

Infiltration Reduction Plan

Goodworth Clatford

October 2021
Version 3.2



from
**Southern
Water** 

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Document Control

Version	Description/Amendment	Date	Prepared by (Author)	Checked By	Reviewed by	Approved by
V1.0	Advance Copy	October 2014	André Bougard	N/A	Richard Andrews	Graham Purvis
V2.0	For EA approval	January 2015	André Bougard	N/A	Richard Andrews	Graham Purvis
V3.0	Re-drafted for EA approval	November 2015	Graham Purvis	N/A	Richard Andrews	Richard Andrews
V3.1	Approved by EA	June 2016	Richard Andrews	N/A	Graham Purvis	Graham Purvis
V3.2	Re-drafted for EA approval	October 2021	Adarsh Essurredeen	R.Dow	Andy Adams	Andy Adams

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 Goodworth Clatford in the Fullerton 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 Fullerton Wastewater Treatment Works (WTW) In Hampshire.

Figure 1.1 shows flows from Goodworth Clatford South Wastewater Pumping Station (WPS) and Goodworth Clatford Station WPS converge at Royal Oak WPS. The resultant flows are pumped onwards via Church Lane WPS to Fullerton WTW which also treats flows from Andover.

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,
- Test Valley Borough Council
- Goodworth Clatford Parish Council

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

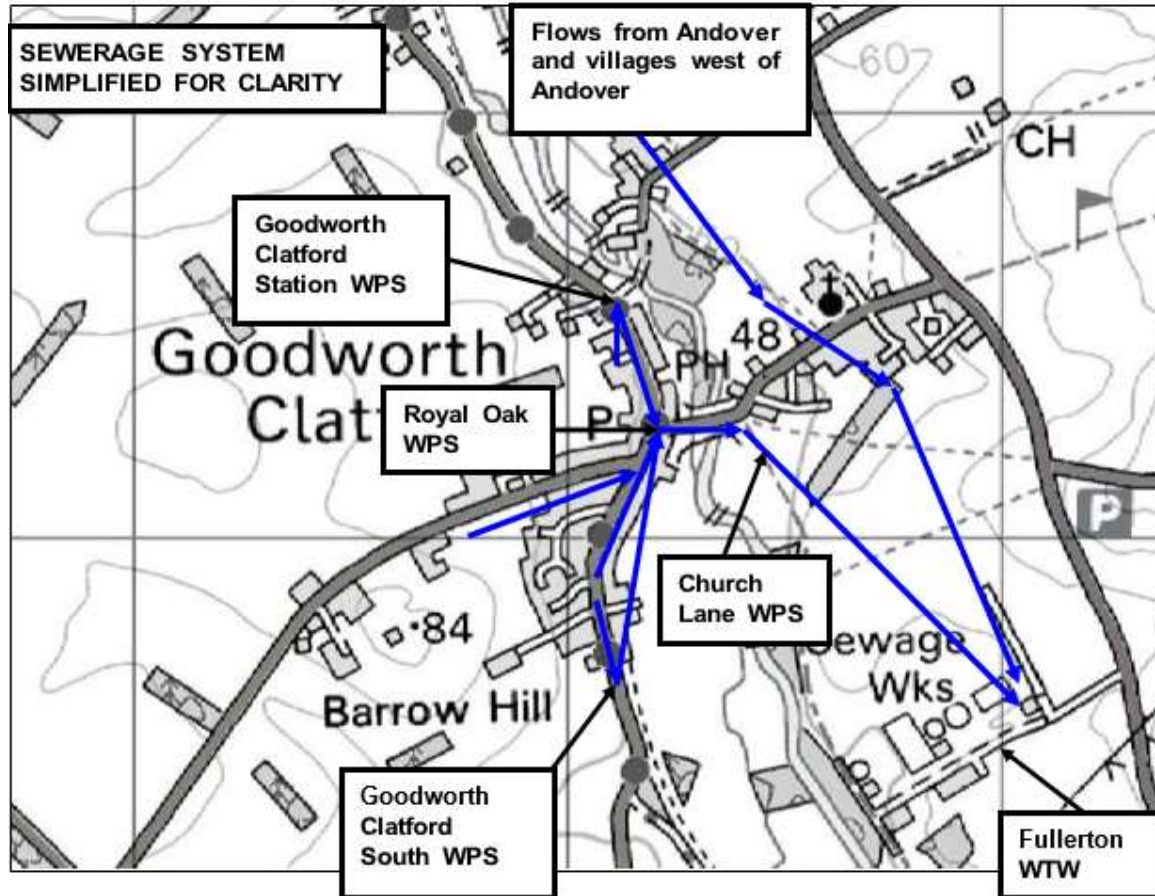


Figure 1.1 - Representation of the sewerage system for the Fullerton WTW catchment (locations of pumping stations is approximate)

2. Groundwater Infiltration at Goodworth Clatford

2.1. The significance of groundwater infiltration.

Goodworth Clatford is a region 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 twenty years SW has invested in carrying out major improvements to the integrity of the sewers and manholes in the vicinity of Goodworth Clatford 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 show reported incidents of sewer flooding since April 2010.

