REGENERATION AND ENVIRONMENT SCRUTINY COMMITTEE - 12TH FEBRUARY 2019

SUBJECT: WASTE REVIEW WORKING GROUP

REPORT BY: INTERIM CORPORATE DIRECTOR FOR COMMUNITIES

---

1. PURPOSE OF REPORT

1.1 To advise the Regeneration and Environment Scrutiny Committee of the outcome of the Waste Review Working Group and to seek the Committee's views on the Working Group's recommendations.

2. SUMMARY

2.1 The Welsh Government Collaborative Change Programme (CCP) offers strategic and tailored support to help Local Authorities achieve the outcomes of the Towards Zero Waste Strategy. The support covers four key phases:-

- Business Planning Toolkit;
- Identification of gaps and changes needed to achieve targets;
- Detailed planning with forward cost forecast;
- Implementation.

2.2 The Authority has been actively engaged in Welsh Government's Collaborative Change Programme (CCP) since 2015. A series of reviews have been undertaken by Waste Resources Action Programme (WRAP) and their appointed consultants on a key range on waste management services including kerbside collection services, household waste recycling centre provision and waste transfer station/depot infrastructure.

2.3 On March 27th 2018, the Regeneration and Environment Scrutiny committee agreed to establish a cross party working group of approximately 10 members to discuss and review the initial findings of the CCP. Cross party representation was received comprising of the following elected members; David Hardacre, Brenda Miles, John Bevan (Chair), Phil Bevan, Steve Kent, Adrian Hussey, Tudor Davies, Denver Preece (Vice Chair), Tom Williams, and Mike Davies. Councillor Nigel George also attended the meetings as an observer.

2.4 The findings of the working group are detailed in the report for consideration by the full committee.

3. LINKS TO STRATEGY

3.1 The Well Being of Future Generations Act (Wales) 2015 sets out a number of goals and principles which public bodies must apply in the strategies and services they deliver. These include:-

- A prosperous Wales;
- A resilient Wales;
- A healthier Wales;
- A more equal Wales;
- A Wales of cohesive Communities;
- A Wales of vibrant culture and thriving Welsh language;
- A globally responsible Wales.

The Act requires public bodies to think more about the long-term, work better with local people and communities prevent problems and take a more joined up approach. The content of this report links into a prosperous Wales, a resilient Wales and globally responsible Wales.

3.2 The Community and Leisure Services Divisional Service Plan contains service specific objectives to meet a range of statutory and non-statutory targets. The plan also outlines the divisions contribution to the Authority's medium term financial strategy.

3.3 Towards Zero Waste One Wales: One Planet 2010, is the overarching Waste Strategy for Wales which sets out Welsh Government's long term framework for resource efficiency and waste management including high level statutory recycling targets and outcomes. In 2011, the strategy was supplemented with a series of sector plans including the municipal waste sector plan which outlined the Welsh Government's recommended service profile for the collection of waste from households. (i.e. the collection Blueprint, this being Welsh Government's preferred service model).

4. REPORT

4.1 Introduction

4.1.1 The Authority has been actively engaged in Welsh Government's Collaborative Change Programme (CCP) since 2015. A series of reviews have been undertaken by Waste Resources Action Programme (WRAP) and their appointed consultants on a key range of waste management services including kerbside collection services, household waste recycling centre provision and waste transfer station/depot infrastructure. These reviews have considered a significant amount of factual and scientific data and have culminated in a series of reports (attached as appendices) which have informed a business plan and cost benefit analysis process undertaken by consultants appointed by WRAP.

4.1.2 On March 27th 2018, the Regeneration and Environment Scrutiny Committee agreed to establish a cross party working group of approximately 10 members to discuss and review the initial findings of the CCP. Cross party representation was received comprising of the following elected members David Hardacre, Brenda Miles, John Bevan (Chair), Phil Bevan, Steve Kent, Adrian Hussey, Tudor Davies, Denver Preece (Vice Chair), Tom Williams, and Mike Davies. Councillor Nigel George also attended the meeting as an observer.

4.1.3 In total, 11 meetings of the group were held between the 14th of May and the 27th of November 2018 (see Appendix 1 highlighting the details of the sessions) and comprised of a series of meetings, formal presentations from WRAP and their appointed consultants, officers of neighbouring authorities as well as several site visits.

4.1.4 The scope of work for the Working Group as agreed by the Scrutiny Committee was to consider financial implications, service delivery options, projected performance, risk analysis, capital investment, consultations and public engagement and timescales.

4.1.5 The current service configuration and associated costs of the key waste services delivered by the Council are indicated in Figure 1 below.

Existing Service Provision & Costs

Figure 1

Service Element	Outline of Service Delivered	Cost of Service (£)
1. Refuse (residual)	– Fortnightly Collection – Wheeled Bins – 7 Vehicles (driver & 2 loaders) – Direct deliver to Trident Park, Viridor (Prosiect Gwyrdd Contract).	Collection £1,146,508 Disposal £1,376,971
2. Dry Recycling & Garden	– Weekly Collection – Predominantly Wheeled Bins – 9 Vehicles (driver & 2 loaders) – Contract for processing with Newport Paper expires July 2019.	Collection £1,087,587 Treatment £883,266
3. Food Waste & Garden	– Weekly Collection – 23 litre food waste caddies – Collected in twin pack RCVs – 7 vehicles (driver & 2 loaders) – Direct delivered and processed at Bryn Compost	Collection £917,425 Treatment £328,028
4. Commercial	– Weekly residual, recycling and food waste collections – Co-collected with domestic rounds – Circa 1500 customers	Collection £286,876 Treatment £358,953 Income -£1,140,696
5. HWRCs	– 6 sites. – Each open 6 days per week open all year around (closed Christmas Day, Boxing Day and New Year's Day).	Running Costs £840,181 Treatment £2,074,248
6. Waste Transfer Station	– Located at Full Moon, Crosskeys. Currently bulk/transfer residual and recycling waste.	Running Costs £120,394
TOTAL		£8,279,742

In addition to the costs included in Figure 1 there is an additional £391,000 RCCO vehicle replacement budget.

4.2 Recycling Collection Systems

The Council's current waste service collection profile is detailed below in Figure 1:

FIGURE 2

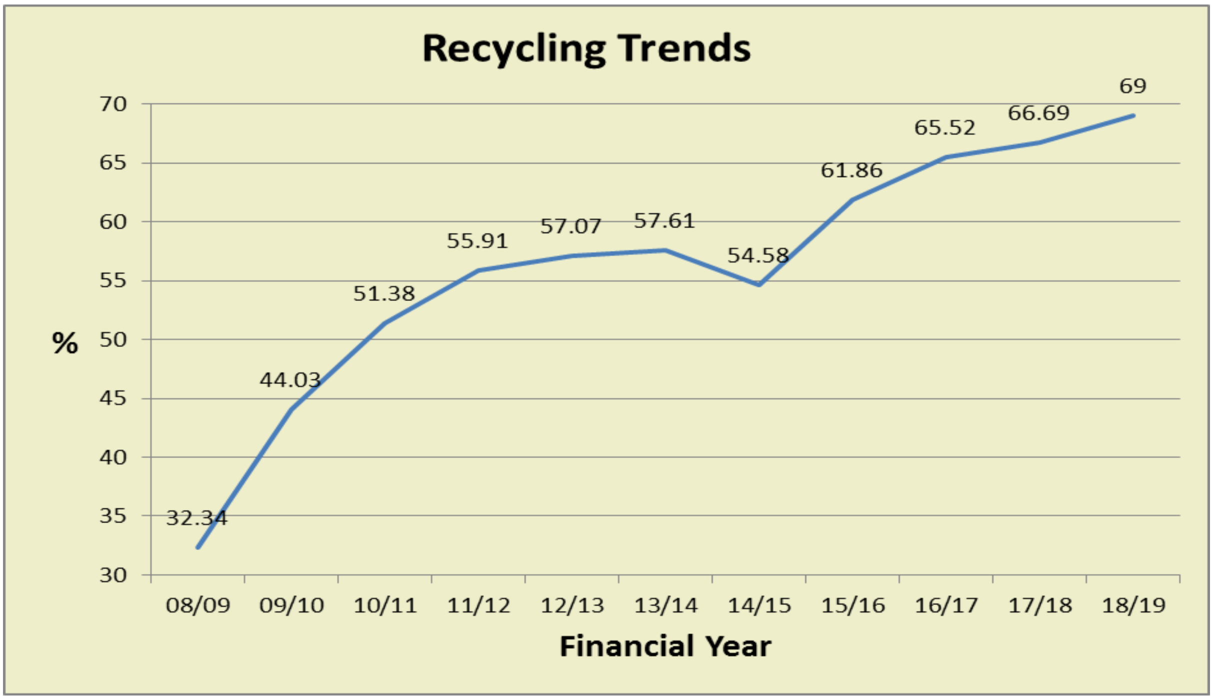
Service	Frequency	Containers Used	Materials Collected
Dry Recycling	Weekly	240l wheeled bin (approx. 70% of households) Kerbside boxes (to approx. 25% households) Single use sacks (approx. 5% of households)	• Glass • Cans • Plastic Bottles • Mixed Plastic • Paper • Card
Food Waste	Weekly	5 Litre Internal Caddy 23Litre Kerbside Caddy	• All Food Waste
Garden Waste	Weekly	Reusable Sack	• All Garden Waste
Refuse (Residual Waste)	Fortnightly	240l wheeled bin (approx. 98% of households) Plastic sacks	• Residual Waste

4.2.1 All households receive a weekly co-mingled dry recycling collection. The authority currently uses a fleet of 9 standard Refuse Collection Vehicles (RCVs) to provide this service along with a smaller tipper vehicle to collect from areas of restricted access. The dry recycling vehicles offload at the authority's bulking station prior to material being sent for sorting to a Materials Recycling Facility (MRF). Currently, we have a contract with Newport Paper until July 2019 and our materials are processed in a facility in Warwickshire operated by Pure Recycling Limited. There are risks associated with the current service. These largely relate to the volatility of the market and the quality of the materials being presented by the householder. In recent years the Authority has implemented many measures to improve the quality of recycling including the distribution of leaflets, a door-stepping campaign and a programme of warning stickers and bin removals. If the current collection system is to be retained these measures, alongside further enforcement solutions would need to be explored. There is an associated risk to the short-term processing contract that is in place and a longer term cost effective solution will also need to be considered.

4.2.2 Through the Waste (Wales) Measure 2010, the Welsh Government made the recycling targets statutory for 2012-13 and beyond, giving itself the option to levy financial penalties against councils that fail to achieve them. The statutory recycling target is weight-based and has increased gradually over time. The target has been 58% since the start of 2015-16, but increases to 64% in 2019-20, and to 70% in 2024/25. In 2017/18 the Council's recycling and composting performance was 66%. The projected performance for 2018/19 is 69%.

4.2.3 For 2017/18, Caerphilly was ranked 4th in terms of recycling performance. The full "league table" can be found in the appendices. (Appendix 2). It is therefore likely that the Authority will achieve the 70% (2024/25) target with the longer term intervention outlined in this report. Caerphilly's recycling performance over the last ten years is depicted in the graph below (figure 3).

Figure 3



4.2.4 Welsh Government is considering increasing the recycling target to 80% in 2034-35 subject to consultation. Welsh Government's collection Blueprint sets out their recommended service profile for the collection of waste from households, including the following central policies:

- Weekly separate collection of dry recyclables via 'kerbside sort' with material being collected separately in boxes and/or in reusable sacks, with two or more boxes provided per household, and recyclables being sorted into separate compartments on the collection vehicle by the collection staff
- Weekly separate collection of food waste
- The use of modern, lightweight, multi-compartment vehicles for a single pass collection of dry recyclables and food waste; and
- Fortnightly collection of residual waste, from collections with reduced residual waste capacity, where 'no side waste' policies are enforced.

4.2.5 The Blueprint relies on the collection of recyclables that are presented part-segregated by residents. The material is then further sorted by operatives at the point of collection. The 'co-mingled' recycling service currently operated by the Council is not Blueprint compliant, although we have adopted other key principles i.e. weekly separate food waste collection and fortnightly residual waste collection with a no side waste policy. Welsh Government believe that if applied optimally, its collections Blueprint offers the most cost-effective overall means of collecting waste from households. The number of councils adopting collection methods that the Welsh Government considers to conform to its collection Blueprint have increased by 3 in 2011/12 to 13 with three currently in the process of changing (see Appendix 3).

4.2.6 At the start of the review (2015) and as part of the CCP work that has been undertaken (see Appendix 4, CBA Report), WRAP undertook a comprehensive modelling exercise using their Kerbside Analysis Tool (KAT) which is an excel based spreadsheet tool which allows users to make projections of kerbside collection infrastructure and associated standardised costs by applying default and user-defined values to key parameters. The projected costs are standardised in order to fairly assess the differences between options. However, it is important to note that KAT modelling is relative and based on current service; if efficiency savings could be made in current services, then they would also be able to be made on all the options considered. Therefore it is the cost difference that is the relevant output of the modelling exercise rather than absolute numbers.

4.2.7 The modelling was undertaken to compare a variety of alternative collection options alongside the current service configuration (See Appendix 5). The options initially modelled were as follows:

- Baseline – Service configuration (as was during KAT modelling 2015)
- Enhanced baseline – Separate collection of food and garden waste, length of working day harmonised. (This is now the configuration operated by the authority – costs are therefore compared to the enhanced baseline)
- Option 1 – Based on Welsh Government Blueprint. Dry recycling/food collected weekly by a Resource Recovery Vehicle (RRV). Residual waste and garden waste collected fortnightly by refuse collection vehicles
- Option 2 – Twinstream. Fibres/Containers collected by a twin chamber Refuse Collection Vehicle (RCV). Food and Garden waste weekly using twin chamber RCV (like those used currently)
- Option 3 – Three stream. 3 chamber vehicles used to collect glass, paper and card, plastic and cans. Food & Garden waste weekly in twin chamber RCV
- Option 4 – Twin Stream. As option 2, however streams collected separately in RCVs. Food & Garden Waste weekly in twin chamber RCV
- Option 5 – Three stream. Twin pack 1 – Fibres/Plastic & Cans. Twin Pack 2 – Food/Glass. Garden waste collected fortnightly in RCVs.

4.2.8 Following the initial modelling, it was decided to model option 1 and option 5 in more detail. In order to undertake the modelling there were a series of key assumptions that were made by WRAP namely:

- Net yield would be the same for both systems.
- Estimated waste transfer station costs were used. These were superseded by more detailed figures in the Cost Benefit Analysis work.
- A change to either Option 1 or 5 would require new waste transfer station infrastructure to deal with separated recycling streams (e.g separation equipment for plastic and cabs, balers etc).
- Recycling yield would increase with reduced residual waste frequency.
- A range of material values were modelled. Material prices are key as any change to kerbside sort or multi stream collections means that the income from sale of materials is important to offset the additional collection costs. Values used in the modelling reflect the status of the markets in 2015 when the modelling was undertaken. The Council's MRF arrangements have since changed with the gate fee reducing to £76 per tonne excluding haulage. This fee is subject to quarterly review and predicted to increase due to the fluctuating nature of the market for materials.

The results from the KAT analysis are as follows in Figure 4:

FIGURE 4

Revenue Expenditure	Baseline	Enhanced Baseline	Option 1	Option 1 - Extra Loader	Option 5
Annual Capital - Vehicles	611,870	633,919	775,665	700,067	799,289
Containers	118,582	118,582	202,592	202,592	301,958
Operating costs	2,527,720	2,572,000	3,017,241	3,305,249	3,313,662
Supervision	370,644	370,644	370,644	370,644	370,644
Overhead	447,877	447,877	447,877	447,877	447,877
Restricted Access Collections	303,959	303,959	331,448	331,448	330,782
Spare Vehicles	240,874	244,874	294,638	265,604	289,020
Total collection	**4,621,526**	**4,691,855**	**5,440,104**	**5,623,481**	**5,853,232**
Bulking Costs	235,000	235,000	610,000	610,000	610,000
Treatment - Dry	1,520,140	1,520,140	-878,841	-878,841	-720,651
Treatment - Organic	645,904	478,084	478,084	478,084	478,084
Disposal - Residual	1,664,932	1,664,932	1,792,201	1,792,201	1,737,019
Income - Trade	-813,000	-813,000	-813,000	-813,000	-813,000
Costs - Trade	37,000	37,000	37,000	37,000	37,000
Total	**7,911,502**	**7,814,011**	**6,665,548**	**6,848,925**	**7,181,685**
Variation from E Baseline	97,491	0	-1,148,462	-965,085	-632,326

4.2.9 The above table (Figure 4) shows the revenue cost for the core options modelled. As can be seen, Option 1 (Welsh Government blueprint compliant) exhibits the lowest cost of the options modelled £1.14m less than the enhanced baseline option. The variant of option 1 with an additional loader does exhibit higher costs than option 1 with a single loader, approximately £180,000 more, but cost calculated for this option is still approximately £330,000 lower than the three stream collection modelled in Option 5.

4.2.10 The enhanced baseline (current service provision) has the lowest collection costs by circa, £750,000. However, due to the gate fees for the Material Recycling Facility (MRF) and associated haulage it has the highest treatment costs (in excess of £1.5Million). In comparison, Option 1 and Option 5, have an income of £878,841 and £720.651 respectively from the sale of separately collected dry recyclate. However, this is based on assumptions on market prices and concerns have been raised as to whether this income will be realised.

4.2.11 Incomes in Option 5 are lower than those in option 1, this is largely due to the reduced income realised from the sales of mixed paper and card compared to the sale of separately collected paper and card in option 1.

4.2.12 Members of the working group have expressed concerns over many of the key assumptions that were made as part of the modelling exercise, specifically as they are crucial to the achievement of the potential savings that could be realised through changing collection methods. There are concerns surrounding the participation of residents in the service if it were to change. The modelling assumes the net yield would be the same but the working group believed that participation would reduce through customer resistance. Additionally, there were concerns surrounding whether the overall levels of income being projected in the model could be achieved.

4.2.13 The modelling undertaken by WRAP indicates that the Authority can only meet the 2024/2025 statutory recycling target of 70% by moving to the collections Blueprint and three weekly refuse collections. However, our current recycling performance and the quality of our recycling is better than that assumed in the modelling (currently projected at 69% for 2018/19). It is therefore recommended that the frequency of residual waste collections is reviewed in light of the actual and projected recycling performance following implementation of the Working Group's recommendations. The Working Group also note that there would be a lead-in time to any changes in collection system and that the timing of the review has regard to that and the requirement to meet the statutory recycling target of 70% in 2024/2025.

4.2.14 As part of the review, the Working Group have visited a number of neighbouring Authorities who operate a Blueprint source separated system. To this end the Waste Review Group went to Blaenau Gwent, Newport, and Merthyr Tydfil Councils to observe their collection services. What was evident to the group was that source separated collection systems are not as efficient or effective as Caerphilly's collection regime. Additionally, many of the Local Authorities changing to a blueprint collection system experienced public resistance and an initial drop in performance following the transition. It is worth noting that there are no local authorities in Wales that have changed from a co-mingled bin collection to a fully blueprint compliant system so the affects on this significant transition on public behaviour are not known and could be significant. The working group were also made aware that one of the Authorities that changed to a blueprint compliant recycling system was subsequently fined for non achievement of targets.

4.2.15 The compartmentalised vehicles used by these Authorities have limited capacity for storage and it is common practice that such vehicles have to return to a tipping depot to offload at least two to three times a day. If Caerphilly CBC operated such a segregated system, particularly given the size of the County Borough in comparison to most of our neighbouring Councils, it would mean even more return trips to offload.

These capacity issues at the Blueprint Councils result in a collection service whereby only 500-700 properties are serviced per day. In comparison Caerphilly CBC collection vehicles are averaging between 1100 and 1500 properties a day. By extension a change to such a source separated system would require at least double the fleet of vehicles and also longer working days for operatives. In addition the on-street process of collection using compartmentalised vehicles is slower which can lead to increased traffic flow disruption.

4.2.16 At the final meeting the Group received a presentation from Rhondda Cynon Taff County Borough Council (RCT), which has a similar demographic profile to Caerphilly and they collect their recyclable materials in a co-mingled (mixed) manner too. RCT is developing a sort facility only 5 miles from our northern boundary at Llwydcoed. The facility they are building for the summer of 2019 will be able to mechanically sort a whole range of recyclable materials using the latest equipment as currently used at our current reprocessing outlet in Warwickshire. RCT anticipate that they will have capacity there to deal with other Authority's recyclate. Hence there may be scope for Caerphilly to explore a partnership with RCT especially given that materials are collected in a similar way. Initial discussions have taken place to explore opportunities to develop a collaborative partnership arrangement which have been positive.

4.2.17 The two Authorities constitute about one sixth the population of Wales and thus by working together it could help both organisations make real sustainable gains and create a reliable waste solution for others to follow. It is also worth noting that Cardiff Council also operate a mixed recycling collection. The three Authorities represent a third of the population of Wales; all of whom deal with mixed (co-mingled) recycling loads.

4.2.18 Welsh Government and UK Government are expected to issue the following consultations by early February 2019:

- Deposit Return Scheme – for single use drinks containers (whether plastic, glass or metal);
- Extended Producer Responsibility – proposal to extend the responsibility of companies to meet the full net cost (including litter) of products that they make or sell;
- Plastics Tax – proposal to introduce a plastics tax on all packaging that does not include at least 30 per cent recycled material;

It is understood that subject to the outcome of the consultations all of the above proposals might be introduced by 2023. Each is likely to have an impact on the quantity and nature of household recycling put out for collection by Local Authorities.

4.3 Waste Transfer Station

4.3.1 Caerphilly currently operates a transfer station at Full Moon, near Cross Keys. Whilst benefitting from good connectivity the existing footprint of the site is deemed to be of insufficient capacity to deal with the future management of residual wastes and dry recyclable material. Securing a site suitable for dealing with the requirements of modern society is an onerous task. The Authority has endeavoured for many years to develop a facility that meets the sustainable needs of the public and the requirements of the statutory regulatory agencies.

4.3.2 WRAP and their consultants have looked at sites to develop (see Appendix 6). Options have included the expansion of Full Moon, the development of Trehir and/or the purchase of a new site. Full Moon has limited developability and there are a lot of obstacles (financial and technical) that limit the potential development of Trehir. There are sites on Industrial Estates that could be acquired; however, previous experiences of high profile projects at Takiron, Bedwas and St, Ives Dyffryn Industrial Estate have proved fruitless despite the best of endeavours and significant amounts of work and money invested by the Authority.

4.3.3 The new Materials Recycling Facility (MRF) being developed by RCT could provide a robust solution for the disposal and treatment of Caerphilly Council's recyclable materials as mentioned above. Their site at Llwydcoed just off the A465 benefits from established planning status as well as the attainment of appropriate environmental permits. However, it is also important to note that the Authority's Waste Transfer Station at Full Moon is likely to require investment in the medium term.

4.4. Household Waste Recycling Centres

4.4.1 All local authorities in Wales have a duty to provide "places" for residents to deposit household waste in its area. These "places" (Household Waste Recycling Centres) (HWRCs)), must be available for deposit of household waste free of charge, although not all wastes have to be accepted at all sites. Other wastes can be accepted (household waste from non-residents or non-householders, or non-household wastes (commercial)) and it is permitted for charges to be levied for the disposal of these wastes.

4.4.2 CCBC currently has six HWRCs:

- Aberbargoed
- Full Moon near Cross Keys/Wattsville
- Penallta, near Ystrad Mynach
- Penmaen, near Blackwood
- Trehir, near Llanbradach
- Rhymney

The Full Moon site also serves as the Council's Waste Transfer Station for the onward transfer of materials for recycling, treatment or disposal.

4.4.3 A detailed breakdown of the existing service is included below in Figure 5.

Figure 5

CCBC Current HWRC Provision & Costs

Site	2017/18 Throughput (tonnes)	Proportion of Network Tonnage 17/18	Costs per Site	Narrative
Penmaen	5662	19.8%	£540,877.72	– This site is inadequate in terms of size for level of use, has limited room for service development, can present H&S risks at peak times and is subject to neighbour complaint. – Potential use by highways and what it saves them. – Not suitable as a site to implement our suggested policy change proposals.
Rhymney	2551	8.9%	£290,143.45	– This site has the lowest throughput of waste and is the closest site for only 6% of the households in the County Borough. – It is likely that a significant proportion of waste is from residents residing outside of the County Borough. – The site is very small and there is little room for cars to pass each other which leads to queues forming quickly in busy periods. – Not suitable as a site to implement our suggested policy change proposals.
Full Moon	4892	17.1%	£479,669.32	– The HWRC shares the site with the Waste Transfer station and the access to each site is via the same entrance/exit. – This needs to be considered if a review of HWRC opening times is to be undertaken. – It is likely that a significant proportion of waste is from residents living outside the County Borough.
Aberbargoed	4882	17.11%	£510,462.72	– This site is currently leased at an annual cost of £31.000 per annum until 2030. There is no break clause in the lease and it is possible that the landlord could request that the site is returned to its original state at the end of use.

Trehir	5885	20.6%	£573,584.55	– Access to the site relies on the Bailey Bridge which needs significant maintenance, (approximately £10,000 per annum which is likely to increase as the bridge ages). Bridge replacement expected to be in the region of £1-£1.5 million. The site is very busy with the highway throughput.
Penallta	4757	16.6%	£451,273.22	– This site is a spacious split level site which has the opportunity of providing additional capacity in its current design. The spatial analysis conducted by resources futures (appendix 7) indicated that this site received a disproportionately high quantity of waste given the number of CCBC residents living in its vicinity. It is possible that cross border usage from residents in neighbouring Authorities may be a significant factor. This will be monitored through the introduction of the proof of residency checks.

4.4.4 In 2017/18, the network handled 28,629 tonnes of waste of which nearly 26,000 tonnes (89.75%) was recycled. Trehir and Penmaen handled the largest throughputs (20.6% and 19.8% respectively) with Rhymney accounting for only 8.9% of the total network throughput. Penallta accounts for 16.6% of the network, whilst Aberbargoed and Full Moon account for 17.1% each.

4.4.5 The legislation does not mention the number of facilities needed for an authority to fulfil its statutory duty. An authority may decide that one facility satisfies that duty, whereas other authorities may consider that they require more sites. WRAP has issued guidance to help local authorities determine what is reasonable and includes the following guidelines (see Figure 6), with current CCBC provision identified alongside:

FIGURE 6

WRAP Guidelines	CCBC HWRC provision
Maximum catchment for a large proportion of the population of 3-5 miles (7 in very rural areas)	Catchment area of 2.4 miles
Maximum driving times for the great majority of residents in good traffic conditions of twenty minutes (30 in very rural areas)	All residents can reach a site within a 15-minute drive (90% can reach a site within 10 minutes) in normal traffic
Maximum number of inhabitants per HWRC of 120,000	CCBC population 180,000, therefore there is one site per 30,000 inhabitants
Maximum number of households per HWRC of 50,000	Number of households is currently 76,950 therefore there is one site for 12,825 households

4.4.6 Most neighbouring Authorities have rationalised the number of Household Waste Recycling Centres (see Figure 7):

FIGURE 7

Local Authority	Number of HWRCs	Population	Population per HWRC
Cardiff	2	363,000	181,500
Rhondda Cynon Taff	7	240,000	34,286
Newport	1	150,000	150,000
Blaenau Gwent	1	69,500	69,500
Merthyr Tydfil	2	60,000	30,000
Torfaen	1	93,000	93,000
Caerphilly	6	182,000	30,333
Vale of Glamorgan	2	128,000	64,000

4.4.7 The WRAP Collaborative Change Programme (CCP) provided support to Caerphilly Council in 2016 and 2017 in a review of its Waste Transfer Station (WTS) and HWRC operations (see Appendix 7). The overall aim of the support was to identify options for making the operations more efficient, whilst maintaining a high recycling rate and providing a good quality service to residents.

4.4.8 Resource Futures Ltd were commissioned to undertake a review to assess options for reducing the number of HWRCs by closing some sites, redeveloping others and potentially developing new HWRCs. The study comprised:

- **Spatial analysis** of existing and potential new HWRCs to identify the 'ideal' location of HWRCs in the borough based on population distribution.
- **Assessment of waste flows** to consider the impacts of changes in site provision on site throughput.
- **Identifying and assessing potential new sites** in terms of civil works and costs associated with developing new sites.
- **Assessment of development costs** for existing and potential new sites. This included assessing the need for civil works and costs associated with developing new sites and for enhancing existing sites so that they are able to accept greater quantities of waste.
- **Assessment of operational costs** to consider the costs associated with HWRC operations for different scenarios and consider potential costs savings that might be achieved by operating a smaller network of HWRCs

4.4.9 A detailed review of operations at each of the HWRCs was also undertaken (Appendix 7 & Appendix 8). The studies identified the need to improve the operational and financial efficiency of the network, potentially through relocating and reducing the number of HWRCs. HWRCs are intended for residents who drive in cars and as such they are 'travel to' facilities. On request, the Authority provides special collections for those without transport. They are 'drive to' sites and travel times and distance thresholds are well within recommended industry guidelines.

4.4.10 The review considered a number of scenarios based on a reduction to 3 HWRCs and concluded that there is not an ideal configuration of sites that will easily allow CCBC to reduce its HWRC network from six sites to three. Scenarios that avoid the need to acquire a new site are considered to be most preferable. On the basis that the Authority would require additional waste transfer station capacity to accommodate changes to the recycling collection system it was also recommended that to accommodate this the HWRC at Full Moon would need to close. Closure would impact upon the remaining sites, in terms of increased throughput and visitor numbers. However, as changes to the recycling collection system are not proposed at this time then Full Moon can be retained as an HWRC to serve the South East of the County Borough. However, it is likely that the existing site may require investment to extend its life and future proof against any legislative or operational requirements.

4.4.11 Whilst three sites would be sufficient to meet CCBC's statutory duty as well as meet WRAP guidelines, it would be a significant reduction in provision compared to the current six sites. Therefore a more generous provision of four sites is proposed at this stage with the retention of Full Moon pending any decision on changes to the collection system which would require additional waste transfer station capacity.

4.4.12 Penmaen HWRC is proposed for closure because it is a small site with very limited opportunities for operational improvements and traffic congestion is an ongoing problem. Residential properties flank the site on its eastern edge and complaints are regularly received. It is also geographically located close to two other HWRC sites (Aberbargoed and Penallta).The site at Aberbargoed is leased with an annual cost of £31,000 until 2030. There is no break clause within the lease. If the Penmaen HWRC site were to close it would be taken over as an operational depot by Highways thereby avoiding £10,000 per year costs that the service is due to incur from 2020 onwards for the leasing of car parking spaces from the adjacent Stagecoach depot. Highways are currently paying £3750 for the leasing of these spaces but Stagecoach have indicated that from 2020 onwards that they would increase the lease cost to £10,000 per annum. Rhymney HWRC is also proposed for closure because it is the least used; it is the closest site for only 6% of households in the county borough and receives the lowest tonnage.

4.4.13 If the sites at Penmaen and Rhymney were to close there would be an annual operational saving of circa £98,000 per annum, plus a further financial benefit if Highways were able to utilise the land at Penmaen as outlined in 4.4.12. The full operational costs outlined in figure 3 would not be realised as savings as it is likely that the waste currently received at these sites would transfer to other sites in the network and would therefore still attract the same treatment costs. Additionally, the staff from the sites would be redeployed at other sites to implement any future policy changes to improve performance e.g. proof of residency checks, black bag sorting and additional public engagement.

4.4.14 Due to the operational limitations at Aberbargoed and Penallta, it will be challenging to provide equitable provision of HWRC services, so consideration should be given to an approach based on the development of a flagship 'super site' at Trehir. This would require that the current facility at Trehir be relocated, ideally to the west bank of the river rather than simply redeveloped in its present isolated location (subject to planning). Additionally, the Bailey Bridge is nearing the end of life. A new site on the West bank would be a practicable and deliverable solution as this would avoid the need for the construction of a replacement bridge and reduce the maintenance liabilities that are the access roads to Trehir and the current site. It would also reduce/control the incidents of enviro-crime and vandalism on this presently extremely vulnerable and remote site. A new site here would benefit from good surveillance and better security but moreover provide the opportunity for our residents to recycle a wider range of materials more effectively and efficiently.

4.4.15 An operational review of existing HWRCs was also undertaken and made a number of policy and site specific recommendations. One of these related to the introduction of a proof of residency requirement to address volumes of waste received due to cross border usage. On 12th December 2018 Cabinet agreed to introduce a proof of residency requirement at the Authority's HWRCs with effect from 1st April 2019.

4.4.16 CCBC's HWRCs achieved a recycling rate of 88% in 2016/17, of which just over half was recycled on site and the remainder was recycled through a 'secondary sort' of general waste by Bryn Recycling. The HWRCs are high performing but there is a reliance on the secondary sort, which has a high cost per tonne. A 'front-end sort' trial and composition analysis was undertaken and the findings indicate that if onsite sorting were successfully increased CCBC could see significant operational savings. However, whilst there would be a financial saving by removing the secondary sort element of processing there could be a significant impact on performance as the trials on site that were undertaken did not achieve the same levels of recycling currently being achieved through the secondary sort. Alternatively, if we improved on-site recycling and reduced the secondary sort requirement this could have a significant impact on the gate fee as it is likely that this would increase to reflect the change in composition.

4.4.17 Improving onsite segregation should also help to 'future proof' CCBC's HWRC recycling performance, should existing outlets for materials change unexpectedly. It is therefore recommended that a ban on 'black bag' waste at HWRCs is introduced. Clearly, any such policy changes would need to be accompanied by a communications campaign that communicates the change positively to residents and illustrates the different alternatives available (i.e. kerbside recycling, residual waste kerbside collections and bring sites). In the longer term, site redevelopment and an increased focus on onsite segregation could allow recycling of other items and materials including mattresses, carpet and dense plastic, as outlets become available. Due to the lack of re-development opportunities at both Rhymney and Penmaen HWRCs it would not be possible to implement black bag sorting at these sites.

5. WELL-BEING OF FUTURE GENERATIONS

5.1 The delivery of sustainable waste management services contributes to many of the well being goals but in particular:

A resilient Wales
A healthier Wales
A more equal Wales
A Wales of cohesive communities
A globally responsible Wales

5.2 The delivery of a sustainable waste management service to the public fits in with the aims of the Well Being of Future Generations Act in particular the 5 ways of working including planning, acting for the long term, integration, involvement, collaboration and prevention.

6. EQUALITIES IMPLICATIONS

6.1 An EIA screening has been completed in accordance with the Council's Strategic Equality Plan and supplementary guidance. No potential for unlawful discrimination and/or low level or minor negative impact has been identified; therefore a full EIA has not been carried out.

7. FINANCIAL IMPLICATIONS

7.1 The revenue and capital costs for each option along with any key assumptions are summarised in Figure 8 below (please note that the costs were calculated in 2017 and are likely to have increased).

FIGURE 8

OPTION SCENARIOS	MODELLED ANNUAL REVENUE COSTS (includes collection and treatment)	REVENUE COSTS OF CHANGE / PHASED CHANGE	CAPITAL COSTS OF CHANGE	ASSUMPTIONS/CAVEATS/RISKS
BASELINE i.e. the service operated by CCBC at the time of the initial study circa 2016				WRAP did not take the original baseline into the scenario modelling as the changes to food and garden were already well embedded in the current service.
ENHANCED BASELINE i.e The Existing CCBC range of collection services and recycling/disposal sites	£10,662,000		• WTS Infrastructure - £500,000 • Development of new "super" HWRC on western side of Trehir £1m-£1.5m	Current Waste Transfer Station (WTS) may require investment to extend life and future proof. Our existing services are enabling the Authority to attain (and exceed) the government recycling targets. However, there also financial risks associated with our current collection methods largely due to: - the short term contract we have in place - the volatility of markets for recyclable materials -the importance and reliance on the public to present high quality materials for collection -the current system does not fit in with the blueprint template and thus will not attract Welsh Government Capital funding
BLUEPRINT (OPTION 1) i.e Source separated recycling collection services				Blueprint with Driver and one collection operative per vehicle was not taken through to the scenario modelling.

BLUEPRINT (OPTION 1 + EXTRA LOADER) No 3 weekly collections Without Bryn Quarry post sort	£9,014,000	£500,000 * * estimated for additional one off revenue costs to support the initial rollout of a new recycling service. £100k additional costs if 3 weekly collections are introduced at a later stage.	Vehicles – £3,120,000 Containers – £780,000 HWRCs - £3,350,000 WTS - £2,210,000 _____________ Total £9,460,000	This model assumes that the participation rates will stay the same. However, If it does decrease this could put us at risk of fines as experienced by some practicing “blueprint” Councils. Funding from Welsh Government is fully committed up until 2021 and there is no indication as to what if any capital funding would be available after this date but based on previous support it could be circa £6.75million The market for recyclable materials is notoriously volatile and subject to regular and extreme fluctuations. This means a regular income would not be guaranteed (as highlighted in 4.2.11 in the report). The transfer station/HWRC costs outlined could prove to be too low.
MULTISTREAM (OPTION 5) No 3 weekly collections Without Bryn Quarry post sort	£9,243,000	£500,000 * estimated for additional revenue costs to support the initial rollout of a new recycling service. £100k additional costs if 3 weekly collections are introduced at a later stage.	Vehicles – £2,280,000 Containers – £640,00 HWRCs - £3,350,000 WTS - £2,120,000 _____________ Total £8,390,000	Infrastructure – the cost of a new waste transfer station and the rationalising of the HWRCs is assumed the same for both change options. Lower vehicle costs as re-allocation of 9 existing twin-pack vehicles. WTS - lower as less Forklifts required. The transfer costs are too low and it is likely that these will be significantly higher (probably double the said amount identified in 2017) As this system is not fully blueprint compliant it is unlikely to attract Welsh Government funding. This model assumes that the participation rates will stay the same. However, If it does decrease this could put us at risk of non achievement of targets and associated fines. The market for recyclable materials is notoriously volatile and subject to regular and extreme fluctuations. This means a regular income would not be guaranteed (as highlighted in 4.2.11 in the report).

7.2 Closing 2 HWRC sites will lead to savings year on year as there are annual licencing permits and discharge consents to pay. There is less maintenance, repair and servicing expenses and additional infrastructure costs. Management, supervision and security requirements would also be reduced. The potential HWRC savings are outlined in paragraph 4.4.13, above.

7.3 Welsh Government has allocated capital funding to the Collaborative Change Programme which has been increased to £12 million a year for the next three years (to 2021). We are advised that the budget is fully committed over the next 3 years as Welsh Government is supporting a number of Local Authorities moving towards the Collections Blueprint. This funding is being used to meet capital cost associated with change such as vehicles, waste/recycling containers, waste transfer and household waste recycling infrastructure.

7.4 It is understood that in supporting Local Authorities through the Collaborative Change Programme Welsh Government are funding approximately 75% of capital costs. As an indication, the modelled capital costs of scenarios 4 and 5 (both full Collections Blueprint) in the cost benefit analysis at Appendix 3 are approximately £9 million pounds at 2017 figures. There is no indication as to what, if any, capital funding would be available beyond 2021, but at current levels of support the Authority might expect approximately £6.75 million of capital funding from Welsh Government to move to the Collections Blueprint (option 1).

8. PERSONNEL IMPLICATIONS

8.1 Any new collection system could affect the configuration of the service however it has been recommended that crews of three per vehicle should be retained. However, given the established productivity rates of compartmentalised vehicles and capacity factors it is envisaged that the fleet of collection vehicles will have to more than double in size. These will require additional operatives to utilise them.

8.2 The closure of 2 HWRC sites will not result in loss of staff, as these will be supplemented into the work rota for the remaining network of sites to implement any future policy changes including proof of residency checks and further interventions to improve recycling performance.

9. CONSULTATIONS

9.1 The report has been sent to the consultees listed below and all consultation responses have been incorporated in the report.

10. CONCLUSIONS

10.1 As the Scrutiny Committee can see from this working group report, it is evident that the Authority’s waste collection systems are performing well and with some policy interventions relating to managing contamination there is every likelihood that the 2024/25 70% Welsh Government target will be achieved without significant collection changes that will affect every resident.

10.2 A collaborative arrangement with RCT council relating to MRF sorting will also reduce the Authority’s exposure to contractual risks and officers will continue to work on this model if the committee are content prior to presenting a report to Cabinet for final approval.

10.3 It is however, important for the committee to understand that no collection system is without risk. In particular, if there were any changes to the current waste and recycling collection service or infrastructure there would be significant financial implications. For example, a change to the collection regime might require the procurement of:

- New bespoke vehicles
- The purchase of new container systems
- The development of transfer/stage and treatment facilities.

There are further financial risks associated with the achievement of income due to the volatility of markets as highlighted in 4.2.11. Additionally the modelling assumed that there would be no change in yield or public behaviour. If this assumption, was incorrect and public participation and yield decreased as a result of service change there is a significant risk that recycling targets may not be reached and financial penalties could be imposed.

10.4 Similarly, retaining our current collection system is not risk free. While the collaboration with RCT will reduce contractual risks there are still risks relating to the volatility of recycling markets (although that risk is also relevant to a changed system, albeit to a lesser degree) and the reliance on the public to present clean, uncontaminated materials for collection. Furthermore our current system does not fully satisfy the collection blueprint and will not therefore attract Welsh Government Capital funding.

10.5 In terms of HWRC provision the Authority currently provides a level of service way above the Welsh Government/WRAP guideline level. The rationalisation suggested by the Working Group therefore takes account of this fact and suggests the closure of 2 sites based on key data and the future requirements of the service. Many Councils have invested in a “super” HWRC to suit future needs and maximise the sale of goods for re-use which has social as well as waste reduction benefits. The working group has therefore suggested that the funding for such a facility is explored.

10.6 The Authority’s waste management infrastructure is ageing (and in most cases is 25+ years old). This includes the Waste Transfer Station and HWRC network and it is therefore important that members of the committee note that there are likely to be investment requirements over the medium term even with a no collection change strategy.

10.7 The Waste Review Group has focussed their efforts on delivering realistic achievable outcomes in a practicable manner that meets the needs and aspirations of our residents and has summarised their views as follows:-

- That the current kerbside collection system for co-mingled (mixed) materials be retained (subject to continuous satisfactory performance attainment and market sustainability)
- Officers develop education and enforcement solutions in order to improve the quality of materials and increase participation in recycling services.
- That the frequency of residual waste collections is reviewed in the light of actual and projected recycling performance following implementation of the Working Group’s recommendations noting that there would be a lead-in time to any changes and having regard to the requirement to meet the statutory recycling target of 70% in 2024/2025.
- To review and update Waste Transfer arrangements in the light of any changes to collection systems.
- Officers to explore the feasibility of developing a working arrangement to take advantage of RCT County Borough Council’s ‘state of the art’ recyclable treatment facility (MRF).
- To rationalise the network of HWRC sites by reducing from 6 to 4 through the closure of Penmaen and Rhymney HWRCs.
- To develop resource recovery initiatives including a ban on black bags and the provision of sorting and re-use areas at the HWRC sites.
- To explore the development (subject to planning) and funding of a ‘super site’ HWRC at Trehir on the Western (road) side of the existing Bailey bridge.

11. RECOMMENDATIONS

11.1 The Scrutiny Committee is asked to consider the views of the waste working group and agree that officers formulate future detailed reports for consideration by Cabinet as appropriate.

12. REASONS FOR THE RECOMMENDATIONS

12.1 To update the Scrutiny Committee on the views of the waste review group.

13. STATUTORY POWER

13.1 Local Government Act 2000 and Environmental Protection Act 1990.

Author: Hayley Jones, Waste Strategy and Operations Manager
Ext 3153, joneshm1@caerphilly.gov.uk

Consultees: Rhodri Lloyd, Principal Waste Management Officer
Councillor Nigel George, Cabinet Member for Neighbourhood Services
Councillor John Bevan, Chair Waste Review Group
Councillor Denver Preece, Vice Chair Waste Review Group
Mark S. Williams, Interim Corporate Director of Communities
Rob Hartshorn, Head of Public Protection, Community & Leisure Services
Rob Tranter, Head of Legal Services and Monitoring Officer
Mike Eedy, Finance Manager
Anwen Cullinane, Senior Policy Officer
Shaun Watkins, HR Manager

Appendices:
Appendix 1: The Proceedings Of The Waste Review Group (May To December 2018) (Wrap)
Appendix 2: Waste Reused, Recycled Or Composted (All Wales League Table)
Appendix 3: The All Wales Local Authority Information On Types Of Collection Service (November 2018)
Appendix 4: Cost Benefit Analysis Report (Wrap Nov 2018)
Appendix 5: Caerphilly Kat (Collections) Modelling Results (December 2015)
Appendix 6: Waste Transfer Station Review (April 2016)
Appendix 7: A Review Of CCBC Waste Transfer Stations And Household Waste Recycling Centre (July 2017)
Appendix 8: HWRC Blank Sheet Review For Caerphilly CBC (July 2017)

APPENDIX 1

WASTE REVIEW WORKING GROUP

ACTIONS OF THE MEETINGS AND SITE VISITS HELD AT PENALLTA HOUSE

Membership: Cllr J. Bevan (Chair), Cllr P. Bevan, Cllr D.T. Davies, Cllr M. Davies (Left Group 15.05.18), Cllr D. Hardacre, Cllr A. Hussey, Cllr S. Kent, Cllr B. Miles, Cllr. L. Phipps, Cllr. D. Preece and Cllr. T. Williams.

Date	Members	Actions
14.05.18 1pm *Unison Meeting Room*	Cllr J. Bevan Cllr P. Bevan Cllr D.T. Davies Cllr M. Davies Cllr D. Hardacre Cllr A. Hussey Cllr S. Kent Cllr B. Miles Cllr. L. Phipps Cllr. D. Preece Cllr. T. Williams Officers: H. Jones R. Lloyd R. Hartshorn M.S. Williams N. Peake (WRAP Cymru)	The working group nominated Cllr J. Bevan as Chair. The Working Group were provided with a detailed presentation on the current provision, along with a presentation from WRAP Cymru. Members asked to receive a list of the future dates, along with copies of the presentations. Members discussed the presentations and information provided, with reference to savings options, future proposals for waste transfer sites as well as vehicles and it was agreed that more detailed discussions would take place at future meetings, following the site visits.
24.05.18 10am *Site Visits*	Cllr J. Bevan Cllr P. Bevan Cllr D.T. Davies Cllr D. Hardacre Cllr A. Hussey Cllr S. Kent Cllr B. Miles Cllr. L. Phipps Cllr. D. Preece Cllr. T. Williams	The working group attended sites visits at the below Household Waste Recycling Centres (HWRC)/ Civic Amenity Site (CA): • Penallta HWRC/ CA Site • Aberbargoed HWRC/CA Site • Rhymney HWRC/ CA Site • Penmaen HWRC/ CA Site • Crosskeys HWRC/ CA Site Transfer Station • Trehir HWRC/ CA Site
14.06.18 10am *Sirhowy Room, Penallta House*	Cllr J. Bevan Cllr P. Bevan Cllr D.T. Davies Cllr A. Hussey Cllr B. Miles Cllr. T. Williams	The Working Group were provided with a presentation which summarised the technical support and review undertaken on the HWRC network in Caerphilly CBC and some options for consideration by the Working Group.

	Officers: R. Hartshorn H. Jones R. Lloyd N. Peake - WRAP E. Clarke – Resource Futures	Members raised concerns around proposals to close sites and the implications on the number of cases of fly tipping, as well as the implications on the waste collections. Members raised concerns for the number of residents living outside of the borough using the sites and the options to remedy this. The Working Group were provided with assurances around fly tipping enforcement, including the new legislation which has been implemented by the Welsh Government. Members requested details around the costs associated with refuse collection, as well as the costs associated with clearance of fly tipping and general litter/ street cleansing. Discussions took place around Super sites and Members asked which, if any sites could be utilised in this way. It was noted that there is space at Trehir and at Full Moon, should Members feel this would be an option. Members sought information on the costs and impacts identified by other Authorities. Whilst it was suggested that this information could be obtained on the site visits, it was requested that the information be sourced prior to the Site Visits.
09.07.18	Denver Preece John Bevan Phil Bevan Steve Kent Scott Jones Rob Hartshorn Steve Fletcher Rhodri Lloyd	Cardiff have gone from operating 5 sites to two super sites. The site at Lamby Way was of a grand scale and had built cantilever shelter structures to protect the quality of the material plus allowing the site users to have a more pleasant experience in adverse weather. The capacity to receive a wide range of materials was considerable. In addition under the above ground structure there was plenty of storage space for associated service activities. It was noted that Cardiff had implemented a check point at the site entrance to ensure that Cardiff Council residents only could be allowed to tip off. Residents are now required to show their driving licence. This policy had deflected up to 20% of traffic from residents outside the City boundaries and in turn saved the Council 400, 000 of pounds of disposal costs in the first year.

17.07.18 Site Visit to RCT	Tudor Davies Denver Preece Brenda Miles David Hardacre Rob Hartshorn Scott Jones Malcolm Smith Rhodri Lloyd	The group visited the HWRC /civic amenity site at Llwydcoed operated by Amgen. The system raised many concerns in terms of traffic management and site safety. The skips were accessed via side doors at the rear of the container.
03.09.18 Site Visit to Newport Wastesavers	Tudor Davies Adrian Hussey Nigel George	The group visited the treatment facility where Newport's recycling materials are bulked up. The site included meeting facilities and an educational room. Newport's collection system involved boxes and hessian sacks for the various recyclables.
01.10.18 Waste Collections Presentation by WRAP	Denver Preece Tudor Davies Tom Williams David Hardacre Adrian Hussey Rob Hartshorn Hayley Jones Mark Miller Hayley Jones Rhodri Lloyd	Welsh Government consultants WRAP Cymru (Nicola Peake and Iwan Pierce) provided a presentation on the collection system options. In relation to the Blue print system concern was expressed about productivity rates and side loading safety matters. In the event of a change of collection system Caerphilly staff anticipate a participation drop but the WRAP calculation does not fact this into the finance calculations. The blue print collection vehicles are renowned for breakdowns. However, there are some replacements available across the region. Average emptyings per day for blue print collections range between 600 to 750 properties per day. Caerphilly CBC vehicles are presently emptying over a 1000 properties per day. As part of the Conway CBC service 4 weekly refuse collection a nappy and hygiene collection service was required but compromised any cost savings. Such specialist collections in other Councils also have proven to be resource intensive and financially burdensome.
16.10.18 Silent Valley Blaenau Gwent	Phil Bevan, Tom Williams, Tudor Davies, Adrian Hussey,	Members received a presentation from a delegation of officers and members from BGCBC and Silent Valley. They had implemented the blue print but have been fined for failing to reach the recycling targets. A tour of the treatment facilities and their trolley box collection system was undertaken. It was noted that BGCBC collected 6,000 tonnes of dry recyclate (Caerphilly CBC's collects 18, 000 tonnes). The compartmentalised vehicles were looked at including the vehicle servicing the back lanes. We noted the issue of multiple journeys to and from the tipping hall because of insufficient capacity on the vehicle for certain recycling materials.

22.10.18 Site Visit to Merthyr CBC Site visit to Bryn Quarry, Gelligaer	Brenda Miles Nigel George Hayley Jones Tudor Davies Adrian Hussey Phil Bevan Scott Jones Malcolm Smith Rhodri Lloyd Mark Miller	The group went out on the street with the collection team. This visit was an eye opener for all. The 1 driver : 1 loader system appeared to be time consuming and raised concerns about having a vehicle running unattended. Merthyr confirmed sickness levels were extremely high and their workforce was purely agency based. The group had a complete tour of the complex including: The Anaerobic Digestion plant (where our food waste is converted into electricity and other by products), The Material Reclamation facility (where our HWRC skip waste is sorted and bulked for ongoing reprocessing elsewhere). The compost area where our garden waste is converted into valuable soil conditioner.
22.11.18 Training Room, Tir-Y-Berth Depot	Cllr N. George Cllr B. Miles Cllr D.T. Davies Cllr A. Hussey Cllr T. Williams Cllr P.J. Bevan Officers: R. Hartshorn H. Jones R. Lloyd M. Eedy R. Shears Also in attendance: N. Peake – WRAP Cymru	The Working Group discussed the activities undertaken over the previous months, such as Site Visits to HWRC's, Waste Transfer sites, Recycling Plants and other Local Authorities, in order to provide a scope for the current process in place and possible best practice sharing. The Working Group were provided with a presentation, which provided the Group with project history and context, Scope of the Review, Cost Benefit Analysis scenarios for each of the review options, Summary of service costs, recycling performance, Implementation timeline assumptions, summary of savings and cost of change and updated issues for consideration. Officers from the Finance Team provided the Group with details on current budget and pressures. The Group discussed the options outlined within the report, and expressed concerns for the cost of change and sought further details on the benefits. It was noted that some other Authorities in Wales have moved over to the Blueprint scenario, and have found that the quality of materials have improved, however, there was some decrease in the amount of materials and participation from residents. Members expressed concerns that their constituents are happy with the current system and felt that it may be too big a change for people, who are not coming from using boxes. Discussions took place around the closure of a HWRC and the possible impacts on fly tipping. Members expressed concerns for the closure of sites and the implications for increased fly tipping.

		The Group discussed the possibility of introducing proof of residency at sites; Officers explained that a report is to be presented to Cabinet in the coming weeks for its consideration.
27.11.18 Sirhowy Room, Penallta House	Cllr P. Bevan Cllr D.T. Davies Cllr N. George Cllr D. Hardacre Cllr A. Hussey Cllr S. Kent Cllr B. Miles Cllr D. Preece Cllr T. Williams Officers: M.S. Williams R. Hartshorn H. Jones R. Lloyd Also in attendance: N. Wheeler - RCT	The Working Group were provided with a presentation about Rhondda Cynon Taff CBC's Waste Service Provision. It was noted that RCT are currently conducting a co-mingled collection, and intend to remain doing so. There are separate food, green, clinical and Nappy waste weekly collections, with a fortnightly residual waste collection. Collection of bulky items service is also available and there are 7 Community Recycling Centres. RCT waste collections are all in-house and conducted by their own Waste Company Amgen, which also runs the Authority's MRF. Food and residual wastes are disposed of with external providers and Amgen are currently working on a Mattress Recycling initiative, with the aim to recycle up to 80% of the materials. In addition, work is due to be completed on their Interactive Education Centre, which can be accessed by Schools to encourage and educate about the importance of recycling. It was noted that there is a policy in place at HWRC's in which Black bags are not accepted and strong enforcement systems are in place. RCT have used a number of hard hitting campaigns and media presence in order to encourage participation and particularly hard hitting messages to educate and discourage people walking dogs/ dog fouling on sports pitches. RCT have introduced a Re-Use shop, which sells items brought to the HWRC's and are developing a new MRF, which is due to be completed in July 2019. The Working Group discussed the presentation at length and sought further information around Enforcement and Legislative implications. It was noted that there is a current Traffic Light scheme being trialled within Wales, in which Red, Amber, Green letters are sent to residents, those who are not recycling receive Red, Amber if there could be improvement and Green letters for those participating well. Members were keen to learn how this trial goes and the possibility of implementing within Caerphilly to encourage participation. Discussions took place around the Mattress Recycling and it was noted that this is something that is currently being trialled, in an attempt to recycle more of the materials from a mattress.

		The Group discussed the new MRF which will be operational in July 2019 and provides sophisticated sorting of materials. It was noted that the implementation of the plant will reduce overall costs in staffing and there is additional capacity for which RCT are looking for partner Authorities. Members were keen to learn about the maintenance costs of the machinery as well as the length of time it would take to payback costs. Members were also invited to attend the site, when it is operational. Whilst discussion Food Waste collections, it was noted that the food waste bags are supplied to RCT residents by the Local Authority. Members were not keen to replicate this initiative, as the percentage of participation at RCT was the same as at Caerphilly and would incur significant costs to the Authority. The Working Group were presented with a Summary of all of the information and presentations they have received during the course of the Working Group business and were asked whether there were any recommendations, which could feed into the Scrutiny Report, due to be presented in February. Following lengthy discussions around options, budgetary implications, participation levels, risk and public perception, the following recommendations were agreed by the Working Group, on the agreement that Officers present the final report to the Working Group, prior to its consideration by Scrutiny. • Members agreed to recommend that the current co-mingling kerbside recycling scheme be retained; • However, Officers to look into Education/ Enforcement options in order to drive the quality of materials and participation in recycling; • Officers to look at the possibility of partnering with RCT following the completion of the MRF, providing details of gate costs etc; • Members agreed to consider the implementation of a 3 weekly refuse collection system, following review of performance; • Members were keen to introduce a Black Bag bans at HWRC's, with sorting facilities on site; • Officers to provide further details on the 4 HWRC model, as per MTFP proposals; • Waste Transfer arrangements to be provided from an Officer perspective, with consideration for MTFP proposals.

APPENDIX 2

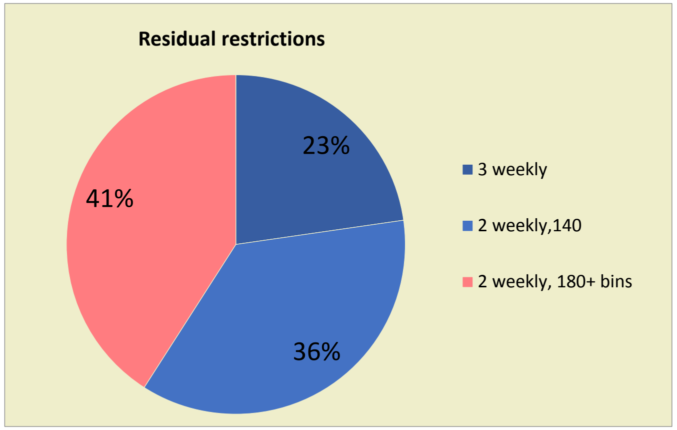
WMT010 & 009b - Waste Reused, Recycled or Composted

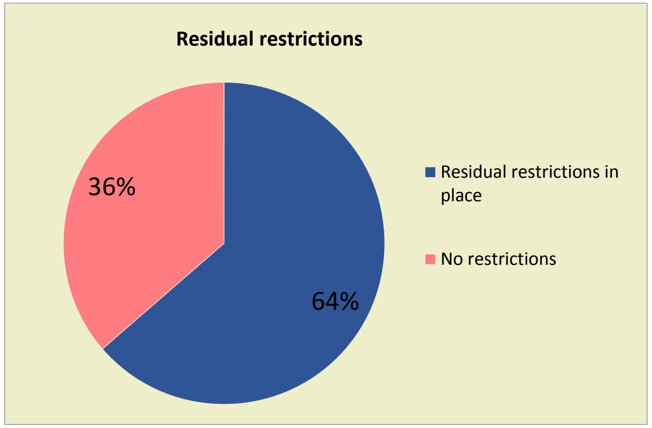
17/18	
Authority	**Average Reuse, Recycling & Composting Rate**
Isle of Anglesey CC	72.19%
Bridgend CBC	68.61%
Flintshire County Council	67.64%
Caerphilly CBC	66.69%
Monmouthshire CC	65.77%
Wrexham CBC	65.44%
Denbighshire County Council	64.21%
Ceredigion County Council	63.70%
Conwy CBC	63.65%
Carmarthenshire County Council	63.64%
City and County of Swansea	63.26%
Vale of Glamorgan Council	63.21%
Merthyr Tydfil CBC	62.74%
Rhondda Cynon Taff CBC	61.31%
Torfaen CBC	60.58%
Neath Port Talbot CBC	60.54%
Powys County Council	60.39%
Gwynedd Council	60.27%
Newport City Council	59.82%
Cardiff County Council	58.26%
Pembrokeshire County Council	57.00%
Blaenau Gwent CBC	56.00%

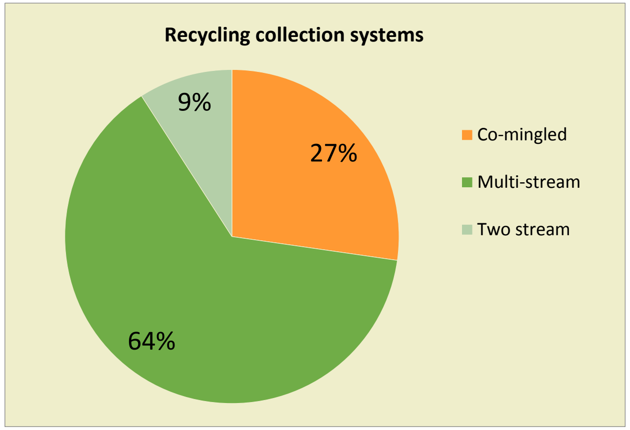
Report Generated : 18/01/2019 12:02:15

Service Confirguration and Collection Frequency for Welsh Local Authorities

*** This information represents WRAP's best understanding of kerbside collections being operated by local authorities in Wales as of October 2018**
On an ongoing basis LAs are introducing service changes and improvements and so note that there may be some variations to the information below.







Local Authority	Current Dry Recycling Collections			Current Food Waste Collections		Current Residual Waste Collections		Current Garden Waste Collections		Current Nappy/AHP collection		
	Scheme Type	Frequency of Collection	Type of Vehicle Used	Service	Frequency of Collection	Container	Frequency of Collection	Frequency of Collection	Charge	Collection provided?	Frequency of Collection	Notes
Isle of Anglesey County Council	Multi-stream	Weekly	Kerbloader	Separate food waste	Weekly	Wheeled bin 180-240 litres	3-weekly and Fortnightly	Fortnightly	No	Yes	n/k	
Conwy County Borough Council	Multi-stream	Weekly / Fortnightly	Kerbloader	Separate food waste	Weekly	Wheeled bin 180-240 litres	3-weekly and 4-weekly	Fortnightly	No	Yes	Weekly	
Flintshire County Council	Multi-stream	Weekly	Some Kerbloaders, some BMI maximisers	Separate food waste	Weekly	Wheeled bin 140-180 litres	Fortnightly	Fortnightly	No	No		
Denbighshire County Council	Co-mingled	Fortnightly/ Weekly	RCV	Separate food waste	Weekly	Wheeled bin 140 litres	Fortnightly	Fortnightly	Yes	No		
Gwynedd County Council	Multi-stream	Weekly	Kerbloader	Separate food waste	Weekly	Wheeled bin 180-240 litres	3-weekly	Fortnightly	Yes	Yes	Weekly	Collected separately

Wrexham County Borough Council	Multi-stream	Weekly	Kerbloader	Separate food waste	Weekly -	Wheeled bin 180-240 litres	Fortnightly	Fortnightly	No	No		
Powys County Council	Multi-stream	Weekly	Kerbloader	Separate food waste	Weekly	Wheeled bin 180-240 litres	3-weekly	None	n/a	No		
Ceredigion County Council	Co-mingled	Weekly	RCV	Separate food waste	Weekly	Householder provides	Fortnightly	Weekly	Not clear	No		
Pembrokeshire County Council	Two Stream (59407 HHs) / Co-mingled (2002 HHs)	Weekly (glass fortnightly)	RCV	Separate food waste	Weekly	Non-reusable sack	Fortnightly	Fortnightly	Yes	No		
Carmarthenshire County Council	Co-mingled	Fortnightly	Split back RCV	Separate food waste	Weekly	Householder provides	Fortnightly	Fortnightly	Yes	Yes	Weekly	Collected separately
Neath Port Talbot County Borough Council	Multi-stream	Weekly	Kerbloader	Separate food waste	Weekly	Wheeled bin 140 litres	Fortnightly	Weekly	no	No		
Swansea City and County Council	Multi-stream	Fortnightly	Split back RCV	Separate food waste	Weekly	Non-reusable sack	Fortnightly	Fortnightly	No	Yes		Can apply for exemption to have additional allowance of residual waste bags
Merthyr Tydfil County Borough Council	Multi-stream	Weekly	Kerbloader	Separate food waste	Weekly	Wheeled bin 140 litres or less	Fortnightly	Fortnightly	No	No		
Blaenau Gwent County Borough Council	Multi-stream	Weekly	Kerbloader	Separate food waste	Weekly	Wheeled bin 180-240 litres	3-weekly	Fortnightly	No	Yes	Weekly	Collected separately
Monmouthshire County Council	Two Stream	Weekly	RCV	Co-collected with garden waste	Weekly	2 Non-reusable sack per collection	Fortnightly	Weekly	Yes	Yes	Fortnightly	Provides bags which are co-collected with refuse
Torfaen County Borough Council	Multi-stream	Weekly/ Fortnightly	Bespoke kerbloader - Designed by the LA	Separate food waste	Weekly	Wheeled bin 140 litres	Fortnightly	Fortnightly	No	Yes	Fortnightly	Provides bags which are co-collected with refuse
Caerphilly County Borough Council	Co-mingled	Weekly	RCV	Separate food waste	Weekly	Wheeled bin 240 litres	Fortnightly	Weekly	No	Yes	Fortnightly	Provides bags which are co-collected with refuse
Rhondda Cynon Taff County Borough Council	Two stream	Weekly	RCV	Separate food waste	Weekly	Wheeled bin 180-240 litres	Fortnightly	Weekly	No	Yes	Weekly	Collected separately
Bridgend County Borough Council	Multi-stream	Weekly	Kerbloader	Separate food waste	Weekly	Non-reusable sack	Fortnightly	Fortnightly	Yes	No		
Newport City Council	Multi-stream	Weekly	Kerbloader	Separate food waste	Weekly	Wheeled bin 180 litres	Fortnightly	Fortnightly	No	Yes	Fortnightly	Collected on alternate week to refuse collection
Cardiff County Council	Co-mingled	Weekly	RCV	Separate food waste	Weekly	Wheeled bin 140 litres	Fortnightly	Fortnightly	No	Yes	Weekly	Collected separately
Vale of Glamorgan Council	Co-mingled	Weekly	RCV	Separate food waste	Weekly	Non-reusable sack - 2 sacks only	Fortnightly	Fortnightly	Yes	No		

APPENDIX 4

Draft Report

Caerphilly County Borough Council CBA Report

A report detailing the outcomes of the Cost Benefit Analysis modelling for Caerphilly County Borough Council's Waste future waste and recycling options.

Project code: CCP100-056
Research date: May – December 2017 **Date:** February 2018

WRAP's vision is a world in which resources are used sustainably.

Our mission is to accelerate the move to a sustainable resource-efficient economy through re-inventing how we design, produce and sell products; re-thinking how we use and consume products; and re-defining what is possible through re-use and recycling.

Find out more at www.wrapcymru.org.uk

Written by: Emma Tilbrook, Mark Cordle and Alex Davies

Executive summary

In 2017, Eunomia Research & Consulting Ltd (Eunomia) were commissioned by the WRAP Cymru to undertake a Cost Benefit Analysis (CBA) of the future options for Caerphilly County Borough Council (CCBC) to deliver their waste and recycling services.

The role of the CBA tool within the Welsh Government Business Planning Toolkit (BPT) is to support authorities in making balanced and sustainable decisions regarding the future of their waste and recycling services. To do this, the CBA compares the performance of each future scenario across four areas:

- Cost of service delivery;
- Performance of the service;
- Environmental impact of the service; and
- Employment generated by the service.

The CBA modelling undertaken as part of this project was carried out in two phases:

Phase A – Five initial scenarios were modelled, with each of the scenarios assuming that Full Moon was to be used as the depot and WTS for waste and recycling collections. In scenarios 3, 4 and 5 this meant the closure of Full Moon as an HWRC. Following a meeting in July 2017, it was agreed that the closure of Full Moon HWRC was not politically or operationally acceptable and that modelling should be updated to reflect the depot and WTS being located in Trehir. Additionally, as the initial 5 scenarios did not offer CCBC savings significant enough to warrant change, Eunomia were also asked to explore how additional modelled savings could be generated from the detailed outputs provided as part of previous collections modelling work undertaken by WRAP and HWRC and depot analysis carried out by Resource Futures. The detailed results of Phase A modelling can be found in Section 2.0 of this report.

Phase B - Within Phase B, 4 additional scenarios were modelled, taking into account the movement of the waste and recycling transfer station (WTS) to Trehir (from Full Moon) and also focussing on the impact of changing recycling collection systems. Within all of these scenarios the HWRC, WTS and commercial waste options remained the same, allowing the impact of changing the recycling service to be isolated. Scenarios 1 and 3 used the blueprint recycling service as a basis for operations and Scenario 2 and 4 the multi-stream recycling service. Scenarios 3 and 4, then overlay two further changes:

- Bryn Quarry no longer used to post-sort HWRC waste
- Black bag ban introduced to increase recycling from HWRCs

These scenarios were then modelled with two weekly refuse collections (as current) or three weekly refuse collections.

The detailed results of Phase B modelling can be found in Section 3.0 of this report.

Cost of Service Delivery

The annualised Phase B scenario costs (compared to the baseline 2016/2017 budget) are summarised in Table 1.

Table 1: Annualised Phase B Scenario costs (compared to the baseline)

Scenario	Two Weekly Refuse Collections (as current)	Three Weekly Refuse Collections
1	- £1.134m	-£1.285m
2	-£905k	-£966k
3	-£1.648m	-£1.862m
4	-£1.419m	-£1.608m

All scenarios modelled generate savings for CCBC against the baseline position, with blueprint recycling services generating larger savings than the equivalent multi-stream option in all cases. This is largely driven by the income received for the collected materials within the market place, offsetting additional vehicle and staffing costs in this option.

It is recognised that material revenues are subject to fluctuation. Sensitivities were run on material revenues as part of the original WRAP collections options modelling, ensuring that fluctuations in material revenues did not significantly change the order or magnitude of savings modelled. The processing cost paid for the current dry recycling stream is a significant cost in the baseline and therefore the main source of savings when switching to the blueprint or multi-stream recycling collection system.

The savings provided for three weekly collections within Table 1 are lower than those normally associated with a move to a more restricted refuse service, however, all of the three weekly scenarios also include the cost of the provision of a weekly Absorbent Hygiene Products (AHP) service. This service costs approximately £300k per annum and has thus reduced the potential savings from this change in the amount shown in Table 1.

In addition to the savings provided in Table 1, it is also likely that if CCBC was to move to the Welsh Government's Collections Blueprint, capital funding may be available to support this transition. When applied to Scenario 3 with three weekly collections, this could save CCBC £2.177m per annum, against current service costs (when an assumption of £2m of capital funding is applied).

Performance of the Service

In analysing CCBC's current recycling performance in more detail, with the aim of understanding if any further increases in performance could be made, we have made two adjustments to the current baseline position:

1. We have included a baseline MRF reject rate 25%, reflecting reported issues with the current co-mingled material. This has an approx. 1.5% impact on baseline recycling rates.
2. Where Bryn Quarry is used, the reported recycling rate of 77% has been replaced by the maximum estimate of 42% in the baseline and 30% in options 1 and 2.With increasing pressure on the wider industry to produce high quality outputs, there is a risk that the contribution of the sorting undertaken by Bryn Quarry is reduced, which has been accounted for in the Phase B modelling. This adjustment has resulted in a 4% reduction in the baseline position.

Although this adjustment to baseline position represents a worst case scenario for CCBC, it is important that this risk is taken into account as part of any assessment of a future 'no change' baseline scenario.

A summary of the modelled recycling performance for each future Scenario can be found in Table 2.

Table 2 – Phase B Scenarios Recycling Rate Performance

Scenario	B/L	1	2	3	4
Recycling Rate – Fortnightly Residual Waste	62%	65%	65%	67%	67%
Recycling Rate – Three Weekly Residual Waste	-	68%	68%	70%	70%
NB: AHP Recycling (rather than disposal) under 3W collections could increase recycling rate by further 1%					

Based upon the more conservative baseline position used in Phase B, in all scenarios CCBC still meet the 2019/2020 target of 64%. However, as within Phase A the modelling demonstrates that 2024/2025 statutory recycling targets of 70% can only be met by moving to three weekly refuse collections.

The potential annualised financial liability to CCBC of the 2024/2025 recycling targets not being met are provided in Table 7.

Table 3 – Phase B Scenarios - Potential Rate Fines

Scenario	B/L	1	2	3	4
Fortnightly Residual Waste	£1.7m	£1m	£1m	£650k	£650k
Three Weekly Residual Waste	£1.7m	£430k	£430k	-	-

Environmental Impact of the Service

The environmental impact of each scenario has been calculated using details from various life-cycle studies and takes into account the details of materials collected, the fate of this material (recycling, refuse, organic treatment etc.) and also emissions for collection and onward transportation of material. As Phase B focuses on a point in time, Table 4 draws upon the results from a point at which all proposed changes to the service have been made. Changes would then be incremental over time following any significant changes in the approach to the way waste and recycling is collected and reprocessed/disposed of.

Table 4 – Environmental Saving of Each Scenario Expressed as Tonnes per CO_2 Equivalent Compared to Baseline

Scenario	No Three Weekly	With Three Weekly
Scenario 1	-9,270	-10,148
Scenario 2	-10,856	-11,922
Scenario 3	-14,793	-15,670
Scenario 4	-16,379	-17,443

Unsurprisingly, all of the scenarios perform better when three weekly collections are introduced.

Employment Generated by the Service
To support CCBC meeting the requirements of the Well-being of Future Generations Act (2015) and improve the employment opportunities through the delivery of waste and recycling services within Caerphilly, the employment generated within each Phase B Scenario has been analysed.

Table 19 shows the maximum amount of people employed within each Phase B following rollout of the new service.

Table 5 – Employment Generated Following Rollout of Services – 2021/2022 Used as Reference Year

Scenario	No Three Weekly	With Three Weekly
Baseline	269	269
Scenario 1	291	291
Scenario 2	273	274
Scenario 3	283	286
Scenario 4	267	268

It is clear in Table 19 that the highest levels of employment are highest from the Collections Blueprint scenarios (1 and 3), this largely driven by the greater number of vehicles and crew require to deliver these services.

Conclusion
In conclusion all scenarios modelled will allow CCBC to make significant savings on their baseline budget position. However, the decision to make such substantial changes to the way in which services are delivered is not purely financial, other issues such as operational and delivery risks need to be considered. With the right planning and support (potentially funded via the WRAP CCP programme), most of these risks can however be largely controlled and/or mitigated.

CCBC do however, need to be cognisant of risks outside of their control such as the risk of fines from Welsh Government and the ever changing materials reprocessing markets, all of which will have an impact on the medium to long term sustainability of a 'do nothing' approach.

In terms of next steps, we would recommend that CCBC undertake a full analysis of the risks associated with all scenarios, examining the potential impact of those both inside and outside of the authority's control, allowing a balanced approach to be taken to the opportunities for the future development of the authority's waste services.

Contents

Tables and Figures

Acknowledgements

A report detailing the outcomes of the Cost Benefit Analysis modelling for Caerphilly County Borough Council's Waste future waste and recycling options.

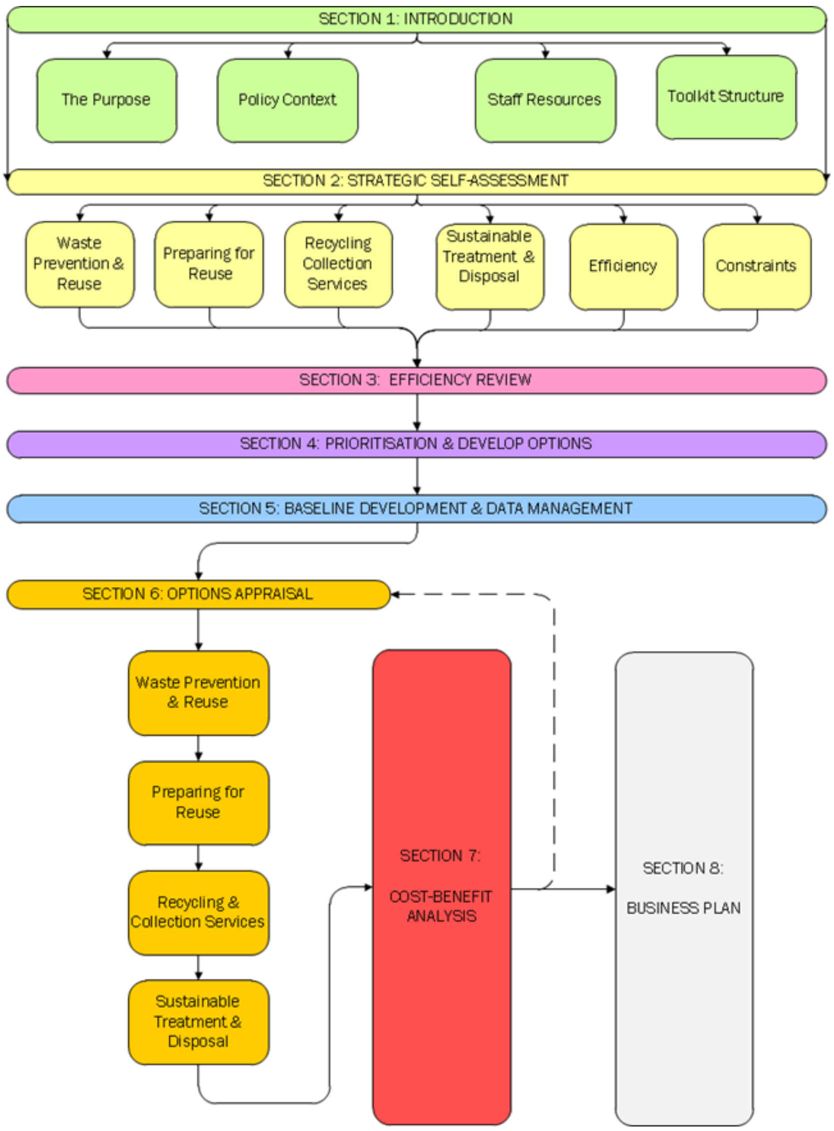
1.0 Introduction

In 2017, Eunomia Research & Consulting Ltd (Eunomia) were commissioned by the WRAP Cymru to undertake a Cost Benefit Analysis (CBA) of the future options for Caerphilly County Borough Council (CCBC) to deliver their waste and recycling services.

1.1 The Business Planning Toolkit

The Business Planning Toolkit (BPT) was developed to provide Welsh authorities with a consistent method for analysing existing service performance, alongside the impacts of potential service changes. The intention is that the outputs of the toolkit will enable authorities to develop a fully costed business plan. This business plan will set out a clear, long-term path to sustainably meet both the authority's statutory 70% recycling target by 2024/25 (as well as interim statutory targets), and the non-mandatory targets associated with waste prevention and re-use, preparation for re-use and sustainable treatment and disposal set out in the Municipal Sector Plan[1]. The overall structure of the Business Planning Toolkit can be seen in Figure 1.

Figure 1 - Business Planning Toolkit Process



[1] *Welsh Assembly Government (2011)* Municipal Sector Plan - Part 1: Collections Blueprint, *March 2011,* *http://wales.gov.uk/topics/environmentcountryside/epq/waste_recycling/publication/municipalsectorplan/?lang=en*

Throughout 2015 and 2016, CCBC has received significant support from the WRAP Collaborative Change Programme (CCP) to undertake Section 6 of the BPT process. As part of this work WRAP have commissioned options appraisals for the following recycling and collection services:

- Kerbside waste and recycling collections;
- HWRC operations; and
- Trade waste and recycling collections.

This project uses the outputs of these Section 6 commissions and additional analysis, to deliver Section 7 of the BPT process, the Cost Benefit Analysis (CBA).

1.2 Section 7 - The CBA

As shown in the BPT process in Figure 1, the CBA is designed bring together the baseline position and the outputs of options appraisal modelling for the four main BPT elements.

- Prevention and Re-use;
- Preparation for Re-use;
- Recycling and Collection Services (including all options appraisals commissioned by WRAP); and
- Sustainable Treatment & Disposal.

These elements reflect the waste hierarchy and the structure of the WG Municipal Sector Plan:

As part of the CBA, up to six scenarios (the baseline and up to five alternative scenarios) can be compared. Within the CBA process a scenario is defined as a combination of development options for each of the BPT elements.

