

Infiltration Reduction Plan Winchelsea Beach

September 2021
Version 6.1



from
**Southern
Water** 

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Document Control

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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 Winchelsea Beach WTW in the Winchelsea 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 Winchelsea Wastewater Treatment Works (WTW) in Sussex.

Figure 1.1 provides a representation of the sewerage system that drains to Winchelsea WTW. Flows are pumped northwards from Victoria Way Wastewater Pumping Station (WPS), where it joins other flows gravitating towards Morlais Ridge WPS. The resultant flows are pumped northwards from Morlais Ridge WPS to Winchelsea Beach WTW. The location particularly affected by sewer flooding is between Victoria Way WPS and Morlais Ridge WPS.

The sewerage system in Winchelsea Beach is designed as a 'foul only' system. Over time surface water connections, or misconnections, have been added to the sewerage system which leads to overloading of the system during prolonged wet weather.

In developing this plan Southern Water has been liaising with key stakeholders and particularly in flooding events has been working closely with these bodies to minimise the impact on customers

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
- Icklesham Parish Council
- Rother District Council
- East Sussex County Council
- Romney Marshes Area Internal Drainage Board
- Winchelsea Sands Flood Group
- Rye Bay and Winchelsea Sands Caravan Parks

In developing this plan Southern Water has been liaising with key stakeholders and particularly in flooding events has been working closely with these bodies to minimise the impact on customers

