



WT1264-Understanding the changes in pesticide usage to inform water company risk assessment

Final report appendices

Appendices

Appendix 1

Table A 1 Active substances that failed to achieve Annex 1 approval over the last 8 years¹* area treated and weight applied given for the last year in which the active substance was available on the market.

Active substance	Main use	Date approval withdrawn	Area Treated (ha)*	Weight applied (kg)
1-3,dichloropropene	Nematicide (Potatoes, hops, Raspberries & Strawberries)		1,197	256,000
2-aminobutane	Fungicide fumigant - seed potatoes	2007		
2-naphthoxyacetic acid	Plant growth regulator - Ornamentals & tomatoes	2008	21	-
Aldicarb	Nematicide - potatoes & veg crops	2007	14,500	25,000
Amitraz	Insecticide - red spider mite control in pears	2007	600	390
Ammonium sulfamate	Herbicide - non selective - Forestry & Ornamentals, Pre-plant vegetables	2006	<1	2
Atrazine	Herbicide - maize	2007	128,000	141,000
Benfuracarb		2007	1,730	865
Bifenthrin	Insecticides - Arable & horticulture crops	2009	142,000	881
Bone oil	Repellent - non crop areas	2008	42	<1
Bromuconazole	Fungicide - Cereals	2008	4,210	450

¹ CRD website – Standing Committee on Food Chain and Animal Health – meeting reports

Active substance	Main use	Date approval withdrawn	Area Treated (ha)*	Weight applied (kg)
Buprofezin	Insecticide - Glasshouse whitefly	2008	12	2
Carbaryl		2006	73	102
Carbofuran		2006	4,700	4,400
Carbosulfan	Insecticide - root crops	2006	19,000	1,000
Chlorothal-dimethyl		2009	2,000	6,300
Cinidon-ethyl	Herbicide - Cereals	2011	2,300	68
Cyanazine	Herbicide - veg crops, WOSR & vining peas	2007	120,000	55,000
Dichlobenil	Herbicide - woody crops	2008	1,300	3,300
Dichlorophen	Moss killer, fungicide, bactericide & algicide - hard surfaces	2004	43	292
Dichlorvos	Insecticide - protected crops	2006	2	<1
Dicloran	Fungicide - glasshouse fumigant	2008	<1	2
Dicofol		2008	1	<1
Diuron	Herbicide - non crop woody areas	2006	3,900	3,400
Endosulphan		2005	300	73
Fenarimol	Fungicide - Turf	2008	412	8
Fenitrothion	Insecticide - livestock & food storage areas	2006	260	110
Fomesafen	Herbicide - veg crops	2007	11,000	1,856
Isoproturon	Herbicide - cereals	2009	1,422,000	1,537,000
Metam Sodium	Soil sterilant	2009		
Methabenzthiazuron	Herbicide - Cereals	2005	3,200	1,700
Methyl bromide	Soil sterilant – pre-plant for food & non food crops	2008	175	143,000
Metoxuron	Herbicide - carrots and parsnips	2007	15,000	18,000
Nicotine	Insecticide - horticulture	2008	12,000	2,400
Pentachlor	Herbicide - veg crops and flowers	2007	2,700	3,000
Phosalone		2006	92	16
Prometryn	Herbicide - horticulture	2007	5,300	2,400
Propachlor	Herbicide - Horticulture	2008	30,000	94,000
Rotenone	Insecticide - Horticulture	2007	190	6
Simazine	Herbicide - peas and beans	2007	138,000	120,000
Sodium monochloroacetate	Herbicide - veg crops	2007	1,800	17,000
Terbutryn	Herbicide - beans and peas	2007	47,000	34,000
Thiodicarb	Molluscicide - cereals	2006	16,500	3,400
Tolyfluanid	Fungicide - Soft Fruit	2010	13,000	12,000
Triazamate	Insecticide - Apples, sugarbeet & peas	2004	3,900	250
Triazoxide	Fungicide	2009	395,000	1,500
Trichlorfon		2006	910	900
Trifluralin	Herbicide – Black-grass control in wheat, oilseed rape	2007	991,000	897,000

Appendix 2

In the table below (Table A2) is a summary of all of the active substances that have been mentioned in section 2 of this report as being of concern due to regulatory requirements. Some of these active substances such as the ones under threat of failing to gain approval are highly likely to be lost. Others such as those that are causing water quality issues are being monitored and efforts taken to reduce the issue in order to protect their approvals. The reasons for threats to availability are explained below along with an assessment of the risk of and active being withdrawn / limited in use:

- **Approvals legislation** = expected to be withdrawn at re-registration as a result of not meeting the hazard requirements of the new approvals legislation Regulation (EC) No. 1107/2009 – *High risk – expected to be withdrawn*
- **Water - multiple article 7** = active substances that have been identified as causing more than 10 surface water bodies to fail article 7 requirements of the WFD. *Moderate risk – potential for limitations on use*
- **Water - article 7** = active substance that has caused at least one surface water body to fail under article 7 of WFD – *Low risk – need to be monitored if increased problems occur – potential for limitations on use*
- **Water - ground water** = active substances that have been detected in groundwater *Moderate risk – potential for limitations on use.*
- **Water - potential priority substance** – active substances that have been put forwards in 2012 as potential priority substances, due to concerns over their potential impacts in water. *Moderate risk – potential for limitations on use if accepted onto list.*
- **Water - potential UK specific pollutant** = Active substances that have been identified in 2012 as potential UK specific pollutants due to concerns over their potential impacts on water. *Moderate risk – potential for limitations on use if accepted onto list.*
- **MRLs** = Active substances for which there are concerns of food products made from crops treated with them meeting maximum residue limits. *Low risk – local market pressures will change usage slightly but at small scale.*
- **Withdrawn** = active substances that have been withdrawn in the last 2 years for which data on changing use has not been captured in the PUS. *Already lost.*

Table A2 Active substances at risk of having approvals withdrawn or restricted in the future and the reason for the threat to their availability

Active substance	Main use	Reason for threat to availability (final use up date if withdrawn)	Area Treated in 2010 (ha)	Weight applied in 2010(kg)	Potential alternatives
2,4-D	Herbicide - cereals, grass & amenity	Water - multiple article 7	75,000	71,000	2,4-DB, MCPA, MCPB
Amitrole	Herbicide - horticulture	Approvals legislation - Endocrine	1,100	500	glyphosate
Asulam	Herbicide - bracken control	Withdrawn 2011 (2012)	11,000	8,900	no alternative / glyphosate

Active substance	Main use	Reason for threat to availability (final use up date if withdrawn)	Area Treated in 2010 (ha)	Weight applied in 2010(kg)	Potential alternatives
Bentazone	Herbicide - beans & potatoes	Water - ground water	71,000	49,000	MCPB
Bifenox	Herbicide - cereals and oilseeds	Water - potential priority substance	53,000	22,000	dithenamid-p, ethametsulfuron-methyl, imazamox, metazachlor, quinmerac
Bifenthrin*	Insecticide - arable and horticulture	Withdrawn 2009	140,000	800	lambda-cyhaltrin
Bitertanol		Approvals legislation - R2 + Endocrine	23,000	2,000	
Captan	Fungicide - horticulture	Water - article 7	69,000	85,000	
Carbendazim	Fungicide - cereals, oilseeds and sugar beet	Approvals legislation Water - article 7	307,000	43,000	thiophanate methyl
Carbetamide	Herbicide - oilseeds & field crops	Water - multiple article 7	72,000	143,000	propyzamide, clomazone, linuron, metazachlor, pendimethalin, prosulfocarb
Chlormequat chloride	Plant growth regulator - cereals	MRLs	2,577,000	2,240,000	trinexepac-ethyl 2-chloroethylphosphonic acid
Chloropicrin	Soil fumigant	Withdrawn 2011	195	52,000	
Chlorpropam (CIPC)	Sprout suppressant - potato stores	MRLs			ethylene, spearmint oil
Chlorotoluron	Herbicide - cereals	Water - multiple article 7	327,000	576,000	flufenacet, pendimethalin, diflufenican,
Chlorpyrifos	Insecticide - cereals & horticulture	Water - priority substance	159,000	85	dimethoate thiachloprid
Chlorothalonil	Fungicide - cereals	Water - potential UK specific pollutant	3,294,000	1,463,000	folpet
Clopyralid	Herbicide - cereals and grassland	Water - article 7	465,000	49,000	aminopyralid, metamitron, propyzamide, thifensulfuron-methyl, trisulfuron
Cypermethrin	Insecticide	Water - potential	1,229,000	30,000	deltamethrin,

