



South London Waste Partnership

Lot 1 Services

Preferred Bidder - January 2017

Technical Response

1.8 TEEP Assessment

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Technical Response

1.8 TEEP Assessment

1. Introduction

This report has been prepared for Veolia for ISFT to support its proposal to the South London Waste Partnership (SLWP) for a Waste Collection and Related Environment Services Contract. The report has been prepared using information and analysis undertaken by Veolia, Ricardo-AEA and Anthesis UK. It summarises the outcomes of the TEEP assessment for waste in the scope of the contract based on Veolia's proposed solution in comparison to a segregated scenario. It is assumed that the Councils have undertaken TEEP assessments which demonstrate the compliance of their existing systems from January 2015. The approach outlined in the Waste Regulations Route Map (Route Map)¹, which is considered by the Environment Agency (EA) to be good practice, has been followed in preparing this assessment.

2. Legislative background

European Directive

The European revised Waste Framework Directive of 2008 (Directive 2008/98/EC on waste, rWFD) set out various requirements, including one in article 10 that "waste shall be collected separately if "technically, environmentally and economically practicable" (TEEP). This is set in the context of such separate collections being necessary for "waste to undergo recovery operations" and to "facilitate or improve recovery". One of the objectives of the rWFD, stated in recital 28, is that the "Directive should help move the EU closer to a 'recycling society', seeking to avoid waste generation and to use waste as a resource", and source segregation and separate collections are incorporated as measures that would help to bring this about. Article 11 again brings in the requirement for separate collections, but in the context of promoting "high quality recycling" and meeting the quality standards of the recycling sector dealing with the material.

European Commission guidance as to what technically, environmentally and economically practicable mean is provided:

- 'Technically practicable' = 'technically developed and proven to function in practice'
- 'Environmentally practicable' = 'added value of ecological benefits justify possible negative environmental effects of the separate collection (e.g. additional emissions from transport)'
- 'Economically practicable' = 'does not cause excessive costs in comparison with the treatment of a non-separated waste stream, considering the added value of recovery and recycling'

¹ WRAP, Waste Regulations Route Map, 2014

Transposition into the law of England and Wales

The requirements of the rWFD regarding separate collection, were transposed into UK law through The Waste (England and Wales) Regulations 2011, and then amended by The Waste (England and Wales) (Amendment) Regulations 2012. The relevant text of the regulations is provided for convenience in Appendix 1. The requirement for Waste Collection Authorities (which include unitary authorities) to institute separate collections of waste paper, metal, plastic and glass from the 1st January 2015 is subject to two tests. Guidance on how to interpret the tests has not been provided by DEFRA, but the plain reading of the text leads to the following possible understanding of the tests:

1. A necessity test – i.e. are separate collections necessary to ensure that waste is “recovered” as high up the waste hierarchy as possible (Article 4 rWFD) and that this “recovery” of the waste protects human health and the environment (Article 13 rWFD) and necessary to “facilitate or improve recovery”.
2. A practicability test – i.e. it needs to be demonstrated that separate collections are practicable in terms of: a technically feasible system being available that is suitable for the locality; net environmental benefits accruing; and the cost not being comparatively excessive.

Enforcement

The Environment Agency (EA), as the enforcement agency for the relevant Regulations, has issued guidance detailing their enforcement approach. The key elements are as follows:

- Collectors who do not have separate collection arrangements should review their collection practices and consider carefully if and how they comply. They should rigorously apply the Necessity and TEEP tests (described above). Collectors who have concluded it not necessary or not TEEP to operate separate collection arrangements should keep, and be able to provide for inspection, an audit trail which will help the EA to understand the basis of their decision-making. Records should be such that, if necessary, they could demonstrate compliance with the Regulations in a court of law. Collectors should consult their lawyers to ensure they are compliant with this legislation.
- Collectors are expected to ensure in all cases that customers can avoid putting paper, plastic, metal or glass in the same collection container as their general waste. In addition, they are expected to collect paper, plastic, metal and glass separately from each other, subject to the above two tests.

There is further explanatory text in the guidance regarding the enforcement approach that the EA will take, emphasising that their aim will be to help collectors to achieve compliance, working with them to help them to comply. As with all its enforcement regimes, a risk based approach will be used, with enforcement being a last resort. There is also the possibility of an independent third party requesting a judicial review of the process by which waste collection arrangements have been determined.

3. Approach to assessment

This document has been prepared to summarise the outcomes of a TEEP review for relevant waste under the contract that SLWP is procuring. The TEEP review has assessed the performance of Veolia’s proposed solution in comparison to a segregated collection system.

The assessment has been prepared with support from independent consultancies Anthesis UK and Ricardo-AEA. The approach to the assessment has included:

- Operational modelling using Ricardo-AEA and Veolia in-house financial and operational models;
- A waste hierarchy assessment;
- Assessment of data and information provided by the Councils and Veolia;
- Use of performance information available publically from WRAP's Local Authority Waste Portal, Materials Facility Reporting Portal and guidance reports;
- In-house data and information from Veolia, Anthesis UK and Ricardo-AEA

The approach outlined in the Waste Regulations Route Map (Route Map), which is considered by the Environment Agency (EA) to be good practice, has been followed in undertaking this assessment.

4. The SLWP authority areas

The South London Waste Partnership Boroughs are four unitary authorities in South London. As London Boroughs they are densely populated in relation to other areas of the UK. A high proportion of the properties, approximately 25% are flats that need to be provided with a waste and recycling service using communal containers. These demographic factors can affect the delivery of waste and recycling services. Specifically:

- A high density of housing means that space for recycling containers, both internally and externally, can be limited
- Operations and vehicle movements can be challenging, for example, there are Health and Safety implications associated with loading vehicles on busy roads and collection operations can contribute significantly to local traffic congestion
- Available space for bulking recycling and waste prior to transport to sorting and reprocessing facilities is limited

5. Comparative solutions considered

Veolia has developed its proposed approach to recycling and waste collection taking into consideration the outcomes of dialogue with officers representing SLWP and the information provided on the geography and demographics of the SLWP area. The basis for Veolia's proposed solution is a twin stream collection of dry recyclables with paper and card collected separately from dry mixed recyclables. The segregated scenario was developed by Ricardo-AEA with reference to similar schemes operating in other areas of the country and was considered to be the most likely methods for collecting separated recyclables in SLWP. The segregated scenario is compared to Veolia's proposed twin stream option. The assessment assumes Veolia is operating a unified collection service (all four authorities are operating a harmonised collection system). The following sections describe the operational collection approaches assumed within Veolia's proposed solution in comparison to the segregated scenario.

Kerbside properties

Within the source separated scenario for kerbside properties (

Table 2) it is assumed that the collection frequency for all material streams would remain consistent with Veolia's proposed solution (

Table 1) but that dry recyclables would be sorted into a stillage vehicle.

Table 1. Veolia's proposed solution for kerbside collection

Material stream	Receptacle	Frequency	Vehicle
Residual	240l wheeled bin	Fortnightly	Standard RCV
Paper and card	140/240l wheeled bin	Fortnightly (alternate weeks alongside food)	Twin Pack 26 tonne 70/30 split
Mixed cans, plastics, foil and glass plus textiles	2 x 55l boxes	Fortnightly (alternate weeks alongside food)	Twin Pack 26 tonne 70/30 split with a separate pod for textiles
Food waste	24l caddy for food	Weekly (alongside dry recyclables alternate weeks)	Twin Pack 26 tonne 70/30 split
Garden waste	240l wheeled bin for garden waste	Fortnightly	Standard RCV

Table 2. Segregated scenario for kerbside collection

Material stream	Receptacle	Frequency	Vehicle
Residual	240l wheeled bin	Fortnightly	Standard RCV
Box 1: Paper and card Box 2: Plastic, cans, glass bottles and jars and mixed plastics	2 x 55 litre boxes for sorting	Fortnightly	Romaquip Kerbsort
Food waste	24l caddy for food	Weekly	7.5tonne Food Waste Vehicle
Garden waste	240l wheeled bin for garden waste	Fortnightly	Standard RCV

Communal properties (blocks of flats)

Within Veolia's proposed solution (

Table 3) a 360 litre bin is provided for paper and card and a 1100 litre bin is provided for mixed containers at blocks of flats. These containers are serviced by a twin pack vehicle. Within the segregated scenario (

Table 4) it is assumed that a four bin system is used with containers being serviced by a top loading vehicle.

