

Flooding and Water Quality Evidence Report

for Fawkham Neighbourhood Plan



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Introduction

Fawkham Parish is located within Flood Zone 1, which means there is an annual probability of flooding by river or sea of less than 0.1%. In such areas, a flood risk assessment for development is required if the site is more than 1 hectare or could be subject to other sources of flooding, including surface water drains¹.

However, Fawkham Parish's topography means it is susceptible to surface water flooding². The three clusters which make up the hamlet are located at the bottom of a steep dry valley which runs north-south. At the southern end are twin valley heads, and a further dry valley (the Pennis Valley) feeds in on the eastern side. This means that heavy rain travels down the valley sides and into the narrow lanes at their bottoms. This natural process is exaggerated by the gradient of the slope, by the nature of modern farming practices, and where there has been loss of natural tree and hedgerow cover from the valley sides. Ploughed or grazed fields (horses, cattle, sheep) leave the topsoil exposed and so water washes downhill more quickly and easily, rather than being slowed down or absorbed by land covered with unploughed or ungrazed vegetation. Conversely, longer, undisturbed vegetation helps bind soil structure, through its extensive roots, and natural tree cover disperses rainfall and absorbs more water.

This report also includes information about the Groundwater Source Protection Zones and Nitrate Vulnerable Zones within the Parish.

Surface Water Flooding

Surface water flooding includes:

- **pluvial flooding** - caused by intense short periods of rainfall and usually affects lower lying areas, often where the natural (or artificial) drainage system is unable to cope with the volume of water. Surface water flooding problems are inextricably linked to issues of poor drainage or drainage blockage by debris, and sewer flooding³.

The likelihood of flooding is dependent on not only the rate of runoff but also saturation of the receiving soils, the groundwater levels and the condition of the surface water drainage system (i.e. surface water sewers, highway authority drains and gullies, open channels, watercourses and Sustainable Drainage Systems (SuDS))⁴. It should be noted that a drainage system can become overloaded due to incremental increases in roofed and paved surfaces at the individual property scale.

- **sewer flooding** - flooding that occurs when the capacity of underground water conveyance systems is exceeded, resulting in flooding inside and outside of buildings. Sewer flooding occurs when intense rainfall overloads the sewer system capacity (surface

¹ <https://www.gov.uk/guidance/flood-risk-assessment-in-flood-zone-1-and-critical-drainage-areas>

² In 2010 the Flood and Water Management Act (FWMA) defined 'surface runoff' in the following terms: "The flooding that takes place from the 'surface runoff' generated by rainwater (including snow and other precipitation) which: (a) is on the surface of the ground (whether or not it is moving), and (b) has not yet entered a watercourse, drainage system or public sewer."

³ Sevenoaks District Level 1 Surface Flooding Risk Assessment August 2022

⁴ Sevenoaks District Council - Level 1 SFRA 2017

water, foul or combined). Sewer flooding can also be caused when problems such as blockages, for example by tree roots, collapses or equipment failure, occur in the sewerage system. Infiltration, entry of soil or groundwater into sewer systems via faults within the fabric of the sewerage system is another cause of sewer flooding. Infiltration is often related to shallow groundwater, and may cause high flows for prolonged periods of time.

Flood Risk Map for Surface Water

In 2013 the Environment Agency, working with Lead Local Flood Authorities (Kent County Council in this Parish's case), produced the Risk of Flooding from Surface Water (RoFSW) maps, derived primarily from identifying topographical flow paths of existing watercourses or dry valleys that contain some isolated ponding locations in low lying areas. The RoFSW map displays different levels of surface water flood risk depending on the annual probability of the land in question being inundated by surface water:

High - Flooding occurring as a result of rainfall with a greater than 1 in 30 chance in any given year (annual probability of flooding 3.3%)

Medium - Flooding occurring as a result of rainfall of between 1 in 100 (1%) and 1 in 30 (3.3%) chance in any given year.

Low - Flooding occurring as a result of rainfall of between 1 in 1,000 (0.1%) and 1 in 100 (1%) chance in any given year.

Very Low - Flooding occurring as a result of rainfall with less than 1 in 1,000 (0.1%) chance in any given year.⁵

The Risk of Flooding from Surface Water dataset shows that surface water predominantly follows topological flow paths of existing watercourses, dry valleys or roads, with some areas of ponding upslope of topographic features including railway lines and roads.

The latest Risk of Flooding from Surface Water map covering Fawkham Parish is shown below. The topography of the Parish means that the areas most at risk from surface water flooding are the valley bottoms, with the map showing the main Fawkham valley running north to south, its twin valley heads at the south, plus Pennis valley to its east, being at a high risk. A small area south of Mussenden Lane is also shown to be at high risk.

