



Managing waste, delivering value, supporting jobs



Optimisation of Waste to 2025 & Beyond

The Waste Agenda Framework

Key Issues

The City faces a stiff challenge. Over the past decade, the city has done really well in increasing its recycling rate from below 10% to around 40% - but more needs to be done in order to reach the 50% target by 2020.

The Council is seeking to increase Belfast's population by 70,000, and encourage 50,000 new jobs, by 2030. This Waste Framework plans to transition waste services from merely being about collection, treatment and disposal to making a more fundamental contribution to the Circular Economy in Belfast.

Over the next six years it is projected that waste disposal costs will increase by around £6m

Waste collection and disposal costs the Council in the region of £26 million per annum. This cost continues to experience significant upward pressures. Over the next six years it is likely that disposal costs will increase significantly, by around £6 million¹. The Waste Framework is designed to; address these cost pressures, contribute to the Circular Economy in terms of supporting jobs and improved resource efficiency while at the same time increasing recycling.

We currently pay around £3 million per year in landfill tax to the UK Exchequer. This money could be better spent by investing in the city to improve local areas as outlined in the Belfast Agenda, supporting the local economy and job growth.

As the emphasis switches from collecting waste to radically improving the quality of materials lifted, so that greater income is generated through its resale, this will mean unprecedented change from what we presently do!

Landfill tax paid to UK Exchequer £3 million per year.

There are significant drivers for this change which will require new organisational structures, new collection arrangements, new infrastructure and new behaviours from householders. Several options were considered and the most realistic to deliver 50% recycling options were assessed and are presented within this document.

Further analysis around costs and job creation was also examined and indications suggest that recycling in Belfast is directly supporting around 500 jobs in both the private and social sectors. How waste and resources management can make a substantive contribution to the Belfast Agenda are also being addressed in a parallel piece of work specifically looking at the Circular Economy – called Resourceful Belfast.

Of increasing importance is how technology can be applied in to achieve effective and efficient means of achieving our goals (i.e. increased recycling, supporting jobs and increased value for money). Work that will support this approach is already underway as part of our Smart City programme. This work whilst outside of the Waste Framework, will support, inform and ultimately become intrinsic to make operations better for ratepayers and more efficient.

A summary table of the key recommendations is presented below:

Collection Arrangements	Infrastructure	Behaviour Change
<p>Option 3 Multi-stream Kerbside Sort</p> <p><i>The sorting of Recycling waste at the kerbside via a kerbside stacking box in every household in Belfast.</i></p> <p><i>Increased Income</i></p>	<p>Recycling Infrastructure Bulky Station</p> <p><i>The Bulking of kerbside sorted materials at Council owned facility to maximise income.</i></p> <p>Residual Infrastructure: Dirty MRF</p> <p><i>Extraction of recyclables from general waste and creation of a fuel for energy recovery</i></p>	<p>Food Waste Campaign - Residual Bins</p> <p><i>Public engagement campaign and enforcement to target food waste in the general waste</i></p>

These options require strong decision making, resilient leadership and clarity of vision to introduce and sustain. The change required from the Council and residents should not be underestimated.

Simply put, if the above recommendations are not implemented the city will not contribute to the 50% recycling target for NI, and will miss the opportunity of supporting jobs through improved resource use. The opportunity for success is within our gift should we choose to grasp it.

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1. Introduction

The Council has developed its first Community Plan called **The Belfast Agenda**, which establishes a new vision for the city

“By 2035 we want Belfast to be a successful and competitive place, at the heart of a thriving city region with fantastic quality of life; a shared city; a city where ambitions can be achieved; and a city where the world wants to be”

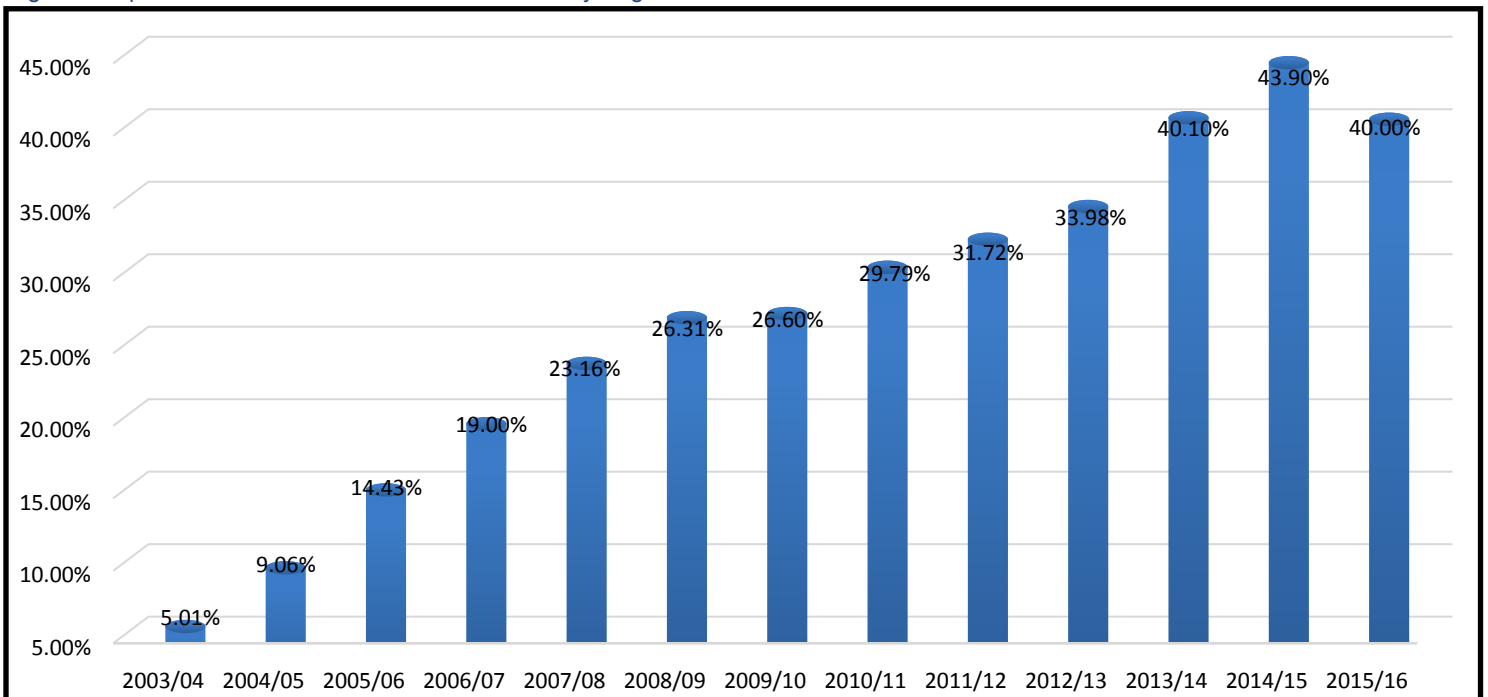
This long-term plan will inform the redevelopment of Belfast by focusing on four key areas – Growing the Economy, City Development, Working & Learning, and Living Here. In real terms, Belfast is seeking to attract a further 70,000 new residents and 50,000 new jobs. As a contribution to this agenda, we commit to reducing the level of household waste going to landfill: for Belfast, this is one of the most significant risks in terms of cost, compliance, operations and reputation. In 2015/16, we spent almost £6M collecting waste and £20M treating and disposing of it.

But there are also opportunities, recycling is considerably less expensive than sending waste to landfill or for energy recovery. For example, **if everyone put the correct items in the correct bin, the Council would save almost £2 million per year and boost the recycling rate by a staggering 20%**. So, recycling saves money, recovers valuable resources which can be used again², thereby creating new and supporting existing employment, and it is beneficial for the environment.

This Waste Framework flows from the Council’s Community Plan and identifies the steps which need to be taken to ensure that Belfast complies with its legal requirements and delivers a fit-for-purpose approach to managing waste in the 21st Century.

Over the past decade, our recycling rate has risen steadily to a high of 44% in 2014/15 (see Figure 1)³. With Local Government Reform and a general rise in the amount of waste produced by householders, the Council’s 2015/16 recycling rate dipped to 40%. The 40% recycling rate is coming under increasing pressure due to; continued increases in the amount of waste generated, reduction in the number of waste treatment & recycling providers and challenging end markets/commodities, resulting in a shift towards energy recovery rather than recycling in a number of instances.

Figure 1 Improvement in the Council’s Household Recycling Rate



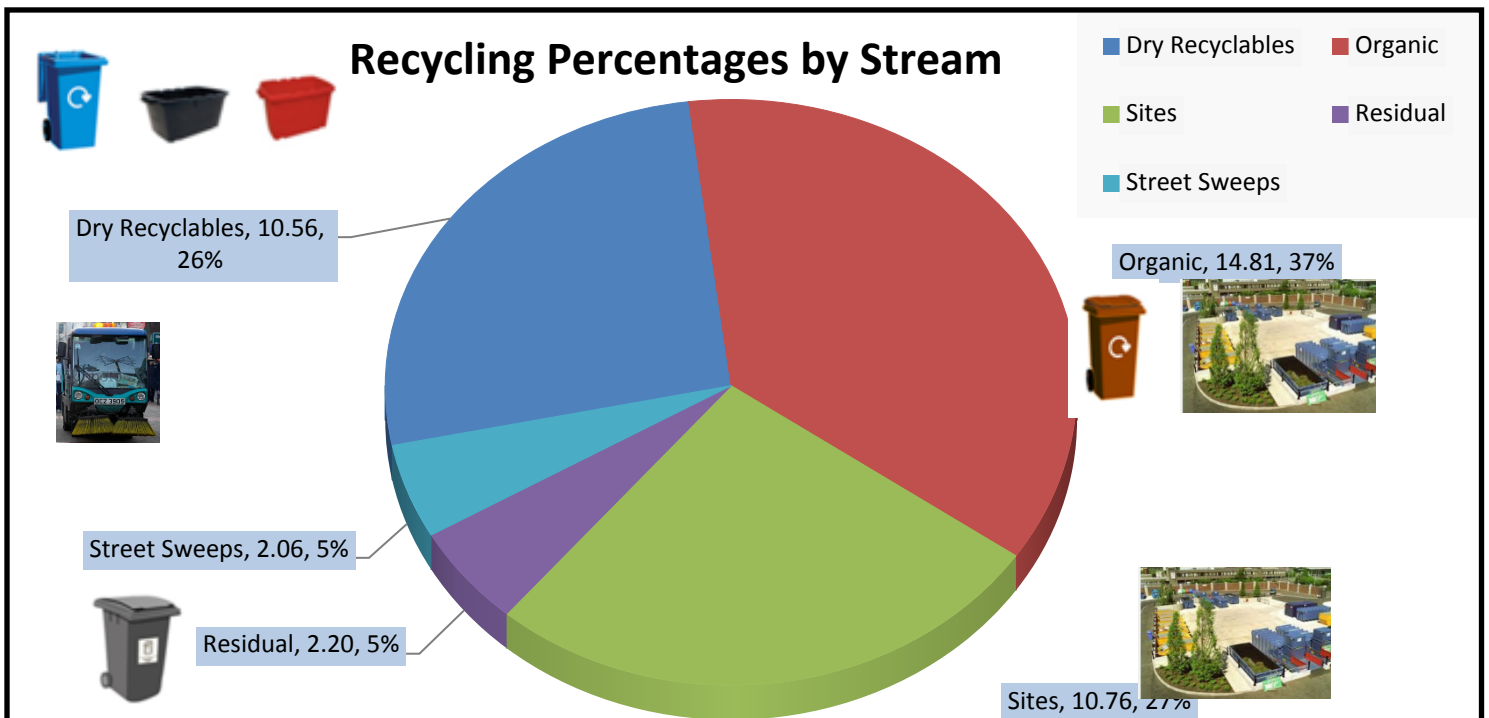
2. Drivers for Change - What this means for Belfast

Despite this positive trend, recent performance suggests that we may have reached a plateau and adopting a business as usual approach will mean we do not achieve the 2020 household recycling rate target of 50% (see Figure 2 below) – the drivers for change mean that we cannot stand still, but need more material to be recycled, more often. **A paradigm shift is needed** – to recycle around 20,000 more tonnes per annum. This will require different waste collection schemes, new infrastructure and changes to our behaviour.

To further **reduce what we landfill or send for energy recovery, comply with new legislation and avoid being fined⁴, we are looking to improve our recycling** – which will also contribute to reducing Belfast's carbon emissions. Figure 2 shows the tonnages which were collected in 2015/16 and how they contributed to our final performance.

The Drivers for Change

Figure 2: the Council's recycling tonnage for 2015/16



2.1. Separate Food Waste Collection Legislation

In 2015, new legislation came into force which requires Councils to provide a separate collection service for food waste by April 2017⁵.

Currently, we provide two main waste collection methods – a kerbside sort/box scheme for the inner city (around 58,000 households) and a bin scheme for the outer city (around 93,000 households – see Appendix 2). There is also an outer city pathfinder project for circa 1,100 households, which involves a separate, dedicated, weekly food waste scheme.

The inner city collections, comprised of a twin box and separate food waste service⁶, are provided by our contractor, Bryson Recycling⁷; while we operate a multi-bin collection service in the outer city which includes a mixed food and garden waste service using brown bins. We continue to review collection arrangements to determine what options work best for us to collect and recycle more waste.

2.2. Separation of Waste at Source – TEEP/ Collection Options

Under Waste Regulations (NI) 2011 (amended 2013), the Council is required to separately collect – paper, card, glass and metals. There are further items in the legislative pipeline which may increase the focus on achieving better quality recyclables, and separation of waste at source is one key means by which this can be delivered.

