PLASTIC LITTER REPORT FOR THE RIVER CRANE

PREPARED BY FRIENDS OF THE RIVER CRANE ENVIRONMENT

VERSION 22 – JUNE 2019

1. Introduction and Context

This report has been produced by Friends of the River Crane Environment (FORCE) and records observations of litter collected and seen in the lower River Crane over the period from December 2016 to June 2019, and uses these records to draw preliminary conclusions. This report will be updated on a regular basis as more information becomes available and this is Version 22.

Litter, and particularly plastic pollution in the river and marine environments of the UK, is a major concern. There are various initiatives to assess and reduce the impact of this pollution, including from ZSL, Thames21 and the European RIMMEL project. In March 2018 the UK Government announced a plastic bottle deposit scheme would be brought in – though no timetable has been given to date.

DeFRA brought out a first annual litter strategy report in summer 2017
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/630999/litter-strategy-for-england-2017-v2.pdf

This notes that plastic bottles collection for recycling has increased dramatically, from less than 13,000 tonnes in 2000 to over 330,000 tonnes in 2015. It does not say however how much the manufacture of these bottles has also increased.

The PLA produced a litter strategy for the Thames in 2018
https://www.pla.co.uk/assets/litterstrategy.pdf

One of the key messages from this strategy is that most litter in the Thames is derived from people who consciously drop litter (or do not ensure it goes into a bin) linked to eating and drinking on the move. The PLA helped to set up a litter forum in 2014 and this is being used to deliver the strategy. A framework for monitoring litter inputs to the Thames will be developed in 2019.

FORCE attended a forum workshop in January 2019 to help develop the PLA strategy. This report was referenced at that meeting, as an example of how to investigate and tackle upstream litter sources, and a link to the report has been sent to all delegates for their information and comment. FORCE requested that the forum works towards an overall mass balance for litter in the tidal Thames, looking to quantify the sources and sinks of the system for key types of litter.

“A Plastic Ocean” is a report, alongside a film, produced by the Plastic Oceans Foundation www.plasticoceans.uk The report records that the world annual plastic production in 2012 was around 300 million tonnes and increasing by around 80 million tonnes per decade. Plastics currently account for between 75 and 95 per cent of all marine litter, where it slowly degrades into micro and nano-plastic fragments. The input of plastics into the ocean has been estimated as between 4 and 12 million tonnes per annum in 2010. In addition to large plastic items such as bottles the load includes large amounts of: (1) tyre wear fragments; (2) polycarbonate nurdles used to make plastic; (3) micro-beads from cosmetics and (4) fibres from synthetic clothing.

Thames 21 hosted a workshop in March 2017, bringing together academics and NGO’s to discuss the issue and consider strategies for managing it. FORCE attended and circulated an earlier version of this paper to key contacts.

Figure 1 below summarises the latest thinking on the sources and distribution of plastics in the marine environment of Europe.

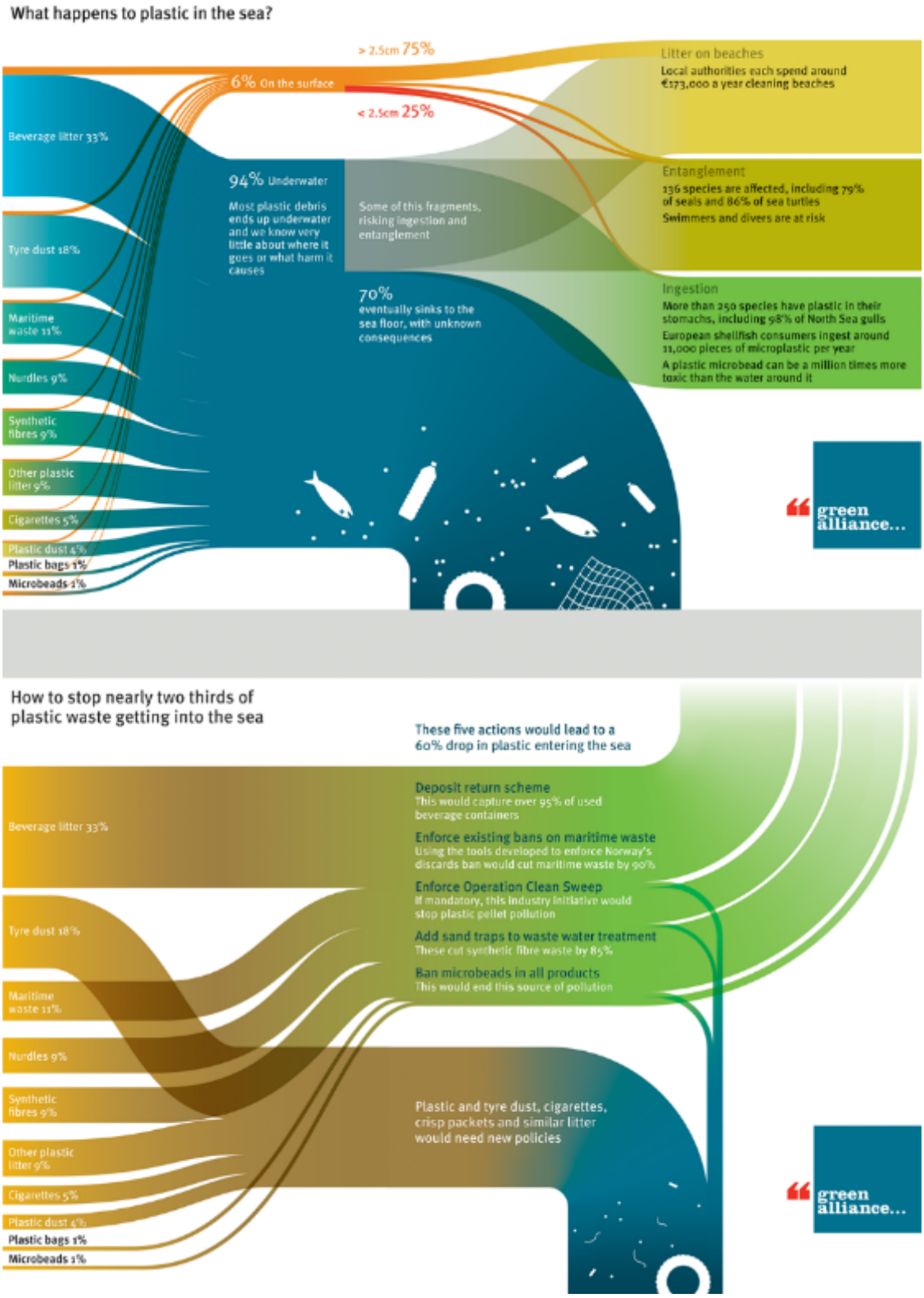


Figure 1: A Green Alliance infographic showing where plastic comes from, and what happens to it when it ends up in our seas + a second figure showing how 60 per cent of it could be removed by changes to Govt policies

A recent report by Earthwatch Europe and Plastic Oceans UK (reported in the Guardian in April 2019) has found that 80 per cent of the plastic in the ocean has come from the World's rivers . The largest constituent is plastic bottles (at 14 per cent of the total) whilst plastic bags now make up only 1 per cent of the total. These data re-inforce the value of both legislation (plastic bag taxes being a major cause of this reduction) and local action to remove plastic and other waste from rivers.

https://www.theguardian.com/environment/2019/apr/08/drinks-bottles-now-biggest-plastic-menace-for-waterways-report

A conference poster; "Estimation of global plastic loads delivered by rivers into the sea: Christian Schmidt, Tobias Krauth, Phillipp Klöckner, Melina-Sophie Römer, Britta Stier, Thorsten Reemtsma and Stephan Wagner"; based on research at the Helmholtz Centre for Environmental Research, has proposed the following numbers for plastic pollution from rivers into the ocean:

- A worldwide total of around 4 million tonnes per annum
- Yangtse River with the highest load – at around 1.5 million tonnes per annum
- The ten most polluting rivers are all in Asia or Africa and between them contribute around 95 per cent of the total
- The Thames contributes around 18 tonnes per annum*

*Note however that the PLA has recently reported it removes between 200 and 300 tonnes per annum of plastic from the tidal Thames. Our work with the Thames Litter Strategy suggests the total is higher and a mass balance has been proposed to explore this further.

A typical 500ml plastic bottle weighs 30 grammes – so that (even assuming the 18 tonne total is correct) whilst the contribution of the Thames may be only 0.0005 per cent of the world total it is still equivalent to around 500,000 plastic bottles per annum.

For comparison, Thames 21 carried out a big litter hunt at 19 locations using 200 volunteers in September 2017, collecting a total of 4100 plastic bottles. The total numbers collected in the tidal Thames since April 2016 by Thames 21 volunteers was estimated as 18000. The Thames Essex Coast Litter volunteers have collected 38000 bottles since 2015. Note: these figures may include some double counting.

There have also been major movements trying to combat plastic waste at a national and international level and the report below provides a useful update on the situation:

https://greenallianceblog.org.uk/2018/04/26/how-far-will-the-uk-plastic-pact-get-us-in-stopping-global-plastic-pollution/

This notes that, even if and when all recycled materials are dealt with, this would still leave two thirds of the problem outstanding including:

"Tyre dust, which accounts for 18 per cent of the problem; maritime waste, at 11 per cent; preproduction plastic pellets, known as nurdles, which are nine per cent; and synthetic microfibres, another nine per cent".

Tyre dust is clearly a major issue in this context – and through the Citizen Crane project FORCE (working with lead organisations including ZSL and Thames 21) are starting to look at road run-off and its impact locally. Solutions include the development of SuDS schemes for heavily polluted road outfalls.

In September 2018 global soft drinks companies apparently committed to having zero plastic bottles escaping into the environment by 2030 (see the link below). Given one million are purchased every minute around the World at present this is an ambitious target.

https://www.theguardian.com/…/global-soft-drink-firms-back-…

Data from our litter records suggest well over 10,000 plastic bottles are thrown into the River Crane catchment every year – and we have collected well over 2000 since we started regular litter counts in December 2016. It will be interesting to see if these numbers reduce over the next few years.

1. FORCE and the River Crane

The River Crane in west London is an urban catchment draining an area of around 127km^2 (see Figure 2 below). The river is a tributary of the River Thames with some 35km of river corridor. The river flows from north to south through the London boroughs of Harrow, Hillingdon, Ealing, Hounslow and Richmond, before entering the tidal River Thames in two channels (the lower River Crane and lower Duke of Northumberland's River) in Isleworth.

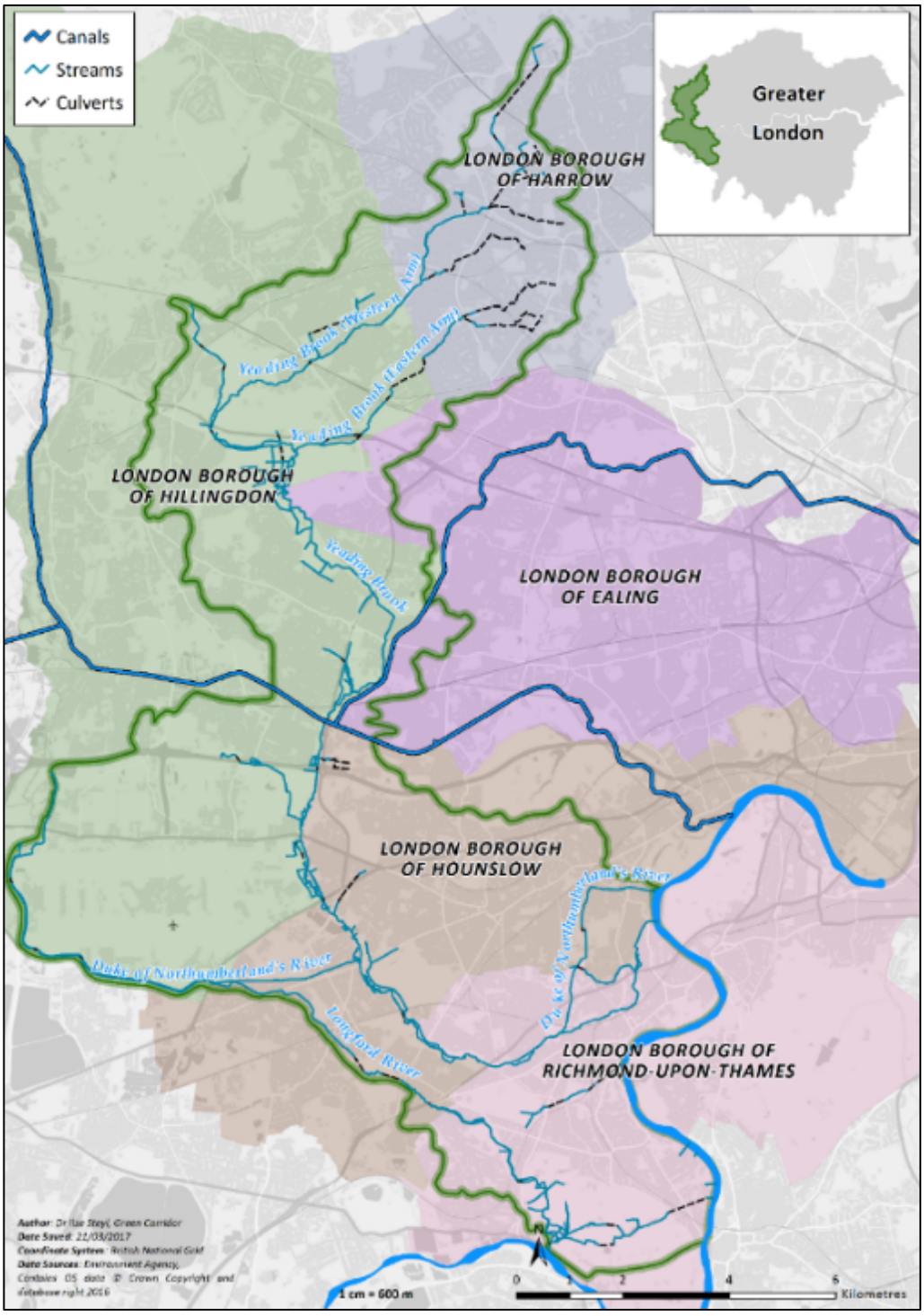


Figure 2: Crane catchment

FORCE is an environmental and community charity, with over 600 members, founded in 2003 www.force.org.uk FORCE carries out regular projects, working with partners in the Crane Valley Partnership, to maintain and improve the environmental and community value of the River Crane corridor. FORCE engaged with the issue of plastic pollution in response to a blog by Thames21 on plastics in the River Thames http://www.thames21.org.uk/2016/11/2500-bottles-stranded-on-the-shore/

FORCE has carried out regular monthly volunteer days at sites within the lower Crane corridor since 2003, undertaking eight or nine events per annum. Litter picking has always been a part of these events and (starting with the December 2016 event) FORCE has also recorded basic data on each litter pick. FORCE has also undertaken observations as to where litter is gathering within the river and carried out surveys of litter movement along the river. These data are presented here. Preliminary conclusions are set out along with proposals for further investigation and assessment.