Active substance	Main use	Reason for threat to availability (final use up date if withdrawn)	Area Treated in 2010 (ha)	Weight applied in 2010(kg)	Potential alternatives
	- most crops	priority substance			esfenvalerate, lambda-cyhalothrin
Cyproconazole	Fungicide - arable crops	Approvals legislation	1,190,000	54,000	prothioconazole
Deltamethrin	Insecticide	Approvals legislation - Endocrine	107,520	706	cypermethrin
Difenoconazole	Fungicide	Approvals legislation - Endocrine	142,329	10,474	azoxystrobin, folpet, pyraclostrobin
Dimethoate	Insecticide	Approvals legislation - Endocrine	48,264	29,062	chlorpyrifos, imidacloprid, lambda-cyhalothrin
Epoxiconazole	Fungicide - cereals	Approvals legislation - Endocrine	3,296,000	184,000	prothioconazole other fungicides
Esfenvalerate	Insecticide - cereals, peas & beans, brassicas, other horticultural crops	Approvals legislation - PBT	111,000	400	cypermethrin, deltamethrin, lambda-cyhalothrin
Fenbuconazole	Fungicide - top fruit	Approvals legislation	6,500	340	prothioconazole
Flumioxazin	Herbicide - cereals (horticulture - off label)	Approvals legislation - Endocrine	3,000	80	carfentrazone-ethyl + flupyrsulfuron-methyl, diflufenican, flufenacet, imazamox
Fluroxypyr	Herbicide - arable, grassland and horticulture	Water - article 7	928,000	111,000	florasulam, mecoprop-p
Flusilazole	Fungicide - cereals, oilseeds and sugar beet	Approvals legislation - R2 + Endocrine	435,000	41,000	prothioconazole
Folpet	Fungicide	Approvals legislation - Endocrine	Only just approved in UK therefore not recorded, potential alternative for other fungicide loses though		azoxystrobin, bixafen, fluxapyroxad, isopyrazam, picoxystrobin
Glufosinate ammonium	Herbicide - fruit, desiccant –	Approvals legislation	21,000	9,000	glyphosate

Active substance	Main use	Reason for threat to availability (final use up date if withdrawn)	Area Treated in 2010 (ha)	Weight applied in 2010(kg)	Potential alternatives
	arable				
Glyphosate	Herbicide - non-selective most crops, desiccant cereals and oilseeds	Water - UK specific pollutant Water - article 7 MRLs	1,649,000	1,510,000	diquat, glufosinate ammonium
loxynil	Herbicide - onions & turf	Approvals legislation - Endocrine	126,000	18,000	mechanical weeding of onions
Iprodione	Fungicide	Approvals legislation - Endocrine	49,493	16,945	azoxystrobin, picoxystrobin
Isoproturon	Herbicide - cereals	Withdrawn 2007 (2009)			diflufenican flufenacet prosulfocarb
Linuron	Herbicide - outdoor horticulture	Approvals legislation - R2 + Endocrine Water - article 7	123,000	58,000	imazamox, isoxaben, terbutylazine
Mancozeb	Fungicide - potatoes	Approvals legislation - Endocrine	527,000	611,000	cyazofamid, amectotradin + dimethomorph, fenamidone + propamocarb hydrochloride, fuazinam, fluopicolide + propamocarb hydrochloride, mandipropamid
Maneb	Fungicide - potatoes and arable crops	Approvals legislation - Endocrine	4,500	3,500	cyazofamid, amectotradin + dimethomorph, fenamidone + propamocarb hydrochloride, fuazinam, fluopicolide + propamocarb hydrochloride, mandipropamid
MCPA	Herbicide - cereal and grassland	Water - multiple article 7	260,000	219,000	aminopyralid, clopyralid, fluroxypyr, triclopyr
MCPB	Herbicide - grassland and cereals	Water - article 7	46,000	40,000	2,4-d, bentazone

Active substance	Main use	Reason for threat to availability (final use up date if withdrawn)	Area Treated in 2010 (ha)	Weight applied in 2010(kg)	Potential alternatives
Mecoprop-P	Herbicide - cereals and grassland	Water - multiple article 7	551,000	311,000	aminopyralid, clopyralid, florasulam, fluroxypyr, triclopyr
Metaldehyde	Molluscicide - all edible crops	Water - multiple article 7	746,000	164,000	methiocarb ferric phosphate
Metazachlor	Herbicide - oilseeds	Water - article 7	453,000	271,000	aminopyralid, carbetamide, propyzamide, triallate
Metconazole	Fungicide - cereals and oilseeds	Approvals legislation - Endocrine	700,000	24,000	prothioconazole
Methiocarb	Molluscicide - all edible crops	Water - potential UK specific pollutant	283,000	34,000	metaldehyde ferric phosphate
Metributzin	Herbicide	Approvals legislation - Endocrine	114,290	48,792	clomazone, flufenacet, prosulfocarb
Myclobutanil	Fungicide	Approvals legislation - Endocrine	55,800	3,528	azoxystrobin, folpet, pyraclostrobin
Penconazole	Fungicide	Approvals legislation - Endocrine	24,899	875	azoxystrobin, folpet, pyraclostrobin
Pendimethalin	Herbicide - cereals and horticulture	Approvals legislation Water - potential UK specific pollutant	1,176,000	1,022,000	bromoxynil , carbetamide , chlorotoluron , diflufenican flufenacet flupyrsulfuron-methyl , isoxaben, isoxaflutole, mesotrione, prosulfuron, prosulfocarb, terbutylazine, triallate
Picloram	Herbicide	Approvals legislation - Endocrine	115,835	2,533	glyphosate
Prochloraz	Fungicide	Approvals legislation - Endocrine			azoxystrobin, folpet, pyraclostrobin
Propiconazole	Fungicide	Approvals legislation - Endocrine	681,032	41,863	azoxystrobin, folpet, pyraclostrobin

Active substance	Main use	Reason for threat to availability (final use up date if withdrawn)	Area Treated in 2010 (ha)	Weight applied in 2010(kg)	Potential alternatives
Propyzamide	Herbicide - oilseeds and horticultural crops	Water quality	257,000	195,000	carbetamide, clomazone, linuron, pendimethalin, prosulfocarb
Prothioconazole	Fungicide - cereals	Approvals legislation - Endocrine	4,136,000	265,000	other azoles azoxystrobin, folpet, pyraclostrobin
Quinoxifen	Fungicide - cereals	Approvals legislation - vPvB Water - potential priority hazardous substance	34,000	1,700	cyflufenamid, proquinazid
Tebuconazole	Fungicide - cereals and horticultural crops	Approvals legislation - Endocrine	2,212,000	184,000	other azoles
Tepraloxydim	Herbicide	Approvals legislation - Endocrine	168,010	8,746	cycloxydim
Terbutryne	Herbicide - algae control	Water - potential priority substance	18,000	12,000	
Thiacloprid	Insecticide	Approvals legislation - Endocrine	49,187	5,963	chlorpyrifos, cypermethrin, pirimicarb, pymetrozine
Thiram	Fungicide	Approvals legislation - Endocrine	511,394	34,013	azoxystrobin, boscalid, cymoxanil, fludioxonil, metalaxyl, picoxystrobin
Triadimenol	Fungicide	Approvals legislation - Endocrine	53,934	2,986	azoxystrobin, folpet, pyraclostrobin
Triflurosulfuron	Herbicide	Approvals legislation - Endocrine	170,110	1,871	chloridazon, ethofumosate
Triticonazole	Fungicide		453,900	3,240	azoxystrobin, folpet, pyraclostrobin

Appendix 3

Table A3 Group 1 Usage Characterisation

Chemical	Baseline Total Weight Applied (t)	Baseline Total Area Treated (ha)	Scenario Total Weight Applied (t)	Scenario Total Area Treated (ha)	Baseline Application Rate (kg/ha)	Scenario Application Rate (kg/ha)	% Change in Total Weight Applied (t)	% Change in Total Area Treated (ha)	Leach Risk	Runoff Risk	Drainflow Risk
bixafen	57.6	989000		0	0.06	0.00	-100.0	-100.0	L	L	L
carbendazim	3.4	65000		0	0.05	0.00	-100.0	-100.0	M	L	M
cyproconazole	74.8	1447000		0	0.05	0.00	-100.0	-100.0	H	M	H
epoxiconazole	291.6	2074000		0	0.14	0.00	-100.0	-100.0	M	H	M
flusilazole	37.0	332000		0	0.11	0.00	-100.0	-100.0	M	H	H
metconazole	40.4	1107000		0	0.04	0.00	-100.0	-100.0	M	H	L
prochloraz	144.1	607000		0	0.24	0.00	-100.0	-100.0	L	H	L
propiconazole	63.0	946000		0	0.07	0.00	-100.0	-100.0	M	H	M
prothioconazole	624.9	3007000	1356.0	3289000	0.21	0.41	117.0	9.4	L	L	L
tebuconazole	172.1	1751000		0	0.10	0.00	-100.0	-100.0	L	M	M
Total	1508.9	12327000	1356.0	3289000	0.12	0.41					
Scenario Total	624.9	3007000	1356.0	3289000	0.21	0.41					

Scenario 1: Replacement of selected triazoles (bixafen, carbendazim, cyproconazole, epoxiconazole, flusilazole, metconazole, prochloraz, propiconazole, tebuconazole) with prothioconazole.

