Infiltration Reduction Plan
Hambledon

July 2024
Version 8

from
Southern
Water

Contents

Document Control

Version	Date
1.0	January 2014
2.0	April 2014
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3.1	December 2014
4.0	November 2015
4.1	June 2016
5.0	January 2020
6.1	September 2021
7	January 2024
8	July 2024

Glossary

AMP – Asset Management Programme
CCTV - Closed-circuit television
EA - Environment Agency
GW – Ground Water
IRP - Infiltration Reduction Plans
l/s - litres per second
MH – Manhole
ODI – Customer Outcome Delivery Incentive
RPS - Regulatory Position Statement
SW – Southern Water
WaSC - Water and Sewerage Companies
WC – Water Closet
WPS - Wastewater Pumping Station
WTW - Wastewater Treatment Works

1. Background

This Infiltration Reduction Plan (IRP) for Hambledon, in the Budds Farm WTW catchment, has been prepared in response to the Environment Agency's (EA) Regulatory Position Statement (RPS). Southern Water has been carrying out work for many years to survey and repair sources of infiltration in the catchment for Budds Farm Wastewater Treatment Works (WTW) in Hampshire.

Figure 1.1 shows the extent of the catchment. Flow from Hambledon gravitates in a southerly direction to Bury Lodge Wastewater Pumping Station (WPS) from where it is pumped southwards towards Denmead. The flow then gravitates through Denmead to Hambledon Road WPS from where it is pumped to Waterlooville and onwards to Budds Farm WTW in Havant.

The scope of this IRP covers the village of Hambledon only and locations connected to the sewer network upstream of Bury Lodge WPS

The repairs carried out by SW improve the integrity of the sewerage system. SW has been working with the following organisations and is dependent on their support to achieve the objective of reducing non-sewage flows into the sewers.

- Environment Agency,
- Hampshire County Council,
- Winchester City Council
- Hambledon Parish Council
- Hambledon Flood Action Group

Southern Water has consulted with representatives of these parties as part of meetings with the local councils.

