Oxfordshire County Council

Minerals & Waste Local Plan Support

Estimate of Baseline, Forecast, Management & Flows for Hazardous Waste Arising in Oxfordshire

Final Report v1.2

Issued: 10 February 2014

BPP Consulting Document Control

Project: Oxfordshire Waste Needs Assessment Refresh

Report: Hazardous Waste Assessment

Version Description: Final Issue

Version No.: 1.2

Date: 10.02.14

Version No.	Version Description	Author	Date	Reviewed	Date
0.1	Draft for Client review	Alan Potter	16.12.13	David Payne	16.12.13
1.0	Draft Post Client Review	Alan Potter	17.12.13	David Payne	18.12.13
1.1	Client Approval	Alan Potter	29.01.14	David Payne	29.01.14
1.2	Final Issue v1.2	Alan Potter	10.02.14	David Payne	10.02.14

Table of Contents

List of Tables

Table of Figures

Appendices

1. Introduction

The *Oxfordshire Minerals and Waste Development Framework Draft Waste Needs Assessment* said the following about hazardous waste:

"Oxfordshire produced some 41,000 tonnes of hazardous waste in 2008, slightly lower than the average for previous years (figure 9). Recent work by SEWPAG suggests that arisings might be lower than this (31,000 tpa)."

It went on to state that:

"Oxfordshire is essentially a net exporter of hazardous waste. Of the 47,000 tonnes of hazardous waste generated in 2006 some 34,000 tonnes was exported for management elsewhere "

2. BPP Approach

Five data sets have been accessed in generating estimates for Oxfordshire as follows:

1. The EA Hazardous Waste Interrogator 2012 - movements.
2. The EA Waste Data Interrogator 2012 - inputs .
3. The EA Waste Data Interrogator 2012 - outputs.
4. The EA non Waste Interrogator Site inputs 2012
5. Wastedataflow Returns 2012

2.1. The EA Hazardous Waste Interrogator(HWI) 2012

This indicates the following results:

1. In 2012 Oxfordshire produced 30,747 tonnes of hazardous waste;
2. Of this 3,852 tonnes were dealt with in Oxfordshire.
3. In addition to the 3,852 tonnes of Oxon's own waste 7,732 tonnes of waste was imported to Oxfordshire to be managed.

Therefore this suggests that Oxfordshire is about 30% self sufficient in capacity.

It is important to note the following caveat:

The HWI dataset relies on hazardous waste consignments notes being generated by the producer of the waste that show it is being 'consigned' to a legitimate site. It is data from these records that is summarised by area in the HWI. This means that the dataset is incomplete for the following reasons:

1. Consignment notes are not issued where waste does not change hands i.e. it is managed onsite or offsite by the producer or same operator.
2. Certain types of hazardous waste may not be consigned by the producer of this waste to cover the movement to the treatment site may only be recorded as hazardous waste on arrival. For example End of Life Vehicles which are classed as hazardous waste will not be consigned to a vehicle de-pollution site because the produce (the owner) does not consider it to be hazardous waste and hence it is not recorded on the HWI. However it will be recorded as hazardous waste on arrival at the de-pollution site and hence recorded on the WDI.

In light of these limitations the EA WDI has also been interrogated to obtain data to fill gaps.

2.2. The EA Waste Data Interrogator 2012

There is a very large single value (429,578 tonnes) of liquid waste attributed to remediation of groundwater at the Harwell site. This produced around 160 tonnes of solid waste that went for disposal offsite. While this does represent hazardous waste processing capacity, because it is only available for use by the site itself and is so large it would skew balanced consideration of this area, it has been excluded from subsequent analysis.

Excluding this value the EA WDI indicates the following results:

1. In 2012 Oxfordshire produced 26,512 tonnes of hazardous waste;.
2. Of this 8,568 tonnes were dealt with in Oxfordshire.
3. In addition to the 8,568 tonnes of Oxon's own waste 18,188 tonnes of waste was imported to Oxfordshire to be managed.

This dataset suggests that Oxfordshire is achieving net self sufficiency.

It is important to note the following caveat:

1. A known weakness of the WDI data is the attribution of site inputs to each WPA. This means input values are under-reported. Cross checking with HWI fills in some of these gaps.
2. Waste received at some facilities, such as Civic Amenity Sites, is not recorded when it comes in but will be recorded as an output via records of receipt from onward destinations. For example, old TVs which have CRTs will be classed and dealt with as hazardous waste when sent on for treatment. Cross checking with WDI Output values fills in these gaps.

In this case the EA non WDI returns no inputs from Oxfordshire were indicated.

The Wastedataflow returns were used to ground truth the entries arrived at for specific wastes that occur in the Local authority Collected Municipal Waste stream such as TVs (CRT) and Fridges

2.3. Integrating the Datasets

It is evident that reliance on a single dataset would be incomplete and misleading. There is however overlap between the two so it is necessary to integrate them. Having agreed a methodology with the EA[1], a detailed reconciliation process between the two datasets was conducted to ensure that the overall dataset used is as accurate and complete as possible. Table 1 shows the combined values for hazardous waste produced in Oxfordshire by whether it is dealt with in Oxfordshire (domestic) or managed outside (export).

