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National Rivers Authority
Awdurdod Afonydd Cenedlaethol

WELSH REGION
Rhanbarth Cymru

**THE INVESTIGATION OF THE
TAFF LITTER PROBLEM**



NOVEMBER 1989

Guardians of the Water Environment
Diogelwyr Amgylchedd Dwr

NRA Wales 64

A REPORT ON :-

THE INVESTIGATION OF THE TAFF LITTER PROBLEM

Report No - PL/EAE/89/2

By :- Gillian L. Davies
Environmental Appraisal Officer
SE.Environmental Appraisal Unit,
St. Mellons Business Park,
St. Mellons,
Cardiff.

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ENVIRONMENT AGENCY



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SUMMARY

1. Significant quantities of litter accumulate in the river Taff, particularly amongst bankside vegetation above the low water level, which causes a great deal of public concern. Potential sources of litter in the catchment are many and diffuse, therefore this investigation was carried out to identify and quantify the main components and sources of the litter.
2. Bankside litter assessments were made at 22 sites on the Taff Fawr and 1 on the Taff Fechan between 22nd May-6th June 1989, using qualitative and semi-quantitative techniques.
3. The diversity and total amount of litter within the 35 categories recorded generally increased with distance downstream. Although potential point sources were identified and assessed, the general accumulation of litter was such that downstream of Pontypridd, no specific inputs were identified as major contributors to the problem.
4. Sewage derived litter was virtually absent from the Taff Fechan but was present at all sites on the Taff Fawr from Merthyr Tydfil downstream. It formed a maximum of 42% of the total reach score at site T6 (Troed- y-Rhiw) but an average of 19% of the total at all affected sites.
5. Because of the scale and diversity of the inputs to the litter problem it is apparent that a clean up can only be achieved by the collaboration of all interested authorities.
6. The statutory responsibilities of the NRA for prevention and/or removal of litter are discussed. It is concluded that existing litter inputs need to be stopped at source and cleared before any longer term preventative strategy can be employed.



Photograph 1: An illustration of the Taff litter problem.

THE INVESTIGATION OF THE TAFF LITTER PROBLEM

1. INTRODUCTION

The presence of significant quantities of debris and litter, particularly that strewn amongst bankside trees and other vegetation above the low water level of the river Taff, has caused major public and Local Authority concern culminating in calls for remedial action (Photograph 1). Differences in opinion exist as to the main sources of the litter and to whom responsibility falls for its removal. It was therefore proposed that the S.E. Environmental Appraisal Unit undertake an investigation into the problem with the following objectives:-

2. OBJECTIVES

1) To describe, if possible quantitatively, the scale and extent of the litter problem in the Taff river corridor.

2) To identify the types and major sources of litter present in the river corridor.

3) To quantify the contribution of waterbourne sources of litter (ie. storm sewage overflows, surface water outfalls and STW effluents) relative to other sources and recommend means of improving and/or eliminating them.

4) To clarify the legal position regarding responsibility for remedial action.

5) To present the data to the relevant authorities and thus motivate and initiate joint action to alleviate the problem.

3. METHODS

In early May 1989, a preliminary investigation of the types of litter was made at certain key sites on the lower Taff in order to devise a method of assessment which would quantify and distinguish between sewage derived litter and refuse or land derived litter. The Taff was then divided into 2km reaches along its length from upstream to downstream and one site within each reach was selected on a random ease of access basis.

At each site a 40m reach was subjectively assessed for the amount of litter, using a scale ranging from the absence of material to gross contamination, within the river channel and on both banks (Table 1, Appendix 1). A 5m wide strip of bank was then selected and litter quantified on a logarithmic scale within the lower, middle and upper bank (Table 2, Appendix 1).

Data were collected for 22 sites on the Taff Fawr and 1 on the Taff Fechan at its confluence with the Taff Fawr (Fig 1). A photographic record of a) the reach and b) the bankside was obtained for each site, the whole survey being carried out between 22nd May - 6th June 1989.

4. RESULTS

A brief description of each site outlining the amount and main distribution and components of the litter is given in Appendix 2 and photographs of sites to illustrate the main types of litter are presented here:



Site T2: A clean site high in the catchment.



Site T4: At Merthyr Tydfil - affected by a Surface Water Outfall (S.W.O.) and debris such as supermarket trollies.



Site T5: Downstream of the Hoover Factory, Pentrebach. Heavier objects in the river channel and an amount of builders rubble dumped on the bankside.





Site T10: Downstream of the Taff Bargoed tributary demonstrating the effect of coal solids on water quality.



Site T11: Tons of builders rubble and general refuse form much of the right hand bank.

Site T12: Cilfynydd STW Storm Sewage Outfall, a potential source of sewage derived litter.



Site T12: The fence on the river bank d/s Cynon STW Final Effluent is draped in rags, plastic strips and sewage derived litter.



Site T19: Typical of the rubbish found strewn around the banks of the Lower Taff.



Site T20: At Fforest Farm railway bridge, Whitchurch, Cardiff. A storm sewer overflow discharging in dry weather with a pool of sewage at the outfall.

4.1. Qualitative Assessment of Litter within the Reach

For presentation purposes, types of litter have been divided into 12 broad categories but initially 35 types of litter were recorded on the Bankside Litter Survey form. The total score per reach ranged from 7 (T2,TF1) to 112 (T8) (Table 1) with an average total score per reach of 49.

The proportion of sewage derived litter and refuse are illustrated in Fig. 2 as pie diagrams with the diameter of the circle representing the log total score. Sewage derived litter was virtually absent on the Taff Fechan but was present at all sites on the Taff Fawr from Merthyr Tydfil downstream. Upstream of Pontypridd, because background levels are low, the proportion of sewage derived litter can be attributed to a number of point sources previously identified by the Pollution Control Section as potential major inputs (Figs 1 and 2). However, downstream of Pontypridd and the major tributary rivers (Taff Bargoed, Afon Cynon, Nant Clydach and the Rhondda) (Fig. 1), sewage derived litter is ubiquitously distributed upstream and downstream of any point sources with only slight localised increase. Sewage derived litter forms greater than 25% of all litter at sites T5, T6, T12, T17, T19 and T20, with the highest percentages at sites T6 (42%), T12 (36%) and T20 (38%).

The diversity and total amount of litter in each category generally increases with distance downstream. Plastic material was found at all sites together with metal objects. Heavier objects such as vehicle debris increase in quantity markedly from downstream of Aberfan (T8) where the variety of litter reached a peak (Fig 3) probably due to a significant input of refuse from the gorge above this site, evidenced by a deposit of refuse at the edge of the gorge.

The amounts and types of litter classed as refuse tended to vary from site to site. Paper litter, take-away food cartons, cans of drink were common at sites with footbridge crossings close to schools (T6) or towns (T4,T13). Items such as pieces of plastic, rags, clothing and household fabrics were

often associated with sewage litter and were similarly caught up on trees. A surprising amount of very heavy debris such as tyres, wheels, parts of vehicles, builders rubble, furniture (mainly fragmented) and large metal objects probably of industrial origin were found at most sites with no obvious point source. Often these large objects were found lying in the river channel as if they had been washed downstream from the point of origin. Fly-tipping was evident at site T11 in particular where a large contribution of refuse was recorded and similar volumes of rubbish were present in a roadside lay-by above the river.

