

6A Water Quality
(Box 3)

POLLUTION CONTROL

ON THE RIVER ALT

MARCH 1995



BY ANTHONY PARSONS

ENVIRONMENT AGENCY



112981

1. Introduction

The River Alt is Liverpool's second river; the River Mersey's poor second cousin. Second in profile, second in charm, even the Mersey's history of gross neglect and industrial pollution seems to have pushed the Alt, paradoxically, into second place. And as the Mersey improves in quality the Alt once again is the unfortunate runner up.

But everyone lives by and knows a part of the River Alt. Rising in the wetlands of Huyton to the east of the City, through Stocksbridge village and West Derby, through Croxteth and Fazakerley it skirts up and around the north of Liverpool, on to pick up the surface waters of Kirkby, Maghull, Lydiate and Formby; draining the moss-land reaching out between Ainsdale and Ormskirk it is finally pumped out into the Crosby channel at Hightown. From Huyton to Hightown the length of the river is 27.7 kilometres; within the overall catchment of the Alt it is estimated there are over 75km of watercourse. The mean flow of the river, measured at Altmouth pumping station just upstream of its mouth, is 250 megalitres per day.

The water quality of the Alt may be regarded as poor, both in chemical and biological terms: in the water quality classification scheme utilised by the NRA, which is based upon chemical criteria and ascribes a score ranging from 1 (excellent quality) to 4 (bad quality); approximately half of the length of the river and its tributaries is designated Class 3 and half Class 4. Pollution continues to be widespread although some of the upper reaches of the tributaries do fall into Class 2. The river has more than a fair share of urban, industrial and agricultural areas in its catchment, all contributing to the severe and diverse, pollution problems.

The high density of urban development surrounding, indeed built over, stretches of the river in the last 100 years may be responsible for a significant part of that pollution - the pollution from old, inadequate or wrongly connected sewerage systems. In addition, three of the principal sewage works treating Liverpool's wastewater, at Fazakerley, Hillhouse and Formby, discharge their effluents - in some cases insufficiently treated - directly into the River Alt.

Industry also has an impact on the Alt. Whilst there are few consented discharges of industrial effluent to the Alt itself, bad housekeeping on industrial premises and some deficiencies in the sewer networks serving the industrial estates give rise to some particular pollution problems; problems exacerbated by the high toxicity of some substances and waste materials handled by companies in the area.

The task of water quality improvement in the Alt is evidently a tough one. Against the legacy of Merseyside's polluted past the NRA is working hand in hand with Liverpool, Knowsley, Sefton and West Lancashire Councils, North West Water, local industry and the farmers, in ambitious and far-reaching pollution alleviation schemes throughout the area. Capital expenditure programmes for refurbishment and substantial improvement of wastewater treatment works are currently both under negotiation and under way, and around fifteen cross-connection surveys and remedial works are scheduled for completion by April 1995.

In addition the NRA continues with its pollution awareness campaigning, focussing on the theory of prevention rather than cure; with its industrial inspection and liaison, and of course with the day to day work in response to pollution incidents. With regard to the future pollution of the River Alt, ignorance of the aims of the NRA in protecting the environment can no longer stand up as reasonable mitigation. The NRA has the power to make the polluter pay and where necessary has no hesitation in using this power.

This report outlines the current state of water quality in the Alt system. In doing so attention is given to the location of the particular stretches of the river and its tributaries; to the important influences on water quality according to the areas it flows through; to the schemes currently being undertaken towards improvement of the river catchment; and finally to the future of the River Alt.

2. Categorisation of the Alt: The upper and lower catchments.

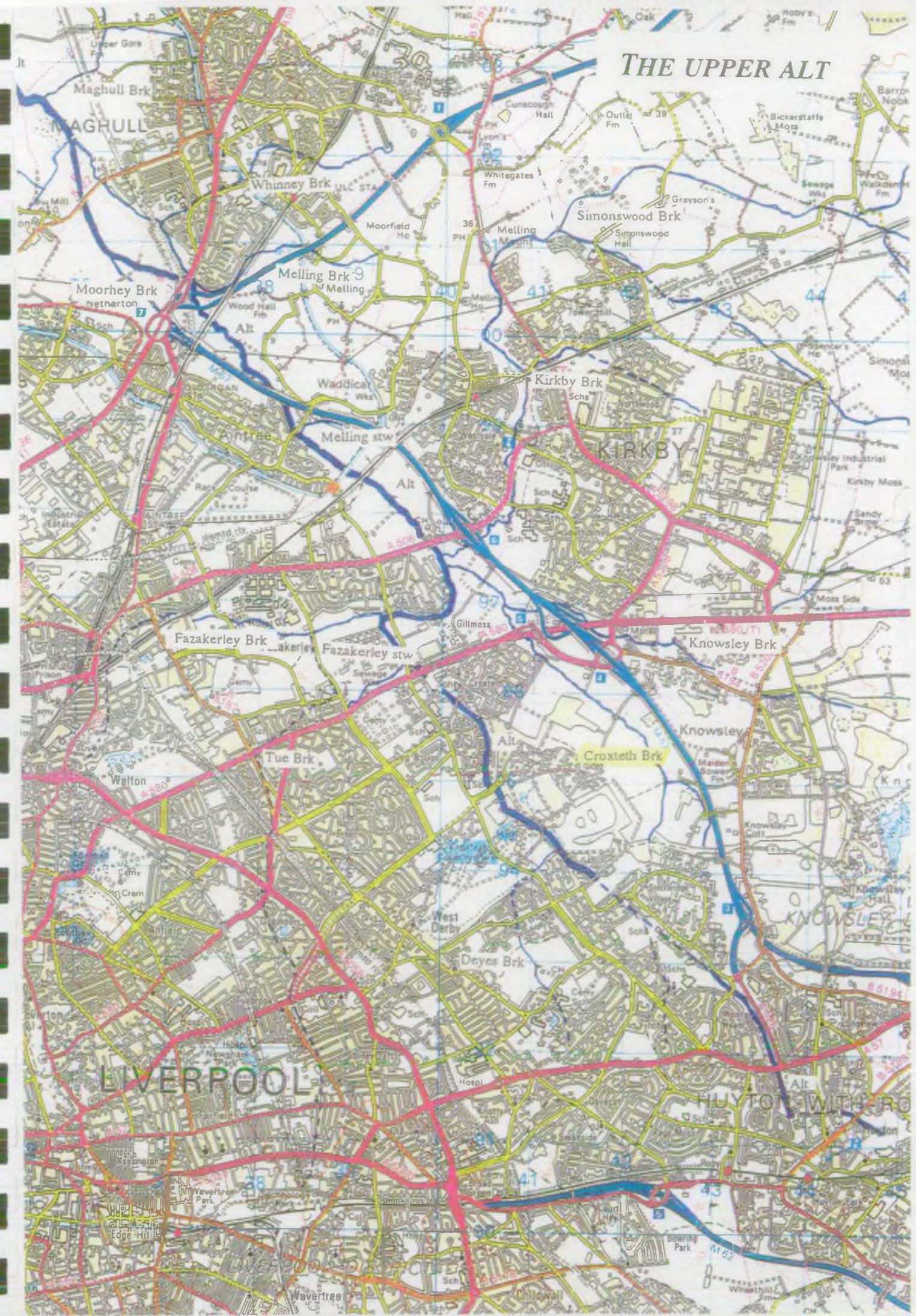
For the purposes of this report the River Alt may be conveniently divided into two characteristically distinct sections. That is, the upper and lower Alt and their associated tributaries. 'Upper' and 'Lower' in this case refers to upstream and downstream respectively, the upper section running from Huyton to Maghull, and the lower section from Maghull to the mouth of the River at Hightown.

The upstream section, as well as the main Alt itself includes the tributaries joining the river along this stretch: Fazakerley, Knowsley, Croxteth, Kirkby, Simonswood, Moorhey, Dovers, Whinney and Maghull Brooks. This is an area rich in industry and urban development; pollution is exemplified by sewage contamination and surface water from industry typically polluted with toxic organic and inorganic substances in trace quantities. Primarily the pollution sources are distinct and generally intermittent in nature.

The downstream section incorporates the length of the river below Maghull through to its estuary at Hightown, this section includes most importantly the tributaries draining the farm land area between Formby and Ormskirk, including Suddell, Barton, Chisnall and Fine Janes Brooks, all joining the Alt via Downholland Brook at Formby. Pollution in this catchment is certainly less severe than in the upper section and is more likely to be attributable to diffuse sources of agricultural origin. Some streams are of reasonable quality according to conventional classification methods, which generally use organic parameters in their grading scheme. However nitrate levels are high and are undoubtedly contributing to eutrophication. In addition biological surveys have revealed the possibility of toxic inputs, likely to be the result of intensive use of agricultural pesticides.

The sections that follow describe the river and its tributaries according to three characteristics: the geography and location of the water courses, the pollution problems associated with the river stretch and the work currently being undertaken in control of pollution in the area.

THE UPPER ALT



2.1 THE UPPER ALT: HUYTON TO MAGHULL

The Alt first appears right in the centre of Huyton, in the area known as Huyton Wetlands, where it rises as a spring. The stream passes beneath Huyton Lane and then flows northwards alongside Salerno Drive, under the Liverpool Road and off towards Stockbridge Village. It appears from culvert next at 'Brookside' and continues North West through Croxteth Hall Country Park towards Fazakerley. Even in these upstream stretches the river is polluted: the contaminated surface water from Huyton and Stockbridge Village are two of the most serious sewage pollution problems on the catchment. With flow rates of the river relatively low, the influence of these organic inputs is significant and knocks the river immediately down to Class 4 'poor' quality. Some recovery of the water course is apparent through Croxteth Park, in fact contributing an attractive amenity feature to the Hall grounds. Sugar Brook, a relatively short tributary joins the Alt on the South side of Fazakerley sewage treatment works.

2.11 FAZAKERLEY BROOK

Fazakerley Brook (upstream as Tue Brook) has two parts, the upper flows eastwards from Long Lane, passing under Higher Lane and through the grounds of Fazakerley hospital. The lower section takes urban drainage from around Wavertree Technology Park flowing northwards, almost exclusively in culvert, through Tuebrook and Clubmoor. The two parts of Tue Brook join under Lower Lane and flow to its confluence with the Alt at Stonebridge Lane.

The whole length of Tue or Fazakerley Brook is severely polluted by contaminated surface water problems at the head of the stream; both from wrongly connected domestic appliances from the residential area and also by possible industrial estate surface water. The extent of any industrial pollution will only become apparent after the CSW investigation is completed.

Downstream of the confluence with Fazakerley Brook, the Alt now swings to the East and then back to the North West again where Knowsley Brook and then Kirkby Brook join the main river, shortly before it passes beneath the Valley Road (A506).