Table 1: Hazardous Waste Arising in Oxfordshire 2012

Fate	Domestic	Export	Total
Incinerator		1,179	**1,179**
Landfill	1,127	2,958	**4,085**
MRS	4,958	1,738	**6,696**
Recovery	317	14,264	**14,581**
Transfer	4,275	9,905	**14,180**
Treatment	0	11,245	**11,245**
Grand Total	**10,678**	**41,346**	**52,024**

MRS = Metal Recycling Sites receiving End of Life Vehicles for processing

Table 2 shows the combined values for hazardous waste managed in Oxfordshire by fate.

Table 2: Hazardous Waste Management in Oxfordshire 2012

Fate	Domestic	Import	Total
Incinerator			-
Landfill	1,127	1,976	**3,103**
MRS	4,958	11,860	**16,818**
Recovery	317	147	**464**
Transfer	4,275	6,553	**10,828**
Treatment	0	16	**16**
Grand Total	**10,678**	**20,551**	**31,229**

The combined datasets indicate the following results *(rounded to nearest 500 tonnes)*:

1. In 2012 Oxfordshire produced just over 52,000 tonnes of hazardous waste;
2. Of this just over10,500 tonnes were dealt with in Oxfordshire.
3. In addition to the 10,500 tonnes of Oxon's own waste just over 20,500 tonnes of waste was imported to Oxfordshire to be managed.

This dataset suggests that Oxfordshire achieved 60% net self sufficiency in hazardous waste management in 2012.

[1] Andrea Purdey Data and Intelligence Manager

2.4. Analysis of Flows by Fate

Landfill

The dataset indicates that in 2012 3,000 tonnes of hazardous waste was disposed of to landfill in Oxfordshire (Table 2). This compares with 3,000 tonnes exported for disposal to landfill (Table 1). The reason for this is that the Oxfordshire landfill capacity is restricted to a cell within a non-hazardous waste landfill site that accepted asbestos contaminated waste only. This cell represents a sub-regional resource serving a wider catchment than Oxfordshire alone. However, as it has restricted inputs, other hazardous waste generated within Oxfordshire requiring landfilling needed to be exported. In addition some asbestos contaminated waste is also exported. Overall nearly as much waste was landfilled within Oxfordshire as was exported.

The pattern or profile of management of hazardous waste produced in Oxfordshire is illustrated in Figure 1 below

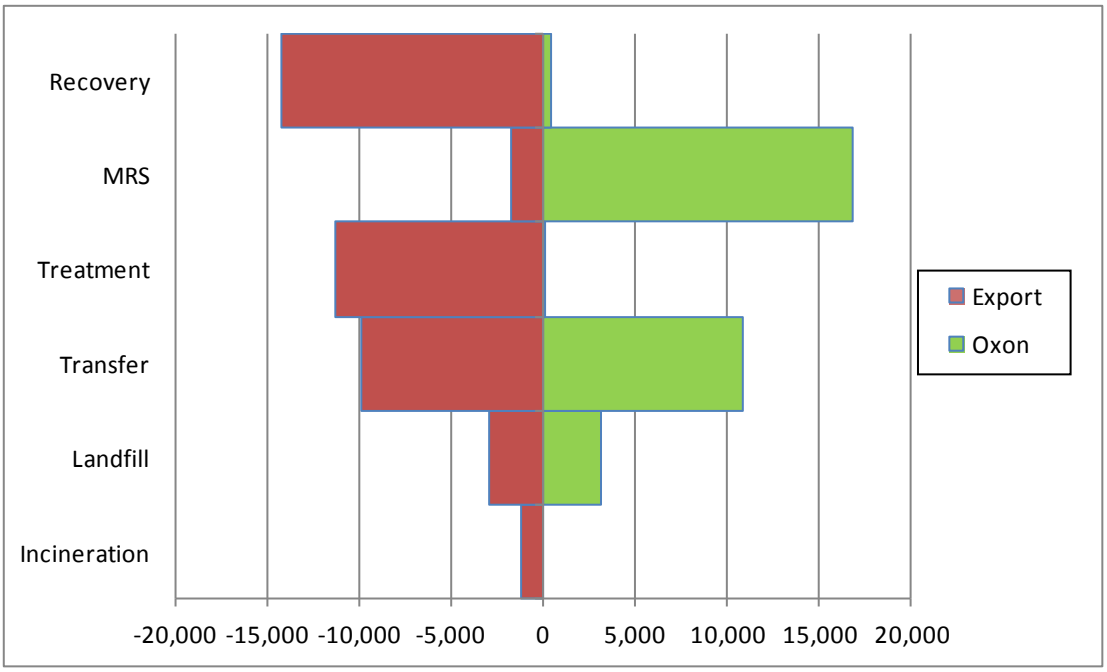

Figure 1: Hazardous Waste Management Route Flows Profile 2012

This figure illustrates that it is the lack of Plan Area treatment capacity that could compromise the ability of Oxfordshire to move further towards net self sufficiency in the longer term. There follows analysis of where waste is moving, following which management routes.

2.5. Mapping Movements

The combined dataset was analysed to establish tonnages going to individual WPA areas. The results are shown in Figure 2 below.

This should inform the Duty to Cooperate exercise as it identifies all WPAs receiving hazardous waste from Oxfordshire in 2012 regardless of tonnage.

