GLA 80795

Schedule 3: Technical Submission

Analysis of scope 3 food and drink emissions in a London borough

Proposal drafted by REDACTED, REDACTED and REDACTED

11 January 2016

Anthesis

Executive summary

Anthesis welcomes the opportunity to respond to the Invitation to Tender (ITT) from the Greater London Authority (GLA) to submit a proposal for 'analysis of scope 3 food and drink emissions in a London borough'.

We believe that we are uniquely placed to deliver a quality piece of work.

- We are subject matter experts with almost **20 years of greenhouse gas (GHG) accounting experience** working for over 300 clients including numerous local authorities and regional governments.
- Our proposed team have **13 years of experience of continuous working with the London Boroughs and the GLA** on the topics of waste and carbon management. For example, we undertook the first resource flow, ecological and carbon analysis of Greater London *City Limits* in 2002, which the then Mayor of London referred to as 'ground-breaking'
- We have been **involved in the development of PAS 2070 since the start**. Our proposed Project Director, Craig Simmons, was engaged as a stakeholder and provided extensive comments on the early drafts. We also assured the first ever application of PAS 2070 (to Greater London) under commission from the GLA and went on to make recommendations for its further development.
- We recognise that food supply chains and food waste is a complex area. Our team therefore also includes **Dr** REDACTED**, an international recognised expert in resource management** who has advised the UK and European Governments as well as WRAP and numerous local authorities on food and drink supply chains. Through our work with retailers, primary producers, brands and WRAP's Product Sustainability Forum, we have access to estimated scope 3 emissions for more than 10,000 food and drink products.

Our team will be led by Queen's Award-winning GHG expert REDACTED, who provided the technical lead on *City Limits* and has worked extensively with the Authority since as a member of the GLA's former Carbon Management Steering Group and as lead consultant to the London 2012 organising committee on the Games carbon management strategy. REDACTED is an internationally recognised expert in food and food waste and will be the Technical Director responsible for the analysis of food provision, consumption and waste. The project will be managed by Bethany Field, a Senior Consultant who has managed numerous footprinting projects (including several GHG standards-related projects for the BSI) which have involved extensive analysis and interpretation, across various business sectors including food and textiles. The wider team will include REDACTEDand REDACTED who have over 13 years of experience of working with the London boroughs on relevant environmental projects and developing and delivering food waste management schemes.

We propose a methodology that will be undertaken in eight key steps, as outlined in Figure 3, over nine weeks.

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1 About Anthesis

Anthesis is a global yet specialist consultancy which believes that commercial success and sustainability go hand in hand. We offer financially driven sustainability strategy, underpinned by technical experience and delivered by innovative collaborative teams across the world.

The company combines the reach of big consultancies with the deep expertise of specialist firms. We take our name from the Greek word “anthesis”, the stage of a plant’s lifecycle when it is most productive. Sustainability is now at that exciting stage of flourishing; it has grown up and is becoming mainstream.

Anthesis has clients across industry sectors, from corporate multinationals like Coca-Cola, Tesco, ArjoWiggins and Reckitt Benckiser to world class events like London 2012, 34th America’s Cup and Sochi 2014. We also service the public sector, working in the UK for Defra, WRAP, NHS, Universities and local authorities (including the GLA), as well as with the EU.

The company brings together expertise from countries around the world and has offices in the US, the UK, Germany, China and the Philippines. It has a track record of pioneering new approaches to sustainability and has won numerous awards.

Anthesis now incorporates Best Foot Forward and LRS Consultancy, both of which have a track record of successfully working with the GLA and significant experience relevant to this project.

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2 Our understanding of your needs

We understand that this work is being commissioned following work that was undertaken by the GLA in 2014 to measure London’s GHG (or CO_2e) emissions using the PAS 2070 specification. The development of the PAS 2070 specification was sponsored by the GLA as part of its commitment to the C40 Cities Climate Leadership Group in 2013, and was developed with input from an international group of subjects matter experts (SMEs). It aims to provide a system for consistent and comparable high quality reporting of emissions from cities and urban areas to allow for meaningful benchmarking and to help aid decision making regarding how emissions can be reduced.

In 2014 the GLA undertook ‘Application of PAS 2070 – London’ which used the new PAS 2070 specification to assess the Greenhouse Gas (GHG) emissions of London. London was the first city to use the new PAS 2070 specification and the project aimed to show how the new specification could be used to measure city-wide GHG emissions. Anthesis verified the outcomes of this work. The outputs of the project identified that the food and drink supply chain (including growing, processing, catering, restaurants and food waste) is responsible for 13.2% of emissions and is the fourth highest source of GHG emissions using the direct plus supply chain assessment methodology.

We understand that the GLA would like to explore the GHG emissions associated with food and drink consumption in more detail via this new study being commissioned. The outputs of the study will provide detailed data on the location of CO_2e emissions within the boundary of a single London borough, and will propose options to reduce emissions. The outputs of the project and recommendations made will be used to inform GLA policy on food and future environmental strategies which will help contribute to the targets for CO_2e emission reduction set within the Mayor’s Climate Change Mitigation and Energy Strategy, 2011.

In addition to emissions from food and drink consumption, the study should also include the waste of food and drink at consumer stage, food waste in the supply chain and handling and management of waste. All types of

food provision in the borough will be included. It is understood that the focus is on emissions from consumption; but it is noted that under PAS 2070 for Food and Drink emissions, direct emissions from production are also in scope (e.g. from allotments). As the focus of this study is Scope 3, or supply chain emissions, it is not anticipated these emissions will need to be included except where they impinge on indirect, or Scope 3, emission categories.

It will be important that robust data is used as a basis for the study and that calculations and assumptions are clearly shown and explained. We understand that the data will be available in the publically accessible London Datastore once the study is complete and therefore should be presented in a way that it is easy to access and understand.

3 Our project team

We have assembled a highly qualified and experienced team to undertake this work. A brief outline of the team and their roles is provided below, with further details regarding the experience of each team member provided in the appended CVs (Section 12) and a summary of areas of experience provided in section 9. Figure 1 provides our proposed project team structure.

REDACTED will be the Project Director and will have overall responsibility for the project delivery. He will also quality assure the outputs of each stage of the project. REDACTED has previously worked with the GLA to quality assure the application of PAS 2070 to London.