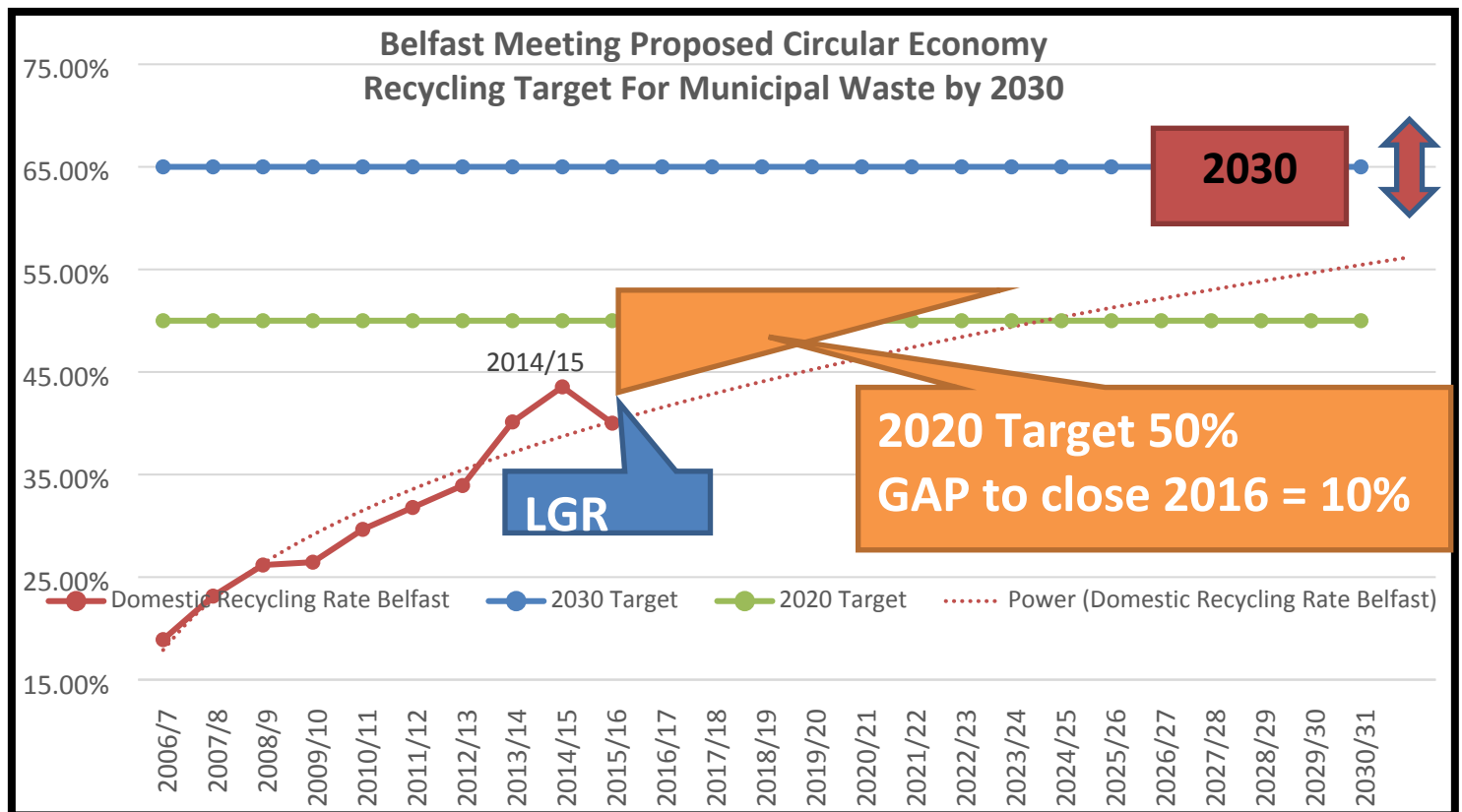
Currently, separate collection is provided for 55,000hh by Bryson Recycling in the inner city, and a further 3,000 as part of a “Stacker box” project, as well as in 22,000 household which are on a glass only separate collection pathfinder initiative in the outer city – a popular, but expensive, scheme. A network of around 50 bring banks also complements this scheme.

The legislation requires the Council to provide separate collections of the above materials unless it can show that comingled collections can provide as good quality as separately collected. Currently, comingled collection contamination rates, despite numerous interventions remains at around 13%. This has a significant impact on revenue generation. Should the Council be able to reduce the contamination to below 5% under the present arrangements, this could generate an income in the region of £800,000. The current arrangement results in an annual cost of £350,000 meaning a saving to the Council of over £1 million.⁸ Separation at source (i.e. at the kerbside), is a major method of reducing contamination and therefore improves the quality of product, thereby increasing income for the Council.

2.3. Recycling Targets

The current business as usual arrangements will not deliver **the 50% recycling target by 2020**. It is also recognised that NI will fail to achieve this target unless dramatic action is taken. This led to a recycling gap analysis, completed in November 2016, to provide strategic guidance in regards to schemes which could significantly boost recycling performance across the board. Belfast faces a significant challenge to add a further 10% to its present recycling rate. This is not the final picture as further targets to deliver a Circular Economy are likely to emerge for 2030 and beyond¹. Figure 3 below shows the gap analysis and the scale of the issue that needs to be addressed:

Figure 3: The shortfall in the Council's projected performance in 2020 and 2030



¹ The EU Circular Economy package is considering introducing a statutory 65% recycling target by 2030.

2.4. Landfill Diversion Targets - Treatment & Disposal

The Council is required to meet its NILAS (Northern Ireland Landfill Allowance Scheme) obligations, aimed at reducing the amount of biodegradable waste disposed of to landfill. As these allowances reduce year on year to 2020, the challenge becomes increasingly difficult. Based on current operations and projections continuing, **in 2020 we risk breaching our NILAS obligations and could be subject to fines of £2M⁹.**

In 2015/16, waste collection, treatment and disposal cost the Council around £26M, approximately one sixth of its annual revenue budget. To comply with landfill diversion targets, we “*balance*” the residual waste between landfill and energy recovery. Given the financial constraints being experienced across Belfast, fundamental reform is imperative to drive recycling and deliver a value-for-money approach and at the same time mitigating risk.

The same year, as part of the £26M Service costs, we paid approx. £3M in landfill tax to the UK Exchequer. Based on current projected landfilling rates, this tax will increase by an additional £80K in 2017/18. This tax payment represents a lost opportunity to invest in local job creation and is a sunk cost to the Council¹⁰.

As waste management operations improve and landfill sites close, there is likely to be an increase in gate fees. WRAP research¹¹ shows that the NI median gate fee is currently £17 per tonne (exc. landfill tax) with a maximum range of £55/t. At the projected levels of landfilling, we could end up paying an additional £930K per annum, once the current contract finishes.

The arc21 regional waste group is in the process of procuring residual waste treatment facilities to meet future landfill diversion targets. These facilities specifically minimise risk for Belfast by providing security of waste disposal¹² and potential revenue share from the sale of recyclable materials and energy, but they are subject to obtaining planning permission and completion of the procurement exercise.

In 2014, a waste compositional analysis showed that an average residual bin contained around 50% of recyclable/compostable materials. **If this material was all recycled using the latest 2015 figures, we could save around £1.9M** per annum, and **increase our recycling rate by around 20%**¹³. Two materials were of particular note, food waste (25%) and glass (5%). Both of these could be recycled relatively easily, and are subject of pilot projects. Not servicing these streams presents a missed opportunity for us to contribute positively to Belfast’s Circular Economy in regards to supporting existing jobs, creating new ones, developing new sectors and providing new training opportunities.

To add additional urgency to this situation, **recently (Q1 2016), the amount of waste produced in Belfast has increased sharply – by around 4%**; double the projected figure, and analysis shows that this is primarily from increased waste being disposed of at the recycling centres and CA sites. The underlying trend of kerbside waste has remained in line with forecasted tonnages. We need to create a step change to our recycling performance (bringing with it efficiencies), and create environmental, social and economic benefits for Belfast¹⁴.

Considering what needs to be done to deliver 50% recycling, **stronger engagement with the public is needed at key stages in implementing the Waste Framework; education and promotion, public recognition, and incentives will be essential but, ultimately, enforcement may be required.** As the biggest council, we should be leading NI by example. We manage around 170K tonnes of municipal waste per annum and it is clear from the drivers outlined above that reorganisation of our waste and resources services and infrastructure is not just an option but an imperative.

In essence a fundamental shift is required in terms of how we re-design waste collection services and operational practices and these need to be supported with educational campaigns to bring about the desired behavioural change.

2.5. Structural Changes

The current structure is not fit for purpose and is subject to a wider departmental and Organisational Development review. Operational efficiencies are anticipated from the amalgamation of the waste collection operations with waste treatment and disposal.

This is subject to an ongoing change management work stream which will consider the recommendations of this report-

2.6. Financial Challenges

With uncertainty in regards to Brexit, the Service has been experiencing increasing costs, arising from exchange rate fluctuations from the gate fees of European energy recovery facilities, to cost increases in fuel. Over the last two years the Service has also been experiencing decreasing income as a result of variability in the sale of dry recyclables on world markets. Whilst this is the case and outside the control of the Council, external validation has shown that waste disposal contracts in the Council represent either reasonable or good value for money²

To date, the Council's approach has been highly reliant on the market place, (i.e. external contractors). The scale of the NI market makes it relatively unattractive for major players such as Veolia, Sita or Biffa and it is reliant upon a limited number of smaller, local players, meaning treatment and disposal costs are likely to remain higher. The service has also developed partnership links with social enterprises running several contracts for collection and recycling – some of which have introduced innovative solutions.

There is a significant underlying problem of criminality within the sector that has and continues to discourage investment. These issues contribute to challenges in regards to procurement and management of contracts with associated resource implications. DAERA has been working with councils to determine how these issues can be better addressed.

The challenge for the Council is to address these issues which are primarily financial and reputational so that resilience and sustainability are incorporated into future plans. It is imperative therefore that options for collection, infrastructure and behaviour change are reviewed in terms of value for money and economic sustainability.

Note on Costs

The costs outlined within this document in regards to collection options have been produced as if the Council were to progress these options as the sole provider. It is recognised that this may not necessarily be the case, with potential options including collaborative arrangements between other Councils to benefit from economies of scale, partnerships with contractors or the social economy sector or even the creation of special purpose vehicles with some of these players to deliver the desired outcomes.

Financing arrangements may also be utilised from central government funding in grant form to utilisation of the green investment bank and a myriad of other sources.

The approach in this document is to list the options with indicative costings so that a direction of travel can be agreed. This can then be refined or reduced/improved through further more detailed considerations. Making assumptions on the various potential funding and operating arrangements would add a significant layer of detail and volume to what is already a complex technical options paper. It is the intention of the Waste Framework that these aspects will form specific project options papers- with

² Review of Procurement & Contract Management in Waste Management Service (BCC) iESE Jan 2017

detailed economic assessments, including potential funding mechanisms that will be subject to scrutiny and approval by members. This will allow transparency on options and allow significant scrutiny of costs and benefits.

2.7. Resource Efficiency

This is a relatively new driver for change – as Brexit begins there are several emerging concerns that need to be mitigated against. Energy security and the need for a sustainable solution to waste require a thinking that has been different to the make, use, dispose, mind-set that has prevailed to date. The waste produced in Belfast can be harnessed to produce new goods and energy, which could drive local infrastructure and economic development. This has been coined as the Circular Economy and deals with the leakages of valuable resources – waste from the local economy.

2.8. Energy/ Resource Security

NI is heavily reliant on imports of fossil fuels to meet its energy demands. This is widely recognised as non-sustainable in the long term. There is the potential to use waste as a resource to produce a fuel for energy locally, rather than exporting it for the benefit of other European countries, or simply dumping it in a hole in the ground and paying significant landfill tax. This requires treatment and processing which creates jobs in the local economy and contributes to the recycling rate. This is the thinking behind the current arc21 Residual Waste Treatment Project – using waste for local energy production.

3. Strategic Management of Waste Collections, Infrastructure and Behaviour

In October 2016, the Council adopted an inter-governmental plan for the **strategic management of waste in NI**, requiring Belfast to:

- (i) minimise municipal waste
- (ii) achieve the 2020 recycling target of 50%, and prepare for the 65% recycling target by 2030¹⁵
- (iii) maximise energy recovery from residual waste in NI and
- (iv) ensure that sufficient landfill capacity is available in NI

This plan also highlighted that organisational changes and new procurement approaches are needed. Delivering recycling targets has been further reinforced in the new draft Programme for Government which proposes that “*increase(ing) household waste recycling*” will be used to measure success¹⁶.

The Waste Framework provides a baseline assessment and actions which will contribute significantly to the above targets.

Options regarding **collection** and **treatment/disposal (infrastructure)** arrangements have been assessed and are addressed in the section below, as have the steps to achieve increased efficiency and target delivery. The decisions are difficult and will be challenging from a public and/or political perspective and, of course, a crucial part of this strategy will be how we consult with our stakeholders and **demonstrate that the “throw-away” society is no longer fit-for-purpose**. Many studies show that by increasing recycling, more jobs are created locally¹⁷.

3.1. Collection Options

Presently, the Council has two main waste collection methods – a kerbside sort/box scheme for the inner city and a three bin scheme for the outer city. Simply maintaining the current arrangements will not deliver on the targets and may face legislative challenge in future years. In assessing what changes are required, a range of options and high-level scenarios were prepared.

The costs associated with changing current arrangements are considerable but financial support may be available from the Department of Agriculture, Environment & Rural Affairs (DAERA). This support could offset capital costs and assist the Council to contribute positively to NI Plc’s recycling performance. Notwithstanding this, challenging decisions will be needed on any alternatives.

A formal collection options study will be completed in 2016/17¹⁸ by WRAP in regards to producing a Technical, Economic & Environmentally Practicable (TEEP) assessment for the Council. This will consider which option would perform best for Belfast in terms of addressing the drivers for change in section 2 above.

Preliminary modelling work has indicated that no single option will deliver the recycling target on its own (see Table 2 below). This will therefore require further intervention and is discussed in the infrastructure and behaviours sections below.

Following an initial technical assessment, a number of options were considered and were deemed unviable in terms of cost, recycling rate performance, resource requirements and operational practices

The potential solutions that met these requirement have been selected for further testing in the following pages.

Table 1: Preliminary High-Level Waste Collection Options Appraisal

Option	Domestic Recycling rate	Selected for Comparison
1. Business As Usual (BAU)	40%	Yes - Base Case But does not Achieve RR
2. BAU + Glass Box + Food Caddy	42%	Yes – Uplift
3. Kerbside Sort (Modelled)	42%	Yes – Uplift

In order to allow an initial comparison, the options which **do not achieve the desired recycling rate have been excluded**, this will be subject external validation, the three options within this document to be examined will be; **1 The base case – Business as usual, 2 Business as usual with separate glass box collection and dedicated food waste and finally 3 Kerbside Sort wheelie-box with food waste collection.**

Options Comparison

The following scenarios are based on 2015/16 tonnage and are modelled cases. A more detailed external collections options appraisal will be conducted before the end of quarter one 2017, to determine the optimal level of performance and efficiency which can be achieved for the Council.

Key:

In order to make a presentable and easy to read assessment of options the following key will be utilised throughout this document.