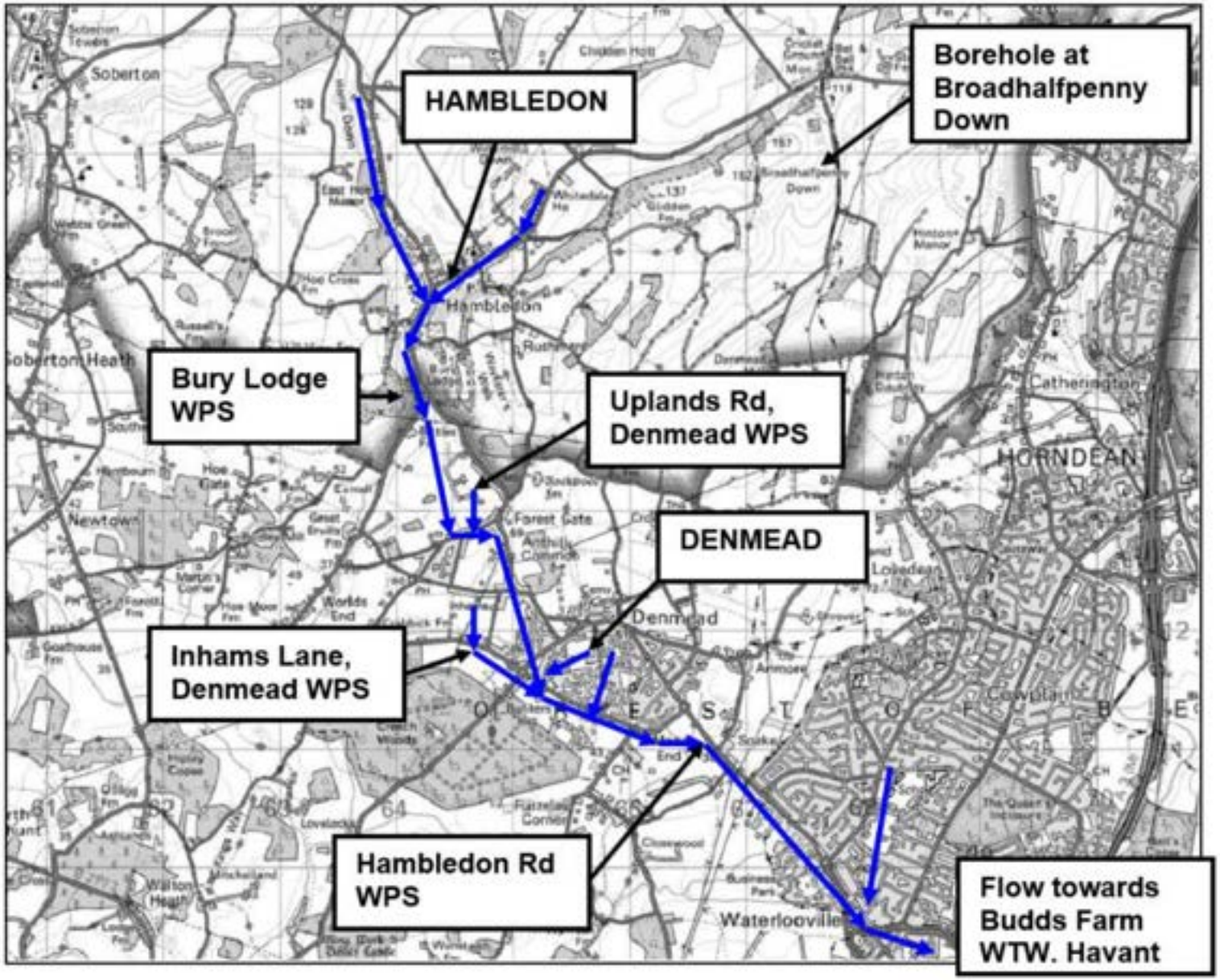


Figure 1.1 - Representation of the sewerage system in the Hambledon area

2. Groundwater Infiltration at Hambledon

2.1. The significance of groundwater infiltration.

The Hambledon Valley is one of several areas in Southern Water's operating area where, during excessively wet winters, customers have been inconvenienced by the effects of groundwater infiltration into sewers. Such effects can include flooding and restricted toilet use (RTU).

Southern Water strives to maintain services for customers by a programme of investigation, repair, maintenance and mitigation. Mitigation measures include the use of tankers and groundwater treatment. Such mitigation measures are not sustainable, so during the last ten years Southern Water has invested in carrying out major improvements to the integrity of the sewers and manholes in the vicinity of the Hambledon Valley in order to minimise the occasions on which mitigation measures is required.

2.2. What would happen if Southern Water did not take action?

Despite the significant groundwater flow through the valley during these conditions, incidents of sewer flooding have been relatively infrequent. Table 2.1 below shows reported incidents of sewer flooding which have been reported to Southern Water during the high groundwater season since April 2005.

Whilst there is no hydraulic model for the catchment; from experience, SW is aware of the locations which are likely to suffer first from the effects of flooding.

In 2014, numerous properties in East Street and West Street suffered groundwater flooding of cellars and only averted flooding of the ground floor by pumping out their cellars. The Hambledon Flood Action Group Further Update on Wednesday 19th February (Day 47) noted *…With the possibility of power cuts and the impact on 1000 or so electric pumps (and thus the certainty of flooded properties should this happen), …* this gives an indication of the number of properties that would have suffered groundwater flooding had they not taken action. It should be noted that this flooding would be directly by groundwater and not from the sewerage system though it does give an indication of the magnitude of the overall problem.

Table 2.1 - Reported Flooding Incidents in Hambledon

Year	External Flooding (Properties & Gardens)	External Flooding (Highways & Other)	Internal Flooding	Restricted Toilet Use	Total
2005 -2011	0	1	0	0	1
2011-2012	0	0	0	0	0
2012-2013	1	0	0	0	1
2013-2014	1	0	2	1	4
2014-2015	0	0	0	0	0
2015-2016	0	0	0	0	0
2016-2017	0	0	0	0	0
2017-2018	0	0	0	0	0
2018-2019	0	0	0	0	0
2019-2020	0	0	0	0	0
2020-2021	0	0	0	0	0
2021-2022	0	0	0	0	0
2022-2023	1	1	0	0	2
2023-2024	0	3	0	0	3
Totals	**3**	**5**	**2**	**1**	**11**

3. Investigation & repairs

3.1. Outline Plans to Investigate Sources of Infiltration

The Generic Plan describes Southern Water's Infiltration Reduction process. The specifics of the investigations and repairs at Hambledon are captured in Section 3.2 below, and includes the following elements:

- Manhole Inspections and CCTV Surveys
- Flow Monitoring Surveys
- Manhole and Sewer Repairs
- Follow-Up Surveys and Repairs

3.2. Investigation and Repairs in Hambledon

Groundwater infiltration into sewers has been a long-running issue for Hambledon. Southern water has been making significant investments over many years to minimise infiltration and the need for groundwater treatment.

