

Cefas contract report C2848

# Radiological Habits Survey: Derby, 2009

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Environment Report RL 05/10

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Environment Report RL 05/10

Final Report

# Radiological Habits Survey: Derby, 2009

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Peer reviewed by G.J. Hunt

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2010

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## SUMMARY

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This report presents the results of a survey conducted in 2009 to determine the habits and consumption patterns of people living, working and pursuing recreational activities in the vicinity of the Rolls-Royce Marine Power Operations Ltd. (RRMPOL) site in Derby. The site discharges gaseous radioactive waste via stacks to the atmosphere, liquid radioactive waste via the Megaloughton Sewage Treatment Works to the River Derwent and contains sources of direct radiation. Areas likely to be most affected by the discharges and sources of radiation were defined as the aquatic survey area for liquid discharges, the terrestrial survey area for gaseous discharges and the direct radiation survey area for ionising radiation emanating directly from the site.

The following potential exposure pathways related to the site were investigated:

- The consumption of food from the aquatic survey area
- Activities and occupancy over river washed substrates in the aquatic survey area
- The handling of fishing gear and sediment
- Activities and occupancy in and on water
- Occupancy in close proximity to sewage, sewage sludge and sewage cake
- The consumption of food from the terrestrial survey area
- The use and destination of produce originating from the survey areas
- The consumption and use of groundwater and surface water in the terrestrial survey area
- The transfer of contamination off-site by wildlife
- Occupancy within 1 km of the site boundary fence
- Any new or unusual exposure pathways

Interviews were conducted with members of the public and data collected for 425 individuals are presented and discussed. High rates of consumption and occupancy over river washed substrates are identified using established methods comprising (a) a 'cut off' to define the high-rate group and (b) 97.5<sup>th</sup> percentiles. The rates so identified can be used in dose assessments. Additionally, profiles of integrated habits data are presented specifically for use in total dose assessments.

In the aquatic survey area, which covered 9.4 km of the River Derwent, internal and external exposure pathways were investigated because of the potential effects from liquid discharges. No interviewees were consuming foods from the aquatic survey area. However, it was reported that fish from the river were consumed by members of Eastern European communities and it is suggested that a consumption rate of coarse fish of 1 kg y<sup>-1</sup> be considered for assessment purposes. The only activity that was observed occurring over river washed substrates in the aquatic survey area was angling. Gamma dose rate measurements were taken at locations where activities were identified or considered likely to occur. The handling of fishing gear and river sediments was not identified.

Occupancy in close proximity to sewage and sewage products at the Megaloughton Lane Sewage Treatment Works was identified. No activities were observed taking place in or on the water in the aquatic survey area, although it was reported that children had occasionally been seen swimming in the River Derwent. It was noted that cattle had access to river water for drinking at one location.

The terrestrial survey area was defined as all land and waterways, excluding those in the aquatic survey area, within 5 km of the RRMPOLE site centre. In this area, internal exposure pathways were investigated because of the potential effects from gaseous discharges. Interviews were conducted at nine farms in the area (producing cows' milk, beef, pigs, lamb and arable crops), eight allotment sites and at several private gardens. Honey was produced by one beekeeper. For foods consumed from the terrestrial survey area, the mean consumption rates for the high-rate group exceeded the respective generic 97.5<sup>th</sup> percentile rates for root vegetables and milk. Other local foods consumed included green vegetables, other vegetables, potato, domestic fruit, cattle meat, pig meat, sheep meat, poultry, eggs, wild/free foods, rabbits/hares and wild fungi. No consumption of food from any of the waterways in the terrestrial survey area was identified but it was likely that coarse fish were consumed by Eastern Europeans as noted in the aquatic area. Human consumption of water from sources other than mains water was not identified. Consumption of rain water, river water and brook water by livestock was identified.

The transfer of contamination off-site by wildlife was investigated as radionuclides could enter the food chain or contaminate the environment through this pathway. A representative of RRMPOLE reported the presence of rabbits and occasionally foxes within the site. However, due to fencing, the wildlife is kept away from controlled areas and is therefore not culled or sampled. Some members of the public who lived in the terrestrial survey area were identified as consuming rabbits that were shot within 5 km of the RRMPOLE site.

The direct radiation survey covered all land and waterways, including those in the aquatic survey area, within 1 km of the site boundary. In this area, external pathways were investigated because of the potential effects of ionising radiation. The highest total occupancy rate was for an elderly resident; the highest outdoor occupancy rate was for one person who worked in the area and the highest indoor occupancy rate was for a resident. Occupancy rates were also recorded for people undertaking recreational activities and children at a primary school. Gamma dose rate measurements were taken indoors and outdoors at most properties where interviews were conducted in the direct radiation survey area. Background readings were taken at distances beyond 5 km of the RRMPOLE site centre.

As this was the first time a habits survey had been conducted at Derby it was not possible to compare the results with previous surveys. Suggestions for the implementation of a food monitoring programme and modifications to the current environmental monitoring programme are provided on the basis of the information collected during the survey. These include the monitoring of samples of

runner beans, onions and milk as these were the highest consumed foodstuffs in groups whose consumption levels were above the generic 97.5<sup>th</sup> percentile rates. It is also suggested that due to the potential radiological significance of leafy green vegetables, 'callaloo' (*Amaranthus* sp.), a novel variety of leaf vegetable which is grown in the area but has not previously been encountered during habits surveys, is also sampled.

### 1 INTRODUCTION

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The public may be exposed to ionising radiation as a result of the operations of the RRMPOLE site either through the authorised discharges of liquid or gaseous radioactive wastes into the local environment, or from radiation emanating directly from the site. This report provides information on activities carried out locally by members of the public in proximity to the RRMPOLE site, which may influence their radiation exposure. The study has been funded by the Environment Agency, the Food Standards Agency and the Health and Safety Executive in order to support their respective roles in protecting the public from the effects of radiation.

UK policy on the control of radiation exposure has long been based on the recommendations of the International Commission on Radiological Protection (ICRP), which embody the principles of justification of practices, optimisation of protection and dose limitation. Radiological protection of the public is based on the concept of a 'representative person'. This notional individual is defined as being representative of the more highly exposed members of the population. It follows that, if the dose to the representative person is acceptable when compared to relevant dose limits and constraints, other members of the public will receive lower doses, and overall protection to the public is provided from the effects of ionising radiation. The term 'representative person' is equivalent to, and replaces, the term 'average member of the critical group' as recommended by ICRP (ICRP, 2006). The recommendations of the ICRP were updated in 2007 (ICRP, 2007) and, for the public, still include the principle of protecting the people most highly exposed to radiation, characterised by the representative person.

#### 1.1 Regulatory framework

The Environment Agency regulates the discharges of waste under the Radioactive Substances Act 1993 (RSA 93) (UK Parliament, 1993) as amended by the Environment Act 1995 (EA 95) (UK Parliament, 1995); by legislation implementing the European Union (EU) Basic Safety Standards (BSS) Directive 96/29/Euratom (CEC, 1996) and by the Energy Act 2004 (EA 04) (UK Parliament, 2004). The Directive takes into account the recommendations of the ICRP, particularly ICRP 60 (ICRP, 1991). From 6 April 2010, in England and Wales, the provisions of RSA 93 authorising the disposals of radioactive waste, will be subsumed within the Environmental Permitting regulations (UK Parliament, 2010). Installation and operation of certain prescribed activities can only occur on sites if they are licensed under the Nuclear Installations Act 1965 (as amended) (NIA 65) (UK Parliament, 1965). The Nuclear Installations Inspectorate (NII) of the Health and Safety Executive implements this legislation and is also responsible for regulating, under the Ionising Radiations Regulations (IRR 99) (UK Parliament, 1999), the exposure of the public to direct radiation from the operations occurring on these sites.

Authorisations under RSA 93 (or, from April 2010, appropriate permits) are, or will be, issued by the Environment Agency after wide-ranging consultations that include the Food Standards Agency. The Food Standards Agency has responsibilities for ensuring that any radioactivity present in food does not compromise food safety and that authorised discharges of radioactivity do not result in unacceptable doses to consumers via the food chain. The Food Standards Agency also ensures that public radiation exposure via the food chain is within EU acceptable limits.

## 1.2 Radiological protection framework

Dose standards for the public are embodied in the national policy (UK Parliament, 2009), in guidance from the International Atomic Energy Agency (IAEA), in the Basic Safety Standards for Radiation Protection (IAEA, 1996) and in European Community legislation in the EU BSS Directive 96/29/Euratom (CEC, 1996). The public dose standards were incorporated into UK law in IRR 99. In order to implement the Directive in England and Wales, the Environment Agency was issued with a direction by the DETR (Department for the Environment, Transport and Rural Affairs) in 2000 (DETR, 2000). This direction has been reaffirmed in the recent policy document (UK Parliament, 2009). It includes the requirements that the environment agencies ensure, wherever applicable, that:

- All public radiation exposures from radioactive waste disposals are kept As Low As Reasonably Achievable (ALARA), social and economic factors being taken into account;
- The sum of each exposure does not exceed the dose limit of 1 mSv a year;
- The dose received from any new source does not exceed 0.3 mSv a year;
- The dose received from any single site does not exceed 0.5 mSv a year.

The dose limit of 1 mSv per year to the public from all anthropogenic sources is also the recommendation made by the ICRP (ICRP, 2007).

The environment agencies are also required to ensure that the dose estimates are as realistic as possible for the population as a whole and for reference groups of the population. They are required to take all necessary steps to identify the reference groups of the population taking into account the effective pathways of transmission of radioactive substances. Guidance on the principles underlying prospective radiological assessment (i.e. assessments of potential future doses) has been provided by a group of UK Government Bodies (EA, SEPA, DoENI, NRPB and FSA, 2002). The National Dose Assessment Working Group (NDAWG) has also published principles underlying retrospective radiological assessment (i.e. assessment of doses already received from past discharges) (Allott, 2005) and possible methods of carrying out these assessments using the data from combined habits surveys (Camplin *et al.*, 2005). NDAWG agreed that the optimal method for performing retrospective dose assessments would be to use habits profiles (profiling method). This approach is being adopted in Radioactivity in Food and the Environment (RIFE) publications, (e.g. EA, NIEA, FSA and SEPA, 2009), as combined habits surveys are completed. NDAWG has also published reports on collection

and use of habits survey data in retrospective and prospective dose assessments (NDAWG 2005; NDAWG 2009); the principles described in these reports are consistent with those used here.

## **2 THE SURVEY**

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### **2.1 Site activity**

The survey was conducted around the Rolls-Royce site at Raynesway in Derby (approx. 5 km from the city centre) which is owned and operated by Rolls-Royce Marine Power Operations Ltd (RRMPOL), a wholly owned subsidiary of Rolls-Royce plc.

RRMPOL operates two adjacent nuclear licensed sites at Derby (referred to collectively in this report as the site), the Neptune/Radioactive Components Facilities site and the Nuclear Fuel Production site (the manufacturing site). The Neptune site accommodates the core design, development, testing and examination of radioactive components. On the manufacturing site the reactor cores and other components are fabricated. These sites are unique in the UK and support new submarine build at Barrow-in-Furness, and refit programmes at Devonport, where these cores are installed into the UK naval submarine fleet.

The development and manufacture of nuclear reactor core assemblies has occurred on this site since the 1960s. In October 2000, RRMPOL made submissions to the Environment Agency for re-authorisation of both nuclear licensed sites to dispose of radioactive wastes (RRMPOL 2000a and b). Both sites are authorised, under the Radioactive Substances Act 93 (RSA 93), to discharge gaseous radioactive waste via stacks to the atmosphere and liquid radioactive waste into the River Derwent via the Megaloughton Lane Sewage Treatment Works. Both sites contain sources of direct radiation.

For the duration of the conduct of the survey and for the preceding 18 months, the site was undergoing a period of maintenance. However, discharge rates remained approximately consistent with those during normal operation.

### **2.2 Survey objectives**

The Centre for Environment, Fisheries and Aquaculture Science (Cefas), undertook the survey in 2009 on behalf of the Environment Agency, the Food Standards Agency and the Health and Safety Executive. The aim of the survey was to obtain comprehensive information on the habits of the public that might lead to their exposure to radiation via gaseous discharges, liquid discharges and direct radiation from the RRMPOL nuclear site.

Specifically, investigations were conducted into the following:

- The consumption of foods from the aquatic survey area
- Activities and occupancy over river washed substrates in the aquatic survey area
- The handling of fishing gear and sediment
- Activities and occupancy in and on water
- Occupancy in close proximity to sewage, sewage sludge and sewage cake
- The consumption of food from the terrestrial survey area
- The use and destination of produce originating from the survey areas
- The consumption and use of groundwater and surface water in the terrestrial survey area
- The transfer of contamination off-site by wildlife
- Occupancy within 1 km of the site boundary fence
- New or unusual exposure pathways

No additional site-specific investigations were requested by the Environment Agency, the Food Standards Agency or the Health and Safety Executive.

### **2.3 Survey areas**

Three survey areas were defined to encompass the main areas potentially affected by the discharges from the site and sources of radioactivity. These were: an aquatic area relating to liquid discharges; a terrestrial area relating to the deposition of gaseous discharges and a direct radiation area relating to ionising radiation emanating directly from the site.

RRMPOL hold an RSA 93 authorisation to make liquid discharges via the Megaloughton Lane Sewage Treatment Works to the River Derwent. Therefore, the aquatic survey area (Figure 1) covered the River Derwent and its banks from the Raynesway Bridge, upstream of the main discharge point (NGR SK 393 344), to the B5010 (Station Road) road bridge, downstream. This provided an aquatic survey area of 9.4 km of waterways; including the main course of the river and its secondary channels. A secondary discharge point from RRMPOL, approximately 680 m upstream of the Raynesway Bridge was also identified, however since the discharges via this outfall are for surface run-off only and therefore minimal in radioactivity terms, the section of the River Derwent into which it flows was excluded from the aquatic survey area. It was, however, included in the terrestrial survey area.

The terrestrial survey area (Figure 2) covered all land and waterways within a circle of diameter 5 km from the RRMPOL site centre (NGR SK 381 348), encompassing the main areas of potential deposition from gaseous discharges. Activities relating to groundwater and surface water in the terrestrial area were also investigated. All watercourses and ponds, including stretches of the River

Derwent that were not included in the aquatic survey area are discussed in the terrestrial sections of this report.

The direct radiation survey area is also shown on Figure 2. It encompassed the area within 1 km of the RRMPOLE site boundary. As previously mentioned, the RRMPOLE site contains two individually licensed sites. The boundary fence of the RRMPOLE site as a whole, as opposed to the licensed site boundaries, was used as the baseline for determining the direct radiation survey area.

## **2.4 Conduct of the survey**

As part of the pre-survey preparation, the Environment Agency, the Food Standards Agency and the Health and Safety Executive were contacted to identify any additional site-specific requirements. Information relating to the activities of people in the aquatic and terrestrial survey areas was obtained from Internet searches and Ordnance Survey maps. Representatives from Derby City Council and Derbyshire County Council provided information on allotment sites.

A proposed fieldwork programme was sent to the Environment Agency, the Food Standards Agency and the Health and Safety Executive before the fieldwork commenced, for their comment.

The fieldwork was carried out from 16<sup>th</sup> to 29<sup>th</sup> September 2009 by a survey team of three people, according to the techniques described by Leonard *et al.* (1982). During the fieldwork a meeting was held between the three members of the survey team and three representatives of RRMPOLE. This discussion provided details about current site activities, local information, potential exposure pathways and activities in the area, and the transfer of contamination off-site by wildlife.

The following information was obtained during the meeting:

- Current site activities are limited due to ongoing maintenance activities, which have been progressing over the past 18 months. However, discharges remain consistent with those during normal operation. The principle release from the manufacturing site is uranium and the principle release from the Neptune site is <sup>60</sup>Co.
- The discharges are expected to remain fairly constant over the next 5 years.
- Wildlife, consisting of rabbits and very occasionally foxes, had been seen within the outer boundary of the site, but had no access to controlled areas. No culling or sampling of wildlife took place.
- Information about potential pathways and activities in the area included: Anglers on the banks of the River Derwent, walkers, cyclist and joggers on the cycle path near the site.

Interviews were conducted with individuals who were identified in the pre-survey preparation and others that were identified during the fieldwork. These included, for example, anglers, cyclists, farmers, allotment holders and people living, working, attending school and undertaking recreational

activities close to the site. Interviews were used to establish individuals' consumption, occupancy and handling rates relevant to the aquatic, terrestrial and direct radiation areas. Any other information of possible use to the survey was also obtained. Gamma dose rate measurements were taken over river washed substrates in the aquatic survey area, and indoors and outdoors at most properties in the direct radiation area where interviews were conducted. Background gamma dose rate measurements were taken at distances beyond 5 km from the RRMPOLE site centre.

Three Cefas personnel spent 12 days each investigating the survey areas and interviewing individuals who were relevant to the survey. Observations for 638 individuals were recorded. However, 213 of these were repeat observations based on generic information provided by larger organisations. Only representative samples of these generic data were included in the analysis, resulting in a total of 425 observations.

For practical and resource reasons, the survey did not involve the whole population in the vicinity of the RRMPOLE site, but targeted subsets or groups, chosen in order to identify those individuals potentially most exposed to radiation pathways. However, it is possible that even within a subset or group there may be people who were not interviewed at the time of the survey. Consequently, in order to aid interpretation, the number of people for whom data was obtained in each group as a percentage of the estimated complete coverage for that group has been calculated. The results are summarised in Table 1. The 'groups' are described and quantified, and the numbers of people for whom data were obtained are given as percentages of the totals. For certain groups, such as anglers, it can be virtually impossible to calculate the total number of people who undertake the activity in the survey area as many people visit from outside or only visit occasionally during the year. Based on the latest UK Office of National Statistics residential data for electoral wards ([www.statistics.gov.uk](http://www.statistics.gov.uk)), the number of residents in the terrestrial survey area was estimated to be approximately 161,000, although habits data was obtained from a significantly smaller number (~0.1%) than this. It should be noted that the survey did not include RRMPOLE employees or contractors whilst they were at work. This is because dose criteria applicable to these people whilst at work and the dose assessment methods are different from those for members of the public. However, any consumption data, and activities and occupancy rates for these employees whilst outside work, are included in the results if employees were encountered during the survey.

People were initially questioned about their habits relating to the survey area that their first identified activity occurred in and, where possible, they were also asked about their habits relating to the other two survey areas. For example, people in the terrestrial survey were initially questioned because it was known that they grew or produced significant quantities of terrestrial foodstuffs. However, they were also asked about habits that might lead to exposure to liquid discharges or direct radiation. During interviews with representatives from organisations such as local businesses it was not possible to collect data for all pathways (for example consumption of local foods) for each person. In these cases, the data were limited to those relating to the primary reason for the interview, for

example, in the case of businesses within the direct radiation survey area, the occupancy rates for the employees. In Annexes 1 and 2, these individuals only have data for the pathways of primary interest.

### 3 METHODS FOR DATA ANALYSIS

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#### 3.1 Data recording

Data collected during the fieldwork were recorded in logbooks. On return to the laboratory, the data were examined and any notably high rates were double-checked, where possible, by way of a follow-up phone call. In cases where follow up phone calls were not possible (e.g. interviewees wished to remain anonymous), the data were accepted at face value. The raw data were entered into a purpose-built database, where each individual for whom information was obtained was given a unique identifier (the observation number) to assist in maintaining data quality.

During the interviews, people could not always provide consumption rates in kilograms per year for foods or litres per year for milk. In these circumstances, interviewees were asked to provide the information in a different format. For example, some estimated the size and number of items (e.g. eggs) consumed per year, where others gave the number of plants in a crop or the length and number of rows in which the crop was grown per year. The database converted these data into consumption rates ( $\text{kg y}^{-1}$  for foods and  $\text{l y}^{-1}$  for milk) using a variety of conversion factors. These factors included produce weights (Hessayon, 1990 and 1997; Good Housekeeping, 1994), edible fraction data researched by Cefas, and information supplied by the Meat and Livestock Commission.

The consumption and occupancy data in the text of this report are rounded to two significant figures, except for values less than 1.0, which are rounded to one decimal place. This method of presentation reflects the authors' judgement on the accuracy of the methods used. In the tables and annexes, the consumption rate data are usually presented to one decimal place. Occasionally, this rounding process causes the computed values (row totals, mean rates and 97.5<sup>th</sup> percentiles), which are based on un-rounded data, to appear slightly erroneous. Consumption rates less than  $0.05 \text{ kg y}^{-1}$  are presented to two decimal places in order to avoid the value  $0.0 \text{ kg y}^{-1}$ . External exposure data are quoted as integer numbers of hours per year.

To ensure the quality of the data collected during the survey fieldwork and presented in this report, the following procedures have been employed:

- Experienced scientific staff were used for fieldwork and data analysis. They had been trained in the techniques of interviewing and obtaining data for all pathways that were relevant to the survey being conducted. Where individuals offered information during the interview that was unusual, they were questioned further in order to double-check the validity of their claims.

- Where possible, interviewees were contacted again to confirm the results of the initial interview if, when final consumption or occupancy rates were calculated, observations were found to be high in relation to our experience of other surveys. Local factors were taken into account in these cases.
- Data were manipulated in a purpose-built database using a consistent set of conversion factors.
- Data were stored in a database in order to minimise transcription and other errors.
- A draft report was reviewed by the Environment Agency, the Food Standards Agency and the Health and Safety Executive, and by a senior radiological consultant.
- Final reports were only issued when the Environment Agency, the Food Standards Agency and the Health and Safety Executive were entirely satisfied with the format and content of the draft report.

For the purpose of data analysis, foodstuffs were aggregated into food groups as identified in Table 2. Specific food types relevant to this survey are presented in the subsequent tables. The data are structured into groups when it is reasonable to assume that consistent concentrations or dose rates would apply within the group. For example, when considering terrestrial food consumption, all types of root vegetables are grouped together in a food group called 'root vegetables'. For external exposure over river washed substrates, occupancies over the same substrate (e.g. grass) are grouped together. In addition, data are structured into age groups because different dose coefficients (i.e. the factors which convert intakes of radioactivity into dose) can apply to different ages. The age groups and their relevant age ranges are based on the recommendations in ICRP 72 (ICRP, 1996), and are listed below.

<b>Age group</b>	<b>Age range in group</b>
3-month-old	Under 1-year-old
1-year-old	1-year-old
5-year-old	2-year-old to 6 year-old
10-year-old	7-year-old to 11-year-old
15-year-old	12-year-old to 16-year-old
Adult	17-year-old and over

For direct radiation pathways, the data are grouped into distance zones from the RRMPOLE site boundary as a coarse indication of the potential dose rate distribution due to this source of exposure. The bands used are: 0 – 0.25 km, >0.25 km – 0.5 km and >0.5 km – 1 km. These distance bands are also useful when assessing exposure to gaseous discharges.

### 3.2 Data analysis

The results of the survey are the individuals' consumption and occupancy rates given in Annexes 1 and 2. These can be used in radiological assessments of the effects of the operation of the RRMPO site.

Annex 3 contains qualitative and estimated data for pathways where it was not possible to obtain quantifiable data from interviews but anecdotal evidence provided sufficient reason to believe such pathways existed. Information is given for reported taking of fish for human consumption from the River Derwent and swimming in the River Derwent.

The habits data have been analysed to indicate high rates of consumption and occupancy, prior to a formal assessment being undertaken. Three approaches have been used:

Firstly, the 'cut-off' method described by Hunt *et al.* (1982) was used. With the 'cut-off' method, the appropriate high rate was calculated by taking the arithmetic mean of the values between the maximum observed rate and one third of the maximum value. In this report, the term 'high-rate group' is used to represent the individuals derived by the 'cut-off' method. The mean of the high-rate group was calculated for each food group, river washed substrate and handling pathways identified during the survey. In certain cases, using the 'cut-off' method resulted in only one person being in the high-rate group. In these cases, expert judgement was used to decide whether the high-rate group should remain as one individual or whether others should be included. If others were included, the second highest rate was divided by three to give a new cut-off value and all observations above this were included in the high-rate group.

Secondly, the 97.5<sup>th</sup> percentile rate was calculated for each group by using the *Microsoft Excel* mathematical function for calculating percentiles. This method accords with precedents used in risk assessments of the safety of food consumption. It should be noted that the interviewees in this study are often selected and therefore the calculated percentiles are not based on random data.

Thirdly, profiles have been produced that give a complete view of the habits of the individual that might lead to exposure to all the discharges and radiation from the site. The profiles are based on values calculated by the 'cut-off' method. The profiled data can be used to assess total dose integrated across all pathways of exposure.

Mean and 97.5<sup>th</sup> percentile rate based on national statistics have been derived by the Ministry of Agriculture, Fisheries and Food ((MAFF) now a part of the Department for Environment, Food and Rural Affairs, Defra) and the Food Standards Agency (Byrom *et al.*, 1995 and FSA, 2002), and these are referred to as generic rates in this report. The generic rates are used as a baseline for comparison with the observed rates.

For ingestion and river washed substrate occupancy, mean rates for the high-rate groups for children have been calculated from the survey data. However, because few child observations were identified, the consumption rates should be viewed with caution. For assessment purposes, an alternative approach may be taken which involves scaling the mean rates for the adult high-rate groups by ratios. These ratios are given in Annex 4 and have been calculated using generic 97.5<sup>th</sup> percentile consumption rates.

For use in assessments of foetal dose, consumption and occupancy rates are provided in Annex 5 for women of childbearing age. The age range used in this report to define women of childbearing age is 15 – 44 years old, which is based on the classification used by the Office of National Statistics ([www.statistics.gov.uk](http://www.statistics.gov.uk)).

For the direct radiation pathway, mean occupancy rates and 97.5<sup>th</sup> percentile rates have not been calculated. Such an analysis is of limited value without a detailed knowledge of the spatial extent of dose rates due to direct radiation.

## 4 AQUATIC RADIATION PATHWAYS

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### 4.1 Aquatic survey area

The aquatic survey area, shown in Figure 1, covered the River Derwent and its banks from the Raynesway Bridge, upstream of the discharge point, to the B5010 (Station Road) bridge, downstream. This provided an aquatic survey area of 9.4 km of waterways; including the main course of the river and the river's secondary channels.

#### ***Overview of the survey area***

The River Derwent flows from west to east through the aquatic survey area and comprises three large meanders. These have been cut through by dykes to straighten the main channel of the river, thus forming islands in the bow of each meander. The flow of the water was generally slow during the survey period and a mixture of static and electro-mechanical weirs regulated water height. Land utilisation varied considerably along the course of the river, from light industry and commercial in the west, through to sewage treatment and heavy industry in the central section, before becoming largely agricultural in the east.

The only riverbank activity leading to occupancy over river washed substrates was angling. Anglers were predominantly standing on areas of trampled down grass and mud which were close enough to the rivers edge to be frequently inundated. A single angling club had the rights to fish in this part of the River Derwent and they operated a strict catch and release policy.

A combined pathway consisting of Route 6 of the National Cycle Network and a National Trail runs along the southern bank of the River Derwent for the length of the aquatic survey area. The route was very popular with walkers, dog walkers, cyclists and horse-riders. However, the path is at the top of a high bank (approx. 4 m) and is unlikely to be flooded, except in the most extreme of circumstances. For this reason, people conducting activities exclusively on the cycle path, were not counted in the aquatic survey.

#### ***Raynesway Bridge to the Derwent Flood Barrier***

Approximately 25 m downstream of the Raynesway Bridge the first meander in the aquatic survey area splits off from the main channel of the River Derwent and creates an island. Access to the river was possible along the western bank of the meander for approximately 840 m but came to an abrupt end due to the boundary fence of the Megaloughton Lane Sewage Treatment Works. Angling was observed at multiple locations, both on the accessible stretch of the meander and on the southern bank of the main channel, where there was easy access from the cycle path. Access to the island

was extremely limited due to private land ownership and fencing. There was anecdotal evidence of people angling on the island in close proximity to the waste transfer station but this was strongly discouraged by staff at the station. Due to the relatively low level of water at the time of the survey, the river was not flowing over the Derwent Flood Barrier (a large concrete weir) and the flow of the river was around the meander. Access to the barrier was unrestricted from the southern bank of the river and some evidence of angling activity was noted in its vicinity. Access to the island by crossing the barrier, however, was highly unlikely due to fencing restrictions at its northern end. It is of note that all of this section of the aquatic survey area and approximately half of the following section, are within the direct radiation survey area.

#### ***Derwent Flood Barrier to the electro-mechanical barrage***

The first meander of the river re-joins the primary channel of the river immediately downstream of the Derwent Flood Barrier. The river then continues eastwards as a single channel for approximately 800 m before splitting again, where a second meander forms another island. Public access to the river in this section is possible only on the southern bank, from the National Cycle Route, as the northern bank is occupied by the Megaloughton Lane Sewage Treatment Works and is securely fenced. The island formed by the second meander is owned by a large chemical manufacturing plant and contains a private nature reserve with no public access. The outfall from the Megaloughton Lane Sewage Treatment Works, which may still hold radionuclides in liquid phase from RRMPO, discharges into the River Derwent from its north bank at this point. There is no public access to the river bank close to the outfall since the surrounding land is occupied by the sewage treatment works and a large chemical manufacturing plant, neither of which are open to the public. Therefore, no activities were observed occurring in close proximity to the outfall. Angling in this section of the aquatic survey area was limited to the southern bank of the main channel where access was provided by the cycle route.