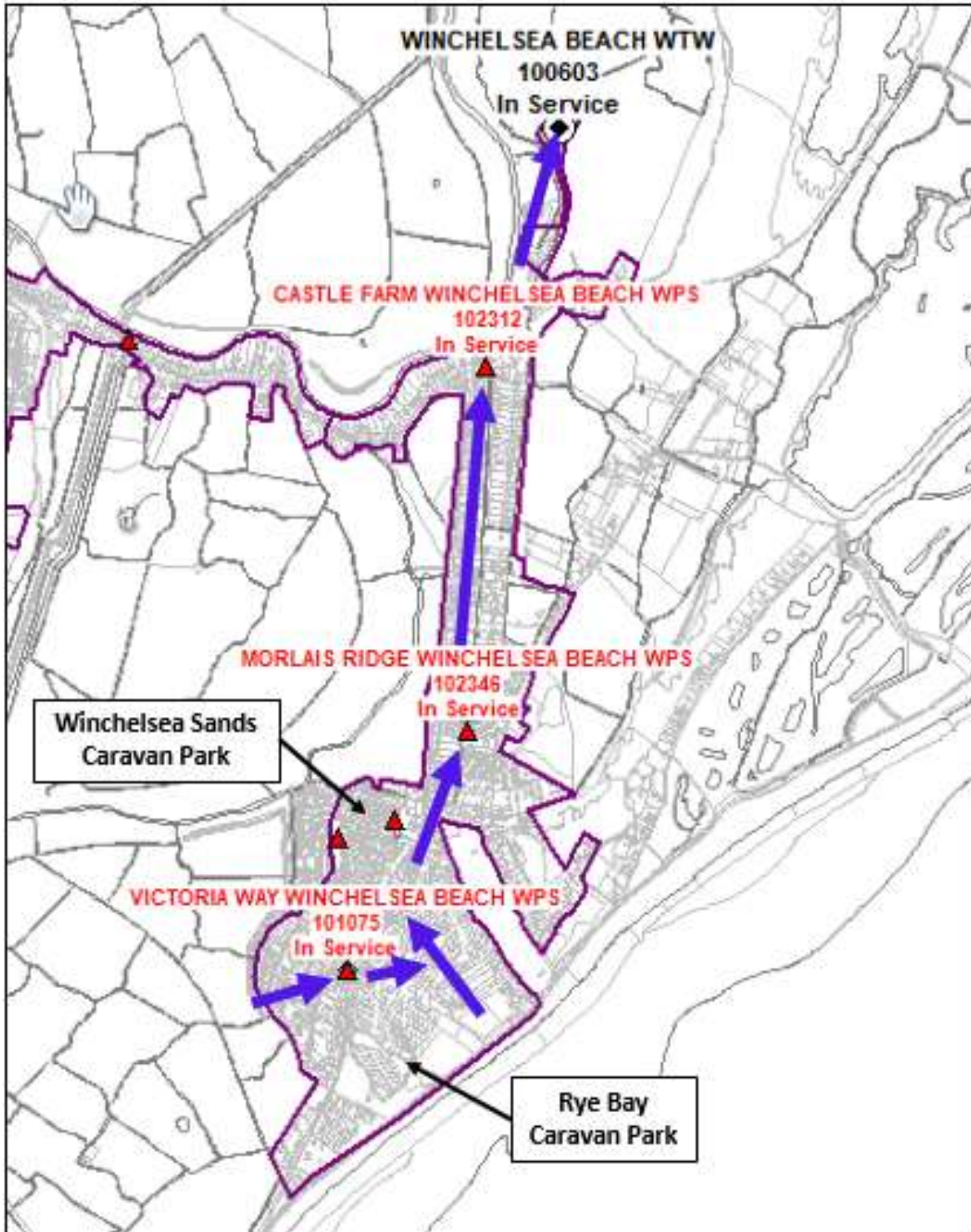


Figure 1.1 - Representation of the sewerage system for Winchelsea Beach WTW

2. Groundwater Infiltration at Winchelsea Beach

2.1. The significance of groundwater infiltration

Winchelsea Beach is an area within 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 seven years SW has invested in carrying out major improvements to the integrity of the sewers and manholes in the vicinity Winchelsea Beach in order to minimise the occasions on which over-pumping is required.

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

Table 2.1 below shows reported incidents of sewer flooding since April 2011.

A hydraulic model of the Winchelsea Beach catchment is available, that can be used to understand the performance of the system and determine options to address risks. 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 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 slightly lower. This may demonstrate the effectiveness to date of the sewer sealing work undertaken in the network.

Table 2.1 - Reported Flooding Incidents in Winchelsea Beach

Year	External Flooding	Internal Flooding	Restricted Toilet Use	Total
2011_2012	1			1
2012_2013	4			4
2013_2014	15			15
2014_2015	8		1	9
2015_2016	6			6
2016_2017	4			4
2018_2019	1			1
2019_2020	12			12
2020_2021	9			9
Total	60	0	1	61

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 Winchelsea Beach 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 Winchelsea Beach

Groundwater infiltration into sewers has been a long-running issue for the Winchelsea Beach. 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 Winchelsea Beach 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 Winchelsea Beach

Step.	Description	Approx Date	Status
1.	Surveys were carried out on 1.2 km of sewer which identified a number of sources of infiltration in manholes and sewers in Dogs Hill Road and Morlais Place.	Summer 2014	Completed
2.	Repairs carried out across in manholes and sewers in Dogs Hill Road and Morlais Place.	March 2015	Completed
3.	Remedial pipe repairs at caravan parks.	Summer 2015	Completed
4.	Approximately 750m of sewer leading to the Victoria Way WPS was surveyed and about 360m of sewer upstream of Morlais Ridge WPS was surveyed	Jan 2018	Completed
5	Further sewer surveys (including investigations at caravan parks) and subsequent repairs	Summer 2021 – Spring 2022	Planned

SW has completed rehabilitation work at the locations shown on the plans in Appendix A (on sewers where infiltration was observed during CCTV and Electroscan surveys).

It is apparent from surveys undertaken over the years that there are at least 2 mechanisms at play here: sub-surface infiltration of groundwater into the system mainly through leaking joints and inundation of rainfall into the system from surface flooding entering the system through drainage gulleys. The root cause of the inundation issue may be the change to land drainage over the years as the area has been developed.

After having completed the sewer repairs identified through CCTV and Electroscan, SW has installed permanent sewer level monitors, pump loggers and a rain gauge within Winchelsea Beach sewer network. The data captured from these monitors will help to identify areas within the catchment where surface water and ground water is entering the sewer. This will help to focus attention in areas of the catchment which are contributing excessive flows into the sewer network and support follow on remediation work for Southern Water to undertake and allow data led discussions with landowners.

The critical pumping stations in Winchelsea Beach have received a health check prior to the winter season in previous years and these pumping stations will continue to receive similar health checks prior to the winter season. These health checks include inspections and maintenance to maintain optimum performance of the pumps to ensure the WPS achieves its design pass forward flow.