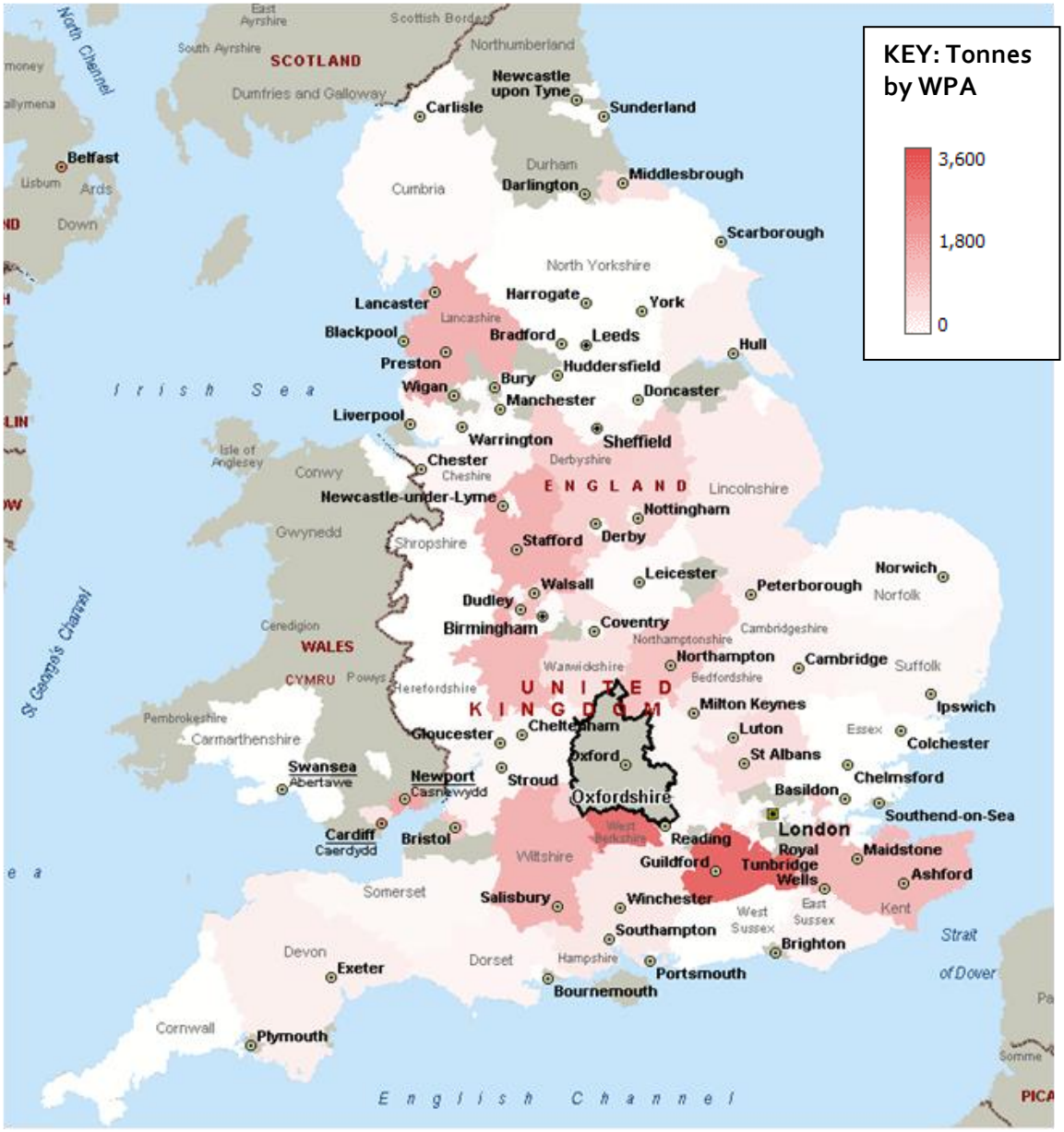

Figure 2: Oxfordshire Hazardous Waste Exports 2012 Mapped by Tonnes & Receiving WPA

Grey shaded areas are either those area not recorded as receiving any tonnage from Oxfordshire and Oxfordshire itself which by definition will not receive exports from itself.

To establish the indicative transport impacts associated with the movements a zoning exercise was undertaken using generated isochrones. This allocated inputs to WPAs to different zones depending on how far the receiving WPA is from the Plan Area. The method is described in detail in Appendix 1.

The integrated dataset was then interrogated by EWC Waste description to identify the tonnage going to each zone. The outputs were ranked by largest tonnage to include 95% of all exports. The values in excess of 100 tonnes were then colour coded by management route/fate. The results are displayed in the matrix (Table 3) below.

Table 3: Management of Oxfordshire Hazardous Waste Exported in 2012

Ranked by tonnage, zoned by distance moved and colour coded by fate.