The Pennis valley has a wider area at high risk than the main valley. Castle Hill and the meadow and field to its north have some areas at medium risk and several areas at a 1 in 1000 year risk, as does the main valley to the north of Castle Hill. Land to the south of Speedgate Hill is also at high risk, with a flow path predicted from Three Gates Road down the valley side in a north-easterly direction.

Climate change is predicted to result in wetter winters and increased summer storm intensity in the future. This increased rainfall intensity will affect land and urban drainage systems, resulting in surface water flooding, due to the increased volume of water entering the system⁶.

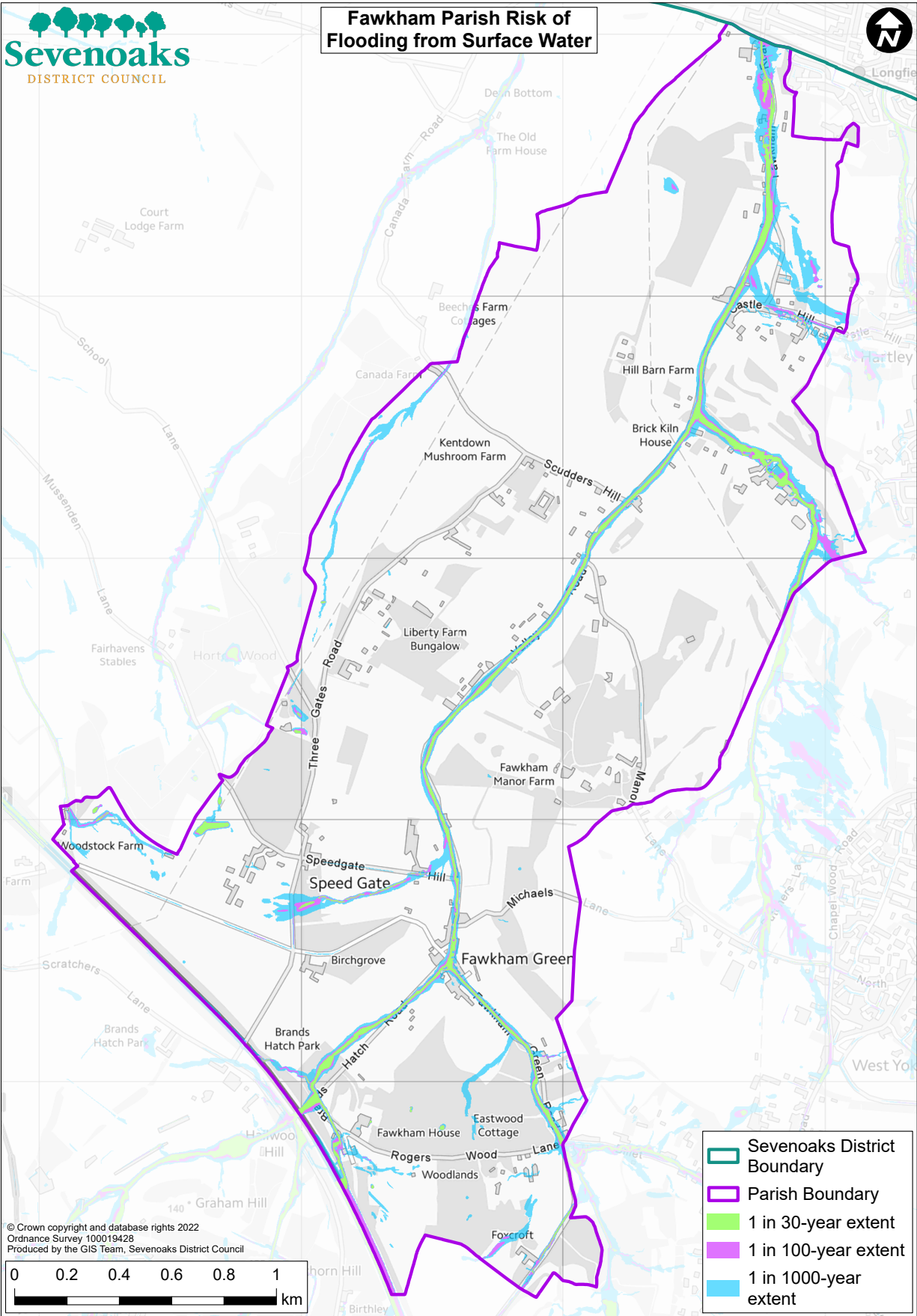
When allocating land for development, consideration must be given to the potential cumulative impact of development on flood risk. The loss of the natural storage and infiltration capacity of undeveloped land, potential loss of surface water storage capacity, the increase in impermeable surfaces and resulting rise in runoff increases the chances of surface water flooding if suitable

⁵ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/842485/What-is-the-Risk-of-Flooding-from-Surface-Water-Map.pdf

⁶ Sevenoaks District Level 1 Surface Flooding Risk Assessment August 2022, para 6.4

mitigation measures, such as SuDS, are not put in place⁷. The same consideration should be given when assessing planning applications.