#### ***Electro-mechanical barrage to the Borrowash Weir***

The second meander rejoins the primary channel of the river approximately 60 m downstream of the electro-mechanical barrage and the river remains as a single channel for another 1.1 km, down to the Borrowash Weir. Public access to the northern bank along this stretch of the river was prevented by fencing and the chemical manufacturing plant. There was easy access to the southern bank from the cycle route and angling was popular along this stretch of the river.

#### ***Borrowash Weir to the B5010 road bridge***

At Borrowash Weir the river splits for the third and final time within the aquatic survey area and the meander loops around a series of three islands, divided by smaller waterways. The centre island of the three islands is known locally as The Stryne and the island to the east is known as Little Stryne.

The western island is the largest of the group and there is a bridge across to it from the southern bank of the River Derwent. Public access across the bridge was prevented by a locked gate but the members of the local angling club were permitted to cross in order to fish from the northern bank of the main channel of the River Derwent. There was no easy public access to the The Stryne and Little Stryne although a group of children were observed angling from Little Stryne. Public access to the western and northern bank of the meander was prevented by the chemical works and a railway line. Access to the southern bank of the Derwent remained good, and the location was popular with anglers. Two gated car parks were also provided for use by members of the local angling club. A field, adjacent to Station Road, was being used to keep cattle, which had access to the River Derwent for drinking water. Enquiries were made as to the ownership of the cattle but no one was available for interview and no further details could be obtained.

### **4.2 Commercial fisheries**

No commercial fisheries were identified during the survey. Following enquiries concerning potential commercial fisheries, EA Fisheries Officers informed Cefas of the presence of signal crayfish (*Pacifastacus leniusculus*) in the River Derwent. However, no licences had been granted for their removal.

### **4.3 Angling**

Angling from the riverbank was a popular activity in the aquatic survey area. A single angling club owned the rights to fish this stretch of the Derwent. Their rights covered the south bank of the river for the length of the aquatic survey area, a small section of the west bank along the first meander and the north bank of the main channel on the larger island in the third meander. Access to the larger island in the third meander was restricted to a limited number of members of the club and required special dispensation. Access to the south bank was good throughout the survey area, due to the close proximity of the National Cycle Route and National Trail. The local angling club was well established, with a large membership and often held organised competitions involving anglers from across the wider region. Day tickets were also available and were sold in local angling shops. Two locked car parks were provided for use by members of the local angling club and access to the river from these car parks was generally very good.

The club operates a strict catch and release policy and like all rivers in England the Derwent is subject to a 'closed season' lasting from 15<sup>th</sup> March to 15<sup>th</sup> June each year, during which time no angling for coarse fish is permitted.

#### **4.4 Megaloughton Lane Sewage Treatment Works**

The sewage treatment works was investigated because liquid effluent discharges from the RRMPOLE site are processed at Megaloughton Lane before entering the River Derwent. Discharges from the site enter the sewerage system where it is combined with sewerage from other sources before entering the sewage treatment works.

During the sewage treatment process, solid matter settles out to form sludge. The sludge then has further treatment to remove water, which produces a sewage cake. The cake is used as a fertiliser and conditioner on farmland. The treated water, which may still contain radionuclides in liquid phase, is then discharged via the outfall to the River Derwent at NGR SK 393 344.

The sewage works had recently been modernised leading to a large amount of processes becoming automated. However, the operators, maintenance staff and one other employee still spent some time in close proximity to sewage, sewage sludge or sewage cake.

The sewage cake was collected from the sewage treatment works periodically and distributed by contractors. The majority of the cake went to farmland in Leicestershire and to some farms in the local area, where it was spread on the land by the contractors themselves. The remainder of the sewage cake was disposed of in landfill facilities.

#### **4.5 Aquatic food consumption data**

Interviewees reported that members of various Eastern European communities were fishing for and consuming coarse fish from the River Derwent within the aquatic survey area. This was not observed by the survey team. However, it is suggested that an adult consumption rate of 1 kg y<sup>-1</sup> of freshwater fish is used in assessments to account for this potential pathway. No other foods were recorded as being taken from the aquatic survey area for human consumption.

#### **4.6 Occupancy over river washed substrates**

Occupancy rates over river washed substrates for adults and children are presented in Table 3 and Table 4 respectively. Activities were identified taking place over mud and over grass.

### ***Adults' occupancy rates***

The maximum observed occupancy over grass was  $940 \text{ h y}^{-1}$  for an angler on the bank of the River Derwent. One further angler had an occupancy rate within a factor of three of this, leading to a high-rate group mean occupancy rate of  $640 \text{ h y}^{-1}$ .

The maximum observed occupancy rate recorded over mud was  $560 \text{ h y}^{-1}$  for an angler on the bank of the River Derwent. No other individual had occupancy rates within a factor of three of this; therefore the occupancy rate for this group is  $560 \text{ h y}^{-1}$ .

### ***Children's occupancy rates***

#### ***15-year-old age group***

Only one child angler was identified with occupancy over river washed substrates. The child spent  $420 \text{ h y}^{-1}$  occupancy over mud.

#### ***Other age groups***

No children in the 10-year-old, 5-year-old, 1-year-old or 3-month-old groups were identified with occupancy over river washed substrates.

### ***Gamma dose rate measurements***

Representative gamma dose rate measurements at 1 m above the substrate were taken over mud; mud and grass; and mud and stones. These measurements (shown in Table 5) ranged from  $0.063 \mu\text{Gy h}^{-1}$  to  $0.069 \mu\text{Gy h}^{-1}$  over mud, and from  $0.063 \mu\text{Gy h}^{-1}$  to  $0.071 \mu\text{Gy h}^{-1}$  over mud and grass. The single measurement over mud and stones was  $0.059 \mu\text{Gy h}^{-1}$ . Natural levels of around  $0.07 \mu\text{Gy h}^{-1}$  over mud and  $0.06 \mu\text{Gy h}^{-1}$  over other substrates are expected.

## **4.7 Handling of fishing gear and sediment**

Handling sediment or handling fishing gear that has become entrained with fine sediment particles, can potentially give rise to skin exposure from beta radiation sources. Doses to the skin need consideration, as there is a separate dose limit for skin exposure for members of the public. There is also a contribution to effective dose due to skin exposure (ICRP 1991).

No handling of fishing gear or sediments was identified during the survey.

Handling of angling equipment, as opposed to commercial fishing gear, was not considered to be a significant pathway. Therefore data for this pathway were not collected.

#### **4.8 Occupancy rates in close proximity to sewage, sewage sludge or sewage cake**

Table 6 shows the occupancy rates in close proximity to sewage, sewage sludge or sewage cake for those employees of the Megaloughton Lane Sewage Treatment Works that regularly worked in close proximity to them.

All seven operators and four maintenance workers spent 890 h y<sup>-1</sup> in close proximity (<10 m) to sewage, sewage sludge or sewage cake. One other employee spent a reduced amount of time in close proximity, at approximately 450 h y<sup>-1</sup>.

#### **4.9 Water based activities**

Activities taking place in or on water can lead to ingestion of water and/or inhalation of spray. These pathways are generally considered to be minor in comparison with other exposure pathways, such as the ingestion of foods produced in the vicinity of a nuclear site. However, in order to enable dose assessment, relevant exposure pathways were investigated.

It was reported that children had occasionally been seen swimming in the River Derwent in the area around Borrowash Weir but this was not observed at the time of the survey and insufficient evidence was available to estimate a rate. No other activities taking place in or on water, either by adults or children, were identified taking place in the aquatic survey area.

## 5 TERRESTRIAL RADIATION PATHWAYS

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### 5.1 Terrestrial survey area

The terrestrial survey area covered all land and watercourses within 5 km of the RRMPOLE site centre (NGR SK 381 348) as shown in Figure 2.

The city of Derby occupied a large proportion of the terrestrial survey area, particularly in the northern, southern and western sectors. City wards that were within the terrestrial survey area included: Chaddesden and Oakwood in the north, Spondon in the east, Alvaston, Osmaston and Sinfyn in the south and Normanton, Derby City Centre and Littleover in the west. The villages of Ockbrook and Borrowash were also within the terrestrial survey area. There were several large areas of industry, particularly in the wards of Sinfyn and Osmaston. The remainder of the land, predominantly in the eastern sector, was agricultural. Sections of the River Derwent, upstream and downstream of the aquatic survey area were also covered by the terrestrial survey, as were various bodies of water located within the 5 km area.

Nine working farms were identified in the area. Of these:

- Two farms produced arable crops
- Two farms produced cows' milk
- One farm produced cows' milk and arable crops
- Three farms produced beef cattle and arable crops
- One farm produced sheep, beef cattle and pigs

Beef cattle, pigs and sheep produced in the survey area were sold at the livestock market in Derby and beef, pork and lamb meat were sold direct to the public at one farm shop. Beef cattle from one farm were also sold to other local farms as calves. Milk was sold to two national dairy chains and from a local farm shop as ice-cream. Arable crops (barley, wheat, oilseed rape and field beans) were sold to national distributors for animal feed and human consumption

Farmers and their families were identified consuming cows' milk, pork, beef, lamb, and pheasants produced or shot on their farms. Some farmers kept chickens, ducks and geese for eggs for their own families' consumption.

One smallholding was identified in the survey area. It produced goats' milk, chicken eggs, goose eggs and chicken meat. The smallholder and their family were identified consuming all of the aforementioned produce. Chicken eggs were sold by the smallholder via an 'honesty box' to the general public from the doorstep of the smallholding.

Twenty-four allotment sites were located within the terrestrial survey area. They were located at: Mackworth Road, Bramfield Avenue, Brigden, Chaddesden Park, Derwent Park, Little Chester, Merrill Way, Normanton Park, Nottingham Road, Osmaston Park, Sunnydale, Swiss Cottage, Borrowfield, Louise Greaves Lane, Wastefields, Littleover Lane, Mill Dam, Shardlow Road, Sinfin Lane, Markeaton Street, Rowditch, Dean Street, Field Lane and Saint Peters Glebe. These allotment sites contained a total of approximately 1800 plots. The allotment sites were well used and well maintained; several sites had waiting lists for new occupants. Interviews were conducted with allotment holders at eight sites: Swiss Cottage, Merrill Way, Osmaston Park, Mill Dam, Louise Greaves Lane, Wastefields, Nottingham Road and Brigden. Many varieties of fruit and vegetables were grown on the allotments. Fruit and vegetables were also identified growing at several private houses where interviews were conducted.

One beekeeper was identified keeping bees within the terrestrial survey area. The average production of each of his hives was 14 kg y<sup>-1</sup>, although production was comparatively low at the time of the survey due to disease. The beekeeper and his family consumed some honey and the rest was sold through a local farm shop.

The consumption of wild foods included blackberries, mushrooms, mixed fungi and sloes. These were collected from hedgerows and fields. Game, including rabbit, pheasant and pigeon, was shot within the survey area and consumed.

No human consumption of groundwater was identified in the terrestrial survey area. Livestock were identified drinking brook water at one farm and rainwater collected for the purpose at one farm and one smallholding. (Within the aquatic survey area cattle had access to the River Derwent for drinking water, as previously noted in section 4.1).

Many anglers were identified fishing along sections of the River Derwent within the terrestrial survey area. However, the angling rights for these stretches of the river were owned by clubs that operated catch and release only policies. No observations of the consumption of any foods were recorded from the waters in the terrestrial survey area, although it is possible that some coarse fish were being taken for consumption, as reported for the part of the River Derwent in the aquatic survey area.

## **5.2 Wholesalers and retailers**

Retailers and wholesalers were interviewed to find out whether they were selling local produce from within the survey area. Two farm shops and a smallholding were identified selling produce originating inside the terrestrial survey area. One farm shop was selling honey and ice-cream produced from cows' milk, the other farm shop was selling meat (pork, beef and lamb). The smallholding was selling chicken eggs.

### **5.3 The transfer of contaminants off-site by wildlife**

The transfer of contamination off-site by wildlife was investigated as radionuclides could enter the food chain or contaminate the environment through this pathway. Representatives from RRMPOLE reported the presence of rabbits and, less frequently, foxes within the outer fence of the site. However, they stated that the wildlife could not get into 'controlled' areas and were therefore, not considered likely to transfer contaminants off-site. No culling, sampling or analysis of wildlife was conducted by RRMPOLE. One person was identified consuming rabbits that were shot within 5 km of the RRMPOLE site but it is unlikely that these animals had spent time on the site because they were shot some distance away.

### **5.4 Food consumption data**

Consumption data for locally produced foodstuffs potentially affected by gaseous discharges from RRMPOLE are presented in Tables 7 to 21 for adults and Tables 22 to 34 for children. These tables include the mean consumption rates for the high-rate groups together with the observed 97.5<sup>th</sup> percentile consumption rates calculated as described in Section 3.2. For the purposes of comparison, the data are summarised in Table 35 for adults and in Tables 36 to 39 for children (15-year-olds, 10-year-olds, 5-year-olds and 1-year-olds, respectively). No children in the 3-month-old age group were identified consuming foods from the terrestrial survey area.

In order to provide information relevant to monitoring and assessment studies, the consumption rate data collected during the survey were analysed to indicate which food types most commonly contributed to each food group. The data are summarised in Table 40.

#### ***Adults' consumption rates***

Consumption of locally produced foods was identified in the following 15 food groups: green vegetables, other vegetables, root vegetables, potato, domestic fruit, milk, cattle meat, pig meat, sheep meat, poultry, eggs, wild/free foods, rabbits/hares, honey and wild fungi. No consumption of venison, cereals, freshwater fish or freshwater crustaceans was identified.

The mean consumption rates for the high-rate groups were found to be greater than the generic 97.5<sup>th</sup> percentile consumption rates in the root vegetable and milk food groups. A further six mean consumption rates for the high-rate groups exceeded the generic mean consumption rates. These were for green vegetables, other vegetables, potato, domestic fruit, eggs and rabbits/hares. Three observed 97.5<sup>th</sup> percentile consumption rates exceeded the generic 97.5<sup>th</sup> percentile consumption rates. These were for other vegetables, root vegetables and milk.

## ***Children's consumption rates***

### ***15-year-old age group***

Nine children in this age group were identified as consumers of locally produced foods. Consumption was identified in the following 10 food groups: green vegetables, other vegetables, root vegetables, potato, domestic fruit, milk, poultry, eggs, wild/free foods and wild fungi. No consumption was identified for cattle meat, pig meat, sheep meat, rabbits/hares, honey, cereals, freshwater fish or freshwater crustaceans. Mean consumption rates for the high-rate group were found to be higher than the generic 97.5<sup>th</sup> percentile in the root vegetables group only. Four mean consumption rates for the high-rate groups exceeded the generic mean consumption rates. These were for other vegetables, root vegetables, milk and eggs. Only one observed 97.5<sup>th</sup> percentile consumption rate was greater than the generic 97.5<sup>th</sup> percentile consumption rate. This was for root vegetables.

### ***10-year-old age group***

Eight children in this age group were identified as consumers of locally produced foods. Consumption was identified in the following nine food groups: green vegetables, root vegetables, other vegetables, potato, domestic fruit, milk, poultry, eggs and wild/free foods. No consumption was identified for cattle meat, pig meat, sheep meat, rabbits/hares, honey, cereals, freshwater fish or freshwater crustaceans. No mean consumption rates for the high-rate groups were found to be higher than their respective generic 97.5<sup>th</sup> percentiles. Six mean consumption rates for the high-rate groups exceeded the generic mean consumption rates. These were for green vegetables, other vegetables, root vegetables, milk, eggs and wild/free foods. Two observed 97.5<sup>th</sup> percentile consumption rates were greater than the generic 97.5<sup>th</sup> percentile consumption rates; these were for green vegetables and other vegetables.

### ***5-year-old age group***

Twelve children in this age group were identified as consumers of locally produced foods. Consumption was identified in the following 10 food groups: green vegetables, other vegetables, root vegetables, potato, domestic fruit, cattle meat, pig meat, sheep meat, eggs and wild/free foods. No consumption was identified for milk, poultry, rabbits/hares, honey, wild fungi, cereals, freshwater fish or freshwater crustaceans. No generic 97.5<sup>th</sup> percentile or generic mean consumption rates have been determined for this age group, therefore no comparisons with the corresponding observed rates are possible.

***1-year-old age group***

Three children in this age group were identified as consumers of locally produced foods. Consumption was identified in the following three food groups: root vegetables, potatoes and eggs. No consumption was identified in any other food group. No generic 97.5<sup>th</sup> percentile or generic mean consumption rates have been determined for this age group, therefore no comparisons with the corresponding observed rates are possible.

***3-month-old age group***

No children in the 3-month-old age group were identified consuming foods produced in the terrestrial survey area.

## 6. DIRECT RADIATION PATHWAYS

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### 6.1 Direct radiation survey area

The direct radiation survey area is shown in Figure 2. It covered all land and watercourses within 1 km of the boundary fence of the RRMPOLE site. As mentioned in Section 2.1, the RRMPOLE site is comprised of two separately licensed sites. Therefore, the boundary fence of the RRMPOLE site as a whole was used as the baseline for the direct radiation survey area. The occupancy data collected from the direct radiation survey area is also applicable to direct exposure arising from gaseous releases from RRMPOLE.

The land within the direct radiation survey area is predominantly commercial and residential. The residential areas are predominantly to the north and south of the site, whilst the areas to the east and west are mainly commercial. The River Derwent bisects the area from north-west to south-east. Several large 'trunk roads' pass close to the site, including the A52 to the north and the A5111 and A6 to the south and east. The route of the Derby to Nottingham mainline railway passes through the centre of the survey area, close to the western boundary fence of the site.

Directly north of the site is a large disused landfill site which is in the early stages of re-development. Beyond that lie several large retail properties bordering the A6 Borrowash bypass. The Cherrytree Hill residential area is situated north of the A6 and covers the remainder of the land in the north of the survey area.

East of the site the majority of the land is occupied by the Megaloughton Lane Sewage Treatment Works and contains various buildings and facilities used in the treatment of waste water. A waste transfer station, involved in the aggregation and distribution of household waste, occupies land close to the sewage treatment works. Several commercial properties, including retail premises, regional head-quarters and depots are to the north-east of the site and on land between the site and the sewage treatment works.

To the south and south-west of the site lie a cricket club and the River Derwent, and beyond these are Alvaston Park and recreation ground. A new housing estate is being developed in the Wilmorton area to the west. A gated community of approximately 180 prefabricated 'park homes' (similar in construction to mobile homes) occupies land to the south of Alvaston Park. These residences were identified as the closest to the RRMPOLE site. Further south lie the residential areas of Crewton and Alvaston, which together encompass the remainder of the land in this direction.

North-west of the site the land is dominated by a recent commercial development, containing several large retail outlets, automobile retailers and the Derby County Football Club stadium. A small nature sanctuary, administered by Derby City Council also covers a small area of land in this direction.

### **6.2 Residential activities**

Two areas of high residential property concentration are located within the direct radiation survey area; the Cherrytree Hill area of Spondon Ward to the north and the Crewton area of Alvaston Ward to the south. These are both areas of dense population and are present in the >0.5 - 1 km zone. A smaller area of residences is located at Wilmorton to the west, again in the >0.5 - 1 km zone, however, this is an ongoing housing development, which will in future cover land in the >0.25 - 0.5 km zone and possibly in the 0 - 0.25 km zone. The gated community of approximately 180 prefabricated 'park homes' near Alvaston Park are the closest residences to the RRMPOLE site, and are located within the >0.25 - 0.5 km zone, to the south of the site. A single road of 12 permanent residences to the south of the park homes are also within the >0.25 - 0.5 km zone. Due to the proximity of the park homes and nearby houses to the RRMPOLE site, higher effort was spent obtaining interviews there than at the other locations.

Interviews were conducted at 17 residences. Six were conducted at the gated park homes site to the south of the site; nine were conducted in houses in the Crewton area, also to the south of the site, and two were conducted at residences in the Cherrytree Hill area, north of the site. Ten of the residences where interviews were conducted were located within the >0.25 – 0.5 km zone and seven were located in the >0.5 – 1 km zone. None of the residences interviewed had resident children and only one had regularly visiting children.

### **6.3 Leisure activities**

Various leisure activities were identified occurring within the direct radiation survey area. A combined National Cycle Route and National Trail followed the course of the River Derwent through the survey area and was popular with joggers, cyclists, dog walkers and walkers. Angling took place at several locations along the River Derwent and the northern bank of the river just to the west of the Raynesway bridge was a particularly popular venue.

Adjacent to the southern boundary fence of the RRMPOLE site were the grounds of a cricket club, which had approximately 100 active members. South of the River Derwent is Alvaston Park and recreation ground which attracts many visitors. The park contains a series of large playing fields, fenced tennis and five-a-side football courts, a BMX cycling track and a large pond. The BMX track was used for organised lessons and was also used on an *ad hoc* basis by casual cyclists. An area of rough land to the north of the site, earmarked for re-development, was being used by motor-cyclists as an unofficial motor-cycle track at the time of the survey.

Pride Park, the home ground of Derby County Football Club is also located within the direct radiation survey area. Average attendance at home games based on statistics for the 2008-2009 season was 29000. A small fenced nature sanctuary was also identified close to the Pride Park stadium. The nature sanctuary was administered by Derby City Council and public access was prohibited.

#### **6.4 Employment activities**

The area surrounding the RRMPOLE site is heavily commercialised, particularly to the north and north-west. To the north of the site lie several large businesses, including manufacturing plants, several depots and retail outlets. Beyond that, further to the north, lie a business park comprised of small business units, offices and a hotel, adjacent to which was a large retail park and supermarket. To the north-west and west of the site lies the Pride Park development which houses small business units, offices, retail properties (particularly automotive) and a staffed park-and-ride. South of the site there are a few small depots, a telephone engineering centre and a conference centre. To the east of the site the land is dominated by the Megaloughton Lane Sewage Treatment Works and the smaller waste transfer station.

Interviews were conducted at nine businesses within the direct radiation survey area.

In the 0 - 0.25 km zone interviews were conducted at three businesses. These were: a retail and distribution centre with five full-time and 14 part-time staff; a car auction centre with 27 full-time staff and three part-time staff and a manufacturing plant with 47 full-time staff (10 of whom were used in the data analysis) and three part-time staff. Members of staff at the first two businesses were identified as spending considerable amounts of time working outdoors.

In the >0.25 – 0.5 km zone interviews were conducted at three businesses. These were: a waste transfer station with 12 members of staff; a technical engineering company with six full-time and one part-time member of staff; and four full-time members of staff at the residential park homes site. Members of staff at the waste transfer station and the park homes site were identified spending considerable time working outdoors.

In the >0.5 – 1 km zone interviews were conducted at a further three businesses. These were: a park-and-ride site with two full-time members of staff; a mobile home retail business with six full-time and two part-time members of staff; and the Megaloughton Lane Sewage Treatment Works which had 12 full-time members of staff. Contractors and visiting clerical staff also worked periodically at the sewage treatment works. Workers at all three establishments spent considerable time working outdoors.

The activities of the employees of RRMPOLE and its contractors whilst at work within the RRMPOLE site were not included in the direct radiation survey.

### **6.5 Educational activities**

Three primary schools and one pre-school were identified in the direct radiation survey area, all of which were located in the >0.5 – 1 km zone. An interview was conducted at one of the primary schools and occupancy rates were recorded. The school employed 25 members of staff, half of whom were full-time, and was attended by 238 pupils. Approximately 121 children were in the 5-year-old age group and 117 children in the 10-year-old age group. Representative samples of 12 full-time members of staff and 16 children were included in the data analysis. Both staff and pupils spent some time outdoors during the course of the school day. Data was also recorded for a pupil attending one of the other primary schools, who was encountered while visiting relatives who lived in the direct radiation survey area.

### **6.6 Occupancy rates**

Table 41 presents indoor, outdoor and total occupancy data for adults and children. Observations for 210 individuals are presented. In some cases where large numbers of generic occupancy rates were obtained, for example employees of large organisations, a representative number of observations have been included. An analysis of the data by distance zones and occupancy rates is shown in Table 42.

#### ***0 – 0.25 km from the site boundary***

Occupancy data are presented for 106 individuals in the 0 – 0.25 km zone. No residences were identified in this zone, therefore occupancy rates are presented for people undertaking employment and recreational activities only. One full-time member of staff at a business, who was also a regular attendee at the cricket ground clubhouse, had the highest total occupancy rate of 2900 h y<sup>-1</sup> and the highest indoor occupancy rate of 2200 h y<sup>-1</sup>. Twelve full-time employees of another business in the zone had the highest outdoor occupancy rates of 1800 h y<sup>-1</sup>.

#### ***>0.25 – 0.5 km from the site boundary***

Occupancy data are presented for 34 individuals in the >0.25 – 0.5 km zone. Fifteen were residents, 18 were employees of business in the zone and one was a regular visitor to a family. The highest total occupancy and indoor occupancy rates were for the same individual, an elderly resident, with 8600 h y<sup>-1</sup> and 8500 h y<sup>-1</sup> respectively. The highest outdoor occupancy rate was 2400 h y<sup>-1</sup> for a full-time employee.

**>0.5 – 1 km from the site boundary**

Occupancy data are presented for 70 individuals in the >0.5 – 1 km zone. Twenty were residents, 31 were employees of businesses and education establishments, 17 were students attending schools, one was a regular visitor to a residence and one was undertaking recreational activities. Again the highest total occupancy and indoor occupancy rates were for the same individual, an elderly resident, with 8700 h y<sup>-1</sup> and 8300 h y<sup>-1</sup> respectively. The highest outdoor occupancy rate was 1400 h y<sup>-1</sup> for a resident who also worked in the direct radiation survey area.

**6.7 Gamma dose rate measurements**

Table 43 presents the gamma dose rate measurements from the Derby direct radiation survey. Gamma dose rate measurements were taken outdoors at recreational areas and both indoors and outdoors at most properties where interviews were conducted. Where interviews were conducted at properties that were in close proximity to each other, a single outdoor gamma dose rate measurement was taken and used for these properties. Outdoor measurements were taken approximately 5-10 metres from the nearest buildings. Where possible, all outdoor measurements were taken over natural substrates, however at some locations no natural substrate was available. Gamma dose rate measurements over grass were taken at locations at distances further than 5 km from the RRMPO site centre in order to obtain background dose rates. All measurements were taken at a height of 1 metre above the substrate. It should be noted that the gamma dose rate measurements presented in this report have not been adjusted for natural background dose rates.

Thirty-two outdoor measurements taken over grass, concrete or tarmac, ranged from 0.054 µGy h<sup>-1</sup> to 0.103 µGy h<sup>-1</sup>. Twenty-eight indoor measurements taken over wood, concrete or tile, ranged from 0.053 µGy h<sup>-1</sup> to 0.127 µGy h<sup>-1</sup>. Four background measurements over grass ranged from 0.076 µGy h<sup>-1</sup> to 0.093 µGy h<sup>-1</sup>. Two of the outdoor measurements taken within the survey area were greater than the highest background measurement.

Comprehensive studies of background radiation have been carried out on a national scale by the Radiation Protection Division of the Health Protection Agency (previously the National Radiation Protection Board), the most recent of these being a review conducted in 2005 (Watson *et al.*, 2005). The results from this review could be used for comparison with the data collected during the survey.

## 7 USE OF HABITS DATA FOR DOSE ASSESSMENTS

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### 7.1 Combined pathways

In determining habits data for the purposes of assessing radiological doses to the public, it may be necessary to consider a combination of pathways. Data are provided in Annexes 1 and 2 so that the full effect of combining pathways can be assessed for individual observations, given the concentrations and dose rates for a particular assessment. In some circumstances, it will be possible to make simplifying assumptions and define the consumption and external exposure rates appropriate to a series of potential high-rate groups. Such assumptions will depend on the assessment in question but some initial observations are provided here as a starting point for those undertaking assessments.

The most extensive combinations of pathways for adult dose assessment are shown in Table 44. Each of the 13 combinations shown in Table 44 represents an actual individual (or individuals) from Annex 1 who has positive data (irrespective of the magnitude), for each pathway marked with an asterisk. It should be noted that combination numbers in Table 44 do not correlate directly with observation numbers in Annex 1. Other individuals from Annex 1 have combinations that are not listed in Table 44 because they have fewer pathways and a dose assessment for them would be adequately covered by one of the 13 listed combinations. An estimated rate for fish consumption was available from data presented in Annex 3 and therefore fish consumers have been included in the combinations.

Combinations of pathways at high-rate group means may be achieved by considering the data in Annexes 1 and 2. Although these mean rates are not given in the annexes, the rates for individuals in the high-rate groups are emboldened and are therefore apparent.