		Zone								
Waste Description	**Oxon**	**<30mins**	**30mins-1hr**	**1hr-1.5hrs**	**1.5hrs-2hrs**	**2hrs-2.5hrs**	**2.5hrs-3hrs**	total export	**% cum contribution to export**
Aqueous Liquid Wastes	26	2	3,546	252	376	103		4,279	10%
Non-Chlorinated Mineral Oils	108	247	753	935	173	178	1,230	3,516	19%
Oil & Concentrates From Separation		29	2,785	511				3,325	27%
Discarded Equipment Containing CFCs (MSW Fridges)	588	161	1,778	1	520	14	0	2,473	33%
Oily Water From Oil/Water Separators	137	1,386	689	23	78	77	18	2,271	38%
Discarded Electrical & Electronic Equipment (MSW CRT)	1,136	84	152	5	97	1,280	535	2,153	44%
Infectious Waste		441	188	1,439	6	1		2,075	49%
Discarded Equipment (non MSW CRT)		170	45	1,298	20	342	61	1,899	53%
Bituminous Mixtures Containing Coal Tar			909				514	1,423	57%
End-Of-Life Vehicles	3,639	749	341	4	65	41	220	1,421	60%
Lead Batteries	1,396	379	242	29	729	5	6	1,389	63%
Construction Materials Containing Asbestos	1,026	128	1,205	16	16	18	2	1,386	67%
Mixtures From Grit Chambers & Oil/Water Separators		867	272	37	15	35	6	1,233	70%
Waste Paint & Varnish Organic Solvents	20	0	172	16	10	3	812	1,014	72%
Other Engine, Gear & Lubricating Oils	6	444	375	25	1	0		845	74%
Absorbents, Filter Materials Etc	317	38	337	358	60	2	0	795	76%
Discarded Equipment Containing CFCs, (non MSW Fridges)	8	104	464		187	3	4	762	78%
Liquid Combustible Wastes							627	627	80%
Premixed Wastes		310	106	79	76			570	81%
Non-Chlorinated Emulsions			567					567	82%
Fuel Oil & Diesel	5	11	112	1	19	414	6	563	84%
Interceptor Sludges	7	198	251	9		95		552	85%
Soil & Stones	25		410				45	455	86%
Wastes Containing Oil		9	378		3			390	87%
Sludges From Groundwater Remediation		162	180					342	88%
Sludges & Filter Cakes			315					315	89%
Insulation Materials Containing Asbestos	279	7	159	91	8	42	1	309	89%
Aqueous Washing Liquids & Mother Liquors	40		272					272	90%
Mineral Based Non-Chlorinated Hydraulic Oils	3		177	2	81			259	91%
Oil Filters	1	3	72	109	14	30	0	228	91%
Mineral-Based Chlorinated Oils				3	189			192	92%
Other Fuels	7	9	25	7	13	0	123	177	92%
Packaging	38	15	107	36	7	9		175	93%
Waste Ink	3		36	67	66			168	93%
Other Solvents & Solvent Mixtures	25	2	10	6	144	1	0	162	93%
Discarded Organic Chemicals	86	142	4	2	1	1		149	94%
Synthetic Engine, Gear & Lubricating Oils	18		95	40		0	1	135	94%
Fluorescent Tubes & Other Mercury-Containing Waste	35	1	3	8	97	4	21	135	94%
Waste Adhesives & Sealants Organic Solvents	9	64	31	15	18			128	95%
Machining Emulsions & Solutions Free Of Halogens	2		113	2				115	95%
Totals	8,987	6,159	17,675	5,426	3,089	2,699	4,232		
% contribution of total export		15%	43%	13%	7%	7%	10%		
Cumulative % of total export		**15%**	**58%**	**71%**	**78%**	**85%**	**95%**		

Key

- Transfer
- Treatment
- Recovery
- Landfill
- MRS
- Incineration

The analysis shows that just under 80% of hazardous waste arising within the Plan Area is managed within 2.5 hours driving time of the centre of the Plan Area and 2 hours of the Oxfordshire boundary. Waste going to landfill, if not managed within Oxfordshire itself, is generally transported only within an hour of the Oxfordshire boundary.

2.6. Analysis of Present Arrangements

To establish if there is a need for the Plan to make provision for additional capacity to manage this waste stream, the implications of the current arrangements and flows needs to be understood. Waste types going predominantly to one outlet as indicated by movement to a single zone could be considered to be vulnerable because of reliance on a single facility. Availability of capacity at the receiving facility may prove to be limited. Table 4 shows the waste types that account for 80% of hazardous waste arisings in Oxfordshire in 2012 (500 tonne plus) i.e. about half of the Table 3 above. In this exercise local transfer has been disregarded as this is a just a step towards an ultimate fate.

Table 4: Oxfordshire Hazardous Waste Exported Over 500 Tonnes & Assessment of Possible Vulnerability

Colour coded by vulnerability (green=safe; amber=possibly vulnerable; red= at risk)

Waste Type	Predominant Management Route	Range from Plan Area	Tonnage	Possible Capacity concern?	Conditions
Aqueous Liquid Wastes	Treatment	0.5 -2.5 hour	4,279	No	Range of outlets indicated
Non-Chlorinated Mineral Oils	Treatment/ Recovery	0.5 -3 hour	3,516	No	Range of outlets indicated
Oil & Concentrates From Separation	Treatment/ Recovery	0.5 -1.5 hour	3,325	No	Choice of outlets indicated
Discarded Equipment Containing CFCs	MRS/Treatment	<0.5 -2 hour	2,473	No	Choice of outlets indicated
Oily Water From Oil/Water Separators	Recovery/ Treatment	0.5 -1 hour	2,271	No	Choice of outlets indicated
Discarded Electrical & Electronic Equipment (MSW CRT)	Recovery/ Treatment	0.5 -3 hour	2,153	No	Range of outlets indicated
Infectious Waste	Incineration/ transfer	0.5 -1.5 hour	2,075	No	Range of outlets indicated
Discarded Equipment (non MSW CRT)	Transfer/ Recovery	1 -2.5 hour	1,899	Yes	Single Zone dominance suggests over reliance on single outlet
Bituminous Mixtures Containing Coal Tar	Landfill/ treatment	0.5 -2 hour	1,423	No	Choice of outlets indicated
End-Of-Life Vehicles	Recovery	<0.5 -3 hour	1,421	No	In Oxon capacity available
Lead Batteries	Recovery	0.5 -2 hour	1,389	No	In Oxon capacity available
Construction Materials Containing Asbestos	Landfill	0.5 -1 hour	1,386	No	In Oxon capacity available
Mixtures From Grit Chambers & Oil/Water Separators	Recovery/ treatment	<0.5 -1 hour	1,233	No	Choice of outlets indicated
Waste Paint & Varnish Organic Solvents	Recovery/ Transfer	0.5 -3 hour	1,014	No	Single Zone dominance suggests over reliance on single outlet
Other Engine, Gear & Lubricating Oils	Recovery	0.5 -1 hour	845	No	Range of local outlets indicated
Absorbents, Filter Materials Etc	Transfer	0.5 -1.5 hour	795	No	Range of outlets indicated although ultimate fate unknown
Discarded Equipment Containing CFCs, (non MSW Fridges)	Recovery/ treatment	<0.5 -2 hour	762	No	Range of local outlets indicated
Liquid Combustible Wastes	Recovery	2.5-3hrs	627	Yes	Single Zone dominance at distance
Premixed Wastes	Incineration/ recovery	<0.5 -1 hour	570	No	Choice of outlets indicated
Non-Chlorinated Emulsions	Recovery	0.5 -1 hour	567	Yes	Single Zone dominance at distance
Fuel Oil & Diesel	Recovery	0.5 -2.5 hour	563	No	Choice of outlets indicated
Interceptor Sludges	Recovery/ treatment	<0.5 -1 hour	552	No	Choice of outlets indicated