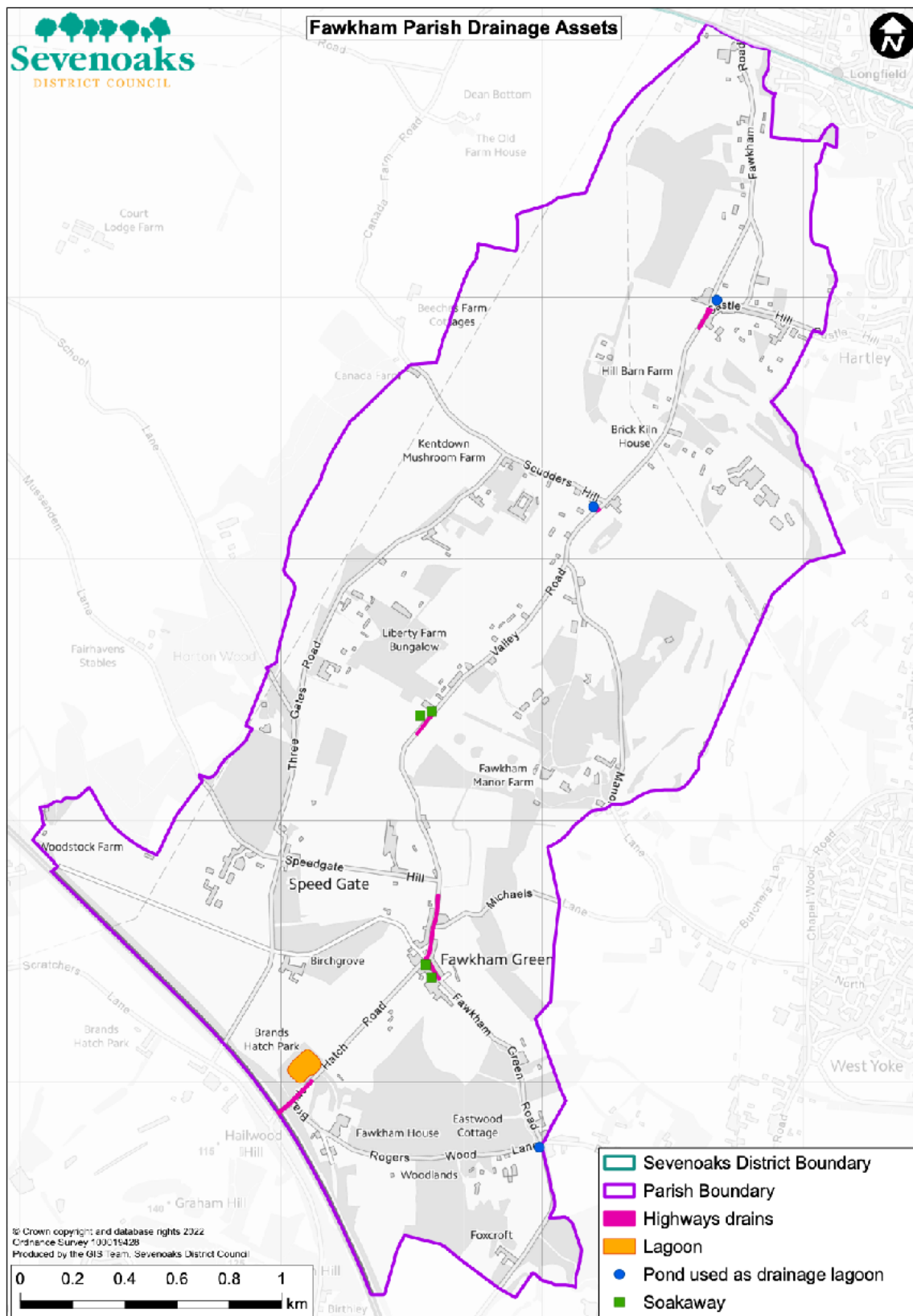
Map 1: Risk of Surface Water Flooding



Drainage Assets in Fawkham Parish

The drainage assets within Fawkham Parish are shown on Map 2, and are described below.

