Infiltration Reduction Plan

Lancing

September 2021
Version 4.0

from
Southern
Water

Contents

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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 Lancing WPS in the East Worthing catchment has been prepared in response to the Environment Agency's (EA) Regulatory Position Statement (RPS). Lancing is prone to flooding from many causes, including flooding from local water courses, coastal flooding, surface water flooding, ponding, capacity constraints in the Lancing Brooks and, as the parish occupies a low-lying coastal plain at the foot of the South Downs, particularly groundwater flooding. Groundwater from the Downs surfaces where it meets the flatter terrain and there are many natural springs beneath the catchment. Acknowledging that high seasonal groundwater is an issue particularly in North Lancing, Southern Water has been working to identify the locations of groundwater infiltration into sewers in North Lancing, and to repair them. The current infiltration reduction programme started in 2013.

Figure 1 shows that flows gravitate from Manor Close, Manor Way and Lewin Close WPS to Grinstead Lane WPS. Following this, flows are pumped from Grinstead Lane WPS to Old Salt WPS. The resultant flows are then pumped to East Worthing Wastewater Treatment Works (WTW) which is west of Lancing.

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,
- West Sussex County Council
- Adur District Council
- Lancing Parish Council
- Adur Floodwatch Group

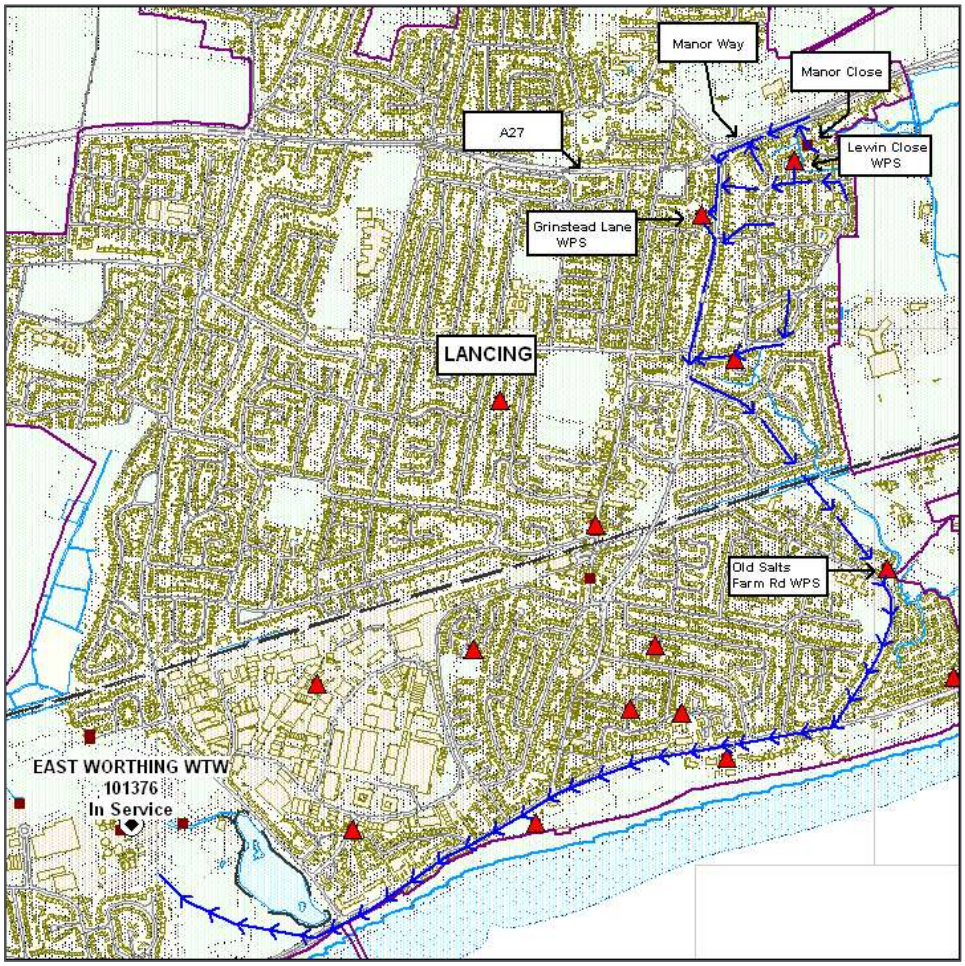

Figure 1.1 - Representation of the sewerage system for the Lancing area to East Worthing WTW

2. Groundwater Infiltration at Lancing

2.1. The significance of groundwater infiltration.

Lancing is an area 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 North Lancing area 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 2009.

