



WIPES IN SEWER BLOCKAGE STUDY

FINAL REPORT

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WATER UK

WIPES IN SEWER BLOCKAGE STUDY – FINAL REPORT

Executive Summary

Objectives

The project objectives were to:

- i) Carry out investigations in wastewater utility areas/catchments, to obtain updated information regarding the composition of both sewer blockages and pump clogs.
- ii) Use the information gained from the investigations to help determine interventions to reduce the incorrect disposal of non-flushable products.
- iii) Use the information gained from the studies to help demonstrate the effect that non-flushable wipes and other non-flushable products have on the sewer network.

Conclusions

- 1) The majority of the sewer blockage material recovered comprised of non-flushable wipes that were not designed to be flushed and should not have been disposed of via the WC. Baby wipes accounted for over 75% by weight of identifiable products. Surface wipes, cosmetic removal wipes and feminine hygiene products accounted for approximately 20% by weight of identifiable products.
- 2) The products recovered that were designed to be flushed accounted for a small proportion of the products recovered – Approximately 0.88% by total weight and 1.9% by weight of products that could be identified. However, it is accepted that during the blockage recovery process some toilet tissue and other weaker material is lost in the blockage removal process.
- 3) The analysis of the samples collected at wastewater treatment works inlets shows a similarity with the items recovered from the sewer blockage samples. This suggests that the items causing/present in sewer blockages are the same types of items (by intended use) and that they remain intact as far as the wastewater treatment works.
- 4) The majority of material in pumping station clogs was an unidentifiable mass of wipes. However, a single pumping station clog where individual products could be recognised, showed that it contained a higher proportion of non-flushable wipes than sewer blockages – 95% as opposed to 75% in sewer blockages. There was limited flushable wipe material (0.09%) identified in the pump clogs in this single sample. Experience suggests that this is because sewage pumps are able to mechanically break the flushable wipes and pass them downstream.
- 5) The analysis of features associated with blockage locations, for which sufficient data was provided, showed a wide variability in the reason for the blockage having formed:

- 11 were the result of wipes being flushed via toilets into drainage systems with features which are integral to drain and sewer systems. These features include interceptor traps, backdrops, 90° bends etc.
 - 4 were the result of wipes being flushed via toilets into drainage systems which contained unavoidable debris, such as gravel/sediment deposits).
 - 1 was the result of a sewer defect that was in need of repair.
 - 6 were due to inappropriate disposal practice; the flushing of a dishcloth, a curtain and at 4 sites, excessive volumes of wipes.
 - 3 were at locations where, despite adequate information being returned from site, there was no obvious cause.
 - 3 of the 7 pump clogs recovered were caused by material (clothes etc.) being disposed of to the sewer system.
 - For the remaining 20 sewer blockages insufficient data was available to assess the features at the blockage locations.
- 6) It is apparent from an analysis of the recovered sewer blockage samples that a significant number of people are unaware of the 'do not flush' advice on the non-flushable wipes packaging; do not appreciate the reason why wipes designed not to be flushed should not be flushed, or are unconcerned by the potential consequences of their actions.

Recommendations

Following the conclusion of this report it is recommended that:

- 1) Public/press communications should target the inappropriate disposal to sewer of non-flushable products.
- 2) Polypropylene or Polyethylene fibres should not be included in any product labelled as flushable.
- 3) Manufacturers and retailers adhere to the labelling requirements of EDANA's flushability guidelines and COP v2. This requires a clear 'do not flush' logo on the front of pack, on all non-flushable wipes.
- 4) Manufacturers and retailers of non-flushable wipes provide responsible disposal information in their advertising and awareness campaigns.
- 5) Manufacturers, retailers and the water industry working collaboratively on a customer campaign, to raise awareness of the correct disposal of non-flushable wipes.
- 6) Awareness and information campaigns need to reinforce the message that, as well as being illegal, in respect of Section 111 of the Water Industry Act 1991, the disposal of clothes/woven materials should be via the solid waste route.

- 7) Consideration should be given to issues around toddler wipes.
- 8) Consideration should be given to conducting a repeat of the study following educational campaigns to see if they have been effective in reducing the number of non-flushable wipes in the sewer.