Map 2: Drainage Assets



The Parish possesses a limited number of highways drains or gullies: 27 drains are located along Valley/Brands Hatch/Fawkham Road, the main lane which runs for nearly 5km along the valley floor, with a further drains on three secondary lanes: 9 on Fawkham Green Road, four on Small Grains, and three on Castle Hill. These assets are located in four areas, detailed from south to north below⁸:

- On Brands Hatch Road, close to its junction with Scratchers Lane, 6 drains lead to a purpose built lagoon at the southern end of the Parish, to the north east of the M20. The lagoon was constructed to serve the motorway and is owned by National Highways. This drainage system also includes drains on Scratchers Lane to the south west of the motorway, immediately outside the Parish boundary. Part of this system was not operating effectively for many years, resulting in Scratchers Lane becoming regularly flooded and impassable to many vehicles, causing problems with the access into the Parish via Brands Hatch Road (the main road along the valley floor). A damaged section of the system was identified and repaired in 2021/22 and the system's operation is being monitored by Kent County Council (KCC) to assess whether the repair has corrected the problem.⁹ From observations of the Neighbourhood Plan Steering Group, the flooding is less extensive, although the flooding here appears not to have been completely resolved.
- On Valley Road, between Speedgate Hill and Fawkham Green Road, 13 drains lead to a soakaway within the grass verge close to the junction of Fawkham Green Road and Valley Road. In late 2022, further drains were installed leading to this soakaway: two on Brands Hatch Road and three on Fawkham Green Road. This system extends further into Fawkham Green Road where six drains lead to a second soakaway close to the entrance to Woodman Villas. Each soakaway has two catch pit chambers to hold silt. A further four drains are located on Small Grains Road; KCC has yet to map this system which may outfall to a further soakaway. KCC have included on the forward works programme a longer term project to install another soakaway on Valley Road to take the surface water for half of this system, to stop the overwhelming of the current soakaway, and also an additional system with a soakaway further east along Fawkham Green Road, to prevent the system at this junction becoming overwhelmed. However, this work is not currently programmed by KCC and would only be implemented if funding became available.
- At the junction of Scudders Hill and Valley Road one drain leads southwards to a pond on Valley Road close to the bottom of Scudders Hill - "Scudders pond" - which is 14m x 8m in size. The pond also receives surface water flowing from south to north along Valley Road. At times of heavy/persistent rain it is observed to overflow back onto the road. The ownership of this is unknown, as the land is unregistered. KCC agreed to cleanse it in August 2022 at the request of the Parish Council.
- Around the junction of Castle Hill with Fawkham/Valley Road three drains lead to a pond at the bottom of Castle Hill, in the corner of the churchyard - "church pond" - which is 26m x 15m in size. The gullies leading to this pond are frequently observed to be blocked with silt, stones and flints washed down the hill, and cease to function effectively. The ownership of this pond is unknown, as the land is unregistered. KCC agreed to cleanse it in August 2022 at the request of the Parish Council.
- A soakaway system is located in a field to the south of the village school which receives water from two sets of drains (five in total) in the verge of Valley Road. Fawkham Parish Council advised the location of this soakaway to KCC in 2020, and, as it did not previously feature on KCC's system, it had not been maintained for many years. The system was subsequently cleansed and returned to operation in 2020. However, these drains frequently become blocked and overgrown with vegetation, and may benefit from the construction of a small wall behind them to retain the verge.

⁸ <https://webapps.kent.gov.uk/KCC.KHSFaultsGIS.Web.Sites.Public/ViewMap.aspx>

⁹ Drainage Asset Engineer – Sevenoaks, Highways Asset Management, Kent County Council March 2022

- A pond at the crossroad junction of Rogers Wood Lane, Fawkham Green Road, Crowhurst Lane and Billet Hill receives surface water from Crowhurst Lane and Rogers Wood Lane. This pond is on land owned by Battersea Dogs and Cats Home who maintain it, with work carried out in 2022 to clear it. Further work is planned by KCC in early 2023 to install two grips with kerbed aprons to allow surface water to flow from the carriageways of Rogers Wood Lane and Crowhurst Lane into the pond more easily, which should reduce the flow of surface water down towards Fawkham Green.¹⁰ This work is also planned to include the cleansing of a soakaway and two gullies which KCC believe may be sited on Billet Hill, just outside the Parish boundary, which, if there is a soakaway in that location, should help further reduce the onward flow of surface water, and to investigate whether additional gullies could be installed at this crossroads.

Appendix 1 contains diagrams of each drainage asset, supplied by KCC.

KCC has advised that from 2022 there will be a change to the work approach, from reactive to planned, meaning that maintenance work will be scheduled on a regular basis for all pipework, gullies, chambers, soakaways, and outfalls such as ditches/ponds etc. Maintenance of soakaways requires road closures, due to the narrowness of the lanes.

Flooding Instances

When clear and functioning correctly, the drainage assets appear to be insufficient to cope with the surface water they currently receive during heavy or intense rainfall, which KCC advises is likely to be due to hydraulic overload¹¹. The quantum of drainage assets, coupled with the topography of the Parish means that, during heavy or prolonged periods of rainfall, surface water flooding runs in a continuous manner along the lane at the bottom of the valley, from south to north.

KCC advises that the issues reported within their database are unlikely to meet the requirements for intervention for improvement works, other than where stated below. Improvement works are based on the severity of flooding, frequency of flooding and danger of flooding to road users or property (internal, habitable areas).