### 7.2 Foetal dose assessment

Dose assessment of the foetus was introduced routinely for the first time in the Radioactivity in Food and the Environment Report for 2005 (EA, EHS, FSA and SEPA, 2006), following the publication of recommendations by the Radiation Protection Division of the Health Protection Agency (National Radiological Protection Board, 2005). The adopted approach is to use the consumption and occupancy data for women of childbearing age in order to calculate the dose to the foetus. Therefore, consumption and occupancy data collected during the Derby habits survey for females of childbearing age are presented in Annex 5. The Office of National Statistics classifies women to be of child bearing age if they are between 15 – 44 years old ([www.statistics.gov.uk](http://www.statistics.gov.uk)); this age range has been used in Annex 5. It was not possible to collect ages for all female observations during the habits

survey. However, these females with unknown ages have been included in Annex 5 as they might be women of childbearing age.

### **7.3 Total dose assessment**

The environment agencies and the Food Standards Agency have considered ways of using habits data to calculate total dose retrospectively. The adopted approach is to use the adult consumption and occupancy data collected in each habits survey to create a matrix with a series of habits profiles for each site. The relevant matrix for the Derby adults' profiled habits data is shown in Annex 6. The National Dose Assessment Working Group (NDAWG) has considered this approach to assessing retrospective total doses (Camplin *et al.*, 2005) and has agreed that using habits profiles is an appropriate approach. Retrospective total doses around Derby will in future be made using these profiles and reported in the Radioactivity in Food and the Environment Reports (e.g. EA, FSA, NIEA and SEPA, 2009). Additionally, profiles have been created for 15-year-old, 10-year-old, 5-year-old and 1-year-old children's age groups, and women of childbearing age. These are shown in Annexes 7, 8, 9, 10 and 11 respectively. They are not currently used in the Radioactivity in Food and the Environment Reports. No profiles are provided for 3-month-old children because there were no data for this age group.

### 8 CONCLUSIONS AND SUGGESTIONS

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#### 8.1 Survey findings

The survey investigated the three potential sources of public radiation exposure from the RRMPO site, which were:

- Discharges of liquid radioactive waste into the River Derwent via the Megaloughton Lane Sewage Treatment Works.
- Discharges of gaseous radioactive waste
- Emissions of direct radiation

Data were collected from 425 individuals including riverbank anglers, farmers, allotment holders, gardeners, a smallholder, beekeepers, sewage workers and people spending time within 1 km of the RRMPO site. These people were targeted because their habits and where they live may cause them to be exposed to radioactivity or radiation from the site. However, it should be noted that the most exposed people can only be defined following the outcome of a dose assessment.

All consumption rates recorded in this report are only for foods grown or produced within the survey areas, as defined in Section 2.3.

#### ***The aquatic survey area***

No interviewees were consuming foods from the aquatic survey area. However, it was reported that fish from the river were consumed by members of Eastern European communities and it is suggested that a consumption rate of coarse fish of  $1 \text{ kg y}^{-1}$  be considered for assessment purposes.

Anglers were identified spending time over river washed substrates along the banks of the River Derwent. The mean occupancy rates for the adult high-rate groups were  $640 \text{ h y}^{-1}$  over grass and  $560 \text{ h y}^{-1}$  over mud.

No handling of fishing gear or sediments was identified.

Workers at the Megaloughton Lane Sewage Treatment Works were identified spending time in close proximity (< 10 m) to sewage, sewage sludge and sewage cake. The maximum occupancy rate in close proximity was  $890 \text{ h y}^{-1}$ .

Livestock at one location in the aquatic survey area had access to the River Derwent for drinking water.

It was reported that children had occasionally been seen swimming in the River Derwent but this was not observed at the time of the survey and insufficient evidence was available to estimate a rate. No other activities taking place in or on water, either by adults or children, were identified taking place in the aquatic survey area.

### ***Terrestrial survey area***

The adult mean consumption rates for the high-rate groups for the separate consumption pathways for foods affected by gaseous discharges were:

- 28 kg y<sup>-1</sup> for green vegetables
- 40 kg y<sup>-1</sup> for other vegetables
- 41 kg y<sup>-1</sup> for root vegetables
- 110 kg y<sup>-1</sup> for potato
- 50 kg y<sup>-1</sup> for domestic fruit
- 250 l y<sup>-1</sup> for milk
- 12 kg y<sup>-1</sup> for cattle meat
- 12 kg y<sup>-1</sup> for pig meat
- 4.0 kg y<sup>-1</sup> for sheep meat
- 6.0 kg y<sup>-1</sup> for poultry
- 13 kg y<sup>-1</sup> for eggs
- 1.1 kg y<sup>-1</sup> for wild/free foods
- 9.0 kg y<sup>-1</sup> for rabbits/hares
- 1.5 kg y<sup>-1</sup> for honey
- 1.0 kg y<sup>-1</sup> for wild fungi

No consumption of venison, cereals, freshwater fish or freshwater crustaceans was identified, although it is likely that freshwater fish were consumed by members of Eastern European communities as noted in the aquatic survey area. Consumption rates for children in the 15-year-old, 10-year-old, 5-year-old and 1-year-old age groups were also recorded. No consumption of terrestrial food was identified for the 3-month-old age group. Combinations of food groups consumed at mean high rates, together with external pathway exposures, may be derived from the data for individuals in Annex 1 and 2. Rates for individuals comprising the high-rate groups are presented in bold type.

No consumption of groundwater by humans or livestock was identified. Livestock were identified drinking brook water at one farm and rainwater collected for the purpose at one farm and one smallholding.

The transfer of contamination off-site by wildlife was investigated as radionuclides could enter the food chain or contaminate the environment through this pathway. Representatives from RRMPO were asked about wildlife they observed on site. They reported the presence of rabbits and, less

frequently, foxes within the outer fence of the site. However, Cefas were informed that the wildlife could not get into 'controlled' areas and were not considered likely to transfer contamination offsite. Therefore, no culling, sampling or analysis was conducted by RRMPO. One person was identified consuming rabbits that were shot within 5 km of the RRMPO site but it is unlikely that these animals had spent time on the site because they were shot some distance away.

### ***Direct radiation survey area***

For occupancy by members of the public within 1 km of the boundary fence of the RRMPO site, the highest total occupancy, indoor occupancy and outdoor occupancy rates were:

- For the 0 – 0.25 km zone; 2900 h y<sup>-1</sup> total occupancy, 2200 h y<sup>-1</sup> indoor occupancy and 1800 h y<sup>-1</sup> outdoor occupancy.
- For the >0.25 – 5 km zone; 8600 h y<sup>-1</sup> total occupancy, 8500 h y<sup>-1</sup> indoor occupancy and 2400 h y<sup>-1</sup> outdoor occupancy.
- For the >0.5 – 1.0 km zone; 8700 h y<sup>-1</sup> total occupancy, 8300 h y<sup>-1</sup> indoor occupancy and 1400 h y<sup>-1</sup> outdoor occupancy.

In the 0 – 0.25 km zone the highest total and indoor occupancies were for an employee of a business who also spent time at the cricket ground clubhouse, and the highest outdoor occupancies were for employees of a business. In the >0.25 – 0.5 km zone the highest total and indoor occupancies were for a resident and the highest outdoor occupancy was for an employee of a business. In the >0.5 – 1 km zone the highest total and indoor occupancies were for a resident and the highest outdoor occupancy was for a resident who also worked in the direct radiation survey area.

## **8.2 Summary of current environmental monitoring programmes**

The 2008 monitoring programmes for the Derby area operated by the Environment Agency and the Food Standards Agency, and published in the RIFE report (EA, FSA, NIEA and SEPA, 2009) included the samples listed below. The location names and substrate classifications are taken directly from that publication. All but one of the samples taken as part of the monitoring programme and published in the RIFE report originated from inside the survey areas used for the 2009 Derby habits survey.

- Sediment and water from River Derwent (downstream of discharge point)
- Sediment and water from River Derwent (upstream of discharge point)
- Sediment and water from River Derwent (at the Station Rd. Bridge)
- Grass (various locations)
- Soil (various locations)

### 8.3 Suggestions for changes to the monitoring programmes

The following lists are suggestions for changes to the current environmental monitoring programmes. It should be noted that the suggestions are based on the findings of this survey. They are not the outcome of any radiological assessment. It is suggested that samples currently monitored, which are not listed below, remain unchanged in the monitoring programme.

- Currently, no foodstuffs are monitored for the presence of radionuclides in the Derby area. It is, therefore, suggested that a one-off sampling of the most commonly consumed foods from each of the food groups be implemented, particularly runner beans, onions and milk, as these were consumed above the generic 97.5<sup>th</sup> percentile rates.
- It was observed that the novel vegetable, callaloo (*Amaranthus sp.*) was eaten, albeit at low rates. As this vegetable has not featured in monitoring programmes before and leafy green vegetables are known to be of potential radiological significance it is suggested that a sample of this be included in future monitoring.
- A sample of sewage cake from the Megaloughton Lane Sewage Treatment Works could be included, since the works receives liquid discharges from RRMPOLE via the sewer network.

## **9. ACKNOWLEDGMENTS**

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Gratitude is expressed to representatives of local authorities and associations and members of the public who offered helpful advice and information during the survey. This survey was undertaken on behalf of the Environment Agency, the Food Standards Agency and the Health and Safety Executive. The project officers for these organisations provided considerable help during the planning of the survey and the drafting of this report.

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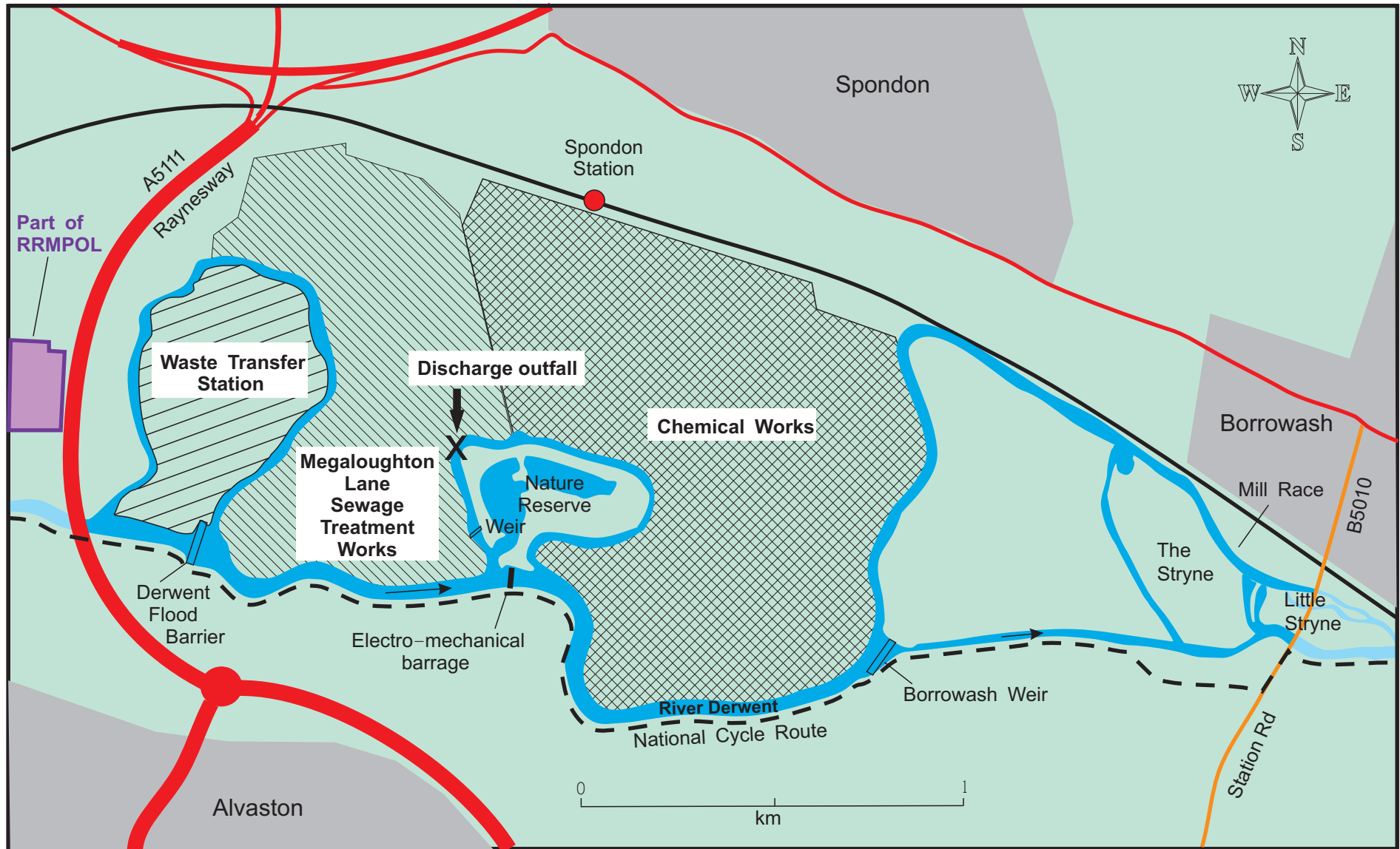
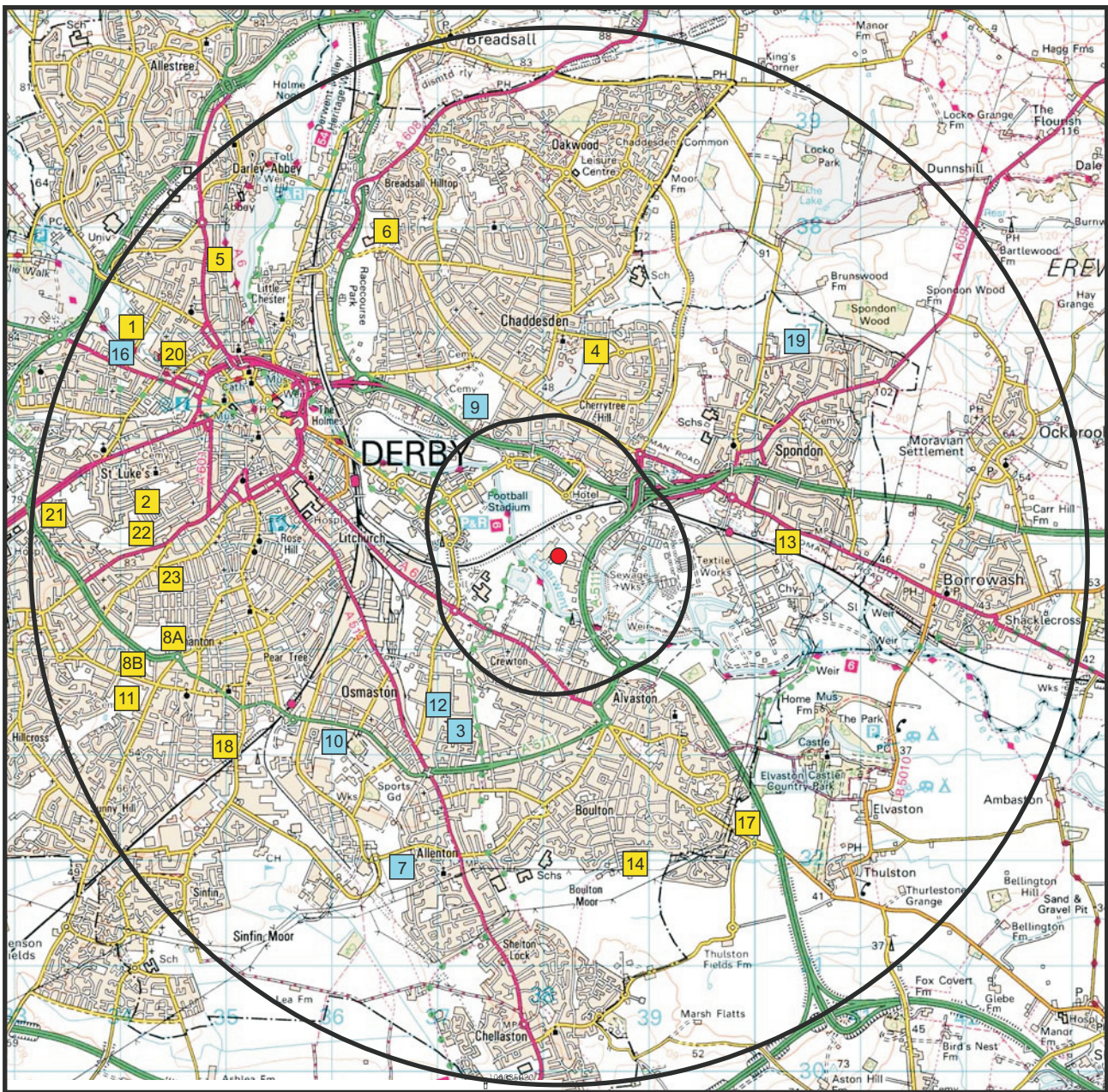


Figure 1. The Derby aquatic survey area

- Watercourses investigated in the aquatic survey
- Watercourses not investigated in the aquatic survey

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**Figure 2. The Derby terrestrial (outer ring) and direct radiation (inner ring) survey areas.**

- The RMPOL site centre
  - Allotment sites visited
  - Allotment sites not visited
- |   |   |
|---|---|
| 1. Ashbourne Road and District allotments | 12. Swiss Cottage allotments                      |
| 2. Bramfield Avenue allotments            | 13. Borrowfield allotments                        |
| 3. Brigden allotments                     | 14. Field Lane allotments                         |
| 4. Chaddesden Park allotments             | 15. Littleover Lane allotments                    |
| 5. Derwent Park allotments                | 16. Mill Dam allotments                           |
| 6. Little Chester allotments              | 17. Shardlow Road allotments                      |
| 7. Merrill Way allotments                 | 18. Sinfin Lane allotments                        |
| 8A. Normanton Park allotments             | 19. Louise Graves Lane and Wastefields allotments |
| 8B. Normanton Park allotments             | 20. Markeaton Leisure Gardens                     |
| 9. Nottingham Road allotments             | 21. Rowditch allotments                           |
| 10. Osmaston Park allotments              | 22. Firs Estate allotments                        |
| 11. Sunnydale allotments                  | 23. St. Peters Glebe allotments                   |

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**Table 1. Survey coverage**

Group	Criteria	Estimate of complete coverage	Number for whom positive data were obtained	Coverage for positive observations	Notes
<b>SUMMARY OF ALL PATHWAYS</b>					
All potential people in the Derby aquatic, terrestrial and direct radiation survey areas	Number of people resident in the terrestrial survey area (excluding those resident in the direct radiation survey area) (See <b>(B) TERRESTRIAL PATHWAYS</b> )	161000 <sup>a</sup>	220 <sup>b</sup>	~0.1%	The survey targeted individuals who were potentially the most exposed, mostly producers of local food i.e. farmers and allotment holders.
	Number of people resident in the direct radiation survey area (See <b>(C) DIRECT RADIATION PATHWAYS</b> )	7550 <sup>a</sup>	33	<0.5%	
	Number of people employed but not resident in the direct radiation survey area, ( See <b>(C) DIRECT RADIATION PATHWAYS</b> )	~1575	139	~10%	Excludes employees of Rolls-Royce Marine Power Operations Ltd. and residents of the direct radiation survey area.
	Number of people visiting the direct radiation survey area (See <b>(C) DIRECT RADIATION PATHWAYS</b> )	U	58	U	People visiting the direct radiation survey area for multiple purposes (school, visits, recreational activities). Excludes residents of and people employed in the direct radiation survey area.
	Number of people affected by liquid discharges (excluding people resident in the terrestrial survey area) (See <b>(A) AQUATIC PATHWAYS</b> )	U	22 <sup>b</sup>	U	Sum of anglers on river washed sediment and sewage treatment plant workers who work in close proximity to sewage and products.
	Total for aquatic, terrestrial and direct radiation survey areas	U	425 <sup>b</sup>	U	In the Summary of All Pathways section each interviewee has only been counted once. This is in the section where their predominant activities took place.
<b>(A) AQUATIC PATHWAYS</b>					
Anglers	Number of anglers with river washed substrate occupancy	U	10	U	Two angling clubs were identified within the aquatic survey area.
Sewage treatment plant workers	Number of people who work with or in close proximity to sewage sludge or sewage cake at the Megaloughton Lane Sewage Treatment Works	12	12	100%	Includes employees of Severn-Trent Water but not contractors used in the collection, distribution and spreading of sludge at farms.

**Table 1. Survey coverage**

Group	Criteria	Estimate of complete coverage	Number for whom positive data were obtained	Coverage for positive observations	Notes
<b>(B) TERRESTRIAL PATHWAYS</b>					
Farms	Number of farmers/smallholders and their family members consuming food from the survey area	U	36	U	Farmers at 9 farms and 1 smallholding in the terrestrial survey area were interviewed.
Allotments	Number of allotment holders and their family members consuming food from the survey area	U	220	U	Interviews were conducted with 43 individuals at 8 allotment sites in the terrestrial survey area.
Gardeners	Number of gardeners and their family members consuming food from the survey area	U	12	U	
Beekeepers	Number of people consuming honey from the survey area	U	3	U	Interview conducted with one beekeeper.
<b>(C) DIRECT RADIATION PATHWAYS</b>					
Residents	Number of residents in the survey area	7550 <sup>a</sup>	33	<0.5%	
Employees	Number of people employed in the survey area	~1500	114	~10%	Excludes employees of Rolls-Royce Marine Power Operations Ltd. and staff at schools. Representative observations entered for employers with more than 20 employees.
School staff	Number of staff at schools in the survey area	~75	25	~33%	
School pupils	Number of children attending schools within the survey area	~750	16	2%	Observations are for 1 school out of 3 in the survey area. Generic data were provided for 238 children but only 16 were entered as representative.
Visitors	Number of visitors to the survey area	U	2	U	Includes a child visiting relatives who also attended a school in the area.
Recreational activities	Number of people undertaking recreational activities within the survey area	U	41	U	Representative observations entered for sports clubs with memberships in excess of 20.
<b>BREAKDOWN OF AGE GROUPS</b>					
Adults	17-year-old and over	95218 <sup>a</sup>	363	<0.4%	
15-year-old	12-year-old to 16-year-old	46088 <sup>a</sup>	20	<0.04%	
10-year-old	7-year-old to 11-year-old	12060 <sup>a</sup>	18	<0.15%	
5-year-old	2-year-old to 6-year-old	11060 <sup>a</sup>	20	<0.2%	
1-year-old	1-year-old	2133 <sup>a</sup>	4	<0.2%	
3-month-old	Under 1-year-old	2059 <sup>a</sup>	0	0%	

**Notes**

<sup>a</sup> Data from [www.statistics.gov.uk](http://www.statistics.gov.uk) were used to estimate these figures for people resident in the 5 km and 1 km survey areas.

<sup>b</sup> The number of people for whom positive data was obtained, for pathways (A), (B) and (C), will not equal the relevant totals in the summary of all pathways. This is because some individuals, for example someone who participates in angling and consumes allotment grown vegetables, will be counted twice.

**Table 2. Typical food groups used in habits surveys**

<b>Food group</b>	<b>Examples of foods within the group</b>
Green vegetables	Asparagus, broccoli, Brussels sprout, cabbage, calabrese, cauliflower, chard, courgettes, cucumber, gherkin, globe artichoke herbs, kale, leaf beet, lettuce, marrow, spinach
Other vegetables	Aubergine, broad bean, chilli pepper, french bean, mangetout, pea, pepper, pumpkin, runner bean, sweetcorn, tomato
Root vegetables	Beetroot, carrot, celeriac, celery, chicory, fennel, garlic, Jerusalem artichoke, kohlrabi, leek, onion, parsnip, radish, shallot, spring onion, swede, turnip
Potato	Potato
Domestic fruit	Apple, apricot, blackberry, blackcurrant, boysenberry, cherry, damson, fig, gooseberry, grapes, greengages, huckleberry, loganberry, melon, nectarines, peach, pear, plum, raspberry, redcurrants, rhubarb, rowanberry, strawberry, tayberry, whitecurrant
Milk	Cows' milk, cream, yoghurt, goats' milk
Solid milk products	Butter, cheese
Cattle meat <sup>a</sup>	Beef
Pig meat <sup>a</sup>	Pork
Sheep meat <sup>a</sup>	Lamb, mutton
Poultry	Chicken, duck, goose, grouse, guinea fowl, partridge, pheasant, pigeon, snipe, turkey, woodcock
Eggs	Chicken egg, duck egg, goose egg
Wild/free foods	Blackberry, chestnut, crab apple, damson, dandelion root, elderberry, nettle, raspberry, rowanberry, sloe, strawberry,
Honey	Honey
Wild Fungi	Mushrooms, other edible fungi
Rabbits/Hares	Rabbit, hare
Venison <sup>a</sup>	Venison
Fish (sea)	Bass, brill, cod, common ling, dab, Dover sole, flounder, gurnard, haddock, hake, herring, lemon sole, mackerel, monkfish, mullet, plaice, pollack, witch saithe, salmon, sea trout, squid <sup>b</sup> , cuttlefish <sup>b</sup> , rays, turbot, whitebait, whiting
Fish (freshwater)	Brown trout, rainbow trout, perch, pike, salmon (river), eels
Crustaceans	Brown crab, spider crab, crawfish, lobster, <i>Nephrops</i> , squat lobster, prawn, shrimp
Molluscs	Cockles, limpets, mussels, oysters, queens, scallops, razor shell, whelks, winkles

**Notes**<sup>a</sup> Including offal<sup>b</sup> Although squid and cuttlefish are molluscs, radiologically they are more akin to fish

**Table 3. Adults' occupancy rates over river washed substrates in the Derby aquatic survey area ( $h\ y^{-1}$ )**

Observation number	Location	Activity	Grass	Mud
<b>252</b>	<b>Various locations on River Derwent</b>	<b>Angling</b>	<b>936</b>	-
<b>312</b>	<b>Bank of River Derwent near B5010 road bridge</b>	<b>Angling</b>	<b>342</b>	-
265	Various locations on River Derwent	Angling	60	-
310	Bank of River Derwent near B5010 road bridge	Angling	32	-
311	Bank of River Derwent near B5010 road bridge	Angling	32	-
238	Various locations on River Derwent	Angling	12	-
<b>20</b>	<b>50m downstream of gated bridge</b>	<b>Angling</b>	-	<b>560</b>
21	Whole length of aquatic survey area	Angling	-	100
18	Southern bank of River Derwent	Angling	-	16

**Notes**

Observations in bold indicate the high-rate individuals

The mean river washed substrate occupancy rate over grass based on 2 high-rate observations is  $639\ h\ y^{-1}$

The observed 97.5<sup>th</sup> percentile rate based on 6 observations for grass is  $862\ h\ y^{-1}$

The mean river washed substrate occupancy rate over mud based on 1 high-rate observation is  $560\ h\ y^{-1}$

The observed 97.5<sup>th</sup> percentile rate based on 3 observations for mud is  $537\ h\ y^{-1}$

**Table 4. Children's occupancy rates over river washed substrates in the Derby aquatic survey area ( $h y^{-1}$ )****15-year-old age group**

Observation number	Age	Location	Activity	Grass	Mud
<b>19</b>	<b>14</b>	<b>50m downstream of gated bridge</b>	<b>Angling</b>	-	<b>420</b>

**Notes**

Observations in bold indicate the high-rate individuals

The river washed substrate occupancy rate over mud based on the only observation is  $420 h y^{-1}$

The observed 97.5<sup>th</sup> percentile rate is not applicable for 1 observation

**Table 5. Gamma dose rate measurements over river washed substrates in the Derby aquatic survey area ( $\mu Gy h^{-1}$ )**

NGR	Location	Substrate	Gamma dose rate at 1 metre <sup>a</sup>
SK 379 346	River Derwent near Alvaston Park <sup>b</sup>	Mud and grass	0.071
SK 385 343	South side of River Derwent to the west of the Derwent Flood Barrier <sup>b</sup>	Mud	0.063
SK 387 349	West bank of meander near Raynesway <sup>b</sup>	Mud and grass	0.064
SK 388 342	South side of River Derwent to the east of the Derwent Flood Barrier <sup>b</sup>	Mud and stones	0.059
SK 392 341	South side of River Derwent approximately 350 m to the west of the electro-mechanical barrage <sup>b</sup>	Mud and grass	0.063
SK 396 341	South side of the River Derwent approximately 70 m to the east of the electro-mechanical barrage	Mud and grass	0.064
SK 405 339	River Derwent 100m downstream from Borrowash Weir	Mud and grass	0.065
SK 415 340	River Derwent 100m upstream of B5010 road bridge	Mud	0.069

**Notes**

<sup>a</sup> These measurements have not been adjusted for natural background dose rates.

<sup>b</sup> These locations are within the direct radiation survey area.

