

# Infiltration Reduction Plan

## Hambleton

September 2021  
Version 6.1



from  
**Southern  
Water** 

# Contents

Contents	2
Document Control	3
Glossary	4
1. Background	5
2. Groundwater Infiltration at Hambledon	7
2.1. The significance of groundwater infiltration.	7
3. Investigation & repairs	8
3.1. Outline Plans to Investigate Sources of Infiltration	8
3.2. Investigation and Repairs in Hambledon	8
4. Over-pumping	10
4.1. Circumstances that lead to over-pumping	10
4.2. Steps to prevent discharges and alternatives to over-pumping	11
4.3. Over-pumping arrangements (flow rates and minimisation of effect on watercourse)	11
4.4. Steps to minimise the volume and duration of over-pumping	11
4.4.1. Tankering	11
4.4.2. Over-pumping	11
4.5. 3rd Party Communications about over-pumping	12
4.6. Monitoring quality of the downstream watercourse	12
5. Options to Reduce Infiltration	13
5.1. Sewer Rehabilitation Programme	13
5.2. Property Level Protection	13
5.3. Local Flow Control	13
5.4. Pumping Stations	13
5.5. Monitoring	13
6. Action Plans	15
Appendix	22

## Document Control

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1.0	January 2014	Richard Andrews	N/A	Graham Purvis	
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## 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  
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). SW 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 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.