Table A4 Group 2 Usage Characterisation

Chemical	Baseline Total Weight Applied (t)	Baseline Total Area Treated (ha)	Scenario Total Weight Applied (t)	Scenario Total Area Treated (ha)	Baseline Application Rate (kg/ha)	Scenario Application Rate (kg/ha)	% Change in Total Weight Applied (t)	% Change in Total Area Treated (ha)	Leach Risk	Runoff Risk	Drainflow Risk
ametoctradin		0	10.9	45000	0.00	0.24			L	L	L
azoxystrobin	122.8	1133000	122.8	1133000	0.11	0.11	0.0	0.0	M	M	L
bifenthrin	1.1	123000		0	0.01	0.00	-100.0	-100.0	L	M	L
bromoxynil	31.8	136000	35.6	149000	0.23	0.24	12.2	9.5	L	L	L
carbendazim	3.4	65000		0	0.05	0.00	-100.0	-100.0	M	L	M
carbetamide	133.1	63000	133.1	63000	2.10	2.10	0.0	0.0	H	L	L
carfentrazone-ethyl	9.0	64000	9.0	64000	0.14	0.14	0.0	0.0	L	L	M
chlorotoluron	1255.0	460000	1533.7	562000	2.73	2.73	122.2	122.2	M	M	M
cyazofamid	16.9	106000	20.5	106000	0.16	0.19	21.4	0.0	L	M	M
cyflufenamid	1.4	114000	1.5	122000	0.01	0.01	7.6	7.6	M	H	L
cypermethrin	39.0	1203000	40.4	1259000	0.03	0.03	3.6	4.7	L	H	H
deltamethrin	0.3	51000	0.7	107000	0.01	0.01	104.4	111.1	L	M	M
diflufenican	132.6	1618000	157.5	1813000	0.08	0.09	118.9	112.0	L	H	H
dimethomorph		0	8.1	45000	0.00	0.18			M	M	L
diquat dibromide	114.6	149000	114.6	149000	0.77	0.77	0.0	0.0	L	H	M
esfenvalerate	0.5	117000		0	0.00	0.00	-100.0	-100.0	L	H	M
fenamidone	6.1	41000	12.9	86000	0.15	0.15	110.5	110.5	L	L	M
fluazinam	6.1	106000	7.0	106000	0.06	0.07	14.8	0.0	L	M	M
flufenacet	299.4	1233000	304.7	1246000	0.24	0.24	1.8	1.1	M	L	H
fluopicolide	9.5	95000	14.0	106000	0.10	0.13	47.6	11.1	H	M	H
flupyrsulfuron-methyl	1.0	102000	3.0	296000	0.01	0.01	290.2	290.2	H	L	L
folpet	9.3	19000	99.1	198000	0.50	0.50	964.8	964.8	L	L	H
glyphosate	2443.0	1706000	2443.0	1706000	1.43	1.43	0.0	0.0	L	M	M
imazamox	3.8	50000	4.4	59000	0.08	0.08	17.0	17.0	H	L	M
ioxynil	22.2	111000		0	0.20	0.00	-100.0	-100.0	L	L	L
isoxaben	0.1	1000	0.2	3000	0.08	0.08	131.0	131.0	M	M	M
isoxaflutole	1.7	20000	2.8	33000	0.09	0.09	63.9	63.9	L	L	M
lambda-	6.9	1035000	7.1	1090000	0.01	0.01	4.0	5.4	L	M	L

Chemical	Baseline Total Weight Applied (t)	Baseline Total Area Treated (ha)	Scenario Total Weight Applied (t)	Scenario Total Area Treated (ha)	Baseline Application Rate (kg/ha)	Scenario Application Rate (kg/ha)	% Change in Total Weight Applied (t)	% Change in Total Area Treated (ha)	Leach Risk	Runoff Risk	Drainflow Risk
cyhalothrin											
linuron	39.8	93000		0	0.43	0.00	-100.0	-100.0	M	M	H
mancozeb	833.7	243000		0	3.43	0.00	-100.0	-100.0	L	L	M
mandipropamid	19.8	106000	26.6	106000	0.19	0.25	34.3	0.0	L	L	H
mesotrione	9.0	103000	10.4	116000	0.09	0.09	15.0	12.5	L	L	M
pendimethalin	1416.5	1188000		0	1.19	0.00	-100.0	-100.0	L	H	L
picoxystrobin	25.0	244000	25.0	244000	0.10	0.10	0.0	0.0	L	L	H
propamocarb hydrochloride	125.7	106000	204.9	106000	1.19	1.94	63.0	0.0	M	L	L
proquinazid	2.9	58000	3.3	66000	0.05	0.05	15.0	15.0	L	H	H
prosulfocarb	1469.0	367000	2249.6	562000	4.00	4.00	153.1	153.1	L	M	M
prosulfuron	0.2	24000	0.4	37000	0.01	0.01	79.9	54.2	H	L	M
quinoxifen	1.2	17000		0	0.07	0.00	-100.0	-100.0	L	H	M
terbuthylazine	22.1	45000	29.2	59000	0.49	0.49	32.1	32.5	M	M	H
thifensulfuron-methyl	1.9	103000	1.9	103000	0.02	0.02	0.0	0.0	L	L	M
thiophanate-methyl	10.9	31000	33.5	94000	0.35	0.36	209.0	204.1	L	L	L
Tri-allate	495.6	220000	934.6	415000	2.25	2.25	188.6	188.6			
tribenuron-methyl	4.1	558000	0.8	79000	0.01	0.01	-80.6	-85.8	H	L	H
Total	7397.4	12745000	5453.3	11579000	0.58	0.47					
Scenario Total	5079.1	10787000	5453.3	11579000	0.47	0.47					

Scenario 2: Replacement of mancozeb with folpet, fenamidone and thiophanate methyl

Scenario 3: Replacement of pendimethalin with chlorotoluron, diflufenican, flupyrsulfuron, prosulfocarb and tri-allate.

Table A5 Group 3 Usage Characterisation

Chemical	Baseline Total Weight Applied (t)	Baseline Total Area Treated (ha)	Scenario Total Weight Applied (t)	Scenario Total Area Treated (ha)	Baseline Application Rate (kg/ha)	Scenario Application Rate (kg/ha)	% Change in Total Weight Applied (t)	% Change in Total Area Treated (ha)	Leach Risk	Runoff Risk	Drainflow Risk
2,4-D	91.2	57000		0	1.59	0.00	-100.0	-100.0	M	L	M
2,4-DB	25.4	33000	59.4	52000	0.77	1.15	133.9	57.3	M	L	L
aminopyralid	0.8	12000	9.9	165000	0.06	0.06	1227.4	1227.4	H	L	H
bentazone	83.4	58000		0	1.44	0.00	-100.0	-100.0	M	L	L
carbetamide	133.1	63000		0	2.10	0.00	-100.0	-100.0	H	L	L
chlorotoluron	1001.0	367000		0	2.73	0.00	-100.0	-100.0	M	M	M
clomazone	17.4	162000	17.6	165000	0.11	0.11	1.2	1.9	H	M	M
clopyralid	44.6	691000	96.9	1140000	0.06	0.09	117.1	64.8	H	L	H
ferric phosphate	6.1	12000	94.5	191000	0.50	0.49	1441.1	1441.7	L	L	L
florasulam	1.2	797000	1.9	978000	0.00	0.00	66.3	22.8	M	L	H
flufenacet	299.4	1233000	409.7	1693000	0.24	0.24	36.9	37.3	M	L	H
fluroxypyr	162.3	1256000	333.6	2172000	0.13	0.15	105.5	72.9	L	L	L
linuron	39.8	93000	41.0	95000	0.43	0.43	3.0	2.6	M	M	H
MCPA	266.0	241000		0	1.10	0.00	-100.0	-100.0	M	L	L
MCPB	110.0	60000	156.8	113000	1.83	1.39	42.6	87.9	L	L	L
mecoprop-P	444.7	580000		0	0.77	0.00	-100.0	-100.0	M	L	M
metaldehyde	138.5	710000		0	0.20	0.00	-100.0	-100.0	L	L	L
metazachlor	312.1	441000	501.3	643000	0.71	0.78	60.6	45.7	H	M	H
methiocarb	20.1	134000	116.0	773000	0.15	0.15	476.4	476.4	L	L	L
pendimethalin	1416.5	1188000	1971.3	1650000	1.19	1.19	39.2	38.9	L	H	L
propyzamide	209.1	246000		0	0.85	0.00	-100.0	-100.0	M	M	M
prosulfocarb	1469.0	367000	1478.6	370000	4.00	4.00	0.7	0.7	L	M	M
triclopyr	40.7	143000	172.4	605000	0.29	0.28	323.3	324.3	H	L	L
Total	6332.2	8946000	5460.8	10805000	0.71	0.51					
Scenario Total	3965.4	6623000	5460.8	10805000	0.60	0.51					

Scenario 4: Replacement of selected herbicides (2,4-D, bentazone, carbetamide, chlorotoluron, MCPA, mecoprop-P and propyzamide) with aminopyralid, clopyralid, florasulam, flufenacet, fluroxypyr, MCPB, metazachlor, pendimethalin, triclopyr.