A hydraulic model of the Fullerton WTW catchment is not available. However, SW is aware from historical reports of which properties are likely to be the first to suffer from the effects of flooding.

It is noted that since 2013/2014 (daily average rainfall of 7.47 mm), there has not been any further incident despite the daily average rainfall being 3.83 mm in 2019/2020. This demonstrates the effectiveness to date of the sewer sealing work undertaken in the network.

Table 2.1 - Reported Flooding Incidents by Category, in Goodworth Clatford.

Year	External Flooding	Restricted Toilet Use	Total
2010_2011	0	0	0
2011_2012	0	0	0
2012_2013	0	0	0
2013_2014	5	1	6
2014_2015	0	0	0
2015_2016	0	0	0
2016_2017	0	0	0
2017_2018	0	0	0
2018_2019	0	0	0
2019_2020	0	0	0
2020_2021	0	0	0
Totals	5	1	6

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 Goodworth Clatford are captured in Section 3.2 below, and includes the following elements:

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

3.2. Investigation and Repairs in the Goodworth Clatford

Groundwater infiltration into sewers has been a long-running issue for Goodworth Clatford. 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 the Goodworth Clatford catchment. 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 at Goodworth Clatford and Environs

Step.	Description	Approx. Date	Status
1.	Sewer Joints sealed. (~120m length) at Longstock Road, near Goodworth Clatford Station WPS	2001/2002	Completed
2.	MH sealed at Junction of Longstock Road and Cottage Green	2001/2002	Completed
3.	Sewer Joints sealed. (~110m length) at Longstock Road, in the vicinity of Meadow Drive		Completed
4.	Sewer Joints sealed. (~30m length) at Longstock Road, near Goodworth Clatford South WPS		Completed
5.	Sewer Joints sealed. (~90m length) at Longstock Road, near Goodworth Clatford Station WPS	2001/2002	Completed
6.	Sewer Joints sealed. (~80m length) at Church Lane, in the vicinity of The Warren		Completed
7.	Sewer Joints sealed. (~20m length) at Yew Tree Cottage	2012/2013	Completed
8.	Sewer Joints sealed. (~135m length) at Longstock Road, south from Goodworth Clatford Station WPS	2012/2013	Completed

Step.	Description	Approx. Date	Status
9.	Sewer Joints sealed. (~75m length) at Longstock Road, south from Goodworth Clatford Station WPS	2012/2013	Completed
10.	CCTV Investigation	December 2016 – February 2017	Completed
11.	Sewer Rehabilitation	July 2016 – February 2019	Completed
12.	Ongoing monitoring	Commences each year	Ongoing
13.	Further surveys and subsequent repairs	Post 2022	Planned

The list in Table 3.1 summarises work carried out between 2000 and 2013 amounting to over 600 metres of sewer repaired.

In spring 2014, a survey was carried out in the village of Goodworth Clatford which identified a number of sources of infiltration in manholes and sewers adjacent to Cottage Green and in Longstock Road (south of Meadow Drive). Using the results of the survey, approximately £60,000 of repairs were carried out in Longstock Road during 2014/15. The plans in Appendix A show the extent of surveys, significant infiltration and completed repairs.

Southern Water took advantage of the high groundwater levels in 2014 to carry out CCTV surveys (Spring 2014) and completed rehabilitation work to improve the situation in March 2015. Further rehabilitation works were scheduled for year 1 AMP 6 (April 2015 – March 2016). Further CCTV Investigations were carried out from December 2016 to February 2017, which led to Sewer rehabilitations from July 2016 to February 2019.

During the winter of 2013/14 ([the wettest winter on record](#)), tankering and over-pumping was used extensively to reduce levels in sewers and to maintain services for customers. Without these measures, there would have been more extensive flooding. Since 2013/14 groundwater levels have not risen to this extent and the catchment has been managed to ensure no flooding or restricted toilet use.

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 graph in Figure 4.1 shows the groundwater level measured at Clanville Gate borehole near Andover.

