Hambledon

Infiltration Reduction Plan

June 2016
### Document Title: Hambledon Infiltration Reduction Plan

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<td>Richard Andrews</td>
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BACKGROUND

The Environment Agency’s (EA) Regulatory Position Statement (RPS) requires Water and Sewerage Companies (WaSC) which are aware of sewerage systems in their area which are vulnerable to infiltration, to submit Infiltration Reduction Plans (IRP) to the EA for approval. This document is produced in response to the RPS.

The IRP will be updated by Southern Water (SW) annually to show the latest information regarding the progress of work in the area to reduce infiltration. Therefore there will not be a ‘final issue’ of the plan; it is a working document, which will be updated as required.

During the current infiltration reduction programme, commenced in 2013, Southern Water has been working to identify the sources of groundwater infiltration into sewers in Hambledon and repair them. Hambledon is located in the catchment of Budds Farm Wastewater Treatment Works (WTW) in Hampshire. The extent of the catchment is shown in the map on the following page. Flow from Hambledon gravitates in a southerly direction to Bury Lodge Wastewater Pumping Station (WPS) from where it is pumped southwards towards Denmead. The flow then gravitates through Denmead to Hambledon Road WPS from where it is pumped to Waterlooville and onwards to Budds Farm WTW in Havant.

Southern Water has been communicating with other agencies and in particular during the winter flooding, SW has been working closely with these bodies to minimise the inconvenience to residents.

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

Environment Agency,
Hampshire County Council,
Winchester City Council,
Hambledon Parish Council,
Hambledon Flood Action Group
Representation of the sewerage system for the Budds Farm WTW catchment
1 REPORT STRUCTURE AND SUMMARY

Southern Water has embarked on a programme to reduce the effects on customers and the environment, of groundwater infiltration. Progress, and current and future activities, are recorded in Infiltration Reduction Plans (IRPs) that SW is producing. This IRP covers the villages of Hambledon and Denmead.

This IRP is arranged in five further sections: Situation, Investigation, Over-pumping, Potential Actions and Conclusion. These headings have been used in order to cover, in a logical structure, the information required by the Regulatory Position Statement (RPS) published by the Environment Agency (EA).

Section 2 - Situation
- acknowledgement that for Hambledon village, groundwater infiltration is significant enough to have necessitated the use of over-pumping to protect customers against sewer flooding (RPS Section 2.2)
- explanation of what would happen if SW were not to actively prevent groundwater getting into the sewers or use mitigation measures to protect customers when flooding does occur. Provide details and locations of infiltration and other likely impacts. (RPS Section 2.3 i)

Section 3 - Investigation and Repairs
- outline our plans for investigation of the problems caused by groundwater getting into the sewers, (RPS Section 2.3 ii)

Section 4 - Over-pumping
- details, circumstances and locations where over-pumping is expected to be required (RPS Section 2.3 iii)
- include information about the over-pumping including typical flow rates and measures to minimise the effect on the watercourse of the discharge. (RPS Section 2.3 iv)
- Explain what SW is doing to avoid the need for over-pumping (RPS Section 2.4 a.)
- Explain the steps SW takes to minimise the amount pumped (RPS Section 2.4 b)
- Describe the physical measures used to prevent remove solid matter (RPS Section 2.4c)
- In the event of needing to over-pump, explain our procedure for notifying the EA and for communicating with people who might be affected by the pumping. (RPS Section 2.4 d)
- Describe how SW monitors the water quality of the downstream watercourse. (RPS Section 2.4 e)

Section 5 – Future Actions
- What SW is doing to minimise the requirement for discharges. This will include planned work to reduce the amount of groundwater getting into
sewers and also work that could be considered in future if the work carried out and the planned work are not adequate. (RPS Section 2.3 v)

Section 5 - Conclusion

- A commitment to review and update the IRP annually (RPS Section 2.3 vi)

2 SITUATION

2.1 The significance of Groundwater Infiltration in the Hambledon Valley

The Hambledon Valley is one of a number of areas in Southern Water’s region, when during wet winters, customers have been inconvenienced by the effects of groundwater infiltration. Excess groundwater which gets into the sewers prevents sewage from customers’ properties being conveyed satisfactorily to the treatment works. During these conditions some customers suffer restriction in use of their facilities and/or sewer flooding. Southern Water strives to maintain services for customers by a programme of investigation, repair, maintenance and mitigation measures that include use of tankers and over-pumping. Such measures are not popular, so during the last three years SW has invested approximately £400k carrying out improvements to the integrity of the sewers and manholes in the Hambledon Valley, to minimise the occasions on which over-pump into the watercourse is required.

In common with many areas that suffer sewer flooding, the valley drains a large area. Approximately 50 to 80 km² of gently sloping farmland drains to the Hambledon Valley. This leads to significant surface water flows as well as groundwater flows.

During Jan/Feb 2014, not only were sewer flows swelled by groundwater infiltration, but also surface water flow along the main roads through the village inundated the sewers. The photograph below shows sandbags that were strategically placed around manhole covers to help prevent surface water entering the sewers. Also several manhole covers were sealed to prevent surface water entering the sewers.
2.2 What would happen if Southern Water did not take Action?

Sewers are designed to accommodate normal flows, which includes an allowance for groundwater infiltration. 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 developed a standard ‘winter check’ process 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.

Groundwater levels in the area change very rapidly in response to heavy rain (20metres rise in 8 days in Feb 2014). The first indication of groundwater potentially causing problems for residents of Hambledon is cellar flooding. As water levels in cellar rise, residents have to pump out from their cellars into the street. When the surface water flow reaching the valley from the large catchment, surcharges the drain at the north end of East Street, the surplus flow discharges into the road and flows through the village. During these conditions, not only does the sewer suffer from infiltration, but also from inundation. Water enters sewers through manhole covers and gratings – despite efforts to seal them.

In 2014, numerous properties in East Street and West Street suffered groundwater flooding of cellars and only averted flooding of the ground floor due to pumping out their cellars. [The Hambledon Flood Action Group Further Update on Wednesday 19th February (Day 47) noted with the possibility of power cuts and the impact on 1000 or so electric pumps (and thus the certainty of flooded properties should this happen), … this gives an indication of the number of properties that would have suffered groundwater flooding had they not taken action.]

Similarly, if Southern Water had not taken deployed the number of pumps that it did, many of those properties are likely to have also suffered sewer flooding. The over-
pumping was set up on a ‘daisy chain’ arrangement to ensure that pumps drew down levels in each length of sewer to protect properties locally, as well as forwarding the dilute effluent from further upstream.

In some catchments, SW has hydraulic models of the sewers which can be used to predict the locations where the sewers are expected to flood during certain storm conditions. SW does not have a model of the Hambledon catchment, but even if it did, it is unlikely it could accurately predict the extent of flooding. This is because of the overwhelming effect of surface water on the sewerage system. However, from experience, SW staff know the locations in the village which are likely to be the first affected as groundwater levels rise.

The graph in Figure 1 below shows incidents of sewer flooding reported to SW’s call centre each year since the millennium. Average winter rainfall since 2005/6 has also been included on the graph. The graph under-reports the number of properties that experienced flooding. Residents refrained from reporting flooding to SW because the causes were self-evident (a ‘river’ in the street), and because of the significant presence by SW in the village to mitigate the effects of flooding. In 2014, six properties experienced internal sewer flooding and many more would have experienced external flooding. The SW staff working in Hambledon Village provided assistance to those customers, and others affected by the flooding.

**Figure 1 – Reported Historic Flooding in the Hambledon Valley**

The graph shows all incidents of flooding reported to SW from 2000 to date. In other words, no flooding was reported in the last 15 years apart for one internal and one external in 2013/14. The rainfall figures - which are only available from 2005/6 - are average winter rainfall figures.

**Definitions of Categories of Flooding**

External flooding [EXTC] at a property is defined as flooding to external areas within the curtilage of the property, due to sewers becoming surcharged. The flooding will normally be from a surcharged manhole, or gully. In extreme conditions, external
Flooding can be contaminated surface water entering the grounds of the property. There are two other categories of external flooding: Highway flooding refers to flooding on roads or footpaths. ‘Other’ external flooding refers to non-residential buildings and public open spaces.

Restricted Toilet Use [RTUX] may be experienced by customers as the sewers become surcharged. Toilet facilities still function, but effluent will be slow to drain away and sometimes facilities can only be used for limited periods – for instance after a tanker has removed dilute effluent from the local sewers.

Internal Flooding [INTL] occurs when sewers either back-up to such an extent that dilute effluent floods inside dwellings from low connections to the drains. (for example through WCs or shower drains), or in extreme conditions when contaminated surface water enters the building.