Benefits

The benefits of the project have been:

- i) An updated and far more detailed evaluation of the material found in blockages and pump clogs, than was previously available.
- ii) To provide information to better target interventions. This may include:
 - Better labelling, in particular for the types of items found in the material collected: and
 - Better targeting of awareness/information campaigns by **all** stakeholders concerned.
- iii) As a result of the above interventions, there is the potential for:
 - Significant financial savings to customers;
 - Improvements in water quality and the natural environment;
 - Reduction in sewer flooding to homes and pollution to the environment; and
 - Increased expenditure by the water industry on improving services to customers as result of not spending the money dealing with avoidable blockages and related incidents.
- iv) Increased reputation of manufacturers and retailers, as responsible players in the area of 'do not flush' labelling and awareness of correct disposal methods for non-flushable products.
- v) Provides basis from which collaborative opportunities can be identified with the water, manufacturing and retail industries.

For further information please contact WaterUK, 3rd Floor, 36 Broadway, London, SW1H 0BH quoting the report reference number

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1 Introduction

Wipes and other disposable products are the main cause of sewer blockages and emergency call outs to sewage pumping stations.

A relatively small study undertaken in the UK in 2011 showed that baby wipes and other items not suitable for WC disposal made up a substantial proportion of the blockage material.

This larger study has been undertaken by WRc as part of the Water UK 21st Century Drainage Programme. It has involved the collection of sewer blockages and pump clogs by six water and sewerage companies (WaSCs) and, by WRc staff, three samples from sewage treatment works inlet channels. The 54 different samples were subsequently assessed by a combination of WaSC staff, manufacturers' representatives, EDANA and WRc staff during the 'Recognition Days' held at WRc on the 7th and 8th August 2017.

This project final report gives details of the blockage sample collection methodology, product identification and the analysis of the findings.

The updated blockage content information will help the water industry and manufacturers, retailers, NGOs to better target their actions and investment to reduce the flushing of inappropriate items.

2 Sample collection

Sample collection was undertaken from blockage incidents allocated to sewer blockage crews and reactive pump maintenance crews who had been selected by the participating water companies to carry out the sample collections. Blockages were allocated to the sample collection crew from the blockage incidents reported to the water company call centre or the pump station control room on a daily basis.

A brief data sheet was provided by WRc for the crews to complete to be attached to the samples. Where possible, a copy of the Incident Reports/feedback from the water company database was requested to provide details of the site and mode of blockage. Some companies also provided photographs. This information was used to subsequently establish the cause of each blockage.

It should be noted that collection of blockage material is totally dependent on the occurrence of appropriate material and the configuration of the drainage system to facilitate collection of that material.

A total of 44 sewer blockages, 7 pump clogs and 3 WwTW inlet samples were collected during the period 11 May to 31 July 2017.

2.1 Sewer blockage collection method

The collection of sewer blockage material samples was carried out as a specific sample collection activity and did not rely on the capture of material cleared from standard blockage clearance with a jetting machine. Experience has shown that collection of material from jetted blockages is very unreliable and material recovered is not necessarily representative of the composition of the blockage.

Where possible the recovery of samples was achieved using drain rods fitted with a plunger. Where upstream and downstream chambers were accessible, a plunger was used from upstream to push the blockage to the downstream collection point in a controlled manner. The plunger helps control the discharge of the backed up effluent.

Some material was recovered using a worm screwed tightly into the blockage from the upstream chamber and the blockage drawn slowly and as intact as possible to the upstream manhole. Samples were also collected from interceptors using a grab. However, it was necessary to dislodge some blockages using a jetter operating under low pressure and samples were collected from the material snagged on the rear of the jetting nozzle.

The samples were recovered from the manhole using a grab or basket (where possible), with care taken not to collect material from the flow backed up by the blockage. However, evidence gained during the blockage recovery process shows that some of the material, such as toilet tissue and other weaker material are lost in the blockage removal process.

2.2 Pump blockage collection method

Pump blockage material was collected by the reactive pump maintenance crews from pump failures on an opportunistic basis.

Pump blockage material was only collected from blockages that required the pump to be lifted to clear the blockage. This ensured the material collected was that which could be specifically identified as being part of the blockage and not general debris from the wet well. Samples recovered were examples of blockages that were removed intact and others that were extracted piece by piece.

2.3 Wastewater Treatment Works inlet collection method

Three sets of samples of wipes and other non-sewage material were collected at two waste water treatment works, serving populations of 117,000 and 216,000, on 22 May and 3 July 2017. Both catchments comprised of residential, commercial and light industrial areas.