Information was collated and analysed from the following reports and utilised within the CBA modelling:

Waste and Recycling Collections

- KAT Modelling results including Further analysis, December 2015, WRAP

Depot, WTS and HWRCs

- HWRC review for Caerphilly County Borough Council, November 2016, Resource Futures
- A Review of Caerphilly County Borough Council Waste Transfer Stations and Household Waste Recycling Centres, July 2017, Resource Futures

Commercial Waste

- Data from the June 2017 commercial waste analysis carried out by Amec Foster Wheeler

The CBA modelling undertaken for Caerphilly County Borough Council (CCBC) was carried out in two phases:

Phase A: Five initial scenarios were modelled and theses have been detailed in Table 6. Each of these scenarios assumed that Full Moon was to be used as the WTS for waste and recycling collections. In scenarios 3, 4 and 5 this meant the closure of Full Moon as an HWRC. Following a meeting in July 2017, it was agreed that the closure of Full Moon HWRC was not politically or operationally acceptable and that modelling should be updated to reflect the WTS being located in Trehir. Additionally, as the initial 5 scenarios did not offer CCBC savings significant enough to warrant change, Eunomia were also asked to explore how additional modelled savings could be generated from the detailed outputs provided as part of previous collections modelling work undertaken by WRAP and HWRC and WTS analysis carried out by Resource Futures.

Within Phase A and Phase B scenarios, the following definitions apply:

Multi-Stream – Recycling collections are made using two split bodied RCVs on a weekly basis. The first RCV will collect food waste in one compartment and glass in the other compartment. In the second RCV paper and card will be collected in one compartment and plastic and cans in the other compartment. Residents will present their paper, card, plastics and cans in two re-useable sacks, glass will be presented in kerbside recycling box and food waste in a caddy.

Blueprint Collections - Recycling collections are made using a modern Resource Recovery Vehicles (RRV) on a weekly basis. The RRV will collect all material paper, card, glass and food waste in separate compartments, with plastics and cans being mixed for separation upon return to the WTS. Residents will present their paper, card, plastics, cans and glass in three kerbside recycling boxes and food waste in a caddy.

Table 6 - Summary of Phase A CBA Scenarios

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Kerbside Refuse and Recycling Services	• **No change** in recycling or garden waste service • **Policy enforcement** work commencing **April 2018**	• **No change** in recycling or garden waste service • **Policy enforcement** work commencing **April 2018** • **Three weekly refuse** collections commencing **April 2023**	• **Policy enforcement** work commencing **April 2018** • Multi stream recycling service commencing **October 2019** • **Three weekly refuse** collections commencing **April 2023**	• **Policy enforcement** work commencing **April 2018** • Collections Blueprint recycling service commencing **October 2019** • **Three weekly refuse** collections commencing **April 2023**	• **Policy enforcement** work commencing **April 2018** • Collections Blueprint recycling service commencing **October 2023** • **Three weekly refuse** collections commencing **April 2023**
HWRCs	• **No change** to the current service • **Pre-Sort Materials** at HWRC in **2018/19** • **Upgrade Full Moon** HWRC and WTS to be complete **October 2019**	• **Pre-Sort Materials** at HWRC in **2018/19** • **Upgrade Full Moon** HWRC and WTS to be complete **October 2019** • **Expansion of Aberbargoed** HWRC to be complete **July 2019** • **Expansion of Trehir** HWRC to be complete **July 2020**	• **Pre-Sort Materials** at HWRC in **2018/19** • **Expansion of Penmaen** HWRC to be complete **October 2018** • **Close Full Moon** in **April 2019** • **Expansion of Aberbargoed** HWRC to be complete **July 2019** • **Expansion of Trehir** HWRC to be complete **October 2021**	• **Pre-Sort Materials** at HWRC in **2018/19** • **Expansion of Penmaen** HWRC to be complete **October 2018** • **Close Full Moon** in **April 2019** • **Expansion of Aberbargoed** HWRC to be complete **July 2019** • **Expansion of Trehir** HWRC to be complete **October 2021**	• **Pre-Sort Materials** at HWRC in **2018/19** • **Improvement work** to **Full Moon** • **Expansion of Aberbargoed** HWRC to be complete **October 2020** • **Expansion of Trehir** HWRC to be complete **October 2021** • **Expansion of Penmaen** HWRC to be complete **October 2021** • **Close Full Moon** in **October 2022**
Commercial	• **No change** to the current service	• **No change** to the current service	• **New service** commencing **April 2019**	• **New service** commencing **April 2019**	• **New service** commencing **April 2019**

Phase B: Within Phase B, 4 additional scenarios were modelled, taking into account the movement of the WTS to Trehir and also focussing on the impact of changing recycling collection systems. Within all of these scenarios the HWRC, WTS and commercial waste options remained the same, allowing the impact of changing the recycling service to be isolated. Within these scenarios, the multi-stream and blueprint recycling services were taken from Phase A for additional analysis. Scenarios 1 and 2 take the analysis carried out within Phase A and use Trehir as the new waste and recycling waste transfer station (WTS). Scenarios 3 and 4, then overlay two further changes:

- Bryn Quarry no longer used to post-sort HWRC waste
- Black bag ban introduced to increase recycling from HWRCs

Table 7 - Summary of Phase B CBA Scenarios

<table>
<tr><th></th><th>Scenario 1</th><th>Scenario 2</th><th>Scenario 3</th><th>Scenario 4</th></tr>
<tr><td>Kerbside Refuse and Recycling Services</td><td>Collections Blueprint Recycling

Three weekly refuse introduced in 2023</td><td>Multi Stream Recycling

Three weekly refuse introduced in 2023</td><td>Collections Blueprint Recycling

Three weekly refuse introduced in 2023</td><td>Multi Stream Recycling

Three weekly refuse introduced in 2023</td></tr>
<tr><td rowspan="2">HWRCs and Depots</td><td colspan="4">• Upgrade Full Moon HWRC to Super HWRC
• Expansion of Penallta and Aberbargoed HWRC
• Rhymney and Penmaen to close
• New HWRC at Trehir
• New WTS at Trehir</td></tr>
<tr><td colspan="2"></td><td colspan="2">Bryn Quarry no longer used to sort HWRC waste

Black bag ban introduced to increase recycling from sites</td></tr>
<tr><td>Commercial</td><td colspan="4">• New commercial waste service commencing April 2019</td></tr>
</table>

Table 8 provides a summary of the outputs provided by the CBA for each scenario.

Table 8 - CBA Scenario Outputs

CBA Output	Description
Cost of Service Delivery	The comparative cost to CCBC of delivering different future service scenarios
Performance of the Service	The comparative recycling performance of different future service scenarios and their contribution to the achievement of the statutory targets as set out in the Welsh Government Strategy '*Towards Zero Waste*'.
Environmental Impact of the Service	The comparative environmental impact of different future service scenarios, as expressed in tonnes of CO_2. Environmental costs expressed as £s are also taken into account.
Employment Generated by the Service	The comparative number of people employed as a direct result of the future service scenario.

Within the CBA, environmental cost results are reflected both in terms of CO_2 equivalent and monetised using unit environmental damage cost calculations. These are then combined with the financial cost analysis to generate a net financial and environmental cost for each scenario. The performance and employment generated by each scenario against the Welsh Government 'Towards Zero Waste' targets is also calculated. Financial costs are presented in net present value (NPV) terms for ease of comparison with existing medium term financial plans, but annual budget data can also be extracted in terms of annual capital and revenue costs.

2.0 **Phase A CBA Modelling Results**

2.1 Cost of Service Delivery

2.1.1 Revenue Costs

In calculating the cost of service delivery, we have transposed the costs of the scenarios and aligned this with the 2016/2017 budget. By doing this, we can relate savings and costs associated with the service to CCBC's budget lines.

Figure 2 to Figure 6 illustrate the financial costs of the baseline and Phase A Scenarios 1 to 5 broken down by budget area; a detailed breakdown of these costs can be found in Appendix C.

Figure 2 - Baseline Financial Costs 2016/2017 to 2029/2031

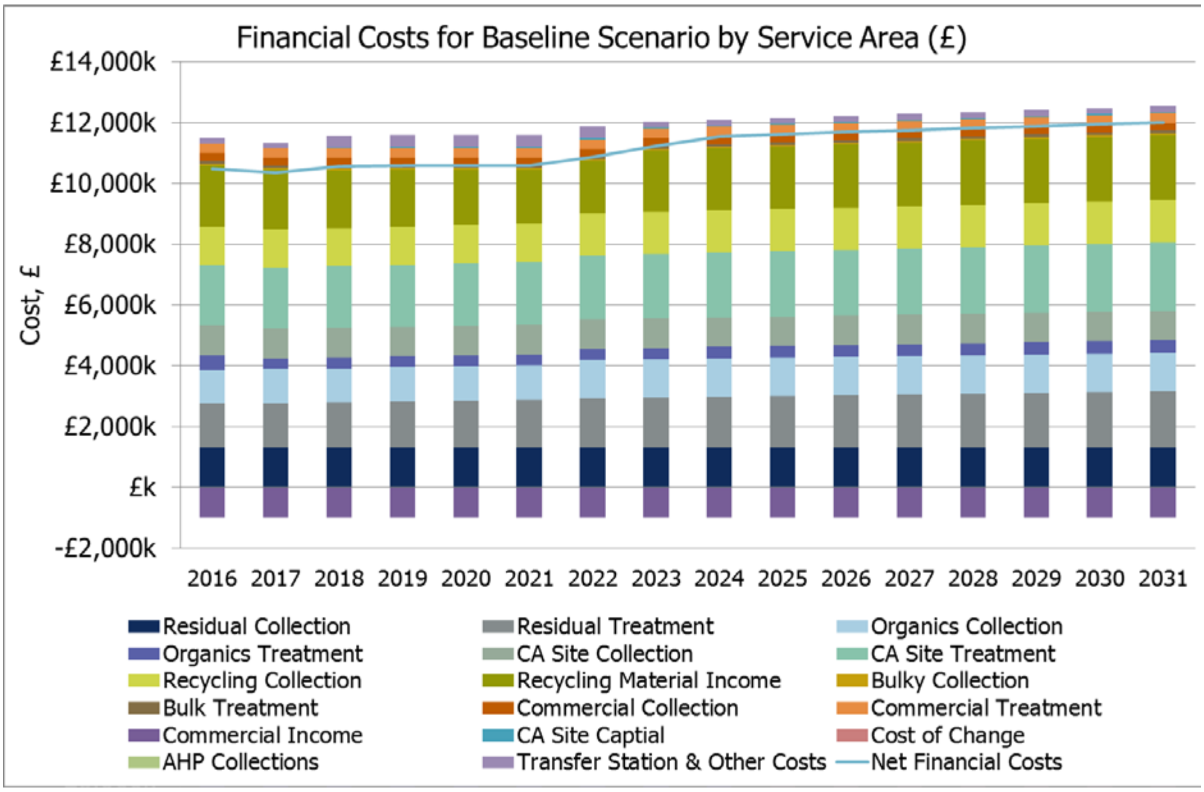


Figure 3 – Phase A Scenario 1 Financial Costs 2016/2017 to 2029/2031

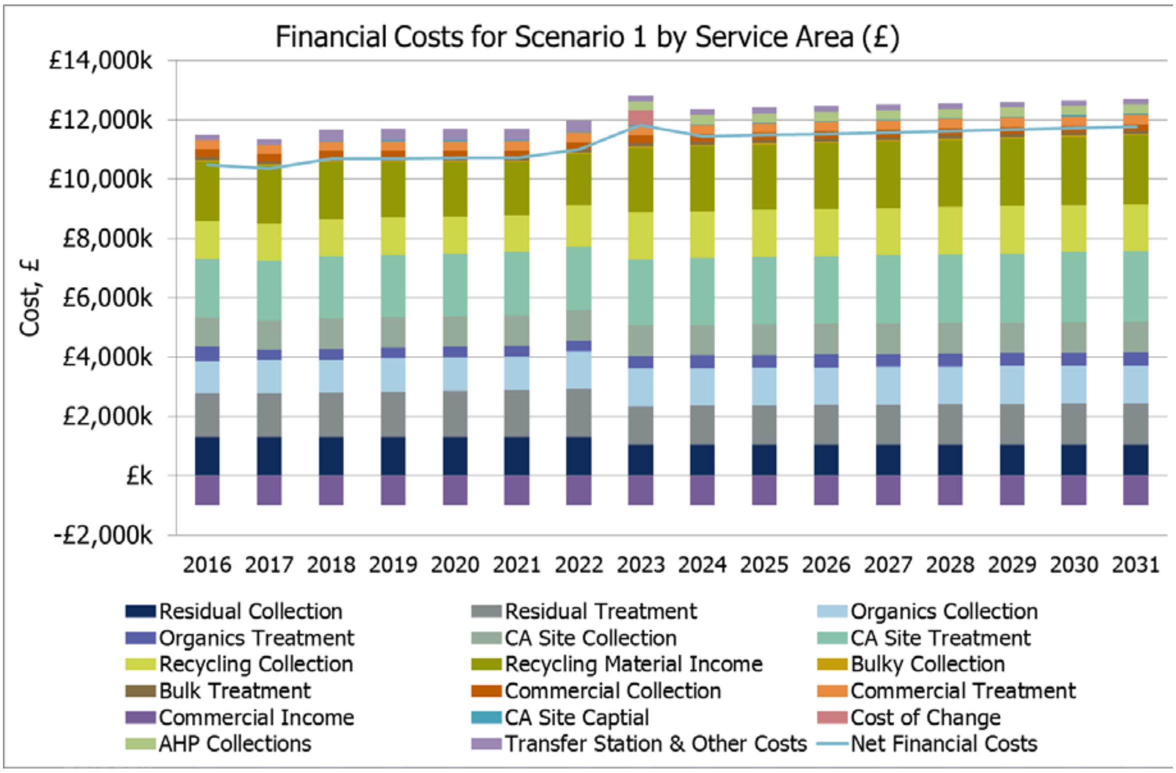


Figure 4 - Phase A Scenario 2 Financial Costs 2016/2017 to 2029/2031

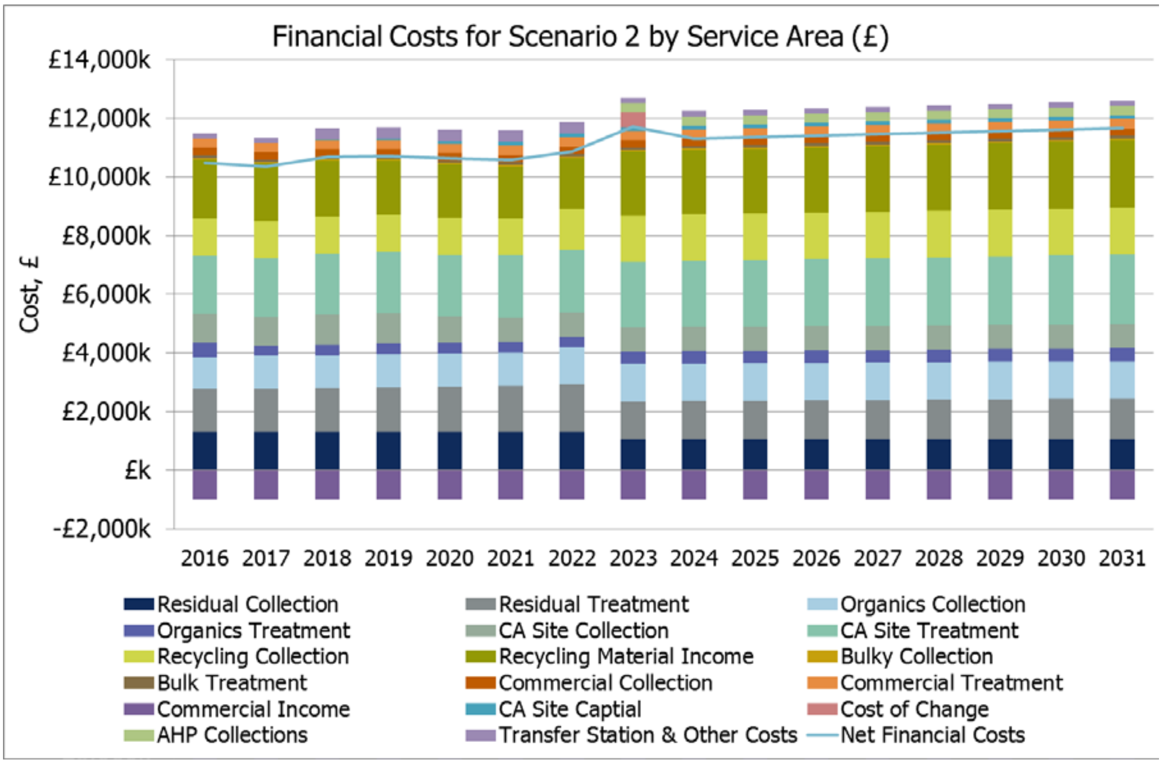


Figure 5 – Phase A Scenario 3 Financial Costs 2016/2017 to 2029/2031

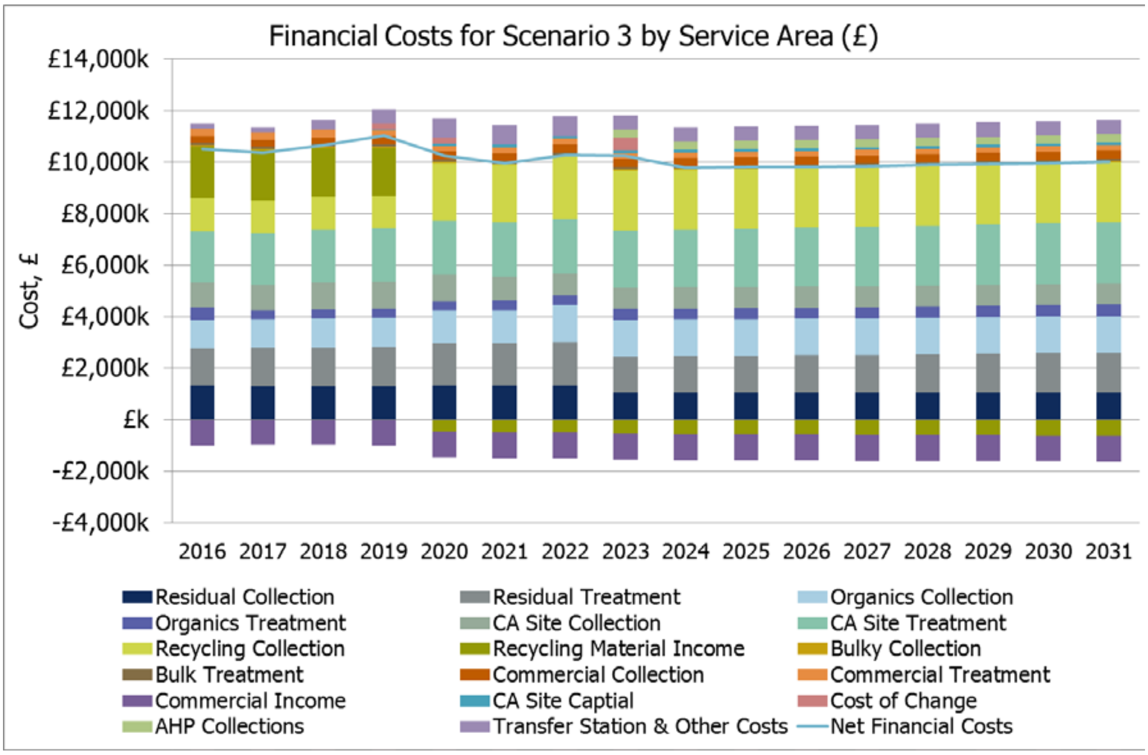


Figure 6 – Phase A Scenario 4 Financial Costs 2016/2017 to 2029/2031

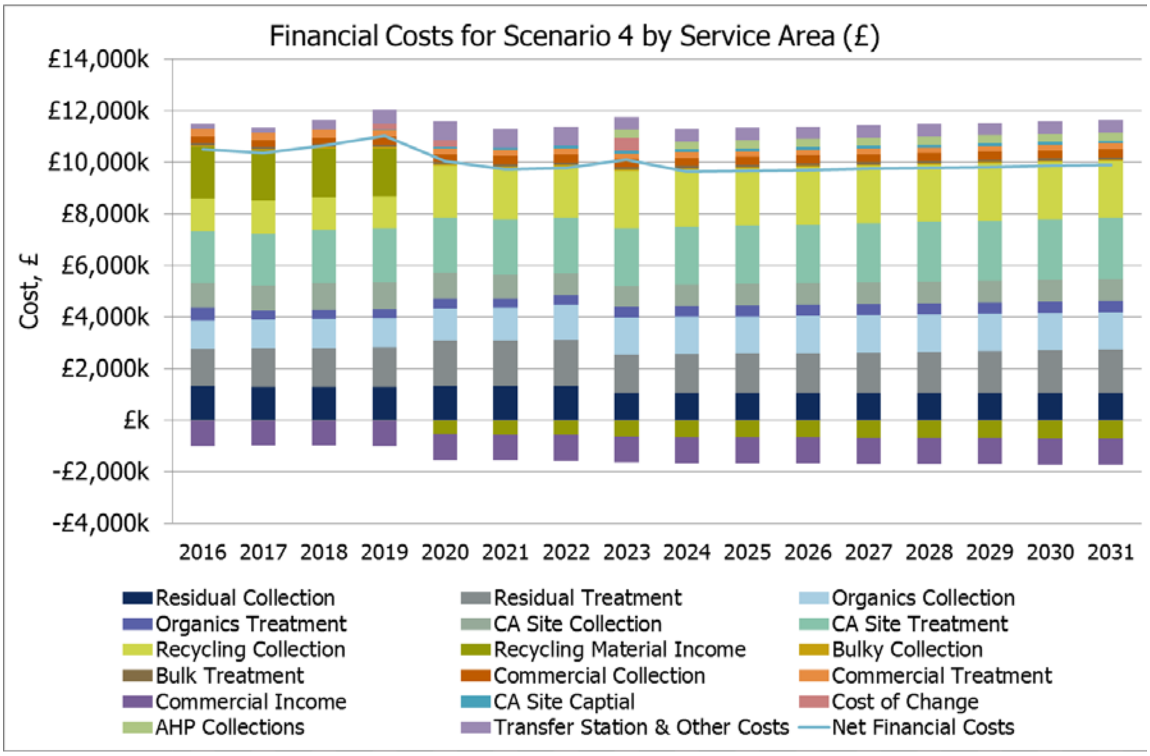


Figure 7 – Phase A Scenario 5 Financial Costs 2016/2017 to 2029/2031

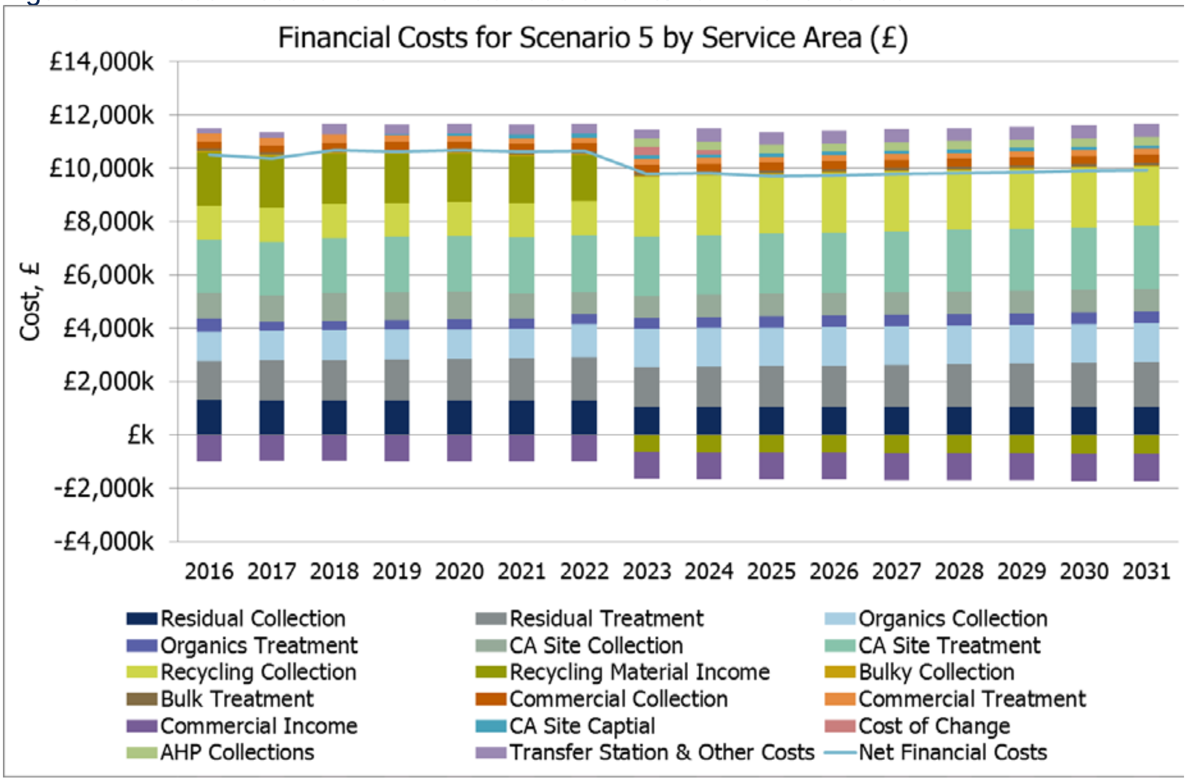


Figure 8 compares the net financial cost of each Phase A scenario over 15 years between 2016/17 to 2031/32.

Figure 8 - Comparison Net Financial Costs over Time

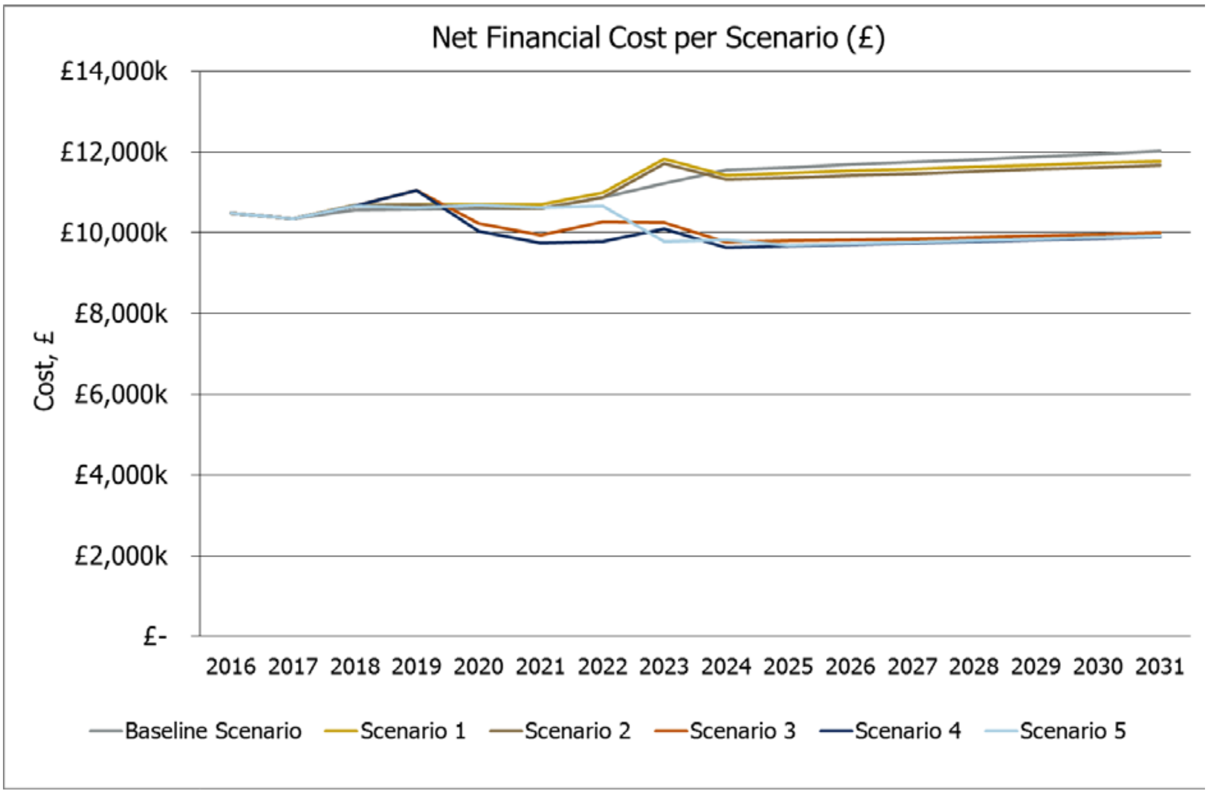


Figure 8 shows that the overall service cost for the baseline is similar to that of Scenario 1 and 2. The baseline has increased from £10.49m in 2016 to £12.02m by 2030/2031, with Scenario 1 and 2 increasing to £11.72m and £11.61m respectively. The main reason for the increase is the housing growth and associated increase in waste arisings. Within Scenario 1 and 2, following the introduction of 3 weekly refuse collection in 2024/2025, the cost of the service falls below that of the baseline.

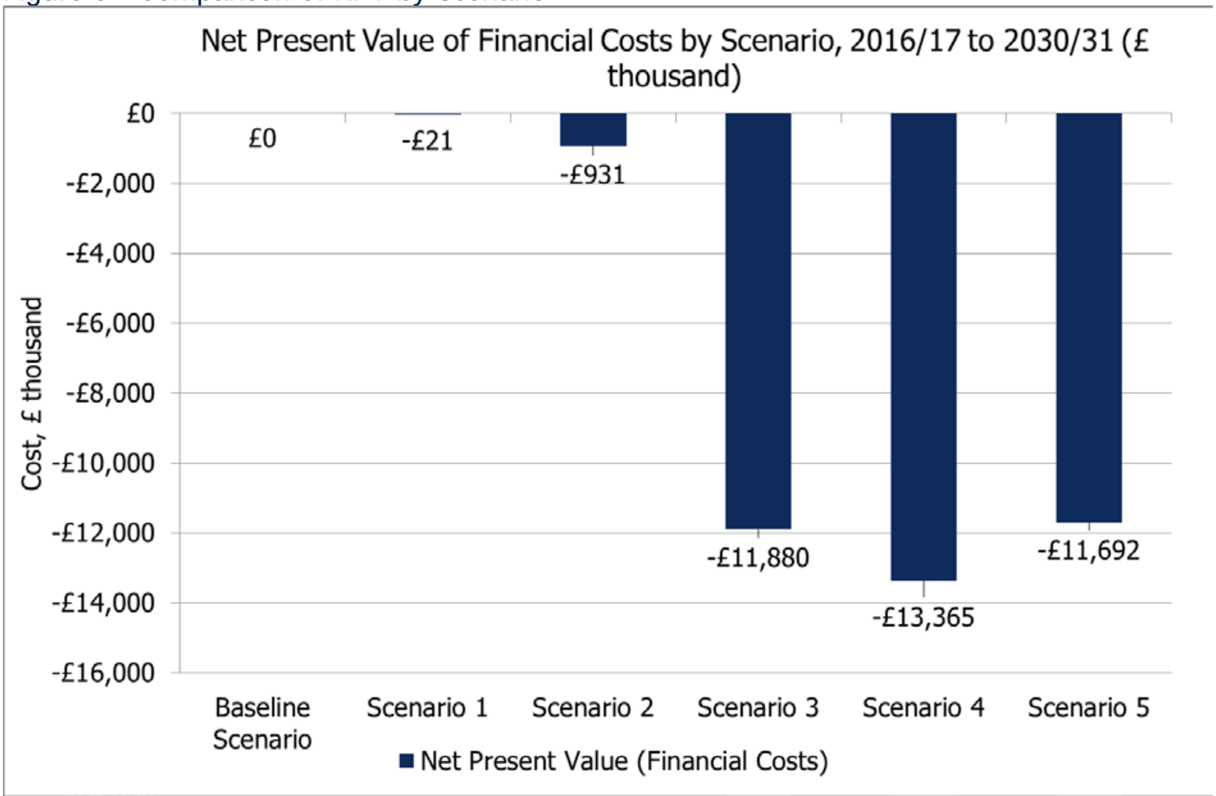
Scenarios 3, 4 and 5 all have relatively similar annual costs price, with £100k between the higher and lower scenarios.

Amongst the scenarios, Scenario 4 has the lowest long term financial cost in 2031 at £9.9m per annum. However, the cost of this option does not come down below the other scenarios until 2020, following the rollout of the new recycling service. Annual costs reduce further in 2023 with the modelled roll out of three weekly refuse collections.

Welsh Government provide an annual grant to CCBC which covers a large proportion of the waste grant budget (£3.13 million in 2016/17), with CCBC providing the remaining funds. As this grant is provided by Welsh Government, CCBC has no control over the amount of money allocated to them. Therefore, if the grant was to be reduced (as has happened over previous years) or not increased in line with the expansion of the recycling services, CCBC would need to contribute further funds to make up this shortfall. The grant has not been included within the output budget lines

Alongside providing year on year costs, the CBA also analyses the comparative NPV of each scenario.

Figure 9 - Comparison of NPV by Scenario



As Figure 9 shows, the comparative NPV of Scenario 1 and 2, remains very similar to the baseline with only small savings being made. The NPV of Scenarios 3, 4 and 5 are very similar, with service costs ranging between £11.7m (Scenario 5) and £13.4m (Scenario 4). Over the 15 years, Scenario 4 offers the lowest NPV. Although the service costs associated with Scenario 5 are very similar to Scenario 4 when the services have been rolled out, it does not provide an NPV as low as Scenario 4, this is due to the delay in introducing the new recycling service.

2.1.2 Capital Costs

In order to develop the waste services and implement the service changes described in the scenarios in Table 6, CCBC will be required in invest capital expenditure into the service. This capital expense will cover the cost of new vehicles, development works for HWRCs and WTSs, and costs of implementing the service change.

Table 9 - Capital costs required for each Scenario between 2017/18 and 2023/24

Scenario	Vehicles	HWRC	Depot & WTS	Containers	Cost of Change	Total
Scenario 1	£0	£0.71m	£0	£0	£0	**£0.71m**
Scenario 2	£0	£2.00m	£0.43m	£0.64m	£0.5m	**£3.59m**
Scenario 3	£2.80m	£2.00m	£1.97m	£0.64m	£1.0m	**£8.48m**
Scenario 4	£3.42m	£2.00m	£1.89m	£0.78m	£1.0m	**£9.14m**
Scenario 5	£3.42m	£2.00m	£1.89m	£0.78m	£0.5m	**£8.63m**

Table 9 shows the level of capital required between 2017/18 and 2023/24 to implement each scenario. A breakdown is provided for each scenario of how the capital costs are made up; kerbside vehicles, HWRC, Depot & WTS, containers and cost of implementing the change in service.

The total cost of vehicles includes the vehicles required when making the switch to fortnightly collections, as well as the additional vehicles required when making the switch to three-weekly collections. The cost of vehicles for switching to Fortnightly collections is £2.2m for Scenario 3, and £ 3.1m for Scenario 4. The extra capital required when moving to three-weekly collections is £530k and £300k for scenario 3 and 4 respectively. As scenario 5 goes straight to three weekly in 2023/24 the full cost of the vehicles come in this year.

In Scenario 3 & 4 the cost of implementing the change is higher, as these scenarios require two change in service. First in 2018/19 for kerbside recycling, and the second in 2023/24 for three weekly refuse.

In Scenario 3, the cost of purchasing new split bodied RCVs has been offset by the vehicles which have already been purchased by CCBC in order to operate the separate collection of food and garden waste. Although the purpose of the vehicles will change, the current vehicles are suitable to be used in Scenario 3, therefore, the capital has been adjusted to purchase only the additional vehicles which are needed.

Full details of the capital costs broken down year by year is provided in Appendix A.

2.2 Performance of the Service

All of the developments included within each of the CBA scenarios have been designed to increase CCBC's recycling performance, supporting the authority in meeting the Welsh Government targets of a 64% recycling rate by 2019/2020 and a 70% recycling rate by

2024/2025. However, due to the different interventions within each scenario, and the timings of these, the overall performance of each scenario does vary.

Figure 10 to Figure 15 illustrate the calculated waste flows for the baseline and Scenarios 1 – 5 and the associated reuse and recycling rates achieved. The baseline recycling rate used within the CBA was 65.7%, inc. IBA, at the time of modelling with was the provisional 2016/2017 recycling rate for the authority. Additional work around this baseline position has been carried out as part of Phase B.

Figure 10 – Phase A Baseline Mass Flows and Recycling Performance

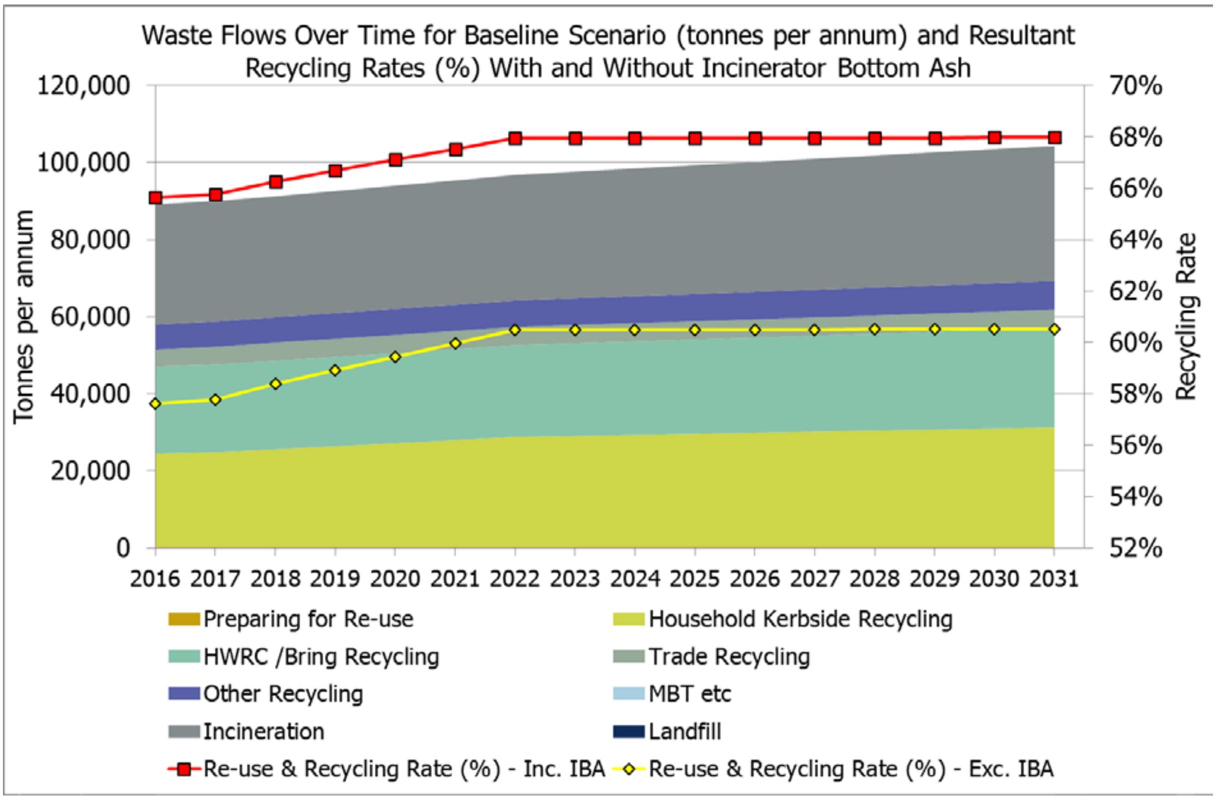


Figure 11 – Phase A Scenario 1 Mass Flows and Recycling Performance

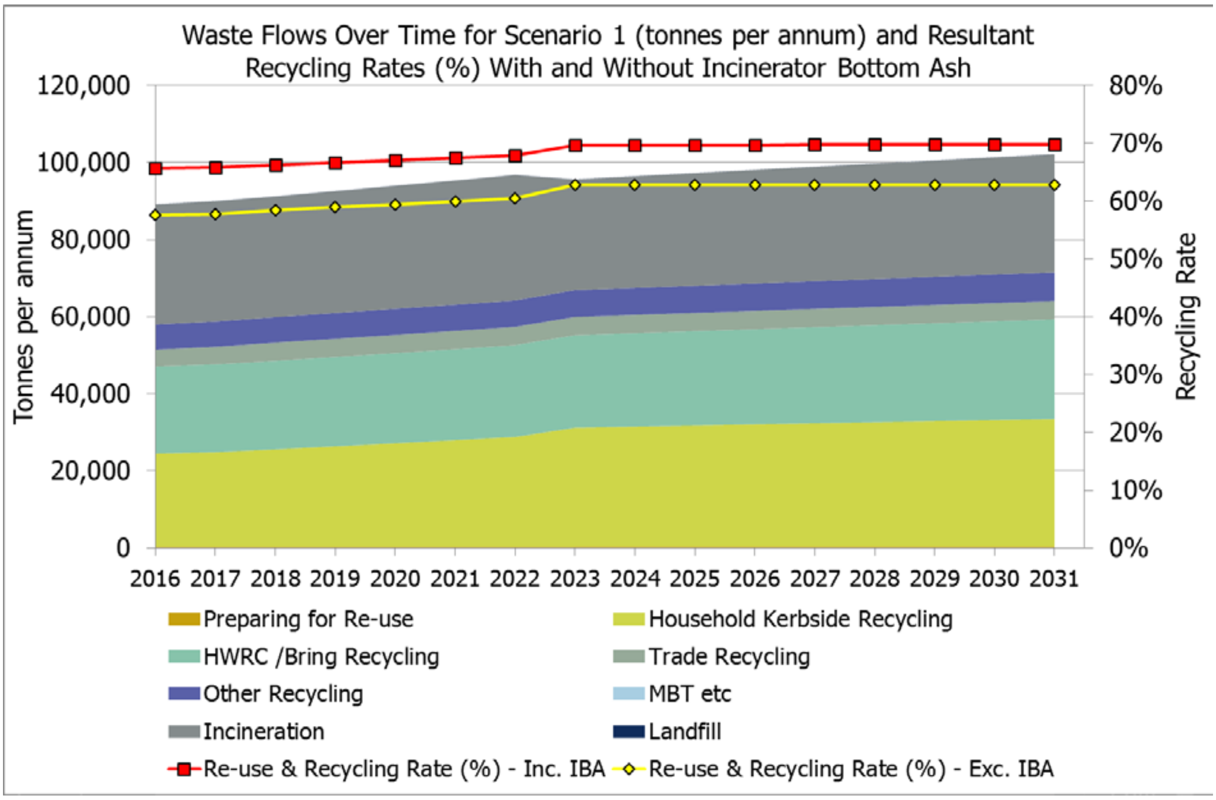


Figure 12 – Phase A Scenario 2 Mass Flows and Recycling Performance

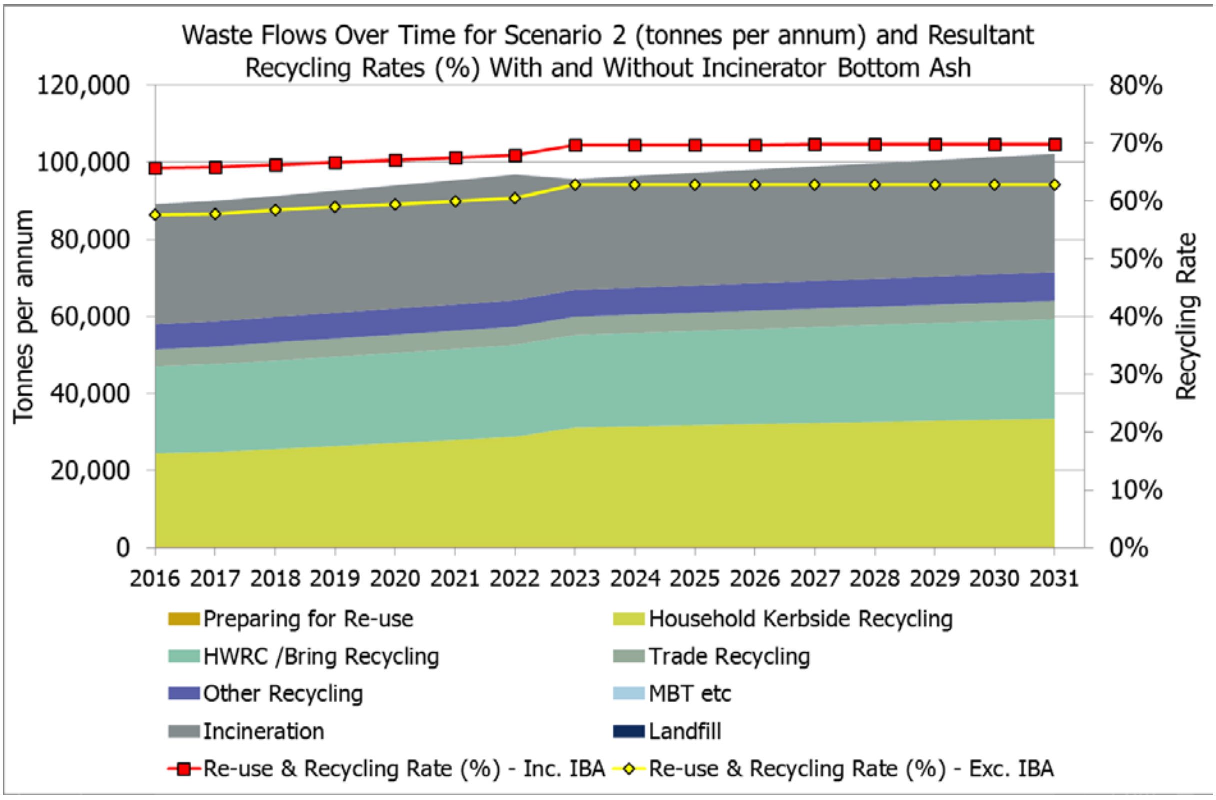


Figure 13 – Phase A Scenario 3 Mass Flows and Recycling Performance

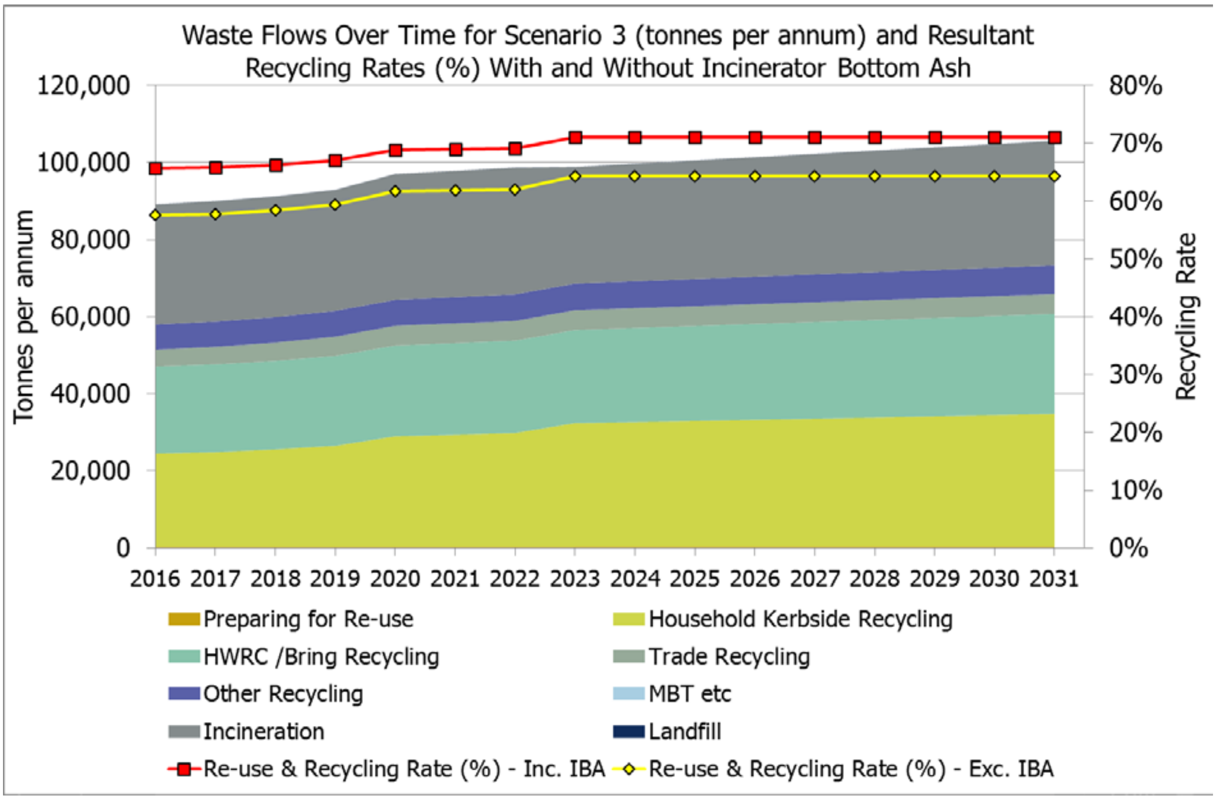


Figure 14 – Phase A Scenario 4 Mass Flows and Recycling Performance

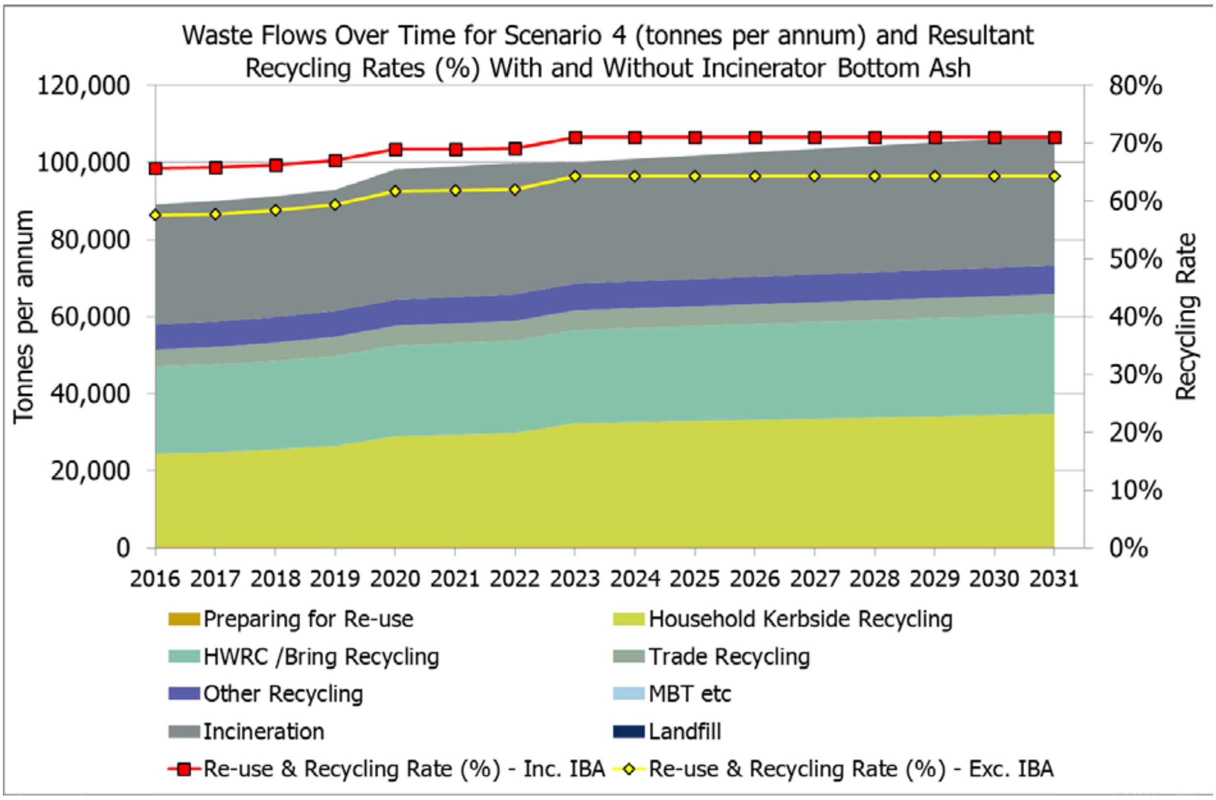
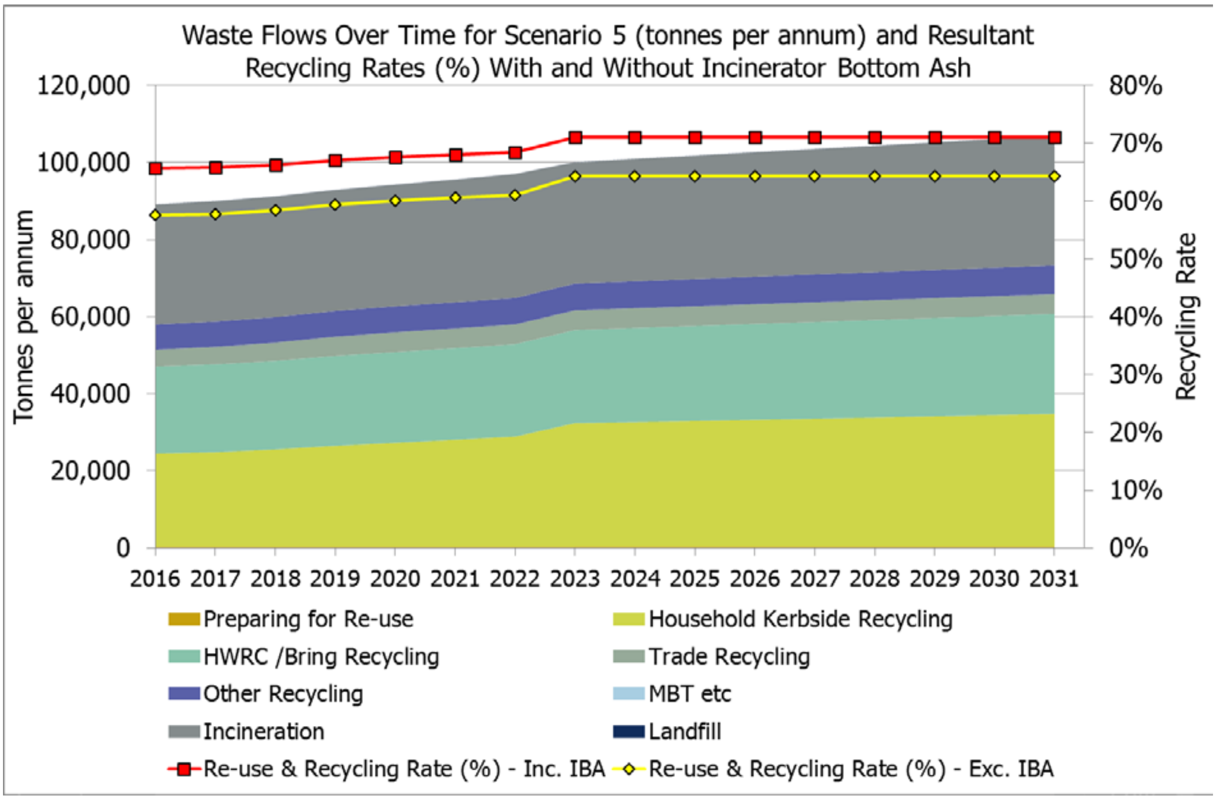


Figure 15 – Phase A Scenario 5 Mass Flows and Recycling Performance



From these figures, we can isolate what factors have the biggest impact on overall recycling performance. In Scenario 1 – 5, the movement of refuse collections to three weekly shows a corresponding increase in performance between 2023 and 2024. Alongside this, in Scenario 3 and 4 the change of recycling collections to multi-stream and collections blueprint, accordingly, between 2020 and 2021 also shows an uplift in recycling performance.

The introduction of three weekly refuse collections in Scenario 1 and 2, during 2023/24 provides an increase in recycling rate from 69% to 70%. In these scenarios the recycling rate stays steady at 70% beyond 2024.

Table 10 compares the modelled recycling performance (inc. IBA) of each scenario to statutory Welsh Government targets. In the target years, where the scenario has met the target the cells are coloured green, where the scenario has failed to meet the target, cells are coloured red.

Table 10 - Comparison of Recycling Performance (including IBA) of Scenarios to Statutory Targets

		Target Year	Target Year	
Year	2017/18	2019/20	2024/25	2029/30
Statutory Target	61.0%[1]	64.0%	70.0%	70.0%[2]
Baseline	65.8%	66.7%	67.9%	68.0%
Scenario 1	66.4%	67.3%	70.4%	70.4%
Scenario 2	66.4%	67.3%	70.4%	70.4%
Scenario 3	66.4%	67.8%	71.7%	71.7%
Scenario 4	66.4%	67.8%	71.7%	71.7%
Scenario 5	66.4%	67.3%	71.7%	71.7%

Notes:

1. *2017/18 is not a statutory target year. This target was calculated based on a linear trajectory between statutory targets for 2015/16 and 2019/20.*
2. *There is no target in place for 2029/30. This year is included for reference and assumes no change in the 70% target.*

Although Table 10 demonstrates that CCBC's current waste and recycling service can reach the 2019/20 statutory recycling target of 64%; the recycling rate will fall short of meeting the next statutory target of 70% by 2024/25. It is expected that all other scenarios tested through the CBA model will provide a sufficient uplift in recycling rate to hit both 2019/20 and 2024/25 recycling targets.

Welsh Government are able to impose fines on authorities of £200 per tonne, for every tonne of material under the recycling target the service performs. The CBA model includes an analysis of the potential fines within the output. If CCBC continued with the current service, the CBA would expected potential fines of up to £450,000 to be imposed. It is therefore clear that CCBC's service should be developed in order to avoid missing recycling targets and potentially significant fines.

2.3 Environmental Impact of the Service

The environmental impact of each scenario has been calculated using details from various life-cycle studies and takes into account the details of materials collected, the fate of this material (recycling, refuse, organic treatment etc.) and also emissions for collection and onward transportation of material. Details of the assumptions used to calculate the environmental impacts can be found in the Business Planning Toolkit Guidance Document and in the Technical Annex to the 2011 report produced for WRAP on behalf of the Welsh Government on Kerbside Collection Options for Wales.[2,3]

Figure 16 shows the change in Greenhouse Gas (GHG) emissions over the CBA period compared to the baseline. Scenario 3 provides the greatest drop in GHG emissions by 2019/20, and again in 2023/24 when the service goes three weekly. Scenarios 4 and 5 eventually provide the same reductions by 2023/24, with a delay in reduction in scenario 5 due to not going three-weekly until 2023/24. Scenario 1 and 2 have a similar kerbside collection service to the baseline, and so limited GHG emission reductions are made under these options.

[2] *Eunomia (2011) Waste Management Business Plan Toolkit – Guidance Document, written on behalf of the Welsh Government, November 2011.*

[3] *Eunomia / Resource Futures / HWC (2011) Kerbside Collection Options: Wales, Final Report to WRAP*

Figure 16 - Change in GHG Emissions over Time Relative to the Baseline for Each Scenario

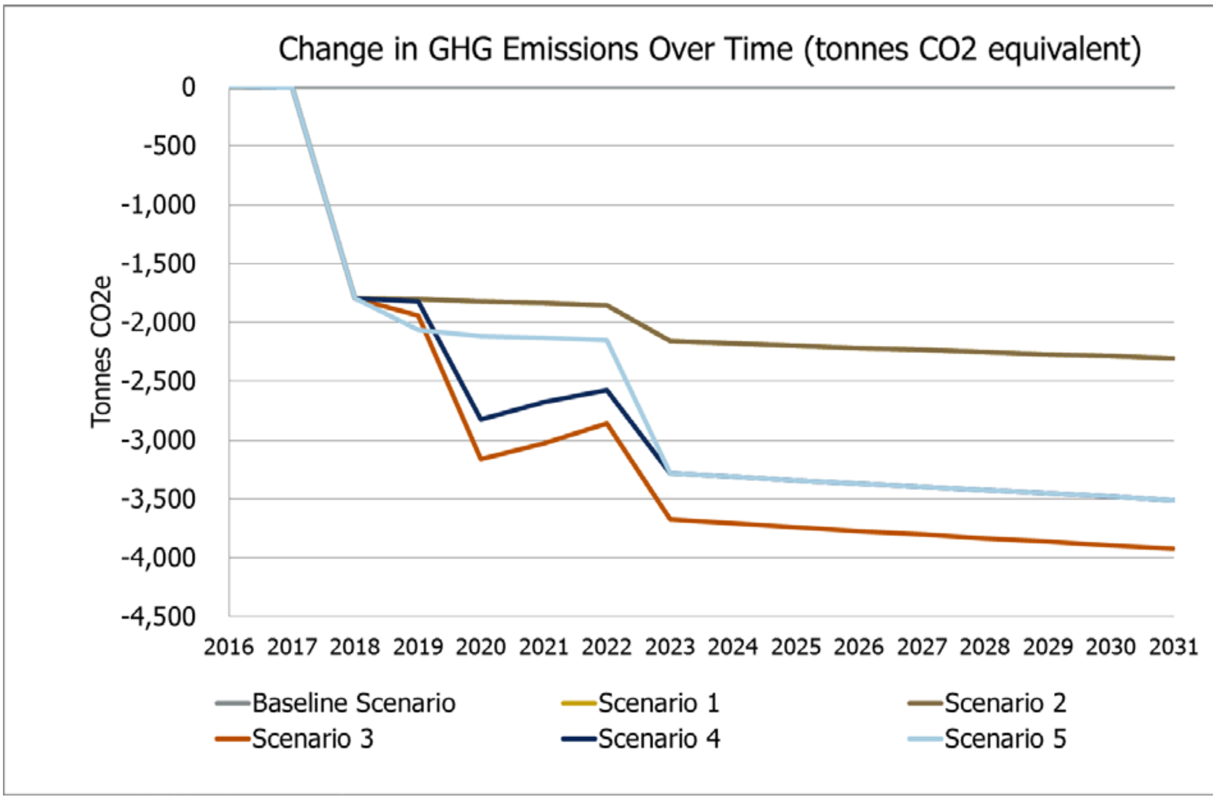
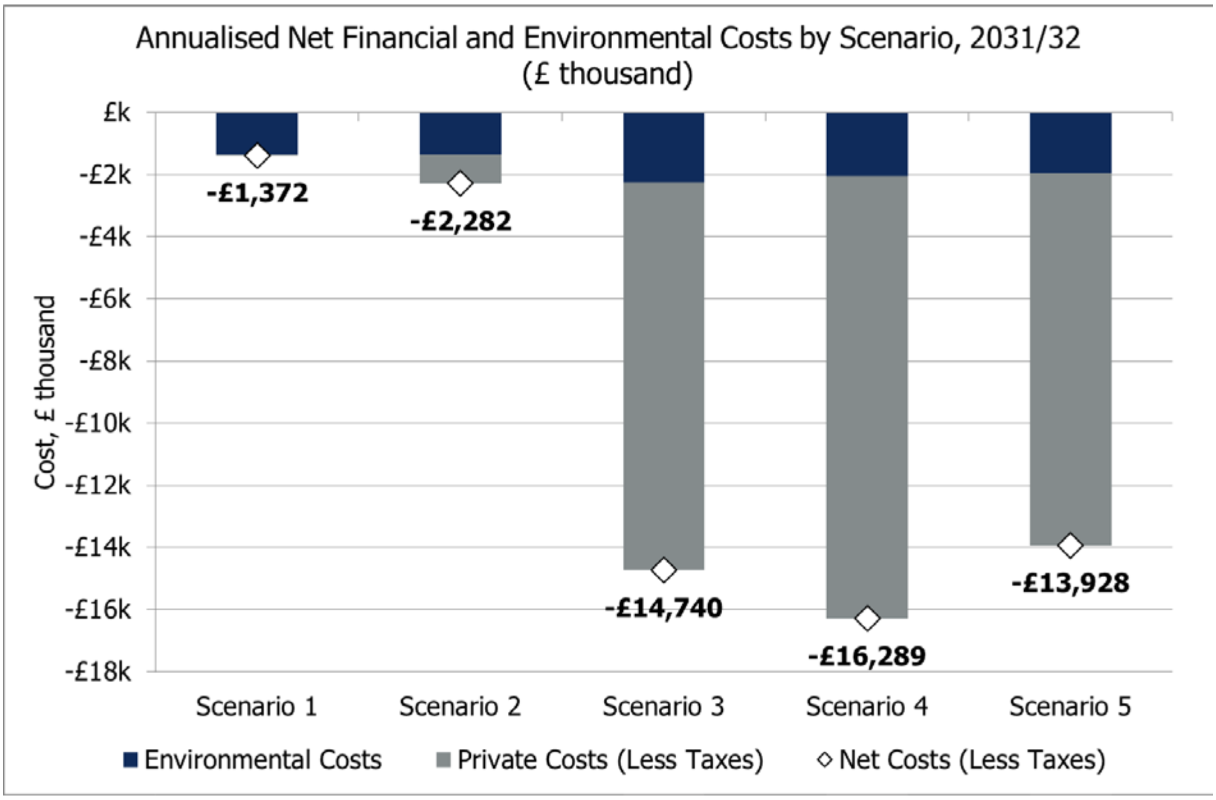


Figure 16 shows how Scenario 3 provides the greatest drop in GHG emissions by 2019/20, and again in 2023/24 when the service goes three weekly. Scenarios 4 and 5 eventually provide the same reductions by 2023/24, with a delay in reduction in scenario 5 due to not going three-weekly until 2023/24. Scenario 1 and 2 have a similar kerbside collection service to the baseline, and so limited GHG emission reductions are made under these options.

Figure 17 compares the combined finical and environmental NPV by scenario (note negative numbers indicate a saving against the baseline.

Figure 17 - Comparison of Combined Financial and Environmental NPV by Scenario, 2016-2030, NPV



2.4 Employment Generated by the Service

To support CCBC meeting the requirements of the Well-being of Future Generations Act (2015) and improve the employment opportunities through the delivery of waste and recycling services within Caerphilly, the employment generated within each Scenario has been analysed.

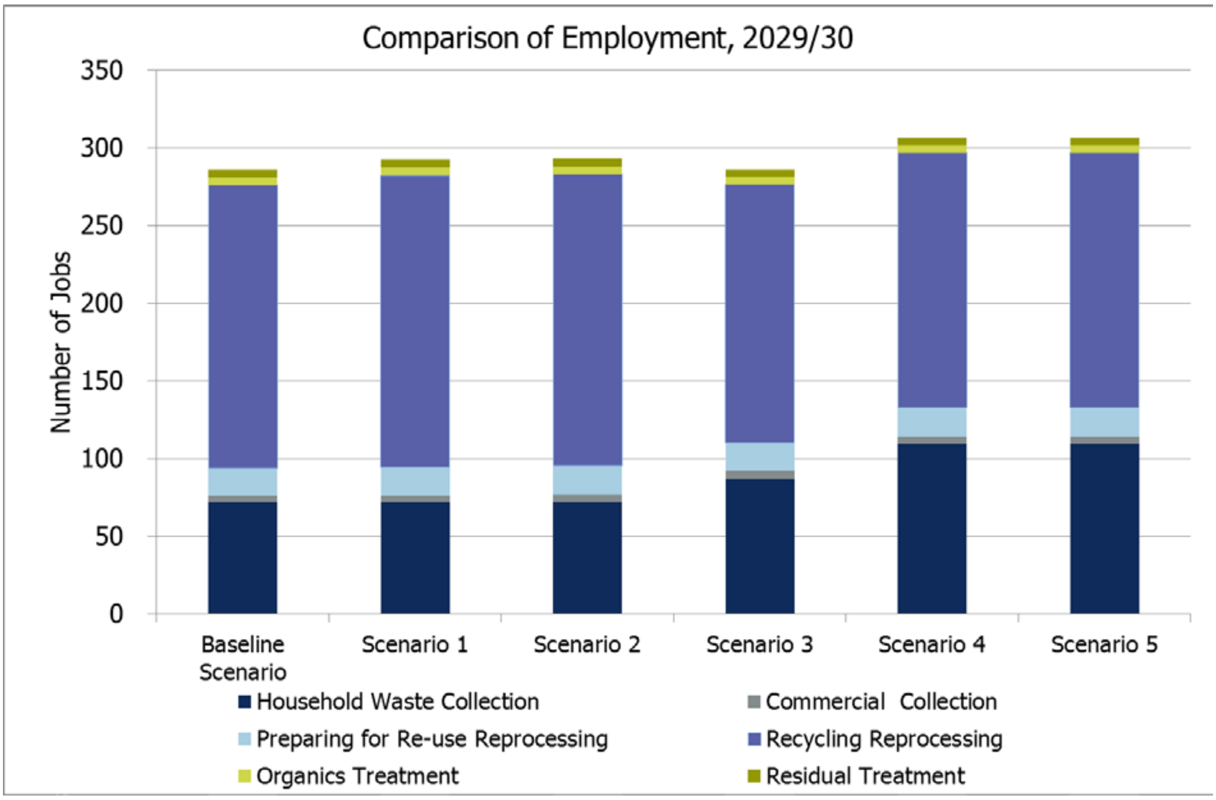
When analysing the employment generated by the delivery of each scenario the following areas have been examined:

- **Household Waste Collections** – The number of people employed in the collection of household waste from the kerbside and the management of this service. These figures are taken from the kerbside collection modelling carried out by WRAP and reflect the kerbside collection options chosen by CCBC.
- **Commercial Waste Collections –** The number of people employed in the collection of trade waste. In Scenarios 3, 4 and 5, where improvements to the commercial service are made, figures have been taken from Amec Foster Wheeler's modelling work.
- **Operations of HWRCs –** The number of people employed in the transfer station, depot and HWRCs
- **Recycling Reprocessing -** The number of people employed in the reprocessing of dry recycling collected as part of the waste and recycling service. This has been calculated by applying the number of jobs created per 1,000 tonnes of material to the tonnages of material collected. Therefore the number of people employed in this area is linked to the amount of material collected for recycling.

- **Organic Treatment –** The number of people employed in the treatment of organic waste collected as part of the waste and recycling service. As with the dry recycling, this has been calculated by applying the number of jobs created per 1,000 tonnes of material to the tonnages of material collected.
- **Residual Treatment -** The number of people employed in the treatment of residual waste collected as part of the waste and recycling service. As with the dry recycling, and organic treatment, this has been calculated by applying the number of jobs created per 1,000 tonnes of material to the tonnages of material collected.
- **Preparation for Re-Use -** The number of people employed in the treatment of residual waste collected as part of the waste and recycling service. As with the other reprocessing elements, this has been calculated by applying the number of jobs created per 1,000 tonnes of material re-used to the tonnages of material collected.

Figure 18 shows the maximum amount of people employed within each Scenario in 2029/2030.

Figure 18 - The Maximum Amount of People Employed in Each CBA Scenario in 2029/2030



It is clear in Figure 18 that the highest levels of employment are highest from scenarios 4 and 5, the main driver behind this being the increase in employment in association with operating the collections blueprint recycling collections. Household collections within Scenario 4 and 5 employ 109 FTEs, whereas Baseline, Scenario 1 and 3 employ 72 FTEs and Scenario 3 employs 87 FTEs.

Although Scenario 3, 4 and 5 provide less employment through recycling reprocessing, reducing from 174.2 FTE to 161.6 FTEs in Scenario 3 and 159.9 FTEs in Scenario 4 and 5, this is offset by the extra employment provided by collection operations.

3.0 Phase B CBA Modelling Results

As discussed in Section 1.2, following the presentation of the Phase A results of this project in July 2017, Eunomia were asked by CCBC and WRAP carry out additional Phase B CBA modelling work. Key changes between Phase A and Phase B were:

- The movement of the WTS
- from Full Moon to Trehir;
- re-assessment of HWRC strategy to reflect movement of WTS;
- understanding that a change to the kerbside collection service is required, therefore, only multi-stream and collections blueprint options to be analysed; and
- a desire to generate greater savings from service change.

For ease of reference, Table 7 of this report is repeated below.

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Kerbside Refuse and Recycling Services	Collections Blueprint Recycling Three weekly refuse introduced in 2023	Multi Stream Recycling Three weekly refuse introduced in 2023	Collections Blueprint Recycling Three weekly refuse introduced in 2023	Multi Stream Recycling Three weekly refuse introduced in 2023
HWRCs and WTS	• Upgrade Full Moon HWRC to Super HWRC • Expansion of Penallta and Aberbargoed HWRC • Rhymney and Penmaen to close • New HWRC at Trehir • New WTS at Trehir			
			Bryn Quarry no longer used to sort HWRC waste Black bag ban introduced to increase recycling from sites	
Commercial	• New commercial waste service commencing April 2019			

Within Phase B Scenario 1 and 2, the modelling aims to support the authority's understanding of the impact of changing the kerbside recycling service. These changes are then built upon in Scenario 3 and 4, where additional changes have been made to the HWRC service. The rationale behind these further modelled changes is:

- The use of Bryn Quarry to undertake additional post sort at HWRCs is modelled to incur significant cost at £130 per tonne. Therefore, as part of Scenario 3 and 4, this service was removed, reducing cost and also recycling performance. The cost of the staff working at the Rhymney and Penmaen sites was re-allocated to the remaining sites to increase the staff's ability to work with residents to divert more waste to recycling.
- In recognition of challenge increasing recycling at HWRCs within Caerphilly and also the potential additional pressure which could be placed on the service if three weekly collection were to be introduced, residual restrictions including a black bag ban are modelled to be introduced at all sites.

3.1 Cost of Service Delivery

3.1.1 Revenue Costs

In calculating the cost of service delivery, as with Phase A, we have transposed the costs of the scenarios and aligned this with the 2016/2017 budget. By doing this, we can relate savings and costs associated with the service to CCBC's budget lines. However, within Phase B of the project, it was recognised that to support decision making, additional CBA outputs would be required to more clearly show the modelled savings in each scenario before and after the introduction of three weekly refuse collections. Figure 19 shows the annualised saving attributed to undertaking all of changes within each scenario apart from implementing three weekly refuse collections.

Figure 19 – Annualised Phase B Scenario Costs Compared to Baseline Scenario (No Three Weekly Refuse Collections)

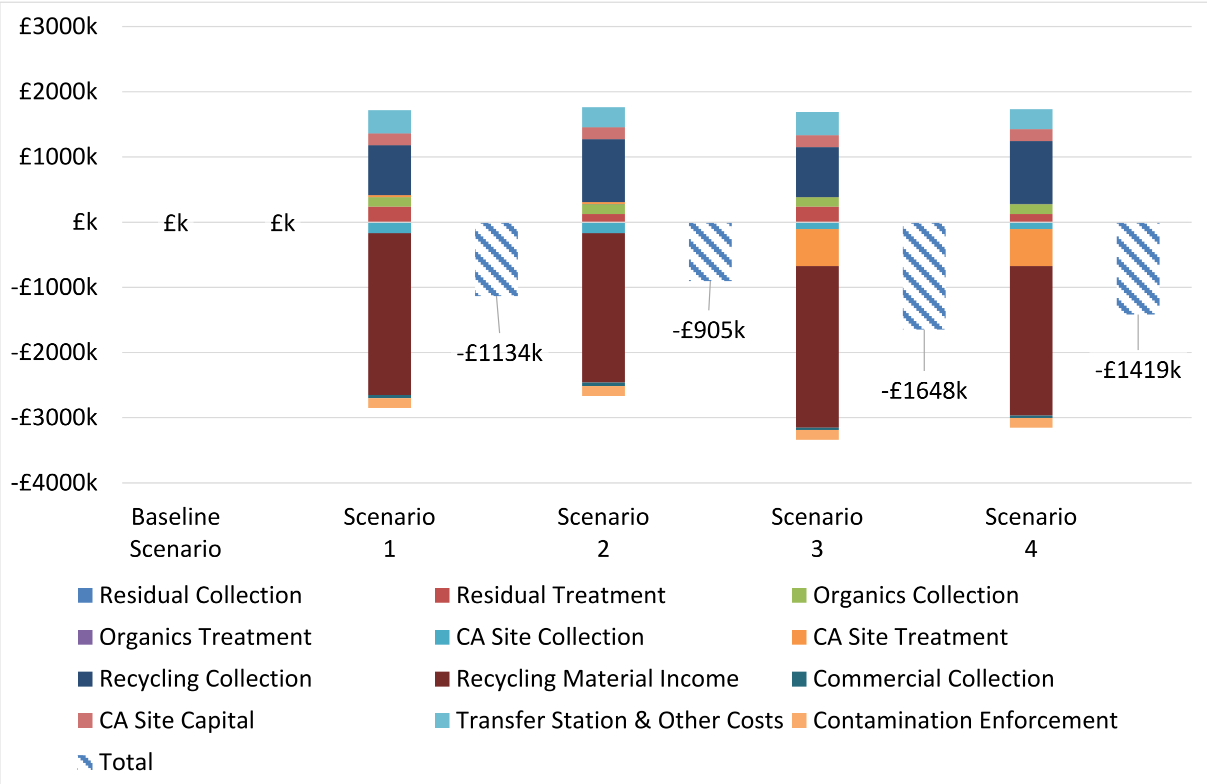


Figure 19 shows net savings of 1.134m from Scenario 1 and £9055k from Scenario 2 (the shaded bars) and additional savings of circa. £510k in Scenario 3 and 4 where Bryn Quarry is no longer used and a black bag ban has been introduced.

In all scenarios, the cost of recycling collections increase significantly (by £765k in Scenario 1 and 3 and £963k in Scenario 2 and 4), alongside an increase in transfer station costs due to the requirement for a new transfer station and sorting facility to be built. These additional costs are however, offset by the increase in income from the sale of dry recyclables by between £2.28m (Scenarios 2 & 4) and £2.47m (Scenarios 1 & 3), and by savings from reducing the budget required to address contamination (we modelled a conservative ongoing cost of £200k for this activity in Phase A of project, however this could reach £300k).

The cost differences between the Blueprint and Multi-stream scenarios are shown in Table 12 below. The Multi-stream options have higher annualised vehicle costs and lower recyclate income (due to the lower value of mixed paper and cardboard compared to separated material), outweighing savings in waste transfer station costs and residual disposal.[4]

It is recognised that material revenues are subject to fluctuation. Sensitivities were run on material revenues as part of the original WRAP collections options modelling, ensuring that fluctuations in material revenues did not significantly change the order or magnitude of savings modelled. The processing cost paid for the current dry recycling stream is a significant cost in the baseline and therefore the main source of savings when switching to source-segregated recycling system.
Savings from commercial waste changes are comparatively minor but common across all scenarios:

Table 11: Commercial Cost Differences: Common to All Scenarios (2019/20)

		Service Cost Change	Reason
Commercial Waste Collections	**Collections**	£59.0k	AFC modelled collection cost increase
	Income	-£18.7k	AFC modelled commercial revenue increase
	Material Revenues	-£74.7k	AFC modelled increase in recyclate tonnages collected
	Food Waste Treatment	£1.7k	AFC modelled increase in food tonnages collected
	Residual Disposal	-£17.7k	Reduction in disposal costs
Total Cost Difference		**-£50.4k**	

Savings from kerbside services are different between the Blueprint (Sc1 & 3) and the Multistream (Sc2 & 4) scenarios:

Table 12: Kerbside Cost Differences: Blueprint Service (1&3) to Multi-Stream Service (2&4)

		Sc1 & 3	Sc2 & 4	Difference Sc1 - Sc2	Reason for Difference Sc1 – Sc2
Enforcement Cost Differences		-£150k			
Collection Cost Differences	**Residual**	£5.5k	£5.4k	*-£0.1k*	Minor change in tipper costs modelled in KAT between options
	Dry Recycling	£765.3k	£963.5k	*£198.2k*	KAT modelled change
	Food Waste	£39.6k	£47.9k	*£8.3k*	KAT modelled change
	Garden Waste	£100.5k		-	
	Supervision,	£24.7k	£48.1k	*£23.4k*	KAT modelled

[4] In both systems, capture of targeted material is assumed to be the same. However, savings in residual treatment arise due to the fact that more contamination is still assumed to be collected alongside mixed paper and cardboard (so collected residual tonnages are reduced). Additionally, the incineration gate fee is higher at the higher tonnage bands, so this avoids approximately £100/tonne of residual treatment costs. The lower gate fee for mixed fibres takes into account the contamination in the material.

