest public sewer, as shown on the records, is the 150mm dia foul sewer further down Honiley Road outside Oak House (MH 0901) this sewer is approximately 400m from the site. Another public sewer is located a similar distance away to the west in fields, but to connect to this sewer will mean going through third party land and include a watercourse crossing and pumping required. The most feasible option is to connect into the foul sewer in Honiley Road to further to the south.

You may require a sewer requisition to the connection point under S98 of the Water Industry Act 1991. This will be at the developer's cost.

Due to recent change in legislation, there could be sewers, which have transferred over to the Company that are not shown on the statutory sewer records but may be located on your clients land.

These sewers will have protective strips that we will not allow to be built over. The sewers could be identified whilst the land is being surveyed. If this is the case, please contact us for further guidance upon discovery.

Please note: there is no guarantee that you will be able to build over or close to any Severn Trent sewers, and where a diversion is required there is no guarantee that you will be able to undertake those works on a self-lay basis. Every approach to build near to or divert our assets has to be assessed on its own merit and the decision of what is or isn't permissible is taken based on the risk to the asset and the wider catchment it serves. It is vital therefore that you contact us at the earliest opportunity to discuss the implications of our assets crossing your site. Failure to do so could significantly affect the costs and timescales of your project if it transpires diversionary works need to be carried out by Severn Trent.

Foul Water Drainage

A gravity foul discharge to the public sewer would be very low and could be accepted into the 150mm dia foul sewer. However, due to the distance to the connection point and the depth of the head manhole (0901) having an invert level of 121.645m, with depth to invert at 1.62m, a pumped discharge may be required, but gravity should be checked through first.

If a pumped discharge is needed, further sewer capacity analysis may be required through modelling to ascertain the existing capacity and the impact that a pumped discharge may have on the sewage pumping station (SPS) downstream to the west of Honiley Road at rear of Ley End Farm. Sewer modelling would be paid for by Severn Trent however, modelling will take between 4 – 8 weeks once commissioned with our modellers. All other foul drainage options such as septic tanks and a gravity discharge to 0901 should be further investigated before we raise modelling.

Surface Water Drainage

Under the terms of Section H of the Building Regulations 2010, the disposal of surface water by means of soakaways should be considered as the primary method. If this is not practical and no watercourse is available as an alternative, the use of sewerage

should be considered. In addition, other sustainable drainage methods should also be explored before a discharge to the public sewerage system is considered.

If ground conditions are not suitable, for soakaways and other SUDs techniques, evidence should be submitted. The evidence should be either percolation test results or by the submission of a statement from the SI consultant (extract or a supplementary letter). This would satisfy the SGN (enclosed).

Subject to the above, can you please provide further information, to demonstrate how the former impermeable areas on the site are currently drained, if indeed they are positively drained, identifying which impermeable areas drain to which pipeline and the connections/outfalls to the public sewerage system identified. Ideally, a drainage survey of the existing site is required.

I assume that there was no previous connection to the public sewer and that the site was drained of surface water by either soakaways or discharged to a nearby watercourse of drainage ditch. No sw will be allowed to be discharged to the public foul sewer in Honiley Road.

Any flows generated by the site in excess of the permitted discharge rate will have to be attenuated within the development site.

Connections

For any new connections including the use, reuse and indirect to the public sewerage system, the developer will need to submit Section 106 application. Our Developer Services department are responsible for handling all such enquiries and applications. To contact them for an application form and associated guidance notes please call 0800 707 6600 or download from www.stwater.co.uk

Please quote the above reference number in any future correspondence (including e-mails) with STW Limited. Please send **all correspondence** to the net.dev.east@severntrent.co.uk email inbox address, a response will be made within 15 days.

If you require a VAT receipt for the application fee please email MISCINCOME.NC@SEVERNTRENT.CO.UK quoting the above Reference Number.

