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Operational Waste and Recycling Management Strategy

Proposed Strategic Housing Development on lands at Palmerstown Retail Park, Kennelsfort Road Lower, Palmerstown, Dublin 20
South Dublin County Council

Randelswood Holdings Ltd.

October 2021

Quality information

Prepared by	Checked by	Approved by
		
Emma Copley Waste Management Consultant	Katherine Lees Associate Director	Katherine Lees Associate Director

Prepared for:

Randelswood Holdings Ltd.

Prepared by:

Emma Copley
Waste Management Consultant

AECOM Limited
Sunley House
4 Bedford Park, Surrey
Croydon CRO 2AP
United Kingdom

T: +44 20 8639 3500
aecom.com

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1. Executive Summary

1.1 AECOM Ireland Limited (hereafter referred to as 'AECOM') has been appointed by Randelswood Holdings Ltd. (hereafter referred to as the 'Applicant') to prepare an Operational Waste and Recycling Management Strategy (hereafter referred to as the 'Strategy') for the proposed Strategic Housing Development on lands at Palmerstown Retail Park, Kennelsfort Road Lower, Palmerstown, Dublin 20 (hereafter referred to as the 'Proposed Development') located within the administrative boundary of South Dublin County Council (SDCC).

1.2 Once complete, the Proposed Development will provide the following:

- 250 residential units; and
- 607 m^2 meters squared (m^2) Net Internal Area (NIA) of residential amenity space.

1.3 The principle aim of this Strategy is to demonstrate how sustainable methods for waste and recycling management have been taken into account for the operational phase of the Proposed Development. Furthermore, with regards to waste and recycling management within the Proposed Development, this Strategy has the following aims:

- To contribute towards achieving current and long-term national, Eastern Midlands Region and SDCC targets for waste minimisation, recycling and re-use;
- To comply with all applicable legal requirements for handling operational waste and recyclate material;
- To achieve high standards of waste management performance, through giving due consideration to the waste generated during operation of the Proposed Development; and
- To provide a convenient, clean and efficient waste management strategy that enhances the operation of the Proposed Development and promotes recycling.

1.4 Once operational, the Proposed Development is anticipated to produce approximately 36,517 litres (L) of (un-compacted) waste from both residential and residential amenity spaces per week. Of this approximately 33,120 L will arise from residential uses per week and approximately 3,397 L will arise from residential amenity spaces per week. Waste arisings per week will equate to approximately 270 tonnes of waste per year (i.e. based on the following approximate densities: Mixed Dry Recyclables (MDR) – 62 kg/m^3 (Kilogrammes/meters cubed), Food waste – 667 kg/m^3, Glass – 277 kg/m^3 and Residual waste – 81 kg/m^3 (Ref. 1)).

1.5 Residents from the proposed residential units will use the lifts within each core to deposit their waste and recyclate material into their closest bin store. Block A and B will deposit their waste and recyclate material into the 75 m^2 bin store located at basement level on the east of the site, and Block C, D and E will deposit their waste and recyclate material into the 77 m^2 bin store located at basement level on the west of the site. The internal management team will transfer waste and recyclate material from the residential amenity spaces to the 75 m^2 bin store located at basement level on the east of the site as all of the residential amenity spaces are concentrated in Block A.

1.6 On the day of collection, the internal management team will use tugs to move the bins from the bin stores to the hard-standing presentation area on the ground floor level at the top of the ramp via the pedestrian and cycle ramp (which is 2 m and has a gradient of 1:12). It is envisioned that the internal management team will bring the tugs to the development on the day of collection from other developments managed by the same internal management team. The internal management team will avoid rush hours and lunchtimes when moving the bins to avoid causing disruption to cyclists and pedestrians using the ramp. The Refuse Collection Vehicle (RCV) will enter the site in a forward gear from the east and pull up to the kerb next to the presentation area. The collection operatives will move the bins from the presentation area to the rear of the RCV and empty them. The collection operatives will then return the empty bins to the presentation area and the RCV will carry on in a forward gear to exit the site to the west via the business park. The internal management team will return the empty bins to the respective bin stores using the pedestrian and cycle ramp, once again avoiding rush hours and lunchtimes to minimise disruption to cyclists and pedestrians.

1.7 These provisions will result in waste produced during the operation of the Proposed Development and all waste infrastructure introduced to the Proposed Development being managed in accordance with the guidelines published by the Eastern Midlands Region, South Dublin County Council, British Standards (BS) 5906:2005 Waste Management in Buildings – Code of Practice and Department of Housing, Planning and Local Government (DoHPLG)'s Sustainable Urban Housing: Design Standards for New Apartments.

1.8 In relation to this Strategy, Waste is defined as per the Waste Framework Directive (2008/99/EC) as "*any substance or object which the holder discards or intends to or is required to discard*".

2. Introduction

2.1 AECOM Ireland Limited (hereafter referred to as 'AECOM') has been appointed by Randelswood Holdings Ltd. (hereafter referred to as the 'Applicant') to prepare an Operational Waste and Recycling Management Strategy (hereafter referred to as the 'Strategy') for the proposed Strategic Housing Development on lands at Palmerstown Retail Park, Kennelsfort Road Lower, Palmerstown, Dublin 20 (hereafter referred to as the 'Proposed Development') located within the administrative boundary of South Dublin County Council) (SDCC).

2.2 This Strategy provides a review of the requirements places upon the Proposed Development under legislation and implemented policy at all levels of government (i.e. national (Ireland), regional (Eastern Midlands Region (EMR) and local (SDCC)). Consideration has also been given to the requirements included in local standards, local planning policy and guidance documents i.e. SDCC's Development Plan 2016-2022 (Ref. 2) so as to comply with relevant objectives and targets. British Standards Institute (BSI), Waste Management in Buildings, Code of Practice (BS 5906:2005) (Ref. 3) has also been used within this document to calculate the waste arising from the Proposed Development and to provide guidance on the requirements the bin stores should adhere to following best practice.

2.3 The methodology used to identify and estimate volumes of waste generated during operation of the Proposed Development is provided in Section 5 of this Strategy. Following this, the approach taken towards waste management within the Proposed Development is discussed. This includes a breakdown of the waste management process, including waste handling, storage area provision, and collection arrangements. All waste reduction measures are compliant with BS 5906:2005, EMR's Waste Management Plan 2015-2021 (Ref. 4) and Sustainable Urban Housing: Design Standards for New Apartments (Ref. 5).

2.4 This Strategy has been written by AECOM, using information provide by Downey Planning & Architecture (hereafter referred to as the 'Architects') and AECOM Transport Consultants (hereafter referred to as the 'Transport Consultants').

3. Legislation/Planning Policy

3.1 A summary list of the legislation and planning policy relevant to the management of operational waste is provided in this section.

National Waste Legislation

- The Waste Framework Directive (Directive 2008/98/EC) (Ref. 6);
- The Directive on Waste Electrical and Electronic Equipment (WEEE Directive 2012/19/EU) (Ref. 7);
- The Directive on Batteries and Accumulators (2006/66/EC) (Ref. 8);
- European Union (Household Food Waste and Bio-waste) Regulations 2015 (Ref. 9);
- European Union (Properties of Waste which Render it Hazardous) Regulations 2015 (Ref. 10);
- European Communities (Transfrontier Shipment of Waste) Regulations 1994 (Ref. 11);
- Waste Management (Collection Permit) Regulations 2007 (as amended) (Ref. 12);
- Waste Management (Facility Permit and Registration) Regulations 2007 (as amended) (Ref. 13);
- Waste Management (Licensing) Regulations 2004 (as amended) (Ref. 14);
- Waste Management (Packaging) Regulations 2014 (as amended) (Ref. 15);
- Waste Management (Planning) Regulations 1997 (Ref. 16);
- Waste Management (Landfill Levy) Regulations 2015 (Ref. 17);
- Waste Management (Food Waste) Regulations 2009 (as amended) (Ref. 18);
- Waste Management (Hazardous Waste) Regulations 1998 (as amended) (Ref. 19);
- Waste Management (Shipments of Waste) Regulations 2007 (as amended) (Ref. 20);
- Waste Management (Movement of Hazardous Waste) Regulations 1998 (Ref. 21);
- The Waste Management Act 1996 (as amended 2001) (Ref. 22)
- Environmental Protection Agency Act 1992 (Ref. 23);
- The Protection of the Environment Act 2003 (Ref. 24);
- Litter Pollution Act 1997 (Ref. 25); and
- Planning and Development Act (as amended 2020) (Ref. 26).