2.12 KNOWSLEY BROOK AND KNOWSLEY INDUSTRIAL ESTATE

Knowsley Brook itself flows towards the Alt from the Eastern side of Knowsley Industrial Estate, to the South of Kirkby. It is also joined by Croxteth Brook coming from the South East rising very close to the source of the main Alt itself. Knowsley Brook has been affected by complex contaminated surface water problems as it passes in culvert beneath the Industrial Estate. The surface water and foul drainage systems travel adjacently beneath the site. Under normal dry weather conditions, in order to protect the watercourse from contamination, some flow through the surface water sewer also passes, via a first flush separator, to the foul sewer and off to Fazakerley WWTW. During high flow (wet weather conditions) the surface water is designed to pass through the separator and directly to the culverted water course. For some time this system had failed to protect the Brook because of direct inputs from industrial sites but many of these problems have now been rectified. An upstream tributary of Knowsley Brook, known as Mill Brook has suffered from C.S.W. problems but many of these have now been rectified. Recently the biology of Knowsley Brook has improved to a class 2 at least in parts.

Fazakerley Waste Water Treatment Works.

This works treats the waste water from a large part of the population of Northern and central Liverpool, including Kirkby, as well as a significant amount of effluents from local industry. In dry weather conditions approximately 60 megalitres per day of effluent is discharged to the Alt, clearly providing the Alt from this point with the largest portion of its flow. The discharge from the works is consented by the NRA and currently has limits on the concentrations of biochemical oxygen demand, and suspended solids of 30 and 45 milligrams per litre of effluent, respectively. The works easily meets these standards.

The sewage passing through Fazakerley works undergoes secondary or biological treatment following initial screening and settlement to remove large debris and settleable solids. All effluent that discharges to inland watercourses (i.e. not estuaries or coastal waters) is required under EC Directive to receive secondary treatment as a minimum standard. This will also apply to estuarine and coastal waters after 1998. The basic principle of secondary treatment is the breakdown of harmful organic components of sewage, for example fats, sugars and proteins into less harmful substances that may more safely be discharged to water and the air, such as carbon dioxide, nitrates, ammonia, and water itself. These processes whilst being chemical in nature are normally facilitated by the use of micro organisms. In the case of Fazakerley these organisms reside in percolating filter beds; they may be termed the 'biological community' of the filter bed.

A percolating filter bed is normally round and about eight feet high. It is packed with media - something for the biological community to grow and live on - the media is often small pieces of clinker or stone about the size of lumps of coal. The biological community is made up of a collection of bacterial, fungi and algae, as well as other larger worm-like creatures, all of which are contained together in a slime that coats the surface of the media. The sewage is trickled over the surface of the bed and passes down through the media where it comes into contact with the biological community. Oxygen is an important component in the breakdown process and this is distributed throughout the bed through the air spaces between the media. In the presence of this air the bacterial and other organisms 'eat' certain components of the sewage and pass out less harmful products. For example, a certain species of bacterial will utilise the carbon of a protein (which in turn causes the bacterial to grow) and produce ammonia, water and carbon dioxide which will pass out in the sewage effluent. Similarly, a whole host of other organisms carry out reactions within the bed; all working together to reduce the polluting power of the final effluent. This biological process is one which would naturally occur in a river system, it is simply maximized in a WWTW. At Fazakerley WWTW, more than 60 of these filter beds can be seen in operation. Whilst they are effective and low in technical demand their main drawbacks are the vast land area that they require and their maintenance. There are alternative secondary treatment systems available: see the section on 'Hillhouse Sewage Treatment Works and the Activated Sludge Process.'

As the effluent contributes such a major flow to the Alt it is clear that for the river to improve in quality then effluent standards will need to be tightened and comparable with a class 2 river. Classification currently applied to setting water quality standards primarily utilises the levels of BOD and ammonia in the water, required to be under 5 and 0.5 mg per litre, respectively. At present negotiations are taking place between North West Water and the NRA regarding the future of this works, with the requirement of improvement in water quality at the top of the agenda. It is expected that significant capital expenditure will be made at Fazakerley by the year 2000.

2.13 CROXTETH BROOK

Croxteth Brook can be first seen as it appears from culvert North of Stockbridge Village, subsequently flowing North Westwards parallel to the M57 motorway and in the same direction as the main River Alt as previously described. Initially the brook is subject to contaminated surface water problems from beneath Stockbridge Village at Cantril Farm; however, downstream the catchment is a narrow belt of farm land and the water quality does improve somewhat. Much of this land is now undergoing development and regular inspection of the soon to be commissioned surface water outfalls from the expanding conurbation is being undertaken in order to prevent the appearance of new CSW problems.

There is a small tributary of Croxteth Brook at its upstream end, locally known as Alder Brook, which is mentioned here because of again a cross connection pollution problem on the stretch, and the intermittent but serious discharges from a sewage pumping station overflow.

As Croxteth Brook passes under the East Lancs Road it receives drainage from the Bus Depot. This site has had several problems from bus washing, disposal of waste oil and dirty yard drainage. Pollution control staff have pushed for improvements to the drainage of the site to include three new oil interceptors. This work has now been completed at some cost.

Croxteth Brook joins Knowsley Brook 100yds downstream from the East Lancs Road.

2.14 SIMONSWOOD AND KIRKBY BROOKS

Kirkby Brook joins the Alt just downstream of its confluence with Knowsley Brook. This Kirkby Brook system comprises Kirkby Brook itself in addition to the expansive Simonswood Moss area North of Kirkby. Simonswood Brook (which has about three branches) is, on the whole, of good quality. One point discharge to this catchment is from Barrownook STW and because of good effluent quality it has no real impact. The only other point source is the surface water system which serves Simonswood Industrial Estate and discharges to the Brook at two points, upstream and downstream of the Murphy Vincent site. Simonswood industrial estate has a history as a munitions site and a large timber works but now the only problems from it are minor oil spills.

In the past the problems on Simonswood Brook catchment have been those associated with illegal discharges from vegetable washing and minor diesel oil spillages. With it being a good class 2 at its source and degrading to a class 3/4 further downstream the possible effect of pesticides on Simonswood Brook from the surrounding farms has still to be established. The work in this area is focussed on maintaining the river's reasonable quality.

As it leaves the open countryside and enters the Tower Hill area of Kirkby, Simonswood Brook is subject to familiar CSW problems from a number of outfalls to the brook. At this point the watercourse feeds Kirkby Mill Dam pond. Several years ago after a decade of neglect this pond was cleaned up and restocked by local anglers and is now an asset to the community. In an area of high unemployment with a reputation for vandalism the pond generally escapes attack. Simonswood and Kirkby Brooks join near the railway bridge beside Boyes Brow just downstream of Mill Dam pond.

Kirkby Brook rises beneath Kirkby (or Knowsley North) industrial estate, in fact at the top end the flow in the brook which is intermittent and of poor quality, is made up entirely of surface water from this area. Flow rate increases as the brook passes beneath the Northwood area of Kirkby, but a further degradation of the watercourse occurs due to more C.S.W. problems. Pollution problems are indeed severe and this is reflected in the NRA classifying the whole length of the brook as a 'Priority Pollution Problem' (PPP).

2.15 KIRKBY INDUSTRIAL ESTATE

The sewerage system serving Kirkby Industrial Estate operates in a similar manner to that of Knowsleys south industrial estate, differing in engineering principles. During dry weather the surface water passes directly to the foul system; during these times Kirkby Brook at the top end is dry. Only during wet weather, as the surface water passes through the interceptor does flow pass to the brook. Pollution problems arise because of surface water on a number of industrial premises being contaminated by toxic chemicals. The principle of the Kirkby interceptor is that when flow passes to the brook it is adequately diluted by rainwater. This however is not effective where contamination is by substances toxic in even parts per billion (ppb). A great deal of work has been channelled into inspecting sites on the estate; partly in the NRA's role in Integrated Pollution Control Authorisation but also as a campaign of routine pollution prevention visits. It is agreed that there is still work to be done in improving housekeeping methods and thus preventing seepage, leakage and spillage of contaminants as well as abating general dirty run-off from sites, particularly where hazardous substances are stored. North West Water's Trade Effluent Officers have and continue to assist greatly in this process.

Recently it was been decided that the answer to the problems affecting Kirkby Brook may lie in greater diversion of the surface water through the foul system, with attenuation for storm water, where it will at least receive some treatment at Fazakerley and a greater degree of dilution before reaching the Alt. Previously a 225mm pipe took flows to the foul system but a protective screen over this pipe suffered frequent blinding and caused dry weather overflows. The 225mm has now been replaced by a 450mm pipe which will send greater flows to the sewage works. It also has a new screen with wider spacing which should not blind as easily.

After flowing in culvert beneath the Northwood area of Kirkby, the Brook swings around to the West shortly before joining Simonswood Brook. As the watercourse then makes its way southwards, alongside the A506 (here often referred to as Mill Brook) sewage pollution problems are apparent, although somewhat reduced in impact through the dilution offered from Simonswood Brook. The Brook here sits in an attractive setting and the potential amenity value is evident as it passes through this 'green corridor' leaving Kirkby. A vast amount of work involving local schools and community groups, under the Auspices of Mersey Basin Trust 'streamcare' group, has been carried out on this section of Kirkby brook, namely the planting of bankside wild flowers and trees and the improvement of footpaths. Still the brook continues to suffer intermittent pollution problems and illegal fly tipping and the overall quality of the water remains poor, graded as Class 4. Kirkby Brook then passes under the M57 at Junction 6 and joins the main river Alt. North West Water are currently funding investigations into the CSW problems and will be tackling other polluting inputs by installing surface water interceptors to direct dry weather flow to the foul sewer.

2.17 MELLING SEWAGE TREATMENT WORKS

Joining the main river Alt again as it flows North westwards into Aintree, the next major influence on the river is the discharge from Melling STW via a small tributary. The effluent from the works is consented with limits of 40mg per litre and 75 mg per litre on BOD and suspended solids, respectively. Analysis of the effluent always reveals a compliance well below this limit except during storm events when the high flows are passed directly to the final discharge point. The future for Melling works is uncertain in the light of this problem, and if refurbishment of Fazakerley WWTW does take place diversion of the Melling flow is likely to ensue.

2.18 AINTREE INDUSTRIAL PARK

A little further downstream, shortly after passing under the M57, the Alt is subject to a consented discharge from Aintree Industrial and Retail Park situated adjacent to the race-course. Historically, a textile factory was located on the site but now it is effectively divided into the retail section, whose sewage passes into the foul sewer on the Ormskirk Road and then on to Hillhouse Sewage Works, and the industrial section whose foul wastewater is treated on site by the small plant that used to serve the textile factory. The foul water enters a large underground settlement tank and periodically is pumped to a filter bed at the North end of the site where it undergoes biological treatment. The wastewater is not treated to a high standard but the flows are low and are not thought to have much effect on the River Alt. More problems, in fact, have been caused by the oversize of the settlement tanks which offer a high residence time often leading to the prevalence of anaerobic conditions and hence septicity of the sewage. This has been known to cause odour problems which have been raised with the Environmental Health Department of Sefton M.B.C. The treated effluent, along with surface water from the industrial and retail areas of the park as well as surface and foul water from the race-course itself, currently pass through twin outfalls under the canal, beneath Sedburgh Avenue to the Alt.

The site has recently changed hands and the new owners are building several new units. This gave the NRA the perfect opportunity to push for the discontinuation of use of the private sewage plant and subsequent connection to the public foul sewer. This work is due for completion in early 1995.