The waste streams coded amber and red in Table 4 above are identified as a cause for concern due to indicated reliance on a single management point and therefore possible candidate for capacity provision in Oxfordshire. Further investigation of these streams has been undertaken to establish the drivers underlying the current pattern of flows.

Such matters should also be investigated through engagement with receiving WPAs under the Duty to Cooperate process.

2.7. Analysis of Waste Flow Drivers

As a number of specific wastes have similar characteristics it is helpful to group the wastes into categories. This illustrates commonalities between different waste types which resulting management needs. The results are showing in Table 5 below.

Table 5: Oxfordshire Hazardous Waste Exported in 2012 Grouped by Type/Characteristic

Colour coded by vulnerability from Table 4[2]

	Characteristic Group										
Waste Type	Oil Residue	Oil based	CFC based	Solvent based	Acid based	Asbestos based	CRT based	ELV based	Infectious	Specific	Unknown/ Various
Aqueous Liquid Wastes											4,279
Non-Chlorinated Mineral Oils		3,516									
Oil & Concentrates From Separation	3,325										
Discarded Equipment Containing CFCs (MSW Fridges)			2,473								
Oily Water From Oil/Water Separators	2,271										
Discarded Electrical & Electronic Equipment (MSW CRT)							2,153				
Infectious Waste									2,075		
Discarded Equipment (non MSW CRT)							1,899				
Bituminous Mixtures Containing Coal Tar										1,423	
End-Of-Life Vehicles								1,421			
Lead Batteries								1,389			
Construction Materials Containing Asbestos						1,386					
Mixtures From Grit Chambers & Oil/Water Separators	1,233										
Waste Paint & Varnish Organic Solvents				1,014							
Other Engine, Gear & Lubricating Oils	845										
Absorbents, Filter Materials Etc											795
Discarded Equipment Containing CFCs, (non MSW Fridges)			762								
Liquid Combustible Wastes				627							
Premixed Wastes											570
Non-Chlorinated Emulsions											567
Fuel Oil & Diesel		563									
Interceptor Sludges											552
Totals	7,673	4,079	3,235	1,641	0	1,386	4,053	2,810	2,075	1,423	6,764

[2] It is assumed that facilities receiving these are capable of processing them except where they are referred to as Transfer.

This illustrates that of the four cases identified:

- While *discarded equipment containing non MSW CRTs* (cathode ray tubes such as TVs or computer monitors) travels to a single zone suggesting a possible vulnerability, *discarded equipment containing CRTs from MSW sources* travels to a number of zones. This suggests that the particular flow identified as vulnerable is a function of the market rather than by capacity availability. Thus indicating a more robust market.
- However the two solvent based waste streams with indicated vulnerability do suggest a need to investigate further albeit for a relatively small amount.

2.8. Forecasting Future Arisings

Due to the frequent changing in definition of hazardous waste and refinement of guidance reliance on historical data to establish possible future trends is not considered reliable. Reference has been made to The National Policy Statement for Hazardous Waste[3] for some guidance and considerable reliance has been placed on expert judgement in the process of generating forecast estimates for Oxfordshire.

The National Policy Statement for Hazardous Waste states that arisings of hazardous waste are expected to increase for the following reasons:

- continuing consumer demand for new goods means that waste will continue to arise as older consumer durables are discarded.
- increasing use of producer responsibility schemes , such as those provided for by the EU Waste Electrical and Electronic Equipment (WEEE) Directive 2002. Such schemes require the separate collection of WEEE waste and this results in more household hazardous wastes being removed from the mixed municipal waste stream, collected separately as hazardous waste and sent for treatment.
- Changes to the list of hazardous properties in the revised Waste Framework Directive and forthcoming changes to the European Waste List, are expected to lead to further increases in the amount of waste that must be managed as "hazardous".
- There are still products for which there remains no alternative but to use a hazardous component and services such as transport services that are likely to produce hazardous waste such as oil for the foreseeable future.

Building on this background information forecasts have been developed for Oxfordshire - these are displayed in Table 7 below.