Samples were collected from the surface of the flow approaching the inlet screens and also from the screens themselves in order to sample the subsurface material. Samples were recovered at random over a period of up to two hours (morning peak flow) using a grab and/or basket. Samples were recovered largely as single items but samples of entangled materials were also recovered.

Intact wipes were targeted to allow identification of products that represent the bulk of material captured on the screens.

2.4 Sample processing

Samples were either delivered to WRc by courier or collected from designated storage at each water company by WRc.

On receipt of the samples at WRc's laboratories in Swindon, each sample was gently rinsed with tap water to remove organic material and the bulk of toilet paper captured with the blockage. It is recognised that dispersible wipe material may also have been washed out during this process as it is similar to toilet paper, although care was taken to retain any of this material if it was identified. All materials other than this, including sanitary products, cotton buds, stones, metals, textiles, plastics, roots etc., included in the blockage, was returned to the sample buckets along with the wipes for subsequent identification. A disinfectant was added at this stage to reduce decomposition and to make the examination of the materials less offensive.

3 Sample 'Recognition Days'

Samples 'Recognition Days' were held at WRc Swindon on the 7th and 8th August 2017. The report gives details of the work that was undertaken and, in an appendix, details of the contents of each of the 54 samples analysed.

4 Analysis of Results

4.1 Contents of samples collected

The contents of each of the 54 samples analysed during the 'Recognition Days' were recorded in an excel database. This resulted in 70 different descriptors being used in the description of the contents. Many of these descriptors were similar and, in order to simplify and enable understandable comparisons, these 70 descriptors have been combined into 18 main categories, as detailed in the tables in Appendix 1.

Sample proportions are defined by weight. It should be noted that the weight represents wet, hand rung samples, not dried samples.

Wipe samples were classified as either '*unidentifiable*' or '*identifiable*', as follows:

- The unidentifiable wipes, 53% by weight, were unidentifiable due to being deformed and/or twisted and are grouped together as an '*unidentifiable mass of wipes*' category.
- The identifiable wipes, 47% by weight, were categorised by their intended use, for example, baby wipes, surface wipe, moist toilet tissue etc, as listed in Appendix 1.

Tables 1, 2, 3 and 4 give the results of the sample analysis, in terms of percentage by weight of the product categories, for the following groups of samples:

- Table 1 - All 54 samples analysed;
- Table 2 - Sewer blockage samples;
- Table 3 - WwTW inlet samples; and
- Table 4 - Pumping Station – pump clog samples.

It is noted that the two categories ‘Unidentified mass of wipes’ and ‘Baby wipe’ are dominant and account for between 79% to 87% of all items from Sewer, WwTW and Pumping Station samples, depending upon the source.

Furthermore, referring to Table 1 below, in excess of 98.7% of items found in the samples analysed are in the first 7 categories, indicating that items in the other 11 categories are relatively uncommon and of less significance in terms of the materials found.

The categories ‘Unidentified mass of wipes’ and ‘Baby wipe’ are the top two categories, by weight, in each of the groups of samples. ‘Surface Wipes’, ‘Female Hygiene’ and ‘Cosmetic Wipe’ categories are always present in the top 7 categories in both the Sewer and WwTW samples.

The Pumping Station samples likewise show ‘Unidentified mass of wipes’ as the primary pump blockage causes (87.6%) but ‘Materials/Clothing’ account for 11% of blockage material by weight. All other items combined represent less than 1.3% of material removed from the pumps.

Gravel/deposits (including encrustation and concrete) are only significant in the sewer samples. Clothing/materials are only significant in the pump blockage samples.

Table 1 Percentage of samples in each product category for all samples (pipe blockage, pumps and inlet)

Product categories	Total weight kg.	% of sample
Unidentified mass of wipes	24.533	49.07
Baby wipe	18.055	36.11
Surface wipe	2.067	4.13
Material/clothing	1.438	2.88
Female hygiene	1.191	2.38
Cosmetic wipe	1.025	2.05
Gravel/deposits	0.863	1.73
Flushable wipe/Moist toilet tissue	0.44	0.88
Plastic wrapper	0.091	0.18
Personal care (non wipe items – See Appendix 1 for further details)	0.083	0.17
Toddler wipe	0.065	0.13
Paper products	0.049	0.10
Metal	0.03	0.06
Various debris	0.024	0.05
FOG	0.023	0.05
Cotton pad	0.012	0.02
Industrial	0.008	0.02
Toilet paper	0.004	0.01
Total	50.001	100.00