Bechers Brook, made famous by the Grand National, starts life on the edge of Aintree racecourse when several surface water drains come together. One of these drains comes from the Barlows Lane Industrial Estate which is mainly devoted to food production and mobile fast food services. The drainage of this Estate suffers from cross connections and vehicle washing. Bechers Brook is of poor quality for its short length and joins the Alt downstream of Bull Bridge.

From this point the Alt continues its journey North West and passes beneath the M58 motorway, just east of Switch Island interchange, then onwards around the south of Maghull and into Sefton village. At this stage the river begins to pick up a vast number of small channels draining this area to the west of Maghull, as it moves into the agricultural catchment. Those tributaries of significance, carrying the surface water from the urban areas of Aintree and Maghull, include Moorhey, Dovers, Whinney, Netherton and Maghull Brooks.

2.19 MOORHEY BROOK

First to join the main Alt is Moorhey Brook. This tributary once ran along what is now Dunnings Bridge Road up until the time when the road and the industrial area were constructed and the stream gave way to the present surface water drain. The section that still remains an open watercourse begins by the ASDA supermarket near the M57 motorway, passing under the motorway to join the surface water outfall from Dunnings Bridge Road area. The stretch of brook from this point to its confluence with the Alt is classed as a contaminated surface water problem, subject to cross connections from Dunnings Bridge Road and Aintree, industrial inputs, and intermittent overflows from the sewage pumping station at Copy Lane. Both the foul and surface water drainage systems for this area are complex and not fully understood. Moorhey Brook is consequently class 4 and badly polluted.

2.110 NETHERTON BROOK

This is a small tributary that joins the main river just downstream from the confluence with Moorhey Brook. Although a minor watercourse it is significant due to its cross connections from the Netherton area, exacerbated by the low summer flows.

From this point the Alt takes a straight northerly route to another confluence: with Dovers Brook and St Helen's Gutter.

2.111 DOVERS, WHINNEY BROOK AND MELLING BROOKS

The surface waters of Southern and central areas of Maghull are carried to the Alt via these three small watercourses. Melling brook drains from the north of Melling taking in Melling water treatment works, under the M58 and the A59 to the back of the garage north of Switch Island. At this point it becomes known as Dovers Brook and it moves North West, parallel to the path of the main Alt to be joined by Whinney Brook by the old railway line at the corner of the playing fields of Maghull High School. Some surface water contamination is apparent at this point but the main pollution problems affecting Dovers Brook are further downstream as it skirts around Sefton Meadows Industrial Estate. Much work has been carried out over the past year in eliminating illegal discharges to the surface water system on this estate, and this has been mostly successful. Some surface water contamination still prevails however, particularly during wet weather, and work is continuing on the estate with the aim of improving tenants' housekeeping practices and hence reducing these minor pollution problems. There are high levels of Ammonia in this brook which could be coming from the site of the old WWTW or from the adjacent tip site. Water quality along this length of brook remains poor but is improving following the removal of some major discharges.

The source of Whinney Brook lies beyond Maghull in the Moss Side area of the town. At this point water quality is good but deterioration occurs through Maghull. The brook is subject to wrong connections in the area between Foxhouse Lane and Saltpit Lane and investigations have been undertaken by Sefton M.B.C. Further pollution problems have occurred further downstream from a blocked sewer that has overflowed through a manhole and discharged to the brook. Dereliction of the manhole brickwork has been repaired by Sefton Council and causes for the blockage within the sewer system are being addressed in order to prevent its reoccurrence.

The Mersey Basin Campaign, through StreamCare, put forward proposals for a scheme to upgrade the general environment of Whinney Brook. This has been happening throughout 1994 with local residents, the "Whinney Brook Volunteers", and interested organisations devoting time and effort to cleaning up the worst areas. Removal of debris from the stream and clearance of invasive plant species from the bankside of the brook have been priorities. Public access has been improved and hence the watercourse and its surroundings have been further enhanced as an amenity for the local residents and the public in general. Councillor Sharman, leader of the "Whinney Brook Volunteers", has received a Mersey Basin Trust Kingfisher Award for his work on the scheme. A further minor tributary joins Dovers Brook just prior to its confluence with the Alt. Another brook carrying the surface water from Maghull, this tributary contributes significant cross connection pollution problems to the system originating at South Meade on the lower side of Maghull.

2.112 MAGHULL BROOK

Continuing along the Alt the next major tributary is Maghull Brook. This water course, although visible as a generally insignificant stream on Kenyons Lane above Maghull, is principally derived from the surface water from the heart of the urban area of Maghull. Evidence of the volume of water that the town contributes to its flow, and the extent of wrongly connected drains, can be seen when the brook reappears from culvert beside the Leeds and Liverpool canal, behind Greenbank Avenue. The severity of the pollution is evident and this was once the most serious contaminated surface water problem on the whole of the Alt system.

North West Water and their agents Sefton Council are fully aware of the extent of pollution from this source and a survey of the residential area for wrongly connected foul water drains is ongoing. This survey and the remedial work likely to ensue is a major task due to the wide geographical area draining to the brook. The problem is confounded by an additional problem of a major, but intermittent, discharge to the brook within the culvert. This discharge is undoubtedly of sewage origin but as yet the source has not been established.

However Maghull Brook did have a flourish of health and could almost have been classed as a major fishery for just over a week. The culvert that the stream passes through under the Leeds/Liverpool canal collapsed sending millions of gallons of water down the route of the brook. Over 200 houses were flooded and fish could be seen everywhere from the garden to the living room. When the canal was blocked off and flows in the brook returned to normal, the fish were trapped in deeper areas of the brook. Just over a thousand fish were reported to have died but many more were returned to the canal by concerned anglers and NRA fisheries staff.

The combination of the cross connections and the sewage discharge makes Maghull Brook an unpleasant water course, the problems are exacerbated by the fact that it runs through a few back gardens and alongside a public footpath in the area where it is particularly poor. Downstream, where the brook joins the Alt the pollution is less severe, but the biology remains poor.

At this point the last of the major urban pollution effects upon the Alt is seen and from then on downstream the river moves into the mainly agricultural area; the Lower Alt.

2.2 THE LOWER ALT: MAGHULL TO HIGHTOWN.

With regard to pollution problems the bulk of the influence in this downstream section is of agricultural origin from the drained area lying between Ainsdale and Ormskirk. In addition to this characteristic the physical features of the water course and its catchment area also allow a distinction to be made. The main river Alt from this point lies within an earth embankment and in some places is actually at a higher level than the surrounding land and its streams (these at some points even lie as low as sea level itself). As a consequence of this 'inverse' flow regime the main tributaries require pumping from their lower level into the main river. An unnatural system results whereby a continuous flow does not exist, rather the flows in the river are intermittent and largely depend on pumping regimes at Altmouth. Obviously this system can cause unique pollution problems, namely the long residence time of pollutants in the water course. Whereas in a normal river the pollutants would be carried away more swiftly in the Alt they have more time to do maximum damage. Eutrophication is becoming evident as a result of the build up of exceptionally high levels of inorganic nutrients and pesticides are also emerging as a major, though generally unseen and undetected source of pollution.

2.21 HUNTS BROOK

The first tributary of this lower section is Hunts Brook. This brook rises in little Crosby and flows Northeast towards the Alt through Crosby Hall. Along most of its length the brook is good quality, Class 2; only as it receives the effluent from Thornton Sewage Treatment Works does the brook fall to Class 4. A large part of this sewage works now lies redundant and hence the flow is much reduced from what it once was. By spring 1995 Thornton will be closed for good and its remaining flow will be pumped to Hillhouse Sewage Treatment Works. Thornton's impact on Hunts Brook will be eliminated and recovery should be forthcoming.

After the confluence with Hunts Brook the Alt flows a short distance before it is joined by Hey Cop Drain. At one time this ditch was simply a field drain but now almost exclusively transports the final effluent from Hillhouse Sewage Treatment Works.

After receiving Hey Cop Drain and the effluent from Hillhouse STW the Alt continues its passage towards Formby. Just prior to passing under the A565 Formby by-pass is the confluence of the Alt and Downholland Brook. This is a major tributary of the river and the Downholland system comprises Suddell, Cheshire Lines, Barton, Chisnall and Fine Janes Brooks extending almost as far as Skelmersdale in the East and Halsall in the North.

THE LOWER ALT



Hillhouse Sewage Treatment Works and the Activated Sludge Process

Hillhouse STW is the second largest works in the Alt catchment discharging around 30 megalitres of treated effluent a day, around half that of Fazakerley STW. The sewage, from Maghull and other Northern areas of Liverpool, is subjected to secondary treatment using the activated sludge process. Mineralisation, or breakdown, of the organic components of the sewage is effected by biological reactions in the same way as the filter bed method. However, in activated sludge bacteria and other micro-organisms are suspended within the water of the sewage and not on a solid medium. Success of this treatment method is reliant upon high levels of aeration and a critical level of the 'activated' biological sludge being returned to the site of treatment prior to effluent discharge and sludge removal. The reactions of the activated sludge process are complex but the principals of treatment are essentially the same as any other biological method.

It is important to bear in mind that the activated sludge process is an extremely sensitive one, in which the bacterial organisms imperative to the treatment of the sewage are highly vulnerable. In the filter bed system the bacteria and other micro-organisms are held within a mass which is attached reasonably securely to the pieces of media within the bed. This system is therefore robust to withstand 'shock' loads of toxic or highly concentrated industrial effluents. In the activated sludge process the organisms, although held together within groups of other organisms, are suspended within the sludge column and are still extremely vulnerable to shock loadings which can knock out some or all of the bacterial community and render the sludge process inactive. Whilst Hillhouse mostly deals with the sewage wastes of urban areas it is clear that a high level dosage, and more importantly an unexpected dosage of industrial waste, may, and often does, have a significant effect on the quality of the effluent.

Hillhouse Sewage treatment works is operating to a consent of 30 mg per litre BOD and 45 mg per litre suspended solids. The discharge of effluent is direct to Hey Cop Drain which flows to and is pumped into the Alt. Both this watercourse and the Alt downstream of this point have a significant Ammonia problem due to Hillhouse Works. If the Alt is ever to become a fishery then nitrification needs to be achieved at Hillhouse works to reduce the levels of ammonia discharged. It is expected that major improvements will be made at Hillhouse before 2000.

2.22 SUDDELL AND CHESHIRE LINES BROOKS

Suddell Brook in its upper reaches may be referred to as Cunscough Brook or Bickerstaffe Brook where it is first seen in Bickerstaffe beside the M58 motorway. As it winds its way westwards the first significant impact is from Bickerstaffe WWTW. The word 'impact' misrepresents the nature of this discharge - it is of low flow and is generally the best quality sewage effluent discharging to the Alt system. The sewage works serves only a small population and currently has consent limits of 30 mg/l BOD and 45mg/l suspended solids; the effluent consistently satisfies these levels. However this works is having some problems with surface water infiltration increasing the flows significantly in wet weather. North West Water are investigating this problem.