There is some correlation between sewer levels and high groundwater levels; however, the main change in sewer flows is when inundation occurs (i.e. when water enters the sewers through manhole covers and historic cross connections between road gullies and the foul sewer). In 2013, SW acknowledged that a more comprehensive approach was required and embarked on the survey and rehabilitation steps of the infiltration reduction process explained in Section 3 below.

3 INVESTIGATION AND REPAIRS

3.1 Comprehensive Approach

In all locations, where infiltration reduction is being tackled, SW has found that a comprehensive and collaborative approach yields the best value results. SW has made significant investments in surveying and repairs at Hambledon, and is pleased that the Hambledon Flood Alleviation Scheme is progressing. It is expected to significantly reduce inundation of sewers in the village.

SW has found from experience in other locations where sewer rehabilitation has been successful, that repairs need to be reasonably comprehensive to reap benefits. It is acknowledged that the surveys at Hambledon have had limited success in finding infiltration. However, the locations where significant infiltration has been found, have been repaired. Consequently the repair of sewers and manholes is included in this section.

3.2 Outline Plans to Investigate Sources of Infiltration

SW has been carrying out surveys and repairs in Hambledon village. The repairs are part of a sewer rehabilitation process developed by SW to minimise the requirement for discharges to watercourses. Repairs were carried out in 2013, 2014 and 2015. (Refer Appendices A and B for location of repairs).
Southern Water’s approach to minimise infiltration into sewers is shown below.

**SW Process to Reduce Infiltration**

1. Survey
2. Immediate Repairs
3. Review of Survey findings & scoping repairs
4. Repairs
5. Flow Monitoring
6. Targeted Follow-up Survey
7. Repairs as required
8. Long-term Monitoring

1. survey (manhole lifting followed by CCTV)
2. immediate repairs of major points of infiltration.
3. review of data and commercial arrangements for repairs
4. carrying out repairs
5. flow monitoring in wet and dry weather conditions
6. targeted follow up survey
7. repairs if required
8. ongoing monitoring

The steps are described below.

### 3.3 Surveys

#### 3.3.1 MH Inspections

Initially SW identifies an area where infiltration is either known, or expected, to exist. This is generally based on local knowledge of the area. Then ‘strategic manholes’ within that area are identified. When the groundwater levels are high but falling and the sewers are no longer surcharged, flow in the strategic manholes is checked. Manholes at the downstream end of the run are inspected first, then the next MH upstream, until the flow is down to normal. Any sewer runs where there is a significant reduction in flow from the downstream manhole to the upstream manhole are noted. The change in flow indicates infiltration. The manholes are also checked for infiltration. As soon as possible after this inspection, the sewer lengths are inspected using CCTV units.
3.3.2 CCTV Surveys

The CCTV cameras are moved through the sewers working upstream from MH to MH, as far as the MH where the flow is normal. If significant flow is seen from lateral connections, these are also surveyed by CCTV (subject to gaining access from customer’s properties – where required).

The CCTV cameras are mounted on a wheeled unit which measures the distance along the pipe from the MH. A report of the CCTV inspection is prepared noting the location of any defects (e.g. displaced joints), or leakage of groundwater into the pipe. Still photos of these are captured from the video and included in the report.

The CCTV surveys for Hambledon are described below, and the work is summarised in Table 1.

2013 Survey and Rehabilitation

The surveys and rehabilitation work carried out in 2013 were on the length of sewer at the southern end of Hambledon. Significant sources of groundwater infiltration were identified between the junction of West Street/Green Lane and Bury Lodge WPS. As a result of that investigation, in the summer of 2013, a total of 13 manholes and 100m of sewers were sealed. Also during the flooding in 2014, sewer manhole covers were sealed to reduce flow from surface water inundation.

Coloured plans showing the extent of the 2013 survey are included in Appendix A. The rehabilitation carried out in 2013/14/15 is all shown in Appendix B.

2014/15 CCTV Survey and Rehabilitation

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

At the south end of the village, despite repairs the previous year, further infiltration was found in 2014 and repaired in spring 2015.

Infiltration was suspected at the east end of East Street, CCTV revealed displaced joints, which are to be repaired this year.

A total of 114 metres of sewers and 6 manholes were sealed in 2014/15.

The extent of the 2014 surveys and the rehabilitation work are shown in plans in Appendix B.

3.3.3 Electro Scan Infiltration Survey

It is not easy to find infiltration at Hambledon because the groundwater levels rise and drop very quickly, leaving only a few days when conditions are optimum for CCTV survey particularly at the north (higher) end of the village. So at Hambledon, SW also trialled an innovative technique for detecting infiltration. In June 2014, an
Electro Scan survey was carried out on six lengths of sewer in the southern end of the village at the locations shown in the plans in Appendix B.

Infiltration in sewers is detected by measuring the electricity flowing from a probe that is pulled through a pipe that is filled with water. A path to earth indicates a defect or crack in the pipe through which water can leak or infiltrate. The method can only be used on pipes that do not conduct electricity such as clay, plastic or concrete sewers. Despite selecting appropriate pipes, the results were unfortunately inconclusive. SW has not ruled out the this of this or other techniques, but will continue to focus on CCTV at times of high groundwater to detect infiltration.

3.3.4 Flow Monitoring Surveys

In addition to the surveys noted above, flow monitoring (Step 5 in the figure above) was carried out in both ‘dry weather’ and ‘wet weather’ conditions to assess whether there remain areas where excessive groundwater is entering the sewers. Both surveys were carried out in 2013/14. The objective of the wet and dry weather flow surveys is to identify areas of high infiltration. A survey technique, such as CCTV or Electrocan is then required to pin-point the infiltration. However because the flow monitors are left in place for four weeks, in locations which have a ‘flashy’ response to rainfall, changes in flow in response to a storm during the monitoring period, can give valuable information about areas of potential infiltration. The concept is similar to inspecting manholes. A dramatic change in flow between adjacent measuring points indicates either infiltration (if the response is slow) or if the response is rapid, direct entry of rainfall into the sewers (inundation or surface water connections).

The ‘wet weather’ flow surveys require optimum conditions of a high groundwater level (above the invert level of the sewer) that coincides with low flow in the sewer. ‘Wet weather’ flow monitoring was carried out during April 2014. However, because the levels in Hambledon change so quickly, the results did not provide a true reflection of the flow during high groundwater conditions, nor did they assist with identifying areas of high infiltration flows. Although the flow monitoring was not successful in Hambledon, in other locations, it has been helpful in locating areas of major infiltration, which have been confirmed by CCTV.

3.3.5 Pumping Station Surveys

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

3.3.6 Survey Reviews and Repairs Scoping

Following completion of surveys, the survey reports are reviewed by Southern Water. The most appropriate repair technique for each location is determined and specified and an order for the work is placed with the SW’s framework networks maintenance contractor.
3.4 Repairs

When the repairs are instructed, the contractor will then return to the site and prior to starting the repair, will rerun the CCTV inspection to ensure there are no material changes since the initial survey was done. This is particularly relevant if the repair is not carried out until sometime later than the initial inspection. The repairs specified by SW would be from the list below. After completing the repairs, a further CCTV survey of the pipes is done to demonstrate the effectiveness of the repairs. This information is retained by SW, which updates its sewer records. The lengths of sewers surveyed by CCTV and the results are also included in the sewer records database.

Where rehabilitation is required, the appropriate repair technique is selected from the following:

- Sewer lining – fitting a new lining to sewers from one manhole to another or to sections of sewer to repair several leaks, by forming a leak-tight pipe within the existing sewer.
- Excavations to repair leaking joints where no-dig techniques are not possible.
- Quick-Locks – metal ‘sleeves’ which are inserted remotely into damaged pipe sections and, once located correctly, are expanded via compressed air against the inner walls of the pipe to instantly seal leaks.
- Joint Test and Seal – each joint between sewer pipes is air tested and if it does not hold the pressure, the joint is injected with a gel to seal it. Sealed joints are retested.
- Capping of leaking un-used connections.
- Top Hats – fibreglass inserts which form a leak-tight bond at the point where a lateral sewer connects to the main pipe.
- Ground Stabilisation – an alternative technique which involves the injection of gel into the ground around a leak.
- Manhole chamber sealing – a non-excavation method to repair manholes.

A number of these techniques have been used in Hambledon to repair the sewers and manholes. Refer Section 3.6.

