

West Midlands Regional Assembly – Regional Planning Body

This report has been prepared on behalf of the West Midlands Regional Assembly, the Regional Planning Body, as technical advice to inform the Regional Spatial Strategy Revision process. It is one of a suite of technical reports commissioned to inform the development of spatial policy as part of Phase Two of the Revision of the West Midlands Regional Spatial Strategy.

Every effort has been made to verify and check the contents of this report including all figures and tables. However the West Midlands Regional Assembly can not accept any responsibility for errors or inaccuracies.

Further information and details of the West Midlands Regional Strategy and the Revision process can be found on our web site www.wmra.gov.uk

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West Midlands Regional Spatial Strategy (RSS 11)
The Impact of Housing Growth on Water Quality and
Waste Water infrastructure

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1. Context

The West Midlands Regional Spatial Strategy (RSS) is being reviewed in 3 phases with the scale and distribution of housing being a key part of the Phase 2 review. As the consultation on the phase 2 options is now complete the Regional Assembly will be developing the preferred option for housing allocations. All the options in the consultation document proposed an increase in housing allocations over current RSS levels. A significant increase in new development will require careful planning to ensure the environmental is protected and that environmental infrastructure is in place to meet the needs of new residents.

This report is a first step to understanding the implications of growth on water quality and water infrastructure. This paper reviews the current quality of the region's waterways and identifies where National and European legislation provides added protection to some rivers. The report also shows the results of modelling work that assesses whether existing large Sewage Treatment Works are likely to have sufficient capacity to meet the needs of new housing development. It must be stressed that this study is designed to highlight potential areas of concern and should not be viewed as a rigorous classification. It is likely that further studies will be needed for many of the sites identified as high or medium in this classification.

The Environment Agency has produced this water quality technical paper. A project board with representatives from the Regional Assembly, Severn Trent Water plc, South Staffordshire Water plc had considerable input into the development of the final document. This paper compliments a paper produced by the Environment Agency on the implications of housing growth in the West Midlands on water resource and water resource infrastructure.

2. Conclusions

- ◆ Most of the Sewage Treatment Works in the high-risk category are in urban areas at the top end of catchments. Major Urban Areas such as Birmingham, Wolverhampton, and Coventry have one or more of the works in the high-risk category. Of the 69 works considered in the study only 14 were in the low risk category suggesting that more work is needed to better understand the capacity issues.
- ◆ Some towns identified as 'growth points' are already planning to carry out studies into waste water capacity
- ◆ Most of the rivers in the West Midlands are of good chemical and biological quality, but there is a particular problem with nutrient enrichment. Nitrates and phosphates come from a range of sources, principally agriculture and treated sewage effluent. If some sewage works increase in size they may be required to significantly reduce the amount of phosphate they discharge.
- ◆ Many rivers in the region are designated under the EU Fresh Water Fish Directive. This gives them special protection from chemicals that are harmful to fish such as ammonia.
- ◆ The EU Water Framework Directive will have considerable influence on how we manage rivers in the future. Work has already been done to identify pressures on the water environment and a consultation on a *Summary of Significant Management Issues* will be out for consultation on the 22 July 2007.

3. Recommendations

- Further work is carried out to consider the implications of preferred option on the capacity of sewage treatment works and the sewerage system in districts identified for significant growth.
- The draft revision of the RSS 11 should include a policy requiring Local Authorities to engage in early consultation with Water Companies and the Environment Agency on site allocations for significant developments to ensure sewerage infrastructure is considered early in the plan process
- The draft revision of RSS 11 should include a policy in the water section requiring Local Authorities to carry out water cycle studies where appropriate to inform the LDD.