Continuing westwards the pollution problems are few, attributable mainly to diffuse farm sources and some septic tanks. After passing beneath the motorway and then back again the brook picks up Knoll Brook just beside the A506 road and then Cock Beck. This latter unclassified tributary although of little impact when it joins Suddell Brook is subject to some minor wrong connections in the Town Green area of Aughton. A survey to establish the specific properties responsible for this surface water contamination is almost completed by West Lancs District Council. From the point downstream of the B5197 to the confluence with Downholland Brook and Barton Brook, at Fine Janes pumping station, the presence of any distinct pollution sources is minimal. Any discharges are from field drains serving the arable farming area in the vicinity and organic pollution is of little consequence. One potential pollution source is from the Moss Side/Park Lane Hospital surface water system which in the past has shown some level of contamination.

Suddell Brook is a fast flowing tributary of the Alt and is Class 2 in its upper reaches falling to Class 3 as it slows down and becomes what is known as Cheshire Lines Brook; the long straight section of the watercourse that travels in a North westerly direction through Downholland Moss, between the B5195 and its confluence with Downholland Brook. The lower quality of Cheshire Lines Brook is almost certainly attributable to the agricultural influences of the surrounding land, including pesticides, inorganic fertilizers and the iron salts (ochre) that leach from the land, but it is exacerbated by the low flows of the water course that are caused by the very small gradient along its length.

2.23 BARTON AND CHISNALL BROOKS

Barton Brook flows from the West of Ormskirk through to its confluence with Downholland Brook just below Fine Janes pumping station. Any large scale map will show the extent of the drainage channels throughout this area; essentially however there are two main arteries of the system: Barton Brook itself, and Chisnall Brook which joins Barton Brook almost at its downstream point. The catchment of this system is similar to that of Suddell Brook but the flows are smaller. The extent of agricultural run-off is more extreme and the brook does in fact show severe signs of toxic pollution from pesticides from time to time.

Two arms of Barton Brook flow Westwards, one from Ormskirk and the other from Aughton, not far from the A59 road on Clieves Hill. These tributaries join at Bangors Green and continue their journey under the A567 to Halsall. Despite a distinct absence of any polluting discharges the brook already is Class 4 and reinforces the theory of pesticide pollution being prominent in the area. At Halsall the sewage works discharges to the Brook and although the flow from this source is low and the effluent generally of reasonable quality the impact is still considered to be a significant contribution to the state of the brook. Consent limits presently lie at 75mg/l BOD and 120mg/l suspended solids and ideally these standards should be reviewed and tightened.

The brook then takes a South westerly route towards Downholland Brook through Barton village where it is joined by Chisnall Brook.

Chisnall Brook starts its life at Downholland Cross, here referred to as Wannishar Brook. As the brook passes beneath Dicconson's Lane there is a consented discharge from Blundell House water treatment works. This works treats water for drinking supply, sourced from groundwater, and discharges are only made when sand filters are back washed for cleaning purposes. Chlorine and manganese, likely to be the main contaminants of such a discharge are monitored but the discharge is seldom of significance.

The Brook passes through Haskayne and to the West of the village it receives the effluent from Haskayne sewage treatment works, which reaches Chisnall Brook via Rough Brook. The works merely serves the village and therefore flows are small; the effluent has little effect. The consent levels for this works are 30mg/l BOD and 45mg/l suspended solids, and the effluent easily satisfies these conditions. However ammonia is not consented for this works and recent studies indicate that there may be higher than expected levels in the effluent.

After being joined by Rough Brook, Chisnall Brook then takes a straight path to the North West and to its confluence with Barton Brook.

BARTON AND CHISNALL FARM SURVEY

The apparent agricultural pollution of the Barton and Chisnall Brooks catchment area led to a farm survey of the area in 1992. Barton Brook is Class 4 despite an absence of any significant pollution sources. Biological surveys indicate the presence of some toxic input to the watercourse. Chisnall Brook is Class 3 although more recent biological surveys have shown the presence of a Class 2 animal community which does perhaps indicate an improvement in this brook.

The aim of the farm survey was not only to establish definitive records for the nature of farming activity in the area but also to abolish any significant actual or potential pollution sources and generally discuss with farmers ways in which pollution may be reduced or prevented during their day to day practices.

Just under 50 farms were visited in the catchment area of Barton and Chisnall Brooks. The vast majority of these are strictly arable farms, including those which grow and prepare vegetables. There are a small number of piggeries but no significant dairy herds. A large number of the properties visited are now purely residential and no longer operational as farms.

Over the course of the survey there was a distinct absence of any pollution sources from the farms, which by the nature of the activity was only to be anticipated. The pig farms which produce and store large volumes of slurry were, on the whole, very well managed and operating within Ministry of Agriculture regulations. There were no polluting discharges to watercourses at the time of the survey and any areas which may have resulted in such surprise discharges were brought to the attention of the owners. It was no surprise to come across a high number of pesticide stores in the area, reflecting the intensive level of pesticides usage. Spillage or leakage from the stores themselves clearly is not a common source of pollution. But in analysing the information gained from the survey the high probability of diffuse pesticide contamination in the catchment from discharges via field drains and surface water run-off certainly demands attention. As always, the farm visits enabled discussion of pollution prevention and vigilance, and to make farmers aware of their part in pollution control.

Investigation into pesticide pollution is currently underway on the Crossens river system, adjacent to the Alt. Here the problems attributable to pesticides usage are far more severe and a high proportion of the watercourses are affected. Work in this area will hopefully take the lead and aid us in establishing and therefore reducing the sources of contamination on the Alt. Work on Barton and Chisnall Brook is again highlighted in the proactive plans for the coming year and whilst it is now more clear about the direction in which we should be heading to eliminate pollution of this nature, it will not be a straight forward exercise. Reduction in pesticide pollution will not only entail a reduction in levels of application but will demand a revolutionary turnaround in farming methods.

2.24 FINE JANES BROOK

Just downstream of the confluence with Barton and Chisnall Brook, Fine Janes Brook joins Downholland Brook from the North. The brook is unique in the fact that it flows southwards into the River Alt system and also North into the Crossens watercourse. The watershed, or dividing point, of the brook is at Segars Lane, the road between Ainsdale and Halsall, although this point does vary according to the flows in the brook. Of course the southerly section of the brook from Segars Lane is the only section to be considered here.

Fine Janes Brook is subject to severe organic pollution problems and is class 4 throughout its length. Most of this pollution is derived from cross connections, overflows and dual manholes from Ainsdale, but also an emergency overflow from Segars lane pumping station which occasionally discharges. Along the length of the brook there are familiar diffuse pollution sources from the surrounding arable farm land. The problems of Fine Janes Brook are particularly severe during the low flows of the Summer months and are a high priority because of the high access to the brook side by the general public along public footpaths.

The effluent from Ainsdale Sewage Treatment works discharges into Fine Janes Brook close to Woodvale primary school and also has a severe impact on WQ. Consent conditions for the effluent are 30mg/l BOD and 45mg/l suspended solids, but if Fine Janes is ever to become a class 2 river then Ainsdale needs to be treating to a BOD standard of around 5mg/l. This is because at this point the Ainsdale discharge constitutes the majority of the flow in Fine Janes. At the moment the brook is in poor state.

After Ainsdale STW Fine Janes Brook flows southwards and then takes a sharp course to the east alongside Plex Moss Lane. At Gettern farm the brook then resumes its path Southwards and is pumped into Downholland Brook, due to its low level, between the confluence with Barton Brook and the confluence with Cheshire Lines Brook.

2.25 DOWNHOLLAND BROOK

The main Downholland Brook now takes a route east and then southwards to join the Alt at the A565 roundabout at Little Altcar. There are no further major tributaries along this section of the brook and therefore the influences of the upstream tributaries are strong. However, the surface water from the whole of Formby drains to this length of brook and additionally there are effects from industrial units situated by the A565 near the Tesco supermarket and from farm drainage in the surrounding area.

Downholland Brook has a high rate of flow and despite the poor quality tributaries and other influences the quality of the watercourse remains good enough to allow some coarse fish species to live in the brook. There is a relatively high number of pollution incidents reported from this brook, primarily during the summer months when low flow and increased vegetation growth, including algae, give rise to fish kills. High organic enrichment both from the surrounding farmland and from sewage contamination upstream, in addition to episodic pollution, can be a problem though recently this brook has been a good class 2.

2.26 DOWNHOLLAND BROOK TO THE CROSBY CHANNEL

Downholland Brook is the last of the Alt's major tributaries and below the Downholland Brook confluence the flow in the river is high. The river takes a big sweep around to travel southwards towards the estuary to the west of Hightown. The river is of better quality in the downstream reaches and this is principally due to its high flow rate. There is a wide variety of water plants to see with the presence of nutrient enrichment evident due to the organic inputs along its whole length and from run-off from the surrounding agricultural land.

The only major input to this downstream stretch of the Alt is the effluent discharge from Formby Wastewater Treatment works. This is a moderate sized works with a flow rate of approximately 15 Ml per day. The works has just undergone significant refurbishment after which some of the flow receiving treatment at Hillhouse works was diverted to here. After the upgrading of the works a new consent was enforced of 30mg/l BOD and 45mg/l SS with a limit of 20mg/l on Ammonia.

The river Alt is pumped through the Altmouth Pumping Station which is based on the grounds of the Altcar training camp. From here it passes into the tidal estuary which is an internationally important recreational and conservation area.

3. The Way Forwards

The river Alt is enshrouded in a cloak of industrial and urban pollution that is evidently persistent and not easy to shake off. In addition it is becoming clear that agricultural activities in the catchment, in becoming more highly intensive, are taking their toll on the water courses that are draining the land and carrying away the toxic residues of pesticide application. Furthermore, eutrophication is apparent, if eclipsed by the upstream pollution at the present time.

3.1 WRONG CONNECTIONS AND CONTAMINATED SURFACE WATER

Whilst most of the city of Liverpool is served by a combined sewerage system which carries away both surface water and foul sewage to the treatment works, the urban and industrial conurbation on the outskirts is nearly all drained by a separate system. This means that whilst the foul wastewater is taken to one of the wastewater treatment works, a separate sewer carries the roof and surface water to the nearest watercourse. A system that works well when it works properly, the separate sewer system presents severe pollution problems when householders or contracted builders wrongly connect foul water outfalls to the surface water system, and when yard water is frequently contaminated with industrial wastes. Surface water road and motorway drains also become contaminated with oil from vehicles, copper from brake linings, chlorides from road salt and present an easy route for pollution to reach a watercourse in the event of a traffic accident.

All of these problems prevail in the Alt catchment and there are over fifteen designated 'Contaminated Surface Water' (CSW) stretches which can be attributed to some of the above mentioned problems. These stretches are those persistently and severely affected by pollution derived from faults in the sewerage system. This does not include intermittent pollution episodes that may result from spillages, intentional waste disposal to surface water drains and the pollution that is derived from washing of yards, plant and vehicles in areas whose surface water drains discharge to river.

Surface water sewers as with foul water sewers are the property of North West Water, in the majority of cases. They are maintained by the district councils as agents of the water company. North West Water are liable should any of these sewers cause pollution and rightly they have mounted an extensive programme of identification and remedial schemes to put right these CSW problems.