Driver For Change	✓ / X	Assessment key
1. Separate Food Waste Collection Legislation	✓	✓ Meets Requirement as set out in driver for change
2. Separation of Waste at Source – TEEP	?	? May not meet requirement but has elements that may contribute
3. Recycling Targets	?	
4. Landfill Diversion Targets - Treatment & Disposal	X	X Does Not Meet Requirement
5. Structural Changes	XX	
6. Financial Challenges	XXX	XX or XXX Denotes Significantly different to requirement e.g. XXX Indicates significant costs)
7. Resource Efficiency	XXX	
8. Energy/ Resource Security	NA	NA Not Applicable

Financial Estimates

The base case sets out the projected medium term financial plan in 3.2. This will be the basis for comparison for all other options- that is, if there is savings or cost increases when compared to the base case.

Note the financial estimates noted are the difference between Option 1 Business As Usual (which is the current 16/17 Waste Medium Term Waste financial Plan) and the additional modelled costs of scenarios Option 2 BAU with Food and Glass and Option 3 Kerbside Sort

3.2. Collections Option 1 Business as Usual - Base Case



Potential Recycling Rate:
40%

The base case is the current method of collection, which includes several schemes that are appropriate to the housing stock within the city.

Option Explanation –

Broadly this is arranged as two separate methods of collection;

1. Outer City - 3 bin scheme – alternate weekly collection, lower density housing, in-house delivery.
2. Inner City – weekly recyclables and food waste collection, fortnightly residual, higher density

Driver For Change	✓/X	Comments
1. Separate Food Waste Collection Legislation	?	Unclear if food waste collected in organics bin would adequately demonstrate full compliance
2. Separation of Waste at Source – TEEP	?	Unclear if dry recyclables collected comingled in recycling bin would adequately demonstrate full compliance
3. Recycling Targets	X	Will not achieve target
4. Landfill Diversion Targets - Treatment & Disposal	X	Will not achieve target
5. Structural Changes	X	Changes to collection schemes will be needed to regularise
6. Financial Challenges	X	Will require some additional funding for regularisation
7. Resource Efficiency	X	Through quality of materials, will make limited contribution to local jobs/circular economy
8. Energy/ Resource Security	NA	

housing, service provided by contractor

Advantages	Disadvantages
<ul style="list-style-type: none"> In house flexibility to adopt to changing regimes 3 bin scheme – simple & familiar Inner City – wide range of materials 	<ul style="list-style-type: none"> Multiple systems = resident confusion and less efficient operations Limited range of materials available in dry recycling bin and contamination Will not achieve the required improvements

Financial Estimates: (Full Supporting Evidence –see Section 9.1 Appendices)

17/18: £20,241k, 18/19: £21,653k, 19/20: £22,228k, 20/21: £23,493k Additional Capital Costs: Nil

Summary Option 1

Does not meet future requirements or address the drivers for change.

	<ul style="list-style-type: none"> Legal compliance – likely to be more challengeable
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3.3. Collections Option 2 Business as Usual - Base Case & Food & Glass

This option adds a number of additional collection schemes (separate food & glass) to the current base case. This primarily affects the outer city collection arrangements.

Outer City – Business as Usual with Separate Food and Glass Collections



Potential
Recycling
Rate:
42%

Option Explanation –

Broadly business as usual with Food & Glass in Outer City

1. Outer City- 3 bin scheme + food caddy + glass box – alternate weekly collection lower density housing in house delivery.
2. Inner City – Remains business as usual in option 1

<i>Driver For Change</i>	<i>✓ / X</i>	<i>Comments</i>
1. Separate Food Waste Collection Legislation	✓	<i>Separate food waste collected will comply</i>
2. Separation of Waste at Source – TEEP	?	<i>Unclear if dry recyclables collected in recycling bin would adequately demonstrate full compliance</i>

3. Recycling Targets	✓	Will contribute to target
4. Landfill Diversion Targets - Treatment & Disposal	✓	Will contribute to target
5. Structural Changes	✓	Collection operations and crews can be streamlined
6. Financial Challenges	XXX	Will require major funding for new receptacles and operations
7. Resource Efficiency	XX	Through quality of materials, will make limited contribution to local jobs/circular economy
8. Energy/ Resource Security	NA	

Advantages	Disadvantages
<ul style="list-style-type: none"> • Current arrangement remains in-house with flexibility to adopt to changing regimes • 3 bin scheme – additional capacity • Outer City – wider range of materials 	<ul style="list-style-type: none"> • Different systems across city can lead to resident confusion and less efficient operations • Limited range of materials available in dry recycling bin and contamination issue • Costs – Additional Vehicles, Crews Bins/Containers • Increased Carbon Footprint due to multiple additional collections

3.4. **Collections Option 3 – Multi Stream Kerbside Sort**

Financial Estimates: (Full Supporting Evidence –see Section 9.1 Appendices)

17/18: 0, 18/19: £639k, 19/20: £639k, 20/21: £639k, =+£1,917K Capital Costs to 2020: £2,468K

Summary Option 2

Contributes to the recycling rate but has increased costs and increased complexity of collections

This option provides a uniform collection arrangement across the city



Potential Recycling Rate:
42%

Option Explanation –

Single method of collection across the city.

1. Wheelie Box replaces the blue bin in the outer city and individual boxes in the inner city
2. Weekly collection of dry recyclables and food waste across whole city
3. Brown bin remains for garden waste only in outer city
4. Fortnightly residual remains at present.

Driver For Change	✓ / X	Comments
1. Separate Food Waste Collection Legislation	✓	Separate food waste collected will comply
2. Separation of Waste at Source – TEEP	✓	Separate dry recyclables collected will comply
3. Recycling Targets	✓	Will contribute to target
4. Landfill Diversion Targets - Treatment & Disposal	✓	Will contribute to target
5. Structural Changes	✓	Collection operations and crews can be streamlined
6. Financial Challenges	XX	Will require funding for new receptacles and operations
7. Resource Efficiency	XX	Through quality of materials, will make positive contribution to local jobs/circular economy
8. Energy/ Resource Security	NA	

Advantages	Disadvantages
<ul style="list-style-type: none"> • City wide – greater range of materials • Standardised approach – simplifies communications • Removes legal challenge separate collections • Decreased Contamination • Decreased Carbon footprint • Cheapest operating costs to deliver compliance • Increased Frequency Of Collections • Additional Recycling capacity • Meets Direction of Travel in industry 	<ul style="list-style-type: none"> • High Capital Set Up costs – may be mitigated with central Government funds • Scheme Acceptance – public & operationally

Financial Estimates: (Full Supporting Evidence –see Section 9.1 Appendices)

17/18: 0, 18/19: £-261k, 19/20: £-261k, 20/21: £-261k, (a Total saving of £783K by 2020) Additional Capital Costs £9,775k

Summary Option 3

Contributes to the recycling rate, higher set up costs lower running costs and meets majority

3.5. Summary of Collections Options – Initial High-Level Waste Collection Options Appraisal

Table 4 Collection Options

	1. Business As Usual (BAU)	2. BAU + Food + Glass	3. Multi Stream Kerbside Sort
Recycling Rate	40%	42%	42%
Finance			
Additional Capital Costs	£0	£ 2,468k	£ 9,775k
Ann Net Expenditure Inc/Dec Vs BAU		£1,917	-£783k
Drivers for Change			
1. Separate Food Waste Collection Legislation	?	✓	✓
2. Separation of Waste at Source – TEEP	?	?	✓
3. Recycling Targets	X	✓	✓
4. Landfill Diversion Targets - Treatment & Disposal	X	✓	✓
5. Structural Changes	X	✓	✓
6. Financial Challenges	X	XXX	XX
7. Resource Efficiency	X	XX	✓
8. Energy/ Resource Security	NA	NA	NA
Selected order of Preference	3	2	1

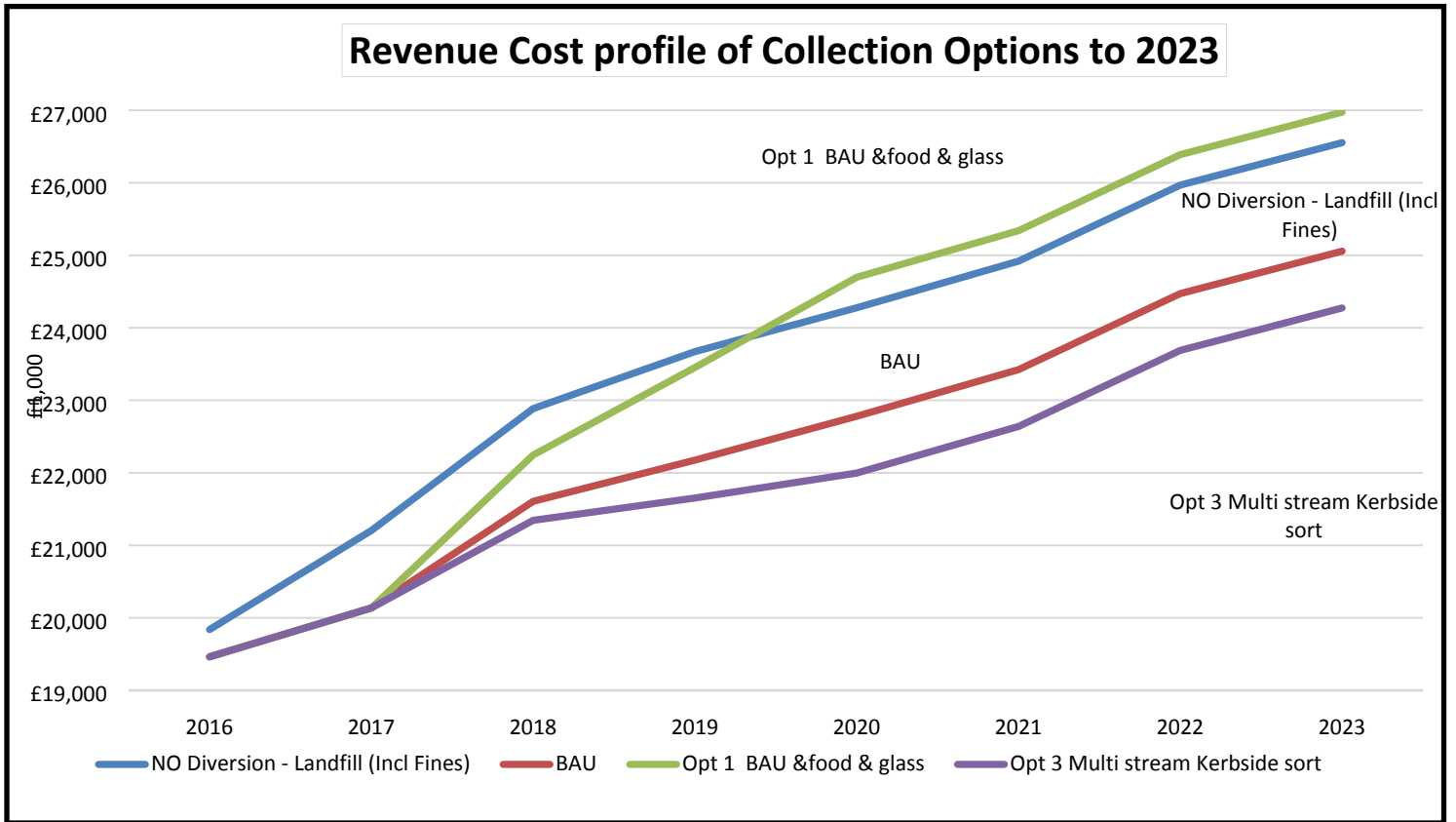
The Preferred Option is the Multi Stream Kerbside Sort. It is envisaged that there will be the opportunity to significantly reduce the high initial capital costs through central government support (Rethink Waste Program). It is noted that this option is significantly cheaper on an annual basis than option 2. It is also noted that an Invest NI funded Collaboration Engagement Network, which includes local reprocessors, have found that this options yields the best results in terms of high quality recyclable material and ultimately supporting local job creation. These findings have been factored into the Resource Efficiency category.

Further details including financial information and tonnage modelling is available within Appendix 1 of this report.

Note that this initial assessment is indicative and a further detailed technical assessment is to be completed in quarter four 2016 by WRAP.

For comparative purposes the above options have been profiled each year to 2023 is shown below. This includes an option to remove all diversion and landfill all waste (this includes fines).

Figure 1 Revenue Cost Profiles of Collection Options to 2023



As can be seen, the cost profiles above Option 1: Business as Usual with separate glass and food waste collections and the option for no diversion (including fines) are cost prohibitive.

Business as usual will not contribute further to the recycling rate and is more expensive than Option 3 Multi Stream Kerbside sort.

Option 3 Multi-stream kerbside sort offers a reduction in revenue costs and an increase in recycling rate. This alone makes this the preferred recommendation. Whilst it is noted that this option has significant capital costs, DAERA is confident that central government funding will be available to assist councils committing to this approach and to that extent, a capital bid of £30m has been submitted to Central Government by DAERA for this purpose.

4. Infrastructure Options

As stated above (see Section 3), we are committed to delivering the recycling targets and to maximise use of energy from residual waste. The options above outline the best way forward for improving waste collection, however to support the preferred collection option and fully deliver a the full potential of a Circular Economy for Belfast, it is envisaged that infrastructural investment will be required. This section focuses on Infrastructure options.