Craig is a founding member of Anthesis, (formerly the co-founder and Technical Director of Best Foot Forward, now part of Anthesis) and is an internationally recognised expert in the field of environmental accounting. He is a member of the Sustainable Europe Research Institute and sits on the Global Footprint Network Standards Committee, and is an advisor to the World Resources Institute (WRI) on the GHG Reporting Protocol for products which he co-authored. He was also an adviser on the WRI's Scope 3 protocol. He is currently working for the WRI on making two relevant municipal GHG standards more accessible; the Mitigation Goal Standard and the Policy and Action Standard. As Chief Technical Adviser, Craig is responsible for all technical analysis work completed by Anthesis and leads regular technical meetings and periodic training sessions with the analyst team. REDACTED also leads on projects, and has previously directed projects for LOCOG and the ODA (London 2012). REDACTED combines his technical abilities with strong communication skills, he runs regular internal and external carbon 'masterclasses' and is a visiting lecturer at Oxford University.

REDACTED will be the Project Manager, and will be responsible for the day to day management of the project including ensuring that the project is delivered using the methodology agreed with the GLA within the agreed timeframes, and be available for regular contact with the GLA project team. REDACTED's broad professional and academic background means she has a wide range of business and technical skills which enable her to support the delivery of projects from their initiation, planning, research and analysis stages, report writing and review. During her time as a sustainability consultant previously for SGS and now Anthesis, REDACTED has managed numerous footprinting projects which have involved extensive analysis and interpretation, across various business sectors including food. Bethany also has recent experience in delivering research and stakeholder engagement for public sector projects for WRAP and the European Union.

REDACTED will act as a Technical Director for the project. REDACTED is a nationally recognised expert in food production, consumption and waste and will use this expertise to direct and quality assure the data analysis related to food and the demographic profile of the borough.

REDACTED joined Anthesis Group in May 2014, and is an acknowledged and respected international expert in the field of waste management and the statistical analysis of waste and resource flows. He has worked on waste management research issues for over 30 years and has been responsible for producing key food waste statistics for the grocery supply chain and food service sectors. He provided statistical analysis of food manufacturing waste in WRAP's recent report 'UK food waste – Historical changes and how amounts might be influenced in the future'.

REDACTED has been a lead researcher on a number of key strategic research projects, including the UK

Government's Foresight Review 'Future of Food and Farming' and the Prime Minister's Strategy Unit report 'Waste Not Want Not'. In addition, he has experience of working with the UK House of Lords as their Specialist Adviser on a recent review of European food waste prevention policies.

REDACTED is a member of the European REFRESH Consortium funded under Horizons 2020, working on waste reduction within the business sector as well as on policies towards food waste reduction. He is a member of the pan-European FUSIONS project external advisory board.

REDACTED is a senior analyst leading on the development of the borough profile and data sourcing and complete the footprint assessment of the CO_2e calculations.

REDACTED is an experienced Senior Analyst with a strong track record in analysis, data interpretation and desk research. She has carried out CO_2e, water and multi-metric studies of various organisations, products and events, and has built Excel models to support many other projects. She has also carried out extensive desk research in supply chain risk and mapping. She has a particular focus on sustainability issues in the food and drinks industry.

REDACTED joined Best Foot Forward in 2012 before its acquisition by Anthesis, with a background in environmental engineering and agronomy. She has previous experiences in carbon offsetting, waste treatment and international cooperation.

REDACTED will be the senior analyst leading on setting up the tool, and completing the verification of the carbon footprint assessment of Scope 3 emissions. REDACTED works in analysis and data quality assurance. She has been involved in the development of Anthesis' data analysis tools including most recently Footprint Reporter™, Anthesis' online Environmental Footprint (EF) and CO_2e calculator. She has undertaken and carbon studies of various organisations, products and transport systems. Claire edited Stepping Forward, the study of the South West of England, and has been responsible for quality assurance on many of Anthesis' other reports.

REDACTED has significant experience of working with the private and public sector to assess food waste production, consumption and waste. He will undertake some primary research to complete some of the gaps in secondary data that we anticipate we will find.

REDACTED is an experienced Senior Consultant with extensive technical knowledge in environmental management systems, sustainable procurement, health and safety, waste management, food waste, carbon reduction and behaviour change. REDACTEDhas a strong track record in projects involving data gathering, information analysis, interpretation and liaison with various stakeholders in the public and private sector. He has been working with many of the London boroughs since 2004 to improve the way that resources and wastes are managed.

REDACTEDwas the project lead for the Ethical Eats programme with Sustain and the Sustainable Restaurant Association (SRA), and has developed strong relationships with the participants that he works with. In addition REDACTED was part for the research team who engaged, Pret a Manger, KFC, Whitbread, Sodexo, 3663 and Break to evaluate their food waste activities and aspirations. Andy previously managed a research and analysis project on behalf of the Recycle Western Riverside Campaign which provided information about food waste collection and disposal schemes. He has also benchmarked the organic fraction of the WRWA boroughs against other London boroughs and calculated potential quantities of food waste generated. Research and surveys were undertaken to establish what new technologies and developments were available to reduce food waste to landfill.

REDACTED will review and advise on the borough profile, support engagement with the identified authority and advise on food waste data.

Ellen has worked with local authorities in London and with the GLA over the past 13 years, having started work with London Remade (subsequently LRS Consultancy and now Anthesis) in 2003. During this time she has worked with all of the London boroughs and waste disposal authorities in some way, delivering individual projects for the vast majority of them. She has good relationships with many of London's waste stakeholders and data regarding their demographics and operations. Ellen specialises in the strategic and technical aspects

of local authority and private sector waste and recycling collection schemes. Her experience includes strategy development, management and implementation of collection services, procurement support, processing infrastructure and behaviour change.

She has previously worked with the GLA to manage and deliver a number of projects including the London local authority Twinning and Mentoring Programme, the London waste website Capital Waste Facts (now transferred to WRAP) and the Supply Infrastructure Project funding scheme.

REDACTED has a significant amount of experience regarding food waste management including developing, launching and monitoring food waste collection schemes, advising authorities regarding food waste prevention and developing good practice guidance and research including WRAP's 'Collecting food waste from NHS hospitals: a guide for waste management companies'.

Figure 1: Anthesis Project Team Structure REDACTED

4 Our approach

Our approach to the project, overview of methodology and main outputs from each of its stages are summarised in Figure 2 and Figure 3.