3.4.1 Follow-Up Survey and Repairs

Despite the various surveys and repairs completed, SW acknowledge the not all infiltration in the village has been located. However, known locations of infiltration have been repaired, or repairs are currently scheduled. Apart from those few minor outstanding repairs, with the current survey and repair programme complete, there is no plan to undertake further investigation until completion of the flood alleviation scheme. However, SW does accept that follow-up survey and potentially repairs may be required once construction of the surface water pipe is complete. (Steps 6 and 7 in the figure above). For instance, SW is aware that infiltration was occurring in the vicinity of the junction of East Street and West Street, but had not been able to locate the exact point(s) of ingress. SW propose to carry out further infiltration survey work when the flood alleviation scheme has been completed. The new surface water drain will sever some of the laterals. A new sewer will be laid, into which those laterals will be connected. It is possible that there may be some ingress as a result of the
construction work, so SW will undertake further CCTV survey, or flow monitoring, in high groundwater conditions when the flood alleviation scheme is complete.

Currently no further physical survey is planned prior to then. However, in addition to physical investigations on site, SW has instigated a programme of monitoring flows in critical catchments, which includes Hambledon village. Details are given in Section 5.3. If an increase in flows for a given groundwater level is observed, further follow-up survey and repairs will be carried out.

3.5 Flood Alleviation

Following a highly publicised campaign by the local Flood Action Group, in July 2014, Hampshire County Council approved a £3.89 million flood alleviation scheme in Hambledon. This work involves improvements to the network of drainage ditches (Phase 1) and the construction of floodwater culverts to reduce surface water flooding caused by high groundwater levels (Phase 2).

The first phase of works on ditch clearance and re-grading was completed earlier this year (2015). Working with its partners at the Environment Agency, Winchester City Council, Hambledon Parish Council and the Flood Action Group, Hampshire County Council has now completed the preparation needed for phase two. Mildren Construction Limited are currently excavating the road to install a 1 metre diameter drain through the village. In addition to the new floodwater culverts, road resurfacing and, where practical, reshaping of the road will help any floodwater stay within the kerbs.

The construction work is due to last until the end of summer 2016.

This scheme should reduce inundation of SW sewer manholes caused by flooding of the roads. Further information is provided in Appendix E.
3.6 Infiltration Reduction Milestones

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<tr>
<th>Date</th>
<th>Surveys Summary</th>
<th>Repairs Summary</th>
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<tr>
<td>Spring 2013</td>
<td>CCTV Bury Lodge WPS to Old Barn Crescent</td>
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<td>Summer 2013</td>
<td>Dry Weather flow Monitoring. South Hambledon - Bury Lodge WPS to Old Barn Crescent</td>
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<td>(27 Aug – 23 Sept)</td>
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<td>Spring 2014</td>
<td>CCTV: Green Lane: Cams Hill to Brooke Lane; also Green Lane/ West Street junction to East Street / Glidden Lane junction.</td>
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<tr>
<td>Spring 2014</td>
<td>Wet Weather Flow Monitoring</td>
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<td>(20 March – 23 April)</td>
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<td>Spring 2014</td>
<td>ElectroScan Surveys</td>
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<td>Summer 2014</td>
<td></td>
<td>South Hambledon - Lashley Meadow and South end of West Street, to Junction of West Street and Hambledon Road (North of Bury Lodge)</td>
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<tr>
<td>Spring 2015</td>
<td>Winter monitoring exercise recommenced.</td>
<td>South Hambledon: in the vicinity of Hook Vinney</td>
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<td>Autumn 2015</td>
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<td>Early 2016</td>
<td>Alterations to sewer in Old Barn Crescent to improve hydraulics. [work being done in conjunction with HCC surface water drain works.]</td>
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<td>Throughout 2016</td>
<td>Monitor the benefit of the sealing work wrt sewer flows (especially during periods of wet weather)</td>
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<tr>
<td>Spring 2017</td>
<td>Planned: Surveys following completion of flood alleviation scheme</td>
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<tr>
<td>Summer / Autumn 2017</td>
<td>Planned: Investigate potential for property level protection</td>
<td>Repairs arising from surveys (as required)</td>
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</table>
3.7 **Groundwater**

3.7.1 **Link between groundwater levels and flooding**

An initial review of the graph of groundwater levels and wet well levels at Bury Lodge shows periods of high groundwater correspond well with periods of prolonged high wet well levels. Statistically the data has a correlation coefficient of 0.46 which indicates a positive correlation between the two variables and that the groundwater levels have some influence on sewer flows. [Source: Hambledon & Denmead Infiltration Reduction Plan RT-CA-1453 02. MWH Jan 2014]

The graph below shows the groundwater level measured at Broadhalfpenny Down borehole in Hambledon during the winters of 2012-13 and 2013-14. The red line shows the actual level recorded, which reached a peak of approximately 77 to 78m AOD in January 2014. This peak was significantly higher than the long term average (green line) of approximately 51 to 52m for January. However, the 2014 peak was less than the maximum level of 86m (dark blue line) which was recorded in 2000.

The graph also shows the approximate groundwater levels when overpumping was started and stopped in Hambledon village in the winters of 2012/13 and 2013/14. Pump reference letters relate to locations provided in Appendix D.

The black lines at the base of the graph represent daily rainfall from World’s End which is approximately 3 miles south of Hambledon.

![Groundwater Levels and Over-pumping 2013 - 2015](image-url)

*Graph contains Environment Agency information © Environment Agency and database right*
Groundwater rose significantly higher in 2014 than it had in 2013, despite this the pumps were not required until the groundwater had reached 78m compared to 60m in 2013. In 2014, due to the high surface water flows, SW used pumps through the village to supplement the gravity flow in the sewers. The majority of these pumps were removed when the groundwater had fallen to 63m, marginally above the level at which the pump at Bury Lodge was turned on the preceding year. In 2014, the final pump at Bury Lodge was removed at a comparable groundwater level (48 to 49m) to when the pump there was removed in 2013.

The sealing work carried out at the south end of the village in 2013, would have improved the conveyance of flows towards Bury Lodge, by reducing the contribution of additional infiltration. Further rehabilitation carried out in 2014 and 2015, based on the findings of the completed surveys, will have reduced the flows further.

3.7.2 Trigger Levels

On the basis of the information from 2014, the following trigger levels are proposed based on groundwater levels at Broadhalfpenny Down borehole.

<table>
<thead>
<tr>
<th>Trigger</th>
<th>Tankering</th>
<th>Pumping</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>55m AoD</td>
<td>55m AoD</td>
</tr>
</tbody>
</table>

These trigger levels 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.

In addition to physical investigations on site, SW has instigated a programme of monitoring flows in critical catchments, including Hambledon. Details are given in Section 5.3.

4 OVER-PUMPING

4.1 Where Over-pumping may be required and under what Circumstances

SW is committed to detecting and repairing sources of infiltration to reduce groundwater infiltration into sewers in accordance with best technical knowledge not entailing excessive cost. (BTKNEEC). Nevertheless, currently in periods of heavy rainfall or high groundwater emergency discharges may continue to be required.

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

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

4.2 Steps to prevent discharges and prior alternatives to over-pumping

In addition to the eight steps outlined in Section 3.2 above, SW also carry out other activities to minimise the requirement for discharges to watercourses. These were formalised during the Winter 2014/15, when SW followed the steps in the following list. These activities supplemented the rehabilitation programme. The approximate timescales for each step are included in brackets.

1. Carry out scheduled maintenance visits to key pumping stations prior to winter weather. [Autumn 2015]
2. Ensure that sewers prone to silt deposition or fat build-up have been jetted as per SW’s Scheduled Maintenance Tasks. [Autumn 2015]
3. Monitor groundwater levels in relevant local boreholes. [from mid-September 2015]
4. When groundwater levels start to rise, monitor WPS performance as groundwater level approaches trigger levels based on previous flood events. [Late autumn 2015, increase frequency of monitoring to weekly as levels rise]
5. Determine forecast dates for trigger levels based on previous dry, average and wet winters. [from mid-September 2015]
6. Hold weekly calls with the EA and share forecasts for potential over-pumping [from late autumn 2015, dependent on groundwater levels]
7. As each trigger level is approached, check sewer levels at selected manholes in the catchment. Continue to monitor and record sewer levels. [from late autumn 2015, dependent on groundwater levels]
8. If levels continue to rise, carry out MH lifting and record sewer levels and share data with the EA. [as required. Share data weekly]
9. Monitor customer calls. Seek to establish whether there is a common cause for the lack of capacity to maintain sewage disposal services. [ad-hoc analysis, as and when required during flood events]
10. Respond to customer calls with targeted sewer jetting, tankering or over-pumping as appropriate. [as required]
11. Keep EA informed about current tankering activities and if over-pumping is expected to be required, agree this course of action with the EA. [from late autumn 2015, through weekly reports and calls]
12. Continue to monitor levels. [weekly through the winter/spring]

13. Keep EA informed about tankering, jetting and over-pumping activities in weekly calls. [from late autumn 2015, through weekly reports and calls]

14. Where over-pumping is required, ensure duration and quantity of discharges are minimised (e.g. by use of level control on pumps). Also ensure the over-pumping components (settlement tanks etc) – as agreed – refer App C of the IRP.