[3] National Policy Statement for Hazardous Waste: A framework document for planning decisions on nationally significant hazardous waste infrastructure Defra June 2013

We have gone through process of identifying possible inhibitors and promotors of growth in production of the specific waste types over the next 20 years. Judgement has been used to assess if those factors together will result in a decline, increase or no growth. Judgment has then be used to assign annual % growth rates to the predicted direction of growth to arrive at estimates for arisings in Oxfordshire in 2031. In general a pessimistic approach has been taken to avoid under-estimation.

Growth estimates have been made for the wastes that account for those streams that occurred in quantities of 500 tonnes or more in 2012. This suggests growth of up to 64% over the period for these streams alone. To account for the remainder it has been assumed that they will remain constant. This gives a total forecast arising in 2031 of 78,668 tonnes - a rise of 51% on the 2012 baseline. The equates to a compound annual growth rate of 2.2% per annum.

Table 6: Estimated Forecast Arising of Hazardous Waste in Oxfordshire at 2031

NB: projected growth rates based of judgement

	Tonnes Produced 2012	Principal Source	Key Factors		Predicted Direction of Production	Factor (% pa)	Predicted quantity at 2031
			Promoter	**Inhibiter**			
Oil Residue	7,673	Surface Water Protection/ Pollution control system	Tighter regulatory control on risky sites; Increased rainfall due to climate change (more frequent emptying)	Improved spillage control; Reduced number of petrol stations	Moderate Increase	2.00%	11,178
Oil based	4,079	Transport	Greater reliance on central distribution & internet shopping; Increase in car ownership and use.	Rising fuel cost (offset by fuel duty escalator); Rising cost of management of waste with pressure to regenerate over use as fuel. Improved vehicle efficiency.	Significant rise	5.00%	10,307
CFC based	3,235	Refrigeration Equip	Fridge replacement	Fall in CFCs based stock	Rapid decline	-10.00%	437
Solvent based	1,641	Paints & inks & cleaners		Regulatory control on solvent emissions & use	Steady decline	-5.00%	619
Asbestos based	2,999	Pre 2000 Building stock - refurbishment & demolition	Increase in demolition with increase pressure for residential provision on previously developed sites.	Reduction of amount embedded in stock	Stable for 10yrs then steady decline	-2.00%	2,450
CRT based	4,053	TVs & Monitors	Producer Responsibility & switch to Flat Screen	Fall in CRT base stock (rise in flat screens)	Steady decline	-5.00%	1,529
ELV based	7,845	Existing vehicle stock	Increase vehicle sales displace existing stock	ELV directive pressure to improve recyclability may encourage switch to use of less hazardous materials; Longevity of vehicles improve	Moderate Increase	2.00%	11,428
Infectious	2,075	Clinical Sources	Infection control pressure	Improved source segregation driven by cost reduction pressure	Stable	0.00%	2,075
Specific	1,423	One-offs		Reduction driven by cost	Stable	0.00%	1,423
Unknown/ Various	6,764	Unknown		Reduction driven by cost	Stable	0.00%	6,764
Air Pollution Control Residues		EfW plant at Ardley	Ardley comes online in 2014 and produces for 35 years.		New stream		14,000
							62,209
Expansion of Haz Waste Definition						10.00%	6,221
subtotal	***41,786***						***68,430***
Remainder (sub 500)	10,237						
Total							**78,668**

Cross Checking with Other Studies

A regional study[4] undertaken for SEERA and GOSE produced in 2009 was to inform regional planning and so is strategic in nature. However it does shed some light on the position in Oxfordshire.

Total hazardous waste production in 2006 was estimated to be 47,111 tonnes. However it should be noted that this baseline value relied on the Hazardous Waste Interrogator so can be expected to have under reported arisings as it will not have counted hazardous waste going directly to permitted sites that are not consigned.

It explored two growth scenarios using the following growth rates:

1. ERM (as used in regional statement for C&I) 1.57% pa to 2015 then 1% pa to 2026;
2. Waste Strategy 2007 rates 2.6% pa for commercial, 0% for industrial.

Figures generated for scenario 1: 57kte by 2015, **65kte** by 2026

Figures generated for scenario 2: 56kte by 2015, **68.5kte** by 2026

This represents growth on the baseline of the plan period of between 38 - 46%.

This suggests the growth rate of 51% indicated through the bottom up exercise is within reasonable realms . It is also notable that the 2015 estimates closely align with the 2012 baseline of 52kte.

[4] Study into the Arisings and Management of Hazardous Waste in the South East Region Main Report April 2009

2.9. Possible Capacity Requirements

The Government *Strategy for Hazardous Waste Management in England (2010)'* established the need for new hazardous waste facilities and set out the types of facility required. Of the facilities identified, the Strategy determined that the following generic types would be likely to include the following facilities:

- Facilities to treat oily wastes and oily sludges
- Waste electrical and electronic equipment plants
- Oil regeneration plant
- Bioremediation / soil washing to treat contaminated soil diverted from landfill
- Hazardous waste landfill
- Treatment plant for air pollution control residues

The listing almost mirrors the ranked order of arisings within Oxfordshire so taking each in turn:

Facilities to treat oily wastes and oily sludges

This forms the largest stream of hazardous waste and the Strategy for Hazardous Waste Management in England identified a need for additional facilities to allow a higher proportion of this waste to be recovered. It is thought that new facilities could increase the proportion of this waste that can be recovered. Thermal desorption is one possible technique for treating this type of waste.