4.2. Results of the Semi-quantitative Bankside Transect.

Figures 4-7 illustrate the results of the 5m bankside transect in order to compare the contribution of sewage derived and refuse litter found on the lower, middle and upper bankside at each site.

Generally, the main component of litter on the lower bank was sewage mixed with the type of refuse associated with sewage e.g. plastic strips and clothing, and similarly on the middle bank. As the maximum height of the flood channel was reached sewage litter became less evident. The upper bank tended to be generally less littered but the main component was refuse. Site T2, between Llwyn On Reservoir and Cefn Coed was the cleanest site and the heaviest contamination with both sewage and refuse recorded at site T20 (Fforest Farm, Whitchurch).

Sewage derived litter was mainly caught up on bankside vegetation and the only site downstream of Merthyr Tydfil at which it was absent from the transect (T11) had no overhanging vegetation. At site T20 (Fforest Farm, Whitchurch) sewage remained ponded around a Storm Sewage Overflow but at this and other sites with a potential point source (T9, T12), sewage litter was also found in similar abundance upstream of the outfall within the reach.

The maximum height of litter caught up on trees equated to the height of the flood channel, which tended to eliminate any significant aerial contribution of litter from sources such as refuse tips.

5. DISCUSSION

5.1. Although potential point sources of litter were many, the general downstream accumulation of litter in the Taff was such that downstream of Pontypridd, no specific inputs were identified as major contributors to the problem.

5.2. Certain storm sewer overflows (S.S.O.), sewage treatment works storm water overflows (S.W.O.) and treated effluents were identified by the Pollution Control Section as being potential major sources of sewage litter in the river (Figure 1). However, it would appear that sewage litter is progressively washed downstream to become caught on overhanging vegetation, as downstream of Pontypridd and the major tributaries, sewage litter was ubiquitously distributed both upstream and downstream of the identified potential point sources.

5.3. The diversity and amount of litter that was not sewage derived would indicate that the problem is much more extensive than that which could be remedied solely by improved screening of Welsh Water discharges. Sewage derived litter formed a maximum of 42% of the total litter score at any one site and its removal at all sites would only reduce the litter problem by on average 19%.

5.4. It is highly likely that the major tributaries of the Taff import a significant quantity of litter into the Taff and this needs to be investigated. The Rhondda in particular has sewage pollution problems (Thomas et al, 1986) and is a potential major contributor of sewage derived litter.

5.5. Flows are very variable in the Taff (range at Pontypridd Gauging Station 1976-1986: $1.57 \text{ m}^3\text{sec}^{-1}$ to $642 \text{ m}^3\text{sec}^{-1}$, Thomas et al 1986)). It is likely that even large and heavy objects of refuse are washed downstream during floods and redeposited at locations downstream. Once refuse has been caught up on vegetation then it hangs there until the next flood. The litter problem is therefore most evident in late winter to early spring when bare bankside vegetation is strewn with litter washed downstream during high flows.

5.6. During Spring and Summer months bankside vegetational growth and leaf opening obscures much of the bankside litter thereby reducing the visual impact.

6. FUTURE WORK

To assess the impact of major tributaries the survey should be extended further up the catchment and this should enable a better identification of point sources.

7. LEGAL POSITION

7.1 CONTROL OF LITTER

The Water Act 1989, Section 107 1(a) is contravened if any person causes or knowingly permits any poisonous, noxious or polluting matter or any solid waste matter to enter any controlled waters. The only exception from prosecution is if the disposal is in accordance with a) a consent to discharge or b) the person holds a disposal licence (Section 108 1(a) and (b)). Thus a discharge or deposit of litter into a watercourse is illegal and the National Rivers Authority could prosecute the offender, but only if the person is caught in the act, which poses practical difficulties in enforcement of the legislation.

Storm Sewage Overflows are consented under the Control of Pollution Act 1974, Section 34 and these consents are still valid under the new Water Act 1989, although future consents will be issued by the National Rivers Authority under Section 113 and Schedule 12 of the Water Act 1989. To date, there has been only a limited requirement in any of the issued consents, to screen the discharge for removal of gross solids.

The Welsh Water Land Drainage Act 1976 byelaws, sections 6.7 and 8 also refer to the prevention of tipping and depositing of material (rubbish, refuse etc) on banksides or in rivers.

7.2 REMOVAL OF LITTER

Under section 8.4 of the 1989 Water Act the Authority has a duty "to such extent as it considers desirable, generally to promote - (a) the conservation and enhancement of the natural beauty and amenity of inland and coastal waters and land associated with such waters." The control and/or removal of litter from river channels and banksides could well be included in these responsibilities. However it is the general opinion that the National Rivers Authority is not statutorily responsible for litter clearance, neither does it have the resources to carry out such a task.

It is the Authority land drainage function's policy to remove large objects from watercourses when they constitute an obstruction to flow and could therefore cause flooding. Under section 115 of the Water Act, the authority is entitled to carry out remedial works for the removal of solid waste matter from any controlled water and to recover the expenses reasonably incurred in doing so from any person who caused or knowingly permittedetc the matter to enter.

The Authority could take steps to remedy pollution and to recharge the cost of any clean-up operation but again this would involve proving that the person was responsible in the first place. District Councils have wider legislative powers

through the Environmental Health Departments to control illegal dumping of refuse on the bankside along with the police force in enforcing the Litter Act.

8. SOLUTIONS

8.1. The National Rivers Authority should address the problem of screening for gross solids when consenting new discharges and in the review of existing consents, especially for storm sewage discharges. However, it is estimated that the removal of all sewage derived litter from the Taff would only reduce the total amount of litter by a maximum of 42% and on average just 19%.

8.2. The whole problem of control and removal of all litter can only be addressed by the joint action of all responsible authorities. Because of the diverse nature of the litter components and the known problems within the catchment of fly-tipping, vehicle dumping etc., a major initiative such as that carried out by the Forth River Purification Board in cleaning up the Forth should be launched (details available). This would involve collaboration between all interested authorities such as Parish, District, City and County Councils, Educational Institutions and voluntary organisations e.g. Keep Wales Tidy and Conservation bodies.

8.3. Existing litter inputs need to be stopped at source and cleared before any longer term preventative strategy could be employed. A paper is being prepared recommending a number of Authority initiatives on this problem.

8. REFERENCES

Forth River Purification Board. Clean Forth '88 Campaign.

H.M.S.O. 1974. The Control of Pollution Act 1974.

H.M.S.O. 1989. The Water Act 1989, Chapter 15.

Thomas et al 1986. The Environmental Quality of the River Taff Catchment 1985 - Water Quality. WWA Internal Report SE/7/86.