The Infrastructure options broadly fall into two categories:

1. **Residual Infrastructure** - concerned mainly with diversion of waste from landfill and avoidance of fines and legal compliance
2. **Recycling infrastructure** – concerned mainly with contributing to the recycling rate, legal compliance and increased revenue

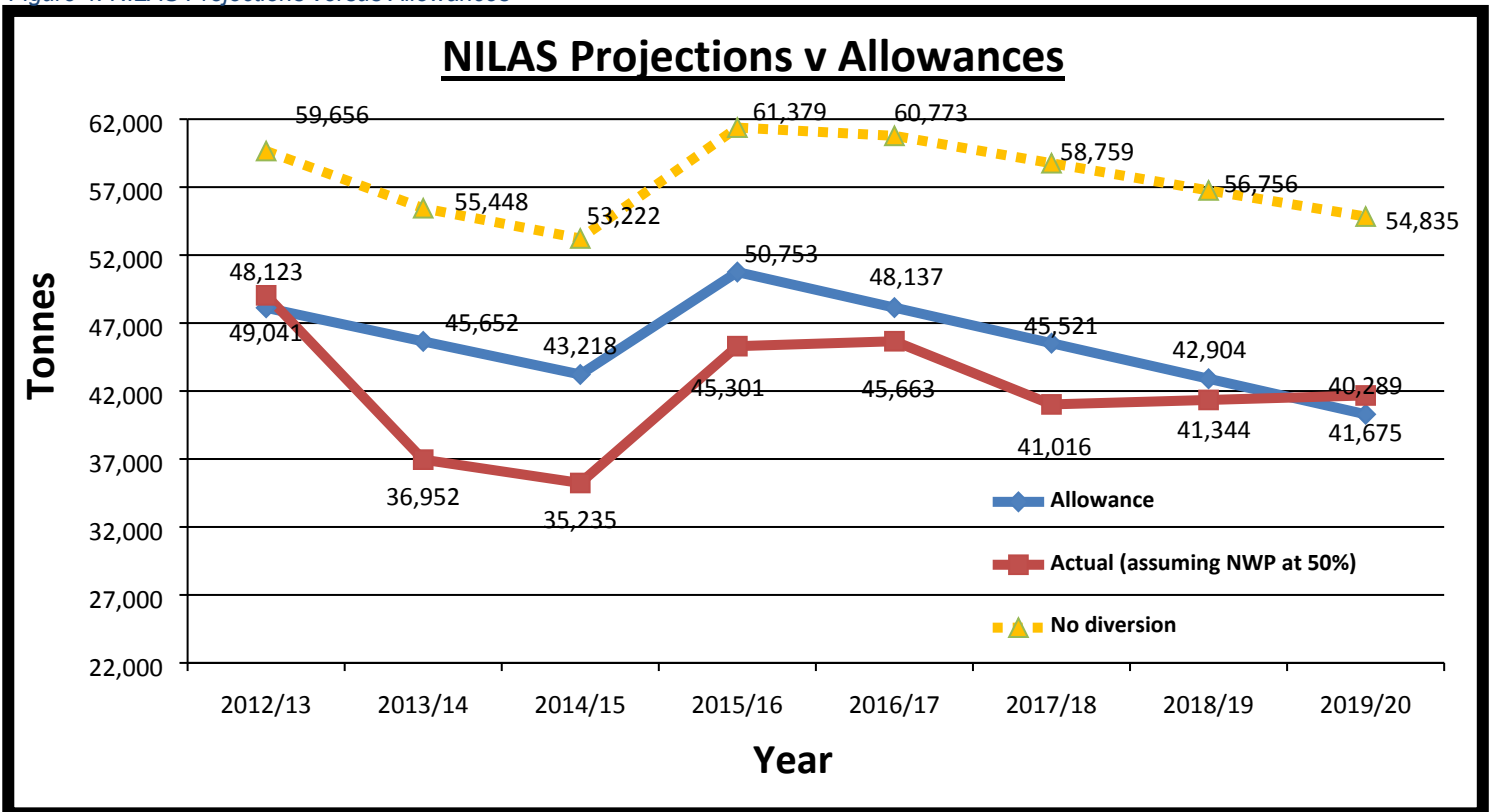
4.1. Residual Infrastructure

There is an increasing urgency in regards to securing adequate infrastructure due to the uncontrollable nature of the increases in waste. Quarter one 2016 is an example of this unforeseeable increase of **4% in Belfast's wastes**, which is representative of a 3.5% general increase across NI.³ This has required an in year intervention to divert and treat more waste from landfill. Should this situation continue without further intervention, the Council will breach its NILAS allowances going forward and potentially be subject to considerable fines (see Figure 4). These fines are £150/t for every tonne above the allowance in 2020 which could result in a financial penalty of approximately £2 million.

The Council is currently committed to the arc21 Residual Waste Treatment Project. This is a six council collaborative partnership to procure a bespoke infrastructure solution for the treatment and disposal of residual waste. This project has experienced significant delays and is currently, at time of writing, subject to a planning appeal. Whilst there is the prospect of merchant capacity being introduced to the current marketplace these solutions are not bespoke to the requirements of the Council but a watching brief is being maintained.

The residual options would only be considered in the context of no arc21 solution.

Figure 4: NILAS Projections versus Allowances



³ <https://www.daera-ni.gov.uk/articles/northern-ireland-local-authority-collected-municipal-waste-management-statistics>

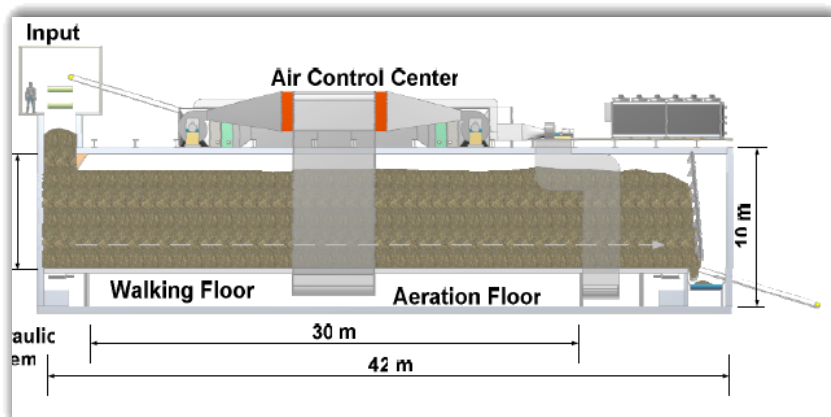
Moving forward, it is recognised there is an infrastructural deficit which requires attention and which would help us achieve the targets by developing more robust approaches to waste treatment and disposal. The Council is committed to developing a Bio-Economy Industrial Park on the North Foreshore and some of the following options considered could be sited there. Should this be agreed, this could have the added benefit of being viewed favourably regarding planning and could provide a stimulus to the Park by creating an anchor tenant. From the initial technologies, a number of options were considered and are considered in the following pages.

4.1.1. Residual Waste Infrastructure - Drying Halls

Option Explanation

In order to achieve NILAS, there is a requirement to decrease the amount of residual waste going to landfill either directly or after treatment. Residual waste has high levels of moisture content, however when dried and with some treatment this can be used as a fuel. This option proposes that the Council develops its own drying facility, which would decrease the total tonnages sent for final treatment or landfill.

This proposal would see the Council build a facility to dry 80K tonnes of residual waste per annum, prior to sending for treatment/disposal and **potentially reduces the cost of residual waste by around 20%**¹⁹. If this was applied to the 2015/16 residual waste costs this could mean a potential saving (exc. cost of drying) of £1.5M



This option would be subject to planning permission/size of operation/cost/environmental controls

Driver For Change	✓ / X	Comments
1. Separate Food Waste Collection Legislation	NA	
2. Separation of Waste at Source – TEEP	NA	
3. Recycling Targets	NA	
4. Landfill Diversion Targets - Treatment & Disposal	✓	Will contribute to landfill target
5. Structural Changes	✓	Will maximise fleet
6. Financial Challenges	XXX	Will require major funding for design/build/operate
7. Resource Efficiency	?	Unclear what impact this will make to local jobs/circular economy
8. Energy/ Resource Security	✓	Will contribute to energy security

Advantages	Disadvantages
<ul style="list-style-type: none"> Reduced contracted & treatment costs NILAS compliance Job creation Potential to use landfill gas generator heat as drying source 	<ul style="list-style-type: none"> High capital set up costs – Annual revenue costs Operational complexities/unproven Size of facility required- Very Large May take Longer than 2020 to build

Financial Estimates: (Supporting Evidence – Options Appraisal report in draft below is extract)

17/18: £0, 18/19: £0, 19/20: £-500k, 20/21: £-500k, (Total Ann saving of £1m by 2020)

Capital Costs £29.3m (as part of a Dirty MRF operation)

Summary Option 4.1.1

Meets diversion requirements, unproven technology and likely to require significant land & capital

4.1.2. Residual Waste Infrastructure - Council-owned Dirty Material Recycling Facility (MRF)

Option Explanation

In order to achieve NILAS, there is a requirement to decrease the amount of residual waste going to landfill either directly or post treatment

This proposal would see the Council build a dirty MRF facility to treat up to 80K tonnes of residual waste per annum prior to sending for energy recovery. This process involves extraction of recyclables from the general waste, then shredding and baling for energy recovery. This could yield a maximum of 4% to the overall recycling rate.



This would also be subject to planning permission/size of operation/cost/environmental controls

Driver For Change	✓ / X	Comments
1. Separate Food Waste Collection Legislation	NA	
2. Separation of Waste at Source – TEEP	NA	
3. Recycling Targets	NA	
4. Landfill Diversion Targets - Treatment & Disposal	✓	Will contribute to target
5. Structural Changes	✓	Will maximise fleet
6. Financial Challenges	XX	Will require major funding for design/build/operate
7. Resource Efficiency	✓	Through sorting of materials, will make contribution to local jobs/circular economy
8. Energy/ Resource Security	✓	Will contribute to energy security

Advantages	Disadvantages
<ul style="list-style-type: none"> • Reduced Contracted & Treatment Costs • Nilas Compliance • Job Creation • Additional recycling • Proven technology – standard set up • Reduces risk of gate fee increases 	<ul style="list-style-type: none"> • High Capital Set Up costs – • Operational complexities • Size of facility required • Timescale until operation (3-5 Yrs.)

Financial Estimates: (Supporting Evidence – Options Appraisal report in draft below is extract)

17/18: £0, 18/19: £0, 19/20: £0, 20/21: £2,500k, (Total additional annual cost of £2.5m from 2020)
Capital Costs £20m

Summary Option 4.1.2

Meets diversion requirements, contributes to recycling rate, proven technology but likely to require significant land, capital and will have considerable time constraints.

4.1.3. Recycling Infrastructure - Clean Material Recycling Facility (MRF)

Option Explanation

This proposal would see the Council build Clean MRF facility to sort around 15K to 20K tonnes of dry recyclables prior to selling on open markets. This process will also address contamination within the collections such as the current Recycling bin arrangements. This option would not be required should the multi stream kerbside sort collection be selected as this will require significant less sorting and is outlined in 4.1.4



<i>Driver For Change</i>	<i>✓ / X</i>	<i>Comments</i>
1. Separate Food Waste Collection Legislation	NA	
2. Separation of Waste at Source – TEEP	NA	
3. Recycling Targets	NA	
4. Landfill Diversion Targets - Treatment & Disposal	NA	

This would also be subject to planning permission/size of operation/cost/environmental controls

Financial Estimates: *(Supporting Evidence – Options Appraisal report in draft below is extract)*
 17/18: £0, 18/19: £0, 19/20: £0, 20/21: £2,000k, (Total add Annual cost of £2.m from 2020)
 Capital Costs £10-£15m

Summary Option 4.1.3

Mitigates contractor risk, maximises income for Council and potentially for service provision to other Local Authorities

Advantages

Disadvantages

<ul style="list-style-type: none"> Reduced contracted & treatment costs 	<ul style="list-style-type: none"> High capital set up costs –
<ul style="list-style-type: none"> Increased income and reduced risk control of income shocks and improved transparency ✓ 	<ul style="list-style-type: none"> Operational complexities and associated risks <i>Through sorting of materials, will make contribution to</i>
<ul style="list-style-type: none"> Job creation 	<ul style="list-style-type: none"> Size of facility required
<ul style="list-style-type: none"> Proven technology – standard set up 	<ul style="list-style-type: none"> Income risk dependant on commodity markets
<ul style="list-style-type: none"> Reduces risk of gate fee increases 	

4.1.4. Recycling infrastructure - Recyclables bulking station

Option Explanation

This proposal would see the Council build bulking station to semi sort, bulk and prepare for sale of up to 50K tonnes of dry recycling prior to selling on open



Driver For Change	✓ / X	Comments
1. Separate Food Waste Collection Legislation	NA	
2. Separation of Waste at Source – TEEP	NA	
3. Recycling Targets	NA	
4. Landfill Diversion Targets - Treatment & Disposal	NA	
5. Structural Changes	✓	<i>Will maximise fleet</i>
6. Financial Challenges	✓	<i>Will require some funding for design/build/operate, but will maximise income generation</i>
7. Resource Efficiency	✓	<i>Through sorting of materials, will make contribution to local jobs/circular economy</i>
8. Energy/ Resource Security	NA	

markets. This process will also address contamination within the collections. This option would be **recommended should the multi stream kerbside sort collection be selected.**

This would also be subject to planning permission/size of operation/cost/environmental controls

Advantages

Disadvantages

<ul style="list-style-type: none"> Reduced Contracted & Treatment Costs 	<ul style="list-style-type: none"> Capital Set Up costs – cheaper than recycling infrastructure option
<ul style="list-style-type: none"> Increased Income and reduced risk control of income shocks and improved transparency 	<ul style="list-style-type: none"> Operational risks
<ul style="list-style-type: none"> Job Creation 	<ul style="list-style-type: none"> Size of facility required smaller scale than recycling infrastructure option 1
<ul style="list-style-type: none"> Proven technology – standard set up 	
<ul style="list-style-type: none"> Reduces risk of gate fee increases 	

Summary Option 4.1.4

Mitigates contractor risk, maximises income for Council and potentially decreased costs, cheaper than recycling infrastructure option (MRF)

4.2. Infrastructure Options Appraisal

Whilst the above highlights the strengths and weakness of the proposals in regards to the potential risk and benefits, the table below notes the costs and impact to the recycling /diversion rates.

These options are being explored further to determine the best return on invest and to consider if a preferred approach should be submitted for inclusion in the Council's capital programme.

Table 3: Initial High-Level Waste Treatment Options Appraisal

	Residual Infrastructure*		Recycling Infrastructure	
	1 Drying Hall	2. Dirty MRF	1 Clean MRF	2 Bulking Station
Recycling Rate	NA	4%	NA	NA
Finance				
Additional Capital Costs	£29m	£21m	£10-15m	£5m
Ann Net Expenditure Inc/(-Dec)	-£500k	£2.5m	£2m	£1m
Drivers for Change				
1. Separate Food Waste Collection Legislation	NA	NA	NA	NA
2. Separation of Waste at Source – TEEP	NA	NA	NA	NA
3. Recycling Targets	NA	NA	NA	NA
4. Landfill Diversion Targets - Treatment & Disposal	✓	✓	NA	NA
5. Structural Changes	✓	✓	✓	✓
6. Financial Challenges	XXX	XX	?	✓
7. Resource Efficiency	?	✓	✓	✓
8. Energy/ Resource Security	✓	✓	NA	NA
Selected order of Preference	2	1	2	1

*The Residual Infrastructure option will only be considered in the event of the current arc21 Residual Waste Treatment Project not progressing.

The above table indicate the order of preference for each of the Recycling Infrastructure and Residual Waste Infrastructure streams. This infrastructure is required to mitigate meeting recycling targets and future costs and to avoid Potential NILAS Fines in regards to residual waste.