Areas with regular surface water flooding issues are discussed below.

Junction of Fawkham Green Road with Valley Road, around the village green

The junction of Fawkham Green Road with Valley Road is an area where the drainage system frequently fails to cope with surface water runoff. Surface water runs down one of the dry valley beds, along Crowhurst Lane/ Fawkham Green Road, into the valley bottom at Fawkham Green. Water fills the carriageway for its full width along the side of the village green.

KCC records show 25 flood reports in the 6 years between July 2017 and July 2022 in the Fawkham Green area (from Michaels Lane south to the village green). Of these, 7 are reports of flooding/water pooling, and the remainder are blocked drains.

Four properties were flooded internally in this area on 10th June 2019; one family were required to move out of their home for repairs to be made, and one property's oil tank was damaged, resulting in leakage of oil. This flooding was as a result of surface water runoff, which is understood to have led to hydraulic overload, coupled with blocked gullies¹². The Environmental

¹⁰ Information obtained from Drainage Asset Engineer – Sevenoaks, Highways Asset Management, Kent County Council, December 2022

¹¹ KCC Drainage Asset Engineer, August 2022

¹² *ibid*

Agency rain gauge sited at the northern end of the Parish recorded 48.6mm of rainfall between 02:00 and 22:45 that day; the average rainfall for the month of June in total is 53mm¹³. The floods



Photographs show (left, centre) emergency response vehicles on the night of the flood of 10th June 2019 and (right) flooding December 2019

on this date are noted as an historic flooding incident within the District.¹⁴

Subsequent CCTV surveys by KCC established that the drainage system here runs south, against the natural flow, to the soakaway on Fawkhams Green Road. A break in the pipework was found and replaced with a new length, and the soakaway was cleansed (January 2021). This has been observed to have resulted in an improvement in the time taken for the water to drain. However, the carriageway continues to become flooded across its full width after heavy or persistent rain, likely due to hydraulic overload, as shown in the photographs below. The drains become blocked with silt and require reporting to KCC on a regular basis.

Photographs showing the village green area, (left and centre) January 2021 - with debris showing



extent of flood width - and (right) June 2021. These are after the repair work was carried out.

¹³ KCC Flood Investigation Report into flooding at West Kingsdown on 10th June 2019

¹⁴ Sevenoaks District Level 1 Surface Flooding Risk Assessment August 2022, para 8.2



Photographs above show the village green area, in May 2022, showing typical flooding of the carriageway following rain.

Photographs below show the effect on a property's ground floor window of a car passing it on the flooded Valley Road close to its junction with Michaels Lane in the Fawkham Green area, August 2022.



Photographs below show (left) Fawkham Green Road close to the junction with Valley Road, and (right) Valley Road close to the junction with Michaels Lane, October 2022



Photograph below shows flooding at the junction of Michaels Lane with Valley Road, August 2022.



Baldwins Green/Castle Hill junction with Valley Road

Flooding issues also occur across the full width of the carriageway from Castle Hill north to the boundary with Longfield. KCC's records show eight reports of flooding at the Castle Hill junction with Valley Rd/Fawkham Road over the six year period from July 2017 to July 2022. This is likely caused by the surface water running down Castle Hill joining with that running along the valley floor. There is a pond at this junction which is used for capturing surface water from Castle Hill, although the gullies leading to it are frequently blocked with flints, other stones and silt.

Photographs below show (left) surface water flooding on Valley Road, close to Baldwins Green/ the junction with Castle Hill, April 2021 and (right) blocked gully leading to the drainage pond, indicated by the black arrow, September 2022



Valley Road, north of the village school

Further flooding issues have resulted from repeated resurfacing of the lane, leading to the carriageway surface being raised above the entrance to driveways of properties on Valley Road to the north of the school. Repeated pluvial and sewer flooding have both occurred at this location. A 300m section of the road at this location was re-profiled by KCC in October 2021, with a kerb laid 40mm above the carriageway surface to prevent water running from the Valley Road into the adjacent properties. However, this issue is likely to reoccur in the future, and occur at other locations, as the carriageway surface receives further layers during resurfacing work, meaning KCC will need to install further kerbs to the carriageway and/or raise kerbs.



Photos above show surface water flooding of Valley Road in this area (left, June 2019 and centre, August 2022) the “tide mark” of debris following water overspilling the new kerb (right, August 2022)

Valley Road, south of Castle Hill and south of Pennis Lane

Flooding issues occur across the full width of the carriageway south of Castle Hill, shown in the photo below (June 2019)



and south of Pennis Lane (left, June 2019) and (right, November 2018).



Fawkham Road, north of junction with Steephill

Flooding of the full width of the carriageway also occurs in this area. There are no drainage assets north of Castle Hill for c.1.13km, until the lane reaches Longfield, within Dartford Borough.