SW recently completed a major programme of survey and repairs to the sewers in Hambledon village. The investigations and repairs followed the process set out in the Generic Plan. The timing and status of each step is in Table 3.1 below.

Table 3.1 – Summary of Survey and Repairs

Step.	Description	Approx Date	Status
1.	CCTV Bury Lodge WPS to Old Barn Crescent	Spring 2013	Completed
3.	Dry Weather flow Monitoring South Hambledon - Bury Lodge WPS to Old Barn Crescent	Summer 2013 (27 Aug – 23 Sept)	Completed
4.	Wet Weather Flow Monitoring	Spring 2014	Completed
5a.	CCTV: Green Lane: Cams Hill to Brooke Lane; also Green Lane/ West Street junction to East Street / Glidden Lane junction.	Spring 2014	Completed
5b.	ElectroScan Surveys	Spring 2014	Completed
7a.	Winter monitoring, South Hambledon - Lashley Meadow and South end of West Street, to Junction of West Street and Hambledon Road (North of Bury Lodge)	Summer 2014	Completed
6.	South Hambledon: in the vicinity of Hook Vinney	Spring 2015	Completed
7b.	Winter monitoring exercise recommenced.	Autumn 2015	Completed

Step.	Description	Approx Date	Status
6a.	Alterations to sewer in Old Barn Crescent to improve hydraulics. [Work being done in conjunction with HCC surface water drain works.]	Early 2016	Completed
7c.	Monitor the benefit of the sealing work with respect to sewer flows (especially during periods of wet weather)	Throughout 2016	Completed
11.	CCTV Investigation	November 2016 – December 2017	Completed
8.	Planned: Surveys following completion of flood alleviation scheme	Spring 2017	Completed
9.	Planned: Investigate potential for property level protection	Spring 2017	Completed
10.	Repairs arising from surveys (as required)	Summer / Autumn 2017	Completed
12.	Sewer Rehabilitation	November 2016 – December 2018	Completed
13.	Further sewer surveys and subsequent repairs	Summer 2021 – Spring 2022	Completed
14.	Electroscan surveys	2023/24	Completed
15.	Review of electroscan data to identify next sewer sealing actions	2024/25	In progress
15	Sewer sealing following electroscan surveys	Post 2025	Dependent on survey findings

In 2013, surveys at the northern end of the village were less successful as groundwater levels had dropped when the surveys were attempted. CCTV surveys were carried out in May 2014 in the northern end of the village which included East Street and Green Lane.

At the south end of the village, despite repairs the previous year, further infiltration was found in 2014 and repaired in spring 2015. Infiltration was suspected at the east end of East Street; CCTV revealed displaced joints, which were repaired. A total of 114 metres of sewers and 6 manholes were sealed in 2014/15. The extent of the 2014 surveys and the rehabilitation work is shown in plans in Appendix A along with other work to date. Further CCTV investigations were carried out from November 2016 to December 2017 which led to sewer rehabilitations from November 2016 to May 2018..

It is not easy to find infiltration at Hambledon because the groundwater levels rise and drop very quickly, leaving only a few days when conditions are optimum for CCTV survey, particularly at the north end of the village. So at Hambledon, SW also trialled a new technique for detecting infiltration. In June 2014, an Electro Scan survey was carried out on six lengths of sewer in the southern end of the village. The successful trial led to a more extensive electroscan survey of sewers in the village and subsequent sealing in 2017-2018. A second round of electroscan has been scheduled and is now complete the results are being analysed to determine further sewer sealing requirements. These are shown in Appendix A.

4. Mitigation measures

4.1. Circumstances that lead to Mitigation measures

Since 2013, SW has made significant investment to reduce infiltration and to protect specific properties at risk of flooding, with the objective of reducing the frequency of discharges to watercourses.

The groundwater levels at Broadhalfpenny Down are a good indicator of when tankering will be required. However it is actually the levels in the manholes locally that determines when tankers need to be deployed, or when groundwater treatment needs to commence. From previous experience, the first properties to be affected are generally at the lower end of Green Lane at the southern end of the village. West Street properties and East Street properties are affected shortly after.