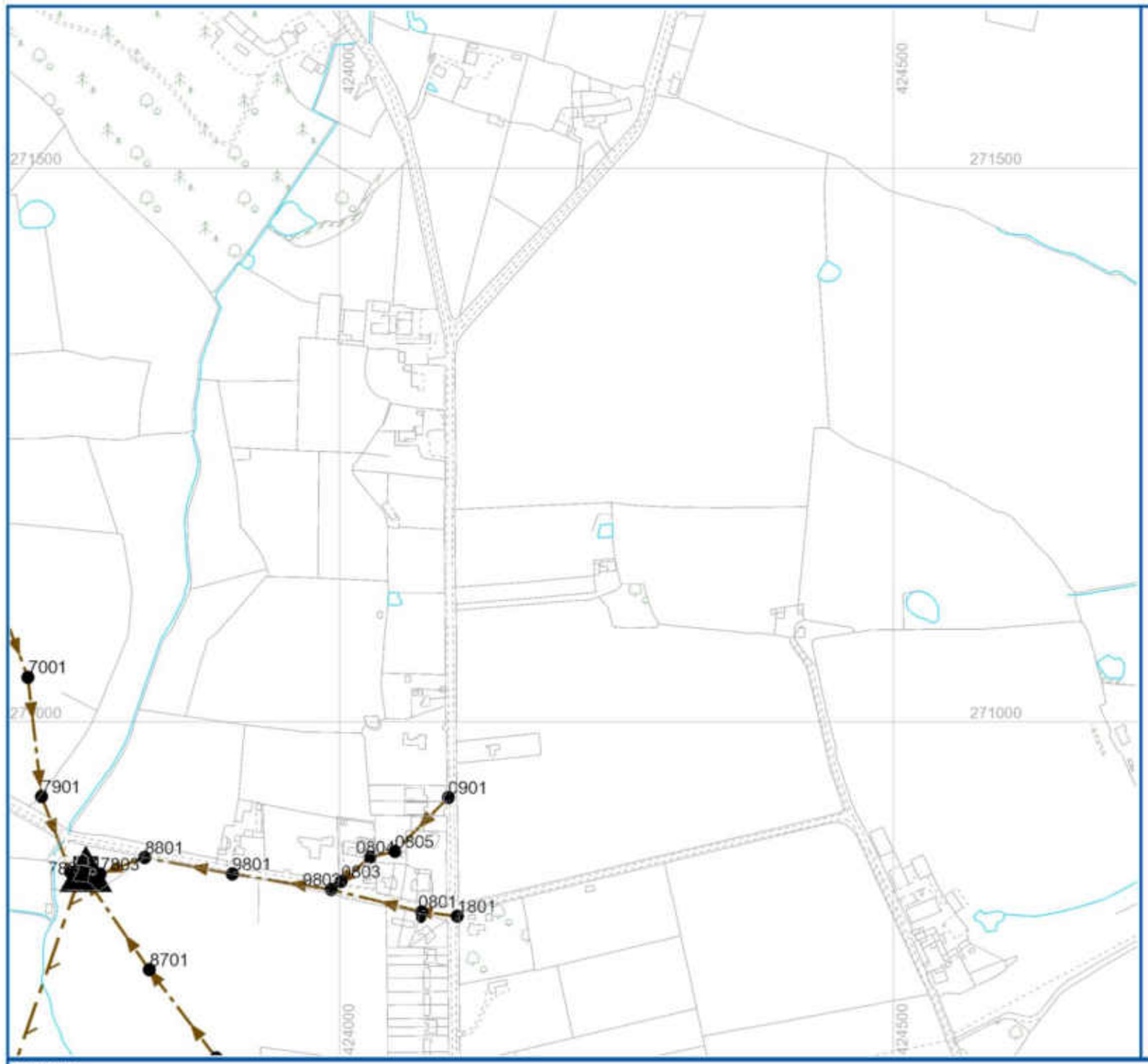
Please note that Developer Enquiry responses are only valid for 6 months from the date of this letter.

