

NORTHLEACH SEWAGE TREATMENT WORKS

Peter Hammond, WASP, January 1st 2020

SUMMARY

This report summarises ongoing analysis by WASP (Windrush Against Sewage Pollution) of information gathered through public sources and Environmental Information Requests (EIRs) to the Environment Agency (EA) and Thames Water Utilities Ltd (TWUL) concerning Northleach Sewage Treatment Works (STW). The analysis is primarily a catalogue of incidents illustrating TWUL's management of the works to enable Northleach Councillors and local residents to decide for themselves if it is to an acceptable standard. Some of these incidents also offer an opportunity to judge the EA's oversight of TWUL's obligations to comply with its permit to discharge to a watercourse, namely the River Leach. The findings have not yet been presented to the EA or TWUL for reaction and/or confirmation of the events described but WASP believes they cast light on the following:

- 1) the resilience of the works during adverse weather and power supply fluctuation;
- 2) the alacrity and thoroughness of TWUL's remedial response to alarms;
- 3) the potential for unreported spills to the River Leach, the works and land adjacent to the works; and,
- 4) the response by TWUL management to operating staff's requests for problems to be addressed.

WHY DID WASP FOCUS ON NORTHLEACH STW?

Water companies are issued permits by the EA to discharge effluent (treated sewage) to watercourses with obligations to treat a minimum flow to specified standards and to report regular flow data and effluent quality to enable the EA to check permit compliance. At times of severe rain or snow melt, when sewage flow can be swollen by surface runoff, the EA permits water companies to store excess untreated sewage flow in a storm tank until the adverse weather abates or, when full, spill excess untreated sewage to a watercourse. Storm tank size is determined by regulation but typically needs to be large enough to avoid raw sewage spillage to a watercourse for 2 hours at a storm or overflow rate that is also determined in the EA permit.

WASP's attention was drawn to Northleach STW in autumn 2018 when effluent flow data for 2016 was provided by TWUL under EIR_4_12. It was immediately noticed that the treated flow out of the works was recorded as "zero" between January 31st and May 23rd 2016 as in Fig. 1 below:

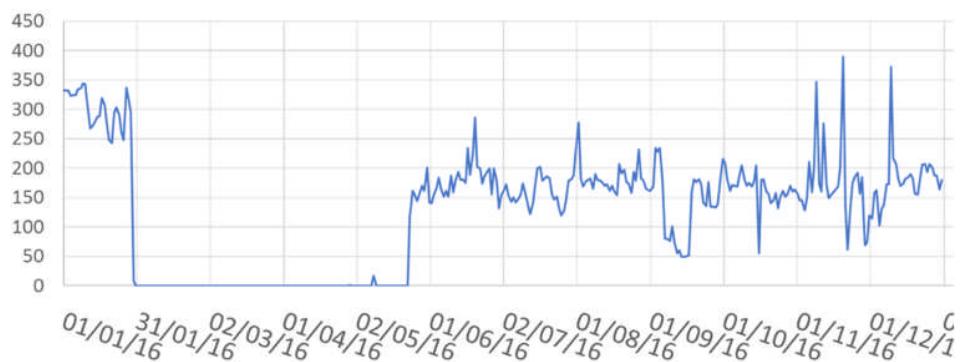


Figure 1: zero recorded effluent flow at Northleach STW Jan 31st to May 23rd 2016

When WASP highlighted this long period of "zero" outflow at meetings separately with TWUL and EA staff, both suggested a faulty flow meter as a likely explanation. Flow meters are vital to checking permit compliance and for both to accept such a long period of malfunction was very surprising. Water companies are obliged by their EA permit to treat a minimum rate of flow, record and report flow data regularly, ensure flow recording equipment is in good order, remedy faults in flow metering promptly and explain significant breaks in flow data acquisition.

Similar gaps in flow data at Burford STW, also identified by WASP, were reported to TWUL through Burford Town Council. In 2019, TWUL accepted that these were caused by equipment malfunction resulting in tonnes of untreated sewage being discharged into the River Windrush. The EA has acknowledged WASP's invitation to consider if these Burford incidents of permit non-compliance deserve prosecution. In view of events at Burford STW, WASP was concerned that a four-month gap in recorded flow data at Northleach STW might be associated with similar, but considerably greater, discharges of untreated sewage into the River Leach.

WHAT HAS WASP FOUND?