Sewers are designed to accommodate normal flows, which include an allowance for groundwater. However, during particularly wet winters, the capacity of the sewers is exceeded, resulting in spillages and sewer flooding. In addition to repairs to the sewers, Southern Water has a standard process which it follows each autumn/winter to ensure sewers are flowing freely. Consequently, it is difficult to assess what the effects of groundwater infiltration would be if no action were taken. It is likely that more customers would suffer loss of sanitation and more manholes would spill if SW did not carry out the pre-winter checks, regular jetting and rehabilitation of the sewers.

It is noted that despite the groundwater levels in 2020 and 2021 being comparable to those experienced in 2013/14 (see Figure 4.1), the impact of this on the customers with respect to flooding and restricted toilet use is much less. This demonstrates the effectiveness to date of the sewer sealing work undertaken in the network.

Table 2.1 Reported incidents of sewer flooding

Year	External Flooding	Internal Flooding	Restricted Toilet Use	Total
2009_2010	4			4
2010_2011	1			1
2011_2012				0
2012_2013	22		4	26
2013_2014	5		7	12
2014_2015	2	1	2	5
2015_2016	7			7
2016_2017				0
2017_2018				0
2018_2019				0
2019_2020	4			4
2020_2021				0
Totals	**45**	**1**	**13**	**59**

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 Lancing 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 the Lancing

Groundwater infiltration into sewers has been a long-running issue for Lancing. 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 Lancing 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 in Lancing

Step.	Description	Approx Date	Status
1.	manhole lifting followed by CCTV Investigation	March 2013 and April 2014	Completed
3.	Determination of required repairs	March 2013 and Summer 2014	Completed
5a.	Dry Weather Flow Survey	August -September 2013	Completed
4.a.	Repairs – Phase 1 (387m length of sewer)	April 2013 – May 2013	Complete
4.b.	Repairs – Phase 2 (316m length of sewer and 6 manholes)	November 2014 – February 2015	Complete
5b.	Wet Weather Flow Survey	N/A	Not carried out
6.	Targeted follow-up survey	Spring 2016	Complete
7.	Further Targeted Repairs – Phase 3	Spring 2017	Complete

Step.	Description	Approx Date	Status
8.	Ongoing monitoring	Commenced December 2015	Ongoing.

Phase 1 of the major repairs was completed in May 2013. This work consisted of 387m of joint testing and sealing in the Manor Close and Manor Way area. Phase 2 of the major repairs, which was completed in February 2015. This work extended the investigation into the housing development around Hayley Road/Lisher Road, resulting in 100m of sewer lining, 6 sealed manholes and 8 patch repairs. In phase 3, SW completed a further 160m of sewer lining in Curving /Woodward Road and 1 patch repair this work was completed in Spring 2016. In total 466m of sewer was sealed from infiltration.

At Grinstead Lane WPS both pumps were replaced after the sewer flooding in 2012/13.

In addition to physical investigations on site, SW has instigated a long-term programme of monitoring flows in critical catchments, including the Lancing catchment.

Additionally, flow monitoring was carried out in dry weather conditions (7th August to 18th September 2013) to establish baseline flows. Comparison of ‘wet and ‘dry’ flow monitoring data can, on occasions, help identify areas of infiltration if it has not been found by other survey methods. In the case of Lancing, this was not necessary as infiltration was located by CCTV survey.

Generally, Southern Water's investment during the past seven years to survey and seal the sewer system in the many locations across its region which are prone to groundwater infiltration of the sewers is paying dividends. Nevertheless, there are never any guarantees as the unpredictable nature of groundwater is that sealing one part of the sewer network can increase the ground water table locally because it is no longer being drained via the sewers. The result is that it finds another way into the sewers, usually via the next highest joint which previously it may not have reached and therefore could not be identified during a sewer survey. It is a long term battle as points of ingress will continue to appear in different places, but if the ingress is significant, Southern Water’s intention is to conduct further survey work.

The locations of repair work undertaken to date can be seen in Appendix A.

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 interruptions to wastewater service and to minimise the risk of flooding or pollution..

If flows continue to increase, as groundwater levels rise, mitigation measures at certain locations will be required. Using previous experience, areas likely to be the first affected are identified. The requirement for tankering will be driven by levels in the manholes locally. Based on experience in 2013 and 2014, over-pumping could be expected to be required when the groundwater level at Ladies Mile BH exceeds 40.1m AOD. However, conditions vary from year to year and to allow time for investigation and preparation, SW is using a 'trigger level' of 37.0m in the winter planning report. Whilst SW would not expect to start physical measures such as tankers or pumps at that level, the purpose of the 'trigger level' is to trigger actions to obtain more information and prepare for an appropriate response.