Table 3. Veolia's proposed solution for communal properties (blocks of flats)

Material stream	Receptacle	Frequency	Vehicle
Residual	1100l wheeled bin for residual	Weekly	Duo 26 tonne
Food waste	240l food bin	Weekly	Duo 26 tonne
Paper and card	360l wheeled bin for paper and card	Weekly	Twin Pack 23.5 tonne 70/30 split
Mixed cans, plastics, foil, glass	1100l wheeled bin for dry mixed recycling	Weekly	Twin Pack 23.5 tonne 70/30

Table 4. Segregated scenario for communal properties

Material stream	Receptacle	Frequency	Vehicle
Residual	1100l wheeled bin for residual	Weekly	Duo 26 tonne
Food Waste	240l food bin	Weekly	Duo 26 tonne
Segregated dry recyclables	4 x 360l wheeled bins (depending on capacity requirements and space available)	Weekly	Toploader

Difficult to access properties

Within Veolia's proposed solution (

Table 5) the receptacles aligned to the kerbside properties are shown for the difficult to access properties. Within the segregated scenario (

Table 6) it is assumed that boxes are provided and the materials are sorted into a mini-kerb loader.

Table 5. Veolia's proposed solution for difficult to access properties

Material stream	Receptacle	Frequency	Vehicle
Residual, Food & Mixed cans, plastics, foil, glass and textiles	240l wheeled bin for residual 24l caddy for food 2 x 55l boxes	Fortnightly	One Pass Vehicle 15 tonne

Food & Paper and Card	24l caddy for food 240l wheeled bin	Fortnightly	Twin Pack 15 tonne 30/50
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Table 6. Segregated scenario for difficult to access properties

Material stream	Receptacle	Frequency	Vehicle
Residual	240l wheeled bin for residual	Fortnightly	Twin Pack 15 tonne 30/50
Food Waste	24l caddy for food	Weekly	Twin Pack 15 tonne 30/50
Box 1: Paper and card Box 2: Plastic, cans, glass bottles and jars and mixed plastics	2 x 55l boxes	Fortnightly	Terberg Mini-kerbloader

Neighbourhood recycling centres

Veolia's proposed solution is to utilise 1,100 litre bins for two streams of dry recyclables (paper and card as one stream and mixed containers as the other) at neighbourhood recycling centres with containers serviced by the same twin pack vehicles that undertake collections of dry recyclable materials from flats.

Within the segregated scenario it is assumed that a four bin system is used with containers being serviced by the Twin pack vehicles that also service flats.

Commercial properties

Within Veolia's proposed solution (Table 7) materials will be collected from commercial properties as two streams with the type of containment and collection frequency provided being determined by the needs of the client. A single visit will be undertaken by a twin pack vehicle to collect dry recyclables. Within the segregated scenario (Table 8) it is assumed that, again, the containment type and size and frequency are determined by the needs of the client but that two visits by twin pack vehicles for clients are required to collect four streams of separated dry recyclables.

Table 7. Veolia's proposed solution for commercial properties

Material stream	Receptacle	Frequency	Vehicle
Residual	Containers as appropriate to client: Sacks and 140, 240, 360, 660 and 1,100ltr wheeled bins,	Collections over 6 days per week (daily to weekly as required by client)	Standard RCV or Duo 26 tonne
Food waste	240l wheeled bin		Duo 26 tonne
Mixed paper and card	Containers as appropriate to client: Sacks and 140,		Twin Pack 26

Material stream	Receptacle	Frequency	Vehicle
	240,360, 660 and 1,100ltr wheeled bins,		tonne
Mixed cans, plastics, foil glass and textiles	Containers as appropriate to client: Sacks and 140, 240,360, 660 and 1,100ltr wheeled bins,		Twin Pack 26 tonne

Table 8. Segregated scenario for commercial properties

Material stream	Receptacle	Frequency	Vehicle
Residual	Containers as appropriate to client: Sacks and 140, 240,360, 660 and 1,100ltr wheeled bins,	Collections over 6 days per week (daily to weekly as required)	Standard RCV or Duo 26 tonne
Food Waste	140 and 240l wheeled bin		Duo 26 tonne
Dry recyclables collected as four separated streams	Containers as appropriate to client: Sacks and 140, 240,360, 660 and 1,100ltr wheeled bins,		Two visits by twin pack 26 tonne vehicles

Street cleansing and fly-tipping

Within Veolia's proposed solution, litter bins for residual waste and fully comingled recycling will be provided. Residual waste from litter bins will go to landfill until 2018 when the ERF being built at Beddington will become operational. Comingled recycling will be sorted at Veolia's MRF in Southwark before being sent on to reprocessors. Street cleansing barrows will have two containers allowing operatives to sort comingled recycling from residual waste and litter pickers will have a dual hoop to allow the same collection methodology. Caged vehicles with a split back will be used to collect residual waste and comingled recycling within separate compartments from street cleansing operations and litter bins. Gully waste and waste from mechanical sweeping will be treated at Veolia's street sweeping recycling plant at Rainham.

Veolia and Anthesis UK are not aware of any identifiable examples of litter being separated into four streams during on street litter picking and street sweeping operations. It is therefore considered that, with reference to the European Commission guidance, this type of operation is not 'technically developed and proven to function in practice' and it has not been possible to assess its performance in relation to TEEP. There are examples of litter bins being provided for segregated materials. The quality of materials from litter recycling bins has been considered in section 0 of this document.

Recyclable materials identified from fly-tips will be taken to the HRRC for sorting with items being separated into the appropriate bays for recycling where possible.

Bulky waste

Residents will be charged for collection via the bulky waste service within Veolia's proposed solution. It is therefore assumed, that residents are likely to present larger non-standard format items such as furniture, wood and large WEEE and bric-a-brac items for collection via the bulky waste service, and that they will use the standard Residual and recycling schemes to dispose of materials such as glass bottles, cans, plastic bottles, paper and card.

Within Veolia's proposed solution the bulky waste collected will be taken to a local SLWP HRRC for initial sorting with items such as scrap metal, WEEE and wood being sorted into the appropriate bays. Reusable furniture and large WEEE items will be protected during transport and placed in protected containers for collection by Kingston Community Furniture and other local charities which will manage the reuse and repair of the items. Large items that are unsuitable for reuse will be taken to Veolia's Bulky Waste MRF at Greenwich where the materials will be broken down with component parts sent for recycling and to produce SRF as appropriate. Advice will be provided to business clients that wish to dispose of bulky items to encourage reuse and charity donations. It is not anticipated that the method of managing bulky waste would be influenced by managing dry recyclables via Veolia's proposed solution or the segregated scenario.

6. Applying the waste hierarchy to wastes to be managed by Veolia

Within this section the first three steps of the Route Map are worked through, namely:

1. Documenting what wastes will be collected and how.
2. Explaining the fate of each stream of waste collected.
3. Identifying where on the Waste Hierarchy each waste stream will be handled.