Scenario 5: Replacement of metaldehyde with ferric phosphate and methiocarb

Table A6 Group 4 Usage Characterisation

Chemical	Baseline Total Weight Applied (t)	Baseline Total Area Treated (ha)	Scenario Total Weight Applied (t)	Scenario Total Area Treated (ha)	Baseline Application Rate (kg/ha)	Scenario Application Rate (kg/ha)	% Change in Total Weight Applied (t)	% Change in Total Area Treated (ha)	Leach Risk	Runoff Risk	Drainflow Risk
bifenox	19.2	35000		0	0.54	0.00	-100.0	-100.0	L	M	L
chlorothalonil	2200.0	2414000		0	0.91	0.00	-100.0	-100.0	L	M	L
cypermethrin	39.0	1203000		0	0.03	0.00	-100.0	-100.0	L	H	H
deltamethrin	0.3	51000	4.2	641000	0.01	0.01	1161.4	1166.8	L	M	M
dimethenamid-p	86.2	166000	90.2	174000	0.52	0.52	4.7	4.8	M	L	L
esfenvalerate	0.5	117000	2.2	524000	0.00	0.00	347.1	347.1	L	H	M
ethametsulfuron-methyl		0	0.2	8000	0.00	0.03			H	M	L
ferric phosphate	6.1	12000	90.9	183000	0.50	0.50	1382.7	1377.9	L	L	O
folpet	9.3	19000	2494.1	2183000	0.50	1.14	26701.2	11629.3	L	L	H
imazamox	3.8	50000	3.8	50000	0.08	0.08	0.0	0.0	H	L	M
lambda-cyhalothrin	6.9	1035000	10.5	1587000	0.01	0.01	52.6	53.3	L	M	L
metazachlor	312.1	441000	342.0	475000	0.71	0.72	9.6	7.8	H	M	H
methiocarb	20.1	134000		0	0.15	0.00	-100.0	-100.0	L	L	L
quinmerac	69.0	276000	77.5	310000	0.25	0.25	12.3	12.3	H	L	H
Total	2772.5	5954000	3115.5	6135000	0.47	0.51					
Scenario Total	494.1	2167000	3115.5	6135000	0.23	0.51					

Scenario 6: Replacement of chlorothalonil with folpet

Table A7 Group 5 (denoted by \$) and Group 5b Usage Characterisation

Chemical	Baseline Total Weight Applied (t)	Baseline Total Area Treated (ha)	Scenario Total Weight Applied (t)	Scenario Total Area Treated (ha)	Baseline Application Rate (kg/ha)	Scenario Application Rate (kg/ha)	% Change in Total Weight Applied (t)	% Change in Total Area Treated (ha)	Leach Risk	Runoff Risk	Drainflow Risk
2,4-D	91.15	57,279.81			1.5913	0.0000	-100.00	-100.00	M	L	M
2,4-DB	25.40	32,990.61	59.43	51,892.95	0.7700	1.1452	133.94	57.30	M	L	L
ametoctradin			10.86	45,252.58	0.0000	0.2400			L	L	L
azoxystrobin	122.77	1,132,743.06	131.64	1,219,277.50	0.1084	0.1080	7.22	7.64	M	M	L
azoxystrobin\$	122.77	1,132,743.06	477.20	3,419,338.79	0.1084	0.1396	288.68	201.86	M	M	L
bifenthrin	1.11	123,474.82			0.0090	0.0000	-100.00	-100.00	L	M	L
bixafen	57.64	989,213.68	59.93	1,019,637.37	0.0583	0.0588	3.96	3.08	L	L	L
bromoxynil	31.77	136,207.87	35.64	149,124.54	0.2332	0.2390	12.20	9.48	L	L	L
carbendazim	3.39	65,388.14			0.0519	0.0000	-100.00	-100.00	M	L	M
carbetamide	133.07	63,368.11			2.1000	0.0000	-100.00	-100.00	H	L	L
carfentrazone-ethyl	9.01	63,610.94	9.01	63,610.94	0.1416	0.1416	0.00	0.00	L	L	M
chloridazon			84.18	64,756.60	0.0000	1.3000			M	L	L
chlorotoluron	1,000.99	366,661.64			2.7300	0.0000	-100.00	-100.00	M	M	M
clomazone	17.38	162,240.20	19.46	185,442.06	0.1071	0.0000	12.02	14.30	H	M	M
cyazofamid	16.89	105,573.55	20.51	105,573.55	0.1600	0.1943	21.43	0.00	L	M	M
cycloxydim	5.76	55,211.68	5.76	55,211.68	0.1044	0.1044	0.00	0.00	L	L	L
cyflufenamid	1.42	113,750.99	1.53	122,400.99	0.0125	0.0125	7.60	7.60	M	H	L
cypermethrin	39.02	1,202,930.20	45.59	1,412,356.62	0.0324	0.0323	16.85	17.41	L	H	H
cyproconazole\$	74.83	1,447,258.32			0.0517	0.0000	-100.00	-100.00	H	M	H
deltamethrin	0.34	50,581.26			0.0067	0.0000	-100.00	-100.00	L	M	M
difenoconazole\$	29.22	113,822.78			0.2567	0.0000	-100.00	-100.00	L	H	M
diflufenican	132.58	1,617,996.29	288.08	2,249,983.39	0.0819	0.1280	117.29	39.06	L	H	H
dimethomorph			8.15	45,252.58	0.0000	0.1800			M	M	L
epoxiconazole\$	291.82	2,076,424.14			0.1405	0.0000	-100.00	-100.00	M	H	M
esfenvalerate	0.48	117,199.66			0.0041	0.0000	-100.00	-100.00	L	H	M
ethofumesate	140.35	124,483.20	205.11	124,483.20	1.1275	1.6477	46.14	0.00	H	M	L
fenamidone	6.14	40,954.56	12.93	86,207.14	0.1500	0.1500	110.49	110.49	L	L	M
fluazinam	6.12	105,573.55	7.03	105,573.55	0.0580	0.0666	14.78	0.00	L	M	M
flufenacet	299.37	1,233,074.77	401.56	1,624,052.01	0.2428	0.2473	34.13	31.71	M	L	H

Chemical	Baseline Total Weight Applied (t)	Baseline Total Area Treated (ha)	Scenario Total Weight Applied (t)	Scenario Total Area Treated (ha)	Baseline Application Rate (kg/ha)	Scenario Application Rate (kg/ha)	% Change in Total Weight Applied (t)	% Change in Total Area Treated (ha)	Leach Risk	Runoff Risk	Drainflow Risk
flupyrsulfuron-methyl	1.02	101,856.44	0.99	99,167.25	0.0100	0.0100	-2.64	-2.64	H	L	L
fluquinconazole\$	5.82	71,872.56			0.0810	0.0000	-100.00	-100.00	M	M	L
flusilazole\$	36.98	332,184.66			0.1113	0.0000	-100.00	-100.00	M	H	H
fluxapyroxad	13.38	130,280.61	17.18	160,704.29	0.1027	0.1069	28.43	23.35	M	L	M
folpet	9.31	18,611.52			0.5000	0.0000	-100.00	-100.00	L	L	H
folpet\$	9.31	18,611.52	2,166.86	2,414,390.22	0.5000	0.8975	23185.19	12872.56	L	L	H
glyphosate	2,443.03	1,705,595.24	2,604.25	1,747,143.67	1.4324	1.4906	6.60	2.44	L	M	M
ioxynil	22.20	111,021.88			0.2000	0.0000	-100.00	-100.00	L	L	L
isoprazam	30.94	255,439.37	34.75	285,863.06	0.1211	0.1215	12.29	11.91	L	L	L
isoxaben	0.10	1,282.96	0.22	2,963.68	0.0750	0.0750	131.00	131.00	M	M	M
lambda-cyhalothrin	6.87	1,034,847.30	7.31	1,112,832.58	0.0066	0.0066	6.39	7.54	L	M	L
linuron	39.84	92,873.83			0.4290	0.0000	-100.00	-100.00	M	M	H
mancozeb	833.70	243,209.55			3.4279	0.0000	-100.00	-100.00	L	L	M
mandipropamid	19.80	105,573.55	26.58	105,573.55	0.1875	0.2518	34.29	0.00	L	L	H
MCPA	266.01	241,303.21	297.20	260,205.55	1.1024	1.1422	11.72	7.83	M	L	L
MCPB	110.01	59,982.93	110.01	78,885.27	1.8340	1.3945	0.00	31.51	L	L	L
mesotrione	9.04	103,153.38	10.40	116,070.06	0.0877	0.0896	15.00	12.52	L	L	M
metribuzin	38.98	69,605.58			0.5600	0.0000	-100.00	-100.00	M	L	L
pendimethalin	1,416.45	1,188,020.83			1.1923	0.0000	-100.00	-100.00	L	H	L
picloram	2.63	111,959.00			0.0234	0.0000	-100.00	-100.00	H	M	L
picoxystrobin	24.98	243,542.78	29.03	275,774.12	0.1026	0.1053	16.23	13.23	L	L	H
prochloraz\$	144.08	607,160.79			0.2373	0.0000	-100.00	-100.00	L	H	L
propamocarb hydrochloride	125.73	105,573.55	204.92	105,573.55	1.1909	1.9411	62.98	0.00	M	L	L
propiconazole\$	62.99	945,891.75			0.0666	0.0000	-100.00	-100.00	M	H	M
propyzamide	209.10	245,996.01	260.98	307,035.74	0.8500	0.8500	24.81	24.81	M	M	M
proquinazid	2.89	57,721.33	3.32	66,371.34	0.0500	0.0500	14.99	14.99	L	H	H
prosulfocarb	1,469.03	367,257.88	1,561.84	390,459.74	4.0000	0.0000	6.32	6.32	L	M	M
prosulfuron	0.24	23,825.22	0.44	36,741.90	0.0102	0.0119	79.89	54.21	H	L	M
prothioconazole\$	624.88	3,007,459.65			0.2078	0.0000	-100.00	-100.00	L	L	L