Welsh Water Authority 1976. Land Drainage Act 1976. Byelaws.

TABLE 1: SUMMARY OF QUALITATIVE ASSESSMENT OF LITTER (TOTAL REACH SCORE PER SITE).

		T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17	T18	T19	T20	T21	T22	
SEWAGE DERIVED LITTER	TOILET PAPER			1	1	4	4	5	6	5	2	1	6	5	5	5	6	6	5	7	5	4		
	NAPKIN LINERS					3	4	5	6	5			5		5		2	5	5	6	5	5		
	SANITARY TOWELS				1	4	5	4	6	3	2	1	6	5	5	5	6	6	5	7	8	5	3	
	CONTRACEPTIVES																			1				
	COTTON BUDS																1							
	TOTAL	0	0	1	0	2	11	13	14	13	4	2	17	10	15	11	14	17	15	21	18	14	5	
PLASTIC STRIPS	POLYSTYRENE	1	1	1		2	2		2	7		1	4		3		4	1			2		4	1
	<30CM		2	2	1	3	4	2	5	7	4	3	4	5	6	6	7	7	4	5	6	7	6	
	30-60CM			1	1	3	3	2	5	7	4	2	4	5	6	6	5	7	5	5	6	5	6	
	>30CM				2	2	4	2	5	7	4	3	5	5	6	6	5	7	6	5	6	4	6	3
	TOTAL	3	3	4	4	10	13	6	17	28	12	9	17	15	21	18	21	22	15	15	20	16	22	11
	CLOTHING/SHOES/RAGS	1		1		2	1	3	5	6	4	4	4	5	7	4	7	4	2	7	4	4		
DROPPED LITTER	CANS		1		1	3	2	3	5	8	3	2	4	2	6	1	5	5	1	2	6		3	
	TAKE-AWAY CARTONS		1		1					4													1	
	PAPER LITTER	1	1		2	3	3	3	3	5	3	3	4		7	4	3		2	2	5		4	6
	TOTAL	1	3	0	3	7	5	6	8	17	6	5	8	2	13	5	8	5	3	4	11	0	8	11
METAL OBJECTS	METAL OBJECTS	6	1	1	3	2	3	4	4	8	4	5	4	5	6	6	6	7	4	5	5	4	5	4
	CONTAINER DRUMS				1				2	1	2	1	2	1		1	3	2	1	2	2		1	2
	INDUSTRIAL REFUSE																4	4		2				
	TOTAL	6	1	1	4	2	3	4	6	9	6	6	6	6	6	7	9	13	9	7	9	4	6	6
	BOTTLES/GLASS/CHINA				1	1	1	1	3	7		2	3		3		1	5	1		2	1	2	
BUILDERS RUBBLE	FENCING				1																			
	RUBBLE	1			2		2		2	5	2	3	9	2	3	6	3	5	1	4	2	2	2	
	WOOD											1												
	TOTAL	1	0	0	3	0	2	0	2	5	2	4	9	2	3	6	3	5	1	4	2	2	2	0
FURNITURE	CARPETS					1		1																
	FLOOR-COVERING				1				7	2	1				1		3		2					
	FURNITURE					1			6			2		1	2	3	1	1	2		1	1	1	
	MATTRESSES													1										
	TOTAL	0	0	0	1	0	2	0	1	13	2	1	2	1	1	3	3	4	1	4	0	1	1	
VEHICLE DEBRIS	TYRES/WHEELS								2			1		1	1	2	2	2	3	3	1	4		
	ROAD CONES								1	1		1		1		1						1		
	VEHICLE PARTS									3		1		1	3	1	2	3	4			3	2	
	TOTAL	0	0	0	0	0	0	0	3	4	0	3	0	3	4	4	4	5	7	3	1	8	2	
LARGE PACKAGING MATERIAL	SUPERMARKET-TROLLIES				3				2								2	1		1				
	CRATES							1	4			1			1	1		1	1	2				
	CARDBOARD				1	1		1							2							1		
	TOTAL	0	0	0	4	1	0	2	6	0	0	1	0	0	3	1	2	2	1	3	0	1		
	ANGLING LITTER	1			1										1									
MISCELLANEOUS	TOYS								1															
	BUCKETS									1														
	ROPE									1	1													
	COMPUTER																	1						
	TOTAL								1	2	1							1						
TOTAL SCORE PER REACH		13	7	7	17	28	40	31	56	112	53	36	55	47	65	69	65	82	58	59	78	47	68	

Fig.1 : Survey sites and discharges which are the supposed major sources of litter in the Taff catchment.