The CSW scheme is an ambitious project, but nonetheless within the Alt catchment progress has been slow and manifestation of the work in terms of completed schemes and a halt in pollution has only been apparent in very few of the agreed works. The programme appears to have been plagued by difficulties and the problems that have come to light are more mammoth than was initially anticipated. It is important, particularly within a catchment having such an array of sewage-derived problems, that the NRA as a regulator of water quality continues to stand its ground to ensure that the water company adheres to deadlines that have been set, thus guaranteeing a continuing commitment to arresting this pollution.

3.2 WASTEWATER TREATMENT WORKS.

The effluents from North West Water's wastewater treatment works contribute a significant loading on the River Alt. The major works such as Fazakerley, Hillhouse and Formby undoubtedly have the highest impact, but it is also essential to consider the effects of the smaller rural works which, although having lower flow rates all discharge into water courses with much smaller dilution. These small works potentially can have a severe impact on the local environment.

Fazakerley Wastewater Treatment Works is sited near the upper reaches of the River Alt and as such the very large discharge of effluent to the river receives little dilution. In fact at this point the River Alt's flows can be as much as 80% sewage from Fazakerley, making a stream into a spate river. Such a large discharge this far upstream in the Alt has a serious pollution effect along its whole length. It is imperative that the polluting effects of this discharge are reduced significantly before any further work on the water course will make any discernible difference.

Whilst major works have been carried out over the last two years at Formby WwTW, there are no definite plans to bring Fazakerley's effluent up to scratch. Fourteen million pounds has been provisionally allocated under the AMP 2 agreement for Fazakerley, but this is an area where the NRA must continue to fight, by setting stringent consent limits and enforcing them in order to secure these funds. It is agreed that the old 30:45 consent is many years out of date and therefore it is important that we examine the discharges from the angle of the state of the receiving water course and setting environmentally protective consents accordingly. New standards for Fazakerley would be in the region of 15 BOD, 30 SS and 5 ammonia.

3.3 INDUSTRIAL POLLUTION.

Although it has recently been reported that HMIP are having increasing difficulty in keeping up with the huge quantity of work that integrated Pollution Control has presented to them in the authorising of processes in industry, it is in evidence within the Alt catchment that IPC is playing an important role in increasing awareness and responsibility of pollution within the industrial sector. Few companies can now claim not to understand the role of the NRA, and willingness to co-operate, coupled with a whole-hearted change in attitude and understanding of pollutant risk minimisation is apparent.

A large number of companies on Knowsley Industrial Estate have now been visited with a great deal of work being undertaken by them, and some prosecutions have been secured by the NRA. Annual visits are programmed for most large companies with pollution control staff working with them to ensure continued awareness and improvement.

3.4 RUBBISH AND FLY TIPPING.

Probably the most visible and annoying type of pollution is that of rubbish. This could be anything from shopping trolleys to traffic cones to bin bags full of beer bottles. Annoying because of the lazy people and vandals that throw the rubbish onto the banks and into the river. The whole upper length of the Alt suffers from rubbish and even when the rubbish is removed, more replaces it within days. Our only hope of preventing this pollution is to educate the local communities and get them involved in looking after the River Alt.

3.5 ALT 2000

The Alt 2000 partnership was born in 1992 when a number of organizations with an interest in the river came together to improve the river Alt, working within the aims of the Mersey Basin Campaign.

The partnership has six main aims....

- Improve the quality of water so as to be able to support fish.
- Clear the river and its surrounding areas of rubbish and improve land for conservation and recreation.
- Protect the internationally important Alt estuary.
- Maintain now and in the future a satisfactory flow of water.
- Make the River Alt more accessible to the public and create a footpath / bridleway along its entire length.
- Fully involve the local community and businesses in the improvement process.

4. Conclusions

Water Quality of the river Alt and its associated water courses improved in 1994 and the majority of them are now class 3 (fair) or better. Obviously there is still significant work to be done to achieve class 2 status along the whole of the rivers length by 2010 as the NRA intends or even by 2000 as ALT 2000 wishes.

Most of the pollution of the river may be attributed to insufficient treatment of sewage with regard to the dilution factor of the water course, primarily referring to the effluent from Fazakerley Wastewater Treatment works. Additionally smaller upper stretches of the Alt and its tributaries suffer from pollution by contaminated surface water, rubbish and industrial contamination.

Although there are no real point sources of agricultural pollution on the catchment due to the absence of animal husbandry practice, it is apparent that pollution exists from diffuse mobilisation of organic pesticides and from nutrient enrichment as a result of the use of inorganic fertilizers. It is feared that the full effects of these pollutants will only manifest themselves when the upper reaches of the river improve in quality.

APPENDIX- CATCHMENT MAPS

ALT
WETLANDS -> M57

BEECHERS BROOK

M57 DRAINS

M57

URBAN

TUE BROOK

DISUSED TIP
DIFFUSE

FAZAKERLEY WWTW

SUGAR BROOK

CROXTETH
COUNTRY PARK

DEYES BROOK

URBAN

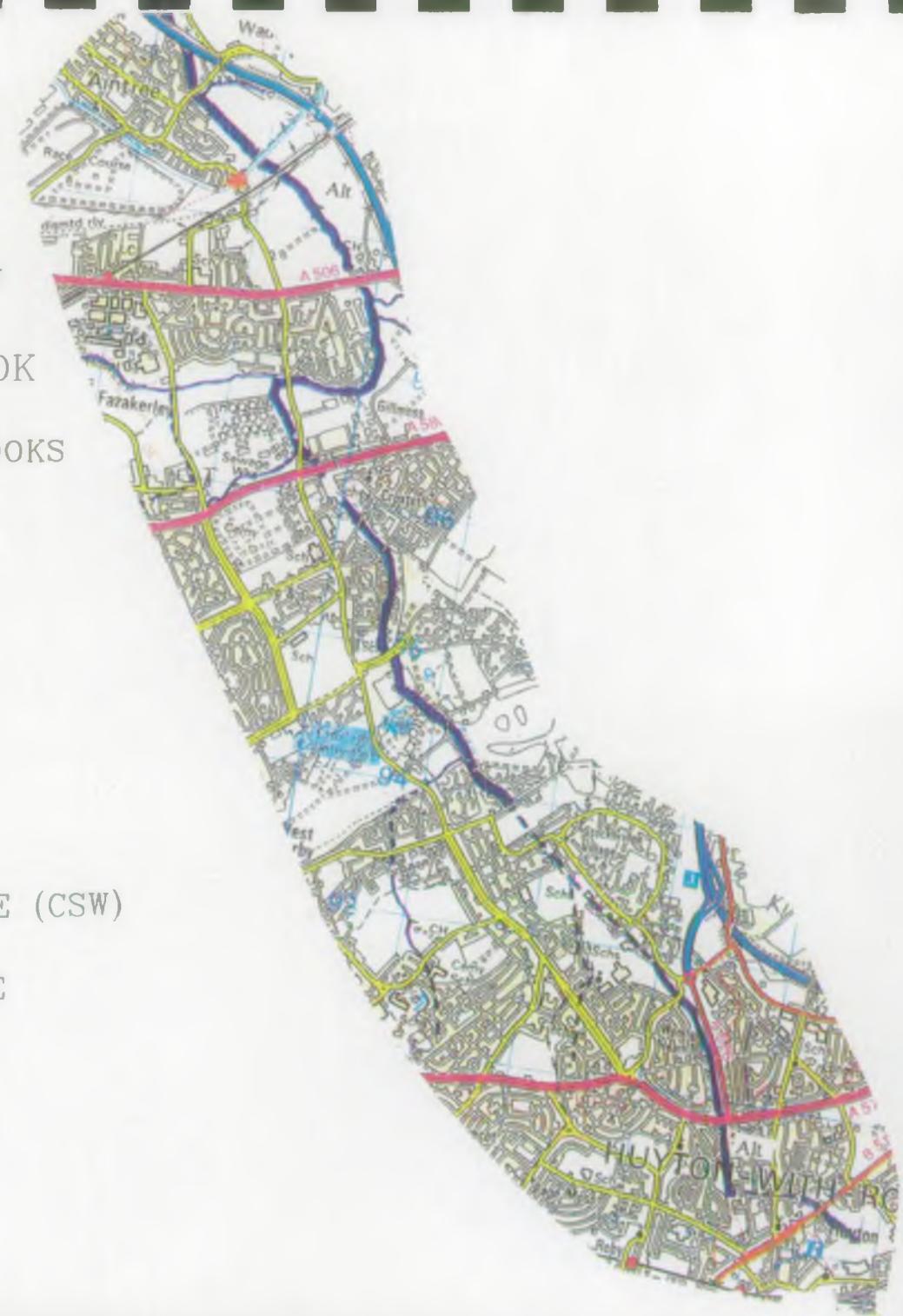
CULVERT UNDER
STOCKBRIDGE VILLAGE (CSW)