Chemical	Baseline Total Weight Applied (t)	Baseline Total Area Treated (ha)	Scenario Total Weight Applied (t)	Scenario Total Area Treated (ha)	Baseline Application Rate (kg/ha)	Scenario Application Rate (kg/ha)	% Change in Total Weight Applied (t)	% Change in Total Area Treated (ha)	Leach Risk	Runoff Risk	Drainflow Risk
pyraclostrobin\$	109.98	1,088,525.63	541.49	2,523,295.87	0.1010	0.2146	392.35	131.81	L	M	L
quinoxifen	1.15	17,300.01			0.0667	0.0000	-100.00	-100.00	L	H	M
sulphur	231.44	28,930.07	231.44	28,930.07	8.0000	8.0000	0.00	0.00	H	H	L
tebuconazole\$	172.13	1,751,137.55					-100.00	-100.00	L	M	M
tepraloxym	2.88	157,416.40			0.0183	0.0000	-100.00	-100.00	M	L	L
thiophanate-methyl	10.85	30,998.84	33.52	94,257.71	0.3500	0.3556	208.95	204.07	L	L	L
Total	11,168.56	27,406,780.25	10,026.33	22,361,667.23	0.4075	0.4484					
Scenario Total	6,128.14	14,199,595.99	10,026.33	22,361,667.23	0.4316	0.4484					

Scenario 7: Replacement of a wide range of fungicides (difenoconazole, fluquinconazole, myclobutanil, penconazole, prochloraz, propiconazole, prothioconazole, tetraconazole, triadimenol, triticonazole, folpet, thiram) with alternates (azoxystrobin, pyraclostrobin, bixafen, fluxapyroxad, isopyrazam, picoxystrobin, boscalid, cymoxanil, fludioxonil, metalaxyl)

Appendix 4 – Surface water risk by catchment

Table A8 Percentage of surface water drinking water protected area in each risk class broken down by water company operational area for key compounds exceeding the PCV in scenario 2.

Water Company Area	Folpet					
	Baseline			Scenario		
	NAR	PNAR	PAR	NAR	PNAR	PAR
Anglian	0.0	11.8	0.0	0.0	0.1	11.7
Northumbrian	3.4	1.6	0.0	0.0	5.0	0.0
Severn Trent	1.5	18.4	0.0	0.2	19.1	0.7
South West	1.8	1.5	0.0	0.1	3.2	0.0
Southern	0.0	5.2	0.0	0.0	5.2	0.0
Thames	0.0	22.6	0.0	0.0	19.6	3.0
UU	4.7	0.5	0.0	1.4	3.8	0.0
Wales	11.2	3.6	0.0	2.4	12.4	0.0
Wessex	0.2	4.4	0.0	0.0	4.6	0.0
Yorkshire	1.1	6.5	0.0	0.5	7.1	0.0

Note: Water company areas relate to water and sewage company boundaries as defined by Water UK

Table A9 Percentage of surface water drinking water protected area in each risk class broken down by water company operational area for key compounds exceeding the PCV in scenario 3.

Water Company Area	Chlorotoluron								Flupyrifluron-methyl					
	Baseline				Scenario				Baseline			Scenario		
	NAR	PNAR	PAR	AR	NAR	PNAR	PAR	AR	NAR	PNAR	PAR	NAR	PNAR	PAR
Anglian	0.0	0.0	4.3	7.5	0.0	0.0	0.0	11.8	0.0	10.8	1.0	0.0	0.0	11.7
Northumbrian	0.0	0.0	5.0	0.0	0.0	0.0	4.9	0.1	0.0	5.0	0.0	0.0	5.0	0.0
Severn Trent	0.2	0.1	19.4	0.3	0.1	0.1	19.1	0.7	0.3	19.7	0.0	0.2	19.1	0.7
South West	0.0	0.1	3.2	0.0	0.0	0.0	3.3	0.0	0.2	3.1	0.0	0.0	3.3	0.0
Southern	0.0	0.0	5.2	0.0	0.0	0.0	5.0	0.2	0.0	5.2	0.0	0.0	5.2	0.0
Thames	0.0	0.0	22.6	0.0	0.0	0.0	19.5	3.1	0.0	22.6	0.0	0.0	19.6	3.0
UU	0.3	2.0	2.8	0.0	0.2	0.3	4.6	0.0	2.4	2.8	0.0	0.6	4.6	0.0
Wales	0.2	4.7	9.9	0.0	0.1	2.1	12.6	0.0	4.8	10.0	0.0	3.0	11.8	0.0
Wessex	0.0	0.0	4.6	0.0	0.0	0.0	4.6	0.0	0.0	4.6	0.0	0.0	4.6	0.0
Yorkshire	0.0	1.1	6.5	0.0	0.0	0.0	4.2	3.4	1.1	6.5	0.0	0.4	7.2	0.0

Note: Water company areas relate to water and sewage company boundaries as defined by Water UK

Water Company Area	Prosulfocarb					
	Baseline			Scenario		
	NAR	PNAR	PAR	NAR	PNAR	PAR
Anglian	0.0	0.0	11.7	0.0	0.0	11.8
Northumbrian	0.0	5.0	0.0	0.0	4.9	0.1
Severn Trent	0.2	19.1	0.7	0.2	15.7	4.1
South West	0.1	3.2	0.0	0.0	3.3	0.0
Southern	0.0	4.9	0.3	0.0	4.5	0.7
Thames	0.0	19.5	3.1	0.0	13.1	9.5
UU	2.1	3.0	0.0	0.6	4.4	0.2
Wales	4.8	10.0	0.0	2.3	12.5	0.0
Wessex	0.0	4.6	0.0	0.0	4.5	0.1
Yorkshire	1.1	6.5	0.0	0.0	4.2	3.4

Note: Water company areas relate to water and sewage company boundaries as defined by Water UK

Table A10 Percentage of surface water drinking water protected area in each risk class broken down by water company operational area for key compounds exceeding the PCV in scenario 4.

Water Company Area	Aminopyralid						Clopyralid							
	Baseline			Scenario			Baseline				Scenario			
	NAR	PNAR	PAR	NAR	PNAR	PAR	NAR	PNAR	PAR	AR	NAR	PNAR	PAR	AR
Anglian	0.5	11.3	0.0	0.0	5.2	6.6	0.0	0.0	9.6	2.2	0.0	0.0	9.6	2.2
Northumbrian	0.0	5.0	0.0	0.0	0.0	5.0	0.0	0.0	5.0	0.0	0.0	0.0	5.0	0.0
Severn Trent	0.1	19.8	0.0	0.0	0.1	19.8	0.0	0.1	19.8	0.0	0.0	0.1	19.8	0.0
South West	0.0	3.3	0.0	0.0	0.1	3.3	0.0	0.0	3.3	0.0	0.0	0.0	3.3	0.0
Southern	0.0	5.2	0.0	0.0	0.0	5.1	0.0	0.0	5.2	0.0	0.0	0.0	5.2	0.0
Thames	0.0	22.6	0.0	0.0	2.9	19.8	0.0	0.0	22.6	0.0	0.0	0.0	22.6	0.0
UU	0.3	4.9	0.0	0.0	0.5	4.7	0.0	0.5	4.7	0.0	0.0	0.0	5.1	0.0
Wales	0.3	14.6	0.0	0.0	0.7	14.1	0.0	0.6	14.2	0.0	0.0	0.2	14.6	0.0
Wessex	0.0	4.6	0.0	0.0	0.0	4.6	0.0	0.0	4.6	0.0	0.0	0.0	4.6	0.0
Yorkshire	0.0	7.6	0.0	0.0	0.0	7.6	0.0	0.0	7.6	0.0	0.0	0.0	7.6	0.0