National Policy

Changing Our Ways (1998)

3.2 The Changing Our Ways policy document issued in 1998 (Ref. 27) by the Irish government was the first in a series of government policy document on the management of waste in Ireland. It identified objectives for the prevention, minimisation, reuse, recycling, recovery and disposal of waste in Ireland. A heavy emphasis was placed on reducing reliance on landfill and finding alternative methods for managing waste. Changing Our Ways stated a target of at least 35% recycling of municipal waste.

Preventing and Recycling Waste – Delivering Change (2002)

3.3 The Irish government published a further policy document, Preventing and Recycling Waste – Delivering Change (Ref. 28), in 2002. This document proposed a number of programmes to increase the recycling of waste and allow diversion from landfill. The need for waste minimisation at source was considered a priority. To summarise, this policy document describes:

- *"the necessary disciplines that must be imposed within waste management systems to secure real progress on waste prevention, re-use and recovery;*
- *a range of measures that will be undertaken in the interests of minimising waste generation and ensuring a sustained expansion in re-use and recycling performance; and*
- *further issues and possible actions which require further systematic consideration."*

Making Ireland Development Sustainable – Review, Assessment and Future Action (2002)

3.4 Making Irelands Development Sustainable – Review, Assessment and Future Action (Ref. 29) was a review of sustainable development policy in Ireland and achievement to date. This document also stressed the need to break the link between economic growth and waste generation, again through waste minimisation and re-use of discarded material.

Taking Stock and Moving Forward (2004)

3.5 Taking Stock and Moving Forward (Ref. 30) was published by the Irish government in 2004 to establish the progress of the Changing Our Ways policy document. The Taking Stock and Moving Forward document covers the period 1998-2003, with the aim to access progress to date with regard to waste management in Ireland, to consider any developments since the policy framework and the local authority waste management plans were put in place, and to identify measures that could be undertaken to further support progress towards the objectives described in Changing our Ways.

3.6 In particular, the document noted a significant increase in the amount of waste being brought to local authority landfills. The document noted that one of the significant challenges in the coming years was the extensions of the dry recyclable collection services.

A Resource Opportunity (2012)

3.7 A Resource Opportunity (Ref. 31) is the most recent policy document to be published by the Irish government. This document stresses the environmental and economic benefits of better waste management, particularly in relation to waste prevention. The document sets out a number of actions, including the following:

- A move away from landfill and replacement through prevention, reuse, recycling and recovery;
- A brown bin roll-out diverting organic waste towards more productive uses;
- Introduce a new regulatory regime for the existing side-by-side competition model within the household waste collection market;
- New Service Standards to ensure that consumers receive higher customer service standards from their operator;
- Placing responsibility on householders to prove that they use an authorised waste collection service;
- The establishment of a team of Waste Enforcement Officers for cases relating to serious criminal activity will be prioritised;
- Reducing red tape for industry to identify and reduce any unnecessary administrative burdens on the waste management industry;
- A review of the producer responsibility model will be initiated to assess and evaluate the operation of the model in Ireland; and
- Significant reduction of Waste Management Planning Regions from ten to three.

Regional Policy

EMR – Waste Management Plan 2015-2021 (2015)

3.8 The EMR Waste Management Plan 2015-2021 is the regional waste management plan for the SDCC area. The regional plan sets out the following strategic targets for waste management in the region:

- *"A 1% reduction per annum in the quantity of household waste generated per capita over the period of the plan;*
- *Achieve a recycling rate of 50% of managed municipal waste by 2020; and*
- *Eliminate the direct disposal of unprocessed residual municipal waste to landfill."*

Local Policy

SDCC – Development Plan 2016-2022 (2016)

3.9 The SDCC Development Plan sets out a number of objectives and actions for the South Dublin area in line with the objectives of EMR's Waste Management Plan. The objectives stated in the Development Plan that relate to waste management are shown in Table 1 of this Strategy.

Table 1. Objectives in the SDCC Development Plan Relating to the Management of Waste

Objective	Description
IE5 Objective 1	*"To support the implementation of the Eastern-Midlands Region Waste Management Plan 2015-2021 by adhering to overarching performance targets, policies and policy actions."*
IE5 Objective 2	*"To support waste prevention through behavioural change activities to de-couple economic growth and resource use."*
IE5 Objective 3	*"To encourage the transition from a waste management economy to a green circular economy to enhance employment and increase the value recovery and recirculation of resources."*
IE5 Objective 4	*"To provide, promote and facilitate high quality sustainable waste recovery and disposal infrastructure/technology in keeping with the EU waste hierarchy and to adequately cater for a growing residential population and business sector."*
IE5 Objective 5	*"To provide and maintain the network of bring infrastructure (e.g. civic amenity facilities, bring banks) in the county to facilitate the recycling and recovery of hazardous and non-hazardous municipal wastes."*
IE5 Objective 6	*"To seek the provision of adequately sized public recycling facilities in association with new commercial developments and in tandem with significant change of use/extensions of existing commercial developments where appropriate."*
IE5 Objective 7	*"To develop countywide network of green waste centres in suitable locations to expand the collection system for compostable waste."*
IE5 Objective 8	*"To secure appropriate provision for the sustainable management of waste within developments, including the provision of facilities for the storage, separation and collection of such waste."*

3.10 In addition, the following actions relating the management of waste are described within the SDCC Development Plan:

- *"Support and facilitate the separation of waste at source into organic and non-organic streams or other waste management systems that divert waste from landfill and maximise the potential for each waste type to be re-used and recycled or composted and divert waste from landfill, in accordance with the National Strategy on Biodegradable Waste (2006);*
- *Implement the objectives of the National Waste Prevention Programme at a local level with businesses, schools, householders, community groups and within the Council's own activities;*

- *Promote an increase in the amount of waste re-used and recycled consistent with the Regional Waste Management Plan and Waste Hierarchy and facilitate recycling of waste through adequate provision of facilities and good design in new developments; and*
- *Implement the South Dublin Litter Management Plan 2015-2019."*

SDCC – Bye-Laws for the Segregation, Storage and Presentation of Household and Commercial Waste (2018)

3.11 SDCC's Bye-Laws for the Segregation, Storage and Presentation of Household and Commercial Waste (Ref. 32) were designed to repeal SDCC's Bye-Laws published in 2012 and 2007. The Bye-Laws place legal obligations on the waste producer in terms of the way waste is stored and managed on a site/premises. Dry recyclables must be segregated at source, and bio-waste (organic) must be segregated if a collection service is available. Waste must be presented in approved containers that are kept in a reasonable state and only presented for collection in approved areas and times by the Council. Key requirements under these Bye-Laws are:

- *"Kerbside waste presented for collection shall not be presented for collection earlier than 8.00pm on the day immediately preceding the designated waste collection day;*
- *All containers used for the presentation of kerbside waste and any uncollected waste shall be removed from any roadway, footway, footpath or any other public place no later than 8.00am on the day following the designated waste collection day;*
- *Neither recyclable household kerbside waste nor food waste arising from households shall be contaminated with any other type of waste before or after it has been segregated;*
- *A management company, or another person if there is no such company, who exercises control and supervision of residential and/or commercial activities in multi-unit developments, mixed-use developments, flats or apartments blocks, combined living/working spaces or other similar complexes shall ensure that:*
    - *Separate receptacles of adequate size and number are provided for the proper segregation, storage and collection of recyclable household kerbside waste and residual household kerbside waste;*
    - *Additional receptacles are provided for the segregation, storage and collection of food waste where this practice is a requirement of the national legislation on food waste;*
    - *The receptacles referred to in the previous two bullet points are located both within any individual apartment and at the place where waste is stored prior to its collection;*
    - *Any place where waste is to be stored prior to its collection is secure, accessible at all times by tenants and other occupiers and it not accessible by any other person other than an authorised waste collector;*
    - *Written information is provided to each tenant or other occupier about the arrangements for waste separation, segregation, storage and presentation prior to collection;*
    - *An authorised waste collector is engaged to service the receptacles referred to in this section of these bye-laws, with documentary evidence, such as receipts, statements or other proof of payment, demonstrating the existence of this engagement being retained for a period of no less than two years. Such evidence shall be presented to an authorised person within a time specified in a written request from either that person or from another authorised person employed by South Dublin County Council; and*
    - *Receptacles for kerbside waste are presented for collection on the designated waste collection day."*

4. The Proposed Development

4.1 Once complete, the Proposed Development will provide the following:

- 250 residential units; and
- 607 m^2 meters squared (m^2) Net Internal Area (NIA) of residential amenity space.

4.2 As shown in Table 2 of this Strategy, the 250 residential units will be located within five blocks. The breakdown of the residential amenity space is shown in Table 3 of this Strategy.