2. Litter Collection and Recording

Litter collection and recording has been carried out on FORCE volunteer days from December 2016. The approach has also been adopted for some TCV events in the river from June 2017. The raw data are set out in Appendix A of this report and summarised in Table 1 below.

Date of volunteer event	Plastic bottles	Cans	Glass bottles	PCG recycle (kg)	Other rubbish (kg)	Total (kg)
11/12/16	75	400	75	60	140	200
8/1/17	58	150	30	20	40	60
12/2/17	41	50	25	15	60	75
12/3/17	48	85	20	5	35	40
9/4/17	126	87	43	75	125	200
14/5/17	6	8	0	0.2	0.8	1
8/10/17	19	4	14	3	100	103
12/11/17	30	36	2	3	30	33
Total Yr 1	**403**	**820**	**209**	**200**	**530**	**730**
10/12/17	10	145	10	10	20	30
17/12/17	91	201	27	30	30	60
12/1/18	72	117	37	30	100	130
17/1/18	44	32	10	25	0	25
12/2/18	288	299	375	100	800	900
11/3/18	97	168	52	30	220	250
8/4/18	117	155	38	60	440	500
12/5/18	800	1150	450	300	2700	3000
10/6/18	40	30	15	0	200	200
14/10/18	32	47	12	5	100	105
11/11/18	160	160	40	15	300	315
Total Yr 2	**1751**	**2404**	**1066**	**600**	**4910**	**5510**
9/12/18	64	89	22	10	90	100
13/1/19	130	404	101	100	500	600
10/2/19	42	121	63	30	550	580
10/3/19	70	80	40	30	200	230
14/4/19	160	300	170	100	1400	1500
12/05/19	0	0	0	0	0	0
9/6/19	16	36	15	5	45	50
Grand Total	**2646**	**4354**	**1686**	**1075**	**8225**	**9300**

Table 1: The total amounts of litter cleared in FORCE volunteer events

There are many other litter collection activities being carried out across the river corridor and we have noted the ones we are aware of:

- Council contractors collect litter from parks – particularly along well used pathways but often not venturing beyond these
- Council contractors will also remove fly tipped rubbish from parks and open spaces when reported by the public. Large items such as motor bikes and burnt out cars are removed in this way: an example being three burnt out cars on Hounslow Heath in early 2019
- Contractors will sometimes become engaged in more pro-active work around dumping over back garden fences for example – including removal and letter drops to deter this practice. We are not aware of further enforcement action taking place
- Developers and the council often clear litter from a site as part of their preparation works. LB Richmond have opened several crane valley sites to the public over the last ten years and each time this has needed the removal of several skip loads of rubbish. The largest litter clearance operation we are aware of is currently going on at the old Hounslow Heath Golf Course site where three skips have been filled to date and it is said 20 or more will be needed to complete the work. This is indicative of the fact that disused and neglected sites become a magnet for fly tipping and litter disposal and this builds up and becomes normalised over time
- Friends groups and other groups such as Heston Action Group, TCV, Green Gyms and scout groups – are becoming increasingly engaged in litter collection and removal
- Activities like the Great British Spring Clean encourage activities by organised groups and individuals. There were clean ups by a large scout group in Crane Park and Thames Water contractors in the Duke's River – plus several LB Hounslow supported events – during the 2019 event for example.
- Individuals are becoming increasingly engaged in litter removal as pro-social behaviour – encouraged by the increased actions of others

Some examples of these behaviours are noted below:

- TCV have been engaged in several days per year of litter removal on the lower Duke's River as part of the Duke's River project – starting in 2014. At the start of this project there was up to a tonne of litter per 100 metre reach in the river, following many years of relative neglect. In 2019, following several years of wider improvement works, this had reduced to around 100kg per hundred metres in the hot spot areas. This indicates that behaviours are changing – albeit slowly and imperfectly, in response to the changes being made to the wider environment and the efforts at litter removal
- TCV have also cleared more litter during their regular volunteer days in the last year or so. For example, their two June 2019 river restoration days included the collection of around a dozen black bags of rubbish removed from the river
- The Pevensey Road Green Gym team have increased their litter removal work in recent months – clearing out large areas of litter along the river bank with the help of a vehicle from Greenspace 360 contractors – amounting to several hundred kilos per month over several months in early 2019, much of it having being there for some years

- A volunteer team started to monitor mink rafts in the lower Duke's River in March 2019. During their first visit they removed 30kg of rubbish including 14 cans, 16 plastic bottles and 9 glass bottles. On their first return a week later they removed 3 cans and 2 plastic bottles only
- Around 200 plastic bottles were removed from the river by two volunteers with the Save Hounslow Heath campaign in April 2017. A further 93 plastic bottles have been collected during four TCV volunteer days recorded since June 2017. These events are recorded in Appendix A.
- Following a FORCE Facebook post about this work in August 2017 we received a posting from a member of the public who had collected a further 50 plastic bottles during a walk through Crane Park in May 2017
- A litter pick by two volunteers in the Duke's River in May 2018 removed around 100kg of rubbish, including 80 cans, 40 plastic and 4 glass bottles.
- A volunteer in Mereway in February 2019 reported clearing 14 kg of rubbish in 45 minutes – including 16 cans, 18 plastic bottles and 8 glass bottles
- A walker on the wheelchair access walk in June 2019 removed 2 small bags of rubbish from the local area including half a dozen plastic bottles and ten cans
- 30 volunteers with the Ibn Batutta scouts collected the following rubbish during a day in Crane park – between A316 and Hanworth Road – in April 2019

No. of Glass Bottles	No. of Plastic Bottles	No. of Aluminium Cans	Bags of General Waste	Bags of Aluminium Cans	Bags of Plastic bottles	Total Number of Volunteers
148	213	649	10	6	2	30

These types of pro-active and pro-social behaviour by other local groups and members of the community are being actively encouraged by FORCE through Facebook and elsewhere – and the numbers of bottles collected will continue to be collated and recorded in this report where we receive the data. We know that a number of dog walkers pick litter as they walk – and we have started to do the same during our monthly "Walk and Talk" events. Observations show that plastic bottles in particular are being actively removed from the river by local people and deposited in or next to litter bins in Crane Park – see the photo below from January 2019.



Fig: 3. 15 bottles taken from the river and left by the bin by a member of the public in Jan 2019

It is very likely therefore that the amount of rubbish (including plastic bottles) collected through pro-social activities by other groups and the general public is a significant proportion of the whole story. There is not yet sufficient evidence to confirm or quantify this – however, we do know that around 200,000 people visit Crane Park every year. If just 0.1 per cent of this total (1 in 1000 people) removed 15 bottles per visit then this would amount to 3000 bottles per year – more than FORCE volunteers removed in 2018 (1751).

One of the most encouraging events was the May 2019 volunteer day in Mill Road. Following recent litter clear ups by other volunteer groups and the council there was no litter found on the day itself and a score of zero was returned. Given the main litter data collection people were not present on the day this has not been fully verified, and it may be that a more detailed search would have revealed some litter remnants day. However, it remains a very encouraging finding.

The following observations have been made of litter within the river itself:

- Survey of litter floating past a set location – Meadway bridge on 15th January 2017
- Record of litter - Mill Road to Pevensey on 23rd January 2017
- Record of litter traps at Twickenham Road Bridge and the Mill Plat boom on the Lower Duke of Northumberland's River on 28th January 2017; 24th March and 3rd May 2017

- Record from litter traps in Pevensey and Brazil Mill Woods in April 2017 and April 2018
- *Ad hoc* observations at bridges
- Record from Mill Road site in Crane Park in June 2017
- Record from marginal vegetation near to Crane Park Island in January 2018
- Record from the base of the Upper DNR in Donkey Wood in August 2018

The detailed observations are set out in Appendix B and the main findings are noted below:

1. **Survey of litter floating past a set location – Meadway bridge on 15th January 2017**

   This was a 90 minute survey only at the base of the river. No bottles or other debris were recorded over this time period. This is insufficient time to come to any major conclusions – though it does support the theory that litter movement occurs in pulses related to high flows rather than throughout the year.

2. **Record of litter - Mill Road to Pevensey on 23rd January 2017**

   A total of 50 bottles recorded over this 2km reach during a walkover survey. On the broad assumption that these bottles were caught up during the seven days since a high rainfall event this would translate to a catchment wide contribution of around 40000 bottles per annum or 4 to 5 bottles per hour

3. **Record of litter traps at Twickenham Road Bridge and the Mill Plat boom on the Lower Duke of Northumberland's River**

   The Lower Duke of Northumberland's River in Isleworth is one of two main outflow points for the Crane catchment. There is a bridge (Kendall Bridge) with a low soffit level at Twickenham Road and a boom across the river at Kidds Mill weir. Both these devices are thought to catch much or all of the floating litter that goes along this arm of the river.

   Several visits have been made to these locations to record the build up of floating litter and on two occasions it has been possible to make an estimate of the rate of litter build up. These daily build up rates are noted in Table 2 below:

Date	March 2017	May 2017
Plastic bottles	3	10
Footballs	0.8	0.2
Cans	2	3.5
Glass bottles	0.5	2
Tennis balls		5
Coconuts		1.5
Polystyrene food boxes		1
Observations	Build up over 18 days. Higher flows but no flood flows over this period	Build up over 21 days. Lower flows over this period

Table 2: Daily floating litter build up rates – based on observations from Kendall Bridge and the EA boom on the Duke's River

Note that during periods of lower flow then (a) there may be less litter available as much of it may catch in log jams upstream however (b) a higher proportion of the available litter may come along the DNR compared to the Crane arm of the system.

In November 2017 we received notice that the EA have reduced the water level at Kidds Mill Sluice and this is intended to stop Kendall Bridge acting as a litter trap and enable the boom at Kidds Mill to operate more effectively. This amendment should be helpful in improving the effectiveness of the litter collection activity at the end of the Duke's River.

4. Record from litter traps in Brazil Mill Woods and Pevensey in April 2017 and April 2018

A single clear up day run by two members of the Save Hounslow Heath group collected over 200 plastic bottles plus six sacks of other floating material from log jams in the Brazil Mill Woods site upstream of Feltham marshalling yards in April 2017. Note that the same team also collected over 100 plastic bottles and three sacks of floating debris from Pevensey in the same month – see the FORCE volunteer day record above. The same order of litter was observed at Pevensey in April 2018.

These records indicate the importance of these log jam features in intercepting floating rubbish and the value in deploying teams to collect it before it is moved on by flood flows.

The Brazil Mill site was visited later in April 2018 following an extended period of heavy rain and high flows. Water levels had returned to a lower level and a trash line could be seen at the log jam sites where the water had been 50cm to a metre higher in the last couple of weeks. It was noticeable that there was no litter at a low level at any of these sites – indicating that the high flows had effectively swept these litter traps clean (see photo).



Figure 4: Natural barriers to litter movement – emptied by recent floods

5. Observations at bridges

Observations at bridges over a number of years indicate these may be a prime source of rubbish discarded into the river.

- Bridges are a main point of intersection between the general public and the river;

- Those walking over bridges are less likely to have an emotional link to the river that would stop them discarding rubbish over it – particularly where there is no other link between the bridge and the river (e.g. a riverside path) or where the river is deemed unattractive (or maybe even unseen) at that point;
- There is a pattern where rubbish seems to accumulate in places where it can be disposed of quietly and discretely adjacent to a main thoroughfare – and dropping something over a bridge fits this requirement;
- Where a bridge has a parapet there is a tendency to balance litter on it – like a shelf - where it might be picked up later by someone else. All too often it is then blown into the river;
- The river banks adjacent to urban bridges are often inaccessible by site managers and others – due in part to H&S concerns governing access. These are often hotspots for the build-up of rubbish

There are maybe 100 bridges along the Crane Valley – one every few hundred metres. The investigation of how much litter is sourced from bridges, and what types of intervention might reduce it, would be an interesting subject for further study. Where possible we have identified separately litter collected around bridge parapets – though note that a large proportion may have gone into the river and therefore not have been counted.

The parapet of the bridge in London Road Twickenham was observed on 29th April 2017 following the Army Navy rugby game. The records show two bottles, three drinks cans, two plastic beakers and a packet of cigarettes on just one of the four parapets at this location. Looking over the bridge there was also a significant amount of rubbish that had either been thrown or fallen into the river. This is illustrative of the problem – albeit at a high use period.

The south bank of the river immediately downstream of the London Road bridge in Twickenham was litter picked as part of a FORCE volunteer day in November 2018. A contractor from Osborne had to wear a harness in order to do this safely. In two hours he removed around 100kg of litter from around 20 metres of the bank immediately downstream of the bridge – and a further 100kg remained in place*. This litter included around 100 cans and 100 plastic bottles. FORCE has been lobbying Network Rail to do something to (a) reduce the amount of litter entering the river at this point and (b) remove it from the bank as soon as it does get there – for around 10 years with little impact on their approach.

*Note: this litter has still not been removed six months later despite regular requests to the contractors to do so.

In December 2018 FORCE worked with the station developers Solum to install posters at this site in an attempt to deter more littering here. The RFU has also agreed to support measures to reduce littering at this site. We will continue to monitor the effectiveness of this.



Figure 5: Poster next to the river at the entrance to Twickenham Station

This issue is also reported from upstream. In February 2019 The Heston Action Group (HAG) reported heavy littering along the Great South Western Road adjacent to the river – with litter clearly also entering the river system from this source (see photo below). HAG reported the clean up of this area in March 2019.



Figure 6: littering next to the GSW Road in Feb 2019

Two car tyres were thrown into the river from the Hospital Bridge Road bridge in June 2019 just a few days after a FORCE river clean up in this area. This indicates that for some people a river bridge is a convenient place to discard heavy items – and can happen despite the river being otherwise very clean.

6. Observations at Mill Road in summer 2017

This site has become used by a group of boys and young men over the last few months since the FORCE volunteer day at the site in February 2017. In that time there has been a rapid accumulation of litter, particularly plastic soft drinks bottles. A site visit in June 2017 counted some 80 plastic bottles in the river around the weir with a further 30 bottles in the undergrowth around the site. This rate of accumulation, over 100 bottles in an area of a few hundred square metres and a length of river backwater of around 50 metres maximum in a period of four months maximum, is unprecedented in the data record to date. This is further evidence of the potential negative impact of hot spots of this nature on the overall bottle count across the catchment.

In the following two months this site was the subject of:

- An initial site clear up and graffiti removal session by the council
- Increased patrols and awareness by park guard and the local pcso's
- Posts on facebook identifying the problem
- Further clear up of the river by TCV on 2nd August 2017

As a result, over 100 plastic bottles were removed from the site. The early signs are that the problems with littering and anti-social behaviour have quietened down.

Update: August 2018. Some minor littering but no major problem here in the intervening 12 months. March 2019. Very little littering in this area over the last 9 months.

7. Litter Collection in the Marginal Vegetation adjacent to Crane Park Island in January 2018

Large areas of marginal river vegetation have developed in this area as a result of concerted work by TCV, LWT and FORCE over a number of years. An initial walk over litter pick by one volunteer over a period of 90 minutes covered around 165 metre length of reed beds, gravel bank and marginal shallow water habitat – around 500 sq metres in total. A total of 44 plastic bottles along with 10 glass bottles and 32 beer cans were removed during this period. This indicates the value of these marginal habitats as filters for floating debris and the potential importance of regular visits to remove this material in these locations.