Further explanation of the preferred options is detailed overleaf

4.2.1. Residual Infrastructure Recommendation

The Council is currently committed to the arc21 Residual Waste Treatment Project. This is a six council collaborative partnership to procure a bespoke infrastructure solution for the treatment and disposal of residual waste. This project has experienced significant delays and is currently, at time of writing, subject to a planning appeal. The Council agreed that while the arc21 procurement exercise is underway the existing arrangements, balancing the residual waste sent to landfill/energy recovery should continue.

At a strategic level, the above residual infrastructure options considers what may happen if the arc21 project is not delivered. Different options for treatment/disposal have been identified, along with timescale for implementation, costs and risk.

Consideration was also given to turning back the clock and just landfilling waste but this raised a number of risks, not just from a reputational perspective but also if we breach our allowance in the next target year 2019/20 if all residual waste was landfilled we would breach our allowance by 13,160t, which would then leave the Council liable for a fine year by year of approximately £2 million.

In the event of non-delivery of the arc21 project, the recommendation for residual waste infrastructure is **Option 2 Dirty MRF**, a further option remains should the RWTP not come to pass to either build or contract for this facility. This will provide significant improvement to the recycling rate and will assist with managing risk to the Council.

Further detailed information is available within Appendix 1 of this report including financial information and modelling.

4.2.2. Recycling Infrastructure Recommendation

There is no contribution to the recycling rate from the preferred options of a bulking station over the use of a clean Materials Recycling Facility. However, this can improve the Councils income generation by retaining more ownership, control and managing risk.

This can also provide additional contingency capacity for the existing Waste Transfer Station, thereby improving the Council's resilience. Linked with the multi-stream kerbside sort collections option, there is also the potential for benefits feeding directly into the Circular Economy approach – including job creation.

5. Behavioural Change

5.1. Behaviour Change

As outlined earlier, to deliver 50% recycling, **stronger engagement with the public is needed at key stages to complement the options proposed on collections and infrastructure.**

High-level modelling in the Collections Options section has indicated that new collection arrangements are projected to deliver up to an additional 2% on the business as usual case, resulting in a recycling rate of around 42% for the city. The Council is a key player in driving NI plc to the 50% household recycling rate target by 2020 and will adopt a graduated approach to implementing a series of robust actions to achieve this, following a focused education and outreach programme.

This means that several city wide actions will be required to boost the city's recycling rate in addition to the behaviour change actions noted below. The Council approved reducing the size of the residual (black) bin on a replacement basis in September 2013,²⁰ but further steps will probably be needed to restrict the amount of waste which householders can dispose of. Many Councils are experiencing waste growth of 4% and have already commenced some of the proposed actions below:

Potential actions include (overleaf):

5.1.1. Food Waste Campaign – Residual Bin –

25% of the residual bin contents is food waste and this needs to be addressed in the most robust and sustainable manner.²¹ This would be required regardless of the collections options adopted. Consideration should be given to a new engagement policy and protocol plus associated resources to deliver this on ground. This would be supported by additional communications plans and face to face engagement. There is also the potential of a dedicated system in order to capture this information on a Council wide basis.

Driver For Change	✓ / X	Comments
1. Separate Food Waste Collection Legislation	✓	<i>Will meet compliance requirements of food waste legislation</i>
2. Separation of Waste at Source – TEEP	?	<i>Unclear to what extent food will actually be separated from garden waste – will need to be checked</i>
3. Recycling Targets	✓	<i>Will contribute to targets</i>
4. Landfill Diversion Targets - Treatment & Disposal	✓	<i>Will contribute to target</i>
5. Structural Changes	✓	<i>Minimal additional resources needed, but will require promotion and potential enforcement</i>
6. Financial Challenges	?	<i>Will require some funding/resources to promote/enforce campaign, may require information system to capture data, but treatment costs less than landfill</i>
7. Resource Efficiency	✓	<i>Increased sorting of material contributes to local jobs/circular economy</i>
8. Energy/ Resource Security	✓	<i>Increased sorting of material contributes to local energy production</i>

Advantages	Disadvantages
<ul style="list-style-type: none"> Increased recycling rate 	<ul style="list-style-type: none"> Political will is required to implement this
<ul style="list-style-type: none"> Decreased treatment costs 	<ul style="list-style-type: none"> Increased enforcement & systems costs
<ul style="list-style-type: none"> Contributes to landfill diversion 	<ul style="list-style-type: none"> Initial public acceptability
<ul style="list-style-type: none"> Job Creation 	<ul style="list-style-type: none"> Reputational risk of implementation and enforcement
<ul style="list-style-type: none"> Potential economic development – Anaerobic Digestion, vehicle fuel 	

5.1.2. Uniform roll-out of 180 litre residual waste bins –

The Council has issued around 22,000 residual waste bins since January 2014. These 180 litre bins replace the previous standard issue bin; 240 litres. This proposal would mean an acceleration from the current replacement only model to a city wide intervention. This would require a phased approach and considerable mapping and significant resources.

<i>Driver For Change</i>	<i>✓ / X</i>	<i>Comments</i>
1. Separate Food Waste Collection Legislation	?	Should encourage greater use of organic/food waste bins (i.e. food waste legislation)
2. Separation of Waste at Source – TEEP	NA	
3. Recycling Targets	✓	Will contribute to targets
4. Landfill Diversion Targets - Treatment & Disposal	✓	Will contribute to target
5. Structural Changes	✓	No additional resources needed once introduced
6. Financial Challenges	XX	Will require funding/resources to uplift/roll-out new bins
7. Resource Efficiency	✓	Increased sorting of material contributes to local jobs/circular economy
8. Energy/ Resource Security	NA	

<i>Advantages</i>	<i>Disadvantages</i>
<ul style="list-style-type: none"> Increased recycling rate 	<ul style="list-style-type: none"> Political will is required to implement this
<ul style="list-style-type: none"> Decreased treatment costs 	<ul style="list-style-type: none"> Initial public acceptability
<ul style="list-style-type: none"> Contributes to landfill diversion 	<ul style="list-style-type: none"> Reputational risk of implementation
<ul style="list-style-type: none"> Temporary Job Creation (duration of project) 	<ul style="list-style-type: none"> Significant capital and roll out costs
	<ul style="list-style-type: none"> Logistically very difficult to implement
	<ul style="list-style-type: none"> Contested ownership of residual bin
	<ul style="list-style-type: none"> Mapping current bin stock in city

Financial Estimates: (Full Supporting Evidence –see Section 8.1 Appendices)

17/18: £0, 18/19: £0, 19/20: 0, 20/21: £0,

Capital Costs £3m

Summary Option 5.1.2

Standardises bin stock across city provides impetus for increased recycling, BUT significant sunk costs, difficult to implement and likely to be initially unpopular.

5.1.3. Household Recycling Centres Review

Currently, the Council’s waste infrastructure consists of; four Household Recycling Centres (HRCs), three Civic Amenity (CA) sites, and a Waste Transfer Station (WTS). These facilities however merely sort the waste before it is sent for recycling or energy recovery/landfill by contractors. We are now considering if this arrangement is best for the Council, or whether a different approach may contribute more to achieving the target. This is particularly relevant in light of increased waste arisings (specifically residual waste) at the sites.

We have recently carried out a review of our Household Recycling Centres and Civic Amenity sites. Approximately. 25,000 tonnes is deposited at our HRCs and CA sites each year. Over five times as much waste goes to the HRCs compared to the older-style CA sites, with around 60% of HRC waste being sent for recycling while a much lower figure prevails for the CA sites (below 20%). On an average cost per tonne treated basis, the HRCs also demonstrate much better value for money than the older style CA sites.

The review recommended that consideration should be given to closing the old style CA sites. In addition there is also opportunity to increase materials accepted and review of operational procedures that reduce residual waste at the HRCs.

<i>Driver For Change</i>	<i>✓ / X</i>	<i>Comments</i>
1. Separate Food Waste Collection Legislation	NA	
2. Separation of Waste at Source – TEEP	✓	<i>Use of HRCs increases norm of waste segregation</i>
3. Recycling Targets	✓	<i>Will contribute to targets</i>
4. Landfill Diversion Targets - Treatment & Disposal	✓	<i>Will contribute to target</i>
5. Structural Changes	✓	<i>No additional resources needed</i>
6. Financial Challenges	✓	<i>No additional funding needed/will generate</i>
7. Resource Efficiency	✓	<i>Increased sorting of material contributes to local jobs/circular economy</i>
8. Energy/ Resource Security	NA	

<i>Advantages</i>	<i>Disadvantages</i>
<ul style="list-style-type: none"> Increased recycling rate 	<ul style="list-style-type: none"> Political will is required to implement this
<ul style="list-style-type: none"> Decreased treatment costs 	<ul style="list-style-type: none"> Initial public acceptability
<ul style="list-style-type: none"> Contributes to landfill diversion 	<ul style="list-style-type: none"> Reputational risk of implementation
<ul style="list-style-type: none"> Adequate provision remains 	

Financial Estimates: (From: iESE “Household Waste Recycling Centres and Civic Amenity Site review”) 17/18: £0, 18/19: £-320K, 19/20: 0, 20/21: £0, (Total Ann Saving of £320 from 2019)

5.1.4.Reduce the residual waste bin collection frequency²²–

Summary Option 5.1.3

Removal of outdated, not fit for purpose facilitates improves recycling and reduces costs **BUT** will generate localised public acceptability risks

There is potential that, should the collection options and behaviour change actions not deliver a sufficient contribution to the recycling rate, consideration should turn to reducing the collection frequency of residual waste. This is likely to be initially highly unpopular – however, as evidenced from benchmark cities this tends to pass as residents become accustomed to the new norms.

The evidence base for this action is expanding as more Councils decide that this is a highly effective method of improving recycling for the lowest outlay.

There are some potential drawback to this option which can be mitigated against such as enforcement in regards to contamination of recycling and fly tipping.

Should the public respond to the collection arrangements, recycling initiatives and the Council achieves the target, this option to reduce the frequency may be taken in regards to efficiency options. Whilst the above highlights the strengths and weakness of the proposals in regards to the potential risk and benefits the below table notes the costs and impact to the recycling /diversion rates

Driver For Change	✓/X	Comments
Advantages		Disadvantages
<ul style="list-style-type: none"> Increased Recycling rate 		<ul style="list-style-type: none"> Significant political will is required to implement this
<ul style="list-style-type: none"> 4. Separation of waste at source – TEEP Decreased treatment costs 	✓	<ul style="list-style-type: none"> Initial public acceptability – slightly more complex calendar arrangements
<ul style="list-style-type: none"> Significant Decreased Collection Costs 	✓	<ul style="list-style-type: none"> Reputational risk of implementation
<ul style="list-style-type: none"> 4. Landfill Diversion Targets Reduced Carbon Footprint 	✓	<ul style="list-style-type: none"> Potential increase in fly tipping Requires further route optimisation
<ul style="list-style-type: none"> 5. Structural Changes 	✓	No additional resources needed, but may require enforcement action
<ul style="list-style-type: none"> 6. Financial Challenges: Financial Challenges 	✓	Will reduce landfill costs/generate income
<ul style="list-style-type: none"> 7. Resource Efficiency 	✓	Increased sorting of material contributes to local
<ul style="list-style-type: none"> 8. Energy/ Resource Security 	NA	

Summary Option 5.1.2

Removal of outdated, not fit for purpose facilitates improves recycling and reduces costs **BUT** will generate localised public acceptability risks

5.1.5. Behaviour Change Options Appraisal

	1 Food Waste Campaign Residual Bin	2. Uniform roll-out of 180 litre	3 Household Recycling Centres Review	4 Reduce the residual waste bin collection frequency
Recycling Rate	1%	1.6%	1%	2%
Finance				
Additional Capital Costs	Nil	£3m	Nil	Nil
Ann Net Expenditure Inc/(-Dec)	-£188K²³	Nil	-£320K²⁴	-£1.2M
Drivers for Change				
1. Separate Food Waste Collection Legislation	✓	?	NA	NA
2. Separation of Waste at Source – TEEP	?	NA	✓	✓
3. Recycling Targets	✓	✓	✓	✓
4. Landfill Diversion Targets - Treatment & Disposal	✓	✓	✓	✓
5. Structural Changes	✓	✓	✓	✓
6. Financial Challenges	?	XX	✓	✓
7. Resource Efficiency	✓	✓	✓	✓
8. Energy/ Resource Security	✓	NA	NA	NA
Selected order of Preference	1	4	2	3

Table 3: Initial High-Level Waste Treatment Options Appraisal

Consideration should be given to a phased approach in relation to implementing these options namely: **Options 1 Food Waste Campaign Residual Bin** then **Option 3 House Recycling Centres review** followed by Option 4 Reduced frequency of the residual bin and finally Option 2 Uniformed 180ltr bins

Option 1 and option 3 represent low or no additional cost options for the Council which can be implemented relatively quickly and will have a significant positive contribution to the recycling rate.

The Council's action plans will be assessed during implementation against performance objectives. Should it become apparent that the Council is not likely to achieve the desired outcomes, then it is likely that, to increase the focus on recycling, save money and support jobs, there will be a requirement to progress some or all of the above options in an expedited manner.

5.2. Outreach Actions

Regardless of which collection and behaviour change options are selected there will be a public engagement plan that supports the implementation and delivery of the interventions.

Based on the Council's own research and experience, and a review of the waste behavioural change literature, common threads running through the research indicate that there is no silver bullet to increase recycling rates. Rather success is achieved by a combination of; multiple integrated activities, the greatest gains are to be made from the middle ground, there is a preference for hard copy over electronic, face to face engagement is preferred, repeated contact is required and provide regular feedback on performance to date.

There are a number of key strands of public engagement required to support the tasks contained within the Waste Framework and deliver the desired behavioural change.

- **Public Consultation** – A number of tasks will require conducting a formal public consultation exercise to outline the direction of travel of the Council and seek feedback from stakeholders.
- **Promotion of proposed collection schemes** – The introduction of any new kerbside collection schemes will require clear and timely communications being delivered to residents. Doorstep canvassing by the Resource Advisor team will be fundamental in this regard.
- **Improved awareness/appreciation of recycling** – Not just about right stuff, right bin but an appreciation that the actions of residents are supporting local jobs and a cleaner, greener city.
- **Tackling Contamination** – Communications have an important role to play in taking action at the kerbside to improve the quality of the recyclables and ensure that income is maximised.
- **Community Engagement** – Linking in with the networks of communities who use the Council or partner services and delivering informative and engaging talks, to encourage participation in the Council's various recycling initiatives.
- **Positive feedback & encouragement** – It is important that the public are informed about how their actions contribute to better outcomes; environmental, social and financial, where appropriate. There needs to be an assurance and "feel-good" factor that when they recycle it has a positive impact. This needs communicated on a regular basis to the public.
- **Doorstep assistance** – The Resource Advisor team can visit households on request, for example in cases where an additional bin has been requested and provide information to residents on how they could better manage their household waste.