Table 2. Palmerstown SHD Residential Dwelling Mix

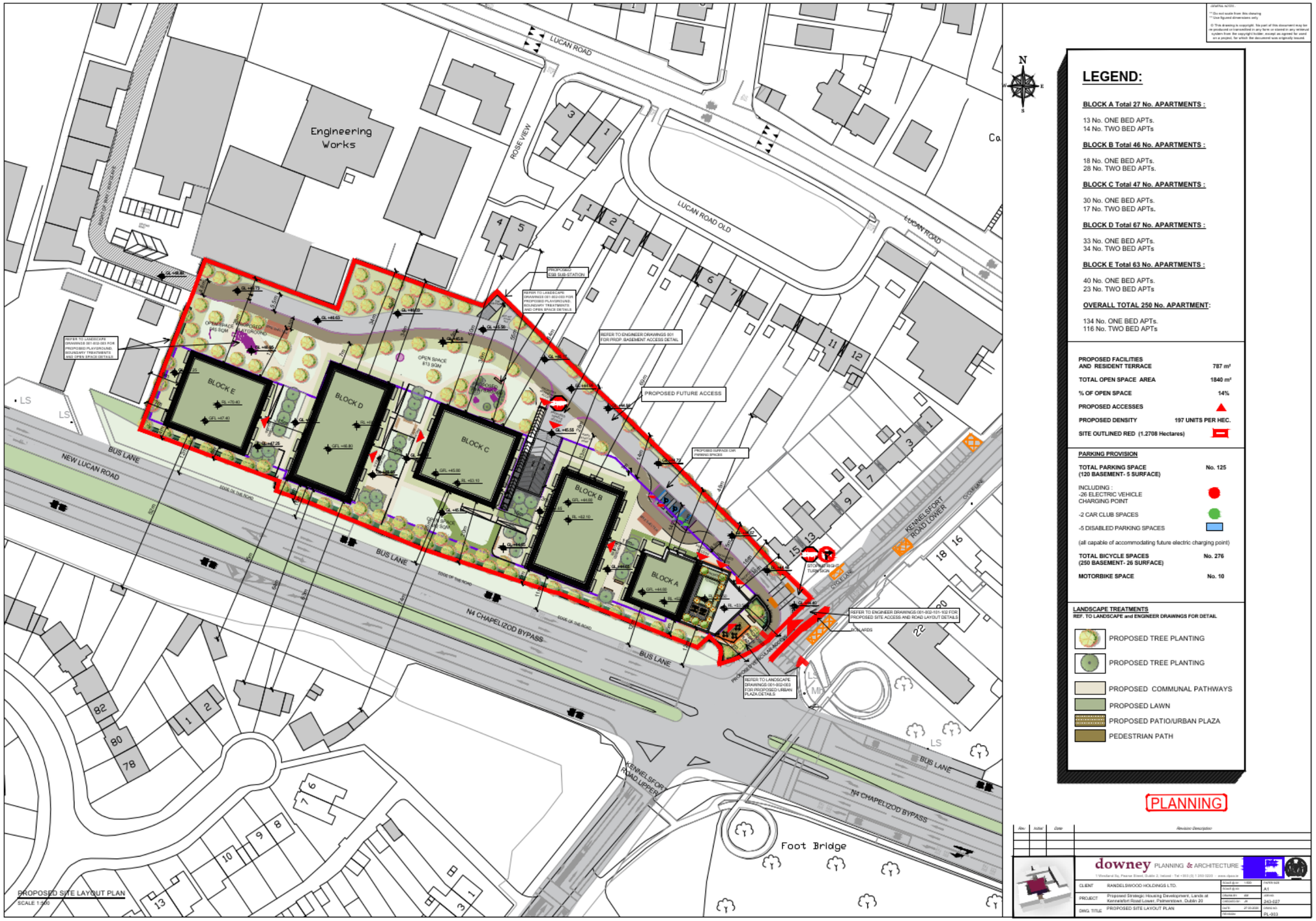
Dwelling Type	Block A	Block B	Block C	Block D	Block E	*Total*
1 Bedroom Apartment	13	18	30	33	40	***134***
2 Bedroom Apartment	14	28	17	34	23	***116***
Total	***27***	***46***	***47***	***67***	***63***	***250***

Table 3. Palmerstown SHD Residential Amenity Space Breakdown

Land Use	NIA (m^2)
Bookable Space	59
Manager Office	11
Reception/Parcel Deliveries	52
Café	133
Work Space/Resident Lounge	39
Meeting Room	38
Gym	96
Games Room	75
Cinema	104
Total Residential Amenity Space	***607***

4.3 A red line boundary of the Proposed Development is shown in Figure 1 of this Strategy.

Figure 1. Red Line Boundary of the Proposed Development



Please Note: Figure 1 not drawn to scale

5. Methodology

Residential

5.1 As SDCC does not have any guidance to calculate residential waste storage requirements, estimated volumes of residential waste arisings (including Mixed Dry Recyclables (MDR), Residual waste (non-recyclable/general waste), Glass and Food waste) from the operational phase of the Proposed Development have been calculated based on the guidance listed in British Standards (BS) 5906:2005.

5.2 BS 5906:2005 guidance recommends calculating the required waste capacity based on the following formula:

$$Number\ of\ dwellings\ x\ ((70\ L\ x\ average\ number\ of\ bedrooms) + 30)$$

5.3 Based on trends seen in National Waste Reports published by the Environmental Protection Agency (EPA), the assumed split between MDR, Food, Glass and Residual waste is a ratio of 45 : 10 : 5 : 40 respectively.

Residential Amenity Space

5.4 SDCC also does not provide guidance for the calculation and storage of commercial waste arisings, therefore reference to BS 5906:2005 has been made in order to calculate the waste arisings and storage requirements for the residential amenity space.

5.5 Table 4 of this Strategy sets out the methodology adopted to determine the waste arising from the residential amenity space. A split of 45 : 5 : 50 between MDR, Glass and Residual waste has been assumed for all residential amenity spaces apart from the Café, which has a spilt of 45 : 30 : 5 : 20 between MDR, Food, Glass and Residual waste, and the Cinema which has a split of 45 : 30 : 5 : 20 between MDR, Food, Glass and Residual waste.

Table 4. Waste Storage Calculation Methodology for the Residential Amenity Space (Based on a Weekly Collection Frequency)

Land Use	Waste Storage Requirements	Waste Stream Ratios
Bookable Space	5 L per m^2 Net Internal Area NIA.	45 : 5 : 50 MDR : Glass : Residual
Manager Office	50 L per employee with one employee calculated per 8 m^2 NIA.	45 : 5 : 50 MDR : Glass : Residual
Reception/Parcel Deliveries	50 L per employee with one employee calculated per 8 m^2 NIA.	45 : 5 : 50 MDR : Glass : Residual
Café	10 L per m^2 Sales Floor Area (SFA)*.	45 : 30 : 5 : 20 MDR : Food : Glass : Residual
Work Space/Resident Lounge	5 L per m^2 NIA.	45 : 5 : 50 MDR :Glass : Residual
Meeting Room	5 L per m^2 NIA.	45 : 5 : 50 MDR : Glass : Residual
Gym	5 L per m^2 NIA.	45 : 5 : 50 MDR : Glass : Residual
Games Room	5 L per m^2 NIA.	45 : 5 : 50 MDR : Glass : Residual
Cinema	5 L per m^2 NIA.	45 : 30 : 5 : 20 MDR : Food : Glass : Residual

**SFA is 2/3 of the NIA.*

Waste Growth Rates

5.6 Estimates of future waste generation rates vary widely, therefore inflationary waste growth predictions have not been applied to the waste calculation estimates for the Proposed Development. Data from National Waste Statistics published by the Environmental Protection Agency (EPA) for the years from 2010 to 2016 show that household waste arisings in Ireland have remained relatively stable at around 2.5 million tonnes per year, with periods of slight increase and decline (Ref. 33). Overall, the total waste collected has increased slightly by 137,863 tonnes from 2010 to 2016, however waste per person has decreased from 621 kg to 581 kg per person from 2014 to 2018 respectively (Ref. 34).

5.7 Whilst volumes of waste generation have fluctuated over recent years, it is likely that the Proposed Development will see a decline in waste growth. This is because the commercial status and long-term population of the Proposed Development are unlikely to change significantly, and widespread initiatives to reduce waste and improve materials reuse and recycling are likely to reduce the long-term production of waste from the Proposed Development. Therefore, it is likely that the current waste production and storage requirements will represent a reasonable worst-case scenario and have therefore formed the basis for the calculation of the long-term waste management and storage provisions for the Proposed Development.