In May 2019, when WASP asked if sewage spills at Northleach STW had been reported to the EA, TWUL replied:

*"We have no records of sewage spills reported to the Environment Agency from Northleach STW in the period requested... **storm tank spills under storm conditions**, within the parameters of the sites permit, **are not reportable to the Environment Agency**."*

This excuse of "storm conditions" was also made by TWUL in its first response to Burford Town Council's challenge but, following WASP's analysis, this was shown to be untruthful and TWUL later admitted to unpermitted discharges of raw sewage into the River Windrush caused by equipment malfunction exacerbated by slow response to alarms.

WASP submitted further EIRs for telemetry alarm exchanges between Northleach STW and TWUL's Waste Operating Control Centre (WOCC) in Reading as well as transcriptions of entries made by operating staff in log books that are maintained at the works. Subsequent analysis of this additional data has confirmed that indeed there was a faulty effluent outflow meter but there was also a faulty inlet sewage meter during the period in question. Besides exposing this period of "zero" recorded flow, WASP's analysis of the telemetry data and operator log books has revealed a catalogue of incidents that demonstrate how TWUL manages Northleach STW, self-reports monitoring data and incidents to the EA, and how closely the EA scrutinises TWUL's performance. Before responding to WASP's analysis and making a final judgement, it would assist Northleach councillors and residents to have answers to the following questions (with references to appendices where further detail is given):

- 1 Why did the EA not detect a four-month gap in outflow data that is non-compliant with TWUL's permit? (A)
- 2 Why did TWUL take 4 months to fix the outflow meter, a component essential to proving compliance with its permit? (A)
- 3 Why did TWUL take 6 months to fix a faulty inlet flow meter? (A)
- 4 Has TWUL investigated why key equipment for producing compliant sewage treatment and transfer of raw sewage to storm tank fails without sending alarm messages to its control centre in Reading? (A)
- 5 On February 9th 2016, did TWUL have a permit in place to discharge untreated sewage to **storm land**? (B)
- 6 Is the EA aware of a possible unpermitted discharge of untreated sewage to **storm land**? (B)
- 7 Did TWUL inform the EA, Northleach town council, local residents and landowners that untreated sewage was **coming up outside** the works on February 9th 2016 constituting a health risk to walkers on adjacent footpaths, pets being exercised and sheep grazing immediately adjacent to the works? (B)
- 8 Has the EA's scrutiny of TWUL's compliance missed unreported spills of raw sewage into the River Leach? (A,C)
- 9 Why is TWUL's rate for target alarm response times only 56% for 2016, 52% for 2017 and 50% for 2018? (D)
- 10 Has TWUL addressed the highest offending sources of call out requests for remedying fault alarms for all four years 2016-2019: effluent ammonia level, submerged aeration filters 1 & 2, and sludge holding tank? (E)
- 11 What has TWUL done, or is planning to do, to protect the works from the 30 or more annual power failure spikes that appear to cause equipment failures, raise alarms and affect effluent quality?
- 12 Has TWUL addressed the leaks at the final effluent sample chamber highlighted by operating staff on 09/02/2017 and 16/08/2018? One of these refers to a leaking storm pipe. (F)
- 13 Why, despite repeated mention by operating staff, was the site phoneline and telemetry communication out of action for almost all of August 2018? (G)
- 14 What effort has been made or is planned to protect the works from the frequent flooding that adversely affects sewage treatment and causes problems, and potentially health hazards, for operating staff and the public? (H)

APPENDIX DETAILED FINDINGS AT NORTHLÉACH STW

A Jan 27th to Jan 31st 2016

The mains power supply to Northleach STW failed on Jan 30th at 00:24, returned intermittently and at 03:22 failed for a further 8 hours. As the log reports show (CHART 1), the generator did not operate automatically but had to be started manually by an engineer called out to the works.

	Date/Time	Response	Source	Message: State changed from
A2	30/01/2016 00:27		STORM TANK	NORMAL to HIGH, value is 1 (Current data) - Alarm raised
A2	30/01/2016 02:34	127 mins	STORM TANK	HIGH to NORMAL, value is 0 (Current data) - Alarm cleared
A2	30/01/2016 10:42		STORM TANK	NORMAL to HIGH, value is 1 (Current data) - Alarm raised
A2	30/01/2016 13:44	182 mins	STORM TANK	HIGH to NORMAL, value is 0 (Current data) - Alarm cleared
A3	30/01/2016 00:33		FINAL FLOW METER	NORMAL to FAILED, value is 0 (Current data) - Alarm raised
A3	29/04/2016 12:04	3 months	FINAL FLOW METER	FAILED to NORMAL, value is 1 (Current data) - Alarm cleared
A3	30/01/2016 00:56		INLET FLOW METER	NORMAL to FAILED, value is 0 (Current data) - Alarm raised
A3	18/07/2016 14:55	5 months	INLET FLOW METER	FAILED to NORMAL, value is 1 (Current data) - Alarm cleared