15. Following the flooding event, as levels in the sewers return to normal, lift MH covers in catchments where there has been over-pumping to identify sudden increases in flow. [Spring 2016, but only if there was flooding during the Winter]

16. Instigate survey and repairs if required. [Spring 2017 (after completion of the HCC surface water drain)]

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

Depending on local conditions, a typical overpumping site consists of a pump located at ground level adjacent to a sewer manhole near the watercourse into which it will discharge. The pump lifts dilute effluent from a surcharged manhole. The suction hose is positioned as near as practical to the top of the flow so that it is mostly liquid rather than solids which is pumped. The solids tend to remain in the sewer. A barrel filter is attached to the end of the suction hose. The barrel filter has 10mm holes in it, so it holds back larger material in the manhole.

The size of pump will be chosen to only remove the necessary flow from the sewer. In fact to minimise the flow that is pumped out of the sewers, ‘level control’ sensors are used to ensure that the pumps only operate when the level in the manhole is high. When the level drops, the pumps stop pumping and only start again when the water level in the manhole rises above the level at which it is necessary to pump to protect properties. As explained above, SW monitors levels in the manholes as the levels rise, so has a fairly good idea of the maximum level in the manhole that can be tolerated before properties experience flooding or restricted toilet use.

Flow rates depend on the size of pump and the length of hoses through which the pump delivers the flow. Larger pumps have higher flow rates. Longer delivery hoses reduce the flow rate.

However, typical discharge rates for pumps with short discharge pipes are:

- 3” pump 10 – 20 l/s
- 4” pump 30 l/s
- 6” pump 80 l/s

Pumps operating with long discharge hoses will deliver lower flows.
For the smaller pumps, power is supplied either by local access point or a combined Silent Pack diesel generator and pump.

Maintenance of the over pumping units is carried out regularly; daily checks include checking the flow and cleaning/replacement of filtration sacks. The settlement tanks are cleaned each week.

4.4 Physical Measures used to Remove Solid Matter

When the pump operates, flow is pumped into a settlement tank. In the tank, the flow passes under settlement weirs, also for the 3” and 4” pumps – which were used in Hambledon, COPA foam is used at the top of the tanks, which traps much of the floating material. Finally, at the end of the discharge hose, before the flow is discharged into the receiving watercourse, it passes through a filtration sack located on the end of the hose.

Further details on a typical over-pumping arrangement are provided in Appendix C and the locations where over-pumping has been used in recent years is given in Appendix D.

4.5 Steps to minimise the Volume and Duration of Over-Pumping

4.5.1 Factors considered prior to over-pumping

As explained in Section 4.2 above, SW follows a set of steps to ensure that their assets operate correctly. Also the steps identify how they deal with high flows when they still occur. SW endeavours not to use over-pumping into watercourses. However, on occasions it cannot be avoided. Generally tankering is used prior to over-pumping. Tankering is an appropriate response to small scale sewer flooding. But if the flooding becomes more widespread, pumping has to be used. There is no clear rule for the exact point to change from tankering to 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 RTU/ 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, Southern Water exhausted the available supply of tankers.

4.5.2 Pros and Cons of Tankers and Pumps

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

The benefits of tankering are: dilute sewage is discharged at a treatment works for treatment, however, the flow rate is low (approx. 1l/s per tanker over a 24 hour period*), there are traffic issues associated with large vehicles using narrow country roads, such roads are frequently not designed to take the load of repeated visits by tankers – resulting in damage to the road, tankers are also noisy causing disturbance to the local properties, particularly at night time. They also have a high carbon footprint compared to over-pumping.

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

Over-pumping discharges dilute effluent to the watercourse, but has several benefits relative to tankering. The discharge rate is significantly greater. A 4” pump will discharge typically 30 l/s; the equivalent of a fleet of 30 tankers. Typical fuel consumption is 0.8l/ hr = 19l/ 24 hrs, about half of what one tanker would use. The pumps are quieter, and are situated off the highway so there is no traffic disruption, except for delivery. The pumps run on level control so only operate when required.

The graph below shows the CO2 equivalent for tankering and pumping at Hambledon.
Irrespective of the method of removing excess infiltration, it is clearly preferable to prevent it entering the system in the first place.

SW responded to the flooding in 2014 by setting up overpumping in a ‘daisy chain’ format after initially using up to 15 tankers in the village (around 24 January). This was found to be insufficient to control the sewer levels and no further tankers could be used in the village due to restricted access and manoeuvring. Pumping dealt with the flow far more efficiently.

4.6 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 face-to-face meetings, and customers were informed via letters. SW also attend local public meetings with stakeholders.

Despite the work being undertaken, if over-pumping is required, prior to commencing over pumping, SW will liaise with the local EA team in order to agree the requirement and to discuss proposed locations for the emergency discharges to watercourses. Immediately prior to commencing overpumping, SW will notify the EA National Incident Communication Service (Tel. 0800 807 060)

The local public, local authorities and Winchester City Council Environmental Health Department would also be kept informed of discharges to watercourses (overpumping) before and during the operation.

Immediately prior to over-pumping being operated, Southern Water will put up advisory signs at the over-pumping discharge location(s) and at appropriate locations downstream along the receiving watercourse, advising the public that over-pumping is in operation. The wording on the signs will be as, or similar to, the example in Appendix F. The location of advisory signs is also provided in Appendix F.

Prior to the cessation of overpumping, SW will also liaise with the local EA team and also inform the EA National Incident Communication Service following cessation.
During the flooding in 2014, SW had a constant presence in the village, enabling a more rapid response and better communications. During the winter of 2014/15, SW and the EA held weekly conference calls to discuss locations where total flows in the sewers were reaching the point where SW would need to respond imminently with tankering or pumping.

4.7 Monitoring quality of the downstream watercourse

Southern Water has been carrying out regular monitoring of receiving watercourses at locations where it has been over pumping. For each site, SW will require sampling/ measurement at each of the following points:

1. 15m upstream of the effluent discharge
2. The effluent discharge
3. Downstream of the effluent discharge

The upstream/downstream points provided above are typical positions and may vary depending on the watercourse depth, width or flow.

When over-pumping is in operation a laboratory sample would be taken at each of the above points once a week for:

- E. coli
- Enterococci
- Total coliforms
- COD
- BOD
- Suspended solids

In addition, Southern Water will discuss the requirement for sondes with the Environment Agency. If required, the sondes would be provided at these locations and would record half hourly measurements of:

- Ammonium (NH4+)/ ammonia(NH3)
- Dissolved oxygen
- Turbidity
- Oxidation reduction potential
- Additional standard parameters that come with sondes (pH, temperature, conductivity, total dissolved solids etc)

5 OPTIONS TO REDUCE INFILTRATION AND MINIMISE THE REQUIREMENT FOR DISCHARGES TO WATERCOURSES

5.1 Sewer Rehabilitation Programme

SW acknowledges that infiltration reduction is an on-going process.

SW has now completed the repairs identified from the surveys. Whilst acknowledging that the surveys have not been fully effective, SW has made significant efforts to locate infiltration and have repaired the sources of infiltration that have been found. Also as noted above, because there may be some disruption to the existing sewers
during the construction of the flood alleviation scheme, SW does not intend to do any further survey on site until after completion of that work.

On a company-wide basis, to ensure that benefit continues to be gained from the work that has been done, SW is continuing the programme of infiltration reduction with proposed investment of a further £10m across its region for AMP6 (2015 – 2020).

5.2 Property Level Protection

In some other locations, property level protection has been used to supplement repair work. It can have benefit in protecting a limited number of vulnerable properties. Depending on the hydraulics, non-return valves fitted to the laterals of vulnerable properties may reduce the need for over-pumping. Where NRVs have been used successfully, services to individual properties of a group of properties are maintained by tankering from the property laterals, reducing the need for over-pumping. There are currently no plans to install additional NRV’s in Hambledon. However, after the flood alleviation scheme is finished, as part of the survey of the sewers, the potential for property level protection will be assessed on a case by case basis.