Figure 2: Proposed Approach

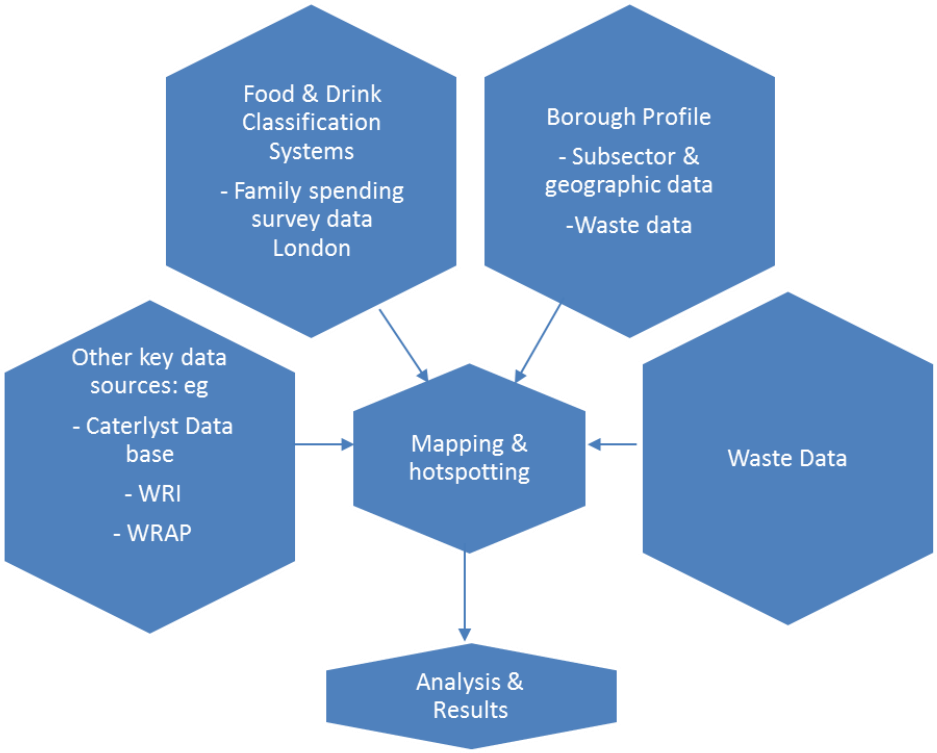
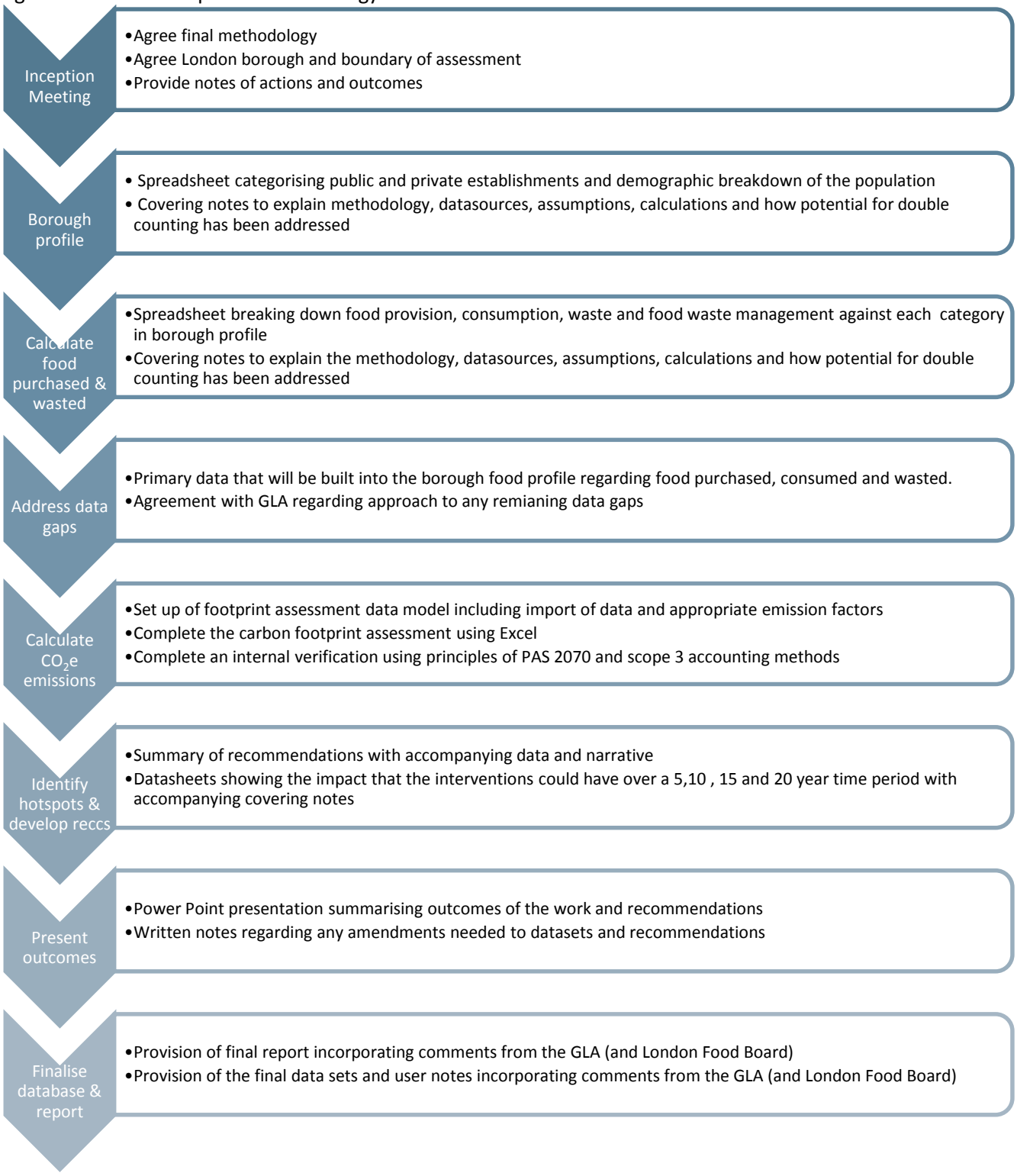


Figure 3: Anthesis Proposed methodology



Step 1. Inception meeting

In line with our Customer First accreditation, the work will be initiated with a Project Inception Meeting (PIM). We propose that our Project Sponsor, REDACTED and Technical Director, REDACTED, will attend this meeting along with REDACTED the Project Manager. We would be pleased for wider stakeholders to be invited to (at least part) of this meeting, e.g. representatives from the London Food Board, as we believe this would be a useful way of gaining their input in a cost efficient way.

In advance of the meeting Bethany will provide a draft agenda to the GLA and agree its content before we meet. REDACTED, REDACTED, REDACTED and REDACTED will also prepare some views on which London boroughs might be suitable to form the focus of the study in order that we can agree this with the GLA.