		Sc1 & 3	Sc2 & 4	Difference Sc1 - Sc2	Reason for Difference Sc1 – Sc2
	Overheads, Spares				change
Material Treatment and Revenues	**Kerbside recyclate income**	£2,477.8k	£2,289.6k	*£188.2k*	Less recyclate income due predominantly to lower value of mixed fibres
	Residual waste disposal	£233.5k	£116.9k	*£-116.6k*	Less residual waste collected (due to contamination collected alongside mixed fibres), at a high marginal residual waste gate fee (banding of prices to incinerator)
	Transfer station costs	£332.3k	£260.3k	*-£71.9k*	Reduced transfer station costs
Total Cost Difference		**-£1,077k**	**-£847k**	***£229.5k***	**Net additional cost**

Table 13 below shows a breakdown of HWRC savings.

In scenarios 1 & 2, the impact of a potential increase in gate fees at Bryn undermines the savings made from rationalising the network and introducing increased front-end recycling. The net capital and operational impact of rationalising and improving the HWRC network is minor, but it provides important improvements to the service and enables higher recycling captures.

In scenarios 3 & 4, additional staff investment maintains higher recycling captures than in scenarios 1 & 2, and the savings made in avoided disposal costs at Bryn is greater than the costs of residual disposal and treatment of more HRWC recycling streams.

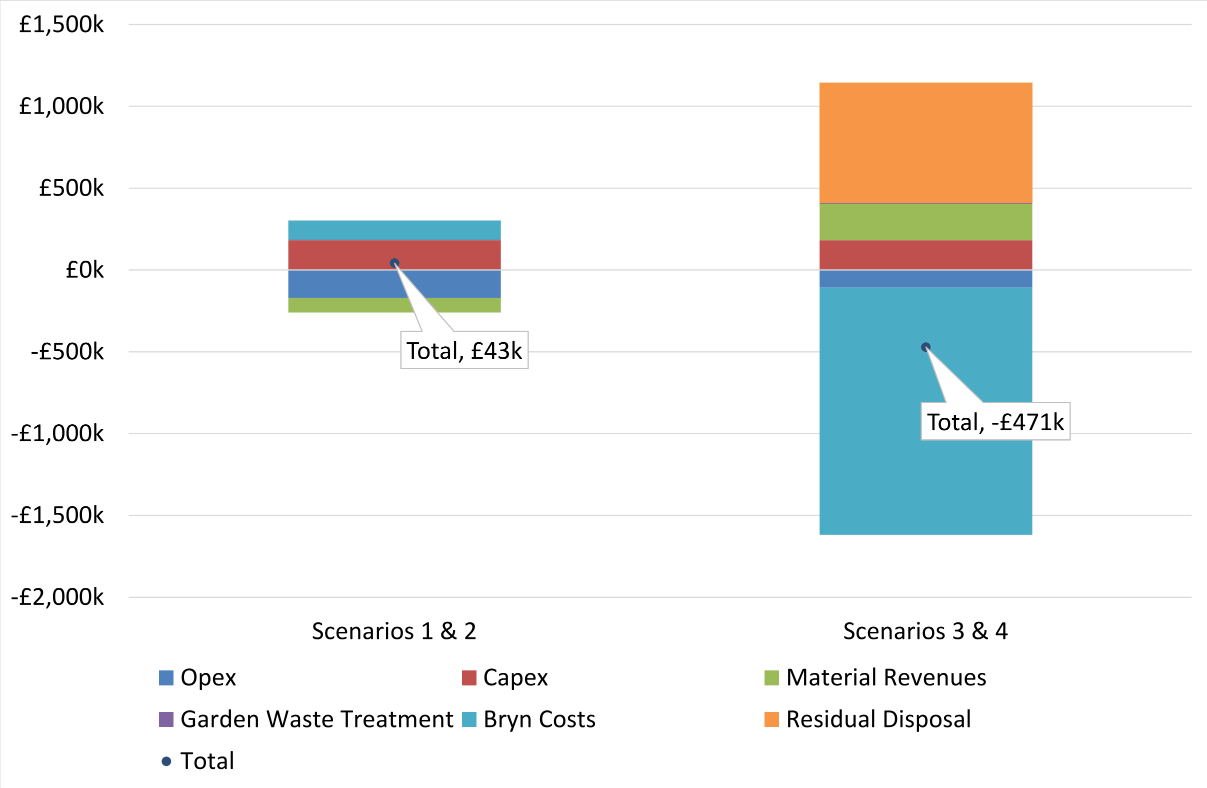


Table 13: Cost Difference: No HWRC Residual Restrictions (Sc1, Sc2) vs Residual Waste Restrictions (Sc3, Sc4)

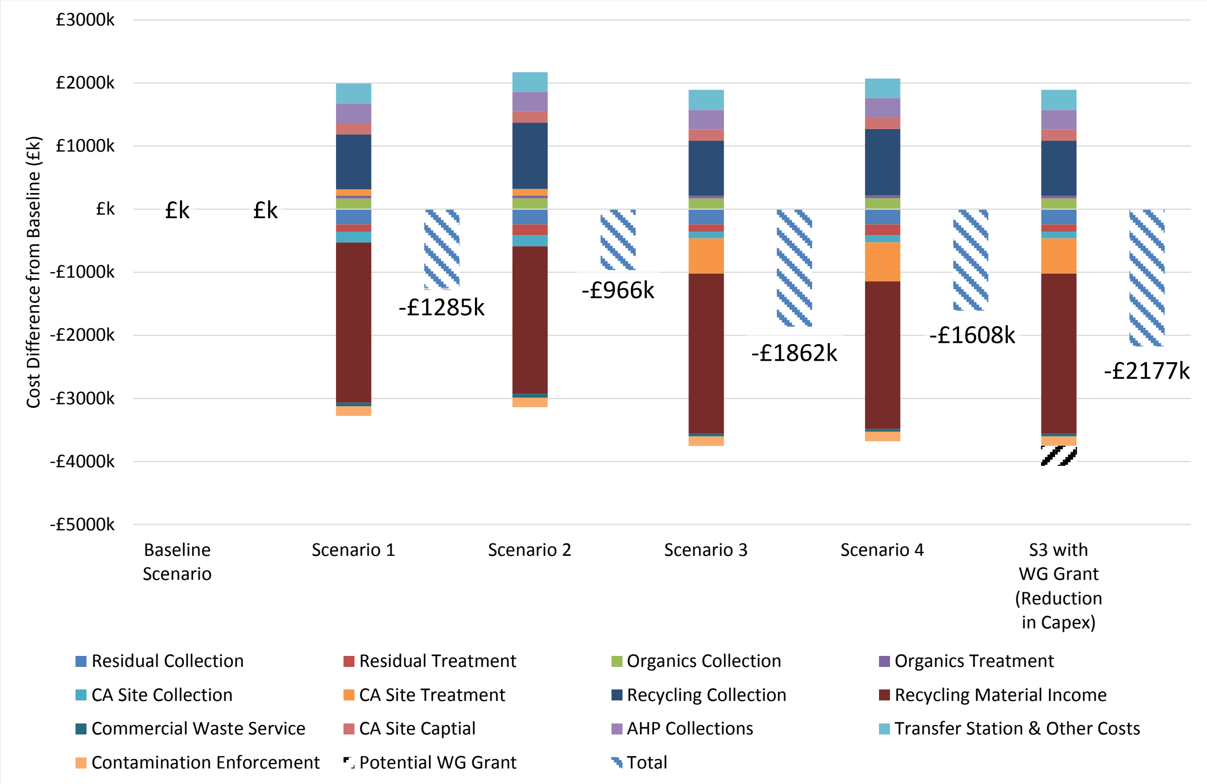
		Sc 1,2	Sc 3,4	Difference	Reason
Operating Cost Differences	**Operating Cost**	-£171.9k	-£107.8k	*£64.2k*	Reduced savings in Sc 3&4 due to redeployment of staff and maintaining current staffing levels
	Capital Costs	£181.8		-	
Material Treatment & Disposal Cost Differences	**Additional Treatment of HWRC Recycling**	-£87.5k	£223.1k	*£310.5k*	Sc 1 & 2 increase capture of higher-value recyclate. Sc 3 & 4 additionally pull out more expensive materials such as mattresses to keep recycling high
	Additional Garden Waste Treatment	£3.5k	£4.6k	*£1.1k*	Less residual waste collected (due to contamination collected alongside mixed fibres), at a high marginal residual waste gate fee (banding of prices to incinerator)
	Bryn Savings	£116.8k	-£1509.7k	*£1,626.4k*	Less recyclate income due predominantly to lower value of mixed fibres
	Residual Disposal	£0.0k	£736.6k	*£736.6k*	Less recyclate income due predominantly to lower value of mixed

					fibres
Total cost difference		**£42.7k**	**-£471.4k**	***-£514.1k***	

These savings are tabulated in more detail in Appendix 5.

Figure 20 shows the annualised saving attributed to undertaking all of changes within each scenario including the rollout of three weekly collections.

Figure 20 - Annualised Phase B Scenario Costs (With Three Weekly Refuse Collections)



When comparing Figure 19 and Figure 20, the financial impact of three weekly refuse collections can be isolated. These savings have been tabulated in Table 14.

Table 14 – Modelling Annualised Savings From the Introduction of Three Weekly Refuse Collections

Scenario	1	2	3	4
Modelled Savings from Three Weekly Collections	£151k	£61k	£214k	£189k

Table 14 highlights that the savings from introducing three weekly refuse collections are much higher in Scenarios 3 and 4 when compared to Scenarios 1 and 2. This is due to the modelled impact of the black bag ban within the HWRCs, minimising the movement of residual waste from the kerbside to HWRCs as capacity is squeezed and the capture of an amount of this displaced waste as recycling. With such a significant difference in the potential level of savings available to CCBC, it would be advisable for the authority to consider the introduction of a restricted residual waste policy at HWRCs before, or alongside, the implementation of three weekly residual waste collections, maximising the financial and performance impact of these changes.

The savings provided in Table 14 are lower than those normally associated with three weekly refuse collections, however, all of the three weekly scenarios also include the cost of the provision of a weekly Absorbent Hygiene Products (AHP) service. This service costs approximately £300k per annum and has thus reduced the potential savings from this change to the amount shown in Table 14.

An additional column has also been included in Figure 20 to analyse the impact of a £2m capital grant from Welsh Government for the purchase of the vehicles. Although this grant is by no means guaranteed, it is possible that a capital grant of this level could be provided by Welsh Government if CCBC were to move to the Collections Blueprint (Scenario 1 and 3), therefore, for illustrative purposes, the impact of this has been modelled against Scenario 3 (the Scenario with the greatest savings) as an annualised capital saving. The additional saving equates to £315k per annum for the first seven years of the new service. Following the purchase of these vehicles, the purchase of any additional or new vehicles at the end of the depreciation period would need to be included in future budgets.

3.1.2 Capital Costs

In terms of capital costs, there are many similarities between Phase A and Phase B, with the main differences being in the HWRC and WTS/depot costs as in Phase B Full Moon is developed into a super HWRC and a new WTS is modelled to be developed at Trehir. Phase B Capital costs are provided in Table 15.

Table 15 – Phase B Scenario Collection Costs (Fortnightly Residual)

	Vehicles	HWRC	Depot	Containers	Cost of Change	Total
Scenario 1	£3.12M	£3.35M	£2.21M	£0.78M	£0.5M	**£9.96M**
Scenario 2	£2.28M		£2.12M	£0.64M		**£8.90M**
Scenario 3	£3.12M		£2.21M	£0.78M		**£9.96M**
Scenario 4	£2.28M		£2.12M	£0.64M		**£8.90M**

Note that:

- Scenario 2 and 4 capital costs are lower due to the re-allocation of 9 existing twin-back vehicles;
- WTS capital costs include £1.6M for the works, £0.43M for a sort-line and baler and £40k (Sc 1 & 3) - £120k (Sc 2 & 4) for forklifts;

For three-weekly collections, additional capital would be required for:
four additional tippers (total £180k);
additional recycling vehicle (120k for one additional RRV in Scenarios 1 and 3, and £350k for two additional twin-back vehicles in Scenarios 2 and 4).

The three-weekly total capital cost for Blueprint scenarios is £10.26M compared to £9.44M for the Multi-stream scenarios.

The combined capital costs of HWRC and WTS/Depot works are higher in the Phase B modelling due to the more extensive works at Full Moon and the new WTS at Trehir

The capital requirements differ from Phase A modelling only in the HWRC and WTS capital costs.

As discussed in Section 3.1.1, with Scenario 1 and 3 there is the potential opportunity for CCBC to apply for Welsh Government funding for capital assets such as vehicles. As the availability of capital funding is not guaranteed, early engagement with Welsh Government and clear political and officer commitment would be recommended to maximise the likelihood of receiving additional support with these purchases.

3.2 Performance of the Service

As within Phase A of the project, all of the Phase B scenarios have been designed to increase CCBC's recycling performance, supporting the authority in meeting the Welsh Government targets of a 64% recycling rate by 2019/2020 and a 70% recycling rate by 2024/2025. However, due to the different interventions within each scenario, and the timings of these, the overall performance of each scenario does vary.

In analysing CCBC's current recycling performance in more detail, with the aim of understanding if any further increases in performance could be made, we have made two adjustments to the current baseline position:

3. A more conservative reduction in the MRF reject rate is modelled, from 30% to 25% (rather than down to 15% as previously modelled in Phase A), reflecting ongoing reported issues with the current co-mingled material despite current enforcement efforts. This has an approx. 1.5% impact on baseline recycling rates.
4. Where Bryn Quarry is used, the reported recycling rate of 77% has been replaced by the maximum estimate of 42% in the baseline and 30% in options 1 and 2. This based on a high-level assessment of composition of the Bryn-recycled materials, based on the recent compositional work. With increasing pressure on the wider industry to produce high quality outputs, the risk that the contribution of the sorting undertaken by Bryn Quarry is reduced needs to be accounted for in our modelling. This adjustment has resulted in a 4% reduction in the baseline position.

Although this adjustment to baseline position represents a worst case scenario for CCBC, it is important that this risk is taken into account as part of any assessment of a future 'no change' baseline scenario.

A summary of the modelled recycling performance for each future Scenario can be found in Table 16.

Table 16 – Phase B Scenarios Recycling Rate Performance

Scenario	B/L	1	2	3	4
Recycling Rate – Fortnightly Residual Waste	62%	65%	65%	67%	67%
Recycling Rate – Three Weekly Residual Waste	-	68%	68%	70%	70%
NB: AHP Recycling (rather than disposal) under 3W collections could increase recycling rate by further 1%					

Based upon the more conservative baseline position used in Phase B, in all scenarios CCBC still meet the 2019/2020 target of 64%. However, as within Phase A the modelling demonstrates that 2024/2025 statutory recycling targets of 70% can only be met by moving to three weekly refuse collections. The potential annualised financial liability to CCBC of the 2024/2025 recycling targets not being met are provided in Table 17.

Table 17 – Phase B Scenarios - Potential Rate Fines

Scenario	B/L	1	2	3	4
Fortnightly Residual Waste	£1.7m	£1m	£1m	£650k	£650k
Three Weekly Residual Waste	£1.7m	£430k	£430k	-	-

3.3 Environmental Impact of the Service

As in Phase A, the environmental impact of each scenario has been calculated using details from various life-cycle studies and takes into account the details of materials collected, the fate of this material (recycling, refuse, organic treatment etc.) and also emissions for collection and onward transportation of material.

However, as Phase B focuses on a point in time impact, the outputs for this phase have been tabulated in Table 18 as opposed to being shown graphically over time. For the purposes of our analysis we have used impact in 2020/2021. Changes would be incremental over time following any significant changes in the approach to the way waste and recycling is collected and reprocessed/disposed of.

Table 18 – Environmental Saving of Each Scenario Expressed as Tonnes per CO_2 Equivalent Compared to Baseline

Scenario	Fortnightly	With Three Weekly
Scenario 1	-9,270	-10,148
Scenario 2	-10,856	-11,922
Scenario 3	-14,793	-15,670
Scenario 4	-16,379	-17,443

3.4 Employment Generated by the Service

As in Phase A, to support CCBC meeting the requirements of the Well-being of Future Generations Act (2015) and improve the employment opportunities through the delivery of waste and recycling services within Caerphilly, the employment generated within each Phase B Scenario has been analysed.

Table 19 shows the maximum amount of people employed within each Phase B following rollout of the new service.

Table 19 – Employment Generated Following Rollout of Services – 2021/2022 Used as Reference Year

Scenario	Fortnightly	With Three Weekly
Baseline	269	269
Scenario 1	291	291
Scenario 2	273	274
Scenario 3	283	286
Scenario 4	267	268

It is clear in Table 19 that the highest levels of employment are highest from the Collections Blueprint scenarios (1 and 3). As in Phase A, the main driver behind this being the increase in employment in association with operating the collections blueprint recycling collections.

4.0 Conclusions

In conclusion all scenarios modelled will allow CCBC to make significant savings on their baseline budget position. However, the decision to make such substantial changes to the way in which services are delivered is not purely financial, other issues such as operational and delivery risks need to be considered. With the right planning and support (potentially funded via the WRAP CCP programme), most of these risks can however be largely controlled and/or mitigated.

If CCBC do decide to move towards a three weekly refuse service in the future (as this is the most cost effective option), it would be advisable for the authority to consider the introduction of a restricted residual waste policy at HWRCs before, or alongside, the implementation of three weekly residual waste collections, maximising the financial and performance impact of these changes.

CCBC do however, need to be cognisant of risks outside of their control such as the risk of fines from Welsh Government and the ever changing materials reprocessing markets, all of which will have an impact on the medium to long term sustainability of a 'do nothing' approach.

In terms of next steps, we would recommend that CCBC undertake a full analysis of the risks associated with all scenarios, examining the potential impact of those both inside and outside of the authority's control, allowing a balanced approach to be taken to the opportunities for the future development of the authority's waste services.

Appendix A - Modelling Assumptions

A.1 Household Numbers

Data was provided by CCBC for low and high forecasts of housing developments, initially over 5 years from 2016, and then further beyond. Details on the number of small scale site completions are expected at a rate of 50 per year. This data was provided by Victoria Morgan (Principle Planner).

It is assumed that the planned developments will be completed in a linear fashion, and the model apportions the developments over the years used in the model. It has been assumed that small scale developments have 8 properties per site. These have been included annually.

Table 20 details the number of properties assumed in the model for each year[5]. The low forecast has been used within the model.

Table 20 - Caerphilly Household Projections

Year	No. of Households
2015/16	78,197
2016/17	79,672
2017/18	80,410
2018/19	81,148
2019/20	81,885
2020/21	82,623
2021/22	83,403
2022/23	84,183
2023/24	84,964
2024/25	85,744
2025/26	86,524
2026/27	87,304
2027/28	88,084
2028/29	88,865
2029/30	89,645
2030/31	90,425

A.2 Prevention and Preparation for Re-Use

As part of each scenario, policy enforcement will be undertaken with the aim to decrease contamination from 2018. CCBC provided Eunomia with two options for policy enforcement and associated costs. The policy enforcement option would involve teams visiting properties

[5] *The Rt Hon Brandon Lewis MP (2014) Written statement to Parliment Small-scale developers*

in Caerphilly. Each team would include; 1 Waste Advisory Officer, 1 Driver, 1 R&C operative and a vehicle.

The policy enforcement approach modelled utilises 2 enforcement teams over a 5 year period, to allow for full coverage of the borough over that period with a repeat visit to 50% of properties. The approximate cost of this is assumed at £200,000 p.a. for 5 years.

Enforcement work will focus, in the main, on reducing contamination rather than solely on increasing recycling tonnages. It is assumed that the target of this enforcement would be to reduce the current high level of contamination (as indicated in the recent input compositions reported to MF portal) and subsequent high rate of rejection from the facility.

A new dry recycling offtaker contract would charge the authority more to achieve recycling rates higher than 70%. Recent sampling work, undertaken by the offtaker and reported to CCBC, has suggested that up to 90-95% of material collected is potentially recyclable.

For the purposes of modelling in the CBA, we assume the impact of enforcement work (and/or the change in MRF) is to bring contamination and subsequent rejects in line with average performance. The assumption of this impact was scaled back for Phase B. This both transfers some contamination into the residual stream, and increases the amount of target material recycled from collections. We also assume a 1% year-on-year target material capture increase is sustained for the five years of the initiative.

In options which switch away from a co-mingled system, the 1% target increase is assumed to be sustained over the remainder of the five year period with a reduced budget of £50k for additional ongoing resident engagement.

Table 21 - Impact of Policy Enforcement

Enforcement		
	Contamination	MRF Rejection Rate
Current	15%	30%
2022/23 (Phase A)	10%	15%
2022/23 (Phase B)	12.5%	20%

As part of the recycling and collection services modelling, there have been no predicted improvements to the kerbside bulky waste or re-use collection tonnages. Currently the majority of re-use is generated through CCBC's network of Bring Sites. This service has not be considered in any of the 5 scenarios.

Modelling work undertaken by Resource Futures hasn't taken into consideration an increase in re-use at HWRCs. No further modelling of this was undertaken as part of the CBA. It is not expected that there will be any increase in the amount of re-use at HWRCs without a serious drive, or improvement in collection facilities. There is currently no infrastructure at HWRCs to set up a re-use drop off point. However, re-use should be considered when designing the "super site" and would further increase CCBC's ability to meet the 70% target

A.3 Recycling and Collection Services

A.3.1 Kerbside Waste and Recycling Collections

Waste Flows
The baseline waste arisings were taken from 2016/17 WasteDataFlow (WDF). The service changed mid-way through this year to introduce separate food and garden waste collections – however, since it is too early to establish a year-round assumption regarding the eventual split and capture of food and garden waste, the assumption of food and garden split remains that used within the KAT modelling.

The Enhanced Baseline as modelled in the KAT work has been used as the baseline KAT scenario from 2017/18 within the CBA model, reflecting the KAT-modelled cost and performance of the separated organics collection over the whole year. Table 22 compares the baseline kerbside-collected tonnages taken from WDF 2016/17 with the calculated tonnage outputs from the Enhanced Baseline scenario and the tonnages modelled within the CBA. The CBA uses co-mingled and residual kerbside household tonnages from WDF but adjusted to align with revised estimates of commercial collected waste. Food and garden waste yields are same in kg/hh terms as in KAT.

Table 22 - Baseline 2016/2017 Household Kerbside Collection Tonnages

Material	KAT Enhanced Baseline (2015/16)	2016/17 WDF Tonnages	CBA Enhanced Baseline 2016/17
Hhlds	**77,614**		**78,935**
Co-mingled	17,884	18,690	18,482
Food	6,343	3,094	6,452
Garden	5,190	450	5,279
Mixed Food and Garden	-	7,766	-
Residual	27,635	26,192	27,796
Total	**57,261**	**56,192**	**57,261**

Source: CCBC WDF 2016/16 & KAT modelling

Service Costs
Baseline service costs for 16/17 have been taken directly from CCBC's budget monitoring sheeting provided by Tony White. The baseline budget can be found in Table 23. Service costs savings in the CBA reflect those modelled within WRAP KAT modelling, and are applied to the budget lines below.

Table 23 - Caerphilly Waste Kerbside Collection Budget 2016/17

Area	Category	Budget
Residual	Collection	£1,302,011
	Treatment	£37,000
	Disposal	£1,430,933
Dry Recycling	Collection	£1,259,429
	Treatment	£2,012,757
Organics	Collection	£1,077,585
	Treatment	£505,094
Bulky	Collection	£52,688
	Treatment	£92,882
Other Associated		£50,914
Transfer Station		£134,694

In KAT, costs are modelled for a 'baseline' year (reflecting the service as it was in 2015/16) and an 'enhanced baseline year' (as it would be in 2017/18).
Due to the introduction of the separate garden and food waste collections halfway through 2016, the budget costs for 2016/17 are assumed to already incorporate half of the cost impacts of switching to the enhanced baseline. A 'KAT current service' equivalent cost was therefore modelled for the organics collections service (at the mid-point between the costs of organics collections under the baseline and the enhanced baseline service), as shown in Table 24.

Table 24 – Baseline Organics Collection Costs

Category	KAT Baseline	KAT Enhanced Baseline	KAT Current Service
Collection	£1,002,215	£1,084,645	£1,043,430

An additional modelling exercise has been completed to inform assumptions around the need for additional resources as household numbers increase. Vehicle requirements were modelled through KAT, and assessed at housing growth of 1400 and 2800. It was assumed that when growth reached these figures the vehicles capacity shown in Table 25 would be required.

Table 25 - Vehicle Uplift with housing growth

Service	+1400	+2800
Baseline, Scenario 1 & 2		
Recycling	0.1	0.2
Food/Garden	0	0.2
Residual	0.1	0.1
Scenario 4 & 5		
Recycling/Food	0.4	0.5
Garden	0	0
Residual	0.1	0.1
Scenario 3		
Recycling	0.2	0.2
Recycling/Food	0.1	0.2
Garden	0	0
Residual	0.1	0.1

It has been assumed that when vehicle requirement reaches 0.2 of a vehicle above the existing resource, an additional vehicle would be required to complete the round. Whole vehicle numbers as used within the CBA are shown in Table 26.

Table 26 - Number of vehicles required each year

Service	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27
Baseline, Scenario 1 & 2											
Recycling	9	9	9	9	9	9	10	10	10	10	10
Food	7	7	7	7	7	7	7	7	7	7	7
Garden											
Residual	7	7	7	7	7	7	7	6	6	6	6
Tipper	5	5	5	5	5	5	5	5	5	5	5
Total	**28**	**28**	**28**	**28**	**28**	**28**	**29**	**28**	**28**	**28**	**28**
Scneario 4 & 5											
Recycling		21	21	21	21	21	21	22	22	22	22
Food											
Garden		4	4	4	4	4	4	5	5	5	5
Residual		7	7	7	7	7	7	6	6	6	6
Tipper		5	5	5	5	5	5	5	5	5	5
Total		**41**	**41**	**41**	**41**	**41**	**41**	**43**	**43**	**43**	**43**
Scenario 3											
Recycling		18	18	18	18	18	20	20	20	20	20
Food											
Garden		4	4	4	4	4	4	5	5	5	5
Residual		7	7	7	7	7	7	6	6	6	6
Tipper		5	5	5	5	5	5	5	5	5	5
Total		**34**	**34**	**34**	**34**	**34**	**36**	**36**	**36**	**36**	**36**

A.3.2 Fuel Costs

The price of diesel was assumed at £1.15 per litre. As part of the KAT modelling, annual miles of each service were provided, this annual figure was used to calculate the cost of fuel per vehicle. When an additional vehicle has been modelling, the same annual mileage has been used, and fuel costs have been calculated in the same way.

A.4 Waste Transfer Station

The capital costs for undertaking WTS redevelopment for Phase A were provided through Resource Futures. Phase B costs for a new Trehir WTS have been estimated at a high level based upon comparative costs, and a more detailed costing is recommended.

These costs have been annualised, in agreement with CCBC over 25 years and an interest add in of 2.5% pa.

Table 27 - Caerphilly WTS Redevelopment Capital Cost Assumptions

Category	Phase A		Phase B (Blueprint/Multi stream WTS)
	Co-mingled WTS	Blueprint/Multi-stream WTS	
FM Depo Improvements	£430k	-	-
FM WTS Redevelopment	-	£1,343k	-
Trehir Depot and WTS	-	-	£1,660k
Total	**£430k**	**£1,343k**	**£1,660k**
Annualised	**£23k**	**£72k**	**£90k**

A depot cost assessment was provided by WRAP calculating additional operating costs for the Blueprint (£242k) and Multi-stream (£170k) depot configurations compared to current depot costs. This is reproduced below in Table 28.

Table 28 - Caerphilly WTS Operational Cost Assumptions (Above current operational costs)

	Co-mingled WTS		Blueprint/Multi-stream WTS	
Operational factor	Qnty	Annual revenue equivalent	Qnty	Annual revenue equivalent
Fork lift trucks	3	£17,143	1	£5,715
Shovel loaders x 2 (redeployed from FM)				
Baler (inc. installation)	1	£28,333	1	£28,333
Equipment maintenance costs		£10,000		£8,000
Power		£2,000		£2,000
Baler wire (£3/tonne baled and estimated 3ktpa to be baled)		£9,000		£9,000
Fork lift drivers	3	£75,000	1	£25,000
Teleporter & Driver	1	£25,000	1	£25,000
Baler operatives	2	£50,000	2	£50,000
Yard manager (£35k)	1	£35,000	1	£35,000
Overheads (10% staff costs)		£18,500		£10,000
Total (estimate)		**£241,976**		**£170,048**
Comingled Recyclate Processing Saving identified in KAT		**-£28,000**		**-£28,000**

modelling				

The capital requirement is different for each option (though this capital is annualised in the table above), because of the requirement for a sortline and baler for the cans and plastics stream, and between one and three additional forklifts.

A.5 Household Waste Recycling Centres

A.5.1 Waste Flows

For Phase A, Waste Flows have been taken directly from Resource Futures HWRC review and no additional assumptions have been made to this data, with the exception of a transfer of kerbside residual waste tonnage to the HWRC network when three-weekly collections are introduced (as modelled in KAT).

Without assumptions regarding implementation of strict residual waste policies at the HWRC (a focus on design and staffing) it is assumed that this is collected as residual waste at the HWRC and incurs additional costs equivalent to this material being incinerated.

For Phase B, recycling captures from HWRCs were revisited and capture rates for different materials taken from best-practice HWRC performance alongside well-implemented residual waste policies. The net result still only brings the on-site recycling rate from 48% baseline to 76%, which is well below best practice performance in Wales – though some of the remaining residual waste may be displaced back into the kerbside due to the impact of a black bag ban. Table 26 below shows resulting assumptions regarding tonnages captured.

Table 29 – Recycling Collected in HWRC Network, Baseline, Phase A, and Phase B (tonnes)

Category	Waste Type	Current	Phase A	Phase B: With Residual Policies	Est. Phase B capture rate
	Mixed glass		129	251	85%
Paper	Paper		258	258	95%
	Card	194	478	1,115	
Plastics	Mixed Plastics			144	70%
	OTHER PLASTICS [7]		102	861	50%
Organics	Green Garden Waste Only	1,961	2,068	2,102	99%
Wood	Wood	4,432	4,732	4,840	95%
WEEE	WEEE	1,004	1,178	1,178	100%
	Other Scrap metal	682	966	1,030	85%
Furniture	Furniture			368	50%
Construction	Rubble	4,982	5,532	6,047	95%
	Soil		121	121	95%
	Plasterboard	294	294	416	-
	Mineral Oil	29	29	29	-
	Mattresses			643	95%
	Carpets			1,338	90%
	Textiles & footwear		436	443	36%
	Other materials (batteries, foil, cans, scrap metal)		20	262	80%
Residual waste		14,717	11,953	6,850	-
Total		**21,446**	**21,446**	**21,446**	**-**
On-site recycling rate		**48%**	**58%**	**76%**	**-**

A.5.2 Service Costs

Baseline service costs for 16/17 have been taken directly from CCBC's budget monitoring sheeting provided by Tony White. The baseline budget can be found in Table 30.

Table 30 - Caerphilly HWRCSite Budget 16/17

Area	Category	Budget
HWRC Sites	Collection	£967,764
	Treatment	£1,998,588

The capital costs for undertaking HWRC network rationalisation and improvements has been taken directly from Resource Futures' work. Resource Future's work provided capital costs for redeveloping Aberbargoed, Penmaen and Trehir as well as improvement works on Full Moon. These costs have been annualised, in agreement with CCBC over 25 years and an interest add in of 2.5% pa.

Table 31 - Caerphilly HWRCSite Redevelopment Capital Cost Assumptions

Category	Phase A		Phase B
	Co-mingled	Blueprint/Multi-stream	
Aberbargoed Expansion	£180k	£180k	£180k
Penmaen Expansion	-	£310k	-
Penalta Expansion	-	-	£360k
FM HWRC Improvements	£280k	-	£1,260k
Trehir HWRC	£1,550k	£1,550k	£1,550k
Total	**£2,010k**	**£2,040k**	**£3,350k**
Annualised	**£109k**	**£110k**	**£182k**

Annual operating costs savings from reducing the number of HWRC sites were provided by Resource Futures from their work. For Phase B, staff are assumed to be redeployed across just four sites to maximise recycling and enforce residual policies.

Table 32 –HWRC Site Operating Costs

	Current	Phase A Network Rationalisation	Phase B Network Rationalisation
Staff	£400k	£336k	£400k
(Staff positions)	11	7 + £30k additional supervisor costs	11
Other Operating Costs	£378k	£270k	£270k
Total Operating Costs	**£780k**	**-**	**£670k**

A.6 Commercial Collections

A.6.1 Waste Flows

The waste flows for the kerbside commercial waste service have been taken directly from modelling completed by Amec Foster Wheeler (AFW).

A.6.2 Service Costs

Baseline service costs for 16/17 have been taken directly from CCBC's budget monitoring sheeting provided by Tony White. The baseline budget can be found in Table 33.

Table 33 – Caerphilly Commercial Waste Service Budget 16/17

Area	Category	Budget
Commercial	Collection	£254,402
	Treatment	£303,827
	Income	-£993,920

A split has been added to commercial waste budget in order to identify the costs of operating refuse and recycling collections. This has been based off work completed by AFW. 6% of costs are associated with recycling operations, and the remaining 94% are associated with refuse collections.

In the CBA, the kerbside service costs within the KAT modelling have been adjusted to remove the estimated costs of collecting commercial waste (since these costs are estimated separately). Additionally, the level of commercial waste collections resource included within KAT modelling changes in scenarios when a three-weekly service is introduced, as the kerbside service is assumed to service half of the current trade waste customers, the remaining half serviced by an additional vehicle. The accounting approach for taking the commercial collections cost out of the KAT modelling is defined as follows:

Kerbside Residual Service	Operations	KAT Collection Cost Attributable to Trade Waste
Baseline and Fortnightly Collection	3,352 tonnes collected from trade (11% of total kerbside residual tonnage collected)	Current Cost Estimate = 11% * Residual Kerbside Collection Cost
3-weekly Collections	Half trade customers assumed to be collected by separate vehicle	3-Weekly Cost Estimate = 0.5 * Current Cost Estimate

A.6.3 Bring Site Provision
It was agreed with WRAP and CCBC that within the CBA it should be assumed that that bring site performance is un-changed from the baseline provision. Baseline tonnages have been taken from 2016/17 WDF data. CCBC budget lines do not include a separate service cost for Bring Sites.

A.7 Residual Waste

A.7.1 End Destinations
Table 34 shows the residual waste treatment and disposal routes assumed within the CBA, based on baseline waste data reported to WasteDataFlow for the year 2016/17.

Table 34 - Assumed Residual Waste Treatment Split

Treatment destinations for residual waste (16/17 onwards)	% of waste		
	Collected Residual	Rejects from MRF	Rejects from Bryn Quarry
Landfill	39.2%		56.2%
Incineration	84.8%	100%	43.8%

Source: Caerphilly WDF 16/17

Table 35 shows the assumed percentage of material sent for incineration which is recycled.

Table 35 - Assumed Percentage of Material Sent for Incineration which is Recycled

Recycling from incineration (16/17 onwards)	% of input tonnage waste	
	Collected Residual	Rejects
Incinerator bottom ash	17.6%	16.5%
Recovery of metals	3.7%	3.2%

Source: Caerphilly WDF 16/17

A.7.2 Disposal Costs

Table 36 details the disposal costs for residual waste used within the CBA in, with Table 37 showing the landfill tax forecasts over the period of the CBA. Total incineration gate fee costs have been calculated annually based on the tonnage input modelled, and a WG subsidy equivalent to £20/tonne for tonnages in bands 0 and 1 has been netted off the cost.

Table 36 - Residual Waste Disposal Costs

Service Element	£ per tonne	
Incineration Band 0	£79.86	0 - 24,840 tpa
Incineration Band 1	£64.01	24,841 -31,090 tpa
Incineration Band 2	£97.24	31,091 - tpa
Landfill	£17.50 + LF tax	
Haulage	£5-£6	

Source: Tony White, CCBC

Table 37 - Landfill Tax Costs within CBA

Year	Landfill tax, 2016 real terms
2016/17	£84.40
2017/18	£86.10

2018/19 onwards	£88.95

Source: HM Revenue and Customs, Published landfill tax rates[6]

A.8 Dry Recyclables

A.8.1 Income and Gate Fees

The modelled income and cost for the kerbside dry recyclables can be found in Table 38 and Table 39. A separate sensitivity analysis was run on the original KAT modelling to demonstrate the impact of varying recyclate incomes per tonne. The co-mingled gate fee from 2017/18 has been amended to reflect the new contract amendment.

Table 38 – Kerbside Dry Recycling Income

Material	Cost, £ per tonne
Co-mingled (Current)	
Co-mingled	£87
Haulage	£5
Co-mingled (July 2017)	
Co-mingled	£57
Haulage	£26

Source: Tony White, CCBC

Table 39 - Kerbside Dry Recycling Income

Material	Income, £ per tonne
Separated	
Paper	£75
Card	£72.5
Glass	£5
Plastic	£45
Steel	£40
Aluminium	£610
Textiles	£375
Twin Stream (loose)	
Fibres	£50
Containers (inc. Glass)	-£35
Twin Stream (bagged)	
Fibres	£35
Containers (inc. Glass)	-£50
Plastics & cans (ex. glass)	£10

Source: WRAP KAT Modelling

The modelled income received for the HWRC dry recyclables can be found in Table 40.

---

[6] *HM Revenue and Customs (2015) Landfill Tax rates, accessed 15 July 2017, https://www.gov.uk/government/publications/rates-and-allowances-landfill-tax/landfill-tax-rates-from-1-april-2013*

Table 40 - HWRC Dry Recycling Income

Material list	Income, £ per tonne
Card	-£10
Paper	£45
Mixed Glass	-£12
Plastics	£100
Garden Waste	£31
Wood	£45
Small WEEE	£0
Large WEEE	£0
Cat Tubes	£0
Fridge/Freezer	£0
Metal	-£65
Rubble	£20
Soil	£20
Plasterboard	£64
Oil	£0
Bryn Quarry Mixed Waste	£98

Source: Resource Futures

Additionally, substantial tonnages of waste recorded within WasteDataFlow as co-mingled recycling is sent to two facilities for sorting/recycling, at Bryn Quarry Ltd. and at Amber Engineering Ltd.

When front-end sorting is introduced and the capture rate of materials rise from HWRCs, it is assumed that the gate fee associated with the material from HWRCs sent to Bryn will increase. CCBC officers reported that conversations with Bryn Quarry have suggested the gate fee shown in Table 41. This is due to the lower recyclable content associated with the residual waste generated from HWRCs.

Quantities and costs of mainly non-household co-mingled recyclable material collected and sent to Amber Engineering are assumed not to change from the baseline.

Table 41 – Bryn Gate Fee (HWRC residual waste)

Material list	Current	With Front End Sort
Gate Fee, £/tonne	£98	£130

Source: Tony White, CCBC

A.9 Organics

A.9.1 Destinations

It was assumed that all organic waste falling under the "Waste Food Only" category of WDF goes to an AD plant. Previously organic waste “Green Garden Waste Only” and “Mixed Garden & Food Waste” have been sent for composting through a mix of Window and in-vessel composting (IVC). However, it has been assumed that going forward with the introduction of a separate food and garden waste collection, all “Green Garden Waste Only” will be send to Windrow.

A.9.2 Disposal Costs

The disposal costs used for garden waste and food waste can be found in Table 42. These have been updated from the values originally used for the KAT modelling.

Table 42 - Organic Disposal Costs

Service Element	£ per tonne	Destination
Garden waste gate fee	£31.00	IVC
Food waste gate fee	£22.00	AD

Source: Tony White, CCBC

Appendix B – Phase A Cost Lines

A breakdown of the cost lines outputs for each scenario over 10 years from 2016/17 to 2025/26.

Table 43 - Baseline Cost Lines 16/17 - 25/26

Cost Line	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Residual Collection	£1,302k	£1,294k	£1,294k	£1,294k	£1,294k	£1,294k	£1,294k	£1,294k	£1,294k	£1,294k
Residual Treatment	£1,472k	£1,488k	£1,507k	£1,537k	£1,566k	£1,596k	£1,628k	£1,656k	£1,684k	£1,712k
Organics Collection	£1,078k	£1,119k	£1,119k	£1,119k	£1,119k	£1,119k	£1,264k	£1,264k	£1,264k	£1,264k
Organics Treatment	£505k	£353k	£356k	£359k	£363k	£366k	£370k	£373k	£377k	£381k
CA Site Collection	£968k	£968k	£968k	£968k	£968k	£968k	£968k	£968k	£968k	£968k
CA Site Treatment	£1,999k	£2,015k	£2,031k	£2,047k	£2,063k	£2,079k	£2,095k	£2,112k	£2,129k	£2,146k
Recycling Collection	£1,259k	£1,259k	£1,259k	£1,259k	£1,259k	£1,259k	£1,393k	£1,393k	£1,393k	£1,393k
Recycling Material Income	£2,013k	£1,953k	£1,908k	£1,862k	£1,815k	£1,767k	£1,719k	£2,023k	£2,038k	£2,053k
Bulky Collection	£53k	£53k	£53k	£53k	£53k	£53k	£53k	£53k	£53k	£53k
Bulk Treatment	£93k	£93k	£93k	£93k	£93k	£93k	£93k	£93k	£93k	£93k
Commercial Collection	£254k	£253k	£251k	£251k	£251k	£251k	£251k	£251k	£251k	£251k
Commercial Treatment	£304k	£307k	£311k	£312k	£313k	£314k	£315k	£316k	£317k	£318k
Commercial Income	-£994k	-£992k	-£990k	-£990k	-£990k	-£990k	-£990k	-£990k	-£990k	-£990k
CA Site Capital	£k	£k	£19k	£39k	£39k	£39k	£39k	£39k	£39k	£39k
Cost of Change	£k	£k	£k	£k	£k	£k	£k	£k	£k	£k
AHP Collections	£k	£k	£k	£k	£k	£k	£k	£k	£k	£k
Transfer Station & Other Costs	£186k	£186k	£386k	£386k	£386k	£386k	£386k	£186k	£186k	£186k
Net Financial Costs	**£10,494k**	**£10,351k**	**£10,568k**	**£10,591k**	**£10,594k**	**£10,597k**	**£10,881k**	**£11,221k**	**£11,550k**	**£11,618k**

Table 44 - Scenario 1 Cost Lines 16/17 - 25/26

Cost Line	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Residual Collection	£1,302k	£1,294k	£1,294k	£1,294k	£1,294k	£1,294k	£1,294k	£1,048k	£1,048k	£1,048k
Residual Treatment	£1,472k	£1,488k	£1,507k	£1,537k	£1,566k	£1,596k	£1,628k	£1,299k	£1,311k	£1,322k
Organics Collection	£1,078k	£1,119k	£1,119k	£1,119k	£1,119k	£1,119k	£1,264k	£1,274k	£1,274k	£1,274k
Organics Treatment	£505k	£353k	£359k	£363k	£366k	£370k	£373k	£416k	£420k	£424k
CA Site Collection	£968k	£968k	£1,028k	£1,028k	£1,028k	£1,028k	£1,028k	£1,028k	£1,028k	£1,028k
CA Site Treatment	£1,999k	£2,015k	£2,075k	£2,091k	£2,108k	£2,124k	£2,142k	£2,234k	£2,251k	£2,269k
Recycling Collection	£1,259k	£1,259k	£1,259k	£1,259k	£1,259k	£1,259k	£1,393k	£1,589k	£1,589k	£1,589k
Recycling Material Income	£2,013k	£1,953k	£1,908k	£1,862k	£1,815k	£1,767k	£1,719k	£2,174k	£2,191k	£2,207k
Bulky Collection	£53k	£53k	£53k	£53k	£53k	£53k	£53k	£53k	£53k	£53k
Bulk Treatment	£93k	£93k	£93k	£93k	£93k	£93k	£93k	£93k	£93k	£93k
Commercial Collection	£254k	£253k	£251k	£251k	£251k	£251k	£251k	£251k	£251k	£251k
Commercial Treatment	£304k	£307k	£311k	£312k	£313k	£314k	£315k	£314k	£314k	£313k
Commercial Income	-£994k	-£992k	-£990k	-£990k	-£990k	-£990k	-£990k	-£990k	-£990k	-£990k
CA Site Capital	£k	£k	£19k	£39k	£39k	£39k	£39k	£39k	£39k	£39k
Cost of Change	£k	£k	£k	£k	£k	£k	£k	£506k	£k	£k
AHP Collections	£k	£k	£k	£k	£k	£k	£k	£308k	£308k	£308k
Transfer Station & Other Costs	£186k	£186k	£386k	£386k	£386k	£386k	£386k	£190k	£190k	£190k
Net Financial Costs	**£10,494k**	**£10,351k**	**£10,676k**	**£10,700k**	**£10,703k**	**£10,706k**	**£10,991k**	**£11,828k**	**£11,428k**	**£11,477k**

Table 45 - Scenario 2 Cost Lines 16/17 - 25/26

Cost Line	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Residual Collection	£1,302k	£1,294k	£1,294k	£1,294k	£1,294k	£1,294k	£1,294k	£1,048k	£1,048k	£1,048k
Residual Treatment	£1,472k	£1,488k	£1,507k	£1,537k	£1,566k	£1,596k	£1,628k	£1,299k	£1,311k	£1,322k
Organics Collection	£1,078k	£1,119k	£1,119k	£1,119k	£1,119k	£1,119k	£1,264k	£1,274k	£1,274k	£1,274k
Organics Treatment	£505k	£353k	£359k	£363k	£366k	£370k	£373k	£416k	£420k	£424k
CA Site Collection	£968k	£968k	£1,028k	£1,028k	£892k	£825k	£825k	£825k	£825k	£825k
CA Site Treatment	£1,999k	£2,015k	£2,075k	£2,091k	£2,108k	£2,124k	£2,142k	£2,234k	£2,251k	£2,269k
Recycling Collection	£1,259k	£1,259k	£1,259k	£1,259k	£1,259k	£1,259k	£1,393k	£1,589k	£1,589k	£1,589k
Recycling Material Income	£2,013k	£1,953k	£1,908k	£1,862k	£1,815k	£1,767k	£1,719k	£2,174k	£2,191k	£2,207k
Bulky Collection	£53k	£53k	£53k	£53k	£53k	£53k	£53k	£53k	£53k	£53k
Bulk Treatment	£93k	£93k	£93k	£93k	£93k	£93k	£93k	£93k	£93k	£93k
Commercial Collection	£254k	£253k	£251k	£251k	£251k	£251k	£251k	£251k	£251k	£251k
Commercial Treatment	£304k	£307k	£311k	£312k	£313k	£314k	£315k	£314k	£314k	£313k
Commercial Income	-£994k	-£992k	-£990k	-£990k	-£990k	-£990k	-£990k	-£990k	-£990k	-£990k
CA Site Capital	£k	£k	£19k	£45k	£105k	£133k	£133k	£133k	£133k	£133k
Cost of Change	£k	£k	£k	£k	£k	£k	£k	£506k	£k	£k
AHP Collections	£k	£k	£k	£k	£k	£k	£k	£308k	£308k	£308k
Transfer Station & Other Costs	£186k	£186k	£386k	£386k	£386k	£386k	£386k	£190k	£190k	£190k
Net Financial Costs	**£10,494k**	**£10,351k**	**£10,676k**	**£10,706k**	**£10,634k**	**£10,597k**	**£10,882k**	**£11,719k**	**£11,319k**	**£11,368k**

Table 46 - Scenario 3 Cost Lines 16/17 - 25/26

Cost Line	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Residual Collection	£1,302k	£1,294k	£1,294k	£1,294k	£1,299k	£1,299k	£1,299k	£1,053k	£1,053k	£1,053k
Residual Treatment	£1,472k	£1,488k	£1,507k	£1,528k	£1,662k	£1,673k	£1,685k	£1,400k	£1,413k	£1,425k
Organics Collection	£1,078k	£1,119k	£1,119k	£1,119k	£1,267k	£1,267k	£1,465k	£1,421k	£1,421k	£1,421k
Organics Treatment	£505k	£353k	£359k	£364k	£368k	£371k	£375k	£418k	£422k	£426k
CA Site Collection	£968k	£968k	£1,028k	£1,028k	£1,028k	£926k	£825k	£825k	£825k	£825k
CA Site Treatment	£1,999k	£2,015k	£2,075k	£2,091k	£2,108k	£2,124k	£2,142k	£2,233k	£2,251k	£2,269k
Recycling Collection	£1,259k	£1,259k	£1,259k	£1,259k	£2,223k	£2,223k	£2,439k	£2,312k	£2,312k	£2,312k
Recycling Material Income	£2,013k	£1,953k	£1,908k	£1,862k	-£462k	-£478k	-£494k	-£558k	-£566k	-£575k
Bulky Collection	£53k	£53k	£53k	£53k	£53k	£53k	£53k	£53k	£53k	£53k
Bulk Treatment	£93k	£93k	£93k	£93k	£93k	£93k	£93k	£93k	£93k	£93k
Commercial Collection	£254k	£253k	£251k	£308k	£310k	£310k	£310k	£310k	£311k	£311k
Commercial Treatment	£304k	£307k	£311k	£224k	£216k	£217k	£217k	£213k	£213k	£213k
Commercial Income	-£994k	-£992k	-£990k	-£1,009k	-£1,009k	-£1,009k	-£1,009k	-£1,009k	-£1,010k	-£1,010k
CA Site Capital	£k	£k	£8k	£23k	£69k	£111k	£111k	£111k	£111k	£111k
Cost of Change	£k	£k	£k	£253k	£253k	£k	£k	£506k	£k	£k
AHP Collections	£k	£k	£k	£k	£k	£k	£k	£308k	£308k	£308k
Transfer Station & Other Costs	£186k	£186k	£386k	£549k	£760k	£760k	£760k	£562k	£562k	£562k
Net Financial Costs	**£10,494k**	**£10,351k**	**£10,665k**	**£11,042k**	**£10,241k**	**£9,944k**	**£10,273k**	**£10,254k**	**£9,773k**	**£9,798k**

Table 47 - Scenario 3 Cost Lines 16/17 - 25/26

Cost Line	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Residual Collection	£1,302k	£1,294k	£1,294k	£1,294k	£1,299k	£1,299k	£1,299k	£1,053k	£1,053k	£1,053k
Residual Treatment	£1,472k	£1,488k	£1,507k	£1,528k	£1,773k	£1,786k	£1,800k	£1,472k	£1,497k	£1,523k
Organics Collection	£1,078k	£1,119k	£1,119k	£1,119k	£1,259k	£1,259k	£1,387k	£1,446k	£1,446k	£1,446k
Organics Treatment	£505k	£353k	£359k	£364k	£368k	£371k	£375k	£418k	£422k	£426k
CA Site Collection	£968k	£968k	£1,028k	£1,028k	£1,028k	£926k	£825k	£825k	£825k	£825k
CA Site Treatment	£1,999k	£2,015k	£2,075k	£2,091k	£2,108k	£2,124k	£2,142k	£2,232k	£2,251k	£2,269k
Recycling Collection	£1,259k	£1,259k	£1,259k	£1,259k	£2,025k	£2,025k	£2,025k	£2,219k	£2,219k	£2,219k
Recycling Material Income	£2,013k	£1,953k	£1,908k	£1,862k	-£544k	-£561k	-£579k	-£641k	-£651k	-£660k
Bulky Collection	£53k	£53k	£53k	£53k	£53k	£53k	£53k	£53k	£53k	£53k
Bulk Treatment	£93k	£93k	£93k	£93k	£93k	£93k	£93k	£93k	£93k	£93k
Commercial Collection	£254k	£253k	£251k	£308k	£310k	£310k	£310k	£310k	£311k	£311k
Commercial Treatment	£304k	£307k	£311k	£224k	£220k	£220k	£221k	£213k	£214k	£214k
Commercial Income	-£994k	-£992k	-£990k	-£1,009k	-£1,009k	-£1,009k	-£1,009k	-£1,009k	-£1,010k	-£1,010k
CA Site Capital	£k	£k	£8k	£23k	£69k	£111k	£111k	£111k	£111k	£111k
Cost of Change	£k	£k	£k	£253k	£253k	£k	£k	£506k	£k	£k
AHP Collections	£k	£k	£k	£k	£k	£k	£k	£308k	£308k	£308k
Transfer Station & Other Costs	£186k	£186k	£386k	£549k	£725k	£725k	£725k	£485k	£485k	£485k
Net Financial Costs	**£10,494k**	**£10,351k**	**£10,665k**	**£11,042k**	**£10,033k**	**£9,736k**	**£9,781k**	**£10,097k**	**£9,630k**	**£9,669k**

Table 48 - Scenario 5 Cost Lines 16/17 -25/26

Cost Line	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Residual Collection	£1,302k	£1,294k	£1,294k	£1,294k	£1,294k	£1,294k	£1,294k	£1,053k	£1,053k	£1,053k
Residual Treatment	£1,472k	£1,488k	£1,507k	£1,528k	£1,552k	£1,582k	£1,614k	£1,472k	£1,497k	£1,523k
Organics Collection	£1,078k	£1,119k	£1,119k	£1,119k	£1,119k	£1,119k	£1,247k	£1,446k	£1,446k	£1,446k
Organics Treatment	£505k	£353k	£359k	£364k	£368k	£371k	£375k	£418k	£422k	£426k
CA Site Collection	£968k	£968k	£1,028k	£1,028k	£1,028k	£926k	£825k	£825k	£825k	£825k
CA Site Treatment	£1,999k	£2,015k	£2,075k	£2,091k	£2,108k	£2,124k	£2,142k	£2,232k	£2,251k	£2,269k
Recycling Collection	£1,259k	£1,259k	£1,259k	£1,259k	£1,259k	£1,259k	£1,259k	£2,219k	£2,219k	£2,219k
Recycling Material Income	£2,013k	£1,953k	£1,908k	£1,862k	£1,815k	£1,767k	£1,719k	-£641k	-£651k	-£660k
Bulky Collection	£53k	£53k	£53k	£53k	£53k	£53k	£53k	£53k	£53k	£53k
Bulk Treatment	£93k	£93k	£93k	£93k	£93k	£93k	£93k	£93k	£93k	£93k
Commercial Collection	£254k	£253k	£251k	£308k	£310k	£310k	£310k	£310k	£311k	£311k
Commercial Treatment	£304k	£307k	£311k	£224k	£213k	£214k	£215k	£213k	£214k	£214k
Commercial Income	-£994k	-£992k	-£990k	-£1,009k	-£1,009k	-£1,009k	-£1,009k	-£1,009k	-£1,010k	-£1,010k
CA Site Capital	£k	£k	£12k	£28k	£83k	£134k	£134k	£134k	£134k	£134k
Cost of Change	£k	£k	£k	£k	£k	£k	£k	£337k	£169k	£k
AHP Collections	£k	£k	£k	£k	£k	£k	£k	£308k	£308k	£308k
Transfer Station & Other Costs	£186k	£186k	£386k	£386k	£386k	£386k	£386k	£328k	£485k	£485k
Net Financial Costs	**£10,494k**	**£10,351k**	**£10,668k**	**£10,630k**	**£10,676k**	**£10,628k**	**£10,660k**	**£9,794k**	**£9,821k**	**£9,692k**

Appendix C – Phase A Capital Costs

Table 49 - Annual breakdown of Capital Cost Requirements

	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	Total
Scenario 1									
Kerbside Vehicles	£k	£k	£k	£k	£k	£k	£k	£k	**£k**
Containers	£k	£k	£k	£k	£k	£k	£k	£k	**£k**
HWRCs	£k	£k	£286k	£k	£k	£k	£k	£k	**£286k**
Depot and WTS	£k	£k	£428k	£k	£k	£k	£k	£k	**£428k**
Cost of Change	£k	£k	£k	£k	£k	£k	£k	£k	**£k**
Total	**£k**	**£k**	**£714k**	**£k**	**£k**	**£k**	**£k**	**£k**	**£714k**
Scenario 2									
Kerbside Vehicles	£k	£k	£k	£k	£k	£k	£k	£k	**£k**
Containers	£k	£k	£643k	£k	£k	£k	£k	£k	**£643k**
HWRCs	£k	£k	£286k	£177k	£1,554k	£k	£k	£k	**£2,017k**
Depot and WTS	£k	£k	£428k	£k	£k	£k	£k	£k	**£428k**
Cost of Change	£k	£k	£k	£k	£k	£k	£k	£k	**£506k**
Total	**£k**	**£k**	**£1,357k**	**£177k**	**£1,554k**	**£k**	**£k**	**£k**	**£3,513k**
Scenario 3									
Kerbside Vehicles	£k	£k	£2,275k	£k	£k	£k	£k	£530k	**£2,805k**
Containers	£k	£k	£643k	£k	£k	£k	£k	£k	**£643k**
HWRCs	£k	£k	£311k	£711k	£1,554k	£k	£k	£k	**£2,043k**
Depot and WTS	£k	£k	£k	£1,973k	£k	£k	£k	£k	**£1,973k**
Cost of Change	£k	£k	£253k	£253k	£k	£k	£506k	£k	**£1,012k**
Total	**£k**	**£k**	**£3,483k**	**£2,403**	**£1,554k**	**£k**	**£506k**	**£530k**	**£6,729k**

Scenario 4									
Kerbside Vehicles	£k	£k	£3,120k	£k	£k	£k	£k	£300k	**£3,420k**
Containers	£k	£k	£775k	£k	£k	£k	£k	£k	**£775k**
HWRCs	£k	£k	£311k	£177k	£1,554k	£k	£k	£k	**£2,043k**
Depot and WTS	£k	£k		£1,888k					**£1,888k**
Cost of Change	£k	£k	£253k	£253k	£k	£k	£k	£k	**£1,012k**
Total	**£k**	**£k**	**£4,460k**	**£2,318k**	**£1,554k**	**£k**	**£506k**	**£300k**	**£9,138k**
Scenario 5									
Kerbside Vehicles	£k	£k	£k	£k	£k	£k	£k	£3,420k	**£3,420k**
Containers	£k	£k	£k	£k	£k	£k	£k	£775k	**£775k**
HWRCs	£k	£k	£k	£177k	£1,866k	£k	£k	£k	**£2,043k**
Depot and WTS	£k	£k	£k	£k	£k	£k	£k	£1,888k	**£1,888k**
Cost of Change	£k	£k	£k	£k	£k	£k	£337k	£169k	**£506k**
Total	**£k**	**£k**	**£k**	**£177k**	**£1,866k**	**£k**	**£337k**	**£6,252k**	**£8,632k**

Appendix D – Breakdown of Phase B Costs

Table 50 – Breakdown of Annual Savings (No Three Weekly Refuse Collections)

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Residual Collection	£5k	£5k	£5k	£5k
Residual Treatment	£234k	£120k	£234k	£120k
Organics Collection	£140k	£148k	£140k	£148k
Organics Treatment	£5k	£5k	£6k	£6k
CA Site Collection	-£172k	-£172k	-£108k	-£108k
CA Site Treatment	£29k	£29k	-£567k	-£568k
Recycling Collection	£765k	£963k	£765k	£963k
Recycling Material Income	-£2,478k	-£2,290k	-£2,478k	-£2,290k
Commercial Collection	-£52k	-£56k	-£35k	-£38k
CA Site Capital	£182k	£182k	£182k	£182k
Transfer Station & Other Costs	£357k	£308k	£357k	£308k
Contamination Enforcement	-£150k	-£150k	-£150k	-£150k
Total	**-£1134k**	**-£905k**	**-£1648k**	**-£1419k**

Table 51 - Breakdown of Annual Savings (Three Weekly Refuse Collections)

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Residual Collection	£241k	-£241k	-£241k	-£241k
Residual Treatment	-£115k	-£177k	-£115k	-£177k
Organics Collection	£169k	£174k	£169k	£174k
Organics Treatment	£43k	£43k	£45k	£45k
CA Site Collection	-£172k	-£172k	-£108k	-£108k
CA Site Treatment	£101k	£102k	-£558k	-£618k
Recycling Collection	£870k	£1,052k	£870k	£1,052k
Recycling Material Income	-£2,538k	-£2,340k	-£2,538k	-£2,340k
Commercial Collection	-£60k	-£59k	-£43k	-£46k
CA Site Capital	£182k	£182k	£182k	£182k
AHP Collections	£308k	£308k	£308k	£308k
Transfer Station & Other Costs	£317k	£310k	£317k	£310k
Contamination Enforcement	-£150k	-£150k	-£150k	-£150k
Total	**-£1,285k**	**-£966k**	**-£1,862k**	**-1,608k**

Appendix E – Phase B Costs Per Annum

Costs provided in are full year following the rollout of services.

Table 52 – By Line Costs Following Rollout of Service (No Three Weekly Collections)

Financial Cost	Baseline Scenario	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Residual Collection	£1294k	£1299k	£1299k	£1299k	£1299k	£1302k
Residual Treatment	£1552k	£1786k	£1673k	£1991k	£1883k	£1538k
Organics Collection	£1119k	£1259k	£1267k	£1259k	£1267k	£1078k
Organics Treatment	£366k	£371k	£371k	£372k	£372k	£470k
CA Site Collection	£968k	£796k	£796k	£860k	£860k	£968k
CA Site Treatment	£2078k	£2108k	£2108k	£1307k	£1300k	£2078k
Recycling Collection	£1259k	£2025k	£2223k	£2025k	£2223k	£1259k
Recycling Material Income	£1917k	-£561k	-£373k	-£561k	-£373k	£1917k
Bulky Collection	£53k	£53k	£53k	£53k	£53k	£53k
Bulk Treatment	£93k	£93k	£93k	£93k	£93k	£93k
Commercial Collection	£251k	£310k	£310k	£310k	£310k	£310k
Commercial Treatment	£313k	£220k	£217k	£237k	£235k	£212k
Commercial Income	-£990k	-£1009k	-£1009k	-£1009k	-£1009k	-£1009k
CA Site Captial	£k	£182k	£182k	£182k	£182k	£k
Cost of Change	£k	£k	£k	£k	£k	£k
AHP Collections	£k	£k	£k	£k	£k	£k
Transfer Station & Other Costs	£386k	£593k	£544k	£593k	£544k	£386k
Landfill Tax	£3k	£3k	£3k	£3k	£3k	£3k
Recycling Target Fines	£k	£k	£k	£k	£k	£k
Total	**£10662k**	**£9528k**	**£9757k**	**£9014k**	**£9243k**	**£10659k**

Table 53- By Line Costs Following Rollout of Service (Three Weekly Collections)

Financial Cost	Baseline Scenario	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Residual Collection	£1294k	£1053k	£1053k	£1053k	£1053k	£1053k
Residual Treatment	£1552k	£1437k	£1375k	£1697k	£1584k	£1697k
Organics Collection	£1119k	£1288k	£1293k	£1288k	£1293k	£1288k
Organics Treatment	£366k	£410k	£410k	£411k	£411k	£411k
CA Site Collection	£968k	£796k	£796k	£860k	£860k	£860k
CA Site Treatment	£2078k	£2180k	£2180k	£1260k	£1252k	£1260k
Recycling Collection	£1259k	£2130k	£2312k	£2130k	£2312k	£2130k
Recycling Material Income	£1917k	-£621k	-£424k	-£621k	-£424k	-£621k
Bulky Collection	£53k	£53k	£53k	£53k	£53k	£53k
Bulk Treatment	£93k	£93k	£93k	£93k	£93k	£93k
Commercial Collection	£251k	£310k	£310k	£310k	£310k	£310k
Commercial Treatment	£313k	£212k	£214k	£230k	£227k	£230k
Commercial Income	-£990k	-£1009k	-£1009k	-£1009k	-£1009k	-£1009k
CA Site Captial	£k	£182k	£182k	£182k	£182k	£182k
Cost of Change	£k	£k	£k	£k	£k	£k
AHP Collections	£k	£308k	£308k	£308k	£308k	£308k
Transfer Station & Other Costs	£386k	£552k	£546k	£552k	£546k	£552k
Landfill Tax	£3k	£3k	£3k	£3k	£3k	£3k
WG Government Grant	£k	£k	£k	£k	£k	-£315k
Total	**£10662k**	**£9377k**	**£9695k**	**£8800k**	**£9054k**	**£8485k**

www.wrapcymru.org.uk/ccp

Helpu Cymru i leihau ei Hôl Troed Carbon
Help Wales reduce its Carbon Footprint

recycle
ailgylchu

APPENDIX 5

Collaborative Change Programme Support to Caerphilly County Borough Council

Caerphilly County Borough Council - KAT Modelling results – Further analysis

This report provides a summary of the outputs from modelling for service collection options at Caerphilly County Borough Council

Date: December 2015

WRAP's vision is a world where resources are used sustainably.

We work with businesses, individuals and communities to help them reap the benefits of reducing waste, developing sustainable products and using resources in an efficient way.

Find out more at www.wrapcymru.org.uk

Written by: WRAP Collaborative Change Programme Unit

Executive summary

Caerphilly County Borough Council (CCBC) is being supported through the Welsh Government Collaborative Change Programme to investigate the impact of various recycling and waste collection options.

The current collection service comprises of a weekly comingled collection, weekly mixed garden and food collection and fortnightly residual waste collection.

WRAP's Kerbside Analysis Tool (KAT) is an Excel based spreadsheet tool, which allows users to make projections of kerbside collection infrastructure and associated standardised costs by applying default and user-defined values to key parameters. The projected costs are standardised in order to fairly assess the differences between options. **It is important to note that KAT modelling is relative and based on the current service; if efficiency savings could be made on the current services, then they would also be able to be made on all of the options considered.** As such it is the cost difference that is the relevant output of this work rather than the absolute numbers.

Two stream, three stream and kerbside sort options have been compared to the current service

Contents

1.0 Introduction

1.1 Support Aims

Caerphilly County Borough Council (CCBC), supported by WRAP and the Welsh Government Collaborative Change Programme, is investigating the potential impacts of introducing one of a range of recycling and waste collection options. This report follows on from the previous papers *'Caerphilly KAT Modelling – Indicative results & assumptions'* (issued July 2015 in which early indicative results from options modelling were presented) and *'Caerphilly County Borough Council - KAT Modelling results and assumptions'* (issued November 2015).

After the indicative results were shared with the authority, a number of refinements and enhancements of the modelling work were undertaken by WRAP and included in the follow up paper issued in November.

The key changes to the modelling were as follows:

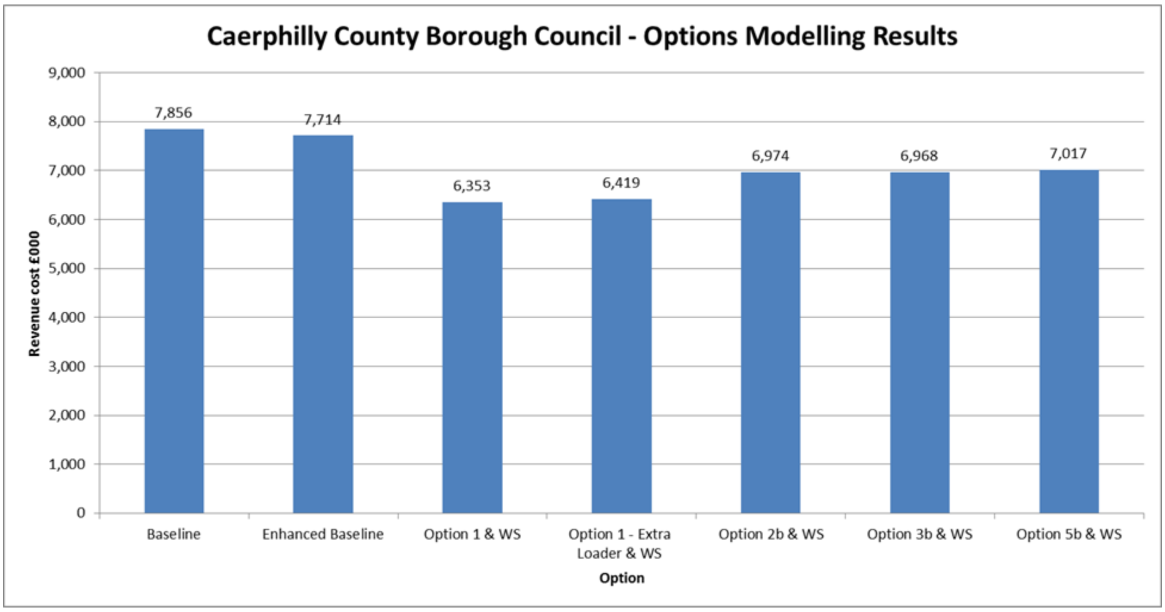
- In addition to driver +1 configuration, blueprint options modelled as driver +2 and driver +1.5.
- Paper/cardboard split updated to reflect the reduction in paper and increased cardboard yields seen.
- Examination of the effect that variations to material prices have on overall cost.
- Updated depot costings
- Additional collection option suggested by CCBC modelled (5b)
- Options modelled with fortnightly, 3 weekly and 4 weekly residual waste collection
- All core options also modelled with winter suspension of garden waste.

Results from previous paper '*Caerphilly County Borough Council - KAT Modelling results and assumptions'* shown in fig 1 below.

Fig 1 – Previous modelling results

Revenue Expenditure	Baseline	Enhanced Baseline	Option 1 & WS	Option 1 - Extra Loader & WS	Option 2b & WS	Option 3b & WS	Option 5b & WS
Annual Capital - Vehicles	611,870	633,919	775,665	681,168	663,843	797,714	799,289
Containers	118,582	118,582	265,139	265,139	246,333	312,303	312,303
Operating costs	2,527,720	2,563,984	2,875,290	3,064,189	2,848,850	3,150,063	3,181,117
Supervision	370,644	370,644	370,644	370,644	370,644	370,644	370,644
Overhead	447,877	447,877	447,877	447,877	447,877	447,877	447,877
Restricted Access Collections	303,959	303,959	331,448	331,448	330,782	330,782	330,782
Spare Vehicles	184,979	153,133	219,159	190,125	173,867	183,741	200,429
Total collection	**4,565,631**	**4,592,098**	**5,285,222**	**5,350,589**	**5,082,197**	**5,593,125**	**5,642,441**
Bulking Costs	235,000	235,000	610,000	610,000	525,000	610,000	610,000
Treatment - Dry	1,520,140	1,520,140	-1,034,177	-1,034,177	-46,721	-672,004	-672,004
Treatment - Organic	645,904	478,084	461,994	461,994	461,994	461,994	461,994
Disposal - Residual	1,664,932	1,664,932	1,806,145	1,806,145	1,727,343	1,750,963	1,750,963
Income - Trade	-813,000	-813,000	-813,000	-813,000	-813,000	-813,000	-813,000
Costs - Trade	37,000	37,000	37,000	37,000	37,000	37,000	37,000
Total	**7,855,606**	**7,714,253**	**6,353,184**	**6,418,551**	**6,973,813**	**6,968,078**	**7,017,395**
Variation from E Baseline	141,353	0	-1,361,070	-1,295,702	-740,440	-746,175	-696,858

Fig 2 – Previous results



From the modelling undertaken previously, it can be seen that Option 1 exhibited the lowest cost overall. Options 2b, 3b and 5b were similar to each other in terms of cost and were all lower than the enhanced baseline.

In light of the above findings, and taking into account feedback from the authority, it was decided that further revisions to the modelling were required:

- Updated commodity prices – Latest available data to be used
- Reduced driver contribution in Option 1 + Extra loader. Previous 10% assumed driver contribution to be reduced to zero.
- Increased ratio of spare vehicles to frontline vehicles – Model updated to include a greater number of spare vehicles. Closer to current level of spares
- Garden waste containment – Brown wheeled bins previously modelled to be replaced by reusable sacks

Also, in light of the results of the previous modelling work, it was decided by the authority to reduce the number of options to be considered, with two preferred options identified for further modelling in addition to the blueprint and baseline options.

Options taken forward:

- Enhanced Baseline – Business as usual option, but with the mixed organic waste stream split into separately collected food and garden waste streams.

- Option 1 – WG Blueprint, source segregated collection of dry recyclate and food using RRV

- Option 1 + Extra Loader – As Option 1, but with Driver +2 configuration rather than the Driver + 1 modelled in option 1.

- Option 5b – 3 stream dry recycling collection and food. Glass, plastics & cans, mixed paper & card and food waste collected using a combination of two twin chamber RCVs.

It was decided by the authority that the following options would not be explored further

- Options 2a and 2b – Small benefit in terms of cost compared to options 3b and 5b, but there was a significant potential risk in terms of compliance as a result of the commingled collection of glass with other recyclate.

- Options 3a and 3b – Slightly lower cost than Option 5b, but not taken forward due to concerns over the complexity and serviceability of the three chamber 'One Pass' vehicles.

1.2 Current Waste and Recycling Services

CBCC delivers an 'in house' kerbside waste and recycling service to approximately 77,614 households across the authority area. The current kerbside service is summarised in Fig 3 below.

Fig 3- CBCC Current Service Profile

Service	Frequency	Containers Used	Materials Collected
Dry Recycling	Weekly	240l wheeled bin (approx. 70% of households) Kerbside boxes (to approx. 25% households) Single use sacks (approx. 5% of households)	• Glass • Cans • Plastic Bottles • Mixed Plastic • Paper • Card
Food Waste	Weekly	5 Litre Internal Caddy 23Litre Kerbside Caddy	• All Food Waste
Garden Waste	Weekly	Reusable Sack	• All Garden Waste
Refuse	Fortnightly	240l wheeled bin (approx. 98% of households) Plastic sacks	• Residual Waste

1.2.1 Kerbside Dry Recycling

Every household in the authority receives a weekly commingled dry recyclate collection.

The authority currently uses a fleet of 9 standard RCVs to provide this service along with a smaller tipper vehicle to collect from areas of restricted access. The dry recycling vehicles offload at the authority's bulking station prior to material being sent for sorting to a MRF.

1.2.2 Kerbside Organics

All households across the authority receive a weekly food waste collection, with every household being provided with internal and external caddies. A weekly garden waste collection is also provided using reusable hessian sacks. Whilst food and garden wastes are presented separately at the kerbside, they are mixed at the point of collection in a standard RCV. Collection fleet consists of 7 RCVs and up to two small caged vehicles for areas of restricted access.

1.2.3 Kerbside Residual Waste

Residual waste is collected fortnightly from all properties. Residual waste is currently collected by a fleet of 7 RCVs and up to two small caged vehicles. This material is then bulked at the authority's transfer station before onward transport to the Viridor EfW facility in Cardiff.

1.2.4 Other Council Services

CCBC operate six Household Waste Recycling Centres (Full Moon, Aberbargoed, Penallta, Penmaen, Trehir, Rhymney). Additionally, CCBC also operate 22 bring sites throughout the county.

CCBC operates a commercial waste and recycling service across the county. Residual waste is co-collected with household waste using a common fleet of RCVs. The mass of commercial waste collected is not directly measured, but recent work undertaken by WRAP on behalf of the authority estimated, based on the number of customers & lifts, that 3,325 tonnes of material is collected. Commercial recycling collections are also offered and again, material is co-collected with the household dry recycling fraction. The amount of commercial recycling is relatively low, estimated to be approximately 208 tonnes.

As commercial wastes are co-collected with household waste they have been included in the KAT model.

2.0 KAT Modelling

WRAP's Kerbside Analysis Tool (KAT) is an Excel based spreadsheet tool, which allows users to make projections of kerbside collection infrastructure and associated standardised costs by applying default and user-defined values to key parameters.

The first step in modelling the service is to create a baseline representative of the authority's current service. It is essential that the resources and logistics of the existing services are reflected as accurately as possible within this so that it serves as a reliable foundation for testing various alternative collection service options. Authority specific inputs to the baseline include information regarding the number and type of households, current services and service performance and resources. Known inputs (from the perspective of the model these include tonnages of each material type collected, numbers and types of households offered the service, assumed tipping locations) are calibrated to known outputs (which in modelling terms includes the numbers of crew and vehicles used to deliver the collection services).

Factors such as productivity, pass rates, participation rates, recognition rates (and therefore capture rates) are subsequently checked (where known), or developed from scratch where required (depending on the data available and its quality) to provide a full baseline model.

Put simply, the baseline model should accurately reflect:

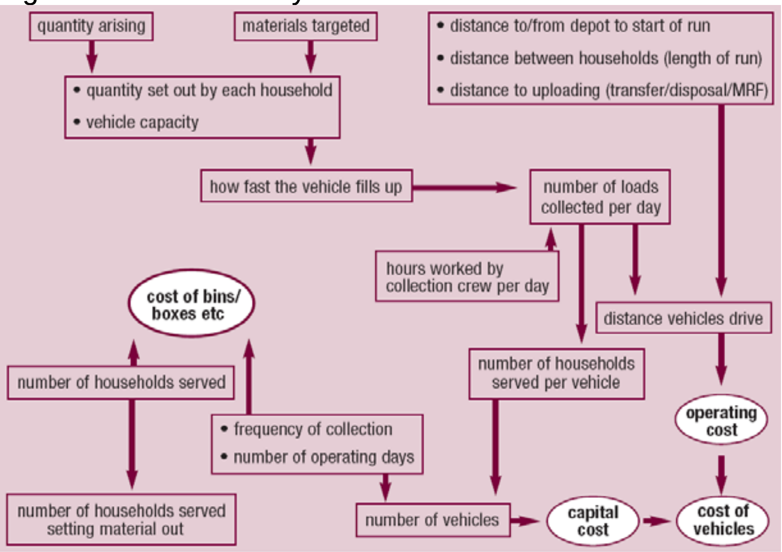
- Waste composition and tonnages;
- Current participation, set out, recognition and capture;
- Authority characteristics (household numbers, population, housing types, distances etc.);

- Travel logistics (time, distance, speed, pass rate, pick up time etc.); and
- Current vehicle and container types and costs.

This creates a sensible/credible basis from which to establish the change in resource requirements for different potential future service configurations, ensuring that CCBC's specific constraints are properly reflected.

The key factors that influence the outputs from KAT are shown in Fig 4 below. KAT uses a series of calculations based on the inter-relationship between refuse collection and recycling to make projections of resources required for a new service provision.

Fig 4 – Overview of key factors in KAT model



For CCBC, KAT has been calibrated using the current collection arrangements. The majority of the data used in the model has been provided by the authority.

KAT outputs are derived from projections of the infrastructure and resource requirements for new services e.g. numbers of collection vehicles required, numbers of loads per day, number of rounds and average round size. All projections are based on average and therefore are indicative of the authority as a whole. The projections highlight the costs of the different options in direct relation to the operational and capital requirements of the vehicles required to deliver the various service options being considered.

The projected costs are standardised in order to fairly assess the differences between options. **It is important to note that KAT modelling is relative and based on the current service; if efficiency savings could be made on the current services, then they would also be able to be made on all other options modelled.** As such it is the costs **difference** that is the relevant output of this work rather than the absolute numbers.

2.1.1 The Enhanced Baseline

The enhanced baseline is created to ensure that a relevant and fair comparison is made with the current system. The current service has a slightly uneven working pattern. As such the enhanced baseline assumes that work is undertaken over an even working day of 7 hours. This results in a slight reduction in collection cost and reflects a more relevant "as is" picture if the current service carried on. It should be noted however, that the enhanced baseline does not address any other service inefficiencies. It is important to note that if the current system can be made more efficient then this should be applied to all options so the relative results will still stand.