5.3 Monitoring

Although SW does not currently have plans for further physical investigations until Autumn 2016, a monitoring programme using currently available telemetry data (e.g. EA borehole level data via telemetry links) was started in January 2015 and continued through the winter. An example of one of the graphs for Hambledon is shown in the figure below. The monitoring included a weekly review of the 10 locations in their region which are most prone to sewer flooding – this included Hambledon. The monitoring used ‘real time’ groundwater levels from local boreholes to predict when it might be necessary to respond to mitigate the effects of flooding. The trigger levels are not the levels at which tankering or over-pumping started historically. When a trigger level is breached SW increase activity to ensure that the sewers are running clearly. Levels in the manholes are also checked, as it is this, not groundwater levels, that determine when surplus effluent needs to removed from the sewers.

In the typical forecast graph for the Hambledon Valley shown below, the Trigger Level is shown by the horizontal black line. The dates for Earliest, Mean and Latest Trigger Dates are based on the time it would take for the groundwater to reach those trigger levels at the rate of groundwater rise for the wettest, driest and average winters (using the last seven years of data).
SW will repeat this monitoring each winter, commencing mid-September, running reports at monthly intervals initially, increasing to fortnightly, then weekly to suit the rise of groundwater levels. The forecast dates for reaching trigger levels is shared with the EA when it is produced.

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

6 CONCLUSIONS/ ACTION PLANS

6.1 Conclusions

As noted previously, reducing infiltration is a journey, so it is never complete. In 2013, SW prioritised 17 areas – including Hambledon Valley – which were identified as priority sites for reducing infiltration.

SW has carried out survey and repairs in the Hambledon Valley between early 2013 and March 2015. SW acknowledges that there has been limited success in locating infiltration, but several significant ‘gushers’ have been found and repaired. Whilst the flood alleviation scheme is in progress, SW does not plan to do any further on-site investigation.

6.2 Action Plans

Reasonable progress to reduce infiltration has been made, but there is more to do. To make it easy to track progress the following table summarises the actions to
reduce infiltration and also to mitigate the effects of it, if the infiltration cannot be controlled at economic cost (in line with BTKNEEC see below).

**SW Actions**

<table>
<thead>
<tr>
<th>Infiltration Reduction</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activities to investigate infiltration and carry out repairs</td>
<td>Refer table in Section 3.6 for completed and planned activities</td>
</tr>
<tr>
<td>Annual IRP updates and quarterly reporting to EA</td>
<td>In 2016, Q1 and Q2 reports submitted and discussed with EA.</td>
</tr>
<tr>
<td>Winter Preparations</td>
<td>Preparation as Section 4.2 and monthly/weekly forecasting.</td>
</tr>
<tr>
<td>Preparation and making suitable arrangements for emergency discharges if required</td>
<td>Arrangements discussed with EA during Winter weekly calls.</td>
</tr>
<tr>
<td>Developments</td>
<td>Respond to planning applications as required</td>
</tr>
</tbody>
</table>

**Flood Mitigation**

<table>
<thead>
<tr>
<th>Forecasting</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet weather monitoring of groundwater levels and sewer levels/flows relative to trigger levels</td>
<td></td>
</tr>
<tr>
<td>EA communications</td>
<td>Monitoring groundwater levels and communicate with EA</td>
</tr>
<tr>
<td>Stakeholder Engagement</td>
<td>Communications with stakeholders and the public as appropriate.</td>
</tr>
</tbody>
</table>

Colour coding of actions in tables: Green – completed, Yellow – imminent action required, Red – overdue, White – on-going actions with no specific end dates.
Multi-agency activities

Infiltration Reduction

- Misconnections - HCC (for highways) and Winchester City Council (for domestic connections) to investigate and pursue as required.
- Groundwater Flooding Strategy - HCC with input by other agencies as appropriate

As noted in Table 3.6, SW has scheduled further work to be carried out in Hambledon, building on the £400,000 already invested in rehabilitation work in the Hambledon area – which benefits a population of 1,000 people.

SW is committed to continuing to pursue infiltration to reduce the frequency of over-pumping. In the RPS, the EA notes that it is not seeking the complete elimination of groundwater surcharging, but requires improvements to be made in line with “best technical knowledge not entailing excessive cost” (BTKNEEC).

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 our assets are operating correctly, and the work to be developed with other agencies to improve an integrated plan to address flooding.

6.3 IRP Updates

The IRP records SW’s commitment to continue strive for the long-term objective of eliminating the need to over-pump. As required by the RPS, SW reports progress quarterly to the EA and will update the IRP annually (RPS Section 2.3 vi).
APPENDIX A

Survey Scope and Completed Rehabilitation 2013

This appendix includes:

- Plan of 2013 CCTV survey locations
- Plans showing MHs and sewers rehabilitated in 2013
Hambledon – Location of CCTV Survey in 2013 – Plan 1 of 1
West St, Hambledon - Sewer/Manhole Rehabilitation Work in 2013 (highlighted in red) - Plan 1 of 3

Old Barn Crescent
Lotts Corner, Hambledon - Sewer/Manhole Rehabilitation Work in 2013 (highlighted in red) - Plan 2 of 3
Bury Lodge WPS, Hambledon - Sewer/Manhole Rehabilitation Work in 2013 (highlighted in red) - Plan 3 of 3
APPENDIX B

Survey Scope 2014 and Completed Rehabilitation 2013/14 & 2014/15

This appendix includes:

- Plan of strategic manholes used for 2014 CCTV survey
- Plans showing extent of Electroscan surveys in 2014
- Plans showing extent of MH and sewer rehabilitation in 2014
CCTV Survey 2014: Strategic Manholes – Plan 1 of 4

- B2150 Green Lane
- Brook Lane
- Strategic Manhole Surveyed
CCTV Survey 2014: Strategic Manholes – Plan 2 of 4

- B2150 Green Lane
- Lashly Meadow
- Strategic Manhole Surveyed
CCTV Survey 2014: Strategic Manholes – Plan 3 of 4

- High St
- Glidden Lane
- East St
- Speltham Hill

Strategic Manhole Surveyed
CCTV Survey 2014: Strategic Manholes – Plan 4 of 4

- Green Lane
- West St
- Cams Hill
- Old Barn Crescent
- Strategic Manhole Surveyed
Hambledon – Location of Electro Scan Survey in 2014 – Plan 1 of 2

Extent of Electroscan Survey
Hambledon – Location of Rehabilitation Work carried out in 2013/14 and 2014/15 – Plan 1 of 2
Hambledon – Location of Rehabilitation Work carried out in 2014 – Plan 2 of 2

LEGEND
- Sewer or Lateral Sealed
- Manhole Sealed
- Catchment Boundary
APPENDIX C

Typical Overpumping Arrangements
The figure above shows a typical overpumping arrangement of the equipment used.
Figure C1 – Typical overpumping arrangement

Pump drawing excess flows from sewer and discharging into a settlement tank. See Figure C3

Settlement tanks. See Figures C4 to C6

Pump hose drawing excess flows from sewer. See Figure C2

Hose discharges to watercourse via filtration sacks. See Figure C7
Figure C2 – Pump lifts flow through a barrel filter from a level in the sewer which captures liquid flows rather than solids

Figure C3 – Pump extracts flows from the sewer and discharges to a settlement tank
Figure C4 - Diagram of a large settlement tank showing the direction of flow beneath and above baffle plates which results in suspended fine solids dropping to the bottom of the tank. The dimensions shown (2.44m x 1.83m x 1.52m = 8ft x 6ft x 5ft) are suitable for use with 150mm (6 inch) hoses.

Figure C5 - Photograph of a small settlement tank usually fed by 75mm (3 inch) or 100mm (4 inch) hoses. The dimensions of the tank are 1.0m wide x 1.5m long x 1.4m high.
Figure C6 – Photograph of a typical settlement tank showing the hose at the entry point to the tank and the baffle plates. The blue foam shown can be added to the tank to capture solids at the entry point for flows supplied by 75mm and 100mm pumpsets only.