A further and more widespread litter pick of these habitats was undertaken in the February 2018 FORCE volunteer day in this area. This day collected more litter and debris than at any previous volunteer event over recent years. The actual amounts collected from the river were not recorded separately, but a total of 288 plastic bottles were collected over the day – more than double that collected at any previous event.

Note: a further site visit in January 2019 removed 50 plastic bottles, 25 cans and 10 glass bottles amongst 100kg total of rubbish in around 90 minutes of collection from the same area of river bed. This is very close to the same amount removed in 2018 and indicates a natural replenishment and/or storage rate for this part of the river.

Observations in March 2019 on the Mill Road backwater showed a high flow trash line of plastic bottles around 0.7m above the normal water line. This supports the idea of floating litter moving largely during a high flow period.

8. Litter collection at the base of the hedge along Pevensey Road in April 2018

This is a 150 metre linear feature which appears to be acting as a linear litter hot spot. 31 plastic bottles; 77 drinks cans and 26 glass bottles were removed from this hedge by 7 volunteers in one hour – a total of 10kg recycled material plus 40kg of general litter. There were around 15 quarter vodka bottles – all Smirnoff and apparently bought from the same shop – and around 30 Fosters cans amongst these. This suggests persistent littering into this hedge by lone drinkers – maybe in part to hide the habit. A posting was made onto Facebook to illustrate this issue and was seen over 2000 times. We will continue to experiment with social media as a means of deterring this type of anti-social behaviour.

9. Litter collection day at Donkey Wood in May 2018

This was the first time, during the 18 month monitoring period, that we have dedicated an entire volunteer event solely to litter picking. It was also the first time we have added a new site during this period. Furthermore it was our most popular volunteer day to date with over 40 people attending.

As a result we removed around the same amount of litter we have taken out in all the previous events combined in a major deep clean event – around 3 tonnes in total. It may be useful to do at least one such event each year going forwards to see how this impacts on the litter removed and the future condition of the site.

10. Follow up visit to the DNR at Donkey Wood in August 2018

FORCE volunteers cleared the minor weir on the DNR in Donkey Wood in May 2018. It appears to effectively capture the rubbish going beneath it as it has a large freeboard. Three months later there were: 15 cans; 4 plastic bottles and 1 glass bottle at this weir. It had a flow beneath it of 50 l/s compared to 150 l/s over the main weir. This suggests an input to the Upper DNR system of four times this amount of rubbish – ie 60 cans; 16 plastic bottles and 4 glass bottles over several km of channel in 3 months. This input is likely to be sourced largely by being directly thrown into the river from paths and bridges. We understand there is a syphon several km upstream on this channel which would effectively stop any rubbish progressing downstream – though this does need to be visited and confirmed.

Note: there were also 15 coconuts in the channel at this location. This indicates a very large number of coconuts entering the channel. Is this a single source and location? It has been understood these are entering the river through Hindu ritual – but it would be interesting to know more about how and where this happens.

11. Second volunteer day at Donkey Wood

This day was held in April 2019 and removed 1500 kg of litter. The area covered was comparable to 2018 and the litter continues to congregate in several hot spots. It is too early to be definitive, but there is encouragement from the reduced amount of litter found compared to 2018 – albeit the numbers remain far greater than for other and better used sites.

12. Observations at Willow Way and Hanworth Road

The Willow Way site has been visited three times over this project period. The observations note that:

- Increasingly the sources of litter are the two boundaries between the site and major roads – indicating that most litter is thrown into the site by people not visiting the site. In the December 2018 event we recorded that 85 % of the 100kg total removed from the site was within throwing distance of the boundary of the site. A further 10% was found in a small cache within the site – leaving just 5kg (5% of the total) scattered within the site itself.
- Much of the boundary litter was within throwing distance of a bus stop on the Hospital Bridge Road boundary of the site. Signs have been put up at this bus stop (in December 2018) with a view to deterring further littering here

The Hanworth Road site has also been visited several times during the project. In January 2019 it was noted that a significant proportion of the total rubbish load was either (a) within 10 metres of the boundary fence or (b) within two small caches with in the park – probably dropped by individuals or a small group of drinkers over an extended period.

Several signs were put up in December 2018 at the bus stop to deter litter. Seven weeks later there was a limited amount of litter around this site amounting to 3 cans; 1 plastic bottle; 2 glass bottles and 5 plastic wrappers. This is less than might be expected (less than half) based on the build-up rates noted previously and may indicate a positive effect of the signage

The Hanworth Road outfall site has been used as a drinking spot by one or more people for a couple of years at least. A return clean up in early 2019 removed 60 cans and a dozen vodka bottles from a small area next to the outfall that had built up over the previous year. The fact that virtually all the cans and bottles were of the same brand indicate one (or possibly two) regular but not excessive drinkers using the site. When the site was re-visited two weeks later a further can of the same make had been dumped in the same place, indicating that tidying the site alone was not sufficient to deter this behaviour. As a result a targeted notice (see below) was installed at the site and the site is being re-visited on a regular basis to see if this has any effect on behaviour.



Figure 7: sign installed at Hanworth Road outfall in January 2019 – note the single can in the background

At the next visit, 18 days later, the sign was in place and no litter had been put there. However, two empty cans of the same brand had been left around 30 metres away from the sign in a similar discrete wood glade. This seems to indicate:

- The sign was effective in deterring this person from littering at that spot
- The urge to litter prevailed as another similar location was used to dispose of the litter

This approach is reminiscent of animals using their spoor. If there is sufficient deterrent from marking one location than another very local site with similar characteristics will be chosen.

Note: two weeks later the two cans had been removed – either by the original offender or another member of the public, and there were no cans left in either location.

Note: as of April 2019 there has been no return to littering at this site.

13. Other Records of Drinking Hot Spots

In May 2019 we visited Cranford Park and discovered a stash of over 100 3 litre blue plastic cider bottles (all the same make) thrown over a wall. This has clearly been happening for a significant period of time and may indicate the habitual activities of one or two park drinkers.



14. Return visits to the same location

There is mounting evidence that litter issues decline following a major clean up. The most recent evidence is from the Marsh Farm Lane area – subject to a major clean up and local posters in late 2017 - the amount of litter was much reduced in the visit of October 2018.

15. Observations of litter at the backs of housing and gardens

There are a number of places in the lower Crane where accumulations of litter and rubbish are found immediately behind peoples' gardens and houses, indicating that the resident (or a previous resident) has thrown the litter over the fence line. This is too common for it to be an isolated issue and indicates a high level of disconnection between some local residents and the local open space. For the most part this litter is domestic rubbish – including kitchen waste as well as large items of metalwork etc.

We have also witnessed the repeat dumping of domestic waste into the adjacent open spaces. This is strange behaviour which is difficult to understand.



Figure 8: repeat dumping of domestic waste on the river bank in Donkey Wood – adjacent to the road and behind a no tipping sign

14 Fly tipping and dumping

There are examples of items – often building waste – being fly tipped in the park. Sometimes these have been carried into the middle of the park and far from an entrance – raising the question of how this is easier than disposing of it legally. FORCE has witnessed a builder wheeling a barrow of rubble into the park and claiming it was normal practice when challenged.

A further issue is the dumping of stolen items, particularly motorbikes and occasionally cars. Mopeds are often left burnt out (possibly following their use in illegal activities) whilst larger bikes can be left for either future use or breakdown for parts. Cars are still occasionally dumped in local open spaces (though this is much less common than 10 years ago).

In all cases this tends to be done in less well used areas and increased public use reduces the incidence of these activities.

4.0 Initial Evaluation of the Field Data

These observations are all made in the lower part of the catchment and this has particular characteristics of being (a) the most heavily used part by the public and (b) possibly also the most actively managed (by a combination of council, volunteers and the community). It is therefore difficult to be certain of any extrapolations drawn from these data.

4.1 Plastic Bottles

The possible inputs to, and routes of plastic bottles through, the catchment can be summarised as follows:

Input:

a) Discarded into the environment local to the river e.g. park, street and other open space. From here it may be picked up and removed from the system, be blown or washed into the river or left to degrade within an overgrown part of the park.
b) Discarded directly into the river - either thrown from the bank or from one of around 100 bridges that cross the river

Route:

a) Floats along the river to leave the catchment into the Thames Estuary – via one of the two arms of the lower catchment - the lower Crane or the Duke of Northumberland's River
b) Caught in a litter trap – e.g. log jam, weir, backwater, marginal vegetation or low bridge such as Kendall Bridge – and subsequently removed by clean ups. Note: there are a number of other organisations doing this type of clean up (e.g. LWT, TCV and Thames 21) along the river
c) Caught in the Duke of Northumberland's River boom at the confluence with the Thames and removed by the EA
d) Sinks and is incorporated into sediment and/or vegetation on the river bed or bank

Note that most bottles found by FORCE volunteers have their tops on allowing them to float. Is this because (a) most people throwing a bottle away put the top back on first or (b) those without tops sink and are lost into the sediment?

As we collect bottles from both the river and the land environment we do have an opportunity to test this theory by recording the numbers of bottles with tops on found in both environments and see if these are different. This will be done where possible going forwards (March 2019).

The accumulation rates of plastic bottles in open spaces in the lower Crane estimated from our volunteer day data (in bottles/ha/annum) are:

- 30 – Hanworth Road (2016)
- 36 – Hanworth Road – Crane Park and Little Park (2018 and 2019)
- 58 and 36 – Willow Way (2017 and 2018)
- 10 – Mill Road (2017)
- 30 – Mill Road (2018)
- 17 – Mill Road (2019)
- 12 – Mereway
- 24 – Butts Farm
- 10 to 12 – Pevensey
- 24 – Mereway
- 50 – Craneford Field (2017)

- 16 – Hospital Bridge Road (2019)
- 30 – Craneford Field (2018)
- 17 – Donkey Wood (2019)

Assuming an average rate of 25/ha/annum would give an accumulation of around 35000/annum over the 1500 hectares of open space along the river corridor.

Two sets of observations of the river between Mill Road and Pevensey suggest an accumulation rate in the river of 30,000 and 40,000/annum. Further data sets for Crane Park from TCV suggests an in-river accumulation rate of between 3000 and 20,000 bottles per annum.

The observations in the Duke of Northumberland's River in January 2017 showed an accumulation of around 500 bottles plus a lot of other floating material at the base of the Duke of Northumberland's River. The time period is not known but it may be this is removed every few weeks – suggesting an accumulation rate for this outflow point from the river system (the other part flowing out of the tidal River Crane) in the order of 5 to 10,000 bottles per annum. Ideally these would all be removed by the EA.

The observations in March 2017 showed a lower accumulation rate of around 1000 per annum via the DNR – with maybe the same order of magnitude through the lower Crane. In May 2017 the record indicates around 3500 bottles per annum – with very few along the Crane due to low flows.

The initial observations of through flow of bottles and other debris at Meadway may not have been for sufficient time to be valid – however, they suggest the accumulation of bottles in the system may not be regular. Given the known number of ad hoc litter traps in the river – maybe one every km or so as well as marginal reed beds and other vegetation traps – then it may be expected that large movements of litter occur during high flow conditions when also much of the catchment outflow is through the Tidal River Crane rather than the Duke of Northumberland's River. This theory is also supported by the evidence of high water level trash lines at various locations along the river.

At present the best estimates of plastic bottle accumulation rates are 35000 per annum in the green spaces along the river with between 3000 and 15000 per annum within the river itself.

Records from specific sites – eg London Road bridge; Mill Road site; and the Hanworth Road and Craneford drinking areas; show the massive potential influence of litter hot spots on the overall accumulation of litter in the river and the catchment.

Evidences from Craneford Fields in December 2017, Mill Road in January 2018 and Hanworth Road in January 2019, indicate that individuals or small groups of people may litter on a quasi-obsessive basis over a number of years – leading to major build ups of litter. The Craneford Fields and Willow Way data also illustrate the influence of a pathway with an associated high wall or fence as a means of attracting litter – by disposal over the barrier.

In April 2018 we cleared 50kg rubbish from 150 metres of hedging along the Pevensey Road boundary. This too is proving an attractive place to dump litter created "on the move" though it will be interesting to see if clearing it out will affect the amount put there next year. We posted the following message onto Facebook to let the wider public know about what we are doing and as an attempt at "nudging" behaviour:

> *"During our volunteer day at Pevensey Nature Reserve last week we cleared around 50kg of litter from this 150 metres of hedge boundary with Pevensey Road – including 31 plastic and 26 glass bottles and 77 cans. We hope that we can slowly influence behaviour here so that this hedge is recognised more as an environmental asset and less as a linear rubbish bin"*

See also the collection of around 300 Corona and Cherry B bottles in one pile near to the Hanworth Road area of Crane Park in 2018. A message was also posted onto Facebook about this.

Repeat data from the Willow Way site also indicate that regular litter picks may reduce the rate of litter build up. Littering rates year on year have reduced by a factor of two at this site. As we build up further data on the rates of littering at specific sites we will be able to test and develop our understanding of the impact of litter removal.

Note: the numbers of people attending volunteer days has grown steadily over the last three years from an average of 15 to above 30 per event. More people also like to litter pick, meaning that the litter picking has become more thorough and wide ranging - which accounts for the amounts being collected increasing between 2017 and 2018/19. In our view this is more a function of the intensity of the litter pick rather than more litter being present.

We have experimented with informal signage at litter hot spots in order to deter repeat offending. Evidence from other sites in London indicates that exposing this issue can have a deterrent effect. The early indications are that several signs placed in the Craneford Fields area in December 2017 have had a noticeable deterrent effect on littering at these sites over the subsequent few months.

A follow up litter removal day at Craneford Feld in October 2018 suggests that litter clear ups and /or local poster campaigns may be effective in reducing litter rates. Further laminated messages have been tried at Twickenham Station, Willow Way and Hanworth Road.

The total number of plastic bottles collected during a dozen or so volunteer events (including the clearance at Brazil Mill by FoHH) and one community action over a period of 12 months to December 2017, was around 900. Around half of these bottles were removed from the river with the remainder from the surrounding land. A further 1000 kg of rubbish was removed during these events, mostly from the surrounding open spaces.

The total number of plastic bottles collected over eleven volunteer events during the next period of 12 months to December 2018, was around 1750 (almost double). A total of 5500kg was removed during these events, mostly from the surrounding open spaces. Many of the bottles were removed from the river or the associated flood plain. The increase in amounts removed is a function of a gradual switch in emphasis towards more litter removal during recent events.

The largest single FORCE event was in May 2018, when a total of around 40 people worked on litter clearance throughout the day and removed around 3000 kg of litter and 800 bottles from the Donkey Wood site. This was the first FORCE event at this site and our experience from previous events five to ten years ago indicates that the first event will bring out an accumulation of many years' litter.