CCBC are intending to collect food and garden wastes separately in future, so a variant of the enhanced baseline has been modelled to reflect this. In this option, the current combined organic collection via single chamber RCVs is replaced by a separate collection using twin chamber RCVs.

Seasonal garden waste collection variants have been applied to all of the options modelled and these are discussed further in Section 4.1.

2.2 Options Modelled

The future service delivery options are described below:

Fig 5 – Options modelled

Option	Description	Dry		Food		Green	
		Frequency	Vehicles & Containers	Frequency	Vehicles & Containers	Frequency	Vehicles & Containers
Baseline	**Current Service**	Weekly	RCV - Single stream commingled 240l wheeled bin	Weekly	RCV- Combined Food & Green Waste 23lCaddy & Reusable Sacks	Weekly	RCV- Combined Food & Green Waste 23lCaddy & Reusable Sacks
Enhanced Baseline & Separate Organic	**Current Service plus efficiencies & Separate organic waste**	Weekly	RCV - Single stream commingled 240l wheeled bin	Weekly	Twinpack - 23l Caddy	Weekly	Twinpack - Reusable sack
Option 1	**WG Blueprint**	Weekly	RRV - 3x Kerbisde boxes & lids	Weekly	RRV - 23l Caddy	Fortnightly	RCV - Reusable sack
Option1 + Extra Loader	**As WG Blueprint additional loader on dry recyclate collection**	Weekly	RRV - 3x Kerbisde boxes & lids	Weekly	RRV - 23l Caddy	Fortnightly	RCV - Reusable sack
Option 5b	**Multi-Stream**	Weekly	Twinpack 1 - Fibres/Plastics & Cans. Twinpack 2 - Glass/food Reusable sacks & box for glass	Weekly	Twinpack - 23l Caddy	Fortnightly	RCV - Reusable sack
All Options - Fortnightly Residual - RCV 240l wheeled bin							
Run all options with separate food & seasonal garden							
Run all options with high and low commodity prices							
Run all options with 3 weekly & 4 weekly residual waste collection							

2.3 Assumptions

The following assumptions have been made as part of the options modelling process:

2.3.1 Depots

From the indicative modelling work it was clear that any service change would likely require a significant change to the current depot and waste transfer station infrastructure. WRAP is currently working with the authority on a detailed study of depot requirements and from this work, the likely cost of new infrastructure will be determined. In lieu of the results of this study being available, a high level estimate of cost has been produced to enable a comparison of options to be undertaken. However, depot costs used in the model will need to be updated when results of the depot study become available, therefore the final comparative option costs may be subject to change as a result.

In calculating the high level depot costs, the current cost of operating the waste transfer station, along with the contribution towards shared depot costs, have been extracted from the waste budget and are used in the baseline and enhanced baseline models.

It is assumed that for the other options the current transfer station would not be suitable for handling the dry recyclate and food waste collected. However, for these options, the current site would still be used for the deposit and bulking of residual wastes. The cost of operating the transfer station for residual waste only has been reduced by £25,000 to reflect the likely reduction in resources required onsite due to the removal of the dry recyclate stream.

Costs were then estimated for establishing and operating a separate facility for the handling of kerbside collected dry recyclate and food waste. The cost of such a site varies depending on the activities required to be undertaken onsite, however, as the material handling requirements of the alternative options considered are broadly similar, the costs of operating a depot for these options is assumed to be the same. It is assumed that the land used for the example site costed is leased rather than purchased, with the annual lease cost included within the revenue cost.

Fig 6 below shows both capital and revenue costs associated with a typical depot required for each collection option, along with the total annual revenue cost resulting from the operation of the depot.

Fig 6 – Depot costs

Capital Cost (£)			
Item	Baseline	Option 1	5b
Design		25,000	25,000
Geotechnical survey		5,000	5,000
Supervison		10,000	10,000
Concrete yard		400,000	400,000
Enclosed Structure		400,000	400,000
External Bays		60,000	60,000
Baler		150,000	150,000
Plastic & cans Sort		200,000	200,000
Loading Shovel		75,000	75,000
FLT		25,000	25,000
Food Skips		10,000	10,000
Total Capital		1,360,000	1,360,000
Annualised capital	**0**	**155,392**	**155,392**
Revenue Cost (£)			
Land Rent/Lease		60,000	60,000
Staff		125,000	125,000
Maintenance		15,000	15,000
Licenses & Permits		10,000	10,000
Baling Wire		6,000	6,000
Electricity		8,000	8,000
Loading shovel running costs		8,000	8,000
FLT Running costs		6,000	6,000
Other costs/contingency		10,000	10,000
Revenue Cost (excluding capital)	0	248,000	248,000
Total Revenue cost including capital	0	403,392	403,392
Residual Waste - Transfer	178,000	150,000	150,000
Shared depot costs	57,000	57,000	57,000
Total Depots & Bulking	**235,000**	**610,392**	**610,392**

2.3.2 Material Income

The previous models were calculated using material prices obtained at the end of December 2014. It was agreed that the models would be re-run using current material prices.

Material prices were obtained from the WRAP Material Pricing Report (MPR) for the month of October 2015, with the mid-point values for each waste stream used.

In addition to re-modelling with updated material prices, the effect that variations to prices would have on overall cost is examined by modelling using material prices 30% greater and 30% lower than those used in the core models.

Fig 7 – Material prices used in model

Material	Core	High	Low
Paper	-75	-97.5	-52.5
OCC	-72.5	-94.25	-50.75
Mixed plastics	-45	-58.5	-31.5
Glass	-5	-6.5	-3.5
Steel	-40	-52	-28
Aluminium	-610	-793	-427
Twin Stream			
Fibres (loose)	-50	-65	-35
Containers (inc Glass - Loose)	35	23	47
Fibres (bagged)	-35	-50	-20
Containers (inc glass - bagged)	50	38	62

Effect on MRF gate fees

It is acknowledged that commodity prices also affect MRF gate fees. Therefore MRF gate fees were varied as part of the sensitivity modelling.

It was assumed that the MRF gate fee is made up of an operating cost (i.e. labour, capital recharges, maintenance, energy use, profit etc.) less the income received from the sale of recyclate to the market.

The 'operating cost' was estimated by taking the current gate fee and subtracting typical incomes from the sale of material processed during the same period (material prices taken from MPR).

For the sensitivity modelling, higher material incomes would result in lower MRF gate fees (i.e. greater income offsetting more of the operating cost) whilst lower material incomes would result in a higher gate fee. The same +/- 30% range of material prices was used.

Fig 8 below details the adjusted MRF gate fees used in the model.

Fig 8 – Adjusted MRF gate fees

Adjusted MRF Costs	Core	High	Low
Commingled dry	85	72	98

2.3.3 Vehicles

A range of vehicles were used in the modelling.

For consistency, the capital cost of vehicles for all options modelled are annualised over 7 years.

RCV

Based on Dennis chassis, single chamber compacting body with 16.7 m^3 capacity.

RCV - Split back

Based on Dennis Chassis, vehicle comprises of twin chamber compacting body with total capacity of 16.2m^3. Larger compartment 65% of total volume, smaller compartment 35%.

Resource Recovery Vehicle - RRV

A Romaquip Kerb sort multi compartment vehicle, with compaction for card and plastic.

Following work undertaken by WRAP, since 2007, RRVs have been developed as an alternative to stillage and Kerbsider type collection vehicles. Standard RRVs are mounted on 12 tonne chassis and are able to load on either one or both sides. They are typically crewed by a team of driver plus one loader.

Separate Food Waste/AHP vehicle

Terberg Plastic Bodied Utility Vehicle (PBUV). Non compacting body constructed from a polypropylene material. Mounted on 7.5t chassis with body volume of 7.5 m3.

Vehicle capacity

For the RRV vehicles an analysis was undertaken as to which compartments within the vehicle were rate limiting, and therefore the likely overall capacity of the vehicle was calculated.

From a detailed specification obtained from the manufacturer, the volumes of the internal compartments within the vehicle were deduced.

It is acknowledged that not all of the available volume within the compartments can be used, therefore the useable volume for each compartment was estimated.

Based on the density and the likely yield of materials collected, it is possible to calculate the number of households that can be collected from before a compartment is full.

Clearly, once a compartment is full the vehicle will need to return to the bulking station to be emptied even if space exists in the other compartments. It is likely therefore that the utilisation of available space within the vehicle will be significantly less than 100%.

From the analysis carried out (see fig 9) it can be seen that typically, the rate limiting compartment on the vehicle will be Cardboard. The analysis would suggest that the vehicle would need to be emptied after passing 582 properties. The analysis would also suggest that at this point 64% of the nominal volume of the vehicle is used.

The % utilisation figure is used within the KAT model to determine the capacity of the collection vehicle. In order to be conservative, a lower utilisation figure of 60% was used in the KAT model.

Fig 9 – Analysis of rate limiting compartment RRV

Material	Nominal Volume (m^3)	Usable volume (m^3)	Density (kgm^{-3})	Compaction Ratio	Mass (kg)	Av Yield per hh (kg)	Households collected	Mass at hh limit (kg)	Volume used (m^3)
Paper	4.4	3.6	300	1	1,080	1.24	873	720	2.4
Card	4.8	4	60	2	480	0.83	582	480	4.0
Plastics & Cans	19	17	31	1	527	0.67	783	392	12.6
Glass	4.9	4	400	1	1,600	1.09	1,469	634	1.6
Food	2.6	2.2	500	1	1,100	1.57	700	914	1.8
Additional (textiles)	1.5	1							1.0
Total	37.2	31.8			4,787	5.40		3,139	23.4
						Households collected at limit			582
						% Utilisation (Usable volume)			75%
						% Utilisation (Nominal volume)			64%

2.3.4 Yield

Mass data was provided by CCBC/WasteDataFlow for the current service for calendar year 2014:

Fig 10 – Mass Collected

Material	Household	Non-Household
Commingled Dry	17,884	5,592
Commingled Organic	11,534	0
Refuse	27,635	3,352

Commercial residual waste is co-collected with the household waste. Recent work undertaken on behalf of CCBC estimates the mass of commercial residual waste to total 3,352 tonnes. For the purposes of the modelling it is assumed that this arrangement would remain across all of the options modelled. The non-household portion of the waste stream is therefore included in the KAT models. It is recognised that the collection of commercial residual waste will incur both costs (from collection and disposal) and income (from commercial waste customers) both of which are included in the modelling results.

The non-household element of kerbside dry recycling recorded in WDF is not collected by the main collection fleet, so is excluded from the KAT models.

In order to model the additional options, it is necessary to estimate the yield and composition of the commingled waste streams currently collected.

Dry Recycling

Data from WDF Q100 put the average MRF contamination rate for the commingled dry recycling stream at 13.68%

It is therefore assumed that of the 17,884 tonnes of commingled material collected at the kerbside, 15,438 tonnes is target material. For options 1 to 5 it is assumed that the mass of target material collected remains constant, but that non target material collected with it, but subsequently rejected, varies (i.e. 0.5% reject rate assumed for separate collections, 10% for three stream).

The mass of dry recyclate collected at the kerbside will be less for Kerbside sort options and three stream options compared to the baseline commingled service. This is due to a reduction in the amount of contamination collected along with the target material compared to the baseline commingled service). However the amount collected and subsequently recycled (i.e. the target material) will be the same for all options.

It is also assumed that non-target material previously collected via the commingled system that would not be collected in KSS or twinstream systems would instead be collected via the domestic residual service. Therefore, for all of the core options modelled, the overall total waste arisings are constant.

The yield calculation is dependent on the reported MRF reject rate being as accurate as possible. The MRF reject rate will be due to both the collection of non-target material and from target material being incorrectly or incompletely sorted at the MRF.

An overall yield of 199 kg per household is calculated by this method.

Whilst this figure in absolute terms is higher than a number of other Welsh authorities which operate a kerbside source segregated collection, it should be viewed in context.

CCBC have the 3rd highest municipal waste arisings per household in Wales. When yield from kerbside dry recyclate of 199kg is taken as a percentage of total MSW, we get a figure of 16.06% (15445 tonnes from Total MSW 96,180)

For comparison, other authorities in South Wales operating a source segregated collection are achieving similar yields:

Newport – 194kg per household, 17.88%
Bridgend – 177kg per household, 16.14%

In addition, early data from Merthyr Tydfil further supports the premise that the yield modelled is achievable with source segregated collection. Based on a 13 week sample of data following the recent service change, the overall annual yield of kerbside dry recycling can be estimated:

Merthyr Tydfil – 214 kg per household

Based on the total municipal waste arisings for 2014/15, a kerbside dry recyclate yield of 214 kg per household per year as calculated would represent 18.4% of total MSW, a figure in excess of that modelled for CCBC.

From the available data, the 199kg dry recycling yield calculated for CCBC, which represents 16% of total municipal waste arisings for the authority, is slightly lower than the yields seen in Newport (17.9%) and Merthyr Tydfil (18.4%) , and broadly similar to that seen in Bridgend (16.1%).

Composition

In order to model separate collection, it is necessary to determine the composition of the commingled dry recycling stream. This can be estimated based on outputs from WDF Q100:

Fig 11 – Composition data

Q100 Composition Data	
Material	%
Glass	25%
Paper & Card	47%
Metal	4%
Plastics	11%
Reject	14%

Using data from WDF Q100 and data gathered by WRAP from WDF and elsewhere, it is then possible to estimate composition of the mixed waste streams shown in the above table.

Fig 12 – Composition of mixed recyclate streams

Composition of mixed streams	
Paper & Card	
Paper	60%
Card	40%
Pastics	
Film	15%
Bottles	50%
Rigid	35%
Cans	
Steel	71%
Aluminium	29%

Since the first iteration of the model, additional data has become available from other Welsh local authorities, and from the initial indicative results of the national waste composition study, which would suggest that the proportion of cardboard within the mixed paper and card stream is likely to be higher than that modelled initially.

Given that cardboard is significantly less dense than paper, the effect of additional cardboard on collection modelling could be significant, having higher volumes of cardboard in the dry recyclate stream is likely to require more resources to collect it.

Therefore the composition of the dry recyclate stream has been updated in the latest models to reflect the increasing amounts of card collected.

From the available data, it is possible to estimate the overall kerbside yield for each material stream:

Fig 13 – Yields used in KAT models

Material	Current		Option 1		Option 5	
	Total	kg/hh	Total	Kg/hh	Total	kg/hh
Paper	4,995	64	4,995	64	4995	64
OCC	3,330	43	3,330	43	3,330	43
Film	295	4	295	4	295	4
Bottles	984	13	984	13	984	13
Rigid	689	9	689	9	689	9
Glass	4,396	57	4,396	57	4,396	57
Steel	534	7	534	7	534	7
Alu	214	3	214	3	214	3
Reject	2,446	32	77	1	1,104	14
Total Dry (collected)	**17,884**	**230**	**15,515**	**200**	**16,542**	**213**
Total Dry ex reject	**15,438**	**199**	**15,438**	**199**	**15,438**	**199**
Residual (HH)	27,635	356	30,004	387	28,977	373
Residual (trade)	3,352	43	3,352	43	3,352	43
Food	6,344	82	6,344	82	6,344	82
Green	5,190	67	5,190	67	5,190	67
Total Organic	**11,534**	**149**	**11,534**	**149**	**11,534**	**149**
Total Arisings	**60,405**	**778**	**60,405**	**778**	**60,405**	**778**

3 weekly & 4 weekly refuse

The effect of additional residual waste restrictions has also been considered in the modelling. Based on results obtained from other local authorities who have introduced 3 weekly and 4 weekly residual waste collections, material yields have been varied to reflect likely uplifts in both dry recyclate and food waste as a result of less frequent residual waste collection.

However, a number of other factors also need to be taken into account:

AHP Collection

It is likely that a separate collection service for Absorbent Hygiene Products (AHP) would be required for 3 & 4 weekly refuse options.

Yield is estimated based on the amount of this type of material within the residual waste stream and the frequency of residual waste collection (i.e. more material collected when 4 weekly residual collections in place compared to 3 weekly residual)

Fig 14 – AHP Yield calculation

AHP Collection - Yield	
Total Residual (household)	27037
AHP as % of Residual (from comp analysis)	11.50%
Mass AHP	3109
Capture %	40%
Mass for collection	1244
Collection Weeks (3 weekly Residual)	17
Weeks AHP Collected	35
Mass separately collected	837
Collection Weeks (4 weekly Residual	13
Weeks AHP Collected	39
Mass separately collected	933

Separate trade waste collection

Given that trade waste is currently co-collected with residual waste, it is likely that a separate collection vehicle would be required to service existing trade customers during weeks where no household residual collections are planned.

It is estimated that approximately half of the current trade waste would be collected on a dedicated vehicle.

The updated trade waste arising figure of 3,352 tonnes, estimated as part of the recent trade waste project undertaken at CCBC, has been used.

Diversion of material to HWRC

It is likely that some material would be diverted to HWRC as a result of increased residual restriction. This has been estimated as 4% of total household residual waste for 3 weekly and 6% for 4 weekly collections.

Waste Reduction effect

Data from other authorities operating 3 & 4 weekly collections would suggest that a reduction in overall waste arisings, albeit small, will occur as a result of introducing less frequent residual waste collection. A reduction factor of 2% of total household residual waste for 3 weekly collection and 4% for 4 weekly collections has been applied.

The effect of these changes can be seen in figs 15 & 16 below.

Fig 15 – Material yields 3 weekly residual

Material	Option 1 - 3W		Option 5 - 3W	
	Total	kg/hh	Total	Kg/hh
Paper	5,245	68	5,245	68
OCC	3,830	49	3,830	49
Film	310	4	310	4
Bottles	1,132	15	1,132	15
Rigid	792	10	792	10
Glass	4,528	58	4,528	58
Steel	614	8	614	8
Alu	247	3	247	3
Reject	83	1	1,217	16
Total Dry (collected)	**16,781**	**216**	**17,914**	**231**
Total Dry ex reject	**16,697**	**215**	**16,697**	**215**
Residual (HH)	27,210	351	26,077	336
Residual (trade)	1,676	22	1,676	22
Separately collected trade	1,676	22	1,676	22
Diverted Residual to HWRC	1,105	14	1,105	14
Waste reduction factor	553	7	553	7
Food	7,612	98	7,612	98
Green	5,450	70	5,450	70
Total Organic	**13,062**	**168**	**13,062**	**168**
Total Arisings	**59,852**	**771**	**59,852**	**771**

Fig 16 – Material yields 4 weekly residual collection

Material	Option 1 - 4W		Option 5 - 4W	
	Total	kg/hh	Total	Kg/hh
Paper	5,495	71	5,495	71
OCC	4,329	56	4,329	56
Film	340	4	340	4
Bottles	1,279	16	1,279	16
Rigid	896	12	896	12
Glass	4,836	62	4,836	62
Steel	694	9	694	9
Alu	279	4	279	4
Reject	91	1	1,331	17
Total Dry (collected)	**18,238**	**235**	**19,478**	**251**
Total Dry ex reject	**18,147**	**234**	**18,147**	**234**
Residual (HH)	24,859	320	23,619	304
Residual (trade)	1,676	22	1,676	22
Separately collected trade	1,676	22	1,676	22
Diverted Residual to HWRC	1,658	21	1,658	21
Waste reduction factor	1,105	14	1,105	14
Food	8,247	106	8,247	106
Green	5,709	74	5,709	74
Total Organic	**13,956**	**180**	**13,956**	**180**
Total Arisings	**59,300**	**764**	**59,300**	**764**

3.0 Core results

The following section seeks to present the headline results and draw out the key findings. The costs are broken down as follows:

Vehicle Capital – This is the annualised capital cost of the core fleet used in each option, based on financing over 7 years. Tipper vehicles and spare vehicles are accounted for separately.
Operating Costs – This includes all costs relating to direct operational staff (drivers and loaders), Fuel and vehicle maintenance costs and standing charges relating to vehicles.
Containers – On going replacement costs for existing containers (i.e. 240l residual bins) are included in the KAT model, however it is assumed that there is no repayment of capital required for the existing containers. In options where new containers are required (e.g. boxes for kerbside sort) capital repayment costs are included within the model in addition to ongoing replacement costs.
Restricted access vehicles – All costs relating to restricted access routes are accounted for, including annualised capital costs for vehicles, staff costs, fuel and vehicle maintenance.
Spare vehicles – Annualised capital costs for spare vehicles are included along with maintenance costs and standing charges.
Bulking costs – costs relating to operation of bulking facilities.
Dry Treatment – This includes the treatment cost of dry recyclate collected, including any income received from sale of material.
Organic Treatment – This includes costs relating to treatment of food & garden waste, based on current arrangements.
Residual Disposal –this includes the treatment and disposal costs relating to residual waste collected, along with cost of disposal of rejected material where applicable.
Trade Income – Income from trade waste service included as trade residual co-collected with household waste
Trade Costs – Additional costs resulting from operation of trade waste service
Supervision and Overheads -
Supervision and management is assumed to be constant across all option, Figures supplied by CCBC used.

3.1 Options Modelled

Option 1 follows the WG Blueprint. Option 5 is a 3 stream configuration, with material presented in a combination of boxes and reusable bags for collection.

Table in Fig 17 shows the revenue cost for the core options modelled. As can be seen, Option 1 exhibits the lowest cost of the options modelled, £1.14m less than the enhanced baseline option.

The variant of Option 1 with additional loader does exhibit higher costs than Option 1 with a single loader, approximately £180,000 more, but cost calculated for this option is still approximately £330,000 lower than the three stream collection modelled in 5b.

Whilst collection costs for option 1 are around £750,000 more expensive than the enhanced baseline, the cost of processing the collected material is far less in option 1. The enhanced baseline sees costs in excess of £1.5m resulting from MRF gate fees & haulage costs compared to an income of just over £870,000 is seen in Option 1 from the sale of separately collected dry recyclate.

A similar pattern is seen in Option 5, with higher collection costs, in excess of those modelled in the enhanced baseline, offset by income generated from the sale of the collected material (as opposed to MRF treatment costs).

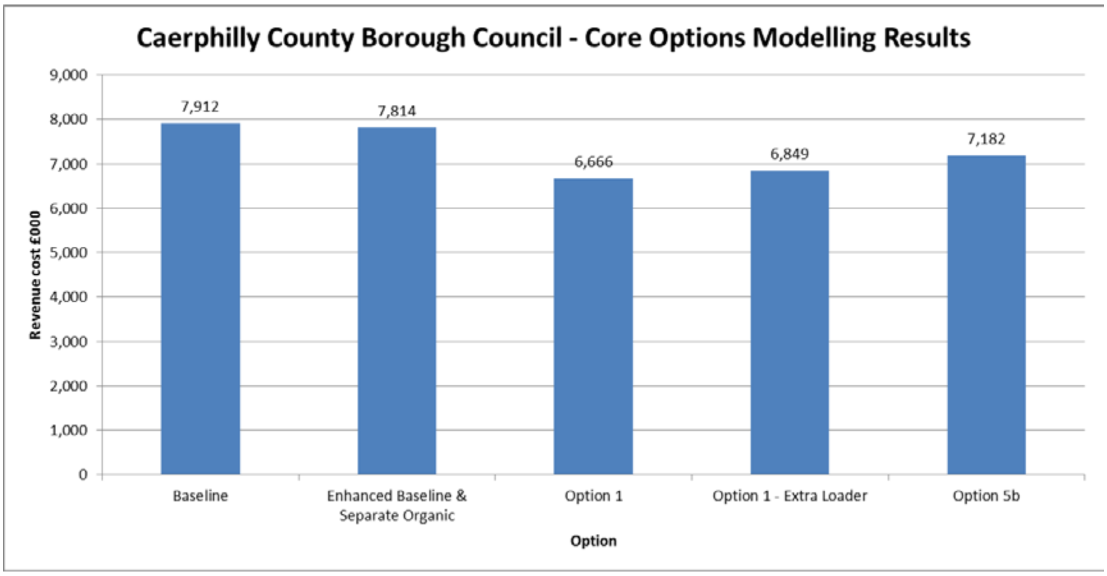
Incomes in option 5 are lower than those in option 1, with just over £720,000 income generated. This is largely due to the reduced income realised from the sale of mixed paper and card compared to the sale of separately collected paper and card fractions in option 1.

Work currently being undertaken by WRAP examining the potential options for bulking facilities and depots for CCBC will also examine whether potential exists to separate cardboard from one of the mixed streams onsite, thus increasing overall income from sales. The additional cost of this activity, if deemed technically possible, will need to be considered alongside the potential increased income.

Fig 17 – KAT modelling results – Core options

Revenue Expenditure	Baseline	Enhanced Baseline	Option 1	Option 1 - Extra Loader	Option 5b
Annual Capital - Vehicles	611,870	633,919	775,665	700,067	799,289
Containers	118,582	118,582	202,592	202,592	301,958
Operating costs	2,527,720	2,572,000	3,017,241	3,305,249	3,313,662
Supervision	370,644	370,644	370,644	370,644	370,644
Overhead	447,877	447,877	447,877	447,877	447,877
Restricted Access Collections	303,959	303,959	331,448	331,448	330,782
Spare Vehicles	240,874	244,874	294,638	265,604	289,020
Total collection	**4,621,526**	**4,691,855**	**5,440,104**	**5,623,481**	**5,853,232**
Bulking Costs	235,000	235,000	610,000	610,000	610,000
Treatment - Dry	1,520,140	1,520,140	-878,841	-878,841	-720,651
Treatment - Organic	645,904	478,084	478,084	478,084	478,084
Disposal - Residual	1,664,932	1,664,932	1,792,201	1,792,201	1,737,019
Income - Trade	-813,000	-813,000	-813,000	-813,000	-813,000
Costs - Trade	37,000	37,000	37,000	37,000	37,000
Total	**7,911,502**	**7,814,011**	**6,665,548**	**6,848,925**	**7,181,685**
Variation from E Baseline	97,491	0	-1,148,462	-965,085	-632,326

Fig 18 – KAT modelling results – core options



Daily Pass Rates

One of the key outputs from the KAT model will be the number of vehicles/crews required for each collection option modelled.

This is affected by a number of factors, such as the mass and density of material set out for collection, the number of households setting out waste for collection in any given week, the capacity of the collection vehicle, crew size, distances travelled, amount of productive and non-productive time in a day, current productivity, time required to empty different waste container types etc.

The KAT model takes all of these factors into consideration when performing the necessary calculations to quantify the level of resources required for each option modelled.

Once the number of vehicles has been calculated, it is possible then to work out the daily average pass rate for each element of the service (i.e. The average number of households each vehicle drives past in a day)

In light of the modelling results presented to the authority, concerns were raised about how achievable the modelled levels of productivity were for the WG Blueprint options (Option 1).

It is useful therefore to compare the pass rates as calculated by the KAT model for CCBC with other authorities operating similar collection systems.

Table in fig 19 below shows the daily average pass rates for a number of local authorities.

Fig 19 – Daily pass rates

Council	Daily Pass rate	Crewing
Newport	765	D+1
Anglsey	680	D+1
Bridgend	750	D+1
Merthyr Tydfil	540	D+1
Blaenau Gwent	711	D+2
Conwy	622	D+2

It can be seen that the calculated pass rate of 616 households per day (for driver + 1) for CCBC is comparable to a number of the authorities sampled, lower than the pass rates achieved by Newport, Anglesey and Bridgend, but higher than those seen in Merthyr Tydfil. Anecdotally, it does appear that now the new service has had time to bed in, some spare capacity exists in the Merthyr Tydfil rounds. With collection rounds routinely finishing ahead of time, potential may exist for a reduction in collection fleet numbers, with a resultant increase in the average daily pass rate.

The daily pass rate of 725 households when the driver + 2 configuration as modelled is broadly similar to that of Blaenau Gwent and is lower than that seen in Bridgend and Newport who operate the service with a single loader. The figure modelled does however exceed that seen in Conwy.

Due to the many and varied factors affecting productivity, it is difficult to compare figures directly with other authorities, but the figures calculated do appear to be in the range of what could realistically be achieved.

4.0 Sensitivities Modelled

4.1 Seasonal garden waste

The current garden waste service is run weekly all year round, largely due to the fact that garden waste is co-collected with food. Garden waste is extremely seasonal and in winter months very little is produced by households. Many authorities either suspend their service or reduce the frequency of collection over the winter months as a result.

In Options 1 & 5, garden waste is collected on a fortnightly basis in a dedicated vehicle; consequently, it is relatively straightforward to suspend the service over the winter months.

Following discussions with CCBC it was felt that the existing brown recycling bin would not be suitable for garden waste collection due to the potential for increased contamination.

It as therefore assumed that householders would continue to be provided with reusable sacks for presentation of garden waste. It should be noted however that WRAP do have concerns regarding manual handling for garden waste collection using this type of container.

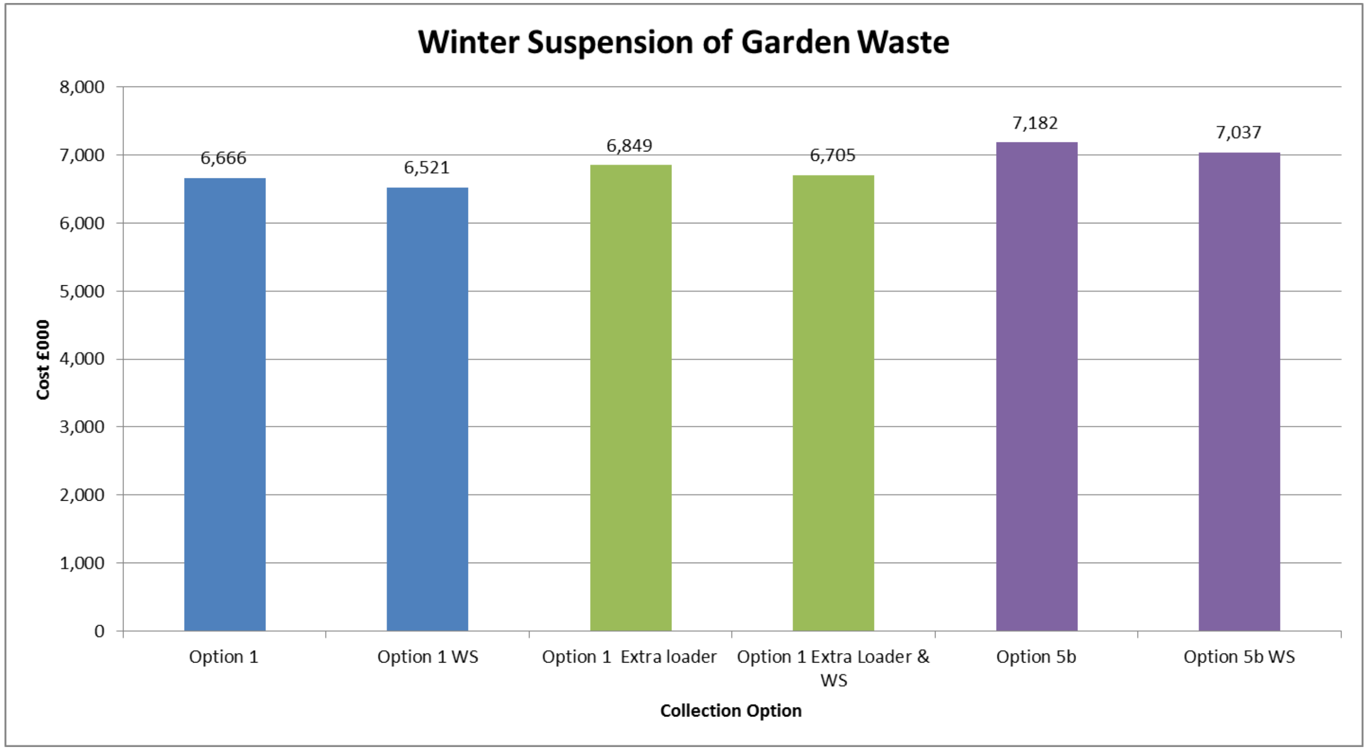
The model has been adjusted to take into account the difference in cost of providing sacks rather than wheeled bins. The collection of bagged materials is likely to be marginally quicker than a corresponding service using bins, but as it is difficult to estimate the resource required for collection of garden waste due to the extremely seasonal nature of collections, the same level of resource has been modelled as previously.

The cost of providing a weekly collection of garden waste for options 1 and 5 has not been modelled, however it is estimated that an additional 2-3 RCVs and crew would be needed, adding approximately £300,000 to the core model cost.

The projected costs of options with suspended garden waste are shown in the chart in fig 20 below, alongside the cost of the corresponding core option.

Fig 20 – Winter suspension of garden waste

Option	Option 1	Option 1 WS	Option 1 Extra loader	Option 1 Extra Loader & WS	Option 5b	Option 5b WS
Cost £000's	6,666	6,521	6,849	6,705	7,182	7,037



It can be seen that in all cases a similar cost saving of approximately £140,000 could be realised from suspending garden waste collections over the winter months.

It is assumed that all labour savings can be realised, though this will require appropriate planning and flexibility. Vehicles will still incur standing cost when not used (insurance, tax etc.), however fuel and other running costs will not be incurred.

4.2 Additional loaders for blueprint options

As requested by CCBC, the blueprint option, Option 1, was modelled with an additional loader per vehicle.

In addition to modelling collections with an extra loader, the model was also run with an additional 0.5 loaders per vehicle. This was to reflect the option of retaining a driver +1 configuration for half of the collection rounds and the operation of driver +2 for the rest.

Fig 21 below shows the relative costs of the driver +1, driver + 1.5 and driver +2 configurations.

Fig 21 – Cost comparison – Additional loaders Option1

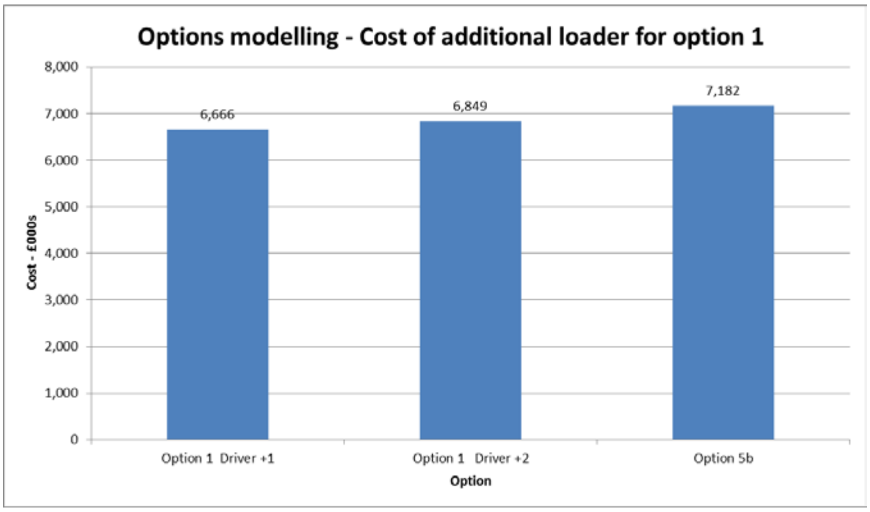
	Option 1 Driver + 1	Option 1 Driver + 1.5	Option 1 Driver + 2
Cost - £000s	6,666	6,710	6,849
Difference from core	-	44	183
Vehicles	24.4	21.8	20.7
Av daily pass rate	616	688	725

The addition of a second loader does increase collection costs; however the increased productivity from having a second loader on the vehicle increases the daily pass rate of the collection vehicle and thus reduces the number of vehicles required overall.

The model was modified with a zero figure assumed for driver contribution (previously 10%). The resulting reduction in productivity means that more vehicles and crew would be required than previously modelled. The daily pass rate dropped from 761 households per day to 725, with an additional vehicle needed as a result. Consequently, the cost of this option increased relative to the core option. However, as was the case previously, the overall cost modelled for option 1 with the additional loader is still less than that calculated for Option 5.

Fig 22 – Cost comparison – Additional loader

	Option 1 Driver +1	Option 1 Driver +2	Option 5b
Cost - £000s	6,666	6,849	7,182



4.3 Effect of commodity prices

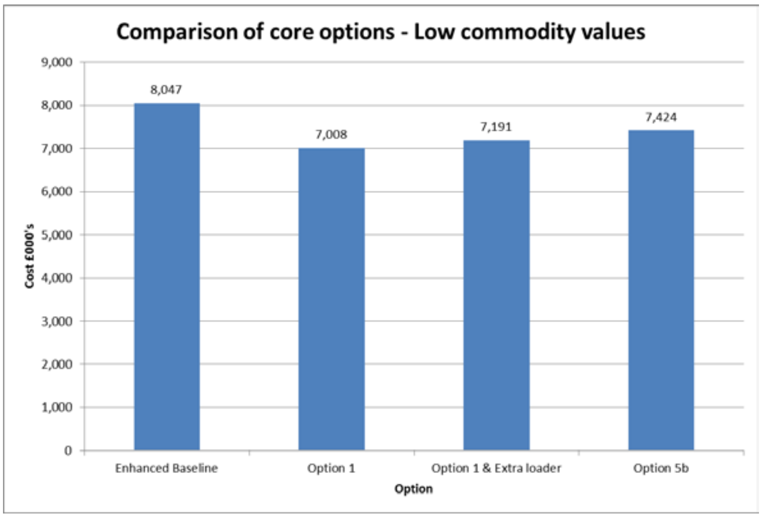
The original commodity prices used in the model were updated with the latest data available from the WRAP Materials Pricing Report (MPR). The figures used were from October 2015, and in general prices are lower for most of the materials modelled compared to the previous data used. This means that overall service costs are higher across all of the alternative collection options modelled, however, the relative positions of the options considered is largely unchanged.

The effect of possible future variations to the commodity prices modelled was also examined.

4.3.1 Low commodity prices

Using the methodology described previously in section 2.3.2 commodity prices in the modelling were reduced by 30% and the adjusted MRF gate fee was used. Fig 23 below shows the costs of core options modelled with low commodity prices:

Fig 23 – Kat modelling results – Low commodity values

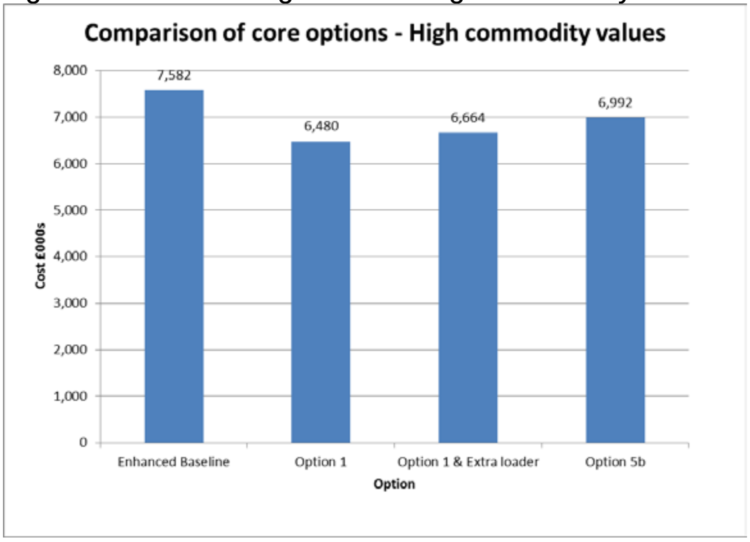


Overall, reduced incomes from the sale of materials result in increased service costs for all of the options modelled. Option 1 remains significantly cheaper than the enhanced baseline, though the difference is reduced to just over £1m. Option 1 also remains the lowest cost option overall, £416,000 less than option (5b). When the variant of option 1 with an additional loader is considered, the differential is reduced to £233,000.

4.3.2 High commodity prices

Again, using the same methodology, commodity prices were increased by 30% compared to those used in the core model. The updated MRF gate fee was also used. Results are shown in fig 24 below.

Fig 24 – Kat modelling results – High commodity values



Increased income from the sale of recyclate resulted in lower costs overall. Option 1 was the lowest cost option overall, approximately £1.1m cheaper than the enhanced baseline. The difference between option 1 and option 5b is more pronounced, with option 1 costing £512,000 less. The addition of a second loader reduces this differential to £328,000.

Ultimately, whilst commodity prices have a significant impact on overall service costs; the relative position of the options being compared remains unchanged.

It should also be noted that high quality separated material is likely to command higher prices and will be easier to sell during periods of low market prices.

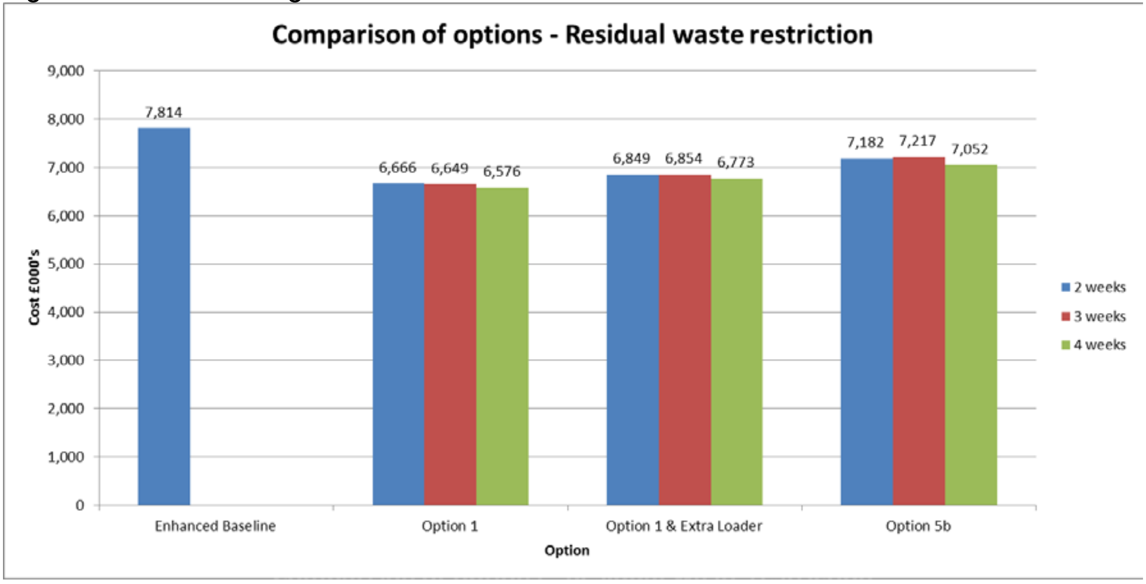
4.4 Additional restriction to residual waste

3 & 4 weekly collection

The core options were modelled with increased yields arising from the less frequent collection of residual wastes.

The chart on fig 25 below shows the cost of the core options as modelled with 2 weekly, 3 weekly and 4 weekly refuse collection.

Fig 25 – KAT modelling results – Additional residual waste restriction



For both 3 and 4 weekly collection the increase in yield of food waste and dry recycling results in an increase in resources required to collect the material. The increased average household yield means that vehicles will fill quicker and the collection rounds themselves will be slower.

For example, when considering Option 1, with current residual waste restriction, the collection vehicle will be full after passing 582 properties, and overall a total of 616 households will be passed per day by each vehicle (requiring 2 trips to the bulking facility). However when the frequency of residual waste collection is reduced to once every 4 weeks, the increased material yield means that the vehicle will, on average, be full after passing 447 properties, and overall the additional work required to collect the additional waste means that the daily pass rate will also be reduced to 553 households. The number of visits each vehicle is required to make to unload at the bulking facility remains at 2 per day, but the lower daily pass rate due to the increased yield means that more vehicles are required overall.

To some degree, this increase in collection cost is offset by the reduction in frequency of residual waste collection and the resulting reduction in the number of residual waste collection vehicles and crews required.

The uplift in recycling yields, and consequent reduction in residual waste collected also results in savings from lower disposal costs and higher incomes from the sale of material, though there is also a significant increase in the treatment cost associated with food waste.

In general terms, the net cost of treatment and disposal of collected material decreases with reduction in frequency of residual waste collection.

However, the reduction in frequency of residual waste collection requires the establishment of collection services for Absorbent Hygiene Product (AHP), and it is assumed that a separate trade waste collection vehicle would be required to collect from premises during periods where no residual waste collections are made.

AHP costs

Service provided using a caged tipper or similar vehicle. Crewing level is assumed to be a driver + 1 loader.

Fig 26 – AHP service cost

Residual Frequency	Vehicles required	Annualised capital	Bags	Operating cost	Total
4 weekly	4.3	35,436	22,198	296,704	354,338
3 weekly	3.8	28,349	22,198	257,776	308,323

CCBC suggest that separate AHP collection may not be required for 3 weekly residual collection options. In this case, the cost of operating the collection, £308,323 can be removed from the overall option cost. This will not affect the relative position of the options being considered as the same cost will need to be removed from all, however, the overall service cost would be lower than that calculated for 4 weekly collection of residual waste.

4 weekly Residual collection – vehicle numbers

Some concerns were raised by CCBC regarding the number of vehicles calculated for the collection of residual waste for the 4 weekly residual collections.

For example, in option 1, the number of RCVs required reduces from 6.5 to 3.7 vehicles.

This is partly due to the reduction in frequency itself, but also due to the additional diversion of material from the residual waste stream to the food and dry recyclate collection services. Some material previously collected, namely a portion of commercial waste and AHP will also move to dedicated collection rounds, further reducing the mass of residual waste to be collected.

With the current fortnightly residual collection, for option 1 it has been calculated that 32,703 tonnes of residual waste would be collected by 6.5 vehicles. This equates to an average mass per vehicle per day of 19.35 tonnes.

The average daily pass rate per vehicle for this collection is calculated as 1,159 properties per day.

With a 4 weekly collection, the mass collected is reduced significantly to 22,361 tonnes. With 3.7 collection vehicles, this equates to 23.2 tonnes per day per vehicle. The daily mass per vehicle is higher than modelled for the 2 weekly residual collection, however it is assumed that due to the less frequent collection, both set out rate and the average mass of material presented by the householder per collection is increased. This results in significantly shorter rounds, albeit with heavier average bin weights (round is reduced to 954 properties per day).

Trade Waste Costs

Fig 27 – Additional trade round cost

Additional Trade round	
Resource	Annual cost
26t RCV	42,996
Driver	29,675
Loader	27,028
Total	99,699

The additional costs from these services mean that overall, the difference in costs between the core options and those for 3 & 4 weekly refuse options are relatively small.

Cost of 3 weekly options are slightly higher than the corresponding core option, whilst the 4 weekly options are generally slightly lower in terms of cost when compared to the core options.

Whilst there may be little benefit in terms of cost, the move to less frequent residual waste collection as modelled does have a beneficial effect on overall recycling rate.

Based on the arisings used for the modelling, and from recycling rates during the same period, the uplift to overall recycling rate resulting from the expected increased yield of dry recyclate and food waste can be calculated.

Moving to a three weekly collection of residual waste would result in an increase of 3.2 percentage points to the overall recycling rate. Whilst moving to a 4 weekly collection cycle would result in an increase of 8.5 percentage points.

Fig 28 – Recycling rate uplift – additional residual waste restriction

	Total Dry Reuse (tonnes)	Total Dry Recycling (tonnes)	Total Composting (tonnes)	Total Municipal Waste (tonnes)	Average Dry Reuse Rate	Average Dry Recycling Rate	Average Composting Rate	Average Reuse, Recycling & Composting Rate	Difference
Baseline	160	32327	23218	99575	0.16%	32.46%	23.32%	55.94%	
Adjustment for 3 weekly	0	1259	1528	-624					
Revised output	160	33586	24747	98951	0.16%	33.94%	25.01%	59.11%	3.17%
Adjustment for 4 weekly	0	2709	1851	-1118					
Revised output	160	36295	26598	97832	0.16%	37.10%	27.19%	64.45%	8.51%

4.5 Trolibocs

As a sensitivity, the cost of providing Trolibocs to all householders for Option 1 was modelled. Trolibocs are significantly more expensive than providing standard boxes and lids, with a unit price of around £28 (as obtained from WRAP Container framework) compared to just under £10 for 3 standard boxes.

Ultimately, provision of Trolibocs all households would have a capital cost of £2.1m. Written off over 10 years, this would represent an additional revenue cost of £154,000 per annum over and above that calculated for the core blueprint option.

5.0 Conclusions and Recommendations

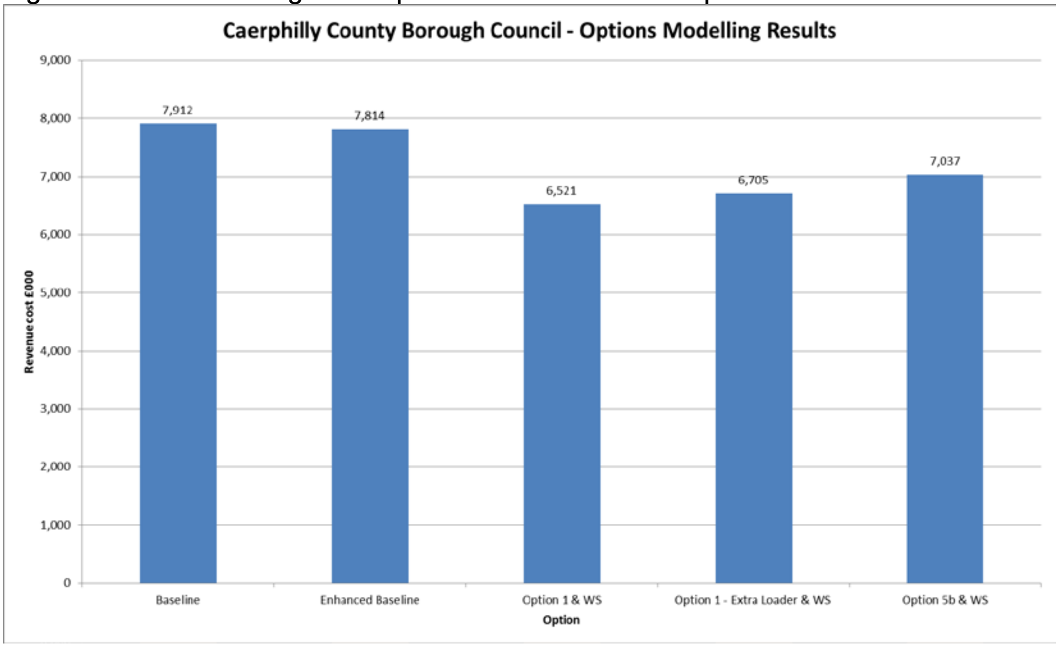
From the modelling work it is possible to draw a comparison of costs across the range of options modelled. From the sensitivities modelled, it is shown that a fortnightly collection of green waste, coupled with a suspension of that service over the winter months will realise a cost saving for all options.

Therefore, to ensure a fair comparison, the table and chart below show the costs for all options with this configuration for green waste.

Fig 29 – KAT Modelling results – comparison of lowest cost options

Revenue Expenditure	Baseline	Enhanced Baseline	Option 1 & WS	Option 1 - Extra Loader & WS	Option 5b & WS
Annual Capital - Vehicles	611,870	633,919	775,665	700,067	799,289
Containers	118,582	118,582	202,592	202,592	301,958
Operating costs	2,527,720	2,572,000	2,875,290	3,163,298	3,171,117
Supervision	370,644	370,644	370,644	370,644	370,644
Overhead	447,877	447,877	447,877	447,877	447,877
Restricted Access Collections	303,959	303,959	331,448	331,448	330,782
Spare Vehicles	240,874	244,874	294,638	265,604	289,020
Total collection	**4,621,526**	**4,691,855**	**5,298,153**	**5,481,530**	**5,710,687**
Bulking Costs	235,000	235,000	610,000	610,000	610,000
Treatment - Dry	1,520,140	1,520,140	-878,841	-878,841	-720,651
Treatment - Organic	645,904	478,084	461,994	461,994	461,994
Disposal - Residual	1,664,932	1,664,932	1,806,145	1,806,145	1,750,963
Income - Trade	-813,000	-813,000	-813,000	-813,000	-813,000
Costs - Trade	37,000	37,000	37,000	37,000	37,000
Total	**7,911,502**	**7,814,011**	**6,521,451**	**6,704,828**	**7,036,994**
Variation from E Baseline	97,491	0	-1,292,559	-1,109,182	-777,017

Fig 30 – KAT modelling – Comparison of lowest cost options



The modelling results indicate that option 1, the WG Blueprint, combined with the suspension of garden waste collections over the winter period, is the lowest cost option.

The cost modelled for this option is around £1.4m per annum less than the baseline option and £1.3m less than the enhanced baseline.

When options 1 and 5 are compared, it can be seen that the cost modelled for option 1 is £516,000 lower than the next lowest cost option (option 5b).

Costs increase with the addition of a second loader to Option 1, reducing the differential in costs with option 5b to £332,000.

All options assume that a similar yield of dry recyclate is collected, and that overall waste arisings remain constant, therefore the performance, in terms of recycling rate, for all the options modelled will be the same.

Sensitivities

In addition to the core options modelling, a number of sensitivities were examined.

Fluctuations in commodity prices

The effect of both high and low commodity prices was examined as part of the modelling. It was shown that commodity prices would have an impact on overall service cost, with low prices resulting in higher overall service costs and conversely, high commodity prices resulting in lower service costs. However, the overall position of the options modelled relative to each other remained unchanged, with option 1 remaining the lowest cost configuration when both high and low commodity prices were modelled.

Additional residual waste restriction

In addition to the current fortnightly residual waste service, options were modelled both with a 3 and 4 weekly residual waste service (using the existing 240l wheeled bin).

The additional yield of dry recyclate and food waste resulting from the additional residual waste restriction required additional resources to collect it, with more vehicles and crew needed for all of the options modelled. The resulting additional costs were offset by reduced disposal costs and increased incomes from the sale of recyclate, along with a reduction in the residual waste fleet. However less frequent residual collection would mean that additional resources would also be needed to provide a collection of AHP and an additional dedicated trade waste round.

Ultimately, moving to less frequent residual waste collection would have little impact in terms of cost, with 3 weekly options exhibiting slightly higher cost than the current restriction and 4 weekly residual resulting in slightly lower costs.

However, there would be an uplift in recycling performance, with 3 weekly residual collection predicted to result in an uplift of 3.2 percentage points and 4 weekly collection resulting in an 8.5 percentage point increase.

Again, the relative position of the options modelled remains largely unchanged when residual waste collection frequency is varied.

The KAT modelling results do indicate that moving from the current commingled system and adopting one of the alternative options modelled would result in cost savings to the authority, with option1, the WG Blueprint, realising the greatest saving.

Reducing the frequency of residual waste collections will not have a great impact on cost, with 4 weekly collections resulting in a small overall cost saving compared to the equivalent core option. However such a move would result in significant improvements to overall recycling rates.

It is recognised that adopting any of the alternative options modelled would require significant capital investment, both in terms of collection vehicles and depot/bulking infrastructure.

WRAP and CCBC are currently examining the depot infrastructure requirements in a separate project, and the results from this work will need to be incorporated in the options modelling once results are available.

Appendix 1 – Supplementary information

Containers

The assumptions made regarding the containers required for each option are provided in Fig 31 below. These assumptions are based upon industry best practice with costs provided by the authority, or where applicable, from the WRAP container procurement framework.

Fig 31 – Container costs

Containers			
Container	Unit cost (£)	Write off period	Replacement rate
240 ltre bin	16.50	10	2%
5 & 23l caddy	2.98	10	4%
kerbside box	3.33	10	4%
Reusable sacks	1.24	5	25%
Poly Sacks	0.03		

Staff

Fig 32 - Staffing levels allocated to the options modelled

Crewing Levels	
Baseline	**Crew**
Dry Recycling	1+2
Organic	1+2*
Residual	1+2
Blueprint	**Crew**
Dry Recycling	1+1
Garden Waste	1+2
Residual	1+2
Twin/Multi Stream	**Crew**
Dry Recycling	1+2
Organic	1+2*
Separate Food	1+1
Separate garden	1+2

Fig 33 – Staff unit costs

Staff costs	
Driver	29,675
Loader	27,028

Overheads

Overhead figure of £447,877 has been taken from information supplied by CCBC.

Supervision

Supervision costs are assumed to remain constant across all options, with figure of £370,654 taken from data provided by CCBC.

Vehicle costs

Fig 34 - Typical vehicle costs

Vehicles - Typical figures used in KAT						
Vehicle	Purchase Cost	Depreciation Period	Annual Capital	Standing cost	Maintenance	Total
RCV	155,000	7	24,412	2,584	10,000	36,996
RCV & Lift	175,000	7	27,562	2,584	10,000	40,146
Twin Pack	175,000	7	27,562	2,584	12,000	42,146
Twin & Lift	195,000	7	30,712	2,584	12,000	45,296
One Pass	200,000	7	31,499	2,584	13,000	47,083
RRV	120,000	7	18,899	2,134	8,000	29,033
PBUV	60,000	7	9,450	2,134	4,000	15,584
Tipper	45,000	7	7,087	2,134	2,000	11,221
Micro RRV	50,000	7	7,875	2,134	2,000	12,009

Vehicle numbers

Calculated by the KAT model, vehicles required for each collection option shown in Fig 35 below.

Fig 35 - Vehicle requirements

2 weekly refuse

Collection	Baseline	Enhanced Baseline	Option 1	Option 1 - WS	Option 1 - 2 loaders	Option 1 - 2 Loaders & WS	Option 5b	Option 5b & WS
A	9.0	9.0	24.4	24.4	20.7	20.7	10.0	10.0
B	6.8	6.9	3.9	4.0	3.9	4.0	8.0	8.0
C	0.0	0.0	0.0	0.0	0.0	0.0	3.9	3.9
D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Refuse	6.7	6.5	6.5	6.5	6.5	6.5	6.5	6.5

3 weekly refuse

Collection	Option 1	Option 1 - WS	Option 1 - 2 loaders	Option 1 - 2 Loaders & WS	Option 5b	Option 5b & WS
A	25.8	25.8	21.9	21.9	10.4	10.4
B	4.0	4.0	4.0	4.0	8.3	8.3
C	3.8	3.8	3.8	3.8	3.9	3.9
D	0.0	0.0	0.0	0.0	3.8	3.8
Refuse	4.3	4.4	4.3	4.4	4.3	4.3

4 weekly refuse

Collection	Option 1	Option 1 - WS	Option 1 - 2 loaders	Option 1 - 2 Loaders & WS	Option 5b	Option 5b & WS
A	27.2	27.2	23.1	23.1	10.8	10.8
B	4.0	4.0	4.0	4.0	8.6	8.6
C	4.3	4.3	4.3	4.3	3.9	3.9
D	0.0	0.0	0.0	0.0	4.3	4.3
Refuse	3.7	3.8	3.7	3.8	3.5	3.6

Collection A = Dry Recycling, B = Organic, C = AHP (Option 5b B=Food, C= Green, D=AHP)

Spare Vehicles

Based on the fleet requirement for each option, a reasonable number of spare vehicles has been estimated for each option capital costs for spare fleet have been annualised (over 7 years) and included in the overall option cost. In addition, standing charges and maintenance costs ae also included.

Fig 36 – Spare vehicles

2 weekly refuse

	Baseline	Enhanced Baseline		Option 1		Option 1 - WS		Option 1 - Extra Loader		Optin 5b		Option 5 b - WS	
Collection	RCV	RCV	Twinpack	RCV	RRV	RCV	RRV	RCV	Twinpack	RCV	Twinpack	RCV	Twinpack
Dry	9	9		0	25		25		21		18		18
Organic	7		7	4	0	4	0	4		4		4	
Residual	7	7		7	0	7	0	7		7		7	
Total	23	16	7	11	25	11	25	11	21	11	18	11	18
Spare	5	4	2	3	6	3	6	3	5	3	4	3	4
Cost	184979	160583	84291	120437	174201	120437	174201	120437	145167	120437	168583	120437	168583

3 weekly refuse

	Option 1		Option 1 - WS		Option 1 - Extra Loader		Optin 5b		Option 5 b - WS	
Collection	RCV	RRV	RCV	RRV	RCV	Twinpack	RCV	Twinpack	RCV	Twinpack
Dry	0	26		26		21		19		19
Organic	4	0	4		4		4		4	
Residual	5	0	5		5		5		5	
Total	9	26	9	26	9	21	9	19	9	19
Spare	2	6	2	6	2	5	2	5	2	5
Cost	80291	174201	80291	174201	80291	145167	80291	210729	80291	210729

4 weekly refuse

	Option 1		Option 1 - WS		Option 1 - Extra Loader		Optin 5b		Option 5 b - WS	
Collection	RCV	RRV	RCV	RRV	RCV	Twinpack	RCV	Twinpack	RCV	Twinpack
Dry	0	28		28	0	22		20		20
Organic	4	0	4		4		4		4	
Residual	4	0	4		4		4		4	
Total	8	28	8	28	8	22	8	20	8	20
Spare	2	7	2	7	2	5	2	5	2	5
Cost	80291	203234	80291	203234	80291	145167	80291	210729	80291	210729

Productivity

Fig 37 below shows the number of properties passed on average by each collection vehicle over the course of a working day.

Fig 37 - Daily Pass Rates

2 Weekly residual

Collection	Baseline	Enhanced Baseline	Option 1	Option 1 & Winter suspension	Option 1 Extra Loadr	Option 1 Extra Loader & WS	Option 5b	Option 5b WS
A	1,661	1,663	616	616	725	725	1,497	1,497
B	2,213	2,177	1,911	1,877	1,911	1,877	1,887	1,887
C	0	0	0	0	0	0	1,911	1,911
D	0	0	0	0	0	0	0	0
Refuse	1,121	1,159	1,159	1,159	1,159	1,159	1,159	1,159

3 weekly residual

Collection	Option 1	Option 1 & Winter suspension	Option 1 Extra Loader	Option 1 Extra Loader & WS	Option 5b	Option 5b WS
A	583	583	685	685	1,441	1,441
B	1,877	1,877	1,877	1,877	1,815	1,815
C	2,633	2,633	2,633	2,633	1,911	1,911
D	0	0	0	0	2,633	2,633
Refuse	1,159	1,147	1,159	1,147	1,159	1,159

4 weekly residual

Collection	Option 1	Option 1 & Winter suspension	Option 1 Extra Loader	Option 1 Extra Loader & WS	Option 5b	Option 5b WS
A	553	553	650	650	1,389	1,389
B	1,877	1,877	1,877	1,877	1,748	1,748
C	2,633	2,633	2,633	2,633	1,911	1,911
D	0	0	0	0	2,633	2,633
Refuse	1,004	992	1,004	992	1,062	1,062

Collection A = Dry Recycling, B = Organic, C = AHP (Option 5b B=Food, C= Green, D=AHP)

Length of day

Fig 38 below shows the actual working times used in the baseline model (calculated from the tachograph data supplied), along with the times used for the enhanced baseline and subsequent options.

Fig 38 – Hours worked

Working Hours		
Service	**Baseline**	**Enhanced Baseline & Options**
Dry	06:35	07:00
Organic	06:50	07:00
Residual	06:50	07:00

Tipper fleet

It is assumed that the requirement to service 2500 properties not on core collection rounds can be provided using a similar level of resource as that used currently across all of the commingled and twinstream options.

Fleet requirements for commingles and source segregated collections were both run through the KAT model.

Costs shown in table below Costs calculated in a similar was as main options and are included in Fig 39 below

Fig 39 – Tipper fleet costs

Costs	Comingled	KSS	2 stream
Capital - Vehicles	37,011	40,161	37,011
Operating Costs	266,948	291,286	293,771
Total	303,959	331,448	330,782

APPENDIX 6

Final report

Caerphilly waste transfer station review

Project code:COL125-001
Research date: October-December 2015 **Date:** 26 April 2016

WRAP's vision is a world in which resources are used sustainably.

Our mission is to accelerate the move to a sustainable resource-efficient economy through re-inventing how we design, produce and sell products; re-thinking how we use and consume products; and re-defining what is possible through re-use and recycling.

Find out more at www.wrapcymru.org.uk

COL125-001
WRAP, 2015, Caerphilly, Waste Transfer Station Review, Prepared by Resource Futures

Written by: Emma Clarke and Eric Bridgwater (Resource Futures), Pete Francis (Independent Consultant) and James O'Neill (Fehily Timoney)

Front cover photography: Full Moon Waste Transfer Station

Executive summary

Resource Futures has been contracted to provide technical advice to review Waste Transfer Stations (WTS) options for Caerphilly County Borough Council (CCBC) under the WRAP Collaborative Change Programme. A waste transfer station is required that will be fit for purpose when a new kerbside collection service is implemented. CCBC have not yet agreed whether the service will be twin stream or full blueprint (as defined in the Welsh Government's Municipal Sector Plan, Part 1, 2011); and therefore for the purposes of this study, both collection systems have been considered.

Three sites are included in the options appraisal: Trehir, DS Smith and Full Moon, with a separate option for twin stream or blueprint kerbside collections. The Trehir twin stream was divided into two options, making a total of seven options included in the options appraisal. Other sites were considered during the study (Penallta, Ty Dyffryn, Bryn Group) but were excluded for various reasons.

The options appraisal used a weighting system that takes into account a range of criteria. This included scoping the civil engineering works and associated capital costs that would be required for each site.

The weighted option ranking was as follows:

1 Full Moon twin stream
2 Full Moon blueprint
3 DS Smith twin stream
4 DS Smith blueprint
5 Trehir twin stream A
6 Trehir twin stream B
7 Trehir blueprint

The results of the options appraisal suggest that Full Moon is the most appropriate site for a waste transfer station. Whilst the location in the south west of the county is not ideal compared to more central sites, the fact that it is an existing waste site, requiring relatively little civil engineering, and owned by CCBC, make it an attractive option. The single most significant factor in the weighting scoring that put Full Moon out in front relates to capital investment, with no land purchase required for the WTS (which penalises the DS Smith option), and moderate redevelopment costs (Trehir options gets penalised for having the highest redevelopment costs). However there will be costs associated with relocating the Full Moon HWRC (see comments below).

Operating a twin stream collection system and using Full Moon as the WTS is ranked above the blueprint; however even the blueprint option scores significantly higher than the third ranked option which is to operate a twin stream service and use the DS Smith site. Either twin stream or blueprint could be accommodated at Full Moon, although it is likely to be necessary for collection vehicles to be parked at the Tir y Berth depot. However the decision in terms of selecting twin stream and blueprint will need to refer to the outcomes of the separate kerbside review that is being carried out with CCBC.

It is worth bearing in mind that for DS Smith, the cost of purchasing the land and the cost of new flood defences is not included. Similarly, the cost for any structural engineering required for the Trehir bridge, or another other modification works to the access road are not included. If either of these sites are to be taken forward to the next stage of decision making, more detailed reports of these risk factors would be needed.

If a WTS were developed at Full Moon then the HWRC currently located there would need to close. Since the Full Moon facility serves a particular region of the authority, it may be deemed prudent to develop a replacement site. Options for reconfiguring the CCBC HWRC network will be investigated in a separate study.

Contents

1.0 Introduction

Resource Futures has been contracted to provide technical advice to review household waste recycling centres (HWRC) and Waste Transfer Stations (WTS) under the WRAP Collaborative Change Programme. The CCP is funded by the Welsh Government to support Welsh Authorities to achieve the targets set out in its waste strategy. Within the framework, Resource Futures were asked to support Caerphilly County Borough Council (CCBC) in identification of a preferred waste transfer station site that will be fit for purpose when a new kerbside collection service is implemented. CCBC have not yet agreed whether the service will be twin stream or full blueprint (as defined in the Welsh Government's Municipal Sector Plan, Part 1, 2011); and therefore for the purposes of this study, both collection systems have been considered.

The focus of this report is an options appraisal to determine which of the WTS options achieves the highest score using a weighting system that takes into account a range of criteria. Three sites are included in the options appraisal: Trehir, DS Smith and Full Moon, with a separate option for twin stream or blueprint kerbside collections. This produces six options. The Trehir twin stream scenario was divided into two options, making a total of seven options included in the options appraisal. The options assessed are listed in Table 1.1. Other sites were considered during the study (Penallta, Ty Dyffryn, Bryn Group) but were excluded for various reasons.

Table 1.1: CCBC WTS options

Scenario name	Dry recycling & organics	Residual	Recycling vehicle parking	HWRC changes
DS Smith Twin stream	DS Smith	DS Smith	Tir y Berth	None
DS Smith Blueprint	DS Smith	DS Smith	DS Smith	None
Trehir Twin stream A	Trehir	Trehir	Tir y Berth	Trehir closes
Trehir Twin stream B	Trehir	Full Moon	Tir y Berth	Trehircloses
Trehir Blueprint	Trehir	Full Moon	Trehir	Trehir closes
Full Moon Twin stream	Full Moon	Full Moon	Tir y Berth	Full Moon closes
Full Moon Blueprint	Full Moon	Full Moon	Tir y Berth	Full Moon closes

It is worth noting the broader context for decision making in selection of a preferred WTS option. This WTS review is integrally linked to the decision making process regarding options on the kerbside collection system, and also for the Household Waste and Recycling Centre (HWRC) network (because some options considered are existing HWRC sites, and involve displacing existing sites). These reviews are the subjects of two separate studies.

It is suggested that the decision regarding the preferred WTS option will need to account for both the findings of this study and of the kerbside options study (which Resource Futures is not involved in). The HWRC review will be carried out by Resource Futures, and the focus of that review will be determined by which WTS option is identified as the preferred option.

2.0 Background

Currently CCBC uses the Waste Transfer Station (WTS) at Full Moon to bulk its residual waste and recyclables before transporting for disposal/treatment. The WTS is on the same site as the Full Moon HWRC and is too small for current requirements. The HWRC site require relocation in order to accommodate the proposed kerbside collection system and associated WTS facilities at Full Moon.

The current WTS consists of the main waste transfer hall (for residual waste) and a bulking facility with a walled bay for dry recyclables. The WTS was originally designed to handle 30,000 - 35,000 tonnes of waste per annum, but now deals with considerably more waste. CCBC now undertake haulage of materials themselves and therefore have fewer problems with backlogs due to delays with hauliers. The Full Moon site has capacity to store approximately 300 tonnes of material (approximately 2-3 days collections). However, in periods of bad weather, increased throughput (e.g. Christmas) or breakdown of loading equipment, the site is problematic to manage.

Changes to collections systems, either to full blueprint or twin stream, will alter the requirements at the WTS, and therefore any new facility needs to take account of this change.

2.1 Waste arisings

2.1.1 Residual waste

CCBC collects over 30,000 tonnes of domestic and commercial waste per annum (approximately 600 tonnes per week), with the vast majority being deposited at Full Moon WTS prior to transfer to Virodor (Prosiect Gwyrdd, Cardiff) for disposal (several miles just outside the southern boundary of the county). Most refuse vehicles collect two loads per day (from between 900 and 1,200 properties). Currently the return journey takes between 1.5 and 2 hours for a bulk haul vehicle carrying approximately three refuse vehicles loads (just over 22 tonnes) of waste. The cost of this transfer was approximately £8 per tonne or £176 per bulk load (charged by contractors) but has reduced to approximately £4 per tonne now transfer is undertaken in-house. Direct delivery for treatment is not a realistic option given the distance the vehicles would have to travel to the treatment facility in Cardiff. It is anticipated that new vehicles purchased to service the new collection system will also not be suitable for direct delivery to a treatment facility located outside the county borough.

2.1.2 Dry recycling

CCBC collects between 18,000 and 21,000 tonnes recyclables co-mingled per annum (approximately 300-400 tonnes per week). It is of lower weight but greater volume than residual waste. Waste audits carried across two phases in 2015 found that 22% of dry recycling was either non-targeted recycling or contamination. The material is delivered to the Lamby Way facility in Cardiff, utilising the in house bulk haul vehicles used for residual waste. The material needs to be kept dry to minimise the risk of being reject at the MRF gates and incurring higher fees.

2.2 Food/Green waste

CCBC collects approximately 12,000 tonnes of combined food/green waste from households per annum (varying from over 100 tonnes per week in the winter to nearly 300 tonnes per week in summer, dependant on the weather). An additional 2-3,000 tonnes of green waste is collected at the HWRCs. Organic waste is direct delivered to the Bryn Group within the borough, but in future this may change and the treatment of organic material may be determined when a longer term procurement process is undertaken. Therefore the review needs to take account of the possibility that organic waste may require bulking at a WTS prior to transportation to a reprocessor.

2.3 Other wastes

Other wastes collected annually by CCBC include:

- ~12,000 tonnes of residual materials from six HWRCs - direct delivered to the Bryn Group, for secondary sort

- ~2,000 tonnes of litter picking waste - direct delivered to the Bryn Group, for secondary sort
- ~3,000 tonnes of Mechanical Sweeping Waste which requires dewatering prior to disposal/treatment and is deposited at the CCBC owned Coed Tophill (where it is dewatered) prior to onward transportation for recycling.

All of the above wastes are direct delivered, but if arrangements for any of the above wastes change, they may need to be disposed of, and in the case of the mechanical sweeper wastes, dewatered, at the chosen WTS site.

2.4 HWRCs

There are six HWRCs (Trehir, Penallta, Aberbargoed, Penmaen, Rhymney and Crosskeys). A recent Wales Audit Office report for Caerphilly suggested that CCBC should consider rationalisation of HWRC provision. This is the focus of a second study within the CCP programmed support to CCBC.

Trehir is a well used site with high throughput. If this site were to be reduced in size or closed to accommodate a WTS at the site, the impact on the community would be significant. When considering the impact on the HWRCs within the options appraisal, it is not assumed that an alternative site will open if an HWRC needs to close. However, the results of the second study may suggest that a new site is needed, and therefore the impact would be lower.

The Full Moon HWRC has fewer users than the Trehir site, but it provides a service to residents in the south eastern part of CCBC, and therefore is arguably an important part of the CCBC HWRC network.

Penallta HWRC was originally considered as a WTS option. However this option was removed from the options appraisal since it would have required the moving of the grounds and maintenance department (adjacent to the current Penallta HWRC, and required for the Penallta WTS option) to the Tir y Berth depot; and it was subsequently confirmed by CCBC that Tir y Berth would not be able to accommodate this move.

3.0 Kerbside collection scenarios

Whilst the preferred collection system has not yet been agreed, it is likely to be either a twin stream option or blueprint collection (single pass kerbside sort) system. The WTS options consider both collection systems, both of which are considerably different from the existing comingled collection, with a separate option defined for each site being considered, and each kerbside collection system.

The kerbside options are either:

- **“Blueprint”** -Welsh Government Blueprint, weekly collection of dry recycling in an RRV using three kerbside boxes with lids (or 2 boxes and a re-usable bag). Food waste would also be collected weekly in an RRV using a 23litre caddy. Garden waste would be collected weekly or fortnightly in re-usable bags by an RCV (although suspended for the winter months) and residual waste collection frequency would initially remain fortnightly, but this may change to three or four weekly.
- **“Twin-stream” -**weekly collection of dry recyclables, food waste and green waste. Recyclables collected in two twin pack vehicles, one chamber with paper and card, the other with plastics and cans; and a second twin pack with glass in one chamber and food waste in the other. (Strictly speaking, this option is multi-stream, but is called twin-stream in this report to distinguish it clearly from the blueprint option.)

The number of vehicles predicted to be required for each collection scenario are shown in Table 1.

Table 1: – numbers of vehicles required for each kerbside collection scenario

Collection stream	Option 1 - Blueprint with extra loader		Option 5b - "Twin-stream"	
	RCV	RRV	RCV	Twinpack
Dry		21		18
Organic	4		4	
Residual	7		7	
Frontline	11	21	11	18
Spare	3	5	3	4
TOTAL	14	26	14	22

The aspects of a kerbside sort scheme that would impact upon the waste transfer option decision are:

- Space for parking operational and staff vehicles; although CCBC have stated that this study should assume that collection vehicles will be parked at the Tir y Berth depot, so that they have ready access to the vehicle maintenance workshops at Tir y Berth
- Space for staff welfare facilities
- The degree of material handling and separation (e.g. equipment to separate paper and card)
- The equipment needed to screen recyclables and reduce manpower.

The preferred kerbside option and associated waste transfer facility should look to maximise recyclate revenue through sorting. It is worth noting that the demands on the waste transfer facility may change in the long term if the collection system changes again (for example, if the twin-stream option is chosen, at some point in the future there may be drivers from the Welsh Government and/or the EU towards implementing blueprint collections, perhaps at the expiration of collection vehicle payback periods). The residual waste frequency is also expected to change in future and therefore any waste transfer station needs to be able to accommodate the change in quantity of residual and recyclable waste and change in the number of vehicles needed.

4.0 Site review: Blueprint

The sections below consider each of the sites and the engineering work they would require to operate as a WTS. The details in this section refer to how the sites would be configured and developed to service the blueprint collection option. It is assumed that all the changes will also be required if twin stream collections are chosen, unless specified in Section 6.0. Key commonality between all blueprint options includes:

- Glass bay/s required along with a covered area for food waste skips. A baling area would require a designated card bay in front of the sorting area with doors opening directly on to the baler feed belt at ground level. Only one baler would be required.
- Space would be required for storage of smaller recyclables such as oil, batteries and textiles as these can be collected in the cupboards of RRV vehicles.
- More fork lift trucks (potentially two) would be required for food waste stillage removal.
- All vehicles will return to site to tip, therefore the impact on the traffic flow and vehicle movement issues will be greater.

4.1 Land assets

If WTS operations were to be moved to DS Smith or Trehir, in principle this could free up the WTS area at Full Moon. However it is unlikely in these scenarios that the land at Full Moon could be sold, since it is probable that CCBC would want to retain the HWRC, and also the CCBC Highways Department would want to continue to use the site for salt-spreading operations.

If the proposed WTS site requires purchase or leasing, this is a considerable additional cost and risk factor (particularly if the site is leased or mortgaged); this would apply to the DS Smith site (which is not owned by CCBC, whereas both Full Moon and Trehir are).

4.2 DS Smith site - blueprint

The DS Smith site is located in Bedwas, close to the A468. It is a good sized site with a large building that could accommodate recycling and refuse operations. The outdoor areas would provide sufficient space for vehicle parking.

The building would require a great deal of civil engineering work. The pillars within the building would be likely to require moving due to the vehicle movements required for tipping multiple materials. The building would also require re cladding. A full structural assessment would be necessary prior to any decision being made.

It is suggested by Caerphilly that due to the site's location off the A468, that vehicles would experience some traffic delays at busy times. Highway Engineers have also expressed concerns over additional pressure on this junction at peak times. Some works at the junction may be required in order to enable better access for heavy vehicles.

A key consideration for this site is that it is not owned by CCBC, so it would either have to be purchased at a cost of £1.8m, or leased at a cost of £120,000 per annum (based on a 20 year term and 5 yearly rent reviews).

The building is on a flood plain so may require additional protection, and the exterior hard standings areas are likely to require resurfacing and kerbing before applying for a NRW Permit to operate as a sorting/bailing facility. Detailed considerations of these matters are not in the scope of the current review, and if the site were chosen as a preferred option, it would be necessary for a separate study to be carried in relation to assessing the flood risk and protection measures required. However it is believed that a flood protection wall should not cost in excess of £100,000 (though it is stressed that this only a highly provisional estimate of the scale of works that might be required).

Photo 4.1: DS Smith site, interior of building

A summary of some of the key advantages and disadvantages associated with the DS Smith is provided below.

	Advantages	Disadvantages
DS Smith site	• Large site with excellent space indoors and outdoors • Future proof if decision to park on site is made later	• Not currently Caerphilly owned(purchase cost £1.8m or lease cost £120,000 pa based on a 20 year term with 5 yearly rent reviews) • Located on busy road which may cause operational issues due to traffic delays. Some works at the junction may be required in order to enable better access for heavy vehicles. • Flood risk – defences likely to be required at additional cost

4.2.1 Layout of site

All vehicles would access/egress through the main gate. However by planning the vehicle movements, cross-over of traffic flows can be avoided. Recycling vehicles should enter the end door to tip inside the building (from the perspective of entering the site via main gate), and exit the middle door after depositing materials. Vehicles will tip materials that require baling first, and subsequently tip loose materials that are not baled prior to onward transportation. The door closest to the fence/gate would remain closed. Refuse vehicles would travel to the far side of the building and enter at the last door on the other side to deposit material.