WONDERFUL ON TAP

SEVERN TRENT

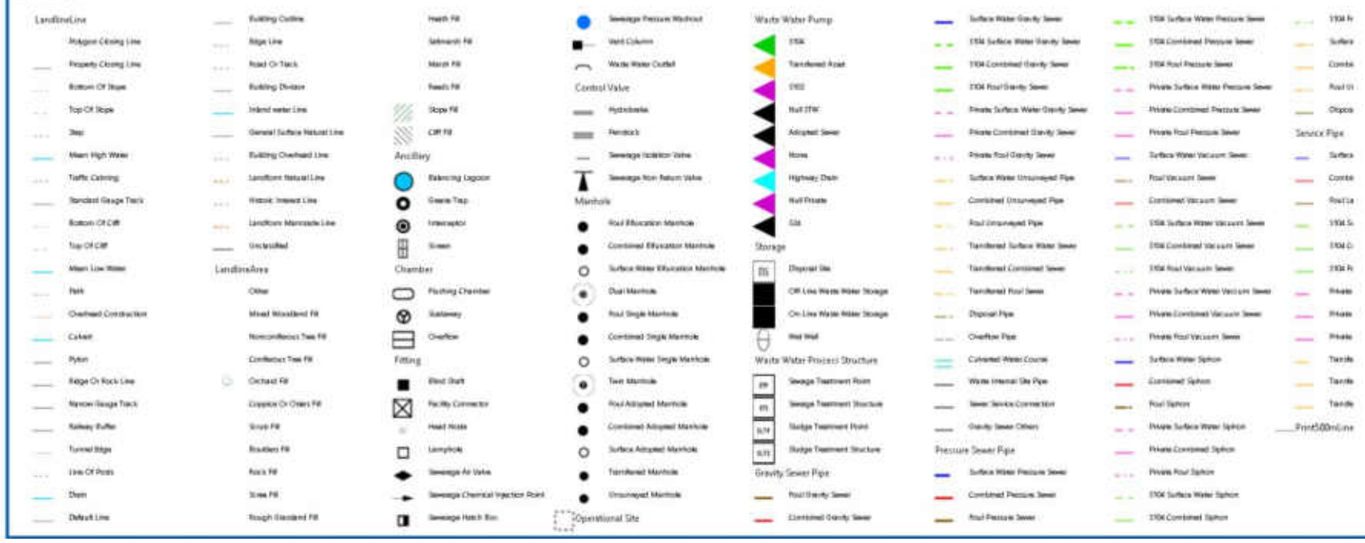
Yours sincerely,

Keith Baker
Senior Evaluation Technician
Asset Protection East (wastewater)
Asset Strategy & Planning
Chief Engineer



Reference	Cover Level	Invert Level Upstream	Invert Level Downstream	Purpose	Material	Pipe Shape	Max Size	Min Size	Gradient	Year Laid
SP23707802	<UNK>	<UNK>	113.591	F	VC	C	150	<UNK>	0	31/12/1899 00:00:00
SP23707801	<UNK>	<UNK>	112.11	F	VC	C	150	<UNK>	0	31/12/1899 00:00:00
SP23708701	<UNK>	<UNK>	113.78	F	VC	C	150	<UNK>	0	31/12/1899 00:00:00
SP23708601	<UNK>	<UNK>	<UNK>	F	VC	C	150	<UNK>	0	31/12/1899 00:00:00
SP23709801	<UNK>	<UNK>	116.356	F	VC	C	150	<UNK>	0	31/12/1899 00:00:00
SP23708801	117.1959	116.326	115.65	F	VC	C	150	<UNK>	62.82	31/12/1899 00:00:00
SP24700901	121.6449	120.025	<UNK>	F	VC	C	150	<UNK>	0	31/12/1899 00:00:00
SP23709802	120.927	119.087	<UNK>	F	VC	C	150	<UNK>	0	31/12/1899 00:00:00
SP23707901	115.125	112.935	<UNK>	F	VC	C	150	<UNK>	0	31/12/1899 00:00:00
SP23707807	114.9499	112.08	111.811	F	VC	C	150	<UNK>	35.15	31/12/1899 00:00:00
SP23707803	116.23	114.4	<UNK>	F	VC	C	150	<UNK>	0	31/12/1899 00:00:00
SP24700803	121.11	119.33	119.177	F	VC	C	150	<UNK>	80.27	31/12/1899 00:00:00
SP24700804	121.396	119.506	119.35	F	VC	C	150	<UNK>	216.94	31/12/1899 00:00:00
SP24700801	121.5899	119.62	119.277	F	VC	C	150	<UNK>	241.85	31/12/1899 00:00:00
SP24700805	<UNK>	<UNK>	119.536	F	VC	C	150	<UNK>	0	31/12/1899 00:00:00
SP24701801	121.621	120.191	119.73	F	VC	C	150	<UNK>	70.41	31/12/1899 00:00:00
SP23717001	117.485	116.285	113.705	F	VC	C	150	<UNK>	42.21	31/12/1899 00:00:00

LEGEND



MATERIALS

-	- NONE
AC	- ASBESTOS CEME
BR	- BRICK
CC	- CONCRETE BOX CULVERT
CI	- CAST IRON
CO	- CONCRETE
CSB	CONCRETE SEGMENTS (BOLTED)
CSU	- CONCRETE SEGMENTS (UNBOLTED)
DI	- DUCTILE IRON
GRP	- GLASS REINFORCED PLASTIC
MAC	- MASONRY IN REGULAR COURSES
MAR	- MASONRY RANDOMLY COURSED
PE	- POLYETHLENE
PF	- PITCH
PP	- POLYPROPYLENE
PSC	- PLASTIC STEEL COMPOSITE
PVC	- POLYVINYL CHLORIDE
RPM	- REINFORCED PLASTIC MATRIX
SI	- SPUN (GREY) IRON
ST	- STEEL
U	- UNKNOWN
VC	- VITRIFIED CLAY
XXX	- OTHER

CATEGORIES

W	- WEIR
C	- CASCADE
DB	- DAMBOARD
SE	- SIDE ENTRY
FV	- FLAP VALVE
BD	- BACK DROP
S	- SIPHON
D	- HIGHWAY DRAIN
S104	- SECTION 104