Table 2 Percentage of samples in each product category for Sewer pipe blockage samples

Product categories	Total weight kg.	% of sample
Unidentified mass of wipes	17.217	45.52
Baby wipe	15.665	41.41
Surface wipe	1.917	5.07
Gravel/deposits	0.863	2.28
Female hygiene	0.783	2.07
Material/clothing	0.433	1.14
Flushable wipe/Moist toilet tissue	0.418	1.11
Cosmetic wipe	0.35	0.93
Personal care (non wipe items – See Appendix 1 for further details)	0.064	0.17
Metal	0.03	0.08
FOG	0.023	0.06
Plastic wrapper	0.019	0.05
Paper products	0.013	0.03
Cotton pad	0.012	0.03
Various debris	0.011	0.03
Toilet Paper	0.004	0.01
Industrial	0.003	0.01
Total	37.825	100

Table 3 Percentage of samples in each product category for inlet of wastewater treatment works samples

Product categories	Total weight kg.	% of sample
Baby wipe	2.278	53.41
Unidentified mass of wipes	1.106	25.93
Female hygiene	0.331	7.76
Cosmetic wipe	0.18	4.22
Surface wipe	0.15	3.52
Plastic wrapper	0.066	1.55
Toddler wipe	0.065	1.52
Paper products	0.036	0.84
Flushable wipe/Moist toilet tissue	0.014	0.33
Various debris	0.013	0.30
Personal care (non wipe items – See Appendix 1 for further details)	0.012	0.28
Cotton pad	0.005	0.12
Industrial	0.005	0.12
Toilet paper	0.004	0.09
Total	4.265	100.00

Table 4 Percentage of samples by product category for Pumping Station samples

Product categories	Total weight kg.	% of sample
Unidentified mass of wipes	6.204	63.29
Baby wipe	2.389	24.37
Material/clothing	1.088	11.10
Female hygiene	0.087	0.89
Personal care (non wipe items – See Appendix 1 for further details)	0.019	0.19
Flushable wipe/Moist toilet tissue	0.009	0.09
Plastic wrapper	0.006	0.06
Paper products	0.001	0.01
Total	9.803	100.00

4.2 Contents of samples collected – Domestic flushed products only

A further analysis has been carried out after removing the following categories from the analysis:

- *Unidentified mass of wipes;*
- *Material/clothing;*
- *FOG;*
- *Metal;*
- *Gravel/deposit’; and*
- *Various debris.*

This enables a comparison of the different types of wipes and products used in a domestic scenario, which could be positively identified, to be made.

The results are given in the following tables:

- Table 5 - All 54 samples analysed;
- Table 6 - Sewer blockage samples;
- Table 7 - WwTW inlet samples; and
- Table 8 - Pumping Station – pump clog samples.

It should be noted that the ‘*unidentified mass of wipes*’ could not be untangled, so whilst the majority appeared to be baby wipes and facial wipes, we cannot be 100% certain. We don’t know the proportions of each and as such cannot report, with any accuracy, the make-up of the tangled masses.

The analyses indicate that the majority of domestic product items recovered were baby wipes. In the case of sewer blockage samples and WwTW samples this was 77% and 72% of all domestic items by weight respectively. The vast majority of the other products recovered from sewer blockage samples and WwTW samples, over 20% of all domestic items by weight, were either surface wipes, female hygiene products or cosmetic removal wipes. Moist toilet tissue accounted for 1.9% by weight of domestic products. Toddler wipes, which may or may not be designed to be flushable, accounted for 0.3% by weight.

It is noted that there is a similarity in the proportion of items, by intended use, recovered from the sewer blockage and WwTW inlet samples. This suggests that the items present in sewer blockages are the same types of items and that they remain intact as far as the wastewater treatment works.

The analysis of four pumping station clogs in which a significant proportion of wipes etc. were recovered, showed that, of the items that could be recognised, over 95% were baby wipes. The lower proportion of other categories of product is because sewage pumps are able to mechanically break up some of these items and pass them downstream – Baby wipes, on the other hand are seen to remain relatively intact in the tangled mass samples, despite the considerable forces applied to them.