Note that there are other volunteer events (plus individual pro-social actions) up and down the catchment that will be intercepting and removing more plastic bottles and other rubbish. We estimate that around 200,000 people are using Crane Park per year. One person was noted removing 15 plastic bottles from the river in January 2019. If 1 in a thousand visitors were to do something similar this would add up to 3000 additional bottles per year being removed (or at least as many as are being removed through organised volunteer events). Replicating this behaviour further upstream would further benefit the litter removal.

In addition, the EA boom at the bottom end of the DNR is thought to be removing up to around 5000 bottles per annum from the river at this point.

On this basis the balance for plastic bottles in the Crane catchment may be in the order of:

- Inputs – 10000 to 30000 per annum
- Removed by FORCE and related volunteers – 900 in 2017 and 1700 in 2018 (1000 to 2000)
- Removed by other volunteers and contractors etc – not known – could be 2000
- Removed at the Environment Agency boom – 5000 per annum?
- Percentage intercepted by actions at present – between 25 and 75 per cent
- Leaving the catchment via the Crane – maybe largely during flood flow periods – 2000 to 10000
- Remaining in the catchment – entrapped in sediment or vegetation – 2000 to 10000

Another way of considering these numbers is to consider the number of people living in the catchment and what their individual contribution to this litter problem might be:

- Total population of the Crane catchment is 567246 (Rural Focus CVP report, 2018)
- The total number of bottles estimated to be entering the river corridor (10,000 to 30,000) therefore represents one bottle per year for every 15 to 50 residents
- In practice it is likely that individual residents visiting these sites, and then littering, are doing this on a regular basis – maybe several times a year on average. Consequently it may be only 1 in 100 or so of the residents of the catchment that are responsible for this problem – in the order of 5000 in total
- This is a simplistic assessment and subject to refinement. However, it does indicate that the vast majority of local residents are not responsible for the litter problem and any approach to litter needs to consider this
- The finding of litter hot spots in time and space during the survey work to date suggests that both the numbers responsible, and the times and places the problem manifests itself, may be even more tightly defined
- Evidence from Craneford Fields in December 2017, Pevensey in April 2018 and Hanworth Road in January 2019, indicate that one or two individuals may be repeat litter offenders over many years. In the first case contributing around 200 lager cans over 4 years in a single location; in the second several hundred plastic and glass bottles and cans over a 12 month period. If this is the case maybe only a very few people contribute a large percentage of the overall litter problem
- The data for the Thames as a whole (Heinholtz Institute 2017 – referenced in Section 1 above) indicates a total input of plastic bottles across the Thames catchment of 500,000. The population of the Thames catchment is around 18 million and therefore this number represents one bottle per year for every 36 residents
- The broadly comparable data for the Crane and for the Thames as a whole indicate the numbers being generated for the Crane catchment may be reasonable
- FORCE and associated volunteers intercepted around 900 plastic bottles in 2017, equivalent to between 3 and 10 per cent of the estimated annual total put into the catchment. In 2018 1700 bottles intercepted represent between 6 and 20 per cent of the total input. By comparison,

Thames 21 have intercepted around 18000 bottles in the tidal Thames over 18 months. This is around 2 per cent of the total estimated input to the overall Thames catchment over this period

- One conclusion of this work is that litter picking in itself is only at present tackling a small percentage of the total problem in the river. Combining this work with public information to discourage people from littering and encourage pro-social litter picks by the general public may be as or more important. In this regard it has been proposed to carry a litter bag and do a litter pick as part of every walk and talk that FORCE organise as a means of promoting this pro-social behaviour
- Any impact of wider legislative reform regarding plastic bags, bottles and wider plastic use will be interesting to record

Some broader findings are as follows:

- We now have a much better understanding of litter amounts and sources - where are the hot spots and what types of litter we may get in different locations – and this helps us to design our approaches to volunteer days
- Hot spots are often linked to specific sites – eg a wall or railings next to a walkway or a bus stop – or to one or more key individuals with long term littering behaviours and favourite places and habits
- Removing litter appears to reduce the amount that comes back – it also encourages pro-social litter removal by others
- We are also in liaison with local councils about how these spaces are managed – removing railings and replacing them with lower barriers for example; regular cutting of vegetation on the far side of fencing etc
- There are some fairly consistent numbers for how much litter accumulates across different areas
- We are having significant success with the use of targeted messaging at litter hot spots
- In the order of 25 plastic bottles per hectare per year are being littered at any site
- The ratio of cans : plastic bottles : glass bottle litter being found is a fairly consistent 3 : 2 : 1 across various sites and times
- Whilst these small recyclable items only amount to around 15 per cent of the total weight removed over the two years (765kg out of a total of 5800 kg in 2017 and 2018) they do account for a sizeable proportion of the small litter. The bulk of the weight is in the form of large metal items such as bikes and shopping trolleys etc - which are also recycled by the council waste contractors following collection from the site

These numbers will be refined and developed as the project works continue.

4.2 Other Rubbish and Litter

This project started by looking at the issue of plastic bottles. However, it has grown to encompass a much wider range of litter in the river and the surrounding green space. Further analysis of these litter sources and causes will be undertaken in the coming months. For now the key types are listed as follows:

1. Food and drinks cartons and packaging. Including plastic bottles (soft drinks), glass bottles and cans as well as crisp packets, other food wrappers and plastic bags. Likely to have been dropped by people eating and drinking on the move. There are a couple of variants on this:

- Drinking dens – often tucked away in the park. Sometime individuals use drinks cans in particular to mark their territory in an obsessive manner. We have also found caches of 50+ vodka bottles which suggest a secret drinks bottle hiding place
- Park margins – where people can throw rubbish over a fence, wall, bridge or hedge for example – can often be the most highly littered part of a park. In places this can be sourced from vehicles as well as pedestrians (see for example the A30 river crossing identified by HAG)

2. Fly tipping: often brought well into the park and into quite inaccessible locations. Car tyres are a main type but all sorts of other domestic and building rubbish can be dumped – often tucked away out of view
3. Garden and domestic rubbish coming into the park from back gardens
4. Rubbish that is left on or near to bins and then is blown into the park
5. Rubbish brought in by foxes. Often quite distinctive and bagged but with teeth marks – also shoes and boots etc
6. Rubbish left by rough sleepers – including tents, clothes, foodstuffs, sleeping bags etc – at abandoned camps
7. Stolen items – including cars, motorbikes, mopeds and bicycles – occasional safes etc
8. Ironically, litter blown into open spaces at council waste recycling depots. This has been a significant problem at the Craneford Way recycling centre: FORCE and others have raised the issue with the council. Litter can also enter the environment during rubbish collections days as it blows out of open recycling bins or falls out when collected

5.0 Plans for the Future

1. Distribute this report for information and comment to all interested parties
2. Continue to collect and review base data:
    - Volunteer day litter collections
    - Records of litter traps
    - Information from the EA re: the Mill Plat boom
    - River observations at Meadway (and maybe along the lower River Crane below the Mereway Road weir) – including during peak flow periods
3. Target major litter issues:
    - Bus stops, drinking areas, bridges, hedges and other litter hot spots – through the continued testing and refinement of informal signage; Facebook campaigns and liaison with the council and pcso's for example
    - The first set of signs were installed on a temporary basis in Craneford Fields in December 2017 following evidence of long term littering by an individual or small group of people. The evidence to February 2018 – when the signs were removed – indicates they could be very successful in reducing litter – if properly targeted. Evidence from a repeat visit in October 2018 backs this up. Further signage has now been trialled at several other locations
    - Areas where public highways run along the park – particularly where the park is overgrown at this point and litter can be "lost". Where this is a particular problem we are asking the council to cut metre strips along the back of fence lines to remove the lost aspect to the site
    - Litter trap areas and marginal habitats within the river – target clear ups for these areas by FORCE and others;
    - Key bridges
4. Update report at regular intervals – and in liaison with interested parties
5. Link with other interested parties – academics and other NGOs for example – who may wish to investigate these issues further using the Crane as an example catchment. To date the report has been sent to organisations with wider and national campaigns including: Plastic Oceans Foundation; Thames 21; ZSL; Keep Britain Tidy; Catchment Partnerships in London; Thames Estuary Partnership and Campaign for the Protection of Rural England (London branch); Port of London Authority etc; as well as local interested Friends groups through South West London Environment Network, LB Richmond and IFHAB for example.
6. Advertise litter issues on social media and through other means. Work to date has included regular reports on the FORCE Facebook, Twitter and Instagram pages as well as a Youtube film produced with LB Richmond in late 2017
7. Promote and encourage pro-social behaviour by the general public – including picking up litter and discouraging people from leaving litter. This is being done through social media and practical action such as litter picking on FORCE "Walks and Talks"

APPENDIX A

RECORDS OF LITTER FROM FORCE VOLUNTEER DAYS AND OTHER EVENTS IN THE CRANE CATCHMENT

Table 1: December 2016 Volunteer Day

Date	**December 11th 2016**
Site name	Crane Park – Hanworth Road
Site area	1.5 hectares of Crane Park immediately downstream of Hanworth Road on the north side of the river in LB Richmond
Description	A well-used part of the park on the north bank of the main river and with a smaller mill stream running through it – an area 200m by 75m with 600m of river/stream bank within it
Litter pick	Several people for parts of the day covered most of this area – maybe 10 person hours in total
Total collected	200kg
Plastic bottles	75 plastic bottles, comprising mostly drinks or water bottles with around 10 plastic milk cartons
Cans	Around 400 drinks cans – mostly alcohol
Glass	Around 75 bottles, mostly alcohol
Recycled total	60kg
Other	140kg
Previous FORCE event at location	April 2015 – i.e. 20 months previously
Other litter picks	The council litter picks along the pathways but not generally in the wooded and more overgrown areas or by the river bank. No other formal picks
Previous FORCE work	May 2015 had been our first in this area for a number of years. In 2015 we removed more than a tonne of rubbish in three to four “tonne bags” as a major work item of our day. This time the task was much smaller, supporting our previous belief that making a place less litter strewn greatly reduces the rate at which it accumulates
Build-up of plastic bottles at the site	75 plastic bottles in 1.5 hectares in 20 months = 30 bottles/hectare/annum
Comments	The area is known to be well used by outdoor drinkers – hence the number of cans, accumulating at a rate of 5 per week. These were largely in two specific areas. Signs are one option to deter the leaving of litter here

Table 2: January 2017 Volunteer Day

Date	**January 8th 2017**
Site name	Crane Park – Willow Way
Site area	One hectare of Crane Park between Hospital Bridge Road and Chertsey Road on the south side of the river in LB Richmond
Description	A newly opened part of the park – in 2013. It is used but not heavily - we saw around half a dozen walkers over the course of a dark and damp day. The river forms the northern boundary of the site for around 200m and the site is

Date	January 8th 2017
	some 50m wide. The eastern and western boundaries are with heavily used roads and these were the main sources of litter
Litter pick	Two people over the morning covered the entire area - around 4 person hours in total
Total collected	60kg
Plastic bottles	58 plastic bottles, comprising mostly drinks or water bottles with around 5 plastic milk cartons
Cans	Around 150 drinks cans – mostly soft drinks
Glass	Around 30 bottles
Recycled total	20kg
Other	40kg
Previous FORCE event at location	January 2016 – 12 months previously
Other litter picks	The council litter pick along the main pathway but not generally in the wooded and more overgrown areas or by the river bank. No other formal picks
Previous FORCE work	The January 2016 volunteer day removed a much larger amount of litter. There were also several tonnes of rubbish removed by the council in the build up to putting this site back into public use in 2015. This supports the idea that regular litter picks do reduce the subsequent litter accumulation
Calculations	58 plastic bottles in 1 hectare in 12 months = 58 bottles/hectare/annum
Comments	There is no significant drinking issue at this site – mostly soft drinks bottles and cans. Around 80 per cent of the rubbish was found along the line of the two main roads, indicating it was not put there by people visiting the site but by those walking along the side of it and discarding their litter over the fence. Note that this was also the case in 2016. Around half the rubbish was found within throwing distance of the Willow Way bus stop on Hospital Bridge Road. This is despite there being a litter bin at this bus stop. We may request further action by transport contacts to counter this problem. Note that there is no litter bin within the Willow Way site. Update: the council has agreed to put new litter bins on the site (02/17). There are more plastic bottles generated by this site despite the overall rubbish loading being low – this may be due to the nature of the litter problem at this site.

Table 3: February 2017 Volunteer Day

Date	February 12th 2017
Site name	Crane Park – Mill Road
Site area	3.5 hectares of Crane Park between Hospital Bridge Road and Mill Road on the north side of the river in LB Richmond.
Description	A well-used part of the park – a mix of woodland, meadow and short grassland with some marginal river habitat areas. The main river channel and a backwater channel.

Date	February 12th 2017
Litter pick	Several people over much of the day in a wide ranging litter pick - 8 person hours in total
Total collected	75kg
Plastic bottles	41 plastic bottles, comprising mostly drinks or water bottles, 5 directly from the river (caught behind the backwater weir).
Cans	Around 50 drinks cans
Glass	25 bottles
Recycled total	15kg
Other	60kg
Previous FORCE event at location	November 2015 – 15 months previously
Other litter picks	The council litter pick along the main pathway but not generally in the wooded and more overgrown areas or by the river bank. No other formal picks – however it is known that a number of local residents undertake informal litter picks as part of their regular walking routine.
Previous FORCE work	This area has been subject to informal litter picking for a number of years now – and as such is subject to low rates of accumulation despite (or maybe because of) being one of the best used parts of the lower River Crane. Usage data for the Meadway entrance to Crane Park indicate usage of 500 to 1,500 people per day.
Calculations	41 plastic bottles in 3.5 hectares in 15 months = 9 bottles/hectare/annum.
Comments	The rubbish found in this site was fairly well scattered across it. The key areas were (a) a part with little public access and (b) the river itself – where the public were not able to access safely.

Table 4: March 2017 – Trafalgar School Event

Date	March 10th 2017
Site name	Mereway Nature Park
Site area	1.5 hectares site downstream of Kneller Gardens in the divergence between the River Crane and Duke of Northumberland's River in LB Richmond.
Description	Eleven children (around 9 years' old) and three adults in a well-used nature park comprising bramble scrub, emergent woodland and meadow including an outdoor classroom area.
Litter pick	14 in total for around half an hour covered all of the area - 7 person hours in total.
Total collected	10kg
Plastic bottles	9 plastic bottles
Cans	11 drinks cans
Glass	3 bottles
Recycled total	3kg
Other	7kg
Previous event at location	There had been a weekly Green Gym event here until October 2016.
Other litter picks	The council litter pick along the main pathway but not generally in the wooded or bramble areas. No other formal picks – however it is known that a number of local residents undertake informal litter picks as part of their

Date	March 10th 2017
	regular walking routine.
Previous FORCE work	This area was where FORCE started 14 years previously and is well used but seems to be fairly well looked after by local people. The Richmond Green Gym kept it in very good condition and we are keen to see this re-instated. In the mean time we will be running a volunteer day on the site in May. We work regularly with Trafalgar School and they will be designing a litter awareness poster for us this spring.
Calculations	9 plastic bottles in 1.5 hectares in 6 months = 12 bottles/hectare/annum.
Comments	The rubbish found in this site was fairly well scattered across it – much of it thrown into the bramble where it would be difficult for the public to retrieve without litter pickers. Some may also have been dragged into the bramble by the resident fox population. Note: February/March is probably the best time to clear areas like this as the bramble and associated vegetation has died right back.