The proposed approach to managing a particular material in line with the waste hierarchy is described. Commentary on how this might be influenced through the approach taken to collecting dry recyclable materials (via Veolia's proposed solution in comparison to the segregated scenario) is also been provided.

Explanation of the waste hierarchy

The waste hierarchy expresses diagrammatically how certain approaches to waste management are preferred above others. Disposal (e.g. landfilling) is the least preferred approach, whereas preventing waste arising in the first place is at the top of the hierarchy of options.

Figure 1. Waste hierarchy

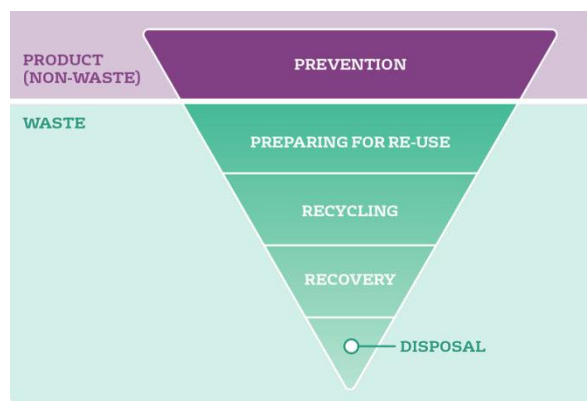


Figure 2. Waste hierarchy

Wastes collected by the Councils

The 2011 Regulations impose a duty for the waste hierarchy to be applied to wastes collected. The duty is qualified by considerations of technical and economic feasibility and environmental protection, and therefore Veolia will work with the Councils throughout the course of the contract to help judge where on the hierarchy each material is treated.

Table 9 summarises how Veolia proposes to manage each material in line with the waste hierarchy and the influence the collections for dry recycling may have.

Table 9: Veolia's proposed approaches to managing different material streams

Material	Prevention	Reuse	Recycling / composting	Energy Recovery	Disposal	Managed in line with Waste Hierarchy?
Paper, card, plastics, metals, glass	Waste prevention of these materials will be promoted via Veolia's communications and engagement team (e.g. via smart shopping messages)	Re-use options have very limited impact, and will not be applicable to most materials.	Regular collections of these materials will be provided to householders, businesses and visitors (via recycling litter bins).	From 2018 materials that are included in the residual waste stream will be sent to the Energy Recovery Facility (ERF)	Until 2018 any materials in residual waste will be landfilled	Yes, households and businesses within the Boroughs will have access to a collection of these material streams. The access to services will remain the same under Veolia's proposed solution and the segregated scenario. Veolia's proposed solution is anticipated to capture an extra 6,790 tonnes of dry recycling per annum (on average) in comparison to the segregated option.
Textiles	Prevention of textiles waste will be encouraged through communications campaigns such as those encouraging the public to 'love their clothes'	Swishing and other events will be and supported too encourage reuse and repair	Residents living in kerbside properties will be able to put out their textiles within a bag and this will be placed in a locker on collection vehicle. Neighbourhood recycling banks will be provided for the public generally (including and residents living in flats). Textiles will also be accepted at HRRC's. Textiles will be managed by Chris Carey's Collections.	From 2018 materials that are included in the residual waste stream will be sent to the ERF	Until 2018 any materials in residual waste will be landfilled	Yes, prevention and reuse will be encouraged. Within both Veolia's proposed solution and the segregated scenario textiles will be collected separately to other materials. This means that the quality will be the same in both Veolia's proposed solution and the segregated option.
Garden waste	Not applicable	Veolia's communications and engagement team will encourage home and	Households on the kerbside collection scheme will be offered a collection service	From 2018 materials that are included in the	Until 2018 any materials in	Yes, Veolia will take a number of steps to manage green waste

Material	Prevention	Reuse	Recycling / composting	Energy Recovery	Disposal	Managed in line with Waste Hierarchy?
		community composting and grass cycling	for garden waste	residual waste stream will be sent to the ERF	residual waste will be landfilled	towards the top of the waste hierarchy. In both Veolia's proposed solution and the segregated scenario it is assumed that garden waste is collected separately to other materials. There is not predicted to be any difference in tonnage of garden waste captured between Veolia's proposed solution and the segregated scenario.
Food waste	Love Food Hate Waste campaigns will be delivered by Veolia's communications and engagement team	Veolia's communications and engagement team will encourage home and community composting	Food waste collections will be provided to households and businesses within all authorities (intensive communications will be undertaken in Sutton which does not currently have a food waste collection scheme). Food waste will be sent for treatment.	From 2018 materials that are included in the residual waste stream will be sent to the ERF	Until 2018 any materials in residual waste will be landfilled	Yes, Veolia will take steps to manage food waste at the top of the waste hierarchy. In both Veolia's proposed solution and the segregated scenario it is assumed that food waste is collected separately to other materials. There is not predicted to be any difference in tonnage of food waste captured between Veolia's proposed solution and the segregated scenario.
Nappies	Not applicable	Promoting use of real nappies	No collection scheme proposed currently	From 2018 materials that are included in the residual waste stream will be sent to the ERF	Until 2018 any materials in residual waste will be landfilled	Yes, focus is on prevention through promotion of real nappies due to the challenges associated with recycling nappies.

Material	Prevention	Reuse	Recycling / composting	Energy Recovery	Disposal	Managed in line with Waste Hierarchy?
						The nappies entering the residual waste stream is not predicted to differ between Veolia's proposed solution and the segregated collection scenario.
Bulky items (i.e. furniture, white goods)	The communications and engagement team will provide advice to the public to prevent items becoming waste (e.g. refurbishment)	Veolia will work with Kingston Community Furniture and local Community Project to organise reuse of suitable items brought to HRRC's and collected through the bulky waste service. Bicycles will go to Re-cycle London. Direct donation of items to local charities and use of websites such as Freecycle and Freecycle will also be encouraged.	Bulky waste collected will be brought to the HRRC's for sorting. Sorting will be undertaken to remove reusable items and store them for charity collections and to place separate materials such as wood and scrap metals into the correct bays for recycling. Items that are not reusable and need to be dismantled will be sent to Veolia's Bulky Waste MRF in Greenwich where they will be broken down for recycling and SRF.	Any components that cannot be recycled will be used to derive SRF.	No element of materials from bulky waste collections will be landfilled	Yes, steps will be taken to manage bulky items at the top of the hierarchy. The bulky waste would be collected via separate vehicles than those used to undertake the collection of residual waste and dry recycling. Therefore the approach to managing bulky waste would remain the same in both Veolia's proposed solution and the segregated option.
WEEE	The communications and engagement team will provide advice to the public to prevent items becoming waste (e.g. encouraging repair of items)	The communications and engagement team will promote reuse and donation to charities. Reuse of white good by Kingston Community Furniture and local Community Groups will be undertaken on suitable items.	Residents will be able to take WEEE items to HRRC's for recycling and advice will be given to businesses regarding recycling of WEEE. The availability of retailer take back schemes will be promoted.	From 2018 materials that are included in the residual waste stream will be sent to the ERF	Until 2018 any materials in residual waste will be landfilled	Yes, a number of steps will be taken to encourage WEEE to be managed at the top of the waste hierarchy. The approach taken to managing WEEE remains unchanged in Veolia's proposed solution and the segregated option.
Batteries	The communications and engagement team will provide advice to the public	Not applicable	The communications and engagement team will encourage use of local battery collections provided	From 2018 materials that are included in the residual waste	Until 2018 any materials in residual	Yes, collections will be provided at HRRC and recycling via local producer take back