We anticipate that the following topics will be discussed during this meeting:

- Project management:
    - Schedule and format for updating the GLA on project progress
    - Project risks and mitigations
    - Project plan, project milestones, timescales for deliverables
    - Confirmation of principal project contacts at GLA and Anthesis (and London Food Board if appropriate)
- Overall project approach:
    - Confirmation of project objectives and proposed methodology
    - Understand how this work fits within wider work being undertaken by the GLA and the London Food Board (so it can support this work to the fullest potential and streamline with any concurrent projects)
    - Agree the key research questions that the study should address – aligned with the GLA's stated policy priorities and relevant UK/EU legislation (such as the new EU Circular Economy Package)
    - Discuss and agree the approach to engaging with stakeholders during the delivery of the work and identify the stakeholders that should be engaged (see our proposed approach later in this document in section 6) including dates and arrangements for future meetings
    - Discuss our views, and the views of the GLA, regarding which London borough would form the most suitable focus of the study. Ideally we believe that it should be a borough that can showcase different types of food provision, consumption and waste i.e. that it will have different types of residential properties (e.g. a mix of flats and houses), different sorts of out of home catering (fast food, staff canteens restaurants, pubs, clubs, event venues, hotels and so on) and different methods of managing food waste (e.g. a local authority collection of household and commercial food waste or an established presence by at least one private sector firm)
- Data gathering and analysis:
    - Discussion of data sources available for use in the study including how recent they are, their suitability and their quality. This will include demographic data for the borough profile, and we will confirm which private data sources GLA has access to
    - Confirmation of types of food provision that will be included in the study
    - Anticipated data gaps and how they might be filled
    - Views on the strengths and weaknesses of the PAS 2070 standard and how the methodology employed should take account of these
    - Discussion of literature sources which can be used to assist to validate the methodological approach developed
- Outputs and reporting
    - Approach to highlighting 'hotspots' of high emissions for likely different hotspot types (e.g. geographical, demographic, supply chain stage/process driven etc)
    - Confirm the format, structure, content and audience for the final project report

During the meeting REDACTED will make a record of the main outcomes, conclusions and action points which she will write up and circulate to the GLA project manager for agreement. This will include the structure of reporting, feedback and collaboration that we have agreed with the GLA as well as the agreed methodology.

The main outputs from this stage of work will be:

1. An agreed methodology and long list of possible data sources
2. An agreed London borough and assessment boundary

3. Written notes of the actions and outcomes of the discussions held

Step 2. Borough profile

Following the inception meeting we anticipate that we will have agreed the London borough that will form the focus of the study and the boundary of the assessment. Julian will oversee the development of a profile for this borough with the data collation and checking being undertaken by Sophie with input from Ellen. The profile will show the numbers, size and types of different residential and out of home catering outlets. This will aim to provide a comprehensive inventory of establishments within the scope of the study in both the private and public sector and will include:

- Residential properties (in terms of household numbers type e.g. houses and flats)
- The demographics of residents within property types (this is important as it greatly influences food consumption patterns, for example within the City of London Corporation there are a significant number of properties used only in the week by City workers who tend to eat out more than at home, and conversely boroughs such as the London Borough of Barnet has quite a high student population and research has shown they may buy food they don't then consume as their plans change)
- The number and type of different out of home catering establishments (fast food, staff canteens restaurants pubs, clubs, event venues, hotels, transport hubs, street vendors)
- Establishments such as universities and hospitals
- Supermarkets, markets and other retail outlets

We have a long history of working with the London boroughs and hope to use our existing relationships with officers to engage them in supporting this work. During the development of the borough profile Ellen and Sophie will engage with officers from the relevant borough to gain their views on the borough profile and ensure that we are using the most relevant and up to date data. We anticipate we will engage with officers specialising in waste management, planning, trading standards and council tax and economics teams, who are all likely to have data and information regarding the profile of the borough.

We believe that the main sources of data for this phase of work will be:

- Demographic and household and commercial information from the Office for National Statistics, Waste Data Flow and the London Datastore
- Household numbers and business number and types held by the London borough (for cross reference against those from other sources, including the GLA economics teams)
- Any geo-demographic profiling data held by the London borough (e.g. Acorn or Mosaic)
- The Caterlyst database which holds information regarding catering establishments, including 380,000 foodservice and convenience outlets and data on public sector catering. We previously used this datasource to complete the national estimates of waste arising from UK's hospitality and foodservice sector.
- We will perform a literature review of other studies to check the approach our approach to data collection and also to source other useful data e.g. from the Sustainable Restaurant Association to assist in developing the borough profile

We recognise the delicate balance between ensuring the most accurate data sources are collated for the chosen borough with the need to ensure that the chose methodology is scalable and readily applicable to other boroughs in the future.

We will take care to ensure the accuracy of data, for example to avoid double counting of property types within different categories and to take account of the fact that university students will not necessarily live in the same borough as the university is located and may live in accommodation with non-students.

The borough profile will be developed by Sophie within an Excel database with calculations, assumptions and data sources clearly shown within the database or its supplementary notes (as appropriate). We anticipate that it will include a breakdown of residential housing types by demographic, each type of out of home catering establishment and each type of retail outlet within categories agreed in advance with the GLA. The database will be internally quality assured by Julian. We will then send this database to the GLA for review and

comment before it is finalised.

The main outputs from this stage of work will be:

1. A spreadsheet categorising the commercial properties by type and size plus households by type and a demographic breakdown of the population
2. Covering notes to clearly explain the methodology used, data sources, assumptions, calculations and how the potential for double counting has been addressed

Step 3. Calculate food purchased, consumed and wasted (borough food profile)

Once the borough profile has been agreed with the GLA we will use it as a basis for developing information regarding food provision, consumption, waste and form of waste management for each of the categories of residential and commercial property within the borough profile. This will mean that for each category of residential property and food and retail outlets within the borough profile we will develop datasets related to how food is provided, managed, consumed, wasted and managed once it becomes waste. This will include supply chain waste. The main data analysis will be undertaken by REDACTED with input, guidance and quality assurance undertaken by Julian. REDACTED will advise on food waste management data.

The data and calculations will include consideration of:

- Food procurement: we have derived a method through previous work undertaken for WRAP of using costs and types of food procurement by different sectors then relating this to the wasted amounts in each subsector to determine the amount of overall food served that was wasted
- The types of food consumed and the amount and composition of food waste across different commercial and public sector establishments and at home as this influences emissions e.g. we have found that at 'top table' restaurants CO_2e intensive high quality protein is more likely to be wasted than at a school or at a catering outlet within the public sector, influencing the waste composition and associated emissions
- Food management processes to take account of edible and inedible food that is wasted during preparation vs that which is cooked and not consumed (as CO_2e emissions are less in preparation waste)

In order to develop this dataset Sophie, Ellen and Julian will draw on the large amount of data and information that we hold already and that is available from verified public sources. We anticipate that this will include:

- Recent Waste Data Flow residual and food waste tonnage data submitted by the local authority
- Any supplementary data available from borough officers such as waste composition analysis, participation in food waste collection schemes (householders, businesses plus schools and other organisations if service offered)
- Numerous datasets of waste composition data for different property types that Anthesis holds internally (to be individually agreed with GLA)
- WRAP, Quantification of food surpluses and wastes at UK food and drink manufacturing and retail sites, 2016
- World Resources Institute, Global Food Loss and Waste Protocol, 2016
- Defra, family food surveys, 2014 - 2011
- WRAP, Waste arising in the UK Hospitality and Food Service Sector, 2013
- WRAP, Estimates of waste in the food and drink supply chain, 2012
- WRAP, Food waste collection for flats, 2012
- London Waste and Recycling Board, Flats Recycling Programme Evaluation Report, 2013
- WRAP, Commercial food waste collection, 2015
- WRAP, Collecting food waste from NHS hospitals, 2014
- WRAP, Recycling Collections for Flats, 2012
- WRAP, Local authority separate food waste collection trials, 2009
- 2008 report for the GLA on food emissions plus any further data and information that is available to the GLA and the London Food Board

We will also draw on the lower resolution data used to produce the existing PAS 2070 study estimate. The

primary purpose being to understand any differences and, therefore the confidence that can be placed in the London-wide figures.

We will again take care to avoid double counting; from our previous work we are particularly aware that with the rising cost of public and private sector staff canteens, more staff choose to take food to their place of work which can lead to a risk of double counting. We will identify issues such as these and agree with the GLA how we should resolve them.

Julian has previously used this approach to developing food consumption patterns for WRAP so we are confident that it will work well and can be scaled to London.

We suggest that the data will be presented within the same database as the borough profile to allow for continuity and ease of amendment at later stages. Again the calculation, assumptions and data sources will be clearly shown. REDACTED and REDACTED will provide quality assurance of the draft database before it is sent to the GLA for review and approval.

The main outputs from this stage of work will be:

1. A spreadsheet breaking down food provision, consumption, waste and food waste management against each of the categories within the borough profile. This will include consideration of wastes within the supply chain, where we will need to make assumptions about food procurement routes & likely losses.
2. Covering notes to clearly explain the methodology used, datasources, assumptions, calculations and how the potential for double counting has been addressed

Step 4. Address data gaps

We anticipate that there will be some gaps in data where secondary data sources are not available, for example we are aware that there is currently little data regarding food management related to transport hubs, events and street markets. We have therefore allowed within our budget a limited amount of time (around three and a half days) for REDACTED to undertake primary research, given his range of relevant contacts. This will involve him developing research questions with input from REDACTED and contacting and interviewing local stakeholders to gather data. Before starting work we suggest that REDACTED and Bethany will discuss the data gaps we have identified with the GLA (and ideally representatives of the London Food Board) in order to ascertain whether any information is held that could fill the gaps, and if not, to agree which stakeholders we should contact within the time we have allowed. It should be noted that this time may not be sufficient to fill all data gaps identified in which case we will agree with GLA the approach to managing any remaining gaps in data.

The main outputs from this stage will be:

- Primary data that will be built into the borough food profile regarding food purchased, consumed and wasted.
- Agreement with GLA regarding approach to managing any remaining data gaps

Step 5. Calculate CO_2e emissions

As the aim of the study is to provide CO_2e data from the major supply chains within the borough boundary, the methodology developed will draw upon the method defined in PAS 2070 (the Consumption Based methodology was used for Food and Drink cradle to gate emissions; however for this study a more detailed scope 3 accounting method is required). Bethany, Craig and Julian will agree key criteria with the GLA to inform methodology development, including scalability. The principles contained within the World Resources Institute (WRI) Corporate Value Chain standard will also be referred to in methodology development.

It is proposed that the method developed will be based on use of secondary or proxy data to estimate emissions from food consumption (with some gaps filled by primary data where available), but to go beyond the existing cradle to gate Food and Drink footprint in the London case study to enable a more detailed Scope 3 footprint . The first step in the methodology development will be to complete a critique of the method used

to calculate cradle to gate emissions from Food and Drink for the London case study. This will be undertaken by Sophie and overseen by REDACTED and REDACTED, who both have previous experience from the assurance of the London case study. We will then aim to improve upon this methodology in order to attain a higher level of granularity to locate key sources of emissions within the Food and Drink supply chain of the borough. For example, only high level financial spend data was used to calculate emissions from consumption of food and drink; with no detailed spend data on different food types within households. For example, using the 2014 data from Defra Family Food Surveys we can obtain more detailed breakdown of estimated emissions by food type. Following the critique we will develop the methodology for assessment which will be aligned with PAS 2070 but build on the approach for calculating scope 3 emissions for food and food waste specifically. This methodology will be agreed with the GLA by REDACTED, Julian and Craig.

REDACTED will develop a spreadsheet calculation tool in order to complete the assessment (which will be an output of the study in addition to the report) with input, guidance and quality assurance by REDACTED. We will utilise a range of emission factor sources from our extensive experience in carbon footprints for the food sector within this tool. Emission factors will be selected on the basis of time relevance and geographic relevance and the source of emission factors will be recorded.

REDACTED and REDACTED will use the data collected for the borough for 2014 on food consumption and waste to complete the CO_2e footprint assessment of the Scope 3 emissions relating to food consumption and waste, based on spend data from within the borough for the identified categories. It is expected that the assessment of GHG emissions associated with economic final consumption of food and drink will include GHG emissions from supply of food and drink consumed by city residents only (the boundary will bet set and agreed with GLA). The assessment will include emissions from upstream and downstream impacts including agricultural production, manufacturing, packaging, transportation, refrigeration and cooking (use phase) and emissions from waste, waste management and transport of waste. The emissions data will include the six GHGs regulated under the Kyoto Protocol, and the CO_2e. Impacts will be reported for the different categories of residential and commercial properties identified in the Borough and by life cycle stage; in order to identify 'hot spots' of emissions in the supply chain (see Step 6).

The calculation tool and assessment undertaken will be quality assured by REDACTED and additionally peer reviewed by Craig and Julian before being sent to the GLA.

The main outputs from this stage will be:

- Methodology for Scope 3 accounting for food consumption and waste in London borough; agreed with GLA; including boundary of assessment and assumptions
- Spreadsheet tool internally verified and populated with data and emission factors
- CO_2e footprint calculations according to the different categories of food consumption and waste; and by life cycle stage

Agreement with GLA regarding approach to managing any remaining data gaps.