A more detailed engagement plan can only prepared as the preferred options are determined. As a paradigm shift is necessary for the Council to achieve 50%, there will be critical decisions needed to fully implement the Waste Framework and which stage public consultation exercises will be undertaken to engage with residents and to ensure that they have an opportunity to contribute to delivery of these objectives.

The engagement plan will also feature heavily in the Departmental review of the Outreach and Communications work. The methods of engagement and resources required will comply with the findings of the Department I review of Outreach and Communication. Whilst this is being formed the tried and tested approach of current Waste Management engagement work will be utilised. This includes door to door engagement, advertising, social media push and targeted interventions.

6. Technology

The Council holds a wealth of information that has, to a very large extent, remained untapped. Waste Management has used a range of ICT approaches for data capture and presentation, bin weighing and monitoring, sensor performance and targeted interventions. With the Departmental Organisational programme however, there are significant opportunities to improve current operations, processes and work flows within Waste Collection and Waste disposal and indeed on a wider scale within the Council. At present, knowledge of how to unlock this potential lies, in the main, outside of Council. This has been recognised by Government and, as part of the digital strategy to transform government and unlocking digital growth,²⁵ Belfast finds itself with all of the key components for a Smart City and has begun to tap this potential.

Belfast is well recognised for its digital sector talent and, along with incentives, has experienced significant growth and development. The knowledge for unlocking the potential to transform government in this sense is literally on our own doorstep. The following items detail the potential methods of unlocking growth and transformation in a very real operational sense. This knowledge can be accessed through Government supported funds such as Innovate UK, or other competition funds, and will feature further within the Smart City's agenda:

6.1. *Business intelligence and Advanced Analytics*

The Council has a considerable amount data and whilst to date this has been used to record what has been done, this may not have been used in the manner which best allows the Council to see in a transparent manner the interconnectedness of issues across the city. There is a significant organisational advantage to be leveraged by employing business intelligence and analytics beyond reporting retrospectively on "**What has happened?**" Business intelligence tools and advanced analytics can provide the Council with a rich insight to answer "**Who did this happen to?**", "**Where did this happen?**" "**Why did this happen?**" And perhaps most importantly "**What if we did something different?**"

These questions can help to tailor services for Belfast's communities in a better, simpler and, at times, more cost effective manner. Fundamentally employing the right technique to give intelligence and insight will benefit the Council for strategic, tactical and operational delivery including communications that are the right fit for their intended audience.

Waste Management is pursuing this agenda along with the Smart City's team and external partners. The outcome of this work will be presented as part of each options appraisal for approval as the Waste Framework is implemented.

6.2. *Internet of Things (IOT)*

This relates to physical devices that are equipped to be "*smart*", from cars to fridges, to watches and home heating, to sensors on refuse vehicles or even on domestic and commercial bins. There is an increasing surge in the application of these devices, each of which will produce data and be connected to the internet in a way that has not been seen to date. This produces opportunities for the Council to use the data produced to provide services in a unique and specific manner; for example, to have real-time data on air quality, antisocial behaviour, traffic management - all of which, when harnessed, can contribute to developing the city to be a better place to live and work.

With such a significant fleet, in-cab technology will be vital in reducing costs – such as route management, fuel usage destinations determined by need rather than by route. Further examples of ICT use include: camera technology to identify contaminated bins as less contamination means cheaper disposal costs and improved income for the Council. Such savings could be earmarked for local investment funding in projects such as associated with the creative industries.

The internet of things is an item on the Smart City's agenda which links directly with industry to look at use of this information in the provision of private and local government services. There are several lighthouse Cities who have pilot programs, such as Edinburgh,²⁶ and learning could be applied to create investment opportunities and improve citizen engagement.

6.3. Local digital talent to solve local and not so local problems

The Council has run competitions to provide solutions to social issues. Belfast and NI is widely regarded as having a significantly high calibre of digital talent. This resource could be leveraged by the Council to highlight new investment opportunities and solve issues which would promote Belfast as a desirable place to live and work. This could contribute to a virtuous cycle of talent growth, external investment, business growth and improved city experience that will support the Belfast Agenda.

This local talent, with the right approach, can be used to provide innovative solutions to the issues surrounding recycling, waste collections and waste disposal. This talent, when combined with access to local data and data from Internet of Things sensors, could provide a springboard for new products and services which had applications beyond the Council and could be marketed.

6.4. Waste as an Asset

The Circular Economy promotes a paradigm shift in managing waste and amongst the strands of thinking on this item is to consider waste more in the context of a supply chain so that each piece can be recovered, treated and returned to the marketplace for recycling, repair and reuse. Even in the case where waste cannot be recovered to a saleable or useable asset – it still has a value in terms of energy recovery both in producing electricity and harnessing heat.

This approach is evident through current innovation in Anaerobic Digestion. The increasing commercialisation of this technology is progressing so well that it is conceivable that the Council could run its fleet on the food wastes produced in the city. This industry is currently in its infancy in NI but there is potential within the Waste Framework for technologies such as this to be supported in order to make a valuable contribution to Belfast and, in this case, there is potential for it to be sited at the Council's N4S site.

Currently, arc21 is pursuing the development of a residual waste project. This project is not just about treating and disposing of waste though and, as said above, the current project plans to use advanced recovery technology through biological and mechanical treatment to recover saleable materials, increase recycling and the prepare fuel for energy and heat recovery.

The Circular Economy is fast developing and is one in which the Council is already considered a thought leader. The Waste Framework has been drafted to complement the Council's thinking in this area – that we improve the quality of recyclables collected (kerbside sort) and reduce costly disposal options (2 Bulking station infrastructure) and, where waste must be disposed of, to ensure that final value can be recovered (Energy-from-Waste).

7. Recommendations

7.1. Arc 21 Residual Waste Treatment Project

The Council is currently committed to the arc21 Residual Waste Treatment Project. This is a six council collaborative partnership to procure a bespoke infrastructure solution for the treatment and disposal of residual waste. This project has experienced significant delays and is currently, at time of writing, subject to a planning appeal.

At a strategic level, we are considering what should happen if the arc21 project is not delivered. Different options for treatment/disposal have been identified within the Waste Framework, along with timescale for implementation, costs and risk (see Section 4). Consideration was also given to turning back the clock and just landfilling waste but this raised a number of risks, not just from a reputational perspective but also if we breach our allowance each year from now on, the NILAS fine could be almost £2M in 2019/20.

Initially, the Council agreed that while the arc21 procurement exercise is underway the existing arrangements, balancing the residual waste sent to landfill/energy recovery should continue.

7.2. Selected Recommendations

The following proposal, which assumes a baseline 40% household recycling rate⁴, outlines an approach which allows Belfast to make a significant contribution to the NI recycling rate. There are a number of key assumptions which would all be tested through public consultation but, for the sake of planning purposes, several combinations from the Waste Framework in regards to collection, infrastructure and behaviour change sections have been included below. They include;

7.2.1. Collections Options

The Preferred Option is **Multi Stream Kerbside Sort**. It is envisaged that there will be the opportunity to significantly reduce the high initial capital costs through central government support (Rethink Waste Program). It is noted that this option is significantly cheaper on an annual revenue basis than option 2. This is primarily due to the increase in income as a result of minimisation/eradication of contaminants from the collections. In addition there is significant central government proposed support for capital purchase that may mitigate the significant capital costs associated with this option.

It is also noted that an Invest NI funded Collaboration Engagement Network, which includes local reprocessors, have found that this options yields the best results in terms of quality recyclable material and ultimately supporting local job creation

7.2.2. Infrastructure Options

In the event of non-delivery of the arc21 project, the recommendation for residual waste infrastructure is **Option 2 Dirty MRF**, a further option remains should the RWTP not come to pass to either build or contract for this facility. This will provide significant improvement to the recycling rate and will assist with managing risk to the Council.

The Recommendation for recycling infrastructure is **Option 2 Bulking Station**. Whilst it is recognised that there is no overall increase in recycling rate this however can improve the Councils income generation. Further to this by retaining more ownership the Council improves the control and management of risk. This can also provide additional capacity to improve the Council's resilience and provide potential benefits that feed directly into the Circular Economy approach – including job creation.

⁴ Belfast has achieved 40% or more each year for the past three years and this has been taken as our baseline figure for modelling purposes, which should be achievable save for an unanticipated event such as a major contractor failing or unusual seasonal weather.

7.2.3. Behaviour Change Options

The initial preferred options of the Council is likely to initially be the combination of: **Options 1 Food Waste Campaign residual bin and Option 3 Household Recycling centres review**. These are low or no additional cost options for the Council which can be implemented relatively quickly and will have a significant positive contribution on the recycling rate. It is also recommended that the other options are considered for implementation on a phased approach in reaction to improvements in the recycling rate.

Table 4 Selected Recommendations and Contribution to Recycling rate

Options	Ann Net Expenditure 2020 £1,000's	Additional Capital Costs To 2020	Projected Contribution to Recycling Rate	Recycling Rate Cumulative Total
Current Recycling Rate	22,780	nil	nil	40%
Collection Options				
Multi Stream Kerbside Sort	21,997	9,775	2%	42%
Residual Waste Infrastructure				
Dirty MRF (est)*	2,500	21m	4%	46%
Recycling Infrastructure				
Bulking Station (est)	500	5.2m	Nil	46%
Behaviour Change				
Food Waste – residual bin	Na	NA	1%	47%
HRC Review (incl op Review)	-320	Nil	1%	48%
Reduce the residual waste bin collection frequency	-1,200	Nil	2%	50%
Total				50%

*Required if no arc21 Solution

The cumulative effect of these proposed initiatives could be to increase the Council's recycling rate by up to 10.5%.

As the initial steps are taken, it is likely that there will be increased levels of engagement with householders as subsequent changes are introduced.

Given the scale of the proposed changes, if the above options were accepted as outlined then these would need to be introduced on a staggered basis to ensure that vehicles were purchased/leased, receptacles were issued, householders were engaged, planning was gained, construction was completed.

A Timeline of the proposed implementation of the options and the increase in recycling rate is available in appendix 9.4

8. Conclusion

Waste collection and disposal costs the Council in the region of £36 million per annum and this is expected to continue increasing. The Waste Framework is designed to; address these cost pressures, contribute to the Circular Economy by supporting jobs and improved resource efficiency while at the same time increasing recycling. We currently pay around £3 million per year in landfill tax to the UK Exchequer and the Waste Framework is also seeking to significantly reduce this figure. To meet our legislative obligations under NILAS and make the necessary contribution to future recycling rate targets, however, there will need to be a significant uplift in the tonnage of recyclables captured (15,000 – 20,000 tpa). This requires changes to the status quo; collection methods, potentially infrastructural development and behaviour change of the householder.

Many of the decisions need to be taken in the very near future to realise this goal given the timescales associated with capital investments and changes to collection arrangements required.

Depending upon the results of the Collections Options/TEEP review, and the public consultation on elements of the Waste Framework, householders will experience changes in their waste collection arrangements. Some of these may be initially unpopular, as householders tend to prefer the collection arrangement with which they are more familiar. The new collection arrangements, combined with new infrastructure, should allow Belfast to reach approx. 47%. This combined with behavioural change actions outlined above could boost the recycling rate by a further 3.5%, to just over the 50% mark. However, this would require a detailed programme of work over a prolonged time frame (5-10 years).

For those individuals and communities which refuse to engage, we will need to adopt a measured but firmer approach. While unpopular and difficult, the threat of enforcement may need to be applied to establish and fully embed the new behaviours.

It is anticipated that the Waste Framework will be reviewed on an annual basis and fully assessed in 2020 or in times of significant change (e.g. decision on the arc21 Residual Waste Treatment Project). As residents' behaviours change, the increasing focus on the Circular Economy will support and provide a driver to continue to increase the amounts recycled, repaired and reused which will deliver the targets within the Waste Framework, and others which are just emerging.

9. Appendices

9.1. Appendix 1 Collections options Appraisal Tables

9.1.1. Option 1 Business as Usual - Base Case Further Details

Table 1 Base Case

	General Waste	Dry recycling	Organic	Glass
Outer City	155,000hh Residual Waste bin	100,000hh Dry Recycling bin	100,000hh Organic Waste bin	22,000hh Glass box
Contribution to Recycling	3%	7%	12%	0.5%
<i>Ann Cost :</i>				
<i>Collection</i>	£ 2,149k	£ 865k	£ 814k	£ 191k
<i>Disposal</i>	£ 7,385k	£ 308k	£ 815k	nil
Inner City External Contractor	NA – In House	55,000hh Food Waste Weekly collection 3,000hh Triple stacker food Fortnightly	55,000hh Food Waste Weekly collection 3,000hh Triple stacker food Fortnightly	58,000hh As part of the box scheme
<i>Contribution to Recycling Rate</i>	NA	3%	2%	<i>NB included within dry box collection</i>
<i>Ann Cost:</i>	NA	<i>Collection & Disposal Contract</i>	<i>Disposal Only</i>	<i>Included in Dry Recycling costs</i>
<i>Disposal</i>		£1,357k	£124k	

Option 1 Base Case Medium Term Financial Plan⁵

£1,000's	2016	2017	2018	2019	2020	2021	2022	2023
Net Exp	19,462	20,241	21,653	22,228	22,841	23,493	24,570	25,156
Capital	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

⁵ The Base Case medium term financial plan adopts the assumptions of the Waste Management MTFP – chiefly that Residual Waste will be the only variable which is consistent with information presented at Waste Program Board meetings. NOTE that this represents the costs of domestic collections only

9.1.2. Option 2 BAU with separate glass box and dedicated food waste

Table 3 Option 2 BAU with Food and Glass Collections

Method of Collection	General Waste	Dry recycling	Organic	Glass	Vs Base Case model 2016
Outer City	155,000hh Residual Waste Bin	100,000hh Dry Recycling Bin	100,000hh bin & caddy (separate food pass)	100,000hh Glass box (separate glass pass)	
Contribution to Recycling	3%	8%	15%	2.5%	+2%
Ann Cost Collection	£3,205k	£ 865k	£2,068k	£ 938k	+£1.917k
Disposal	£7,001k	£ 308k	£ 856k	nil	
Capital Costs* Boxes Vehicles					+£2,468k

*Capital costs are purchase of vehicles and boxes incl replacement of boxes from Modelled Costs

Option 2 BAU with Separate Glass Box and Dedicated Food Waste Medium Term Financial Plan⁶

£1,000's / Yr	2016	2017	2018	2019	2020	2021	2022	2023	Total
1. Waste Medium Term Financial Plan (MTFP)	19,462	20,241	21,653	22,228	22,841	23,493	24,570	25,156	
2. Option 2 BAU & Food & Glass Increase/Decrease Vs Model BAU			639	639	639				1,917
3. New Waste MTFP (= 1+2)			22,292	22,931	23,570	25,410	26,487	27,073	
4. Capital	Nil	Nil	823	823	823	Nil	Nil	Nil	2,468

*Note the costs displayed are the difference between Option 1 Business As Usual (which is the current 16/17 Waste Medium Term Waste financial Plan) and the additional modelled costs of scenarios Option 2 BAU with Food and Glass and Option 3 Kerbside Sort

** Capital costs displayed relates to new capital items only, model includes costs of replacement fleet etc. that for comparison purposes is removed in this instance.