The dark blue line and yellow line shows tankering and pumping which was required at a peak of 92.6m AOD in March 2014. This peak was significantly higher than the long term average of approximately 85m for March. On the basis of the information from the last few winters, a trigger level of 90 m AOD (grey line) has been proposed based on groundwater levels at Clanville Gate borehole. The trigger level will be reviewed following other high groundwater events. Because groundwater levels change so rapidly, pumps and tankers will not be deployed at specific groundwater levels, but the decision will be influenced by current and forecast conditions.

Overpumping was started on 01/03/2014 and stopped on the 07/05/2014 during the winter of 2013/14. There was no overpumping in the winter of 2012/13, although tankering was used to remove excess flows. During winter 2014/15, overpumping equipment was moved into Goodworth Clatford Station WPS as a precaution against rising GW levels, but not used.

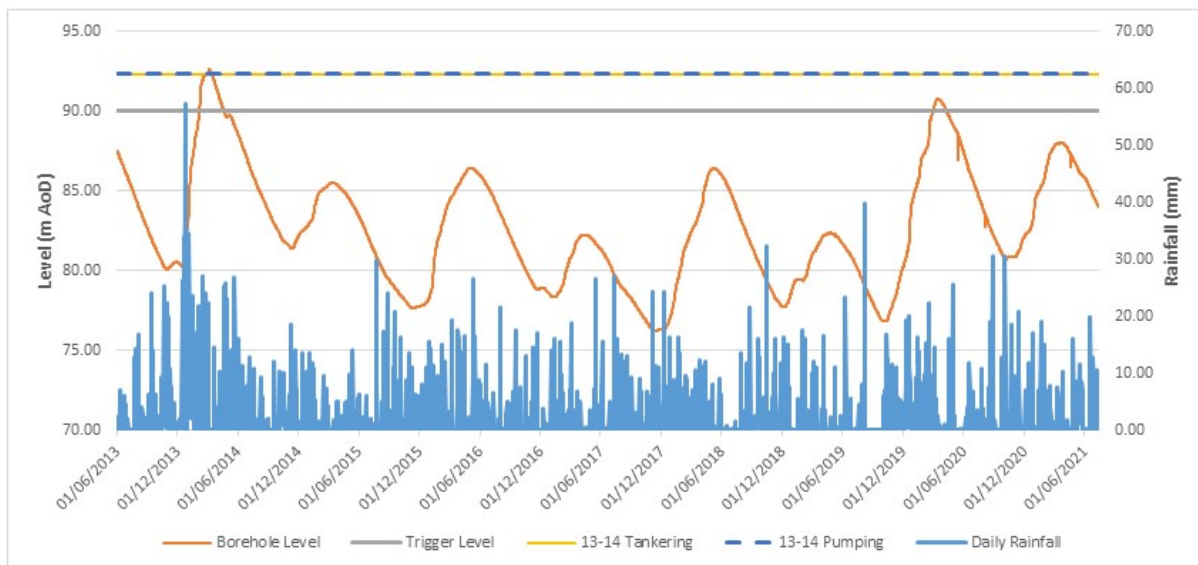


Figure 4.1 - Groundwater levels across the years

The details of where tankering and over-pumping has been necessary in the past are given in Appendix B. The repairs carried out, combined with the winter preparation checks, are expected to minimise the number of locations where over-pumping would 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 of, or in addition to, the sites described in Appendix B.

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 2014, 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.

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 Goodworth Clatford catchment are captured below.

4.4.1. Tankering

Benefits:

- See Generic Plan.

Disadvantages

- The flow rate is low (approx. 3l/s per tanker over a 24 hour period*).
- Tankers operating at Goodworth Clatford discharge at Fullerton WTW - round trips of an average of approximately 2 hours including loading and discharging.
- See also the Generic Plan.

4.4.2. Over-pumping

Benefits:

- Typical pump fuel consumption is 85% of the fuel that one tanker would use in a day.
- The discharge rate is significantly greater. A 3" pump will discharge typically 10- 20 l/s; the equivalent of a fleet of 10 tankers.
- See also the Generic Plan.

Disadvantages

- See Generic Plan.

The graph in Figure 4.2 shows the estimated carbon emission per m³ of dilute effluent removed by tanker and by pump. In this example, a 4000 gallon tanker and 3" diesel pump assuming that the tanker is discharging at Fullerton WTW. The data indicates that per m³ of effluent removed, the use of tankers emit over ten times more carbon to the environment than a diesel pump.