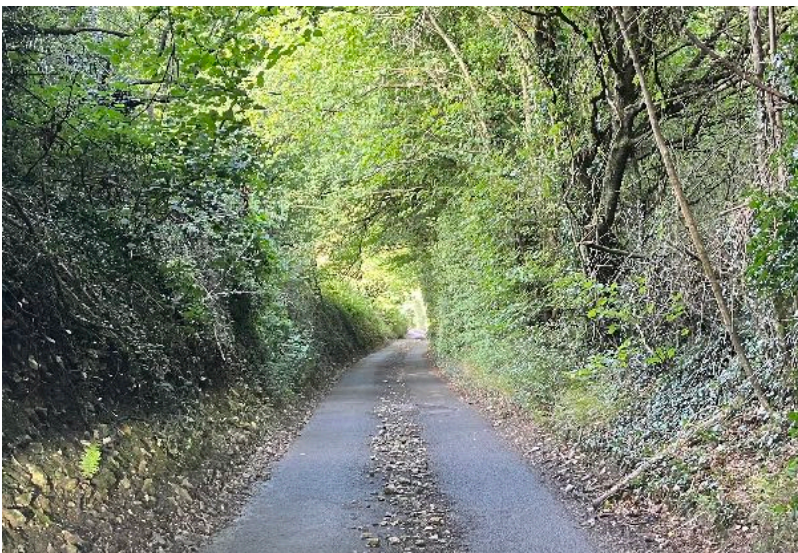
Photographs below show this location in (left - right) June 2019, June 2020 and October 2021



Flints and Debris

Flints, silt and debris are regularly washed down the valley sides and banks and onto the carriageway by surface water runoff, including on Valley Road, Manor Lane and Crowhurst Lane. This represents a danger to road users, and also causes blockages to the drainage assets.

Photo: Crowhurst Lane showing flints washed into the carriageway, July 2022



Sewer flooding in Fawkham Parish

Thames Water is responsible for waste water. A sewer was constructed in Valley Road/Brands Hatch Road in the early 1980s, although connection to it was not mandatory. Some properties within the Parish do not have mains drainage, including on Three Gates Road, Speedgate Hill, Gallows Wood, and parts of Fawkham Green Road, Sun Hill and Rogers Wood Lane.

Thames Water has supplied information extracted from its Sewer Flooding History Database covering the five year period from April 2017 to April 2022; the database only includes closed cases. This shows 16 instances of sewer flooding in Fawkham Parish: 9 of which impacted properties, 7 affected highways and 1 affected private land. Data held by the Steering Group shows an additional three instances reported to Thames Water which are not included in the information supplied by them. These records equate to nearly 4 instances of foul water flooding on average each year.

Thames Water's records state that the majority of blockage causes are unknown/unrecorded (10), with 4 caused by paper/rags, 1 by roots and 1 by fat/grease. Each blockage was dealt with on a case by case basis. In at least one incidence, work was ongoing for over 12 months to resolve the issue. Thames Water subsequently agreed to include the Valley Road sewer in this area on their annual planned inspection programme.

It should be noted that existing sewers can also become overloaded as new development adds to their catchment, even with restrictions in place on permitted discharge, or due to incremental increases in roofed and paved surfaces at the individual property scale.¹⁵ Thames Water has advised that the capacity of the system would only be assessed if they felt it was required to accommodate future development i.e. if the size of the development surpassed the parameters set for the area.