Oil regeneration plant

The National Strategy identifies a need for further capacity for recycling used lubricants to a very high level back into base lubricating oil. At present, most waste oil is processed into a fuel substitute and used for energy recovery. However, to realise the benefits of moving the management of this waste up the waste hierarchy, capacity for the regeneration of waste oil needs to be increased. Any oil regeneration plant is likely to need a capacity of at least 70,000 tonnes per annum to be viable and new facilities are therefore expected to be nationally significant infrastructure

Waste electrical and electronic equipment plants

While there is sufficient capacity to deal with refrigerators and CRT based WEEE, there is a growing need for specialist facilities to treat the Flat Panel Displays used in some computer monitors, TVs and laptops. These contain mercury. Existing facilities for the more general treatment of waste

electrical and electronic equipment have not been designed to deal with this waste stream because Flat Panel Displays are relatively new and have only recently started to be discarded as waste.

Figures from the Waste and Resources Action Programme (WRAP) of arisings of waste desktop monitors, laptops and LCD TVs containing fluorescent backlights[5] show that arisings are expected to increase from 70,000 tonnes in 2013 peaking at around 120,000 tonnes in 2016 and then falling from that point on.

Taking data submitted through WasteDataFlow CRTs collected from Oxfordshire household waste stream at 1,100tonnes represented 5% of the total collected in the South East in 2012. The South east accounted for 17% production of the household waste in England (DEFRA 2012/12). This suggests that Oxfordshire may account for 0.85% of national risings (5% of 17%) equal to around 600 tonnes in 2013, increasing to just over 1000 tonnes at the peak in 2016. So it suggests that screen management needs will be stable through to 2020 at least as TV/screen turnover switches from CRT to Flat Screen.

Technologies for managing Flat Panel Displays are currently under development and are expected to require a large investment, which is likely to drive the development of a small number of larger facilities to manage the expected arisings.

Bioremediation / soil washing to treat contaminated soil diverted from landfill

While the National Strategy identifies a need for greater capacity to treat contaminated soil within Oxfordshire the quantity of such waste that went to landfill in 2012 was very small. It is hard to predict what quantities may arise should construction activity revive to pre 2008 levels - or in line with planned housing growth. While some soil will be treated by mobile plant at the site of production, some will need to be treated off-site and there remains a need for dedicated permanent facilities including limited landfill.

[5] http://www.wrap.org.uk/content/flat-panel-display-recycling-technologies

Hazardous waste landfill

The Strategy for Hazardous Waste Management in England includes a principle to reduce reliance on landfill, which is to only be used where, overall, there is no better recovery or disposal option. However, in the case of Oxfordshire provision of a stable non-reactive hazardous waste cell within the Non-Hazardous waste landfill at Ardley has enabled it to achieve net self sufficiency for landfill of hazardous waste - catering solely for asbestos contaminated bulk materials.

Treatment plant for air pollution control residues

There is a need for further facilities to treat the Air Pollution Control (APC) residues that arise from the treatment of flue gases from energy from waste plant (EfW). Arisings will increase significantly in future years as more EfW facilities are developed. This is particularly the case where Ardley EfW is under construction and Finmere also has an extant consent. Arisings of APC residues could grow from nothing to 18,000 tonnes over the next few years.

While historically hazardous waste landfill has been extensively used for this waste stream following 'conditioning', reliance on this solution for the future would be misplaced as the activity benefited from a derogation from complying with the Waste Acceptance Criteria specified in the Landfill Directive. The Government Strategy committed to eliminating reliance on this derogation by the end of 2013 after which special case status will need to be sought to continue the practice. Therefore alternative routes will need to be established. While APC residues can be treated at facilities taking other waste streams, the increasing amount produced means more facilities are needed some of which will be focussed on APC residues and deal only with or mainly with this waste stream. A number of different treatment options exist for APC residues including solidification, vitrification, stabilization and extraction.

3. Conclusion & Recommendation

The analysis indicates that:

1. There is sufficient capacity within a reasonable travel time of the Plan Area boundary to manage all principal hazardous waste streams. Thus the arrangements appear to be reasonably resilient. The availability of the capacity should be confirmed with receiving WPAs via Duty to Cooperate arrangements.
2. The vast majority of hazardous waste arising in Oxfordshire is managed through recovery, with disposal either through landfill or incineration only being used as a last resort. Therefore the need to make provision in the Plan for capacity that promotes movement of this waste stream up the waste hierarchy appears to be satisfied.

Bearing in mind provision for management of hazardous waste is not necessarily expected to be at Plan Area level, there does not appear to be a need to make provision for additional management capacity within the Plan Area itself.

The forecasts indicate that hazardous waste arising in Oxfordshire may grow from the current level of around 52,000 tonnes to as much as **79,000 tonnes in 2031**. However there is unlikely to be sufficient to warrant provision of specialist facilities to deal with any stream on its own in isolation from surrounding WPAs.

It is recommended that the Plan considers making provision to retain existing capacity through safeguarding and policies to encourage improvement and expansion in the form of:

1. Metal recycling sites (MRS) to receive and process end of life vehicles (ELVs) as this makes a significant contribution towards the current level of 50% plus net self -sufficiency.
2. Transfer capacity as this provides the facility for waste to be bulked up enabling it to move more readily to suitable capacity even if it is at some distance from the Plan Area boundary.
3. SNRHW cell capacity at Landfill to maintain net self sufficiency in asbestos contaminated waste, all the while significant quantities of this are being produced[6]. We note in this context that Ardley landfill is due to close in 2019 under current arrangements.