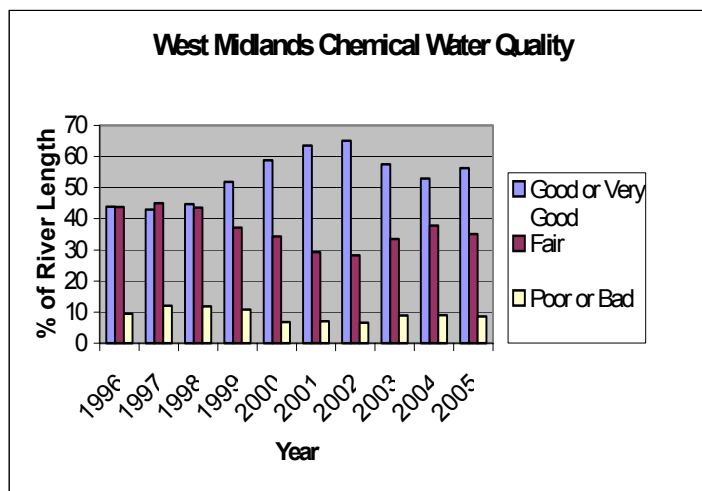
4. Water Quality

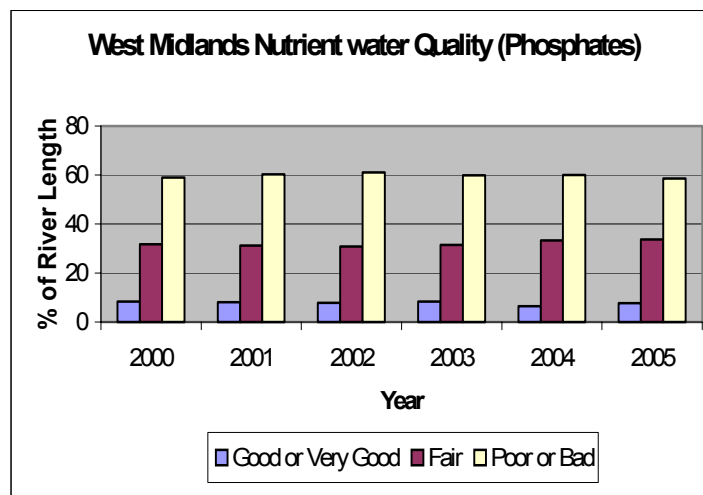
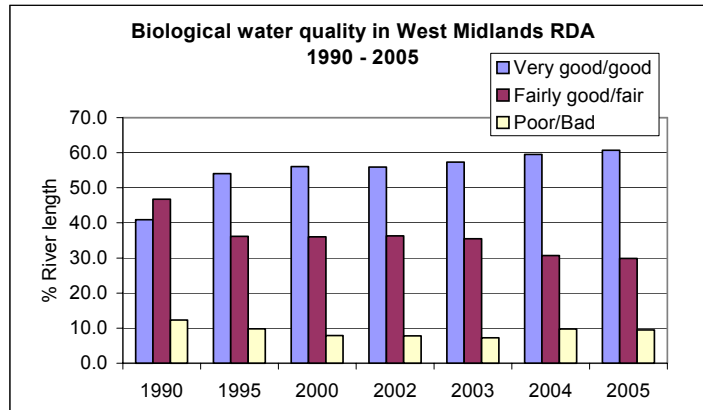
The West Midlands has a varied landscape, ranging from upland pasture through river valley and plain and industrialised urban catchment. It has a high quality river environment that supports a wide range of wildlife habitats and adds to the quality of life in the region. The quality of the water environment has been improving over the last 15 years. This is largely down to investment by water companies in sewage treatment facilities. A major expansion in housing could put pressure on the system and require significant investment from water companies.

Although point source pollution is now closely controlled, diffuse pollution is an increasing problem. Diffuse pollutants are ones that can not usually be traced back to a single discharge point. Better surface water management through the use of sustainable drainage techniques can help to mitigate this type of pollution.