If groundwater levels have risen to a point where the sewerage system is below the water table groundwater will enter the system through leaking joints in both the public and private pipes and manholes. To ensure the sewerage system continues to function this excess flow must be removed from the network. This is done by deploying tankers to the villages to extract flow and to tanker this, primarily groundwater, to larger WTW sites with capacity to treat the flow. If levels and flows continue to rise there comes a point where increased tankering is not viable due to available locations to extract from and the logistics relating to the number of tanker movements in small villages and the disruption this causes. Once this point is reached we will move to our action of last resort which is to install groundwater treatment equipment at strategic points. These local treatment sites will take excess flow from the sewerage system primarily groundwater, and the flow will be passed through a series of processes using screening and filtering to remove solids, rag and other deposits, the residual liquid only will then be treated by ultra-violet light prior to discharge to the watercourse. The quality of treated effluent returned to the environment will be monitored to ensure that the flows are of a quality which not be harmful to the environment.

The locations for tankers and groundwater treatment are given in Appendix B.

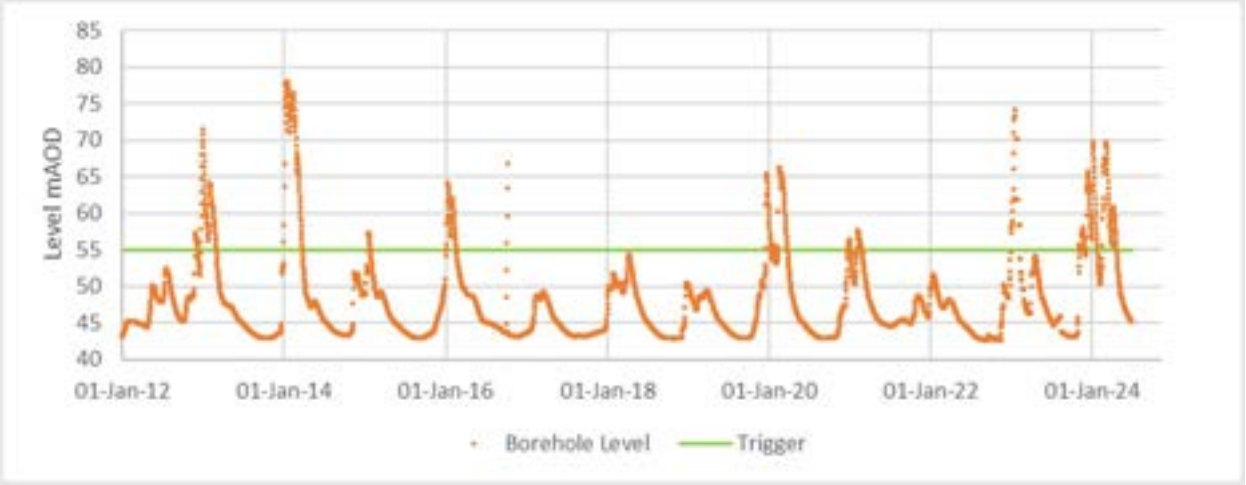
The repairs carried out, combined with the construction of the surface water drain, and the winter preparation checks, are expected to minimise the number of locations where groundwater treatment will be required. However, as a consequence of repairs and potentially other factors outside SW's control (such as the severity of the weather), the hydraulics may dictate that groundwater treatment is required at other locations either in place or, or in addition to, the sites described in Appendix B. In addition to these locations, manholes in the vicinity of the tankering/treatment may spill during severe weather events, despite SW's actions to maintain sewage disposal services for customers by the use of tankers and (where appropriate) treatment.

Figure 4.1 illustrates groundwater levels in the period 2012 to 2024. Historic analysis showed that periods of high groundwater correspond well with periods of prolonged high wet well levels at Bury Lodge.

In the winter 2013/14 SW used a daisy-chain of up to ten pumps to move effluent through the village before finally discharging it to the watercourse, just below Lotts Corner. In 2014/15, groundwater levels were much lower and no pumps or tankering was required. Tankering was required between 11th March and 30th November 2020.

Due to the early onset of high groundwater in winter 2023 tankers were deployed to address sewer surcharge issues at Bury Lodge WPS earlier than would be considered usual. However additional mitigation was not required.

Figure 4.1 – Groundwater levels from 2012 to 2024 at Broadhalfpenny Down



4.2. Steps to prevent discharges to the environment

The Generic Plan details the typical activities that Southern Water undertakes to minimise the requirement for discharges to watercourses. Since 2013, SW has undertaken extensive surveys and repaired sewers and manholes where infiltration had been found (the extent of the work is shown in Appendix A). This built on the repairs that had been carried out in previous years (shown in Appendix A).