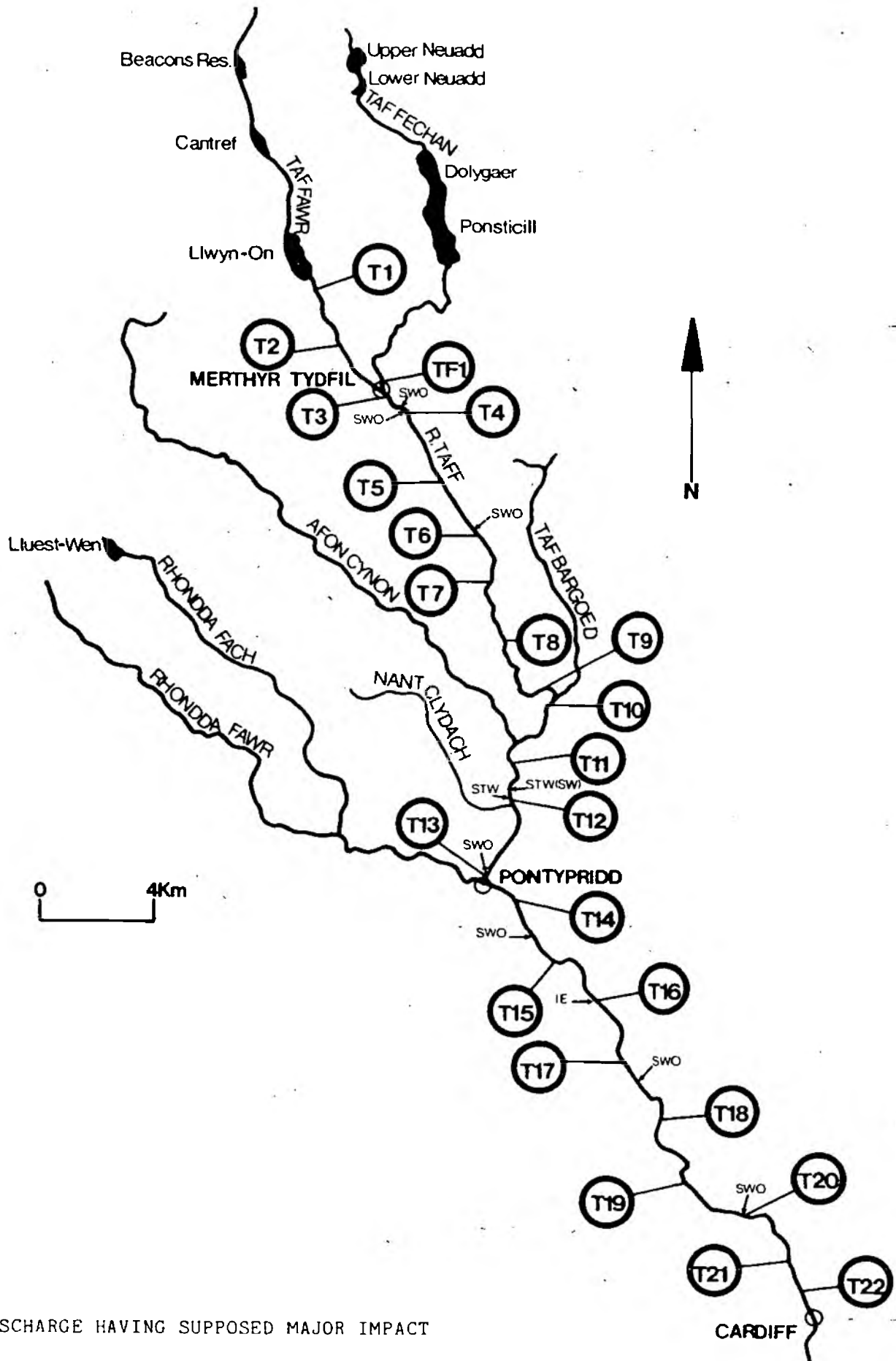


FIG.2 : Abundance of litter and the proportion which is sewage derived at each survey site on the Taff.