**Table 6. Occupancy rates in close proximity (<10 m) to sewage, sewage sludge or sewage cake (h y<sup>-1</sup>)**

<b>Observation number</b>	<b>Activity</b>	<b>Occupancy in close proximity (&lt;10 m) to sewage, sewage sludge or sewage cake</b>
274	Servicing pumps etc.	892
275	Servicing pumps etc.	892
276	Servicing pumps etc.	892
277	Servicing pumps etc.	892
267	Clearing grit and rag traps, operating centrifuge, moving cake to storage area, sampling etc.	892
268	Clearing grit and rag traps, operating centrifuge, moving cake to storage area, sampling etc.	892
269	Clearing grit and rag traps, operating centrifuge, moving cake to storage area, sampling etc.	892
270	Clearing grit and rag traps, operating centrifuge, moving cake to storage area, sampling etc.	892
271	Clearing grit and rag traps, operating centrifuge, moving cake to storage area, sampling etc.	892
272	Clearing grit and rag traps, operating centrifuge, moving cake to storage area, sampling etc.	892
273	Clearing grit and rag traps, operating centrifuge, moving cake to storage area, sampling etc.	892
266	Managing operations	446

**Table 7. Adults' consumption rates of green vegetables from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

Observation number	Artichoke	Asparagus	Broccoli	Brussel sprout	Cabbage	Calabrese	Callaloo (Amaranthus sp.)	Cauliflower	Chard	Courgettes	Cucumber	Herbs	Kale	Lettuce	Marrow	Pak choi	Rocket	Spinach	Total
109	-	-	15.0	9.1	12.2	-	-	3.7	-	-	8.5	-	-	-	5.4	-	-	-	53.9
6	-	-	18.3	-	8.4	-	-	3.3	0.6	6.9	4.3	0.2	-	1.1	1.9	-	-	-	45.0
2	-	-	-	12.6	16.9	-	-	-	-	-	11.2	-	-	-	-	-	-	-	40.7
3	-	-	-	12.6	16.9	-	-	-	-	-	11.2	-	-	-	-	-	-	-	40.7
286	-	-	-	10.9	10.2	-	-	8.2	-	3.7	1.7	-	-	1.2	3.6	-	-	-	39.5
120	-	-	18.0	-	14.6	-	-	-	-	2.2	-	-	-	2.3	-	-	-	0.9	37.9
121	-	-	18.0	-	14.6	-	-	-	-	2.2	-	-	-	2.3	-	-	-	0.9	37.9
4	-	-	9.2	-	8.4	-	-	3.3	0.6	6.9	4.3	0.2	-	1.1	1.9	-	-	-	35.8
5	-	-	9.2	-	8.4	-	-	3.3	0.6	6.9	4.3	0.2	-	1.1	1.9	-	-	-	35.8
9	-	-	1.9	2.3	3.0	-	-	0.9	-	24.3	-	-	-	0.8	-	-	-	-	33.2
15	-	-	-	7.3	9.7	-	-	-	-	-	10.2	-	-	-	5.8	-	-	-	33.0
16	-	-	-	7.3	9.7	-	-	-	-	-	10.2	-	-	-	5.8	-	-	-	33.0
319	-	-	9.0	-	14.6	-	-	9.0	-	-	-	-	-	-	-	-	-	-	32.6
320	-	-	9.0	-	14.6	-	-	9.0	-	-	-	-	-	-	-	-	-	-	32.6
317	-	-	5.6	-	11.0	-	-	6.7	1.2	2.8	2.6	-	-	-	-	-	-	-	29.8
316	-	-	5.6	-	11.0	-	-	6.7	1.2	2.8	2.6	-	-	-	-	-	-	-	29.8
284	-	-	2.3	18.1	3.4	-	-	1.1	-	1.1	-	-	1.1	1.6	-	-	-	-	28.8
285	-	-	2.3	18.1	3.4	-	-	1.1	-	1.1	-	-	1.1	1.6	-	-	-	-	28.8
113	-	-	-	6.0	6.0	7.4	-	4.9	1.0	-	-	0.3	2.1	1.0	-	-	-	-	28.8
112	-	-	-	6.0	6.0	7.4	-	4.9	1.0	-	-	0.3	2.1	1.0	-	-	-	-	28.8
161	-	-	-	9.1	9.1	-	-	-	-	10.1	-	-	-	-	-	-	-	-	28.4
162	-	-	-	9.1	9.1	-	-	-	-	10.1	-	-	-	-	-	-	-	-	28.4
163	-	-	-	9.1	9.1	-	-	-	-	10.1	-	-	-	-	-	-	-	-	28.4
425	1.6	-	3.4	2.1	10.7	-	-	2.0	1.6	3.1	-	-	-	1.7	-	-	2.0	-	28.2
423	1.6	-	3.4	2.1	10.7	-	-	2.0	1.6	3.1	-	-	-	1.7	-	-	2.0	-	28.2

**Table 7. Adults' consumption rates of green vegetables from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

Observation number	Artichoke	Asparagus	Broccoli	Brussel sprout	Cabbage	Calabrese	Callaloo (Amaranthus sp.)	Cauliflower	Chard	Courgettes	Cucumber	Herbs	Kale	Lettuce	Marrow	Pak choi	Rocket	Spinach	Total
424	1.6	-	3.4	2.1	10.7	-	-	2.0	1.6	3.1	-	-	-	1.7	-	-	2.0	-	28.2
123	-	-	-	5.5	9.1	2.2	-	3.4	-	6.1	1.4	-	-	-	-	-	-	-	27.7
124	-	-	-	5.5	9.1	2.2	-	3.4	-	6.1	1.4	-	-	-	-	-	-	-	27.7
125	-	-	-	5.5	9.1	2.2	-	3.4	-	6.1	1.4	-	-	-	-	-	-	-	27.7
128	-	-	-	5.5	9.1	2.2	-	3.4	-	6.1	1.4	-	-	-	-	-	-	-	27.7
122	-	-	-	5.5	9.1	2.2	-	3.4	-	6.1	1.4	-	-	-	-	-	-	-	27.7
126	-	-	-	5.5	9.1	2.2	-	3.4	-	6.1	1.4	-	-	-	-	-	-	-	27.7
127	-	-	-	5.5	9.1	2.2	-	3.4	-	6.1	1.4	-	-	-	-	-	-	-	27.7
129	-	-	-	5.5	9.1	2.2	-	3.4	-	6.1	1.4	-	-	-	-	-	-	-	27.7
12	-	-	2.4	-	0.5	-	-	2.4	-	-	20.4	-	-	1.8	-	-	-	-	27.6
13	-	-	2.4	-	0.5	-	-	2.4	-	-	20.4	-	-	1.8	-	-	-	-	27.6
110	-	-	7.5	4.6	6.1	-	-	1.9	-	-	4.3	-	-	-	2.7	-	-	-	26.9
111	-	-	7.5	4.6	6.1	-	-	1.9	-	-	4.3	-	-	-	2.7	-	-	-	26.9
131	-	-	9.0	-	12.2	-	-	-	-	2.2	2.0	-	-	-	-	-	-	-	25.4
132	-	-	9.0	-	12.2	-	-	-	-	2.2	2.0	-	-	-	-	-	-	-	25.4
133	-	-	9.0	-	12.2	-	-	-	-	2.2	2.0	-	-	-	-	-	-	-	25.4
134	-	-	9.0	-	12.2	-	-	-	-	2.2	2.0	-	-	-	-	-	-	-	25.4
297	-	-	7.5	9.1	5.7	-	-	2.3	-	-	-	-	-	-	-	-	-	-	24.5
298	-	-	7.5	9.1	5.7	-	-	2.3	-	-	-	-	-	-	-	-	-	-	24.5
299	-	-	7.5	9.1	5.7	-	-	2.3	-	-	-	-	-	-	-	-	-	-	24.5
300	-	-	7.5	9.1	5.7	-	-	2.3	-	-	-	-	-	-	-	-	-	-	24.5
114	-	-	1.6	1.0	6.3	1.3	-	-	-	5.9	2.7	0.1	4.5	-	-	-	-	-	23.5
115	-	-	1.6	1.0	6.3	1.3	-	-	-	5.9	2.7	0.1	4.5	-	-	-	-	-	23.5
116	-	-	1.6	1.0	6.3	1.3	-	-	-	5.9	2.7	0.1	4.5	-	-	-	-	-	23.5
199	-	-	4.5	2.7	11.0	-	-	1.4	-	1.8	-	-	-	1.8	-	-	-	-	23.2

**Table 7. Adults' consumption rates of green vegetables from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

Observation number	Artichoke	Asparagus	Broccoli	Brussel sprout	Cabbage	Calabrese	Callaloo (Amaranthus sp.)	Cauliflower	Chard	Courgettes	Cucumber	Herbs	Kale	Lettuce	Marrow	Pak choi	Rocket	Spinach	Total
118	-	-	4.5	2.7	11.0	-	-	1.4	-	1.8	-	-	-	1.8	-	-	-	-	23.2
119	-	-	4.5	2.7	11.0	-	-	1.4	-	1.8	-	-	-	1.8	-	-	-	-	23.2
198	-	-	4.5	2.7	11.0	-	-	1.4	-	1.8	-	-	-	1.8	-	-	-	-	23.2
195	-	-	-	3.0	8.1	-	-	2.5	-	3.7	4.5	-	-	1.0	-	-	-	-	22.9
196	-	-	-	3.0	8.1	-	-	2.5	-	3.7	4.5	-	-	1.0	-	-	-	-	22.9
197	-	-	-	3.0	8.1	-	-	2.5	-	3.7	4.5	-	-	1.0	-	-	-	-	22.9
167	2.4	0.7	2.5	1.5	12.2	-	-	-	-	1.6	0.8	-	-	-	-	-	-	-	21.7
168	2.4	0.7	2.5	1.5	12.2	-	-	-	-	1.6	0.8	-	-	-	-	-	-	-	21.7
170	2.4	0.7	2.5	1.5	12.2	-	-	-	-	1.6	0.8	-	-	-	-	-	-	-	21.7
164	2.4	0.7	2.5	1.5	12.2	-	-	-	-	1.6	0.8	-	-	-	-	-	-	-	21.7
165	2.4	0.7	2.5	1.5	12.2	-	-	-	-	1.6	0.8	-	-	-	-	-	-	-	21.7
166	2.4	0.7	2.5	1.5	12.2	-	-	-	-	1.6	0.8	-	-	-	-	-	-	-	21.7
169	2.4	0.7	2.5	1.5	12.2	-	-	-	-	1.6	0.8	-	-	-	-	-	-	-	21.7
171	2.4	0.7	2.5	1.5	12.2	-	-	-	-	1.6	0.8	-	-	-	-	-	-	-	21.7
172	2.4	0.7	2.5	1.5	12.2	-	-	-	-	1.6	0.8	-	-	-	-	-	-	-	21.7
323	-	-	-	3.1	12.3	-	-	-	-	3.3	3.0	-	-	-	-	-	-	-	21.7
324	-	-	-	3.1	12.3	-	-	-	-	3.3	3.0	-	-	-	-	-	-	-	21.7
177	-	-	-	1.1	15.2	-	-	-	-	1.8	-	-	-	-	-	-	-	-	18.2
178	-	-	-	1.1	15.2	-	-	-	-	1.8	-	-	-	-	-	-	-	-	18.2
305	-	-	5.9	-	4.0	-	-	5.0	-	-	-	0.8	-	-	-	-	-	-	15.7
306	-	-	5.9	-	4.0	-	-	5.0	-	-	-	0.8	-	-	-	-	-	-	15.7
318	-	-	-	-	9.1	-	-	5.6	-	-	0.9	-	-	-	-	-	-	-	15.6
328	-	-	-	-	9.1	-	-	5.6	-	-	0.9	-	-	-	-	-	-	-	15.6
326	-	-	-	4.1	5.5	-	-	-	-	-	-	-	5.8	-	-	-	-	-	15.3
327	-	-	-	4.1	5.5	-	-	-	-	-	-	-	5.8	-	-	-	-	-	15.3
7	-	-	1.9	2.3	3.0	-	-	0.9	-	5.1	-	-	-	0.8	-	-	-	-	13.9





**Table 7. Adults' consumption rates of green vegetables from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

Observation number	Artichoke	Asparagus	Broccoli	Brussel sprout	Cabbage	Calabrese	Callaloo (Amaranthus sp.)	Cauliflower	Chard	Courgettes	Cucumber	Herbs	Kale	Lettuce	Marrow	Pak choi	Rocket	Spinach	Total
193	-	-	-	-	-	-	-	-	-	2.8	3.4	-	-	-	-	-	-	-	6.2
194	-	-	-	-	-	-	-	-	-	2.8	3.4	-	-	-	-	-	-	-	6.2
1	-	-	-	-	3.7	-	-	1.5	-	-	-	-	-	-	-	-	-	-	5.2
303	-	-	1.5	1.8	1.1	-	-	0.5	-	-	-	-	-	-	-	-	-	-	4.9
179	-	-	-	0.3	3.8	-	-	-	-	0.5	-	-	-	-	-	-	-	-	4.6
180	-	-	-	0.3	3.8	-	-	-	-	0.5	-	-	-	-	-	-	-	-	4.6
181	-	-	-	0.3	3.8	-	-	-	-	0.5	-	-	-	-	-	-	-	-	4.6
182	-	-	-	0.3	3.8	-	-	-	-	0.5	-	-	-	-	-	-	-	-	4.6
183	-	-	-	0.3	3.8	-	-	-	-	0.5	-	-	-	-	-	-	-	-	4.6
184	-	-	-	0.3	3.8	-	-	-	-	0.5	-	-	-	-	-	-	-	-	4.6
185	-	-	-	0.3	3.8	-	-	-	-	0.5	-	-	-	-	-	-	-	-	4.6
186	-	-	-	0.3	3.8	-	-	-	-	0.5	-	-	-	-	-	-	-	-	4.6
412	-	-	-	0.5	1.2	-	-	-	-	2.2	-	-	-	-	-	-	-	-	3.9
413	-	-	-	0.5	1.2	-	-	-	-	2.2	-	-	-	-	-	-	-	-	3.9
414	-	-	-	0.5	1.2	-	-	-	-	2.2	-	-	-	-	-	-	-	-	3.9
415	-	-	-	0.5	1.2	-	-	-	-	2.2	-	-	-	-	-	-	-	-	3.9
416	-	-	-	0.5	1.2	-	-	-	-	2.2	-	-	-	-	-	-	-	-	3.9
417	-	-	-	0.5	1.2	-	-	-	-	2.2	-	-	-	-	-	-	-	-	3.9
408	-	-	-	1.4	1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	3.2
307	-	-	1.2	-	0.8	-	-	1.0	-	-	-	0.2	-	-	-	-	-	-	3.1
309	-	-	1.2	-	0.8	-	-	1.0	-	-	-	0.2	-	-	-	-	-	-	3.1
59	-	-	0.2	-	1.3	-	-	-	-	-	-	0.5	-	-	1.1	-	-	-	3.1
60	-	-	0.2	-	1.3	-	-	-	-	-	-	0.5	-	-	1.1	-	-	-	3.1
225	-	-	-	-	2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	2.5
226	-	-	-	-	2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	2.5
117	-	-	0.2	0.1	0.6	0.1	-	-	-	0.6	0.3	0.01	0.5	-	-	-	-	-	2.3
234	-	-	-	-	-	-	-	-	-	-	1.0	-	-	0.7	-	-	-	-	1.7

**Table 7. Adults' consumption rates of green vegetables from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

Observation number	Artichoke	Asparagus	Broccoli	Brussel sprout	Cabbage	Calabrese	Callaloo (Amaranthus sp.)	Cauliflower	Chard	Courgettes	Cucumber	Herbs	Kale	Lettuce	Marrow	Pak choi	Rocket	Spinach	Total
406	-	-	-	-	-	-	-	-	-	1.5	-	-	-	-	-	-	-	-	1.5
407	-	-	-	-	-	-	-	-	-	1.5	-	-	-	-	-	-	-	-	1.5

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of green vegetables based on the 69 high-rate adult consumers is 27.7 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 159 observations is 39.5 kg y<sup>-1</sup>

**Table 8. Adults' consumption rates of other vegetables from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

Observation number	Aubergine	Broad bean	Chilli pepper	French bean	Pea	Pepper	Pumpkin	Runner bean	Squash	Sweetcorn	Tomatillos ( <i>Physalis sp.</i> )	Tomato	Total
16	-	-	-	-	-	-	1.6	54.4	-	1.8	-	28.8	86.6
15	-	-	-	-	-	-	1.6	54.4	-	1.8	-	28.8	86.6
109	-	9.1	-	5.4	4.5	1.0	-	13.6	0.1	1.4	-	21.6	56.7
12	-	-	-	-	8.1	3.5	-	-	-	1.4	-	43.2	56.2
13	-	-	-	-	8.1	3.5	-	-	-	1.4	-	43.2	56.2
285	-	9.4	-	2.6	15.3	-	-	8.5	-	3.4	-	15.9	55.0
284	-	9.4	-	2.6	15.3	-	-	8.5	-	3.4	-	15.9	55.0
118	-	-	-	-	8.1	4.9	-	10.2	0.1	6.9	-	13.5	43.7
119	-	-	-	-	8.1	4.9	-	10.2	0.1	6.9	-	13.5	43.7
198	-	-	-	-	8.1	4.9	-	10.2	0.1	6.9	-	13.5	43.7
199	-	-	-	-	8.1	4.9	-	10.2	0.1	6.9	-	13.5	43.7
2	-	12.6	-	-	10.4	-	-	12.6	-	-	-	7.1	42.7
3	-	12.6	-	-	10.4	-	-	12.6	-	-	-	7.1	42.7
10	-	-	-	2.2	10.8	-	-	27.2	-	1.8	-	-	42.0
102	-	-	-	-	-	-	9.8	19.0	8.1	1.4	-	-	38.3
103	-	-	-	-	-	-	9.8	19.0	8.1	1.4	-	-	38.3
104	-	-	-	-	-	-	9.8	19.0	8.1	1.4	-	-	38.3
105	-	-	-	-	-	-	9.8	19.0	8.1	1.4	-	-	38.3
114	3.3	-	0.2	5.7	-	-	-	13.5	0.4	-	-	11.7	34.9
115	3.3	-	0.2	5.7	-	-	-	13.5	0.4	-	-	11.7	34.9
116	3.3	-	0.2	5.7	-	-	-	13.5	0.4	-	-	11.7	34.9
408	-	-	-	15.4	-	-	1.2	8.2	-	9.0	-	-	33.7
112	-	-	-	-	13.5	-	2.9	13.6	-	3.0	-	-	33.1
113	-	-	-	-	13.5	-	2.9	13.6	-	3.0	-	-	33.1
122	-	-	-	-	4.1	-	0.3	12.2	12.1	3.2	-	-	31.9
123	-	-	-	-	4.1	-	0.3	12.2	12.1	3.2	-	-	31.9
124	-	-	-	-	4.1	-	0.3	12.2	12.1	3.2	-	-	31.9
125	-	-	-	-	4.1	-	0.3	12.2	12.1	3.2	-	-	31.9
126	-	-	-	-	4.1	-	0.3	12.2	12.1	3.2	-	-	31.9
127	-	-	-	-	4.1	-	0.3	12.2	12.1	3.2	-	-	31.9
128	-	-	-	-	4.1	-	0.3	12.2	12.1	3.2	-	-	31.9
129	-	-	-	-	4.1	-	0.3	12.2	12.1	3.2	-	-	31.9
166	-	6.1	-	-	6.0	-	-	18.1	-	0.4	-	1.2	31.8
168	-	6.1	-	-	6.0	-	-	18.1	-	0.4	-	1.2	31.8
164	-	6.1	-	-	6.0	-	-	18.1	-	0.4	-	1.2	31.8
165	-	6.1	-	-	6.0	-	-	18.1	-	0.4	-	1.2	31.8
167	-	6.1	-	-	6.0	-	-	18.1	-	0.4	-	1.2	31.8
169	-	6.1	-	-	6.0	-	-	18.1	-	0.4	-	1.2	31.8
170	-	6.1	-	-	6.0	-	-	18.1	-	0.4	-	1.2	31.8
171	-	6.1	-	-	6.0	-	-	18.1	-	0.4	-	1.2	31.8
172	-	6.1	-	-	6.0	-	-	18.1	-	0.4	-	1.2	31.8
120	-	-	-	4.9	0.7	-	-	18.4	-	2.6	-	3.2	29.7
121	-	-	-	4.9	0.7	-	-	18.4	-	2.6	-	3.2	29.7
4	-	-	-	7.1	3.6	-	0.3	16.7	0.1	0.6	-	0.2	28.5
6	-	-	-	7.1	3.6	-	0.3	16.7	0.1	0.6	-	0.2	28.5
5	-	-	-	7.1	3.6	-	0.3	16.7	0.1	0.6	-	0.2	28.5
110	-	4.6	-	2.7	2.3	0.5	-	6.8	0.1	0.7	-	10.8	28.3
111	-	4.6	-	2.7	2.3	0.5	-	6.8	0.1	0.7	-	10.8	28.3
288	-	10.2	-	1.6	-	-	-	-	1.0	3.1	-	12.2	28.1
289	-	10.2	-	1.6	-	-	-	-	1.0	3.1	-	12.2	28.1

**Table 8. Adults' consumption rates of other vegetables from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

Observation number	Aubergine	Broad bean	Chilli pepper	French bean	Pea	Pepper	Pumpkin	Runner bean	Squash	Sweetcorn	Tomatillos ( <i>Physalis</i> sp.)	Tomato	Total
323	-	-	-	-	-	-	0.9	14.3	-	-	-	12.6	27.8
324	-	-	-	-	-	-	0.9	14.3	-	-	-	12.6	27.8
17	-	-	-	1.4	-	-	9.4	10.9	-	4.6	-	-	26.3
134	-	7.3	-	4.3	10.8	-	-	-	-	0.9	-	-	23.3
131	-	7.3	-	4.3	10.8	-	-	-	-	0.9	-	-	23.3
132	-	7.3	-	4.3	10.8	-	-	-	-	0.9	-	-	23.3
133	-	7.3	-	4.3	10.8	-	-	-	-	0.9	-	-	23.3
175	-	6.8	-	-	3.4	-	-	10.2	-	1.7	-	-	22.1
176	-	6.8	-	-	3.4	-	-	10.2	-	1.7	-	-	22.1
233	-	-	-	-	-	-	-	12.1	-	-	-	9.6	21.7
235	-	-	-	-	-	-	-	12.1	-	-	-	9.6	21.7
161	-	2.3	-	-	1.1	-	-	6.8	10.1	-	-	-	20.3
162	-	2.3	-	-	1.1	-	-	6.8	10.1	-	-	-	20.3
163	-	2.3	-	-	1.1	-	-	6.8	10.1	-	-	-	20.3
423	0.7	7.5	0.2	0.5	-	2.9	-	-	0.6	3.8	-	1.7	17.8
424	0.7	7.5	0.2	0.5	-	2.9	-	-	0.6	3.8	-	1.7	17.8
425	0.7	7.5	0.2	0.5	-	2.9	-	-	0.6	3.8	-	1.7	17.8
409	-	-	-	10.3	-	-	0.2	2.6	-	4.3	-	-	17.3
410	-	-	-	10.3	-	-	0.2	2.6	-	4.3	-	-	17.3
411	-	-	-	10.3	-	-	0.2	2.6	-	4.3	-	-	17.3
143	-	-	-	4.1	5.1	0.7	-	-	0.1	0.6	-	6.8	17.2
144	-	-	-	4.1	5.1	0.7	-	-	0.1	0.6	-	6.8	17.2
145	-	-	-	4.1	5.1	0.7	-	-	0.1	0.6	-	6.8	17.2
146	-	-	-	4.1	5.1	0.7	-	-	0.1	0.6	-	6.8	17.2
177	-	-	-	1.4	1.1	-	0.7	12.5	-	0.9	-	-	16.6
178	-	-	-	1.4	1.1	-	0.7	12.5	-	0.9	-	-	16.6
8	-	3.4	-	-	-	-	-	-	-	0.6	-	12.6	16.6
9	-	3.4	-	-	-	-	-	-	-	0.6	-	12.6	16.6
287	-	-	-	1.8	-	-	-	13.6	-	1.2	-	-	16.6
191	-	-	-	-	-	-	-	13.6	-	2.3	-	-	15.9
192	-	-	-	-	-	-	-	13.6	-	2.3	-	-	15.9
193	-	-	-	-	-	-	-	13.6	-	2.3	-	-	15.9
194	-	-	-	-	-	-	-	13.6	-	2.3	-	-	15.9
195	-	-	-	-	-	-	-	9.1	-	3.1	-	3.6	15.7
196	-	-	-	-	-	-	-	9.1	-	3.1	-	3.6	15.7
197	-	-	-	-	-	-	-	9.1	-	3.1	-	3.6	15.7
316	-	0.8	0.2	-	6.8	0.7	0.7	3.1	-	-	-	2.7	15.0
317	-	0.8	0.2	-	6.8	0.7	0.7	3.1	-	-	-	2.7	15.0
11	-	-	-	2.2	10.8	-	-	-	-	1.8	-	-	14.8
305	-	6.1	-	1.2	3.0	-	-	2.0	0.6	1.8	-	-	14.7
306	-	6.1	-	1.2	3.0	-	-	2.0	0.6	1.8	-	-	14.7
319	-	2.7	-	-	-	-	-	8.2	-	-	-	3.6	14.5
320	-	2.7	-	-	-	-	-	8.2	-	-	-	3.6	14.5
7	-	-	-	-	-	-	-	-	-	0.6	-	12.6	13.2
148	-	-	-	2.7	3.4	0.5	-	-	0.04	0.4	-	4.5	11.5
149	-	-	-	2.7	3.4	0.5	-	-	0.04	0.4	-	4.5	11.5
147	-	-	-	2.7	3.4	0.5	-	-	0.04	0.4	-	4.5	11.5
150	-	-	-	2.7	3.4	0.5	-	-	0.04	0.4	-	4.5	11.5
151	-	-	-	2.7	3.4	0.5	-	-	0.04	0.4	-	4.5	11.5
152	-	-	-	2.7	3.4	0.5	-	-	0.04	0.4	-	4.5	11.5

**Table 8. Adults' consumption rates of other vegetables from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

Observation number	Aubergine	Broad bean	Chilli pepper	French bean	Pea	Pepper	Pumpkin	Runner bean	Squash	Sweetcorn	Tomatillos ( <i>Physalis</i> sp.)	Tomato	Total
106	-	-	1.6	-	-	0.8	1.0	5.4	-	0.5	-	1.4	10.6
412	-	-	-	-	-	-	1.2	5.4	-	3.5	-	-	10.1
1	-	2.7	-	2.2	0.9	-	-	-	-	-	-	4.3	10.1
413	-	-	-	-	-	-	1.2	5.4	-	3.5	-	-	10.1
414	-	-	-	-	-	-	1.2	5.4	-	3.5	-	-	10.1
415	-	-	-	-	-	-	1.2	5.4	-	3.5	-	-	10.1
416	-	-	-	-	-	-	1.2	5.4	-	3.5	-	-	10.1
417	-	-	-	-	-	-	1.2	5.4	-	3.5	-	-	10.1
286	-	-	-	2.8	-	-	-	-	-	1.4	-	5.4	9.5
158	-	-	-	-	-	-	-	9.1	-	-	-	-	9.1
159	-	-	-	-	-	-	-	9.1	-	-	-	-	9.1
160	-	-	-	-	-	-	-	9.1	-	-	-	-	9.1
318	-	6.8	-	-	-	-	-	-	-	-	-	1.8	8.6
328	-	6.8	-	-	-	-	-	-	-	-	-	1.8	8.6
135	-	-	-	-	1.7	-	-	4.2	-	-	-	-	5.8
136	-	-	-	-	1.7	-	-	4.2	-	-	-	-	5.8
137	-	-	-	-	1.7	-	-	4.2	-	-	-	-	5.8
234	-	-	-	-	-	-	-	3.0	-	-	-	2.4	5.4
321	-	0.9	-	-	-	-	-	2.7	-	-	-	1.2	4.8
322	-	0.9	-	-	-	-	-	2.7	-	-	-	1.2	4.8
290	-	-	-	-	-	-	-	4.4	-	-	-	-	4.4
291	-	-	-	-	-	-	-	4.4	-	-	-	-	4.4
292	-	-	-	-	-	-	-	4.4	-	-	-	-	4.4
293	-	-	-	-	-	-	-	4.4	-	-	-	-	4.4
294	-	-	-	-	-	-	-	4.4	-	-	-	-	4.4
295	-	-	-	-	-	-	-	4.4	-	-	-	-	4.4
296	-	-	-	-	-	-	-	4.4	-	-	-	-	4.4
181	-	-	-	0.3	0.3	-	0.2	3.1	-	0.2	-	-	4.2
184	-	-	-	0.3	0.3	-	0.2	3.1	-	0.2	-	-	4.2
179	-	-	-	0.3	0.3	-	0.2	3.1	-	0.2	-	-	4.2
180	-	-	-	0.3	0.3	-	0.2	3.1	-	0.2	-	-	4.2
182	-	-	-	0.3	0.3	-	0.2	3.1	-	0.2	-	-	4.2
183	-	-	-	0.3	0.3	-	0.2	3.1	-	0.2	-	-	4.2
185	-	-	-	0.3	0.3	-	0.2	3.1	-	0.2	-	-	4.2
186	-	-	-	0.3	0.3	-	0.2	3.1	-	0.2	-	-	4.2
297	-	2.3	-	1.6	-	-	-	-	-	-	-	-	3.9
298	-	2.3	-	1.6	-	-	-	-	-	-	-	-	3.9
299	-	2.3	-	1.6	-	-	-	-	-	-	-	-	3.9
300	-	2.3	-	1.6	-	-	-	-	-	-	-	-	3.9
117	0.3	-	0.02	0.6	-	-	-	1.4	0.04	-	-	1.2	3.5
138	-	-	-	-	1.0	-	-	2.5	-	-	-	-	3.5
139	-	-	-	-	1.0	-	-	2.5	-	-	-	-	3.5
140	-	-	-	-	1.0	-	-	2.5	-	-	-	-	3.5
141	-	-	-	-	1.0	-	-	2.5	-	-	-	-	3.5
142	-	-	-	-	1.0	-	-	2.5	-	-	-	-	3.5
309	-	1.2	-	0.2	0.6	-	-	0.4	0.1	0.4	-	-	2.9
307	-	1.2	-	0.2	0.6	-	-	0.4	0.1	0.4	-	-	2.9
225	-	-	-	-	-	-	-	1.6	-	-	-	-	1.6
226	-	-	-	-	-	-	-	1.6	-	-	-	-	1.6
59	-	-	-	-	-	-	1.0	-	-	-	0.6	-	1.5