5. Summary of Water Quality in the West Midlands

- There were over 4,600km of watercourses monitored in the West Midlands in 2003 for quality
- 91% of these were good or fair chemical quality
- 90 % were good or fair biological quality
- But 38% were poor nitrate quality and 58% were poor phosphate quality





6. Urban Waste Water Treatment Directive

The Urban Wastewater Treatment Directive (UWWTD) is designed to make sure all wastewater in the EU is treated to the appropriate standard. An essential element of the Directive is that quality standards for effluent fall into categories depending on size of the treatment works and the sensitivity of the receiving water. As populations grow in each sewerage catchment, some sewage treatment works may exceed the Urban Waste Water Treatment Directive threshold that requires nutrient removal. Some of the region's most important rivers have special designations under this Directive. The Rivers Blythe, Anker and Aqualate Mere are designated as UWWTD Sensitive Area (Eutrophic) while the River Teme is classified an SSSI and the Clun is a habitat ROC site. Many of the rivers with special designations run through important regional towns and cities. For works discharging into a Sensitive Area (Eutrophic) a population equivalent exceeding 10,000 will require phosphate removal to a standard of 2mg/l (as an annual average). If however the population equivalent is increased to exceed 100,000, then a tighter standard of 1 mg/l (as an annual average) phosphorous is required. It is clear that growth in some areas of the West Midlands could result in tighter limits on the quality of the effluent and this could have major implications for investment in new sewage treatment infrastructure.

7. Fresh Water Fish Directive

The Fresh Water Fish Directive is designed to protect fish from harmful chemicals such as ammonia. The West Midlands has a significant number of rivers designated under this Directive. Many sewage treatment works such as Minworth in Birmingham have already had major investment in order to meet the tight ammonia standards required in this Directive. Any new discharges into these rivers must also meet the Fresh Water Fish Directive standards. This could increase the cost of new facilities particularly if the works discharges into a small river with limited dilution capacity.

8. The Water Framework Directive

The Water Framework Directive is a way of developing strategic approaches to the management of water quality and quantity. The aim of the Directive is to ensure all water bodies reach good ecological status or potential. This will be achieved through a programme of measures contained in River Basin Management Plans. The River Severn and Avon are in the Severn River Basin District while the Trent is in the Humber River Basin District. Each River Basin Management District now has a River Basin Liaison Panel to help identify issues and develop the final river basin plan. For each River Basin Management District a document called *Summary of significant Water Management Issues* is being produced. Each District will have a consultation document and the consultation period will run from the July 22nd 2007 for 6 months. The draft River Basin Management Plans are due to go out for public consultation in December 2008. The planning system is likely to be expected to help deliver improvement to the water environment.

9. Diffuse Pollution

Diffuse pollutants are ones that can not usually be traced back to a single discharge point. Pollutants such as sediment, oil, pesticides collect on hard surface like recreational areas, roads and pavements and then enter rivers during rain events. Sustainable Drainage Systems (SUDS) can be effective in helping to reduce diffuse pollution. Instead of sending water down a pipe into the river, the water is directed into the ground through features such as porous pavements or ponds. This slows the flow and allows pollutants to be filtered or decay before the water reaches the river. Intractable urban pollution problems can be overcome using these techniques and if incorporated into a green grid or green infrastructure plans they can have multifunctional benefits for people and wildlife.

10. Growth points

Several of the Region's large towns and cities are now part of the government's growth point initiative. All the successful growth point bids were agreed on the basis that they were complied with a number of conditions. Where there was any doubt about the capacity of the sewerage system or sewage treatment works the Environment Agency added a condition, requesting that a water study be carried out. These studies will help identify at an early stage in the planning process where waste water treatment capacity could be a constraint to development. They do not cover the whole region, but cover a number of key towns that are likely to have a significant increase in housing allocations.

11. Local Waste Water Infrastructure

This report has only considers the capacity of larger works and it may be necessary to consider the capacity or options for expansion of some of the region's smaller works. In addition there may also be a need to expand or replace some of the existing sewerage

system to accommodate the new development. Local Planning Authority policies will need to recognise this when considering the locations for future housing developments.

12. Climate Change

Climate change is predicted to increase the intensity and frequency of wet weather events in the winter. Warmer drier summers may reduce flows in rivers and create conditions favorable for invasive species. An increased intensity of storm events is expected to scour more riverbanks, collect more urban and agricultural pollution and hence contribute more sediment and pollution in rivers. Under these circumstances the capacity of rivers to accept additional polluting material from STWs is likely to be reduced.