Table 5: March 2017 Volunteer Day

Date	March 12th 2017
Site name	Butts Farm area of Crane Park
Site area	2 hectares of Crane Park between Butts farm estate and the river in LB Hounslow.
Description	This part of the park was opened up in 2011 as part of the Priority Parks project. Until this time it had been little used and had a reputation as a dumping ground for cars, motorbikes etc. It is now much better used (several hundred people per day on a nice weekend) and is an attractive part of the park with mature trees and bramble scrub and 200m of attractive river bank and water vole habitat with pathways going through it.
Litter pick	Two people for part of the day – 5 person hours in total.
Total collected	40kg
Plastic bottles	48 plastic bottles, comprising mostly drinks or water bottles, many pulled out of the path side brambles.
Cans	85 drinks cans, mostly alcohol and many found in the undergrowth in batches of five or six suggesting one or more regular park drinkers causing maybe 70 per cent of the total number.
Glass	20 bottles
Recycled total	5kg
Other	35kg: some heavy material that had been there a long time – 20 to 30 years maybe – and a lot of plastic wrappers for crisps, cigarettes, dog litter bags, sweet wrappers etc.
Previous FORCE event at location	March 2016: but probably not as focussed a litter pick.
Other litter picks	The council litter pick along the main pathway but not generally in the wooded and more overgrown areas or by the river bank.
Previous FORCE work	Annual litter pick – the amount has reduced considerably year on year.
Calculations	48 plastic bottles in 2 hectares in 12 months = 24 bottles/hectare/annum
Comments	See photo of litter collected at the site.



Figure 9: Some of the litter collected at Butts Farm

Table 6: April 2017 Volunteer Day

Date	**April 9th 2017**
Site name	Pevensey Nature Reserve
Site area	10 hectare site immediately upstream of Crane Park in LB Hounslow.
Description	This site had been run down for around 35 years until work started around 7 years ago to start to open it up and improve its environmental and community value. This work has continued with the formation of the Pevensey Green Gym three years ago, which meets and works there weekly. LB Hounslow rangers have also been collecting litter and rubbish from the site more regularly in recent months. The site is around 500 metre long, running long the southern bank of the River Crane and curling around the SW London Crematorium site. It includes, river bank, wetland, backwater ponds, woodland, wet woodland, meadow and grassland habitats. It also include Feltham Circles, a disused sewage works site used for around 3 years by graffiti artists.
Litter pick	Several people for at least part of the day – maybe 12 person hours in total.
Total collected	200kg
Plastic bottles	107 plastic bottles from a log dam in the river. It has not rained significantly for around six weeks and the dam may have built up over this timescale. 19 plastic bottles from the surrounding area.
Cans	15 metal cans from the log dam. 72 metal cans – many drinks cans associated with the Feltham Circles graffiti site, from the surrounding area
Glass	27 bottles from the log dam 16 bottles from the surrounding area
Recycled total	75kg

Date	April 9th 2017
Other	125kg Includes three bin bags of polystyrene and other floating debris from the log dam plus several pieces of pipe-work and one car tyre from the river
Previous FORCE event at location	April 2016
Other litter picks	There have been several other litter picks here since by the green gym and others.
Previous FORCE work	Annual litter pick – the work of Green Gym and LB Hounslow has considerably reduced the amount of litter on site. We have previously not been able to cover the whole site with many large items left. It is the first time we have cleared the river at this location.
Calculations	The accumulation of bottles in the site is difficult to calculate given the amount of recent work here. A rate of 19 in 12 hectares in one year would make around 2 bottles/hectare/annum The accumulation in the log dam is maybe over 6 weeks. Note there is another dam around a km upstream. This would result in around 107x52x35/6 bottles per annum in the river = 30,000 bottles per annum in the river Now this site has been cleared it would be possible to assess the rate litter accumulates in the future
Comments	See photos 10 and 11 below



Figure 10: June and Ian preparing to remove the litter from behind the log dam



Figure 11: plastic bottles and other floating debris removed from behind the log dam

Table 7: May 2017 volunteer day

Date	**May 14th 2017**
Site name	Mereway Nature Park
Site area	1.5 hectares site downstream of Kneller Gardens in the divergence between the River Crane and Duke of Northumberland's River in LB Richmond.
Description	A volunteer day held at this site two months following the children's event in March 2017. There was little or no litter found in the spaces cleared by the children in March though a small amount was found in adjoining areas.
Litter pick	1 person for two hours – occasional picks later.
Total collected	1kg
Plastic bottles	6 plastic bottles
Cans	8 drinks cans
Glass	0 bottles
Recycled total	0.2 kg
Other	0.8 kg
Previous event at location	Children's event in March 2017.
Other litter picks	The council litter pick along the main pathway but not generally in the wooded or bramble areas. No other formal picks – however it is known that a number of local residents undertake informal litter picks as part of their regular walking routine.
Previous FORCE work	This area was where FORCE started 14 years previously and is well used but seems to be fairly well looked after by local people. The Richmond Green Gym kept it in very good condition and we are keen to see this re-instated.
Calculations	6 plastic bottles in 1.5 hectares in 2 months = 24 bottles/hectare/annum.

Date	May 14th 2017
Comments	The rubbish found in this site was fairly well scattered across it – much of it thrown into the bramble where it would be difficult for the public to retrieve without litter pickers. Some may also have been dragged into the bramble by the resident fox population. Note: the vegetation in May is well developed and other litter may have been hidden.

Table 8: TCV River Restoration Days

Date	June21st and 22nd 2017
Site name	Crane Park
Site area	300 metres of river where the deflectors and with two or three minor blockages within it.
Description	Restoration works as part of the community learning series of events – working on the same sites that have been done in 2016
Litter pick	Clearing floating litter from within the deflector areas and a couple of willow carr type blockages within the river over a 300 metres reach.
Total collected	20kg
Plastic bottles	44 plastic bottles over two days
Cans	100 drinks cans
Glass	Not recorded
Recycled total	3 kg
Other	17 kg
Previous event at location	Event in 2016
Other litter picks	No
Previous FORCE work	
Calculations	50 bottles in 300 metres – over a total length of 30km this would translate to 5000 bottles. It is not known how long this litter has built up over – though a maximum period of 12 months
Comments	These data are consistent with other data on the build up of plastic litter within the river

Table 9: TCV River Restoration Days

Date	July 5th and July 19th 2017
Site name	Crane Park
Site area	500 metres of river where the deflectors and with two or three minor blockages within it.
Description	Restoration works as part of the community learning series of events – working on the same sites that have been done in 2016
Litter pick	Returning to the areas covered last month and looking at a further 200 metres of river
Total collected	Not recorded
Plastic bottles	30 plastic bottles on day one – 8 from the initial 300 metres and 22 from the additional 200 metres 10 bottles on day two – covering the 500 metre reach looked at two weeks previously

Date	July 5th and July 19th 2017
Cans	Not recorded
Glass	Not recorded
Recycled total	
Other	
Previous event at location	22nd June – see above
Other litter picks	No
Previous FORCE work	
Calculations	Day one: 8 bottles over 300 metres in 13 days (assuming 100 per cent clear up first time around) – this translates to 365/13 * 100 * 8 or 20,000 per annum. Note however that (a) some of these may have been missed first time around and (b) there had been a flood flow in the interim fortnight which may have brought down more than an average number from upstream 22 bottles in a further 200 metres over one year – translates to 3300 per annum. Day two: 10 bottles over 500 metres in 14 days – translates to 365/14*30000/500*10 or 15,000 per annum
Comments	These data are consistent with other data on the build up of plastic litter within the river

Table 10: FORCE Volunteer Day - October 2017

Date	8th October 2017
Site name	Twickenham Junction Rough
Site area	300 metres of river adjacent to the Brewery Wharf site
Description	Regular volunteer day – including access to the river for a litter pick
Litter pick	Clearing mainly heavy metal litter as well as a small amount of floating plastic material over a 300 metres reach
Total collected	100kg
Plastic bottles	19 plastic bottles
Cans	4 drinks cans
Glass	14 glass bottles
Recycled total	3 kg
Other	100 kg
Previous event at location	Event in 2016
Other litter picks	River clearance in October 2016
Previous FORCE work	
Calculations	The build up of recycled material is not relevant as most floating material will float past this site with no places for a build up to occur. More relevant is the build up of other heavy metal material. An accumulation of 100 kg in one year indicates this site will need a regular clean up – at least once per annum

Date	8th October 2017
Comments	

Table 11: November 2017 Volunteer Day

Date	November 12th 2017
Site name	Crane Park – Willow Way
Site area	One hectare of Crane Park between Hospital Bridge Road and Chertsey Road on the south side of the river in LB Richmond
Description	A newly opened part of the park – in 2013. This site was litter picked in January 2017. This litter pick comprised an initial littler pick during a TCV event on 8th November followed by the main clear up during the FORCE day on 12th November. As a result the litter clearance was more comprehensive than in January 2017 and picked up some litter that had clearly been there for several years. The site is used by the public but not heavily. In January we witnessed around half a dozen people using it – whereas on this day we saw 15 to 20 people over the course of the day. The river forms the northern boundary of the site for around 200m and the site is some 50m wide. The eastern and western boundaries are with heavily used roads and these were the main sources of litter
Litter pick	Two people over the two days covered the entire area - around 6 person hours in total
Total collected	30kg
Plastic bottles	30 plastic bottles, comprising mostly drinks or water bottles with a couple of plastic milk cartons
Cans	Around 36 drinks cans – soft drinks and alcohol
Glass	2 bottles
Recycled total	3 kg
Other	27 kg
Previous FORCE event at location	January 2017 – 10 months previously
Other litter picks	The council litter pick along the main pathway but not generally in the wooded and more overgrown areas or by the river bank. No other formal picks
Previous FORCE work	The January 2016 volunteer day removed a much larger amount of litter. The January 2017 event removed around twice this amount of litter. There were also several tonnes of rubbish removed by the council in the build up to putting this site back into public use in 2015. This supports the idea that regular litter picks do reduce the subsequent litter accumulation
Calculations	30 plastic bottles in 1 hectare in 10 months = 36 bottles/hectare/annum. This compares to 58 bottles/hectare/annum in 2016
Comments	There is no significant drinking issue at this site – mostly soft drinks bottles and cans. Around 80 per cent of the rubbish was found along the line of the two main roads, indicating it was not put there by people visiting the site but by those walking along the side of it and discarding their litter over the fence. Note

Date	November 12th 2017
	that this was also the case in 2016.

Table 12: December 2017 Volunteer Day

Dates	December 10th and 17th 2017
Site name	Marsh Farm Lane and the triangle
Site area	Around 0.25 hectare of emergent woodland and some 70m of pathway next to Craneford Fields in LB Richmond
Description	FORCE visit this site every year. In the last 18 months new paths have been installed and others upgraded and the numbers of people using the spaces have increased. There is a significant litter problem here – recognised over the years and due perhaps in part to its use as a route to the local college, the RFU stadium and the Quins Stoop stadium as well as the increased local use of the spaces. The initial volunteer day was heavily curtailed due to snow and the total area covered by the litter pick was much reduced. We then went back the following Sunday and carried out a more extensive litter pick
Litter pick	10th Two people over a total of around 4 hours 17th Two people over around 5 hours
Total collected	30kg on 10th + 60kg on 17th = 90 kg total
Plastic bottles	10 plastic bottles, comprising mostly drinks or water bottles – 10th 91 plastic bottles – many of which had come over the wall (see below) – 17th
Cans	145 drinks cans – virtually all lager – see below – on 10th 201 drinks cans – again mostly lager but some variety – on 17th
Glass	10 bottles – 10th 27 bottles – 17th
Recycled total	10 kg – 10th 30kg – 17th
Other	20 kg – 10th 30kg – 17th
Previous FORCE event at location	November 2016 – not recorded here. However we did a much more intensive litter pick this time and covered areas not done properly before. A good half of the litter was at least 12 months old
Other litter picks	The council litter pick along the main pathway
Previous FORCE work	The November 2016 litter pick probably removed around the same amount of litter as the initial 10th December pick
Calculations	100 plastic bottles in 0.5 hectare in maybe 4 years total = 50 bottles/hectare/annum. However, much of this was in an elongated litter hot spot along the far side of a high brick wall from a popular public footpath (see figure 6)
Comments	There is a scattering of rubbish through this site – which is typical of the site. The likelihood is that the site is litter picked on occasion by council contractors but this litter picking does not stray far from the path and there is a build up of litter in the undergrowth. There was one major litter hot spot where around 125 lager cans were pulled

Dates	December 10th and 17th 2017
	from a small clump of bramble – all within a radius of 2 to 3 metres. Around 70 per cent of these cans were Fosters with a few others (maybe three other brands in total). The use by dates on the cans dated from 2014 to 2018 and the cans themselves were largely undented and all empty. Note: a visit to the site on 21st December, following the clean up, recovered one further can conspicuous in this area and with a best before date of April 2018. This appears to be a quasi-deliberate act and in response a temporary sign has been installed at this site (see figure 7 below). This indicates a new type of littering – a single object disposed of in a ritual manner over a period of around 4 years and at a rate of say once a fortnight. There was another elongate litter hot spot on the far side of a high brick wall (see photo) that contributed around 150 cans, 60 plastic bottles and only 2 glass bottles. This hot spot is caused by the temptation to throw something over a high wall where the impact cannot be seen. There were more coke cans and plastic drinks bottles here. A further sign was put up here. There was also evidence of further activity from the Fosters drinkers – with another 100 + cans found over the wider area and another hot spot through some railings. A third sign was put up here. Other items of note included – around 30 poo bags and twenty to thirty drugs bags. No needles found though. The level of litter here was a significant concern – though note this was the first time this area had been cleared out for many years



Figure 12 – wall over which a lot of litter had been thrown – Marsh Farm Lane runs along the other side and a is a major thoroughfare for the college and also for rugby matches at RFU and Harlequins



Figure 13 – litter report notice installed in the bramble lager can hot spot on 21st December

February 2018 follow up. The signs were removed as they have been damaged by rainfall – though they were all still on place. Note: a message had also gone up on the FORCE web-site publicising this signage and with a large amount of support from users. A site visit six weeks later indicated very little rubbish accumulating in this area over the intervening period

Table 13: FORCE Volunteer Day – January 2018

Date	**12th January 2018**
Site name	Mill Road in Crane Park
Site area	An area of around 0.5 ha around the old mill site and river backwater in the morning followed by an area of around 2 hectares in the meadow and woodland to the west of this in the afternoon