**Table 8. Adults' consumption rates of other vegetables from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

Observation number	Aubergine	Broad bean	Chilli pepper	French bean	Pea	Pepper	Pumpkin	Runner bean	Squash	Sweetcorn	Tomatillos ( <i>Physalis</i> sp.)	Tomato	Total
60	-	-	-	-	-	-	1.0	-	-	-	0.6	-	1.5
350	-	-	-	-	-	-	-	-	-	-	-	0.9	0.9
351	-	-	-	-	-	-	-	-	-	-	-	0.9	0.9
303	-	0.5	-	0.3	-	-	-	-	-	-	-	-	0.8
326	-	-	-	-	-	-	-	-	-	0.3	-	-	0.3
327	-	-	-	-	-	-	-	-	-	0.3	-	-	0.3
325	-	-	-	-	-	-	-	-	-	0.3	-	-	0.3
107	-	-	-	-	-	-	-	-	0.1	-	-	-	0.1
108	-	-	-	-	-	-	-	-	0.1	-	-	-	0.1

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of other vegetables based on the 43 high-rate adult consumers is 39.8 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 159 observations is 56.2 kg y<sup>-1</sup>





**Table 9. Adults' consumption rates of root vegetables from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

Observation number	Beetroot	Carrot	Celeriac	Celery	Fennel	Garlic	Jerusalem artichoke	Kohl rabi	Leek	Onion	Parsnip	Radish	Shallot	Spring onion	Swede	Sweet potato	Turnip	Total
324	-	-	-	-	-	-	-	-	-	8.4	-	-	-	-	-	-	-	8.4
286	5.3	-	-	-	-	-	-	-	2.4	-	-	-	-	-	-	-	-	7.7
138	-	-	-	-	-	-	-	-	2.5	5.0	-	-	-	-	-	-	-	7.5
139	-	-	-	-	-	-	-	-	2.5	5.0	-	-	-	-	-	-	-	7.5
140	-	-	-	-	-	-	-	-	2.5	5.0	-	-	-	-	-	-	-	7.5
141	-	-	-	-	-	-	-	-	2.5	5.0	-	-	-	-	-	-	-	7.5
142	-	-	-	-	-	-	-	-	2.5	5.0	-	-	-	-	-	-	-	7.5
158	-	1.5	-	-	-	-	-	-	3.0	2.4	-	-	-	-	-	-	-	6.9
159	-	1.5	-	-	-	-	-	-	3.0	2.4	-	-	-	-	-	-	-	6.9
160	-	1.5	-	-	-	-	-	-	3.0	2.4	-	-	-	-	-	-	-	6.9
291	-	1.0	-	-	-	-	-	-	2.0	2.2	1.3	-	-	-	-	-	-	6.5
292	-	1.0	-	-	-	-	-	-	2.0	2.2	1.3	-	-	-	-	-	-	6.5
293	-	1.0	-	-	-	-	-	-	2.0	2.2	1.3	-	-	-	-	-	-	6.5
295	-	1.0	-	-	-	-	-	-	2.0	2.2	1.3	-	-	-	-	-	-	6.5
296	-	1.0	-	-	-	-	-	-	2.0	2.2	1.3	-	-	-	-	-	-	6.5
290	-	1.0	-	-	-	-	-	-	2.0	2.2	1.3	-	-	-	-	-	-	6.5
294	-	1.0	-	-	-	-	-	-	2.0	2.2	1.3	-	-	-	-	-	-	6.5
17	-	3.6	-	-	-	-	-	-	-	2.9	-	-	-	-	-	-	-	6.5
1	-	-	-	-	-	-	-	-	1.8	1.4	1.4	-	-	-	-	-	-	4.7
180	-	0.6	-	-	-	-	0.5	-	-	3.6	-	-	-	-	-	-	-	4.6
181	-	0.6	-	-	-	-	0.5	-	-	3.6	-	-	-	-	-	-	-	4.6
182	-	0.6	-	-	-	-	0.5	-	-	3.6	-	-	-	-	-	-	-	4.6
183	-	0.6	-	-	-	-	0.5	-	-	3.6	-	-	-	-	-	-	-	4.6
185	-	0.6	-	-	-	-	0.5	-	-	3.6	-	-	-	-	-	-	-	4.6
184	-	0.6	-	-	-	-	0.5	-	-	3.6	-	-	-	-	-	-	-	4.6
186	-	0.6	-	-	-	-	0.5	-	-	3.6	-	-	-	-	-	-	-	4.6
12	-	-	-	-	-	-	-	-	-	4.0	-	-	-	-	-	-	-	4.0
13	-	-	-	-	-	-	-	-	-	4.0	-	-	-	-	-	-	-	4.0
225	-	1.6	-	-	-	-	-	-	-	1.6	-	-	-	-	-	-	-	3.3
226	-	1.6	-	-	-	-	-	-	-	1.6	-	-	-	-	-	-	-	3.3
409	-	-	-	-	-	-	-	-	3.2	-	-	-	-	-	-	-	-	3.2
410	-	-	-	-	-	-	-	-	3.2	-	-	-	-	-	-	-	-	3.2
411	-	-	-	-	-	-	-	-	3.2	-	-	-	-	-	-	-	-	3.2
234	1.8	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.8
307	0.5	0.6	-	-	-	-	-	-	0.4	-	-	-	0.3	-	-	-	0.4	2.2
309	0.5	0.6	-	-	-	-	-	-	0.4	-	-	-	0.3	-	-	-	0.4	2.2
117	-	-	-	-	-	-	-	-	2.0	0.1	-	-	-	-	-	-	-	2.1
106	-	-	-	-	-	-	-	-	0.9	-	-	-	-	0.6	-	-	-	1.5
59	-	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-	-	0.2
60	-	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-	-	0.2

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of root vegetables based on the 48 high-rate adult consumers is 40.5 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 157 observations is 52.8 kg y<sup>-1</sup>

**Table 10. Adults' consumption rates of potato from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

<b>Observation number</b>	<b>Potato</b>
<b>109</b>	<b>227.5</b>
<b>15</b>	<b>145.6</b>
<b>16</b>	<b>145.6</b>
<b>110</b>	<b>113.8</b>
<b>111</b>	<b>113.8</b>
<b>2</b>	<b>110.5</b>
<b>3</b>	<b>110.5</b>
<b>10</b>	<b>109.2</b>
<b>11</b>	<b>109.2</b>
<b>284</b>	<b>89.0</b>
<b>285</b>	<b>89.0</b>
<b>118</b>	<b>81.9</b>
<b>119</b>	<b>81.9</b>
<b>198</b>	<b>81.9</b>
<b>199</b>	<b>81.9</b>
112	72.8
113	72.8
4	65.3
5	65.3
6	65.3
323	61.4
324	61.4
122	54.6
123	54.6
124	54.6
125	54.6
126	54.6
127	54.6
128	54.6
129	54.6
177	54.6
178	54.6
114	51.7
115	51.7
116	51.7
107	50.5
108	50.5
120	49.1
121	49.1
161	45.5
162	45.5
163	45.5
326	45.0
327	45.0
143	41.0
144	41.0
145	41.0
146	41.0
175	41.0
176	41.0
325	37.5
164	36.4
165	36.4
166	36.4
167	36.4

**Table 10. Adults' consumption rates of potato from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

<b>Observation number</b>	<b>Potato</b>
168	36.4
169	36.4
170	36.4
171	36.4
172	36.4
316	34.1
317	34.1
233	32.4
235	32.4
7	31.9
8	31.9
9	31.9
131	29.1
132	29.1
133	29.1
134	29.1
288	28.7
289	28.7
147	27.3
148	27.3
149	27.3
150	27.3
151	27.3
152	27.3
195	24.3
196	24.3
197	24.3
102	21.8
103	21.8
104	21.8
105	21.8
106	19.1
17	18.2
191	18.2
192	18.2
193	18.2
194	18.2
297	16.7
298	16.7
299	16.7
300	16.7
135	16.7
136	16.7
137	16.7
12	13.7
13	13.7
179	13.7
180	13.7
181	13.7
182	13.7
183	13.7
184	13.7
185	13.7
186	13.7
158	12.1

**Table 10. Adults' consumption rates of potato from the Derby terrestrial survey area ( $\text{kg y}^{-1}$ )**

<b>Observation number</b>	<b>Potato</b>
159	12.1
160	12.1
319	10.9
320	10.9
138	10.0
139	10.0
140	10.0
141	10.0
142	10.0
305	9.4
306	9.4
287	9.1
225	8.2
226	8.2
234	8.1
1	5.5
117	5.2
321	3.6
322	3.6
303	3.3
406	2.3
407	2.3
307	1.9
309	1.9
59	1.1
60	1.1
313	1.1
314	1.1

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of potato based on the 15 high-rate adult consumers is  $112.7 \text{ kg y}^{-1}$

The observed 97.5<sup>th</sup> percentile rate based on 138 observations is  $113.8 \text{ kg y}^{-1}$

**Table 11. Adults' consumption rates of domestic fruit from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

Observation number	Apple	Apricot	Blackberry	Blackcurrant	Blueberry	Cherry	Damson	Fig	Gooseberry	Grapes	Greengages	Loganberry	Pear	Plum	Raspberry	Redcurrants	Rhubarb	Strawberry	Whitecurrant	Total
15	18.1	-	-	15.3	3.3	-	8.2	-	-	-	-	9.5	-	21.8	5.4	-	-	15.2	-	96.9
16	18.1	-	-	15.3	3.3	-	8.2	-	-	-	-	9.5	-	21.8	5.4	-	-	15.2	-	96.9
119	11.3	-	2.3	0.5	-	-	-	-	3.4	-	-	-	-	6.8	1.1	1.4	-	14.3	-	41.0
118	11.3	-	2.3	0.5	-	-	-	-	3.4	-	-	-	-	6.8	1.1	1.4	-	14.3	-	41.0
120	-	-	1.9	2.7	-	-	4.8	-	6.0	-	6.8	-	-	1.8	1.5	-	2.3	12.9	-	40.6
121	-	-	1.9	2.7	-	-	4.8	-	6.0	-	6.8	-	-	1.8	1.5	-	2.3	12.9	-	40.6
198	11.3	-	-	0.5	-	-	-	-	3.4	-	-	-	-	3.4	1.1	1.4	-	14.3	-	35.4
199	11.3	-	-	0.5	-	-	-	-	3.4	-	-	-	-	3.4	1.1	1.4	-	14.3	-	35.4
289	-	-	-	12.8	-	-	-	-	7.4	-	-	-	-	-	6.1	-	2.1	6.4	-	34.7
288	-	-	-	12.8	-	-	-	-	7.4	-	-	-	-	-	6.1	-	2.1	6.4	-	34.7
112	5.7	-	-	-	-	-	-	-	2.3	-	-	-	0.7	5.7	6.8	-	0.9	4.5	-	26.5
113	5.7	-	-	-	-	-	-	-	2.3	-	-	-	0.7	5.7	6.8	-	0.9	4.5	-	26.5
109	5.0	-	-	-	-	7.0	-	-	-	-	-	-	-	-	-	-	-	9.5	-	21.5
323	2.3	-	-	-	-	-	-	-	-	-	-	-	-	15.3	-	-	-	3.2	-	20.8
324	2.3	-	-	-	-	-	-	-	-	-	-	-	-	15.3	-	-	-	3.2	-	20.8
12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.4	-	1.4	16.3	-	19.1
13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.4	-	1.4	16.3	-	19.1
177	0.5	-	-	0.5	-	-	-	-	0.5	-	-	-	0.5	3.0	-	-	7.5	5.0	-	17.5
178	0.5	-	-	0.5	-	-	-	-	0.5	-	-	-	0.5	3.0	-	-	7.5	5.0	-	17.5
114	-	-	1.8	3.5	-	-	-	-	-	2.0	-	-	-	-	2.9	4.7	-	-	-	14.9
115	-	-	1.8	3.5	-	-	-	-	-	2.0	-	-	-	-	2.9	4.7	-	-	-	14.9
116	-	-	1.8	3.5	-	-	-	-	-	2.0	-	-	-	-	2.9	4.7	-	-	-	14.9
284	7.9	-	-	1.5	-	-	-	-	-	-	-	-	-	-	2.3	-	2.3	-	-	13.9
285	7.9	-	-	1.5	-	-	-	-	-	-	-	-	-	-	2.3	-	2.3	-	-	13.9
7	-	-	-	5.7	-	-	-	-	2.0	-	-	-	-	-	2.3	-	-	3.4	-	13.4
8	-	-	-	5.7	-	-	-	-	2.0	-	-	-	-	-	2.3	-	-	3.4	-	13.4
9	-	-	-	5.7	-	-	-	-	2.0	-	-	-	-	-	2.3	-	-	3.4	-	13.4
110	2.5	-	-	-	-	3.5	-	-	-	-	-	-	-	-	-	-	-	4.8	-	10.8
111	2.5	-	-	-	-	3.5	-	-	-	-	-	-	-	-	-	-	-	4.8	-	10.8
161	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-	1.5	-	0.7	7.9	-	10.3
162	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-	1.5	-	0.7	7.9	-	10.3

**Table 11. Adults' consumption rates of domestic fruit from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

Observation number	Apple	Apricot	Blackberry	Blackcurrant	Blueberry	Cherry	Damson	Fig	Gooseberry	Grapes	Greengages	Loganberry	Pear	Plum	Raspberry	Redcurrants	Rhubarb	Strawberry	Whitecurrant	Total
163	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-	1.5	-	0.7	7.9	-	10.3
191	5.0	-	-	0.3	-	-	-	-	0.3	-	-	-	-	0.5	1.3	-	-	2.5	0.3	10.0
192	5.0	-	-	0.3	-	-	-	-	0.3	-	-	-	-	0.5	1.3	-	-	2.5	0.3	10.0
193	5.0	-	-	0.3	-	-	-	-	0.3	-	-	-	-	0.5	1.3	-	-	2.5	0.3	10.0
194	5.0	-	-	0.3	-	-	-	-	0.3	-	-	-	-	0.5	1.3	-	-	2.5	0.3	10.0
313	3.0	-	-	-	-	0.8	-	-	-	-	-	-	3.0	3.0	-	-	-	-	-	9.8
314	3.0	-	-	-	-	0.8	-	-	-	-	-	-	3.0	3.0	-	-	-	-	-	9.8
131	-	-	0.5	0.5	-	-	-	-	0.5	-	-	-	-	-	0.5	0.5	-	6.8	-	9.3
132	-	-	0.5	0.5	-	-	-	-	0.5	-	-	-	-	-	0.5	0.5	-	6.8	-	9.3
133	-	-	0.5	0.5	-	-	-	-	0.5	-	-	-	-	-	0.5	0.5	-	6.8	-	9.3
134	-	-	0.5	0.5	-	-	-	-	0.5	-	-	-	-	-	0.5	0.5	-	6.8	-	9.3
144	2.3	-	0.9	0.1	-	-	-	-	0.3	1.1	-	-	-	1.1	1.7	-	0.6	0.5	-	8.6
145	2.3	-	0.9	0.1	-	-	-	-	0.3	1.1	-	-	-	1.1	1.7	-	0.6	0.5	-	8.6
146	2.3	-	0.9	0.1	-	-	-	-	0.3	1.1	-	-	-	1.1	1.7	-	0.6	0.5	-	8.6
143	2.3	-	0.9	0.1	-	-	-	-	0.3	1.1	-	-	-	1.1	1.7	-	0.6	0.5	-	8.6
317	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5	-	1.7	5.1	-	8.4
316	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5	-	1.7	5.1	-	8.4
195	3.3	-	-	0.7	-	-	-	-	-	-	-	-	-	-	-	-	1.7	1.7	0.7	8.0
197	3.3	-	-	0.7	-	-	-	-	-	-	-	-	-	-	-	-	1.7	1.7	0.7	8.0
196	3.3	-	-	0.7	-	-	-	-	-	-	-	-	-	-	-	-	1.7	1.7	0.7	8.0
5	-	0.5	2.4	-	-	-	-	-	-	-	-	-	0.5	-	2.0	-	1.8	-	-	7.3
305	-	-	-	0.3	-	-	-	-	0.3	-	-	-	-	-	2.3	0.3	0.5	3.4	-	7.1
306	-	-	-	0.3	-	-	-	-	0.3	-	-	-	-	-	2.3	0.3	0.5	3.4	-	7.1
297	-	-	-	-	-	-	1.7	-	-	-	-	-	-	5.0	-	-	-	-	-	6.7
298	-	-	-	-	-	-	1.7	-	-	-	-	-	-	5.0	-	-	-	-	-	6.7
299	-	-	-	-	-	-	1.7	-	-	-	-	-	-	5.0	-	-	-	-	-	6.7
300	-	-	-	-	-	-	1.7	-	-	-	-	-	-	5.0	-	-	-	-	-	6.7
148	1.5	-	0.6	0.1	-	-	-	-	0.2	0.8	-	-	-	0.8	1.1	-	0.4	0.3	-	5.7
151	1.5	-	0.6	0.1	-	-	-	-	0.2	0.8	-	-	-	0.8	1.1	-	0.4	0.3	-	5.7
152	1.5	-	0.6	0.1	-	-	-	-	0.2	0.8	-	-	-	0.8	1.1	-	0.4	0.3	-	5.7
147	1.5	-	0.6	0.1	-	-	-	-	0.2	0.8	-	-	-	0.8	1.1	-	0.4	0.3	-	5.7

**Table 11. Adults' consumption rates of domestic fruit from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

Observation number	Apple	Apricot	Blackberry	Blackcurrant	Blueberry	Cherry	Damson	Fig	Gooseberry	Grapes	Greengages	Loganberry	Pear	Plum	Raspberry	Redcurrants	Rhubarb	Strawberry	Whitecurrant	Total
149	1.5	-	0.6	0.1	-	-	-	-	0.2	0.8	-	-	-	0.8	1.1	-	0.4	0.3	-	5.7
150	1.5	-	0.6	0.1	-	-	-	-	0.2	0.8	-	-	-	0.8	1.1	-	0.4	0.3	-	5.7
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.7	-	-	5.0	-	5.7
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.7	-	-	5.0	-	5.7
318	-	-	-	-	-	-	-	-	-	-	-	-	2.8	2.8	-	-	-	-	-	5.7
328	-	-	-	-	-	-	-	-	-	-	-	-	2.8	2.8	-	-	-	-	-	5.7
423	3.0	-	-	-	-	-	0.9	-	-	-	-	-	-	1.5	-	-	-	-	-	5.4
424	3.0	-	-	-	-	-	0.9	-	-	-	-	-	-	1.5	-	-	-	-	-	5.4
425	3.0	-	-	-	-	-	0.9	-	-	-	-	-	-	1.5	-	-	-	-	-	5.4
6	-	0.5	2.4	-	-	-	-	-	-	-	-	-	0.5	-	-	-	1.8	-	-	5.3
4	-	0.5	2.4	-	-	-	-	-	-	-	-	-	0.5	-	-	-	1.8	-	-	5.3
106	-	-	-	3.4	-	-	-	-	-	-	-	-	-	-	-	-	0.5	1.0	-	4.8
406	1.5	-	-	-	-	-	-	-	-	-	-	-	-	1.5	-	-	1.5	-	-	4.5
407	1.5	-	-	-	-	-	-	-	-	-	-	-	-	1.5	-	-	1.5	-	-	4.5
122	2.7	-	-	-	-	-	-	-	-	0.2	-	-	0.2	0.5	-	-	-	0.8	-	4.4
123	2.7	-	-	-	-	-	-	-	-	0.2	-	-	0.2	0.5	-	-	-	0.8	-	4.4
124	2.7	-	-	-	-	-	-	-	-	0.2	-	-	0.2	0.5	-	-	-	0.8	-	4.4
125	2.7	-	-	-	-	-	-	-	-	0.2	-	-	0.2	0.5	-	-	-	0.8	-	4.4
126	2.7	-	-	-	-	-	-	-	-	0.2	-	-	0.2	0.5	-	-	-	0.8	-	4.4
127	2.7	-	-	-	-	-	-	-	-	0.2	-	-	0.2	0.5	-	-	-	0.8	-	4.4
128	2.7	-	-	-	-	-	-	-	-	0.2	-	-	0.2	0.5	-	-	-	0.8	-	4.4
129	2.7	-	-	-	-	-	-	-	-	0.2	-	-	0.2	0.5	-	-	-	0.8	-	4.4
179	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8	-	-	1.9	1.3	-	3.9
180	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8	-	-	1.9	1.3	-	3.9
181	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8	-	-	1.9	1.3	-	3.9
182	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8	-	-	1.9	1.3	-	3.9
183	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8	-	-	1.9	1.3	-	3.9
184	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8	-	-	1.9	1.3	-	3.9
185	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8	-	-	1.9	1.3	-	3.9
186	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8	-	-	1.9	1.3	-	3.9
175	-	-	-	1.5	-	-	-	-	-	-	-	-	-	-	1.5	-	-	-	-	3.0



**Table 11. Adults' consumption rates of domestic fruit from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

Observation number	Apple	Apricot	Blackberry	Blackcurrant	Blueberry	Cherry	Damson	Fig	Gooseberry	Grapes	Greengages	Loganberry	Pear	Plum	Raspberry	Redcurrants	Rhubarb	Strawberry	Whitecurrant	Total
142	-	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5
208	-	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5
209	-	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5
210	-	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5
68	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	0.3
59	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
60	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of domestic fruit based on the 10 high-rate adult consumers is 49.7 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 131 observations is 40.9 kg y<sup>-1</sup>

**Table 12. Adults' consumption rates of milk from the Derby terrestrial survey area ( $l\ y^{-1}$ )**

Observation number	Ice-cream	Cows' Milk	Goats' milk	Total
<b>208</b>	-	<b>365.0</b>	-	<b>365.0</b>
<b>210</b>	-	<b>365.0</b>	-	<b>365.0</b>
<b>198</b>	-	-	<b>304.0</b>	<b>304.0</b>
<b>199</b>	-	-	<b>304.0</b>	<b>304.0</b>
<b>209</b>	-	<b>182.5</b>	-	<b>182.5</b>
<b>229</b>	-	<b>182.5</b>	-	<b>182.5</b>
<b>230</b>	-	<b>182.5</b>	-	<b>182.5</b>
<b>231</b>	-	<b>182.5</b>	-	<b>182.5</b>
<b>232</b>	-	<b>182.5</b>	-	<b>182.5</b>
22	-	103.7	-	103.7
23	-	103.7	-	103.7
120	4.5	-	-	4.5
121	4.5	-	-	4.5

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of milk based on the 9 high-rate adult consumers is  $250.1\ l\ y^{-1}$

The observed 97.5<sup>th</sup> percentile rate based on 13 observations is  $365.0\ l\ y^{-1}$

**Table 13. Adults' consumption rates of cattle meat from the Derby terrestrial survey area ( $kg\ y^{-1}$ )**

Observation number	Beef
<b>120</b>	<b>12.0</b>
<b>121</b>	<b>12.0</b>
212	3.0
213	3.0
214	3.0
215	3.0

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of cattle meat based on the 2 high-rate adult consumers is  $12.0\ kg\ y^{-1}$

The observed 97.5<sup>th</sup> percentile rate based on 6 observations is  $12.0\ kg\ y^{-1}$

**Table 14. Adults' consumption rates of sheep meat from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

Observation number	Lamb
<b>120</b>	<b>6.0</b>
<b>121</b>	<b>6.0</b>
212	3.0
213	3.0
214	3.0
215	3.0

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of sheep meat based on the 6 high-rate adult consumers is 4.0 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 6 observations is 6.0 kg y<sup>-1</sup>

**Table 15. Adults' consumption rates of pig meat from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

Observation number	Pork
<b>120</b>	<b>12.0</b>
<b>121</b>	<b>12.0</b>
212	3.0
213	3.0
214	3.0
215	3.0

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of pig meat based on the 2 high-rate adult consumers is 12.0 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 6 observations is 12.0 kg y<sup>-1</sup>

**Table 16. Adults' consumption rates of poultry from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

Observation number	Chicken	Goose	Pheasant	Pigeon	Turkey	Total
<b>198</b>	<b>3.6</b>	<b>1.8</b>	-	-	<b>1.4</b>	<b>6.8</b>
<b>199</b>	<b>3.6</b>	<b>1.8</b>	-	-	<b>1.4</b>	<b>6.8</b>
<b>225</b>	-	-	-	<b>4.6</b>	-	<b>4.6</b>
212	-	-	1.1	-	-	1.1
213	-	-	1.1	-	-	1.1
214	-	-	1.1	-	-	1.1
215	-	-	1.1	-	-	1.1
218	-	-	0.9	-	-	0.9
219	-	-	0.9	-	-	0.9
313	-	-	0.3	-	-	0.3
314	-	-	0.3	-	-	0.3
208	-	-	0.2	-	-	0.2
209	-	-	0.2	-	-	0.2
210	-	-	0.2	-	-	0.2

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of poultry based on the 3 high-rate adult consumers is 6.0 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 14 observations is 6.8 kg y<sup>-1</sup>

**Table 17. Adults' consumption rates of eggs from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

Observation number	Chicken egg	Duck egg	Goose egg	Total
<b>198</b>	<b>13.3</b>	-	<b>6.6</b>	<b>20.0</b>
<b>199</b>	<b>13.3</b>	-	<b>6.6</b>	<b>20.0</b>
<b>122</b>	<b>17.1</b>	-	-	<b>17.1</b>
<b>123</b>	<b>17.1</b>	-	-	<b>17.1</b>
<b>225</b>	<b>15.1</b>	-	-	<b>15.1</b>
<b>226</b>	<b>15.1</b>	-	-	<b>15.1</b>
<b>118</b>	<b>8.9</b>	-	-	<b>8.9</b>
<b>119</b>	<b>8.9</b>	-	-	<b>8.9</b>
<b>212</b>	<b>8.9</b>	-	-	<b>8.9</b>
<b>213</b>	<b>8.9</b>	-	-	<b>8.9</b>
<b>214</b>	<b>8.9</b>	-	-	<b>8.9</b>
<b>215</b>	<b>8.9</b>	-	-	<b>8.9</b>
205	5.9	-	-	5.9
206	5.9	-	-	5.9
191	4.4	-	-	4.4
192	4.4	-	-	4.4
193	4.4	-	-	4.4
194	4.4	-	-	4.4
207	3.0	-	-	3.0
220	1.1	0.7	0.5	2.3
221	1.1	0.7	0.5	2.3
222	1.1	0.7	0.5	2.3
223	1.1	0.7	0.5	2.3
224	1.1	0.7	0.5	2.3
120	0.7	-	-	0.7
121	0.7	-	-	0.7

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of eggs based on the 12 high-rate adult consumers is 13.1 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 26 observations is 20.0 kg y<sup>-1</sup>

**Table 18. Adults' consumption rates of wild/free foods from the Derby terrestrial survey area ( $\text{kg y}^{-1}$ )**

Observation number	Blackberry	Sloe	Total
175	2.0	-	2.0
176	2.0	-	2.0
225	1.8	-	1.8
226	1.8	-	1.8
161	1.5	-	1.5
162	1.5	-	1.5
163	1.5	-	1.5
423	0.9	0.3	1.2
424	0.9	0.3	1.2
425	0.9	0.3	1.2
297	0.8	-	0.8
298	0.8	-	0.8
299	0.8	-	0.8
300	0.8	-	0.8
122	0.8	-	0.8
123	0.8	-	0.8
124	0.8	-	0.8
125	0.8	-	0.8
126	0.8	-	0.8
127	0.8	-	0.8
128	0.8	-	0.8
129	0.8	-	0.8
313	0.3	0.5	0.8
314	0.3	0.5	0.8
22	0.5	-	0.5
23	0.5	-	0.5
198	0.5	-	0.5
199	0.5	-	0.5
284	0.2	-	0.2
285	0.2	-	0.2
303	0.2	-	0.2

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of wild/free foods based on the 24 high-rate adult consumers is  $1.1 \text{ kg y}^{-1}$

The observed 97.5<sup>th</sup> percentile rate based on 31 observations is  $2.0 \text{ kg y}^{-1}$