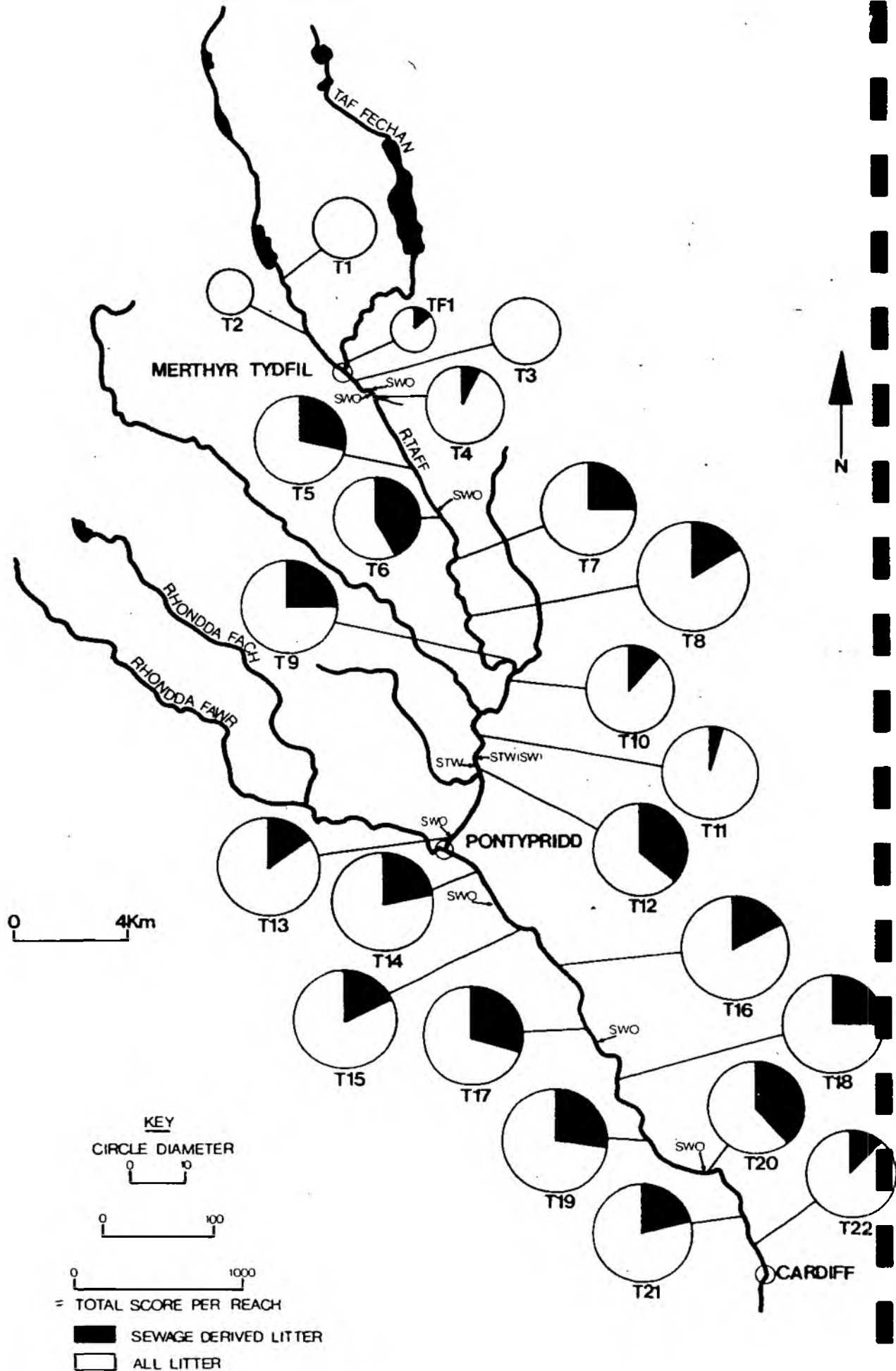


Fig.3: Distribution of major litter types in the Taff

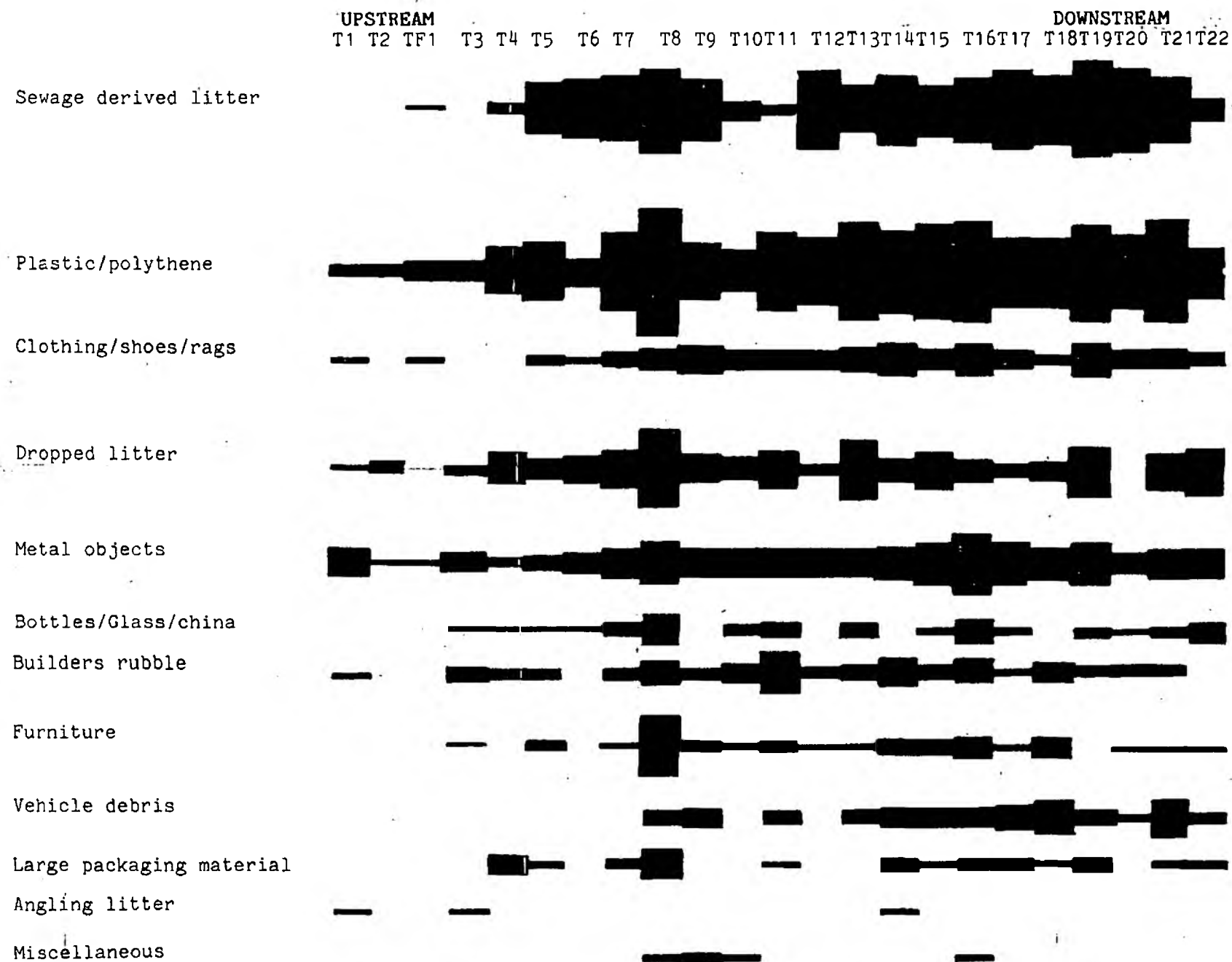


Fig 4:

TAFF LITTER: SEMI-QUANTITATIVE ASSESSMENT

LOWER BANK

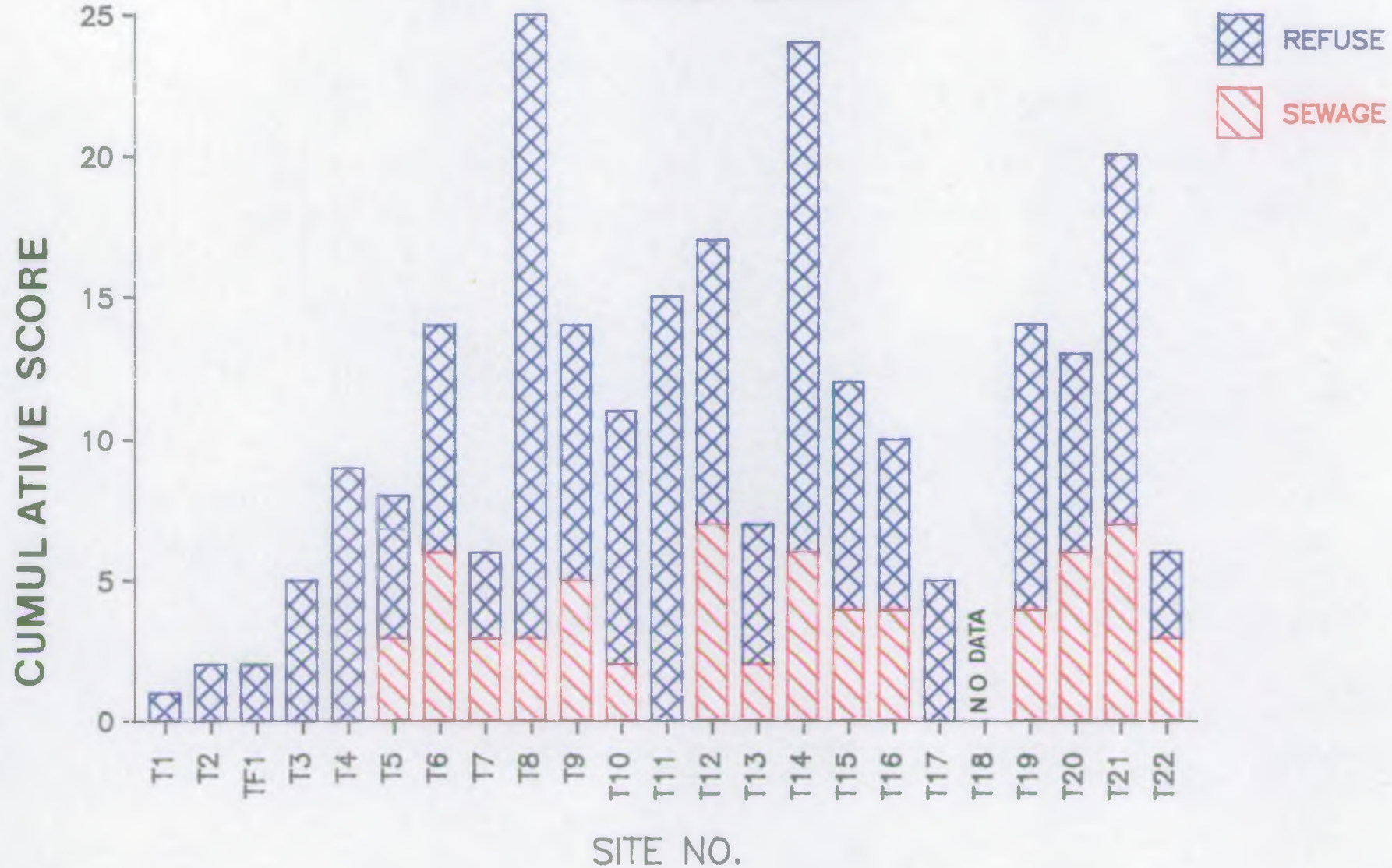


Fig 5:

TAFF LITTER: SEMI-QUANTITATIVE ASSESSMENT

MIDDLE BANK

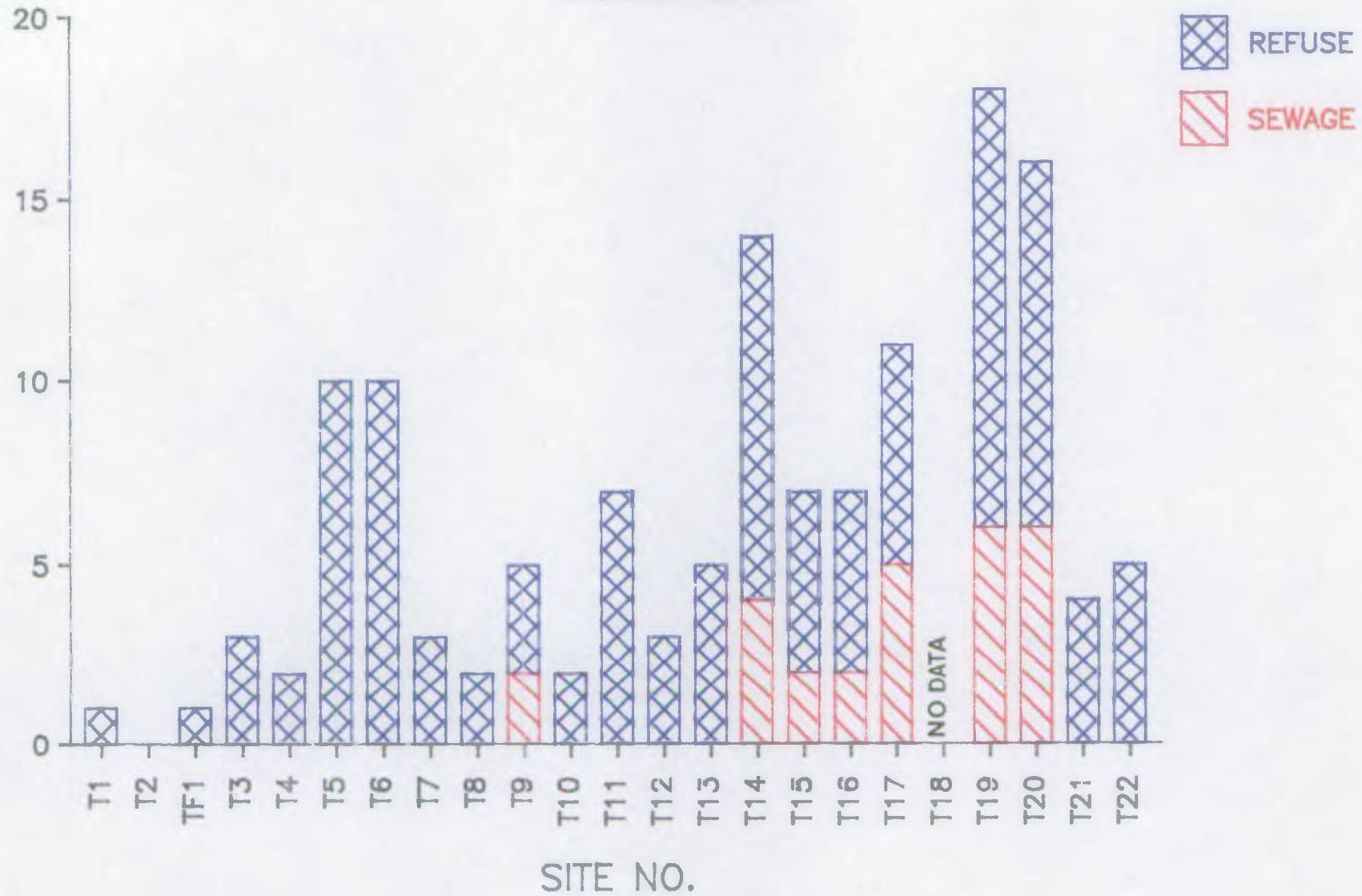


Fig 6:

TAFF LITTER: SEMI-QUANTITATIVE ASSESSMENT

UPPER BANK

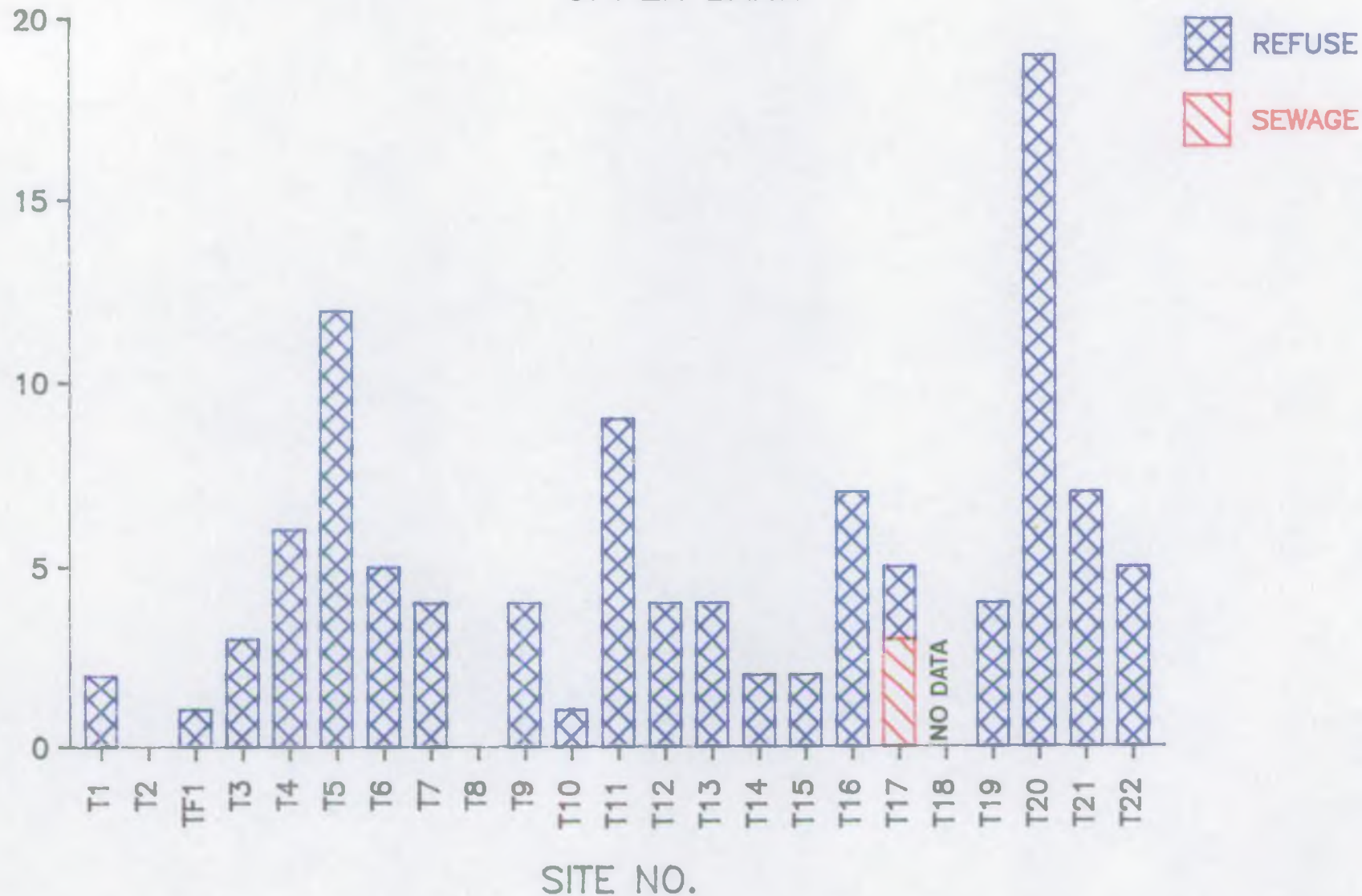
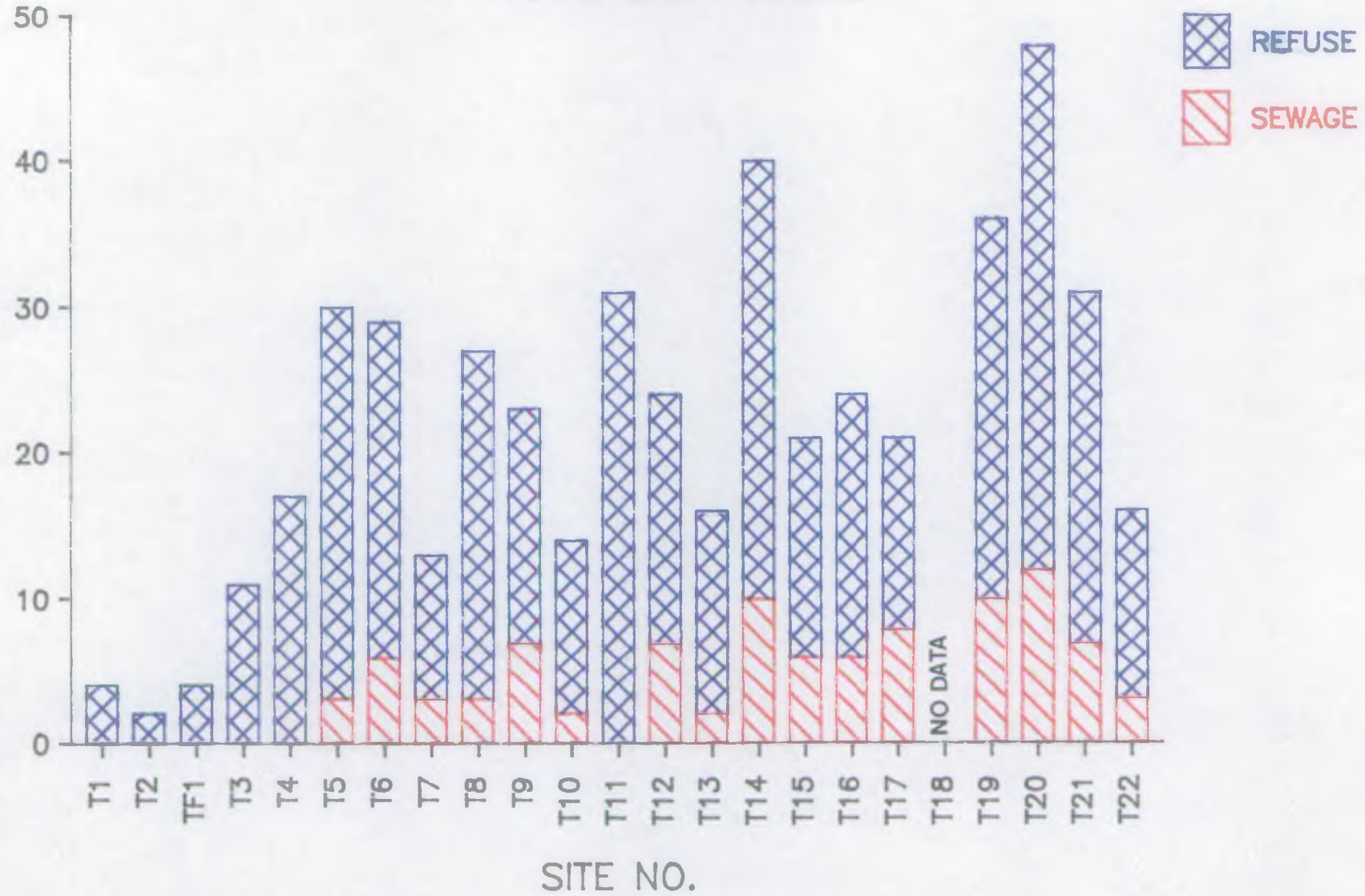


Fig 7:

TAFF LITTER: SEMI-QUANTITATIVE ASSESSMENT

TOTAL BANK SCORE



APPENDIX 1

NATIONAL RIVERS AUTHORITY (WELSH REGION)
South East Area Environmental Appraisal Unit

Bankside Litter Survey Form

River:

River Reach: u/s NGR

d/s NGR

Reach Code:

Date:

Recorder(s):

Sketch of Survey Area:

(Select a survey area to a maximum length of 40m i.e. 20m u/s and d/s of your access point. If possible survey the whole length and width of the survey area but if it is not possible to access both banks then define clearly the area surveyed on the plan)

Physical Characteristics of Reach:

1. Riffle/fast run/slow run/glide/pool, etc.?

2. Description of bank - walled / steeply sloping / gently sloping / overhanging, etc.,?

3. Vegetation types (tick if present)

Trees ☐ Tree ☐ Shrubs/
Roots ☐ Bushe ☐ Low plants ☐ Grasses ☐

estimate %age of reach with overhanging vegetation:

Record maximum height of litter (m) in branches and state whether or not this is still within the flood channel if possible:

Describe any point sources of litter from e.g. STW storm water, Storm Sewage Overflows (S.S.O's). Complete the quantitative and qualitative litter descriptions - 1 for u/s and 1 for d/s source. Include the name of the outfall:

Was the discharge occurring under Dry Weather Flow conditions?

Record any tributaries and state whether or not the input appears to be a major source of litter. If necessary complete an /s and d/s assessment as above.

Select a 5M wide transect of the bank and semi-quantitatively assess the bankside litter from the river channel upwards. Divide the bank subjectively into lower, middle and upper bank and record in Table 1 overleaf:

TABLE 1 QUALITATIVE DESCRIPTION OF LITTER IN SURVEY AREA

REACH CODE:

MAJOR CATEGORIES	DESCRIPTION	RIVER CHANNEL	BANKSIDE		TOTAL REACH SCORE
			LEFT	RIGHT	
SEWAGE	toilet paper				
	contraceptives				
	sanitary towels				
	napkin liners				
	cotton buds				
	sewage smell				
	other (specify)				
REFUSE	angling litter				
	road cones				
	polystyrene				
	plastic crates				
	plastic strips				
	<30cm length				
	30-60cm length				
	>30 cm length				
	clothing				
	cans				
	metal objects				
	bottles				
	vehicles (or parts of vehicles)				
	tyres/wheels				
	supermarket-trolleys				
	furniture				
	plastic/metal drums				
	builders rubble				
	other (specify)				
OTHER	(specify)				