SHAPE

C	- CIRCULAR
E	- EGG SHAPED
O	- OTHER
R	- RECTANGLE
S	- SQUARE
T	- TRAPEZOIDAL
U	- UNKNOWN

PURPOSE

C	- COMBINED
E	- FINAL EFFLUENT
F	- FOUL
L	- SLUDGE
S	- SURFACE WATER

SEVERN TRENT

Severn Trent Water Limited
Asset Data Management
PO Box 5344
Coventry
CV3 9FT
Telephone: 0345 601 6616

SEWER RECORD (Tabular)

O/S Map Scale: 1:5,000

Date of Issue: 14-09-20

This map is centred upon:

X: 424211.11 **Y:** 271170.78

Disclaimer Statement:

1 Do not scale off this Map.

2 This plan and any information supplied with it is furnished as a general guide, is only valid at the date of issue and no warranty as to its correctness is given or implied. In particular this plan and any information shown on it must not be relied upon in the event of any development or works (including but not limited to excavations) in the vicinity of SEVERN TRENT WATER assets or for the purposes of determining the suitability of a point of connection to the sewerage or distribution systems.

3 On 1 October 2011 most private sewers and private lateral drains in Severn Trent Water's sewerage area, which were connected to a public sewer as at 1 July 2011, transferred to the ownership of Severn Trent Water and became public sewers and public lateral drains. A further transfer takes place on 1 October 2012. Private pumping stations, which form part of these sewers or lateral drains, will transfer to ownership of Severn Trent Water on or before 1 October 2016. Severn Trent Water does not possess complete records of these assets. These assets may not be displayed on the map.

5 Ordnance Survey licence number: **100031673**

6 Document users other than SEVERN TRENT WATER business users are advised that this document is provided for reference purpose only and is subject to copyright, therefore, no further copies should be made from it.

APPENDIX E – Drainage Strategy Drawing No. TPB-LE-GEN-XX-DR-CE-500

GENERAL NOTES

1. THIS DRAWING SHOULD NOT BE REPRODUCED IN WHOLE OR PART WITHOUT THE WRITTEN CONSENT OF LINK ENGINEERING.
2. DO NOT SCALE FROM THIS DRAWING. UNITS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
3. THE CONTRACTOR IS TO CHECK ALL INFORMATION PROVIDED PRIOR TO COMMENCING WORKS AND SEEK CLARIFICATION FROM THE ENGINEER IN RESPECT TO ANY AMBIGUITIES FOUND.
4. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER SCHEME SPECIFIC DRAWINGS.

INVERT LEVEL OF DITCH TO BE SURVEYED TO CONFIRM OUTFALL

HEADWALL
IL 117.65

225Ø

MANHOLE TO BE CONSTRUCTED ON LINE OF EXISTING 225Ø OUTFALL PIPE

SMH6
CL 120.00
IL 118.65

225Ø

SMH5
CL 121.20
IL 119.85
VORTEX FLOW CONTROL
DESIGN HEAD 1.2m
FLOW RATE 5l/s

225Ø

TREATED FOUL TO DISCHARGE TO SURFACE WATER NETWORK

FIC
CL 121.50
IL 120.90

SMH4
CL 121.50
IL 120.15

225Ø

min. 7m OFFSET TO BUILDINGS

KLARGESTER BIOFICIENT 6 OR SIMILAR FOUL PACKAGE TREATMENT WORKS

CELLULAR STORAGE
10m x 15m x 0.8m
VOLUME 114m³

FIC
CL 121.50
IL 120.70

FIC
CL 121.50
IL 120.60

FIC
CL 122.20
IL 121.50

SMH2
CL 122.20
IL 120.85

225Ø

SMH3
CL 122.10
IL 120.715

FIC
CL 122.10
IL 121.30

225Ø

SMH1
CL 122.30
IL 120.95

DRAINAGE KEY

FIC
CL 46.000
IL 45.350
PRIVATE FOUL WATER DRAIN & INSPECTION CHAMBER (100mm DIA UNLESS OTHERWISE STATED)

PRIVATE FOUL PACKAGE TREATMENT WORKS

SMH
CL 46.100
IL 45.265
PRIVATE SURFACE WATER DRAIN & MANHOLE

HEADWALL

ATTENUATION TANK

Rev.	Amendments	Date	By
A	LAYOUT UPDATED.	09.12.20	MTC
-	INITIAL ISSUE.	15.10.20	MTC

Revisions

Client
CALM HOMES

Find us @ www.linkeng.co.uk

Project
THE PADDOCKS
BEAUSALE

Drawing
DRAINAGE LAYOUT

Scale @ A1: 1:200
Drawn: MTC
Checked: NHM
Rev: A

Drawing No.: TPB-LE-GEN-XX-DR-CE-500
Status: PRELIMINARY (S1)