The schematic below illustrates the potential layout at the DS Smith site. This site could accommodate collection vehicles parking if required.

4.2.2 Structural review and assessment

A structural review and assessment would be required to determine the two following points:

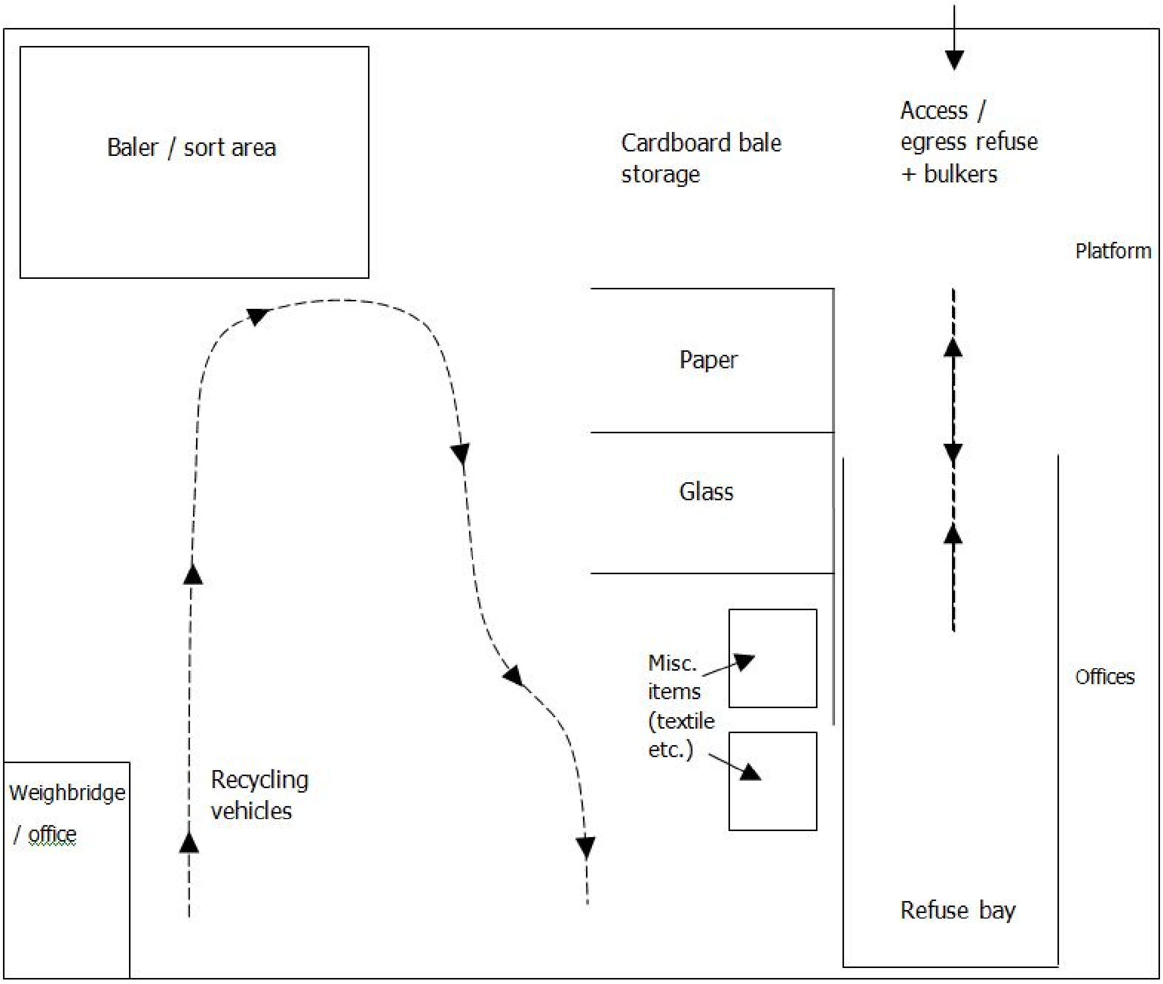
- Recladding of current building: The existing building exterior and cladding is in a poor state on visual inspection. It is initially proposed that re cladding of the entire building may be necessary investment.
- Removal of pillars as necessary: This would be required to provide comfortable operational space. It is envisaged that removal of a minimum of 4 pillars will be required and additional strengthening elsewhere.

It is understood that the DS Smith site is on a flood plain and is likely to require a flood defence wall. It is unlikely that if this is needed it would need to be around the whole perimeter because of the location of the site. Costs could vary significantly dependant on the height and length of the wall and the materials used. Detailed designs would be needed, and without it is not possible to estimate the cost, though it is considered unlikely that it would be in excess of £100,000. This is a risk item for CCBC to be aware of when reviewing the options.

Photo 4.2: Aerial view of DS Smith site

Note: this photo was taken when the site was being used to bulk and process paper

Figure 4.1: Outline schematic of layout, DS Smith blueprint



Note: food waste and garden waste to be bulked outside – see Section 4.2.4

4.2.3 Provision of office/welfare

The site contains an office for the weighbridge which should be refurbished and there is additional office space (also requires refurbishment) on far side of the building. This could house welfare (canteen, toilets/washroom). If CCBC wished to use the office space for other tasks or departments, pre made cabins are a cost effective option.

It is not known how many administration staff require relocation now that Tir y Berth has been confirmed as being retained. However, some administration, such as material weights, site records and compliance etc, will be expected to be held on site. There is a three storey purpose built office space already on the site that would require refurbishment.

4.2.4 Construction of bays (recycling, loose materials, food waste)

Following the tipping of materials that require baling into the baling area, two bays would be required, for loose material, i.e. paper and glass. These would need to be robust at the rear, with push walls capable of withstanding pressures of scooping material by loading shovel or large telehandler. Pre-cast concrete units could be used to provide flexibility, reduce the civils programme and to control costs.

Food waste would require ro-ro skips or artic trailers with roofs and sealed doors. It may be preferred to house these outside due to space and odour. If this is the case they would require a simple covered area (steel pillars, corrugated plastic roof) large enough to house them (the number will be dependent on frequency of tipping; each can hold approx 8 tonnes). It is suggested that garden waste is tipped and bulked in an outdoor bay. It will be necessary to ensure that suitable drainage is in place for all bays.

4.2.5 Construction of refuse bay

The refuse bay would be entered from the far side of the building, thereby avoiding traffic management issues from mixing recycling and refuse vehicles. Refuse vehicles would enter through the door nearest to the perimeter. The bay would be at the far end by the office area. The shape of the building would allow bulk hauliers to enter the building and be loaded inside (positioned by current viewing platform). Pre-cast concrete wall units could be used here also to provide flexibility and to control costs.

4.2.6 Installation of baler and sorting line equipment

It is suggested that the baler equipment and bays be constructed to the rear of the building (from the position of the main gate into the site).

4.2.7 Marking of traffic flow

Appropriate road marking and signage would be required to separate as far as possible the recycling and refuse operations. Wholesale changes to the site layout are not advised due to the requirement to retain the weighbridge.

4.2.8 Plant procurement

A machine will be required for the loading of paper and pushing up of stock to feed baling equipment. This could be a telehandler with shovel/grab or a loading shovel. A loading shovel is suggested for reliability. A fork lift truck with baling clamps will also be required for the removal, stacking and loading of bales, and another two with forklift tines for the tipping of food waste stillages. Two fork lifts will be in regular use: one with a clamp to load bales etc and one with tines to tip stillages. It is therefore recommended that there are three fork lift trucks on site because there is a significant risk in downtime, if there is no spare capacity and one of the fork lifts requires maintenance; however these would not require full-time operation.

4.3 Full Moon site – blueprint

The Full Moon site accommodates the current CCBC refuse and recycling WTS, as well as an HWRC. The current WTS consists of the main waste transfer hall (for residual waste) and a bulking facility with a walled bay for dry recyclables. The WTS was designed to handle 30,000 - 35,000 tonnes of waste per annum, but is often stretched to the limits of its capacity with no resilience for storage of materials or increases in capacity. However there is sufficient space at the site that, with redevelopment, it could accommodate refuse and blueprint WTS requirements.

Photo 4.3: Full Moon – current WTS

Some of the key advantages and disadvantages associated with this site are summarised below.

	Advantages	Disadvantages
Full Moon	• Large site capable of housing refuse and recycling • Current surface good • Good layout • Already owned by CCBC	• Poor position in district, for both collections and vehicle return to Tir Y Berth • Requires relocation of HWRC

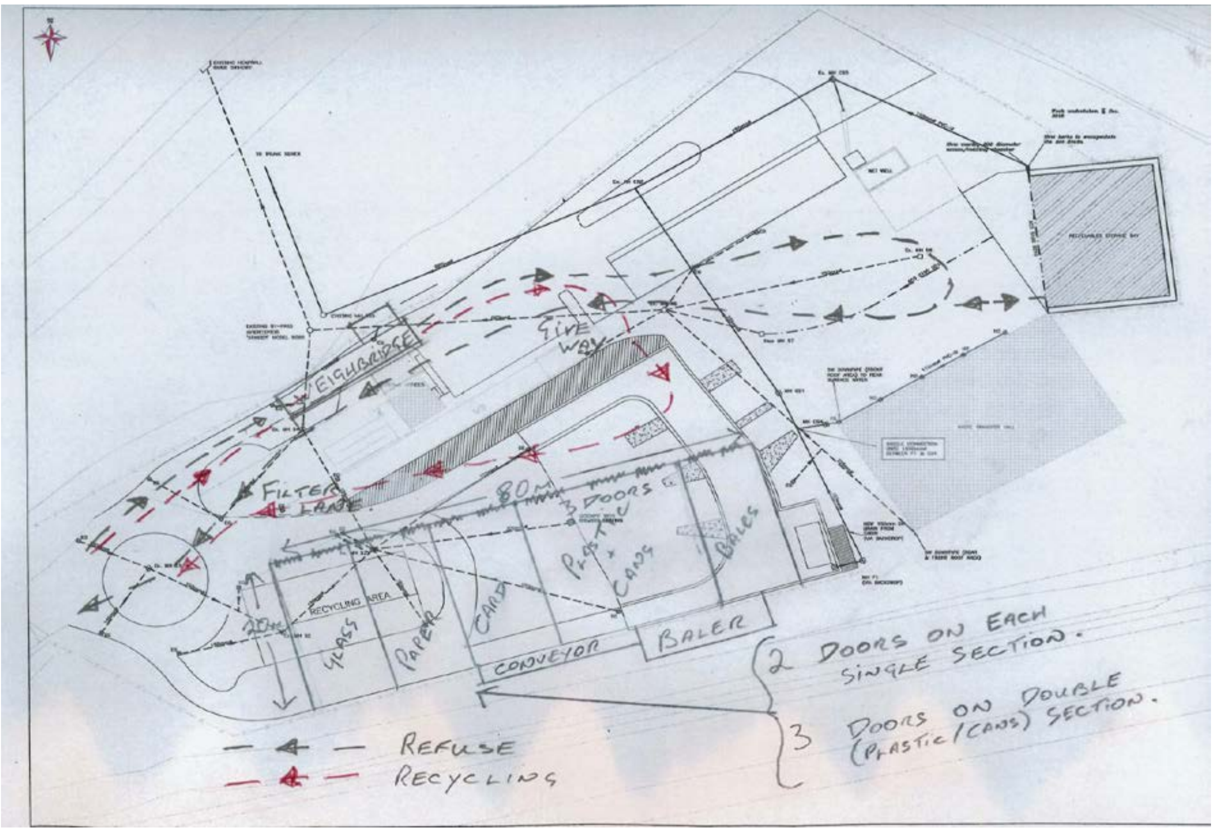
4.3.1 Layout

The Full Moon site has a good layout for designing a new WTS. The shape of the site (basically rectangular) allows for easy planning of buildings and bays etc. With the retention of the current refuse shed, refuse vehicles would travel from the weighbridge to the left as you enter, straight to the rear of the site to tip. It would be possible for them to turn and leave without crossing recycling vehicles, with the use of pre-programmed tare weights; the vehicles could exit to the right of the weighbridge office in an anti clockwise fashion. Recycling vehicles would turn in a clockwise fashion towards bays and baler area. These would back onto the fence line to the side on which the current recycling shed sits, but nearer to the gate (see Figure 4.2).

If parking is not required on site it would be possible to manage refuse and recycling at Full Moon with the retention of the current refuse shed.

Photo 4.4: Full Moon – aerial view

Figure 4.2: Outline schematic of layout, Full Moon blueprint



Note: drawing provided by CCBC

4.3.2 Current recycling shed
The current recycling shed is in a poor state and it is also too close to the refuse shed, which would remain in place. It is suggested that this building could be used to store bales.

4.3.3 Relocating of existing HWRC area
It would be essential to remove the existing HWRC to provide sufficient operational space. This would involve removal of the ramp and resurfacing. Options for relocating the Full Moon HWRC, in the scenario where the WTS is to be located at Full Moon, will be explored in a follow on project.

4.3.4 Provision of office/welfare
The site will require office space for the weighbridge and welfare facilities for crews. The most cost effective option, that also uses space efficiently, would be four pre-made cabins, stacked. Welfare would be best placed in the parking area on the far left of the site, to prevent the need for crews to enter the operational area, other than to take vehicles in if drivers are instructed to tip their own vehicle. The office building should be at the current weighbridge office position.

4.3.5 New Processing Building and Equipment Installation
The new building for baler equipment and bays should be constructed in line with the current HWRC area and towards the perimeter gate (as per current position). The entire area for all bays and baler equipment would need to be concreted (rather than current tarmac surface).

4.3.6 Remarking of traffic flow

Appropriate road markings and signage would be required to separate, as far as possible, the traffic from both the recycling and refuse operations. Wholesale changes to the site layout are not advised due to the requirement to retain the weighbridge and office. However there are grassed areas within the site that could be utilised to provide extra space for traffic flows.

4.3.7 Plant procurement

A machine will be required for the loading of paper and pushing up of stock to feed baling equipment. This could be a telehandler with shovel/grab or a loading shovel similar to the machine currently on site. There are currently 2 loading shovels operating on site which could be used or adapted to fulfil this function.

It is therefore recommended that there are three fork lift trucks on site because there is a significant risk in downtime, if there is no spare capacity and one requires maintenance; though only two full-time staff would be required to operate these vehicles. One fork lift truck with baling clamps for the removal, stacking and loading of bales, as well as two further fork lift trucks for handling food waste stillages are recommended as two fork lifts will be in regular use: one with a grab to load bales etc, and one with tines to tip stillages.

4.4 Trehir site - blueprint

The Trehir site currently accommodates a relatively heavily used HWRC. If the WTS were to be located at this site, this would require that the HWRC facility at Trehir be closed, and an alternative site may potentially need to be developed, potentially in the same general location, ie adjacent to a potential new WTS facility; (as per previous plans produced by CCBC for a WTS and HWRC to be developed at the site).

There is sufficient space at the site to accommodate WTS operations, although the layout is not ideal, particularly with the higher level area in the current HWRC.

There could be some challenges associated with heavy vehicles using the access road. The road is steep in places, and as it is primarily laid on old landfill it is susceptible to sinking. Furthermore there are parts of the road where it could be problematic if heavy vehicles were to encounter each other and find it difficult to pass. The access road goes over a bridge, which may require strengthening works or replacing, which would prove very expensive. Furthermore the access road feeds into a roundabout, and it may be necessary to change the feed-in to the roundabout to make it suitable for heavy vehicles. The costs of bridge strengthening and any changes to the access route have not been considered in this options appraisal, as they would need to be the subject of a separate assessment. However these issues should be noted as a risk when considering the options.

Therefore there are several significant cost elements that have not been included in the costings for presented in this report for locating the WTS at Trehir, which could potentially make this option considerably more expensive:

- Replacement or relocation of the current Trehir HWRC
- Bridge strengthening or replacement works
- Works required on the access road feeding into the roundabout.

CCBC produced detailed cost estimates for building a WTS and new HWRC on the Trehir site, which covered these aspects, as some additional cost elements, such as water mains works and significant boundary fence construction. The CCBC estimates, which are now around 5 years old (and therefore could possibly be slightly low in relation to current prices) came to a total of around £7-8 million, greatly in excess of the estimate presented in this report. The potential significant additional costs associated with establishing a WTS at Trehir have been accounted for in the scoring for in options appraisal (Section 9).

Photo 4.5: Trehir – current HWRC

A summary of some of the key advantages and disadvantages of the Trehir site are summarised below.

	Advantages	Disadvantages
Trehir	• Well located in district • Currently in Caerphilly ownership • Could house both refuse and recycling	• Poorly laid out (across 2 levels), preventing best use of space available. • Difficult access for large vehicles • Bridge strengthening works on access road may be required • Additional feeder lane to roundabout for access road may be required • HWRC will require closure while works are being carried out. A new HWRC could be accommodated on the site in conjunction with a transfer station, though there would be a significant cost associated with this.

4.4.1 Layout

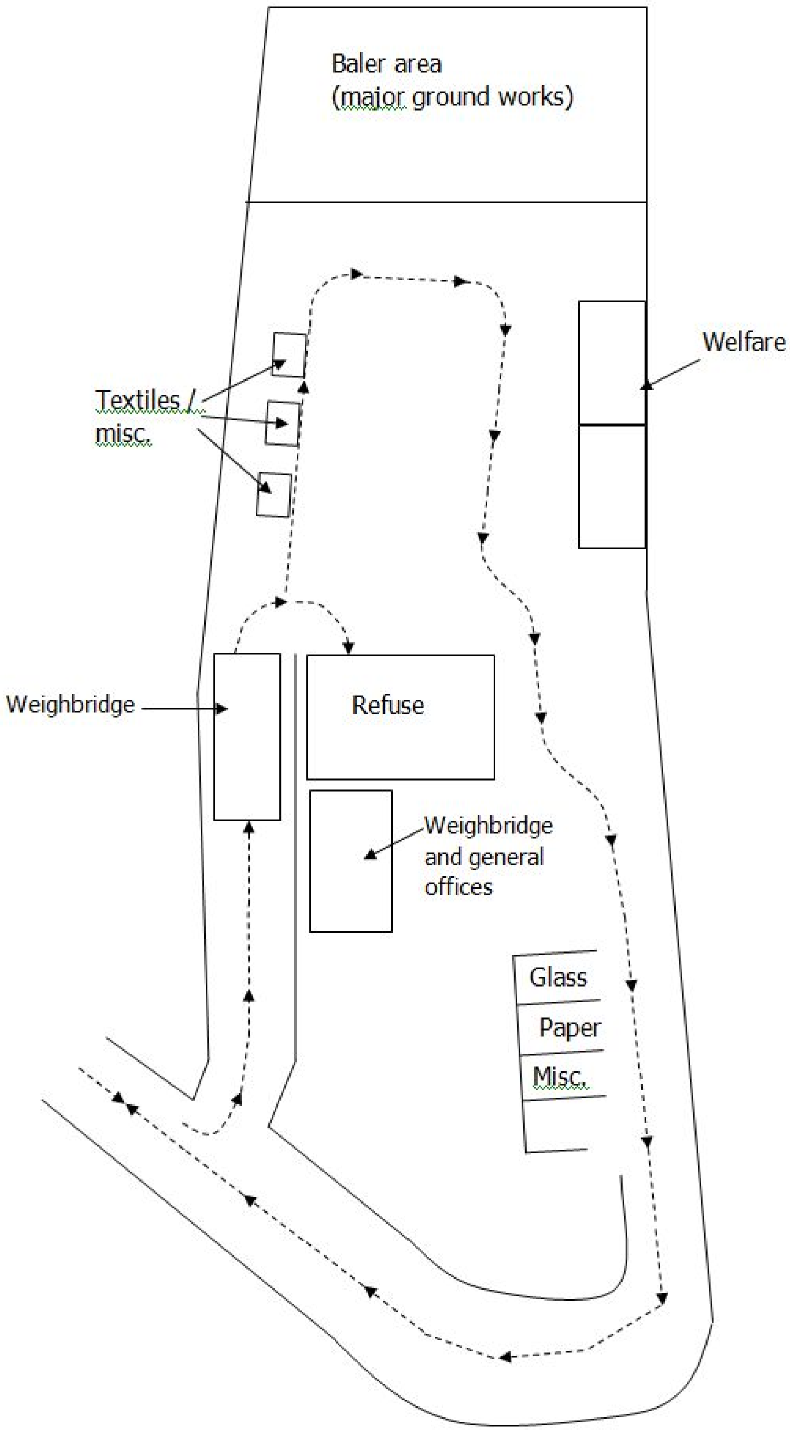
The entrance and egress from the site is via a long entrance road with an awkward turn from the main road/roundabout. There is a temporary bridge which requires maintenance and/or replacement. This can only be crossed by one vehicle at a time.

If parking is not required on site, it would be possible to run refuse and recycling with extensive ground works. However, there are concerns regarding access for blueprint vehicles (approx 23 vehicles) as well as refuse vehicles and bulk hauliers.

Figure 4.3 shows a suggested layout for Trehir WTS.

Photo 4.6: Trehir HWRC – aerial view

Figure 4.3: Outline schematic of layout, Trehir blueprint



4.4.2 Access

There are significant issues with access to Trehir for HGV and RCV vehicles, particularly with the road's gradient and the location where there is a sharp bend in the road. There may be traffic flow issues when vehicles pass one another, particularly on the bridge. Poor weather conditions such as snow and ice may cause further access issues and safety concerns. There is also concern regarding the bridge which may require strengthening/replacing to allow bulk vehicles to cross safely. A detailed structural assessment of the existing bridge would be required to assess its suitability for long term site access if any Trehir option is to be progressed. Costs for bridge repair or maintenance have not been included in this options appraisal.

4.4.3 Rebuilding of current maintenance sheds
The existing steel portal building is not of a suitable size for the proposed refuse shed. It would need to be demolished and a new shed built to house the waste collected daily, with appropriate buffer storage. The use of this area would allow refuse vehicles to tip and leave without interfering with recycling operations. The use of this area will require extensive ground works (excavation/removal of earth/rubble) around the existing shed to create an extra approx150m^2 of flat surface.

4.4.4 Construction of office/welfare space
Crews will require toilets and canteen area (for breaks while tipping), as well as an office for supervision and weigh bridge operations. This building should be placed in a line on the road at the top of the site which turns into the track to the previous landfill. The cheapest option would be prebuilt modular units on two stories (2 x 2: toilet block, canteen, weighbridge office, manager/supervision).

4.4.5 Installation of weighbridge
A weighbridge of a length capable of weighing 44 tonne haulage vehicles would be required for council and commercial hauliers as well as CCBC collection crews. This could be surface mounted for simplicity. It would be placed at the entrance to the site to the left of the current shed. It would be necessary to erect a small cabin for a weighbridge operator, unless CCTV relaying to main site office as proposed previously was deemed suitable.

4.4.6 Flattening of HWRC area
Removal of the HWRC at Trehir would be essential to provide comfortable operational space. This would involve the removal of ramps and resurfacing.

4.4.7 Other groundworks
Other than the area in which the current HWRC sits, the entire site would require resurfacing. All areas to be used for baler area or bays would require a concrete surface. Other areas (through roads) could be surfaced with tarmacadam to reduce initial costs; however lifetime costs (maintenance and repair) should also be considered.

4.4.8 Construction of baler, sort line equipment and building
It is suggested that the new building for baler equipment and bays is constructed at the rear perimeter of the current HWRC area. The entire area for all bays and baler equipment would need to be concreted (rather than current tarmac surface).

4.4.9 Additional bays/storage
As there is limited remaining space for the storage of materials due to the proposed development; bays for the storage of loose materials would be required to be sited elsewhere. Two possible options are considered:

1. Run along the middle of the site on the right hand edge of the current HWRC area as you enter the site.
2. Use the area above the current shed once resurfaced, leaving more room in the current HWRC area for storage of baled materials. The loose materials would be taken off in these bays once card/plastics and cans are tipped.

The bays required are:
- Paper bay (preferably covered) capacity 100 tonnes

- Glass bay to accept either 100 tonnes of mixed glass; or 75 tonnes of green, 50 tonnes clear, 30 tonnes brown[1]. If brown glass is mixed with green, an additional bay for brown glass will not be required. Suggest concrete pre-form construction. This/these can be sited outdoors.
- Covered area to house food skips. (2x standard 16 yard Ro Ro skips with sealed doors/ roofing system).

4.4.10 Remarking of traffic flow

Appropriate road markings and signage would be required to ensure a safe working area and compliance with health and safety.

4.4.11 Plant procurement

A machine will be required for the loading of paper and pushing up of stock to feed baling equipment. This could be a telehandler with shovel/grab or a loading shovel similar to the machine currently on Full Moon site (CAT loading articulated shovel or similar). A fork lift truck with grab attachment for the removal, stacking and loading of bales, as well as two further fork lift trucks for food waste stillages would also be required.

4.5 General considerations relating to site location

The number of vehicles entering the WTS site will be dependent on the collections option chosen. The table below details the number of vehicles needed to undertake the collections, and the number of vehicles that will return to the WTS to tip. Within the twin stream option, only 10 of the 18 twin pack vehicles will tip at the WTS as the vehicles collecting food waste and glass will direct deliver to Bryn Recycling. However the outline plans for the WTS scenarios have accounted for the possibility that with twinstream options food waste and glass could bulk at the transfer station (as they would under the blueprint scenarios), in the event that food and glass were no longer direct delivered to Bryn Recycling.

Table 4.1: Collection vehicle requirements

Collection stream	Option 1 - Blueprint with extra loader		Option 5b - "Twin-stream"	
	RCV	RRV	RCV	Twinpack
Dry		21		18
Organic	4/5		4/5	
Residual	7		7	
Frontline	11	21	11	18
Spare	4	5	4	4
TOTAL	14	26	14	22
Number of vehicles entering WTS	**7/8**	**21**	**7/8**	**10**

[1] *CCBC will need to decide whether the price for colour separated glass is sufficient to offset the additional operational cost of managing different glass streams. As low volumes/ weights of brown glass typically arise, it may be preferable to mix brown and green glass.*

Note: Figures in this table were originally provided by WRAP but were subsequently adjusted as advised by CCBC

For this study it is being assumed that all collection vehicles will be garaged at Tir y Berth depot. This means that this will be their start and end location, as is currently the case. The impact on collection crew start locations is minimal, as they will already use Tir y Berth. The location of Tir y Berth from the WTS will impact on the time required to return to the depot and therefore round length and productivity but it will not impact on their overall shift length.

The impact on nearby residents and businesses is anticipated to be less for any site operating a twin stream service. With regards to the community, it is assumed (for the purposes of this study) that any twin stream vehicles collecting food waste and glass will direct deliver to the Bryn Group, and therefore only 10 of the 18 recycling vehicles operating the twin stream service will need to tip at the chosen WTS; see Table 4.1. However with the twin stream service, there will be consequent increased traffic in the vicinity of the Bryn Group site.

It is also worth highlighting that the length of time needed to fill a twin stream or blueprint vehicle will differ to residual vehicles depending on factors such as density of material and number of vehicle compartments, set-out rates, crew levels and loading times. For the blueprint options, if vehicles leave the depot a 7am, they could be expected to tip twice, mid morning and at the end of the round. Twinpack vehicles within the twin stream option and residual vehicles within all options may tip once or twice. This means that the impact on heavily congested routes should be minimal because the vehicles should miss morning rush hours. All vehicles (refuse and recycling) are expected to miss the evening rush hour. However, regardless of the time the vehicles will tip, the impact of heavy vehicles upon the local community will be greater for Trehir than DS Smith or the Full Moon sites. This is due to the nature of the local road network, whereas although DS Smith is located on a busy and congested route, proportionally the addition of refuse and recycling vehicles will be low due to the number of journeys already undertaken on the route. The impact in the surrounding area of Full Moon is expected to be low as the site is quite isolated.

5.0 Blueprint equipment requirements

In any of the blueprint options described in Section 4, the WTS would require the following equipment:

- Dedicated cardboard tipping bay, large enough to hold 300% of daily collected materials. The bay would be placed in front of the main baler feed belt with doors on runners to close off belt while not processing card.
- Dedicated plastic and cans bay for circa 18 tonnes loose material positioned to feed sort line.
- Covered area to house food skips. (2x standard 16 yard Ro Ro skips with sealed doors/ roofing system)
- Paper bay
- Inline conveyor (feeding sorting equipment)
- Sort conveyor and system, comprising of overband magnet (steel removal) and eddy current separator (aluminium removal)
- Bays for all baled material (partly below sort line) steel, plastics, aluminium
- Feed conveyor
- Baler.

All baled materials other than cardboard would drop into bays below, once removed by equipment/gravity. These in turn would be opened as required, to supply the feed conveyor to the baler, with operators selecting which materials to bale.

Cardboard would mount up through the days tipping while other materials were processed/baled. It is suggested that first thing every morning, while sort line runs (filling bays below sort line), card is processed for approximately 2 hours by operatives to clear bay for the first tip. This would require doors opened to reveal feed conveyor and card pushed onto the belt directly by mobile plant. The bay would then fill further after second tip.

Although paper would not require baling for UK/European markets, the bay should be indoors to reduce complaints from buyers regarding wet material. This would also reduce litter problems.

Pits would be required under feed conveyors for the collection of leachates from baled materials. The baler should also be fitted with a (simple) drainage system to avoid build up of pooling leachates. It is suggested that advice from NRW is sought to avoid future issues.

The glass bay will need to be large enough to accept 300 tonnes of mixed glass. Suggest concrete pre-form construction. This can be sited outdoors.

If smaller materials such as textiles are to be included then provision space for containers should be made on leaving the weighbridge for collection staff to remove by hand. In the case of textiles, the container type would depend on processor as they would provide and collect as standard practice.

6.0 Twin stream options

In terms of the site, and the actions described in Section 4, there are few differences in requirements for twin stream collections. The key operational differences are:

- Within all blueprint options food waste will be tipped at the WTS and bulked for transportation to the reprocessor. Within the twin stream options, it is assumed that all the vehicles collecting food (and therefore glass) will be direct delivered to Bryn Group (or other reprocessor). This reduces the number of vehicles that will be returning to the waste transfer station to tip (and potentially park), and therefore reduces the impact on the community/ congestion. No requirement for glass bay/s and covered area for food waste storage as these materials will be tipped elsewhere. However the sites should have sufficient space and storage bays to accommodate food and glass storage at the site, in case direct delivery to Bryn Recycling of these materials should cease.
- No requirement for storage of smaller recyclables segregated during collections such as oil, batteries and textiles as these would not be collected on a vehicle such as split back RCV.
- Smaller sites (particularly Trehir) would be more viable due to speed of tipping, more space due to less bays, and less mobile plant (no FLTs required for food waste, only one needed for bale handling).
- No card bay to feed the baler (one tipping point for baled materials). However, extra sorting equipment in the form of a screen would be required for the removal of card, possibly manned full time by two members of staff. Due to the constant flow of materials that will require baling (i.e. card and plastic, aluminium and steel cans), two balers would be preferable (one for card and one for other materials). If only one baler is installed, it may not operate fast enough to cope with the volume of card and plastic which will

quickly fill the hoppers. Two balers will allow a more constant operation and ensure that operational issues do not arise with large volumes of unbaled card ("mixed papers") that requires storage post sorting, pre-baling.

7.0 Size of site

The total footprint of the site will depend on which site is chosen. All of the sites included within this study are believed to be large enough to accommodate the operations as described, albeit with civil engineering works completed to remove existing infrastructure if need be. The schematics in the report provide a suggestion of how operations could be configured. However some sites are obviously larger than others, and will therefore more easily accommodate WTS operations. The table below details the approximate sizes of the current sites and an estimate of the requirement for the new WTS.

Table 7.1: Size of existing sites

Site	Element	Approx. area, m^2
Full Moon	Total Site	8,100
	Existing. Waste Transfer Shed	310
	Existing. Dry Recycling Transfer Shed	525
	Yard Apron (Dry and Waste)	850
Trehir	Total Site Area	10,000
DS Smith	Total Site Area	10,000
	Existing Shed Area	2,200

All of the options assume all vehicles are parked at Tir y Berth. However, if CCBC decided in future to garage vehicles at the WTS, an estimate of the space required is included in Table 7.2. CCBC would need to ensure there is sufficient space for staff vehicles as well as the refuse and recycling collection vehicles.

Table 7.2: Estimated footprint of new site

WG Blueprint			
	Number	**Total size, m^2**	**Comments**
Operational area	Covered area	2,000	Includes bays, baler area and welfare facilities
	Uncovered area	850	Area for vehicle turning, un/loading, food waste containers
Refuse vehicle parking	14 vehicles	420	Assume $30m^2$ required per vehicle
Recycling vehicle parking	26 vehicles	780	
Staff parking	8 spaces	160	Yard staff, supervisor and visitors. Assume $20m^2$ required per vehicle.
Staff parking	50 spaces	1,000	Residual and recycling crews. Assume $20m^2$ required per vehicle.
Total footprint		5,210	
Twin stream			
	Number	**Total size, m^2**	**Comments**
Operational area	Covered area	2,000	Includes bays, baler area and sort lines, welfare facilities
	Uncovered area	850	Area for vehicle turning, un/loading, food waste containers
Refuse vehicle parking	14 vehicles	420	Assume $30m^2$ required per vehicle
Recycling vehicle parking	22 vehicles	660	
Staff parking	8 spaces	160	Yard staff, supervisor and visitors. Assume $20m^2$ required per vehicle.
Staff parking	50 spaces	1,000	Residual and recycling crews. Assume $20m^2$ required per vehicle.
Total footprint		5,090	

Note: for Twin stream, an area of 2,000 m^2 has been assumed, even though less space should be required than for blueprint, to allow for futureproofing.

8.0 Costs

Tables 8.1 to 8.3 below detail the costs associated with upgrading each site to accommodate waste transfer of dry recycling (twin stream or blueprint) collections and residual waste. These costs relate to the civil engineering costs for construction and infrastructure for each of the options.

It should be noted that some costs have been excluded from these estimates, detailed in Table 8.4, as it is not within the scope of this work to produce accurate assessment of those additional costs. For example, locating the WTS at Full Moon would require the closure of the HWRC, and if a replacement site were deemed necessary, there would be a significant cost associated with this; in this example, a follow on study will include addressing options for replacing the Full Moon HWRC, and so an accurate cost cannot be included here. However the likely magnitude of these additional costs have been considered alongside the civil engineering costs in Tables 8.1 to 8.3 when arriving at the relevant scorings in the options appraisal (Section 9).

Outline operational costs for the blueprint and twin stream options are provided in Table 8.5.

During the project CCBC officers visited the recently built Silent Valley WTS in Blaenau Gwent. A query was raised regarding whether the costs presented in this section were aligned to those the Blaenau Gwent reported had been incurred in building the Silent Valley WTS. In particular, a comparison was made of cost estimates produced for this study for a WTS at Full Moon and those for Silent Valley.

Details on the Silent Valley costs were provided in confidence to consultants working on this project and as a result of this, some elements of the costings for Full Moon were revised in line with the scope of works and costs incurred in building the Silent Valley WTS. As appropriate, all changes in assumptions were also included in the DS Smith and Trehir WTS costings, and so costings for all scenarios were updated. This has included allowing for more roller shutter doors in waste transfer buildings, and the installation of a fire suppression system.

However there is still a discrepancy between the revised Full Moon WTS cost estimate of£1,343,100 (see Table 8.2) and the costs provided by Blaenau Gwent for the Silent ValleyWTS of approximately £1.9 million; a discrepancy of £590,000. Through careful comparison of the scope of works for each WTS, it was found that this discrepancy can be explained by various factors:

- For Silent Valley the cost of paving, tarmac road and concrete yard is £360,000 in excess of the Full Moon estimates, due to Full Moon being able to use the existing yard area, and the new yard area at Full Moon is minimal. By contrast, new surfaces had to be laid for the whole Silent Valley site.
- Earthworks required at Silent Valley were much more extensive than those estimated to be required for Full Moon, resulting in an additional cost of £50,000 for Silent Valley.
- The Silent Valley site involved the construction of 2 sheds, whereas the Full Moon estimates require only 1 new shed to be built. This results in higher costs for Silent Valley in steel supply and erection of £90,000, and cladding of £50,000.

The above factors account for £550,000, ie a great majority of the £590,000 discrepancy. Therefore it is suggested that the costs presented here for Full Moon, and indeed the other WTS options, are consistent broadly with those reported for the Silent Valley WTS, in terms of assessing scope of works required and costs for each option. Once a preferred option is chosen, it is advised that suitably qualified civil engineers should be commissioned to provide more detailed costings.

Table 8.1: Costs associated with developing DS Smith site

Item	Quantity	Unit	Rate, £	Cost	Note
-	-	-	-		
Allowance for Structural Condition Assessment, Building Survey, Electrical Survey and Structural Modelling	1	Sum	£ 20,000	£ 20,000	Estimate
-	-	-	-		
General Site Works	-	-	-		
-	-	-	-		
General Site Clearance	1	Sum	£ 5,000	£ 5,000	Estimate
Removal and Disposal of Existing Cladding	4,001	m^2	£ 8	£ 32,008	SPONS 2015 (Labour and Plant Costs of Cladding, assumed similar works for removal
Removal and Disposal of Existing Purlins	4,001	m^2	£ 2	£ 8,002	Estimate based on Cladding Removal
New Single Skin Cladding (Roof)	2,307	m^2	£ 40	£ 92,280	Tender Rate Wales 2015
New Single Skin Cladding (Walls)	1,694	m^2	£ 40	£ 67,760	Tender Rate Wales 2016
New Purlins and Secondary Fixing	16	t	£ 2,750	£ 44,011	Assumes £2,000/t supply plus £750/tonne erection
Secondary Steel Works Minor	1	Sum	£ 20,000	£ 20,000	Estimate
Removal of Existing Roller Door	8	No.	£ 1,000	£ 8,000	Estimate
Installation of Roller Shutter Doors	8	No.	£ 4,500	£ 36,000	Estimate based on 2015 Wales tender rate (Standard Electric)
Upgrade of Existing Electrical Services	1	Sum	£ 30,000	£ 30,000	Estimate (Electrical Condition Survey required)
Backfilling of Existing Pit 1	211	m^3	£ 30	£ 6,318	Estimate based on 2015 Wales tender rate
Backfilling of Existing Pit 2	11	m^3	£ 30	£ 329	Estimate based on 2015 Wales tender rate

Concrete Floor to Pit Area 1	156	m^2	£ 50	£ 7,800	Estimate based on 2015 Wales tender rate (250mm A393 x 2 layers)
Concrete Floor to Pit Area 2	11	m^2	£ 50	£ 549	Estimate based on 2015 Wales tender rate (250mm A393 x 2 layers)
Allowance for Internal Structural Steel Changes	1	Sum	£ 40,000	£ 40,000	Estimate
Allowance for Precast Concrete Bay Subdivisions	1	Sum	£ 30,000	£ 30,000	Estimate
Allowance for Outside Storage Area	1	Sum	£ 50,000	£ 50,000	Estimate
Office					
Upgrade works to Existing Three Storey Office Building	453	m^2	£ 250	£ 113,250	Estimate
Staff Car Park Area & Remainder of Site					
General Clearance Works	1	Sum	£ 2,500	£ 375	Estimate
Minor Pavement Repairs	1	Sum	£ 2,500	£ 10,000	Estimate
Line Painting and Signage Allowance	1	Sum	£ 10,000	£ 10,000	Estimate
Installation of Interceptor	1	Sum	£ 5,000	£ 5,000	Estimate
Site Signage	1	Sum	£ 2,000	£ 2,000	Estimate
Mech and Electrical					
Entrance Barriers	2	No.	£ 2,500	£ 5,000	Estimate Entrance and Exit
Upgrade Works to Weighbridge	1	No.	£ 2,500	£ 2,500	Estimate
Site lighting	1	No.	£ 10,000	£ 10,000	Estimate
CCTV	1	No.	£ 7,500	£ 7,500	Estimate
Misc (cabling etc)	1	No.	£ 15,000	£ 15,000	Estimate
Fire Fighting Allowance	1	No.	£ 150,000	£ 150,000	Estimate dependant on requirements

Sub-Total 1				£ 808,682	
Add 10% Contractor Prelims				£ 80,868	
Sub-Total 2				£ 889,551	
Add 10% Contingency				£ 88,955	
Grand Total (excl VAT)				**£ 978,506**	

1. This preliminary cost estimate does not purport to guess potential tender submissions in current and future market conditions.
2. FTC has used approximations of rates for similar works items where possible and has used engineering judgement to estimate rates & sums where similar rates are not available
3. Management of Hazardous Materials (ACMs Office building and Cladding) and possible local ground conditions has not been allowed for.
4. This cost estimate assumes that materials to be imported are available from local sources
5. This cost estimate excludes VAT
6. This cost estimate excludes in/deflation
7. This estimate includes for a level of contingency as indicated
8. Costs are largely based on previously tendered rates for similar work or cited reference sources, Prices may have changed in the intervening period
9. It is assumed that the new site is serviced by public road access, water supply and sewerage services

Table 8.2: Costs associated with developing Full Moon

Item	Quantity	Unit	Rate, £		Cost		Note
-	-	-	-				
General Site Clearance and Demolition Works	-	-	-				
-	-	-	-				
General Site Clearance	1	Sum	£	5,000	£	5,000	Estimate
Demolition and Disposal of Existing Building	600	m^2	£	35	£	21,000	Estimate (Optional)
Demolition and Disposal of Existing HWRC Area including ramp	1	Sum	£	15,000	£	15,000	Estimate
New Materials Processing Building (2,000m²)							
General Clearance and Preparation	2,250	m	£	5	£	11,250	Estimated
New Single Skin Cladding (Roof)	2,000	m^2	£	50	£	100,000	Tender Rate Wales 2015
New Single Skin Cladding (Walls)	990	m^2	£	50	£	49,500	Tender Rate Wales 2016
Estimated Structural Steel	60	t	£	2,250	£	135,000	Estimated quantity with Tender Rates
New Purlins and Secondary Fixing	10	t	£	2,500	£	25,000	Assumes £2,000/t supply plus £500/tonne erection
Exterior Push Walls (Assume 300mm RC Concrete to 4m High)	165	m	£	950	£	156,750	Estimated quantity with Tender Rates
Internal Concrete Works in Foundations	2,000	m^2	£	65	£	130,000	Estimated quantity with Tender Rates, assumes large portion of existing yard left intact

Additional Concrete Works Allowance (Baler Pits etc.)	1	Sum	£	20,000	£	20,000	Estimate
Allowance for Services (Electrical, Fire, Water, CCTV etc)	1	Sum	£	50,000	£	50,000	Estimate
Installation of Roller Shutter Doors	5	No.	£	4,500	£	22,500	Estimate based on 2015 Wales tender rate (Standard Electric)
Allowance for Internal Office/Welfare Area	1	Sum	£	75,000	£	75,000	Estimate
Allowance for Yard Apron to Front of New Building	2,000	m^2	£	40	£	80,000	Estimate
Car Park Area & Remainder of Site							
-							
General Clearance Works	1	Sum	£	2,500	£	2,500	Estimate
Pavement Works and Repairs	1	Sum	£	15,000	£	15,000	Estimate
Line Painting and Signage Allowance	1	Sum	£	10,000	£	10,000	Estimate
Installation of Interceptor	1	Sum	£	5,000	£	5,000	Estimate
Site Signage	1	Sum	£	2,000	£	2,000	Estimate
Mech and Electrical							
Entrance Barriers	2	No.	£	2,500	£	5,000	Estimate Entrance and Exit
Upgrade Works to Weighbridge	1	No.	£	2,000	£	2,000	Estimate
Site lighting	1	No.	£	10,000	£	10,000	Estimate
Site CCTV	1	No.	£	5,000	£	5,000	Estimate
Fire Fighting Allowance	1	No.	£	150,000	£	150,000	Estimate dependant on requirements
Misc (cabling etc)	1	No.	£	7,500	£	7,500	Estimate
Sub-Total 1					£	1,110,000	
Add 10% Contractor Prelims					£	111,000	
Sub-Total 2					£	1,221,000	
Add 10% Contingency					£	122,100	

Grand Total (excl VAT)				**£ 1,343,100**	

1. This preliminary cost estimate does not purport to guess potential tender submissions in current and future market conditions.
2. FTC has used approximations of rates for similar works items where possible and has used engineering judgement to estimate rates & sums where similar rates are not available
3. Management of Hazardous Materials (ACMs Office building and Cladding) and possible local ground conditions has not been allowed for.
4. Pricing is based primarily on concept designs for the site, no detailed designs have been completed
5. This cost estimate assumes that materials to be imported are available from local sources
6. This cost estimate excludes VAT
7. This cost estimate excludes in/deflation
8. This estimate includes for a level of contingency as indicated
9. Costs are largely based on previously tendered rates for similar work or cited reference sources, Prices may have changed in the intervening period
10. It is assumed that the new site is serviced by public road access, water supply and sewerage services

Table 8.3: Costs associated with developing Trehir

Item	Quantity	Unit	Rate, £	Cost	Note
-	-	-	-		
General Site Clearance and Demolition Works	-	-	-		
-	-	-	-		
Allowance for Structural Assessment of Bridge Access	1	Sum	£ 20,000	£ 20,000	Estimate
Demolition and Disposal of Existing Maintenance Building	250	m^2	£ 40	£ 10,000	Estimate
Demolition and Disposal of Existing HWRC Area	1	Sum	£ 12,500	£ 12,500	Estimate
New Materials Processing Building (2,000m²)					
General Clearance and Preparation	2,250	m	£ 8	£ 16,875	Estimated
New Single Skin Cladding (Roof)	2,000	m^2	£ 50	£ 100,000	Tender Rate Wales 2015
New Single Skin Cladding (Walls)	990	m^2	£ 50	£ 49,500	Tender Rate Wales 2016
Estimated Structural Steel	60	t	£ 2,250	£ 135,000	Estimated quantity with Tender Rates
New Purlins and Secondary Fixing	10	t	£ 2,500	£ 25,000	Assumes £2,000/t supply plus £500/tonne erection
Exterior Push Walls (Assume 300mm RC Concrete to 4m High)	165	m	£ 950	£ 156,750	Estimated quantity with Tender Rates

Internal Concrete Works in Foundations	2,000	m^2	£	65	£	130,000	Estimated quantity with Tender Rates
Additional Concrete Works Allowance (Baler Pits etc.)	1	Sum	£	20,000	£	20,000	Estimate
Allowance for Services (Electrical, Fire, Water, CCTV etc)	1	Sum	£	50,000	£	50,000	Estimate
Installation of Roller Shutter Doors	5	No.	£	4,500	£	22,500	Estimate based on 2015 Wales tender rate (Standard Electric)
Allowance for Internal Office/Welfare Area	1	Sum	£	75,000	£	75,000	Estimate
Allowance for Yard Apron to New Building	1,000	m^2	£	40	£	40,000	Estimate
Refuse Transfer Shed							
Allowance for the development of additional refuse transfer building	1	Sum	£	200,000	£	200,000	Estimate
Additional Storage Areas							
Allowance for the development of additional outdoor storage areas	1	Sum	£	75,000	£	75,000	Estimate
Car Park Area & Remainder of Site							
-							
General Clearance Works	1	Sum	£	2,500	£	2,500	Estimate
Pavement Works and Repairs	1	Sum	£	15,000	£	15,000	Estimate
Line Painting and Signage Allowance	1	Sum	£	5,000	£	5,000	Estimate
Installation of Interceptor	1	Sum	£	5,000	£	5,000	Estimate
Site Signage	1	Sum	£	2,000	£	2,000	Estimate
Mech and Electrical							
Entrance Barriers	2	No.	£	2,500	£	5,000	Estimate Entrance and Exit

Allowance for New Weighbridge inc. civils	1	No.	£ 15,000	£ 15,000	Estimate
Site lighting	1	No.	£ 10,000	£ 10,000	Estimate
Site CCTV	1	No.	£ 5,000	£ 5,000	Estimate
Fire Fighting Allowance	1	No.	£ 150,000	£ 150,000	Estimate dependant on requirements
Misc (cabling etc)	1	No.	£ 7,500	£ 7,500	Estimate
Sub-Total 1				£ 1,360,125	
Add 10% Contractor Prelims				£ 136,013	
Sub-Total 2				£ 1,496,138	
Add 10% Contingency				£ 149,614	
Grand Total (excl VAT)				**£ 1,645,751**	

Notes

1. This preliminary cost estimate does not purport to guess potential tender submissions in current and future market conditions.
2. FTC has used approximations of rates for similar works items where possible and has used engineering judgement to estimate rates & sums where similar rates are not available
3. Management of Hazardous Materials, waste materials and possible local ground conditions has not been allowed for.
4. Structural alterations to existing entrance bridgehave not been allowed for
5. Pricing is based primarily on concept designs for the site, no detailed designs have been completed
6. This cost estimate assumes that materials to be imported are available from local sources
7. This cost estimate excludes VAT
8. This cost estimate excludes in/deflation
9. This estimate includes for a level of contingency as indicated
10. Costs are largely based on previously tendered rates for similar work or cited reference sources, Prices may have changed in the intervening period
11. It is assumed that the new site is serviced by public road access, water supply and sewerage services
12. If residual waste is to remain at Full Moon, it is anticipated that the costs for redeveloping or maintaining this site will be minimal.

Table 8.4: Summary of CAPEX costs

Site	Estimated CAPEX cost	Items excluded from estimate
DS Smith	£978,506	• Purchase (£1.8m) or lease of land • Flood defences • Changes to road layout outside site boundary • Potential loss of income from direct delivery of recyclables*
Full Moon	£1,343,100	• Potential loss of income from direct delivery of recyclables* • Relocation of HWRC on different site, if required
Trehir	£1,645,751	• Changes to road layout • Structural upgrade or annual maintenance for Trehir bridge • Potential loss of income from direct delivery of recyclables* • Construction of new HWRC (possibly adjacent to existing location),if required • Other works identified in previous CCBC Trehir study which may be necessary for building a WTS at Trehir, ie water mains works, significant boundary fence works.

** Potential loss of income from direct delivery of recyclables relates to the delivery of food waste and glass direct to Bryn Group in the twin stream option, with consequent loss of potential income from sale of glass.*

In relation to Trehir, it is worth emphasising that there are several significant cost elements that have not been included in the costings for presented in this report for locating the WTS at Trehir (mentioned in Table 8.4), which could potentially make this option considerably more expensive:

- Replacement or relocation of the current Trehir HWRC
- Bridge strengthening or replacement works
- Works required on the access road feeding into the roundabout.

CCBC produced detailed cost estimates for building a WTS and new HWRC on the Trehir site, which covered these aspects, as some additional cost elements, such as water mains works and significant boundary fence construction. The CCBC estimates, which are now around 5 years old (and therefore could possibly be slightly low in relation to current prices) came to a total of around £7-8 million, greatly in excess of the estimate presented in this report. The potential significant additional costs associated with establishing a WTS at Trehir have been accounted for in the scoring for in options appraisal (Section 9).

The differences in operational costs for twin stream verses blueprint are detailed in Table 8.5. It should be noted that these are estimated costs, and the costs for baling and sorting equipment should be subject to a more detailed assessment once a preferred option has been identified. The purpose of Table 8.5 is to identify the differential in costs between Blueprint and Twin stream options. Staff costs have been estimated to be £25,000 per annum per FTE employee. As can be seen, the estimated annual revenue equivalent operating costs are fairly similar, though with the twin stream option being more expensive, and therefore scoring lower in the options appraisal scoring (see Section 9).

In relation to Table 8.5:

- Although only one FLT (Forklift Truck) is required for twin stream operations, it has been assumed that a second FLT should be purchased, so that a spare FLT is on hand, in case the first FLT breaks down.
- Baler costs have been derived from the WTS in Blaenau Gwent
- Maintenance costs are difficult to specify, but it is considered that £10,000 per annum for blueprint should be a conservatively high estimate. For twin stream, the stars in the star screen will need replacing regularly, as well as general maintenance being required for the star screen. This cost is estimated at 5% pa of the star screen's capital cost (of £125,000), resulting in an additional £6,250 per annum maintenance cost for the twin stream option.
- In terms of power costs, twin stream is twice as expensive as blueprint, due to the inclusion of the star screen for the twin stream option.

It should be noted that there may be additional operational costs for the blueprint option, relating to the tipping off of RRVs. These costs would arise with the collection crews, if it is necessary for collection vehicles to park at the Tir y Berth depot. Therefore these costs could be accounted for in the kerbside modelling, and it should be checked that this factor is not double-counted when the kerbside and WTS reviews are considered together. However for the purpose of the current review it is assumed that there is an additional operational cost associated with the blueprint option, in comparison to the twin stream option, relating to tipping off time.

Table 8.5: Mobile plant, baling and sorting equipment and staff costs associated with waste transfer of blueprint and twin stream collections

Operational factor	Blueprint			Twin stream		
	Capital	Write off period	Annual revenue equivalent	Capital	Write off period	Annual revenue equivalent
Fork lift trucks	3 FLTs@ £40,000 each = £120,000	7 yrs	£17,143	2 FLTs@ £40,000 each = £80,000	7 yrs	£11,429
Shovel loaders x 2	*Redeployment of existing 2 loads at Full Moon*	*n/a*	*n/a*	*Redeployment of existing 2 loads at Full Moon*	*n/a*	*n/a*
Baler	£425,000 (includes installation)	15 yrs	£28,333	£425,000 (includes installation)	15 yrs	£28,333
Star screen and sorting line *(for separating card and some paper from fibre mix)*	n/a	n/a	n/a	£125,000 (includes installation)	10 yrs	£12,500
Equipment maintenance costs	n/a	n/a	£10,000	n/a	n/a	£16,250

Power	n/a	n/a	£2,000	n/a	n/a	£4,000
Baler wire	n/a	n/a	£9,000 (£3/tonne baled and estimated 3ktpa to be baled)	n/a	n/a	£9,000 (£3/tonne baled and estimated 3ktpa to be baled)
Staffing	n/a	n/a	3 Forklift drivers 1 Teleporter & Driver 2 Baler operatives Total 6 staff @ £25,000 = £150,000	n/a	n/a	1 Forklift driver 1 Teleporter & Driver 2 QC operatives 2 Baler operatives Total 6 staff @ £25,000 = £150,000
Management	n/a	n/a	1 yard manager @ £35,000	n/a	n/a	1 yard manager @ £35,000
Overheads	n/a	n/a	10% of staff costs: £18,500	n/a	n/a	10% of staff costs: £18,500
Total (estimate)	**£545,000**	n/a	**£271,976**	**£630,000**	n/a	**£285,012**

9.0 WTS options appraisal

The WTS options included in the appraisal are listed in Table 9.1.

Table 9.1: CCBC WTS options

Scenario name	Dry recycling & organics	Residual	Recycling vehicle parking	HWRC changes
DS Smith Twin stream	DS Smith	DS Smith	Tir y Berth	None
DS Smith Blueprint	DS Smith	DS Smith	DS Smith	None
Trehir Twin stream A	Trehir	Trehir	Tir y Berth	Trehir closes
Trehir Twin stream B	Trehir	Full Moon	Tir y Berth	Trehir closes
Trehir Blueprint	Trehir	Full Moon	Trehir	Trehir closes
Full Moon Twin stream	Full Moon	Full Moon	Tir y Berth	Full Moon closes
Full Moon Blueprint	Full Moon	Full Moon	Tir y Berth	Full Moon closes

Based on the research undertaken for this project, the criteria listed in Table 9.2 have been identified to evaluate the above options. The options appraisal process involves prioritising and weighting the criteria; the most important criteria have a larger weighting and influence on the outcome of the options appraisal. Prioritising takes account of factors most important to CCBC. The priorities and maximum weighted scored are also in Table 9.2.Each option is scored based on the detail in the table in Appendix 1, to produce a score which is multiplied by the weighting factor. The scores for each criterion are totalled for each option, identifying a preferred option. The options are ranked according to their scores.

Each option is assessed using a scale of 0-5 as per below:

5 = Highly satisfactory
3 = Satisfactory
1= Unsatisfactory
0= Not at all satisfactory

For each criterion, the priority number is multiplied by the scoring for that criteria. For example, if the first criteria in Table 9.2 (Capital investment needed - Purchase of a new site or sale of an existing site) is scored 5 (Highly satisfactory) for a particular option, the weighted score would be 16 (the priority number in Table 9.2) multiplied by 5 = 80 points.

Table9.2: Options appraisal criteria and priority score

Option criteria			Priority	Maximum weighted score
Finance	**Capital investment needed**	Purchase of a new site or sale of an existing site	16	80
Finance	**Capital investment needed**	Civil engineering works required	15	75
Deliverability	**Deliverability and timescales**	A new site will take time to develop, Therefore redevelopment of an existing waste site, scores more highly than an unidentified new site.	14	70
Operational efficiency	**Operational considerations**	Downtime associated with tipping, queuing, congestion	13	65
Operational efficiency	**Operational considerations**	Residual and recycling waste transfer collocated with depot (i.e. vehicle parking, staff welfare and vehicle maintenance)	12	60
Operational efficiency	**Ease of access to the sites**	The positioning of a site in an easily accessible location is important.	11	55
Operational efficiency	**Future needs**	A WTS and depot network that allows for future amendments (e.g. space for additional material segregation) will score more highly than sites that are not flexible to change.	10	50
Deliverability	**Deliverability and timescales**	A new site will take time to develop, Therefore redevelopment of an existing waste site, scores more highly than an unidentified new site.	9	45
Deliverability	**Deliverability and timescales**	Ease of planning - A site that already has waste infrastructure is likely to receive planning permissions more easily than a site that does not already accept waste.	8	40
Finance	**Cost to operate waste transfer facilities**	Costs associated with managing waste transfer, e.g. utilities and site maintenance, WTS staff salaries, equipment costs (e.g. Maintenance).	7	35
Impact	**Impact on local community**	Servicing of residents (for example the removal of a HWRC for alternative use)	6	30
Impact	**Impact on local community**	Sites that vehicles have to queue for, travel in built up areas are scored lower	5	25
Impact	**Impact on local community**	Sites that potentially cause environmental (e.g. noise and odour) problems for neighbouring businesses or residents are scored lower.	4	20

Impact	**Impact on staff**	Disruption to staff in moving their work location and how potential role and responsibility changes will impact on staff	3	15
Impact	**Environmental impact**	Environmental impact of new build	2	10
Impact	**Political impact**	When locating new sites, there is often a "Not In My Back Yard" attitude. The option(s) likely to achieve the greatest public support are rated more highly.	1	5
Highest potential total score				**680**

9.1 Results

Un-weighted scorings for the options appraisal are provided in Table 9.3. The rational for the scoring is provided in Table 9.4. The final weighted scoring is presented in Table 9.5.

Table9.3: Un-weighted options appraisal scores

Options appraisal criteria			DS Smith twin stream	DS Smith blueprint	Trehir twin stream A	Trehir twin stream B	Trehir blueprint	Full Moon twin stream	Full Moon blueprint
Finance	**Capital investment needed**	Purchase of a new site or sale of an existing site	0	0	5	5	5	5	5
		Civil engineering works required	3	3	0	0	0	1	1
	Cost to operate waste transfer facilities	Costs associated with managing waste transfer	3	5	3	3	5	3	5
Operational efficiency	**Operational considerations**	Downtime associated with tipping, queuing, congestion	3	1	3	3	1	5	3
		Residual and recycling waste transfer co-located	5	5	5	3	3	5	5
	Ease of access to the sites	Easily accessible location is important.	3	1	3	3	1	1	0
	Future needs	A WTS and depot network that allows for future service changes.	3	5	0	0	1	1	3
Impact	**Impact on local community**	Sites that vehicles have to queue for, travel in built up areas are scored lower	5	3	3	5	3	5	5
		Environmental (e.g. noise, visualor odour) problems for neighbouring businesses or residents are scored lower	3	3	3	3	1	5	5
		Servicing of residents (for example the removal of a HWRC for alternative use)	5	5	1	3	1	3	3
	Impact on staff	Disruption to staff in moving their work location or changing roles and responsibilities	3	1	3	3	1	5	3
	Environmental impact	Environmental impact of new build	5	5	3	3	3	3	3
	Political impact	The option(s) likely to achieve the greatest public support are rated more highly	5	5	3	3	3	3	3
Deliverability	**Deliverability and timescales**	(Re)development timescales	3	3	1	1	1	3	3
		Ease of planning - A site that already has waste infrastructure is likely to receive planning permissions more easily than a site that does not	1	1	3	3	3	5	5
TOTAL SCORE (un-weighted)			50	46	39	41	31	53	52
RANK (un-weighted)			3	4	6	5	7	1	2

Table9.4: Summary of rationale for un-weighting scorings

Options appraisal criteria			Rationale for scores
Finance	**Capital investment needed**	Purchase of a new site or sale of an existing site	DS Smith site would need to be purchased: lowest score. Trehir and Full Moon owned by CCBC: scored equally highly.
		Civil engineering works required	Scores based on CAPEX civil engineering costs in Table 7.4.
	Cost to operate waste transfer facilities	Costs associated with managing waste transfer	Relatively small differential in operational costs between blueprint and twin stream, Table 7.5. Blueprint scored higherthan twin stream as annualised operating costs estimated to be slightly lower in comparison to twin stream.
Operational efficiency	**Operational considerations**	Downtime associated with tipping, queuing, congestion	Potential congestion issues at DS Smith (next to A468) and Trehir (access road); both scored lower than Full Moon (with no anticipated congestion issues). All blueprint options scored lower than corresponding twin stream options at the same site, due to longer procedure required to tip off RRVs.
		Residual and recycling waste transfer co-located	All options involve collocating of residual and recycling, part from *Trehir twin stream B* and *Trehir blueprint* (see Table 8.1).
	Ease of access to the sites	Easily accessible location is important.	None of the sites is ideally located. However Full Moon is further from the centre of the authority, and therefore scored lower. The WTS location is less critical for twin-stream, as half of collection vehicles will tip at Bryn Group, which is relatively centrally located in the authority. Therefore twin-stream is scored higher than corresponding blueprint options; see Section 4.5.
	Future needs	A WTS and depot network that allows for future service changes.	In terms of available area for potential future parking needs, DS Smith has the greatest (scoring highest), followed by Full Moon, and Trehir having the least available area. Twin stream is not fully aligned with the WG blueprint, and therefore is scored lower than blueprint.
Impact	**Impact on local community**	Sites that vehicles have to queue for, travel in built up areas are scored lower	Although none of the sites are located close to residential areas, Full Moon is located furthest from centres of population, and therefore scores highest. Blueprint involves more vehicles and is therefore scored lower.

		Environmental (e.g. noise, visual or odour) problems for neighbouring businesses or residents are scored lower	Although none of the sites are located close to residential areas, although Full Moon is located furthest from centres of population, and therefore scores highest.
		Servicing of residents (for example the removal of a HWRC for alternative use)	DS Smith options do not involve changes to the HWRC network and therefore score higher. *Trehir twin stream B* and *Full Moon twin stream and blueprint* involve decreasing the size of the existing HWRC, and score lower. The remaining options (*Trehir twin stream A* and *Trehir blueprint*)result in the closure of the existing HWRC (and potentially building a new HWRC adjacent to the existing site).
	Impact on staff	Disruption to staff in moving their work location or changing roles and responsibilities	Residual and recycling crews currently tip off at Full Moon, so locating the new WTS at Full Moon involves the least disruption, and is scored highest. Blueprint options are scored lower than corresponding twin stream options, due to changes in working practices at the WTS (longer to tip off RRVs).
	Environmental impact	Environmental impact of new build	DS Smith involves adapting an existing building and therefore scores highest.
	Political impact	The option(s) likely to achieve the greatest public support are rated more highly	DS Smith is scored highest on the basis that it would not require changes to the existing HWRC network.
Deliverability	**Deliverability and timescales**	(Re)development timescales	Trehir requires the greatest redevelopment works (see Table 7.4) and scores lower than DS Smith and Full Moon, which both require a broadly comparable scale of works.
		Ease of planning - A site that already has waste infrastructure is likely to receive planning permissions more easily than a site that does not	Full Moon is already operating as a WTS and therefore scores highest. Trehir is operating as a HWRC, but not a WTS, and therefore there may be a small planning challenge in extending its use to WTS activities. DS Smith is not currently operated as a waste facility (though it has been used for paper recycling previously), and so would have the greater challenge of all listed options in terms of waste permits and planning.

Table 9.5: Weighted options appraisal scores

Options appraisal criteria			DS Smith twin stream	DS Smith blueprint	Trehir twin stream A	Trehir twin stream B	Trehir blueprint	Full Moon twin stream	Full Moon blueprint
Finance	**Capital investment needed**	Purchase of a new site or sale of an existing site	0	0	80	80	80	80	80
		Civil engineering works required	45	45	0	0	0	15	15
	Cost to operate waste transfer facilities	Costs associated with managing waste transfer	21	35	21	21	35	21	35
Operational efficiency	**Operational considerations**	Downtime associated with tipping, queuing, congestion	39	13	39	39	13	65	39
		Residual and recycling waste transfer co-located	60	60	60	36	36	60	60
	Ease of access to the sites	Easily accessible location is important.	33	11	33	33	11	11	0
	Future needs	A WTS and depot network that allows for future service changes.	30	50	0	0	10	10	30
Impact	**Impact on local community**	Sites that vehicles have to queue for, travel in built up areas are scored lower	25	15	15	25	15	25	25
		Environmental (e.g. noise, visual or odour) problems for neighbouring businesses or residents are scored lower.	12	12	12	12	4	20	20
		Servicing of residents (for example the removal of a HWRC for alternative use)	30	30	6	18	6	18	18
	Impact on staff	Disruption to staff in moving their work location or changing roles and responsibilities	9	3	9	9	3	15	9
	Environmental impact	Environmental impact of new build	10	10	6	6	6	6	6
	Political impact	The option(s) likely to achieve the greatest public support are rated more highly.	5	5	3	3	3	3	3
Deliverability	**Deliverability and timescales**	(Re)development timescales.	27	27	9	9	9	27	27
		Ease of planning - A site that already has waste infrastructure is likely to receive planning permissions more easily than a site that does not	8	8	24	24	24	40	40
TOTALSCORE (weighted)			**354**	**324**	**317**	**315**	**255**	**416**	**407**
RANK (weighted)			**3**	**4**	**5**	**6**	**7**	**1**	**2**

10.0 Conclusions and discussion

According to Table 9.5 the weighted option ranking is as follows:

1. Full Moon twin stream
2. Full Moon blueprint
3. DS Smith twin stream
4. DS Smith blueprint
5. Trehir twin stream A
6. Trehir twin stream B
7. Trehir blueprint

The results of the options appraisal suggest that Full Moon is the most appropriate site for a waste transfer station. Whilst the location in the south west of the county is not ideal compared to more central sites, the fact that it is an existing waste site, will require relatively little civil engineering, is owned by CCBC make it an attractive option.

It is worth noting that there is very little difference in the weighted scores for the two Full Moon options, with twin stream scoring 416 points, compared to blueprint scoring 407. This suggests that the WTS review presented here does not identify a significant difference overall between blueprint and twin stream, insofar as requirements for a WTS and its operation are concerned. Rather, this usefulness of this study is in identifying clearly that Full Moon is the preferred option, on the basis of the criteria included in the options appraisal (Section 9).

The single most significant factor in the weighting scoring that put Full Moon out in front relates to capital investment, with no land purchase required (which penalises the DS Smith option), and moderate redevelopment costs (Trehir options gets penalised for having the highest redevelopment costs).

Operating a twin stream collection system and using Full Moon as the WTS is ranked above the blueprint; however even the blueprint option scores significantly higher than the third ranked option which is to operate a twin stream service and use the DS Smith site. Either twin stream or blueprint could be accommodated at Full Moon, although it is likely to be necessary for collection vehicles to be parked at the Tir y Berth depot. However the decision in terms of selecting twin stream and blueprint will need to refer to the outcomes of the separate kerbside review that is being carried out with CCBC.

It is worth bearing in mind that for DS Smith, the cost of purchasing the land and the cost of new flood defences is not included. Similarly, the cost for any structural engineering required for the Trehir bridge, or another other modification works to the access road are not included. If either of these sites are to be taken forward to the next stage of decision making, more detailed reports of these risk factors would be needed.

If Full Moon WTS were to be redeveloped to accommodate a twin stream or blueprint recycling collection, the HWRC would need to be relocated. The relative impact on the community would be more significant if Trehir were to close, as Trehir HWRC receives significantly more visitors for than Full Moon HWRC; although since the Full Moon facility serves a particular region of the authority, it may be deemed prudent to develop a replacement site. Options for reconfiguring the CCBC HWRC network will be investigated in a separate study.

In terms of the equipment requirements and operational issues, blueprint would require more fork lift trucks (and therefore more qualified drivers), whereas the twin stream system would require more sorting equipment (specifically, a star screen for extracting cardboard) and more staff to man the sorting lines.

Finally, it should be noted that another option was considered during this study, of CCBC using the WTS in a neighbouring authority, ie the Silent Valley WTS in Blaenau Gwent. This option was deemed to be impractical for several reasons, including:

- Significantly longer travel times for collection vehicles, requiring a larger collection fleet and significant additional costs (estimated by CCBC to be around £700,000 to £850,000 pa)
- Costs associated with paying the neighbouring authority for the use of the facility (estimated by CCBC) to be £5-10 per tonne
- Potential loss of income from collected recyclate
- Concerns about whether the facility would have the capacity to cope with the additional throughput of material accepted from CCBC.

However the Silent Valley WTS could be a useful temporary backup facility, in the event that any problems were to arise with a WTS based in CCBC.

Appendix 1: Detail of options appraisal criteria

Options criteria			5 = Highly satisfactory	3 = Satisfactory	1= Unsatisfactory	0= Not at all satisfactory
Finance	**Capital investment needed**	Purchase of a new site or sale of an existing site	Site and adjacent land owned by CCBC	Site and adjacent land leased by CCBC	Site owned by CCBC but additional land may be required to be leased or purchased	New site requires purchase
		Civil engineering works required	Civil Engineering Works in the region of £500,000-750,000 CAPEX	Civil Engineering Works in the region of £750,000-1,000,000 CAPEX	Civil Engineering Works in the region of £1,000,000-1,250,000 CAPEX	Civil Engineering Works in the region of £1,250,000-1,500,000 CAPEX
	Cost to operate waste transfer facilities	Costs associated with managing waste transfer, e.g. utilities and site maintenance, WTS staff salaries, equipment costs (e.g. Maintenance).	Low additional resource required	Moderate additional resource required, for example relating to additional tipping off time required for RRVs.	Significant resource required, differential of more than £250,000 per annum in costs	Highly significant resource required, differential of more than £500,000 per annum in costs
Operational efficiency	**Operational considerations**	Downtime associated with tipping, queuing, congestion	Site large enough to ensure no congestion or downtime associated with tipping. Queuing reduced as sufficient bays to allow numerous vehicles to tip at once	Congestion and tipping efficiency managed but no onsite parking	Congestion on site can be managed but no onsite parking so downtime associated with tipping	Small site means congestion when vehicles return to tip, and no onsite parking so downtime associated with tipping
		Residual and recycling waste transfer collocated with depot (i.e. vehicle parking, staff welfare and vehicle maintenance)	All wastes co-located, space for all vehicle parking and associated infrastructure	All wastes co-located but no space for parking and associated infrastructure	Residual and recyclable waste transfer separated, but vehicles can park. No space for associated infrastructure	Residual and recyclable waste transfer separated, vehicle parking and associated infrastructure elsewhere
	Ease of access to the sites	The positioning of a site in an easily accessible location is important.	Site in accepted industrial location, queuing does not occur, no impact on neighbouring businesses and homes	Sites in an accepted industrial location, queuing is rare, impact on neighbouring businesses and homes is low	Sites in less built up area. Some queuing occurs, but usually only very busy periods.	Sites in built up/ residential areas with shared access to other businesses. Queuing is common and can impact significantly on nearby businesses and residents.
	Future needs	A WTS and depot network that allows for future amendments (e.g. space for additional material segregation) will score more highly than sites that are not flexible to change.	Site is large enough and designed to accommodate additional material segregation, vehicle storage and maintenance	Site could accommodate moderate additional material segregation or other activities	Site unlikely to be able to be modified further	Site is expected to be outgrown within ten years
Impact	**Impact on local community**	Sites that vehicles have to queue for, travel in built up areas are scored lower	No access problems.	Generally acceptable access. Occasional impact on local road users	Trunk road access but congestion from site would impact on this access.	Access problems as road infrastructure cannot accommodate number and type of heavy vehicles
		Sites that potentially cause environmental (e.g. noise and odour) problems for neighbouring businesses or residents are scored lower.	Site located in an industrial area where existing waste activity is accepted.	Some impact on local residents due to additional vehicle movements but environmental impacts limited to very few residents and businesses	Some impact on local residents due to additional vehicle movements. Noise and odour impacts limited to xxx residents and businesses	Located within residential and leisure area. Impact on residents and businesses could be significant
		Servicing of residents (for example the removal of a HWRC for alternative use)	Current HWRC provision unchanged	Closure of existing site but new HWRC opens to compensate	Closure of one HWRC, no additional sites open	Closure of two HWRCs, no additional sites open
	Impact on staff	Disruption to staff in moving their work location and how potential role and responsibility changes will impact on staff	Minimal disruption to collection crew due to depot location (start point)and WTS staff	Some disruption to either the collection crews due to depot location (start point) or changes in roles at the WTS	Significant disruption to either collection crew or WTS staff, potential for mediation with HR department and the unions	Significant disruption to collection crew and WTS staff, potential for mediation with HR department and the unions
	Environmental impact	Environmental impact of new build	No impact on surrounding environment	Build on brown field site. Impact on environment is minimised	Build in brown field site but impacts on the environment are expected	Build on green field site, impacts on the environment are inevitable
	Political impact	When locating new sites, there is often a "Not In My Back Yard" attitude. The option(s) likely to achieve the greatest public support are rated more highly.	Members likely to support well planned and costed option	Members expected to require convincing of the merits of the option	Members unlikely to support option for political, financial and environmental reasons	Members do not support the option for political, financial and enviornmental reasons

Deliverability	**Deliverability and timescales**	A new site will take time to develop, Therefore redevelopment of an existing waste site, with minimal civil engineering scores more highly than an unidentified new site.	Minimal Civil Engineering Works required as there is existing suitable infrastructure e.g. building and ancillary services. Minor upgrades necessary to existing site infrastructure. Construction Programme <3-6 months	Minor Civil Engineering Works required, upgrades required to Existing Infrastructure including Minor Building. Construction Programme <6-9 months	Major Civil Engineering Works required: Site with limited suitable existing infrastructure but including ancillary services. Extensive Upgrades or replacement of Existing Infrastructure including major building works such as the construction of a new building. Construction Programme <12-18 months	Major Civil Engineering Works required to accommodate WTS, Green/Brownfield site development. Complete construction of a new building and associated site infrastructure e.g. access roads, hardstandings. Construction Programme >18 months
		Ease of planning - A site that already has waste infrastructure is likely to receive planning permissions more easily than a site that does not already accept waste.	Planning required, EIA required, Site has history industrial usage and existing or historical waste activities at the site	Planning required, EIA required, Site has history of industrial usage but no history of waste activities	Planning required, EIA required, Site has history of industrial usage but no history of waste activities, Site is close to a number of sensitive receptors such as residential areas, AONB, SSSI, or Heritage areas.	Planning required, EIA required, Site has no history of industrial or waste activity usage, Site is close to a number of sensitive receptors such as residential areas, AONB, SSSI, or Heritage areas.

www.wrapcymru.org.uk/

APPENDIX 7

Final Report

A Review of Caerphilly County Borough Council Waste Transfer Stations and Household Waste Recycling Centres

A report combining the findings of WRAP Collaborative Change Project Waste Transfer Station and Household Waste and Recycling Centre support for Caerphilly County Borough Council

Project code: CCP100-052
Research date: October 2015 – June 2017 **Date:** July 2017

WRAP's vision is a world in which resources are used sustainably.

Our mission is to accelerate the move to a sustainable resource-efficient economy through re-inventing how we design, produce and sell products; re-thinking how we use and consume products; and re-defining what is possible through re-use and recycling.

Find out more at www.wrapcymru.org.uk

Document reference: [WRAP, 2017, Caerphilly, A Review of Caerphilly County Borough Council Waste Transfer Stations and Household Waste Recycling Centres, Prepared by Resource Futures

Written by: Emma Clarke, Laura Snoulton, Poppy Jacobs, Pete Wills and Dave Lerpiniere

Front cover photography: Penmaen HWRC

Executive summary

Introduction

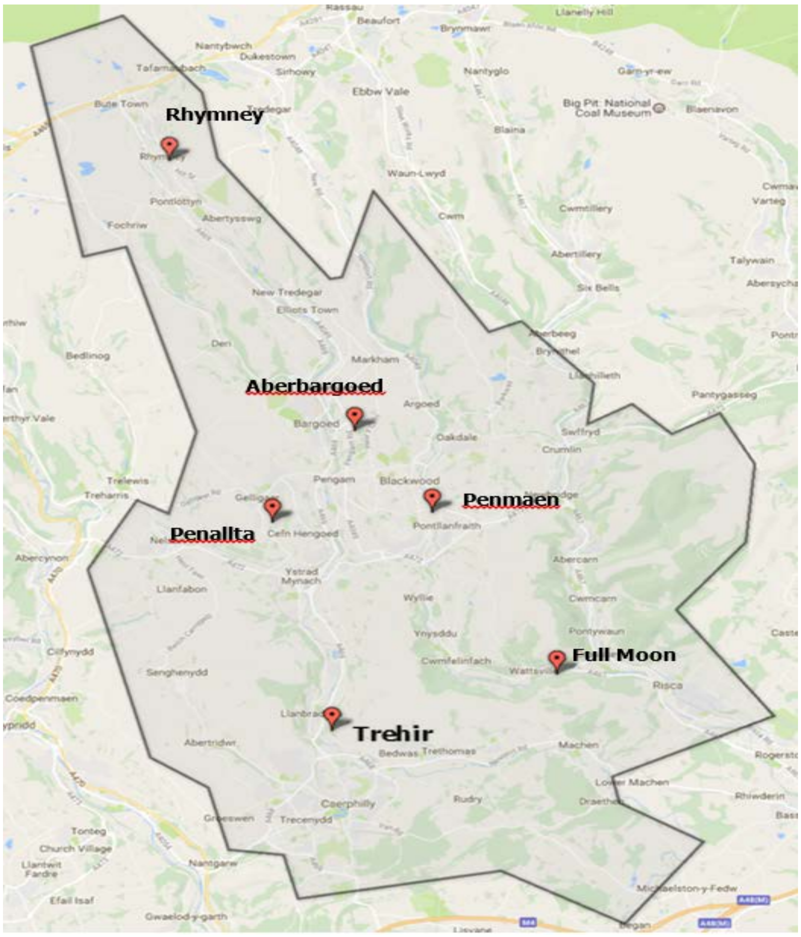
In 2016 and 17, the WRAP Collaborative Change Programme (CCP) supported Caerphilly County Borough Council (CCBC) to review its Waste Transfer Station (WTS) and Household Waste and Recycling Centre (HWRC) operations. The overall aim of the support was to identify how the services can be made more efficient, whilst maintaining a high recycling rate and providing a good quality service to residents.