Material	Prevention	Reuse	Recycling / composting	Energy Recovery	Disposal	Managed in line with Waste Hierarchy?
	regarding batteries to prevent waste (e.g. encouraging use of reusable batteries)		through producer responsibility schemes. Use of HRRC's will also be encouraged with car and household batteries collected for recycling at the sites.	stream will be sent to the ERF	waste will be landfilled	schemes. The approach taken to managing batteries remains unchanged in Veolia's proposed solution and the segregated option.
Used cooking oil	Not applicable	Not applicable	Used cooking oil from householders will be collected at the HRRC for recycling by Arrow Oils Limited. Advice will be provided to businesses regarding arrangements they can make for recycling of used cooking oil.	From 2018 materials that are included in the residual waste stream will be sent to the ERF	Until 2018 any materials in residual waste will be landfilled	Yes, it is not considered feasible to prevent or reuse used cooking oil therefore recycling remains the most appropriate option. The approach taken to managing batteries remains unchanged in Veolia's proposed solution and the segregated scenario.
Hard Plastics (e.g. toys etc)	The communications and engagement team will provide advice to the public to prevent items becoming waste (e.g. encouraging repair of items)	The communications and engagement team will provide advice to the public encourage donation of items. Bric-a-brac including CD's and DVD's will be collected at the HRRC's by the British Heart Foundation	There are very limited recycle markets for hard plastics currently meaning it is currently unfeasible to recycle them, however, this will continue to be reviewed as markets change.	From 2018 materials that are included in the residual waste stream will be sent to the ERF	Until 2018 any materials in residual waste will be landfilled	Yes, where feasible prevention and reuse will be encouraged. The approach taken to managing hard plastics remains unchanged in Veolia's proposed solution and the segregated scenario. It is not considered feasible to collect them from households or businesses due to the poor markets and irregular shapes making this type of material unsuitable for collection.
Wood	No (aside from wood arising as part of	No (aside from wood arising as part of bulky	Wood will be accepted for recycling from residents at	Wood produced from Veolia's	Until 2018 any wood in	Yes, there are limited options for reuse of wood

Material	Prevention	Reuse	Recycling / composting	Energy Recovery	Disposal	Managed in line with Waste Hierarchy?
	items that Veolia will encourage repair of)	items to be reused by the charities)	the HRRC and will also be sorted from bulky waste collections and fly-tip clearance at the HRRC. From the HRRC wood will be sent to Hadfield Wood Recycling in Essex. Wood from the dismantling of bulky waste at Veolia's MRF in Greenwich will be graded and recycled.	operations at the Greenwich MRF will be sent for SRF. From 2018 wood that is included in the residual waste stream will be sent to the ERF	residual waste will be landfilled	unless it forms part of a reusable item of furniture therefore the focus will be on recycling. The approach taken to managing wood remains unchanged in Veolia's proposed solution and the segregated scenario as the irregular sizes and shape of the material mean that it would need to be managed through the bulky waste collection.
Tyres	No	No	Tyres delivered to HRRC's by residents and those collected via other methods (i.e. the bulky waste collection service and fly-tip clearance) will be sent to London Tyre Disposals Ltd for recycling	No	No	Yes, recycling is currently felt to be the most appropriate form of management for tyres as it is unlikely that reduction or reuse activities are appropriate to this material stream. The method of managing tyres remains the same within Veolia's proposed solution and the segregated scenario.
Scrap Metal	No (aside from wood arising as part of items that Veolia will encourage repair of)	No (aside from wood arising as part of bulky items to be reused by the charities)	Metals delivered to HRRC's by residents and those collected via other methods (i.e. the bulky waste collection service and fly-tip clearance) will be sent to EMR in Croydon for recycling	Wood produced from Veolia's operations at the Greenwich MRF will be sent for SRF. From 2018 wood that is included in the residual waste stream will be	Until 2018 any wood in residual waste will be landfilled	Yes, recycling is currently felt to be the most appropriate form of management for scrap metal as it is unlikely that reduction or reuse activities are appropriate to this material stream. The method of managing tyres remains the same

Material	Prevention	Reuse	Recycling / composting	Energy Recovery	Disposal	Managed in line with Waste Hierarchy?
				sent to the ERF		within Veolia's proposed solution and the segregated scenario.
Paint	The communications and engagement team will provide advice to the public to prevent items becoming waste (e.g. encouraging smart shopping to prevent over purchase of products)	The communications and engagement team will provide advice to the public to help reuse of items becoming waste (e.g. encouraging use of Repaint schemes). Paint will be accepted at the HRRC's	No	Residents to organise collection direct from the City of London for treatment.	N/A	Yes, there are limited options for managing paint due to its hazardous nature and low frequency with which it arises. Veolia will aim to encourage reuse where possible. The method of managing paint remains the same within Veolia's proposed solution and the segregated scenario.

7. Tests

This section considers Veolia's proposed solution in relation to the regulatory requirement for separate collections of materials against the two tests: a necessity test and a practicability test (in relation to technical, environmental and economic practicability).

Separate collection

Within both Veolia's proposed solution and the segregated scenario, residents, businesses and visitors to the Borough are provided with an opportunity to put plastic, glass, metals and paper in separate containers from their residual waste. Within both scenarios these materials will never be re-mixed with other waste streams having been collected separately. This meets one of the stipulations in the EA's briefing note. However within Veolia's proposed solution only paper (with card) is handled as a separate stream while glass, plastics and metals are collected mixed together. Therefore there is a requirement to apply the necessity and practicality tests.

Necessity

Referring to the Route Map, which is considered good practice by the EA, the following questions are considered:

- Examine the quantity and quality of recycling to show if separate collection is necessary to 'facilitate' or 'improve' recovery.
- Is it clear that separate collection either will or will not lead to an increase in either the quantity or quality of material collected?
- Does separate collection deliver the best results?

Quantity and contaminated tonnages

The dry recycling tonnage and contaminated tonnages anticipated to be achieved through Veolia's Veolia's proposed solution and the segregated scenario are summarised in

Table 10. The tonnages related to household materials for the segregated scenario have been developed by Ricardo-AEA using their in-house model for household collections. Commercial tonnage data has been developed by Veolia for their proposed solution. A key assumption in relation to commercial waste is that smaller businesses will not have sufficient space to store more than two segregated streams of recycling. This assumption has been made based on research undertaken by Anthesis UK which included business surveys in the London Borough of Southwark, Waveney District and Cambridge City Councils (2012/13), and is supported by Veolia's internal knowledge of their London customer base.

The segregated scenario is predicted to have the lowest amount of contaminated material but, even taking this into account, achieves 6,790 tonnes per year less of recycling than Veolia's proposed solution.

Table 10. Tonnages anticipated to be collected via Veolia's proposed solution

Material stream	Total (tonnes / year)	Total Household only (tonnes / year)	Standard (tonnes / year)	Flats (tonnes / year)	Difficult to reach properties (tonnes / year)	Commercial properties (tonnes / year)
Residual	164,837	150,135	113,037	34,880	2,218	14,702
Recycling	73,152	69,518	60,381	7,910	1,227	3,634
Dry recycling contamination	4,600	4,164	3,617	474	73	436
Food waste	25,128	24,924	23,311	1,382	232	204
Garden waste	17,321	17,321	17,148	0	173.21	0

Table 11. Tonnages anticipated via the segregated solution

Material stream	Total (tonnes/year)	Total Household only (tonnes/year)	Commercial properties (tonnes/year)
Residual	174,920	159,582	15,338
Recycling	66,362	62,997	3,365
Dry recycling contamination	1,328	1,259	69
Food waste	25,128	24,924	204
Garden waste	17,321	17,321	0

Assumptions related to the operational modelling are included in Appendix 4. Operational and cost assumptions

Quality

The quantity of recycling collected should not be taken in isolation, and so it is necessary to consider the quality of recycling produced from the four priority waste streams. Recycling quality is currently not subject to officially recognised standards but the grade of materials and end use of materials provides an indication of quality, in terms of its acceptability to end markets. For example, glass that is sent for re-melt could be regarded as a higher quality than glass used for aggregate, and "news and pams" is viewed as a higher quality product than "mixed paper".