APPENDIX F – Supporting MicroDrainage Calculations

Link Engineering		Page 1
Lombard House 145 Great Charles Street Birmingham, B3 3LP	Greenfield Runoff The Paddocks Beausale	
Date 14/10/2020 File	Designed by MTC Checked by NHM	
Innovyze	Source Control 2018.1.1	

ICP SUDS Mean Annual Flood

Input

Return Period (years) 2 Area (ha) 0.473 SAAR (mm) 700 Soil 0.450 Urban 0.000 Region Number Region 4

Results l/s

QBAR Rural 2.1
QBAR Urban 2.1

Q2 years 1.9

Q1 year 1.7
Q30 years 4.1
Q100 years 5.3

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	10	Maximum Rainfall (mm/hr)	50	Volumetric Runoff Coeff.	0.750	Minimum Backdrop Height (m)	0.200	Min Vel for Auto Design only (m/s)	1.00
M5-60 (mm)	19.600	Maximum Time of Concentration (mins)	30	PIMP (%)	100	Maximum Backdrop Height (m)	1.500	Min Slope for Optimisation (1:X)	500
Ratio R	0.400	Foul Sewage (l/s/ha)	0.000	Add Flow / Climate Change (%)	0	Min Design Depth for Optimisation (m)	1.200		

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	18.380	0.235	78.2	0.040	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	13.581	0.135	100.6	0.047	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	22.522	0.565	39.8	0.074	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	22.487	0.300	75.0	0.058	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	47.687	1.200	39.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	24.990	1.000	25.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.21	120.950	0.040	0.0	0.0	0.0	1.48	58.8	5.4
2.000	50.00	5.17	120.850	0.047	0.0	0.0	0.0	1.30	51.8	6.4
1.001	50.00	5.39	120.715	0.161	0.0	0.0	0.0	2.08	82.7	21.8
1.002	50.00	5.64	120.150	0.219	0.0	0.0	0.0	1.51	60.1	29.7
1.003	50.00	6.02	119.850	0.219	0.0	0.0	0.0	2.08	82.8	29.7
1.004	50.00	6.18	118.650	0.219	0.0	0.0	0.0	2.63	104.5	29.7

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
1	122.300	1.350	Open Manhole	1200	1.000	120.950	225				
2	122.200	1.350	Open Manhole	1200	2.000	120.850	225				
3	122.100	1.385	Open Manhole	1200	1.001	120.715	225	1.000	120.715	225	
								2.000	120.715	225	

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
4	121.500	1.350	Open Manhole	1200	1.002	120.150	225	1.001	120.150	225	
5	121.200	1.350	Open Manhole	1200	1.003	119.850	225	1.002	119.850	225	
6	120.000	1.350	Open Manhole	1200	1.004	118.650	225	1.003	118.650	225	
	119.000	1.350	Open Manhole	0		OUTFALL		1.004	117.650	225	

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.004		119.000	117.650	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff 0.750 Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000
Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000 Run Time (mins) 60
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.800 Output Interval (mins) 1

Number of Input Hydrographs 0 Number of Online Controls 1 Number of Offline Controls 0 Number of Storage Structures 1 Number of Time/Area Diagrams 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Region England and Wales Ratio R 0.400 Cv (Summer) 0.750 Storm Duration (mins) 30
Return Period (years) 10 M5-60 (mm) 19.600 Profile Type Summer Cv (Winter) 0.840

Online Controls for Storm

Hydro-Brake® Optimum Manhole: 5, DS/PN: 1.003, Volume (m³): 2.4

Unit Reference	MD-SHE-0103-5000-1200-5000	Objective	Minimise upstream storage	Invert Level (m)	119.850
Design Head (m)	1.200	Application	Surface	Minimum Outlet Pipe Diameter (mm)	150
Design Flow (l/s)	5.0	Sump Available	Yes	Suggested Manhole Diameter (mm)	1200
Flush-Flo™	Calculated	Diameter (mm)	103		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	5.0	Flush-Flo™	0.354	5.0	Kick-Flo®	0.745	4.0	Mean Flow over Head Range	-	4.4

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.4	0.400	5.0	0.800	4.1	1.400	5.4	2.000	6.3	2.600	7.2	4.000	8.8	5.500	10.2	7.000	11.5	8.500	12.6
0.200	4.7	0.500	4.9	1.000	4.6	1.600	5.7	2.200	6.6	3.000	7.7	4.500	9.3	6.000	10.7	7.500	11.8	9.000	12.9
0.300	5.0	0.600	4.7	1.200	5.0	1.800	6.0	2.400	6.9	3.500	8.3	5.000	9.8	6.500	11.1	8.000	12.2	9.500	13.3