¹⁵ SDC Strategic Flood Risk Assessment August 2022, para 8.8

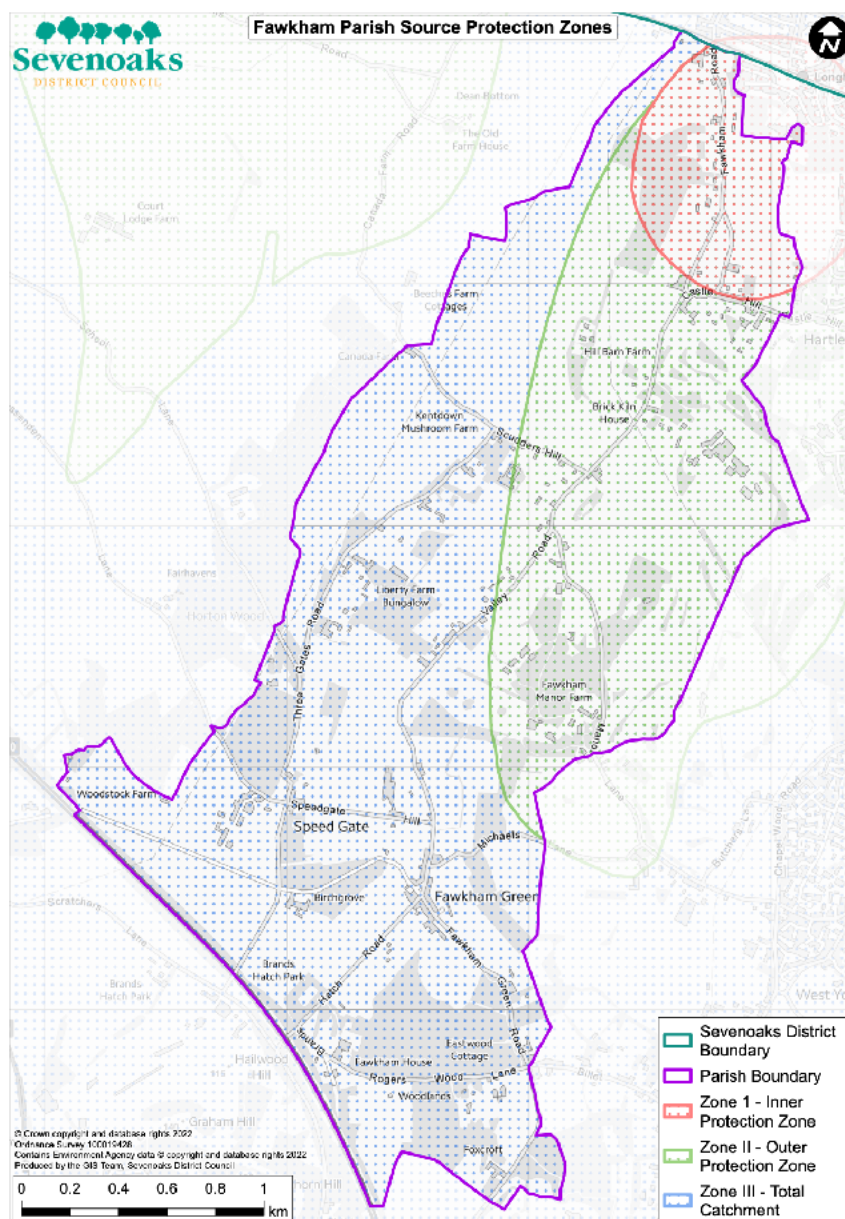
Groundwater Source Protection Zone (GSPZ)

The Environment Agency defines Groundwater Source Protection Zones (GSPZs) in the vicinity of groundwater abstraction points. The purpose of GSPZs is to provide additional protection to safeguard drinking water quality through constraining the proximity of an activity that may impact upon a drinking water.¹⁶

One such extraction point is within Fawkham Parish: Southern Water has a water pumping station at the northern end of the Parish. As a consequence, the Parish is a Source Protection Zone and the map below shows the various zones.

The GSPZ requires new development to provide attenuated storage of surface water runoff to prevent infiltration and contamination.

Map 3: Groundwater Source Protection Zones:



¹⁶ <https://www.data.gov.uk/dataset/09889a48-0439-4bbe-8f2a-87bba26fbbf5/source-protection-zones-merged>