6. Operational Waste Management Strategy

Residential Waste Arisings

6.1 Based on the methodology provided in paragraph 5.1 to 5.3 of this Strategy and based on a weekly collection frequency, the waste arisings for the residential units in the Proposed Development are provided in Table 5 of this Strategy.

Table 5. Anticipated Residential Waste Arisings Based on a Weekly Collection Frequency

Block	Dwelling Type	Number of Units	MDR (L)	Food (L)	Glass (L)	Residual (L)	Total (L)
A	1 Bedroom Apartment	13	585	130	65	520	1,300
	2 Bedroom Apartment	14	1,071	238	119	952	2,380
	Total Block A	***27***	***1,656***	***368***	***184***	***1,472***	***3,680***
B	1 Bedroom Apartment	18	810	180	90	720	1,800
	2 Bedroom Apartment	28	2,142	476	238	1,904	4,760
	Total Block B	***46***	***2,952***	***656***	***328***	***2,624***	***6,560***
C	1 Bedroom Apartment	30	1,350	300	150	1,200	3,000
	2 Bedroom Apartment	17	1,300.5	289	144.5	1,156	2,890
	Total Block C	***47***	***2,650.5***	***589***	***294.5***	***2,356***	***5,890***
D	1 Bedroom Apartment	33	1,485	330	165	1,320	3,300
	2 Bedroom Apartment	34	2,601	578	289	2,312	5,780
	Total Block D	***67***	***4,086***	***908***	***454***	***3,632***	***9,080***
E	1 Bedroom Apartment	40	1,800	400	200	1,600	4,000
	2 Bedroom Apartment	23	1,759.5	391	195.5	1,564	3,910
	Total Block E	***63***	***3,559.5***	***791***	***395.5***	***3,164***	***7,910***
Total Residential Waste Arisings		***250***	***14,904***	***3,312***	***1,656***	***13,248***	***33,120***

Residential Amenity Space Waste Arisings

6.2 Based on the methodology provided in Table 4 of this Strategy and based on a weekly collection frequency, the waste arisings for the residential amenity spaces in the Proposed Development are provided in Table 6 of this Strategy.

Table 6. Anticipated Waste Arisings for the Residential Amenity Spaces Based on a Weekly Collection Frequency

Land Use	NIA (m^2)	Working Area	MDR (L)	Food (L)	Glass (L)	Residual (L)	Total (L)
Bookable Space	59	59 m^2	133.75	-	15.75	147.5	297
Manager Office	11	2 employees**	45	-	5	50	100
Reception/Parcel Deliveries	52	7 employees**	157.5	-	17.5	175	350
Café*	133	89 m^2 SFA	400.5	267	44.5	178	890
Work Space/Resident Lounge	39	39 m^2	87.5	-	9.75	97.5	195
Meeting Room	38	38 m^2	85.5	-	9.5	95	190
Gym	96	96 m^2	216	-	24	240	480
Games Room	75	75 m^2	168.75	-	18.75	187.5	375
Cinema	104	104 m^2	234	156	26	104	520
Total Residential Amenity Space Waste Arisings	***607***	***-***	***1,528.5***	***423***	***170.75***	***1,274.5***	***3,397***

**It has been assumed that the café will mainly be selling pre-made food i.e. sandwiches, with a limited amount of food preparation on site. Therefore, the methodology for A1 units has been used to calculate the total amount of waste arising from the café.*

***1 employee per 8 m^2 NIA.*

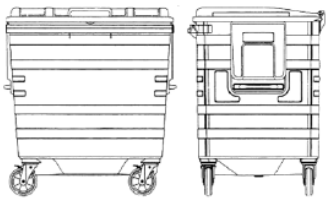
****SFA is 2/3 of the NIA.*

NB: Some numbers may not add up due to rounding.

Storage Containers

6.3 The waste arising from the Proposed Development will be stored within 1,100 L and 240 L containers, similar to the examples provided in Table 7 of this Strategy. These will be colour coded depending on waste stream: MDR, Food, Glass or Residual waste.

Table 7. Example Bin Dimensions

1,100 L	
	Capacity (L): 1,100
	Height (mm): 1,370*
	Depth (mm): 1,260*
	Width (mm): 990*
240 L	
	Capacity (L): 240
	Height (mm): 1,085*
	Depth (mm): 730*
	Width (mm): 570*

**Dimensions may vary between manufacturers*

6.4 The waste arising from the residential units once the Proposed Development is operational will be stored in:

- 1,100 L Euro Bins for MDR;
- 240 L Wheeled Bins for Food Waste;
- 240 L Wheeled Bins for Glass; and
- 1,100 L Euro Bins for Residual Waste.

6.5 The waste arising from the residential amenity space once the Proposed Development is operational will be stored in:

- 1,100 L for MDR;
- 240 L Wheeled Bins for Food Waste;
- 240 L Wheeled Bins for Glass; and
- 1,100 L for Residual Waste.

Regional Waste Management Service Providers and Facilities

6.6 The waste producer is responsible for waste from the time it is generated through until its legal disposal (including its method of disposal). Waste contractors will be employed to physically transport waste to the final waste disposal/recovery site.

6.7 It is therefore critical that the residents and the proposed management company undertake on-site management of waste in accordance with all legal requirements and employ suitably permitted/licensed contractors to undertake off-site management of waste in accordance with all legal requirements. This includes the requirement that a waste contractor handle, transport and reuse/recover/recycle/dispose of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of these activities.

6.8 A collection permit to transport waste must be held by each waste contractor which is issued by the National Waste Collection Permit Office (NWCPO). Waste receiving facilities must also be appropriately permitted or licensed. Operators of such facilities cannot receive any waste, unless in possession of a Certificate of Registration (COR) or waste permit granted by the relevant Local Authority under the Waste Management (Facility Permit and Registration) Regulations 2007 (as amended) or a waste or IED (Industrial Emissions Directive) license granted by the EPA. The COR/permit/license held will specify the type and quantity of waste able to be received, stored, sorted, recycled, recovered and/or disposed of at the specified site.

6.9 Various contractors offer waste collection services for the residential and commercial sector in South Dublin County Council. Details of waste collection permits (granted, pending and withdrawn) for the region are available from the NWCPO.

Waste Management and Storage Requirements

Residential Waste Storage Requirements

6.10 Based on the residential waste arisings presented in Table 5 of this Strategy, the subsequent waste storage requirements for the residential units are shown in Table 8 of this Strategy.

6.11 It should be noted that the total number of bins has been calculated based on the total combined residential waste arisings. The waste storage requirements for Block A and Block B will be stored in the 75 m^2 Bin Store, and the waste storage requirements for Block C, Block D and Block E will be stored in the 77 m^2 Bin Store. The internal management team will be available to swap full/empty bins between the bin stores should the need arise.

Table 8. Waste Storage Requirements for the Residential Units Based on a Weekly Collection Frequency

Block	MDR	Food	Glass	Residual	Total
75 m^2 Bin Store	5 x 1,100 L	5 x 240 L	3 x 240 L	5 x 1,100 L	8 x 240 L 10 x 1,100 L
77 m^2 Bin Store	9 x 1,100 L	9 x 240 L	4 x 240 L	7 x 1,100 L	13 x 240 L 16 x 1,100 L
Total Residential Waste Storage Requirements	***14 x 1,100 L***	***14 x 240 L***	***7 x 240 L***	***12 x 1,100 L***	***21 x 240 L 26 x 1,100 L***

Residential Amenity Space - Waste Storage Requirements

6.12 Based on the waste arisings presented in Table 6 of this Strategy, the subsequent waste storage requirements for the residential amenity spaces are shown in Table 9 of this Strategy. The waste storage requirements for the residential amenity spaces will be stored within the 75 m^2 Bin Store as all of the residential amenity spaces are concentrated in Block A.