The Environmental Permitting (England and Wales) (Amendment) Regulations 2014 were laid on 11 February 2014 and came into force on 5 March 2014. Schedule 9A of the Regulations automatically adds a condition into the environmental permits of all qualifying Material Facilities (MFs) to require them to routinely report the composition of their input and output materials. This has been effective since 1st October 2014 and reporting outcomes are published on a publically accessible portal provided by WRAP². Information from this portal has been used in assessing the quality of material expected from Veolia's proposed solution.

Paper and card:

- Within both Veolia's proposed solution and the segregated scenario paper and card would be collected and handled separately to containers (cans, plastic bottles and glass), and it is assumed that they would be sold as a 'mixed paper' grade to reprocessors.
- The recycling containers used may have some influence on quality. Within the segregated scenario the box may make it easier for crews to identify and reject contaminants within the kerbside element of the service than identifying contaminant materials within the wheeled bin that is being proposed by Veolia. However the box is more likely to allow water ingress to the paper than the bin (wet fibres are one of the most undesirable contaminants for the paper industry³).
- Presentation of paper and card by commercial properties and residents in flats would use the same containment in both Veolia's proposed method and the segregated option. Therefore the quality of paper and card is unlikely to differ significantly for these properties between Veolia's proposed solution and the segregated scenario.
- **Conclusion:** Overall the quality of paper and card has the potential to be slightly lower in Veolia's proposed solution given that there will be less opportunity to reject any contaminant materials contained within the wheeled bin, during collection at the kerbside.

Glass:

- Due to the limited space available for containers at bring bank sites for flats, within businesses, at on-street locations, on stillage vehicles and within waste transfer stations it is assumed that within the segregated scenario that glass would be collected as a mixed colour stream and sold to a re-processor (such as Berrymans) as a 'mixed bottles' grade for re-melt into glass containers.
- Within Veolia's proposed solution glass from households and businesses would be collected along with metals, plastics and cans with materials being sorted at Veolia's MRF at Rainham. The output glass from the Rainham MRF is currently sold for use as aggregate.
- **Conclusion:** The glass collected under Veolia's proposed solution is predicted to be of a high enough quality to respond to an end market demand in the aggregate industry, but of lower quality than would be achieved through the segregated scenario as the majority will not be sent for re-melt.

Plastics:

² <http://mfrp.wrap.org.uk>

³ Based on research undertaken by Anthesis in 2015 to identify good practice in materials presentation.

- High-technology sorting of plastics into separate polymer grades would be required for plastics collected via the segregated scenario as well as that produced from the twin stream collections within Veolia's proposed solution. It is assumed that within the segregated scenario the plastics collected from households and businesses would be sent to Veolia's Rainham MRF. This is the same facility that would receive the container mix from Veolia's proposed solution and reports 1.4% non-recyclable materials within the plastic bottle outputs via the MF reporting portal¹.
- **Conclusion:** As plastics from household and commercial collections would be processed within the same facility within both Veolia's proposed solution and the segregated scenario it is assumed there would be no difference in quality in respect of what is sent to the end market.

Metals:

- Metals are less susceptible to damage and contamination than other materials and the non-recyclable content of the metal streams produced by Rainham MRF appears relatively low based on MF portal data. The MRF reported 0.1% non-recyclable materials within the aluminium stream and 0.2% within the steel stream. This means it is likely that the quality of metals within the metal streams is likely to be comparable within both Veolia's proposed solution and the source segregated scenario.
- **Conclusion:** The quality of metals is likely to be comparable between Veolia's proposed solution and the segregated scenario

Dry recycling from street cleansing

Previous research by Anthesis (then LRS Consultancy) has identified that recycling from litter bins can be highly contaminated with up to 48% of the materials placed in them being contaminant materials⁴. This means that it is extremely unlikely that even separated materials collected from recycling litter bins could be sent directly to a reprocessor without pre-sorting.

In both the segregated scenario and Veolia's proposed solution it is assumed that recyclable materials collected from street cleansing operations and litter bins would be sent for sorting at Veolia's MRF in Southwark. This means that the materials produced in the segregated collection would be of a similar quality to those produced from Veolia's proposed solution. MF portal data indicates that Veolia's Southwark MRF produces high quality outputs, for example:

- The fibre outputs are graded (as cardboard, newspapers and magazines, mixed newspapers and magazines) and the most recent data suggests that non-recyclable materials within the output fibre grades from the Veolia Southwark MRF are low, ranging from 0.02% non-recyclable material for cardboard to 0.2% for mixed paper⁵ suggesting that high quality outputs are being achieved.
- Glass outputs are sent for re-melt for manufacture of new containers.

Practicability

⁴ Recycle Western Riverside, Assessment of Opportunities for Expanding Recycling in Public Spaces Feasibility Report

⁵ MF Portal Reporting results for 2015 Q3

Technical

This section considers the technical practicability of the segregated scenario.

Within the segregated scenario, residents living in properties served by the kerbside service would use two boxes to present recycling. The collection crew would then sort the recycling, at the kerbside, into a stillage vehicle. Modelling undertaken by Ricardo-AEA using its in-house operational model indicates that six more vehicles would be needed to provide core collection services for kerbside households alone in the segregated scenario (Table 12).

Table 12. Vehicle numbers necessary for core collection services

Service type	Veolia's solution	Segregated scenario
Household recycling ⁶ and Food	34	36
Household garden	7	7
Household residual and Food	-	19
Household residual and Food (communal)	9	9
Household residual	17	-
Commercial Waste Vehicles	7	9
Total	74	86

The modelling undertaken by Ricardo-AEA also indicates that total mileage would be 5% higher for core vehicles undertaking household collections within the segregated scenario in comparison to Veolia's proposed solution. The need for loaders to sort four material streams onto the vehicles for the kerbside collections rather than loading dual stream materials will result in slower loading of vehicles. The increased number of vehicles, increased vehicle mileage and slow loading could significantly increase local traffic congestion during operations.

For the segregated scenario to be feasible, a waste transfer station with sufficient space for a bay for each of the segregated materials would be required. This would allow the materials to be bulked before transport to reprocessors (as it would not be feasible for each material stream to be separately delivered to reprocessors by collection vehicles). There are two transfer stations that are available for Veolia to manage the materials collected on behalf of SLWP; Stubbs Mead in Croydon and Garth Road in Merton, neither of which have the capacity to receive four streams of separately collected dry recyclates.

Stubbs Mead transfer station currently has two open bays that can be used for transfer (these bays are shown in the bottom left hand corner of

Figure 3. Within Veolia's proposed solution these bays will be roofed, with one bay used for paper and card and the other for the container mix. There is no further room at the site for additional bays for other recyclates, though Veolia does plan to try and locate a skip at the site to bulk mechanical sweeping and gully waste prior to transfer to the new sweeper treatment facility at Rainham.

⁶ Household streams include those from kerbside properties, communal properties and difficult to access properties

Figure 3. Diagram of Stubbs Mead transfer station in Croydon



Garth Road transfer station (

Figure 4) has three existing covered bays which provide sufficient capacity for the paper and card and mixed containers that are collected within Veolia's proposed solution. A skip is also needed at this site to bulk materials from mechanical sweeping and gully waste prior to transfer to the new sweeper treatment facility at Rainham. In addition a contingency bay for garden waste and food waste collected on Saturday and Sunday catch-up collections is required plus a contingency area for the adjacent HRRC site. This means that there is no space available at the site for the four streams of segregated materials.