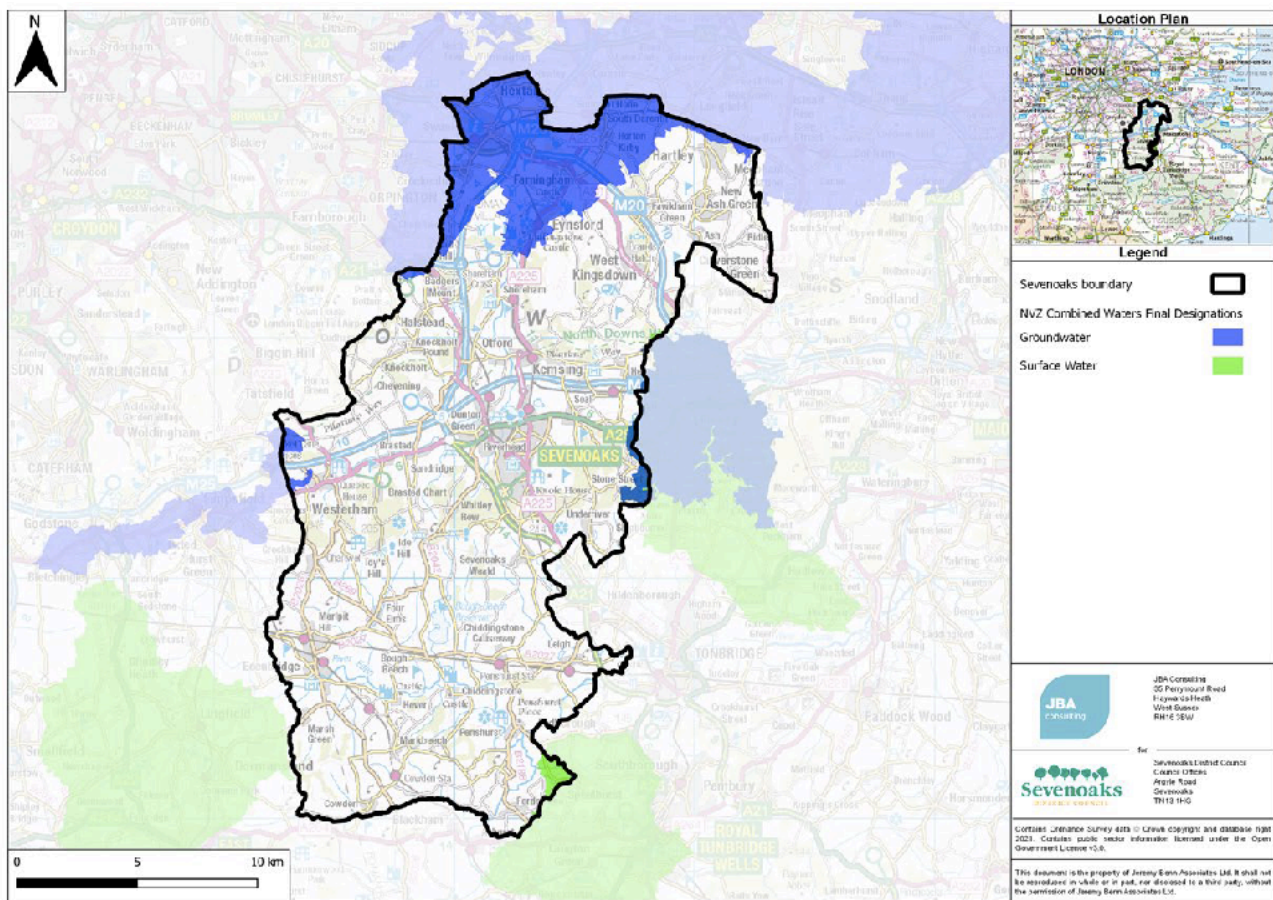
Nitrate Vulnerable Zone

Nitrate Vulnerable Zones (NVZs) are areas designated as being at risk from agricultural nitrate pollution. Nitrate levels in waterbodies are affected by surface water runoff from surrounding agricultural land entering receiving waterbodies.

Groundwater NVZ is an area of land where groundwater supplies are at risk from containing nitrate concentrations exceeding the 50 mg/l level dictated by the EU Council's Surface Water Abstraction Directive (1975) and Nitrates Directive (1991).

An extensive groundwater NVZ area is located in the north-western section of Sevenoaks district, which covers the northern edge of Fawkham Parish and the northern edge of Hartley, as well as areas to the west of the Parish, as shown in the map below.¹⁷

Map 4: Nitrate Vulnerable Zones¹⁸



Fawkham Neighbourhood Plan Steering Group February 2023

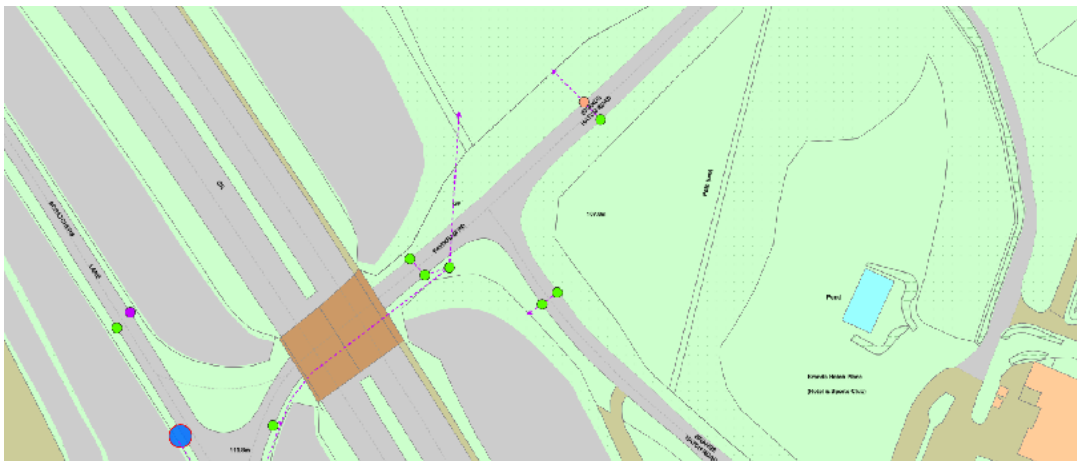
¹⁷ Sevenoaks District Level 1 Strategic Flood Risk Assessment August 2022

¹⁸ *ibid*, figure 11-4

Appendix 1: Details of Drainage Assets, supplied by KCC, as at December 2022



Valley Road, Fawkham (Outside School and just down from School) Outfall - Soakaway



Brands Hatch Road/Scratchers Lane Outfall - National Highways Lagoon

[illegible]