CSW SALERNO DRIVE

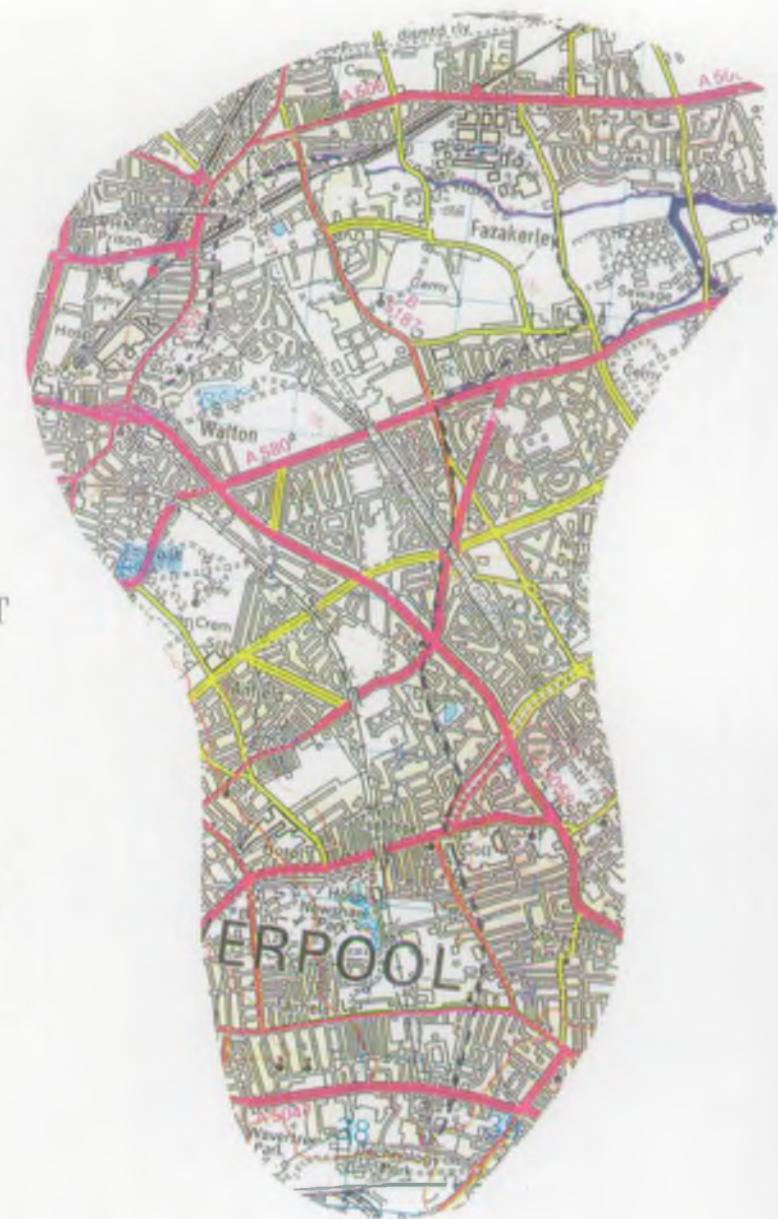
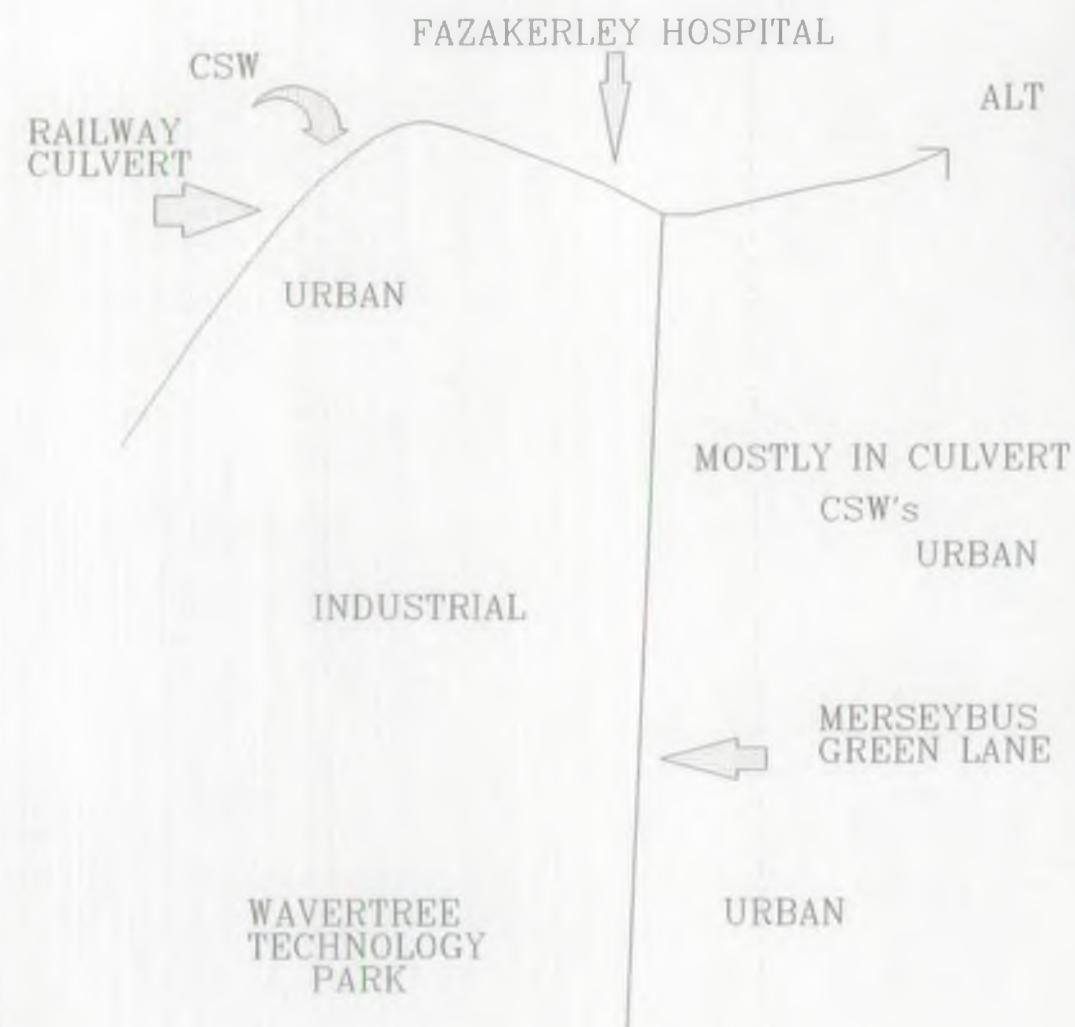
CSW HUYTON TOWN