Historically there has been significant surface water from the two of the largest Caravan Parks entering the public sewers via private sewer networks.

In summer 2015 both these parks have undertaken some remedial works. One of the caravan parks has repaired known pipe defects where infiltration was suspected to get into their private sewers. The other one has capped off known mis-connections to the sewers, and is undertaking ditch clearance works to allow the land drainage system within their site to function more effectively. There have been further manhole upgrade works and private land drainage improvement works done every year since 2015. Additional investigation works have been undertaken in summer 2021 and the outcomes will be included in the next update of the IRP after the 2021/22 groundwater season.

SW will continue to work with residents and local caravan parks to help reduce the amount of surface water entering our sewers via private sewer networks to identify pragmatic solutions. Further local engagement and monitors will be installed, to help develop a clearer understanding of the volume and location of surface water entering the Southern Water's network via private sewers.

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.

Tankering is triggered by the wetwell level at Morlais Ridge WPS and the level at which SW trigger the Emergency Action Plan (EAP) is shown in Figure 4.1. It has been observed that external flooding occurs in customer properties when the wetwell level reaches about 70% and the EAP is triggered once the level in the wetwell exceeds 70%. SW undertook a flow measurement survey at Winchelsea Beach during winter 2015. The survey provided better information about areas of high non-sewage flows. Further repairs were undertaken in 2015/16. SW completed another flow survey during winter 2016 to monitor the flow in the sewers in Winchelsea Beach and also understand the benefits of improvement works undertaken.

SW has now included Winchelsea Beach in the Winter Planning group. As part of this process the wetwell levels and pump run time at Morlais Ridge WPS are regularly reviewed during periods of prolonged high groundwater.

Historical data showed that that deployment of tankers coincides with high wetwell level at Morlais Ridge WPS, which is a result of heavy rainfall. In these situations, customers in Winchelsea Beach start experiencing restricted toilet use or flooding issues.

To provide effective drainage the initial response has traditionally been to provide tankers and to deploy these at strategic locations to manage water levels. However, this is not always an appropriate action, over-pumping is often the more effective response.

Consequently, SW propose to deploy tankers (ideally a maximum of 2 to minimise traffic congestion) to respond to a combination of high wetwell level and customer complaints. The situation shall be monitored and should customer issues persist the need for overpumping will be assessed and discussed with the EA at the time prior to overpumping being deployed. Section 4.4 provides a comparison of the carbon footprint of using a tanker as opposed to overpumping.

Overpumping at Winchelsea Beach has been used during winters of 2013/14, 2015/16, 2018/19 and 2019/20 to assist in mitigating flooding issues in Winchelsea Beach which was caused by prolonged wet weather. Tankering has also been used across each winter between 2014/15 and 2019/20.