Figure 4.1 shows the groundwater levels over the last seven years at Ladies Mile BH, Patcham. Following the Phase 1 repairs, over-pumping was not required in 2014 until the groundwater level measured at Ladies Mile BH reached 43.7m AOD, compared to 40.1m AOD in February 2013. This supports the view that the Phase 1 repairs have been successful in reducing infiltration. However, whilst the groundwater levels at nearby boreholes are useful indicators, it is levels in the sewers that determine the response required by Southern Water.

Figure 4.1 - Groundwater levels from 2012 to 2021

The details of where tankering and over-pumping has been necessary in the past are given in Appendix B.

Overpumping was not required in winter 2014/15, however tankering did take place briefly in January 2015. Overpumping was also required at Manor Close between Christmas 2019 and March 2020.

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.

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). In addition to this work, SW also carries out other activities to minimise the requirement for discharges to watercourses.

There is no clear rule for the exact point to change from tankering to over-pumping. However, the following factors are taken into account.

1. Use of the appropriate equipment to maintain services to customers (e.g. minimising restricted toilet use).
2. Avoidance of imminent internal or external sewer flooding to protect public health.
3. Forecast of sudden increase in groundwater levels due to severe or prolonged rainfall that would significantly increase risk of sewer flooding.
4. Minimising health and safety risks or disruption to residents due to tanker movements, particularly where tankers are required at night or where tankers restrict access to properties.
5. Whether there are isolated properties suffering restricted toilet use/ flooding or whether the disruption is more widespread.
6. Traffic congestion caused by tankers.
7. As flood conditions worsen, determining whether tankers remain a practical and economically viable solution.
8. The availability and proximity of a suitable receiving watercourse with sufficient flow.
9. Noise and exhaust fumes pollution of tankers versus the potential impact of over-pumping on the receiving watercourse.
10. Demand for tankers elsewhere. During the exceptional high rainfall experienced in 2014, in responding to sewer flooding events, the available supply of tankers was exhausted.

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 Lancing catchment are captured below.

4.4.1. Tankering

Benefits:
- See the Generic Plan.

Disadvantages
- The flow rate is low (approx. 2l/s per tanker over a 24 hour period).
- See also the Generic Plan.

4.4.2. Over-pumping

Benefits:
- Typical pump fuel consumption is 20% of the fuel that one tanker would use in a day.
- The discharge rate is significantly greater. A 75mm (3") pump will discharge typically 10 to 15 l/s; the equivalent of a fleet of 7 tankers.
- See also the Generic Plan.

Disadvantages
- See the Generic Plan.

The graph in Figure 4.2 shows the estimated carbon emission per m^3 of dilute effluent removed by tanker and by pump. Averaged data have been used for the tankers and pumps deployed in 2014.

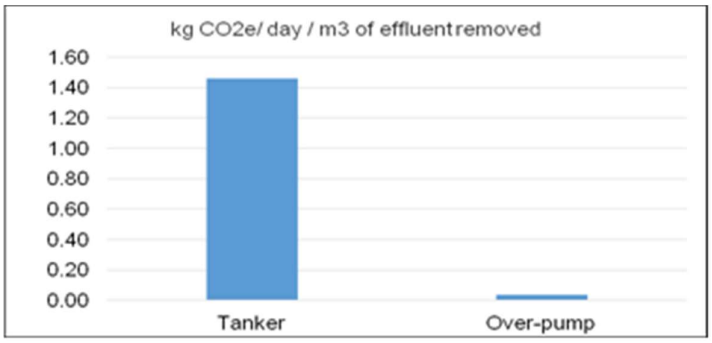

Figure 4.2 – Carbon Footprint figures for Tankers and Over-pumps per m^3 of effluent removed.

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. Discussion with representatives from these groups has been influential in helping to shape the IRP. The latest version of the IRP approved by the EA, will be published on SW's website.

From time to time, SW updates stakeholders about completed and planned work.

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 invested in surveys and repairs at Lancing. The work was carried out in three phases; that work has been completed.

5.2. Property Level Protection

Non-return valves (NRVs) have always been part of Southern Water's armoury for preventing infiltration affecting vulnerable properties. NRVs 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 in the Lancing catchment, the potential benefit of further property level protection will be investigated, if it is considered appropriate, when the planned repairs have been completed.

5.3. Pumping Stations

In order to minimise infiltration, SW continues to ensure that design discharges are maintained at pumping stations. Both pumps at Grinstead Lane WPS were replaced after the 2012/13 sewer flooding. Maintaining the pumps ensures that the design flow is reliably discharged.