Figure 4. Diagram of Garth Road transfer station in Merton



The table below illustrates the calculated storage space for materials at the two transfer stations. The capacity has been calculated based on the assumed material density, volume of bays at the sites, and the height and slope of assumed material storage. The assumed density for the container mix is 0.1t/m³ and for paper and card is 0.15t/m³.

	Stubbs Mead	Garth Road
Container Mix		
Storage Capacity (M ²)	267	360
Storage Capacity (T)	80	108
Paper and Card		
Storage Capacity (M ²)	260	196
Storage Capacity (T)	117	88

Assuming Croydon and Sutton tonnages are deposited at Stubbs Mead and Merton and Kingston tonnages are deposited at Garth Road the following table compares available capacity with anticipated annual tonnages in 2024/25 when all material is in Veolia control.

	Stubbs Mead	Garth Road
Container Mix		
Storage Capacity (M ²)	267	360
Storage Capacity (T)	80	108
Annual Tonnage Assumption (2024/25)	21964	14585
Tonnes per day (312 days)	70.4	46.75
Storage Capacity in Days	1.14	2.31
Paper and Card		
Storage Capacity (M ²)	260	196
Storage Capacity (T)	117	88
Annual Tonnage Assumption (2024/25)	19181	15957
Tonnes per day (312 days)	61.48	51.14
Storage Capacity in Days	1.9	1.72
Total Material to Transfer Station (T/year)	42,003	31,396
Licence Capacity (T/year)	75,000	75000

It is important to ensure that capacities for material receipt is maintained at each of the transfer stations and that the quality of recycling loads are at their best when material arrives at the reprocessors. To ensure that both of these priorities are realised loads out of the transfer stations will be programmed throughout each operational day, based on the expected input levels, maintaining minimal levels within the bays and ensuring early dispatch of collected materials to the reprocessors.

Conclusion: Despite issues with congestion and significant additional vehicle movements, making kerbside sort collections technically undesirable, it is not considered that these issues would make them impracticable. However, following collection, the materials would need to be tipped at a WTS or similar for bulking and transport onto reprocessors. Neither transfer station that Veolia has access to for the delivery of the SLWP contract has sufficient space for four streams of dry recyclate to be managed, therefore making separate collections of recyclables impracticable.

Environmental

In order to model the greenhouse gas impact of Veolia's proposed solution in comparison to the segregated option, Ricardo-AEA undertook a high level assessment of the CO₂(eq) emissions. The principal sources of emissions factors for management of materials are:

- 2013 DECC GHG Conversion Factors for Company Reporting⁷
- The Scottish Carbon Metric Technical Report, October 2013, Zero Waste Scotland⁸

⁷ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/224437/pb13988-emission-factor-methodology-130719.pdf

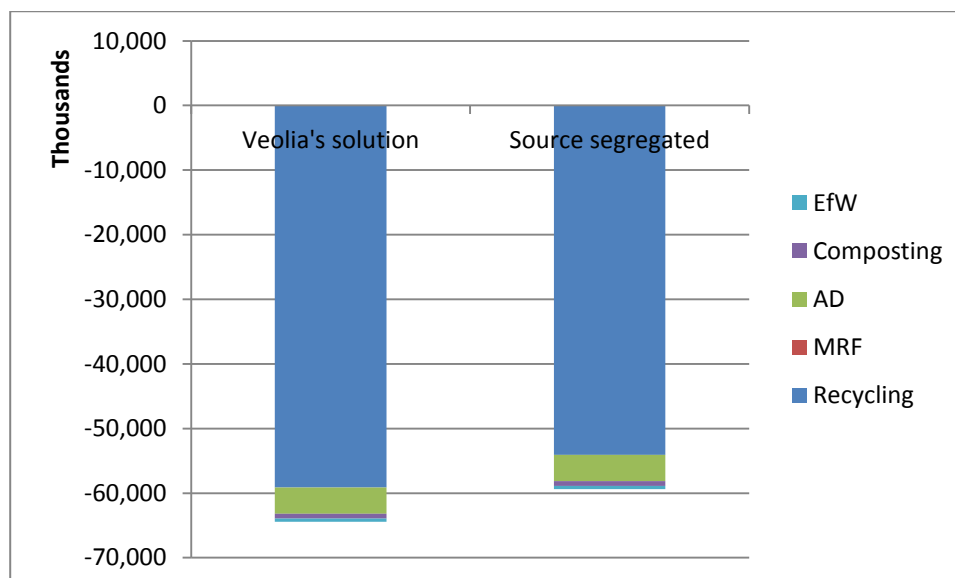
⁸ <http://www.zerowastescotland.org.uk/category/subject/carbon-metric>

The factors used from these sources are predominantly based on the following assumptions:

- The factors include the carbon impact of managing one tonne of material in a given way and include the associated benefit. For example, one tonne of aluminium uses 599 kg CO₂ equivalent per tonne when recycled, but offsets the production of new raw materials (9,844 kg CO_{2(eq)} per tonne) and thus equates to a saving of -9,245 kg CO_{2(eq)} per tonne.
- The factors do not include any avoided disposal. They do include an element of transport once the material is formed into waste.

The emission factors assumed are provided in Appendix 3: Emission factors. This methodology was repeated by Anthesis UK in relation to commercial waste. The modelling indicates that the Partnership's CO_{2(eq)} burdens would be 8% greater for a separate collection approach compared to Veolia's proposed solution.

Figure 5. Embedded kg CO_{2(eq)} burdens comparison



As outlined previously in

Table 10 it is predicted that Veolia's proposed solution will, capture 6,790 tonnes (2%) more recycling per annum than the segregated scenario.

The collection system used may also have some impacts on local environmental quality and amenity due to the containers used. For flats, larger commercial properties and on street bring banks a greater number of containers would be needed in order to allow greater separation of the material streams within the segregated scenario, which may have some visual amenity impacts. The lower capacity for dry recyclables for kerbside properties (110 litres in the source

segregated scenario compared to 350 litres in Veolia's proposed solution⁹) could lead to a greater potential for windblown litter from overfilled containers and accidental littering from overfilled containers by operatives when taking boxes from the household to the kerbside and when sorting materials. However, this impact is not anticipated to be significant.

Conclusion: Based on the evaluation undertaken, the segregated scenario does not have a benefit in relation to CO₂(eq) in comparison to Veolia's proposed solution. It is also predicted that Veolia's proposed solution will capture 6,790 tonnes more recycling per annum than the segregated option. Local amenity impacts are considered to have a minimal difference between Veolia's proposed solution and the segregated scenario.

Economic

Ricardo AEA undertook an assessment of the economic impacts of the segregated option in comparison to Veolia's proposed solution using its in-house financial model. The indicators assessed were:

- Net service cost - gross collection cost (including recycling revenue, treatment and disposal costs)
- Affordability - Potential savings from the proposed solution

The assumptions used within the financial model are provided in Appendix 4. Operational and cost assumptions.

The modelling indicates that the source segregated scenario is 4.5% per annum more expensive than Veolia's proposed solution. Operationally, more waste collection vehicles are making more rounds, meaning increased purchase, maintenance, fuel, driver and loader costs associated with collection. As more income can be generated from the sale of segregated materials in comparison to those collected co-mingled, the cost of processing recyclable material is much smaller for this option than the proposed solution. However, as this collection system generates more residual waste, the costs of residual waste treatment are higher, leading to an overall higher cost.