In some areas these pressures may require new ways of managing our use and disposal of waste water better. Sustainable water management schemes such as rainwater harvesting or greywater recycling are becoming more mainstream. These technologies are becoming better understood and may be cost effective and environmentally beneficial in situations where local sewage treatment facilities are not available and pumping to waste to treatment works is the only other option.

13. Environment Agency Consents to Discharge

Anyone wishing to discharge a polluting material legally into a watercourse must first apply to the Environment Agency for a 'consent to discharge' under the Water Resources Act. The Environment Agency calculates discharge consents based on the quality and volume of the waste water and the quality and volume of the receiving watercourse. The waste water must not contain more polluting material than can be broken down in the river without significant impact on water quality or biodiversity. The polluting capacity of treated sewage effluent is determined using BOD (Biochemical Oxygen Demand), which measures the capacity of the waste water to use up oxygen in the river and ammonia which also uses up oxygen in the river, but is also toxic in its own right. If a river is small and the volume of effluent large, then the quality of effluent must be high in order to protect river quality. If however the river is large then there is more dilution and a more relaxed standard can be applied to the effluent.

If a works needs to expand due to new development it may be necessary to apply to the Environment Agency for a new consent for increased flow. The Environment Agency may grant this, but is likely to set tighter limits on the pollutant concentrations to ensure the overall loading is unaltered. Some works are currently discharging lower volumes than the consent permits and could therefore increase flow without having to apply for a new consent. The purpose of the risk assessment is to determine which works have the capacity to improve quality or increase flow in order to accommodate any additional demand caused by new growth within the region. The risk assessment puts works into different categories depending on how difficult it would be to improve the quality of the discharge and how close they are to discharging the consented volumes. The overall score for the works is determined by the highest risk in either of the categories. Annex 1 shows the categories used to determine the risk factors.

The capacity of existing sewage treatment works to treat sewage from new development can be considered in 4 broad categories.

1. The sewage treatment works is well within its consented discharge limits and therefore has the capacity to increase the volume of effluent it treats
2. The sewage treatment works is nearing the limit of its consent, but is likely to be granted a new consent because the increases in volume could be counterbalanced by improvements to the quality of the effluent

3. The sewage treatment works is already producing a good quality effluent. It may be difficult to improve the quality still further with the current technology.
4. The sewage treatment works can not increase the volume of water discharged without an increase in the risk of downstream flooding.

The risk assessment of sewage treatment works carried out in this technical paper tries to identify sewage treatment works that fall into the 3rd and 4th category. These are works that are going to have difficulty expanding to accommodate additional growth. In these circumstances the only solution may be to pump the effluent to a new or existing treatment works that discharges into a river that can accommodate either the additional pollution load or flow or both.

14. Methodology for Risk Assessment

The aim of the study is to identify where new development could put pressure on the sewage treatment infrastructure. The study categorises large sewage treatment works into risk grouping based on the current Environment Agency discharge consent limit. The works to the west of the region were assessed for BOD, ammonia and volume while to the east they were assessed for BOD and volume. This is because many works in the west of the region have an additional ammonia limit to protect fish in rivers designated as fisheries under the Fresh Water Fish Directive.

The assessment does not cover all waste water treatment facilities, but only those serving over 10,000 population equivalents. It gives an early indication of areas that may have a problem with additional population growth given the current sewage treatment infrastructure. It is a broad-brush assessment that does not look in detail at the local circumstances of each sewage treatment works. It is likely that further work will be necessary to identify specific issues in a proposed growth area.

15. Interpretation of the Risk Map

Most of the Sewage Treatment Works in the high-risk category are in urban areas at the top end of catchments. Major Urban Areas such as Birmingham, Wolverhampton, and Coventry has one or more of the sewage works in the high-risk category. Despite being a designated fishery under the Fresh Water Fish Directive some of the works on the River Severn and River Trent are in the low or medium category and therefore may have the potential to expand. Of the 69 sites assessed only 14 are in the low risk category and most of these are in rural locations. This suggests that sewage infrastructure is an issue across the region and needs to be assessed and developed along side any growth proposals.