Review work undertaken by Resource Futures in 2016 under the CCP identified a number of changes that are likely to need to be made to CCBC's HWRC and WTS network, including potential closure of the Full Moon HWRC, reducing the size of the HWRC network, and increasing on-site recycling and general operational efficiency at HWRCs (see Figure E1). To identify and assess potential operational improvements that could be implemented at CCBCs six HWRCs, in 2017 Resource Futures was commissioned to review operations at HWRCs in further detail. The review comprised:

1. Traffic count and visitor numbers analysis.
2. Front-end sort trial and composition analysis.
3. Assessment of HWRC site operations.
4. Assessment of waste disposal and recycling costs.

Resource Futures also undertook a parallel assessment of options for reducing the size of the network from six to three sites, including assessment of the potential to redevelop existing sites and to develop new, replacement HWRC sites. For further details please see the separate WRAP CCP report, *CCBC HWRC Blank Sheet Review, July 2017.*

Figure E1: HWRC Sites in Caerphilly County Borough Council



Findings

HWRC Visitor Numbers

Traffic count results across all sites demonstrate peak usage between 10am and 3pm. As such, reduced opening hours could be implemented across all HWRC sites to reduce operating costs. Alternatively, sites could close for an additional day, operating a five-day week. The Rhymney HWRC handles a relatively small proportion of CCBC's HWRC use (9% compared to an average of 18%) so could potentially serve as a trial site for reducing opening hours.

Traffic count data indicates that householders are sometimes preferring to use HWRCs other than their closest site. For example, population density data indicates that Trehir has the potential to see visitor numbers above 275,000 per annum, whilst traffic count survey indicates that only half this number are actually using the site. The data also suggests that visitors to the Trehir HWRC are bringing large amounts of waste indicating that sites may be being used by traders or users resident outside CBCC. Measures to control access to sites by non-residents and trade customers could help control waste quantities. Redeveloping Trehir to provide a high-quality site for residents in this area, could help to improve access, reducing the need for them to travel further north.

Introducing front end sort at HWRCs

At present, the CCBC's HWRCs achieved a recycling rate of 88% in 2016/17, of which just over half was recycled on site and the remainder was recycled through a 'secondary sort' of general waste by Bryn Recycling. The HWRCs are high performing but there is a reliance on the secondary sort, which has a high cost per tonne. A 'front-end sort' trial and composition analysis was undertaken to assess the potential recycling performance that could be achieved by improving on-site segregation of waste received at HWRCs.

Composition analysis data indicated there is the potential to recycle 33% of general waste currently received at HWRCs. However, the front-end trial resulted in only 8.5% of recyclable waste being successfully segregated. Clearly, based on composition analysis findings, there is still more material that could be segregated onsite, including inert, textiles, wood, paper and cardboard, plastic, glass, metal, small WEEE and garden waste but much of this is bagged and would require a range of measures to be taken, including policy changes, to encourage residents to pre-sort recyclable materials. In the longer term, site redevelopment and an increased focus on onsite segregation could allow recycling of other items and materials including mattresses, carpet and dense plastic, as outlets become available.

Cost savings from increasing recycling

If onsite sorting were successfully increased to 20% of residual waste, CCBC could see significant operational savings. This is still well-below the potential maximum of 33% (see above). Improving onsite segregation should also help to 'future proof' CCBC's HWRC recycling performance, should existing outlets for materials change unexpectedly.

If the charge for residual wasted disposal were to stay constant, then potential savings from reducing residual waste disposal costs could be over £300,000. However, if costs for residual disposal increase, then savings would be much lower. For example, if Bryn Recycling were to charge £130 per tonne rather than £98, then there would be no overall saving.

Review of potential operational improvements

Operational assessment of HWRCs was undertaken to identify potential operational improvements that could be made at each HWRC site. Key issues and potential opportunities for increasing operational efficiency and performance are summarised in Table E1 below.

Table E1: Summary of site-specific operational review

HWRC site	Operational assessment conclusions
Aberbargoed	• The Aberbargoed HWRC site currently uses available space efficiently.
Full Moon	• Traffic enters and exits the site through the same entrance/exit and flows in a one-way system. However, there is little room for cars to pass others which are stopped to deposit materials into the bulky skips, which could lead to queues forming very quickly at busy periods.
Penallta	• Penallta is a spacious split-level site which has the opportunity of providing additional capacity in its current design. • Site space could be used more efficiently • Traffic enters and exits the site through separate exits and flows in a one ways system; however, there is little room for cars to pass those which are parked to deposit materials into the bulky skips. This causes backlog and limits throughput of users.
Penmaen	• Penmaen is a split-level site and already accepts a high proportion of CCBC HWRC waste. However, it has significant space limitations.
Trehir	• Trehir is a busy site which currently uses available space efficiently. However, traffic enters and exits the site through one entrance/exit which creates traffic flow issues and queuing.

HWRC site	Operational assessment conclusions
Rhymney	• Rhymney is a very small site. Traffic enters and exits the site through one entrance/exit and flows in a one-way system. However, there is little room for cars to pass others which are stopped to deposit materials into the bulky skips, which could lead to queues forming very quickly at busy periods.

Recommendations

Table E2 below summarises recommended actions in terms of opportunities for short-term improvements, strategic and policy related actions, and long-term investments and improvements to the HWRC network.

Table E2: Summary of recommendations

Short-term action	• Staff training and supervision • Reduce number of residual skips • Improve site security. • Improve traffic management and skip organisation.
Strategic actions	• Introduce front-end sort on a long-term trial basis. • Review of HWRC opening hours. • Implement controls on the use of HWRCs to reduce cross-border use and abuse by traders. • Consider introducing a 'black bag policy' to restrict or ban the deposit of black bag waste at HWRCs.
Long term actions	• Redevelopment of existing sites to support operational improvements. • Rethinking the approach to overall HWRC provision and implement the preferred option, if any, for rationalising the HWRC network.

Contents

Glossary and acronyms

CCP	WRAP Collaborative Change Programme
HWRC	Household Waste Recycling Centre
CCBC	Caerphilly County Borough Council
WTS	Waste Transfer Station

Acknowledgements

Resource Futures wish to acknowledge the input received from Caerphilly County Borough Council, and in particular their involvement in the front-end segregation trial and waste analysis fieldwork.

1.0 Introduction

The WRAP Collaborative Change Programme (CCP) provided support to Caerphilly County Borough Council (CCBC) in 2016 and 2017 in a review of its Waste Transfer Station (WTS) and Household Waste and Recycling Centre (HWRC) operations. The overall aim of the support was to identify options for making the operations more efficient, whilst maintaining a high recycling rate and providing a good quality service to residents.

In 2016 Resource Futures completed several studies to assist CCBC:

1. Waste transfer station review (competed in April 2016)
2. Initial review of HWRC operations (completed in July 2016)
3. Estimate of improvement of front end recycling (completed in July 2016)

Full details of these studies can be found in the associated reports provided to WRAP and CCBC. In summary, these studies recommended that Full Moon become the primary WTS for CCBC and identified that, to accommodate this, the HWRC at Full Moon may need to close. Closure would impact upon the remaining sites, in terms of increased throughput and visitor numbers.

The initial review identified that existing sites would not be able to manage the expected increase in tonnage throughput and associated visitor numbers. As such, both operational improvements and redevelopment of HWRCs in Caerphilly would be required.

To identify and assess potential operational improvements that could be implemented at CCBCs HWRCs, Resource Futures was commissioned to review operations at HWRCs in further detail and to specifically assess the potential for introducing ‘front end sorting’ of recyclables at HWRCs. This operational review comprised:

1. **Traffic count and visitor numbers analysis** to consider the potential effect of site changes on site visitor numbers, throughout and opening hours (see Section 3)

2. **Front-end sort trial and composition analysis** to assess the potential recycling performance that could be achieved by improving on-site segregation of waste received at HWRCs (see Section 4)

3. **Operational assessment** of HWRCs to identify potential operational improvements that could be made (see Section 5)

4. **Assessment of waste costs** if greater onsite segregation is achieved (see Section 6)

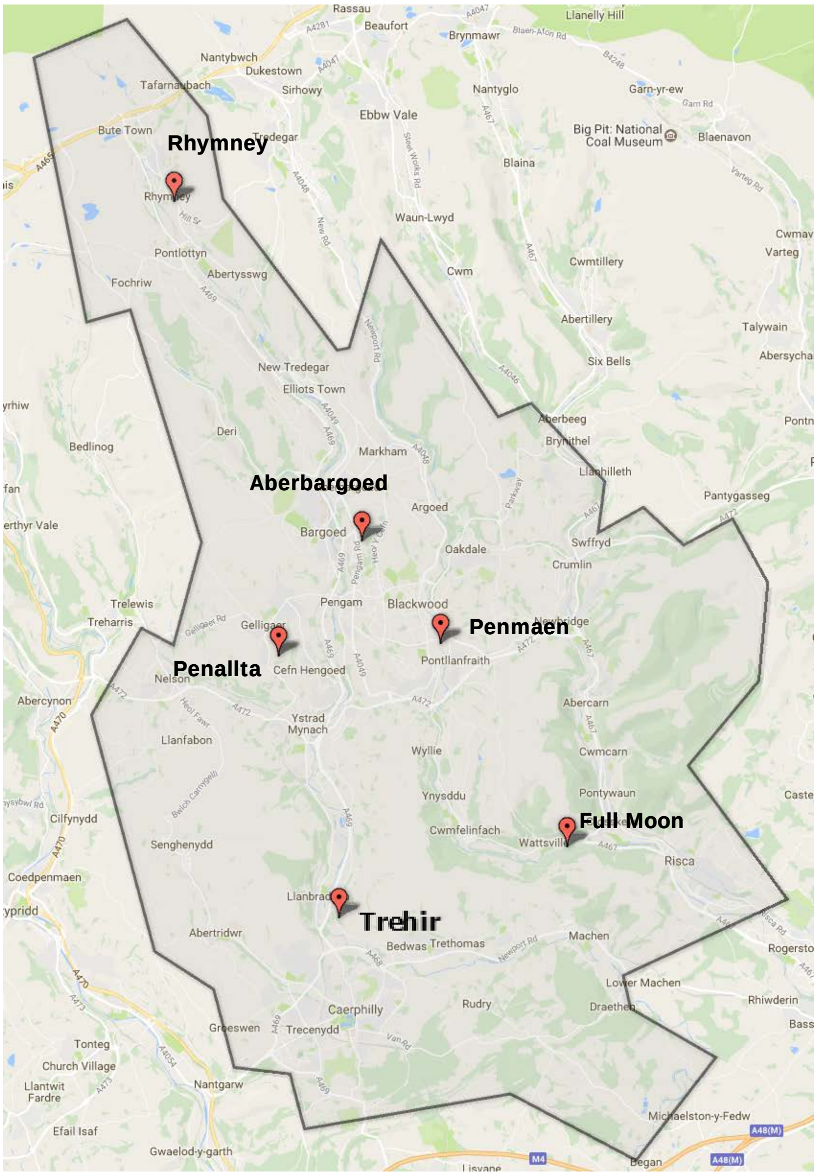
Overall conclusions and recommendations are presented in Sections 7 and 8 respectively.

The potential to redevelop infrastructure at existing HWRCs to cope with additional throughput has been considered as part of a wider ‘blank sheet’ review of options for reducing the HWRC network from six to three sites. This blank sheet review is presented in a separate report. For further details please see WRAP CCP report, *CCBC HWRC Blank Sheet Review, July 2017.*

2.0 Current operations

CCBC currently has six HWRCs located at Aberbargoed, Full Moon, Penallta, Penmaen, Trehir and Rhymney (see Figure 1). Full Moon is also CCBC's Waste Transfer Station.

Figure 1: Current HWRC configuration in CCBC



In 2016/17, the network handled 28,296 tonnes of waste of which nearly 25,000 tonnes (88%) was recycled[1]. Trehir and Penmaen handle the largest throughputs (21.3% and 19.3% respectively) with Rhymney accounting for only 8.4% of the total network throughput. Full Moon currently accounts for about 18% of CCBC's HWRC throughput.

[1] *Figures based on 2016/17 unaudited waste data provided by CCBC*

Table 2 shows the throughput, tonnes recycled and the recycling rate per site. The sites currently segregate green waste, wood, scrap metal, hardcore and cardboard as well as all categories of WEEE, oil and plasterboard (recorded as miscellaneous in Table 1.

Table 1: CCBC HWRC tonnage throughputs and recycling performance

Waste stream	Aberbargoed	Full Moon	Penallta	Penmaen	Trehir	Rhymney	All sites
Residual	2,511.5	2,611.7	2,263.5	2,704.6	3,301.1	1,324.6	14,716.9
Green	285.1	329.1	344.2	483.9	422.8	96.2	1,961.3
Wood	723.2	810.1	750.9	830.2	1,005.4	312.1	4,432.0
Scrap	128.4	165.0	81.3	155.0	106.2	46.0	681.8
Hardcore	751.4	818.6	955.4	1,039.1	984.2	433.6	4,982.2
Cardboard	42.6	41.1	26.5	42.1	41.7	0.0	194.0
Miscellaneous *	282.0	256.0	257.9	202.2	171.8	157.3	1,327.3
Total	**4,724.2**	**5,031.5**	**4,679.8**	**5,457.0**	**6,033.2**	**2,369.8**	**28,295.5**
Total recycled	*4,146.6*	*4,430.8*	*4,159.2*	*4,835.0*	*5,274.0*	*2,065.2*	*24,910.7*
Throughput as % of network	*16.7%*	*17.8%*	*16.5%*	*19.3%*	*21.3%*	*8.4%*	*100%*

*Miscellaneous includes all WEEE, mineral oil and plasterboard

Residual waste is currently sent to Bryn Recycling where it is sorted and additional recyclable material extracted. Currently, Bryn Recycling report a recycling performance of 77% with a further 7% sent to energy from waste. This has the effect of significantly boosting CCBC's HWRC recycling rate. Table 2 compares the on-site recycling rate (which is approximately 50% of throughput) with the overall recycling rate, which includes Bryn Recycling's secondary sort of the remaining materials.

Table 2: Summary of site throughput and recycling performance

Site	16/17 throughput (tonnes)	Recycling performance	
		Onsite	Including Bryn
Aberbargoed	4,724	46.8%	87.8%
Full Moon	5,032	48.1%	88.1%
Penallta	4,680	51.6%	88.9%
Penmaen	5,457	50.4%	88.6%
Trehir	6,033	45.3%	87.4%
Rhymney	2,370	44.1%	87.1%

Secondary sorting was previously undertaken by Rhonda Cannon Taff Borough Council but it is not common place. It is an effective way of ensuring that recycling is maximised with only a small amount left for ultimate disposal. However it is an expensive practice.

Overall, including the recycling achieved via Bryn Recycling, CCBC's HWRCs are consistently high performing. However, all of the HWRCs have provision for recycling some of the material streams Bryn Recycling extracts and therefore it would be more economical (if manpower and site layout allow) for segregation to be undertaken at the point of reception ('front end sorting') thus avoiding a proportion of the cost for secondary sorting.

CCBC are currently within an extension period of the current residual secondary sorting contract with Bryn Recycling, which expires in March 2018. At the end of this period, CCBC have the option to extend for a maximum of one year.

2.1 Initial HWRC review

As highlighted above, Resource Futures conducted an initial review of CCBC's HWRC provision and operations in 2016 (see report ref: WRAP, 2016, Caerphilly HWRC Review).

Continued housebuilding in the Borough will exacerbate HWRC congestion and visitor numbers are likely to increase. The road network between the east and west of the Borough is not adequate which means that provision is required in both the eastern and western valleys. Peak time congestion at Penmaen and access to Trehir HWRC are key issues that will need to be mitigated by site redevelopment or policy changes (as discussed in Section 5). For example, excluding recyclables such as wood or rubble, or making some sites recycling only sites, would result in residents being obliged to use the network differently.

3.0 Traffic count and visitor numbers analysis

3.1 Approach

Traffic count surveys took place at all six sites in April and March 2017 over 18 days, split across two monitoring phases. The first monitoring phase took place between 4th and 12th March, and the second between 15th and 23rd April. The analysis is based on the traffic count being undertaken between 9am and 4.30pm in March (winter opening hours) and between 9am – 5.30pm in April (summer opening hours) when the HWRCs are open to the public. The results indicate visitor numbers to each HWRC and also indicate how visitor numbers fluctuate during the week. The results have also been used to estimate annual visitor numbers.

Due to the timescales of the project, a traffic count was not undertaken during a typically busy period at the HWRCs (i.e. a warm weekend in the summer). However, the second monitoring phase in April coincided with the Easter bank holiday, which is comparable with the busyness experienced at the sites during the summer. This busy period allows us to see how visitor numbers increase during bank holidays and school holidays. However, the April data does not follow the normal weekday/weekend visitor pattern and therefore has been excluded from some analysis.

3.2 Results

Table 9 shows the average traffic count for each HWRC, using March and April traffic count data. The results suggest Aberbargoed is the busiest HWRC in the network, with 480 visits per day on average across the survey period. Rhymney has the lowest traffic count, with an average of 202 visits per day.

Table 3: Average daily traffic count per HWRC

	Aberbargoed	Penmaen	Full Moon	Penallta	Trehir	Rhymney
March (per day)	455	428	399	348	341	204
April (per day)	506	477	445	417	379	201
Average count (per day)	480	453	422	382	360	202
% total	21%	20%	18%	17%	16%	9%

Table 4 gives a breakdown of visits per day, assuming there are no site closures during the week. The results suggest that Sunday has the highest number of visits on average. A total of 2,302 cars accessed the HWRC network on average on Sunday, which is equivalent to 384 cars accessing each site over the day. Saturday was the second busiest day, with 2,299 cars visiting the HWRCs. The quietest days were Monday and Wednesday, with 2,017 and 1,961 cars accessing the sites respectively. This equates to 336 and 327 average visits over the day per site.

Table 4: Traffic count per day across all CCBC HWRCs

Day	Total Traffic Count per Day	Daily Average Traffic	% of Total
Sunday	2,302	384	15.4%
Saturday	2,299	383	15.3%
Tuesday	2,213	369	14.8%
Thursday	2,157	360	14.4%
Friday	2,044	341	13.6%
Monday	2,017	336	13.5%
Wednesday	1,961	327	13.1%

Figure 4 shows the average visitor numbers per hour for each HWRC across CCBC between 9am and 5pm. It suggests that visitor numbers are steady between 11am and 3pm, often peaking around midday, and numbers are lower in the first hour of opening and the last two hours before closing. This would suggest there is scope for reducing opening hours to generate some (accepting that many fixed costs will remain) financial savings. Of course, with a smaller network it would be sensible to maintain opening hours and encourage visitors to come early or later in the day to avoid peak times and minimise congestion.

Figure 2: Average visitor numbers per hour

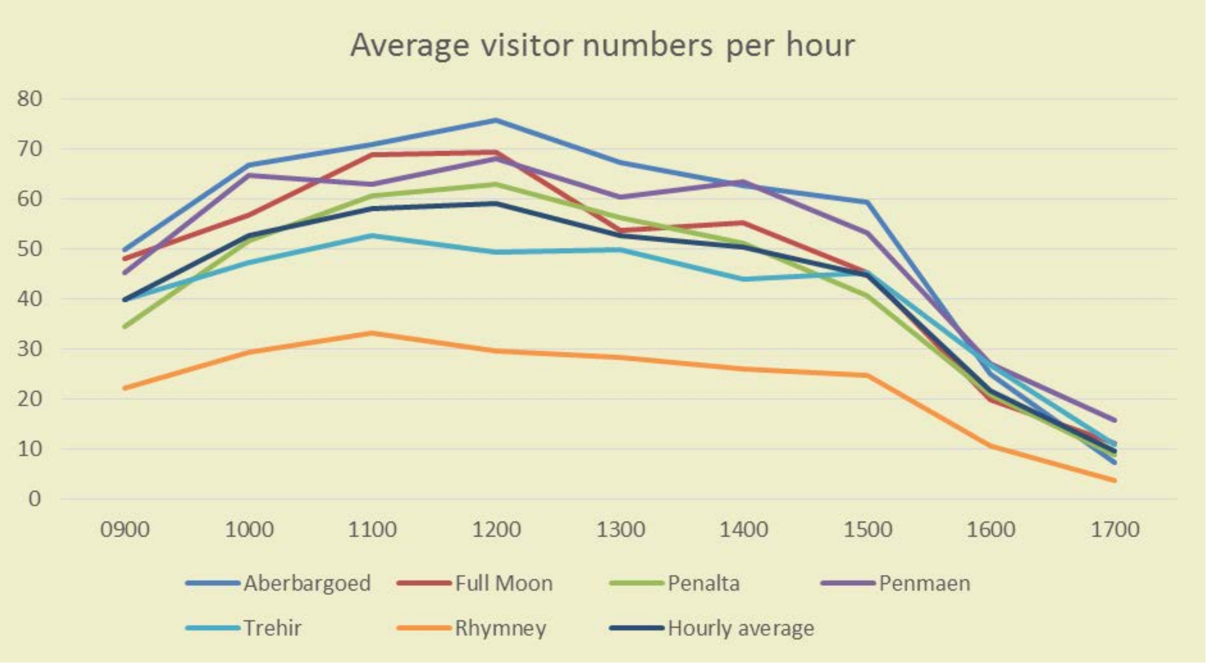
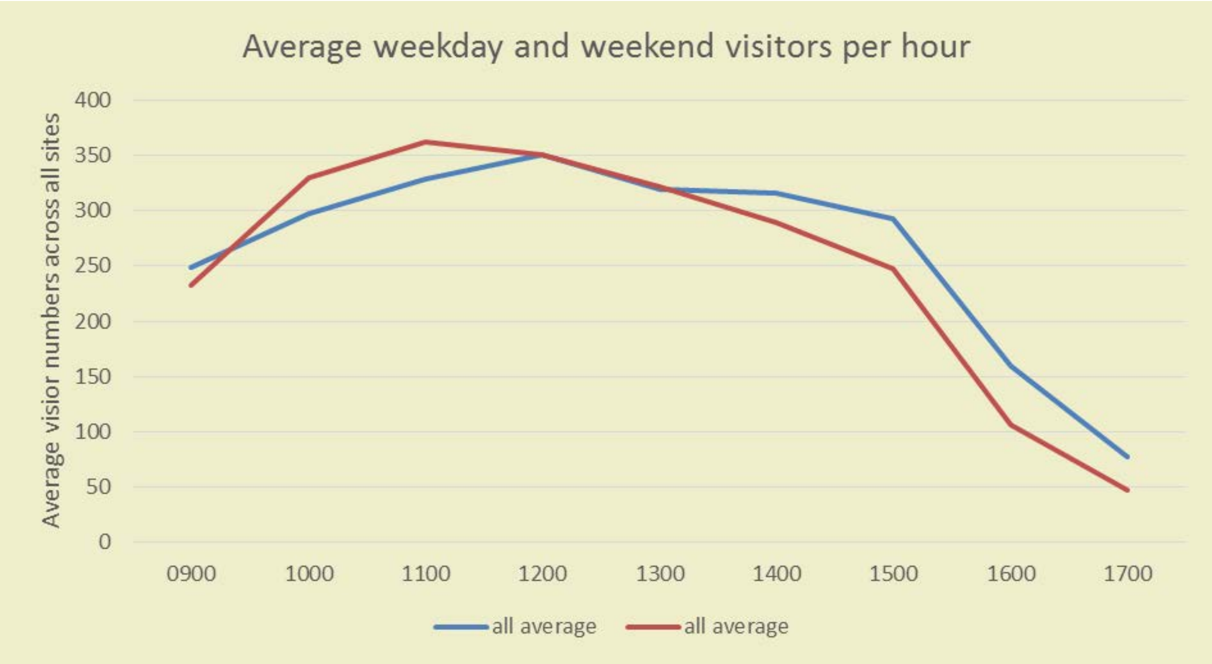


Figure 5 below compares the average visitor numbers per hour across all sites between weekdays and weekends. It shows visitor numbers over the weekend peaking earlier at around 11am and decreasing after 3pm. Weekday visitor numbers are highest between 10am and 3pm. This would again suggest there is scope for reducing opening hours to generate financial savings, especially over weekends. However, this would only be suitable for the current size of the network; a network of only three sites should maintain opening hours to enable sufficient time for the larger volume of vehicles to use the sites.

Figure 3: Average visitor numbers per hour across all sites-weekday vs weekend



Annual visitor numbers can be estimated based on the monitoring data. Assuming the March monitoring phase represents winter and spring (~50% of the year), and April represents a summer and autumn (~50% of the year), the total annual visitor numbers are 729,797.

Using this estimate, it is possible to estimate the amount of waste each visitor brings (38.8kg per visit, based on the 16/17 total tonnages figure).

Table 5 provides an estimation of kg per visit for each site, using the annual visitor number estimate and 16/17 tonnages. Most sites have an estimated kilogram per visit of between 30-40kg, apart from Trehir HWRC which receives approximately 52.8kg of waste per visit.

Table 5: Kilogrammes per visit per HWRC

Site	% of visitors	Visitor number / year	Tonnage / year (16/17)	Kg / visit
Aberbargoed	20.9%	152,488	4,724.2	31.0
Full Moon	18.3%	133,872	5,031.5	37.6
Penallta	16.6%	121,363	4,679.8	38.6
Penmaen	19.7%	143,620	5,457.0	38.0
Trehir	15.7%	114,222	6,033.2	52.8
Rhymney	8.8%	64,232	2,369.8	36.9
Total	**100%**	**729,797**	**28,296**	**38.8**

3.3 Findings

3.3.1 Traffic count data and spatial analysis findings

The difference in traffic count data compared to spatial analysis data obtained as part of the *CCBC HWRC Blank Sheet Review* (WRAP, July 2017) suggests that householders are sometimes preferring to use HWRCs other than their closest site. For example, spatial analysis suggests that Trehir should see visitor numbers upwards of 275,000 per annum. The survey results suggest that only half this many visitors are using Trehir. Redeveloping Trehir as discussed elsewhere in the report would help to improve access to a high-quality site for residents in this area, reducing the need for them to travel further north.

Possible reasons for residents choosing alternative sites to their nearest HWRC could be that they are including a trip to the HWRC with other activities, such as using an HWRC en-route to seeing friends and family elsewhere, or en-route to go shopping or to work. Perhaps the day of the week their nearest HWRC is closed is also a factor. For example, the Full Moon site is closed on a Sunday, when many residents would traditionally use a HWRC. Instead of waiting until the next day to use their closest site, residents are instead choosing to drive further to an open HWRC because that is the most convenient for them.

A more detailed survey of site users would help to identify residents preferred sites to use, frequency of use and which alternatives they use. This information would be valuable to help inform a consultation on site rationalisation. It is recommended that during any onsite survey, postcode data is also obtained[2] to allow investigation of cross border impact.

Table 6 Comparison of yearly visitor numbers based on traffic count and nearest drive time

Site	Visitor number /year (based on traffic count)	Visitor number/ year (based on spatial analysis)[1]
Aberbargoed	152,488	131,364
Full Moon	133,872	109,470
Penallta	121,363	14,596
Penmaen	143,620	153,257
Trehir	114,222	277,323
Rhymney	64,232	43,788

Note 1: See WRAP CCP100-052 CCBC HWRC Blank Sheet Review. July 2017.

3.3.2 Waste throughput

The data suggests that visitors to the Trehir HWRC are bringing large amounts of waste. The average quantity of waste taken to HWRCs is 38.8kg, but Trehir visitors bring over 50kg, suggesting potential cross-border use of Trehir or that residents of Caerphilly town are more likely to use their HWRC than residents elsewhere in the county. However, when the weights per material stream are analysed, as per Table 1, above, the site has the highest tonnage throughput as a percentage of the network, at 21.3%, and the materials which are highest compared to the other HWRCs are residual, green and wood waste. This, may reflect local demographics but could also be a result of trade waste abuse.

---

[2] *Can be super-output area of the postcode, i.e. the first three or four letters and numbers.*

4.0 Front-end sort trial and composition analysis

4.1.1 Approach

A trial was undertaken to assess the potential to increase the recycling performance by implementing on-site sorting at the HWRCs (i.e. the manual segregation, by householders, of materials when delivered to the site). To provide robust data for the trial, residual waste composition analysis was undertaken before and after the trial's implementation.

The first phase of waste composition analysis was undertaken in March 2017, before implementation of a trial. This assessed both weekday and weekend residual skips from all six sites. The additional onsite segregation was implemented in April and a second phase of composition was then undertaken in May. Whilst the analysis is not statistically representative, it is indicative and does meet WRAP guidance.

The main aim of the waste composition analysis was to provide composition data to identify the proportion of residual waste that could be recycled by householders at the kerbside or within existing containers at the HWRCs. In addition, assessing the potential to divert material into containers already available onsite and other materials which could be diverted in future if viable markets are available and operational constraints are removed.

Residual waste from skips at all six HWRCs was analysed to identify the proportion of residual waste that could be recycled. Data from the first phase of composition work showed whether waste was: larger, bulky items; bagged material similar to kerbside domestic waste; or smaller, loose items. The proportion of bulky waste compared to bagged waste provides some indication of how householders are managing their waste before coming to a site and then to what degree waste is then segregated at the site.

4.2 Results

4.2.1 Phase 1 composition analysis

A statistically representative sample of 20.2 tonnes of HWRC waste was analysed from 12 skips, including 14,571 kg of bulky waste, 2,697 kg of bagged waste and 2,966 kg of loose waste. Bulky waste such as carpet and mattresses accounted for 72% of the waste by weight, black bag waste accounted for 13% and loose waste, which was not contained in bags, made up 15% of the material. Bags of single materials were classified as bulky waste – for example, a bin bag full of paper would be classified as bulky as it would be easy to identify and dispose of in the correct container. However, it is difficult for recyclable material contained within black bags to be identified as such by site staff, especially during busy periods.

Table 7: Recyclability of material at CCBC HWRC by material type

% Waste recyclable at HWRCs					
	Day	Bulky Waste	Bagged Waste	Loose Waste	All Waste
All sites	Average	37.0%	43.8%	51.7%	**43.1%**
	Weekday	36.0%	40.9%	45.6%	**38.4%**
	Weekend	38.1%	46.8%	57.8%	**44.3%**

Across the network the average composition results suggest that 43.1% of all material from the 12 skips could be diverted to containers for recyclable waste already available onsite. The following table gives a breakdown of the total materials across all groups for which segregation could be improved. Across each of the waste types, weekend waste samples generally contained a higher proportion of recyclable materials. This is unsurprising; on busy days it is more difficult for operatives to interact with all visitors and encourage them to deposit waste in the correct skips.

On average the bulky element of waste samples, whether weekday or weekend contained a similar proportion of recyclable material. The loose element of the samples was more variable between week days and weekends.

The following table summarises the average content of recyclable materials which could have been diverted from the residual waste samples at the HWRC sites.

Table 8: Materials within residual waste stream currently accepted on site

Waste stream	% of composition
Other non-combustible, usually inert waste - (rubble)	9.4%
Reusable clothing and accessories	5.0%
Wood	4.5%
Card & cardboard	4.3%
Paper	4.2%
Scrap ferrous metal	3.6%
Reusable linens (non-stuffed)	2.6%
Small WEEE	2.0%
Glass bottles and jars	1.6%
Plastics (bottles & PTTs)	1.4%
Soil	1.3%
Garden waste	1.1%
All other accepted materials	2.0%
Total recyclable at HWRC	43.1%

The table above indicates the average total of all recyclable materials from all samples which could have been diverted at the HWRCs. All other accepted recyclable items such as batteries, aluminium foil, non- ferrous cans, and other non-ferrous metals accounted for less than two percent in total and less than one percent individually. The reusable clothing total excludes clothing that was heavily soiled or damaged as a result of security breaches. Resource Futures sorting staff were instructed to categorise these items as residual waste so as not to overestimate the potential for reuse and recycling.

A further 34.7% of materials could potentially be diverted by segregating additional materials at the front end, if sites are reconfigured and markets are available. Table 9 indicates the proportion of these materials found during the analysis.

Table 9: Potential to divert in future

Waste stream	Proportion
Dense plastic	11.7%
Carpets	10.1%
Mattresses	4.6%
Furniture for potential reuse	5.0%
Non-packaging glass	3.3%

A summary of the results of the first phase were provided to WRAP and CCBC as a briefing note to inform discussions regarding the front-end sort trial. The results suggested that the trial should focus on extracting the highest possible proportion of the 43% of recyclable waste that could be segregated on site already.

4.2.2 Front-end sort trial

The results of the first phase of the composition study were used to inform the design of a front-end segregation trial, whereby more recyclable materials would be diverted into existing recycling containers at the site. The trial took place over two weeks at the end of April 2017 and was immediately followed by a second, smaller phase of composition analysis fieldwork to assess the impact of any changes. The trial took place at Penallta and Aberbargoed HWRCs as results suggested these sites had significant potential to divert recyclable waste and CCBC suggested there would be a high level of staff engagement.

Following recommendations from WRAP and Resource Futures, CCBC implemented a number of actions as part of the trial. These included:

- Officers from CCBC provided training to all site operatives to encourage better segregation, refocusing roles and responsibilities;
- Increased supervision of site staff during the trial; and
- Participation in a second phase of analysis involving separation of residual waste skips and staff.

4.2.3 Phase 2 composition analysis

The second phase of composition analysis took place in the week of 8th May, following the trial and included samples from four waste skips from Penallta and Aberbargoed sites; a weekend and a weekday skip. The same sorting method was used as in the first phase to investigate and compare whether greater segregation was taking place following the trial.

4.2.4 Comparison of results

Overall a representative sample of 4.7 tonnes of HWRC waste was analysed from the four skips, including 2,578 kg of bulky waste, 1,580 kg of bagged waste and 550 kg of loose waste. The table below provides a comparison with the proportion of each waste during the first phase of the study.

Table 10: Average proportion of waste materials making up the weight of samples

Type of material within samples	Bulky	Bagged	Loose	Total
Phase 1 tonnage and percentage of the sample	14,571	2,697	2,966	**20,234**
	72.0%	13.3%	14.7%	**100%**
Phase 2 tonnage and percentage of the sample	2,578	1,580	550	**4,709**
	54.8%	33.6%	11.7%	**100%**

Bulky waste made up 54.8% of the waste by weight. This is considerably less on average compared to the first phase where bulky waste items accounted for 72.0% of the composition. This was expected as it is easier for site operatives and site users to identify the correct skip to recycle this waste compared with heterogenous loose or bagged waste. Bagged waste made up more of the average sample by weight at 33.6% and loose waste, which was not contained in bags made up a similar proportion at 11.7% of the material. Again, bags of single material were classified as bulky waste.

The recyclability of the four samples was calculated according to different waste types and whether or not materials were currently accepted at the HWRCs. The results are summarised in the table below with a comparison to the first phase.

Table 11: Average HWRC recyclability of all samples across phase 1 and 2

Proportion of recyclable waste in residual waste skips at HWRCs					
	Day	Bulky Waste	Bagged Waste	Loose Waste	All Waste
Phase 1	Average	**37.0%**	**43.8%**	**51.7%**	**43.1%**
	Weekday	36.0%	40.9%	45.6%	38.4%
	Weekend	38.1%	46.8%	57.8%	44.3%
Phase 2	Average	**28.2%**	**40.6%**	**46.2%**	**34.5%**
	Weekday	25.8%	41.8%	42.9%	31.1%
	Weekend	30.7%	39.5%	49.5%	36.0%

The waste composition analysis undertaken following the trial indicated that 34.5% of the waste from all sampled skips could be recycled at the HWRCs, a reduction of 8.6% from the before trial composition analysis. The average recyclability of the bulky element of all samples was less during the second phase at 28.2% of all the bulky materials compared to 37.0% in the first phase.

The average content of site recyclable material from both waste composition analysis phases is outlined in Table 12. Inert waste showed the greatest reduction at 4.3%. Scrap ferrous metal was 2.5% lower and the carboard and paper and the wood categories were 1.1% lower.

Table 12: Summary of results from both phases of composition analysis

Material category	Phase 1	Phase 2	Difference
Inert waste and rubble	9.4%	5.1%	4.3%
Reusable clothing and accessories	4.2%	4.0%	0.2%
Wood	4.5%	3.4%	1.1%
Card & cardboard	4.3%	3.2%	1.1%
Paper	3.6%	3.2%	0.4%
Scrap ferrous metal	5.0%	2.5%	2.5%
Reusable linens (non-stuffed)	1.1%	2.2%	-1.0%
Small WEEE	2.6%	2.0%	0.6%
Glass bottles and jars	1.6%	1.8%	-0.2%
Plastics (bottles & PTTs)	1.3%	1.4%	-0.1%
Soil	2.0%	1.2%	0.8%
Garden waste	1.4%	1.4%	0.0%
All other materials	2.0%	3.1%	-1.0%
Total all HWRC accepted recyclable materials	**43.1%**	**34.5%**	**8.7%**

4.3

4.4 Findings

The initial sort results from both phases of analysis indicate a difference in the proportions of the type of waste (i.e. bulky, bagged or loose waste). In phase 2, bulky waste items accounted for less of the waste by weight at 54.8% compared to 72.0% in phase 1. Bagged waste accounted for more of the average composition in the second phase at 33.6% compared to 13.3% in phase 1, most probably because more bulky items were being diverted to the appropriate recycling containers rather than the residual waste skip, meaning that bagged, household type waste was more prominent within samples during the second phase.

On average the actual content of material which could be recycled at the HWRCs was lower in each of the bulky, bagged and loose material types. Bagged waste was around 3% lower and loose waste was around 4% lower. Most notably, bulky waste contained less recyclables at 28.2% compared to 37.0%.

Overall, almost 9% of residual waste was diverted for recycling following the introduction of the front-end sort approach. This suggests that the trial has had a beneficial impact of the separation of recyclable materials however, efforts should be made to maintain and improve upon this good practice. Future improvements to the amount of recyclable waste being captured for recycling from black bag waste could be made to recycling performance and the capture of recyclable materials by introducing bagged waste splitting on site and encouraging residents not to bring mixed bagged waste to the sites in future, for example by introducing a black bag ban. This is considered within Section 5.3.4. The financial implications of greater on-site segregation is considered in Section 6.0.

The table below summarises the current throughput, onsite recycling rate and total recycling rate including post sort of residual waste at Bryn Recycling. The recycling rate is anticipated to increase as a result of the front-end sort.

Table 13: Summary of existing sites

Site	16/17 throughput (tonnes)	Recycling Rate			
		Without front-end sort		With front-end sort	
		Onsite	Including Bryn	Onsite	Including Bryn
Aberbargoed	4,724	46.8%	87.8%	47.9%	90.2%
Full Moon	5,032	48.1%	88.1%	49.1%	90.4%
Penallta	4,680	51.6%	88.9%	52.6%	91.1%
Penmaen	5,457	50.4%	88.6%	51.4%	90.9%
Trehir	6,033	45.3%	87.4%	46.4%	89.9%
Rhymney	2,370	44.1%	87.1%	45.2%	89.7%

All of the HWRCs have provision for recycling some of the material streams Bryn Recycling extracts and therefore there is potential (if manpower and site layout allow) for segregation to be undertaken at the point of reception thus avoiding a proportion of the cost for secondary sorting. It will be challenging for CCBC to achieve the same level of recycling that

Bryn Recycling report. However, if it is successfully implemented it should result in financial savings and will ensure CCBC are transparent in the performance achieved.

To maximise recycling in future, CCBC should consider redevelopment of HWRCs, even if network rationalisation does not occur. This is particularly pertinent for sites such as Penmaen which are already congested. CCBC should also consider policy changes to reduce the burden on the HWRCs (for example, introducing a ban on 'black bag' waste at HWRCs). Clearly, any such policy changes would need to be accompanied by a communications campaign that communicates the change positively to residents and illustrates the different alternatives available (i.e. kerbside recycling, residual waste kerbside collections and bring sites).

WRAP have undertaken materials marketing research on behalf of CCBC, including for mattresses, carpets and dense plastics and it is recommended that CCBC review this to investigate whether it is appropriate to segregate onsite.

5.0 Operational assessment

5.1 Approach

Site visits were undertaken in February 2017 to identify short-term operational or long-term improvements that could be made to the HWRCs, particularly if CCBC were to utilise a smaller network of three HWRC sites. A report summarising the observations was circulated to WRAP and CCBC in March 2017. This report therefore documents the findings in the wider context of potential changes that CCBC may make to its HWRC network.

The focus of the site visits was on the operational impact of:

- Additional tonnage generated at HWCRs as a result of potential site closures;
- Additional visitor numbers, particularly at peak times;
- Greater segregation of the residual waste which is currently sent to Bryn Recycling;
- Possible cross-border usage of CCBC HWRCs;
- Changes to HWRCs in neighbouring authorities; and
- Introducing a ‘black bag’ policy at the HWRCs.

Consideration was given to how all sites could improve recycling rates and operational efficiency in the short-term, if front-end sorting is rolled out throughput the network.

5.2 Short-term actions

All of the current HWRC sites are relatively small, with proportionally small tonnage throughputs. However, there are several short-term actions that CCBC could implement to drive up the recycling rates at all of the sites and improve residual waste diversion, whilst generating efficiency savings. These could be implemented before, during or after any front-end sorting is implemented at HWRCs.

1) **Staff training.** Overall many of the materials which are already recyclable on site were observed to be present in the residual waste skips. Staff engagement with site users was low with neither staff or site users prioritising recycling. Staff are known to remove items from skips using hooks after they have been disposed, rather than getting residents to deposit items correctly in the first place. Staff training has previously, and more recently, been undertaken but to help to improve the recycling of these materials, generate an increased income from the sale of recyclate, decreased costs in residual waste disposal and motivate staff to interact with site users, CCBC should consider regular and on-going refresher training to all staff about the importance of actively undertaking segregation on site., even if this segregation of waste was to be phased in across the HWRC network due to the possible operational issues that may be caused on site.

2) **Reduce the number of residual waste skips.** As the front-end sort trial is embedded and greater proportions of recyclables are separated onsite, the number of residual waste skips should be reduced, which would simultaneously allow for more recycling skips to be utilised on site instead. This would further drive up recycling rates and improve residual waste diversion, whilst reducing the reliance on Bryn to

undertake a post-sort of the residual waste. CCBC could also be generating an increased income from the sale of recycling and decreased costs in residual waste disposal.

3) **Improve site security.** Break-ins are frequently reported, particularly targeting the textiles banks, resulting in the loss of high-value material and a negative impact on the recycling tonnages. WEEE and scrap metal have also been targeted, having the same impacts as with textiles. Improving security at the sites would help to combat this. Incidents are reported to the police but there is little or no follow up and site staff appear demoralised at the frequency of the incidents and perceived lack of action to prevent it.

   Whilst CCTV has been improved at some sites it has not deterred the criminals, therefore given the associated costs in clearing up the sites following a break-in, loss of income from theft or damage to recyclables, CCBC should consider the possibility of operating a trial with tougher security on the sites for a fixed period of time so that the extent of the impacts the thefts have can be quantified. For example, Lancaster County Council increased the use of CCTV provision at its HWRC in Burnley following an increase in reports of thefts from their scrap metal skips. The cost of extending site security depends on the nature and volume of additional security required, but a free of charge option could be for CCBC to closely liaise with the local police community beat team to increase their presence around the HWRCs with the highest likelihood of theft.

4) **Improved traffic management and skip organisation.** To encourage residents to use the HWRC sites effectively it is important to make them as user friendly as possible. The speed of throughput of the public is key and therefore CCBC should endeavour to optimise parking at those sites which can be improved.

   Each of the sites observed had varying degrees of traffic and queuing issues, and residents who have been queuing for long times are notoriously difficult to engage with, making source segregation at point of entry more difficult. Some sites could re-design the layout of the skips to encourage residents to recycle further still. For example, Isle of Anglesey County Council anticipated that by re-designing two of their HWRCs to allow for better traffic flow would realise an increase of up to 5% in their recycling rate.

Table 14 summarises the short-term improvements that could be made at each site.

Table 14: Site-specific short-term recommendations

HWRC site	Site improvements which could be made in the short-term
Aberbargoed	• The Aberbargoed HWRC site currently uses available space efficiently so no short-term improvements are necessary.
Full Moon	• Traffic enters and exits the site through the same entrance/exit and flows in a one-way system. However, there is little room for cars to pass others which are stopped to deposit materials into the bulky skips, which could lead to queues forming very quickly at busy periods. A clearly marked passing lane and marked spaces would help to improve traffic flow.
Penallta	• Penallta is a spacious split-level site which has the opportunity of providing additional capacity in its current design. • Site space could be used more efficiently – smaller skips currently sited on the upper level could be moved to the lower level as the bottom part of the site has space available, taking into account the reasons why some skips are sited in this way. For example, the small WEEE containers are sited on the ramp for security and health and safety reasons. • Traffic enters and exits the site through separate exits and flows in a one ways system; however, there is little room for cars to pass those which are parked to deposit materials into the bulky skips. This causes backlog and limits throughput of users. A clearly marked passing lane and marked spaces would help to improve traffic flow. • Switching the entrance/exit may be beneficial, as the loop at the end of the road could be used to hold traffic.
Penmaen	• Penmaen is a split-level site and already accepts a high proportion of CCBC HWRC waste. However, it has significant space limitations. • The lower level of the site could be improved by reorganising the existing containers to make better use of space. • Improving road markings and reversing the traffic flow could help improve congestion, allowing vehicles to pass stationary vehicles.
Trehir	• Trehir is a busy site which currently uses available space efficiently. However, traffic enters and exits the site through one entrance/exit which creates traffic flow issues and queuing.
Rhymney	• Rhymney is a very small site. Traffic enters and exits the site through one entrance/exit and flows in a one-way system. However, there is little room for cars to pass others which are stopped to deposit materials into the bulky skips, which could lead to queues forming very quickly at busy periods. A clearly marked passing lane and marked spaces would help to improve traffic flow.

5.3 Strategic and policy actions

In addition to the short-term recommendations, there is a range of strategic and policy changes that CCBC could implement to improve recycling rates, including policies on:

- Cross border use of HWRCs
- Trade waste controls
- Improving re-use
- Black bag sorting

Each is discussed below.

5.3.1 Cross border use of HWRCs

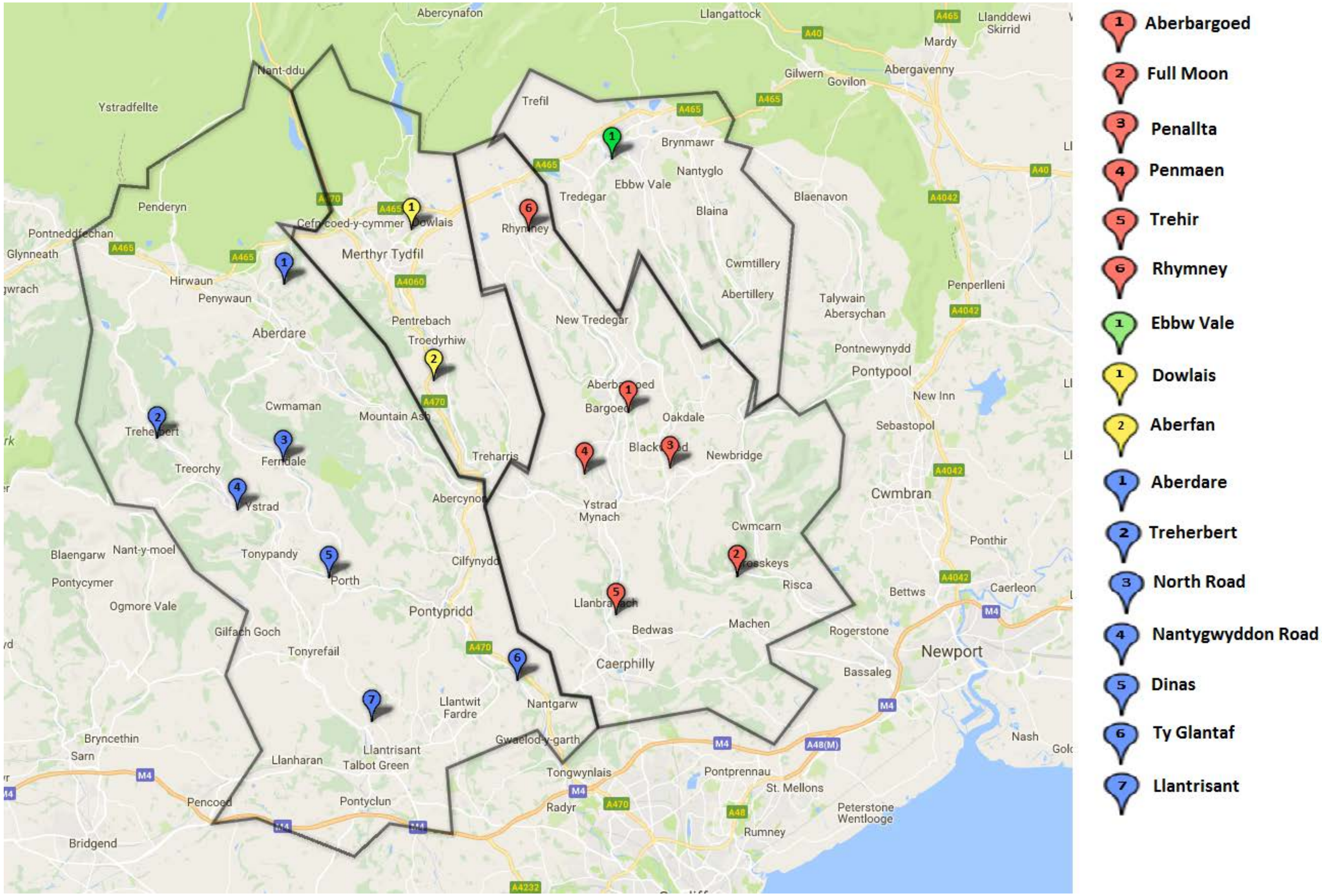
The spatial analysis of CCBC's HWRCs conducted by Resource Futures (*CCBC HWRC Blank Sheet Review, July 2017*) indicated that Penallta HWRC receives a disproportionately high quantity of waste given the number of CCBC residents living in its vicinity. It is possible that cross border abuse from residents in neighbouring authorities may play a part. It is also believed that there is waste deposited at Full Moon from Newport residents.

Resource Futures investigated HWRCs across Wales in 2012 to produce good practice guidance for the Welsh Local Government Association (WLGA). There are several alternative approaches to managing cross boarder usage, but importantly, controls should consider the range of factors for each authority on an individual basis.

Figure 6 shows the HWRCs in the Borough and neighbouring authorities Merthyr Tydfil and Rhondda Cynon Taff. The Penallta site is located centrally and to the West of the authority close to the border with the other authorities. The map suggests that some households in the far south of Merthyr Tydfil and East of Rhondda Cynon Taff may be closer to the Penallta site than the closest site in their own authority. It is possible that residents in Merthyr Tydfil and RCT use CCBC sites due to restrictions on residents depositing bagged waste in the residual skips in Merthyr. A more detailed spatial analysis could provide further insight into the actual number of households for which this is the case.

CCBC does not have a residents' permit scheme for HWRC sites for visits by car, although there are other vehicle restrictions. Currently, large vans and large trailers are not permitted to use any CCBC HWRC sites. Small to medium vans and smaller trailers are permitted, but the driver must present a single use permit to the site to confirm their residence in Caerphilly, and access is restricted to a maximum of six permits per annum. Cars are not currently required to present a resident permit. Such a permit scheme could prove costly to implement and monitor, however. For example, Derbyshire County Council anticipated such a scheme to cost in the region of £50,000 to implement across its network of 9 HWRC sites, which receive annual visitor numbers of 1.5 million. Other measures such as automatic number plate recognition (ANPR) could be considered to minimise cross border abuse. Many local authorities operate ANPR systems at their HWRC sites, for example this is in place at HWRC sites in Swansea, Isle of Anglesey and Cardiff. In addition, adding review of proof of residency to the responsibilities of site staff (i.e. a meet and greet operative) may help combat cross border abuse.

Figure 4: Current HWRC sites in Caerphilly, Merthyr Tydfil, Blaenau Gwent and Rhondda Cynon Taff



In summary, there is potentially cross border abuse at Penmaen as a result of stricter policies at HWRCs in other surrounding local authority areas. Neighbouring Torfaen's single HWRC does not accept DIY waste or rubble at all, while Blaenau Gwent also only has one site at Ebbw Vale.

CCBC sites are believed to be receiving cross border input of waste, possibly as a result of policy changes implemented at HWRCs in neighbouring authorities. This is potentially going to be exacerbated as stricter controls are enforced in neighbouring HWRCs. The impacts of these changes on CCBC also needs to be considered, especially as in the last year CCBC has seen a significant increase in tonnage of recyclables and residual waste into their sites.

To tackle this issue, CCBC should consider implementing a resident's permit system, either using an ANPR system, or asking visitors to provide proof of residence in Caerphilly. The costs and benefits of the approach implemented should be considered careful to ensure that it is effective whilst requiring minimal staff input.

5.3.2 *Trade waste controls*

Trade waste is not accepted on site and there is a van ban and permit scheme in place to discourage trade waste inputs. However, as in other authorities, trade inputs are expected to arise. Many authorities in Wales are considering introducing stricter controls or limit inputs or wastes potentially generated through trade activity, for example by introducing van bans, commercial 'DIY waste' charges or the introduction of ANPR to monitor and act on commercial waste users. Others are considering actively encouraging it, but for a charge. This is expected to result in significant decline in waste arisings of certain wastes (e.g. rubble and plasterboard), whilst at the same time generating some income for the council.

Trade waste controls can result in a loss of throughput and therefore impact upon the HWRC recycling rate. An alternative to consider is a 'reasonable usage' policy for all site users, including householders. For example, local authorities such as Swansea and the Isle of Anglesey have introduced a reasonable use resident permit scheme of 12 permits per 12 months free of charge for residents who use a van or trailer. Site staff are often aware of which vehicles are frequently the site regularly. Any frequent users that are identified should be requested to complete a disclaimer form which can be investigated by officers. This type of policy does not penalise residents that only have access to commercial vehicles because it can be used instead of a van ban or vehicle permit system. It will identify any vehicle that is a frequent site user and will allow CCBC to differentiate between genuine household use and suspected trade abuse. It will require resource for enforcement but it is anticipated that this would be lower admin costs than a permit scheme.

Managing trade waste abuse by communicating a reasonable usage scheme through greater staff interaction with site users either when tipping or as a meet and greet function will help to deter some traders. Staff could be supplied with body cameras to wear onsite which will record all interactions providing evidence if staff are abused or complaints are made (and which can then be followed up).

Longer term, CCBC should consider introducing APNR to the rationalised network to help identify frequent site visitors.

5.3.3 *Improving reuse*

Reuse is becoming more common at HWRCs, either through an onsite shop or a container for offsite sales, often with the involvement of the third sector. Some authorities have very low cost, simple to manage, no-frills offerings and others have large shops which reuse a higher tonnage of items and generate more income, but require significantly more management. There are several options available to CCBC, including developing:

- a container or area on site for segregating items for a third party to cherry pick for offsite sales;
- a small reuse shop managed by existing HWRC operatives; or
- a larger reuse shop managed by a third party. This could be a franchise if different reuse organisations manage shops on each site.

It is suggested that re-use is only considered at CCBC sites once greater segregation of recyclables has become well-established and, if applicable, sites are redeveloped (or newly built). Small scale reuse could be introduced at all three sites in the new configuration. Alternatively, one reuse shop at the largest, flagship site could receive feedstock segregated in containers in the other sites. As the authority is not very large, a franchise-based re-use shops approach, similar to Warwickshire County Council for example, is not considered to be appropriate. There are a number of case studies and videos on the WRAP website that provide guidance on reuse options. Discussions with, and a visit to, Newport Wastesavers shop at the Newport HWRC or the FCC Environmental shop at Bryn Lane in Wrexham, managed by a local hospice, will show officers what can be achieved.

If the Council proceeds with establishing a reuse scheme, it is recommended that it conducts further research and develops a business case that takes account of the Council's preferences, for example on the type of items to reuse, involvement of charity partners, location and management of the shop. This business case could phase the introduction of reuse, as discussed below. Further advice is available in WRAP guidance and Appendix 1 discusses how to set up reuse.

5.3.4 *Black bag sorting*

The results of the second phase of residual waste analysis highlighted that there was 33.6% of black bag waste in the skips but sorting of black bags deposited by residents at HWRCs would currently be challenging to implement on sites such as Penmaen and Aberbargoed, because the sites are small.

However, equipment for black bag sorting does not need to be sophisticated. For example, some authorities, such as Wrexham, and south Gloucestershire have a small table next to the residual waste skip and a few bins for key materials. Where there is a larger footprint, for example in a redesigned or new build site, there would be space for a larger, more permanent provision (e.g. a separate building to house permanent sort tables and bins or boxes for recyclable waste). Black bag sorting would help improve the onsite recycling rate, but site staff are unlikely to welcome such an additional task, especially as this is likely to mean that operatives are diverted from other duties, such as guiding residents to the correct containers, or meet and greet duties etc. However, black bag sorting can encourage more, not less black bags if residents are happy for the council to perform a duty they do not want to undertake themselves.

An alternative therefore is to introduce a strict black bag policy, effectively banning waste that is not pre-sorted by residents, or which they have to sort onsite themselves otherwise they will be unable to deposit it. For example, Rhondda Cynon Taf Borough Council saw a jump in its HWRC recycling rates from 78.4% to 93.4% following the introduction of a black bag ban across all of their HWRC sites in June 2014. Also, moving the residual waste skip in between other recyclables that commonly appear, for example cardboard, will enable the public or site operatives to easily access the correct skip. Containers for materials that arise less frequently in residual waste can be further away.

5.4 Long-term actions

There are two longer term actions for CCBC to assess that would help to address the requirement for more capacity in the network to mitigate current congestion and ensure the network can accommodate housing growth:

1. **Redevelopment of sites**: Expansion and redevelopment of sites would help CCBC to improve onsite operations through additional skips for greater segregation of materials and improved traffic management to make it quicker and easier to recycle.
2. **Site Rationalisation:** A reduction in the size of the network would require redevelopment of sites and construction of a new site, for example at Trehir. This would require CCBC to manage the network with one large purpose built 'core' site that is future proofed to accommodate changes in segregation of recycling and two smaller satellite sites that accept key materials only.

These two actions are considered in more detail, including conceptual designs for redevelopment and capital cost requirements in a second report, *WRAP CCCP100-052 CCBC HWRC Blank Sheet Review, July 2017*.

6.0 Assessment of waste costs

Table 15 presents the estimated costs and savings associated with diverting 20% of residual waste to recycling at all HWRCs in the CCBC network. This is more than the 9% observed as a result of the trial and will require management supervision to ensure operatives continue to maximise recycling current operational spend for the network. This will be even more important if Bryn Recycling increase the gate fee as this will reduce any potential savings.

Table 15 presents the potential savings if CCBC can achieve a hypothetical 20% reduction in the waste sent to Bryn Recycling. Hypothetical cost estimates include residual waste at both £98 per tonne and £130 per tonne depending on whether gate fees increase. If Bryn Recycling charges a higher rate for residual waste disposal, CCBC will need to consider the trade-off between financial efficiency and recycling rates. For example, if the residual waste gate fee increases to £130 per tonne, costs are expected to increase by circa £88,000 from 2016/17 costs.

Table 15: Summary of waste disposal costs and savings per annum

Waste type	2016/17			2017/18		
	Quantity (tonnes)	Cost per tonne	Total cost	Estimated quantity (tonnes)[1]	Estimated total cost (high)[2,3]	Estimated total cost (low)[3,4]
General waste	14,717	£98	£1,442,266	11,774	£1,530,620	£1,153,852
Green	1,961	£31	£60,791	2,068	£64,108	
Wood	4,432	£45	£199,440	4,732	£212,940	
Scrap	682	-£65	-£44,330	966	-£62,790	
Hardcore	4,982	£20	£99,640	5,532	£110,640	
Cardboard	194	£45	£8,730	478	£21,510	
Miscellaneous *	*1,327*	£0	£0	1,521	£0	
WEEE	1,004	£0	£0	1,178	£0	
Mineral oil	29	£0	£0	29	£0	
Plasterboard	294	£64	£18,816	294	£18,816	
Textiles	-	-£180	£0	436	-£78,480	
Soil	-	£20	£0	121	£2,420	
Paper	-	-£75	£0	258	-£19,350	
Plastics	-	£100	£0	102	£10,200	
Glass	-	-£12	£0	129	-£1,548	
GRAND TOTAL	**28,296**		**£1,785,353**	**28,117**	**£1,809,086**	**£1,432,318**

*miscellaneous refers to WEEE, mineral oil and plasterboard

Note 1: Assuming reduction of 20% through front end sort.
Note 2: Based on a residual waste disposal cost of £130 per tonne.
Note 3: 2016/17 costs/revenues per tonne for recyclable materials applied to estimate total cost by material type.
Note 4: Based on a residual waste disposal cost of £98 per tonne.
Note 5: The slight reduction compared to 2016/17 is as a result of rounding.

7.0 Conclusions

7.1 Traffic Count

Traffic count data indicates that householders are sometimes preferring to use HWRCs other than their closest site. For example, spatial analysis suggests that Trehir should see visitor numbers upwards of 275,000 per annum. The survey results suggest that only half this many visitors are using Trehir. Redeveloping Trehir as discussed elsewhere in the report would help to improve access to a high-quality site for residents in this area, reducing the need for them to travel further north.

With the exception of Rhymney, the traffic count across the HWRC network is broadly similar, averaging at 18.4% of traffic using each site. Unsurprisingly, as the site with the lowest tonnage throughput, Rhymney has only 9% of the total traffic using this site. There is therefore the possibility that further savings could potentially be achieved by reducing the opening hours at Rhymney or, more significantly, by further reducing the opening days at the site, without adversely affecting the number of users. Taking into account the peak times users were visiting the site, it would appear that maintaining the site opening between 10am and 3pm would be most sensible. Given that the traffic count results across all sites demonstrate peak usage between 10am – 3pm, these reduced opening hours could be extended across all HWRC sites if increased savings were necessary. Alternatively, sites could close for an additional day, operating a five-day week.

The data suggests that visitors to the Trehir HWRC are bringing large amounts of waste. The average quantity of waste taken to HWRCs is 38.8kg, but Trehir visitors bring over 50kg, suggesting potential cross-border use of Trehir or that residents of Caerphilly town are more likely to use their HWRC than residents elsewhere in the county. As such, measures to control access to sites by non-residents and trade customers could help control waste quantities (see below).

7.2 Front-end sort trial and potential cost savings

Residual waste analysis of a weekend and weekday skip from all six sites suggested there is the potential to extract 33% from general waste at the HWRCs. Actual trial results suggested that operatives were extracting 8.5% of recyclable waste onsite. If this is increased to 20%, CCBC could see significant savings even taking account of additional staff costs to supervise segregation. This assumes residual waste gate fees remain the same or increase by less than 25%. The analysis suggests there is still more material that could be segregated onsite, including inert, textiles, wood, paper and cardboard, plastic, glass, metal, small WEEE and garden waste but much of this is bagged and would require a policy decision to require residents to pre-sort or additional manpower on site to sort onsite.

7.3 Operational assessment

Table 16 presents the key findings of the operational assessment and summarises the key issues identified at each site.

Table 16: Summary of site-specific operational review

HWRC site	Operational assessment conclusions
Aberbargoed	• The Aberbargoed HWRC site currently uses available space efficiently
Full Moon	• Traffic enters and exits the site through the same entrance/exit and flows in a one-way system. However, there is little room for cars to pass others which are stopped to deposit materials into the bulky skips, which could lead to queues forming very quickly at busy periods.
Penallta	• Penallta is a spacious split-level site which has the opportunity of providing additional capacity in its current design. • Site space could be used more efficiently • Traffic enters and exits the site through separate exits and flows in a one ways system; however, there is little room for cars to pass those which are parked to deposit materials into the bulky skips. This causes backlog and limits throughput of users.
Penmaen	• Penmaen is a split-level site and already accepts a high proportion of CCBC HWRC waste. However, it has significant space limitations.
Trehir	• Trehir is a busy site which currently uses available space efficiently. However, traffic enters and exits the site through one entrance/exit which creates traffic flow issues and queuing.
Rhymney	• Rhymney is a very small site. Traffic enters and exits the site through one entrance/exit and flows in a one-way system. However, there is little room for cars to pass others which are stopped to deposit materials into the bulky skips, which could lead to queues forming very quickly at busy periods.

8.0 Recommendations

The operational review identified a range of actions that can be taken by CBCC improve operational and financial efficiency, and potentially increase recycling rates. These comprise:

1. **Short-term actions** that could be implemented relatively quickly.
2. **Strategic and policy actions** that, if appropriate, could be implemented in the short to medium term.
3. **Longer-term actions** that will require detailed assessment and capital investment but could provide long term benefits and may be critical in addressing long term needs and constraints.

These recommendations are discussed in the separate sections below.

8.1 Short-term actions

Overall, it is recommended that CCBC continue to segregate as much recyclable waste onsite as possible to reduce reliance on sorting of residual waste by Bryn Recycling and generate further savings. Improving onsite segregation should also help to 'future proof' CBCC's HWRC recycling performance, should existing outlets for materials change unexpectedly. To enable this, the following actions could be implemented in the short-term:

1. **Staff training and supervision** to remind staff to segregate recyclable waste and the link between lower residual waste arisings and cost savings.
2. **Reduce number of residual skips** to encourage visitors (and site operatives) to recycle more.
3. **Improve site security.** Explore options for a trial with a security firm to improve security with a view to recovering income lost through theft and vandalism.
4. **Improve traffic management and skip organisation** to speed-up the time required to dispose of waste and recyclables to reduce the amount of time site visitors are on site to mitigate congestion.

8.2 Strategic and policy actions

The review identified a number of strategic opportunities for developing HWRC-related and increasing efficiency and recycling at the sites:

1. **Introduce front-end sort on a long-term trial basis**, including:
    a. Implementing front end sort all sites.
    b. Reviewing alternative markets for recyclables and residual waste to maximise revenues and minimise costs, and introducing further segregation of recyclables when onsite sorting is embedded practice.
    c. Maintaining a watching brief on the views of Bryn Recycling to assess the likelihood of Bryn Recycling increasing the general waste gate fee and ensure that CCBC is able to respond to such a change, potentially by contracting elsewhere.

2. **Review HWRC opening hours**, including**:**

    a. Considering closing all sites two days per week, Rhymney could be closed three days per week.

    b. Considering summer and winter hours.

    c. Mitigating the impact of the above by increasing opening hours on weekends, when the sites are busiest.

3. **Implement controls on the use of HWRCs to reduce cross-border use and abuse by traders**, including:

    a. Maintaining a watching brief on changes within neighbouring authorities to ensure CCBC sites do not receive further cross border inputs,

    b. Considering introducing a reasonable usage policy.

    c. Assess the post costs and benefits of implementing an ANPR system to support any controls on site usage.

4. **Consider introducing a 'black bag policy' to restrict or ban the deposit of black bag waste at HWRCs**. Applying this type of policy will need to be done carefully. In particular, the following issues need to be considered:

    a. A black bag ban would be more straight forward for site operatives than onsite sorting. The design of the policy needs to take account of the likely impacts on black bag practice and the resources available at HWRCs to supervise or sort black bag waste.

    b. The importance of consulting with residents about their use of the sites, in particular when and why they bring black bag waste to site.

    c. Expand communications to ensure residents are aware of the alternative waste services (kerbside recycling and residual, bring sites etc) to minimise black bag waste arisings at the HWRC and mitigate any potentially negative side effects of introducing a policy change.

8.3 Long term actions

The need for redevelopment of existing HWRCs and overall network rationalisation are two key issues identified by previous studies undertaken by Resource Futures and WRAP for CBCC. The findings of this operational review confirm the need for CBCC to consider these issues carefully and invest in infrastructure so as to increase site capacity and efficiency. Rationalisation of the network is also likely to be needed to reduce costs and improve overall network efficiency. To summarise, CBCC should give careful consideration to:

1. **Redevelopment of sites**: Expansion and redevelopment of sites would help to improve onsite operations.

2. **Site Rationalisation:** A reduction in the size of the network would require redevelopment of sites, construction of a new site, for example at Trehir and reconsideration about how sites operate.

These issues are considered in more detail in *WRAP CCCP100-052 CCBC HWRC Blank Sheet Review, July 2017*.

Appendix 1: Setting up reuse

Setting Up Reuse

Reuse operations can target bicycles, WEEE, textiles, furniture, books, CDs and DVDs, bric-a-brac and other housewares if the shop/container is large enough. It is suggested that for the first year or so, CCBC should focus on setting up a simple, small scale system, whereby easily targetable reuse items can be dropped off and stored. Focusing on bric-a-brac and other housewares will ensure items such as textiles and WEEE remain available for recycling and reuse through existing contracts and agreements. However, if involving a third sector partner, their preferences, and the types of items received and intercepted by site staff will influence what is collected. A re-use trial was previously undertaken at Penallta, but due to staffing levels at that time it was not considered a viable option.

As the activity grows, new categories can be added. Large furniture could be included if there is enough storage space, if a partner wants them and if the items are very good quality and have fire safety labels (for soft furniture). Larger items are more difficult to sell because site visitors may not be able, or willing to take large items in their car if the car is small or dirty from transporting other wastes to the HWRC. Small electricals could be included if PAT testing and basic function testing can take place.

Ideally, site users will be able to park directly outside the reuse area to drop off donations and in the case of a shop, whilst browsing and purchasing. If there is insufficient parking outside the building, the council should ensure there is appropriate traffic markings (e.g. pedestrian crossings) to allow safe access to the shop from the site. However, with a new site, this can be included in the design from the outset. Other considerations are to place the reuse shop before the entrance to the HWRC or before the ramp up to skips, so the site as a whole follows the waste hierarchy approach and shop visitors can visit without accessing the HWRC itself.

Within an onsite shop, CCBC and its partner should prioritise retail, over storage and repair. The shop should mimic a high-street retail experience if possible and be well lit, products should be clean and attractively displayed, prices clearly visible, with friendly and available staff and stock rotated regularly (many customers will be repeat customers).

There are examples of HWRC reuse facilities with significant repair and refurbishment operations but they do not necessarily generate more income or reuse a higher number of items/ tonnage. It does however require significantly more management and both staff and volunteers or trainees need specific skills.

Estimated Amounts of Reuse Collected

Reuse tonnages achieved at HWRCs varies greatly. However, WRAP research suggests that 1% of total site throughput can be reused. However there is a range of factors that influence reuse activity, such as:

- type of items targeted;
- opening hours of the reuse facility;
- staff interaction with site users;
- number of site users;
- promotion of the facility; and
- ease of access (e.g. parking).

For a container/reuse drop off area that focusses on bric-a-brac it is assumed that the items would have been deposited in residual waste. However, as reuse grows, reusable items will be diverted from both residual waste and recyclable waste streams. However, there is not usually a negative impact on recycling rates because the presence of a reuse shop appears to encourage behaviour change and therefore more items are recycled as well as reused, meaning the overall site recycling rate increases.

Income and Costs

Containers/reuse drop off areas do not generate as much income as shops. Some arrangements may result in no additional income to the authority but there are examples of councils receiving around £150 per tonne of income. Running costs are very low as existing staff and infrastructure could be utilised (especially in off-peak times) and therefore even at a low or no income, the cost of reuse is low or covered by residual waste savings.

However, shops cover their running costs and larger shops can generate substantial tonnage and profit returns. Reuse income per tonne is variable but, in general, larger shops achieve a higher income per tonne (c. £874) than smaller shops (c. £366). Items are often sold for c.50 pence up to a few pounds. Prices are low to sell items quickly and free up space for incoming goods and to reflect the location (many people still view a HWRC as a waste tip or dump), and shop set-up (quality of building, layout, display etc.).

It is possible that there will be a loss of income from recycling if items are diverted for reuse. However, as previously acknowledged, this could be replaced with more recycling, and the tonnage diverted is relatively small that most councils willingly accept this.

Final report

Household Waste Recycling Centre Blank Sheet Review for Caerphilly County Borough Council

A report detailing the findings of a WRAP Collaborative Change Project to conduct a blank sheet review of the Caerphilly HWRC network for Caerphilly County Borough Council

Project code: CCP100-052
Research date: May 2017 **Date:** July 2017

WRAP's vision is a world in which resources are used sustainably.

Our mission is to accelerate the move to a sustainable resource-efficient economy through re-inventing how we design, produce and sell products; re-thinking how we use and consume products; and re-defining what is possible through re-use and recycling.

Find out more at www.wrapcymru.org.uk

Document reference: [WRAP, 2017, Caerphilly, A Review of Caerphilly County Borough Council Waste Transfer Stations and Household Waste Recycling Centres, Prepared by Resource Futures

Written by: Emma Clarke, Laura Snoulton, Poppy Jacobs, Pete Wills, Dave Lerpiniere and James O'Neill (Fehily Timoney and Co)

Front cover photography: Penmaen HWRC

Executive summary

Introduction

The WRAP Collaborative Change Programme (CCP) provided support to Caerphilly County Borough Council (CCBC) in 2016 and 2017 to review its Waste Transfer Station (WTS) and Household Waste and Recycling Centre (HWRC) operations. The overall aim of the support was to identify options for making the operations more efficient, whilst maintaining a high recycling rate and providing a good quality service to residents.

As part of this support Resource Futures conducted several studies in 2016: a review of existing waste transfer station capacity, an initial review of current HWRC operations; and a study of the potential to implement 'front-end sort' of residual waste suitable for recycling at HWRCs. Full details of these studies can be found in the associated reports provided to WRAP and CCBC:

- Waste transfer station review (competed in April 2016)
- Initial review of HWRC operations (completed in July 2016)
- Estimate of improvement of front end recycling (completed in July 2016).

Following on from these studies, Resource Futures was commissioned in 2017 to undertake a more detailed 'blank sheet' review of HWRC provision in Caerphilly to assess options for rationalising the HWRC network. The review comprised:

1. **Spatial and waste flow analysis** to assess potential locations, and the required capacity, of HWRCs based on population distribution.
2. **An assessment of redevelopment requirements and associated capital costs** for existing sites HWRCs and potential new HWRCs.
3. **An analysis of operational costs** and savings, associated with implementing a reduced network, including the potential to generate savings by increasing recycling of materials at HWRCs and reducing residual waste disposal costs.

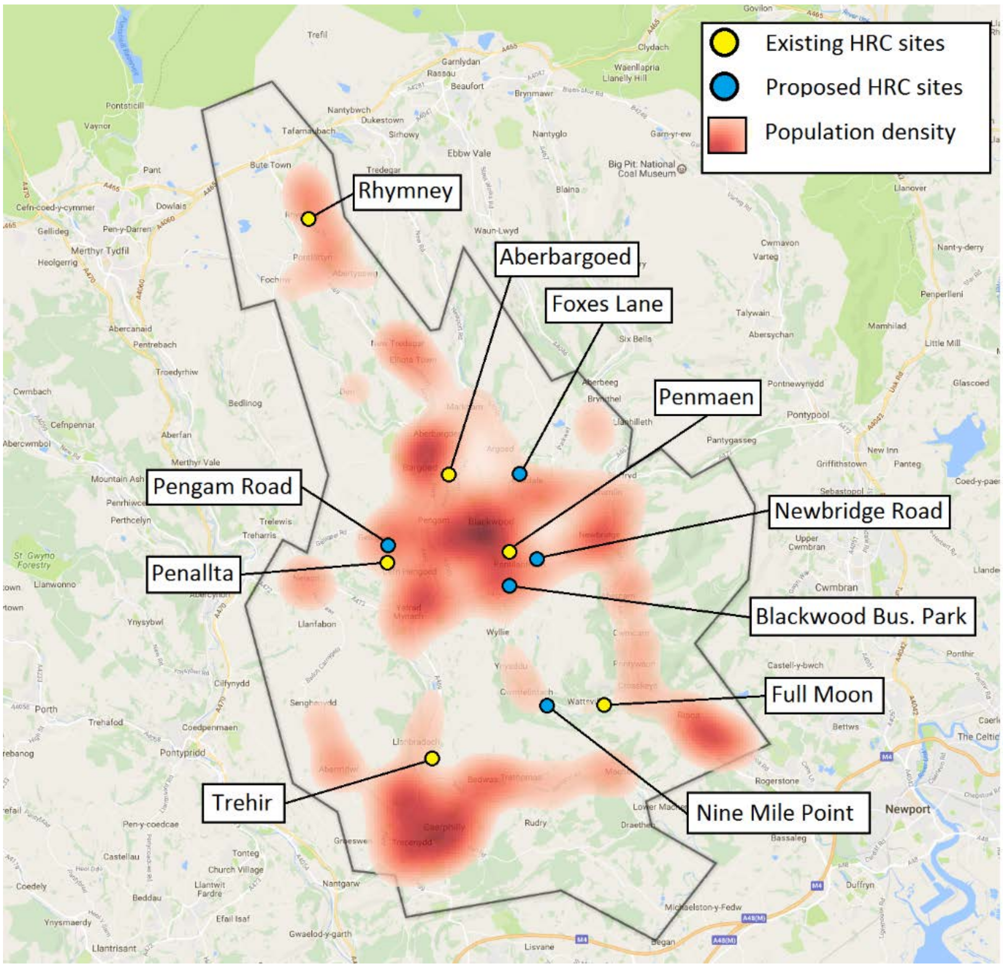
As agreed with CCBC and WRAP, the review assessed seven potential scenarios, each comprising a different configuration of three HWRC sites. The scenarios are summarised below. The site locations are illustrated on Figure E1.

- Scenario 1: Retaining Aberbargoed, relocating Trehir and operating a new site at Newbridge Road, near Sainsburys.
- Scenario 2: Retaining Aberbargoed site and operating new sites at Blackwood Business Park and Nine Mile Point.
- Scenario 3a: Retaining Penallta and relocating Trehir site and operating a new site at Newbridge Road, near Sainsburys.
- Scenario 3b: Relocating Trehir site and operating new sites at Newbridge Road, near Sainsburys and Pengam Road (old Scandinavi site).
- Scenario 4: Operating three new sites at Oakdale Business Park, Blackwood Business Park and Nine Mile Point.
- Scenario 5: Retaining Aberbargoed, Penmaen and Trehir sites.
- Scenario 6: Retaining Full Moon, Penallta and Trehir sites.
- Scenario 7: Aberbargoed, Full Moon and Trehir.

A detailed review of operations at each of the HWRCs was also undertaken in parallel to this blank sheet review to assess opportunities for increasing the efficiency and effectiveness of

HWRC operations (for more details see *report CCP100-052 CCBC HWRC Operational Review, July 2017*).

Figure E1: Existing and Potential HWRC Locations in Caerphilly



Spatial and waste flow analysis

In line with WRAP HWRC guidance, it is suggested to reduce the network from six sites to three. There is no ideal solution to reducing CCBC's network due to a range of constraints including site availability, the Borough's geography, road networks, political and public acceptability and operational limitations. However, rationalisation of the network to three HWRCs should be operationally feasible in service provision terms.

Spatial analysis indicates that several configurations of three sites could provide reasonable coverage for Caerphilly's residents; Scenarios 1, 5 and 7 (see Table E1). Of these three options, Scenario 5 or 7 are preferable to Scenario 1 in the respect that they avoid the need to obtain a new site. If Full Moon HWRC were to close in order to provide additional WTS capacity, then Scenario 5, comprising HWRCs at Aberbargoed, Penmaen and Trehir, is the most suitable of these three scenarios in spatial coverage terms.