**Table 19. Adults' consumption rates of honey from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

<b>Observation number</b>	<b>Honey</b>
<b>202</b>	<b>1.5</b>
<b>203</b>	<b>1.5</b>
<b>204</b>	<b>1.5</b>

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of honey based on the 3 high-rate adult consumers is 1.5 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 3 observations is 1.5 kg y<sup>-1</sup>

**Table 20. Adults' consumption rates of rabbits/hares from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

<b>Observation number</b>	<b>Rabbit</b>
<b>225</b>	<b>9.0</b>

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of rabbits/hares based on the only adult consumer is 9.0 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate is not applicable for 1 observation

**Table 21. Adults' consumption rates of wild fungi from the Derby terrestrial survey area ( $\text{kg y}^{-1}$ )**

<b>Observation number</b>	<b>Mixed fungi</b>	<b>Mushrooms</b>	<b>Total</b>
<b>225</b>	-	<b>1.0</b>	<b>1.0</b>
<b>226</b>	-	<b>1.0</b>	<b>1.0</b>
114	0.2	0.2	0.3
115	0.2	0.2	0.3
116	0.2	0.2	0.3
22	-	0.2	0.2
23	-	0.2	0.2

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of wild fungi based on the 2 high-rate adult consumers is  $1.0 \text{ kg y}^{-1}$

The observed 97.5<sup>th</sup> percentile rate based on 7 observations is  $1.0 \text{ kg y}^{-1}$

**Table 22. Children's consumption rates of green vegetables from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

**15-year-old age group**

Observation number	Age	Broccoli	Brussel sprout	Cabbage	Calabrese	Cauliflower	Courgettes	Cucumber	Herbs	Lettuce	Total
<b>14</b>	<b>14</b>	<b>1.2</b>	-	<b>0.3</b>	-	<b>1.2</b>	-	<b>10.2</b>	-	<b>0.9</b>	<b>13.8</b>
302	16	1.5	1.8	1.1	-	0.5	-	-	-	-	4.9
301	15	1.5	1.8	1.1	-	0.5	-	-	-	-	4.9
418	13	-	0.5	1.2	-	-	2.2	-	-	-	3.9
419	13	-	0.5	1.2	-	-	2.2	-	-	-	3.9
227	12	-	-	1.2	-	-	-	-	-	-	1.2

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of green vegetables based on the 1 high-rate 15-year-old age group consumer is 13.8 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 6 observations is 12.7 kg y<sup>-1</sup>

**10-year-old age group**

Observation number	Age	Broccoli	Brussel sprout	Cabbage	Calabrese	Cauliflower	Courgettes	Cucumber	Herbs	Lettuce	Total
<b>130</b>	<b>8</b>	-	<b>5.5</b>	<b>9.1</b>	<b>2.2</b>	<b>3.4</b>	<b>6.1</b>	<b>1.4</b>	-	-	<b>27.7</b>
201	8	1.1	0.7	2.7	-	0.3	0.5	-	-	0.5	5.8
200	10	1.1	0.7	2.7	-	0.3	0.5	-	-	0.5	5.8
308	10	1.2	-	0.8	-	1.0	-	-	0.2	-	3.1
420	7	-	0.1	0.4	-	-	0.7	-	-	-	1.2
421	7	-	0.1	0.4	-	-	0.7	-	-	-	1.2
187	8	-	-	0.5	-	-	-	-	-	-	0.5

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of green vegetables based on the 1 high-rate 10-year-old age group consumer is 27.7 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 7 observations is 24.4 kg y<sup>-1</sup>

**Table 22. Children's consumption rates of green vegetables from the Derby terrestrial survey area ( $\text{kg y}^{-1}$ )**

**5-year-old age group**

Observation number	Age	Broccoli	Brussel sprout	Cabbage	Calabrese	Cauliflower	Courgettes	Cucumber	Herbs	Lettuce	Total
<b>422</b>	<b>5</b>	-	<b>0.1</b>	<b>0.4</b>	-	-	<b>0.7</b>	-	-	-	<b>1.2</b>
<b>228</b>	<b>5</b>	-	-	<b>0.6</b>	-	-	-	-	-	-	<b>0.6</b>
173	6	-	-	0.2	-	-	-	-	-	-	0.2
154	5	-	-	-	-	0.2	-	-	-	-	0.2
156	5	-	-	-	-	0.2	-	-	-	-	0.2
155	4	-	-	-	-	0.2	-	-	-	-	0.2
157	2	-	-	-	-	0.1	-	-	-	-	0.1

**Notes**

Emboldened observations are the high-rate consumers

The mean consumption rate of green vegetables based on the 2 high-rate 5-year-old age group consumers is  $0.9 \text{ kg y}^{-1}$

The observed 97.5<sup>th</sup> percentile rate based on 7 observations is  $1.1 \text{ kg y}^{-1}$

**Table 23. Children's consumption rates of other vegetables from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

**15-year-old age group**

Observation number	Age	Broad bean	French bean	Pea	Pepper	Pumpkin	Runner bean	Squash	Sweetcorn	Tomato	Total
<b>14</b>	<b>14</b>	-	-	<b>4.1</b>	<b>1.8</b>	-	-	-	<b>0.7</b>	<b>21.6</b>	<b>28.1</b>
<b>418</b>	<b>13</b>	-	-	-	-	<b>1.2</b>	<b>5.4</b>	-	<b>3.5</b>	-	<b>10.1</b>
<b>419</b>	<b>13</b>	-	-	-	-	<b>1.2</b>	<b>5.4</b>	-	<b>3.5</b>	-	<b>10.1</b>
227	12	-	-	-	-	-	0.8	-	-	-	0.8
302	16	0.5	0.3	-	-	-	-	-	-	-	0.8
301	15	0.5	0.3	-	-	-	-	-	-	-	0.8

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of other vegetables based on the 3 high-rate 15-year-old age group consumers is 16.1 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 6 observations is 25.8 kg y<sup>-1</sup>

**10-year-old age group**

Observation number	Age	Broad bean	French bean	Pea	Pepper	Pumpkin	Runner bean	Squash	Sweetcorn	Tomato	Total
<b>130</b>	<b>8</b>	-	-	<b>4.1</b>	-	<b>0.3</b>	<b>12.2</b>	<b>12.1</b>	<b>3.2</b>	-	<b>31.9</b>
<b>200</b>	<b>10</b>	-	-	<b>2.0</b>	<b>1.2</b>	-	<b>2.6</b>	<b>0.0</b>	<b>1.7</b>	<b>3.4</b>	<b>10.9</b>
<b>201</b>	<b>8</b>	-	-	<b>2.0</b>	<b>1.2</b>	-	<b>2.6</b>	<b>0.0</b>	<b>1.7</b>	<b>3.4</b>	<b>10.9</b>
420	7	-	-	-	-	0.4	1.6	-	1.0	-	3.0
421	7	-	-	-	-	0.4	1.6	-	1.0	-	3.0
308	10	1.2	0.2	0.6	-	-	0.4	0.1	0.4	-	2.9
187	8	-	-	0.2	-	-	0.5	-	-	-	0.7

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of other vegetables based on the 3 high-rate 10-year-old age group consumers is 17.9 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 7 observations is 28.8 kg y<sup>-1</sup>

**Table 23. Children's consumption rates of other vegetables from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

**5-year-old age group**

Observation number	Age	Broad bean	French bean	Pea	Pepper	Pumpkin	Runner bean	Squash	Sweetcorn	Tomato	Total
<b>422</b>	<b>5</b>	-	-	-	-	<b>0.4</b>	<b>1.6</b>	-	<b>1.0</b>	-	<b>3.0</b>
173	6	-	-	-	-	-	0.5	-	-	-	0.5
228	5	-	-	-	-	-	0.4	-	-	-	0.4
154	5	-	-	0.2	-	-	-	-	0.2	-	0.4
156	5	-	-	0.2	-	-	-	-	0.2	-	0.4
155	4	-	-	0.2	-	-	-	-	0.2	-	0.4
188	3	-	-	0.1	-	-	-	-	-	-	0.1
189	3	-	-	0.1	-	-	-	-	-	-	0.1

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of other vegetables based on the 1 high-rate 5-year-old age group consumer is 3.0 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 8 observations is 2.6 kg y<sup>-1</sup>

**Table 24. Children's consumption rates of root vegetables from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

**15-year-old age group**

Observation number	Age	Beetroot	Carrot	Leek	Onion	Parsnip	Radish	Shallot	Spring onion	Swede	Sweet potato	Turnip	Total
<b>418</b>	<b>13</b>	<b>0.8</b>	<b>0.9</b>	<b>1.8</b>	<b>5.4</b>	-	-	-	-	<b>1.4</b>	<b>19.2</b>	<b>0.5</b>	<b>30.0</b>
<b>419</b>	<b>13</b>	<b>0.8</b>	<b>0.9</b>	<b>1.8</b>	<b>5.4</b>	-	-	-	-	<b>1.4</b>	<b>19.2</b>	<b>0.5</b>	<b>30.0</b>
302	16	-	1.8	1.4	1.8	0.7	-	0.6	-	2.7	-	0.5	9.6
301	15	-	1.8	1.4	1.8	0.7	-	0.6	-	2.7	-	0.5	9.6
14	14	-	-	-	2.0	-	-	-	-	-	-	-	2.0
227	12	-	0.8	-	0.8	-	-	-	-	-	-	-	1.6

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of root vegetables based on the 2 high-rate 15-year-old age group consumers is 30.0 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 6 observations is 30.0 kg y<sup>-1</sup>

**10-year-old age group**

Observation number	Age	Beetroot	Carrot	Leek	Onion	Parsnip	Radish	Shallot	Spring onion	Swede	Sweet potato	Turnip	Total
<b>130</b>	<b>8</b>	<b>4.9</b>	-	<b>6.8</b>	-	<b>3.2</b>	<b>2.7</b>	-	-	-	-	-	<b>17.6</b>
<b>200</b>	<b>10</b>	<b>0.8</b>	<b>3.4</b>	<b>3.4</b>	<b>2.7</b>	<b>0.7</b>	-	-	<b>0.4</b>	-	-	-	<b>11.3</b>
<b>201</b>	<b>8</b>	<b>0.8</b>	<b>3.4</b>	<b>3.4</b>	<b>2.7</b>	<b>0.7</b>	-	-	<b>0.4</b>	-	-	-	<b>11.3</b>
<b>420</b>	<b>7</b>	<b>0.2</b>	<b>0.3</b>	<b>0.5</b>	<b>1.6</b>	-	-	-	-	<b>0.4</b>	<b>5.8</b>	<b>0.2</b>	<b>9.0</b>
<b>421</b>	<b>7</b>	<b>0.2</b>	<b>0.3</b>	<b>0.5</b>	<b>1.6</b>	-	-	-	-	<b>0.4</b>	<b>5.8</b>	<b>0.2</b>	<b>9.0</b>
308	10	0.5	0.6	0.4	-	-	-	0.3	-	-	-	0.4	2.2
187	8	-	0.2	-	0.4	-	-	-	-	-	-	-	0.6

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of root vegetables based on the 5 high-rate 10-year-old age group consumers is 11.6 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 7 observations is 16.7 kg y<sup>-1</sup>

**Table 24. Children's consumption rates of root vegetables from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

**5-year-old age group**

Observation number	Age	Beetroot	Carrot	Leek	Onion	Parsnip	Radish	Shallot	Spring onion	Swede	Sweet potato	Turnip	Total
<b>422</b>	<b>5</b>	<b>0.2</b>	<b>0.3</b>	<b>0.5</b>	<b>1.6</b>	-	-	-	-	<b>0.4</b>	<b>5.8</b>	<b>0.2</b>	<b>9.0</b>
228	5	-	0.4	-	0.4	-	-	-	-	-	-	-	0.8
154	5	-	0.5	-	-	-	-	-	-	-	-	-	0.5
156	5	-	0.5	-	-	-	-	-	-	-	-	-	0.5
155	4	-	0.5	-	-	-	-	-	-	-	-	-	0.5
173	6	-	0.2	-	-	-	-	-	-	-	-	-	0.2
188	3	-	0.1	-	-	-	-	-	-	-	-	-	0.1
189	3	-	0.1	-	-	-	-	-	-	-	-	-	0.1
157	2	-	0.1	-	-	-	-	-	-	-	-	-	0.1

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of root vegetables based on the only 1-year-old age group consumer is 9.0 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 9 observations is 7.4 kg y<sup>-1</sup>

**1-year-old age group**

Observation number	Age	Beetroot	Carrot	Leek	Onion	Parsnip	Radish	Shallot	Spring onion	Swede	Sweet potato	Turnip	Total
<b>304</b>	<b>1</b>	-	<b>1.8</b>	-	-	-	-	-	-	-	-	-	<b>1.8</b>

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of root vegetables based on the only 1-year-old age group consumer is 1.8 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate is not applicable for 1 observation

**Table 25. Children's consumption rates of potato from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

**15-year-old age group**

<b>Observation number</b>	<b>Age</b>	<b>Potato</b>
<b>14</b>	<b>14</b>	<b>6.8</b>
<b>227</b>	<b>12</b>	<b>4.1</b>
<b>302</b>	<b>16</b>	<b>3.3</b>
<b>301</b>	<b>15</b>	<b>3.3</b>

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of potato based on the 4 high-rate 15-year-old age group consumers is 4.4 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 4 observations is 6.6 kg y<sup>-1</sup>

**10-year-old age group**

<b>Observation number</b>	<b>Age</b>	<b>Potato</b>
<b>130</b>	<b>8</b>	<b>54.6</b>
<b>200</b>	<b>10</b>	<b>20.5</b>
<b>201</b>	<b>8</b>	<b>20.5</b>
187	8	3.0
308	10	1.9
315	11	1.1

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of potato based on the 3 high-rate 10-year-old age group consumers is 31.9 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 6 observations is 50.3 kg y<sup>-1</sup>

**Table 25. Children's consumption rates of potato from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

**5-year-old age group**

<b>Observation number</b>	<b>Age</b>	<b>Potato</b>
<b>228</b>	<b>5</b>	<b>2.1</b>
<b>173</b>	<b>6</b>	<b>2.0</b>
<b>154</b>	<b>5</b>	<b>2.0</b>
<b>156</b>	<b>5</b>	<b>2.0</b>
<b>155</b>	<b>4</b>	<b>2.0</b>
188	3	0.5
189	3	0.5
174	3	0.5
157	2	0.2

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of potato based on the 5 high-rate 5-year-old age group consumers is 2.0 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 9 observations is 2.0 kg y<sup>-1</sup>

**1-year-old age group**

<b>Observation number</b>	<b>Age</b>	<b>Potato</b>
<b>304</b>	<b>1</b>	<b>3.3</b>
190	1	0.1

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of potato based on the 1 high-rate 1-year-old age group consumer is 3.3 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 2 observations is 3.3 kg y<sup>-1</sup>

**Table 26. Children's consumption rates of domestic fruit from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

**15-year-old age group**

Observation number	Age	Apple	Blackberry	Blackcurrant	Cherry	Damson	Gooseberry	Grapes	Pear	Plum	Raspberry	Redcurrants	Rhubarb	Strawberry	Total
<b>14</b>	<b>14</b>	-	-	-	-	-	-	-	-	-	<b>0.7</b>	-	<b>0.7</b>	<b>8.2</b>	<b>9.5</b>
302	16	-	-	-	-	0.3	-	-	-	1.0	-	-	-	-	1.3
301	15	-	-	-	-	0.3	-	-	-	1.0	-	-	-	-	1.3
227	12	0.6	-	-	-	-	-	-	-	0.4	-	-	-	-	1.0
211	14	-	0.5	-	-	-	-	-	-	-	-	-	-	-	0.5

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of domestic fruit based on the 1 high-rate 15-year-old age group consumer is 9.5 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate is not applicable for 1 observation

**10-year-old age group**

Observation number	Age	Apple	Blackberry	Blackcurrant	Cherry	Damson	Gooseberry	Grapes	Pear	Plum	Raspberry	Redcurrants	Rhubarb	Strawberry	Total
<b>200</b>	<b>10</b>	<b>3.7</b>	-	<b>0.5</b>	-	-	<b>1.7</b>	-	-	<b>1.7</b>	<b>1.1</b>	<b>1.4</b>	-	<b>3.6</b>	<b>13.7</b>
<b>201</b>	<b>8</b>	<b>3.7</b>	-	<b>0.5</b>	-	-	<b>1.7</b>	-	-	<b>1.7</b>	<b>1.1</b>	<b>1.4</b>	-	<b>3.6</b>	<b>13.7</b>
<b>315</b>	<b>11</b>	<b>3.0</b>	-	-	<b>0.8</b>	-	-	-	<b>3.0</b>	<b>3.0</b>	-	-	-	-	<b>9.8</b>
130	8	2.7	-	-	-	-	-	0.2	0.2	0.5	-	-	-	0.8	4.4
308	10	-	-	0.1	-	-	0.1	-	-	-	0.5	0.1	0.1	0.7	1.4
187	8	-	-	-	-	-	-	-	-	0.3	-	-	-	0.5	0.8

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of domestic fruit based on the 3 high-rate 10-year-old age group consumers is 12.4 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 6 observations is 13.7 kg y<sup>-1</sup>

**Table 26. Children's consumption rates of domestic fruit from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

**5-year-old age group**

Observation number	Age	Apple	Blackberry	Blackcurrant	Cherry	Damson	Gooseberry	Grapes	Pear	Plum	Raspberry	Redcurrants	Rhubarb	Strawberry	Total
156	5	0.5	-	0.1	-	-	-	-	-	0.2	0.2	-	-	-	1.0
155	4	0.5	-	0.1	-	-	-	-	-	0.2	0.2	-	-	-	1.0
154	5	0.5	-	0.1	-	-	-	-	-	0.2	0.2	-	-	-	1.0
228	5	0.3	-	-	-	-	-	-	-	0.2	-	-	-	-	0.5
173	6	-	-	-	-	-	-	-	-	-	-	-	-	0.5	0.5
153	3	0.3	-	-	-	-	-	-	-	0.1	0.1	-	-	-	0.5
188	3	-	-	-	-	-	-	-	-	0.1	-	-	-	0.1	0.2
189	3	-	-	-	-	-	-	-	-	0.1	-	-	-	0.1	0.2
174	3	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1
157	2	0.1	-	-	-	-	-	-	-	-	-	-	-	-	0.1

**Notes**

Emboldened observations are the high-rate consumers

The mean consumption rate of domestic fruit based on the 6 high-rate 5-year-old age group consumers is 0.7 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 10 observations is 1.0 kg y<sup>-1</sup>

**Table 27. Children's consumption rates of milk from the Derby terrestrial survey area ( $l\ y^{-1}$ )**

**15-year-old age group**

Observation number	Age	Cows' milk
<b>211</b>	14	<b>182.5</b>
<b>24</b>	15	<b>103.7</b>
<b>25</b>	12	<b>103.7</b>

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of milk based on the 3 high-rate 15-year-old age group consumers is  $130.0\ l\ y^{-1}$

The observed 97.5<sup>th</sup> percentile rate based on 3 observations is  $178.6\ l\ y^{-1}$

**10-year-old age group**

Observation number	Age	Goats' milk
<b>200</b>	10	<b>152.0</b>
<b>201</b>	8	<b>152.0</b>

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of milk based on the 2 high-rate 10-year-old age group consumers is  $152.0\ l\ y^{-1}$

The observed 97.5<sup>th</sup> percentile rate based on 2 observations is  $152.0\ l\ y^{-1}$

**Table 28. Children's consumption rates of cattle meat from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

**5-year-old age group**

Observation number	Age	Beef
<b>216</b>	<b>4</b>	<b>0.1</b>

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of cattle meat based on the only 5-year-old age group consumer is 0.1 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate is not applicable for 1 observation

**Table 29. Children's consumption rates of sheep meat from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

**5-year-old age group**

Observation number	Age	Lamb
<b>216</b>	<b>4</b>	<b>0.1</b>

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of sheep meat based on the only 5-year-old age group consumer is 0.1 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate is not applicable for 1 observation

**Table 30. Children's consumption rates of pig meat from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

**5-year-old age group**

Observation number	Age	Pork
<b>216</b>	<b>4</b>	<b>0.1</b>

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of pig meat based on the only 5-year-old age group consumer is 0.1 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate is not applicable for 1 observation

**Table 31. Children's consumption rates of poultry from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

**15-year-old age group**

Observation number	Age	Chicken	Goose	Pheasant	Turkey	Total
<b>211</b>	<b>14</b>	-	-	<b>0.2</b>	-	<b>0.2</b>

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of poultry based on the only 15-year-old age group consumer is 0.2 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate is not applicable for 1 observation

**10-year-old age group**

Observation number	Age	Chicken	Goose	Pheasant	Turkey	Total
<b>200</b>	<b>10</b>	<b>0.9</b>	<b>0.4</b>	-	<b>0.4</b>	<b>1.7</b>
<b>201</b>	<b>8</b>	<b>0.9</b>	<b>0.4</b>	-	<b>0.4</b>	<b>1.7</b>
315	11	-	-	0.3	-	0.3

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of poultry based on the 2 high-rate 10-year-old age group consumers is 1.7 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 3 observations is 1.7 kg y<sup>-1</sup>

**Table 32. Children's consumption rates of eggs from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

**15-year-old age group**

<b>Observation number</b>	<b>Age</b>	<b>Chicken egg</b>
<b>227</b>	<b>12</b>	<b>7.6</b>

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of eggs based on the only 15-year-old age group consumer is 7.6 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate is not applicable for 1 observation

**10-year-old age group**

<b>Observation number</b>	<b>Age</b>	<b>Chicken egg</b>
<b>130</b>	<b>8</b>	<b>17.1</b>
<b>200</b>	<b>10</b>	<b>13.3</b>
<b>201</b>	<b>8</b>	<b>13.3</b>

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of eggs based on the 3 high-rate 10-year-old age group consumers is 14.6 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 3 observations is 16.9 kg y<sup>-1</sup>

**Table 32. Children's consumption rates of eggs from the Derby terrestrial survey area ( $\text{kg y}^{-1}$ )**

**5-year-old age group**

<b>Observation number</b>	<b>Age</b>	<b>Chicken egg</b>
<b>228</b>	<b>5</b>	<b>3.8</b>
<b>216</b>	<b>4</b>	<b>3.0</b>

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of eggs based on the 2 high-rate 5-year-old age group consumers is  $3.4 \text{ kg y}^{-1}$

The observed 97.5<sup>th</sup> percentile rate based on 2 observations is  $3.8 \text{ kg y}^{-1}$

**1-year-old age group**

<b>Observation number</b>	<b>Age</b>	<b>Chicken egg</b>
<b>217</b>	<b>1</b>	<b>0.7</b>

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of eggs based on the only 1-year-old age group consumer is  $0.7 \text{ kg y}^{-1}$

The observed 97.5<sup>th</sup> percentile rate is not applicable for 1 observation

**Table 33. Children's consumption rates of wild/free foods from the Derby terrestrial survey area (kg y<sup>-1</sup>)**

**15-year-old age group**

Observation number	Age	Blackberry	Sloe	Total
<b>227</b>	<b>12</b>	<b>0.9</b>	-	<b>0.9</b>
<b>24</b>	<b>15</b>	<b>0.5</b>	-	<b>0.5</b>
<b>25</b>	<b>12</b>	<b>0.5</b>	-	<b>0.5</b>
302	16	0.2	-	0.2
301	15	0.2	-	0.2

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of wild/free foods based on the 3 high-rate 15-year-old age group consumers is 0.6 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 5 observations is 0.9 kg y<sup>-1</sup>

**10-year-old age group**

Observation number	Age	Blackberry	Sloe	Total
<b>130</b>	<b>8</b>	<b>0.8</b>	-	<b>0.8</b>
<b>315</b>	<b>11</b>	<b>0.3</b>	<b>0.5</b>	<b>0.8</b>
<b>200</b>	<b>10</b>	<b>0.5</b>	-	<b>0.5</b>
<b>201</b>	<b>8</b>	<b>0.5</b>	-	<b>0.5</b>

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of wild/free foods based on the 4 high-rate 10-year-old age group consumers is 0.6 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 4 observations is 0.8 kg y<sup>-1</sup>

**5-year-old age group**

Observation number	Age	Blackberry	Sloe	Total
<b>228</b>	<b>5</b>	<b>0.5</b>	-	<b>0.5</b>

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of wild/free foods based on the only 5-year-old age group consumer is 0.5 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate is not applicable for 1 observation

**Table 34. Children's consumption rates of wild fungi from the Derby terrestrial survey area (kg**

**15-year-old age group**

<b>Observation number</b>	<b>Age</b>	<b>Mushrooms</b>
<b>24</b>	<b>15</b>	<b>0.2</b>
<b>25</b>	<b>12</b>	<b>0.2</b>

**Notes**

Observations in bold indicate the high-rate individuals

The mean consumption rate of wild fungi based on the 2 high-rate 15-year-old age group consumers is 0.2 kg y<sup>-1</sup>

The observed 97.5<sup>th</sup> percentile rate based on 2 observations is 0.2 kg y<sup>-1</sup>

**Table 35. Summary of adults' consumption rates from the Derby aquatic and terrestrial survey areas ( $\text{kg y}^{-1}$  or  $\text{l y}^{-1}$ )**

Food group	Number of observations	Number of high-rate consumers	Observed maximum consumption rate for the high-rate group	Observed minimum consumption rate for the high-rate group	Observed mean consumption rate for the high-rate group	Observed 97.5 <sup>th</sup> percentile consumption rate	Generic mean consumption rate	Generic 97.5 <sup>th</sup> percentile consumption rate
<b>From the aquatic survey area</b>								
Freshwater fish	NC	NC	NC	NC	NC	NC	ND	ND
Freshwater crustaceans	NC	NC	NC	NC	NC	NC	ND	ND
<b>From the terrestrial survey area</b>								
Green vegetables	159	69	53.9	18.2	27.7	39.5	15.0	45.0
Other vegetables	159	43	86.6	29.7	39.8	56.2	20.0	50.0
Root vegetables	157	48	88.9	29.6	40.5	52.8	10.0	40.0
Potato	138	15	227.5	81.9	112.7	113.8	50.0	120.0
Domestic fruit	131	10	96.9	34.7	49.7	40.9	20.0	75.0
Milk	13	9	365.0	182.5	250.1	365.0	95.0	240.0
Cattle meat	6	2	12.0	12.0	12.0	12.0	15.0	45.0
Pig meat	6	2	12.0	12.0	12.0	12.0	15.0	40.0
Sheep meat	6	6	6.0	3.0	4.0	6.0	8.0	25.0
Poultry	14	3	6.8	4.6	6.0	6.8	10.0	30.0
Eggs	26	12	20.0	8.9	13.1	20.0	8.5	25.0
Wild/free foods	31	24	2.0	0.8	1.1	2.0	7.0	25.0
Rabbits/hares	1	1	9.0	9.0	9.0	NA	6.0	15.0
Honey	3	3	1.5	1.5	1.5	1.5	2.5	9.5
Wild fungi	7	2	1.0	1.0	1.0	1.0	3.0	10.0
Venison	NC	NC	NC	NC	NC	NC	ND	ND
Cereals	NC	NC	NC	NC	NC	NC	50.0	100.0
Freshwater fish	NC	NC	NC	NC	NC	NC	ND	ND
Freshwater crustaceans	NC	NC	NC	NC	NC	NC	ND	ND

ND = not determined

NC = not consumed

NA = not applicable

**Table 36. Summary of consumption rates from the Derby aquatic and terrestrial survey areas for children in the 15-year-old age group (kg y<sup>-1</sup> or l y<sup>-1</sup>)**

Food group	Number of observations	Number of high-rate consumers	Observed maximum consumption rate for the high-rate group	Observed minimum consumption rate for the high-rate group	Observed mean consumption rate for the high-rate group	Observed 97.5 <sup>th</sup> percentile consumption rate	Generic mean consumption rate	Generic 97.5 <sup>th</sup> percentile consumption rate
<b>From the aquatic survey area</b>								
Freshwater fish	NC	NC	NC	NC	NC	NC	ND	ND
Freshwater crustaceans	NC	NC	NC	NC	NC	NC	ND	ND
<b>From the terrestrial survey area</b>								
Green vegetables	6	3	13.8	4.9	7.9	12.7	9.0	25.0
Other vegetables	6	3	28.1	10.1	16.1	25.8	10.0	30.0
Root vegetables	6	2	30.0	30.0	30.0	30.0	7.5	20.0
Potato	4	4	6.8	3.3	4.4	6.6	60.0	130.0
Domestic fruit	5	1	9.5	0.5	9.5	NA	15.0	50.0
Milk	3	3	182.5	103.7	130.0	178.6	110.0	260.0
Cattle meat	NC	NC	NC	NC	NC	NC	15.0	35.0
Pig meat	NC	NC	NC	NC	NC	NC	10.0	30.0
Sheep meat	NC	NC	NC	NC	NC	NC	5.5	15.0
Poultry	1	1	0.2	0.2	0.2	NA	6.5	20.0
Eggs	1	1	7.6	7.6	7.6	NA	7.0	25.0
Wild/free foods	5	3	0.9	0.5	0.6	0.9	3.0	13.0
Rabbits/hares	NC	NC	NC	NC	NC	NC	ND	ND
Honey	NC	NC	NC	NC	NC	NC	2.0	5.0
Wild fungi	2	2	0.2	0.2	0.2	0.2	2.0	5.5
Venison	NC	NC	NC	NC	NC	NC	ND	ND
Cereals	NC	NC	NC	NC	NC	NC	50.0	95.0
Freshwater fish	NC	NC	NC	NC	NC	NC	ND	ND
Freshwater crustaceans	NC	NC	NC	NC	NC	NC	ND	ND