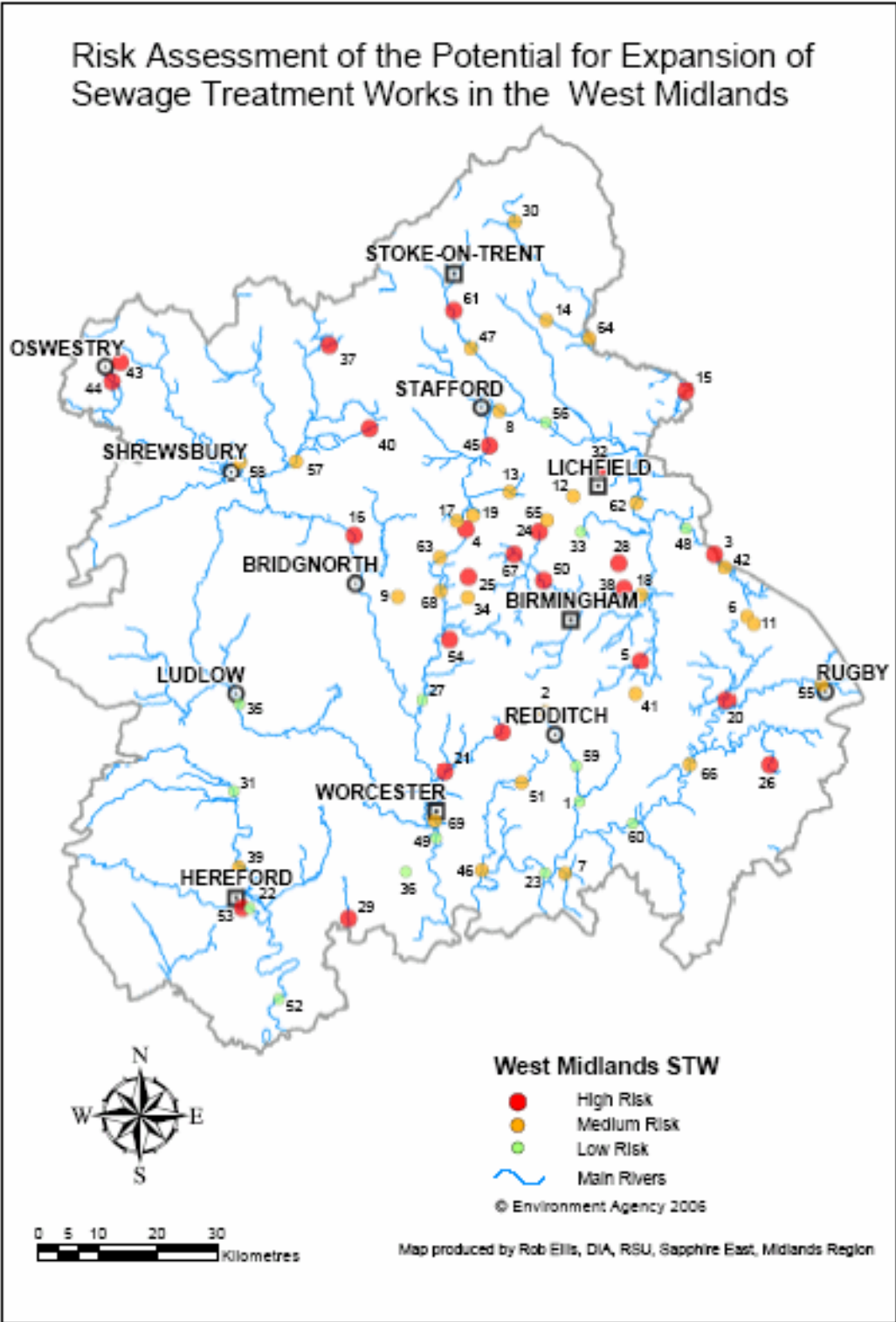
16. Review of the Potential Impacts of Increased Growth

Development needs to be carefully planned and integrated with the development of new sewers and sewage treatment works. Some of the possible implications of housing growth on sewage treatment infrastructure and the potential impacts on the water environment are set out below.