⁶ Follows Base case comparison above

9.1.3. Option 3 Kerbside Sort wheelie-box with food waste collection

Method of Collection	General Waste	Dry recycling	Organic	Glass	Vs Base Case Model 2016
Whole City	155,000hh Residual Waste bin	155,000hh Dry Recycling bin Triple Stacker	155,000hh Bin & External food caddy	155,000hh Box or Stacker	
Contribution to Recycling	3%	12%	15%	2.5%	+2%
Ann Cost: Collection Disposal	£ 2,118k £ 7,001,k	£3,048k -£ 950k (income)	£ 508k £ 980k	n/a n/a	-£783k
Capital Costs Stackers/ Caddies Vehicles					+£9,775k

*Assumed that with introduction of food waste, organic wheeled bin moves to seasonal frequency

Option 3 Kerbside Sort wheelie-box with food waste collection Medium Term Financial Plan

£1,000's / Yr	2016	2017	2018	2019	2020	2021	2022	2023	Total
1. Waste Medium Term Financial Plan (MTFP)	19,462	20,241	21,653	22,228	22,841	23,493	24,570	25,156	
2. Option 3 Multi Stream Kerbside sort Increase/Decrease Vs Model BAU			-261	-261	-261				-783
3. New Waste MTFP (= 1+2)			21,392	21,131	20,870	22,710	23,787	24,373	
4. Capital	Nil	Nil	3,258	3,258	3,258	Nil	Nil	Nil	9,775

9.1.4. Options Comparison model tables – full model available in separate excel file

Base Case BAU

Net costs - breakdown									Total	Total Capital requ
Vehicles (Capital)	306,000	612,000	612,000	765,000	306,000	0	0	0	2,601,000	Net Capital
Containment (Capital)	0	246,918	246,918	246,918	246,918	246,918	246,918	246,918	1,728,426	
Dry recycling collection & treatment	0	2,654,077	2,654,077	2,654,077	2,654,077	2,654,077	2,654,077	2,654,077	18,578,537	
Organic waste collection & treatment	0	1,629,753	1,629,753	1,629,753	1,629,753	1,629,753	1,629,753	1,629,753	11,408,274	Net Rev 2017-202
glass collections & treatment pilot	0	184,504	184,504	184,504	184,504	184,504	184,504	184,504	1,291,526	
Residual waste collection, haulage & treatment	0	9,533,665	9,533,665	9,533,665	9,533,665	9,533,665	9,533,665	9,533,665	66,735,656	
Overheads	0	0	0	0	0	0	0	0	0	Avg. annual oper
Other Income	0	-313,211	-313,211	-313,211	-313,211	-313,211	-313,211	-313,211	-2,192,476	13,688,788
Net Total Cost	306,000	#####	14,547,706	14,700,706	14,241,706	13,935,706	13,935,706	13,935,706	100,150,944	

Opt2 BAU & Food & Flagg

Net costs - breakdown									Total	Total Capital requ
Vehicles (Capital)	1,266,000	612,000	612,000	765,000	306,000	0	0	0	3,561,000	Net Capital
Containment (Capital)	1,120,000	280,518	280,518	280,518	280,518	280,518	280,518	280,518	3,083,626	
Dry recycling collection & treatment	0	2,967,288	2,967,288	2,967,288	2,967,288	2,967,288	2,967,288	2,967,288	20,771,013	
Organic waste collection & treatment	0	1,158,950	1,158,950	1,158,950	1,158,950	1,158,950	1,158,950	1,158,950	8,112,651	Net Rev 2017-202
glass collections & treatment pilot	0	908,944	908,944	908,944	908,944	908,944	908,944	908,944	6,362,606	
Residual waste collection, haulage & treatment	0	9,119,481	9,119,481	9,119,481	9,119,481	9,119,481	9,119,481	9,119,481	63,836,370	
Separate food waste collection outer city	0	1,764,121	1,764,121	1,764,121	1,764,121	1,764,121	1,764,121	1,764,121	12,348,849	
Overheads	0	0	0	0	0	0	0	0	0	Avg. annual oper
Other Income	0	-313,211	-313,211	-313,211	-313,211	-313,211	-313,211	-313,211	-2,192,476	15,605,573
Net Total Cost	2,386,000	#####	16,498,091	16,651,091	16,192,091	15,886,091	15,886,091	15,886,091	115,883,640	
Capital Vs BAU	2,080,000	33,600	33,600	186,600	33,600	33,600	33,600	33,600	2,468,200	
Revenue Vs BAU		1,916,785	1,916,785	1,916,785	1,916,785	1,916,785	1,916,785	1,916,785	13,417,495	

Option 2 £1,000's / Yr	2016	2017	2018	2019	2020	2021	2022	2023	Total
1. Waste Medium Term Financial Plan (MTFP)	19,462	20,241	21,653	22,228	22,841	23,493	24,570	25,156	
2. Option 2 BAU & Food & Glass Increase/Decrease Vs Model BAU			639	639	639				1,917
3. New Waste MTFP (= 1+2)			22,292	22,931	23,570	25,410	26,487	27,073	
4. Capital	Nil	Nil	823	823	823	Nil	Nil	Nil	2,468

Opt 3 Multi Stream Kerbside sort

Net costs - breakdown									Total	Total Capital requ
Vehicles (Capital)	4,000,000	0	0	0	0	0	0	0	4,000,000	Net Capital
Containment (Capital)	7,107,020	384,552	384,552	384,552	384,552	384,552	384,552	384,552	9,798,884	
Dry recycling collection & treatment	0	3,248,540	3,248,540	3,248,540	3,248,540	3,248,540	3,248,540	3,248,540	22,739,783	
Organic waste collection & treatment	0	1,488,578	1,488,578	1,488,578	1,488,578	1,488,578	1,488,578	1,488,578	10,420,043	Net Rev 2017-202
glass collections & treatment pilot	0	0	0	0	0	0	0	0	0	
Residual waste collection, haulage & treatment	0	9,137,022	9,120,785	9,120,785	9,120,785	9,120,785	9,120,785	9,120,785	63,861,734	
Overheads	0	0	0	0	0	0	0	0	0	Avg. annual oper
Other Income	0	-952,957	-952,957	-952,957	-952,957	-952,957	-952,957	-952,957	-6,670,697	12,905,834
Net Total Cost	11,107,020	#####	13,289,499	13,289,499	13,289,499	13,289,499	13,289,499	13,289,499	104,149,747	
Capital Vs BAU	11,107,020	-474,366	-474,366	-627,366	-168,366	137,634	137,634	137,634	9,775,458	
Revenue Vs BAU		-767,605	-783,842	-783,842	-783,842	-783,842	-783,842	-783,842	5,470,656	

Option 3 £1,000's / Yr	2016	2017	2018	2019	2020	2021	2022	2023	Total
1. Waste Medium Term Financial Plan (MTFP)	19,462	20,241	21,653	22,228	22,841	23,493	24,570	25,156	
2. Option 3 Multi Stream Kerbside sort Increase/Decrease Vs Model BAU			-261	-261	-261				-783
3. New Waste MTFP (= 1+2)			21,392	21,131	20,870	22,710	23,787	24,373	
4. Capital	Nil	Nil	3,258	3,258	3,258	Nil	Nil	Nil	9,775

Methodology for Financial Assessment - Model Comparison to Waste Medium Term Financial plan

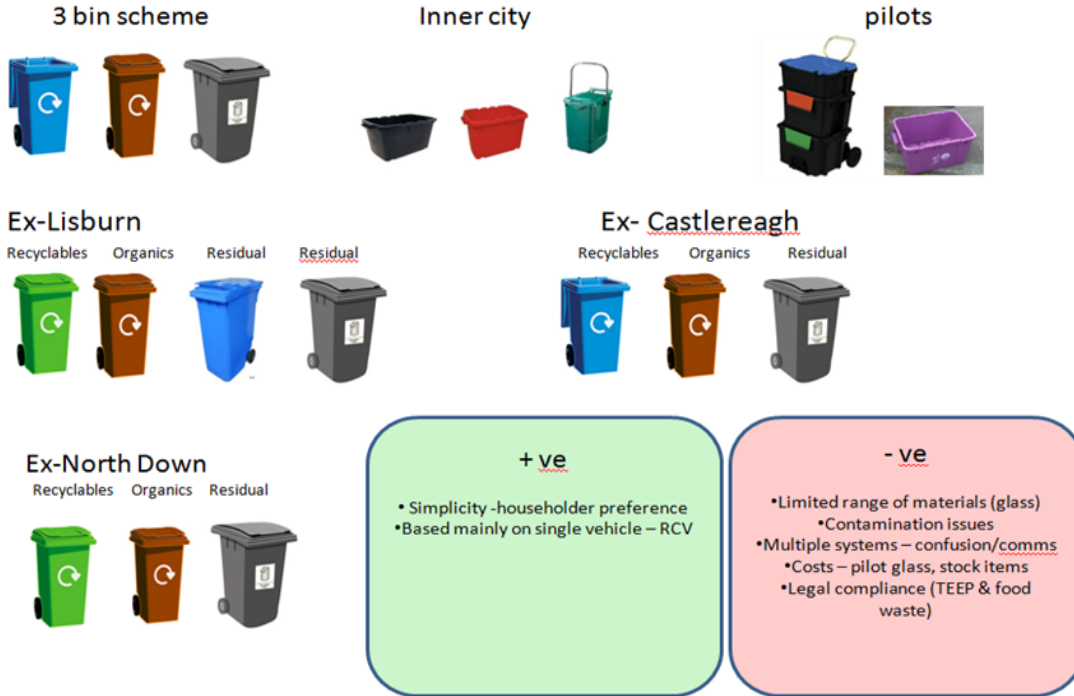
1. Note both above options assume that any change implemented will take time to procure and roll out as such costs that impact on revenue and capital have been provided over three years into the final target year of 2020.
2. The method employed has been to run the standalone collections model to ascertain how much revenue will be impacted on an annual basis and how much Capital will be required over the period to deliver the service.
3. This variance to the base case model is then added to the previously shared Waste Management Medium term financial plan
4. To demonstrate where costs are derived from these have been colour coded on the model and MTFP profile.
5. An image of the Waste Medium Term Financial Plan is contained overleaf.

V47 Taggart Tonnages With 17/18 Draft Estimates No Inflation other than residual <u>Minimal Meeting of Nilas Waste Financial Plan</u>	BCC In-house Residual Arrangements Residual Waste Costs are a blend of residual contract treatment and landfilling. % Treatment and % Landfill		Potential Arc21 Interim arrangements prior to Residual Waste Treatment plant commissioning Interim Period = Gate Fee x Residual tonnage				Arc21 Go Live MBT and EFW Solution see below Go Live = Gate Fee x Residual Tonnage	
	Revenue Estimate	50/50 SAP 16/17	60% Treat Draft Estimate	70% Treat	75% treat	80% Treat	85% Treat	100% Treat
Profit centre	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24
490003 Waste Transfer Station	1,421,125	1,298,355	1,298,355	1,298,355	1,298,355	1,298,355	1,298,355	1,298,355
490005 Residual Waste Contract	8,814,606	10,831,547	£12,243,471	£12,819,229	£13,431,905	£14,083,715	£15,161,035	£15,746,692
490006 Waste Operations Management	868,661	745,980.00	745,980	745,980	745,980	745,980	745,980	745,980
490007 Multi Bin Recycling Schemes	312,000	336,910.00	336,910	336,910	336,910	336,910	336,910	336,910
490008 Box Recycling/Inner city dry	1,495,465	1,532,042.00	1,532,042	1,532,042	1,532,042	1,532,042	1,532,042	1,532,042
490009 Bring Sites Recycling	15,600	15,600.00	15,600	15,600	15,600	15,600	15,600	15,600
490012 Special Hazardous Wst Coll	50,122	50,122.00	50,122	50,122	50,122	50,122	50,122	50,122
490014 Bins & Containers	280,984	255,984.00	255,984	255,984	255,984	255,984	255,984	255,984
490018 In-Vessel Composting	1,335,800	1,351,951.00	1,351,951	1,351,951	1,351,951	1,351,951	1,351,951	1,351,951
490021 Agnes Street	295,403	157,863.00	157,863	157,863	157,863	157,863	157,863	157,863
490022 Alexandra Avenue	737,557	527,545.00	527,545	527,545	527,545	527,545	527,545	527,545
490023 Blackstaff Way Recycling Ctr	679,779	502,193.00	502,193	502,193	502,193	502,193	502,193	502,193
490027 Palmerston Road	644,265	488,678.00	488,678	488,678	488,678	488,678	488,678	488,678
490028 Park Road	633,072	493,196.00	493,196	493,196	493,196	493,196	493,196	493,196
490030 Springfield Avenue	291,220	165,913.00	165,913	165,913	165,913	165,913	165,913	165,913
490049 Community Awareness	671,135	628,767.00	628,767	628,767	628,767	628,767	628,767	628,767
490050 Policy & Resources	246,540	239,845.00	239,845	239,845	239,845	239,845	239,845	239,845
490051 Business Support	522,738	525,230.00	525,230	525,230	525,230	525,230	525,230	525,230
490054 Cregagh Road CAC	146,018	93,044.00	93,044	93,044	93,044	93,044	93,044	93,044
Total	19,462,090	20,240,765	21,652,689	22,228,447	22,841,123	23,492,933	24,570,253	25,155,910
Commercial Waste (13,000t/ann 17/18)	1,569,600	1,469,000	1,633,580	1,682,587	1,733,065	1,785,057	1,838,609	1,893,767
Waste Financial Plan total	21,031,690	21,709,765	23,286,269	23,911,034	24,574,188	25,277,989	26,408,861	27,049,677
Impact on rates		678,075	1,576,504	624,766	663,153	703,802	1,130,872	640,815
Growth rate		3.22%	7.26%	2.68%	2.77%	2.86%	4.47%	2.43%
RWC Gate Fee	109.00	113.00	125.66	129.43	133.31	137.31	141.43	145.67
Residual Waste Tonnages Taggarts Model incl diverted Waste from sites	92,551	101,381	102,112	102,872	103,639	104,412	105,321	106,237
Landfill Tax	£84.40	£86.10	£88.95	£90.73	£92.54	£94.39	£96.28	£98.21
Landfill Gate Fee	£8.75	£9.30	£9.49	£9.68	£9.87	£10.07	£9.87	£10.07
Total Landfill costs/t		£95.40	£98.44	£100.40	£102.41	£104.46	£106.15	£108.27
	Held Gate Fee from 15/16	Gate Fee Prices advised by RRR 16/08/2016	Gate Fee Prices Ref Email GC 09/08/2016				Gate Fee Prices Ref Email GC 09/08/2016	