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5.4. Monitoring

The Lancing catchment is a location, 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.

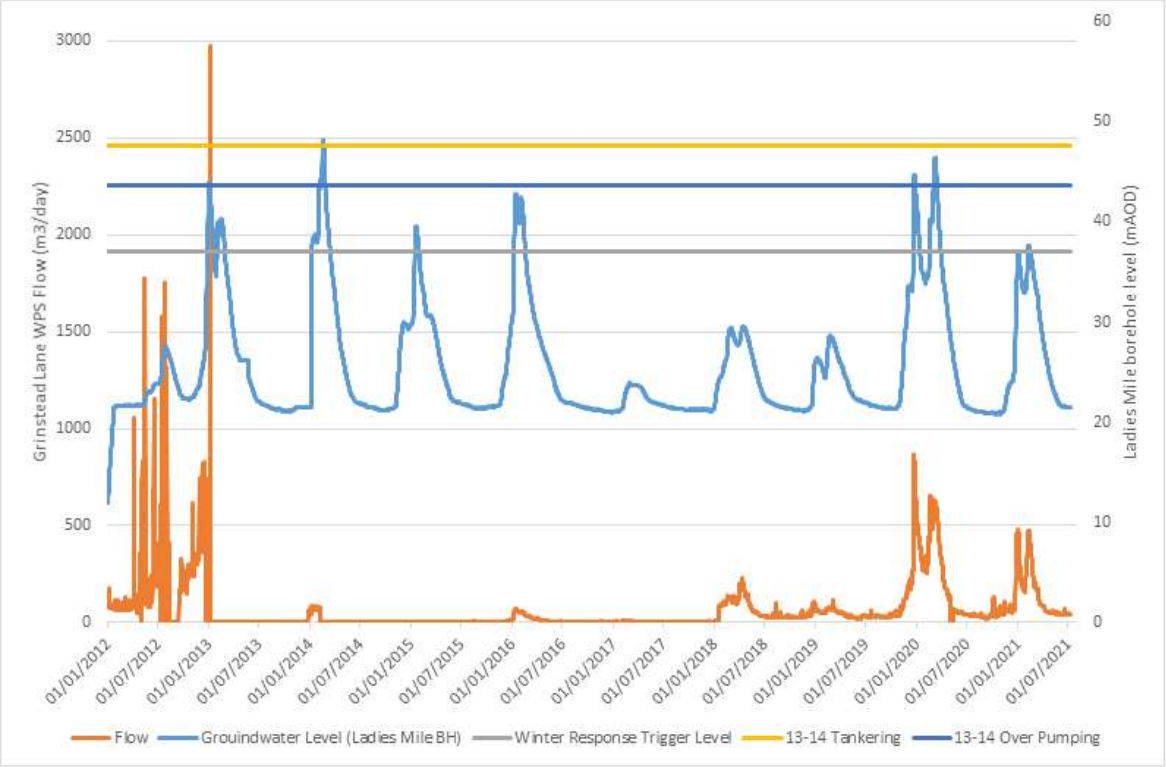

Figure 5.1 – Forecasting of Trigger Dates

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.

Figure 5.2 quantitatively illustrates how flow varies with groundwater levels. It is reasonable that as groundwater levels increase, the rate of infiltration increases. Data points prior to the major repairs are plotted in blue: (Dec 2009 – Aug 2013). The data points for the period after major repairs (Jan 2014 – Jun 2021) are plotted in orange. Linear regression lines are also included for each set of data. These give an indication of the difference between average conditions for 'before' and 'after' repairs.