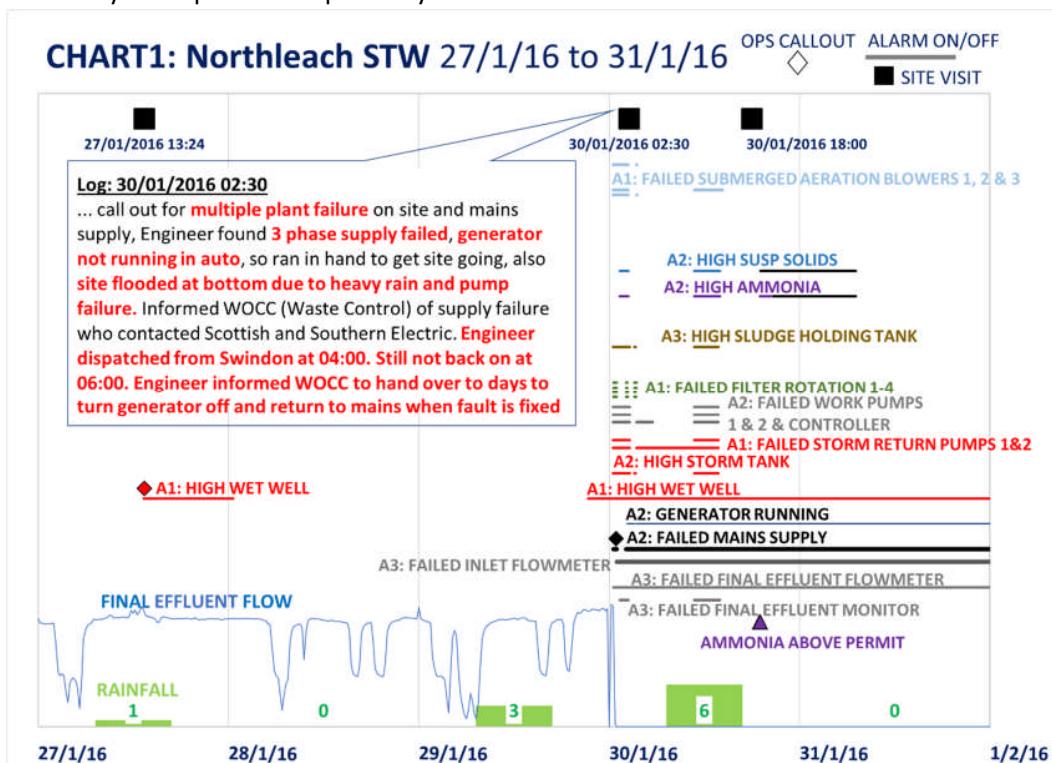
Table1: telemetry alarms for inlet and effluent flow meters and storm tank

For an hour or so, the site had no power and various pumps failed and alarms were set off. Without power, raw sewage could not be passed to treatment so it overflowed to the storm tank for 2 hours (there was little rain). The pumps emptying the storm tank failed, the wet well high alarm was already raised and the storm tank was high for 3 more hours. For these 5 hours, the average effluent volume that would have been passed to treatment was close to storm tank capacity. Given that the storm tank was high and both storm tank return pumps had failed earlier in the month, the storm tank was not empty when this incident began.

Q1 Can TWUL prove there was no spill of raw sewage into the River Leach on January 30th 2016?

Q2 Why did TWUL exceed their response time standard (90 mins for an A2 alarm – see table in appendix D) and not respond to and address the storm tank high alarms for 2 and 3 hours?

As the messages in Table 1 confirm, the inlet flow and final effluent meters failed on January 30th and were not working until 18th July and April 29th respectively.