Table 9. Waste Storage Requirements for the Residential Amenity Spaces Based on a Weekly Collection Frequency

Land Use	MDR	Food	Glass	Residual	Total
75 m^2 Bin Store	***2 x 1,100 L***	***2 x 240 L***	***1 x 240 L***	***1 x 1,100 L***	***3 x 240 L 3 x 1,100 L***

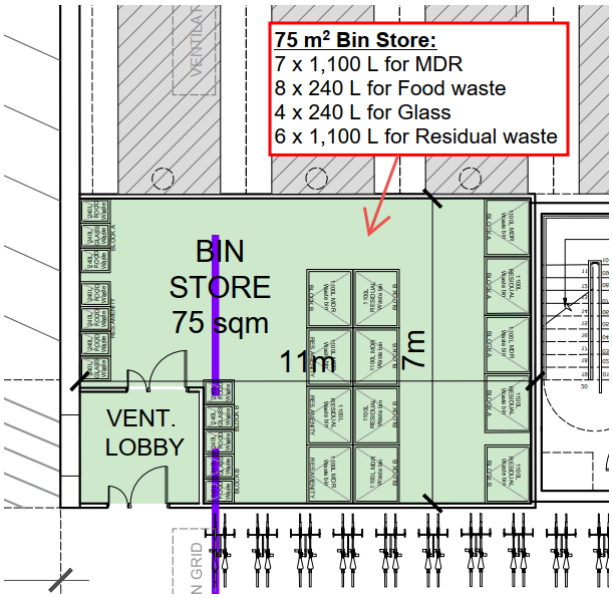
Waste Management

6.13 Residents from the proposed residential units will use the lifts within each core to deposit their waste and recyclate material into their closest bin store. Block A and B will deposit their waste and recyclate material into the 75 m^2 bin store located at basement level on the east of the site (shown in Figure 2 of this Strategy), and Block C, D and E will deposit their waste and recyclate material into the 77 m^2 bin store located at basement level on the west of the site (shown in Figure 3 of this Strategy). The internal management team will transfer waste and recyclate material from the residential amenity spaces to the 75 m^2 bin store located at basement level on the east of the site as all of the residential amenity spaces are concentrated in Block A.

6.14 On the day of collection, the internal management team will use tugs to move the bins from the bin stores to the hard-standing presentation area on the ground floor level at the top of the ramp (shown in Figure 4 of this Strategy) via the pedestrian and cycle ramp (which is 2 m and has a gradient of 1:12). It is envisioned that the internal management team will bring the tugs to the development on the day of collection from other developments managed by the same internal management team. The internal management team will avoid rush hours and lunchtimes when moving the bins to avoid causing disruption to cyclists and pedestrians using the ramp. The Refuse Collection Vehicle (RCV) will enter the site in a forward gear from the east and pull up to the kerb next to the presentation area. The collection operatives will move the bins from the presentation area to the rear of the RCV and empty them. The collection operatives will then return the empty bins to the presentation area and the RCV will reverse to exit the site to the east in forward gear onto Kennelsford Road Lower via the same route it used to enter the site(as shown in Figure 5 of this Strategy). The internal management team will return the empty bins to the

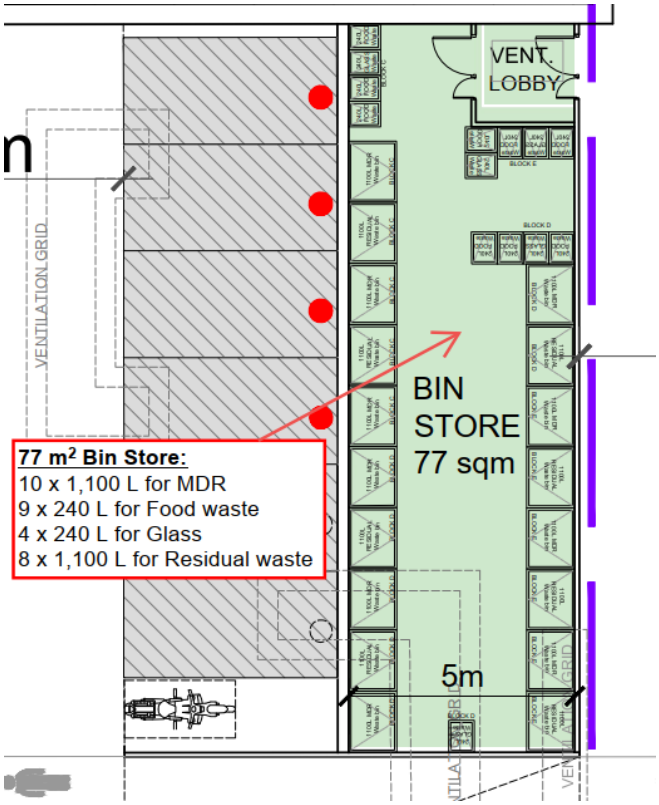
respective bin stores using the pedestrian and cycle ramp, once again avoiding rush hours and lunchtimes to minimise disruption to cyclists and pedestrians.

Figure 2. 75 m² Bin Store Used by Block A, Block B and the Residential Amenity Spaces



6.15 It can be seen in Figure 2 of this Strategy, that the 75 m² Bin Store contains one extra 240 L Wheeled Bin for Food waste compared to the waste storage requirements listed in Table 8 and Table 9 of this Strategy. It is envisioned that the internal management team can swap this extra bin with a full bin from the 77 m² Bin Store should the need arise.

Figure 3. 77 m² Bin Store Used by Block C, Block D and Block E



6.16 It can be seen in Figure 3 of this Strategy, that the 77 m² Bin Store contains one extra 1,100 L Euro Bin for MDR and one extra 1,100 L Euro Bin for Residual waste compared to the waste storage requirements listed in Table 8 of this Strategy. It is envisioned that the internal management team can swap these extra bins with full bins from the 75 m² Bin Store should the need arise.

Figure 4. Location of the Presentation Area

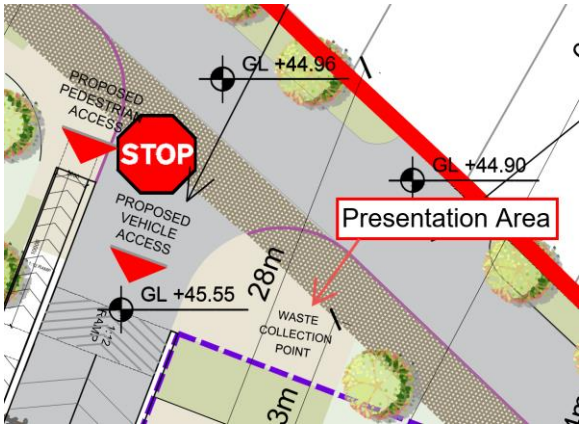
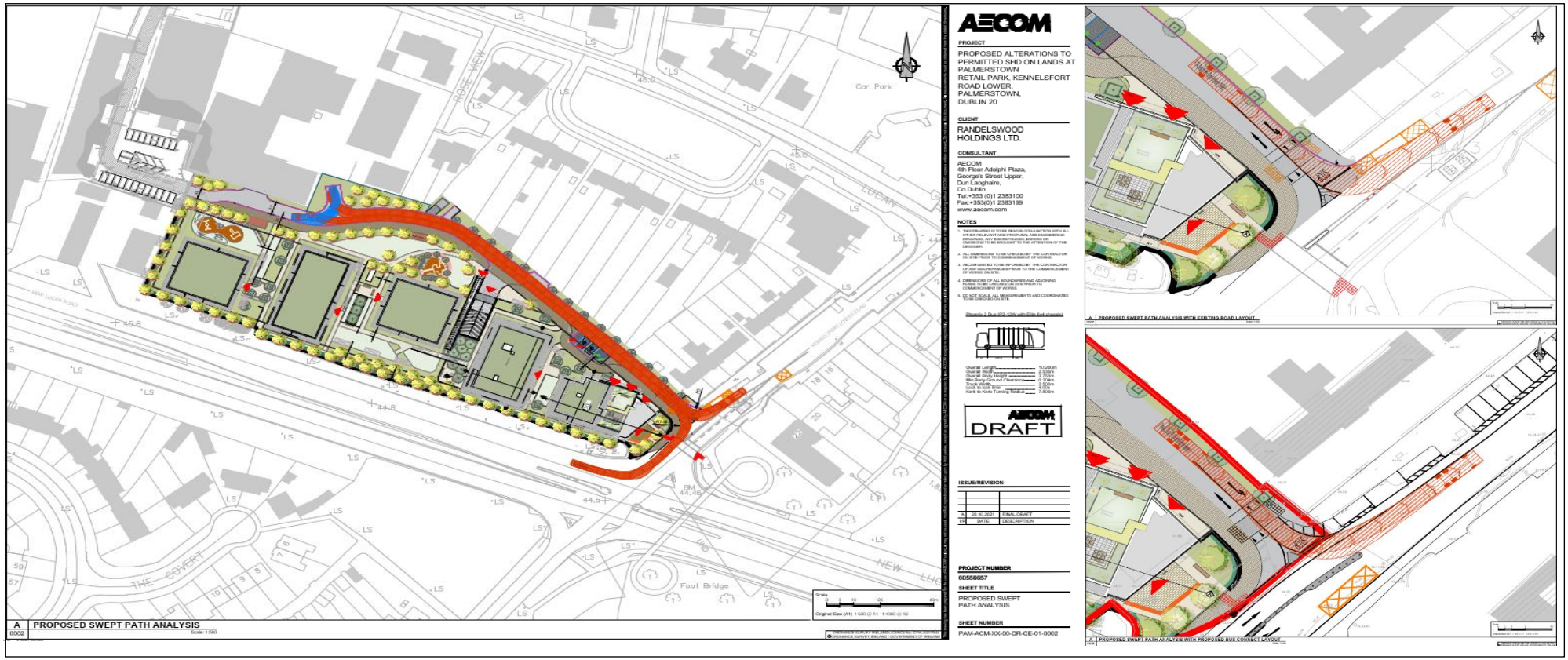