Table E1: Summary of Spatial Analysis of HWRC Provision

Cumulative drive time		Equitability of coverage		Combined rank	
Rank	Scenario	Rank	Scenario	Rank	Scenario
1	Scenario 7	1	Scenario 1	**1**	Scenario 1
2	Scenario 5	2	Scenario 5	**1**	Scenario 5
3	Scenario 1	3	Scenario 7	**1**	Scenario 7
4	Scenario 6	3	Scenario 3b	**4**	Scenario 3b
5	Scenario 3a	5	Scenario 3a	**5**	Scenario 6
5	Scenario 3b	5	Scenario 6	**6**	Scenario 3a
6	Scenario 2	7	Scenario 4	**7**	Scenario 2
7	Scenario 4	8	Scenario 2	**7**	Scenario 4

Clearly, the tonnage throughput will also increase at each individual HWRC site if there are only three, rather than the current six, within the network. To accommodate these increases, existing sites will need to be redeveloped to provide the necessary additional capacity. Operational improvements are also likely to be needed to increase the efficiency of operations so that sites are able to handle larger quantities of all materials and numbers of visitors. Operational improvements are considered in a separate report (CCP100-052 CCBC HWRC Operational Review, July 2017).

Development costs

As all three sites would be expected to receive an increase in tonnage, any existing sites included in a Scenario, will need to be re-engineered. All proposed new sites will need to be constructed from the design stage onwards. The table below summarises the total estimated capital costs for each modelled scenario and indicates the relative ranking of each scenario in terms of total estimated capital cost.

Table E2: Summary of Estimated Capital Costs for Development of New and existing HWRCs

Scenario	TOTAL	Rank
Scenario 1	£2,544,811	6
Scenario 2	£1,804,158	1
Scenario 3a	£2,729,541	7
Scenario 3b	£3,181,528	8
Scenario 4	£2,440,875	4
Scenario 5	£2,042,592	3
Scenario 6	£2,201,720	4
Scenario 7	£2,016,990	2

Operational costs

Analysis of operational costs indicates that reducing the network to three sites should generate some operational costs savings. This is primarily achieved through realising reductions in staff costs, but also potentially through reductions in residual waste disposal and recycling costs, achieved by improving recycling through the introduction of a front-end sort approach at the HWRCs. The table below summarises the estimated cost savings based on an assessment of staff costs, non-staff costs and waste disposal and recycling costs.

Table E3: Summary of Estimated Operational Costs

Scenario	Total operational costs1	Total estimated saving2	Rank
Current service	£2,564,009	-	-
Scenario 1	£2,080,419	£483,590	8
Scenario 2	£2,065,640	£498,367	7
Scenario 3a	£2,047,366	£516,642	5
Scenario 3b	£2,015,904	£548,104	2
Scenario 4	£2,031,542	£532,466	3
Scenario 5	£2,041,004	£523,004	4
Scenario 6	£2,014,745	£549,263	1
Scenario 7	£2,071,489	£492,519	6

Note 1: Operational costs include staff costs, non-staff costs and waste disposal and recycling costs.
Note 2: Saving compared to current operational costs.

Conclusions and recommendations

Overall, assessment of spatial issues, and capital and operational costs indicates that providing equal distribution of HWRC capacity across the Brough with three HWRCs will be very challenging.

Table E4 summarises the combined relative performance of each scenario against spatial analysis, capital cost and operational cost issues. The ranks of each of these factors have been summed and then ranked a second time to show how the scenarios compare when all three aspects are combined. The overall results suggest that Scenario 5 (comprising HWRCs at Aberbargoed, Penmaen and Trehir) ranks highest against these issues, followed by Scenarios 6 and 7 (Full Moon, Penallta and Trehir or Aberbargoed, Full Moon and Trehir respectively).

Rather than establish a network of three equally sized sites, it may be more feasible in practical terms to develop one large ‘super site’ which can accommodate a proportionately larger tonnage, accepts a wide range of materials and maximises segregation of recyclables. This site could then be supported by two smaller ‘satellite sites’ that are operated differently, for example as zero waste sites or excluding certain materials that require more space to manage (e.g. rubble).

If CCBC decides to continue with this approach to rationalisation, further assessment will be needed to assess its feasibility. This will need to include more detailed assessment and design work to confirm the feasibility of constructing a new HWRC at Trehir, the acquisition of the site at Aberbargoed and redevelopment of the Penmaen site.

Regardless of whether HWRC site rationalisation progresses, we would recommend that a range of operational and policy improvement measures are implemented to increase efficiency of HWRC operations. Please see the separate HWRC Operational Review report for more details.

Table E4: Summary of Overall Ranking of Scenarios

Scenario	Rank				
	Spatial analysis	Operational costs	Development costs	Sum	Overall rank
Scenario 1	1	8	6	21	7
Scenario 2	7	7	1	17	4
Scenario 3a	6	5	7	24	8
Scenario 3b	4	2	8	18	6
Scenario 4	7	3	4	17	4
Scenario 5	1	4	3	11	1
Scenario 6	5	1	4	15	2
Scenario 7	1	6	2	15	2

Note: Please note that the overall ranking presented above is provided for illustrative purposes only. Overall, a balanced judgment will need to be made by CCBC, taking into account the trade-off between different aspects of different site configurations and also in view of wider considerations such as kerbside collection changes and requirements to expand the WTS at Full Moon.

Contents

Glossary and acronyms

CCBC	Caerphilly County Borough Council
CCP	WRAP Collaborative Change Programme
HWRC	Household Waste Recycling Centre
NRW	Natural Resources Wales
WTS	Waste Transfer Station

Acknowledgements

Resource Futures wish to acknowledge the input received from Caerphilly County Borough Council.

1.0 Introduction

The WRAP Collaborative Change Programme (CCP) provided support to Caerphilly County Borough Council (CCBC) in 2016 and 2017 in a review of its Waste Transfer Station (WTS) and Household Waste and Recycling Centre (HWRC) operations. The overall aim of the support was to identify options for making the operations more efficient, whilst maintaining a high recycling rate and providing a good quality service to residents.

In 2016 Resource Futures completed several studies to assist CCBC:

1. Waste transfer station review (competed in April 2016)
2. Initial review of HWRC operations (completed in July 2016)
3. Estimate of improvement of front end recycling (completed in July 2016)

Full details of these studies can be found in the associated reports provided to WRAP and CCBC. A summary of the previous studies can be found in Section 2.0.

In summary, these studies recommended that Full Moon become the primary WTS for CCBC and, to accommodate this, the HWRC at Full Moon would need to close. Closure would impact upon the remaining sites, in terms of increased throughput and visitor numbers. It was also identified the need to improve the operational and financial efficiency of the network, potentially through relocating and reducing the number of HWRCs.

Resource Futures was commissioned to undertake a ‘blank sheet’ review to assess options for reducing the number of HWRCs by closing some sites, redeveloping others and potentially developing new HWRCs. The study comprised:

1. **Spatial analysis** of existing and potential new HWRCs to identify the ‘ideal’ location of HWRCs in the borough based on population distribution (see Section 3.0).

2. **Assessment of waste flows** to consider the impacts of changes in site provision on site throughput (see Section 4.0).

3. **Identifying and assessing potential new sites** in terms of civil works and costs associated with developing new sites (see Section 5.0)

4. **Assessment of development costs** for existing and potential new sites. This included assessing the need for civil works and costs associated with developing new sites and for enhancing existing sites so that they are able to accept greater quantities of waste (see Section 5.0)

5. **Assessment of operational costs** to consider the costs associated with HWRC operations for different scenarios and consider potential costs savings that might be achieved by operating a smaller network of HWRCs (see Section 6.0)

Overall conclusions and recommendations are presented in Sections 7.0 and 8.0 respectively.

A detailed review of operations at each of the HWRCs was also undertaken in parallel to this blank sheet review. The operational review considered opportunities for increasing the efficiency and effectiveness of HWRC operations, and the potential to segregate recyclables at the point of reception. The operational review is documented in a separate study (CCP100-052 CCBC HWRC Operational Review, July 2017).

2.0 Background

2.1 Statutory duties and guidelines for HWRCs

2.1.1 Statutory duties

All local authorities in Wales have the duty to provide "places" for residents to deposit household waste in its area as set out in section 51 of the Environmental Protection Act 1990, summarised below in Table 1. A glossary of terms is included in Appendix 1 for information:

Table 1: Summary of legislation for providing "places" for residents to deposit household waste

s51 Environmental Protection Act 1990
It shall be the duty of each waste disposal authority to arrange— (a) for the disposal of the controlled waste collected in its area by the waste collection authorities; and (b) for places to be provided at which persons resident in its area may deposit their household waste and for the disposal of waste so deposited; (2) The arrangements made by a waste disposal authority under subsection (1)(b) above shall be such as to secure that— (a) each place is situated either within the area of the authority or so as to be reasonably accessible to persons resident in its area; (b) each place is available for the deposit of waste at all reasonable times (including at least one period on the Saturday or following day of each week except a week in which the Saturday is 25th December or 1st January); (c) each place is available for the deposit of waste free of charge by persons resident in the area; but the arrangements may restrict the availability of specified places to specified descriptions of waste. (3) A waste disposal authority may include in arrangements made under subsection (1)(b) above arrangements for the places provided for its area for the deposit of household waste free of charge by residents in its area to be available for the deposit of household or other controlled waste by other persons on such terms as to payment (if any) as the authority determines.

These "places" (Household Waste Recycling Centres (HWRCs)) for residents to deposit household waste, must be available for deposit of household waste free of charge, although not all wastes have to be accepted at all sites. Other wastes can be accepted (household waste from non-residents or non-householders, or non-household wastes (commercial)) and it is permitted for charges to be levied for the disposal of these wastes. All waste accepted is 'controlled waste', which is defined in section 75 of the Environmental Protection Act 1990 (EPA 1990) and through the Controlled Waste (England and Wales) Regulations 2012, although it will depend on the site permit as to what types and how much waste they can accept.

The EPA1990 does not mention the number of facilities needed for an authority to fulfil its statutory duty. An authority may decide that one facility satisfies that duty, whereas other authorities may consider that they require more sites.

2.1.2 National guidelines

In 2016 WRAP updated its Household Waste Recycling Centre guidance document. This guide is intended to assist local authorities on managing efficient and effective HWRC services to improve performance and meet or exceed the ever-higher standards required of them by the public and by law. The guide includes examples of good practice, an overview of relevant legislation and evidence-based approaches to assessing and improving HWRC performance. Research shows that recycling rates can be improved if:

- the range of materials that are targeted at HWRCs is widened;
- there is good kerbside dry-recycling coverage in the local area;
- the HWRC material provision matches the kerbside situation; and
- there is good public awareness of waste and recycling services available in the area.

As stated above, the legislation does not specify how many sites an authority should provide and therefore to help local authorities determine what is reasonable, the WRAP guidance includes the following guidelines, with current CCBC provision identified alongside:

WRAP Guidelines	CCBC HWRC provision
Maximum catchment for a large proportion of the population of 3-5 miles (7 in very rural areas)	Catchment area of 2.4 miles
Maximum driving times for the great majority of residents in good traffic conditions of twenty minutes (30 in very rural areas)	All residents can reach a site within a 15-minute drive (90% can reach a site within 10 minutes) in normal traffic
Maximum number of inhabitants per HWRC of 120,000	The population 180,000[1], therefore there is one site for 30,000 inhabitants
Maximum number of households per HWRC of 50,000	No. households is currently 76,950 therefore there is one site for 12,825 households

2.2 Current operations

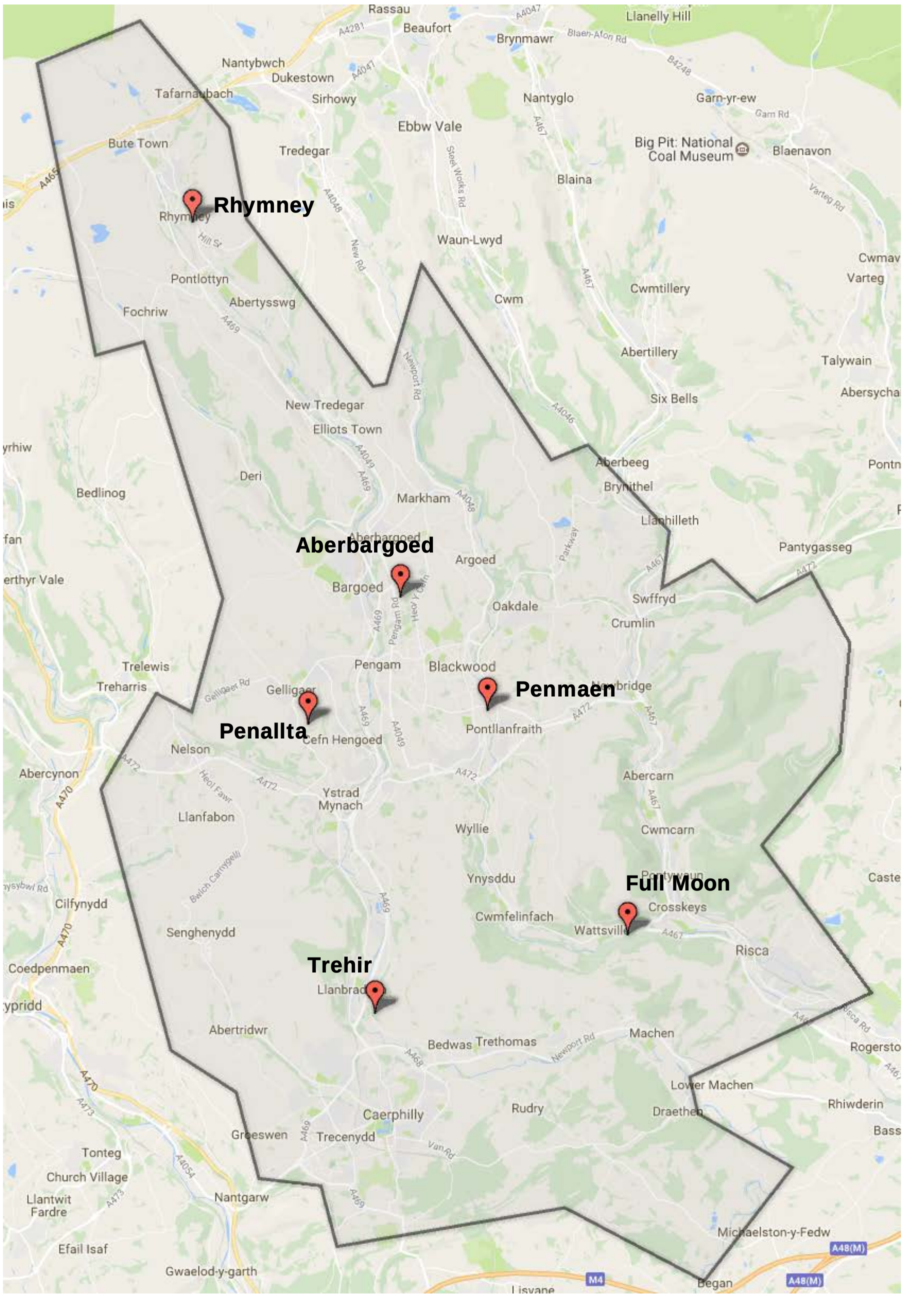
CCBC currently has six HWRCs (see Figure 1):

- Aberbargoed
- Full Moon
- Penalta
- Penmaen
- Trehir
- Rhymney

The Full Moon site also serves as CCBC's Waste Transfer Station for the onward transfer of materials for recycling, treatment or disposal.

Figure 1: Current HWRC configuration in CCBC

[1] *mid-year estimate (2014) stated in the CCBC Corporate Plan 2015/16*



In 2016/17, the network handled 28,296 tonnes of waste of which nearly 25,000 tonnes (88%) was recycled[2]. Trehir and Penmaen handle the largest throughputs (21.3% and 19.3% respectively) with Rhymney accounting for only 8.4% of the total network throughput. Full Moon currently accounts for around 18% of the network, and Aberbargoed and Penalta account for ~16.5% each.

Table 2 shows the throughput, tonnes recycled and the recycling rate per site. Currently the sites segregate green waste, wood, scrap metal, hardcore and cardboard as well as all categories of WEEE, oil and plasterboard (recorded as miscellaneous in Table 2). All residual waste is sent to Bryn Recycling where it is sorted and recyclable waste extracted.

[2] *Figures based on 2016/17 unaudited waste data provided by CCBC*

Table 2: CCBC HWRC tonnage throughputs and recycling performance

	Aberbargoed	Full Moon	Penallta	Penmaen	Trehir	Rhymney	All sites
Residual	2,511.5	2,611.7	2,263.5	2,704.6	3,301.1	1,324.6	14,716.9
Green	285.1	329.1	344.2	483.9	422.8	96.2	1,961.3
Wood	723.2	810.1	750.9	830.2	1,005.4	312.1	4,432.0
Scrap	128.4	165.0	81.3	155.0	106.2	46.0	681.8
Hardcore	751.4	818.6	955.4	1,039.1	984.2	433.6	4,982.2
C'board	42.6	41.1	26.5	42.1	41.7	0.0	194.0
Misc *	282.0	256.0	257.9	202.2	171.8	157.3	1,327.3
Total	**4,724.2**	**5,031.5**	**4,679.8**	**5,457.0**	**6,033.2**	**2,369.8**	**28,295.5**
Tot rec	4,146.6	4,430.8	4,159.2	4,835.0	5,274.0	2,065.2	24,910.7
Throughput as % of network	16.7%	17.8%	16.5%	19.3%	21.3%	8.4%	100%

*WEEE, mineral oil and plasterboard

Currently, Bryn Recycling reports a recycling performance of 77% with a further 7% sent to energy from waste. This significantly boosts CCBC's HWRC recycling rate. Table 3 compares the on-site recycling rate (which is approximately 50% of throughput) with the overall recycling rate, which includes Bryn Recycling's secondary sort of the remaining materials.

Table 3: Summary of site throughput and recycling performance

Site	16/17 throughput (tonnes)	Recycling performance	
		On-site	Including Bryn
Aberbargoed	4,724	46.8%	87.8%
Full Moon	5,032	48.1%	88.1%
Penallta	4,680	51.6%	88.9%
Penmaen	5,457	50.4%	88.6%
Trehir	6,033	45.3%	87.4%
Rhymney	2,370	44.1%	87.1%

Secondary sorting from HWRCs is not common place, although it was previously used by Rhonndda Cynon Taf County Borough Council (RCT). It is one method of ensuring that recycling is maximised with only a small amount left for ultimate disposal. However, the cost of managing waste in this way is high.

CCBC is currently within an extension period of the current residual secondary sorting contract with Bryn Recycling, which expires in March 2018. At the end of this period, CCBC has the option to extend for a maximum of one year, or find an alternative disposal route. Any significant change in the amount of waste sent to Bryn Recycling may affect the contract price per tonne. CCBC will then need to consider the financial and recycling rate impacts that may occur. This issue is considered further in the study *CCP100-052 CCBC HWRC Operational Review, July 2017.*

2.3 WTS options appraisal

2.3.1 Introduction

CCBC is considering whether to implement a new kerbside collection service in 2022/23. Options under consideration are 'twin stream' collection and Welsh Government's 'Collections Blueprint' (as defined in the Municipal Sector Plan, Part 1, 2011) as well as 'no change'. Regardless of whether the kerbside service is to change, there are some improvements required to ensure that CCBC's WTS at Full Moon is fit for purpose for the next five years. The WTS is relatively small for current requirements. The waste throughput is kept moving by using multiple loading shovels and by double shifting haulage vehicles.

To consider options for ensuring that CCBC's WTS capacity is sufficient, in April 2016 Resource Futures conducted an options appraisal of the Council's waste transfer operations, and considered options for either up-grading the WTS at Full Moon or relocating waste transfer operations to another site. This section summarises the findings of the WTS options appraisal. Full details of the options appraisal are available in a separate report (*WRAP, 2016, Caerphilly HWRC Review)*.

2.3.2 Options appraisal approach

The options appraisal considered three sites for use as CCBC's WTS: Trehir HWRC, the DS Smith site at Bedwas and Full Moon WTS/HWRC. Three other sites were initially considered during the study (Penallta, Ty Dyffryn and Bryn Recycling) but were excluded from the final analysis for various reasons, for example location, lack of council ownership, or preferential use of the site for alternative uses. Separate options for ‘twin stream’ and ‘Collections Blueprint’ kerbside collections were also considered, and the Trehir twin stream was divided into two options[3], making a total of seven options that were appraised.

The options appraisal used a range of criteria to assess the relative pros and cons of different sites. A weighting system was used to reflect the relative importance of different criteria. The civil engineering works and associated capital costs that would be required to develop or up-grade each site were also considered.

2.3.3 Options appraisal findings

The results of the options appraisal indicated that Full Moon is the most appropriate site for a waste transfer station. Whilst a more central site may be preferable, the fact that it is an existing waste site, requiring relatively little civil engineering, and owned by CCBC, make it the most attractive option.

Either twin stream or Collections Blueprint kerbside recycling collection systems could be accommodated at Full Moon provided that it is substantially improved and extended, although it is likely to be necessary for collection vehicles to be parked at the Tir y Berth depot overnight.

2.3.4 WTS requirements until 2022/23

Any change to kerbside collection services is not expected to take effect until 2022/23. Full Moon waste transfer station is expected to need upgrading before this time, in order to process the volume of waste it currently accepts. Also, if CCBC agree a ‘no change’ kerbside collection service in the long-term, the WTS will require expansion to the same extent as considered above.

Estimated capital costs for an additional transfer shed on the opposite side of the existing dry recycling shed have been provided in Appendix 4. It is estimated that this would cost in the region of £427,897 for a waste transfer building of 450m2. This would be suitable for operations in the short term and would future-proof CCBC waste transfer facilities if there is ‘no change’ to kerbside collections from 2022/23. This would also enable the Full Moon HWRC to remain open.

2.4 HWRC review

2.4.1 Introduction

An initial review of the current HWRC network suggested there are more sites than are needed to fulfil CCBC’s statutory duty, and the level of provision also goes beyond WRAP guidelines, which include that HWRC provision has:

- maximum catchment radii of three miles in urban areas and seven miles in rural areas covering the great majority of residents;

- maximum driving times to a site for the great majority of residents of 20 minutes in urban areas, and 30 minutes in rural areas; though preferably less than this by the order of 10 minutes in each case; and

---

[3] *In Option A, recycling and residual waste transfer is co-located and in Option B, residual waste remains at Full Moon and recycling is managed at a Trehir WTS.*

- at least one site per 143,750 residents, with a maximum throughput for any site of 17,250 tonnes per annum.

The initial review also concurred with a Wales Audit Office report which suggested that CCBC should consider the rationalisation of its HWRC provision.

As a first step in understanding options for rationalising CCBC's HWRC network, Resource Futures conducted an initial review of CCBC's HWRC provision and operations. This section summarises the findings of the review. Full details of the review can be found in a separate report (*WRAP, 2016, Caerphilly HWRC Review*).

2.4.2 Review approach

Three scenarios were modelled spatially to identify the optimum number and location of HWRCs in Caerphilly. Waste flow modelling was also used to assess the likely impacts of diverting the current tonnage from the closed sites to each of the remaining HWRCs in each scenario. Whilst three sites would be sufficient to meet CCBC's statutory duty as well as meet WRAP guidelines, it would be a significant reduction in provision compared to the current six sites therefore a more generous provision of four sites was considered under the initial review.

Three scenarios, each comprising four sites, including the construction of a new site in the east of the authority, were assessed. Each of the three scenarios included the closure of the Full Moon HWRC, which would allow for the proposed expansion of the WTS (see above). In addition, each scenario also involved the closure of Penmaen HWRC because it is geographically located close to two other HWRC sites (Aberbargoed and Penallta) and is a site that cannot be further developed. The closure of the Penmaen and Full Moon HWRCs would result in additional tonnage, site users and traffic being diverted to the remaining sites and therefore two of the three scenarios were modelled to include the construction of a new site in the lower eastern valley to alleviate this additional pressure from the remaining HWRC sites. Civil engineering consultancy Fehily Timoney & Company (a subcontractor to Resource Futures) estimated costs to develop a new site at these two locations. One of these scenarios also included the closure of Rhymney HWRC because it is the closest site for only 6% of households in the county and receives the lowest tonnage.

2.4.3 Review findings

Overall, the review indicated that the scenario involving Aberbargoed, Penallta, Trehir and new site at Eastern Valley would provide the most comprehensive HWRC network for residents, and the most efficient service provision for CCBC. In this scenario, creation of a new site would help to limit the impact for residents that previously favoured Full Moon and Penmaen.

Following the findings of this initial HWRC review, CCBC requested a more extensive assessment of HWRC provision that considered a wider series of options for redeveloping existing sites and developing new sites. This 'blank sheet' review is described in the remaining sections of this report.

The initial HWRC review also identified that existing sites would not be able to manage the expected increase in tonnage throughputs or visitor numbers, and so would require operational improvements as well as potential redevelopment. These operational issues are considered in a separate report (*CCP100-052 CCBC HWRC Operational Review, July 2017).*

3.0 Spatial Analysis

3.1 Approach

The spatial analysis comprised the following key steps:

1. Identification of potential alternative sites in CCBC for new HWRCs.
2. Plotting of sites and population data using a Geographical Information System (GIS).
3. Calculation of travel times for CCBC residents to each HWRC.
4. Scenario modelling to consider the population coverage provided by different combinations of HWRCs.

Potential new sites for HWRCs were identified by visiting Caerphilly in May 2017 with a CCBC officer. The site identification process involved visiting local industrial estates, business parks and other premises that were available for redevelopment (as identified by the CCBC officer). Sites were assessed visually for suitability and local estate agents were contacted to obtain further details of sites that were on sale (see below). However, please note that further work will be needed to determine the availability, suitability and cost of these sites.

Using the population map and the existing and potential alternative locations for HWRCs, several scenarios were modelled to assess the different drive times for residents for different combinations of sites. As agreed with CCBC and WRAP, each scenario was based on a network of three strategic HWRC sites. This was considered to represent an appropriate level of provision given the geography of the borough, CCBC's statutory duty to provide appropriate HWRC access for residents, the need to reduce overall HWRC operational costs, and WRAP guidance on the optimum number of HWRC's per resident.

The spatial assessment was based on current postcode data held by CCBC[4]. In total 76,950 households were included in the analysis. The household and HWRC location data were combined and a matrix of distances and driving times were produced. Driving times were then calculated using the current road network, not 'as the crow flies' estimates. All calculations assumed that residents are likely to visit their closest site within CCBC as determined by driving distance. However, it is important to recognise that there are a number of factors that influence which site a resident might use, including waiting times, range of materials to recycle, layout and feel of the site, site staff, etc.

3.2 Alternative sites

The review of alternative sites identified six potential locations, details of which are provided in Table 4. These sites are marked in blue in Figure 2. Existing sites are marked in red.

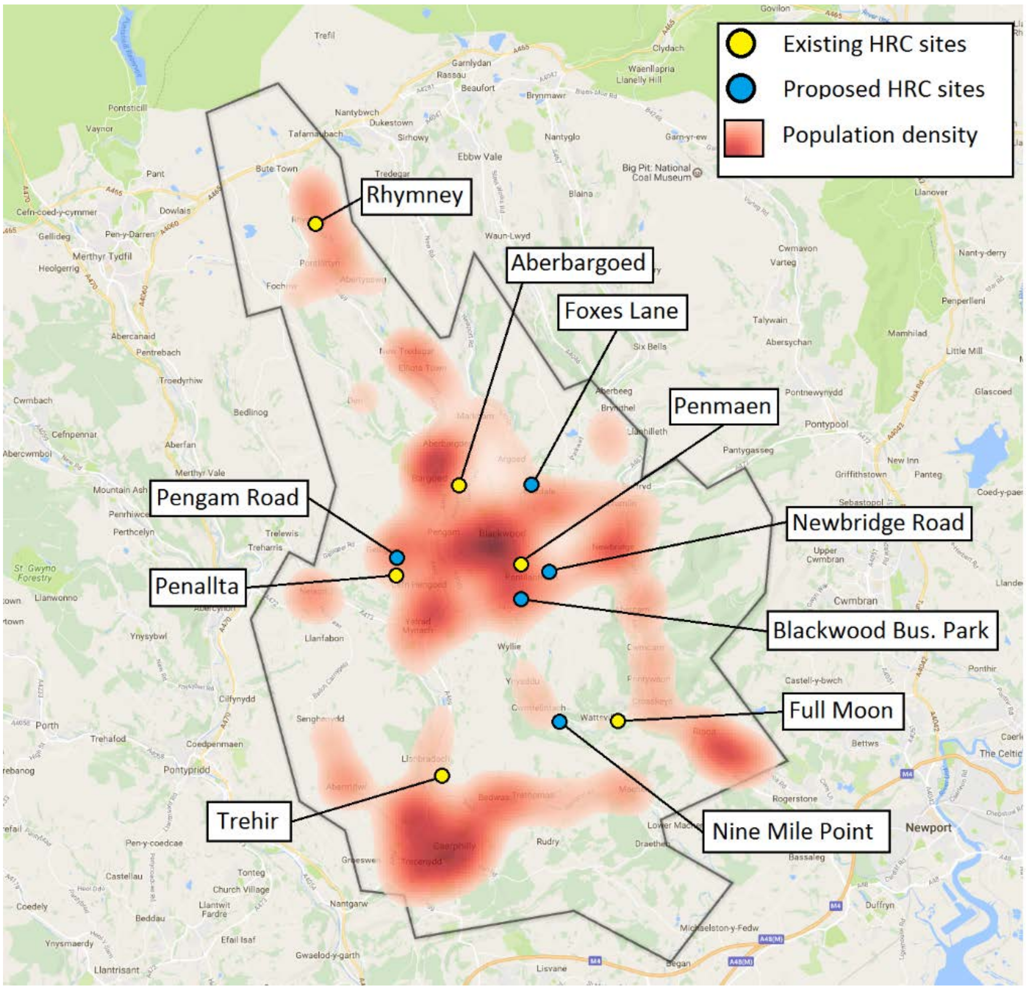
---

[4] *The original dataset comprised 3,821 postcodes, equating to 76,972 households. Of all the postcodes, three were not included within the spatial assessment as they were not recognised by the GIS software. This equated 22 households, or 0.03% of the total number of households.*

Table 4: Status of potential sites, mid-May 2017

Potential site	Postcode	Agent	Size (acres)	Cost	Comments
Oakdale Business Park	NP12 4AB	Owned by CCBC	3.4 to 30.2	Owned by CCBC	More prestigious business park with office blocks and only light industrial units. Unlikely to be suitable as a waste site.
Newbridge Road (near Sainsburys at Blackwood)	NP12 2AN	Savills	11.5	Unknown	Estate agent is currently in the process of negotiating a land promotion agreement with a property company.
Blackwood Business Park (near Gryphonn and Hawker Siddeley Switchgear)	NP12 2XH	Cushman and Wakefield/DTZ		N/A	The estate agent is no longer appointed on the site. They think there is no vacant accommodation there now.
Pengam Road (Old Scandinavi site)	CF82 7SS	JLL	2.98	£1.85 million for freehold	Still available
Nine Mile Point	NP11 7HZ	Alder King / F1 real estate management	0.59	£85,000/year rent	Unit 5 has been sold. Unit 7 available to let from August 2017 (0.25 acres, £36,000 per year)
Pantglas Industrial Estate (old DS Smith site)	CF83 8DR	Cusman and Wakefield	4.22	£575,000	The old DS Smith site, this is currently under offer with a buyer.

Figure 2: Existing and potential HWRC sites and population density in CCBC



To assess the current status of these sites, Resource Futures contacted the relevant agent to identify availability and price. Unfortunately, many of sites thought to be available are no longer on the market, and in the case of Nine Mile Industrial Estate, it is only available for rent, not purchase (see Table 4). This therefore limits the scenarios that are viable and suggests that scenarios reliant on one or more new build are not as feasible.

3.3 Scenarios

Seven scenarios were developed in discussion with CCBC and WRAP to consider different potential combinations of new and existing sites. Table 5 summarises the scenarios that were modelled as part of the spatial analysis. In summary:

- Scenarios 1 and 2 used the population density map to identify the two scenarios that offer the best HWRC coverage based on the distribution of the Borough's population.
- Scenario 3 is a scenario which excludes Aberbargoed because this site is leased by CCBC (it may be preferable for CCBC to own all assets so as to provide long-term security). Scenario 3 is split into 3a and 3b because of the location of the site in the west of the authority: 3a uses the existing Penallta site, while 3b uses an alternative site at Pengam Road, but for travel distance modelling purposes, the scenario is the same because the locations are so close. In Scenario 3a, Penallta HWRC could be substituted with Penmaen HWRC to provide a site in the eastern valley.
- Scenario 4 involves constructing three new purpose-built sites.
- Scenario 5 is the opposite of Scenario 4, using current CCBC assets only.
- Scenarios 6 and 7 assume that Full Moon and Trehir HWRCs will remain open and that either Penallta or Aberbargoed will provide a facility for residents in the north of the county.

Table 5: Sites included within each scenario

	Scenario								
	Current	1	2	3a	3b	4	5	6	7
Aberbargoed	x	x	x				x		x
Full Moon	x							x	x
Penallta	x			x				x	
Penmaen	x						x		
Trehir	x	x		x	x		x	x	x
Rhymney	x	Always closes							
Oakdale Business Park						x			
Newbridge Road, nr Sainsburys		x		x	x				
Blackwood Bus. Park, nr Gryphonn			x			x			
Pengam Road (old Scandinavi site)					x				
Nine Mile Point			x			x			

Note: new sites in *italics*.

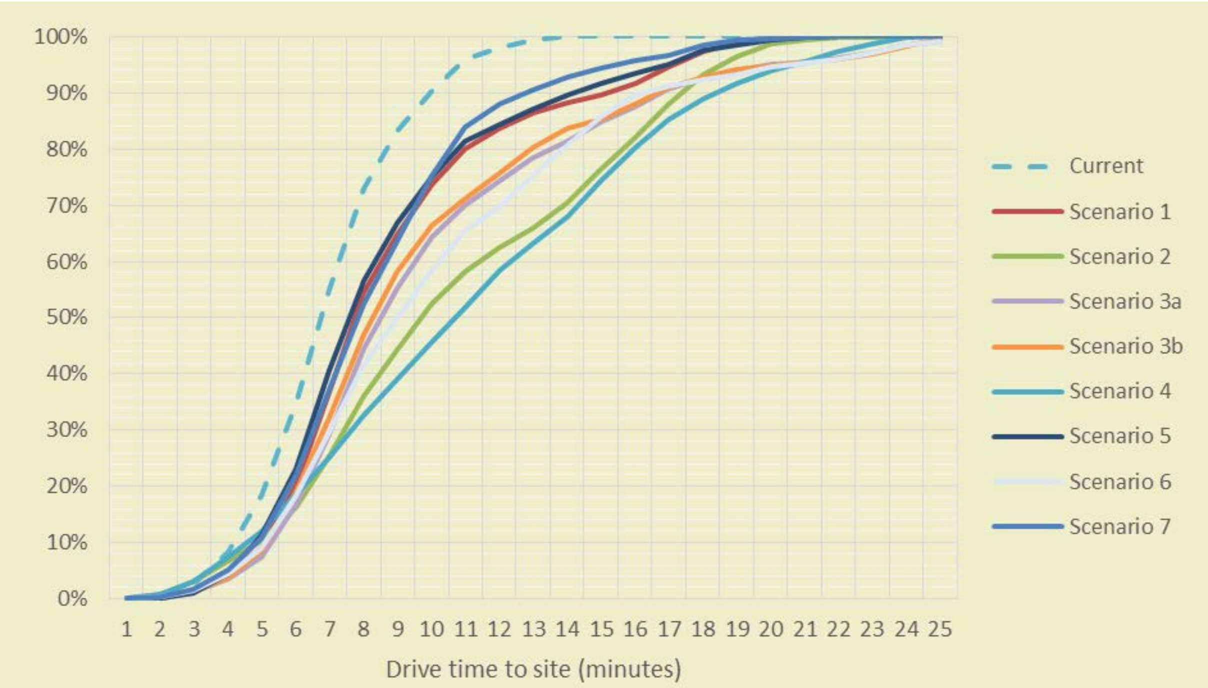
It is important to recognise that there are challenges associated with all potential scenarios. There is no perfect solution due to constraints posed by site availability, the Borough's geography, road networks, political and public acceptability and operational limitations. For example, there are two valleys in the county with relatively poor cross valley road links between east and west given the current volume of traffic. There will also be significant house building in the county in future that will also affect traffic flows and population distribution.

The range of scenarios assessed during the blank sheet review attempted to address these issues as far as possible by considered a range of different options. Also, any change to the HWRC network will also need to be undertaken alongside operational improvements and policy changes in order to provide an effective HWRC service for Caerphilly's residents.

3.4 Results

Figure 3 presents the results of the spatial drive-time analysis. The data as a cumulative curve, whereby the proportion of the population served is plotted with each minute driving time from their closest site. The scenario with the left-most cumulative percentage offers the best provision to households and the right-most the least preferable, in terms of drive time. Note that the analysis does not account for road works or areas of peak-time congestion.

Figure 3: Cumulative drive time for HWRC scenarios



As would be expected from the relatively large number of HWRCs in the borough, the current situation offers the best provision. Scenarios 7, 5 and 1 provide the next best level of coverage. Scenarios 3a, 3b and 6 offer a similar provision, while scenario 2 and 4 offer the least provision.

Table 6 summarises the results in terms of drive time banding. Scenario 1 and 7 offer all properties less than a 20-minute drive to their nearest HWRC, while Scenario 2 and 5 offer 99% of properties less than a 20-minute drive. Scenarios 3a, 3b and 6 offer a very similar provision, with 95% of households under 20 minutes from their nearest HWRC, followed by Scenario 4 with 94% of households within 20 minutes.

Scenarios 5, 7 and 1 provide the largest proportion of households with an HWRC less than 10 minutes' drive away, with 75%, 75% and 74% respectively. Scenarios 3a, 3b and 6 offer a similar provision, with 64%, 66% and 58% of households under 10 minutes from their nearest HWRC, respectively. Scenarios 4 and 2 offer the smallest proportion of households with under a 10-minute drive to their nearest site, with 46% and 52% respectively.

Table 6: Proportion of households in each of the drive time bands for each scenario

Scenario	Proportion of Households				
	Less than 5 minutes	5 to 10 minutes	10 to 15 minutes	15 to 20 minutes	More than 20 minutes
	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
Current	18%	72%	10%	0%	0%
Scenario 1	9%	65%	16%	10%	0%
Scenario 2	10%	42%	24%	22%	1%
Scenario 3a	7%	57%	21%	10%	5%
Scenario 3b	8%	58%	19%	10%	5%
Scenario 4	12%	34%	29%	19%	6%
Scenario 5	11%	64%	16%	8%	1%
Scenario 6	9%	49%	27%	9%	5%
Scenario 7	11%	65%	19%	5%	0%

The drive time analysis provides an indication of which site should be most convenient for householders with the calculations based on the existing road network. However, the facilities offered by each site will also have a bearing on the sites to which people take their waste and recycling, as well as convenience and preference. Table 7 summarises the proportion of households closest to a site in each scenario. Scenarios 1, 5 and 7 offer the most even spread between the three sites.

Table 7: Proportion of households closest to each site in each scenario

Site	Scenario								
	Current	1	2	3a	3b	4	5	6	7
Aberbargoed	18%	27%	25%				26%		32%
Full Moon	15%							32%	26%
Penallta	2%			11%				12%	
Penmaen	21%						34%		
Trehir	38%	40%		43%	36%		40%	56%	42%
Rhymney	6%								
Oakdale Business Pk						27%			
Newbridge Road		33%		46%	42%				
Blackwood Bus. Pk			61%			60%			
Pengam Road					22%				
Nine Mile Point			13%			13%			

Note: new sites in *italics*.

3.5

3.6 Findings

Table 8 presents a ranking of scenarios based on a combination of cumulative drive time data and equitability of coverage across the county.

Table 8: Combined assessment of site

Cumulative drive time		Equitability of coverage		Combined rank		
Rank	Scenario	Rank	Scenario	Rank	Scenario	Sites
1	Scenario 7	1	Scenario 1	**1**	Scenario 1	• Aberbargoed • Trehir • New site at Newbridge Road
2	Scenario 5	2	Scenario 5	**1**	Scenario 5	• Aberbargoed • Penmaen • Trehir
3	Scenario 1	3	Scenario 7	**1**	Scenario 7	• Aberbargoed • Full Moon • Trehir
4	Scenario 6	3	Scenario 3b	**4**	Scenario 3b	• Trehir • New site at Newbridge Road New site at Pengam Road
5	Scenario 3a	5	Scenario 3a	**5**	Scenario 6	• Full Moon • Penallta • Trehir
5	Scenario 3b	5	Scenario 6	**6**	Scenario 3a	• Penallta • Trehir • New site at Newbridge Road
6	Scenario 2	7	Scenario 4	**7**	Scenario 2	• Aberbargoed • New site at Blackwood Business Park • New site at Nine Mile Point
7	Scenario 4	8	Scenario 2	**7**	Scenario 4	• New site at Oakdale Business Park • New site at Blackwood Business Park • New site at Nine Mile Point

The combined analysis indicates that Scenario 1 (Aberbargoed, Trehir and a new site at Newbridge Road), Scenario 5 (Aberbargoed, Trehir and Penmaen) and Scenario 7 (Aberbargoed, Full Moon and Trehir) offer the best coverage both in terms of drive time and distribution within the authority (i.e. the number of households closest to each site is most equitable).

Note that this analysis does not consider operational practicability and political acceptability of the scenarios. In selecting a preferred network, it will be important to consider the other factors that affect the site that residents chose to use (e.g. ease of access, range of materials recycled, etc). For example, the spatial modelling indicates that the Penallta site is currently the closest site for only 2% of Caerphilly households. However, annual tonnage figures suggest that this site handles around 17% of the total throughput of the network. This high figure of waste generation in comparison to the number of households nearby suggests that either more householders are preferring to travel further than their closest site to reach Penallta HWRC and, or that cross-border use from a neighbouring authority might be a problem and is contributing to increased tonnages being received.

4.0 Waste flows

4.1 Approach

This section presents an assessment of the changes of tonnage that may result from alternations in the number of HWRCs. Clearly, if the number of HWRC sites reduces then the remaining sites will have to be able to cope with additional site users and their associated waste materials. Existing sites may need to be redeveloped to cope with additional tonnage and new sites will have to be designed with sufficient capacity.

The change in HWRC tonnage under each scenario was estimated using the average amount of waste within the network (in terms of kg/hh/yr) combined with the number of households assumed to be using each HWRC. The number of households using each HWRC under each scenario was based on the spatial analysis results (see above) and assumes that each household will use the HWRC that it is closest to in terms of drive time. The analysis was based on 2016/17 tonnage data provided by CCBC (see Table 9).

Table 9: Tonnage throughput in 2016/17 at each of the existing HWRC sites

Site name	Tonnes recycled p/a	Tonnes disposed p/a	Total tonnage p/a	Proportion of network tonnage p/a	Recycling performance p/a
Aberbargoed	4,147	578	4,724	16.7%	87.8%
Full Moon	4,431	601	5,032	17.8%	88.1%
Penallta	4,159	521	4,680	16.5%	88.9%
Penmaen	4,835	622	5,457	19.3%	88.6%
Trehir	5,274	759	6,033	21.3%	87.4%
Rhymney	2,065	305	2,370	8.4%	87.1%
Total	**24,911**	**3,385**	**28,296**	**100%**	**88.0%**

Data from WRAP's HWRC national directory suggests that when one or more sites close, tonnages decrease within the network. Whilst it is likely that waste arisings will reduce when the size of the network is reduced (potentially due to the exclusion of cross border waste), this is not always the case. A smaller network is likely to have at least one large site allowing for acceptance of a wider variety of wastes and be easier and quicker for residents to use. This could therefore encourage residents to visit more frequently and counter any reduction in cross border inputs. For these reasons, it is assumed that there will be no change to the overall throughput of CCBC's HWRCs.

Note that this waste flows analysis does not take into account other factors that may affect the tonnage received at each site (e.g. the range of materials accepted or householder preference for a specific site) but serves to provide an initial assessment of potential changes in tonnage and the implications that this may have on site capacity. Operational issues associated with changes in tonnage are considered in the separate HWRC operational review report (*CCP100-052 CCBC HWRC Operational Review, July 2017).*

4.2 Results

The average waste recycled and disposed of at HWRCs was calculated as 368kg per household per year in 2016/17. This value was combined with the estimated number of households using each site under each scenario to estimate the tonnage at each site. Table 10 details the estimated quantities of waste expected at each site for each scenario.

Table 10: Modelled impact on tonnage throughputs at each site by scenario

Site		Current	Scenario 1	Scenario 2	Scenario 3a	Scenario 3b	Scenario 4	Scenario 5	Scenario 6	Scenario 7
Aberbargoed	Tonnes	4,724	7,588	7,189				7,283		8,973
	% change	-	61%	52%				54%		90%
Full Moon	Tonnes	5,032							9,058	7,447
	% change	-							80%	48%
Penallta	Tonnes	4,680			3,169				3,376	
	% change	-			-32%				-28%	
Penmaen	Tonnes	5,457						9,654		
	% change	-						77%		
Trehir	Tonnes	6,033	11,335		12,107	10,147		11,359	15,862	11,876
	% change	-	88%		101%	68%		88%	163%	97%
Rhymney	Tonnes	2,370								
	% change	-								
Foxes Lane	Tonnes (t)						7,691			
Newbridge Road			9,372		13,020	11,834				
Blackwood Bus. Park				17,401			16,897			
Pengam Road						6,315				
Nine Mile Point				3,706			3,707			

Note: New sites in *italics*.

In Scenario 1, following the closure of the Full Moon, Penallta, Penmaen and Rhymney sites, the Aberbargoed site throughput would increase by 61%, to around 7,500 tonnes per year. The Trehir site would see an 88% increase in annual tonnage to just over 11,000 tonnes per year. It is worth noting that the National Resources Wales (NRW) permitted tonnage is far higher than the tonnages currently collected per site and the estimated increases. Therefore additional throughput will be permitted by NRW at each site.

In scenario 2, the closure of the Full Moon, Penallta, Penmaen, Trehir and Rhymney sites, and opening of two new HWRCs at Blackwood Business Park and Nine Mile Point, means that site throughput at the Aberbargoed site would increase by 52%, to just over 7,100 tonnes per year. The addition of two new sites to the network would mean that the tonnage increase to the Aberbargoed site would be similar to scenario 1.

In scenario 3a, the Penallta site is expected to receive less tonnage than currently, with an estimated annual tonnage decrease of 32% following closure of the Aberbargoed, Full Moon, Penmaen and Rhymney sites. It is estimated that the Trehir site would have a substantial 100% increase in annual tonnage throughput. The proposed Newbridge Road site is expected to have just over a 13,000 tonnes throughput per year.

In scenario 3b, the Trehir site is expected to receive an increase of 68% in total tonnage throughput than currently, following the closure of the Aberbargoed, Full Moon, Penallta, Penmaen and Rhymney HWRC sites. The proposed sites at Newbridge Road and Pengam Road are estimated to have a tonnage throughput of just under 12,000 and just over 6,000 tonnes per year respectively.

In scenario 4, the closure of all existing HWRC sites would mean that the three proposed new sites at Foxes Lane, Blackwood Business Park and Nine Mile Point receive an annual tonnage throughput of just over 7,500 tonnes, and just under 17,000 and 4,000 tonnes per year respectively.

In scenario 5, the closure of the Full Moon, Penallta and Rhymney sites would see overall tonnages substantially increasing at the remaining Aberbargoed, Penmaen and Trehir sites - by 54%, 77% and 88% respectively.

In scenarios 1, 3a, 3b and 5, the Trehir site would potentially need to be able to handle up to an additional 100% increase in tonnage. In Scenarios 1, 2 and 5, the Aberbargoed site would need to be able to handle an increase in annual tonnage of between 52% and 61%. This could mean that significant expansion or redevelopment of these sites is required.

4.3 Findings

Table 11 summarises the estimated changes in tonnage at each site. For the majority of scenarios, all existing sites are expected to receive an increase in quantities of waste. This is simply the result of the same quantity of waste being taken to a smaller number of HWRCs. The exception is Penallta which is expected to receive a lower tonnage of waste under scenarios 3a and 6. This is because under scenario 3a a greater quantity of waste is diverted to a hypothetical new site at Newbridge Road and under scenario 6 the majority of waste is assumed to be taken to Full Moon and Trehir.

Table 11: Summary of estimated changes in tonnage at each existing HWRC

Site	Estimated minimum increase	Estimated maximum increase
Aberbargoed	54%	90%
Full Moon	48%	80%
Penallta	-32%	-28%
Penmaen	77%	
Trehir	68%	163%
Rhymney	-	-

To accommodate the general, and in some cases very significant large, increases in the tonnage received at each HWRCs under a reduced network existing, sites will require both redevelopment and operational changes. Additional containers and more frequent collection of skips will be required. Accordingly, traffic flow will substantially increase at, to and from these sites, and new traffic management plans will be necessary. Additional staff would be required on the sites in a rationalised network to maintain the quality of recycling and separation of materials (please also see Section 6.0). Furthermore, a number of operational and policy changes are likely to be needed to accommodate the significant increases in total annual tonnages. Please refer to HWRC Operational study for a detailed assessment of these issues (*CCP100-052 CCBC HWRC Operational Review, July 2017*).

The distribution of waste within the network has been used to estimate the operational costs and engineering works, and associated and capital expenditure, that would be required to develop a network that is fit for purpose (see Section 5.0).

5.0 Development Costs

5.1 Introduction

As highlighted above, to manage the same throughput of waste in a smaller network, the remaining sites will require redevelopment to improve operational efficiency and reduce the amount of time visitors spend on time to mitigate congestion. This section presents an assessment of redevelopment options and associated costs for existing sites and an estimate of development costs for a generic new HWRC site.

The assessment was undertaken by Fehily Timoney & Company (FTC). FTC visited sites in May 2017 and discussed redevelopment and operational requirements with Resource Futures to develop conceptual designs and estimate development costs. The estimated costs were based on recent construction projects in the region. Note that actual costs may vary depending on the specific requirements of the redesign, market prices at the time of tendering and inflation. The conceptual designs for redevelopment, associated implementation plans and detailed costs are included in Appendix 2.

The conceptual designs for redevelopment assume that operational improvements to increase the efficiency of site operations will be implemented by CCBC as part of a wider rationalisation programme. Please see the separate HWRC Operational Review report for further details of suggested operational improvements (ref: *WRAP, July 2017, CCP100-052 CCBC HWRC Operational Review)*.

5.2 Development Requirements

Table 12 summarises the improvements the key issues at each of the existing sites that need to be addressed by redevelopment and indicates redevelopment needs.

The requirements for each site have been considered in the context of the wider network. For example, were it to form part of a reduced network, the Trehir site would be expected to receive significant increases in waste inputs due to its strategic location in the south of Caerphilly. To accommodate this, replacing the existing site with an entirely new site would be advantageous as it means an HWRC can be constructed with a larger footprint, incorporating adequate queuing and passing lanes and the ability to accept a wider range of recyclable materials. A 'supersite' such as this would be supported by the smaller satellite sites that could become zero waste sites, or exclude certain materials (e.g. rubble) to ensure that site visitors are able to flow through the site more quickly.

Some of the redevelopment suggested will also have implications on other services, for example, if Aberbargoed HWRC is to expand into the area currently occupied by Building Services, the current activities will need to be relocated. These considerations would need to be considered in more detail once a preferred scenario is identified and work commences on transition support, to include for example more comprehensive site redesign and costings, relocation of other CCBC services and survey work. As there are implications on other waste and CCBC services, CCBC officers and Members will need to agree the priorities and subsequently work to make the scenario work in practice.

Table 12: HWRC Site Redevelopment Requirements

HWRC site	Comments	Improvements needed	Redesign features
Aberbargoed	The site would struggle to cope with significant additional tonnage in its current design. Expansion would be required to accommodate more skips. There is land available to the north of the site (currently occupied by CCBC Building Services) which could be used to expand the site. To utilise this area this function will need relocating.	Reduce problem of queuing and congestion at peak times by addressing traffic flow: provision for greater queuing on-site, a clearly marked passing lane and marked bays. Additional skips to enable greater segregation of more materials, or used for existing wastes, e.g. small domestic appliances collected in a skip.	• Retention of the existing site; • Extension of site into yard area to north; • Relocation of entrance; • Extension of retained area by excavation around existing area; • Relocation of all small items storage to new northern yard; • Additional five-six skips accessible from raised level.
Penmaen	The site would struggle to cope with significant additional tonnage in its current design. Redevelopment is possible but expansion is not. Congestion is already a significant problem resulting in complaints from local residents. Redevelopment at Penmaen would help to mitigate current congestion but if retaining Penmaen in a smaller HWRC network, significant policy/ operational changes will be required to reduce the impact.	Reverse the traffic flow, expand the upper level with a retained wall to allow space for additional skips. Relocate small recyclable containers to the upper level. Consider operating as a zero waste site and exclude residual waste, or remove another recyclable material from site, such as rubble or wood, i.e. recyclables that are often large and heavy and take visitors longer to dispose of.	• Retention of the exiting site; • Relocation of entrance; • Extension of existing retained area; • Relocation of all small items storage; • Additional five/six skips accessible from raised level.
Trehir	Access to the site uses the Bailey Bridge which needs significant maintenance, approximately £10,000 per annum, which is likely to increase as the bridge ages. Bridge replacement expected to be in the region of £1-1.5 million. The (second-hand) bridge was	Expansion towards the neighbouring landfill site would allow a separate entrance and exit and another row of containers which would enable the site to cope with higher inputs.	• Development of additional HWRC area to rear of site; • Lengthening of exiting ramped area to provide five to six additional skip location;

HWRC site	Comments	Improvements needed	Redesign features
	originally installed in the mid 1980's and at that time had an estimated life of 10 – 15 years). Primarily for this reason, the HWRC would struggle to cope with increased use.		• Pavement improvement and upgrade works to existing site.
Penallta	This site could be expanded into an area currently occupied by CCBC Grounds Maintenance and space used more efficiently whilst taking account of current operational decisions such as small WEEE containers are sited on the amp for security and health and safety reasons.	Switching the entrance/exit may be beneficial, as the loop at the end of the road could be used to hold traffic. Add a clearly marked passing lane and marked spaces would help to improve traffic flow. Additional containment for greater segregation of recyclables	• Retention of the exiting site; • Extension of site into existing council owned yard area to north; • Relocation of entrance; • Extension of existing retained area by excavation around existing area; • Relocation of all small items storage to new northern yard; • Additional five/six skips accessible from raised level.
Full Moon	The HWRC shares the site with the Waste Transfer Station. Any redesign would need to take into account the additional vehicle movements for the WTS.	Additional containment for greater segregation of recyclables	• Retention of the existing site • Construction of an additional retained area • Additional five skips accessible from raised level. • Relocation of small recyclable containers.
Rhymney	Not assessed as site is expected to close in all scenarios modelled.		Not applicable

The Trehir option presented has assumed a retained area of 1,000 m2 with the projected construction costs of this fixed area alone calculated at approximately £396,000.

If a modular approach (approx. £725/m2) were to be adopted the projected increase in cost would be in the region of £330,000 - £350,000.

It should be noted that a modular approach atop an existing landfill may be more susceptible to the following:

- Differential settlement due to anticipated ground movements
- Possible risk of Landfill gas migration into enclosed spaces beneath the retained area

All structural and pavement designs would be required to account for this possibility.

5.3 Assessment of Development Costs

Table 13 summarises the civil engineering works required to deliver the design concepts and HWRC improvements detailed in Appendix 3. It includes estimated redevelopment costs for existing sites and a cost estimate for developing a generic, new HWRC site. This generic site development cost is illustrative to show CCBC what the capital costs are likely to be, if an alternative site could be found. Two estimates of capital costs are provided for Trehir: the first is for redeveloping the existing site and a second for relocating the site to the area before the bridge.

Table 13: Estimated development costs for existing and new HWRC

HWRC	Civil Engineering works suggested	Estimated cost
Aberbargoed	• Construction of an enlarged retained split level HWRC area; • Development of rear access yard; • Replacement of pavements; and • Other ancillary works.	£176,908
Full Moon	• Construction of an additional retained area • Local pavement improvements; and • Other ancillary works.	£285,804
Penallta	• Construction of enlarged retained upper level area; • Development of rear access yard; • Relocation of small item containers and welfare facilities; • Replacement of pavements; and • Other ancillary works.	£361,638
Penmaen	• Construction of enlarged retained upper level area; • Relocation of small item containers and welfare facilities; • Replacement of pavements; and • Relocation of entrance way and associated works • Other ancillary works.	£311,406
Trehir redevelopment	• Construction of additional HWRC area to rear of site; • Construction of additional retained area to provide additional skip locations; • Pavement improvement and upgrade works.	£258,910
HWRC	**Civil Engineering works suggested**	**Estimated cost**
Trehir relocation	• Increase in overall facility size in line with neighbouring	£1,554,278

	facilities (5,000m2); • Increase in retained area for maximum service provision; • Allowance for permanent welfare building; • Allowance for permanent onsite waste storage/maintenance building.	
Generic new site	• retained area for maximum service provision; • Allowance for permanent welfare building; • Allowance for permanent onsite waste storage/maintenance building.	£813,625

The capital cost estimates do not include land purchase and VAT and exclude inflation/deflation. This preliminary cost estimate does not purport to guess potential tender submissions in current and future market conditions. Pricing is based primarily on concept designs for the site, no detailed designs have been completed and FTC has used approximations of rates for similar works items where possible and has used engineering judgement to estimate rates & sums where similar rates are not available. Management of Hazardous Materials (existing building) and possible local ground conditions has not been allowed for but contingency has been included.

Cardiff City Council and Pembrokeshire County Council have both recently constructed new HWRCs. A brief comparison of their plans and costs has been undertaken and is included in Appendix 6.

5.4 Comparison of Scenarios

Table 14 summarises the estimate total redevelopment and development costs for each scenario. Each scenario has been ranked in terms of estimated total capital cost. Note that the cost estimates are indicative only and do not include costs associated with purchasing new sites and ancillary costs (e.g. relocating building services at if Aberbargoed). Scenario 2, is the lowest cost (£1.8M) and Scenario 3b is the highest (£3.1M).

Table 14: Estimated capital costs for each scenario

Scenario	TOTAL	Rank
Scenario 1	£2,544,811	6
Scenario 2	£1,804,158	1
Scenario 3a	£2,729,541	7
Scenario 3b	£3,181,528	8
Scenario 4	£2,440,875	4
Scenario 5	£2,042,592	3
Scenario 6	£2,201,720	4
Scenario 7	£2,016,990	2

6.0 Operational costs

6.1 Approach

Operational cost is a key factor in deciding which scenario is preferable and which changes to introduce. This section presents an assessment of operational costs associated with each scenario. It comprised consideration of the site operative staff costs, non-staff costs and waste disposal costs associated with site operations.

All estimates are based on cost data provided by CCBC. Any inflationary or contractual increases have not been included. By comparing these operational costs with current costs, the potential savings CCBC could potentially achieve were estimated.

6.2 Results

6.2.1 Staff costs

Current staff costs are circa £400,000 for 17 operatives to cover the staff requirements at CCBC's six sites. Annual salary per operative has therefore been calculated as £23,530 including pension and on-costs. As sites are open six days per week and to cover sickness and holiday, it is assumed that 1.55 full time equivalent (FTE) operatives are required to cover the opening times per post. There is no formula within national guidance to identify the number of staff required per site according to waste throughput. In Caerphilly, there are currently two operatives at all sites at all times except Rhymney, where there is only one operative. This equates to approximately one post (i.e. 1.55 FTE) per 3,000 tonnes throughput. These figures have been used to calculate the expected staffing levels required within each scenario.

As discussed in Section 4.0, with some exceptions, the total throughput of each HWRC site in a reduced network is expected to increase. The number of staff required on each of the remaining three sites will need to increase to provide additional resources to manage the greater quantity of materials and visitors, reflecting the increase in tonnages and the changes in their roles and responsibilities, as well as the necessary improvements to be made in terms of site management. Some staff from sites that close are expected to be relocated within the network but, overall it is estimated that there will be surplus staff who would need to be redeployed within the local authority (if vacancies exist).

In addition to general site staff, additional staff will be needed to supervise the front-end sorting and maximise on-site recycling (see above). It is understood that CCBC currently plans to employ two site supervisors to oversee this process for its existing network of six sites. Within a smaller network, it is assumed that one supervisor will be sufficient. The salary costs for this supervisor was estimated at £30,000 including pension and on-costs.

Details of estimated staffing and staffing costs for each scenario are presented in Table 15. The table also shows the current staffing levels and costs for CCBC's HWRCs service.

Table 15: Current and estimated staff numbers and associated costs

Site	Scenario								
	Current	**1**	**2**	**3a**	**3b**	**4**	**5**	**6**	**7**
Aberbargoed	2	3	3				3		3
Full Moon	2							3	2
Penallta	2			1				1	
Penmaen	2						3		
Trehir	2	3.5		4	3		3	4.5	3.5
Rhymney	1								
Oakdale Business Park						2.5			
Newbridge Road, nr Sainsburys		3		4	3.5				
Blackwood Bus. Park, nr Gryphonn			4.5			4.5			
Pengam Road					2				
Nine Mile Point			1			1			
Staffing and Costs									
Total No. staff on site per day	11	9	8	9	9	8	8.5	8.5	9
Total No staff on HWRC payroll	17	14	12	14	13	12	13	13	14
Reduction in staff roles	0	-3	-5	-3	-4	-5	-4	-4	-3
Staff cost	£401,187	£328,244	£291,772	£329,544	£313,839	£291,772	£310,008	£310,707	£327,269
Saving from current		£72,943	£109,415	£71,643	£87,348	£109,415	£91,179	£90,479	£73,917
Supervision for front end sort		£30,000	£30,000	£30,000	£30,000	£30,000	£30,000	£30,000	£30,000
Net saving		£42,943	£79,415	£41,643	£57,348	£79,415	£61,179	£60,479	£43,917
Rank of largest savings		7	1	8	5	1	3	4	6

Note: New sites in *italics*.

6.2.2 Non-staff costs

Non-staff costs include:

- Haulage charges/skips
- Maintenance
- Materials
- NNDR (business rates)
- Other energy costs
- Permits
- Plant and vehicle costs
- Rent
- Security
- Telephone direct charges
- Water (inc. metered)

Some of the above costs are dependent on the tonnage collected and not the number of sites in the network, for example haulage and maintenance and other costs will be site specific. To calculate the non-staff costs per scenario, the cost item has either been redistributed to an HWRC site in proportion to the tonnage it accepts or as an average of existing costs.

Non-staffing operational costs are currently around £380,000[5] for the HWRCs (excluding WTS costs). Using the breakdown of current costs and the anticipated waste throughputs for each new scenario, the anticipated non-staffing operational costs have been calculated, as shown in Table 16.

It is anticipated that operational savings can be made in all scenarios. Estimations for proposed sites are based on averages for all current sites, therefore once the preferred scenario is identified, CCBC will need to review whether operational costs, for example rent or permit costs, will change.

The costs in the table below do not include annualised capital costs but do include rental costs where known (i.e. Aberbargoed). All capital investment is considered in Section 5.2.

[5] Data from CCBC and includes haulage charges and skips, maintenance, materials, NNDR, energy costs, permits, plant and vehicle costs, rent, security, telephone and water costs.

Table 16: Non-staff operational costs

Site	Current service	Scenario 1	Scenario 2	Scenario 3a	Scenario 3b	Scenario 4	Scenario 5	Scenario 6	Scenario 7
Aberbargoed	£91,079	£120,082	£116,288				£117,179		£133,239
Full Moon	£56,554							£90,905	£76,761
Penallta	£58,171			£46,855				£48,736	
Penmaen	£65,084						£83,507		
Trehir	£54,695	£97,869		£103,711	£88,874		£98,050	£132,136	£101,960
Rhymney	£51,874								
Oakdale Business Park						£86,738			
Newbridge Road, nr Sainsburys		£101,964		£134,996	£106,655				
Blackwood Bus. Park, Nr Gryphonn			£174,672			£170,113			
Pengam Road					£74,277				
Nine Mile Point			£50,649			£50,659			
Costs									
Total non-staff costs	**£377,458**	**£319,915**	**£341,608**	**£285,562**	**£269,805**	**£307,510**	**£298,736**	**£271,778**	**£311,960**
Saving from current		**£57,543**	**£35,849**	**£91,896**	**£107,653**	**£69,948**	**£78,722**	**£105,680**	**£65,498**
Rank of largest savings		7	8	3	1	5	4	2	6

Note: New sites in *italics*.

6.2.3 Waste disposal and recycling costs

Disposal costs have been estimated based on an assessment of potential savings associated with the introduction of a 'front-end sort' process which would allow recyclables to be removed when waste is received at HWRCs. For full details of the assessment of the potential to introduce this please see the separate report (*CCBC HWRC Operational Review, July 2017*). In discussion with CCBC, it was assumed that operatives could remove 20% of recyclable material from residual waste, but by reducing the tonnage sent to Bryn Recycling by approximately 3,000 tonnes, Bryn Recycling potentially may increase the cost in the region from £98 to £130 per tonne, although this is an estimate and is not based on existing contractual terms and conditions. It should also be noted that CCBC will have the opportunity to negotiate this cost prior to the existing contract termination. The waste composition is assumed to remain the same as are the gate fees and income per tonne the recyclables currently attract.

There may be a reduction in waste arisings and therefore disposal costs depending on the scenario introduced due to a reduction in cross-border use and strategic policy changes. However, over time, as more homes are built in the Borough, waste inputs will increase. The Local Development Plan indicates that there will be 12,000 new homes constructed over the life of the plan. Over time therefore the pressure on the HWRC network is likely to increase. Factors such as changes in kerbside recycling and residual waste frequency will also affect the site throughput. Gate fees and income generation of materials will also vary over time.

These factors will be the same for all scenarios and are outside the scope of this analysis. Therefore, for the purposes of assessing costs, these factors were considered to be the same for all scenarios. The total network throughput was assumed to remain at 2016/17 levels for all proposed scenarios. Current gate fees and income were also used.

However, in order to provide an indication of the potential costs savings associated with increasing the proportion of materials separated for recycling at HWRC, the potential cost savings of introducing a front-end sort process were estimated. Table 17 presents the estimated costs associated with a 20% reduction in the quantity of waste sent to Bryn Recycling. Cost estimates are shown for residual waste disposal fees of £98 and £130 per tonne. This is to reflect uncertainty of whether Bryn Recycling might increase its per tonne gate fees if the overall quantity is reduced.

The overall saving associated with a 20% reduction in residual waste generated at HWRCs is estimated to be between £334,294 at a cost of £98 and an additional **cost** of £23,659 if residual waste costs are £130 per tonne.

Table 17: Summary of waste disposal and recycling costs[6]

Waste type	2016/17			2017/18		
	Quantity (tonnes)	Cost per tonne	Total cost	Estimated quantity (tonnes)[1]	Estimated total cost (high)	Estimated total cost (low)
General waste	14,717	£98	£1,442,266	11,774	£1,530,620[2]	£1,153,852[4]
Green	1,961	£31	£60,791	2,068	£64,108[3]	
Wood	4,432	£45	£199,440	4,732	£212,940[3]	
Scrap	682	-£65	-£44,330	966	-£62,790[3]	
Hardcore	4,982	£20	£99,640	5,532	£110,640[3]	
Cardboard	194	£45	£8,730	478	£21,510[3]	
Misc *	1,327	£0	£0	1,521	£0[3]	
Weee	1,004	£0	£0	1,178	£0[3]	
Mineral oil	29	£0	£0	29	£0[3]	
Plasterboard	294	£64	£18,816	294	£18,816[3]	
Textiles	-	-£180	£0	436	-£78,480[3]	
Soil	-	£20	£0	121	£2,420[3]	
Paper	-	-£75	£0	258	-£19,350[3]	
Plastics	-	£100	£0	102	£10,200[3]	
Glass	-	-£12	£0	129	-£1,548[3]	
GRAND TOTAL	**28,296**		**£1,785,353**	**28,117**[5]	**£1,809,086**	**£1,432,318**

Note 1: Assuming reduction of 20% through front end sort.
Note 2: Based on a residual waste disposal cost of £130 per tonne.
Note 3: 2016/17 costs/revenues per tonne for recyclable materials applied to estimate total cost by material type.
Note 4: Based on a residual waste disposal cost of £98 per tonne.
Note 5: The slight reduction compared to 2016/17 is as a result of rounding.
Note 6: A uniform 20% increase in recyclable material has been applied across all recyclable material streams, although it is recognised that, in reality, some recyclable materials are more likely to increase by this amount than others.

6.3 Findings

Table 18 summarises the estimated staff, non-staff operational costs and waste disposal costs for each scenario. Ranking the total estimated savings suggests that Scenarios 3b and 6 would have the lowest operational costs.

The scenarios that rank highly in the spatial analysis perform less well in terms of overall financial savings. This in part will be due to the inclusion of rent costs (circa £30,000) for Aberbargoed (increasing the estimated operational costs of Scenarios 1,2, 5 and 7), whereas land purchase and capital costs for sites owned by CCBC are not included.

With regards the waste disposal and recycling costs, the figures included in Table 18 assume that the cost per tonne for general waste sent to Bryn Recycling remains at £98 per tonne. If the cost increases as suggested to £130 per tonne, total waste costs are actually expected to **increase** by circa £23,649. This would significantly affect the financial savings that could be made within the network.

Table 18: Summary of estimated operational costs and savings for each scenario

Cost item	Current service	Scenario 1	Scenario 2	Scenario 3a	Scenario 3b	Scenario 4	Scenario 5	Scenario 6	Scenario 7
Staff costs	£401,187	£328,244	£291,772	£329,544	£313,839	£291,772	£310,008	£310,707	£327,269
Non-staff costs	£377,458	£319,915	£341,608	£285,562	£269,805	£307,510	£298,736	£271,778	£311,960
Waste disposal and recycling costs	£1,785,364	£1,432,260	£1,432,260	£1,432,260	£1,432,260	£1,432,260	£1,432,260	£1,432,260	£1,432,260
Total costs	£2,564,009	£2,080,419	£2,065,640	£2,047,366	£2,015,904	£2,031,542	£2,041,004	£2,014,745	£2,071,489
Estimated savings	-	**£483,590**	**£498,367**	**£516,642**	**£548,104**	**£532,466**	**£523,004**	**£549,263**	**£492,519**
Rank of total savings	-	8	7	5	2	3	4	1	6

7.0 Conclusions

7.1 Spatial and waste flow analysis

With a network of only three HWRCs, the optimum scenarios as indicated by the spatial analysis are Scenarios 1, 5 or 7. These scenarios offer the best coverage both in terms of drive time and distribution within the authority (i.e. the number of households closest to each site is most equitable, minimising the burden on any one site).

Of these three options, Scenario 5 or 7 are preferable to Scenario 1 in the respect that they avoid the need to obtain a new site. This is particularly important given that the site identified for Scenario 1 is currently subject to a land promotion agreement and as such may not be available to CCBC. Table 19 presents a summary of the spatial analysis findings and the combined ranking of each scenario.

Table 19: Summary of spatial analysis results

Cumulative drive time		Equitability of coverage		Combined rank		Sites
Rank	Scenario	Rank	Scenario	Rank	Scenario	
1	Scenario 7	1	Scenario 1	**1**	Scenario 1	• Aberbargoed • Trehir • New site at Newbridge Road
2	Scenario 5	2	Scenario 5	**1**	Scenario 5	• Aberbargoed • Penmaen • Trehir
3	Scenario 1	3	Scenario 7	**1**	Scenario 7	• Aberbargoed • Full Moon • Trehir
4	Scenario 6	3	Scenario 3b	**4**	Scenario 3b	• Trehir • New site at Newbridge Road New site at Pengam Road
5	Scenario 3a	5	Scenario 3a	**5**	Scenario 6	• Full Moon • Penallta • Trehir
5	Scenario 3b	5	Scenario 6	**6**	Scenario 3a	• Penallta • Trehir • New site at Newbridge Road
6	Scenario 2	7	Scenario 4	**7**	Scenario 2	• Aberbargoed • New site at Blackwood Business Park • New site at Nine Mile Point
7	Scenario 4	8	Scenario 2	**7**	Scenario 4	• New site at Oakdale Business Park • New site at Blackwood Business Park • New site at Nine Mile Point

The availability of sites is also a critical issue that needs to be considered on an on-going basis. For example, a land promotion agreement for the land at Newbridge Road, near Sainsburys at Blackwood is currently being negotiated. Therefore, it is unlikely that this site will be available for use as an HWRC in future. This therefore suggests that either Scenario 5 or 7, using existing CCBC sites is most viable.

Clearly, the tonnage throughput will increase at each individual HWRC site if there are only three sites, rather than six, within the network. Table 20 summarises the expected changes in waste tonnage at each site.

Table 20: Summary of waste flow analysis results

Site	Estimated minimum increase	Estimated maximum increase
Aberbargoed	54%	90%
Full Moon	48%	80%
Penallta	-32%	-28%
Penmaen	77%	
Trehir	68%	163%
Rhymney	-	-

To accommodate these increases, existing sites will need to be redeveloped to provide additional capacity (see Section 7.3). Operational changes are also likely to be needed to increase the efficiency of operations are sites are able to handle larger quantities of materials and numbers of visitors. Operational improvements are considered in the separate report (*CCP100-052 CCBC HWRC Operational Review, July 2017*).

7.2 Development costs

Table 21 shows the estimated total development costs for existing and new sites. Two options are included for Trehir, one involving its redevelopment and the other based on its relocation to the area on the other side of the bridge which is currently used to access the site.

Table 21: Summary of development required and estimated capital costs

Site	Civil Engineering works suggested	Estimated cost
Aberbargoed	• Construction of an enlarged retained split level HWRC area; • Development of rear access yard; • Replacement of pavements; and • Other ancillary works.	£176,908
Full Moon	• Construction of an additional retained area • Local pavement improvements; and • Other ancillary works.	£285,804
Penallta	• Construction of enlarged retained upper level area; • Development of rear access yard; • Relocation of small item containers and welfare facilities; • Replacement of pavements; and • Other ancillary works.	£361,638
Penmaen	• Construction of enlarged retained upper level area; • Relocation of small item containers and welfare facilities; • Replacement of pavements; and • Relocation of entrance way and associated works	£311,406

Site	Civil Engineering works suggested	Estimated cost
	• Other ancillary works.	
Trehir redevelopment	• Construction of additional HWRC area to rear of site; • Construction of additional retained area to provide additional skip locations; • Pavement improvement and upgrade works.	£258,910
Trehir relocation	• Increase in overall facility size in line with neighbouring facilities (5,000m2); • Increase in retained area for maximum service provision; • Allowance for permanent welfare building; • Allowance for permanent onsite waste storage/maintenance building.	£1,554,278
Generic new site	• retained area for maximum service provision; • Allowance for permanent welfare building; • Allowance for permanent onsite waste storage/maintenance building.	£813,625

Please note that these capital cost estimates do not include land purchase and VAT and exclude inflation/deflation. These are preliminary cost estimates are not intended to indicate potential tender submissions in current and future market conditions. Pricing is based primarily on concept designs for the site, no detailed designs have been completed and FTC has used approximations of rates for similar works items where possible and has used engineering judgement to estimate rates & sums where similar rates are not available. Management of Hazardous Materials (existing building) and possible local ground conditions has not been allowed for but contingency has been included.

Table 22 summarises the total estimated capital costs for each scenario and indicates that relative ranking of each scenario in terms of total estimated capital cost.

Table 22: Estimated capital costs for each scenario

Scenario	TOTAL	Rank
Scenario 1	£2,544,811	6
Scenario 2	£1,804,158	1
Scenario 3a	£2,729,541	7
Scenario 3b	£3,181,528	8
Scenario 4	£2,440,875	4
Scenario 5	£2,042,592	3
Scenario 6	£2,201,720	4
Scenario 7	£2,016,990	2

Scenario 2, is the lowest cost (£1.8M). This is based on redevelopment of the existing site at Aberbargoed and development of new HWRCs at Blackwood Business Park and Nine Mile Point. Scenario 3b is associated with the highest estimated capital cost (£3.1M) and is based on redevelopment of Trehir (on the other side of the existing bridge) combined with new sites at Newbridge Road and Pengam Road.

Some of the redevelopment suggested will have implications on other services, primarily Grounds Maintenance and Building Services which both occupy land next to existing sites.

These activities will need to be relocated. This would need to be considered in more detail once a preferred scenario is identified and work commences on transition support.

7.3 Operational costs

Table 23 summarises the operational cost analysis. Staffing requirements are expected to reduce by three to five operatives, depending on the scenario that is pursued and this has an impact on the overall operational costs. Non-staff costs are expected to decrease between £36,000 and £108,000 depending on the scenario pursued. Waste costs are not expected to be significantly affected by changes to the size of the network. It was assumed that front end sorting will continue and that operatives will successfully extract 20% of recyclable waste from residual waste. The lowest cost scenario to operate is Scenario 6, followed by Scenario 3b.

Table 23: Summary and ranking of operational costs

Scenario	Total operational costs[1]	Total estimated saving[2]	Rank
Current service	£2,564,009	-	-
Scenario 1	£2,080,419	£483,590	8
Scenario 2	£2,065,640	£498,367	7
Scenario 3a	£2,047,366	£516,642	5
Scenario 3b	£2,015,904	£548,104	2
Scenario 4	£2,031,542	£532,466	3
Scenario 5	£2,041,004	£523,004	4
Scenario 6	£2,014,745	£549,263	1
Scenario 7	£2,071,489	£492,519	6

Note 1: Operational costs include staff costs, non-staff costs and waste disposal and recycling costs.
Note 2: Saving compared to current operational costs.

7.4 Comparison of Scenarios

The table below summarises the combined relative performance of each scenario against spatial analysis, capital cost and operational cost issues. The ranks of each of these factors have been summed and then ranked a second time to show how the scenarios compare when all three aspects are combined. The results suggest that Scenario 5 (comprising HWRCs at Aberbargoed, Penmaen and Trehir) ranks highest against these issues, followed by Scenarios 6 and 7 (Full Moon, Penallta and Trehir or Aberbargoed, Full Moon and Trehir respectively).

Please note that the overall ranking presented below is provided for illustrative purposes only. A balanced judgment will need to be made by CCBC, taking into account the trade-off between different aspects of different site configurations and also considering other waste management service changes such as kerbside collection changes and requirements to expand the WTS at Full Moon.

Overall, assessment of spatial issues, and capital and operational costs indicates that providing equal distribution of HWRC capacity across the Brough with three HWRCs will be very challenging due to a range of constraints including site availability, the Borough’s geography, political and public acceptability and operational limitations.

Rather than establish a network of three equally sized sites, it may be more feasible in practical terms to develop one large 'super site' which can accommodate a proportionately larger tonnage, and accepts a wide range of materials and maximises segregation of recyclables. This site could then supported by two smaller 'satellite sites' that are operated differently, for example as zero waste sites or excluding certain materials that require more space to manage (e.g. rubble).

Table 24: Summary of HWRC Review

Scenario	Rank				
	Spatial analysis	Operational costs	Development costs	*Sum*	Overall rank
Scenario 1	1	8	6	*21*	**7**
Scenario 2	7	7	1	*17*	**4**
Scenario 3a	6	5	7	*24*	**8**
Scenario 3b	4	2	8	*18*	**6**
Scenario 4	7	3	4	*17*	**4**
Scenario 5	1	4	3	*11*	**1**
Scenario 6	5	1	4	*15*	**2**
Scenario 7	1	6	2	*15*	**2**

8.0 Recommendations

As highlighted above, there is not an ideal configuration of sites that will easily allow CCBC to reduce its HWRC network from six sites to three. Careful consideration needs to be given to a wide range of issues, including capital and operational costs, political and public acceptability, the need to provide an equitable distribution of sites given Caerphilly's geography and population distribution, and site availability and site-specific operational limitations.

Overall however, analysis suggests that there are several site configurations that can provide reasonable HWRC provision for Caerphilly's residents:

- Scenario 1: Use of existing HWRCs at Aberbargoed and Trehir and a new site at Newbridge Road.
- Scenario 5: Use of existing HWRCs at Aberbargoed, Penmaen and Trehir.
- Scenario 7: Use of existing HWRCs at Aberbargoed, Full Moon and Trehir.