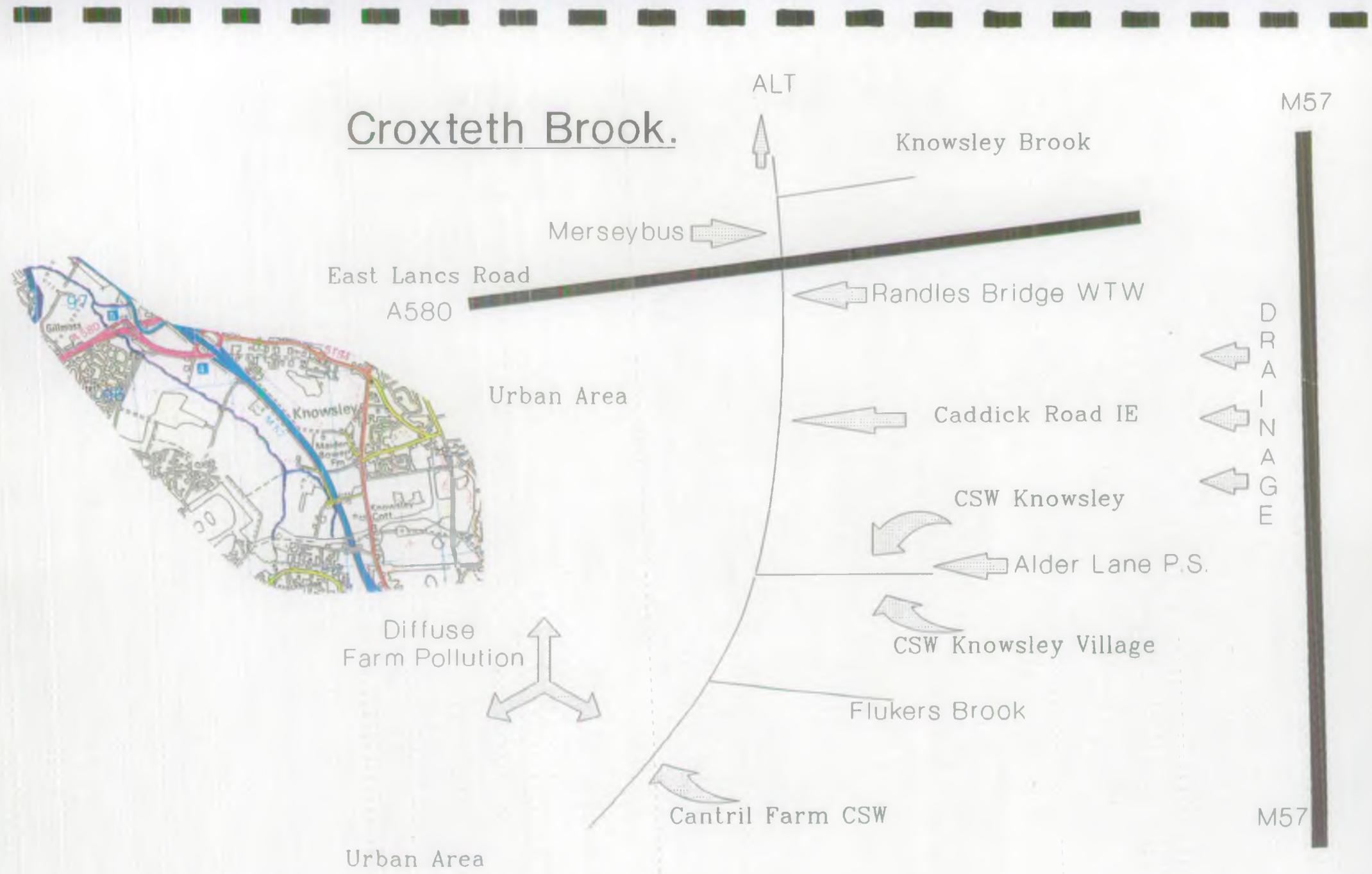
URBAN

HUYTON WETLANDS

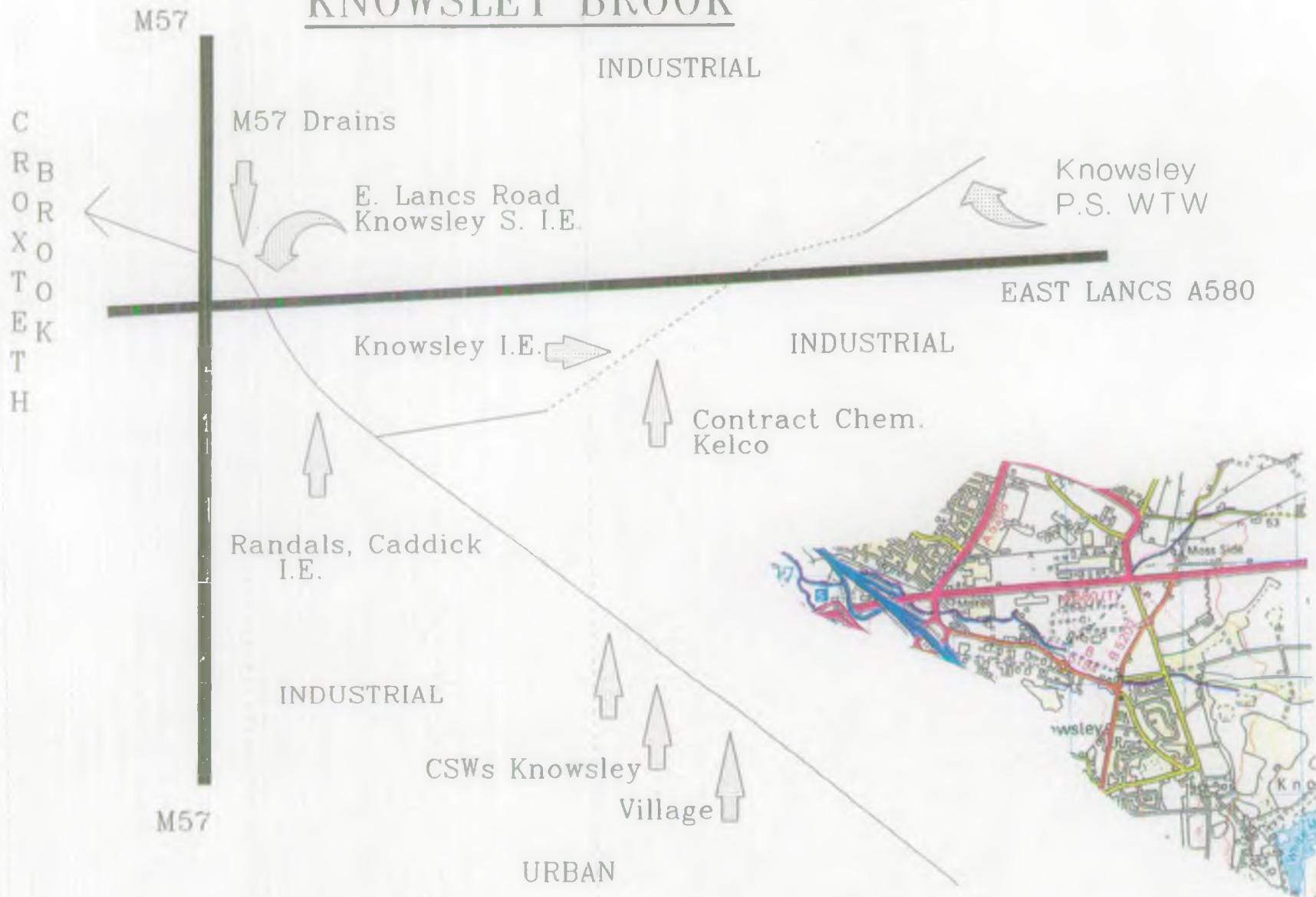


FAZAKERLEY/TUE BROOK

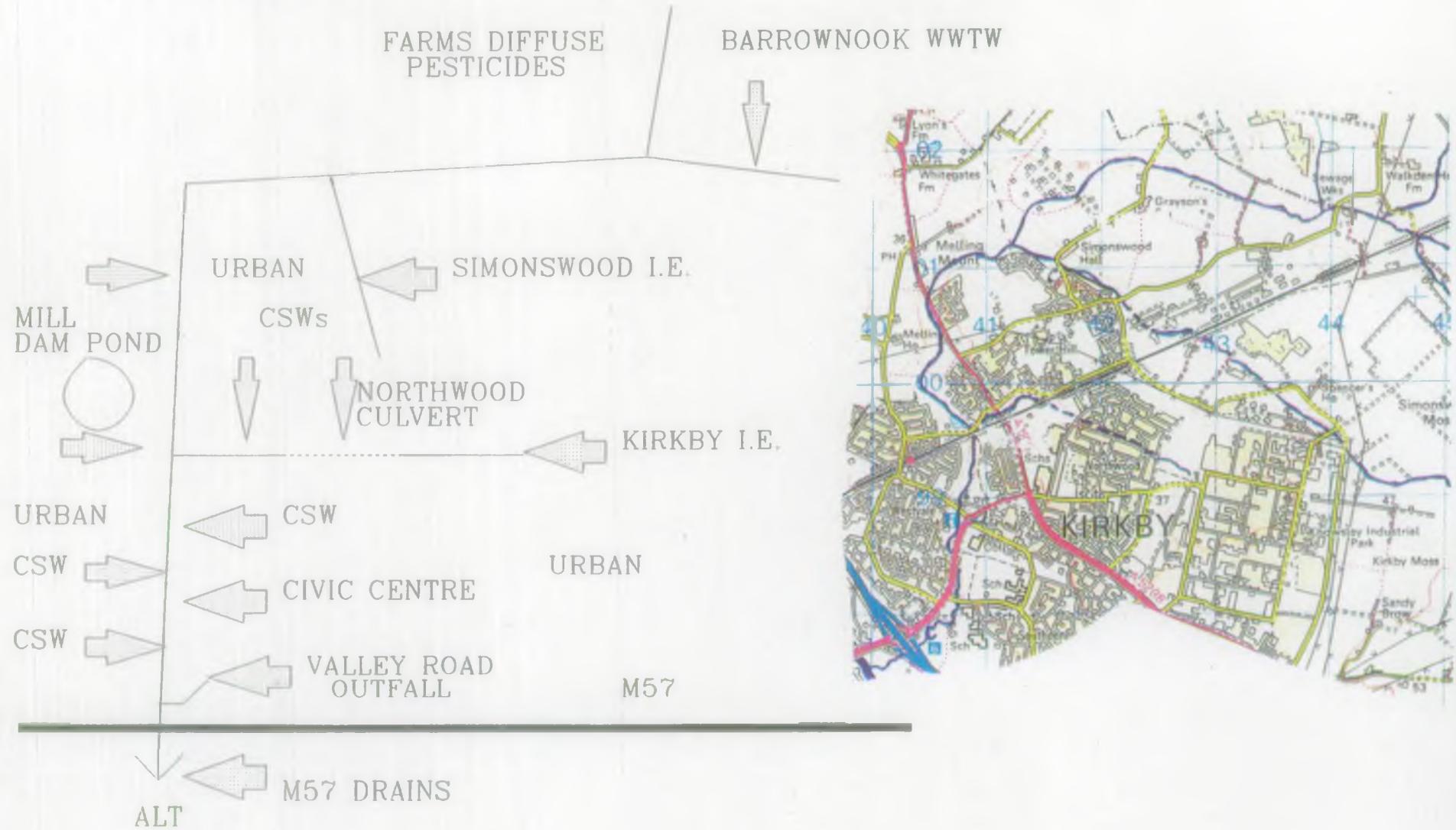




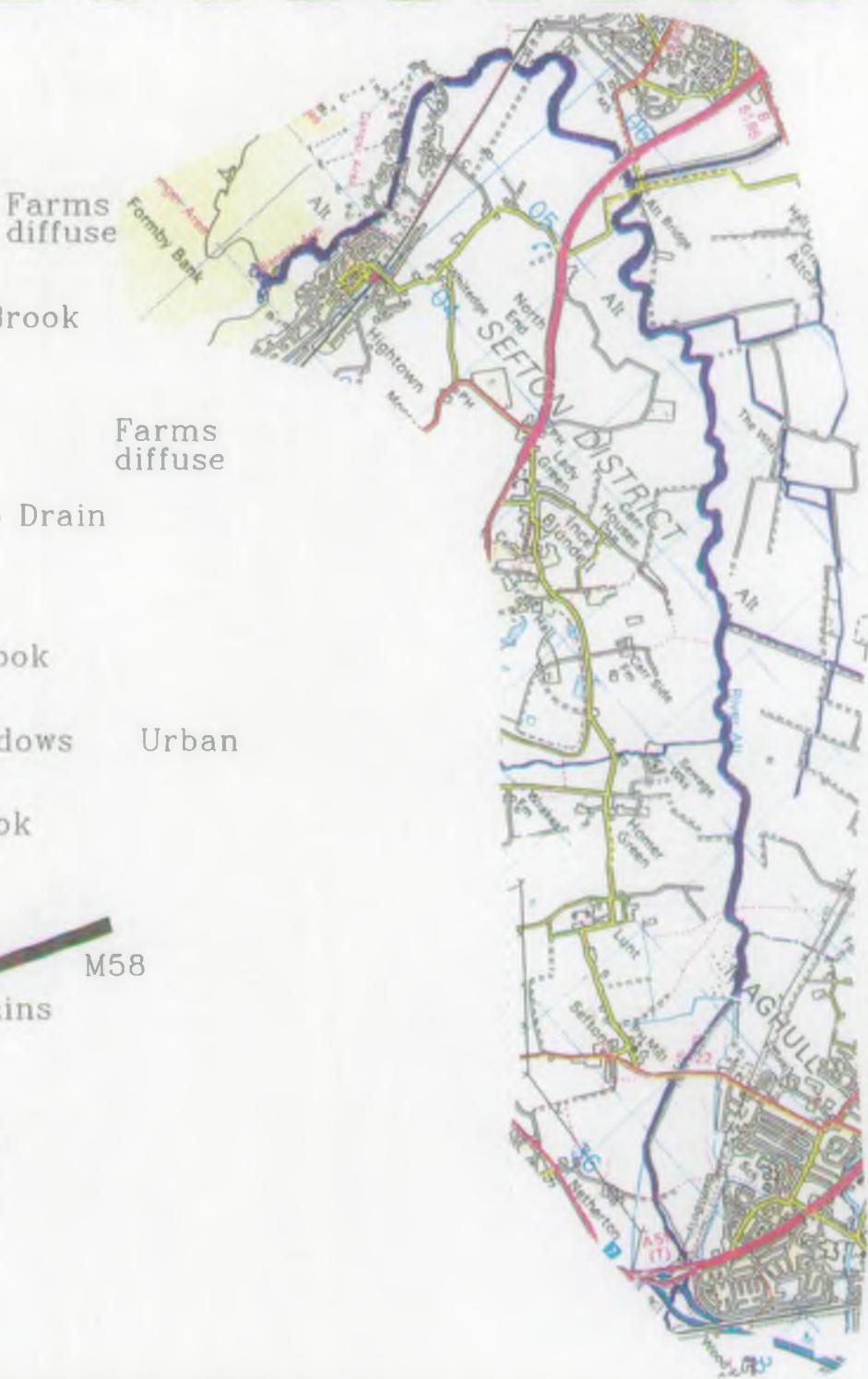
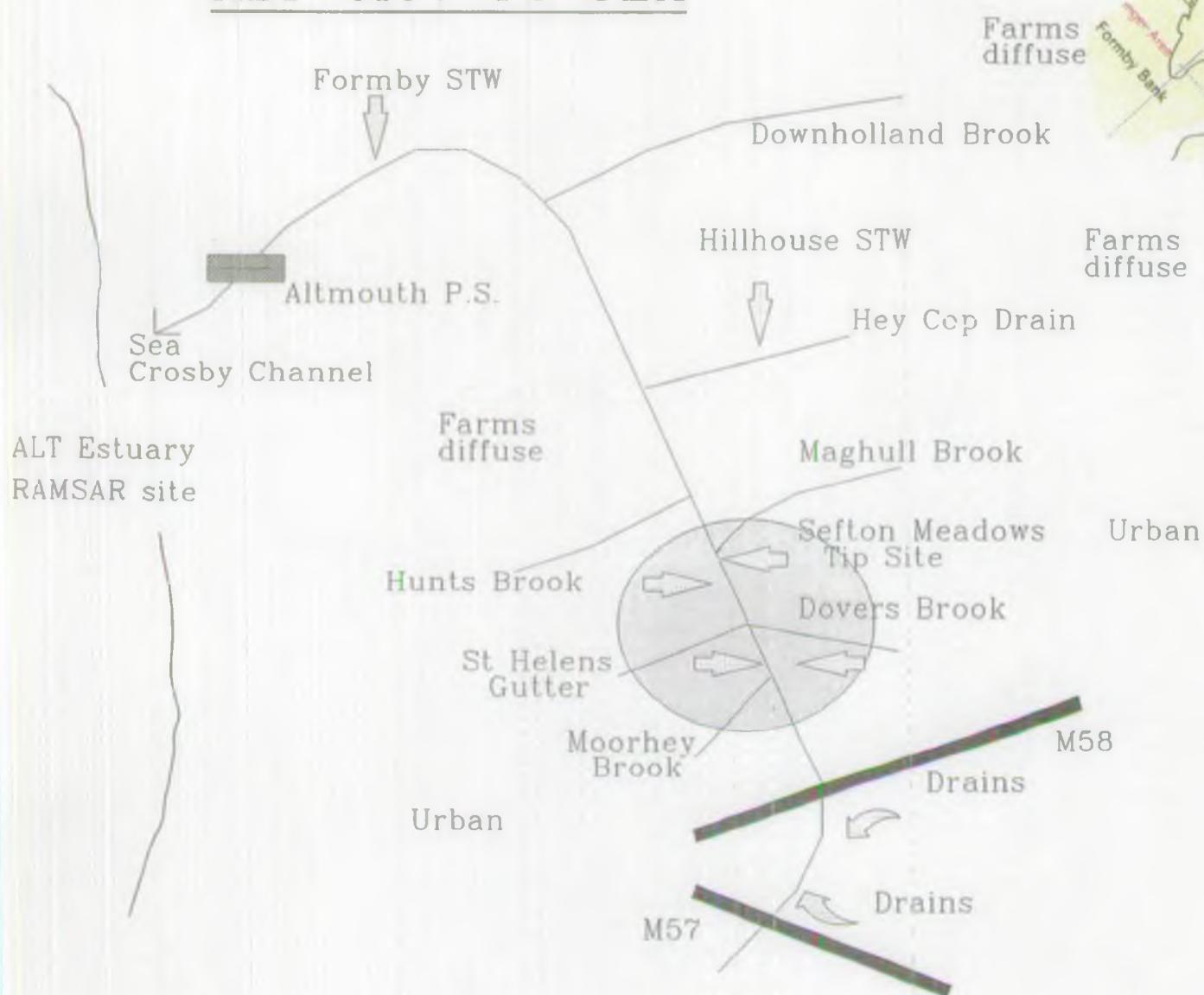
KNOWSLEY BROOK