In addition to this work, SW also carries out other activities to minimise the requirement for discharges to watercourses. In the short term this will include tankering of excess flows from the network, in the longer term this will involve the iterative process of sewer sealing.

4.3. Groundwater treatment arrangements

A typical arrangement of a groundwater treatment setup is provided in Appendix B.

The location where tankering and pumping to groundwater treatment is in Appendix B. These locations were previously effective in restoring service to customers and are the default locations should the situation re-present itself.

5. Steps to minimise the volume and duration of groundwater treatment

The Generic Plan outlines a detailed rationale behind the use of tankers and groundwater treatment, and summarises the benefits and disadvantages. Some specific issues in relation to the Hambledon catchment are captured below.

5.1. 3rd Party Communications about groundwater treatment

Since the start of the Infiltration Reduction Programme in 2013, Southern Water has been active in communicating with stakeholders and customers about planned and completed work to improve the integrity of the sewerage system. Stakeholders have been kept informed of progress on survey and sealing work via emails and or face-to-face meetings. However, we recognise there is more to do in this area to keep everyone informed of the mitigation measures that may be required and informing when we have deployed the measures.

SW will attend and convene meetings with local groups to ensure progress against the plan and the on-site mitigation activity is clearly communicated. Meetings that have been held over the last 10 years with local council and EA representatives have been influential in helping to shape the IRP. The latest version of the IRP will be shared with the EA, prior to being published on SW's website.

From time to time, SW updates stakeholders about completed and planned work, as part of stakeholder meetings with the local councils.

5.2. Monitoring quality of the downstream watercourse

The Generic Plan provides details of water quality monitoring that will be undertaken, should groundwater treatment be required. An example of the type of monitoring is shown in Appendix B.

6. Options to Reduce Infiltration

6.1. Sewer Rehabilitation Programme

SW acknowledges that infiltration reduction is an on-going process. SW has now completed the repairs identified from the surveys. Whilst acknowledging that the surveys have not been fully effective, since 2013 SW has made significant efforts to locate infiltration and have repaired the sources of infiltration that have been found. The major repair work was completed in 2013. Further checks were carried out in December 2014 and October 2015; and further CCTV investigations were carried out from November 2016 to December 2017 which led to sewer rehabilitations from November 2016 to May 2018.

On a company-wide basis, to ensure that benefit continues to be gained from the work that has been done, SW continued the programme of infiltration reduction with further proposed investment in surveys and repairs.

During 2023 and into 2024 a significant proportion of sewers are being surveyed using a new technique called electroscan. Sewer defects which may allow groundwater to enter the sewerage system through leaking joints will be addressed once the survey work is complete. The surveyed sections a portion of the defects identified can be seen in Appendix A, analysis is still ongoing. Table 5.1 below summarises the work undertaken in the system since 2014 with an annual breakdown in Table 5.2. As infiltration only causes issues in this system very occasionally the amount of sewer sealing work here has been a lower priority than other areas which have received a much greater focus. This is evident by the low volume of work delivered post 2018.

Action	Km of sewer
Length Surveyed	9.58
Length with no work required	7.61
Length Sealed	1.22
Length to be sealed	0.75
Manholes sealed	19
Manholes to be sealed	1

Table 5.1 – summary of work done in the catchment

Year	Surveyed (km)	Sewers sealed (km)	Manholes sealed
Pre 2014	6.28	0.12	0
2014	0.8	0.3	11
2015	0.4	0.2	6
2016	0.1	0.1	1
2017	0.2	0.2	1
2018	0m	0.3	0
2019	0m	0	0
2020	0m	0	0
2021	0m	0	0
2022	0	0	0
2023	1.8	0	0
2024	0	0	0

Table 5.2 – annual summary of work completed

6.2. Property Level Protection

Non-return valves have always been part of SW's armoury for dealing with infiltration, but they are only effective if infiltration is under control on both the lateral and the main sewer. Whilst there are no plans currently to install

non-return valves, the potential benefit of property level protection will be investigated if it is deemed appropriate.

6.3. Local Flow Control

As noted in Section 4.1, in the winter 2013/14 SW used a daisy-chain of up to ten pumps to move effluent through the village before finally discharging it to groundwater treatment, just below Lotts Corner. In 2014/15, groundwater levels were much lower and no such arrangement was required. Tankering was required between 11th March and 30th November 2020 and again in the winter of 2024 in part due to very high groundwater levels.