ND = not determined

NC = not consumed

NA = not applicable

**Table 37. Summary of consumption rates from the Derby aquatic and terrestrial survey areas for children in the 10-year-old age group (kg y<sup>-1</sup> or l y<sup>-1</sup>)**

Food group	Number of observations	Number of high-rate consumers	Observed maximum consumption rate for the high-rate group	Observed minimum consumption rate for the high-rate group	Observed mean consumption rate for the high-rate group	Observed 97.5 <sup>th</sup> percentile consumption rate	Generic mean consumption rate	Generic 97.5 <sup>th</sup> percentile consumption rate
<b>From the aquatic survey area</b>								
Freshwater fish	NC	NC	NC	NC	NC	NC	ND	ND
Freshwater crustaceans	NC	NC	NC	NC	NC	NC	ND	ND
<b>From the terrestrial survey area</b>								
Green vegetables	7	4	27.7	3.1	10.6	24.4	6.0	20.0
Other vegetables	7	3	31.9	10.9	17.9	28.8	8.0	25.0
Root vegetables	7	5	17.6	9.0	11.6	16.7	6.0	20.0
Potato	6	3	54.6	20.5	31.9	50.3	45.0	85.0
Domestic fruit	6	3	13.7	9.8	12.4	13.7	15.0	50.0
Milk	2	2	152.0	152.0	152.0	152.0	110.0	240.0
Cattle meat	NC	NC	NC	NC	NC	NC	15.0	30.0
Pig meat	NC	NC	NC	NC	NC	NC	8.5	25.0
Sheep meat	NC	NC	NC	NC	NC	NC	4.0	10.0
Poultry	3	2	1.7	1.7	1.7	1.7	5.5	15.0
Eggs	3	3	17.1	13.3	14.6	16.9	6.5	20.0
Wild/free foods	4	4	0.8	0.5	0.6	0.8	3.0	11.0
Rabbits/hares	NC	NC	NC	NC	NC	NC	ND	ND
Honey	NC	NC	NC	NC	NC	NC	2.0	7.5
Wild fungi	NC	NC	NC	NC	NC	NC	1.5	4.5
Venison	NC	NC	NC	NC	NC	NC	ND	ND
Cereals	NC	NC	NC	NC	NC	NC	45.0	75.0
Freshwater fish	NC	NC	NC	NC	NC	NC	ND	ND
Freshwater crustaceans	NC	NC	NC	NC	NC	NC	ND	ND

ND = not determined

NC = not consumed

**Table 38. Summary of consumption rates from the Derby aquatic and terrestrial survey areas for children in the 5-year-old age group (kg y<sup>-1</sup> or l y<sup>-1</sup>)**

Food group	Number of observations	Number of high-rate consumers	Observed maximum consumption rate for the high-rate group	Observed minimum consumption rate for the high-rate group	Observed mean consumption rate for the high-rate group	Observed 97.5 <sup>th</sup> percentile consumption rate	Generic mean consumption rate	Generic 97.5 <sup>th</sup> percentile consumption rate
<b>From the aquatic survey area</b>								
Freshwater fish	NC	NC	NC	NC	NC	NC	ND	ND
Freshwater crustaceans	NC	NC	NC	NC	NC	NC	ND	ND
<b>From the terrestrial survey area</b>								
Green vegetables	7	2	1.2	0.6	0.9	1.1	ND	ND
Other vegetables	8	1	3.0	3.0	3.0	NA	ND	ND
Root vegetables	9	5	9.0	0.5	2.3	7.4	ND	ND
Potato	9	5	2.1	2.0	2.0	2.0	ND	ND
Domestic fruit	10	6	1.0	0.4	0.7	1.0	ND	ND
Milk	NC	NC	NC	NC	NC	NC	ND	ND
Cattle meat	1	1	0.1	0.1	0.1	NA	ND	ND
Pig meat	1	1	0.1	0.1	0.1	NA	ND	ND
Sheep meat	1	1	0.1	0.1	0.1	NA	ND	ND
Poultry	NC	NC	NC	NC	NC	NC	ND	ND
Eggs	2	2	3.8	3.0	3.4	3.8	ND	ND
Wild/free foods	1	1	0.5	0.5	0.5	NA	ND	ND
Rabbits/hares	NC	NC	NC	NC	NC	NC	ND	ND
Honey	NC	NC	NC	NC	NC	NC	ND	ND
Wild fungi	NC	NC	NC	NC	NC	NC	ND	ND
Venison	NC	NC	NC	NC	NC	NC	ND	ND
Goat Meat	NC	NC	NC	NC	NC	NC	ND	ND
Cereals	NC	NC	NC	NC	NC	NC	ND	ND
Freshwater fish	NC	NC	NC	NC	NC	NC	ND	ND
Freshwater crustaceans	NC	NC	NC	NC	NC	NC	ND	ND

ND = not determined

NC = not consumed

NA = not applicable

**Table 39. Summary of consumption rates from the Derby aquatic and terrestrial survey areas for children in the 1-year-old age group ( $\text{kg y}^{-1}$  or  $\text{l y}^{-1}$ )**

Food group	Number of observations	Number of high-rate consumers	Observed maximum consumption rate for the high-rate group	Observed minimum consumption rate for the high-rate group	Observed mean consumption rate for the high-rate group	Observed 97.5 <sup>th</sup> percentile consumption rate	Generic mean consumption rate	Generic 97.5 <sup>th</sup> percentile consumption rate
<b>From the aquatic survey area</b>								
Freshwater fish	NC	NC	NC	NC	NC	NC	ND	ND
Freshwater crustaceans	NC	NC	NC	NC	NC	NC	ND	ND
<b>From the terrestrial survey area</b>								
Green vegetables	NC	NC	NC	NC	NC	NC	ND	ND
Other vegetables	NC	NC	NC	NC	NC	NC	ND	ND
Root vegetables	1	1	1.8	1.8	1.8	NA	ND	ND
Potato	2	1	3.3	3.3	3.3	NA	ND	ND
Domestic fruit	NC	NC	NC	NC	NC	NC	ND	ND
Milk	NC	NC	NC	NC	NC	NC	ND	ND
Cattle meat	NC	NC	NC	NC	NC	NC	ND	ND
Pig meat	NC	NC	NC	NC	NC	NC	ND	ND
Sheep meat	NC	NC	NC	NC	NC	NC	ND	ND
Poultry	NC	NC	NC	NC	NC	NC	ND	ND
Eggs	1	1	0.7	0.7	0.7	NA	ND	ND
Wild/free foods	NC	NC	NC	NC	NC	NC	ND	ND
Rabbits/hares	NC	NC	NC	NC	NC	NC	ND	ND
Honey	NC	NC	NC	NC	NC	NC	ND	ND
Wild fungi	NC	NC	NC	NC	NC	NC	ND	ND
Venison	NC	NC	NC	NC	NC	NC	ND	ND
Goat Meat	NC	NC	NC	NC	NC	NC	ND	ND
Cereals	NC	NC	NC	NC	NC	NC	ND	ND
Freshwater fish	NC	NC	NC	NC	NC	NC	ND	ND
Freshwater crustaceans	NC	NC	NC	NC	NC	NC	ND	ND

ND = not determined

NC = not consumed

NA = not applicable

**Table 40. Percentage contribution each food type makes to its terrestrial food group for adults**

<p><b>Green vegetables</b></p> <p>Cabbage 36.09 %            Brussel sprout 13.92 %            Courgettes 12.04 %            Broccoli 11.99 %            Cucumber 8.96 %            Cauliflower 7.22 %            Calabrese 2.34 %            Lettuce 1.83 %            Kale 1.58 %            Marrow 1.28 %            Artichoke 1.01 %            Chard 0.48 %            Spinach 0.38 %            Asparagus 0.24 %            Rocket 0.23 %            Herbs 0.17 %            Callaloo 0.14 %            Pak choi 0.11 %</p>	<p><b>Potato</b></p> <p>Potato 100.00 %</p> <p><b>Domestic fruit</b></p> <p>Strawberry 26.81 %            Apple 17.34 %            Plum 14.03 %            Blackcurrant 8.47 %            Raspberry 8.33 %            Rhubarb 5.68 %            Gooseberry 4.61 %            Blackberry 2.83 %            Damson 2.77 %            Redcurrants 1.76 %            Loganberry 1.48 %            Pear 1.34 %            Grapes 1.34 %            Cherry 1.21 %            Greengages 1.06 %            Blueberry 0.54 %            Whitecurrant 0.23 %            Apricot 0.12 %            Fig 0.02 %</p> <p><b>Milk</b></p> <p>Cows' milk 74.99 %            Goats' milk 24.65 %            Ice-cream 0.36 %</p> <p><b>Cattle meat</b></p> <p>Beef 100.00 %</p> <p><b>Sheep meat</b></p> <p>Lamb 100.00 %</p> <p><b>Pig meat</b></p> <p>Pork 100.00 %</p> <p><b>Poultry</b></p> <p>Pheasant 29.48 %            Chicken 28.02 %            Pigeon 17.90 %            Goose 13.70 %            Turkey 10.90 %</p>	<p><b>Eggs</b></p> <p>Chicken egg 90.56 %            Goose egg 7.77 %            Duck egg 1.67 %</p> <p><b>Wild/free foods</b></p> <p>Blackberry 93.85 %            Sloe 6.15 %</p> <p><b>Rabbits/hares</b></p> <p>Rabbit 100.00 %</p> <p><b>Honey</b></p> <p>Honey 100.00 %</p> <p><b>Wild fungi</b></p> <p>Mushrooms 86.50 %            Mixed fungi 13.50 %</p>
<p><b>Other vegetables</b></p> <p>Runner bean 37.91 %            Tomato 17.95 %            Pea 12.56 %            Broad bean 8.65 %            Sweetcorn 6.61 %            French bean 6.27 %            Squash 5.48 %            Pumpkin 2.55 %            Pepper 1.48 %            Aubergine 0.40 %            Chilli pepper 0.10 %            Tomatillos 0.04 %</p>		
<p><b>Root vegetables</b></p> <p>Onion 26.30 %            Leek 20.99 %            Beetroot 16.56 %            Carrot 12.69 %            Swede 7.05 %            Parsnip 5.01 %            Sweet potato 3.55 %            Shallot 2.97 %            Turnip 1.29 %            Radish 0.80 %            Artichoke 0.78 %            Spring onion 0.62 %            Celery 0.46 %            Kohl rabi 0.44 %            Garlic 0.44 %            Celeriac 0.03 %            Fennel 0.02 %</p>		

**Notes**

Percentages are based on the consumption of all adults in the survey consuming that particular food group.

**Table 41. Occupancy rates for adults and children ( $h\ y^{-1}$ ) in the Derby direct radiation survey area**

Observation Number	Sex	Age (years)	Indoor occupancy	Outdoor occupancy	Total occupancy
<b>0 - 0.25 km zone</b>					
243	M	35	2230	630	2860
329	M	U	2001	69	2070
330	M	U	2001	69	2070
331	M	U	2001	69	2070
332	M	U	1035	1035	2070
333	M	U	1725	345	2070
26	M	U	2040	-	2040
27	M	U	2040	-	2040
28	M	U	2040	-	2040
29	M	U	2040	-	2040
30	M	U	2040	-	2040
31	M	U	2040	-	2040
32	M	U	2040	-	2040
33	F	U	2040	-	2040
34	F	U	2040	-	2040
35	F	U	2040	-	2040
36	F	U	2040	-	2040
37	F	U	2040	-	2040
38	F	U	2040	-	2040
39	F	U	2040	-	2040
40	M	U	204	1836	2040
41	M	U	204	1836	2040
42	M	U	204	1836	2040
43	M	U	204	1836	2040
44	M	U	204	1836	2040
45	M	U	204	1836	2040
46	M	U	204	1836	2040
47	F	U	204	1836	2040
48	F	U	204	1836	2040
49	F	U	204	1836	2040
50	F	U	204	1836	2040
51	F	U	204	1836	2040
52	F	U	204	1836	2040
386	U	U	1790	50	1840
387	M	U	1380	460	1840
388	U	U	1790	50	1840
389	U	U	1790	50	1840
390	U	U	1790	50	1840
391	U	U	1790	50	1840
392	U	U	1790	50	1840
393	U	U	1790	50	1840
394	U	U	1790	50	1840
395	U	U	1790	50	1840
53	F	U	102	918	1020
54	F	U	102	918	1020
55	M	U	1020	-	1020
252	M	35	-	749	749
244	M	39	179	536	715
245	M	U	179	536	715
246	M	U	179	536	715
247	M	U	179	536	715
342	M	U	-	690	690
343	M	U	-	690	690
344	M	U	-	690	690

**Table 41. Occupancy rates for adults and children ( $h\ y^{-1}$ ) in the Derby direct radiation survey area**

Observation Number	Sex	Age (years)	Indoor occupancy	Outdoor occupancy	Total occupancy
345	M	U	-	690	690
346	M	U	-	690	690
347	M	U	-	690	690
334	M	U	-	460	460
335	M	U	-	460	460
336	M	U	-	460	460
337	M	U	-	345	345
338	M	U	-	345	345
339	M	U	-	345	345
340	M	U	-	345	345
341	M	U	-	345	345
256	M	26	-	273	273
257	F	24	-	273	273
248	M	U	52	208	260
249	M	U	52	208	260
250	M	U	52	208	260
251	M	U	52	208	260
261	F	33	-	260	260
258	M	11	-	200	200
255	M	74	-	169	169
259	M	35	-	150	150
79	F	22	-	124	124
262	M	43	-	83	83
263	M	33	-	80	80
253	M	20	-	78	78
254	M	45	-	78	78
80	M	15	-	70	70
81	M	15	-	70	70
82	M	15	-	70	70
83	F	15	-	70	70
84	F	15	-	70	70
85	M	16	-	70	70
86	M	16	-	70	70
87	F	16	-	70	70
88	F	16	-	70	70
89	F	16	-	70	70
90	M	17	-	70	70
91	M	17	-	70	70
92	M	17	-	70	70
93	F	17	-	70	70
94	F	17	-	70	70
95	M	18	-	70	70
96	M	18	-	70	70
97	F	18	-	70	70
98	F	18	-	70	70
99	F	18	-	70	70
122	M	54	-	52	52
123	F	51	-	52	52
130	M	8	-	52	52
260	F	29	-	50	50
264	M	29	-	26	26
265	M	41	-	24	24

**Table 41. Occupancy rates for adults and children ( $h\ y^{-1}$ ) in the Derby direct radiation survey area**

Observation Number	Sex	Age (years)	Indoor occupancy	Outdoor occupancy	Total occupancy
<b>&gt;0.25 - 0.5 km zone</b>					
61	F	63	8482	96	8578
65	F	65	8383	157	8540
67	F	80	8446	52	8498
381	F	73	7277	469	7746
350	M	71	7478	168	7646
351	F	68	7574	72	7646
66	M	38	6924	104	7028
63	F	65	6368	520	6888
59	M	56	6140	488	6628
348	M	72	6211	261	6472
349	F	68	6211	261	6472
68	M	63	5700	32	5732
69	F	62	5257	475	5732
60	F	55	4816	128	4944
62	M	36	3398	-	3398
278	F	U	2280	71	2350
279	M	U	1175	1175	2350
280	M	U	-	2350	2350
281	M	U	705	1645	2350
282	M	U	2303	47	2350
283	M	U	2303	47	2350
397	M	U	2205	45	2250
398	M	U	2205	45	2250
399	M	U	2205	45	2250
400	M	U	2205	45	2250
401	M	U	2205	45	2250
402	M	U	2205	45	2250
56	F	60	1739	47	1786
57	M	U	1429	357	1786
58	M	U	1429	357	1786
404	M	U	840	840	1680
405	M	U	840	840	1680
403	F	U	855	45	900
70	F	1	168	-	168
<b>&gt;0.5 - 1 km zone</b>					
236	M	70	8320	400	8720
396	M	U	7752	730	8482
233	F	52	7581	867	8448
238	M	55	7406	730	8136
240	F	57	7599	525	8124
239	F	53	7615	365	7980
100	M	34	7684	244	7928
380	M	61	6073	1449	7522
385	M	19	7248	52	7300
241	M	58	5874	350	6224
242	M	23	6049	175	6224
235	M	20	5871	90	5961
237	M	38	5000	694	5694
384	F	18	5588	52	5640
383	M	48	4932	548	5480
382	F	44	5058	182	5240
407	M	39	4938	200	5138
406	F	38	4728	192	4920

**Table 41. Occupancy rates for adults and children ( $h\ y^{-1}$ ) in the Derby direct radiation survey area**

Observation Number	Sex	Age (years)	Indoor occupancy	Outdoor occupancy	Total occupancy
101	F	18	3744	-	3744
64	F	7	1697	637	2334
71	M	40	1258	839	2097
72	M	U	1258	839	2097
73	M	U	1258	839	2097
74	F	U	2097	-	2097
75	M	U	2097	-	2097
76	M	U	2097	-	2097
266	M	U	1070	714	1784
267	M	U	1070	714	1784
268	M	U	1070	714	1784
269	M	U	1070	714	1784
270	M	U	1070	714	1784
271	M	U	1070	714	1784
272	M	U	1070	714	1784
273	M	U	1070	714	1784
274	M	U	1070	714	1784
275	M	U	1070	714	1784
276	M	U	1070	714	1784
277	M	U	1070	714	1784
234	M	56	1226	126	1352
352	F	U	1209	59	1268
353	F	U	1209	59	1268
354	F	U	1209	59	1268
355	F	U	1209	59	1268
356	F	U	1209	59	1268
357	F	U	1209	59	1268
358	F	U	1209	59	1268
359	F	U	1209	59	1268
360	F	U	1209	59	1268
361	F	U	1209	59	1268
362	F	U	1209	59	1268
363	F	U	1209	59	1268
364	M	3	1073	195	1268
365	F	3	1073	195	1268
366	M	4	1073	195	1268
367	F	4	1073	195	1268
368	M	5	1073	195	1268
369	F	5	1073	195	1268
370	M	6	1073	195	1268
371	F	6	1073	195	1268
372	M	7	1073	195	1268
373	F	7	1073	195	1268
374	M	8	1073	195	1268
375	F	8	1073	195	1268
376	M	9	1073	195	1268
377	F	9	1073	195	1268
378	M	10	1073	195	1268
379	F	10	1073	195	1268
77	F	U	1248	-	1248
78	M	U	749	499	1248
218	M	37	-	40	40

**Notes**

U = Unknown

**Table 42. Analysis of occupancy rates in the Derby direct radiation survey area**

<b>0 - 0.25 km zone</b>	
<b>Number of hours</b>	<b>Number of observations</b>
8000 to 8760	0
7000 to 8000	0
6000 to 7000	0
5000 to 6000	0
4000 to 5000	0
3000 to 4000	0
2000 to 3000	33
1000 to 2000	13
0 to 1000	60
<b>0 to 8760</b>	<b>106</b>

<b>&gt;0.25 - 0.5 km zone</b>	
<b>Number of hours</b>	<b>Number of observations</b>
8000 to 8760	3
7000 to 8000	4
6000 to 7000	4
5000 to 6000	2
4000 to 5000	1
3000 to 4000	1
2000 to 3000	12
1000 to 2000	5
0 to 1000	2
<b>0 to 8760</b>	<b>34</b>

<b>&gt;0.5 - 1 km zone</b>	
<b>Number of hours</b>	<b>Number of observations</b>
8000 to 8760	5
7000 to 8000	4
6000 to 7000	2
5000 to 6000	6
4000 to 5000	1
3000 to 4000	1
2000 to 3000	7
1000 to 2000	43
0 to 1000	1
<b>0 to 8760</b>	<b>70</b>

**Table 43. Gamma dose rate measurements for the Derby direct radiation survey ( $\mu\text{Gy h}^{-1}$ )**

**Businesses, residences and recreational areas**

Location	Outdoor substrate	Gamma dose rate at 1 metre <sup>a</sup>	Indoor substrate	Gamma dose rate at 1 metre <sup>a</sup>
Business 1	Tarmac	0.0692	Concrete	0.097
Business 2	Grass	0.0610	Tile	0.088
Business 3	Grass	0.0814	Concrete	0.082
Business 4	Tarmac	0.0594	Concrete	0.070
Business 5	Grass	0.0814	Wood	0.062
Business 6	Grass	0.0888	Concrete	0.084
Business 7	Concrete	0.0629	Concrete	0.085
Business 8	Concrete	0.0744	Concrete	0.068
Business 9	Concrete	0.0671	Concrete	0.063
Business 10	Concrete	0.0538	Wood	0.053
Residence 1	Grass	0.0822	Concrete	0.062
Residence 2	Grass	0.0856	Concrete	0.122
Residence 3	Grass	0.0894	Concrete	0.112
Residence 4	Grass	0.0894	Concrete	0.118
Residence 5	Grass	0.0858	Concrete	0.109
Residence 6	Grass	0.0858	Concrete	0.120
Residence 7	Grass	0.0766	Concrete	0.062
Residence 8	Grass	0.0977	Concrete	0.108
Residence 9	Grass	0.0816	Concrete	0.127
Residence 10	Grass	0.0978	Concrete	0.102
Residence 11	Grass	0.0837	Concrete	0.106
Residence 12	Grass	0.0850	Concrete	0.108
Residence 13	Grass	0.0814	NM	NM
Residence 14	Grass	0.0778	Wood	0.058
Residence 15	Grass	0.0841	NM	NM
Residence 16	Grass	0.0862	Wood	0.061
Residence 17	Grass	0.0731	Wood	0.112
Residence 18	Concrete	0.1027	NM	NM
Residence 19	Grass	0.0799	Concrete	0.103
Recreational Area 1	Grass	0.0724	NM	NM
Recreational Area 2	Grass	0.0850	NM	NM
Recreational Area 3	Grass	0.0864	NM	NM

**Backgrounds**

Location	NGR	Substrate	Gamma dose rate at 1 metre	
Background 1	SE of the area	SK431336	Grass	0.085
Background 2	Markeaton Park	SK333373	Grass	0.085
Background 3	Stanley Common	SK413412	Grass	0.076
Background 4	SW of the area	SK332307	Grass	0.093

**Notes**

NM = Not measured

<sup>a</sup> These measurements have not been adjusted for natural background dose rates.

**Table 44. Combinations of adult pathways for consideration in dose assessments in the Derby area**

Combination number	Fish (from aquatic survey area) <sup>a</sup>	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Occupancy over river washed substrate (grass)	Occupancy over river washed substrate (mud)	Occupancy in proximity (<10 m) to sewage, sewage sludge or sewage cake	Indoor occupancy within 1 km of the site boundary	Outdoor occupancy within 1 km of the site boundary
1	X	X	X	X	X	X														X	X
2																		X			
3							X						X			X					
4		X	X	X	X	X					X	X	X	X		X					
5		X	X	X	X	X	X	X	X	X		X									
6		X	X	X	X	X						X	X								X
7		X	X	X	X	X	X				X	X	X								
8															X						
9								X	X	X	X	X									
10											X										X
11																X				X	X
12																		X	X	X	X
13	X																				

**Notes**

The food groups and external exposure pathways marked with an x are combined for the corresponding combination number. For example, combination number 1 represents an individual (or individuals) from Annex 1 who had positive data in the following pathways; green vegetables, other vegetables, root vegetables, potato, domestic fruit and indoor and outdoor occupancy within 1 km of the site boundary.

<sup>a</sup>Based on anecdotal evidence (see Annex 3)



**Annex 1. Adults' consumption rates (kg y<sup>-1</sup> or l y<sup>-1</sup>) and occupancy rates (h y<sup>-1</sup>) in the Derby area**

Observation number	Sex	Age (years)	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Occupancy over river washed substrate (grass)	Occupancy over river washed substrate (mud)	Occupancy in close proximity (<10 m) to sewage, sewage sludge or sewage cake	Indoor occupancy within 1 km of the site boundary	Outdoor occupancy within 1 km of the site boundary	
27	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2040	-	
28	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2040	-
29	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2040	-
30	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2040	-
31	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2040	-
32	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2040	-
33	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2040	-
34	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2040	-
35	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2040	-
36	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2040	-
37	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2040	-
38	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2040	-
39	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2040	-
40	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	204	1836
41	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	204	1836
42	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	204	1836
43	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	204	1836
44	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	204	1836
45	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	204	1836
46	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	204	1836
47	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	204	1836
48	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	204	1836

**Annex 1. Adults' consumption rates (kg y<sup>-1</sup> or l y<sup>-1</sup>) and occupancy rates (h y<sup>-1</sup>) in the Derby area**

Observation number	Sex	Age (years)	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Occupancy over river washed substrate (grass)	Occupancy over river washed substrate (mud)	Occupancy in close proximity (<10 m) to sewage, sewage sludge or sewage cake	Indoor occupancy within 1 km of the site boundary	Outdoor occupancy within 1 km of the site boundary	
49	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	204	1836	
50	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	204	1836
51	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	204	1836
52	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	204	1836
53	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	102	918
54	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	102	918
55	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1020	-
56	F	60	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1739	47
57	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1429	357
58	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1429	357
59	M	56	3.1	1.5	0.2	1.1	0.2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6140	488
60	F	55	3.1	1.5	0.2	1.1	0.2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4816	128
61	F	63	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	8482	96
62	M	36	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3398	-
63	F	65	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6368	520
65	F	65	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	8383	157
66	M	38	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6924	104
67	F	80	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	8446	52
68	M	63	.	.	.	.	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5700	32
69	F	62	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5257	475
71	M	40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1258	839
72	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1258	839











**Annex 1. Adults' consumption rates (kg y<sup>-1</sup> or l y<sup>-1</sup>) and occupancy rates (h y<sup>-1</sup>) in the Derby area**

Observation number	Sex	Age (years)	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Occupancy over river washed substrate (grass)	Occupancy over river washed substrate (mud)	Occupancy in close proximity (<10 m) to sewage, sewage sludge or sewage cake	Indoor occupancy within 1 km of the site boundary	Outdoor occupancy within 1 km of the site boundary
207	F	17	-	-	-	-	-	-	-	-	-	-	3.0	-	-	-	-	-	-	-	-	-
208	M	55	-	-	-	-	0.5	<b>365.0</b>	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-
209	F	55	-	-	-	-	0.5	<b>182.5</b>	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-
210	M	25	-	-	-	-	0.5	<b>365.0</b>	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-
212	M	37	-	-	-	-	-	-	3.0	3.0	<b>3.0</b>	1.1	<b>8.9</b>	-	-	-	-	-	-	-	-	-
213	F	37	-	-	-	-	-	-	3.0	3.0	<b>3.0</b>	1.1	<b>8.9</b>	-	-	-	-	-	-	-	-	-
214	M	75	-	-	-	-	-	-	3.0	3.0	<b>3.0</b>	1.1	<b>8.9</b>	-	-	-	-	-	-	-	-	-
215	F	73	-	-	-	-	-	-	3.0	3.0	<b>3.0</b>	1.1	<b>8.9</b>	-	-	-	-	-	-	-	-	-
218	M	37	-	-	-	-	-	-	-	-	-	0.9	-	-	-	-	-	-	-	-	-	40
219	M	68	-	-	-	-	-	-	-	-	-	0.9	-	-	-	-	-	-	-	-	-	-
220	M	58	-	-	-	-	-	-	-	-	-	-	2.3	-	-	-	-	-	-	-	-	-
221	F	53	-	-	-	-	-	-	-	-	-	-	2.3	-	-	-	-	-	-	-	-	-
222	M	31	-	-	-	-	-	-	-	-	-	-	2.3	-	-	-	-	-	-	-	-	-
223	M	29	-	-	-	-	-	-	-	-	-	-	2.3	-	-	-	-	-	-	-	-	-
224	M	26	-	-	-	-	-	-	-	-	-	-	2.3	-	-	-	-	-	-	-	-	-
225	M	42	2.5	1.6	3.3	8.2	2.0	-	-	-	-	<b>4.6</b>	<b>15.1</b>	<b>1.8</b>	<b>9.0</b>	-	<b>1.0</b>	-	-	-	-	-
226	F	43	2.5	1.6	3.3	8.2	2.0	-	-	-	-	-	<b>15.1</b>	<b>1.8</b>	-	-	<b>1.0</b>	-	-	-	-	-
229	M	48	-	-	-	-	-	<b>182.5</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
230	F	47	-	-	-	-	-	<b>182.5</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
231	F	22	-	-	-	-	-	<b>182.5</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
232	F	17	-	-	-	-	-	<b>182.5</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
233	F	52	6.7	21.7	11.3	32.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7581	867