Step 6. Identify hot spot areas and develop initial recommendations

Once the data analysis is complete REDACTED REDACTED will identify 'hot spot' sub-sectors and/or geodemographic groupings, as appropriate, for CO_2e emissions for each of the main elements within the borough profile. REDACTED, REDACTED, REDACTEDand REDACTED will use these as a basis for developing recommendations for policy and project based interventions that the GLA and London Food Board could employ to reduce CO_2e emissions. In developing these recommendations we will draw on our previous experience (such as the cost-benefit food waste tool have developed for WRAP) as well as published reports and case studies, making sure that the interventions are appropriate for the target audience and London in general. REDACTED will undertake modelling within the database we have developed to quantify (wherever possible) the impact that each intervention might have over as 5, 10, 15 and 20 year period (as well as the cumulative impact of the interventions).

Within the final report we will summarise for each recommendation:

- Likely impact on emissions (in order that the GLA can prioritise actions)
- Likely cost (high, medium or low within scales agreed with the GLA)
- A brief summary of considerations regarding implementation of the intervention (e.g. lessons learned from previous work / how the greatest impact might be achieved)
- Any financial savings or other benefits that may be realised e.g. savings by the target audience including narrative on any health or other wellbeing benefits of lowering the CO_2e impact of the food system

In our experience emissions 'hot spots' related to food provision, consumption, waste and waste management will not necessarily be within defined geographical areas (though will depend on the borough, and whether more commercial or residential). They are often related to the processes related to the management of food and food waste by different types of organisation and individual. For example, during previous work we have found that university students can be a 'hot spot' but are geographically dispersed or that wastage of high CO_2e foods occurs in particular types of restaurants, which again tend to be geographically dispersed.

We therefore suggest that the 'mapping' of food CO_2e emissions we undertake might be delivered through visual representations regarding where within the different processes of food management peaks of CO_2e emissions arise. We suggest that we use a design package (such as InDesign) to produce these in order that they can be included in the final report (which we understand will be in Word format).

The main outputs from this stage will be presented to the GLA (and London Food Board) during the next step of the work. They will include:

1. A summary of recommendations with accompanying data and narrative
2. Datasheets showing the impact that each intervention might have over as 5, 10, 15 and 20 year period (as well as the cumulative impact of the interventions).
3. Covering notes to clearly explain the methodology used, data and information sources as well as assumptions, calculations and how the potential for double counting has been addressed in relation to the impact modelling
4. A review of any sub-sector or geodemographic hot spots within the borough; based on an extrapolation of where the main process based hot spots are located
5. Likely explanation of any variations from the original PAS 2070 study and associated data sources.

Step 7. Present outcomes and initial recommendations

REDACTED, REDACTED and REDACTED will present the initial outcomes of the work to the GLA and the London Food Board to get feedback on the initial outcomes of the work and agree any amendments that need to be made in order to finalise the data. We would also include a discussion regarding our recommendations of interventions that could be made in order to understand the ease, cost and impact of project and policy interventions the GLA and London Food Board might be willing to make in future, so we can reflect these in the final report.

We anticipate that the discussions will include:

- The methodology used and the data sources (including outcomes of the primary research)
- The headline outcomes from the study
- Any amendments that need to be made to the data, calculations and assumptions used
- The 'hotspots' identified in terms of the most significant activities and areas of GHG emissions
- Our initial views on the types of interventions that could be undertaken to reduce emissions with feedback from the GLA and London Food Board regarding the types of project and policy interventions they feel it would be most appropriate for them to make and the impact that these could have over a 5, 10, 15 and 20 year period
- Our views on how the approach used to the study might be scaled across London
- Any views we have regarding modification to PAS 2070 methodology and monitoring/reporting of food and drink emissions.

Following the meeting REDACTED and REDACTED will make any agreed amendments to

the data. The main outputs from this stage will be:

1. A Power Point presentation summarising the outcomes of the work and the recommendations
2. Written notes that will be agreed with the GLA regarding any amendments that need to be made to the datasets and recommendations

Step 8. Finalise database and prepare final report

We understand that the intended target audience for the final report is the GLA and the London Food Board. Bethany will lead the preparation of a final report with input from all other team members to relevant sections. Bethany will agree a format and contents structure in advance with the GLA and will take into account the feedback that we have received during the presentation of outcomes. We anticipate that the report will be presented in Word format and will include:

- A brief background and introduction to the study
- A step by step explanation of the methodology used including a clear explanation of the calculations and assumptions made and assessment boundary, a comprehensive list of data sources, emission factor sets, and the limitations of the research
- A discussion of the main outcomes of the study including Scope 3 emissions of food consumed, and waste produced
- The 'hotspot' areas for emissions identified with an explanation of the most significant activities and their contribution to GHG emissions
- Recommendations regarding the interventions that could be undertaken by the GLA and London Food Board to reduce emissions against the timelines requested (as outlined in Section **Error! Reference source not found.**)
- Guidance regarding how the approach could be scaled across London; this is likely to involve a profiling methodology that can be adapted from data from the trial area and reweighted according to different borough profiles
- Recommendations regarding any modifications we feel might be needed to the PAS2070 methodology and monitoring/ reporting of food and drink emissions

The report will be supported by the datasets provided within a clearly set out and easy to use Excel database. The database will be clearly structured and referenced in order that the source data can be viewed in future. We will develop a set of guidance notes to support the use of this database. This will provide further explanation of the source data, the data presented within each sheet and how the data should be used / interpreted.

We understand that the information and data may be published on the London Datastore so we will make sure that it is suitable to be publicly available.

The report and database will be internally quality assured by REDACTED and REDACTED before being sent to the GLA for review and comment. We anticipate that the GLA may wish for representatives of the London Food Board to review and comment on the report and data too. In this case we would ask that the GLA coordinates comments so that we receive one collective set of comments on only one version of the document.

Once comments are received REDACTED, REDACTED and REDACTED will discuss them for clarification with the GLA and make amendments before supplying the final report and dataset.

The main outputs from this stage of the project will be:

1. Provision of a final report incorporating comments from the GLA (and London Food Board)
2. Provision of the final data sets and user notes incorporating comments from the GLA (and London Food Board)

5 Project management

Throughout the project, Anthesis will maintain our high standards for quality assurance and project management, through rigorous internal review of analysis and regular communication with the GLA project manager. We operate a Quality Management System that has developed in-house over many years to meet our own specific requirements as a specialist environmental consultancy. The policies and practices we have

instituted provide assurance that we deliver high quality outputs that meet our clients' needs. We believe our approach to be consistent with the aims and goals of ISO9001:2008, and follows the nationally recognised accreditation standard 'Customer First' ensuring that we follow best practice in project management, client management, stakeholder engagement, quality management and knowledge management. Key elements of our QMS are detailed below.

Our process ensures that each project has a Project Director at senior level (REDACTED) to provide technical and quality oversight as well as an experienced project manager (REDACTED for ensuring the project team are delivering against the project requirements from day to day. These individuals are responsible for the successful delivery of the project in time and to budget at the highest professional standards in line with our QMS.