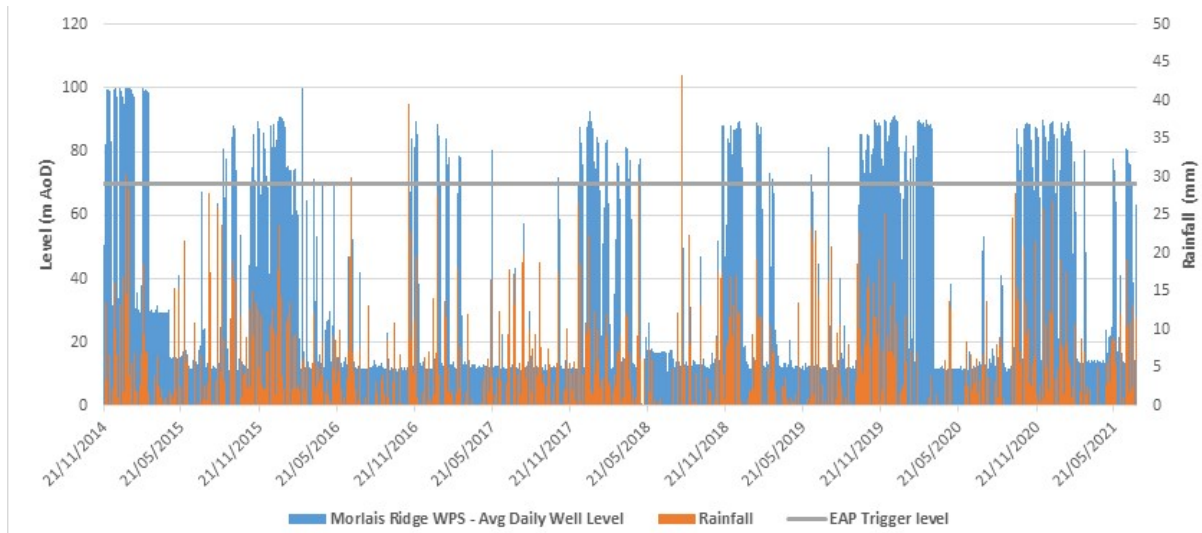


Figure 4.1 – Pumping station level trends from 2012 to 2021

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).

SW also carry 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.

In addition to the measures described above to remove solid matter, SW invested in ten portable biological treatment units in January 2014 for use at flooded areas throughout its area. However units were not used in Winchelsea Beach.

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 Winchelsea Beach catchment are captured below.

4.4.1. Tankering

Benefits:

- See Generic Plan.

Disadvantages

- See Generic Plan.
- The flow rate is low (approx. 2l/s per tanker over a 24 hour period*)
- The roads at Winchelsea Beach will not have been designed to take the load of repeated visits by tankers – resulting in damage to the road,

4.4.2. Over-pumping

Benefits:

- See Generic Plan.
- typical pump fuel consumption is 85% of the fuel that one tanker would use in a day.
- the discharge rate is significantly greater. A 4” pump will discharge typically 30 l/s; the equivalent of a fleet of 15 tankers.

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. This assumes a 4000 gallon tanker discharging at Winchelsea Beach WTW and 4 inch (100mm) diesel pump. The data indicates that the use of tankers emit about 20 times more carbon to the environment than a diesel pump. This figure could be larger if effluent is discharged to other sites that are further away, such as the Rye WTW.

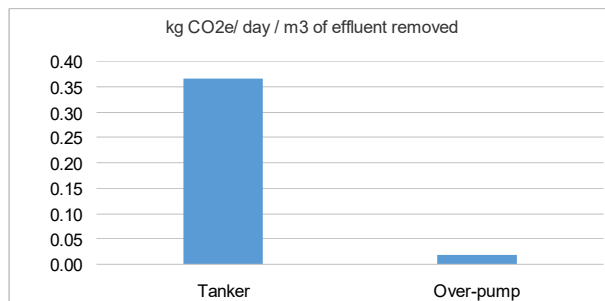


Figure 4.2 – Carbon Footprint figures for Tankers and Over-pumps per m³ of effluent removed.

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 stakeholders, which have been influential in helping to shape the IRP. During the flooding of 2013/14 SW had representatives on site who visited affected customers to help them.

Despite the work being undertaken, if over-pumping is required, the locations are shown 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 meetings with 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 extensive investigations and repairs in Winchelsea Beach. SW has completed rehabilitation work at the locations shown on the plans in Appendix A on sewers where infiltration was observed during CCTV and Electro Scan surveys. A detailed survey of the parts of the system which have not previously been surveyed, including some private lateral sewers is being undertaken in 2021, the findings and arising actions taken will be reported in the next update of the IRP in autumn 2022 following the next groundwater season. The work to be undertaken in 2021/22 is shown in Appendix C.

5.2. Local Flow Control

Overpumping at Winchelsea Beach has been used during winters of 2013/14, 2015/16, 2018/19 and 2019/20 to assist in mitigating flooding issues in Winchelsea Beach which was caused by prolonged wet weather. Tankering has also been used across each winter between 2014/15 and 2019/20.

5.3. Pumping Stations

The overpump used in 2013/14 was a 4" pump. A 4" pump typically has an output of around 30l/s. The WPS pump is designed to accommodate dry weather flows, plus 40% infiltration allowance, plus a margin for daily variation and some spare capacity. However when the sewers are surcharged by surface water which is entering the sewers either directly (by connection or inundation) or indirectly (by infiltration), the flows can be an order of magnitude greater than the normal flows. So the over-pump may need to discharge considerably more than the WPS pump, in order to restore sewerage services to customers. The 4" pump was reported to have rapidly reduced the surcharging of the sewers.