B Feb 6th to Feb 10th 2016

Between Feb 6th and Feb 10th 2016, Northleach STW was again heavily flooded. Once more, a power surge had badly affected equipment on site – described by the visiting operator on Feb 6th as “serious plant failed (sic)”. Repeated operator visits were required, the storm tank high alarm (severity A2) was set for more than 2 days and the storm return pump failure (severity A1) for almost 4 days (see CHART 2) – such alarms should be cleared by the WOCC within 90 and 60 minutes respectively. Given the high rainfall, the inevitable untreated sewage spill would likely fall within permitted “storm conditions”. However, disturbingly, on February 9th 2016 the operator noted the following:

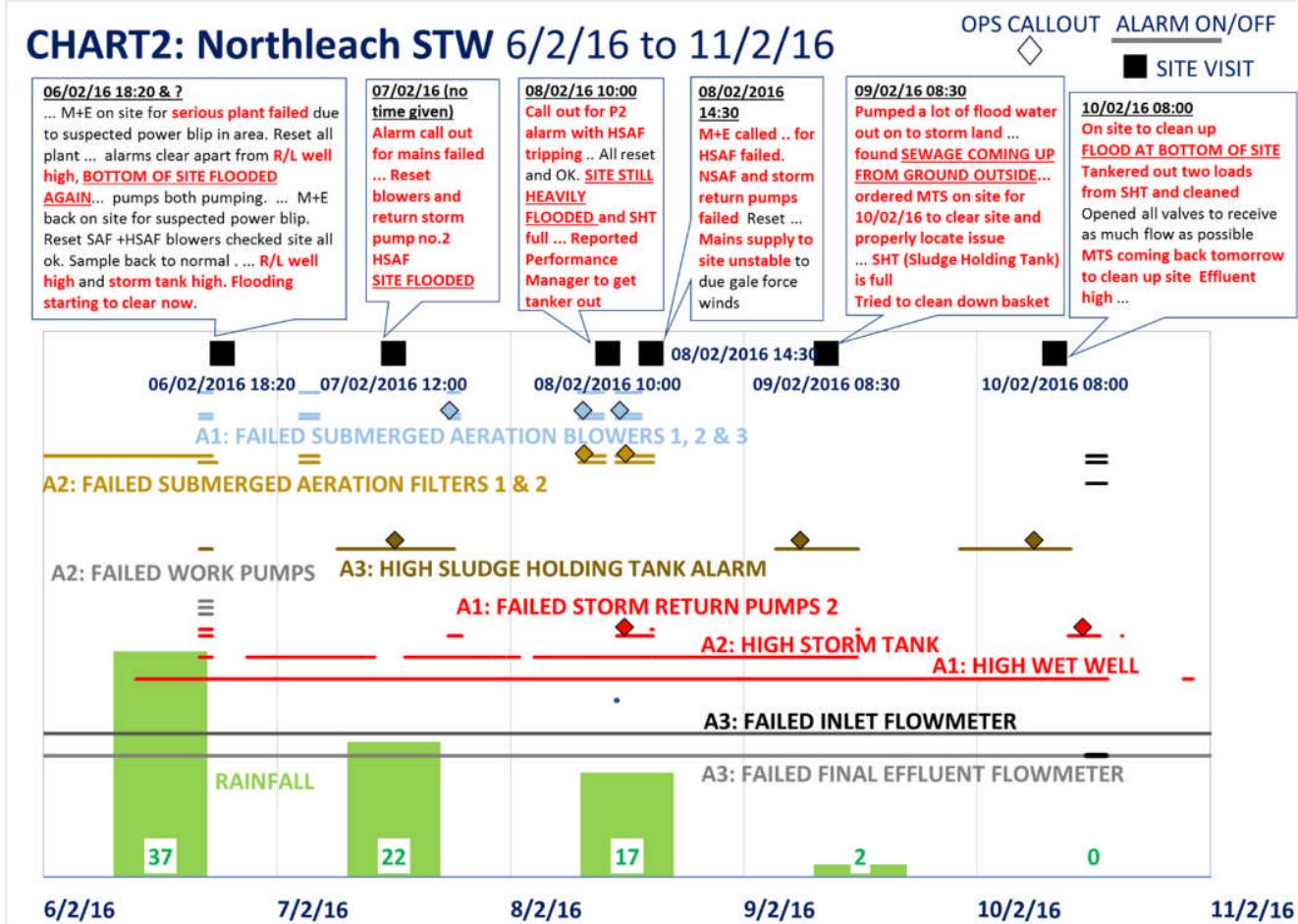
*Pumped a lot of flood water out on to storm land ... found **SEWAGE COMING UP FROM GROUND OUTSIDE**... ordered MTS on site for 10/02/16 to clear site and properly locate issue*

Q6 Is the *storm land* referred to a so-called land treatment area? Did TWUL have a discharge permit for such a facility at Northleach STW at the time?