TICK IF LITTER PREDOMINATELY CAUGHT
ON BANKSIDE VEGETATION

0=Absence of material
1=Traces of material
2=Some material at intervals
3=Gross contamination

TABLE 2 SEMI-QUANTITATIVE ASSESSMENT OF LITTER IN 5M TRANSECT

REACH CODE:		LEFT OR RIGHT BANK?		
MAJOR CATEGORIES	DESCRIPTION	LOWER BANK	MID BANK	UPPER BANK
SEWAGE				
	toilet paper			
	contraceptives			
	sanitary towels			
	napkin liners			
	cotton buds			
	sewage smell			
	other (specify)			
REFUSE				
	angling litter			
	road cones			
	polystyrene			
	plastic crates			
	plastic strips			
	<30cm length			
	30-60cm length			
	>30 cm length			
	clothing			
	cans			
	metal objects			
	bottles			
	vehicles (or parts of vehicles)			
	tyres/wheels			
	supermarket-trolleys			
	furniture			
	plastic/metal drums			
	builders rubble			
	other (specify)			
OTHER				
	(specify)			

TICK IF LITTER PREDOMINATELY CAUGHT ON BANKSIDE VEGETATION

0=0

1-10=1

11-100=2

101-1000=3

>1000=4

NUMBER OF ITEMS OF LITTER

APPENDIX 2: TAFF LITTER SURVEY SITE DESCRIPTIONS

T1-Below Llyn On Reservoir (SO 013 111)

Traces of metal debris e.g. rusting wire.

T2-Between Llyn On and Cefn Coed (SO 022 089)

Traces of picnic debris.

TF1-Taff Fechan at its confluence with Taff Fawr (SO 0380 0725)

Slight contamination with glass and plastic bags etc.- not a major contribution to litter on the Taff Fawr.

T3-Taff Fawr d/s confluence with Taff Fechan (SO 037 072)

No sewage contribution but picnic debris, broken bottles and a large amount of fencing material in one heap.

T4-Merthyr Tydfil Technical College Car Park (SO 046 060)

Only a slight sewage litter contamination despite the presence of a SS0 within the reach (see photograph). Heavily contaminated with litter from the footbridge which is the main pedestrian exit from the car park into Merthyr shopping centre and largely comprised of wrappers, take-away cartons, cardboard boxes and a whole bin-bag full of rubbish. 7 supermarket trollies visible in the river channel.

T5-Downstream of Hoover's Factory, Pentrebach (SO 055 039)

Some sewage litter contamination and paper litter, glass, polythene bags/strips, but large amount of builder's rubble, furniture and carpeting material. Council workmen use the upper right bank to store road materials plus building repair work and easy access from conurbation opposite to dump rubbish.

T6-Troedyrhiw (SO 071 020)

Sewage smell from trunk sewer which runs parallel to the footbridge. Dense Japanese Knotweed growth on both banks therefore could not locate the exact position of any SWO, but even upstream contamination of sewage litter. Heavy contamination of paper wrappers, cans, take-away cartons, bottles etc., dropped from the footbridge which is used to reach the local school.

T7-Aberfan (ST 072 999)

Left bank walled with parkland and footpath on opposite bank. Some sewage contamination and widely scattered litter of all description with no obvious point source.

T8-(ST 080 975)

Taff Anglers Private Fishing Water. Very picturesque with a steep-sided gorge right bank and fields left bank. However, extremely contaminated in a shallow area of the river channel with sewage litter caught up on vegetation within the channel and a vast amount of refuse - mainly large objects (furniture, floor-covering, wooden crates, toys, tyres, paper litter, take-away cartons and builders rubble). The suspected source is a rubbish dump on top of the gorge? Visual evidence of tipping from above but this may not be the only source.

T9-Quakers Yard (ST 095 9660)

Picnic area. SWO on right bank but no discharge. Some sewage litter and general litter but not heavily contaminated.

T10-D/S Taff Bargoed at A470 Road Junction and Flyover (ST 089 952)

Very obvious water quality deterioration caused by coal solids input from Taff Bargoed with the river bed no longer visible and water black. Some sewage litter contamination and refuse e.g. floor covering, clothing with no obvious point source.

T11-D/S Abercynon (ST 081 938)

Heavily contaminated with refuse, builders rubble etc. and evidence of fly-tipping in lay-by on opposite side of road. Physical characteristics of reach made it unsuitable for the accumulation of sewage litter (very little overhanging vegetation). River bed not visible due to coal solids.

T12-Cilfynydd (ST 082 929)

D/S Cilfynydd STW storm water overflow and Cynon STW final effluent discharges into the reach. Mainly sewage litter - the fence on bank adjacent to Cynon STW outfall is draped in clothing/plastic strips (see slide).

T13-Ynysangharad Park, Pontypridd (ST 073 900)

At Ynysangharad Park immediately upstream of the Rhondda confluence. Footbridge crossing the river from Park to Pontypridd shopping centre therefore paper litter, cans and bottles etc., thrown over the bridge. In addition quite heavily contaminated with clothing, refuse and some sewage contamination.

T14-Downstream end of Ynysangharad Park (ST 083 896)

Sewage litter and heavy refuse such as parts of vehicles, tyres and builders rubble.

T15-at Hawthorn (ST 102 872)

Industrial area with SSO on right bank and quite easy bankside access. Some sewage derived litter plus heavier refuse such as builders rubble, metal objects and parts of vehicles.

T16-At wooden bridge Treforest Industrial Estate (ST 1065 8634)

Grossly contaminated by Leiner's Gelatin effluent with white sludge silting around the mouth of the outfall and a very strong smell of decaying animal products. The area around the outfall was very contaminated with refuse (e.g. computer keyboard, bottles, clothing, cans, metal objects, parts of vehicles, builders rubble, floor covering, industrial plastic

discs and about 10 supermarket trollies) and sewage litter contamination also.

T17-U/S Gwaelod-y-Garth (ST 119 851)

Site only accessable through farmland but littered with heavy refuse e.g. lawn-mower, industrial refuse and general refuse which must have been washed down from upstream - some sewage litter.

T18-Taffs Well (ST 124 831)

Difficult to find suitable access point within this reach. The site was assessed from a footbridge although much of this reach was obscured by vegetation. Quite littered by sewage and refuse.

T19-U/S Fforest Hall Farm (ST 131 807)

D/S Radyr Weir. Close to railway line and consequently railway sleepers and a huge cable drum had been dumped there. Large amounts of refuse and sewage litter deposited on the right bank in particular.

T20-At Fforest Farm Railway Bridge, Whitchurch (ST 1405 7980)

SS0 with sewage ponded around the outfall but upstream contamination by sewage litter also. Less refuse here and more water-bourne debris.

T21-Llandaff Weir (ST 152 784)

The whole area smells of sewage (cf activated sludge plant). Gross contamination especially of left bank and river channel with sewage derived litter and litter of all description. Right bank overall less contamination especially with sewage.

T22-At Blackweir (ST 1705 7805)

River channel contaminated by refuse mainly. Upstream of weir deep channel and some sewage material caught up on trees.