- ◆ As the population grows so too will water consumption, and the volume of waste water flowing through sewerage systems to sewage treatment works. In dry weather the sewers may be able to cope with the extra volumes, but this may not be the case in wet weather. In many areas surface water runoff goes into the foul water drains. If sewers are already close to capacity the rainwater can cause sewers to prematurely overflow into the river. This type of pollution is unacceptable and the sewer will have to be upgraded. Renewing sewers can be difficult and expensive as they may be in inaccessible locations such as under roads and buildings.

- ◆ New housing can increase the risk of diffuse pollution getting into surface water sewers. In modern developments clean surface water is often directed into nearby rivers through a separate sewerage system. This has the advantage of reducing the volume of clean water going for treatment, but if pollution from surface runoff gets into these drains it is sent quickly and untreated into the rivers. The pollution can come from a range of sources, such as waste water from houses or industry that should go to the foul drain, or oil and sediment collected on hard surfaces that is washed into these drains during rain events. Sustainable Drainage Systems (SUDS) can be used to mitigate the impact of this type of diffuse pollution.
- ◆ In parts of the region it may not be possible for new development to use current sewage treatment infrastructure. Some treatment works may be using the best technology to produce good quality effluent. This may be required because the works serves a large population and/or there is limited dilution in the receiving river. In these circumstances it may not be technically possible or cost effective to improve the effluent quality still further. Without an improvement in quality the works is unlikely to be allowed to increase the volume of the discharge. In this case the only other option is to pump the effluent to another sewage treatment works that has additional capacity.
- ◆ Some rivers in the region may be at greater risk of flooding if new development significantly increases the flow in the river. This can be a particular problem in rivers where the dry weather flow is higher than the natural levels because the rivers carry significant volumes of treated sewage effluent.
- ◆ The water environment is managed and protected in part through the need to comply with British and European legislation. New development must not put at risk our ability to comply with this legislation and indeed meet future requirements such as those of the Water Framework Directive.

Annex 1 Risk Assessment Map



Key to Risk Assessment map

	Sewage Treatment Works	Flow Risk	Quality Risk	Overall Risk
1	ALCESTER (OVERSLEY GREEN) STW	L	L	L
2	ALVECHURCH SEWAGE TREATMENT WORKS	L	M	M
3	ATHERSTONE SEWAGE TREATMENT WORKS	H	L	H
4	BARNHURST SEWAGE TREATMENT WORKS	L	H	H
5	BARSTON SEWAGE TREATMENT WORKS	H	H	H
6	BEDWORTH SEWAGE TREATMENT WORKS	L	M	M
7	BLACKMINSTER STW	M	M	M
8	BRANCOTE SEWAGE TREATMENT WORKS	L	M	M
9	BRIDGNORTH (THE SLADS) STW	M	L	M
10	BROMSGROVE/FRINGE GREEN STW	L	H	H
11	BULKINGTON SEWAGE TREATMENT WORKS	M	M	M
12	BURNWOOD SEWAGE TREATMENT WORKS	M	L	M
13	CANNOCK SEWAGE TREATMENT WORKS	L	M	M
14	CHECKLEY SEWAGE TREATMENT WORKS	L	M	M
15	CLAYMILLS SEWAGE TREATMENT WORKS	H	L	H
16	COALPORT STW	H	L	H
17	CODSALL SEWAGE TREATMENT WORKS	M	M	M
18	COLESHILL SEWAGE TREATMENT WORKS	L	M	M
19	COVEN HEATH SEWAGE TREATMENT WORKS	L	M	M
20	COVENTRY(FINHAM) STW	M	H	H
21	DROITWICH/LADYWOOD STW	H	L	H
22	EIGN STW	H	L	H
23	EVESHAM/HAMPTON PARKS STW	L	L	L
24	GOSCOTE STW	M	H	H
25	GOSPEL END SEWAGE TREATMENT WORKS	L	H	H
26	ITCHEN BANK SEWAGE TREATMENT WORKS	M	H	H
27	KIDDERMINSTER (OLDINGTON) STW	L	L	L
28	LANGLEY SEWAGE TREATMENT WORKS	H	M	H
29	LEDBURY STW	L	H	H
30	LEEK SEWAGE TREATMENT WORKS	L	M	M
31	LEOMINSTER STW	L	L	L
32	LICHFIELD SEWAGE TREATMENT WORKS	H	L	H
33	LITTLE ASTON SEWAGE TREATMENT WORKS	L	L	L
34	LOWER GORNAL STW	M	L	M
35	LUDLOW SEWAGE TREATMENT WORKS	L	L	L
36	MALVERN (BARNARDS GREEN) STW	L	L	L
37	MARKET DRAYTON STW	M	H	H
38	MINWORTH SEWAGE TREATMENT WORKS	L	H	H
39	MORETON ON LUGG STW	M	L	M
40	NEWPORT STW	M	H	H
41	NORTON GREEN STW	L	M	M
42	NUNEATON (HARTSHILL) STW	M	M	M
43	OSWESTRY DRENEWYDD STW	L	H	H
44	OSWESTRY MILE OAK STW	L	H	H
45	PENKRIDGE SEWAGE TREATMENT WORKS	H	L	H
46	PERSHORE (TIDDLESLEY WOOD) STW	L	M	M
47	PIREHILL SEWAGE TREATMENT WORKS	M	L	M
48	POLESWORTH SEWAGE TREATMENT WORKS	L	L	L
49	POWICK STW NEW	L	L	L
50	RAY HALL STW	M	H	H
51	REDDITCH PRIEST BRIDGE STW	M	M	M