Q7 Was the EA aware then that TWUL were discharging untreated sewage to land at Northleach STW?

Q8 Why did TWUL not inform the EA that untreated sewage was “coming up” outside the site? Surely, this constitutes an unpermitted spill of untreated sewage and in addition is a health and safety issue for the local people walking on the adjacent public footpaths, for their pets being exercised – let alone the sheep grazing immediately adjacent to the works. Were local landowners/farmers warned of this sewage spill outside the works?

CHART2: Northleach STW 6/2/16 to 11/2/16



C **Feb 25th to Feb 29th 2016**

The log report of 26th February 2016 at 03:00 in Chart 3 below describes an incident where the failure of multiple components (all 4 rotational biofilters) did not raise alarms. It also says that there was "no flow coming into the works".

Q9 Why did the failure of 4 key components not send alarm messages to the WOCC in Reading?

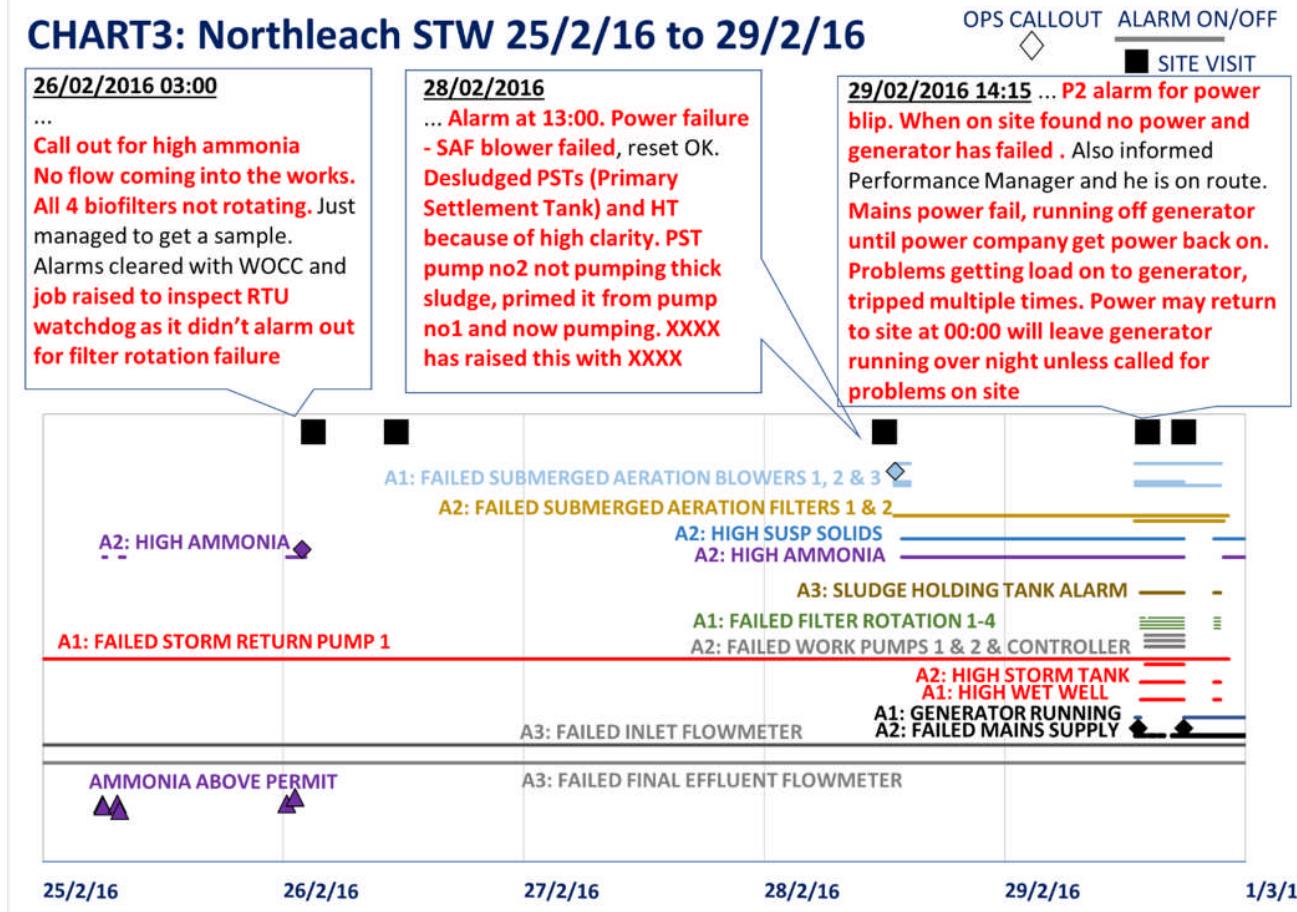
Q10 If untreated sewage was not being passed forward for treatment, how long was this for and did it end up in the storm tank? If so, why was the storm tank alarm not raised?