In addition criteria based policy to enable consideration of applications on a case-by-case basis where the market seeks to respond to changing conditions and patterns. These should require applicants to provide evidence that the proposed facility will manage hazardous waste at the most appropriate point on the waste hierarchy. In addition how the facility will help to achieve the principles set out in the National Strategy for Hazardous Waste Management should be assured.

[6] Over time, this waste stream can be expected to reduce as the quantity present in the building stock diminishes.

Appendix 1: Analysis of Oxfordshire Export of Hazardous Waste

1. Integrating Datasets

- Two data sets were extracted from the WDI – tonnes of hazardous waste from the plan area received by sites anywhere (inputs) and tonnes of hazardous waste removed from sites within the plan area (outputs). Outputs that went to sites within the Plan Area were deleted to avoid double counting.
- A dataset from the HWI for waste that originated in the plan area was also extracted.
- Additionally a dataset of inputs and outputs of waste to facilities that are not recorded by the WDI (non-WDI) waste was sourced from the EA.
- Waste moving within the plan area was ignored.
- The inputs and outputs files were combined using the following rules:
    - If the input value was less than the output value, the sum of the values was taken.
    - If the input value was greater or equal, then only the input value was taken.
    - If the resulting value was less than the HWI value, the two were added together, otherwise the WDI was ignored. The resulting value was then added to the Non-WDI value.

  <u>To eliminate/reduce double counting</u>
- The dataset was supplemented with a field indicating WPA. If there were multiple records found with similar tonnage and a similar destination WPA, only one record was kept (that with the most specific destination).

2. Zoning Flows

The following approach was taken:

- A central point in the Plan Area was identified, from which seven 'drive time' zones (isochrones) were created. (Figure A1.1)
- The zones were created at 30 min intervals, up to 4 hours (240mins) driving time from the centre of the Plan Area. However as the 30 minute isochrone closely corresponded to the boundary of Oxfordshire and there was no WPA that fell completely within the small overlap (coloured turquoise on figure A1.1) it was discounted. This mean that the isochrones beyond Oxfordshire should be adjusted by 30 minutes to reflect the fact.
- Each WPA area was allocated a driving time zone from the Plan Area.
  Because the location of each receiving site within a WPA area was unknown, each WPA was allocated to the drive time zone that enclosed the *furthest* limit of that WPA area. i.e. if Gloucestershire falls partly into the 1hour isochrone with the remainder falling within the 1.5hr isochrone the whole of Gloucestershire was all zoned to the 1.5 hour isochrone.

The outputs are shown in Figure A1.1 below

Figure A1.1: Isochrone Zones used to zone Oxfordshire Hazardous Waste Exports 2012

Appendix 2: WPAs receiving Oxfordshire Hazardous Waste 2012

Receiving WPA 100 t +	Tonnes
Gloucestershire CC	3,693
Surrey CC	3,073
West Berkshire UA	2,889
Newport UA	1,784
Lancashire CC	1,567
Wiltshire CC	1,560
Staffordshire CC	1,545
Worcestershire CC	1,417
Kent CC	1,372
Sandwell MBC	1,264
Northamptonshire CC	1,177
Bristol City	1,083
LB Havering	992
Essex CC	988
Derbyshire CC	927
Nottinghamshire CC	873
Swindon BC	861
Walsall MBC	820
Stockton-on-Tees UA	725
Slough UA	713
Hertfordshire CC	663
Warwickshire CC	575
Redcar and Cleveland UA	559
Middlesbrough UA	544
Cardiff County	539
Hampshire CC	472
Milton Keynes UA	469
LB Hammersmith & Fulham	418
Peterborough UA	416
LB Richmond Upon Thames	394
Bedford UA	375
West Sussex	373
Lincolnshire CC	366
Devon CC	300
Dudley MB	289
East Riding of Yorkshire UA	262
Dorset CC	237
LB Hillingdon	237
Cambridgeshire CC	224
Cheshire CC	203
East Sussex CC	190
South Gloucestershire UA	190
Somerset CC	182
Buckinghamshire CC	233
Stoke-on-Trent City	145
Suffolk CC	256
Wolverhampton MBC	131
Liverpool City	131
Kingston Upon Hull City	122
Salford City	120
Rotherham MBC	119
Sefton MBC	118
Wokingham UA	111

Receiving WPA <100	Tonnes
Warrington	96
Brent	89
Manchester	88
Birmingham	82
Cumbria	81
Aylesbury Vale	75
Wakefield	71
Leicestershire	65
Knowsley	64
Coventry	58
Nottingham City	58
Windsor and Maidenhead	47
Norfolk	45
Sheffield	40
Greenwich	37
Southampton	36
Trafford	33
Bolton	32
Slough UA	26
Thurrock	25
Barnsley	25
Bridgend	21
Stockport	19
Shropshire	18
St Helens	16
Telford and Wrekin	15
Leicester City	14
North Yorkshire	14
Bexley	13
Kirklees	9
North East Lincolnshire	8
Reading	8
Hounslow	7
Medway	6
Blaenau Gwent	6
Ealing	5
Barking and Dagenham	5
South East	5
Carmarthenshire	4
City of Derby	4
Leeds	3
Kingston Upon Thames	3
Oldham	3
Bradford City	2
Enfield	2
Cornwall UA	2
Halton	1
Harlow	1
Bedfordshire	1
Doncaster	1
Portsmouth City	1
West Sussex	1
Newham	1