It should be noted that the pump clog analysis is only on items that could be positively identified. It does not include the unidentified mass of wipes, typically found in pump clogs. Reference to Table 4 shows that the majority of materials found in four pump clogs were entangled masses.

Three pump clogs were the result of clothing/materials being ingested into the pumps. These clogs did contain some wipes but these have not been included in the above pump clog analysis.

Table 5 Percentage of samples by domestic product category for all samples collected (sewers, pumps and wastewater treatment works inlets)

Product categories	Total weight kg.	% of sample
Baby wipe	18.055	78.2
Surface wipe	2.067	9.0
Female hygiene	1.191	5.2
Cosmetic wipe	1.025	4.4
Flushable wipe/Moist toilet tissue	0.44	1.9
Plastic wrapper	0.091	0.4
Personal care	0.083	0.4
Toddler wipe	0.065	0.3
Paper products	0.049	0.2
Cotton pad	0.012	0.1
Industrial	0.008	0.0
Toilet paper	0.004	0.0
Total	23.113	100.0

Table 6 Percentage of samples by domestic product category for Sewer Samples

Product categories	Total weight kg.	% of sample
Baby wipe	13.387	76.8
Surface wipe	1.917	11.0
Cosmetic wipe	0.846	4.9
Female hygiene	0.773	4.4
Flushable wipe/Moist toilet tissue	0.419	2.4
Personal care	0.052	0.3
Plastic wrapper	0.019	0.1
Paper products	0.013	0.1
Cotton pad	0.012	0.1
Industrial	0.003	0.0
Total	17.441	100.0

Table 7 Percentage of samples by domestic product category for WwTW Samples

Product categories	Total weight kg.	% of sample
Baby wipe	2.278	72.4
Female hygiene	0.331	10.5
Cosmetic wipe	0.18	5.7
Surface wipe	0.15	4.8
Plastic wrapper	0.066	2.1
Toddler wipe	0.065	2.1
Paper products	0.036	1.1
Flushable wipe/Moist toilet tissue	0.014	0.4
Personal care	0.012	0.4
Cotton pad	0.005	0.2
Industrial	0.005	0.2
Toilet paper	0.004	0.1
Total	3.146	100.0

Table 8 Percentage of samples by domestic product category for Pumping Station Samples

Product categories	Total weight kg.	% of sample
Baby wipe	2.389	95.2
Female hygiene	0.087	3.5
Personal care	0.019	0.8
Flushable wipe/Moist toilet tissue	0.009	0.4
Plastic wrapper	0.006	0.2
Total	2.51	100.0

4.3 Analysis by features

Sample collection crews were asked, whenever possible, to identify and record the probable cause of each sewer blockage where samples were recovered. Nevertheless, it is recognised that there are occasions when it is not possible to identify the likely cause.

Of the 44 sewer blockage samples recovered, detailed information accompanied 24 of the blockages. This information was contained on either the blockage data sheet which the crews were asked to complete by WRc and or from the WaSCs corporate incident report system.

Unfortunately, 20 of the sewer blockages were accompanied by either insufficient or no information to enable the cause to be determined.

Of the 24 sewer blockages where sufficient data was provided, the features associated with sewer blockages have been determined, as indicated in Table 9.

Table 9 Features associated with sewer blockages

Feature	Number
Combination of inappropriate disposal and feature in the drain/sewer system	
Backdrop pipe	2
Bend	3
Interceptor trap	3
Low/intermittent flow	3
Item in pipe or defect	
Gravel/deposits	3
Sewer defect	1
Disposal of items	
Disposal of dishcloth (Sample 11)	1
Disposal of a curtain (Sample 49)	1
Volume of wipes	4
No obvious cause	
Sufficient information supplied and no obvious cause	3
TOTAL	24

Of those sewer blockages where a likely cause could be determined 11 were due to a combination of inappropriate disposal and features that are common in sewer system design. These features in all other respects would be regarded as a serviceable sewer.

Four of the blockages were caused by either deposits in the pipe or by a defect.

Six blockages were caused by disposal practices; two were due to the disposal of woven textiles and four due to large volume of wipes. Where volume of wipes was recorded, all were in pipes of 150 and 225 mm diameter with large numbers (200 to 1000+) of properties connected. A greater variety of types of products were also noted compared to blockages

with fewer properties (12 or less) upstream. In all of these blockages there was no other obvious contributory factor, for example a pipe defect or gravel being present.