Figure 5. Tracking of the RCV

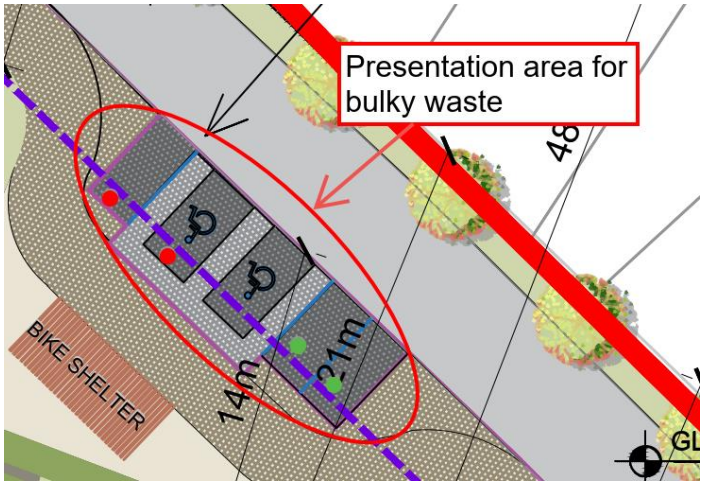


Please Note: Figure 5 not drawn to scale

Bulky Waste

6.17 SDCC does not require accessibility space for occupants to present/store bulky waste items. It is envisioned that residents will hold their bulky waste items within the household until the day of collection to avoid fly tipping. Any items from the residential amenity spaces will be held within the amenity area until the day of collection. On the day of collection, the internal management team will help residents to bring bulky waste down to the presentation area (i.e. one of the car parking spaces on the ground floor as indicated in Figure 6 of this Strategy).

Figure 6. Presentation Area for Residents to Leave Bulky Waste



Maintenance and Fit Out

6.18 In addition to the general bin stores and waste management areas, sufficient space will be provided within the Proposed Development for the storage of waste for future maintenance and fit out activities. Space for a skip has been provided within the location shown in Figure 7 of this Strategy. Tracking to show that a skip collection vehicle can collect the skip from this location has also been provided in Figure 8 of this Strategy.

Figure 7. Location Provided for a Skip

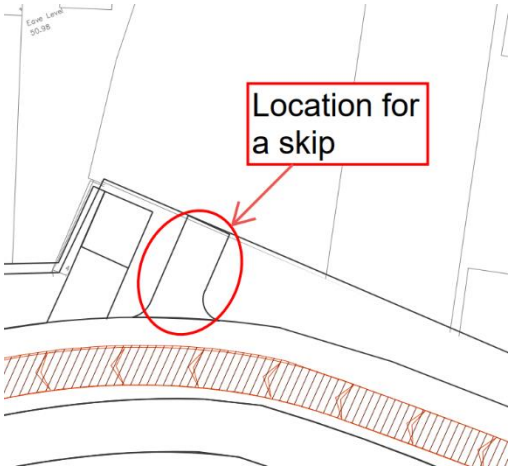
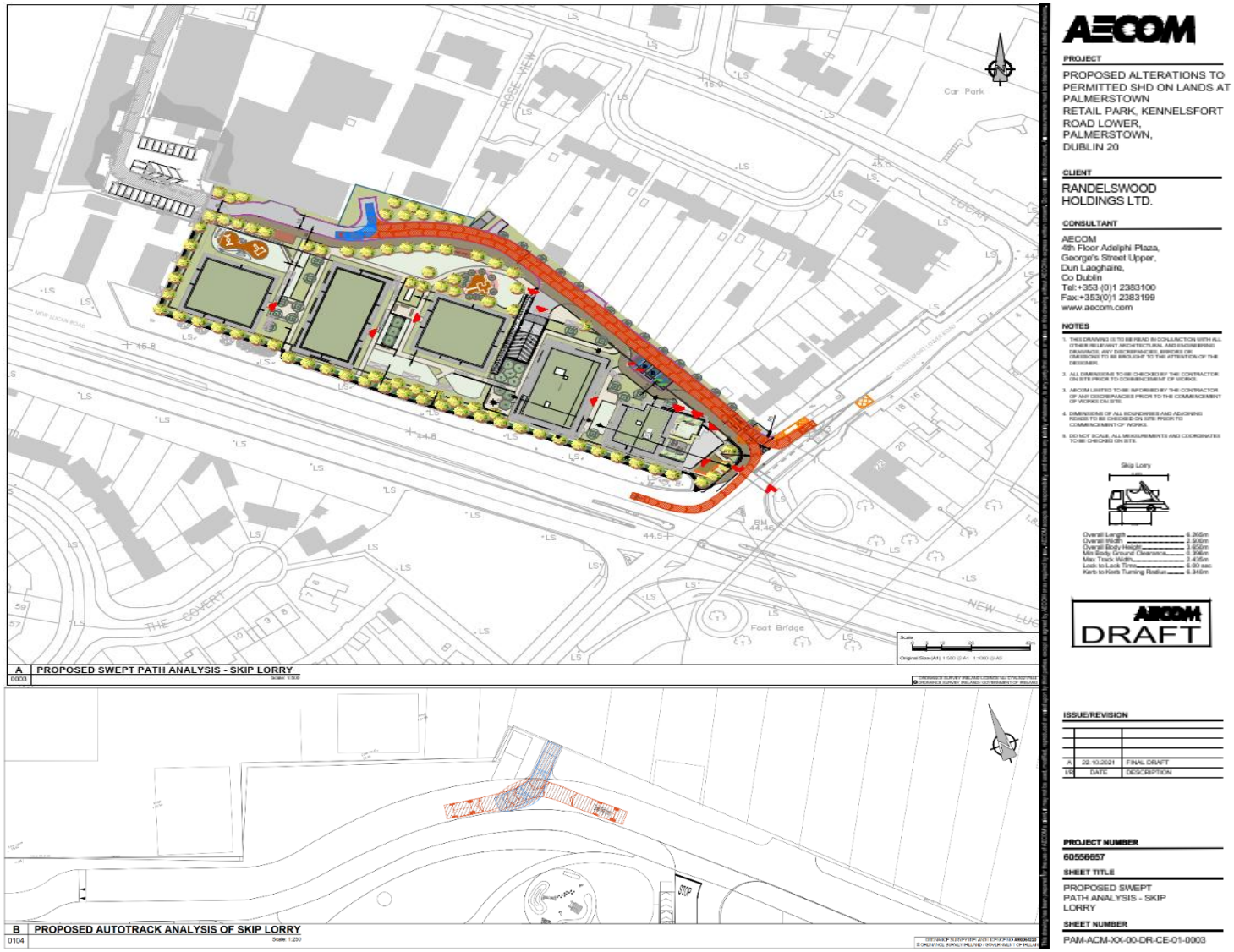


Figure 8. Tracking of the Skip Collection Vehicle



Please Note: Figure 8 not drawn to scale

Unique Waste

6.19 There is likely to be a small component of the overall waste arisings from the Proposed Development that will comprise of other waste streams, such as waste electrical and electronic equipment (WEEE), printer and toner cartridges and florescent light tubes. Building maintenance will also give rise to materials such as paints and waste lubricating oils that will require separate storage in dedicated sealed containers.

6.20 This type of waste is termed “unique” as it will not be produced on a regular basis and therefore its management will be on special arrangement with a registered waste handler for the specific waste that is produced. Hazardous waste is required to be kept separate from general and bulky waste. Separate arrangements will be made for the safe disposal of these waste streams, as covered by Waste Management (Hazardous Waste) Regulations 1998, Waste Management (Movement of Hazardous Waste) Regulations 1998 and the Directive on Waste Electrical and Electronic Equipment (WEEE Directive 2012/19/EU). All waste management will have to comply with the Waste Management Act 1996 (as amended 2001) and the Environmental Protection Agency Act 1992. Although unique waste is unlikely to be produced on a regular basis, should the residents generate any unique waste, it is envisioned that the internal management team will engage with the residents to help them dispose of it with a suitable private waste contractor.