6.4. Pumping Stations

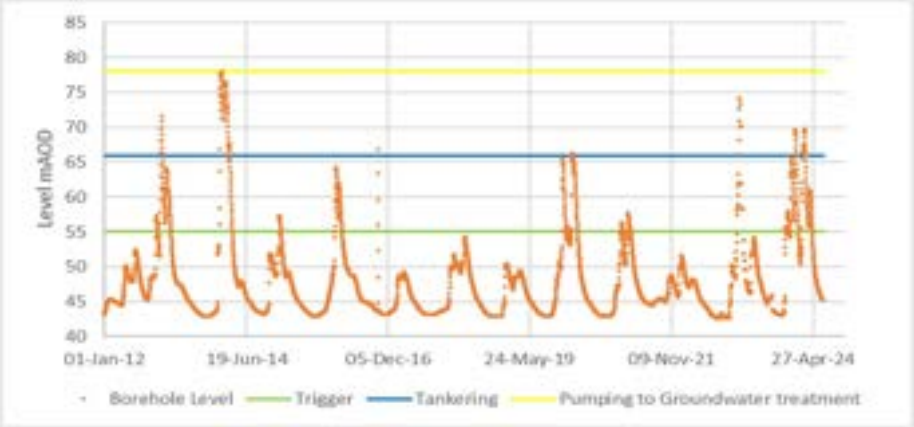
As well as minimising the 'non-sewage' flow that enters the sewers, it is also important that the pumping stations are operating efficiently. Bury Lodge WPS is a critical pumping station in the catchment and received a health check prior to the start of groundwater season further checks were carried out in December 2014 and October 2015. Critical pumping stations will receive pre-winter health checks. These health checks include inspections and maintenance to maintain optimum performance of the pumps to ensure they achieve their design pass forward flow rate.

6.5. Monitoring

The Hambledon catchment is one of ten locations, where groundwater levels have been monitored via electronic data since January 2015. This monitoring helps inform SW's response, in terms of when tankering and groundwater treatment are required. The Generic Plan has more detail on the overall monitoring strategy.

The graph below, in Figure 6.1, is an example of those used for predicting the earliest, average, and latest dates for when the trigger levels are forecast to be breached. This graph shows groundwater levels and an indication of flows, with the Trigger Level shown by the horizontal green line.

Figure 6.1 – Forecasting of Trigger Dates



In addition to the groundwater flooding forecasts explained above, SW is also looking at longer-term trends to monitor the effectiveness of the completed rehabilitation work.

SW will repeat this monitoring each winter, commencing mid-September, running reports at monthly intervals initially, increasing to fortnightly, then weekly to suit the rise of groundwater levels. The forecast dates for reaching trigger levels is shared with the EA when it is produced.

That approach works well in the winters when groundwater levels are rising, but it is important for SW to continue to monitor flows through the dryer months of the year. The data does not lend itself to statistical analysis, but often changes are visible by inspection. SW will use the information to identify whether investigation and repair work is required either to sewers or pumps.

7. Action Plans

A significant amount has been achieved in the Hambledon catchment in the last 10 years. Some actions are ongoing which reflects the continuous improvement process for dealing with infiltration due to groundwater. To make it easy to track progress, the following tables set out the actions to reduce infiltration and also to mitigate the effects of it, if the infiltration cannot be controlled at economic cost. Tables 7.1 and 7.2 cover the actions by SW and by other parties, respectively, to reduce infiltration. Tables 7.3 and 7.4 cover mitigation of the effects of flooding (communication and other activities).

Southern water is committed to continuing to pursue infiltration to reduce the frequency of local groundwater treatment. This IRP describes the work that has been done by SW to improve the situation. In addition, it also describes what is being done to monitor flows, the 'winter preparation' work to be carried out to ensure assets are operating correctly, and the work to be developed with other agencies to improve an integrated plan to address flooding.

Colour coding of actions in tables:

- Green – completed
- Orange – imminent action required
- Red – overdue
- White – on-going actions with no specific end dates.