Figure C7 – Discharge of treated flow to the watercourse through a filtration sack which is replaced regularly.
APPENDIX D

Locations used for Emergency Discharges

The over-pumping locations shown in this appendix are those used in the winter of 2013/14. When over-pumping is necessary, sites will be selected to provide the most effective arrangements to maintain services, whilst minimising environmental effects. Where practical, sites that have been used previously are expected to be re-used (when necessary), but the use of different locations cannot be ruled out, if hydraulic conditions dictate.
Pump A - East St, Hambledon - Overpumping and Tankering Sites in the Winter of 2013-14 (Sheet 1 of 8)

- **Tanker Point (MH8101)**
- **Church Lane**
- **East St**
- **Speltham Hill**

**Pump A**
(464766, 115099)
Adjacent to The Paddock House
4 inch pump from MH7004 to MH6005
(See photograph)

**Camera angle of view for adjacent photograph**
Pump B - Junction of East St and High St, Hambledon - Overpumping and Tankering Sites in the Winter of 2013-14 (Sheet 2 of 8)

Pump B
(464642,115044)
Adjacent to Manor Farm House
6 inch pump from MH6005 to MH5002
(See photograph)
Pump C - West Street, Hambledon - Overpumping Sites in the Winter of 2013-14 (Sheet 3 of 8)

- **Tanker Point (MH5002)**
- **Vicarage Lane**
- **West Street**
- **Camera angle of view for adjacent photograph**
- **Overpump (MH6005 to MH5002)**
- **Pump C (464547, 115008)**
  - Opposite The Gardens
  - 6 inch pump from MH5002 to MH3902
  - (See photograph)
Pumps D and E - Junction of Green Lane and West Street, Hambledon - Overpumping Sites in the Winter of 2013-14 (Sheet 4 of 8)

Pump E
(464302, 114877)
Adjacent to No. 1 West St
6 inch pump from
MH3804 to MH1506
See detailed location plan and photograph on next sheet

Overpump
(MH5002 to
MH3902)

Pump D
(464336, 114901)
Adjacent to Hunters Cottage
6 inch pump from
MH3902 to MH3804

Green Lane

West St
Pump E – Junction of Green Lane and West Street, Hambledon - Overpumping Sites in the Winter of 2013-14 (Sheet 5 of 8)

Pump E
(464302, 114877)
6 inch pump located close to pedestrian island in westbound carriageway (closed to traffic) lifts flow from MH3804 (See photograph)

Hose from MH3902

Hose crosses West Street beneath protective ramp

Green Lane

Camera angle of view for adjacent photograph

Hose to MH1506

West Street (subject to traffic management at junction)
Pumps F and G, Old Barn Crescent, Hambledon - Overpumping Sites in the Winter of 2013-14 (Sheet 6 of 8)

- **Overpump from MH3804 to MH1506**
- **Manholes that are particularly vulnerable to spillages**
- **Pump F (464233, 114726)**
  - On Green at Old Barn Crescent
  - 4 inch pump from MH2702 to MH1601
- **Pump G (464177, 114651)**
  - Adjacent Dovetail Cottage
  - 4 inch pump from MH1601 to MH1506
Pump H, Lotts Corner, Hambledon - Overpumping Sites in the Winter of 2013-14 (Sheet 7 of 8)

- **Hose crosses Cams Hill beneath protective ramp**
- **Overpumping (MH3804 to MH1506)**
- **Overpumping (MH1601 to MH1506)**
- **Settlement tank on verge opposite Snowdrop Cottage**
- **Pump H**
  - (464146, 114582)
  - Adjacent to Lotts General Store
  - 6 inch pump from MH1506 to 1 No. settlement tank
- **Settlement Tank**
  - (464124, 114542)
  - On verge opposite Snowdrop Cottage
  - (see adjacent photograph)
- **Seasonal Watercourse**
- **Discharge to water course via filtration sacks**
- **Camera angle of view for adjacent photograph**
- **B2150 Road**
- **Cams Hill**
- **Camera angle of view for adjacent photograph**

Seasonal Watercourse

Hose crosses Cams Hill beneath protective ramp

Settlement tank on verge opposite Snowdrop Cottage

Pump H (464146, 114582)
Adjacent to Lotts General Store
6 inch pump from MH1506 to 1 No. settlement tank

Settlement Tank (464124, 114542)
On verge opposite Snowdrop Cottage (see adjacent photograph)
Pumps I & J, Bury Lodge WPS, Hambledon - Overpumping Site in the Winter of 2013-14 (Sheet 8 of 8)

Manholes that are particularly vulnerable to spillages

Pumps I & J
(464208, 113950)
At Bury Lodge WPS
2 No. 6 inch pumps from MH2901 to
2 No. settlement tanks to filtration sacks before discharge to watercourse (See adjacent photograph)

Settlement tank at Bury Lodge WPS

Pump at Bury Lodge WPS

B2150 Road

Camera angle of view for adjacent photograph

Watercourse
Timing for Deployment of Tankers and Overpumps in the Winter of 2013-14

<table>
<thead>
<tr>
<th>Date (+/- 1 day)</th>
<th>Groundwater Level (m AOD) at Broadhalfpenny Down</th>
<th>SW Activities in Hambledon</th>
</tr>
</thead>
<tbody>
<tr>
<td>08.01.14</td>
<td>75</td>
<td>Flooding issue became apparent at Bury Lodge WPS due to increase in flow.</td>
</tr>
<tr>
<td>09.01.14</td>
<td>78</td>
<td>Tankers deployed at Bury Lodge WPS following spillage of dilute sewage from manholes near pumping station.</td>
</tr>
<tr>
<td>17.01.14</td>
<td>71</td>
<td>Tankers deployed in village due to spillage of dilute sewage from manholes on Lower West St. One overpump deployed at Bury Lodge WPS to discharge into watercourse.</td>
</tr>
<tr>
<td>19.01.14</td>
<td>78</td>
<td>Second overpump (controlled by floats) deployed at Bury Lodge WPS to assist first pump when required.</td>
</tr>
<tr>
<td>21.01.14</td>
<td>78</td>
<td>Overpump deployed at Lotts Corner to discharge into ditch adjacent to the road. 5 No. tankers deployed in Hambledon village.</td>
</tr>
<tr>
<td>22 to 23.01.14</td>
<td>77</td>
<td>4 No. overpumps deployed from manhole to manhole from Lotts Corner to The Gardens. 2 No. overpumps remain at Bury Lodge. 6 No. tankers deployed in East St.</td>
</tr>
<tr>
<td>24.01.14</td>
<td>76</td>
<td>Additional overpump installed in East St in centre of the village. Number of tankers in East St reduced from 6 to 5.</td>
</tr>
<tr>
<td>25.01.14</td>
<td>76</td>
<td>Number of tankers in East St reduced from 5 to 4.</td>
</tr>
<tr>
<td>26.01.14</td>
<td>75</td>
<td>Number of tankers in East St reduced from 4 to 2.</td>
</tr>
</tbody>
</table>
### Hambledon - Infiltration Reduction Plan

**Date (+/- 1 day)** | **Groundwater Level (m AOD) at Broadhalfpenny Down** | **SW Activities in Hambledon**
--- | --- | ---
04.02.14 | 74 | Tanker deployed in Old Barn Crescent due to overflowing manhole
06.02.14 | 73 | Four tankers deployed in Old Barn Crescent (and East St) to reduce risk of property flooding.
13.02.14 | 75 | Additional overpump operational in Old Barn Crescent. Number of tankers reduced from 4 to 2.
02.03.14 | 67 | Trial switching off of some overpumps, but levels rose rapidly so pumps restarted.
10.03.14 | 66 | Overpumps removed from East St.
15.03.14 | 63 | Majority of overpumps removed apart from pumps at Lotts Corner and Bury Lodge WPS
15.04.14 | 48 to 49m | Last remaining pump turned off

No over-pumping or tankering was carried out in Hambledon in 2014/15.
APPENDIX E

Hambledon Flood Alleviation Scheme
Press statement issued by Hampshire County Council on 11th July 2014

**£3.89 million Hambledon flood alleviation scheme approved by Hampshire County Council**

A £3.89 million scheme that will help mitigate the effect of flooding in Hambledon has been approved.

Councillor Seán Woodward, Executive for Economy, Transport and Environment at Hampshire County Council approved the two phase scheme at his decision day on Friday 11 July.

During the floods this winter, caused by the excessive heavy rainfall, the main road through Hambledon was severely affected by flood water.

Councillor Woodward said: “Hambledon has a long history of groundwater flooding. This winter the village suffered damaging and prolonged flooding as a result of the extreme wet weather, causing major disruption to the community. More extensive damage and disruption was only averted by the combined efforts of the County Council, Emergency Services, Armed Forces, Winchester City Council, Hambledon Parish Council, Southern Water and the local Flood Action Group. The residents of the village showed enormous resilience as a community and it is clear that Hambledon is an area in need of some intervention, which is why I am pleased to agree the funding for this flood alleviation scheme. I hope the Government will play its part now and allow the full scheme to go ahead.”