Storage Structures for Storm

Cellular Storage Manhole: 4, DS/PN: 1.002

Invert Level (m) 120.150 Infiltration Coefficient Base (m/hr) 0.00000 Infiltration Coefficient Side (m/hr) 0.00000 Safety Factor 2.0 Porosity 0.95

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	150.0	0.0	0.800	150.0	0.0	0.801	0.0	0.0

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Hot Start Level (mm) 0 Foul Sewage per hectare (l/s) 0.000 MADD Factor * 10m³/ha Storage 2.000 Flow per Person per Day (l/per/day) 0.000
Hot Start (mins) 0 Manhole Headloss Coeff (Global) 0.500 Additional Flow - % of Total Flow 0.000 Inlet Coeffiecient 0.800

Number of Input Hydrographs 0 Number of Online Controls 1 Number of Offline Controls 0 Number of Storage Structures 1 Number of Time/Area Diagrams 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Region England and Wales M5-60 (mm) 19.500 Ratio R 0.400 Cv (Summer) 0.750 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DTS Status OFF Inertia Status ON
Analysis Timestep 2.5 Second Increment (Extended) DVD Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	15 Winter	1	+0%	100/15 Summer				120.998	-0.177	0.000	0.10		5.4	OK	
2.000	2	15 Winter	1	+0%	100/15 Summer				120.906	-0.169	0.000	0.14		6.3	OK	
1.001	3	15 Winter	1	+0%	100/15 Summer				120.795	-0.145	0.000	0.27		20.1	OK	
1.002	4	60 Winter	1	+0%	30/30 Winter				120.235	-0.139	0.000	0.15		8.4	OK	
1.003	5	60 Winter	1	+0%	1/15 Summer				120.224	0.150	0.000	0.06		5.0	SURCHARGED	
1.004	6	120 Winter	1	+0%					118.682	-0.192	0.000	0.05		5.0	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Hot Start Level (mm) 0 Foul Sewage per hectare (l/s) 0.000 MADD Factor * 10m³/ha Storage 2.000 Flow per Person per Day (l/per/day) 0.000
Hot Start (mins) 0 Manhole Headloss Coeff (Global) 0.500 Additional Flow - % of Total Flow 0.000 Inlet Coeffiecient 0.800

Number of Input Hydrographs 0 Number of Online Controls 1 Number of Offline Controls 0 Number of Storage Structures 1 Number of Time/Area Diagrams 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Region England and Wales M5-60 (mm) 19.500 Ratio R 0.400 Cv (Summer) 0.750 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DTS Status OFF Inertia Status ON
Analysis Timestep 2.5 Second Increment (Extended) DVD Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	15 Winter	30	+0%	100/15 Summer				121.027	-0.148	0.000	0.25		13.3	OK	
2.000	2	15 Winter	30	+0%	100/15 Summer				120.942	-0.133	0.000	0.35		15.6	OK	
1.001	3	15 Winter	30	+0%	100/15 Summer				120.859	-0.081	0.000	0.72		54.7	OK	
1.002	4	60 Winter	30	+0%	30/30 Winter				120.428	0.053	0.000	0.18		9.9	SURCHARGED	
1.003	5	60 Winter	30	+0%	1/15 Summer				120.418	0.343	0.000	0.06		5.0	SURCHARGED	
1.004	6	360 Winter	30	+0%					118.682	-0.192	0.000	0.05		5.0	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Hot Start Level (mm) 0 Foul Sewage per hectare (l/s) 0.000 MADD Factor * 10m³/ha Storage 2.000 Flow per Person per Day (l/per/day) 0.000
Hot Start (mins) 0 Manhole Headloss Coeff (Global) 0.500 Additional Flow - % of Total Flow 0.000 Inlet Coeffiecient 0.800

Number of Input Hydrographs 0 Number of Online Controls 1 Number of Offline Controls 0 Number of Storage Structures 1 Number of Time/Area Diagrams 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Region England and Wales M5-60 (mm) 19.500 Ratio R 0.400 Cv (Summer) 0.750 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DTS Status OFF Inertia Status ON
Analysis Timestep 2.5 Second Increment (Extended) DVD Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	15 Winter	100	+40%	100/15 Summer				121.233	0.058	0.000	0.43		22.9	SURCHARGED	
2.000	2	15 Winter	100	+40%	100/15 Summer				121.267	0.192	0.000	0.59		26.6	SURCHARGED	
1.001	3	15 Winter	100	+40%	100/15 Summer				121.186	0.246	0.000	1.18		89.2	SURCHARGED	
1.002	4	120 Winter	100	+40%	30/30 Winter				120.785	0.411	0.000	0.13		7.3	SURCHARGED	
1.003	5	120 Winter	100	+40%	1/15 Summer				120.776	0.701	0.000	0.06		5.0	SURCHARGED	
1.004	6	1440 Winter	100	+40%					118.682	-0.192	0.000	0.05		5.0	OK	