Table 7.1 – Southern Water Current Activities to Reduce Groundwater Infiltration

Ref.	Item	Actions	Timescale and Status	Outcomes
1.1	Develop an approach for reduction of infiltration and maintenance of reduced levels of infiltration.	Refer to Section 3 above and the report in Appendix A.	Summer 2013, Complete	The steps are being followed to deliver results.
1.2	'Dry weather' flow surveys (to measure background levels of infiltration during low groundwater periods)	Identify suitable measurement points, carry out survey over four week period in Summer, match rainfall records with flow data.	August/September 2013 - Complete	Groundwater infiltration is greater than would be expected for summer conditions.
1.3	'Wet weather' flow surveys (to identify remaining areas of infiltration following initial sewer rehabilitation/repair).	Identify suitable measurement points, carry out survey over four week period, match rainfall records with flow data.	March-April 2014– Survey complete Analysis - complete	Wet Weather and Dry Weather flow monitoring data used in hydraulic model completed in 2014.
1.4	CCTV etc. survey of sewers	Identify Strategic Manholes, survey manholes to identify clear flow and infiltration. Carry out CCTV survey where clear flow was identified.	2013 / 2014 - Complete	Identify major sources of infiltration to determine scope of rehabilitation work.
1.5	Carry out sewer rehabilitation work	Use various techniques to seal infiltration points in manholes and sewers	West St – 2013 Lotts Corner – 2013 Bury Lodge WPS – 2013	Structural integrity of sewers restored.
1.6	Further surveys (CCTV or alternative techniques), if required, where 'wet weather' flow surveys show areas of high infiltration remaining	Further surveys in areas where high infiltration flows remain.	2014 –Completed	Determine scope and carry out further rehabilitation if identified as required from the survey results.

Ref.	Item	Actions	Timescale and Status	Outcomes
1.7	Further sewer rehabilitation work, if required, in areas where surveys carried out.	As above, use various techniques to seal infiltration points in manholes and sewers	Summer/Autumn 2015 - Completed	Reduced infiltration, leading to reduced requirement for tankers.
1.8	Maintain IRP as a live document	Review text of the IRP and update if appropriate to describe work carried out and/or developments	Annually	Reviewed/Updated IRP. Last issued for review 2017. Re-issued 2024
1.8a	Maintain IRP as a live document	Review Tables 6.1 to 6.5 and as appropriate amend to show progress on individual activities.	Quarterly	Up to date tables of Actions
1.9	Consider alternative solutions that involve some risk	Investigate unconventional options such as vacuum sewers or consider conventional combined sewer overflows	2020	Complete.
1.10	Install Property Level Protection to Vulnerable properties.	Survey and install NRVs at vulnerable properties.	Autumn 2014 - Complete	The aim is that protection to vulnerable properties restricts tankering to those properties only as opposed to more significant sewer pumping.
1.11	Groundwater Sites: improve effluent quality	Investigate potential for improved screening and basic treatment at points of discharge into watercourse.	SW, Summer/Autumn 2014	Improved arrangements for discharges when required.
1.12	Groundwater Sites: minimise flow	Add level control to pumps to reduce durations for pumping	SW, 2014, Complete	Establish whether seasonal discharge (s) will be necessary in order to maintain use of sewerage services for customers during periods of very high groundwater levels.

Ref.	Item	Actions	Timescale and Status	Outcomes
1.12	Standards for groundwater emergency discharges	SW to discuss with EA about best practice set up for Groundwater treatment arrangements.	SW, 2014.	Agree with EA acceptable treatment for discharges and acceptable flow rates.
1.13	Flow, location, screening arrangements for emergency discharges	Determine potential flow rates and screening arrangements and most appropriate locations,	SW, included in this IRP	Agree with EA, Canterbury CC, Shepway DC and local Parish Councils acceptable arrangements for future emergency discharges.
1.14	Action Plans	Develop SW action plans documenting set up of pumps, tankers, etc. for emergency situations.	SW, Summer 2014- Complete	Action Plan available for planning sessions with other authorities in preparation for repeat flooding events. Engagement with the local community about the potential arrangements for dealing with excess flows into sewers to mitigate disruption to customers.
1.16	Surveys and repairs	Undertake surveys of public sewers using electroscan technique	2023/24	Complete
1.17	Sewer repairs	Undertake repairs to defective 0.75 km sewers identified in electroscan surveys	Post April 2025	Planned