Date	12th January 2018
Description	Regular volunteer day
Litter pick	Two to three people over several hours – maybe 6 hours in total. Around a dozen plastic bottles from the river itself with the remaining litter in the surrounding open space. One hot spot of cans in the area of the old mill site – however much less litter here than was seen last summer. Around 25 Strongbow dark fruit cider cans scattered around the site –indicating that one individual was creating a significant part of the litter problem.
Total collected	100kg
Plastic bottles	72 plastic bottles
Cans	117 drinks cans
Glass	37 glass bottles
Recycled total	30 kg
Other	70 kg
Previous event at location	Litter pick in February 2017. There was more litter here than was recorded last time. This may be due to this area becoming something of a young person's hang out during the summer of 2017 – as recorded previously – see appendix B note 6 below.
Other litter picks	
Previous FORCE work	
Calculations	A build up of 100kg in 2.5 hectares in 12 months compares to 70kg in 3.5 hectares over 15 months in 2017 ie the overall litter build up in 2017 was around twice what was recorded over the previous year – which is disappointing. This includes 72 plastic bottles in 2.5 hectares over 12 months – or 30 bottles per hectare per annum – which is comparable with other sites measured over the last year of records. The records also indicate that individuals and small groups may be responsible for a large percentage of the total litter in this area. This would be consistent with the information recorded at this site in summer 2017 – see Appendix B note 6 below
Comments	Note: a film was made by Richmond waste and recycling using footage recorded during this litter pick

Table 14:TCV coppicing event – January 2018

Date	17th January 2018
Site name	The river adjacent to Crane Park Island
Site area	165 metres of riverside marginal habitat comprising around 55 sq metres in total
Description	TCV coppicing day – one volunteer spent 90 minutes clearing this area
Litter pick	Clearing bottles and cans as well as some plastic litter, a car tyre and wheel clamp from the river margins – most of which had washed down the river from previous flood episodes and caught in the marginal vegetation
Total collected	24kg

Date	17th January 2018
Plastic bottles	44 plastic bottles
Cans	32 drinks cans
Glass	10 glass bottles
Recycled total	24 kg
Other	15 kg
Previous event at location	No previous litter clearance here – note that the marginal vegetation here has developed over the previous 5 to 10 years in response to various projects by LWT, TCV, FORCE etc. Before this there was no marginal habitat and this litter would not have caught here.
Other litter picks	
Previous FORCE work	
Calculations	Not possible as this is the first time the site has been cleared. However, the accumulation of such a significant amount of litter along a 165m length of river bank is comparable with the accumulations seen elsewhere
Comments	

Table 15: February 2018 Volunteer Day

Date	February 11th 2018
Site name	Crane Park – Hanworth Road and Little Park
Site area	1.5 hectares of Crane Park immediately downstream of Hanworth Road on the north side of the river in LB Richmond and a further 2.5 hectares in Little Park on the west side of the Hanworth Road
Description	The area in Crane Park is a well-used part of the park on the north bank of the main river and with a smaller mill stream running through it – an area 200m by 75m with 600m of river/stream bank within it. It was previously litter picked by FORCE in December 2016 The area in Little Park is not well used but has not been litter picked in several years. The pick covered both the mill stream and the north bank of the main river through Little Park
Litter pick	This was the largest scale litter pick we have carried out during this monitoring period. 10 to 15 people for most of the day – probably 50 person hours in total, and was a deeper clean than was carried out in Dec 2016.
Total collected	900kg – compared to 200kg in 2016. Note: over half this total was large pieces of ironwork and car tyres collected from Little Park
Plastic bottles	288 plastic bottles – compared to 75 in 2016. Many of these bottles came from the flood bank in both sides of the park
Cans	300 cans – compared to 400 drinks cans in 2016. Tis indicates a continued drinking and littering culture in this part of the park – see also the bottles below
Glass	375 bottles – including around 150 corona and cherry B bottles in one small area – compared to 75 bottles in 2016
Recycled total	100kg
Other	800kg
Previous FORCE	Dec 2016 – ie 15 months previously

Date	February 11th 2018
event at location	
Other litter picks	The council litter picks along the pathways in Crane Park but not generally in the wooded and more overgrown areas or by the river bank. No other formal picks. No litter pick in Little Park – where much of the litter had been thrown from the Hanworth Road into an area that looks largely abandoned
Previous FORCE work	In 2015 we removed more than a tonne of rubbish in three to four "tonne bags" as a major work item of our day – from the 1.5ha in Crane Park. In Dec 2016 we removed 200kg from the Crane Park area. This time we again removed 900kg but this time from an area over twice the size (and including an area that has not been cleared for say three years.
Build-up of plastic bottles at the site	288 plastic bottles in 4 hectares in 15 to 36 months – say 24 months on average = 36 bottles/hectare/annum – compared to 30 bottles/hectare/annum in 2016. This is comparable – note also that a large number of these bottles came down the river and were caught during flood flows this time – as two people were wearing waders with none doing this last time
Comments	The area is known to be well used by outdoor drinkers – hence the number of cans and bottles, accumulating at a rate of 5 per week.

Table 16: March 2018 Volunteer Day

Date	March 11th 2018
Site name	Butts Farm area of Crane Park
Site area	4 hectares of Crane Park between Butts farm estate and the river in LB Hounslow. Covered double the area compared to 2017 – extending to the A316. However, it was not a comprehensive coverage
Description	This part of the park was opened up in 2011 as part of the Priority Parks project. Until this time it had been little used and had a reputation as a dumping ground for cars, motorbikes etc. It is now much better used (several hundred people per day on a nice weekend) and is an attractive part of the park with mature trees and bramble scrub and attractive river bank and water vole habitat with pathways going through it.
Litter pick	Four to five people for much of the day – 20 person hours in total.
Total collected	250kg
Plastic bottles	97 plastic bottles, comprising mostly drinks or water bottles, many pulled out of the path side brambles. Also around 30 from the side of the A316 bridge
Cans	168 drinks cans, a mix of alcohol and non-alcohol. Scattered in the verges but also around 30 from the bridge area.
Glass	52 bottles
Recycled total	30kg
Other	220kg: includes a lot of old rusty iron (say 100kg) that has been there for a long time along the A316. There has also been a lot of dumping over the back fence over many years. We did not tackle much of this.
Previous FORCE event at location	March 2017: this time over 2 hectares only.
Other litter picks	The council litter pick along the main pathway regularly but not generally in the wooded and more overgrown areas or by the river bank.
Previous FORCE	Annual litter pick – the amount is about the same as last year for the core

Date	March 11th 2018
work	area.
Calculations	97 plastic bottles in 4 hectares in 12 months = 24 bottles/hectare/annum – exactly the same amount as last year
Comments	March is probably the best time of year for finding litter in the undergrowth – much of that collected could not have been removed in the summer. A bag of used needles were found on site – only the second time this has happened in 15 years of volunteer days – also a large knife. Both were reported to the police and the parks dept

Table 17: April 2018 Volunteer Day

Date	April 8th 2018
Site name	Pevensey Nature Reserve
Site area	10 hectare site immediately upstream of Crane Park in LB Hounslow.
Description	This site had been run down for around 35 years until work started around 8 years ago to start to open it up and improve its environmental and community value. This work has continued with the formation of the Pevensey Green Gym three years ago, which meets and works there weekly. The site is around 500 metre long, running long the southern bank of the River Crane and curling around the SW London Crematorium site. It includes, river bank, wetland, backwater ponds, woodland, wet woodland, meadow and grassland habitats. It also include Feltham Circles, a disused sewage works site used for around 3 years by graffiti artists.
Litter pick	An average of 5 people over the day – maybe 20 person hours in total.
Total collected	600kg
Plastic bottles	31 from the hedge along Pevensey Road 50 from the river. Note: the river has been flowing high for at least two weeks and the log dams are not holding as much rubbish as usual. This also restricted the amount that could be removed from the river with another 50 or so remaining uncollected. 36 from around the site 117 removed in total
Cans	77 from the hedge 10 from the river 68 from around the site 155 in total
Glass	26 from the hedge 6 from the river 6 from the surrounding site 38 in total
Recycled total	60kg

Litter Report for the River Crane

Date	April 8th 2018
Other	100kg in black bin liners 400kg of large pieces – mostly steel fencing and other metalwork along with 10 car tyres – removed on the Lampton Greenspace 360 truck
Previous FORCE event at location	April 2016 and April 2017
Other litter picks	There have been several other litter picks here since by the green gym and others.
Previous FORCE work	Annual litter pick – the work of Green Gym and LB Hounslow has considerably reduced the amount of litter on site. This was the deepest clean we have done on the site with much f the heavier materials having been in place for a number of years. We also deep cleaned the hedge along Pevensey Road for the first time. We were not able to do the river completely though due to high water levels.
Calculations	Accumulation of 117 plastic bottles in 10 hectares in 12 months = 12 bottles/hectare/annum
Comments	The base of the hedge was completely cleared for the first time. 3 adults and 4 younger volunteers cleared out 31 plastic bottles; 25 glass bottles and 77 metal cans – a total of 10kg of recycled material plus 40kg of black bag litter - in around one hour. This hedge runs for around 150 metres along the boundary of the nature reserve and Pevensey Road and has obviously been used as a dumping ground by a few people as they walk along there. Individual items included around 15 vodka quarter bottles and around 30 Fosters cans – indicating individual repeated actions. We hope that clearing this hedge – for the first time in such a systematic way – will result in a reduction in future littering. We will look at it again during our next visit in 2019.



Figure 15: the hedge at Pevensey following the litter pick. Two recycle bags and four black bin liners of rubbish removed from its length

Table 18: May 2018 Volunteer Day

Date	**May 12th 2018**
Site name	Donkey Wood and Brazil Mill Wood
Site area	DW covers around 10 hectares and BMW around the same on the west bank of the River Crane in LB Hounslow.
Description	Both sites are elongate and extend for around 2500 metres in total along the west bank of the river and opposite the Hounslow Heath site. The sites are of high value and the London LOOP goes through the both. However, the sites are underused by the public and have been under-managed by LBH for many years. This is the first time FORCE has worked on these sites and there are no Friends groups although there are informal networks of people with an interest in the sites and a significant level of underlying interest from local people. The sites are largely in the flood plan and are prone to inundation. They comprise woodland and open glades with areas of wet meadow.
Litter pick	This was the main focus of the day with 35 people engaged in DW for 135 man hours in total. A further five people worked in BMW for a total of 25 hours making 160 hours in total. This is by far the most time allocated to litter clearance since this project began – and ten times the typical amount of time invested during a normal volunteer day.

Date	May 12th 2018
	The main litter collections area were: • Upper DNR sluice • Upper DNR up to the North Feltham Trading Estate • Main River Crane and banks • Backwater areas upstream of the DNR • Woodland areas and back garden line downstream of the DNR This was a deep clean in DW – although there were restrictions caused by higher than average water levels and the vegetation starting to grow higher. The clean in BMW was more superficial due to lower numbers – and it is interesting to note the difference in volumes collected during the deep clean. Note: given the scale of the event it was not possible to develop precise numbers of material gathered and the following are best estimates only.
Total collected	3000kg
Plastic bottles	800 – including around 500 from the river and the bank/flood plain (Crane and DNR
Cans	1150
Glass	450
Recycled total	300kg
Other	2700 kg of general waste - black bin liners + pieces of metal including bike frames, burnt out moped, around half a dozen car tyres etc. Two loads plus of the Lampton Greenspace 360 truck
Previous FORCE event at location	This was the first FORCE event at this location
Other litter picks	There are occasional litter picks by the contractors as well as by local residents – including the Save Hounslow Heath group.
Calculations	A total of 800 plastic bottles – but no time scale for this. Some had arrived in the last year whilst others had been there a very long time.
Comments	This is a typical first clean for an area – bringing out a large amount of rubbish including much that had been there for a number of years. This is the first such major deep clean we have done on a new site since this monitoring programme started in December 2016 and the outputs are remarkable. The amount of rubbish in total more than equalled that collected at the previous 15 events combined and the amounts of recyclable materials were around 70 per cent of the previous combined total

Table 19: FORCE Volunteer Day – June 2018

Date	10th June 2018
Site name	Hospital Bridge Road area of Crane Park

Date	10th June 2018
Site area	400 metres of the river and bank upstream and downstream of HB Road
Description	Our annual balsam removal day – which included wading along the river to do a litter clearance
Litter pick	Three people spent a total of around 12 hours walking the river and clearing litter – mainly in the form of road cones (four found); bike parts; metal tubing and around 10 bags of rubbish Note: around 5000kg of balsam was also removed during the day
Total collected	200kg
Plastic bottles	40 plastic bottles
Cans	30 drinks cans
Glass	10 glass bottles
Recycled total	0 kg – due to the highly corroded and mud filled nature of much of the recyclable material it was not thought to be justified to do any recycling
Other	200 kg
Previous event at location	Event in 2017 – but no litter recorded from that event
Other litter picks	
Previous FORCE work	
Calculations	Some of the litter had been in the river for a considerable amount of time. Much of the weight was made up of a few heavier items. The litter collected from the river equates to 2.5 bags or 50kg per 100 metres, much of which may have been thrown from the two main bridges that cross this site
Comments	Given the fact the site has not been cleared in this way before – and the proximity of the two bridges – this amount of litter collected appears encouragingly low when compared to the rates of litter accumulation in the Duke's River for example. This indicates the Crane here is seen as a potential litter dumping ground by many fewer (or less active) people than the Duke's – where it is a major problem

Table 20: October 2018 Volunteer Day

Dates	October 14th 2018
Site name	Twickenham Rough, Marsh Farm Lane and the triangle, Rifle Club site and Craneford Field
Site area	Twickenham Rough: 2.5 ha – newly opened Marsh Farm Lane and the triangle: around 0.25 hectare of emergent woodland and some 70m of pathway next to Craneford Fields Craneford Field: around a hectare of open grassland Rifle Club – around 0.7 ha privately managed but with some public access All in LB Richmond
Description	FORCE visited the Rough last October The MFL site received a major litter pick in December 2017

Dates	October 14th 2018
Litter pick	Several people for around 6 hours in total – moderate rain throughout the day
Total collected	105 kg in total – though most of this was in the form of a trolley and bike pulled out of the river. 20kg of litter in black bin bags and 5 kg of recyclable materials
Plastic bottles	32 plastic bottles in total. Many of these were in the area along MFL – as last year. However, the numbers were greatly reduced from the 91 found last year.
Cans	47 in total – many from MFL but also scattered around the site. Much reduced from the 346 found in MFL alone in 2017
Glass	12 – scattered around the site. Reduced from the 37 found last year in MFL alone.
Recycled total	5kg
Other	100kg – includes 80 kg removed from the river (trolley and bike).
Previous FORCE event at location	December 2017 – MFL + October 2017 – TJR
Other litter picks	The council litter pick along the main pathway. The litter is so much better than last year – may be the result of reduced littering and/or more litter picking by the council/college and/or local public
Previous FORCE work	See the numbers above
Calculations	32 plastic bottles – mostly in MFL and Craneford Field = 1.25 Ha in 10 months = 30 bottles/hectare/annum. This compares to around 50/ha/annum last year – assuming the bottles had been deposited over 4 years previously
Comments	There remain one or two hotter spots. However, for the most part the situation was a lot better than last year and the major drinks cans hot spot had not been refilled following our poster campaign. is a scattering of rubbish through this site – which is typical of the site. The likelihood is that the site is litter picked on occasion by council contractors but this litter picking does not stray far from the path and there is a build up of litter in the undergrowth. Crucially there were no Fosters cans found this year – compared to 125 cans found in one spot last year

Table 21: November 2018 Volunteer Day

Date	November 11th 2018
Site name	Twickenham Station
Site area	3 hectares on both sides of London Road – station to Moormead and Twickenham Rough
Description	This was our first visit to the station site. It has been largely unavailable to the public apart from a few small locations where bridges cross the river or the site itself. We also returned to the TJR site from last month.