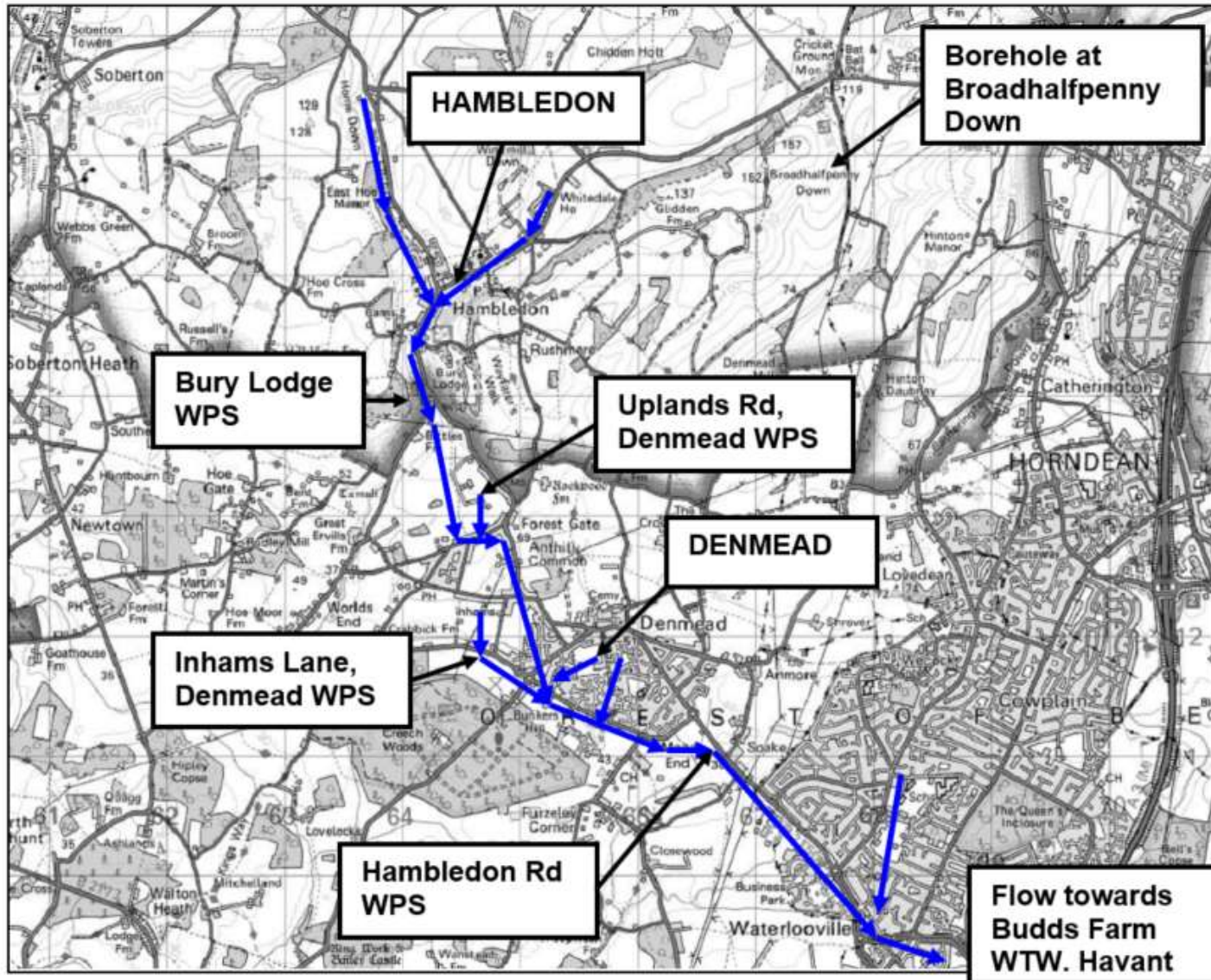


Figure 1.1 - Representation of the sewerage system in the Hambleton area

## 2. Groundwater Infiltration at Hambledon

### 2.1. The significance of groundwater infiltration.

The Hambledon Valley is one of a number of 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 over-pumping. Such mitigation measures are not sustainable, so during the last eight years SW 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 over-pumping 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 since April 2010. In 2013\_2014, a total of 4 incidents happened. The SW staff working in Hambledon provided assistance to those customers, and others affected by the flooding.

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 due to 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.

**Table 2.1 - Reported Flooding Incidents in Hambledon**

Year	External Flooding	Internal Flooding	Restricted Toilet Use	Total
2010_2011	0	0	0	0
2011_2012	0	0	0	0
2012_2013	1	0	0	1
2013_2014	1	2	1	4
2014_2015	0	0	0	0
2015_2016	0	0	0	0
2016_2017	0	0	0	0
2017_2018	0	0	0	0
2018_2019	0	0	0	0
2019_2020	0	0	0	0
2020_2021	0	0	0	0
<b>Totals</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>5</b>

## 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. SW has been making significant investments over many years to minimise infiltration and the need for over-pumping.

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
5a.	CCTV: Green Lane: Cams Hill to Brooke Lane; also Green Lane/ West Street junction to East Street / Glidden Lane junction.	Spring 2014	Completed
4.	Wet Weather Flow Monitoring	Spring 2014 (20 March – 23 April)	Completed
5b.	ElectroScan Surveys	Spring 2014	Completed
7a.	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



Step.	Description	Approx Date	Status
6.	South Hambledon: in the vicinity of Hook Vinney	Spring 2015	Completed
7b.	Winter monitoring exercise recommenced.	Autumn 2015	Completed
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	Ongoing
9.	Planned: Investigate potential for property level protection	Spring 2017	Ongoing
10.	Repairs arising from surveys (as required)	Summer / Autumn 2017	Ongoing
12.	Sewer Rehabilitation	November 2016 – December 2018	Completed
13.	Further sewer surveys and subsequent repairs	Summer 2021 – Spring 2022	Planned

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 B. Further CCTV investigations were carried out from November 2016 to December 2017 which led to sewer rehabilitations from November 2016 to May 2018. Further surveys are planned across 2021-22.

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 (higher) end of the village. So at Hambledon, SW also trialled an innovative 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 at the locations shown in the plans in Appendix B.

## 4. Over-pumping

### 4.1. Circumstances that lead to over-pumping

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 or pumping will be required. However it is actually the levels in the manholes locally that determines when tankers need to be deployed, or when overpumping needs to commence. From previous experience, the first properties to be affected are generally down the lower end of Green Lane (near Old Barn Crescent and Lotts Store) at the southern end of the village. West Street properties and East Street properties are affected shortly after.