Typical discharge rates for over pumping are between 10 l/s and 50 l/s depending on the size of pump and the pipework configuration. Power is supplied either by local access point or Silent Pack diesel generators on site. Maintenance of the over pumping units is carried out regularly which includes checking the flow, cleaning/replacement of filtration sacks and cleaning the tanks.

5.4. Monitoring

The Winchelsea Beach catchment is one of a number of locations, where the impact of groundwater levels on sewer operating level 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.

Rainfall has a major influence on groundwater level in Winchelsea Beach which makes ground water level unpredictable. However, based on a few years' data, it has been observed that there is a good correlation between wet well level at Morlais Ridge WPS and the amount of rainfall. The graph in Figure 5.1 shows the correlation between rainfall data and Morlais Ridge WPS wetwell level. It also indicates that tankering and/or over-pumping have been needed when the EAP level is exceeded.

Morlais Ridge WPS serves the worse affected sub-catchment in Winchelsea Beach. As it can be observed from the graphs, the wetwell level at this pumping station reacts very quickly to rainfall event, i.e. there is a quick increase in the wetwell level – it reaches 100% during periods of heavy rainfall. As noted in the Section 1, the system was designed as 'foul-only', hence, it is quickly overloaded when it receives increased rainfall related flows such as surface water or rainfall induced infiltration.

It is quite normal for wet wells to fill, but if incoming flows continue to increase, the capacity of the pumps will be exceeded. Once this occurs the upstream sewers start to surcharge. SW has investigated whether the output of the pumps can be increased slightly. However, the pipes into which they pump (rising mains) and treatment works are all part of an integrated system. Consequently it is not always possible to modify any one in isolation. Once the capacity of the pumps is exceeded, customers may start to experience flooding or restricted toilet use issues. Consequently SW has taken steps to reduce infiltration; also with the input of other parties, SW is expecting surface water flows in the sewers to be reduced. Recent monitoring of the performance of the catchment shows the duration during which the wetwell level at Morlais Ridge WPS stays high following rainfall events, has considerably reduced.

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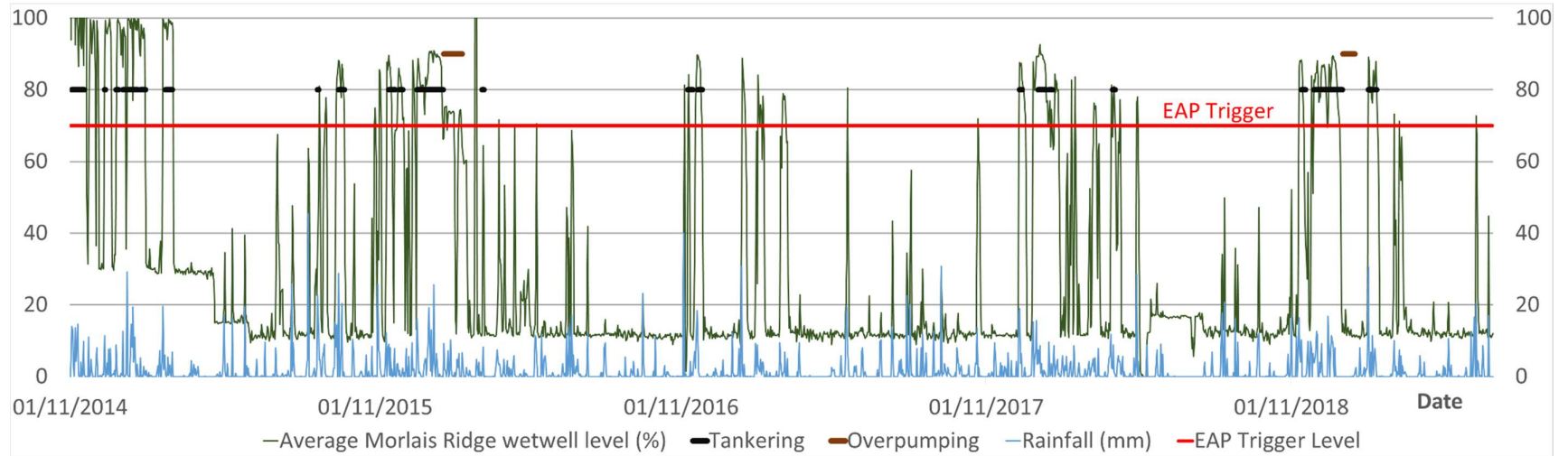