Date	November 11th 2018
Litter pick	Several people for part of the day – maybe 15 person hours in total.
Total collected	300kg
Plastic bottles	100 from the river bank next to London Road + 60 largely from a few other hot spot areas.
Cans	100 from the river bank next to London Road + 60 largely from a few other hot spot areas.
Glass	10 from the river bank + 30 from other hot spot areas. It may be that the lack of bottles on the bank is due to bottles not being thrown over the wall here
Recycled total	15kg
Other	300 kg – a lot of newspapers – including bundles thrown over the wall. Some large pieces of metal and asbestos that may have been there for a long time. Around 20kg from the TJR which had been picked the previous month.
Previous FORCE event at location	
Other litter picks	None There may have been a Network Rail pick of the river bank but not in the last two years.
Previous FORCE work	
Calculations	Not applicable – though noted that most of the rubbish was in a few hot spots where two bridges cross the river and one bridge crosses the open space
Comments	The London Road hot spot is one of the worst we have seen – we will try to use notices to reduce the littering here

Table 22: December 2018 Volunteer Day

Date	December 9th 2018
Site name	Crane Park – Willow Way
Site area	One hectare of Crane Park between Hospital Bridge Road and Chertsey Road on the south side of the river in LB Richmond
Description	This part of the park was opened in 2013. The river forms the northern boundary of the site for around 200m and the site is some 50m wide. The eastern and western boundaries are with heavily used roads and these have been the main sources of litter during each visit. This is the third volunteer day here where litter reports have been produced, following days in January and November 2017. This provides an opportunity to assess further the cumulative impact of litter picking at the site. The site is used by the public but not heavily. In January 2017 we witnessed around half a dozen people using it; in November 2017 and on this day it was around 15 to 20 people over the course of the day.
Litter pick	Two people litter picking for the most of the day - around 8 person hours in total. The litter pick was fairly comprehensive and covered much of the site area. However, there was some undergrowth still – including live nettles – and this may have reduced the visibility of litter. For the most part the litter

	appeared to have been deposited in the last year. This level of clearance is comparable to the November 2017 clearance.
Total collected	100kg total comprising: • 40 kg from the small area behind the bus stop on Hospital Bridge Road. Clearing this area took around 5 person hours of the 8 total. Note: this bus stop has a functioning bin • 10 kg from a small cache in the centre of the site. This looked like a den – including a paper dating from two weeks previously – but no night sleeping • 10 kg from the length of the A316 boundary. This amount was much less than in previous years • 35 kg from a discrete cache next to the entrance onto the A316 – including parts of a mobility scooter and a set of bed springs – all dumped over the fence from the road • 5 kg only from the main part of the site – which was much cleaner than in previous years This compares with just 30 kg collected in November 2017
Plastic bottles	63 total of which 51 were behind the bus stop and a further 8 along the A316
Cans	89 total of which 69 were behind the bus stop area and a further 15 along the A316
Glass	23 total, 19 of which were behind the bus stop area
Recycled total	10 kg
Other	90 kg
Previous FORCE event at location	November 2017 – 13 months previously
Other litter picks	The council litter pick along the main pathway but not generally in the wooded and more overgrown areas or by the river bank. The frequency of their picks is not known. No other formal picks
Previous FORCE work	Previous work had indicated that the amount of litter was gradually reducing at this site. This remains true for much of the site but this monitoring work is also revealing key litter hot spots, by far the worst of which is the area behind the bus stop. This area appears to have become worse since 2017 and this year comprised 80%+ of the total recyclable litter removed from the site.
Calculations	63 plastic bottles in 1 hectare in 13 months = 56 bottles/hectare/annum. This is an increase compared to 36 b/h/a recorded in 2017 and is exactly the same rate as was assessed for 2016
Comments	There is no significant drinking issue at this site – mostly soft drinks bottles and cans – though more of the cans behind the bus stop seemed to be beer cans. When also including the A316, upwards of 90 per cent of the rubbish was found along the line of the two main roads, indicating it was not put there by people visiting the site but by those walking along the side of it and discarding their litter over the fence. Note that this problem is growing compared to 2017 – whereas the litter problem on site appears steady or reducing We intend to put up signage at the bus stop site in an attempt to deter people

	from littering here. We shall also inform the council of the problem.



Figure 16: picking litter from behind the bus stop site on Hospital Bridge Road



Figure 17: sign added to the Hospital Bridge Road bus shelter in December 2018

Table 23: January 2019 Volunteer Day

Date	**January 13th 2019**
Site name	Crane Park – Hanworth Road and Little Park
Site area	1.5 hectares of Crane Park immediately downstream of Hanworth Road on the north side of the river in LB Richmond and a further 2.5 hectares in Little Park on the west side of the Hanworth Road
Description	The area in Crane Park is a well-used part of the park on the north bank of the main river and with a smaller mill stream running through it – an area 200m by 75m with 600m of river/stream bank within it. It was previously litter picked by FORCE in February 2018 The area in Little Park is not well used. It was litter picked in February 2018 for the first time in several years. This year the litter pick was probably a deeper clean and removed some rubbish that has been there for several years as well as some that had arrived in the last 11 months. The pick covered both the mill stream and the north bank of the main river

Date	January 13th 2019
	through Little Park. It also included the main river channel over around 600 metres of the river.
Litter pick	This was a large scale litter pick with six or more people for most of the day – around 30 person hours in total – compared to some 50 person hours in 2018.
Total collected	600kg total – compared to 900kg in Feb 2018 and 200kg in 2016. Note: as per 2018, over half this total comprised large pieces of ironwork, piping and five car tyres collected from Little Park and the river
Plastic bottles	130 plastic bottles – compared to 288 in 2018 and 75 in 2016. Many of these bottles came from the flood bank in both sides of the park
Cans	404 cans, compared to 300 in 2018 and 400 drinks cans in 2016. This indicates a continued drinking and littering culture in this part of the park – see also the bottles below. Note that these are increasingly in small caches within the park and may therefore respond well to targeted signage
Glass	101 glass bottles this time, compared to 375 bottles – including around 150 corona and cherry B bottles in one small area – in 2018 and 75 bottles in 2016
Recycled total	100kg
Other	500kg
Previous FORCE events at location	Feb 2018 – ie 11 months previously and Dec 2016
Other litter picks	The council litter picks along the pathways in Crane Park but not generally in the wooded and more overgrown areas or by the river bank. No other formal picks. No council litter pick in Little Park – where much of the litter had been thrown from the Hanworth Road into an area that looks largely abandoned. Note: changing the design of this entrance may greatly enhance the way this site is valued.
Previous FORCE work	In 2015 we removed more than a tonne of rubbish in three to four "tonne bags" as a major work item of our day – from the 1.5ha in Crane Park. In Dec 2016 we removed 200kg from the Crane Park area. In 2018 we again removed 900kg but this time from an area over twice the size (and including an area that has not been cleared for say three years. This time we removed 600 kg from at least the same size area – but also including a deeper clean and a larger length of main river
Build-up of plastic bottles at the site	133 plastic bottles in 4 hectares in 11 months = 36 bottles per hecare/annum. In 2018 the calculation was 288 plastic bottles in 4 hectares in 15 to 36 months – say 24 months on average = 36 bottles/hectare/annum – compared to 30 bottles/hectare/annum in 2016. The totals remain very comparable across the three volunteer days.
Comments	The area is known to be well used by outdoor drinkers. The number of cans and bottles accumulated at around 5 per week last year - this year the rate of accumulation is greater – at around 10 per week. This is becoming a major problem and needs to be addressed – maybe by more temporary signs. A message to this effect has already been put onto Facebook. Note: 17 days later three temporary signs were erected around the litter hot spot areas.

Table 24: February 2019 Volunteer Day

Date	February 10th 2019
Site name	Butts Farm area of Crane Park
Site area	Five hectares of Crane Park between Butts Farm estate and the river in LB Hounslow. We covered a larger area than in 2018 – and removed some rubbish that has clearly been there for many years – but still not a comprehensive coverage.
Description	This part of the park was opened up in 2011 as part of the Priority Parks project. Until this time it had been little used and had a reputation as a dumping ground for cars, motorbikes etc. It is now much better used (several hundred people per day on a nice weekend) and is an attractive part of the park with mature trees and bramble scrub and attractive river bank and water vole habitat with pathways going through it.
Litter pick	Several people for much of the day – 12 person hours in total.
Total collected	500kg
Plastic bottles	62 plastic bottles, comprising mostly drinks or water bottles, many pulled out of the path side brambles. The riverside areas were not investigated due to high water levels
Cans	121 drinks cans, a mix of alcohol and non-alcohol. Scattered in the verges – some of them having been there for a long time but also around 30 from the bridge area.
Glass	63 bottles
Recycled total	30kg
Other	470kg: includes a lot of domestic rubbish dumped over garden fences + some fly tipping waste in the park, two car tyres and one burnt out motorbike
Previous FORCE event at location	March 2018: this time over 4 hectares.
Other litter picks	The council litter pick along the main pathway regularly but not generally in the wooded and more overgrown areas or by the river bank.
Previous FORCE work	Annual litter pick – the amount is around twice the amount removed last year: though several new areas were looked at – including large litter accumulations behind garden fences.
Calculations	62 plastic bottles in 5 hectares in 11 months = 14 bottles/hectare/annum – this is less than removed last year (24) though this may be due t the lack of access to riverside areas
Comments	February is probably the best time of year for finding litter in the undergrowth – much of that collected could not have been removed in the summer. Around 70 per cent of the material removed was probably quite old - having been there for more than a year. In general there still seems to be a slow improvement to the amounts of litter being found on this site - and the scope of our litter pick is slowly expanding.

Table 25: February 2019 – Private litter pick

Date	February 12th 2019
Site name	Mereway Nature Park
Site area	1.5 hectares site downstream of Kneller Gardens in the divergence between the River Crane and Duke of Northumberland's River in LB Richmond.

Date	February 12th 2019
Description	One volunteer for 45 minutes in this well-used nature park comprising bramble scrub, emergent woodland and meadow including an outdoor classroom area.
Litter pick	Less than one person hour in total
Total collected	14kg
Plastic bottles	18 plastic bottles
Cans	16 drinks cans
Glass	8 bottles
Recycled total	5kg
Other	9kg
Previous event at location	There is a weekly green gym here but they have not been doing a regular litter pick. In the light of this work we will ask them to resume a litter pick here in future and record what they find
Other litter picks	The council litter pick along the main pathway but not generally in the wooded or bramble areas. No other formal picks – however it is known that a number of local residents undertake informal litter picks as part of their regular walking routine.
Previous FORCE work	This area was where FORCE started 14 years previously and is well used but seems to be fairly well looked after by local people. The Richmond Green Gym took the site over in 2015
Calculations	Not possible
Comments	Around 75 per cent of the rubbish is less than a year old. It appears the site is being used by a lot of young people and some of them are littering the site. This is likely the main source of litter rather than people passing through the site. The impact of one person clearing the site for less than an hour is interesting and indicates the power of individual action on a site – effectively clearing the litter from 1.5 hectares.

Table 26: March 2019 Volunteer Day

Date	March 9th 2019
Site name	Crane Park – Mill Road
Site area	3.5 hectares of Crane Park between Hospital Bridge Road and Mill Road on the north side of the river in LB Richmond.
Description	A well-used part of the park – a mix of woodland, meadow and short grassland with some marginal river habitat areas. The main river channel and a backwater channel.
Litter pick	Several people over the morning in a wide ranging litter pick - 16 person hours in total. Note: this litter pick covered the same broad area as Feb 2017 and Jan 2018 – however, each time the area was covered in more detail and with more thoroughness than the time before – with around a third of the rubbish collected being older than 12 months in age
Total collected	230kg
Plastic bottles	70 plastic bottles, comprising mostly drinks or water bottles, around 30 from the river or the high water mark along the backwater channel.
Cans	80

Date	March 9th 2019
Glass	40 bottles
Recycled total	30kg
Other	200kg: includes a shopping trolley, car tyre, heavy gate and two bikes out of the river – over 100kg of metal. Note: a large shopping bag of needles – some used – was found and reported to the police.
Previous FORCE event at location	January 2018 – 14 months previously
Other litter picks	The council litter pick along the main pathway but not generally in the wooded and more overgrown areas or by the river bank. No other formal picks – however it is known that a number of local residents undertake informal litter picks as part of their regular walking routine.
Previous FORCE work	The third annual clear up measured in this way – though FORCE has been coming here for volunteer days for many years. This area has been subject to informal litter picking by FORCE and others for a number of years now – and as such is subject to low rates of accumulation despite (or maybe because of) being one of the best used parts of the lower River Crane. Usage data for the Meadway entrance to Crane Park indicate usage of 500 to 1,500 people per day.
Calculations	70 plastic bottles in 3.5 hectares in 14 months = 17 bottles/hectare/annum.
Comments	The rubbish found in this site was fairly well scattered across it. The key areas were (a) a part with little public access and (b) the river itself – where the public were not able to access safely.