The locations where over-pumping has been necessary in the past are given in Appendix B. The repairs carried out, combined with the constriction of the surface water drain, and the winter preparation checks, are expected to minimise the number of locations where over-pumping 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 over-pumps are 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/pumping 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) pumps.

Figure 4.1 illustrates groundwater levels in the period 2013 to 2021. 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 overpumps or tankering was required. Tankering was required between 11<sup>th</sup> March and 30<sup>th</sup> November 2020.

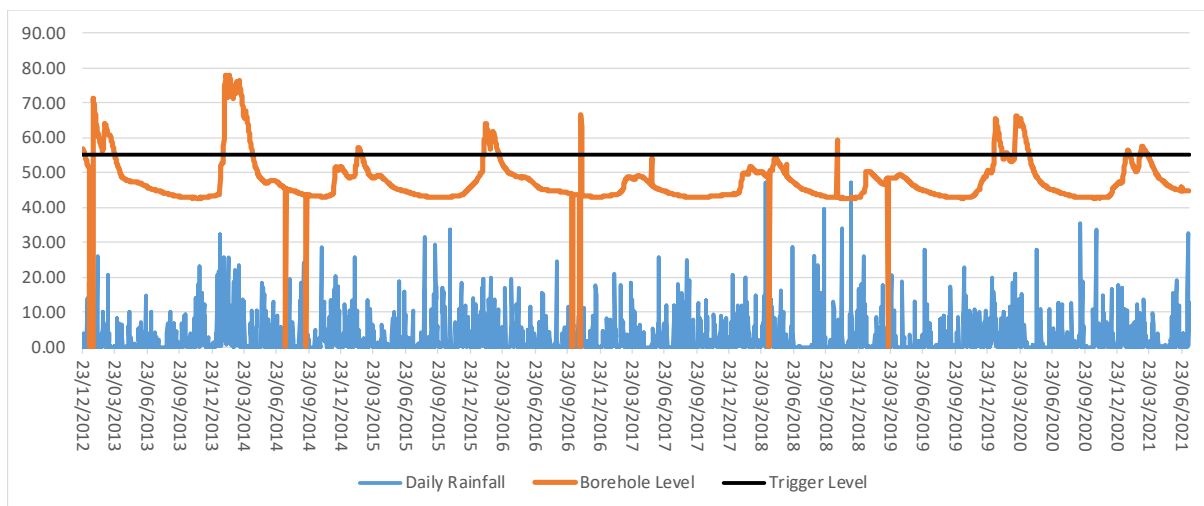


Figure 4.1 – Groundwater levels from 2013 to 2021

## 4.2. Steps to prevent discharges and alternatives to over-pumping

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).

Following the main repairs, further targeted repairs were completed. In addition to this work, SW also carries out other activities to minimise the requirement for discharges to watercourses.

## 4.3. Over-pumping arrangements (flow rates and minimisation of effect on watercourse)

A typical arrangement of an over-pumping setup is provided in the Generic Plan.

The locations where tankering and over-pumping has been used in recent years are shown in Appendix B. These locations were effective in restoring service to customers and are the default locations should the situation re-present itself. Dates of historic tankering and over-pumping are also provided in Appendix B.

SW invested in ten portable biological treatment units in January 2014 for use at flooded areas throughout its area. The units were trialled but found to be unreliable, so UV units have been used instead when over-pumping is required.

## 4.4. Steps to minimise the volume and duration of over-pumping

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

### 4.4.1. Tankering

#### Benefits:

- See Generic Plan.

#### Disadvantages

- See Generic Plan.
- The flow rate is low (approx. 1l/s per tanker over a 24 hour).

\* Tankers operating in Hambledon village discharge excess flows downstream into large diameter sewers in Denmead or Waterlooville (a round trip of 1 - 2 hours).