Figure 5.1 – Forecasting of Trigger Dates

6. ACTION PLANS

A significant amount has been achieved in the Winchelsea Beach catchment in the last 7 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.	Summer 2013, Complete	The steps are being followed to deliver results.
1.2	CCTV etc survey of sewers	Identify Strategic Manholes; survey MHs to identify clear flow and infiltration. Carry out CCTV survey where clear flow was identified.	Spring 2014, Complete	Successful survey will identify major sources of infiltration to determine scope of rehabilitation work.
1.3	Carry out sewer rehabilitation work	Use various techniques to seal infiltration points in manholes and sewers.	2014/15. Complete	Rehabilitation will restore the structural integrity of the sewers.
1.4	Further surveys (CCTV or alternative techniques), if required,	Further surveys and investigation if required.	Spring 2015. Complete	Determine scope and carry out further surveys if identified as required from the initial survey results.
1.5	Sewer rehabilitation work, if required, in areas where surveys carried out.	Use various techniques to seal infiltration points in manholes and sewers	Winter 2015. Complete	Rehabilitation will restore the structural integrity of the sewers.
1.6	Consider alternative solutions to enhance customer service	Investigate following completion of planned rehabilitation works completed as per 1.5 above.	SW, 2016. Complete	Cost-effective. Enhanced customer service.
1.7	Maintain IRP as a live document	Review IRP as appropriate to describe work carried out and/or developments	Annual review of the IRP	The EA requirement is for the IRP to be reviewed annually.

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Ref.	Item	Actions	Timescale and Status	Outcomes
1.8	Quarterly progress reports	A progress report on infiltration reduction work related to this catchment will be submitted to the Environment Agency	Quarterly	Keep the Environment Agency informed of progress on a regular basis
1.9a	Strategy for inflows via private drains	Southern Water to propose a strategy for dealing with infiltration via private drains*	SW , Complete	Southern Water's 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.
1.9b	Flow Survey	Undertake a flow survey of the catchment to understand the inflow from different areas of the catchment.	SW, Winter 2015. Complete	To identify areas that are contributing excessive flows into the sewers.
1.9c	Consider alternative solutions that involve some risk	Investigate unconventional options such as vacuum sewers or consider conventional combined sewer overflows	Complete	No alternatives identified
1.10	Electro Scan Survey	Undertake an Electroscan Survey of the incoming main sewer to the south of Morlais Ridge WPS.	SW, Winter 2016. Complete	Survey identified sources of infiltration in this part of the network.
1.11	Sewer rehabilitation work in areas where Electro Scan survey carried out.	Use various techniques to seal infiltration points in manholes and sewers	Year 3 Amp 6. Complete	Rehabilitation will restore the structural integrity of the sewers.
1.12	Flow Survey	Undertake another flow survey of the catchment to understand the inflow from different areas of the catchment.	SW, Winter 2016. Complete	To understand the benefits following works undertaken in the catchment and identify areas that are still contributing excessive flows into the sewers.

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Ref.	Item	Actions	Timescale and Status	Outcomes
1.13	ElectroScan Survey	Undertake Electro Scan Survey of sewer leading to Victoria Way WPS	SW, Winter 2017. Complete	Survey identified sources of infiltration in this part of the network.
1.14	Sewer rehabilitation work in areas where Electro Scan survey carried out.	Use various techniques to seal infiltration points in manholes and sewers	Year 4 Amp 6. Complete	Rehabilitation will restore the structural integrity of the sewers.
1.15	Manhole, sewer and lateral CCTV surveys	Undertake surveys of manholes, sewers and laterals to identify infiltration. Appendix C	Summer/ Autumn 2021	To be reported and actioned on completion
1.16	Caravan park surveys	As above	Summer/ Autumn 2021	To be reported and actioned on completion
1.17	Sewer Rehabilitation	Use various techniques to seal infiltration points in manholes and sewers	TBC	Dependant on items 1.15 and 1.16