Appendix G – Foul Package Treatment Works Details

Water Management Solutions

BioFicient

Water Management Solutions

OVER 60 YEARS OF EXPERTISE

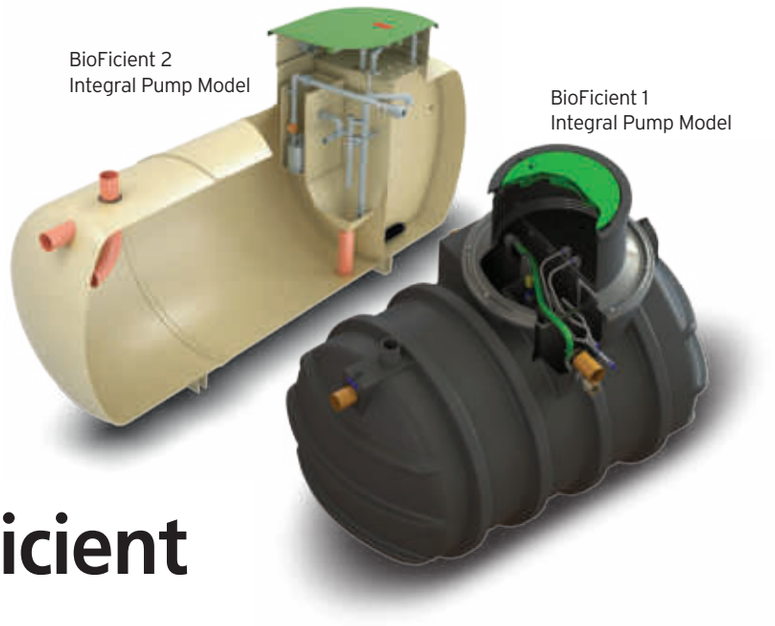
KINGSPAN KLARGESTER, WASTEWATER MANAGEMENT EXPERTS

Kingspan Klargester

With over 60 years' experience in wastewater treatment solutions worldwide, Kingspan Klargester are here to help you make the correct wastewater system choice for your home with a fully integrated, no hassle wastewater treatment package tailored to your home's individual needs.

Introducing BioFicient

The Kingspan Klargester BioFicient treatment plant provides a reliable and effective solution for domestic applications without access to mains drainage. Suitable for homes with up to 30 people, the BioFicient is manufactured from high quality Polyethylene and GRP and uses the latest treatment technology to deliver a high level of water discharge quality. A new Integral Pump Discharge option is now available for the BioFicient 1-4 range.



BioFicient

BioFicient offers the following benefits for the homeowner:

- BioFicient is suitable for shallow dig requirements, with minimal visual impact.
- Easy to install, requiring only a small digger due to its lightweight and unique design features, saving on-site time and expenses.
- Designed and manufactured by Kingspan Klargester, BioFicient is fully compliant, tested and approved to BS EN 12566-3.

BioFicient Benefits

It's designed to the highest standards, with the following features:

- Suitable for shallow dig installations
- Robust and lightweight
- Easy and affordable installation
- High performance, efficient treatment technology
- Low power consumption
- Minimum visual impact
- An extension neck is available to allow for deeper installation on difficult sites
- Our modern design means that access for desludging is easier through the wide neck
- New Integral pump option available for the BioFicient 1-4 range
- BioFicient comes fully supplied with control panel, externally sited air blower and loss of pressure alarms as standard

KINGSPAN KLARGESTER
EXPERTISE, RELIABILITY
AND TRUST

EXPERTISE

Kingspan provide you with the confidence that comes from a world leading wastewater brand. We offer expert guidance on choosing the correct wastewater treatment solution, right through to aftersales service and maintenance.

RELIABILITY

Our wastewater solutions use tried and tested technologies. Our reliable performance products are hassle free for ultimate peace of mind.

TRUST

With over 60 years' experience delivering high performance and reliable wastewater treatment systems worldwide, you can trust Kingspan.

REQUEST A FREE SITE VISIT FROM OUR EXPERT TEAM.

klargester@kingspan.com
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Water Management Solutions