In three blockages there was no obvious cause. The pipe was in a fully serviceable condition and there were no obvious features or defects in the drainage system. Similarly, items such as gravel or woven cloth were not present. Therefore, the most likely cause of the blockage was volume of wipes.

4.4 Analysis by cause of pump blockage

Of the seven pump blockages recovered, the following items were present:

- i) Mass of wipes (most likely baby wipes) - 3 pump clogs in pumps rated from 2.4 to 37 kW.
- ii) Baby wipes (could be separated and identified as such) – 1 pump clog in a pump rated at 13.5 kW.
- iii) Woven textiles (clothing etc.) – 3 pump clogs in pumps rated from 1.3 to 18.7 kW.

5 Conclusions

- 1) The detailed analysis of the contents of sewer blockages, together with 7 pump clogs and three treatment work inflow samples, has given significant new and detailed information, which will be very useful to both the water industry and wipe manufacturers.

A similar, although far smaller study, was carried out in 2011 and this gave a valuable insight into the problem at that time. This new study gives a more detailed, representative and up to date review of blockage content - 54 blockages have been analysed and the results show a consistency between many of the samples analysed. The majority of material recovered comprised of wipes that were not designed to be flushed and should not have been disposed of via the WC. Of the items that could be identified, baby wipes accounted for over 75% by weight of identifiable products. Surface wipes, cosmetic removal wipes and feminine hygiene products accounted for approximately 20% by weight of identifiable products.

- 2) A significant finding that has come out of the study is that a large proportion of the material present in sewer blockages and pump clogs are non-flushable wipes, the majority of which are spun lace. Such wipes are not suitable to be flushed and should not have been disposed of via the toilet. Whilst many of these products are labelled as not flushable (or similar) there is clearly a significant number of people who are unaware of this labelling or do not appreciate the reason why these items should not be flushed or are unconcerned by the potential consequences of their actions.
- 3) Whilst the vast majority of products recovered were not designed to be flushed, a small proportion of the products recovered (approximately 0.88% by total weight and 1.9% by weight of products that could be identified) were designed to be flushed. However, it is accepted that during the blockage recovery process toilet tissue and other weaker

material, is lost in the blockage removal process. Similarly, there will be some material loss with the blockages that are 'rodded through' to the next accessible manhole. The analysis of the samples collected at wastewater treatment works inlets shows a similarity with the items recovered from the sewer blockage samples. This suggests that the items causing/present in sewer blockages are the same types of items (by intended use) and that they remain intact as far as the wastewater treatment works.

- 4) The majority of material in pumping station clogs was an unidentifiable mass of wipes. However, a single pumping station clog where individual products could be recognised, showed that it contained a higher proportion of non-flushable wipes than sewer blockages – 95% as opposed to 75% in sewer blockages. There was limited flushable wipe material (0.09%) identified in the pump clogs in this single sample. Experience suggests that this is because sewage pumps are able to mechanically break the flushable wipes and pass them downstream.
- 5) The analysis of features associated with blockage locations, for which sufficient data was provided, showed a wide variability in the reason for the blockage having formed. Of the 24 blockages where sufficient information was returned, 11 were at features which are integral to drain and sewer system design in the UK. These features, in all other respects, do not present a problem and are regarded as being part of a serviceable sewer. Four of the blockages are thought to have been the result of other unavoidable debris in the pipe (gravel/deposits) and a sewer defect that was in need of repair. Six blockages were due to highly inappropriate disposal practice; the flushing of a dishcloth, a curtain and at 4 sites, excessive volumes of wipes.

Three blockages were at locations where, despite adequate information being returned from site, there was no obvious cause. The pipe was in a fully serviceable condition and there were no obvious features or defects in the drainage system.

- 6) Three of the seven pump clogs recovered were caused by material (clothes etc.) being disposed of to the sewer system. This proportion is considerably higher than had been anticipated and may be a consequence of a relatively small number of pump clog samples being collected and analysed. Also, many pumps that become stalled because of foreign matter caught in the impellers are able to be cleared by reversing the pumps. Accordingly, the samples collected represent the most severe of the many problems that occur.