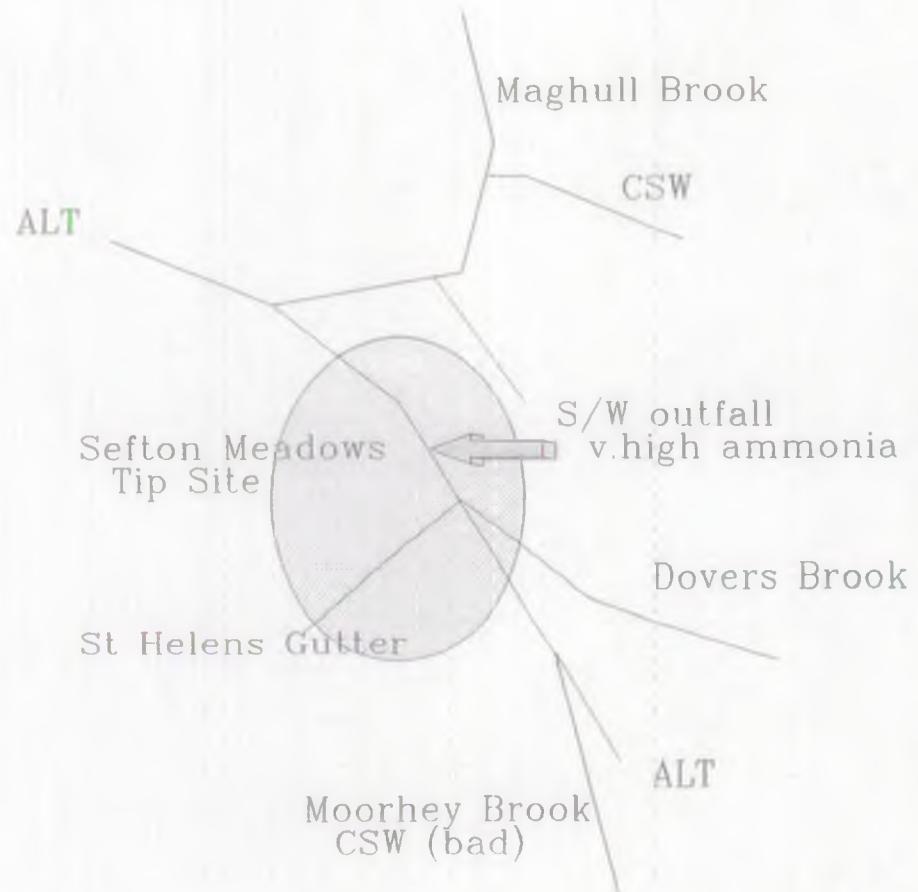
SIMONSWOOD & KIRKBY BROOKS



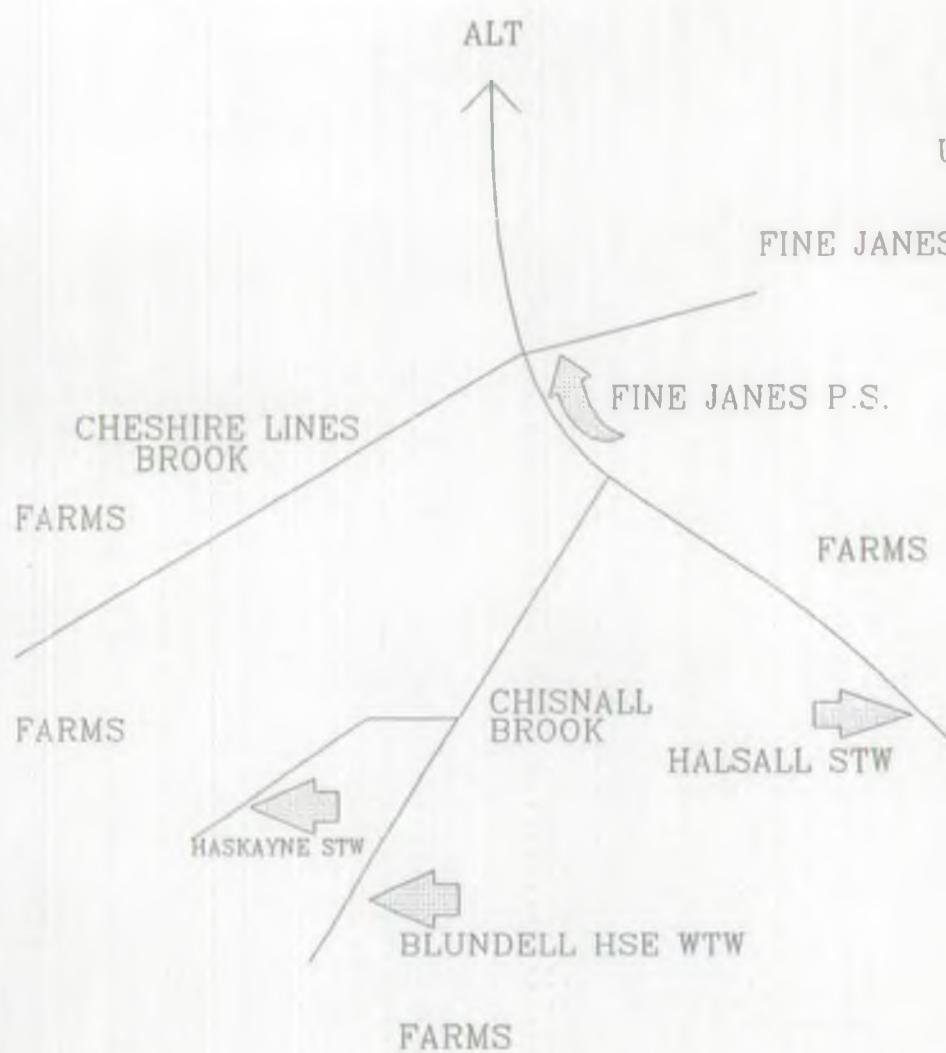
ALT-M57 TO SEA



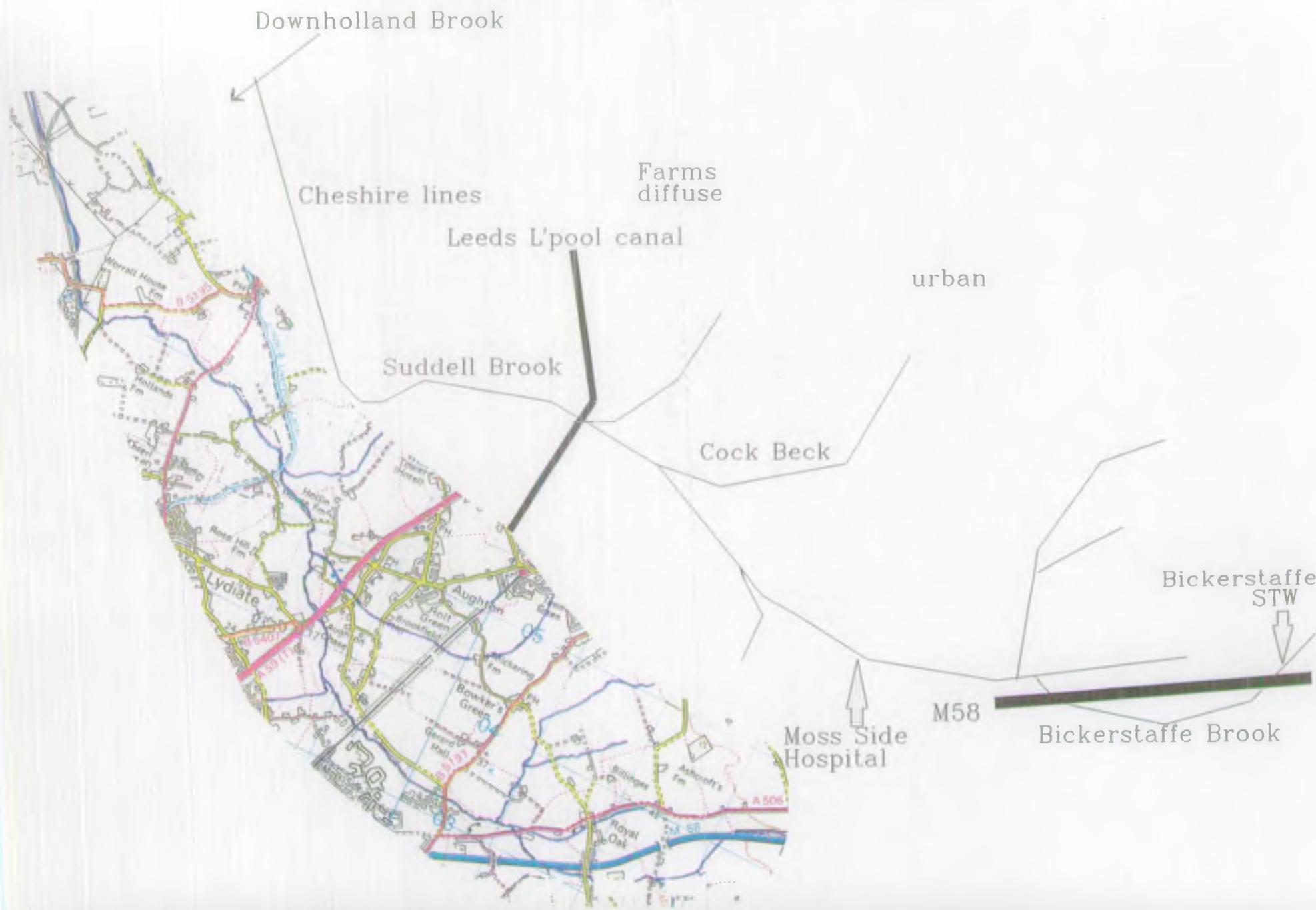
Sefton Meadows area



DOWNHOLLAND BROOK



SUDDELL BROOK



FINE JANES BROOK

Hillhouse Farm
S/W outfall
Dual manholes

Ainsdale STW

Farms
diffuse

Downholland
Brook

Farms
diffuse

Fine Janes P.S.



Farms
diffuse