The County Council, working closely with the Environment Agency (EA), Winchester City Council, Hambledon Parish Council and other partners, is progressing plans for the Hambledon Flood Alleviation Scheme. The County Council and its partners have secured funding to start Phase 2 and work will start in January 2015. However, completion of the full extent of this phase is subject to the availability of funding from central Government.

It is proposed that the work will be undertaken in 2 phases:

**Phase 1, which has already been approved and is due for implementation this summer,** will improve the outfall and network of drainage ditches to the south of Lotts Store by widening and providing larger pipes beneath property accesses. This section of works is due to start at the end of August with an estimated duration of 3 months. During this time, the roads will remain open with traffic lights where required.

**Phase 2** will seek to reduce flooding in East Street, West Street, and parts of Green Lane through the provision of floodwater culverts along East Street and West Street, and re-profiling and resurfacing the highway to enhance the management of surface water drainage. The work will link into the improvements carried out as part of Phase 1.

In order to prepare for this work, properties in East and West Street that are close to the road will be surveyed to ensure that the construction plans can take into account any specific requirements or features such as cellars.

Phase 2 is currently in the design phase and more details about this part of the scheme, management of the works and its duration will be available in early Autumn.
An event to provide local residents and businesses with further information is being planned for September.

As additional information becomes available it will be provided on our website: [www.hants.gov.uk/transport-schemes-winchester](http://www.hants.gov.uk/transport-schemes-winchester) and also sent to the Hambledon Parish Council and Hambledon Flood Action Group.

On the following pages are Hampshire County Council Display Material describing Phase 2 of the Scheme. [source](http://www3.hants.gov.uk/transport-schemes-index/transport-schemes-winchester/hambledon-flood-alleviation.htm)
Welcome

Hampshire County Council, Winchester City Council, the Environment Agency, Hambledon Parish Council and Hambledon Flood Action Group have been working together to develop plans for a flood alleviation scheme for Hambledon.

Following the exhibition in October 2014, Phase 1 work, including ditch clearance and re-grading, has now been substantially completed. A significant amount of work has also been undertaken to prepare for Phase 2 and the implementation of the ‘Big Pipe’. Mildren Construction Ltd has been appointed as the contractor.

The purpose of this exhibition is to provide information about Phase 2:
- What work will be undertaken;
- The overall programme;
- Order of works and operations;
- An overview of the traffic management arrangements; and
- How you will be kept informed.

Phase 2 will start by the end of May 2015 with, initially, enabling work for the ‘Big Pipe’.

How will the work take place?

The £4.5m flood alleviation scheme is being constructed in two phases:
- **Phase 1** (October 2014 to June 2015): Improvements to the outfall and network of drainage ditches downstream of the village; and
- **Phase 2** (May 2015 to late summer 2015): Provision of floodwater culverts along East Street, West Street and parts of Green Lane, and re-profiling and resurfacing the highway to help improve drainage.

**Phase 1 – Update**

This work is now substantially complete. However, at Brittons Farm there are currently two channels, a temporary bypass completed in December from the original ditch and an improved direct route. It is planned to complete the direct route by June 2015 when new culverts will be put in place. As the culverts weigh 9 tonnes, a temporary track way, to give machinery access to manoeuvre them into position, needs to be constructed. This operation has had to wait until ground conditions improved.

Due to the proximity of overhead power lines, it has not proved possible to crane the culverts in to place as was originally planned.
Hambledon Flood Alleviation Scheme

Who will do the Phase 2 work and implement the 'Big Pipe'?

The contract for the 'Big Pipe' works has been awarded to Mildren Construction Ltd.

Mildren Construction Ltd is a Civil Engineering and Building Contractor operating throughout southern England. Mildren has built an enviable reputation with good local knowledge and excellent relationships with both customers and suppliers, developed over the last 25 years.

Mildren has a broad range of experience in the water, waste and energy sectors, in bridges and structures projects, and highways and public realm schemes. Further information about Mildren can be found at http://www.mildrenconstruction.co.uk

Mildren’s normal working hours will be Monday to Friday from 07.30am to 17.00pm. Special consent will be required for works outside of these hours.

Hampshire County Council will continue to be closely involved in the work and will have at least one officer on site at all times during the works.

Hambledon Flood Alleviation Scheme

How will the contractor work with you?

In addition to constructing the works, Mildren are committed to:
- arranging frequent updates on progress and what works are coming up;
- providing a regular time for you to meet with them to raise any issues;
- liaising with residents, businesses, emergency services and other service providers regarding access, parking, deliveries, bus services and refuse collection;
- helping to make sure that Hambledon remains open for business as usual during the work;
- minimising the impact of disruption, dust, noise and vibration. Activity method statements and risk assessments will be developed with priority given to those specific criteria;
- ensuring that the works are properly protected and safe for everyone;
- enabling access for carers and medical personnel to those that need it;
- providing information to you at the right time so that you know what’s happening, what you need to do and how you can help the works progress with the minimum of disruption.

How will I be able to get more information about the works?

We are still receiving information that is needed to complete our detailed programming for the 'Big Pipe' and the road closures that will be needed to carry out this work. We therefore realise that there are questions that we won’t be able to answer for you today.

The contractor will start on site at the end of May. The initial stages will include work to the foot sever and other elements that will enable the installation of the 'Big Pipe' to make good progress once it starts. It is anticipated that there will be the need to close lengths of road from the end of June onwards.

We realise that the implementation of the 'Big Pipe' will be the most disruptive time for you and we are committed to providing information as far in advance as possible so that we all have time to make the necessary arrangements. As soon as the contractor starts on site at the end of May we will provide the following ways for us to keep you informed and for you to access information easily.

- Site staff – if you have any questions or concerns during the course of the works please contact one of the members of staff. If they are unable to help they will make sure your enquiry is forwarded to the appropriate person.
- Information boards – these will be provided close to where work is taking place. The boards will tell you what is happening, what the programme is for the next two weeks and what will be happening in the month ahead.
- ‘One-stop-shop’ – a regular monthly opportunity for you to ‘drop-in’ at a convenient location in the village and ask the contractor and Hampshire County Council any questions. The location, date and times will be provided at the Information point on the website.
- Information point – a noticeboard will be set up at the Village Hall providing the latest information about the work and key contact details.
- Leaflets – these will be provided on a regular basis to those immediately adjacent to where works are taking place. They will include information about what work is taking place and where, how it will affect you, arrangements being made to minimise disruption and contact details. Copies of the leaflets will also be available on the information boards and information points.
- Telephone – you will also be able contact us through the Hampshire County Council on 0300 903 1368 or visit the Hampshire County Council’s website.
- Website – dedicated webpages at www.hants.gov.uk/hambledon-flood-alleviation will continue to provide an overview of the scheme, programme and the latest scheme drawings. Links will be provided from Winchester City Council and Hambledon Parish Council’s websites.
- Updates – information about the scheme will also be available on the Parish Council’s Facebook page https://www.facebook.com/HambledonParishCouncilWantage and other local media.
Hambledon - Infiltration Reduction Plan

Southern Water

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June 2016

Hambledon Flood Alleviation Scheme

What work will be undertaken?

- Plastic twin walled pipes are being used for the new foulwater culverts. They are up to 34% lighter in weight than concrete, and easier to handle and transport. They also contain a high proportion of recycled material.

- Being so light means when empty the 1200mm diameter pipes must be surrounded in concrete to stop them becoming buoyant as the water table rises around them. The 900mm diameter pipes do not have this problem so a pea shingle surround is proposed.

- Above the pipe surround the trench will be relined, using either the excavated chalk if suitable or imported material, and the road surface added.

- The top layer of trench material will be a temporary surface. This will be removed when the rest of the road surface is prepared prior to resurfacing towards the end of the project.

- Areas of pavement directly affected by the works will be resurfaced.

Typical section of the works

- As the typical section shows, the new foulwater culvert will be installed deep in the ground to minimise the impact on other utility services. However, some diversions will still be required and connections from properties will need to be cut and reconnected as quickly as possible. All residents will be notified in advance.

Hambledon Flood Alleviation Scheme

Typical section 1200mm Pipe

- The section above is located near Dowtell Cottage, which has the widest excavation due to two new foulwater pipes. In most locations there is only one pipe.