6 Recommendations

It is recommended that:

- 1) Public/press communications should target the inappropriate disposal to sewer of non-flushable products.
- 2) Manufacturers and retailers adhere to the labelling requirements of EDANA's flushability guidelines and COP v2. This requires a clear 'do not flush' logo on the front of pack, on all non-flushable wipes.

- 3) Manufacturers and retailers of non-flushable wipes provide responsible disposal information in their advertising and awareness campaigns.
- 4) Manufacturers, retailers and the water industry working collaboratively on a customer campaign, to raise awareness of the correct disposal of non-flushable wipes.
- 5) Polypropylene or Polyethylene fibres should not be included in any product labelled as flushable. This is because the majority of the items found in the sewer blockage and pump clog samples are composed of these materials.
- 6) Awareness and information campaigns need to reinforce the message that, as well as disposal to sewer being illegal, in respect of Section 111 of the Water Industry Act 1991, clothes/materials should be disposed of via the solid waste route.

Section 111, of the Water Industry Act, states:

'Subject to the provisions of Chapter III of this Part, no person shall throw, empty or turn, or suffer or permit to be thrown or emptied or to pass, into any public sewer, or into any drain or sewer communicating with a public sewer—

a) any matter likely to injure the sewer or drain, to interfere with the free flow of its contents or to affect prejudicially the treatment and disposal of its contents'

- 7) A useful cross-reference to this study would be to ascertain from market data all types and numbers of wipes currently sold in the UK.
- 8) Consideration should be given to issues around toddler wipes.
- 9) Consideration should be given to a repeat of the study following educational campaigns to see if they have been effective in reducing the number of non-flushable wipes in the sewer.

7 References

- 1) UKWIR Phase 2 – Flushability Joint test Protocol. Briefing Note 4 – Analysis of blockage and pump clog samples, categorisation by inspection and weight, October 2011.
- 2) Water Industry Act 1991

Appendix 1

Product categories, as used in Section 4 of the report, are as follows:

<i>Final product type categories.</i>	<i>70 different descriptions from Recognition Day categorised as 18 types of products</i>
Baby wipe	Baby wipe Baby wipe/hard surface wipe, baby/facial
Cosmetic wipe	Cosmetic wipe, facial wipe
Cotton pad	Cotton pad, cosmetic pad, cosmetic removal pads
Female hygiene	Tampon, panty liner, panty liner plastic, sanitary towel, fem care remainders, adult incontinence products
Flushable wipe/ Moist toilet tissue	Flushable toilet wipe, moist toilet tissue, MTT
FOG	FOG, fat lumps
Gravel/deposits	Gravel, encrustation, concrete
Industrial	Industrial wipe
Material/clothing	Shirt, material, knickers, restaurant serviette, curtain, high vis, net
Metal	Iron, grid
Paper products	Paper towel, kitchen roll, kit roll fragments, wallpaper pieces
Personal care products (other than wipes) Note – this is not personal wipes	Disposable glove, ear bud stem, condom, gloves, dental floss
Plastic wrapper	Biscuit wrapper, disposable carrier bag, packing tape, plastic, plastic film napkin wrap, pill packet, toilet block holder, wrap
Surface wipe	Cleaning wipe, , cleaning mop wipe, floor wipe, household cleaning wipe
Toddler wipe	Toddler training wipes
Toilet paper	Toilet paper
Unidentified mass of wipes	Mass of wipes that would not come to pieces
Various debris	Silicon, plastic sewer collar, various debris, chunks, hair, general, snake skin, chamois leather

The categorisation of wipes as being non-flushable or potentially flushable, are as follows:

Overall category	Wet Wipes		
Flushable/DNF	Non-flushable wipes ⁽¹⁾	Flushable wipes ⁽²⁾	
Application	Baby, cosmetic, hard surface cleaning wipes	Moist toilet tissue and toilet cleaning wipes	
Technologies	Spunlace = long fibres, carded and hydroentangled, or alternatives	Wetlaid pulp and short fibres, hydroentangled (GD3 compliant)	Airlaid pulp with binder or synthetic fibres for bonding. (mostly not GD3 compliant)
<p>Notes</p> <p>⁽¹⁾ Baby wipes, cosmetic removal wipes and other cleaning wipes, made of long staple fibres</p> <p>⁽²⁾ Flushable wipes, such as moist toilet tissue and toddler training wipes are made of pulp and short fibres, designed to be (potentially) flushable</p>			