### 4.4.2. Over-pumping

#### Benefits:

- See Generic Plan.
- Typical pump fuel consumption is 0.8l/ hr = 19l/ 24 hrs, about half of what one tanker would use.
- The discharge rate is significantly greater. A 4" pump will discharge typically 30 l/s; the equivalent of a fleet of 30 tankers.

Disadvantages

- See Generic Plan.

The graph in Figure 4.2 shows the estimated carbon emission per m<sup>3</sup> of dilute effluent removed by tanker and by pump.

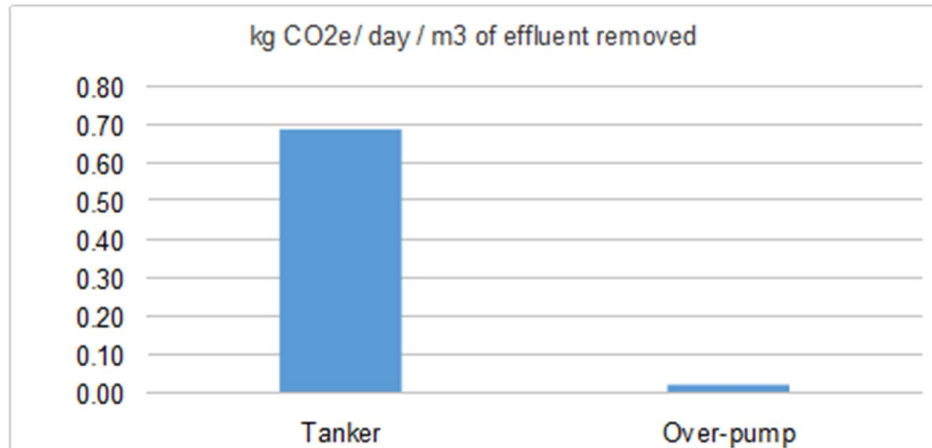


Figure 4.2– Carbon Footprint figures for Tankers and Over-pumps per m<sup>3</sup> of effluent removed.

## 4.5. 3rd Party Communications about over-pumping

Since the start of the Infiltration Reduction Programme in 2013, Southern Water has been proactive 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.

SW attends and convenes meetings with a number of local groups. In particular meetings with multi-agency representatives was influential in helping to shape the IRP. During the flooding in 2014, SW had a constant presence in the village, enabling a more rapid response and better communications. During the winter of 2014/15, SW and the EA held weekly conference calls to discuss locations where total flows in the sewers were reaching the point where SW would need to respond imminently with tankering or pumping. The latest version of the IRP approved by the EA, will be published on SW's website.

Despite the work being undertaken, if over-pumping is required, the locations are provided in Appendix B. The Generic Plan provides more detailed arrangements around over-pumping.

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

## 4.6. Monitoring quality of the downstream watercourse

The Generic Plan provides details of water quality monitoring that will be undertaken, should over-pumping be required.

## 5. Options to Reduce Infiltration

### 5.1. 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.

### 5.2. 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.

### 5.3. 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 the watercourse, just below Lotts Corner. In 2014/15, groundwater levels were much lower and no overpumps or tankering was required. Tankering was required between 11<sup>th</sup> March and 30<sup>th</sup> November 2020.