Conclusion:

The segregated scenario would result in costs being 4.5% higher per annum than Veolia's proposed solution. The SLWP Councils would need to consider whether this higher level of cost would be considered 'excessive' given their existing and future budgetary provision.

8. Outcome of Tests

The data relevant to the different options modelled in relation to the regulatory requirement for separate collections of materials against the two tests: a necessity test and a practicability test (in relation to technical, environmental and economic practicability), necessity and TEEP tests is outlined section 0. This section summarises the outcomes of the tests.

⁹ Due to the provision of two boxes rather than a wheeled bin and a box

Necessity

Option	Necessity assessment	Commentary
Segregated scenario	Outcome: Inconclusive	The outcome of the necessity test is inconclusive: The segregated collection scenario is preferable to Veolia's proposed solution in terms of material quality but not quantity. The necessity assessment indicates the quality of plastics and metals achieved via Veolia's proposed solution would be comparable to that achieved by the segregated system. However, the quality of paper may be slightly lower and grade of glass achieved would be lower. It is predicted that Veolia's proposed solution will gain 6,790 tonnes more recycling per year than could be achieved through the segregated solution.

Technical practicability

Option	Technical practicability	Commentary
Segregated scenario	Outcome: Fail	The segregated scenario fails the technical practicability test. Despite issues with congestion and significant additional vehicle movements making kerbside sort collections technically undesirable, it is not considered that these issues would make them impracticable. However, following collection, the materials would need to be tipped at a waste transfer station for bulking and transport onto reproprocessors. Neither transfer station that Veolia has access to for the delivery of the SLWP contract has sufficient space for four streams of dry recyclate to be managed.

Environmental practicability

Option	Environmental practicability	Commentary
Source separated scenario	Outcome: Fail	The segregated scenario fails the environmental practicability test. Based on the evaluation undertaken the segregated scenario has a lower CO _{2(eq)} benefit in comparison to Veolia's proposed solution. It is also predicted that Veolia's proposed solution will capture more recycling per annum than the segregated option.

Economic practicability

Option	Economic practicability	Commentary
Segregated scenario	Outcome: Inconclusive	The outcome of this test is inconclusive: Modelling indicates that the segregated collection would be 4.5% per annum more expensive than Veolia's proposed solution. The SLWP Councils would need to consider whether this higher level of cost would be considered 'excessive' given their existing and future budgetary provision

Conclusion

The outcomes of the assessment undertaken indicate that in terms of material quantity, price and CO_{2(eq)} performance Veolia's proposed solution is more environmentally and economically

advantageous than the segregated scenario. The lack of suitable waste transfer stations with the necessary capacity currently makes the segregated solution technically impracticable at the current time.

9. Review period

Veolia recognises that the assessment of waste management arrangements against the regulations is not a one-off activity. The regulations will continue in force for the foreseeable future, and will need to be reviewed periodically during the lifetime of the contract. In-line with the Route Map, Veolia suggests that a review would be triggered by changes that could influence the outcome of the assessment of TEEP compliance. This could include:

- New transfer stations or other facilities becoming available to Veolia or the SLWP Boroughs that would make a segregated scenario technically practicable and affect the quality or quantity of materials that could be captured through either system
- Opportunities or issues that might influence CO_{2(eq)} of operations, e.g. changes to sites at which materials are managed or potential upgrades to the vehicle fleet
- Significant changes in the quality of outputs being achieved by the facilities that will process materials collected via Veolia's proposed solution
- Significant changes in the cost of service provision, processing, gate fees or recyclate values (e.g. changes to costs of staff, vehicles, income potential and processing / disposal costs)
- The need to procure a new vehicle fleet
- Events that change the way that the obligations associated with the regulations are interpreted (e.g. new case law or guidance)
- Changes or developments in quality standards and protocols for glass, paper, metal and plastics or significant changes to market conditions and demand for secondary commodities

Veolia suggests that the need for a further review of TEEP compliance is discussed with the SLWP Boroughs regularly at the Annual Partnership meeting to help ensure ongoing compliance. In the event of a material change in the service, or the way the requirements of the regulations are interpreted, the assessment will be reviewed as required. Veolia monitors a number of indicators internally that could support decision making regarding the future need for a review of TEEP and will share these with the Partnership at Annual Partnership meetings.

Appendix 1. Relevant text of regulations

Duties in relation to collection of waste

13. (1) This regulation applies from 1st January 2015.

(2) Subject to paragraph (4), an establishment or undertaking which collects waste paper, metal, plastic or glass must do so by way of separate collection.

(3) Subject to paragraph (4), every waste collection authority must, when making arrangements for the collection of waste paper, metal, plastic or glass, ensure that those arrangements are by way of separate collection.

(4) The duties in this regulation apply where separate collection—

(a) is necessary to ensure that waste undergoes recovery operations in accordance with Articles 4 and 13 of the Waste Framework Directive and to facilitate or improve recovery; and

(b) is technically, environmentally and economically practicable.”.

Appendix 2. Performance assumptions

Household participation, set-out and capture rates

The tonnage collected from householders is driven by the set out, participation, recognition and capture rates, where:

- Set out rate is the percentage of households presenting waste at the kerbside on any given week (this factor does not affect the tonnage but does effect the collection and fill rates for the collection vehicles);
- Participation rate is the percentage of households that take part in the collection (measured over three consecutive collection periods);
- Recognition rate is the proportion of targeted material that each householder actually presents in their collection system (for example householders may not bother to empty and wash out half used jars for recycling and so this glass could be recycled but isn't)
- Capture rate is the proportion of material available from the waste stream which is actually recycled and it is a function of the scheme coverage (number of households eligible for the scheme), participation rate and recognition rate

For the modelling of Veolia's proposed solution, the participation and set-out rates have been based on information provided by Veolia. There has been no change assumed in participation and set-out.

The change in predicted recognition rates used in the modelling of the fully source-separated option is summarised in the table below.

Assumed Changes in Householder Recognition Levels (%) relative to existing performance

Material	Proposed service	Source-separated System	Reason for change in recognition
All materials	Varies	-15%	It is predicted that recognition rates could fall significantly if a source-separated system was operated. This is because the multi-stream system would involve a significant reduction in capacity (2 x 55ltr boxes fortnightly = 110ltrs a fortnight, compared to the capacity for the proposed baseline solution of 310-480ltrs). In addition to this, operatives involved in kerbside sorting may misallocate materials when taking them from the box and separating them at speed into the various compartments on the vehicle. A 15% drop in recognition has been modelled per material relative to baseline levels.

Assumed losses

Ricardo-AEA made the following assumptions with respect to rejects and un-recycled material arising from collections. Material rejection will affect recycling rates and also income achievable from material sales. These assumptions have been based on the following data sources:

- The WRAP MRF Quality Assessment Study³ reports an average MRF contamination rate of 12%. However, WRAP's standard assumption for twin-stream services (such as the proposed baseline solution) is 5-6%. For the purposes of modelling the options Ricardo-AEA has used 6%.
- It is anticipated that source-separated systems will achieve lower contamination rates, with positive sorting by operatives at the kerbside. So as per current assumptions by WRAP for other options modelling projects¹⁰ that Ricardo-AEA has undertaken, a 2% rejection for the source-separated option is assumed.

It is not possible to predict with certainty how householders in the four Boroughs of the South London Waste Partnership would behave if a source - segregated collection was introduced. The performance assumed is based on industry standards used in modelling exercises undertaken by WRAP.