52	ROSS LOWER CLEEVE WWTW	L	L	L
53	ROTHERWAS STW	L	L	L
54	ROUNDHILL SEWAGE TREATMENT WORKS	M	H	H
55	RUGBY NEWBOLD STW	M	M	M
56	RUGELEY SEWAGE TREATMENT WORKS	L	L	L
57	RUSHMOOR STW	L	M	M
58	SHREWSBURY MONKMOOR SEWAGE TREATMEN	M	L	M
59	SPERNAL (REDDITCH) STW	L	L	L
60	STRATFORD(MILCOTE) STW	L	L	L
61	STRONGFORD SEWAGE TREATMENT WORKS	L	H	H
62	TAMWORTH SEWAGE TREATMENT WORKS	M	L	M
63	TRESCOTT STW	M	L	M
64	UTTOXETER SEWAGE TREATMENT WORKS	M	L	M
65	WALSALL WOOD STW	M	L	M
66	WARWICK(LONGBRIDGE) STW	L	M	M
67	WILLENHALL SEWAGE TREATMENT WORKS	L	H	H
68	WOMBOURNE SEWAGE TREATMENT WORKS	M	L	M
69	WORCESTER STW	M	L	M

ANNEX 2

Table of consented effluent standards used for Risk Assessment

Midlands used BOD, Ammonia and Flow, Anglian used BOD and Flow

BOD risk

- H Consented BOD of 10 mg/l or less
- M Consented BOD of greater than 10 mg/l and less than or equal to 15 mg/l
- L Consented BOD of greater than 15 mg/l

Ammonia risk

- H Consented NH₄ of 3 mg/l or less
- M Consented NH₄ of greater than 3 mg/l and less than 10 mg/l
- L Consented NH₄ of greater than or equal to 10 mg/l

Flow Risk

Estimated flow is calculated as 0.180 x population equivalent in lieu of actual data from Water Companies and is assumed to be a representation of Dry Weather Flow (DWF).

- H Estimated flow is 100 per cent of Consented DWF, or greater
- M Estimated flow is greater than or equal to 75 and less than 100 percent of Consented DWF
- L Estimated flow is less than 75 per cent of Consented DWF

Risk

Overall risk is identified by the highest of the three risks calculated above.