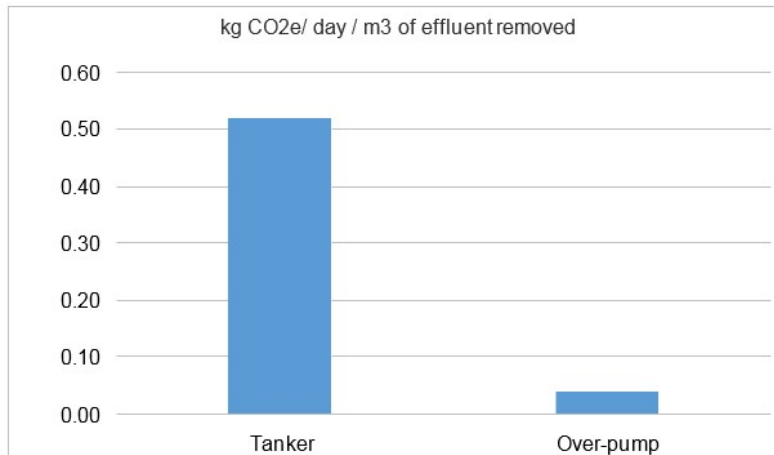


Figure 4.2 – Carbon Footprint figures for Tankers and Over-pumps per m³ of effluent removed.

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 the meetings with local council representatives have been influential in helping to shape the IRP. SW liaised with the local flood action group and local residents about siting and daily management of the tankers to minimise disruption. 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 location of advisory signs near the over-pumps is also 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 on-going process. Since 2013, SW has undertaken surveys and repairs at Goodworth Clatford. The major repair work was completed in 2013, and the critical pumping stations in Goodworth Clatford received special health check visits in January 2015 to ensure they are functioning in their optimum conditions.

However, 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 investment across its region for AMP6 (2015 – 2020). Further CCTV Investigations were carried out from December 2016 to February 2017, which led to Sewer rehabilitations from July 2016 to February 2019. Further surveys may be undertaken in the future depending on how the catchment reacts to high groundwater following previous sewer sealing work.

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 overpumping was started on 01/03/2014 and stopped on the 07/05/2014 during the winter of 2013/14. There was no overpumping in the winter of 2012/13, although tankering was used to remove excess flows. Neither tankering or over-pumping were required in 2019/20 or 2020/21.

5.4. Pumping Stations

The critical pumping stations in Goodworth Clatford receive regular checks; they receive special health check visits pre groundwater season to ensure they are functioning in their optimum state, so that they achieve their design pass forward flow rate.

5.5. Monitoring

The Goodworth Clatford 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 (shown at the top of the graph) for when the trigger levels are forecast to be breached. These were based on rates of groundwater rise over the previous eight years.