Note: Water company areas relate to water and sewage company boundaries as defined by Water UK

Water Company Area	Flufenacet								Fluroxypyr							
	Baseline				Scenario				Baseline				Scenario			
	NAR	PNAR	PAR	AR	NAR	PNAR	PAR	AR	NAR	PNAR	PAR	AR	NAR	PNAR	PAR	AR
Anglian	0.0	0.0	10.8	1.0	0.0	0.0	11.8	0.0	0.0	0.0	11.8	0.0	0.0	0.0	10.0	1.8
Northumbrian	0.0	1.6	3.4	0.0	0.0	1.5	3.5	0.0	0.0	0.0	5.0	0.0	0.0	0.0	5.0	0.0
Severn Trent	0.2	0.6	19.2	0.0	0.2	0.1	19.7	0.0	0.0	0.1	19.8	0.0	0.0	0.1	19.8	0.0
South West	0.0	1.0	2.3	0.0	0.0	0.5	2.8	0.0	0.0	0.1	3.3	0.0	0.0	0.0	3.3	0.0
Southern	0.0	0.0	5.2	0.0	0.0	0.0	5.2	0.0	0.0	0.0	5.2	0.0	0.0	0.0	5.2	0.0
Thames	0.0	0.0	22.6	0.0	0.0	0.0	22.6	0.0	0.0	0.0	22.6	0.0	0.0	0.0	22.6	0.0
UU	0.4	4.2	0.5	0.0	0.4	2.1	2.6	0.0	0.0	0.5	4.7	0.0	0.0	0.4	4.8	0.0
Wales	0.6	10.6	3.6	0.0	0.5	7.8	6.4	0.0	0.0	0.6	14.2	0.0	0.0	0.4	14.4	0.0
Wessex	0.0	0.0	4.6	0.0	0.0	0.0	4.6	0.0	0.0	0.0	4.6	0.0	0.0	0.0	4.6	0.0
Yorkshire	0.0	1.1	6.5	0.0	0.0	1.1	6.5	0.0	0.0	0.0	7.6	0.0	0.0	0.0	7.6	0.0

Note: Water company areas relate to water and sewage company boundaries as defined by Water UK

Water Company Area	MCPB						Metazachlor							
	Baseline			Scenario			Baseline				Scenario			
	NAR	PNAR	PAR	NAR	PNAR	PAR	NAR	PNAR	PAR	AR	NAR	PNAR	PAR	AR
Anglian	0.0	4.3	7.5	0.0	0.0	11.8	0.0	0.0	9.8	2.0	0.0	0.0	9.8	2.0
Northumbrian	0.0	0.0	5.0	0.0	0.0	5.0	0.0	0.0	4.9	0.0	0.0	0.0	5.0	0.0
Severn Trent	0.0	0.1	19.8	0.0	0.1	19.8	0.2	0.1	19.7	0.0	0.2	0.1	19.7	0.0
South West	0.0	0.1	3.2	0.0	0.1	3.2	0.0	0.5	2.9	0.0	0.0	0.2	3.1	0.0
Southern	0.0	0.0	5.2	0.0	0.0	5.2	0.0	0.0	5.2	0.0	0.0	0.0	5.2	0.0
Thames	0.0	2.8	19.8	0.0	0.0	22.6	0.0	0.0	22.6	0.0	0.0	0.0	22.6	0.0
UU	0.0	0.5	4.7	0.0	0.5	4.7	0.4	3.9	0.8	0.0	0.3	2.2	2.6	0.0
Wales	0.1	0.7	14.1	0.1	0.7	14.1	0.3	7.7	6.9	0.0	0.2	6.3	8.3	0.0
Wessex	0.0	0.0	4.6	0.0	0.0	4.6	0.0	0.0	4.6	0.0	0.0	0.0	4.6	0.0
Yorkshire	0.0	0.4	7.2	0.0	0.0	7.6	0.0	1.1	6.5	0.0	0.0	1.1	6.5	0.0

Note: Water company areas relate to water and sewage company boundaries as defined by Water UK

Water Company Area	Triclopyr					
	Baseline			Scenario		
	NAR	PNAR	PAR	NAR	PNAR	PAR
Anglian	0.0	2.8	9.0	0.0	0.0	11.8
Northumbrian	0.0	0.0	5.0	0.0	0.0	5.0
Severn Trent	0.0	0.1	19.8	0.0	0.1	19.8
South West	0.0	0.1	3.2	0.0	0.0	3.3
Southern	0.0	0.0	5.2	0.0	0.0	5.2
Thames	0.0	0.0	22.6	0.0	0.0	22.6
UU	0.0	0.5	4.7	0.0	0.3	4.8
Wales	0.0	0.6	14.2	0.0	0.3	14.5
Wessex	0.0	0.0	4.6	0.0	0.0	4.6
Yorkshire	0.0	0.0	7.6	0.0	0.0	7.6

Note: Water company areas relate to water and sewage company boundaries as defined by Water UK

Table A11 Percentage of surface water drinking water protected area in each risk class broken down by water company operational area for key compounds exceeding the PCV in scenario 6.

Water Company Area	Folpet							
	Baseline				Scenario			
	NAR	PNAR	PAR	AR	NAR	PNAR	PAR	AR
Anglian	0.0	11.8	0.0	0.0	0.0	0.0	9.8	2.0
Northumbrian	3.4	1.6	0.0	0.0	0.0	0.0	5.0	0.0
Severn Trent	1.5	18.4	0.0	0.0	0.2	0.1	19.7	0.0
South West	1.8	1.5	0.0	0.0	0.0	0.2	3.1	0.0
Southern	0.0	5.2	0.0	0.0	0.0	0.0	5.2	0.0
Thames	0.0	22.6	0.0	0.0	0.0	0.0	22.6	0.0
UU	4.7	0.5	0.0	0.0	0.3	2.1	2.8	0.0
Wales	11.2	3.6	0.0	0.0	0.2	4.6	10.0	0.0
Wessex	0.2	4.4	0.0	0.0	0.0	0.0	4.6	0.0
Yorkshire	1.1	6.5	0.0	0.0	0.0	1.1	6.5	0.0

Note: Water company areas relate to water and sewage company boundaries as defined by Water UK

Table A12 Percentage of surface water drinking water protected area in each risk class broken down by water company operational area for key compounds exceeding the PCV in scenario 7.

Water Company Area	Azoxystrobin						Fluxapyroxad					
	Baseline			Scenario			Baseline			Scenario		
	NAR	PNAR	PAR	NAR	PNAR	PAR	NAR	PNAR	PAR	NAR	PNAR	PAR
Anglian	0.0	2.3	9.5	0.0	0.0	11.8	0.0	11.8	0.0	0.0	10.2	1.6
Northumbrian	0.0	5.0	0.0	0.0	3.4	1.6	4.9	0.1	0.0	0.0	5.0	0.0
Severn Trent	0.2	19.4	0.3	0.2	3.4	16.4	5.3	14.7	0.0	0.3	19.7	0.0
South West	0.2	3.1	0.0	0.0	1.8	1.5	3.3	0.0	0.0	0.7	2.6	0.0
Southern	0.0	5.2	0.0	0.0	0.0	5.2	0.1	5.1	0.0	0.0	5.2	0.0
Thames	0.0	22.6	0.0	0.0	0.0	22.6	1.6	21.0	0.0	0.0	22.6	0.0
UU	2.4	2.8	0.0	0.4	4.3	0.5	5.0	0.2	0.0	2.4	2.8	0.0
Wales	3.5	11.4	0.0	0.6	10.6	3.6	14.8	0.0	0.0	5.7	9.1	0.0
Wessex	0.0	4.6	0.0	0.0	0.2	4.4	3.2	1.5	0.0	0.0	4.6	0.0
Yorkshire	1.1	6.5	0.0	0.0	1.4	6.2	4.2	3.4	0.0	1.1	6.5	0.0

Note: Water company areas relate to water and sewage company boundaries as defined by Water UK

Appendix 5 – Ground water risk by area by water company operational area

Table A13 Percentage of ground water source protection zone area in each risk class broken down by water company operational area for key compounds exceeding the PCV in scenario 3.

Water Company Area	Chlorotoluron					
	Baseline			Scenario		
	NAR	PNAR	PAR	NAR	PNAR	PAR
Anglian	6.3	0.9	20.6	6.3	0.8	20.7
Northumbrian	0.5	1.4	0.5	0.5	1.4	0.5
Severn Trent	4.1	5.0	4.0	3.6	5.4	4.1
South West	0.3	0.3	0.3	0.3	0.2	0.4
Southern	1.5	0.9	10.3	1.5	0.6	10.6
Thames	0.4	3.5	16.1	0.4	3.2	16.4
UU	2.6	1.7	2.1	2.2	2.1	2.1
Wales	0.7	0.6	0.3	0.6	0.7	0.3
Wessex	0.5	3.1	6.5	0.5	2.8	6.8
Yorkshire	0.5	0.2	4.4	0.5	0.2	4.5

Note: Water company areas relate to water and sewage company boundaries as defined by Water UK

Table A14 Percentage of ground water source protection zone area in each risk class broken down by water company operational area for key compounds exceeding the PCV in scenario 3.