Table 6.2. Multi-Agency Activities to Reduce Groundwater Infiltration

Ref.	Item	Actions	Owner, Timescale and Status	Outcomes
2.1	Investigate highway and private road '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	East Sussex County Council, Rother District Council and Winchelsea Sands Holiday Park owner with support from SW, 2015. Complete.	Reduced flow of surface water (if connections are found).
2.2	Groundwater investigation on customers' drains	Where non-sewage flow is identified from customers' properties, investigate to identify source of flow into SW sewers	SW, with assistance from Rother District Council where required, Ongoing.	Reduced flow of surface water (if connections are found).
2.3	Consider effects of proposed new developments on infiltration.	District Council to continue to consult with SW on development applications.	Rother District Council, Ongoing	Rother Distinct Council consults on most applications including extensions, but this is not obligatory; SW is not a statutory consultee. SW would like to be consulted on everything that will have a discharge to a public sewerage system. Developments in areas which would be detrimental to sewer flooding, to have conditions recommended by SW and applied, as appropriate, by the District Councils.
		SW to determine threshold above which they require to be consulted.	SW	
		Sewerage materials for new developments	SW, Rother District Council	
2.4	Long-term Monitoring	SW will monitor sewer flow to identify significant increases in inflows.	Ongoing	Early identification of areas where infiltration has increased

*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

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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 other non-sewage flows into sewerage system	Attend public meetings with other agencies/ organisations as appropriate to communicate to customers and stakeholder’s progress and planned activities.	SW, ESCC, as required	Inform local population of progress and planned activities and receive feedback.
3.2	Liaise with other agencies as appropriate.	Discuss and agree actions to reduce requirements for tankering and emergency discharges to watercourses.	SW, ESCC, RDC, RMIDB, EA, IPC.	Improved understanding of issues 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 sewer levels/flows.	SW, EA, 2015, Complete	Develop trigger levels by comparing historic customer complaints and tankering with BH levels (or other reference). Note trigger levels should vary as a consequence of rehabilitation.
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, 2015, Complete.	Potentially less disruption to residents when tankering / pumping is essential.
4.3	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.
4.4	Integrated Approach to reduce sewer flooding	Develop a multi-agency approach to the management of sewer flooding within the catchment	East Sussex County Council/Rother District Council, with inputs from SW, EA and Parish Councils	Actions for participating authorities that in unison, will reduce the extent of flooding and the impact of flooding.

Table 6.5. Activities required if Groundwater Infiltration cannot be adequately reduced at reasonable cost (BTKNEEC)/ interim arrangements.

Ref.	Item	Actions	Owner, Timescale and Status	Outcomes
5.1	Over-pumping Sites: improve effluent quality	Investigate potential for improved screening and basic treatment at points of discharge into watercourse.	SW, 2014, Done	Improved arrangements for discharges when required.
5.2	Over-pumping Sites: minimise flow	Add level control to pumps to reduce durations for pumping	SW, 2014, Done	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.
5.3	Standards for emergency discharges	SW to discuss with EA about best practice set up for over-pumping arrangements.	SW, 2014, Done	Agree with EA acceptable standards for discharges and acceptable flow rates.
5.4	Flow, location, screening arrangements for emergency discharges	Determine potential flow rates and screening arrangements and most appropriate locations,	SW, Done	Agree with EA, County Council and local Parish Councils acceptable arrangements for future emergency discharges.
5.5	Action Plans	Develop SW action plans documenting set up of pumps, tankers, etc. for emergency situations.	SW, 2014 , Done	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.

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Ref.	Item	Actions	Owner, Timescale and Status	Outcomes
5.6	Implementation of Action Plan	SW to implement action plan when trigger point is reached, i.e. high wetwell and customer reports flooding during rainfall event.	SW, as required	Tankers to be deployed and situation monitored. Consult EA and other stakeholders if situation doesn't improve.

Appendix

- A Survey Findings and Rehabilitation Scope
- B Emergency Discharge Sites
- C Planned surveys 2021