The log reports of 28th and 29th February mention further power failures and the second describes how the operator arrived to find both mains power and a backup generator failed. As can be seen in Chart 3 below, this left the site with no power and resulted in untreated sewage being passed to the storm tank whose alarm was set high from 13:31 to 17:53 and from 20:53 to 21:31 with a full wet well and both pumps for emptying the storm tank without power and failed. In that period, the untreated flow volume would have been close to the 78 cu m capacity of the storm tank. Therefore,

Q11 Can TWUL prove that there was no spill of raw sewage to the River Leach on Feb 29th 2016?

Once again, the remedial interventions to severity A1 alarms (storm return pumps, wet well, filter rotations 1-4, aeration blowers 1 and 2, generator) and severity A2 alarms (high ammonia, high suspended solids, aeration filters 1 & 2, storm tank, mains supply) alarms were well outside TWUL internal targets. The ammonia level in the treated effluent was above the permit level on five occasions on Feb 25th and Feb 26th.

CHART3: Northleach STW 25/2/16 to 29/2/16



D EFFICIENCY OF TWUL RESPONSE TO ALARMS

The TWUL Data Protection Adviser provided target response times for various grades of alarm. Tables below record the number and overall rate at which TWUL's response to alarms is under the target times. The overall, annual achievement rates were 56% (2016), 52% (2017) and 50% (2018). Alarms relating to sludge management receive the most sluggish response. The repeat offending sources of call out requests for all four years 2016-2019 are effluent ammonia level, submerged aeration filters 1 & 2, and sludge holding tank.

Alarm Priority	Action response by control centre (on receipt of alarm)	Attendance target
A1P	15 minutes	P1 (within 2 hours)
A1	60 minutes	P2 (within 2 hours)
A2	90 minutes	P3 (within 4 hours)
A3	Next working day	P6 (within 3 working days)

2016	UNDER	TOTAL	%		UNDER	TOTAL	%
ALL ALARMS IN TABLE	367	655	56	SAF BLOWER 1	13	26	50
WORK PUMP 1	1	7	14	SAF BLOWER 2	15	29	52
HUMUS DESLUDGE PUMP 2	1	6	17	SAF BLOWER 3	14	26	54
PRIMARY DESLUDGE PUMP 1	1	6	17	RTU WATCHDOG	5	9	56
PRIMARY DESLUDGE PUMP 2	1	6	17	HSAF PLANT 2	16	26	62
HSAF PLANT 1	3	18	17	FILTER 4 ROTATION	20	31	65
STORM TANK LEVEL METER	1	6	17	FINAL EFFLUENT SUS SOLIDS	18	27	67
WORK PUMP 2	1	6	17	FILTER 2 ROTATION	12	18	67
WORK PUMP CONTROLLER	1	6	17	GENERATOR	4	6	67
FINAL EFFLUENT BOD LEVEL	2	9	22	GENERATOR FUEL TANK	4	6	67
FINAL EFFLUENT MONITOR	2	9	22	STORM TANK	43	60	72
MACERATOR	2	8	25	STORM RETURN PUMP 1	17	22	77
HUMUS DESLUDGE PUMP 1	2	6	33	FILTER 1 ROTATION	12	15	80
GENERATOR FUEL BUND	2	5	40	FILTER 3 ROTATION	10	12	83
FINAL EFFLUENT AMMONIA	27	61	44	STORM RETURN PUMP 2	49	54	91
WET WELL	21	47	45	SITE SUPPLY	7	7	100
SLUDGE HOLDING TANK	32	67	48	BALANCING TANK	1	1	100