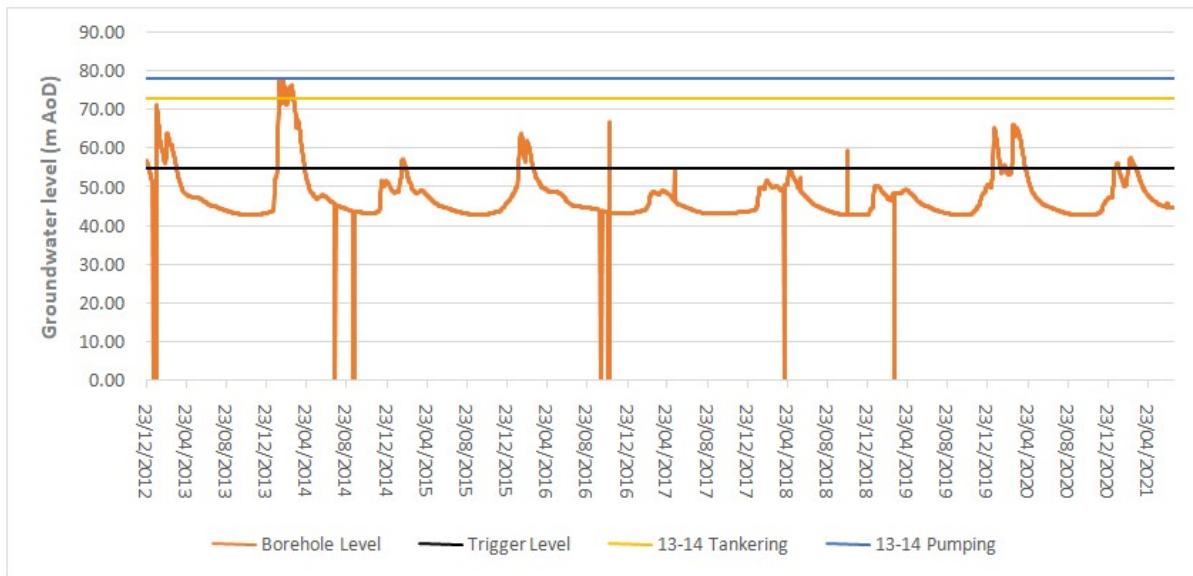
### 5.4. Pumping Stations

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 during the year in 2014, 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.

### 5.5. 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 over-pumping are required. The Generic Plan has more detail on the overall monitoring strategy.

The graph below, in Figure 5.1, 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 black line.



**Figure 5.1 – 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.

## 6. Action Plans

A significant amount has been achieved in the Hambledon catchment in the last eight 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 6.1 and 6.2 cover the actions by SW and by other parties, respectively, to reduce infiltration. Tables 6.3 and 6.4 cover mitigation of the effects of flooding (communication and other activities).

SW is committed to continuing to pursue infiltration to reduce the frequency of over-pumping. 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 6.1 – 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.



Hambleton Infiltration Reduction Plan

Ref.	Item	Actions	Timescale and Status	Outcomes
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.
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 2020.
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	Ongoing.
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.

Hambledon Infiltration Reduction Plan

Ref.	Item	Actions	Timescale and Status	Outcomes
1.11	Over-pumping 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	Over-pumping 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.
1.12	Standards for emergency discharges	SW to discuss with EA about best practice set up for over-pumping 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	Identification of lengths of sewer to survey or resurvey in the period 2021-25	Review sewer records with available ground water profile date	Post 2022	To be considered depending on performance in winter 2021/22

Table 6.2 – 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.	Parish Council, Ongoing.	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.
		SW to determine threshold above which they require to be consulted.	Parish Council, Ongoing. SW wish to be consulted on all proposed development.	

**Hambledon Infiltration Reduction Plan**

<b>Ref.</b>	<b>Item</b>	<b>Actions</b>	<b>Owner, Timescale and Status</b>	<b>Outcomes</b>
		Sewerage materials for new developments	SW & Parish Council, when developments are at planning approval stage. Ongoing.	

\*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 6.3 – Publicity/ Communication Activities to Reduce / Mitigate the Effects of Groundwater Infiltration.**

<b>Ref.</b>	<b>Item</b>	<b>Actions</b>	<b>Owner, Timescale and Status</b>	<b>Outcomes</b>
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 6.4 – Activities to Mitigate the Effects of Groundwater Infiltration/ Other Flood Protection Mechanisms**

<b>Ref.</b>	<b>Item</b>	<b>Actions</b>	<b>Owner, Timescale and Status</b>	<b>Outcomes</b>
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 and over-pump units 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 Action Group.	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

A Survey Findings and Rehabilitation Scope

B Emergency Discharge Sites