Water Company Area	Aminopyralid						Clopyralid					
	Baseline			Scenario			Baseline			Scenario		
	NAR	PNAR	PAR	NAR	PNAR	PAR	NAR	PNAR	PAR	NAR	PNAR	PAR
Anglian	0.5	12.9	14.4	0.5	12.9	14.4	2.2	19.1	6.5	2.2	19.1	6.5
Northumbrian	0.1	1.7	0.6	0.1	1.7	0.6	0.3	1.4	0.7	0.3	1.4	0.7
Severn Trent	0.2	1.8	11.1	0.2	1.8	11.1	0.8	2.6	9.7	0.8	2.5	9.8
South West	0.0	0.9	0.0	0.0	0.9	0.0	0.1	0.8	0.0	0.1	0.8	0.0
Southern	0.2	7.9	4.6	0.2	7.9	4.6	1.0	6.0	5.6	1.0	6.0	5.6
Thames	0.1	3.2	16.7	0.1	3.2	16.7	0.2	2.4	17.4	0.2	2.4	17.4
UU	0.5	2.1	3.9	0.5	2.1	3.9	0.7	2.2	3.5	0.6	2.2	3.5
Wales	0.1	0.4	1.1	0.1	0.4	1.1	0.2	0.5	0.8	0.2	0.5	0.9
Wessex	0.1	2.3	7.8	0.1	2.3	7.8	0.1	4.5	5.5	0.1	4.5	5.5
Yorkshire	0.2	1.2	3.7	0.2	1.2	3.7	0.2	1.2	3.7	0.2	1.2	3.7

Note: Water company areas relate to water and sewage company boundaries as defined by Water UK

Water Company Area	Fluroxypyr						MCPB					
	Baseline			Scenario			Baseline			Scenario		
	NAR	PNAR	PAR	NAR	PNAR	PAR	NAR	PNAR	PAR	NAR	PNAR	PAR
Anglian	5.5	22.1	0.1	5.5	22.3	0.0	15.3	12.4	0.0	15.3	12.4	0.0
Northumbrian	0.6	1.8	0.0	0.6	1.8	0.0	1.8	0.6	0.0	1.8	0.6	0.0
Severn Trent	3.2	9.8	0.1	3.2	9.9	0.0	12.2	0.9	0.0	12.2	0.9	0.0
South West	0.3	0.3	0.4	0.3	0.3	0.4	0.5	0.4	0.0	0.5	0.4	0.0
Southern	1.5	8.2	3.0	1.5	10.4	0.7	7.5	5.2	0.0	7.3	5.3	0.0
Thames	0.6	7.5	11.8	0.6	7.6	11.8	4.9	3.5	11.6	4.9	3.5	11.6
UU	1.1	3.8	1.5	1.0	3.8	1.5	4.0	2.4	0.0	4.0	2.4	0.0
Wales	0.3	0.9	0.3	0.3	1.0	0.3	1.1	0.4	0.0	1.1	0.4	0.0
Wessex	0.5	6.5	3.1	0.5	7.1	2.5	6.0	4.1	0.0	6.0	4.1	0.0
Yorkshire	0.5	4.5	0.2	0.5	4.5	0.2	4.4	0.7	0.0	4.4	0.7	0.0

Note: Water company areas relate to water and sewage company boundaries as defined by Water UK

Water Company Area	Triclopyr					
	Baseline			Scenario		
	NAR	PNAR	PAR	NAR	PNAR	PAR
Anglian	0.5	24.5	2.7	0.5	22.4	4.8
Northumbrian	0.3	1.6	0.4	0.3	1.6	0.4
Severn Trent	0.3	3.6	9.2	0.3	2.2	10.6
South West	0.0	0.9	0.0	0.0	0.5	0.4
Southern	0.4	4.4	7.9	0.4	2.9	9.4
Thames	0.1	2.8	17.1	0.1	2.7	17.2
UU	0.6	2.5	3.3	0.5	2.5	3.4
Wales	0.2	0.7	0.7	0.2	0.5	0.9
Wessex	0.1	1.7	8.3	0.1	1.4	8.7
Yorkshire	0.2	2.7	2.2	0.2	1.6	3.3

Note: Water company areas relate to water and sewage company boundaries as defined by Water UK

Appendix 6 – Key raw pesticide usage survey data 1990 – 2010

Table A 15 Changes in the area of herbicide actives applied to cereals between 1990 & 2010 ('000 spray ha)

	2,4-D	Chlorotoluron	Diffenican	Flufenacet	Fluroxypyr	Glyphosate	Iodosulfuron-methyl-sodium	Isoproturon	Linuron	MCPA	Mecoprop	Mesosulfuron-methyl	Metsulfuron-methyl	Pendimethalin	Simazine
1990	3	241	768	0	484	139	0	2,115	96	173	881	0	533	264	0
1991	3	241	768	0	484	139	0	2,115	96	173	881	0	533	264	0
1992	5	208	766	0	862	201	0	2,105	61	158	289	0	615	455	90
1993	5	208	766	0	862	201	0	2,105	61	158	289	0	615	455	90
1994	2	56	667	0	824	170	0	1,934	6	155	459	0	889	166	61
1995	2	56	667	0	824	170	0	1,934	6	155	459	0	889	166	61
1996	4	101	1,135	1	858	204	0	2,914	6	98	315	0	700	468	162
1997	4	101	1,135	1	858	204	0	2,914	6	98	315	0	700	468	162
1998	0	34	1,323	0	966	397	0	3,303	4	83	225	0	783	454	168
1999	0	34	1,323	0	966	397	0	3,303	4	83	225	0	783	454	168
2000	0	49	1,023	0	980	725	0	2,511	0	89	181	0	751	692	91
2001	0	49	1,023	0	980	725	0	2,511	0	89	181	0	751	692	91
2002	2	149	868	173	836	862	24	2,101	0	83	0	0	743	948	111
2003	2	149	868	173	836	862	24	2,101	0	83	0	0	743	948	111
2004	9	150	735	323	1,144	727	298	1,893	46	75	6	227	833	1,108	154
2005	9	150	735	323	1,144	727	298	1,893	46	75	6	227	833	1,108	154
2006	5	145	840	515	942	578	631	1,642	28	59	0	549	665	838	9
2007	5	145	840	515	942	578	631	1,642	28	59	0	549	665	838	9
2008	8	185	917	722	1,020	846	1,116	1,284	14	39	0	1,042	761	1,111	1
2009	8	185	917	722	1,020	846	1,116	1,284	14	39	0	1,042	761	1,111	1
2010	0	327	1,613	1,236	838	659	1,150	4	2	36	0	1,092	823	940	0

Table A 16 Changes in the area of herbicide actives applied to oilseeds between 1990 & 2010 ('000 spray ha)

	Carbetamide	Clopyralid	Fluazifop-P-butyl	Glyphosate	Metazachlor	Metsulfuron-methyl	Propaquizafop	Propyzamide	Quizalofop-P-ethyl	Tepraloxym	Trifluralin
1990	21	130	134	41	56	8	0	150	0	0	12
1991	21	130	134	41	56	8	0	150	0	0	12
1992	6	190	160	74	82	77	0	100	0	0	27
1993	6	190	160	74	82	77	0	100	0	0	27
1994	8	155	80	83	83	31	3	70	0	0	42
1995	8	155	80	83	83	31	3	70	0	0	42
1996	10	117	88	53	117	35	92	81	0	0	29
1997	10	117	88	53	117	35	92	81	0	0	29
1998	7	101	144	194	200	92	144	99	22	0	84
1999	7	101	144	194	200	92	144	99	22	0	84
2000	2	60	50	190	132	45	99	66	20	3	52
2001	2	60	50	190	132	45	99	66	20	3	52
2002	10	71	70	189	184	4	132	84	12	60	93
2003	10	71	70	189	184	4	132	84	12	60	93
2004	22	69	82	331	242	13	232	133	22	78	162
2005	22	69	82	331	242	13	232	133	22	78	162
2006	20	67	96	375	259	20	208	139	33	98	110
2007	20	67	96	375	259	20	208	139	33	98	110
2008	62	170	106	536	343	6	245	201	35	122	153
2009	62	170	38	536	343	6	245	201	35	122	153
2010	58	165	38	609	431	11	342	236	85	91	1

Table A 17 Changes in the weight of herbicide actives applied to cereals between 1990 & 2010 ('000 kg active substance)