Anthesis prides itself on being an approachable and responsive organisation. Bethany will provide frequent updates via telephone and/or email to the GLA project manager (frequency and format to be agreed in the inception meeting, but likely to be weekly or fortnightly) which will highlight the project progress against the plan. We suggest this update will provide information on:

- Progress to date and against agreed targets.
- Actions arising, completed and not completed
- Problems and issues, and mitigation and corrective actions.
- Changes (if any) to delivery schedule.

Bethany will be on hand to answer calls/e-mails, as required. The GLA Project Manager will be informed in the interim if any issues arise with the collected data and these will be addressed in consultation.

Quality in delivery of the data analysis is key to delivering robust project outputs. To this end, the project will be directed by REDACTED (project manager for the previous work that verified the application of PAS 2070 for London) and will utilise highly experienced staff. The quality of the collected data will be checked thoroughly by experts REDACTED and REDACTED at each stage of the project.

Anthesis completes a **risk register** for each client project that we deliver. The register ranks risks and requires mitigation methods for each risk to be developed. It is reviewed against each activity as the project progresses. Risks are considered under different headings by an experienced member of staff. Examples of risks that might be identified include: project slippage, impacts of external influences, data gaps, quality of information, unexpected staff absence, H&S issues associated with site visits etc.

The risk register scores risks 1 to 5 for both the likelihood of risk occurring and the impact on project if risk did occur; it also requires mitigation methods for each risk to be developed to reduce the likelihood and / or impact of the risk. For this project, REDACTED will be responsible for completing the risk register. It will be shared and agreed with the GLA.

Adhering to standards There is currently a degree of uncertainty in the environmental accounting field about issues such as defining boundaries, conversion factors and accounting rules. Anthesis adhere to the relevant ISO, GHG Protocol and PAS/BSI standards and guidelines as appropriate for each project.

Documentation: Anthesis maintains an internal 'Wiki' knowledge management system which is constantly updated and expanded with standard information such as policy developments, carbon accounting rules, valuable sources, related projects and includes a 'Quality Manual' and 'Quality Policy'. Such documentation – along with the supporting measures as set out below – minimise the risk of disruption to our work due to staff sickness or changes in workload and provide flexibility of delivery.

Management Commitment to Quality Anthesis' management team are committed to the QMS and its continuous improvement. Anthesis has also commissioned independent surveys of its customers to evaluate our performance against expectations. We have a corporate goal of: enhancing customer satisfaction; providing high quality products and services delivered on-cost and on-time; effective management of our products, processes and services to deliver superior outputs; promoting the safety, awareness and well-being of employees through training and education.

Internal training Anthesis delivers a 'Carbon Footprint Masterclass' training course for external attendees, and all new staff attend such a course as part of induction. There is a bi-monthly internal training half day for CPD on subjects ranging from referencing databases to Excel programming to report writing. Technical meetings also provide a forum for raising complex questions for wider discussions led by Anthesis' Chief Technical Adviser.

6 Approach to stakeholder engagement

We anticipate that the main stakeholders that would have a view on the work undertaken will sit on the London Food Board. We suggest that the most cost efficient way to engage with them is to involve representatives of the board in some or all of the discussions that we hold with the GLA. We would be pleased to discuss and agree with the GLA other stakeholders that should be engaged with during the work and our methodology for engaging them. We additionally anticipate that the London borough that will form the focus of the study and the organisations and individuals we may contact when undertaking primary research will be stakeholders who we will engage with. A summary of our proposed approach to stakeholder engagement is summarised in **Table 1**.

Table 1 Summary proposed stakeholder engagement approach

Stakeholder	Engagement approach	Desired outcome
GLA and representatives of the London Food Board	Inception meeting Presentation of outcomes Review of draft and final report and datasets	Gain feedback on and agreement to proposed methodology Gain feedback on initial outcomes of study and interventions suggested Gain feedback on final report and datasheets
Representatives of the London Borough selected as the focus of the case study	Meeting with representatives with email and telephone follow up	Verify datasets to be used to develop borough profile and gain feedback on profile developed
Establishments for which there is limited secondary data available	Interviews (in person ideally or by phone where necessary)	Gather primary data regarding food consumption and waste to help fill gaps in the secondary data
Other key stakeholders as agreed with the GLA such as the Sustainable Restaurant Association, London Waste and Recycling Board, London Sustainable Development Commission, WRAP, London Food Link	Interviews (in person ideally or by phone where necessary)	To contribute to development of borough profile and filling of data gaps

7 Data and information sources that will be used

Data sources will based on existing up to date secondary data for the London region wherever possible. When identifying secondary data for use in GHG emissions assessment, secondary data arising from competent government sources from the London area which have been peer reviewed will be preferred over secondary data from other sources. **Table 2** summarises some of the main data sources that we anticipate we will use during the study. We propose to discuss the data sources available to GLA at the inception meeting in order to finalise a list.

Table 2: Proposed Data sources and their use

Source	Use
Office for National Statistics and London Datastore	Demographic and property number information to develop profile of properties and demographics.
Demographic datasets provided by the borough (e.g. Acorn or Mosaic)	Can be used to develop the demographic profile of residents within the borough profile.
Waste composition, tonnage and scheme performance data	The local authority may be able to provide additional information such as the outcomes of local waste composition analysis, participation in food waste collection schemes (householders, businesses plus schools and other organisations if service offered) and tonnage data which can supplement / be cross checked against the information that we have from other sources
Waste Data Flow	Contains information regarding property numbers and properties served with different types of waste and recycling collection scheme as well as tonnage data that can be used to develop the borough profile and its food waste profile.
The Caterlyst database	This database contains information regarding different catering establishments within a geographical area including school catering, health establishments and public and private staff canteens etc. It will be used to develop the borough profile for foodservice across both commercial and public sector
Food waste reports and research available from WRAP	There are numerous reports regarding food production, consumption and waste that have been published by WRAP – many of which we have been involved in preparing. These will be used to provide data for the calculations as well as informing the recommendations. Some example reports are: • WRAP, Quantification of food surpluses and wastes at UK food and drink manufacturing and retail sites, 2016 • WRAP, Estimates of waste in the food and drink supply chain (2013) • WRAP, Waste arising in the UK Hospitality and Food Service Sector, 2013 • WRAP, Commercial food waste collection, 2015 • WRAP, Food waste collection for flats, 2012 • WRAP, Commercial food waste collection, 2012 • WRAP, Collecting food waste from NHS hospitals, 2014 • WRAP, Recycling Collections for Flats, 2012 • WRAP, Local authority separate food waste collection trials, 2009
World Resources Institute	Global Food Loss and Waste Protocol, 2016. Anthesis is working on the final draft of this protocol designed to provide a standard approach to reporting food losses and waste across all supply chain stages. It contains information and data relevant to this project.
Information and feedback available from the GLA and the Food Board	Identification of further data and information sources and feedback on approach to and outcomes of study
Information available from some of our other industry contacts such as the Sustainable Restaurant Association	Identification of further data and information sources