Table 27: April 2019 Volunteer Day

Date	April 14th 2019
Site name	Donkey Wood and Brazil Mill Wood
Site area	DW covers around 10 hectares and BMW around the same on the west bank of the River Crane in LB Hounslow.
Description	Both sites are elongate and extend for around 2500 metres in total along the west bank of the river and opposite the Hounslow Heath site. The sites are of high value and the London LOOP goes through the both. However, the sites are underused by the public and have been under-managed by LBH for many years. This is the second time FORCE has worked on these sites following a major initial litter pick in May 2018. There are no Friends groups although there are informal networks of people with an interest in the sites and a significant level of underlying interest from local people. We did a use survey during our volunteer day and counted 37 people using the site in 6 hours – all adult males. This indicates a significant suppressed value in the site – compared to likely usages elsewhere in the lower Crane of between 300 and 1000 over the same time period. The sites are largely in the flood plan and are prone to inundation. They comprise woodland and open glades with areas of wet meadow.
Litter pick	This was a major focus of the day with around 20 people engaged in DW for around 80 man hours in total. A further four people worked in BMW for a

Date	April 14th 2019
	total of 20 hours making 100 hours in total. This is a major commitment to litter – though less than the 160 hours invested in 2018. It was felt important that other tasks were achieved as well as litter collection during our visit. The main litter collections area were: • Behind the Upper DNR sluice • Upper DNR up to the North Feltham Trading Estate (including the south bank which is not generally accessible to the public and has been a major dumping ground in the last few years • Main River Crane and banks • Backwater areas along the Crane upstream of the DNR confluence • Woodland areas and back garden line downstream of the DNR This was quite a deep clean in DW – although there were restrictions caused by the vegetation starting to grow higher. The clean in BMW was restricted to the main entrance on Staines Road and did not go further than this entrance area. Note: given the scale of the event it was not possible to develop precise numbers of material gathered and the following are best estimates only.
Total collected	1500kg (compared to 3000kg in 2018)
Plastic bottles	160 – compared to 800 in 2018. This may be due to their being many less in the river and/or the river being less of a focus. Note: there were around 500 from the river and the bank/flood plain alone in 2018
Cans	300 – 1150 in 2018
Glass	170 – 450 in 2018. Includes over 40 large vodka bottles from one small area
Recycled total	100kg – 300kg in 2018
Other	1400 kg of general waste - black bin liners + pieces of metal including one motorbike, several car parts and a large steel door. Probably around 400kg of metalwork in total. One load and one half load on a Lampton Greenspace 360 truck
Previous FORCE event at location	This was the second FORCE event at this location
Other litter picks	There are occasional litter picks by the contractors as well as by local residents – including the Save Hounslow Heath group. Lampton are starting to spend more time here
Calculations	A total of 160 plastic bottles in 10 hectares over 11 months = 17 bottles per hectare per month. Note that this probably was not a deep clean (though some bottles had been there for more than a year).
Comments	There is some encouragement in the reduction in litter compared to the first

Date	April 14th 2019
	clean in 2018. Nevertheless the total amount of litter is much greater than at other sites where we visit more regularly. Numbers using the site are low and the findings suggest that a few people throwing general litter plus occasional fly tipping is more common in less well used sites – due to the perception that it is a low risk and low impact activity.

Table 28: May 2019 Volunteer Day

Date	May 12th 2019
Site name	Crane Park – Mill Road
Site area	3.5 hectares of Crane Park between Hospital Bridge Road and Mill Road on the north side of the river in LB Richmond.
Description	A well-used part of the park – a mix of woodland, meadow and short grassland with some marginal river habitat areas. The main river channel and a backwater channel.
Litter pick	An initial search by several volunteers failed to find any litter. It was then called off for the rest of the day.
Total collected	0kg
Plastic bottles	
Cans	
Glass	
Recycled total	
Other	
Previous FORCE event at location	March 2019 – 2 months previously
Other litter picks	Other volunteers have picked this site in the last month as part of the Great British spring clean. The council contractors were out the previous day and it did a more thorough clean up than usual going into the green spaces. We also know that local people have been litter picking during their walks.
Previous FORCE work	The fourth clear up measured in this way – though FORCE has been coming here for volunteer days for many years. This area has been subject to informal litter picking by FORCE and others for a number of years now – and as such is subject to low rates of accumulation despite (or maybe because of) being one of the best used parts of the lower River Crane. Usage data for the Meadway entrance to Crane Park indicate usage of 500 to 1,500 people per day.
Calculations	
Comments	In some ways the most remarkable result of the 28 surveys undertaken to date. It may be that it results from a freak collection of factors. Nevertheless we take great encouragement from it and hope there will continue to be reduced levels of litter at other sites in the future.

Table 29: FORCE Volunteer Day – June 2019

Date	**10th June 2018**
Site name	Hospital Bridge Road area of Crane Park
Site area	400 metres of the river and bank upstream and downstream of HB Road; the wider area on both sides of the river; and Willow Way
Description	Our annual balsam removal day – which included wading along the river to do a litter clearance
Litter pick	Two people spent a total of around 8 hours walking the river and clearing litter. Around 3 bags were removed – compared to ten bags in 2018. Several people also litter picked the surrounding area – a hectare in total – removing a further four bags of rubbish
Total collected	50kg (compared to 200kg over a smaller area last year)
Plastic bottles	16 (40 last year)
Cans	36 (30)
Glass	11 (10)
Recycled total	5 kg
Other	50 kg
Previous event at location	The 2018 event produced more litter from a smaller search area.
Other litter picks	
Previous FORCE work	
Calculations	Last year we pulled 200kg from the river. This year it was only around 20kg – with 30kg from the surrounding area. Note: two car tyres were thrown into the river from Hospital Bridge road bridge just a few days after this litter pick so the area is still vulnerable to littering from bridges
Comments	The low level of litter in the area reflects the findings from May and is very encouraging. Note however that the vegetation is high at this time of year and may be hiding a lot of items.

APPENDIX B

RECORDS OF LITTER FROM SITE OBSERVATIONS AND THIRD PARTIES

The following observations have been made of litter within the river:

1. Survey of litter floating past a set location – Meadway bridge on 15th January 2017
2. Record of litter - Mill Road to Pevensey on 23rd January 2017
3. Record of litter traps at Kendall (Twickenham Road) Bridge and the Mill Plat boom on the Lower Duke of Northumberland's River on 28th January 2017; 24th March and 3rd May 2017
4. Record from litter traps in Pevensey and Brazil Mill Woods in April 2017
5. *Ad hoc* observations at bridges
6. Record from Mill Road site in Crane Park in June 2017

These are considered in turn below.

1. Floating Litter Static Survey

Date: 15th January 2017

Location: Meadway Bridge 250m upstream of where the River Crane splits from the Lower Duke of Northumberland's River

Duration: 90 minutes between 3pm and 4:30pm

Conditions: cold and wet with rainfall over much of the previous 48 hours.

Observations: no plastic bottles or other floating litter seen – only leaves and small twigs.

Comments: this was a short length of time and firm conclusions cannot be drawn. Nevertheless, the site monitors the whole of the upstream catchment. Given there was no litter recorded throughout this period it indicates either (a) relatively low rates of debris accumulation or (b) accumulation is largely in response to episodic events not witnessed during this period. Further survey work is required to corroborate this.

2. Floating Litter Survey – Mill Road to Pevensey

Date: 23rd January 2017

Location: between Mill Road and Pevensey Nature Reserve – a distance of 2km

Conditions: The weather was cold and frosty – there had been heavy rainfall the weekend of 14th January but no rainfall since. Ice movement on the river connected backwaters in Pevensey indicated water levels had fallen by 15 to 30cms over the previous week

Observations:

- Ten bottles in various locations along the river – mostly caught in overhanging branches, on the bank or river margin
- A further 10 bottles caught behind the sluice on the Mill Road backwater channel (or elsewhere local to it)
- Around 30 plastic bottles (plus several footballs, glass bottles, cans and other debris) caught behind a willow which forms a shallow height dam across the width of the river in Pevensey

Comments:

- A broad assumption would be that these bottles represent the accumulation on this length of river since the high water levels around 7 days previously
- Note that some of these bottles may have been there for longer – we may also have missed some and others may have floated past this point over the last week – so it is a broad assumption
- On this basis however there has been an accumulation of 50 bottles in 7 days on 7 per cent of the river (albeit towards the base of the catchment)
- This translates to 39,000 bottles per annum over the whole catchment – or 4 to 5 bottles per hour

3. Floating Litter Surveys at Kendall Bridge (Twickenham Road Bridge) and Mill Plat Boom

Date: 28th January 2017

Location: Kendall Bridge near the base of the Duke of Northumberland's River.

Conditions: cold and wet.

Comments:

The low soffit level on the bridge acts to skim floating debris from the river and there is often a backlog of material here. The EA has collected this in the past – though it is difficult to gain access for a vehicle onto the garage forecourt.

An EA officer has reported that the EA now seek to drop the water level at the sluice on a regular basis in order to allow this material to float downstream to the main boom (see below). The EA may also in future effect a permanent reduction in water level at the sluice sufficient that this no longer acts as a skim. The EA noted that the sluice level had been raised in the last few years and this had exacerbated the problem.

Another EA officer estimated that the boom is cleared of debris every two weeks or so

The photo below shows approximately:

- 40 footballs and three rugby balls
- 50 tennis balls
- 100 plastic bottles
- Various glass bottles, cans and other debris

FORCE also clear this site during our regular annual volunteer days on the site between 2012 and 2015. We also noted a large number of footballs here then. One explanation would be that they do not clear the soffit of the bridge even when water levels drop (allowing other debris to pass).



Figure 6: Litter backed-up above Twickenham Road (Kendall Bridge)

Questions for the EA:

- How often is the level dropped to allow this blockage to clear?
- What is the longer term plan and when might it be implemented?

Date: 28th January 2017

Location: Mill Plat boom at the base of the Duke of Northumberland's River – around 500m downstream of Kendall Bridge.

Conditions: cold and wet

Comments:
The boom is in place to stop surface litter going into the major sluice downstream and onwards into the River Thames. The EA clears the debris from this boom quite regularly. Immediately downstream of the boom is the intake for Syon House lakes.
The photo below shows approximately:

- 15 footballs
- 400 plastic bottles

- Various other debris including glass bottles and cans

There are a few bottles also around the Syon intake – which may indicate that some debris is either thrown into the area downstream of the boom – or maybe blows over it during high winds?
Questions for the EA:

- How often is the debris cleared from the boom? Every few weeks
- How much debris is normally cleared?
- It would be very helpful if the EA could roughly record of the dates the boom is cleared and how much debris is removed – in particular approximately how many plastic bottles are removed.



Figure 7: Mill Plat boom: March 2017

Date: 24th March 2017

Location: Kendall Bridge near the base of the Duke of Northumberland's River.

Conditions: cool and dry

Comments: The EA reported that the site had been cleared of all debris on 6th March 2017. When visited there was a significant build up of rubbish at the site comprising around 50 plastic bottles, 6 glass bottles, 11 footballs and one rugby ball, and 40 drinks cans. There were also a significant number of plastic bags and other debris floating at the site.

We then visited the Mill Plat boom downstream and noted that this had relatively little rubbish in place comprising 3 footballs, 10 plastic bottles, 2 glass bottles and 5 cans.

Assuming this build up had occurred over the previous 18 days then the rate of build-up has been as follows:

- Footballs – 0.8 per day

- Plastic bottles – 3 per day
- Cans – 2 per day
- Glass bottles – 0.5 per day

Note that the DNR is one of two outflow points for the river system. The main Crane outflow takes the bulk of the flow during high flow periods but little flow during low flow periods. A first assumption may be to expect a similar order of litter outflowing through each river and these attrition rates would therefore be doubled.

Note also that there had been some higher flows during the preceding 18 days but no major rainfall events – and therefore the system of upstream holding points (log jams etc) may have remained largely un-breached.

3rd May 2017
Location: EA boom at Mill Plat
Conditions: cool and dry
We visited the site with Paul Evans from the EA. He noted that the boom had been cleared around three weeks previously. We counted approximately:

- 200 plastic bottles
- 100 tennis balls
- 4 footballs
- 70 cans
- 40 glass bottles
- 20 polystyrene food boxes
- 30 coconuts

This indicates a build up rate of:

- plastic bottles – 10 per day
- 100 tennis balls – 5 per day
- 4 footballs – 0.2 per day
- 70 cans – 3.5 per day
- 40 glass bottles – 2 per day
- 20 polystyrene food boxes – 1 per day
- 30 coconuts – 1.5 per day

This is a faster rate of build up than recorded earlier in the year. Note however that (a) the weather has been warmer so more people would have been out and about and (b) river flows have been low so most if not all the rubbish would have come down the Duke's River.



Figure 8: Mill Plat boom in May 2017

4. Litter Surveys at Log Dams in Pevensey and Brazil Mill Wood

Date: April 2017

Location: log dam in Brazil Mill Wood.

Comments: clearance work done by volunteers with "Save Hounslow Heath"

Information: over 200 plastic bottles removed along with around half a dozen sacks of floating rubbish

Date: 9th April 2017

Location: log dam in Pevensey

Comments: clearance work done as part of FORCE volunteer day – see also above

Information: 107 plastic bottles removed along with 23 glass bottles, 15 metal cans and three sacks of floating debris.

Date: 8th April 2018

Location: log dam in Pevensey

Comments: clearance work done as part of FORCE volunteer day – see also above

Information: 50 plastic bottles removed along with 6 glass bottles, 10 metal cans and four sacks of floating debris – 60kg in total. Note that there was at least as much again that could not be removed due to high water levels.

5. Floating Litter Survey – Observations at Bridges

Observations at bridges over a number of years indicate these may be a prime source of rubbish discarded into the river.

- Bridges are a main point of intersection between the general public and the river

- Those walking over bridges are less likely to have an emotional link to the river that would stop them discarding rubbish over it – particularly where there is no other link between the bridge and the river (e.g. a riverside path) or where the river is deemed unattractive (or maybe even unseen) at that point
- There is a pattern where rubbish seems to accumulate in places where it can be disposed of quietly and discretely adjacent to a main thoroughfare – and dropping something over a bridge seems to fit this requirement
- Where a bridge has a parapet there is a tendency to balance litter on it – like a shelf - where it might be picked up later by someone else. All too often it is then blown into the river
- The river banks adjacent to urban bridges are often inaccessible by site managers and others – due in part to H&S concerns governing access. These are often hotspots for the build-up of rubbish

There are maybe 100 bridges along the Crane Valley – one every few hundred metres. The investigation of how much litter is sourced from bridges, and what types of intervention might reduce it, would be an interesting subject for further study.

The parapet of the bridge in London Road Twickenham was observed on 29th April 2017 (see Figure 9 below) following the Army Navy rugby game. This shows two bottles, three drinks cans, two plastic beakers and a packet of cigarettes on one of the four parapets at this location. Looking over the bridge there was also a significant amount of rubbish that had either been thrown or fallen into the river. This is illustrative of the problem – albeit at a high use period.



Figure 9: bridge parapet in Twickenham Road: 30th April 2017

6. Observations at Mill Road in summer 2017

This site has become used by a group of boys and young men over the last few months since the FORCE volunteer day at the site in February 2017. In that time there has been a rapid accumulation of litter, particularly plastic soft drinks bottles. A recent site visit counted some 80 plastic bottles in the river around the weir with a further 30 bottles in the undergrowth around the site. This rate of accumulation, over 100 bottles in an area of a few hundred square metres and a length of river backwater of around 50 metres maximum in a period of four months maximum, is unprecedented in

the data record to date. This is further evidence of the potential negative impact of hot spots of this nature on the overall bottle count across the catchment.

In the following two months this site has been the subject of:

- An initial site clear up and graffiti removal session by the council
- Increased patrols and awareness by park guard and the local pcso's
- Posts on facebook identifying the problem
- Further clear up of the river by TCV on 2nd August 2017

As a result, over 100 plastic bottles were removed from the site. The early signs are that the problems with littering and anti-social behaviour have quietened down.

7. Litter removed along the Duke's River

TCV have been doing regular litter removal work along the Lower Duke's River since 2016 as part of the Duke's River project. In the first year this amounted to around a tonne of litter removed along every 100 to 200 metres of the river and the site was clearly being used as a dumping ground.

The work has continued through until 2019 and works in January 2019 have removed around 200kg along 350 metres of river that had been the worst area for littering in the past. This work indicates that repeated clearances and the associated improvement of the environmental value of these reaches can have a major impact on local public behaviour – though the works need to be sustained for the benefits to be assured.