	2,4-D	Chlorotoluron	Diflufenican	Flufenacet	Fluroxypyr	Glyphosate	Iodosulfuron-methyl-sodium	Isoproturon	Linuron	MCPA	Mecoprop	Mecoprop-P	Mesosulfuron-methyl	Metsulfuron-methyl	Pendimethalin	Simazine	Trifluralin
1990	2	688	97	0	77	102	0	3,119	39	139	1,586	143	0	3	316	0	284
1991	2	688	97	0	77	102	0	3,119	39	139	1,586	143	0	3	316	0	284
1992	1	577	68	0	122	155	0	2,749	23	146	381	456	0	3	456	14	286
1993	1	577	68	0	122	155	0	2,749	23	146	381	456	0	3	456	14	286
1994	2	130	43	0	109	126	0	2,346	3	137	603	453	0	4	140	9	151
1995	2	130	43	0	109	126	0	2,346	3	137	603	453	0	4	140	9	151
1996	2	279	65	0	106	139	0	3,183	2	79	351	340	0	3	413	27	334
1997	2	279	65	0	106	139	0	3,183	2	79	351	340	0	3	413	27	334
1998	0	97	66	0	110	295	0	3,357	1	64	221	305	0	3	403	24	487
1999	0	97	66	0	110	295	0	3,357	1	64	221	305	0	3	403	24	487
2000	0	133	51	0	111	555	0	2,635	0	83	137	322	0	3	635	13	621
2001	0	133	51	0	111	555	0	2,635	0	83	137	322	0	3	635	13	621
2002	0	341	38	36	95	648	0	2,157	0	52	0	412	0	4	926	18	536
2003	0	341	38	36	95	648	0	2,157	0	52	0	412	0	4	926	18	536
2004	4	316	31	67	137	594	1	2,160	18	57	2	372	3	3	1,069	23	689
2005	4	316	31	67	137	594	1	2,160	18	57	2	372	3	3	1,069	23	689
2006	2	243	39	97	104	451	2	1,853	9	42	0	311	7	3	761	2	557
2007	2	243	39	97	104	451	2	1,853	9	42	0	312	7	3	761	2	557
2008	4	363	43	138	113	653	3	1,434	3	26	0	319	12	3	1,005	0	706
2009	4	363	43	138	113	653	3	1,434	3	26	0	319	12	3	1,005	0	706
2010	0	576	83	231	96	490	3	4	0	23	0	247	13	3	794	0	3

Table A 18 Changes in the weight of herbicide actives applied to oilseeds between 1990 & 2010 ('000 kg active substance)

	Carbetamide	Clopyralid	Fluazifop-P-butyl	Glyphosate	Metazachlor	Metsulfuron-methyl	Propaquizafop	Propyzamide	Quizalofop-P-ethyl	Tepraloxydim	Trifluralin
1990	41	8	15	31	48	0	0	95	0	0	12
1991	41	8	15	31	48	0	0	95	0	0	12
1992	12	11	16	53	61	0	0	62	0	0	26
1993	12	11	16	53	61	0	0	62	0	0	26
1994	17	10	8	67	53	0	0	45	0	0	45
1995	17	10	8	67	53	0	0	45	0	0	45
1996	20	7	8	41	82	0	5	45	0	0	28
1997	20	7	8	41	82	0	5	45	0	0	28
1998	15	6	12	173	137	0	7	60	1	0	82
1999	15	6	12	173	137	0	7	60	1	0	82
2000	6	4	4	188	85	0	4	47	0	0	52
2001	6	4	4	188	85	0	4	47	0	0	52
2002	21	4	6	187	113	0	5	55	0	3	90
2003	21	4	6	187	113	0	5	55	0	3	90
2004	46	5	7	344	149	0	10	92	1	4	157
2005	46	5	7	344	149	0	10	92	1	4	157
2006	41	5	7	411	169	0	8	101	1	5	107
2007	41	5	7	410	169	0	8	101	1	5	107
2008	124	15	8	548	228	0	11	150	1	6	143
2009	124	15	3	548	228	0	11	150	1	6	143
2010	114	13	3	646	255	0	17	179	2	5	1

Table A 19 Changes in the area of fungicide actives applied to cereals between 1990 & 2010 ('000 spray ha)

	Azoxystrobin	Chlorothalonil	Cyproconazole	Epoxiconazole	Fenpropimorph	Isopyrazam	Proquinazid	Prothioconazole	Pyraclostrobin	Quinoxifen	Tebuconazole
1990	0	669	0	0	1,698	0	0	0	0	0	0
1991	0	669	0	0	1,698	0	0	0	0	0	0
1992	0	1,551	543	0	1,485	0	0	0	0	0	0
1993	0	1,551	543	0	1,485	0	0	0	0	0	0
1994	0	1,273	775	0	731	0	0	0	0	0	1,175
1995	0	1,273	775	0	731	0	0	0	0	0	1,175
1996	0	1,553	743	800	1,246	0	0	0	0	0	1,618
1997	0	1,553	743	800	1,246	0	0	0	0	0	1,618
1998	820	1,176	844	2,016	1,534	0	0	0	0	234	1,953
1999	820	1,176	844	2,016	1,534	0	0	0	0	234	1,953
2000	1,905	426	623	3,195	1,432	0	0	0	0	466	1,462
2001	1,905	426	623	3,195	1,432	0	0	0	0	466	1,462
2002	1,460	382	449	3,442	1,429	0	0	0	659	454	1,207
2003	1,460	382	449	3,442	1,429	0	0	0	659	454	1,207
2004	1,008	2,334	555	4,097	1,854	0	0	0	638	384	1,084
2005	1,008	2,334	555	4,097	1,854	0	0	0	638	384	1,084
2006	712	2,323	551	2,350	827	0	132	2,223	765	125	1,351
2007	712	2,323	551	2,350	827	0	132	2,223	765	125	1,351
2008	815	3,124	1,132	3,575	1,098	0	189	3,471	1,346	78	1,658
2009	815	3,124	1,132	3,575	1,098	0	189	3,471	1,346	78	1,658
2010	662	2,885	955	3,287	756	25	264	3,708	1,338	25	1,767

Table A 20 Changes in the area of fungicide actives applied to oilseeds between 1990 & 2010 ('000 spray ha)

	Azoxystrobin	Boscalid	Carbendazim	Chlorothalonil	Cyproconazole	Fenpropimorph	Flusilazole	Methiocarb	Prochloraz	Prothioconazole	Tebuconazole
1990		0	126	10		304	0	13	219		
1991		0	126	10	0	304	0	13	219		
1992		0	140	4	0	304	3	17	153		
1993		0	140	4	0	304	3	17	153		0
1994		0	146	3	3	232	16	34	71		39
1995		0	146	3	3	232	16	34	71		39
1996		0	293	9	3	210	121	10	117		80
1997	0	0	293	9	3	210	121	10	117		80
1998	2	0	488	10	5	235	216	23	68		176
1999	2	0	488	10	5	235	216	23	68		176
2000	0	0	278	7	0	69	121	27	49		96
2001	0	0	278	7	0	69	121	27	49		96
2002	1	0	277	2	0	1	184	25	21		119
2003	1	0	277	2	0	1	184	25	21		119
2004	1	122	317	1	0	0	286	16	22		93
2005	1	122	317	1	0	0	286	16	22	0	93
2006	63	104	213	7	3	1	273	21	36	72	152
2007	63	104	213	7	3	1	273	21	36	72	152
2008	198	174	393	7	87	0	458	26	123	314	260
2009	198	174	393	7	87	0	458	26	123	314	260
2010	197	228	280	6	63	0	334	17	143	418	346

Table A21 Changes in the weight of fungicide actives applied between 1990 & 2010 ('000 kg of active)

	Azoxystrobin	Boscalid	Carbendazim	Chlorothalonil	Cyproconazole	Epoxiconazole	Fenpropimorph	Prothioconazole	Pyraclostrobin	Tebuconazole
1990	0	0	338	359	0	0	709	0	0	0
1991	0	0	339	359	0	0	709	0	0	0
1992	0	0	295	680	27	0	507	0	0	0
1993	0	0	297	680	27	0	507	0	0	0
1994	0	0	297	559	37	0	227	0	0	163
1995	0	0	299	559	37	0	227	0	0	163
1996	0	0	306	623	30	53	304	0	0	139
1997	0	0	311	623	30	53	304	0	0	139
1998	80	0	295	503	37	132	266	0	0	152
1999	80	0	293	503	37	132	266	0	0	152
2000	207	0	148	173	24	193	201	0	0	98
2001	207	0	146	173	24	193	201	0	0	98
2002	139	0	101	165	18	167	199	0	62	76
2003	139	1	100	165	18	167	199	0	62	76
2004	108	37	108	1,061	24	230	277	0	55	74
2005	108	37	106	1,061	24	230	277	0	55	74
2006	65	94	76	1,073	23	141	149	162	64	101
2007	65	98	74	1,076	23	141	149	162	64	101
2008	83	177	64	1,338	46	205	201	241	111	126
2009	83	177	63	1,338	46	205	201	241	111	126
2010	65	162	50	1,213	41	184	137	226	106	131