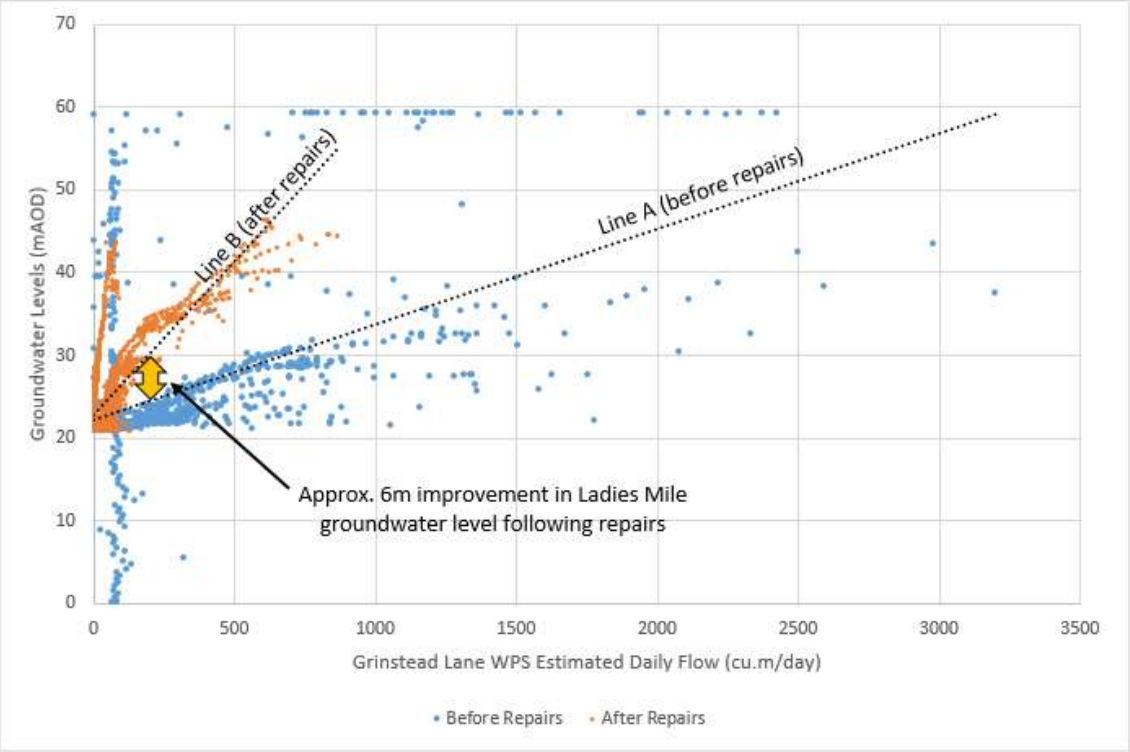

Figure 5.2 – Long Term Monitoring (Dec 2009 to Feb 2021)

The difference in groundwater level between the lines is approximately 6m. In other words, for a given groundwater level, the corresponding flow is lower after the repairs. This confirms that the repair work has been effective.

The analysis outlined above is supported by historic tankering and over-pumping dates. During the winter of 2013/14, over-pumping only had to commence at a groundwater level of 40 mAOD. In the winter of 2014/15 over-pumping was not required, and tankering only had to start when the groundwater level reached 43 mAOD.

6. Action Plans

A significant amount has been achieved in the Lancing catchment in the last 8 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 1 above and the report in Appendix 1.	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.	July/ August 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.	May/ June 2014 – Survey complete Analysis - complete	Wet Weather and Dry Weather flow monitoring data used in hydraulic model completed in December 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.	Lancing Summer 2014 - Complete	Identify major sources of infiltration to determine scope of rehabilitation work.

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	Summer/Autumn 2014 – Complete Autumn 2018 - Complete Autumn 2019 - Complete	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.	2015 – 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 20121.
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
1.10	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.

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, WSCC, Adur 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.
1.15	Further survey and sealing work proposed for the public sewerage system	SW to gain approval to undertake necessary work	Post 2022	Further work dependent on catchment performance at time of high groundwater

Ref.	Item	Actions	Timescale and Status	Outcomes
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	If required
1.17	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	If required
1.18	Survey result review	Review results of surveys undertaken in 1.16 to determine sewer sealing work.	Post 2022	If required
1.19	Undertake required sewer sealing	Seal sewers and manholes by most appropriate technique	Post 2022	If required
1.20	Review effectiveness of any sealing work	Analyse monitoring data and groundwater data to determine benefit of investment	Post 2022	If required
1.21	Review further options for property protection and alternative tanker points	The potential benefit of further property level protection will be investigated, if it is considered appropriate, when the planned repairs have been completed.	Post 2022	If required

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	WSCC (for highways) and Adur District Council (for domestic connections) to investigate and pursue as required.	Reduced flow of surface water (if connections are found).
2.2b	Investigate groundwater infiltration on domestic drains	Groundwater Flooding Strategy	WSCC with input by other agencies as appropriate	Reduced flow of surface water (if connections are found).
2.3	Consider effects of proposed new	Respond to planning applications as required	District Council, Ongoing.	Developments in areas which would be detrimental to sewer flooding, to have conditions

Ref.	Item	Actions	Owner, Timescale and Status	Outcomes
	developments on infiltration.			recommended by SW and applied, as appropriate, by the City and District 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. District 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	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

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). Note: due to the success of the rehabilitation work, the trigger level has been raised from 40m to 43m at Grinstead Lane WPS.
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.
4.5	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 District 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