Source	Use
Anthesis internal information	We hold a significant amount of data internally including databases regarding food waste composition in different types of establishment and food waste losses from retailers which we can draw upon (we can agree these in principle with the GLA before they are used)
PAS 2070 methodology	The PAS 2070 methodology will be followed during the delivery of the work, with any amendments to the approach being agreed in advance with the GLA
The PAS 2070 datasets and GIS data (which we understand from the specification will be available from the London Datastore)	Food and drink data will be compared with the project results to identify any key variations
Using PAS 2070 to assess London's indirect emissions	Use PAS 2070 to guide our methodology choices (for example boundaries etc)
Defra Family Food surveys (2011 to 2014)	This report includes the average UK person food consumption and has been developed annually. The data provides household food and drink and catering consumption, including eating out, home-grown and takeaways brought home, grams/person/week. Data is available for the London region, and based on a profile of the borough using demographic data (e.g. from government sources on average earnings) the detailed spend data from the surveys could be used to create a model for the borough. Anthesis has experience of using the Defra data in the original City Limits Ecological footprint and mass balance for London.
2008 report for the GLA on food emissions	Relevant information and data from the report will be used within the modelling and to inform the recommendations
London Waste and Recycling Board	Flats recycling funding evaluation, 2012. The background data includes information regarding food waste schemes for flats in London.
Healthy and Sustainable Food for London The Mayor's Food Strategy, 2006 and related subsequent building Sustainable Supply Chains	Will be reviewed for context

8 Delivery timetable

We have provided below a suggested timetable for the delivery of the work though would be happy to discuss any amendments required with the GLA. REDACTED will have responsibility for developing a more detailed delivery plan at the start of the project which will break down tasks, responsibilities, days allocated and timeframe. The team will be briefed on the project and regular catch-ups held to track project progress. Staff will report any potential delays or issues as they arise. Reasons for any slippage will be identified in order to address them. Appropriate steps will be taken to prevent / recover project slippage and might include:

- Allocate additional Anthesis staff to the project
- Additional internal project monitoring by senior management
- Bring forward later tasks where possible if unavoidable delays to current task (e.g. factors outside our control)
- Reallocate staff to ensure that critical tasks are undertaken as a priority and revisit those without dependent activities later
- Agree with the GLA if a change in methodology will help prevent unavoidable slippage while still delivering the desired outputs

Description of initials of staff involved at each stage:

- CSi – REDACTED
- BF – REDACTED
- JP – REDACTED
- SS – REDACTED
- CS – REDACTED
- ES – REDACTED
- AM – REDACTED

Table 3: Proposed Project Timeline

Activity	W/C 25 Jan	1 Feb	8 Feb	15 Feb	22 Feb	29 Feb	7 Mar	14 Mar	21 Mar	Staff days	Staff involved
Inception meeting prep.										1.25	JP, CSi, BF, ES
Inception meeting and notes agreed										1.75	JP, CS, BF
Literature review										2.5	JP, CSi, CSt
Develop borough profile										4.5	JP, SS, ES
Milestone 1. Agree borough profile with GLA										NA	BF, JP
Develop borough food profile										5.5	JP, SS, ES
Milestone 2. Agree borough food profile with GLA										NA	BF, JP
Primary research to fill data gaps										3.75	JP, AM
Undertake carbon calcs										7.5	JP, CSi, CSt, SS
Milestone 3. Agree carbon calcs with GLA					By 26 Feb					NA	CSi, BF
Analysis of emission hotspots and recommendations.										7.25	CSi, JP, BF, ES CSt
Milestone 4. Present outcomes										4	CSi, JP, BF
Prepare first draft of report										6	CSi, JP, BF, CSt
Milestone 5. Supply final documents										2	CSi, JP, BF, CSt
Project management										5.5	BF, CSi and rest of team
Total delivery time allowed										**51.5**	

9 Areas of experience

A brief summary of our some of our relevant areas of experience is provided here. Please refer to the team CVs for the detailed experience of each team member.

City and Regional Footprints

- Anthesis has been involved from the earliest work on city footprints and has assisted the European Common Indicators Programme, as well as conducting numerous regional footprints including Scotland and Luton, and the ground breaking City Limits footprint of Greater London published in 2002, as well as an ecological footprint study of the Hamburg region using our innovative Regional Stepwise methodology.
- Anthesis was commissioned by the GLA to assess whether London's greenhouse gas (GHG) assessment was compliant with the requirements set out in PAS2070: Specification for the assessment of greenhouse gas emissions of a city (PAS2070).

Scope 3 Environmental Accounting

Anthesis are Scope 3 experts having conducted numerous Scope 3 footprints and contributed to the development of the new Corporate Value Chain (Scope 3) Accounting and Reporting Standard. Anthesis developed the ground-breaking footprinting methodology and assessment used by London 2012.

Experience of assuring against a number of GHG standards

Anthesis has experience of assuring against a number of GHG standards including the Carbon Trust Standard (Anthesis are CT approved suppliers), CEMARS, The Carbon Neutral Company Protocol, the UK's mandatory carbon reporting standard, Footprint Protocol (Global Footprint Network), ISO14064-1, PAS 2050, PAS 2060 and a number of GHG Protocol standards.

Prior working experience with GLA

- REDACTED, has already delivered projects for GLA in relation to IT Infrastructure, Construction Sector Scope 3 Guidance and sits on GLA's Carbon Management Steering Group. Anthesis has been involved from the earliest work on city footprints and has assisted the European Common Indicators Programme, as well as conducting numerous regional footprints including Scotland and Luton, and the ground breaking City Limits footprint of Greater London published in 2002, as well as an ecological footprint study of the Hamburg region using our innovative Regional Stepwise methodology.
- REDACTEDand REDACTED have a long history of working with the GLA with projects including the management of Supply Infrastructure Funding, the waste website Capital Waste Facts (now transferred to WRAP) and the London local authority Twinning and Mentoring Programme.

Food and food waste

- REDACTEDi s a nationally recognised expert in food provision, consumption and waste. He has delivered numerous projects relevant to the work that the GLA is commissioning including two that are currently being developed; the Global Food Loss and Waste Protocol and Quantification of food surpluses and wastes at UK food and drink manufacturing and retail sites
- REDACTED and REDACTED have delivered numerous projects related to food waste collection and processing including assisting the launch and monitoring of local authority collection schemes for households and businesses.

10 Team CVs ALL HAVE BEEN REDACTED