Typical section 900mm Pipe

- The section above is located near George House

<table>
<thead>
<tr>
<th></th>
<th>1200mm Pipe</th>
<th>900mm Pipe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trench width for pipe</td>
<td>2m</td>
<td>1.2m</td>
</tr>
<tr>
<td>Trench width for manholes</td>
<td>4m</td>
<td>2m</td>
</tr>
<tr>
<td>Depth of excavation</td>
<td>Approx 2m to 3.3m</td>
<td>Approx 2.5m</td>
</tr>
<tr>
<td>No. of surface water manholes</td>
<td>10</td>
<td>35</td>
</tr>
<tr>
<td>Diameter of surface water manholes</td>
<td>2.1m</td>
<td>1.2m or 1.35m or 1.8m</td>
</tr>
<tr>
<td>Total length of pipe</td>
<td>0.46km</td>
<td>1.11km</td>
</tr>
</tbody>
</table>
Hambledon Flood Alleviation Scheme

What utility services are affected?

We will make sure that you are kept informed of any changes that will affect you. The contractor will liaise with you to keep any disruption to a minimum.

- Portsmouth Water are bringing their 2020 improvement programme forward. Existing cast iron pipes are to be replaced and all services along the route are to be replaced up to and including the customer stop-cock.

- The 4" cast iron main from Old Farm Crescent to Whiledale Farm, approximately 1600 metres in length, will be replaced with a 125mm HPPE (high pressure polyethylene) pipe.

- This work means that the water supply will need to be interrupted. It is planned for these to take place between 0900-1700hrs. The period of interruption will be kept to a minimum, however, the amount of time will vary from 30mins upwards.

- We are in discussions with Portsmouth Water in order that our contractor can undertake some of the works on their behalf.

- British Telecom, who are currently installing superfast broadband, are the least affected utility. Residents are unlikely to experience disruption of this service.

- Scottish and Southern Electric (SSE) have a 11kV high voltage electrical cable that runs between the Village Hall sub-station and Vicarage Lane. When the road is closed, our contractor will dig a new trench for SSE to install the replacement cable and complete the jointing works. The trench will remain open until SSE have completed the works. SSE propose to provide a temporary generator during the switch over works, so residents should experience very little disruption of service.

- Southern Water foul sewers, and private laterals linking to the sewers, in several locations with the 'big pipe' and connections to it.

As shown in this display, new 225mm diameter foul sewers are proposed. If all of the system is required, work to establish this will be amongst the operations undertaken by the contractor in the initial stages from the end of May onwards. There will be 17 new manholes and around 0.8km of pipe. Residents on the side of the street adjacent to the sewer will be affected as new laterals connections are needed. These works will be part of the main contractors work. A temporary toilet will be available during these works.

Hambledon Flood Alleviation Scheme

How will the big pipe work in the next flood event?

- The main cause of flooding in the village is a rise in the level of the groundwater. This causes flooding of cellars, and to some ground floor areas, which leads to pumping out of properties. It also causes surface water flooding and flooding of the foul sewers.

- Future Flood Events
  - The new surface water pipe will collect surface water via gullies within the road as well as the ditch to the north of the village.
  - Properties will be able to pump from their cellar into a 'pump point' which connects directly to a gully and into the surface water pipe. This will keep water from the road surface as well as removing trip hazards from the footpath.

- Past Flood Events
  - Cellar flooding
  - Potential infiltration of foul sewer
  - Pumping out
  - Direct route for groundwater to enter the surface water system.
Hambledon Flood Alleviation Scheme

When will the work take place?

**Phase 1 + 2 Detailed Design**
- Development of the scheme.
- Submission of bid for central Government funding.
- Repairs to existing drainage systems carried out.

**Phase 1 Works**
- On site investigations carried out.
- Environment Agency consents applied for.
- September - Phase 1 contractor appointed.
- September / October - condition surveys carried out.
- October to January - Phase 1 works substantially completed.
- April - Phase 2 contractor appointed.
- Methodology and programme confirmed.

**Phase 2 Works**
- December 2015

**End of May 2016**

**Works Complete**
- Late Summer 2015
- December 2016

What will happen during this period?

- Initial stages – accommodation work to enable the ‘Big Pipe’ including construction of outlet / headwall, lift sewer installation, and some of the main drainage.
- Electricity, British Telecom and Portsmouth Water diversions undertaken.
- ‘Big Pipe’ works start near Ledgton Store following completion of the accommodation works. They are estimated to take 60 weeks. Flooding and unknown issues such as utilities, high water table or difficult ground conditions may cause delays.
- Roads will be closed in sections to allow the work to be carried out with traffic diversions in place.
- Pedestrian access to all properties will be maintained throughout the works.
- Continuation of ‘Big Pipe’ installation, kerbs, footways and pump points.
- Final carriageway surfacing carried out.
- Handover of pump points.
Hambledon Flood Alleviation Scheme

Traffic management arrangements

Due to the limited space, it will be necessary to close sections of the road while work is being undertaken. It is anticipated that there will be road to start to close lengths of road from the end of June onwards.

Work will be undertaken in stages to minimise impact on properties while providing sufficient space for the contractors to work.

Arrangements for parking will be notified as the work progresses.

Signed diversion routes will be in operation as shown, depending on where the contractor is working.

We are required to divert traffic onto the same class of road. For example, a B road must be diverted onto an A or E road. Buses will be re-routed using the same system as during the floods with a shuttle bus. Once the works pass Old Barn Crescent buses will use this as a turning area allowing the Hambledon service to resume.

Hambledon Flood Alleviation Scheme

Some frequently asked questions about Phase 2

Q. How can I access my property during the works?
A. Pedestrian access will be available at all times. Vehicular access will be disrupted. If you have not already done so, you can help us by completing the questionnaire. The more information you can give us the better.

Works are to be built in work zones and will be limited to works vehicles only. Outside of the work zone access and parking areas will be restricted to ensure that local residents and businesses can park and receive deliveries, and the contractor has access to the works. Temporary space for turning and reversing vehicles will also be provided.

Q. What happens if there is an emergency?
A. If emergency vehicles require access through the works then works will stop and trenches will be boarded up to allow them to pass. Due to the level of disruption and the delay to work, it is not possible to undertake this to allow general access through the works.

Q. How will my carer access my property?
A. We will liaise with the known carers about the need to park at the end of the works and to walk to the relevant property. If carers require vehicle access, we will liaise with them to ensure the quality of care is not reduced.

Q. Where will I, my customers, visitors park?
A. Vehicle access will be restricted while the works are directly outside your property; however, parking areas for these affected will be identified. It will be necessary for people to walk through the works at times however the distance will be minimised as much as possible. Those with mobility issues will be contacted and specific arrangements made.

Q. What happens with deliveries, refuse collection etc.?
A. We will liaise with the known delivery and refuse collection companies with regards to the disruptions. Delivery companies will have to park at the end of the works and walk to the relevant property. Suitable collection points will be agreed for refuse collections.

Q. What happens if it floods during the works?
A. It all depends on the severity of the flood. If the flood is manageable, then pumping will be employed by the contractor. The works will need to be temporarily suspended if not.

Q. Will we still be able to pump out our cellars onto the road whilst the works are being carried out?
A. Only if water reaches the level where pumping is allowed, in which case works will be suspended to enable pumping. Otherwise pumping will not be permitted while works are under way due to health and safety reasons.
Hambledon Flood Alleviation Scheme

Thank you for taking the time to view the exhibition. We hope you found it informative.

We will be providing more information about the work as our contractor finalizes the detailed programme. As described earlier in this display, from the end of May when the initial work begins through to the installation of the ‘Big Pip’ and the end of the works, we will be providing information to you in a number of ways and a range of options for how to contact us.

You can also continue to find out more and contact us at the following:

- Website: www.hants.gov.uk/hambledon-flood-alleviation
- Email: hambledon@hants.gov.uk
- Telephone: Hampshire County Council - 0300 555 1398
  Textphone - 0300 555 1390
- Write to us at: Hambledon Flood Alleviation Scheme
  Economy, Transport and Environment Department,
  Hampshire County Council,
  The Castle,
  Winchester,
  SO23 8UD

If you haven’t already completed a questionnaire telling us about your circumstances, or if you have new information that you think it would be helpful for us to know, please contact us. We are committed to working with you to ensure that this scheme is completed successfully and safely, and that Hambledon remains open for business as usual during the works.
APPENDIX F

Signage
Typical Advisory Sign - Reference Number and Village Name to be Amended

VILLAGE NAME
EMERGENCY OVERPUMPING

Please note over-pumping of dilute screened sewage to the TBC
t is being undertaken to protect customers from flooding and
lack of drainage.

It is advised to keep children & pets from the watercourse in the vicinity of
this discharge. If you have contact with the water please ensure you wash
your hands before eating or drinking.

If you have any concerns please contact:

Southern Water 0845 278 0845 Quoting Ref: TBC
Location of Advisory Signs in 2013/14