Table 7.2 – Multi-Agency Activities to Reduce Groundwater Infiltration

Ref.	Item	Actions	Owner, Timescale and Status	Outcomes
2.1	Strategy for infiltration via private drains	Southern Water to propose a strategy for dealing with infiltration via private drains*	SW supported by EA and local Parish Councils, Summer/ Autumn 2014. Completed 2014.	Southern Water objective is to improve awareness of the significance of infiltration into private drains and the importance for customers to ensure infiltration is repaired when it is discovered.
2.1a	Long-term Monitoring	SW will monitor sewer flow to identify significant increases in inflows.	Ongoing	Early identification of areas where infiltration has increased
2.2a	Investigate highway 'mis-connections'	Where non-sewage flow is identified, check highway drainage relative to sewers to ensure road drainage is not a source of flow into the SW sewers	Hampshire County Council with support from SW, 2014 onwards. To be pursued as and when required.	Reduced flow of surface water (if connections are found).
2.2b	Investigate groundwater infiltration on domestic drains	Where non-sewage flow is identified from domestic properties, investigate to identify source of flow into SW sewers	SW, with assistance from Winchester City Council where required, 2014 onwards. To be pursued as and when required.	Reduced flow of surface water (if connections are found).
2.3	Consider effects of proposed new developments on infiltration.	Parish Council to continue to consult with SW on development applications. SW to determine threshold above which they require to be consulted. Sewerage materials for new developments	Parish Council, Ongoing. SW wish to be consulted on all proposed development.	Developments in areas which would be detrimental to sewer flooding, to have conditions recommended by SW and applied, as appropriate, by the City and Parish Councils.

*Note: Southern Water does not have powers to require residents to repair private drains. Hence the support of the other agencies is required. It is acknowledged that customers may not be aware of infiltration in their private drains, so SW will consider ways of obtaining information to demonstrate the presence of infiltration. Parish Councils would only be able to instigate action under Section 59 of the Building Act where proof/evidence is provided of the defect.

Table 7.3 – Publicity/ Communication Activities to Reduce / Mitigate the Effects of Groundwater Infiltration.

Ref.	Item	Actions	Owner, Timescale and Status	Outcomes
3.1	Public meetings about reducing groundwater infiltration into sewerage system	Attend public meetings with other agencies as appropriate.	SW, as required	Inform stakeholders of progress and planned activities and receive feedback.
3.2	Letters from SW to stakeholders about reducing groundwater infiltration into the sewerage system	Send letters at regular intervals to communicate progress and planned activities	SW, as required	Inform stakeholders of progress and planned activities
3.3	Multi-Agency Group meetings	Discuss and agree actions to reduce requirements for tankering and emergency discharges to watercourses.	All Parties, Discussed and actions agreed in 2013 and 2014. To be discussed in future as required.	Improved understanding and appreciation of issues. Agreement to actions to help reduce the need for tankering and emergency discharges to watercourses

** SW can provide base information to councils to include in articles publicising the role that everyone can play in minimising non-sewage flows into sewers, and the importance of doing so to reduce the incidence of restricted toilet use during periods of high groundwater.

Table 7.4 – Activities to Mitigate the Effects of Groundwater Infiltration/ Other Flood Protection Mechanisms

Ref.	Item	Actions	Owner, Timescale and Status	Outcomes
4.1	Early Warning system	Joint continuous monitoring of groundwater levels and sewer levels/flows.	SW, EA, 2014. Ongoing. Commenced Jan 2015. Re-commenced annually	Develop trigger levels by comparing historic customer complaints and tankering with BH levels (or other reference).
4.2	Tankering arrangements	Investigate options for improving location of tankers for future events. e.g. by use of longer hoses/ pumping	SW, Spring 2014, Complete	Potentially less disruption to residents when tankering / pumping is essential.
4.3	Maximise the capacity of the sewerage system and pumping stations	Investigate the carrying capacity of the sewerage system	SW, July 2014 for capacity determination. Trial - if and when - the sewers are surcharged	Potential to increase output from the pumping station.
4.4	Flooding Management Plan	Develop plan to address the flooding issues caused by high groundwater. Implement recommendations. This is being addressed by the Hambledon Flood ActionGroup.	Hampshire County Council & Winchester City Council, Hambledon Flood Action Group with inputs from SW, EA, and Parish Councils	Plan including actions for participating authorities that in unison will reduce the extent of flooding and the impact of flooding.
4.5	Maintenance of watercourses	Riparian owners to carry out their responsibilities to maintain adequate flow through watercourses by clearing vegetation, desilting, etc.	Riparian owners with input from City and Parish Councils – ongoing responsibility	Maximise the flow along watercourses in order to minimise surface flooding, which results in inundation of manholes to the sewerage system.
4.6	Review of utilisation of a control structure	Investigate the possible use of a fixed control structure to relieve hydraulic overloading of sewers.	SW	No current plans to progress this option.

Appendix