Scenarios 5 and 7 are considered to be most preferable as they avoid the need to acquire a new site. If Full Moon HWRC is to close in order to provide additional WTS capacity, then Aberbargoed, Penmaen and Trehir is the best of these three scenarios. Due to the operational limitations at Aberbargoed and Penmaen, it will be challenging to provide equitable provision of HWRC services, so consideration should be given to an approach based on the development of a flagship 'super site' at Trehir and 'satellite sites' at Aberbargeod and Penmean.

This would require that Trehir be relocated, to the area of the other site of Bailey Bridge, rather than simply redeveloped. This would allow it to have a large footprint (5,000m^2) and to serve as the Borough's primary HWRC, providing a full range of HWRC services and maximising segregation, and reuse and recycling of materials. The satellite sites would accept a refined range of materials and be redeveloped to maximise the use of space. Clearly, there will be challenges associated with developing on the closed landfill site at Trehir but this is technically feasible.

Clearly, if CCBC decides to proceed with this approach to rationalisation, further assessment will be needed to assess its feasibility. This will need to include more detailed assessment and design work to confirm the feasibility of constructing a new HWRC at Trehir, the acquisition of the site at Aberbargoed and redevelopment of the Penmaen site.

Furthermore, we would recommend that a range of operational and policy improvement measures are implemented to increase efficiency of HWRC operations. Please see the separate HWRC Operational Review report for more details.

Appendix 1: Glossary of legislative terms

Legislative term	Summary of legislative meaning
“Household Waste”	means waste from— (a) domestic property, that is to say, a building or self-contained part of a building which is used wholly for the purposes of living accommodation; (b) a caravan (as defined in section 29(1) of the Caravan Sites and Control of Development Act 1960) which usually and for the time being is situated on a caravan site (within the meaning of that Act); (c) a residential home; (d) premises forming part of a university or school or other educational establishment;
“Commercial Waste”	means waste from premises used wholly or mainly for the purposes of a trade or business or the purposes of sport, recreation or entertainment excluding— (a) household waste; (b) industrial waste; and (c) waste of any other description prescribed by regulations made by the Secretary of State for the purposes of this paragraph. For example: the Controlled Waste (England & Wales) Regulations 2012.
“Industrial Waste”	means waste from any of the following premises— (a) any factory (within the meaning of the Factories Act 1961); (b) any premises used for the purposes of, or in connection with, the provision to the public of transport services by land, water or air; (c) any premises used for the purposes of, or in connection with, the supply to the public of gas, water or electricity or the provision of sewerage services; (d any premises used for the purposes of, or in connection with, the provision to the public of postal or telecommunications services; or (e) any mine or quarry or any premises used for agriculture within the meaning of the Agriculture Act 1947.
“Controlled Waste”	means “household, industrial and commercial waste or any such waste” (EPA s 75(4))

Appendix 2: HWRC Design Options and Implementation Plans

Aberbargoed Implementation

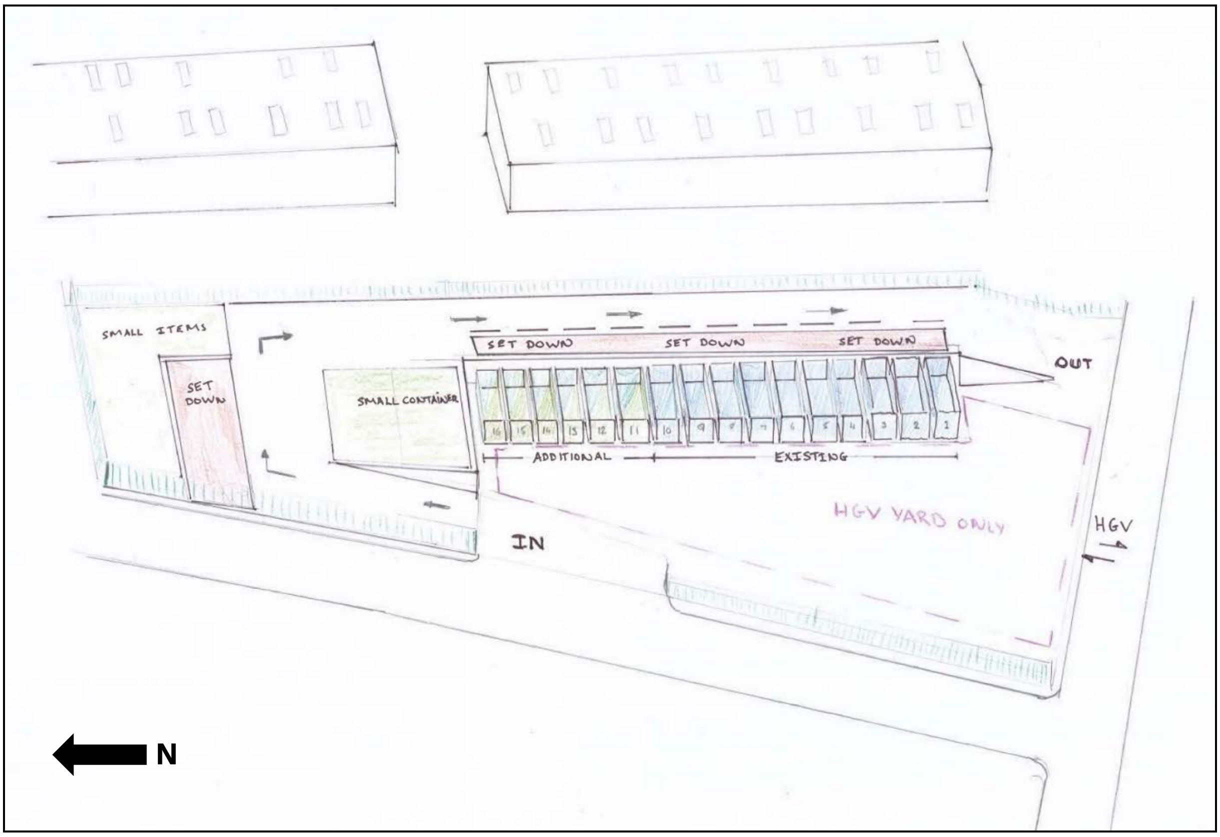
The figure below shows the current layout of Aberbargoed HWRC.

Figure 4: Layout of Aberbargoed

Figure 8 shows design option for Aberbargoed. The main features of this re-design are:

- retention of the exiting site;
- extension of site into existing yard area to North;
- relocation of entrance
- extension of existing retained area by excavation around existing area and provision of additional skips.
- relocation of all small items storage to new northern yard;
- additional five-six skips accessible from raised level

Figure 5: Aberbargoed Concept Design



The design option at Aberbargoed comprises the following general works:

- construction of an enlarged retained split level HWRC area;
- development of rear access yard;
- replacement of pavements; and
- other ancillary works.

A draft phased works plan has been developed with the aim of maintaining normal operations during the construction works period in so far as reasonably practicable. A provisional construction programme of 12 -16 weeks should be allowed for the works. Any phased plan would be subject to contractor agreement and relevant construction health and safety regulations. Diagrams showing the construction phases for all HWRC redevelopment options are included in Appendix 5.

Phase 1

Phase 1 of works would require:

- the separation and delineation of Area 1 by suitable safety fencing;
- upgrade and relocation of existing entrance;
- removal of existing fencing and construction of pavement tie ins.;
- road marking and relocation of welfare and small item containers

Phase 2

Upon completion of Phase 1 works, phase 2 works would require:

- adoption of new entrance location in upper yard
- phase 2 area to be sectioned off (total area dependant on the contractor's method of construction and required space for operations.)
- excavation of existing pavement and new lowered area to within safe distance of existing retained area
- placement of pavements to new lower yard area to within a safe distance of existing retained area.

It is envisaged that the contractor would need to allow for shared access through the work site to existing skip for emptying/replacement.

Phase 3

Upon completion of Phase 2 works, phase 3 works would require:

- closure of the HWRC for a limited period (4-6 weeks)
- excavation of retained area with marked area (red line)
- construction of new retaining wall;
- backfilling of retained area and placement of final paved surfaces

Phase three works may require evening or weekend works to allow for a reduced period of suspended HWRC operations. Appendix 5 includes figures showing each construction phase.

Full Moon HWRC implementation

Figure 3 shows the location of the existing Full Moon HWRC. The site currently occcupies an area to the western extent of the existing site.

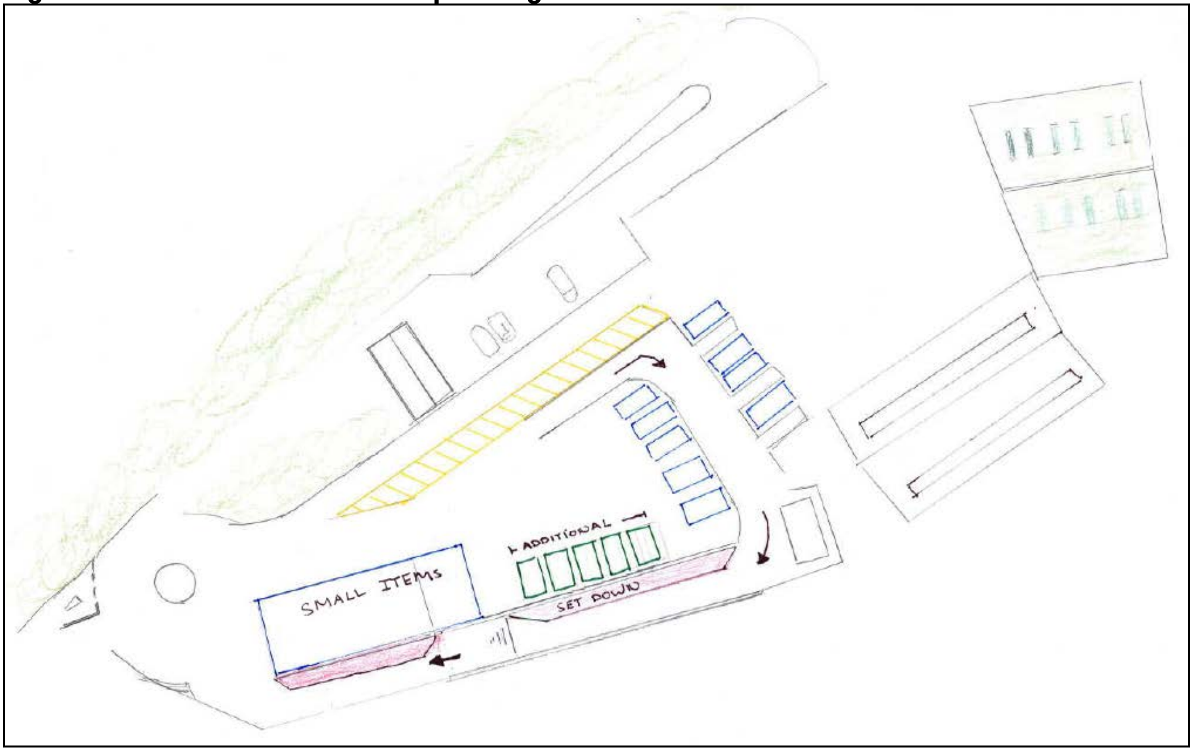
Figure 6: Full Moon HWRC Extension - Aerial

The design option at Full Moon comprises the following general works:

- construction of an additional retained area
- local pavement improvements; and
- other ancillary works.

Updated costings are included in the appendices to this document.

Figure 7 Full Moon HWRC Concept Design



Phasing of works to maintain HWRC subject be subject to review and final design. The operational nature of the site of as waste transfer and additional construction traffic may require the HWRC to be closed for the duration of the construction period.

A provisional construction programme of 12 -16 weeks should be allowed for the works.

Any construction programme or works phasing would be subject to contractor agreement and relevant construction health and safety regulations.

Trehir Landfill Option 1 Review

The figure below shows Trehir Landfill Option 1 site. The main features of this re-design are:

- development of additional HWRC area to rear of site;
- lengthening of exiting ramped area to provide five to six additional skip location;
- pavement improvement and upgrade works to existing site

Figure 8: Trehir Landfill Option 1 Design

Implementation Plan

Trehir Landfill Option 1 comprises the following general works:

- construction of additional HWRC area to rear of site;
- construction of additional retained area to provide additional skip locations;
- pavement improvement and upgrade works.

A draft phased works plan has been developed below with the aim of maintaining normal operations during the construction works period is so far as reasonably practicable. A provisional construction programme of 10 -12 weeks should be allowed for the Trehir Landfill Option 1 works. Any phased plan would be subject to contractor agreement and relevant construction health and safety regulations.

Phase 1

Works would require:

- the separation and delineation of Area 1 by suitable safety fencing;
- excavation of existing area to achieve formation levels
- placement of new concrete pavement
- fencing and road marking to new area

- removal of existing fencing

It is envisaged that the contractor would need to allow for shared access through the work site to existing skip for emptying/replacement. A traffic management plan would be required as part of the works

Phase 2

Upon completion of Area 1 works, Phase 2 works would require:

- the separation and delineation of Area 2 by suitable safety fencing;
- restriction on access to elevated area by HWRC users;
- demolition and removal of existing down ramp;
- construction of new retaining walls;
- backfill of new retained area and construction of new pavements

It is envisaged that the contractor would require sole access to the delineated blue area. It may be possible to maintain operation at the HWRC via a dedicated traffic management plan and possible additional staffing to transport materials via the old ramped area to existing skips.

Upon completion of Phase 2 works, the Phase three works would be completed on a sectional basis within the red line area to allow for operations to resume at the HWRC post completion of Phase 2.

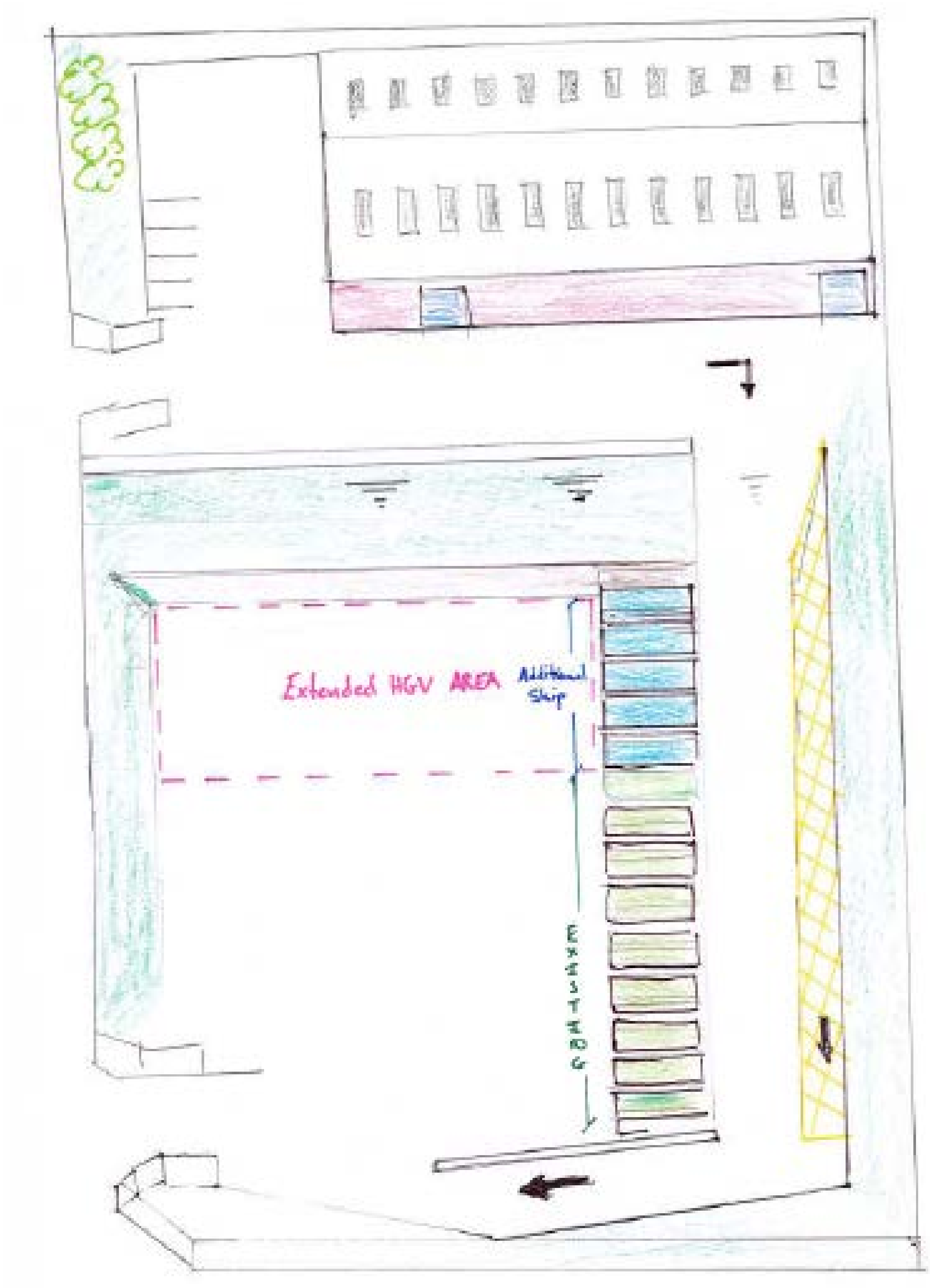
Penallta Industrial Estate Implementation

The figures below show the existing Penallta site and the design concept for the site. The main features of this re-design are:

- retention of the exiting site;
- extension of site into existing council owned yard area to North;
- relocation of entrance
- extension of existing retained area by excavation around existing area and provision of additional skips.
- Relocation of all small items storage to new northern yard;
- additional five/six skips accessible from raised level

Figure 9: Penallta Industrial Estate Existing Site

Figure 10: Penallta Industrial Estate Design Concept



Implementation Plan

The Penallta Industrial Estate option comprises the following general works:

- construction of enlarged retained upper level area;
- development of rear access yard;
- relocation of small item containers and welfare facilities;
- replacement of pavements; and
- other ancillary works.

A draft phased works plan has been developed below with the aim of maintaining normal operations during the construction works period is so far as reasonably practicable. A provisional construction programme of 20-24 weeks should be allowed for the Penalta Industrial Estate works. Any phased plan would be subject to contractor agreement and relevant construction health and safety regulations.

Phase 1

Works would require:

- the separation and delineation of Area 1 (see green highlighted area in by suitable safety fencing;
- decommissioning of existing council yard and removal of all equipment and materials;
- excavation of existing yard area to the level of existing HWRC construction of sloped access.
- Pavement works to slope access area
- retaining walls to be constructed within the Phase 1 area and permanent paving of rear access yard to be completed. Replacement of pedestrian footpath;
- backfilling of retained area constructed would be achieved via the constructed rear entrance.

Phase 2

Upon completion of Phase 1 works, Phase 2 works would require:

- closure of existing entrance and development of new site access via yard entrance and Phase 1 access ramp
- demolition and excavation of part of the existing retained access ramp area to final formation
- construction of proposed retaining wall
- construction of pavement to new lower level HGV access yard

Phase 3

Upon completion of Phase 2 works, Phase 3 works would require:

- delineation of proposed Phase 3 works area (red boundary)
- restriction of down access ramp to one lane (dependant of geotechnical assessment, HWRC may require temporary closure 4-6 weeks)
- demolition and excavation of part of the remaining existing retained access ramp area to final formation

- construction of proposed retaining wall and tie in to newly constructed and existing wall
- completion of pavement to new lower level HGV access yard
- pavement repairs to new upper level HWRC access roads
- completion of other ancillary works.

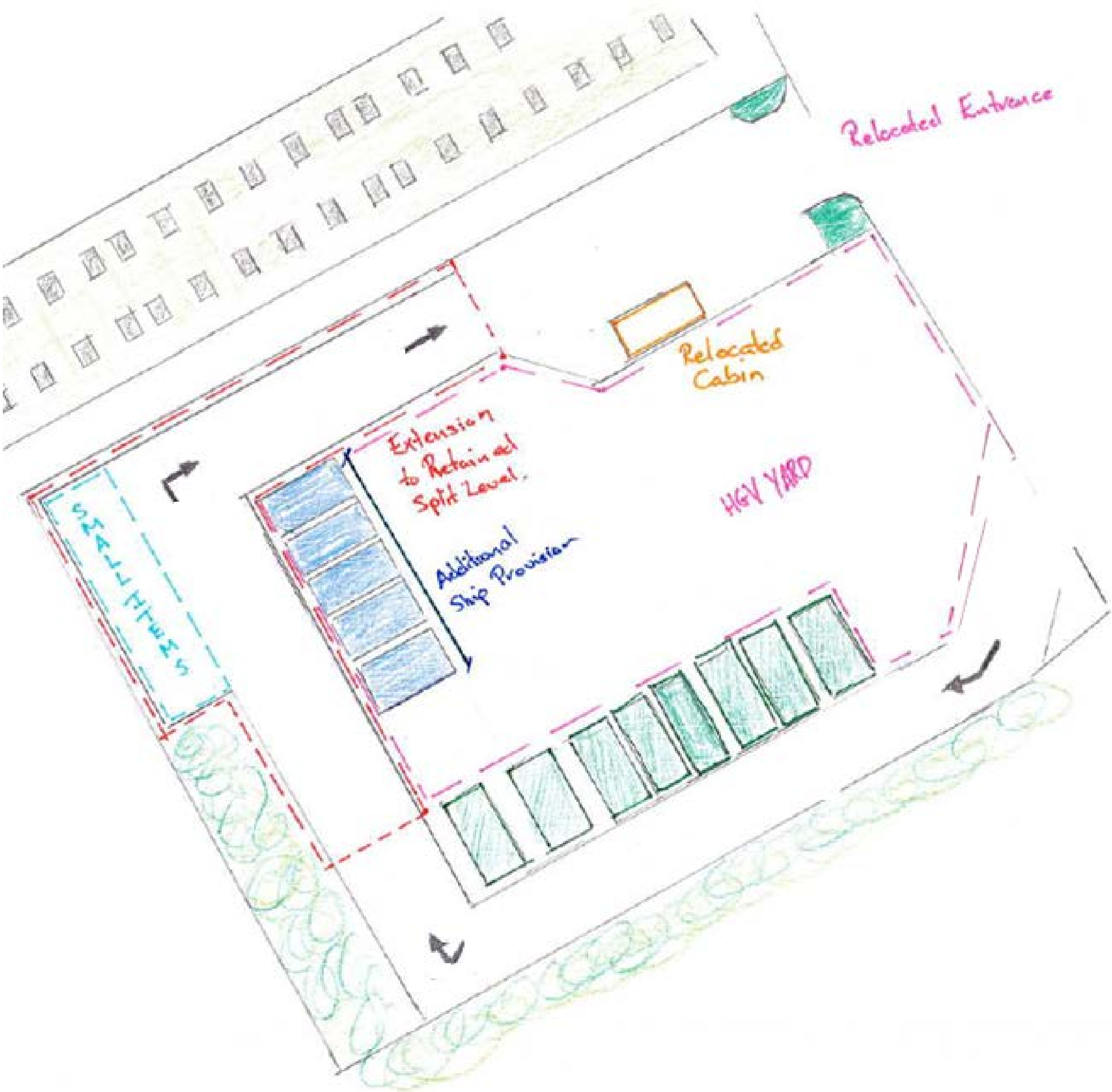
Penmaen Implementation

Figure 12 shows the current Penmaen site and Figure 13 shows the design concept for the Penmaen Site. The main features of this re-design are:

- retention of the exiting site;
- relocation of entrance;
- extension of existing retained area and provision of additional skips;
- Relocation of all small items storage;
- additional five/six skips accessible from raised level

Figure 11: Penmaen Existing Site

Figure 12: Penmaen Industrial Estate Design Concept



Implementation Plan

The Penmaen Industrial Estate option comprises the following general works:

- construction of enlarged retained upper level area;
- relocation of small item containers and welfare facilities;
- replacement of pavements; and
- relocation of entrance way and associated works
- other ancillary works.

A provisional construction programme of 12-16 weeks should be allowed for the Penmaen Industrial Estate works. A phased works plan may not be possible at the Penman site due to the limited existing area and location of the works in relation to the existing retained area. Any proposed phased working plan would be subject to contractor design/agreement and relevant construction health and safety regulations.

Appendix 3: HWRC Design Options Capital Costs

Aberbargoed HWRC Extension

Table 25: Aberbargoed Extension Capital Costs

Item	Quantity	Unit	Rate, £	Cost	Note
Design					
Allowance for Site Investigation works	1	Rate	£2,500	£2,500	Allowance
Topographical Survey	1	Rate	£1,000	£1,000	Allowance
Detailed Structural Design	1	Rate	£5,000	£5,000	Allowance
General Site Clearance and Demolition Works					
General Site Clearance	1	Sum	£2,500	£2,500	Allowance for Clearance of Existing Site
Removal of boundary and fencing to adjacent site (approx. 30m)	30	m	£15	£450	Estimate
Demolition of existing retaining wall (approximately 19m length, 2m height)	19	m^3	£160	£3,040	Rate Spons 2015
Construction of Elevated HWRC Area	35	m			Assumed Elevated Area constructed with 35m of Retaining wall
General Excavation of current entry road (343m^2)	515	m^3	£8	£3,859	Current entry road excavation to approx. 1.5m depth (343m2*1.5m) to become location of additional skips
General Excavation - Foundation for new retaining wall (20m extension along current length, approx. 15m perpendicular to this)	35	m^3	£6	£193	Allowance for trimming excavations to provide grade
Disposal of Materials Offsite	550	m^3	£18	£9,616	Estimated
Placement of 300mm of Type 1 materials to form foundation subbase	70	m^2	£8	£525	Assumed 300mm of Type 1 beneath Retaining wall foundation
50mm Lean Mix Concrete blinding	4	m^3	£98	£341	Assumed design, Local Rates
Retaining Wall Foundations Concrete supply and placement (2m x 0.5m)	35	m^3	£128	£4,463	Assumed design, Local Rates
Retaining Wall Foundations (Shuttering 0.5m deep Rough Form Work)	35	m^2	£65	£2,275	Assumed design, Local Rates
Reinforcement to Retaining Wall Foundations	5	T	£1,100	£5,775	Assumed design, Local Rates
Retaining Wall Concrete (2m x 0.5m)	35	m^3	£125	£4,375	Assumed design, Local Rates
Retaining Wall Reinforcement	5	T	£1,100	£5,775	Assumed design, Local Rates
Retaining Wall Shuttering	140	m^2	£65	£9,100	Assumed design, Local Rates

Item	Quantity	Unit	Rate, £	Cost	Note
Infilling of Constructed Area (0.00-1.60m)	140	m^3	£22	£3,080	Assumed design, Local Rates (Use of broken out existing paving as backfill assumed)
Placement of 200mm Type 1 Capping Layer	175	m^2	£5	£875	Assumed design, Local Rates
Concrete pavements to raise area, 250mm deep including Reinforcement, jointing and placement	175	m^2	£43	£7,438	Assumed design, Local Rates
Perimeter Safety Railing	35	m	£100	£3,500	Estimate
<u>Construction of Lower HWRC Level</u>	345	m^2			Estimated Area
Placement of 200mm Type 1 fill to achieve formation level and form Sub Base	345	m^2	£5	£1,725	Approximate Area, Local Rates 2016
Preparation of Sub Base	345	m^2	£2	£690	Approximate Area, Local Rates 2016
Concrete pavements; insitu concrete slab grade C35/45 250mm depth; to concrete hardstanding areas. Including Reinforcement, jointing and placement	345	m^2	£43	£14,663	Approximate Area, Local Rates 2016
<u>Drainage Upgrade Works</u>					
Allowance for Upgrade of Site Drainage	1	Rate	£5,000	£5,000	Estimate
Allowance for Attenuation system	1	Rate	£0	£0	Assume not required
Allowance for Interceptor	1	Rate	£0	£0	Assume not required
<u>Car Park Area & Remainder of Site</u>					
Line Painting and Signage Allowance	1	Sum	£2,500	£2,500	Estimate
Allowance for adjustments to access gate at site entrance	1	Sum	£5,000	£5,000	Estimate
Site Signage	1	Sum	£2,000	£2,000	Estimate
New fencing across old entrance	17	m	£100	£1,700	Estimated length, local rates
<u>Mech and Electrical</u>					
Allowance for Site Lighting Upgrades	1	No.	£2,500	£2,500	Estimate
Allowance for Upgrade of Site CCTV	1	No.	£5,000	£5,000	Estimate
Misc. (cabling etc.)	1	No.	£2,500	£2,500	Estimate
Additional Waste Containers	6	No.	£4,000	£24,000	MHT Skips - 40 Yd. Hook £3,800 20 Yd. Hook £3,300, 15-yard Hook £3,200
Sub-Total 1				£142,956	
Add 10% Contractor Prelims				£14,296	
Sub-Total 2				£157,252	
Add 12.5% Contingency				£19,656	
Grand Total (excl VAT)				**£176,908**	

Notes on the above:

1. This preliminary cost estimate does not purport to guess potential tender submissions in current and future market conditions.

Item	Quantity	Unit	Rate, £	Cost	Note
2. FTC has used approximations of rates for similar works items where possible and has used engineering judgement to estimate rates & sums where similar rates are not available. 3. Management of Hazardous Materials (existing building) and possible local ground conditions has not been allowed for. 4. Pricing is based primarily on concept designs for the site, no detailed designs have been completed. 5. This cost estimate assumes that materials to be imported are available from local sources. 6. This cost estimate excludes VAT. 7. This cost estimate excludes in/deflation. 8. This estimate includes for a level of contingency as indicated. 9. Costs are largely based on previously tendered rates for similar work or cited reference sources, Prices may have changed in the intervening period. 10. It is assumed that the new site is serviced by public road access, water supply and sewerage services.					

Full Moon HWRC Expansion

Table 26: Full Moon Expansion

Item	Quantity	Unit	Rate, £	Cost	Note
Design					
Allowance for Site Investigation works	1	Rate	£2,500	£2,500	Allowance
Topographical Survey	1	Rate	£1,000	£1,000	Allowance
Detailed Structural Design	1	Rate	£10,000	£5,000	Allowance
General Site Clearance and Demolition Works					
General Site Clearance	1	Sum	£2,500	£2,500	Allowance for Clearance of Existing Site
Demolition of existing retained area	320	m^3	£5	£1,600	Rate Spons 2015
Construction of Elevated HWRC Area	80	m	300		Assumed Elevated Area constructed with 35m of Retaining wall
General Excavation of Existing Pavement	99	m^3	£15	£1,485	Current entry road excavation to approx. 1.5m depth (343m2*1.5m) to become location of additional skips
General Excavation - Foundation for new retaining wall (20m extension along current length, approx. 15m perpendicular to this)	80	m^3	£6	£440	Allowance for trimming excavations to provide grade
Disposal of Materials Offsite	179	m^3	£18	£3,133	Estimated
Placement of 300mm of Type 1 materials to form foundation subbase	160	m^2	£8	£1,200	Assumed 300mm of Type 1 beneath Retaining wall foundation
50mm Lean Mix Concrete blinding	8	m^3	£98	£780	Assumed design, Local Rates
Retaining Wall Foundations Concrete supply and placement (2m x 0.5m)	80	m^3	£128	£10,200	Assumed design, Local Rates
Retaining Wall Foundations (Shuttering 0.5m deep Rough Form Work)	80	m^2	£65	£5,200	Assumed design, Local Rates
Reinforcement to Retaining Wall Foundations	12	T	£1,600	£19,200	Assumed design, Local Rates
Retaining Wall Concrete (2m x 0.5m)	80	m^3	£125	£10,000	Assumed design, Local Rates
Retaining Wall Reinforcement	12	T	£1,600	£19,200	Assumed design, Local Rates
Retaining Wall Shuttering	320	m^2	£65	£20,800	Assumed design, Local Rates
Infilling of Constructed Area (0.00-1.60m)	320	m^3	£22	£7,040	Assumed design, Local Rates (Use of broken out existing paving as backfill assumed)
Placement of 200mm Type 1 Capping Layer	1500	m^2	£5	£7,500	Assumed design, Local Rates
Concrete pavements to raise area, 250mm deep including Reinforcement, jointing and placement	1500	m^2	£43	£63,750	Assumed design, Local Rates
Perimeter Safety Railing	80	m	£100	£8,000	Estimate
Lower HWRC Level: Pavement Improvement	345	m^2			Estimated Area

Item	Quantity	Unit	Rate, £	Cost	Note
Placement of 200mm Type 1 fill to achieve formation levels and form Sub Base	150	m^2	£5	£750	Approximate Area, Local Rates 2016
Preparation of Sub Base	150	m^2	£2	£300	Approximate Area, Local Rates 2016
Concrete pavements; in-situ concrete slab grade C35/45 250mm depth; to concrete hardstanding areas. Including Reinforcement, jointing and placement	150	m^2	£43	£6,375	Approximate Area, Local Rates 2016
Drainage Upgrade Works					
Allowance for Upgrade of Site Drainage	1	Rate	£5,000	£5,000	Estimate
Allowance for attenuation system	1	Rate	£0	£0	Assume not required
Allowance for Interceptor	1	Rate	£0	£0	Assume not required
Car Park Area & Remainder of Site					
Line Painting and Signage Allowance	1	Sum	£2,500	£2,500	Estimate
Site Signage	1	Sum	£2,000	£2,000	Estimate
Mech and Electrical					
Allowance for Site Lighting Upgrades	1	No.	£2,500	£2,500	Estimate
Allowance for Upgrade of Site CCTV	1	No.	£5,000	£2,500	Estimate
Misc. (cabling etc.)	1	No.	£2,500	£2,500	Estimate
Additional Waste Containers	4	No.	£4,000	£16,000	MHT Skips - 40 Yard Hook £3,800 20 Yard Hook £3,300, 15-yard Hook £3,200
Sub-Total 1				£230,953	
Add 10% Contractor Prelims				£23,095	
Sub-Total 2				£254,048	
Add 12.5% Contingency				£31,756	
Grand Total (excl VAT)				**£285,804**	

Notes

This preliminary cost estimate does not purport to guess potential tender submissions in current and future market conditions.

FTC has used approximations of rates for similar works items where possible and has used engineering judgement to estimate rates & sums where similar rates are not available

Management of Hazardous Materials have not been allowed for.

Pricing is based primarily on concept designs for the site, no detailed designs have been completed

This cost estimate assumes that materials to be imported are available from local sources

This cost estimate excludes VAT

This cost estimate excludes in/deflation

This estimate includes for a level of contingency as indicated

Costs are largely based on previously tendered rates for similar work or cited reference sources, Prices may have changed in the intervening period

It is assumed that the new site is serviced by public road access, water supply and sewerage services

Trehir Landfill Option 1

Table 27: Trehir Landfill Option 1 Capital Costs

Item	Quantity	Unit	Rate, £	Cost	Note
Design	-	-	-		
	-	-	-		
Allowance for Site Investigation works	1	Rate	£2,500	£2,500	Allowance
Topographical Survey	1	Rate	£1,000	£1,000	Allowance
Detailed Structural Design	1	Rate	£5,000	£5,000	Allowance
	-	-	-		
General Site Clearance and Demolition Works	-	-	-		
General Site Clearance	1	Sum	£5,000	£5,000	Allowance for Clearance of Existing Site
Break Out and removal of Existing Concrete Yard	20	m^3	£160	£3,200	Estimate
Crushing and Storage for Reuse Onsite (Backfilling)	20	m^3	£15	£300	Estimate, reuse of Back fill to raised area
Construction of Elevated HWRC Area	40	m			Assumed Elevated Area constructed with 20m of Retaining wall
General Excavation - Foundation for new retaining walls	40	m^3	£6	£220	Allowance for trimming excavations to provide grade
Disposal of Materials Offsite	40	m^3	£18	£700	Estimated
Placement of 300mm of Type 1 materials to form foundation subbase	80	m^2	£8	£600	Assumed 300mm of Type 1 beneath Retaining wall foundation
50mm Lean Mix Concrete blinding	4	m^3	£98	£390	Assumed design, Local Rates
Retaining Wall Foundations Concrete supply and placement (2m x 0.5m)	40	m^3	£128	£5,100	Assumed design, Local Rates
Retaining Wall Foundations (Shuttering 0.5m deep Rough Form Work)	40	m^2	£65	£2,600	Assumed design, Local Rates
Reinforcement to Retaining Wall Foundations	6	T	£1,100	£6,600	Assumed design, Local Rates
Retaining Wall Concrete (2m x 0.5m)	40	m^3	£125	£5,000	Assumed design, Local Rates
Retaining Wall Reinforcement	6	T	£1,100	£6,600	Assumed design, Local Rates
Retaining Wall Shuttering	160	m^2	£65	£10,400	Assumed design, Local Rates
Infilling of Constructed Area (0.00-1.80m)	160	m^3	£22	£3,520	Assumed design, Local Rates (Use of broken out existing paving as backfill assumed)
Placement of 200mm Type 1 Capping Layer	280	m^2	£5	£1,400	Assumed design, Local Rates

Item	Quantity	Unit	Rate, £	Cost	Note
Concrete pavements to raise area, 250mm deep including Reinforcement, jointing and placement	280	m^2	£42	£11,760	Assumed design, Local Rates
Perimeter Safety Railings	40	m	£80	£3,200	Estimate
Lower Level Reinstatement	50	m^2			Estimated Area based on repaving excavated area for retaining wall construction
Cut and Breakout of Existing Hardstanding Area for jointing	1	No.	£2,500	£2,500	Allowance
Placement of 200mm Type 1 fill to achieve formation levels and form subbase	50	m^2	£5	£250	Approximate Area, Local Rates 2016
Preparation of Sub Base	50	m^2	£2	£100	Approximate Area, Local Rates 2016
Concrete pavements; insitu concrete slab grade C35/45 250mm depth; to concrete hardstanding areas. Including Reinforcement, jointing and placement	50	m^2	£42	£2,100	Approximate Area, Local Rates 2016
Lower Level Rear Yard	600	m^2			Approximate area green space behind site
General Excavation - paving of extended lower level yard	360	m^3	£6	£1,980	Allowance for trimming excavations to provide grade
Disposal of Materials Offsite	360	m^3	£18	£6,300	Estimate
Allowance for Geogrid 2 Layers	600	m^2	£3	£1,500	Estimate
Preparation of 400mm of 641 Capping layer	600	m^2	£3	£1,500	Estimate
Placement of 400mm of 641 Capping layer	600	m^2	£13	£7,500	Estimate
Placement of 200mm Type 1 fill to achieve formation levels and form Sub Base	600	m^2	£5	£3,000	Approximate Area, Local Rates 2016
Preparation of Sub Base	600	m^2	£2	£1,200	Approximate Area, Local Rates 2016
Concrete pavements; insitu concrete slab grade C35/45 250mm depth; to concrete hardstanding areas. Including Reinforcement, jointing and placement	600	m^2	£42	£25,200	Approximated Area, Local Rates 2016
Allowance for Kerbing	1	Rate	£10,000	£10,000	Estimate
Drainage Upgrade Works					
Allowance for Upgrade of Site Drainage	1	Rate	£12,500	£12,500	Estimate
Allowance for Attenuation system	1	Rate	£10,000	£10,000	Estimate
Allowance for Interceptor	1	Rate	£7,500	£7,500	Estimate
Car Park Area & Remainder of Site					
Line Painting and Signage Allowance	1	Sum	£2,500	£2,500	Estimate
Site Signage	1	Sum	£2,000	£2,000	Estimate

Item	Quantity	Unit	Rate, £	Cost	Note
Mech and Electrical					
Allowance for Site Lighting Upgrades	1	No.	£5,000	£5,000	Estimate
Allowance for Upgrade of Site CCTV	1	No.	£5,000	£5,000	Estimate
Misc. (cabling etc.)	1	No.	£2,500	£2,500	Estimate
Additional Waste Containers	6	No.	£4,000	£24,000	MHT Skips - 40 Yd. Hook £3,800 20 Yd. Hook £3,300, 15-yard Hook £3,200
Sub-Total 1				£209,220	
Add 10% Contractor Prelims				£20,922	
Sub-Total 2				£230,142	
Add 12.5% Contingency				£28,768	
Grand Total (excl VAT)				**£258,910**	
The notes listed under the previous capital costs table also apply.					

Trehir Landfill Option 2

Table 28: Trehir Landfill Option 2 Capital Costs

Item	Quantity	Unit	Rate, £	Cost	Note
Design					
Allowance for Site Investigation works	1	Rate	£2,500	£2,500	Allowance
Topographical Survey	1	Rate	£2,000	£2,000	Allowance
Detailed Design	1	Rate	£10,000	£10,000	Allowance
-	-	-	-		
General Site Clearance and Demolition Works	-	-	-		
General Site Clearance	0.6	ha	£5,000	£5,000	Allowance for Clearance of existing site
Construction of Elevated HWRC Area	300	m	1000		Assumed Elevated Area constructed with 350m of Retaining wall to achieve 1250m2 of elevated area
General Excavation - Foundation for new retaining walls	300	m^3	£6	£1,650	Allowance for trimming excavations to provide grade
Disposal of Materials Offsite	300	m^3	£18	£5,250	Estimate, reuse on site for backfilling
Placement of 300mm of Type 1 materials to form foundation subbase	600	m^2	£8	£4,500	Assumed 300mm of Type 1 beneath Retaining wall foundation
50mm Lean Mix Concrete blinding	30	m^3	£98	£2,925	Assumed design, Local Rates
Retaining Wall Foundations Concrete supply and placement (2m x 0.5m)	300	m^3	£128	£38,250	Assumed design, Local Rates
Retaining Wall Foundations (Shuttering 0.5m deep Rough Form Work)	300	m^2	£65	£19,500	Assumed design, Local Rates
Reinforcement to Retaining Wall Foundations	45	T	£1,100	£49,500	Assumed design, Local Rates
Retaining Wall Concrete (2m x 0.5m)	300	m^3	£125	£37,500	Assumed design, Local Rates
Retaining Wall Reinforcement	45.0	T	£1,100	£49,500	Assumed design, Local Rates
Retaining Wall Shuttering	1200	m^2	£65	£78,000	Assumed design, Local Rates
Infilling of Constructed Area (0.00-1.80m)	1800	m^3	£22	£39,600	Assumed design, Local Rates
Placement of 200mm Type 1 Capping Layer	1000	m^2	£5	£5,000	Assumed design, Local Rates
Concrete pavements to raise area, 250mm deep including Reinforcement, jointing and placement	1000	m^2	£43	£42,500	Assumed design, Local Rates
Perimeter Safety Railings	300	m	£75	£22,500	Estimate
Lower Level Yard	4000	m^2			Approximate Area of lower level yard
Preparation of 400mm of 641 Capping layer	4000	m^2	£3	£10,000	Estimate

Placement of 400mm of 641 Capping layer	4000	m^2	£12	£48,000	Estimate
Placement of 300mm Type 1 fill to achieve formation levels and form Sub Base	4000	m^2	£8	£30,000	Approximate Area, Local Rates 2016
Preparation of Sub Base	4000	m^2	£2	£8,000	Approximate Area, Local Rates 2016
Allowance for Geogrid 2 Layers	8000	m^2	£3	£22,000	Estimate
Concrete pavements; in-situ concrete slab grade C35/45 250mm depth; to concrete hardstanding areas. Including Reinforcement, jointing and placement	4000	m^2	£42	£168,000	Approximated Area, Local Rates 2016
Allowance for Entrance	2	Rate	£10,000	£15,000	Estimate
Allowance for Kerbing	1	Rate	£5,000	£5,000	Estimate
HWRC Access Road	15	m			Approximate access road length
General Clearance	1	No.	£5,000	£5,000	Estimate
Preparation of 400mm of 641 Capping layer	138	m^2	£3	£345	
Placement of 400mm of 641 Capping layer	138	m^2	£12	£1,656	
Placement of 400mm (??) Type 1 fill to achieve formation levels and form Sub base	138	m^2	£10	£1,380	Assumed design, Local Rates
Preparation of Sub Base	138	m^2	£2	£276	Assumed design, Local Rates
Allowance for Geogrid 2 Layers	138	m^2	£2	£331	Assumed design, Local Rates
Concrete pavements; in-situ concrete slab grade C35/45 250mm depth; to concrete hardstanding areas. Including Reinforcement, jointing and placement	138	m^2	£38	£5,175	Approximated Area, Local Rates 2016
Kerbing to Road Edge	30	m	£25	£750	Assumed design, Local Rates
Pedestrian Footpath	23	m^2	£18	£394	Estimate
Line Painting Allowance	1	No.	£5,000	£5,000	Estimate
Ducting and Drainage Allowance	1	No.	£10,000	£10,000	Estimate
Drainage Upgrade Works					
Allowance for Site Drainage	1	Rate	£40,000	£40,000	Estimate
Allowance for Attenuation system	1	Rate	£25,000	£25,000	Estimate
Allowance for Interceptor	1	Rate	£10,000	£10,000	Estimate
Additional Items					
Line Painting and Signage Allowance	1	Sum	£10,000	£10,000	Estimate
Site Signage	1	Sum	£50,000	£50,000	Estimate
Fencing to site	340	m	£100	£34,000	Estimated length, local rates
Mech and Electrical					
Entrance Gates	2	No.	£2,500	£5,000	Estimate Entrance and Exit
Allowance for Site lighting	1	No.	£7,500	£7,500	Estimate
Allowance for Site CCTV	1	No.	£12,500	£12,500	Clearview 5 No. 2mp 20x Optical Zoon IR Pole Mounted Cameras, supplied

					and fitted ex. Cabling and poles
Automatic Number Plate Recognition	1	No.	£10,000	£10,000	
Misc. (cabling etc.)	1	No.	£10,000	£10,000	Estimate
Waste Containers	20	No.	£4,000	£80,000	MHT Skips - 40 Yard Hook £3,800 20 Yard Hook £3,300, 15-yard Hook £3,200
Waste Containers (Small Items	1	Item	£25,000	£25,000	Allowance
Welfare Building					
Allowance for provision of welfare building	1	Sum	£75,000	£75,000	Provisional Sum
Waste Storage Building					
Allowance for provision of Storage Building	200	m^2	£550	£110,000	Provisional Sum
Sub-Total 1				£1,255,982	
Add 10% Contractor Prelims				£125,598	
Sub-Total 2				£1,381,580	
Add 12.5% Contingency				£172,698	
Grand Total (excel VAT)				**£1,554,278**	

Notes

This preliminary cost estimate does not purport to guess potential tender submissions in current and future market conditions.
FTC has used approximations of rates for similar works items where possible and has used engineering judgement to estimate rates & sums where similar rates are not available
Management of Hazardous Materials have not been allowed for.
Pricing is based primarily on concept designs for the site, no detailed designs have been completed
This cost estimate assumes that materials to be imported are available from local sources
This cost estimate excludes VAT
This cost estimate excludes in/deflation
This estimate includes for a level of contingency as indicated
Costs are largely based on previously tendered rates for similar work or cited reference sources, Prices may have changed in the intervening period
It is assumed that the new site is serviced by public road access, water supply and sewerage services

Penallta Industrial Estate

Table 29: Capital Costs: Penallta Industrial Estate

Item	Quantity	Unit	Rate, £	Cost	Note
Design					
Allowance for Site Investigation works	1	Rate	£2,500	£2,500	Allowance
Topographical Survey	1	Rate	£1,000	£1,000	Allowance
Detailed Structural Design	1	Rate	£12,500	£5,000	Allowance
General Site Clearance and Demolition Works					
General Site Clearance	1	Sum	£2,500	£2,500	Allowance for Clearance of Existing Site
Demolition of existing retaining wall (approximately 40m length, 2m height)	50	m3	£160	£8,000	Rate Spons 2015
Construction of Elevated HWRC Area	**75**	**m**	**780**		Assumed Elevated Area constructed with75m of Retaining wall
General Excavation of current entry road (780m2)	1950	m3	£8	£14,625	Assumed excavation averages circa 2.5m across entire area in absence of survey
General Excavation - Foundation for new retaining wall (20m extension along current length, approx. 15m perpendicular to this)	112.5	m3	£6	£619	Allowance for trimming excavations to provide grade
Disposal of Materials Offsite	2062.5	m3	£18	£36,094	Estimated
Placement of 300mm of Type 1 materials to form foundation subbase	225	m2	£8	£1,688	Assumed 300mm of Type 1 beneath Retaining wall foundation
50mm Lean Mix Concrete blinding	11.3	m3	£98	£1,097	Assumed design, Local Rates
Retaining Wall Foundations Concrete supply and placement (3m x 0.5m)	112.5	m3	£128	£14,344	Assumed design, Local Rates
Retaining Wall Foundations (Shuttering 0.5m deep Rough Form Work)	75.0	m2	£65	£4,875	Assumed design, Local Rates
Reinforcement to Retaining Wall Foundations	14.1	T	£1,100	£15,469	Assumed design, Local Rates
Retaining Wall Concrete (3m x 0.5m)	112.5	m3	£125	£14,063	Assumed design, Local Rates
Retaining Wall Reinforcement	14.1	T	£1,100	£15,469	Assumed design, Local Rates
Retaining Wall Shuttering	450	m2	£65	£29,250	Assumed design, Local Rates
Infilling of Constructed Area	337.5	m3	£22	£7,425	Assumed design, Local Rates (Use of broken out existing paving as backfill assumed)
Placement of 200mm Type 1 Capping Layer	187.5	m2	£5	£938	Assumed design, Local Rates
Concrete pavements to raise area, 250mm deep including Reinforcement, jointing and placement	187.5	m2	£43	£7,969	Assumed design, Local Rates
Perimeter Safety Railing	75	m	£100	£7,500	Estimate

Item	Quantity	Unit	Rate, £	Cost	Note
Construction of Extended Lower HWRC Level	780	m2			Estimated Area
Placement of 200mm Type 1 fill to achieve formation levels and form Sub Base	780	m2	£5	£3,900	Approximate Area, Local Rates 2016
Preparation of Sub Base	780	m2	£2	£1,560	Approximate Area, Local Rates 2016
Concrete pavements; insitu concrete slab grade C35/45 250mm depth; to concrete hardstanding areas. Including Reinforcement, jointing and placement	780	m2	£43	£33,150	Approximate Area, Local Rates 2016
<u>Construction of New Ramped Entrance way</u>	**160**	**m2**			Estimated Area
Placement of 200mm Type 1 fill to achieve formation levels and form Sub Base	160	m2	£5	£800	Approximate Area, Local Rates 2016
Preparation of Sub Base	160	m2	£2	£320	Approximate Area, Local Rates 2016
Concrete pavements; insitu concrete slab grade C35/45 250mm depth; to concrete hardstanding areas. Including Reinforcement, jointing and placement	160	m2	£43	£6,800	Approximate Area, Local Rates 2016
Drainage Upgrade Works					
Allowance for Upgrade of Site Drainage	1	Rate	£12,500	£12,500	Estimate
Allowance for Attenuation system	1	Rate	£0	£0	Assume not required
Allowance for Interceptor	1	Rate	£0	£0	Assume not required
Car Park Area & Remainder of Site					
Line Painting and Signage Allowance	1	Sum	£5,000	£5,000	Estimate
Site Signage	1	Sum	£2,000	£2,000	Estimate
New fencing across old entrance	17	m	£100	£1,700	Estimated length, local rates
<u>Mech and Electrical</u>					
Allowance for Site Lighting Upgrades	1	No.	£2,500	£2,500	Estimate
Allowance for Upgrade of Site CCTV	1	No.	£5,000	£5,000	Estimate
Misc. (cabling etc.)	1	No.	£2,500	£2,500	Estimate
Additional Waste Containers	6	No.	£4,000	£24,000	MHT Skips - 40 Yd. Hook £3,800 20 Yd. Hook £3,300, 15-yard Hook £3,200
Sub-Total 1				£292,152	
Add 10% Contractor Prelims				£29,215	
Sub-Total 2				£321,367	
Add 12.5% Contingency				£40,171	
Grand Total (excl VAT)				**£361,538**	

Penmaen Industrial Estate

Table 30 presents detailed capital costs for Penmaen Industrial Estate.

Table 30: Capital Costs: Penmaen Industrial Estate

Item	Quantity	Unit	Rate, £	Cost	Note
Design					
Allowance for Site Investigation works	1	Rate	£2,500	£2,500	Allowance
Topographical Survey	1	Rate	£1,000	£1,000	Allowance
Detailed Structural Design	1	Rate	£7,500	£7,500	Allowance
General Site Clearance and Demolition Works					
General Site Clearance	1	Sum	£2,500	£2,500	Allowance for Clearance of Existing Site
Demolition of existing retaining wall (approximately 30m length, 2.5m height)	37.5	m^3	£160	£6,000	Rate Spons 2015
Construction of Elevated HWRC Area	**96**	**m**	**320**		Assumed Elevated Area constructed with approx. 96 m of Retaining wall
General Excavation of current lower yard area(320m^2)	96	m^3	£8	£720	Assumed excavation averages circa 2.5m across entire area in absence of survey
General Excavation - Foundation for new retaining walls	120	m^3	£6	£660	Allowance for trimming excavations to provide grade
Disposal of Materials Offsite	216	m^3	£18	£3,780	Estimated
Placement of 300mm of Type 1 materials to form foundation subbase	288	m^2	£8	£2,160	Assumed 300mm of Type 1 beneath Retaining wall foundation
50mm Lean Mix Concrete blinding	14.4	m^3	£98	£1,404	Assumed design, Local Rates
Retaining Wall Foundations Concrete supply and placement (2.5m x 0.5m)	120.0	m^3	£128	£15,300	Assumed design, Local Rates
Retaining Wall Foundations (Shuttering 0.5m deep Rough Form Work)	96.0	m^2	£65	£6,240	Assumed design, Local Rates
Reinforcement to Retaining Wall Foundations	15.0	T	£1,100	£16,500	Assumed design, Local Rates
Retaining Wall Concrete (2.5m x 0.5m)	120	m^3	£125	£15,000	Assumed design, Local Rates
Retaining Wall Reinforcement	15.0	T	£1,100	£16,500	Assumed design, Local Rates
Retaining Wall Shuttering	480	m^2	£65	£31,200	Assumed design, Local Rates
Infilling of Constructed Area	1440	m^3	£22	£31,680	Assumed design, Local Rates (Use of

Item	Quantity	Unit	Rate, £	Cost	Note
					broken out existing paving as backfill assumed)
Placement of 200mm Type 1 Capping Layer	320	m^2	£5	£1,600	Assumed design, Local Rates
Concrete pavements to raise area, 250mm deep including Reinforcement, jointing and placement	320	m^2	£43	£13,600	Assumed design, Local Rates
Perimeter Safety Railing Allowance	96	m	£100	£9,600	Estimate
Lower HWRC Level	105	m^2			Estimated Area
Placement of 200mm Type 1 fill to achieve formation levels and form Sub Base	105	m^2	£5	£525	Approximate Area, Local Rates 2016
Preparation of Sub Base	105	m^2	£2	£210	Approximate Area, Local Rates 2016
Concrete pavements; insitu concrete slab grade C35/45 250mm depth; to concrete hardstanding areas. Including Reinforcement, jointing and placement	105	m^2	£43	£4,463	Approximate Area, Local Rates 2016
Allowance for Relocation of Existing Entrance	1	Item	£12,500	£12,500	Allowance
Drainage Upgrade Works					
Allowance for Upgrade of Site Drainage	1	Rate	£10,000	£10,000	Estimate
Allowance for Attenuation system	1	Rate	£0	£0	Assume not required
Allowance for Interceptor	1	Rate	£0	£0	Assume not required
Car Park Area & Remainder of Site					
Line Painting and Signage Allowance	1	Sum	£5,000	£5,000	Estimate
Site Signage	1	Sum	£2,000	£2,000	Estimate
Allowance for Relocation of Fencing	1	Sum	£2,500	£2,500	Estimated length, local rates
Mech and Electrical					
Allowance for Site Lighting Upgrades	1	No.	£2,000	£2,000	Estimate
Allowance for Upgrade of Site CCTV	1	No.	£2,000	£2,000	Estimate
Misc. (cabling etc.)	1	No.	£1,000	£1,000	Estimate
Additional Waste Containers	6	No.	£4,000	£24,000	MHT Skips - 40 Yd. Hook £3,800 20 yd. Hook £3,300, 15-yard Hook £3,200
Sub-Total 1				£251,642	
Add 10% Contractor Prelims				£25,164	
Sub-Total 2				£276,806	

Item	Quantity	Unit	Rate, £	Cost	Note
Add 12.5% Contingency				£34,601	
Grand Total (excl VAT)				**£311,406**	

Generic new build HWRC

Table 31 presents detailed capital costs for constructing an HWRC, if and when a new site is identified.

Table 31: Generic HWRC new build capital costs

Item	Quantity	Unit	Rate, £	Cost	Note
Design					
Allowance for Site Investigation works	1	Rate	£2,500	£2,500	Allowance
Topographical Survey	1	Rate	£2,000	£2,000	Allowance
Detailed Design	1	Rate	£10,000	£10,000	Allowance
General Site Clearance and Demolition Works					
General Site Clearance	0	ha	£5,000	£5,000	Allowance for Clearance of existing site
Construction of Elevated HWRC Area	**154**	**m**	**650**		Assumed Elevated Area constructed with 154m of Retaining wall. Approx. 650m2 of Elevated Area
General Excavation - Foundation for new retaining walls	116	m3	£6	£635	Allowance for trimming excavations to provide grade
Disposal of Materials Offsite	116	m3	£18	£2,021	Estimate, reuse on site for backfilling
Placement of 300mm of Type 1 materials to form foundation subbase	385	m2	£8	£2,888	Assumed 300mm of Type 1 beneath Retaining wall foundation
50mm Lean Mix Concrete blinding	19	m3	£98	£1,877	Assumed design, Local Rates
Retaining Wall Foundations Concrete supply and placement (2.5 m x 0.4m)	154	m3	£128	£19,635	Assumed design, Local Rates
Retaining Wall Foundations (Shuttering 0.4m deep Rough Form Work)	154	m2	£65	£10,010	Assumed design, Local Rates
Reinforcement to Retaining Wall Foundations	23	T	£1,100	£25,410	Assumed design, Local Rates
Retaining Wall Concrete (2.5m x 0.4m)	154	m3	£125	£19,250	Assumed design, Local Rates
Retaining Wall Reinforcement	23	T	£1,100	£25,410	Assumed design, Local Rates
Retaining Wall Shuttering	770	m2	£65	£50,050	Assumed design, Local Rates
Infilling of Constructed Area (0.00-2.0m)	1300	m3	£22	£28,600	Assumed design, infilling 5m3 (4x (1/2) x2.5), Local Rates
Placement of 200mm Type 1 Capping Layer	650	m2	£5	£3,250	Assumed design, Local Rates
Concrete pavements to raise area, 250mm deep including Reinforcement, jointing and placement	650	m2	£38	£24,375	Assumed design, Local Rates
Perimeter Safety Railings	154	m	£80	£12,320	Estimate

Item	Quantity	Unit	Rate, £	Cost	Note
Lower Level Yard	**3175**	**m2**			Total area 3,825m2 minus elevated area of 590m2
General Excavation for paving yard	1588	m3	£6	£8,731	Allowance for trimming excavations to provide grade
Placement of 300mm Type 1 fill to achieve formation levels and form Sub Base	3175	m2	£8	£23,813	Approximate Area, Local Rates 2016
Preparation of Sub Base	3175	m2	£2	£6,350	Approximate Area, Local Rates 2016
Concrete pavements; insitu concrete slab grade C35/45 250mm depth; to concrete hardstanding areas. Including Reinforcement, jointing and placement	3175	m2	£42	£133,350	Approximated Area, Local Rates 2016
Allowance for Construction of Entrances (Footpaths, Kerb Dishing etc.)	3	Rate	£5,000	£15,000	Estimate
Allowance for Kerbing	1	Rate	£5,000	£5,000	Estimate
Drainage Upgrade Works					
Allowance for Site Drainage	1	Rate	£20,000	£20,000	Estimate
Allowance for Attenuation system	1	Rate	£15,000	£15,000	Estimate
Allowance for Interceptor	1	Rate	£7,500	£7,500	Estimate
Additional Items					
Line Painting and Signage Allowance	1	Sum	£7,500	£7,500	Estimate
Site Signage	1	Sum	£2,000	£2,000	Estimate
Fencing to entire Area	200	m	£115	£23,000	Estimated length, local rates
Mech and Electrical					
Entrance Gates	3	No.	£2,500	£7,500	Estimate Entrance and Exit
Allowance for Site Lighting	1	No.	£10,000	£10,000	Estimate
Allowance for Site CCTV	1	No.	£10,000	£10,000	Estimate
Automatic Number Plate Recognition	1	No.	£10,000	£10,000	Estimate
Misc. (cabling etc.)	1	No.	£7,500	£7,500	Estimate
Waste Containers	15	No.	£4,000	£60,000	MHT Skips - 40 Yd. Hook £3,800 20 Yd. Hook £3,300, 15-yard Hook £3,200
Small Items Waste Containers	5	No.	£2,000	£10,000	Estimated
Welfare Building					
Allowance for provision of modular welfare building	1	Sum	£50,000	£30,000	Provisional Sum
Sub-Total 1				£657,475	
Add 10% Contractor Prelims				£65,747	
Sub-Total 2				£723,222	
Add 12.5% Contingency				£90,403	

Item	Quantity	Unit	Rate, £	Cost	Note
Grand Total (excl VAT)				**£813,625**	

D.S. Smith Site PantGlas Industrial Estate

Table 32: Capital Costs - D.S. Smith Site PantGlas Industrial Estate

Item	Quantity	Unit	Rate, £	Cost	Note
Design					
Allowance for Site Investigation works	1	Rate	£2,500	£2,500	Allowance
Topographical Survey	1	Rate	£1,000	£1,000	Allowance
Detailed Structural Design	1	Rate	£5,000	£5,000	Allowance
General Site Clearance and Demolition Works					
General Site Clearance	1	Sum	£5,000	£5,000	Allowance for Clearance of Existing Site
Break Out and removal of Existing Concrete Yard	465	m3	£15	£6,975	Estimated for breakout of elevated area of approx. 1400m2
Crushing and Storage for Reuse Onsite (Backfilling)	465	m3	£13	£5,813	Estimate, reuse of Back fill to raised area
Construction of Elevated HWRC Area	**190**	**m**	**750**		Assumed Elevated Area constructed with 190m of Retaining wall including ramps - Total Area approx. 750m2
General Excavation - Foundation for new retaining wall	190	m3	£6	£1,045	Allowance for trimming excavations to provide grade
Disposal of Materials Offsite	190	m3	£18	£3,325	Estimated
Placement of 300mm of Type 1 materials to form foundation subbase (foundation 2.5x2.5x0.3)	475	m2	£8	£3,563	Assumed 300mm of Type 1 beneath Retaining wall foundation
50mm Lean Mix Concrete blinding	24	m3	£98	£2,316	Assumed design, Local Rates
Retaining Wall Foundations Concrete supply and placement (2.5m x 0.3m)	143	m3	£128	£18,169	Assumed design, Local Rates
Retaining Wall Foundations (Shuttering 0.3m deep Rough Form Work)	143	m2	£65	£9,263	Assumed design, Local Rates
Reinforcement to Retaining Wall Foundations	21	T	£1,100	£23,513	Assumed design, Local Rates
Retaining Wall Concrete (2.5m x 0.3m)	143	m3	£125	£17,813	Assumed design, Local Rates
Retaining Wall Reinforcement	21	T	£1,100	£23,513	Assumed design, Local Rates
Retaining Wall Shuttering	950	m2	£65	£61,750	Assumed design, Local Rates
Infilling of Constructed Area (0.00-2.0m)	1035	m3	£22	£22,770	Assumed design, Local Rates (Use of broken out existing paving as backfill assumed)

Item	Quantity	Unit	Rate, £	Cost	Note
Placement of 200mm Type 1 Capping Layer	750	m2	£5	£3,750	Assumed design, Local Rates
Concrete pavements to raise area, 250mm deep including Reinforcement, jointing and placement	750	m2	£43	£31,875	Assumed design, Local Rates
Perimeter Safety Railings and Barriers	190	m	£100	£19,000	Estimate
Construction/Reinstatement of Lower HWRC Level	**250**	**m2**			Estimated Area of entire lower level, lower area directly adjacent to retaining wall estimated at 900m2
Placement of 200mm Type 1 fill to achieve formation levels and form Sub Base	250	m2	£5	£1,250	Approximate Area, Local Rates 2016
Preparation of Sub Base	250	m2	£2	£500	Approximate Area, Local Rates 2016
Concrete pavements; insitu concrete slab grade C35/45 250mm depth; to concrete hardstanding areas. Including Reinforcement, jointing and placement	250	m2	£38	£9,375	Approximate Area, Local Rates 2016
Upgrading of remaining pavement area	1	Rate	£5,000	£5,000	Allowance
Drainage Upgrade Works					
Allowance for Upgrade of Site Drainage	1	Rate	£10,000	£10,000	Estimate
Allowance for Attenuation system	1	Rate	£15,000	£15,000	Assume not required
Allowance for Interceptor	1	Rate	£7,500	£7,500	Assume not required
Car Park Area & Remainder of Site					
Line Painting and Signage Allowance	1	Sum	£2,500	£2,500	Estimate
Allowance for adjustments to access gate at site entrance	1	Sum	£5,000	£5,000	Estimate
Site Signage	1	Sum	£2,000	£2,000	Estimate
Mech and Electrical					
Entrance Gates	2	No.	£2,500	£2,500	Estimate for one gate for Entrance and Exit
Allowance for Site Lighting Upgrades	1	No.	£2,500	£2,500	Estimate
Allowance for Upgrade of Site CCTV	1	No.	£5,000	£5,000	Estimate
Automatic Number Plate Recognition	1	No.	£10,000	£10,000	Estimate
Misc. (cabling etc.)	1	No.	£2,500	£2,500	Estimate
Waste Containers	16	No.	£3,800	£60,800	MHT Skips - 40 Yd. Hook £3,800 20 Yd. Hook £3,300, 15-yard Hook £3,200
Small Items Waste Containers	5	No.	£2,000	£10,000	Estimate
Welfare Building					

Item	Quantity	Unit	Rate, £	Cost	Note
Allowance for provision of modular welfare building	1	Sum	£30,000	£30,000	Provisional Sum
Sub-Total 1				£449,374	
Add 10% Contractor Prelims				£44,937	
Sub-Total 2				£494,312	
Add 12.5% Contingency				£61,789	
Grand Total (excl VAT)				**£556,101**	

Appendix 4: Full Moon Waste Transfer Station Operations Extension

Table 33: Full Moon Transfer Operations Extension: Capital Costs

Item	Quantity	Unit	Rate	Cost	Notes
Design					
Allowance for Site Investigation works	1	Rate	£2,500	£2,500	Allowance
Topographical Survey	1	Rate	£1,000	£1,000	Allowance
Detailed Structural Design	1	Rate	£7,500	£7,500	Allowance
General Site Clearance and Demolition Works					
General Site Clearance	1	Sum	£5,000	£5,000	Allowance for Clearance of Existing Site
Construction of New Transfer Building **450m2**					
General Excavation	450	m2	£17	£7,521	Comparable/m^2 rates Waste Transfer Building Wales 2016
Allowance for Ground Improvements (Piling)	450	m2	£52	£23,516	Comparable/m^2 rates Waste Transfer Building Wales 2016
Concrete Work: Floors and Groun Beams	450	m2	£50	£22,531	Comparable/m^2 rates Waste Transfer Building Wales 2016
Push Walls Concrete	450	m2	£29	£12,891	Comparable/m^2 rates Waste Transfer Building Wales 2016
Reinforcement: Floors and Ground Beams	450	m2	£48	£21,429	Comparable/m^2 rates Waste Transfer Building Wales 2016
Reinforcement: Push Walls	450	m2	£117	£52,429	Comparable/m^2 rates Waste Transfer Building Wales 2016
Portal Frame Steel supply and Erect	450	m2	£114	£51,511	Comparable/m^2 rates Waste Transfer Building Wales 2016
Cladding	450	m2	£121	£54,447	Comparable/m^2 rates Waste Transfer Building Wales 2016
Roller Doors	4	No.	£3,500	£14,000	Assumed design, Local Rates
Internal Lighting	1.0	Sum	£5,000	£5,000	Assumed design, Local Rates
Fire Alarm	1	Sum	£3,500	£3,500	Assumed design, Local Rates
Allowance for Precast divisions	1	Sum	£15,000	£15,000	Assumed design, Local Rates (Use of broken out existing paving as backfill assumed)
Drainage Upgrade Works					
Allowance for Upgrade of Site Drainage	1	Rate	£7,500	£7,500	Estimate
Allowance for Attentuation system	1	Rate	£0	£0	Assume not required
Allowance for Interceptor	1	Rate	£0	£0	Assume not required
Car Park Area & Remainder of Site					
Line Painting and Signage Allowance	1	Sum	£5,000	£5,000	Estimate
Site Signage	1	Sum	£2,000	£2,000	Estimate
Allowance for Relocation of Fencing	1	Sum	£2,500	£2,500	Estimated length, local rates

Item	Quantity	Unit	Rate	Cost	Notes
Mech and Electrical					
Allowance for Site lighting Upgrades	1	No.	£2,000	£2,000	Estimate
Allowance for Upgrade of Site CCTV	1	No.	£2,000	£2,000	Estimate
Misc (cabling etc)	1	No.	£1,000	£1,000	Estimate
Additional Waste Containers	6	No.	£4,000	£24,000	MHT Skips - 40 Yrd Hook £3,800 20 Yrd Hook £3,300, 15 yard Hook £3,200
Sub-Total 1				£345,776	
Add 10% Contractor Prelims				£34,578	
Sub-Total 2				£380,353	
Add 12.5% Contingency				£47,544	
Grand Total (excl VAT)				**£427,897**	

Notes

This preliminary cost estimate does not purport to guess potential tender submissions in current and future market conditions.

FTC has used approximations of rates for similar works items where possible and has used engineering judgement to estimate rates & sums where similar rates are not available

Management of Hazardous Materials have not been allowed for.

Pricing is based primarily on concept designs for the site, no detailed designs have been completed

This cost estimate assumes that materials to be imported are available from local sources

This cost estimate excludes VAT

This cost estimate excludes in/deflation

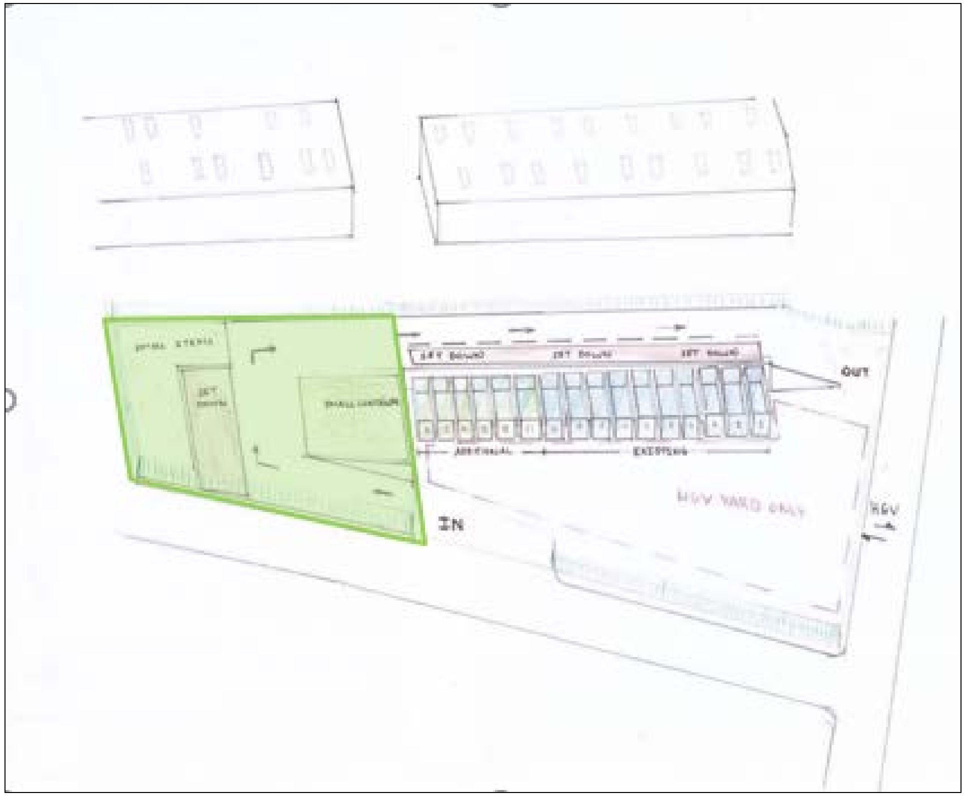
This estimate includes for a level of contingency as indicated

Costs are largely based on previously tendered rates for similar work or cited reference sources, Prices may have changed in the intervening period

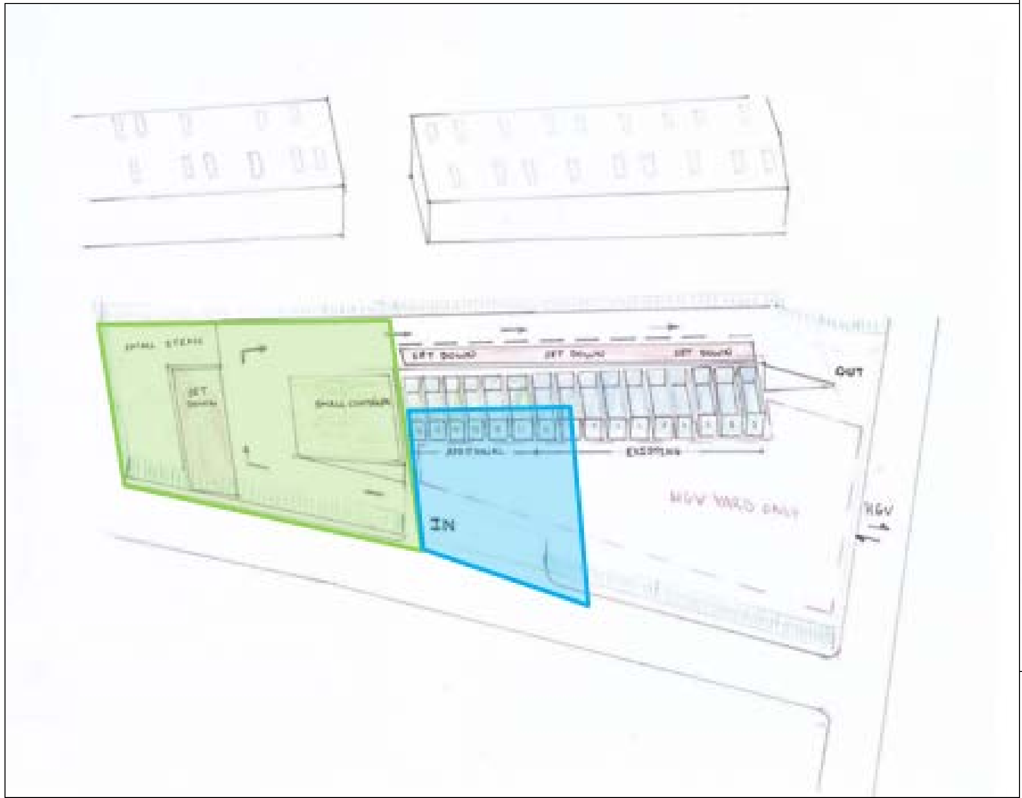
It is assumed that the new site is serviced by public road access, water supply and sewerage services

Appendix 5: Construction phases for redevelopment of existing sites

Aberbargoed - Phase 1 Works



Aberbargoed - Phase 2 Works



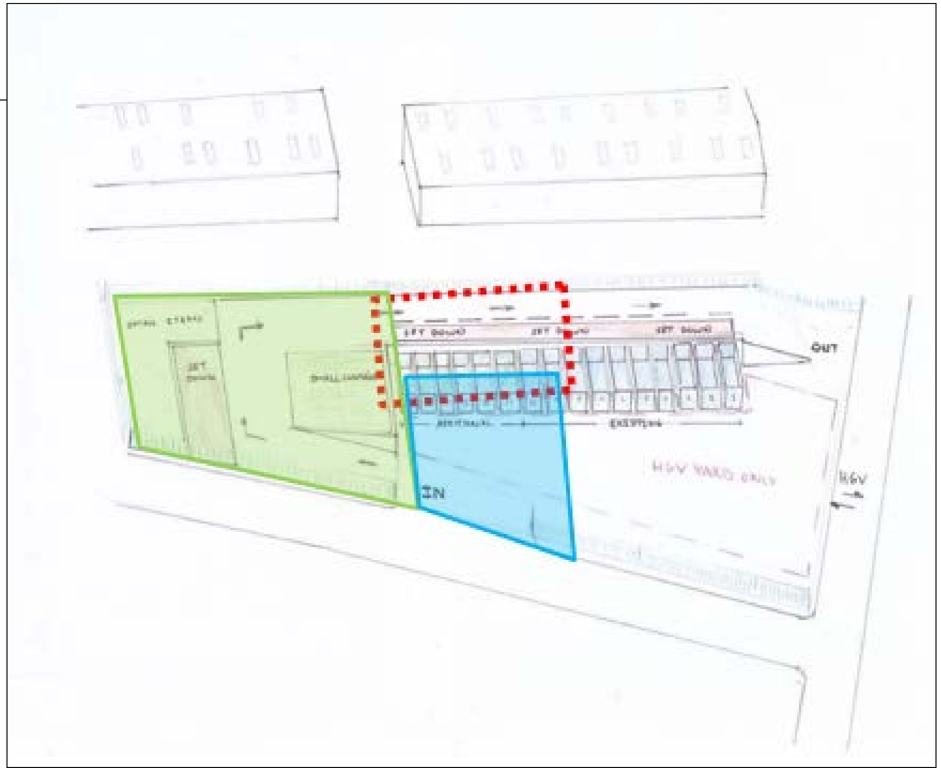


Figure 13: Aberbargoed Phase 3 Works

Trehir Phase 1 Works

Trehir Phase 2 Works

Penallta – Phase 1 Works

Penallta – Phase 2 Works

Penallta – Phase 3 Works

Appendix 6: HWRC construction cost comparison

Cost Comparison: Lamby Way

Lamby Way HWRC has been presented as a comporable HWRC development in the assessment of the projected Trehir costs. Capital costs in the region of £1.5M have been indicated for the scheme. A brief review of the development was undertaken. The development of the facility was undertaken at an existing site car parking area using modular precast units; minor entrance road alterations and fencing works are also evident.

The area of the site occupied by modular units is approximately 1,695 m^2 in accordance with the drawings reviewed.

It is understood from previous HWRC studies that modular installation cost are in the region of £725/m^2 .

It is estimated thererfore that the modular element of Lamby Way development costs in the region of £1.19M - £1.23M.

Cost Comparison: Pembrokeshire – Crane Cross HWRC

Crane Cross HWRC was also presented as a comporable HWRC development in the assessment of the projected Trehir costs. Capital costs in the region of £2.2M where indicated.

A review of the Crane Cross development shows the following:

• Overall Site Area	10,800 m^2
• Overall HWRC “Hardstanding” Area	6,000 m^2
• Elevated HWRC Area	1125 m^2
• Compactor Building Area	275m^2
• Canopied Building Area	68m^2
• Welfare/Office	35m^2

The original Trehir Option 2 proposed (£1.05M) the following

• Overall Site Area	4,000 m^2
• Overall HWRC “Hardstanding” Area	3,500 m^2
• Elevated HWRC Area	850 m^2
• Modular Office Accommodation	

The Trehir Option 2 has since been updated increasing the overall development size to 500m2 and including permanent buildings. Updated costing are estimated as £1,554,278