**Annex 1. Adults' consumption rates (kg y<sup>-1</sup> or l y<sup>-1</sup>) and occupancy rates (h y<sup>-1</sup>) in the Derby area**

Observation number	Sex	Age (years)	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Occupancy over river washed substrate (grass)	Occupancy over river washed substrate (mud)	Occupancy in close proximity (<10 m) to sewage, sewage sludge or sewage cake	Indoor occupancy within 1 km of the site boundary	Outdoor occupancy within 1 km of the site boundary	
328	F	U	15.6	8.6	24.5	.	5.7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
329	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2001	69
330	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2001	69
331	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2001	69
332	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1035	1035
333	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1725	345
334	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	460
335	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	460
336	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	460
337	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	345
338	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	345
339	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	345
340	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	345
341	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	345
342	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	690
343	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	690
344	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	690
345	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	690
346	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	690
347	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	690
348	M	72	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6211	261
349	F	68	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6211	261

**Annex 1. Adults' consumption rates (kg y<sup>-1</sup> or l y<sup>-1</sup>) and occupancy rates (h y<sup>-1</sup>) in the Derby area**

Observation number	Sex	Age (years)	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Occupancy over river washed substrate (grass)	Occupancy over river washed substrate (mud)	Occupancy in close proximity (<10 m) to sewage, sewage sludge or sewage cake	Indoor occupancy within 1 km of the site boundary	Outdoor occupancy within 1 km of the site boundary	
350	M	71	.	0.9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7478	168	
351	F	68	.	0.9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7574	72
352	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1209	59
353	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1209	59
354	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1209	59
355	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1209	59
356	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1209	59
357	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1209	59
358	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1209	59
359	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1209	59
360	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1209	59
361	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1209	59
362	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1209	59
363	F	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1209	59
380	M	61	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6073	1449
381	F	73	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7277	469
382	F	44	.	.	.	.	0.9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5058	182
383	M	48	.	.	.	.	0.9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4932	548
384	F	18	.	.	.	.	0.9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5588	52
385	M	19	.	.	.	.	0.9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7248	52
386	U	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1790	50
387	M	U	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1380	460



**Annex 1. Adults' consumption rates ( $\text{kg y}^{-1}$  or  $\text{l y}^{-1}$ ) and occupancy rates ( $\text{h y}^{-1}$ ) in the Derby area**

Observation number	Sex	Age (years)	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Occupancy over river washed substrate (grass)	Occupancy over river washed substrate (mud)	Occupancy in close proximity (<10 m) to sewage, sewage sludge or sewage cake	Indoor occupancy within 1 km of the site boundary	Outdoor occupancy within 1 km of the site boundary
410	F	56	8.7	17.3	3.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
411	F	78	8.7	17.3	3.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
412	M	U	3.9	10.1	<b>30.0</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
413	F	U	3.9	10.1	<b>30.0</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
414	M	U	3.9	10.1	<b>30.0</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
415	F	U	3.9	10.1	<b>30.0</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
416	M	U	3.9	10.1	<b>30.0</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
417	F	U	3.9	10.1	<b>30.0</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
423	F	40	<b>28.2</b>	17.8	15.1	-	5.4	-	-	-	-	-	-	<b>1.2</b>	-	-	-	-	-	-	-	-
424	F	34	<b>28.2</b>	17.8	15.1	-	5.4	-	-	-	-	-	-	<b>1.2</b>	-	-	-	-	-	-	-	-
425	F	56	<b>28.2</b>	17.8	15.1	-	5.4	-	-	-	-	-	-	<b>1.2</b>	-	-	-	-	-	-	-	-

**Notes**

Observations in bold indicate the high-rate individuals

U = Unknown



**Annex 2. Children's consumption rates (kg y<sup>-1</sup> or l y<sup>-1</sup>) and occupancy rates (h y<sup>-1</sup>) in the Derby area**

Observation number	Sex	Age (years)	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Wild fungi	Occupancy over river washed substrate (mud)	Indoor occupancy within 1 km of the site boundary	Outdoor occupancy within 1 km of the site boundary
<b>5-year-old age group</b>																		
153	M	3	-	-	-	-	<b>0.5</b>	-	-	-	-	-	-	-	-	-	-	-
154	F	5	0.2	0.4	0.5	<b>2.0</b>	<b>1.0</b>	-	-	-	-	-	-	-	-	-	-	-
155	F	4	0.2	0.4	0.5	<b>2.0</b>	<b>1.0</b>	-	-	-	-	-	-	-	-	-	-	-
156	F	5	0.2	0.4	0.5	<b>2.0</b>	<b>1.0</b>	-	-	-	-	-	-	-	0.0	-	-	-
157	M	2	0.1	-	0.1	0.2	0.1	-	-	-	-	-	-	-	-	-	-	-
173	M	6	0.2	0.5	0.2	<b>2.0</b>	<b>0.5</b>	-	-	-	-	-	-	-	-	-	-	-
174	F	3	-	-	-	0.5	0.1	-	-	-	-	-	-	-	-	-	-	-
188	M	3	-	0.1	0.1	0.5	0.2	-	-	-	-	-	-	-	-	-	-	-
189	M	3	-	0.1	0.1	0.5	0.2	-	-	-	-	-	-	-	-	-	-	-
216	F	4	-	-	-	-	-	-	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	-	<b>3.0</b>	-	-	-	-	-
228	F	5	<b>0.6</b>	0.4	0.8	<b>2.1</b>	<b>0.5</b>	-	-	-	-	-	<b>3.8</b>	<b>0.5</b>	-	-	-	-
364	M	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1073	195
365	F	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1073	195
366	M	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1073	195
367	F	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1073	195
368	M	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1073	195
369	F	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1073	195
370	M	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1073	195
371	F	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1073	195
422	F	5	<b>1.2</b>	<b>3.0</b>	<b>9.0</b>	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>1-year-old age group</b>																		
70	F	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	-
190	F	1	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-
217	M	1	-	-	-	-	-	-	-	-	-	-	<b>0.7</b>	-	-	-	-	-
304	M	1	-	-	<b>1.8</b>	<b>3.3</b>	-	-	-	-	-	-	-	-	-	-	-	-

**Notes**

Observations in bold indicate the high-rate individuals

**Annex 3. Qualitative and estimated data for use in dose assessments**

<b>Details of activity</b>	<b>Exposure pathways involved</b>	<b>Estimated rate</b>	<b>Other pathways possibly involved</b>
Anecdotal evidence of fish being taken for consumption by people believed to be of Eastern European origin.	Freshwater fish consumption from water affected by liquid discharges.	1 kg y <sup>-1</sup>	Occupancy over river washed substrates
Anecdotal evidence of children swimming in the River Derwent close to weir at SK404 339	Occupancy in water affected by liquid discharges	Insufficient data to estimate rate.	Occupancy over river washed substrates

#### Annex 4. Ratios for determining consumption and occupancy rates for children

Group	Ratio child/adult <sup>a</sup>	
	1-year-old	10-year-old
Fish <sup>b</sup>	0.050	0.200
Crustaceans <sup>b</sup>	0.050	0.250
Molluscs <sup>b</sup>	0.050	0.250
Green vegetables	0.222	0.444
Other vegetables	0.200	0.500
Root vegetables	0.375	0.500
Potatoes	0.292	0.708
Domestic fruit	0.467	0.667
Milk	1.333	1.000
Cattle meat	0.222	0.667
Pig meat	0.138	0.625
Sheep meat	0.120	0.400
Poultry	0.183	0.500
Eggs	0.600	0.800
Wild/free foods <sup>c</sup>	0.110	0.490
Game <sup>d</sup>	0.140	0.500
Honey	0.789	0.789
Wild fungi	0.150	0.450
Freshwater fish <sup>b</sup>	0.050	0.250
Direct radiation	1.000	1.000
External exposure	0.030	0.500
Plume	1.000	1.000

#### Notes

<sup>a</sup>The age groups suggested for assessment in this table are those relating to dose coefficients representing 1 to 2 year olds (labelled 1-year-old) and 7 to 12 year olds (labelled 10-year-old). Excepting notes b and c, consumption ratios were derived from Byrom et al., (1995) for 1-year-old (6 to 12 months) and 10-year-old children (10 to 11 years)

<sup>b</sup>Ratios were derived from Smith and Jones, (2003) which presented data for infants and children.

<sup>c</sup>Ratios were derived from FSA data for wild fruit and nuts for infants and 10-yr-old children.

<sup>d</sup>Game includes rabbits/hares and venison.



**Annex 5. Consumption rates (kg y<sup>-1</sup> or l y<sup>-1</sup>) and occupancy rates (h y<sup>-1</sup>) for women of childbearing age in the Derby area, for use in foetal dose assessments**

Observation number	Sex	Age (years) <sup>a</sup>	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Wild fungi	Indoor occupancy within 1 km of the site boundary	Outdoor occupancy within 1 km of the site boundary
98	F	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	70
99	F	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	70
101	F	18	-	-	-	-	-	-	-	-	-	-	-	-	-	3744	-
141	F	U	7.5	3.5	7.5	10.0	0.5	-	-	-	-	-	-	-	-	-	-
142	F	U	7.5	3.5	7.5	10.0	0.5	-	-	-	-	-	-	-	-	-	-
144	F	42	12.5	17.2	13.5	41.0	8.6	-	-	-	-	-	-	-	-	-	-
145	F	21	12.5	17.2	13.5	41.0	8.6	-	-	-	-	-	-	-	-	-	-
146	F	25	12.5	17.2	13.5	41.0	8.6	-	-	-	-	-	-	-	-	-	-
149	F	28	8.3	11.5	9.0	27.3	5.7	-	-	-	-	-	-	-	-	-	-
150	F	27	8.3	11.5	9.0	27.3	5.7	-	-	-	-	-	-	-	-	-	-
160	F	32	9.6	9.1	6.9	12.1	-	-	-	-	-	-	-	-	-	-	-
163	F	25	28.4	20.3	41.3	45.5	10.3	-	-	-	-	-	-	1.5	-	-	-
167	F	17	21.7	31.8	36.9	36.4	1.9	-	-	-	-	-	-	-	-	-	-
170	F	28	21.7	31.8	36.9	36.4	1.9	-	-	-	-	-	-	-	-	-	-
171	F	25	21.7	31.8	36.9	36.4	1.9	-	-	-	-	-	-	-	-	-	-
179	F	32	4.6	4.2	4.6	13.7	3.9	-	-	-	-	-	-	-	-	-	-
182	F	40	4.6	4.2	4.6	13.7	3.9	-	-	-	-	-	-	-	-	-	-
184	F	38	4.6	4.2	4.6	13.7	3.9	-	-	-	-	-	-	-	-	-	-
186	F	26	4.6	4.2	4.6	13.7	3.9	-	-	-	-	-	-	-	-	-	-
197	F	25	22.9	15.7	18.7	24.3	8.0	-	-	-	-	-	-	-	-	-	-
199	F	44	23.2	43.7	45.4	81.9	35.4	304.0	-	-	-	6.8	20.0	0.5	-	-	-
207	F	17	-	-	-	-	-	-	-	-	-	-	3.0	-	-	-	-
213	F	37	-	-	-	-	-	-	3.0	3.0	3.0	1.1	8.9	-	-	-	-



**Annex 5. Consumption rates ( $\text{kg y}^{-1}$  or  $\text{l y}^{-1}$ ) and occupancy rates ( $\text{h y}^{-1}$ ) for women of childbearing age in the Derby area, for use in foetal dose assessments**

Observation number	Sex	Age (years) <sup>a</sup>	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Wild fungi	Indoor occupancy within 1 km of the site boundary	Outdoor occupancy within 1 km of the site boundary
361	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	1209	59
362	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	1209	59
363	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	1209	59
382	F	44	-	-	-	-	0.9	-	-	-	-	-	-	-	-	5058	182
384	F	18	-	-	-	-	0.9	-	-	-	-	-	-	-	-	5588	52
403	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	855	45
406	F	38	1.5	-	-	2.3	4.5	-	-	-	-	-	-	-	-	4728	192
413	F	U	3.9	10.1	30.0	-	-	-	-	-	-	-	-	-	-	-	-
415	F	U	3.9	10.1	30.0	-	-	-	-	-	-	-	-	-	-	-	-
417	F	U	3.9	10.1	30.0	-	-	-	-	-	-	-	-	-	-	-	-
423	F	40	28.2	17.8	15.1	-	5.4	-	-	-	-	-	-	1.2	-	-	-
424	F	34	28.2	17.8	15.1	-	5.4	-	-	-	-	-	-	1.2	-	-	-

**Notes**

U=Unknown

<sup>a</sup> Based on National Statistics guidelines women were deemed to be of childbearing age if they were between 15 and 44 years old. Women of unknown age were included as they were potentially women of childbearing age.

Annex 6. Summary of profiles for adults in the Derby area

Profile Name	Pathway Name																						
	Number of individuals	Direct radiation <sup>a</sup>	Eggs	Fish - River <sup>e</sup>	Fruit - Domestic	Fruit and nuts - Wild	Gamma ext - Sediment <sup>b</sup>	Honey	Meat - Cow	Meat - Game <sup>c</sup>	Meat - Pig	Meat - Poultry	Meat - Sheep	Milk	Mushrooms	Occupancy in proximity to sewage sludge	Plume (IN; 0-0.25km) <sup>d</sup>	Plume (MID; 0.25-0.5km) <sup>d</sup>	Plume (OUT; 0.5-1km) <sup>d</sup>	Vegetables - Green	Vegetables - Other Domestic	Vegetables - Potatoes	Vegetables - Root
		kg	kg	kg	kg	h	kg	kg	kg	kg	kg	kg	kg	l	kg	h	h	h	h	kg	kg	kg	kg
Occupants for direct radiation	180	1	0.2	-	0.1	-	10	-	-	-	-	-	-	-	-	60	580	770	1000	0.4	0.7	1	0.3
Egg consumers	12	0.2	13.1	-	13.8	0.5	-	-	1	0.8	1	1.9	1	50.7	0.2	-	10	-	-	12.7	20.2	37.8	20.9
Freshwater fish consumers	2	-	-	1	-	-	300	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Domestic fruit consumers	10	-	5.9	-	49.7	0.1	-	-	2.4	-	2.4	1.4	1.2	61.7	-	-	-	-	-	26.2	46.4	77.4	51.5
Wild fruit and nut consumers	24	0.1	2.7	-	5.8	1.1	-	-	-	0.4	-	0.2	-	-	0.1	-	-	-	-	21.4	18	30.9	23.6
Occupants for exposure - Sediment	3	0.3	-	-	-	-	610	-	-	-	-	-	-	-	-	-	250	-	-	-	-	-	-
Honey consumers	3	-	-	-	-	-	-	1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cattle meat consumers	2	-	0.7	-	40.6	-	-	-	12	-	12	-	6	4.5	-	-	-	-	-	37.9	29.7	49.1	31.4
Game meat consumers	1	-	15.1	-	2	1.8	-	-	-	9	-	4.6	-	-	1	-	-	-	-	2.5	1.6	8.2	3.3
Pig meat consumers	2	-	0.7	-	40.6	-	-	-	12	-	12	-	6	4.5	-	-	-	-	-	37.9	29.7	49.1	31.4
Poultry meat consumers	3	-	18.4	-	24.2	0.9	-	-	-	3	-	6	-	202.7	0.3	-	-	-	-	16.3	29.7	57.3	31.4
Sheep meat consumers	6	-	6.2	-	13.5	-	-	-	6	-	6	0.8	4	1.5	-	-	-	-	-	12.6	9.9	16.4	10.5
Milk consumers	9	-	4.4	-	8	0.1	-	-	-	-	-	1.6	-	250.1	-	-	-	-	-	5.1	9.7	18.2	10.1
Mushroom consumers	2	-	15.1	-	2	1.8	-	-	-	4.5	-	2.3	-	1	-	-	-	-	-	2.5	1.6	8.2	3.3
Occupancy in proximity to sewage sludge	12	1	-	-	-	-	-	-	-	-	-	-	-	-	-	850	-	1780	-	-	-	-	-
Occupants for plume pathway (inner area)	46	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1950	-	-	-	-	-	-
Occupants for plume pathway (mid area)	15	1	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	6800	-	0.4	0.3	0.2	-
Occupants for plume pathway (outer area)	19	1	-	-	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	6680	0.9	2.3	3.6	1.2
Green vegetable consumers	69	-	1.4	-	13.8	0.3	-	-	0.3	-	0.3	0.2	0.2	8.9	-	-	-	-	-	27.7	30	52.3	28.8
Other vegetable consumers	43	-	2.2	-	15.6	0.2	-	-	0.6	-	0.6	0.3	0.3	14.3	-	-	-	-	-	25	39.8	61.2	29.7
Potato consumers	15	-	3.8	-	28.6	0.1	-	-	-	-	-	0.9	-	40.5	-	-	-	-	-	28.2	47.6	112.7	39.2
Root vegetable consumers	48	-	1.2	-	15.8	0.2	-	-	0.5	-	0.5	0.3	0.3	12.9	-	-	-	-	-	22.4	28	47	40.5

**Notes**

- <sup>a</sup> Expressed as the proportion of the profile members who are exposed to direct radiation
  - <sup>b</sup> Gamma ext - sediment includes occupancy over grass; and mud
  - <sup>c</sup> Game meat represents rabbits
  - <sup>d</sup> Plume times are the sums of individuals' indoor and outdoor times
  - <sup>e</sup> Based on anecdotal data (see Annex 3).
- The means of the high-rate groups are determined by the 'cut-off' method and are highlighted on the diagonal

**Annex 7. Summary of profiles for children in the 15-year-old age group in the Derby area**

Profile Name	Pathway name													
	Number of individuals	Direct radiation <sup>a</sup>	Eggs	Fruit - Domestic	Fruit and nuts - Wild	Gamma ext - Sediment <sup>b</sup>	Meat - Poultry	Milk	Mushrooms	Plume (IN; 0-0.25km) <sup>c</sup>	Vegetables - Green	Vegetables - Other Domestic	Vegetables - Potatoes	Vegetables - Root
		-	kg	kg	kg	h	kg	l	kg	h	kg	kg	kg	kg
Occupants for direct radiation	10	1	-	-	-	-	-	-	-	70	-	-	-	-
Egg consumers	1	-	7.6	1	0.9	-	-	-	-	-	1.2	0.8	4.1	1.6
Domestic fruit consumers	1	-	-	9.5	-	-	-	-	-	-	13.8	28.1	6.8	2
Wild fruit and nut consumers	3	-	2.5	0.3	0.6	-	-	69.1	0.2	-	0.4	0.3	1.4	0.5
Occupants for exposure - Sediment	1	-	-	-	-	420	-	-	-	-	-	-	-	-
Poultry meat consumers	1	-	-	0.5	-	-	0.2	182.5	-	-	-	-	-	-
Milk consumers	3	-	-	0.2	0.3	-	0.1	130	0.2	-	-	-	-	-
Mushroom consumers	2	-	-	-	0.5	-	-	103.7	0.2	-	-	-	-	-
Occupants for plume pathway (inner area)	10	1	-	-	-	-	-	-	-	70	-	-	-	-
Green vegetable consumers	3	-	-	4.1	0.1	-	-	-	-	-	7.9	9.9	4.5	7
Other vegetable consumers	3	-	-	3.2	-	-	-	-	-	-	7.2	16.1	2.3	20.7
Potato consumers	4	-	1.9	3.3	0.3	-	-	-	-	-	6.2	7.6	4.4	5.7
Root vegetable consumers	2	-	-	-	-	-	-	-	-	-	3.9	10.1	-	30

**Notes**

<sup>a</sup> Expressed as the proportion of the profile members who are exposed to direct radiation

<sup>b</sup> Gamma ext - sediment represents occupancy over mud

<sup>c</sup> Plume times are the sums of individuals' indoor and outdoor times

The means of the high-rate groups are determined by the 'cut-off' method and are highlighted on the diagonal

**Annex 8. Summary of profiles for children in the 10-year-old age group in the Derby area**

Profile Name	Number of individuals	Pathway Name											
		Direct radiation <sup>a</sup>	Eggs	Fruit - Domestic	Fruit and nuts - Wild	Meat - Poultry	Milk	Plume (IN; 0-0.25km) <sup>b</sup>	Plume (OUT; 0.5-1km) <sup>b</sup>	Vegetables - Green	Vegetables - Other Domestic	Vegetables - Potatoes	Vegetables - Root
		-	kg	kg	kg	kg	l	h	h	kg	kg	kg	kg
Occupants for direct radiation	11	1	1.6	0.4	0.1	-	-	20	1130	2.5	2.9	5	1.6
Egg consumers	3	0.3	14.6	10.6	0.6	1.1	101.3	20	-	13.1	17.9	31.9	13.4
Domestic fruit consumers	3	-	8.9	12.4	0.6	1.2	101.3	-	-	3.9	7.3	14	7.5
Wild fruit and nut consumers	4	0.3	10.9	10.4	0.6	0.9	76	10	-	9.8	13.5	24.2	10
Poultry meat consumers	2	-	13.3	13.7	0.5	1.7	152	-	-	5.8	10.9	20.5	11.3
Milk consumers	2	-	13.3	13.7	0.5	1.7	152	-	-	5.8	10.9	20.5	11.3
Occupants for plume pathway (inner area)	1	1	-	-	-	-	-	200	-	-	-	-	-
Occupants for plume pathway (outer area)	9	1	-	-	-	-	-	-	1390	-	-	-	-
Green vegetable consumers	1	1	17.1	4.4	0.8	0	0	52	-	27.7	31.9	54.6	17.6
Other vegetable consumers	3	0.3	14.6	10.6	0.6	1.1	101.3	20	-	13.1	17.9	31.9	13.4
Potato consumers	3	0.3	14.6	10.6	0.6	1.1	101.3	20	-	13.1	17.9	31.9	13.4
Root vegetable consumers	5	0.2	8.8	6.3	0.4	0.7	60.8	10	-	8.3	12	19.1	11.6

**Notes**

<sup>a</sup> Expressed as the proportion of the profile members who are exposed to direct radiation

<sup>b</sup> Plume times are the sums of individuals' indoor and outdoor times

The means of the high-rate groups are determined by the 'cut-off' method and are highlighted on the diagonal

**Annex 9. Summary of profiles for children in the 5-year-old age group in the Derby area**

Profile Name	Number of individuals	Pathway Names											
		Direct radiation <sup>a</sup>	Eggs	Fruit - Domestic	Fruit and nuts - Wild	Meat - Cow	Meat - Pig	Meat - Sheep	Plume (OUT; 0.5-1km) <sup>b</sup>	Vegetables - Green	Vegetables - Other Domestic	Vegetables - Potatoes	Vegetables - Root
		-	kg	kg	kg	kg	kg	kg	h	kg	kg	kg	kg
Occupants for direct radiation	8	1	-	-	-	-	-	-	1270	-	-	-	-
Egg consumers	2	-	3.4	0.2	0.2	0.1	0.1	0.1	-	0.3	0.2	1	0.4
Domestic fruit consumers	6	-	0.6	0.7	0.1	-	-	-	-	0.2	0.3	1.7	0.4
Wild fruit and nut consumers	1	-	3.8	0.5	0.5	-	-	-	-	0.6	0.4	2.1	0.8
Cattle meat consumers	1	-	3	-	-	0.1	0.1	0.1	-	-	-	-	-
Pig meat consumers	1	-	3	-	-	0.1	0.1	0.1	-	-	-	-	-
Sheep meat consumers	1	-	3	-	-	0.1	0.1	0.1	-	-	-	-	-
Occupants for plume pathway (outer area)	8	1	-	-	-	-	-	-	1270	-	-	-	-
Green vegetable consumers	2	-	1.9	0.2	0.2	-	-	-	-	0.9	1.7	1	4.9
Other vegetable consumers	1	-	-	-	-	-	-	-	-	1.2	3	1.7	9
Potato consumers	5	-	0.8	0.8	0.1	-	-	-	-	0.3	0.4	2	0.5
Root vegetable consumers	5	-	0.8	0.7	0.1	-	-	-	-	0.5	0.9	1.6	2.3

**Notes**

<sup>a</sup> Expressed as the proportion of the profile members who are exposed to direct radiation

<sup>b</sup> Plume times are the sums of individuals' indoor and outdoor times

The means of the high-rate groups are determined by the 'cut-off' method and are highlighted on the diagonal

**Annex 10. Summary of profiles for children in the 1-year-old age group in the Derby area**

Profile Name	Number of individuals	Pathway Names				
		Direct radiation <sup>a</sup>	Eggs	Plume (MID; 0.25-0.5km) <sup>b</sup>	Vegetables - Potatoes	Vegetables - Root
		-	kg	h	kg	kg
Occupants for direct radiation	1	1	-	170	-	-
Egg consumers	1	-	0.7	-	-	-
Occupants for plume pathway (mid area)	1	1	-	170	-	-
Potato consumers	1	-	-	-	3.3	1.8
Root vegetable consumers	1	-	-	-	3.3	1.8

**Notes**

<sup>a</sup> Expressed as the proportion of the profile members who are exposed to direct radiation

<sup>b</sup> Plume times are the sums of individuals' indoor and outdoor times

The means of the high-rate groups are determined by the 'cut-off' method and are highlighted on the diagonal

**Annex 11. Summary of profiles of women of childbearing age in the Derby area**

Profile Name	Number of individuals	Pathway Name																
		Direct radiation <sup>a</sup>	Eggs	Fruit - Domestic	Fruit and nuts - Wild	Meat - Cow	Meat - Pig	Meat - Poultry	Meat - Sheep	Milk	Mushrooms	Plume (IN; 0-0.25km) <sup>b</sup>	Plume (MID; 0.25-0.5km) <sup>b</sup>	Plume (OUT; 0.5-1km) <sup>b</sup>	Vegetables - Green	Vegetables - Other Domestic	Vegetables - Potatoes	Vegetables - Root
		-	kg	kg	kg	kg	kg	kg	kg	l	kg	h	h	h	kg	kg	kg	kg
Occupants for direct radiation	44	1	-	0.1	-	-	-	-	-	-	-	670	70	870	-	-	0.1	-
Egg consumers	3	-	14.7	12.4	0.8	1	1	2.6	1	101.3	0.3	-	-	-	8.5	15.1	30	16.2
Domestic fruit consumers	4	-	5	25.6	0.1	-	-	1.7	-	76	-	-	-	-	24.4	36.2	39	43.2
Wild fruit and nut consumers	5	-	3	6.6	1.3	-	-	0.1	-	-	0.2	-	-	-	17.5	11.5	11	14.9
Cattle meat consumers	1	-	8.9	-	-	3	3	1.1	3	-	-	-	-	-	-	-	-	-
Pig meat consumers	1	-	8.9	-	-	3	3	1.1	3	-	-	-	-	-	-	-	-	-
Poultry meat consumers	1	-	20	35.4	0.5	-	-	6.8	-	304	-	-	-	-	23.2	43.7	81.9	45.4
Sheep meat consumers	1	-	8.9	-	-	3	3	1.1	3	-	-	-	-	-	-	-	-	-
Milk consumers	3	-	6.7	11.8	0.2	-	-	2.3	-	223	-	-	-	-	7.7	14.6	27.3	15.1
Mushroom consumers	1	-	15.1	2	1.8	-	-	-	-	-	1	-	-	-	2.5	1.6	8.2	3.3
Occupants for plume pathway (inner area)	15	1	-	-	-	-	-	-	-	-	-	1900	-	-	-	-	-	-
Occupants for plume pathway (mid area)	2	1	-	-	-	-	-	-	-	-	-	-	1630	-	-	-	-	-
Occupants for plume pathway (outer area)	5	1	-	1.3	-	-	-	-	-	-	-	-	-	4330	0.3	-	0.5	-
Green vegetable consumers	16	-	1.2	10.5	0.3	-	-	0.4	-	19	-	-	-	-	21.2	23.3	31.4	28.5
Other vegetable consumers	7	-	2.9	15	0.3	-	-	1	-	43.4	-	-	-	-	22.6	34.8	39.8	41.5
Potato consumers	13	-	1.5	10.5	0.2	-	-	0.5	-	23.4	-	-	-	-	17.9	21.5	40	30.5
Root vegetable consumers	10	-	2	9.9	0.2	-	-	0.7	-	30.4	-	-	-	-	17.5	23.4	29.7	41.1

**Notes**

<sup>a</sup> Expressed as the proportion of the profile members who are exposed to direct radiation

<sup>b</sup> Plume times are the sums of individuals' indoor and outdoor times

The means of the high-rate groups are determined by the 'cut-off' method and are highlighted on the diagonal

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## Customer focus

With our unique facilities and our breadth of expertise in environmental and fisheries management, we can rapidly put together a multi-disciplinary team of experienced specialists, fully supported by our comprehensive in-house resources.

Our existing customers are drawn from a broad spectrum with wide ranging interests. Clients include:

- international and UK government departments
- the European Commission
- the World Bank
- Food and Agriculture Organisation of the United Nations (FAO)
- oil, water, chemical, pharmaceutical, agro-chemical, aggregate and marine industries
- non-governmental and environmental organisations
- regulators and enforcement agencies
- local authorities and other public bodies

We also work successfully in partnership with other organisations, operate in international consortia and have several joint ventures commercialising our intellectual property.