7. Waste and Recycling Storage and Collection Provision

7.1 The following guidance document provide standard requirements that the Proposed Development will comply with when considering storage and collection of waste arising from the operational activities within the buildings:

- South Dublin County Council, (2016); Development Plan 2016-2022;
- South Dublin County Council, (2018); Household and Commercial Waste Bye-Laws; and
- DoHLPG, (2015); Sustainable Urban Housing: Design Standards for New Apartments.

7.2 In addition, the following guidance documents provide additional best practice requirements that the Proposed Development will comply with:

- BS 5906:2005;
- Part H6 of the Building Regulations (2010) (2015 Edition) (hereafter referred to as “Part H6”) (Ref. 35).

SDCC – Development Plan 2016-2022 (2016)

- The location and design of the refuse storage area will ensure that it is easily accessible for both residents and for bin collection, be insect and vermin proofed, will not present an odour problem, and will not significantly detract from the residential amenities of adjacent property of future occupants; and
- Access to private waste storage in residential schemes will be restricted to residents only.

SDCC - Bye-Laws for the Segregation, Storage and Presentation of Household and Commercial Waste (2018)

- The internal management team will regularly check the bins to make sure that containers used for the presentation of kerbside waste will be maintained in such condition and state of repair that the waste placed therein will not be a source of nuisance or litter. Waste will not be presented in a container where the wheels or lid has been removed or damaged to such an extent that it is not able to contain the waste without spillage or is otherwise unfit for the purpose for which it was designed or is not capable of being conveniently emptied. No waste will be presented on top of the lid or adjacent to the waste container;
- Other than on the day before and the designated waste collection day, containers used for the presentation of kerbside waste will be held within the two designated bin stores. They will not be stored on a roadway, footway, footpath or any other public place;
- The internal management team will not present the bins for collection earlier than 8.00 pm on the day immediately preceding the designated waste collection day. The internal management team will remove all containers used for the presentation of kerbside waste and any uncollected waste from any roadway, footway, footpath or any other public place no later than 8.00 am on the day following the designed waste collection day; and
- Commercial waste will not be deposited at any bring facility provided by or on behalf of South Dublin County Council.

DoHLPG – Sustainable Urban Housing: Design Standards for New Apartments (2018)

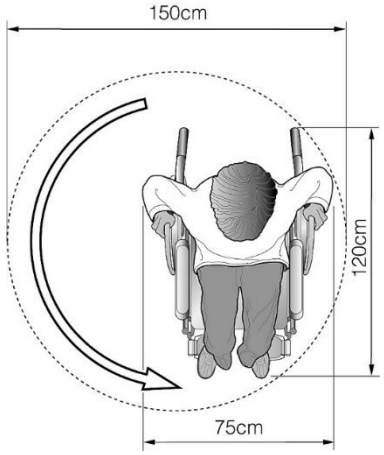
- Provision will be made for the storage and collection of waste materials in apartment schemes. Refuse facilities will be accessible to each apartment stair/ lift core and designed with regard to the projected level of waste generation and types and quantities of receptacles required. Within apartments, there will be adequate provision for the temporary storage of segregated materials prior to deposition in communal waste storage and in-sink macerators are discouraged as they place a burden on drainage systems.
- The following general design considerations will be taken into account in the provision of refuse storage facilities:
    - Sufficient communal storage area to satisfy the three-bin system for the collection of mixed dry recyclables, organic waste and residual waste;
    - In larger apartment schemes, consideration will also be given to the provision of separate collection facilities for other recyclables such as glass and plastics (MDR bins can be re-labelled where necessary if separate streams are needed);
    - Waste storage areas will be adequately ventilated so as to minimise odours and potential nuisance from vermin/flies and taking account the avoidance of nuisance for habitable rooms nearby;
    - Provision in the layout for sufficient access for waste collectors, proximity of, or ease of access to, waste storage areas from individual apartments, including access by disabled people;
    - Waste storage areas will not present any safety risks to users and will be well-lit;
    - Waste storage areas will not be on the public street, and will not be visible to or accessible by the general public. Appropriate visual screening will be provided, particularly in the vicinity of apartment buildings;
    - Waste storage areas in basement car parks will be avoided where possible, but where provided, will ensure adequate manoeuvring space for collection vehicles; and
    - The capacity for washing down waste storage areas, with wastewater discharging to the sewer.

BS 5906:2005

- Basement level storage will have adequate provision to move waste to the ground floor for collection.
- Waste storage areas will be away from the main entrance to the building.
- The collector will not be required to carry individual waste containers or move two wheeled containers for a distance more than 15m, nor to manoeuvre four wheeled waste storage containers from storage points to collecting vehicles more than 10m.
- Residents will be made aware of the fire risk from waste storage. This will be done using signage and displaying the dangers when waste materials are stored carelessly.
- All roads will be clearly marked and controlled to prevent unauthorised parking.
- External and internal facilities for buildings are designed for older persons and persons with disabilities as set out by the Disability and Discrimination Act (DDA), as specified in the BS 8300:2001 (Ref. 36).
- BS 8300:2001 details that space allowance is needed for wheelchair access; slip resistant requirements on flooring and reach ranges which enrapture all individuals for the use of facilities such as disposal or recycling units.
- Waste storage areas will provide a clear turning circle with a minimum diameter of 1,500 mm for wheelchair users, as specified in Part M of the Building Regulations (Ref. 37) and shown in Figure 9 of this Strategy.

- There will not be steps and projections at the entrance of a waste storage area.
- The waste storage area will either be external to the building or capable of being isolated from the main building. This will ensure access to the main building will not be used through the waste storage area.
- Roads will be a minimum width of 5m.
- Paths between container storage areas and collecting vehicles will be free from kerbs or steps and inclines with a gradient more than 1:12, be non-slip and a minimum of 2m wide.
- Roads will be arranged so that collecting vehicles can continue mainly in a forward direction. If reversing, the distance should not exceed 12m.
- Vehicles operating in service areas will enter and leave in a forward-facing direction.
- Loading bays will have headroom appropriate to the method of waste collection.
- The walls and roofs of the waste storage area will be formed of non-combustible robust and secure materials with a smooth finish suitable of washing down. The floor of the waste storage area will be no less than 100mm thick.
- The door of the waste storage area will be capable of being opened from the inside as well as the outside for reasons of safety.
- A universal lock and key system will be used to secure waste storage areas. The standard Fire Brigade (FB) mortise lock and key would be the preferred option by the collection agent. Electronic entry systems may also be used.
- The walls and roofs of the waste storage area will have a fire resistance of one hour when tested in accordance with BS 476-21 (Ref. 38). The door of the chamber will be made of steel or have a fire resistance of 30 minutes when tested in accordance with BS 476-22 (Ref. 39).
- Permanent ventilators will be provided giving a total ventilation area of not less than 0.2m^2. Passive ventilators will be fly and vermin proof and located as near the ceiling and floor of the chamber as possible but away from windows and dwellings.
- Electrical lighting will consist of sealed bulkhead fittings with houses related to IP65 in BS EN 60529: 1992 (Ref. 40) for the purposed of cleaning down with hoses and inevitable splashing.
- Luminaires will be low energy light fittings or low energy lamp bulbs, controlled by proximity detection or a time delay button to prevent lights being left on.
- Arrangements will be made for cleaning of the chamber with water. A hose union tap will be provided in agreement with the local water authority and the EPA.
- Floor of the chamber will have suitable fall towards the drainage point. Gullies will be positioned not to be in the track of container wheels and will incorporate a trap, which maintains a seal, even during prolonged periods of disuse.

Figure 9. Example Wheelchair Turning Circle



Part H6 of the Building Regulations

- Containers will be within 25m of the waste collection point specified by the waste collection authority.
- Waste containers will be sited so that the containers can be taken to the collection point without being taken through a building unless it is a porch, garage, car port or other open space.
- External storage areas for waste containers will be away from windows and ventilators and preferably be in shade or under shelter.
- Bins will be fitted with close fitting lids to prevent vermin access.
- Waste storage areas will be marked, and signs will be provided.
- For waste containers up to 250L steps will be avoided between the container store and the collection point, however if steps are unavoidable, they will not exceed 3 in number.
- Unsightly bins can damage the visual amenity and contribute to increased levels of anti-social nuisance such as odour and litter. Therefore, bins will be planned carefully will not be stored in a publicly accessible area.

8. Further Consideration

8.1 Building Research Establishment Environmental Assessment Method (BREEAM) provides assessment criteria for newly constructed and refurbished developments, such as the Proposed Development, for a range of environmental factors, including waste. These assessment criteria are described within the BREEAM New Construction Non-Domestic Buildings Technical Manual (Ref. 41). With regards to waste arisings generated during the operational phase of the Proposed Development, one credit is available for meeting requirements of Wst 03 Operational.