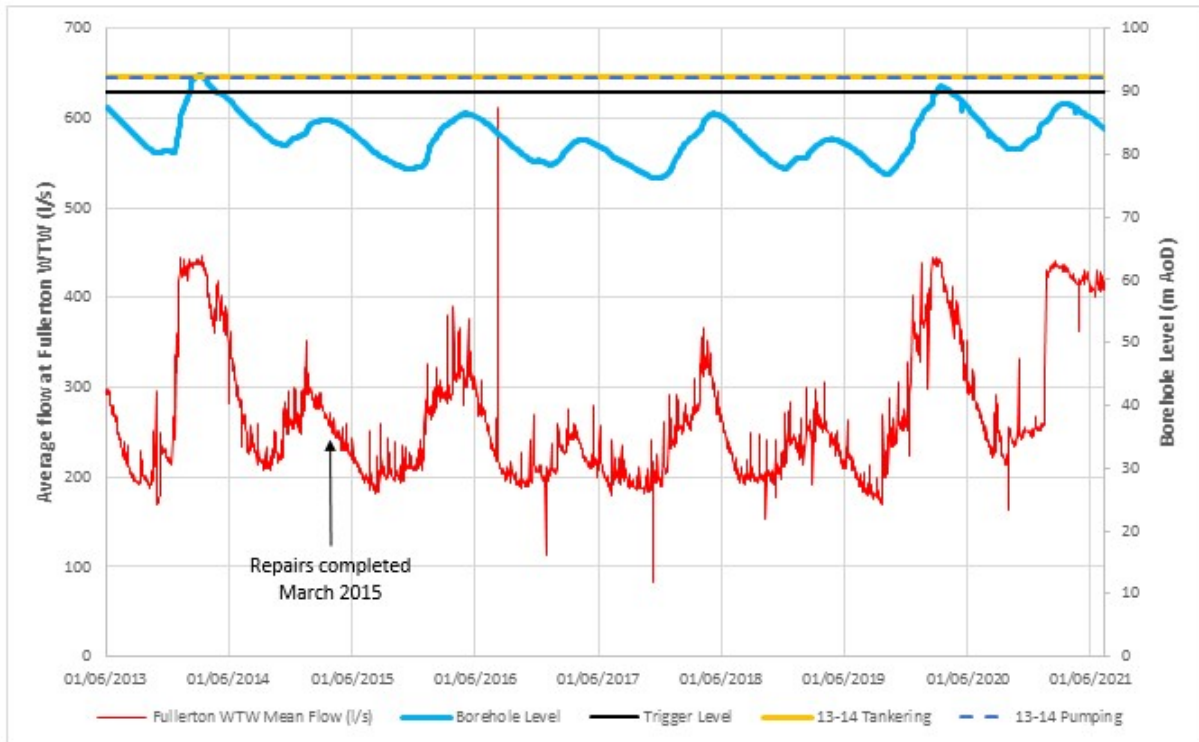


Figure 5.1 – Forecasting of Trigger Dates

The longer term trend in flows arriving at Fullerton WTW is indicated by the red line on the graph; and groundwater level is shown by the light blue line. The graph shows that for a given groundwater level (say 80m), the flow dropped significantly at the time the repairs were carried out. A factor affecting the residual flow may have been the rainfall. The purpose of Figure 5.1 is not to draw a specific conclusion, but to show that monitoring is ongoing and that information can be gleaned from the data to help identify whether infiltration is increasing. The flow was monitored against groundwater levels during winter 2015/16 to seek to establish the long-term benefits of the rehabilitation work; both the completed work and the further work being carried out in 2015.

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.

6. Action Plans

A significant amount has been achieved in the Goodworth Clatford 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.	Mid-September 2015 - 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.	May/ June 2014 – Survey complete	Wet Weather and Dry Weather flow monitoring data used in hydraulic model
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.	Summer 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	March 2015 – Completed	Structural integrity of sewers restored.

Goodworth Clatford Infiltration Reduction Plan

Ref.	Item	Actions	Timescale and Status	Outcomes
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.	2015 – Completed December 2016 – February 2017 – 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	April 2015 – March 2016 complete July 2016 – February 2019 – 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 2015. Re-issued 2016.
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 where required		The aim is that protection to vulnerable properties restricts tankering to those properties only as opposed to more significant sewer pumping. No NRVs required

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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, included in this IRP	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, Hampshire County Council, Test Valley Borough Council 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.
1.15	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	Planned

Goodworth Clatford Infiltration Reduction Plan

Ref.	Item	Actions	Timescale and Status	Outcomes
1.16	Surveys by CCTV or electroscan lengths of sewer potentially at risk	Compare historical survey coverage with results of 1.15 and produce a survey schedule.	Post 2022	Planned
1.17	Survey result review	Review results of surveys undertaken in 1.16 to determine sewer sealing work.	Post 2022	Planned
1.18	Undertake required sewer sealing	Seal sewers and manholes by most appropriate technique	Post 2022	Planned
1.19	Review effectiveness of any sealing work	Analyse monitoring data and groundwater data to determine benefit of investment	Post 2022	Planned
1.20	Review further options for property protection and alternative tanker points	Consider future improvements	Post 2022	Planned

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, Ongoing	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	Local councils 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 local councils 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.	

Goodworth Clatford Infiltration Reduction Plan

Ref.	Item	Actions	Owner, Timescale and Status	Outcomes
		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.

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	Communication from SW to stakeholders about reducing groundwater infiltration into the sewerage system	Send comms 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
3.4	Implement local campaign to discourage misconnections	Publicise through parish councils. Include article in Parish magazines. **	Parish and Borough Councils, Complete	Article included in Council magazine.

** 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

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 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	Flooding Management Plan	Develop plan to address the flooding issues caused by high groundwater. Implement recommendations. This is being addressed by the Little Stour, Nailbourne and Petham Bourne Flood Management Group Action Plan.	Hampshire County Council with inputs from SW, EA, and Parish Councils	Plan including actions for participating authorities, which in unison will reduce the extent of flooding and the impact of flooding.
4.4	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 Parish Council – ongoing responsibility	Maximise the flow along watercourses in order to minimise surface flooding, which results in inundation of manholes to the sewerage system.

Appendix

A Survey Findings and Rehabilitation Scope

B Emergency Discharge Sites