2017	UNDER	TOTAL	%		UNDER	TOTAL	%
ALL ALARMS IN TABLE	288	554	52	WET WELL	10	16	63
HUMUS DESLUDGE PUMP 2	1	6	17	STORM RETURN PUMP 1	9	14	64
PRIMARY DESLUDGE PUMP 1	1	6	17	FINAL EFFLUENT BOD LEVEL	6	9	67
HUMUS DESLUDGE PUMP 1	1	5	18	FINAL EFFLUENT MONITOR	6	9	67
SLUDGE HOLDING TANK	16	69	23	FILTER 4 ROTATION	6	9	67
FINAL EFFLUENT AMMONIA	12	41	29	GENERATOR	7	10	70
PRIMARY DESLUDGE PUMP 2	2	6	33	FILTER 3 ROTATION	7	9	78
HSAF PLANT 1	17	47	36	STORM TANK LEVEL METER	15	19	79
HSAF PLANT 2	11	29	37	FILTER 1 ROTATION	5	6	83
SAF BLOWER 1	13	31	42	GENERATOR FUEL TANK	5	6	83
WORK PUMP 1	3	7	43	MACERATOR	5	6	83
WORK PUMP 2	3	7	43	STORM RETURN PUMP 2	27	32	84
WORK PUMP CONTROLLER	3	7	43	PRIMARY SETTLEMENT TANK1	5	5	100
GENERATOR FUEL BUND	1	2	50	SITE SUPPLY	4	4	100
RTU WATCHDOG	5	10	50	BALANCING TANK	3	3	100
FINAL EFFLUENT SUS SOLIDS	20	32	63	BALANCING TANK MIXER	5	5	100
SAF BLOWER 3	20	37	54	FILTER 2 ROTATION	6	6	100
STORM TANK	6	11	55	INLET LEVEL	3	3	100
SAF BLOWER 2	14	25	56	PRIMARY SETTLEMENT TANK2	5	5	100

2018	UNDER	TOTAL	%		UNDER	TOTAL	%
ALL	257	509	50				
SLUDGE HOLDING TANK	8	66	12	STORM RETURN PUMP 1	5	11	45
FILTER 4 ROTATION	3	12	25	STORM RETURN PUMP 2	8	14	57
FILTER 2 ROTATION	5	19	26	GENERATOR	7	12	58
FILTER 1 ROTATION	3	9	33	SAF BLOWER 2	10	16	63
HUMUS DESLUDGE PUMP 2	4	12	33	SAF BLOWER 3	11	16	69
HSAF PLANT 2	7	20	35	FINAL EFFLUENT MONITOR	7	10	70
HSAF PLANT 1	9	25	36	SAF BLOWER 1	9	12	75
FILTER 3 ROTATION	3	8	38	FILTER FEED PUMP STATION	22	26	85
HUMUS DESLUDGE PUMP 1	4	10	40	STORM TANK	30	37	81
PRIMARY DESLUDGE PUMP 1	4	10	40	FINAL EFFLUENT BOD LEVEL	10	11	91
PRIMARY DESLUDGE PUMP 2	4	10	40	FINAL EFFLUENT SUS SOLIDS	14	15	93
RTU WATCHDOG	4	10	40	BALANCING TANK	1	1	100
STORM TANK LEVEL METER	4	10	40	BALANCING TANK MIXER	4	4	100
WORK PUMP 1	4	10	40	FILTER FEED PUMP 1	5	5	100
WORK PUMP 2	4	10	40	FILTER FEED PUMP 2	5	5	100
WORK PUMP CONTROLLER	4	10	40	MACERATOR	10	10	100
WET WELL	5	12	42	PRIMARY SETTLEMENT TANK1	2	2	100
FINAL EFFLUENT AMMONIA	17	38	45	PRIMARY SETTLEMENT TANK2	1	1	100