8.2 In order to meet Wst 03 Operational, the following criteria must be complied with:

- Provision of dedicated storage space to cater for the segregation and storage of operational MDR waste volumes generated by the Proposed Development, its occupants and activities;
- The dedicated space must be:
    - Clearly labelled, to assist with segregation, storage and collection of MDR waste stream;
    - Accessible to occupants/facilities operators (i.e. management teams) for the deposit of materials and collections by waste management contractors; and
    - Of a capacity appropriate to the building type, size and number of units (if relevant) and predicted volume of waste that will arise from daily/weekly operational activities and occupancy rates.

8.3 Providing the waste storage requirements specified within this Strategy are adhered to, it is considered that the Proposed Development will meet the Wst 03 Operational criteria.

9. Summary

9.1 Once complete, the Proposed Development will provide the following:

- 250 residential units; and
- 607 m^2 meters squared (m^2) Net Internal Area (NIA) of residential amenity space.

9.2 The principle aim of this Strategy is to demonstrate how sustainable methods for waste and recycling management have been taken into account for the operational phase of the Proposed Development. Furthermore, with regards to waste and recycling management within the Proposed Development, this Strategy has the following aims:

- To contribute towards achieving current and long-term national, Eastern Midlands Region and SDCC targets for waste minimisation, recycling and re-use;
- To comply with all applicable legal requirements for handling operational waste and recyclate material;
- To achieve high standards of waste management performance, through giving due consideration to the waste generated during operation of the Proposed Development; and
- To provide a convenient, clean and efficient waste management strategy that enhances the operation of the Proposed Development and promotes recycling.

9.3 Once operational, the Proposed Development is anticipated to produce approximately 36,517 litres (L) of (un-compacted) waste from both residential and residential amenity spaces per week. Of this approximately 33,120 L will arise from residential uses per week and approximately 3,397 L will arise from residential amenity spaces per week. Waste arisings per week will equate to approximately 270 tonnes of waste per year (i.e. based on the following approximate densities: Mixed Dry Recyclables (MDR) – 62 kg/m^3 (Kilogrammes/meters cubed), Food waste – 667 kg/m^3, Glass – 277 kg/m^3 and Residual waste – 81 kg/m^3 (Ref. 1)).

9.4 Residents from the proposed residential units will use the lifts within each core to deposit their waste and recyclate material into their closest bin store. Block A and B will deposit their waste and recyclate material into the 75 m^2 bin store located at basement level on the east of the site, and Block C, D and E will deposit their waste and recyclate material into the 77 m^2 bin store located at basement level on the west of the site. The internal management team will transfer waste and recyclate material from the residential amenity spaces to the 75 m^2 bin store located at basement level on the east of the site as all of the residential amenity spaces are concentrated in Block A.

9.5 On the day of collection, the internal management team will use tugs to move the bins from the bin stores to the hard-standing presentation area on the ground floor level at the top of the ramp via the pedestrian and cycle ramp (which is 2 m and has a gradient of 1:12). It is envisioned that the internal management team will bring the tugs to the development on the day of collection from other developments managed by the same internal management team. The internal management team will avoid rush hours and lunchtimes when moving the bins to avoid causing disruption to cyclists and pedestrians using the ramp. The Refuse Collection Vehicle (RCV) will enter the site in a forward gear from the east and pull up to the kerb next to the presentation area. The collection operatives will move the bins from the presentation area to the rear of the RCV and empty them. The collection operatives will then return the empty bins to the presentation area and the RCV will carry on in a forward gear to exit the site to the west via the business park. The internal management team will return the empty bins to the respective bin stores using the pedestrian and cycle ramp, once again avoiding rush hours and lunchtimes to minimise disruption to cyclists and pedestrians.

9.6 These provisions will result in waste produced during the operation of the Proposed Development and all waste infrastructure introduced to the Proposed Development being managed in accordance with the guidelines published by the Eastern Midlands Region, South Dublin County Council, British Standards (BS) 5906:2005 Waste Management in Buildings – Code of Practice and Department of Housing, Planning and Local Government (DoHPLG)'s Sustainable Urban Housing: Design Standards for New Apartments.

9.7 In relation to this Strategy, Waste is defined as per the Waste Framework Directive (2008/99/EC) as "*any substance or object which the holder discards or intends to or is required to discard*".

10. References

Ref. 1 Waste and Resources Action Programme (WRAP) Business Waste Weights Calculator [accessed on 23/03/2020] http://www.wrap.org.uk/sites/files/wrap/Business%20waste%20weights%20calculator_businesses%20v1_0.xlsx

Ref. 2 South Dublin County Council (SDCC), (2016); South Dublin County Council Development Plan 2016-2022.

Ref. 3 British Standards Institute (BSI), (2005); BS 5906:2005 Waste management in buildings, Code of practice.

Ref. 4 Eastern Midlands Region (EMR), (2015); Eastern Midlands Region Waste Management Plan 2015-2021.

Ref. 5 Department of Housing, Planning and Local Government (DoHPLG), (2018); Sustainable Urban Housing: Design Standards for New Apartments.

Ref. 6 Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives.

Ref. 7 Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE).

Ref. 8 Directive 2006/66/EC of the European Parliament and of the Council of 6 September 2006 on batteries and accumulators and repealing certain Directive 91/157/EEC.

Ref. 9 European Union (Household Food Waste and Bio-waste) Regulations 2015.

Ref. 10 European Union (Properties of Waste which Render it Hazardous) Regulations 2015.

Ref. 11 European Communities (Transfrontier Shipment of Waste) Regulations 1994.

Ref. 12 Waste Management (Collection Permit) Regulations 2007 (as amended).

Ref. 13 Waste Management (Facility Permit and Registration) Regulations 2007 (as amended).

Ref. 14 Waste Management (Licensing) Regulations 2004 (as amended).

Ref. 15 Waste Management (Packaging) Regulations 2014 (as amended).

Ref. 16 Waste Management (Planning) Regulations 1997.

Ref. 17 Waste Management (Landfill Levy) Regulations 2015.

Ref. 18 Waste Management (Food Waste) Regulations 2009 (as amended).

Ref. 19 Waste Management (Hazardous Waste) Regulations 1998 (as amended).

Ref. 20 Waste Management (Shipments of Waste) Regulations 2007 (as amended).

Ref. 21 Waste Management (Movement of Hazardous Waste) Regulations 1998.

Ref. 22 The Waste Management Act 1996 (as amended 2001).

Ref. 23 Environmental Protection Agency Act 1992.

Ref. 24 Protection of the Environment Act 2003.

Ref. 25 Litter Pollution Act 1997.

Ref. 26 Planning and Development Act (as amended 2020).

Ref. 27 The Department of the Environment and Local Government (DoELG), (1998); Waste Management – Changing Our Ways – A Policy Statement (1998).

Ref. 28 DoELG, (2002); Waste Management - Preventing and Recycling Waste – Delivering Change – A Policy Statement (2002).

Ref. 29 DoELG, (2002); Making Irelands Development Sustainable – Review, Assessment and Future Action (2002).

Ref. 30 DoELG, (2004); Waste Management – Taking Stock and Moving Forward – A Policy Statement (2004).

Ref. 31 DoELG, (2012); A Resource Opportunity – Waste Management Policy in Ireland.

Ref. 32 SDCC, (2018); Bye-Laws for the Segregation, Storage and Presentation of Household and Commercial Waste.

Ref. 33 Environmental Protection Agency (EPA), (2018); Municipal Waste Statistic for Ireland [accessed on 24/03/2020] http://www.epa.ie/mobile/nationalwastestatistics/municipal/

Ref. 34 EPA, (2019); Ireland's Environmental Indicators [accessed on 24/03/2020] http://www.epa.ie/mobile/nationalwastestatistics/nationalindicators/

Ref. 35 OFDM, (2010); Building Regulations – Approved Document H – Drainage and Waste Disposal (2015) – Part H6: Solid Waste Storage.

Ref. 36 BSI, (2009); BS 8300:2001, Design of Buildings and their Approaches to Meet the Needs of Disabled People.

Ref. 37 OFDM, (2010); Building Regulations – Approved Document M – Access to and Use of Buildings (2015) (Amendment 2016).

Ref. 38 BSI, (1987); BS 476-21, Fire tests on building materials and structures: Part 21.

Ref. 39 BSI, (1987); BS 476-22, Fire tests on building materials and structures: Part 22.

Ref. 40 BSI, (1992); BS EN 60529:1992, Specifications or Degrees of Protection Provided by Enclosures (IP Code).

Ref. 41 Building Research Establishment Environmental Assessment Method (BREEAM), (2011); BREEAM New Construction Non-Domestic Buildings Technical Manual.