Rejects and un-recycled material

Option	Paper	Card	Plastic bottles	Mixed Plastic	Glass	Steel cans	Aluminium cans	Justification
Proposed Service	6%	6%	6%	6%	6%	6%	6%	WRAP standard assumption
Source-separated service	2%	2%	2%	2%	2%	2%	2%	WRAP standard contamination assumption

¹⁰ Recent projects have been undertaken for Chorley BC, Barrow BC, Craven District Council, Slough BC and Craigavon DC

11% contamination was assumed by Veolia for development of the commercial service data for both the proposed solution, and 2% for the source segregated solution. This was reflected in the tonnages developed.

Appendix 3: Emission factors

The tables below summarise the emission factors used to model the greenhouse gas impact of Veolia's proposed solution in comparison to the segregated scenario.

Recycling waste management emission factors (kg CO_{2(eq)} per tonne)

Material stream		Carbon Factor (kg CO _{2(eq)} per tonne)
Metal	Aluminium cans and foil	-9,245
Metal	Steel cans	-1,702
Plastic	Plastics: other	-1,170
Plastic	Plastics: PET	-1,671
Paper & Card	Card	-345
Paper & Card	Paper	-225
Glass	Glass	-197
Glass	Aggregates	-21

Disposal management emission factors (kg CO_{2(eq)} per tonne)

Treatment Type	Carbon Factor (kg CO _{2(eq)} per tonne) (for MRF kg CO _{2(eq)} /kwh)
MRF	0.53748
AD - food	-162
Windrow	-42
MBT	37
EfW - Residual	-3
Landfill	463

Appendix 4. Operational and cost assumptions

Vehicle type and costs

The assumptions regarding vehicle types used for the operational and cost modelling are identified below.

Vehicle specifications used in the options modelling

Vehicle Type	Capacity Tonnes	Volume (m ³)	GVW (tonnes)	Capital Cost	Annual Cost	Average MPG
Twin Pack 26 tonne 70/30	33	21.4	26	£177,775	£37,400	3.5
Standard 26 tonne RCV	22	21.4	26	£138,515	£37,400	3.5
Duo 26 tonne RCV	7	21.4	23.5	£163,045	£37,400	3.5

Twin Pack 15 tonne RCV	1	7.4	15	£115,047	£14,374	3.0
One Pass 15 tonne RCV	1	7.4	15	£139,468	£18,374	3.0
Kerbloder ¹¹	6.105	32.24	12	£94,000	£15,980	3.5
Toploader ¹²	6.105	28	18	£100,000	£17,000	3.5
Mini Kerbsider ¹³	3	10	10	£139,050	£23,639	3.5

Staffing levels

Both Veolia's proposed solution and the source segregated option are modelled as double-shifted. The number of loaders required per shift for each vehicle is provided below.

Staffing levels per shift for different vehicles

Vehicle Type	Loaders
Standard RCV	2
Twin Pack 26 tonne 70/30	2
Duo 26 tonne RCV	2
Twin Pack 15 tonne	1
One Pass 15 tonne RCV	1
Kerbloder	2
Toploader	2
Mini Kerbsider	1

Driver and loader costs

Driver and loader cost assumptions used for the collection systems modelled are presented below.

Staff Salary Assumptions

Job	Salary per member	Hrly Rate - Flat
Driver	£25,929.02	£12.47
Loader	£20,436.00	£9.83
Supervisor	£35,867.50	£17.24
Management	£55,371.25	£26.62
Cleaner	£19,032.00	£9.15
Administration	£19,604.00	£9.43

Communication costs

Ricardo-AEA assumed a cost for both of the services' communications of £1 per property in the first year of operating the systems. This is based on WRAP's Planning your Activities chapter of its Improving Recycling through effective communications guidance¹⁴.

¹¹ http://www.terbergcms.nl/matec/public/files/kerbloder_uk_51658b5321832.pdf

¹² <http://prod.terbergcotec.com/globalassets/matec/brochures/recyclers/food-waste/toploader---en-uk---rev-2---july-2014.pdf>

¹³ http://www.terbergcms.nl/matec/public/files/mini-kerbsider_stillage_uk_4b7287d464250.pdf

¹⁴ <http://www.wrap.org.uk/content/planning-your-activities-0>. Accessed 5/03/2015.

Recyclate Value

The value of materials achievable through the segregated scenario are shown below. Values are based on prices reported and are average prices quoted by Letsrecycle (for source-separated recycling).

Recyclate Values used for calculation of income from separate collection

Recyclate	Category	Income/Gate Fee	Source
Newspaper and mags	Paper: News & Pams	-£71.96	Letsrecycle.com 12 month mid- point average (July 14 – June 15)
Other Paper	Paper: Mixed Papers: domestic	-£42.83	
Corrugated Card	Paper: OCC: domestic	-£65.67	
Non corrugated Card	Paper: OCC: export	-£65.67	
Plastic film			
Plastic bottles	Plastic bottles: Mixed bottles	-£94.58	
Plastic - other	Plastic bottles: Coloured PET	-£51.25	
Glass flint	Glass: Mixed	-£21.67	
Glass brown	Glass: Mixed	-£17.00	
Glass green	Glass: Mixed	-£8.13	
Steel cans	Cans: Steel	-£98.67	
Aluminium cans	Cans: Aluminium: baled	-£743.75	
Foil			
Textiles	Textiles: Banks	-£280.00	

Final destinations

It has been assumed that material from Merton and Kingston would be bulked at the Merton transfer station which will be made available by the Council to Veolia as part of the contract. Material from Sutton and Croydon would be bulked at the Stubbs Mead depot, Croydon.

It has been assumed that there is space at these depots for bulking of two material streams and that the bulking of additional streams would require Veolia to source and pay for alternative sites.

MRF and bulking Costs

Veolia's net cost for processing materials is shown below. Residual costs have not been considered in this study.

MRF and bulking costs

Facility Type	Category	Cost £/tonne	Source
MRF	Cans, plastic, glass, textiles (includes bulking)	£41.80	Veolia
MRF	Paper and cardboard	-£68	Veolia
Transfer station	Bulking surcharge applied to all materials in source - separated collection option	£31.88	WRAP Wales study

Operating cost modelling

The modelled operating cost for the source-separated service are detailed below.

Contract operating costs

Name of Item	Cost	Units
In-Cab Tech.	£400.00	Per vehicle
Radio/communication	£350.00	Per vehicle/supervisor
Protective clothing	£360.00	Per operative
Training	£200.00	Per operative
Depot utilities	0.50%	Of Direct cost total
Phone calls and rental	0.10%	Of Direct cost total
Tools/materials	0.50%	Of Direct cost total
Expenses	0.10%	Of Direct cost total
Defaults	0.10%	Of Direct cost total
I.T.	0.20%	Of Direct cost total
Printing	0.20%	Of Direct cost total
Adverts in press	0.10%	Of Direct cost total
Depot cost-NNDR,R&M	1.50%	Of Direct cost total
Central Support Charges	3%	Of Overall Cost
Profit/contingency	6%	Of Overall Cost

Vehicle distances

All run and depot distances provided by Veolia are detailed below. The distances provided for the proposed solution are identical to those used for the segregated scenario.

Run, Depot and Tipping distances

Collection	Property type	Distance Depot to run (miles)	Distance Run to Tipping	Distance Tipping to depot
Recycling	Standard	3.68	3.88	2.01
	Flats	3.57	3.72	1.7
	Difficult access	3.65	3.83	1.92
Garden	Standard	3.68	3.88	2.01
	Difficult access	3.65	3.83	1.92
Residual	Standard	3.68	3.88	2.01
	Flats	3.57	3.72	1.7
	Difficult access	3.65	3.83	1.92

Unloading times for the source segregated scenario is longer than current times due to having to off-load a range of different material streams.

Collection speeds for the source-separated system will also be slower than the speeds for the proposed baseline solution, due to the requirement to load material from more than one container into more than one compartment on the vehicle