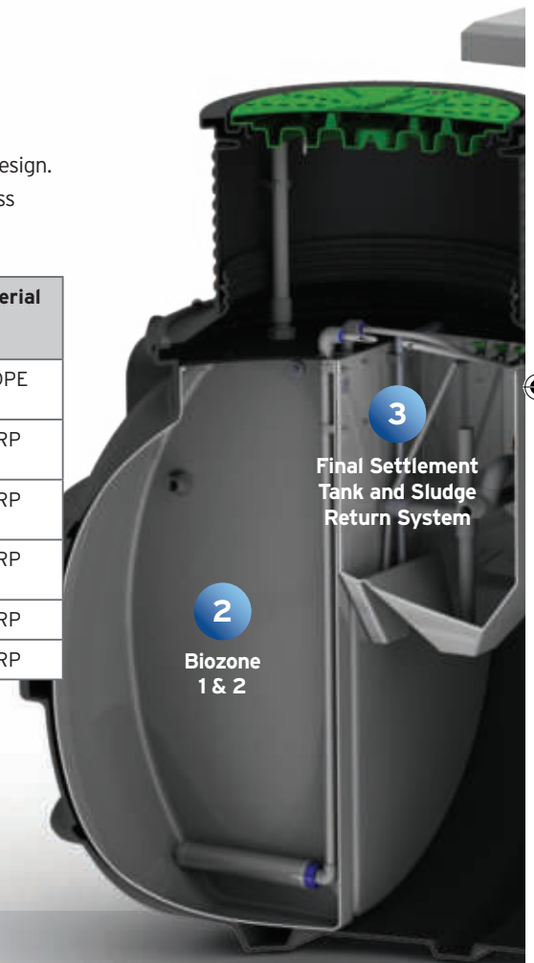
OVER 60 YEARS OF EXPERTISE

BioFicient HOW IT WORKS

BioFicient unit is a new generation of package sewage treatment plant developed to treat domestic sewage waste in a simple and compact system comprising three treatment zones within a 'uni-tank' design. The moving aerated media process used is a compact development of the traditional biological process and provides a more effective and complete means of sewage treatment.

Model	Population Equivalent	Overall Diameter (mm)	Length (mm)	Inlet Invert (mm)	Outlet Invert (mm)	Material
BioFicient 1	6	1540	2500	800*	Gravity 600-1600 IPS 555-1555	MDPE
BioFicient 2	8	1425	3760	500-1500	Gravity 600-1600 IPS 320	GRP
BioFicient 3	10	1425	3760	500-1500	Gravity 600-1600 IPS 320	GRP
BioFicient 4	15	1920	3230	500-1500	Gravity 600-1600 IPS 320	GRP
BioFicient 5	20	1920	4390	500-1500	600-1600	GRP
BioFicient 6	30	1920	6220	500-1500	600-1600	GRP

*500-1500 available by trimming or adding necks



BioFicient sewage treatment system is available in variety of sizes for all types of domestic applications. Various inlet and outlet options are available to choose from. Our expert team will guide you through the correct choice and size of system for your home, after we carry out our free comprehensive site assessment.

Step 1

Raw sewage gravitates to the unit where it is received in the primary settlement zone. Here, gross solids and other social debris settle to the bottom of the tank where they remain until the tank requires desludging. Settled sewage is displaced from primary zone and enters the first of two sequential moving aerated media reactors.

Step 2

Solids are broken down by air agitated media in the Biozone. Media and liquid circulation in the Biozone is achieved through the use of a compressor and diffuser, which introduces fresh air into each compartment. The liquor is constantly re-circulated and contacts the moving media and as it does so, it is purified by the micro organisms growing on the surface of the media and within the moving liquor. Excess growth of biomass is shed as solid particles into the liquor.

OVER 60 YEARS OF EXPERTISE

BioFicient 2
IPS Model

1
Primary Settlement Tank

BioFicient 1
IPS Model

Step 3

The final settlement tank is where humus solids settle to form sludge. At preset intervals, portions of the sludge and liquor are returned to the primary tank for additional treatment.

BioFicient from Kingspan Klargester

For further technical information and videos on the BioFicient treatment plant visit our website at **kingspanklargester.com**

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CUSTOMER SUPPORT

We stand by the quality and performance of Kingspan Klargester products and our support doesn't stop once your tank is installed. We're on standby 24/7 with guidance on servicing and maintenance and offer tailored warranty options. Our trained professional support team is only a phone call away.

Peace of mind with extended warranty options
We offer an extended and tailored warranty or bond on your sewage treatment plant to suit your needs and budget. This cost effective package offers the benefits of scheduled maintenance inspections to ensure your system performs at optimum levels at all times.

Customer support when you need it
Our friendly local customer service team are on hand with professional advice. Contact our sales office on +44 (0) 1296 633 000 or use our support email address klargester@kingspan.com

Service and maintenance
Regular tank maintenance is recommended to ensure optimal performance of any system. When your tank is due to be serviced, our local installers are on hand to help.

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Contact your expert local Kingspan Klargester team today

Our experienced local Kingspan Klargester product experts are on hand with professional advice on all aspects of your sewage treatment system, including sizing and installation.

Book your no obligations site assessment from the global experts in wastewater treatment, Kingspan Klargester. Contact us today on **+44 (0) 1296 633 000.** You can also book your visit online at **kingspanklargester.com**

BioFicient

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