9.2. Appendix 2 Collections Options Appraisal Diagrams

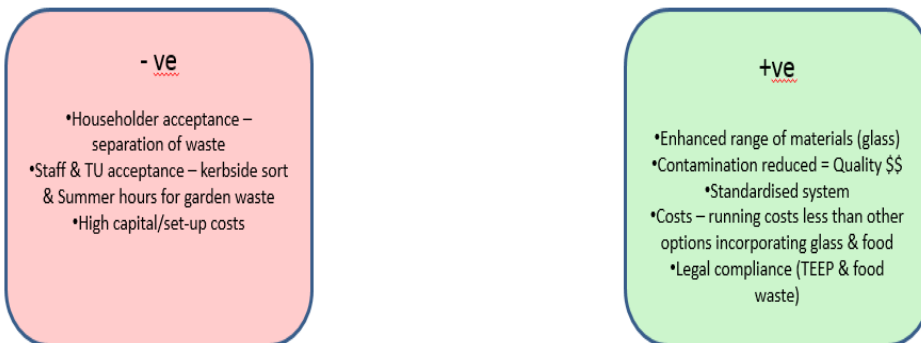
Appendix 2 Current Waste Collection Arrangements

Current Kerbside Recycling Schemes



Option 3 – Multi-stream kerbside sort

Recyclables Food Garden – summer only Residual



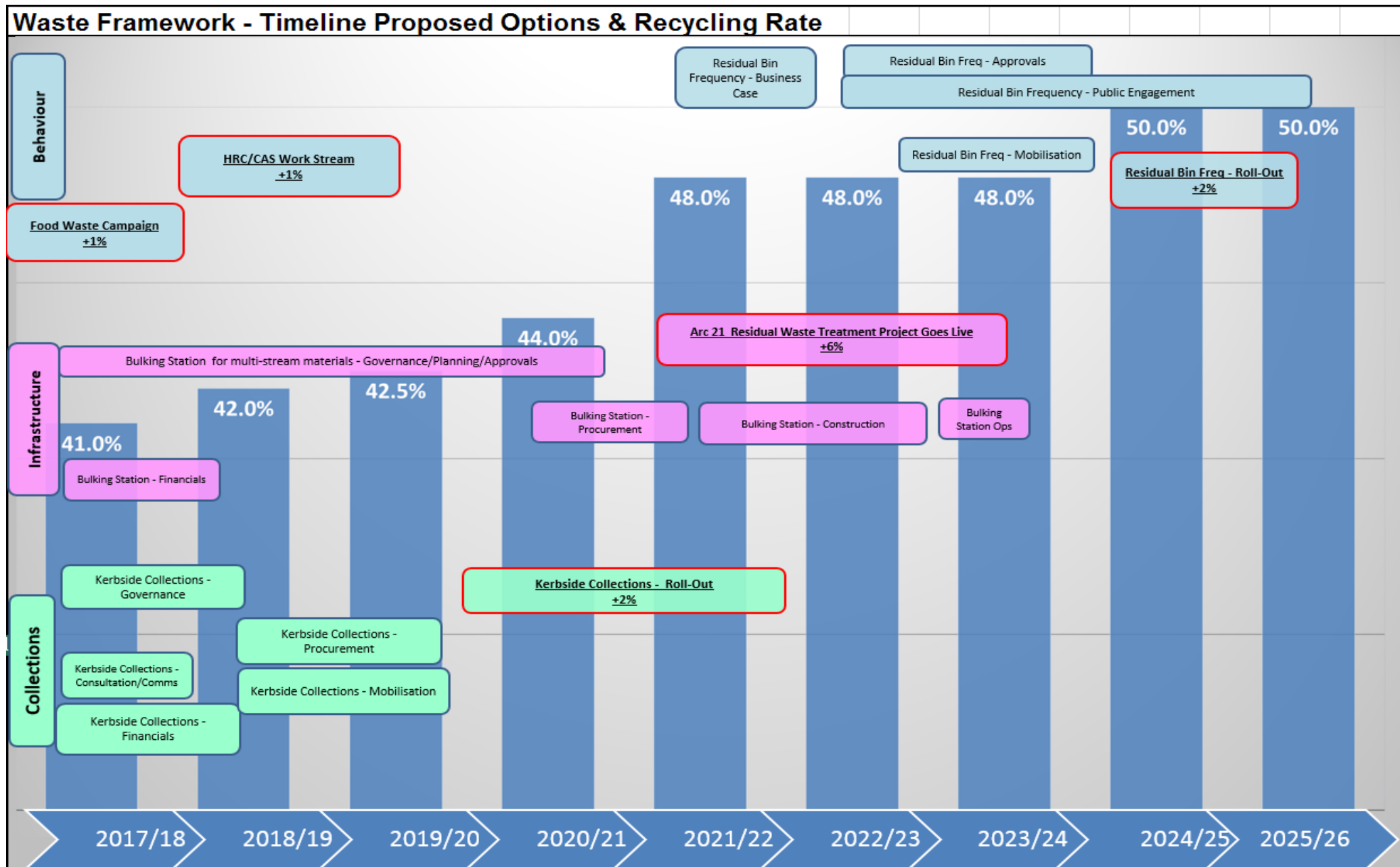
9.3. Appendix 3 Infrastructure Options

These options were considered further to determine what they could contribute towards improved waste management practices and achieving the target (see Table 3). There are a range of strengths and weaknesses with these options but, as the Council will need to secure capital expenditure to develop whichever option is considered most suitable, alongside which planning, site and construction issues will need to be progressed, there is an urgency if this option is to make any contribution towards the 50% recycling target by 2020.

Strengths & Weaknesses of Infrastructure Options

Option	Strengths	Weakness
1. Residual Waste drying facility	<ul style="list-style-type: none"> • Reduce amount of waste being sent for landfill • Improve calorific value of waste being sent for energy recovery 	<ul style="list-style-type: none"> • Residence time for drying • Size of facility needed • Potential dust/odour problems • Cost – Capital & revenue (heating)
2. Council-owned dirty MRF Residual Waste+	<ul style="list-style-type: none"> • Extracts additional recyclables from residual waste stream • Generally lower capital costs compared to clean MRFs (per tonne equivalent) • Can be used as part of an integrated system to gain energy and materials value out of the residual waste stream • Applying proven technology 	<ul style="list-style-type: none"> • Size of facility needed • Low quality of recyclables can equal low value • Unless there is a high level of separation, likely to be a major component of the waste for onward disposal at a landfill or energy from waste facility • Where materials are divided, the facility is reliant on other waste management operations • Potential dust/odour problems and health issues for staff on picking belts • Outputs still classified as BMW and active waste under Landfill Tax
3. Council-owned clean MRF	<ul style="list-style-type: none"> • High processing efficiency • Potential for revenues from sale of materials • Recyclate generally of relatively high quality • Can significantly contribute to meeting high recycling targets • Proven under world-wide conditions • Can attract material from both bring & kerbside collection systems, including some commercial / industrial • Can provide work opportunities for disadvantaged sectors of the community 	<ul style="list-style-type: none"> • Exposed to market fluctuations • Potential fire risk from storage of materials on site • Relies on householders to participate to minimise contamination & provide security of input materials • Potential dust emissions & health issues for workers • Reliance on efficiency of mechanical equipment
4 Council-owned bulking station	<ul style="list-style-type: none"> • Very high processing efficiency • Potential for revenues from sale of materials • Recyclate generally of relatively high quality • Can significantly contribute to meeting high recycling targets • Proven under world-wide conditions • Ideal for kerbside collection systems, including some commercial/industrial 	<ul style="list-style-type: none"> • Exposed to market fluctuations • Potential fire risk from storage of materials on site • Potential dust emissions & health issues for workers

9.4. Appendix 4 Timeline of proposed Options and Recycling Rate



9.5. Appendix 5 End notes

¹ This is according to the Waste Medium Term Financial Plan 2017/18-2023/24 see page 40 for details.

² Commonly referred to as the Circular Economy and money we don't spend on disposal could be better invested to improve the city.

³ This improvement is more than any other council in NI and resulted from implementing our "Towards Zero Waste" Action Plan, 2012-15.

⁴ The Council has progressively reducing annual tonnage allowances for landfilling (NILAS). If these are exceeded, there is the potential of financial penalties being imposed on the council. Provisional figures for 2015/16 indicate that Belfast used around 90% of its allowances in this year. Revised projections of Council waste growth show that between 2016/17 and 2019/20 the amount of waste Belfast recycles or sends for energy recovery will have to increase significantly to meet NILAS obligations.

⁵ The Food Waste (NI) Regulations. The legislation states that whilst food waste can be collected with garden waste, but only where we can demonstrate that the amount captured is not significantly less than a dedicated food waste collection service, Belfast has found through pathfinder programs that separate collections are justified.

⁶ The Council has a wheelie-box pathfinder scheme for circa 3,000 households in west Belfast. It is working as well as the comingled (blue bin) collection scheme which it replaced, but with less contamination and a glass collection service integral to the scheme.

⁷ This is likely to be extended until August 2018 during which time the Council will determine whether to continue to provide these services under contract, or in-house.

⁸ Current Contamination for 2016 is 12% = Quality grade C 10%-14% Which is a cost of £35/t, Approx. 10,000 tonnes therefore an annual cost of £350,000. If contamination was reduced to below 5% then this would be an income of £82/t x 10,000t = £820,000

⁹ Nilas Calculation is based on fines of NILAS Forecast (see Figure 4 in section 4.1) If BCC reverted to 100% landfill and there was a target year (2019/20) there would be £150/t fine for the NILAS overshoot of 13,160t. This is the forecast 54,835 no diversion - Allowance 41,675t = +13,160t x £150 = £1,974,000. Note that if there was no diversion there would be significantly more.

¹⁰ Landfill tax is based on a domestic residual tonnages estimated in 2017/18 of 101,381t +13,000 commercial tonnages =114,381t. This residual waste is subject to x 40%landfill and 60% Treatment spilt in 17/18 = 45,752t x £86.10/t the 17/18 Landfill tax cost = £3,939,282. Increase from 16/17 in Costs for landfill is £1.70 x 45,752t = +£77,778

¹¹ Available at <http://www.wrap.org.uk/content/wrap-gate-fees-report-2015-download-summary-report>

¹² Concerns are increasing about the security of disposal routes for RDF to Europe, and pricing schedules

¹³ The 2015 Domestic Recycling rate was 40% on 141,403t of Waste Arising, therefore there was 60% Residual waste which is 84,481t. If 50% of this as part of the composition study is recyclable = 42,421t

¹⁴ Much of this forms the basis for the Council's Circular Economy work – called "*Resourceful Belfast*" approved by Council in Sept 2016 which aligns with the Belfast Agenda. The Council will be working with WRAP to develop this strategy which plays a supportive role to the Waste Agenda by highlighting the prospects for the Council in terms of new areas for development.

¹⁵ Compliance with the EU Circular Economy Package, 2015 has yet to be addressed in the context of Brexit

¹⁶ Draft Programme for Government, frames this as "*increasing recycling rates can create resource streams that are economically valuable, promoting growth of the circular economy*". See page 104 of

<https://www.northernireland.gov.uk/sites/default/files/consultations/newnigov/draft-pfg-framework-2016-21.pdf>

¹⁷ The Council's proposition document "*Resourceful Belfast*" is available at <http://gsintmin01:9077/documents/s58248/Appendix%20%20-%20Towards%20a%20Resourceful%20Belfast.pdf>

The ReNEW study on jobs for NI is available at <http://gsintmin01:9077/documents/s58249/Appendix%20%20-%20ReNEW%20CE%20Employment%20Report.pdf>

The WRAP study on UK jobs created by CE per ward is available at <http://www.wrap.org.uk/content/new-circular-economy-jobs-created-2030>

The LGA position on job creation from waste is available at http://www.local.gov.uk/c/document_library/get_file?uuid=a9ae477e-e0cf-4665-862e-ed01caa810f6&groupId=10180

The Green Alliance paper on job creation and resource efficiency is available at <http://www.green-alliance.org.uk/resources/Employment%20and%20the%20circular%20economy.pdf>

¹⁸ WRAP is conducting a Gap Analysis for DAERA to review the collection options applicable to NI, the results of which should also be released in the autumn. The Council will engage an external consultant to test its collection options to produce a Technical, Economic & Environmentally Practicable (TEEP) assessment for the Council

¹⁹ Indicative moisture reduction from Commercial drying process have been noted at 20% reduction therefore the domestic residual waste approximately 80,000t could potential be treated meaning a 20% reduction in treatment cost.

²⁰ Report available at <http://gsintmin01:9077/documents/g1262/Public%20reports%20pack%2007th-Aug-2013%2016.30%20Pre%20April-2015%20Health%20and%20Environmental%20Services%20Committee.pdf?T=10>

²¹ Waste Composition Study

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- ²² The DfE Innovation Lab work model options, will also include consideration of alternative frequency arrangements.
- ²³ Food campaign is estimated to contribute a 1% increase in Recycling and a reduction in residual waste is of 1,500t x £125.66 residual Waste gate Fee 2018 = £188,490 saving.
- ²⁴ iESE "*Household Waste Recycling Centres and Civic Amenity Site review*"
- ²⁵ <https://www.gov.uk/government/news/uk-digital-strategy-the-next-frontier-in-our-digital-revolution>
- ²⁶ <http://smartcitiescouncil.com/article/one-way-cities-can-stay-top-waste-collection-think-sensors>