E NUMBERS OF AUTOMATED CALL OUT REQUESTS TO ATTEND NORTHLEACH STW AND REMEDY FAULTS

SOURCE OF CALLOUT	2016	2017	2018	2019*
BALANCING TANK MIXER	0	0	0	1
FILTER 1 ROTATION	3	1	4	4
FILTER 2 ROTATION	7	0	2	0
FILTER 3 ROTATION	1	1	2	0
FILTER 4 ROTATION	15	3	5	1
FILTER FEED PUMP STATION	0	0	2	12
FINAL EFFLUENT AMMONIA	25	19	12	7
FINAL EFFLUENT MONITOR	0	0	1	0
FINAL EFFLUENT SUS SOLIDS	4	9	1	0
FINAL EFFLUENT TEMPERATURE LEVEL	0	0	1	0
GENERATOR FUEL BUND	1	2	0	0
GENERATOR FUEL TANK	0	2	0	1
HSAF PLANT 1	14	31	5	12
HSAF PLANT 2	8	11	2	4
HUMUS DESLUDGE PUMP 1	0	0	1	0
HUMUS DESLUDGE PUMP 2	0	0	2	0
MAINS SUPPLY	4	2	3	3
OUTSTATION	0	2	3	3
OUTSTATION DEVICENET STATUS	0	0	2	1
PRIMARY SETTLEMENT TANK 1	0	0	1	4
PRIMARY SETTLEMENT TANK 2	0	0	0	1
RTU WATCHDOG	8	4	3	5
SAF BLOWER 1	16	12	3	0
SAF BLOWER 2	3	3	3	5
SAF BLOWER 3	2	5	1	0
SLUDGE HOLDING TANK	25	34	37	20
STORM RETURN PUMP 1	1	2	0	0
STORM RETURN PUMP 2	4	3	1	2
STORM TANK	3	0	1	0
WET WELL	6	1	1	0

*until October 2019

EXAMPLES OF OPERATOR REQUESTS/REMINDERS TO FIX FAULTS

F LEAKING FINAL SAMPLE EFFLUENT CHAMBER RECORDED IN LOG BOOK IN 2017 AND 2018

09/02/2017 - Project excavation found FE sample chamber to be seriously leaking below ground level
@ 13:00: FE divert pipes installed bypassing FE flowmeter & sample chamber
Likely to be out of action for several days
Sample can still be taken from plastic pipe over FE outfall channel
Reported to managers

16/08/2018 10:45 Syphon (*sample?*) chamber leaking badly, told management enough times above it, quotes all done, still leaking from storm pipe which everyone aware of for ages even up to senior level.

G EXAMPLES OF PHONELINE FAILURE RECORDED BY OPERATORS IN LOG BOOK IN AUGUST 2018

05/08/2018 09:15 phoneline dead reported to WOCC
08/08/2018 15:00 Phone line here still down emailed & rang WOCC
09/08/2018 12:15 Rang WOCC. Phone line still down – asked them to chase up BT.
10/08/2018 08:15 no phone line
10/08/2018 20:00 Request site visit to check site as no phone line
19/08/2018 21:30 BT phoneline broke again. Raised with WOCC. Rang back and it's tomorrow

H EXAMPLES OF FLOODING RECORDED BY OPERATORS IN LOG BOOK IN EARLY 2016

30/01/2016 02:30 site flooded at bottom due to heavy rain and pump failure
01/02/2016 08:30 Bottom end of site still flooded
02/01/2016 08:15 Tried to pump out as much flood water as possible but ran out of time
Receive pump closest to building had tripped out. Pump reset and flowing well. Road flooding believed to have been caused by this
04/02/2016 08:15 Flood water at bottom of works has cleared
06/02/2016 18:20 site flooded again ... Flooding starting to clear now. Sample texted
07/02/2016 (no time) Site flooded
08/02/2016 10:00 Site still heavily flooded and sludge holding tank full right to top
09/02/2016 08:30 Pumped a lot of the flood water out on to storm land
10/02/2016 08:00 On site to clean up flood at bottom of site
No date given ... due to RL well being high, this seemed to add to local flooding around SHT

I EXAMPLES OF COMMUNICATIONS FAILURE RECORDED BY OPERATORS IN LOG BOOK IN AUGUST 2018

05/08/2018 09:15 ICA on site for comms failure
06/08/2018 12:30 Comms down from weekend, asked to check site.
10/08/2018 08:15 Site visit/check because of no comms
11/08/2018 11:15 On site – site visit as no comms.
12/08/2018 08:00 Weekend site visit as no comms on site.
12/08/2018 21:00 On site – no comms on site.
13/08/2018 09:30 Site visit – no comms.
13/08/2018 13:30 Request site visit to check sample as no comms
16/08/2018 19:30 Site check because of no comms.
21/08/2018 12:00 Site visit as no comms
21/08/2018 20:30 No comms.
23/08/2018 14:00 Site check – no comms
24/08/2018 10:15 Site visit to check through site as no comms
24/08/2018 22:30 Site visit as comms still down.
25/08/2018 06:45 Site check due to comms fail.
25/08/2018 - Site visit due to comms line fault
26/08/2018 07:30 Morning check for comms fail.
28/08/2018 20:30 Site visit to sample as no comms
29/08/2018 21:00 Site visit as still no comms
30/08/2018 13:00 Site check - *still no comms.
31/08/2018 14:30 Site visit due to no comms