Great Ormond Street Hospital

Centre for Research into Rare Disease in Children

Waste Management Strategy

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1 Introduction

1.1 Overview

The Centre for Research into Rare Disease in Children (CRRDC) at Great Ormond Street Hospital (Phase 3A development) is located in the London Borough (LB) of Camden. This report sets out the waste strategy for the new building and therefore includes an assessment of the waste generation, storage, handling and collection requirements in order to discharge planning condition 10 relating to planning permission 2014/6068/P.

Planning Condition 10 states that:

Before the commencement of above grade works details of the location, design and method of waste storage and removal including recycled materials, shall be submitted to and approved by the local planning authority in writing. The facility as approved shall be provided prior to the first occupation of any of the new units and permanently retained thereafter.

1.2 Development Proposals

The proposed development will provide a new hospital research building.

The ground floor, lower ground floor and basement levels are shown in Figures 1 to 3, respectively.

Figure 1 Ground Floor

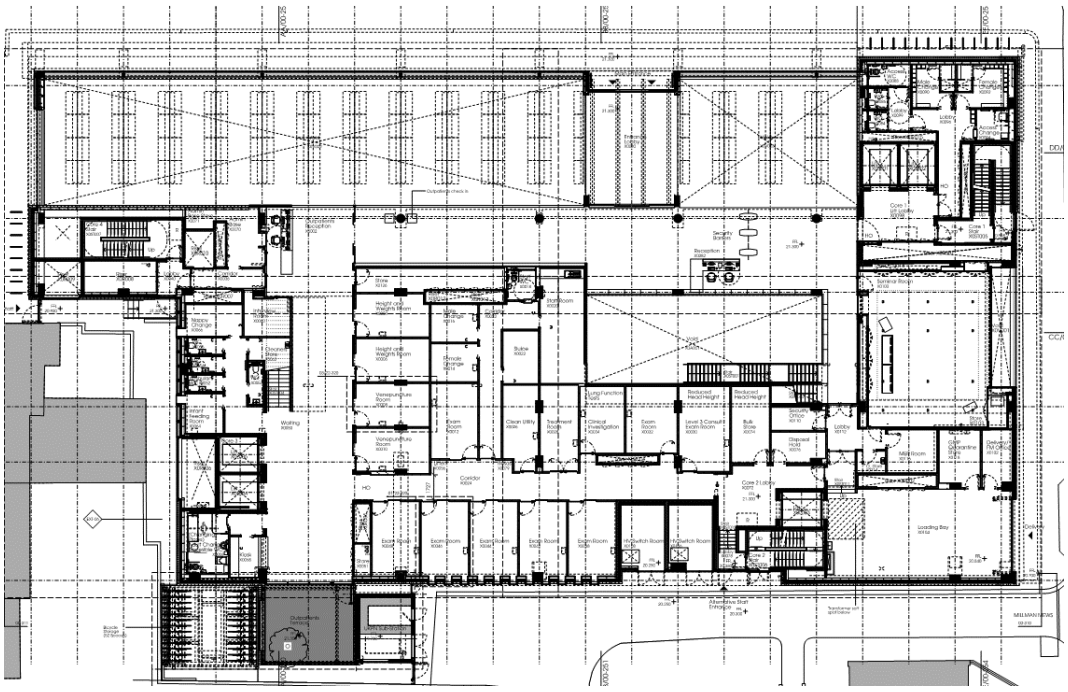


Figure 2 Lower Ground Floor

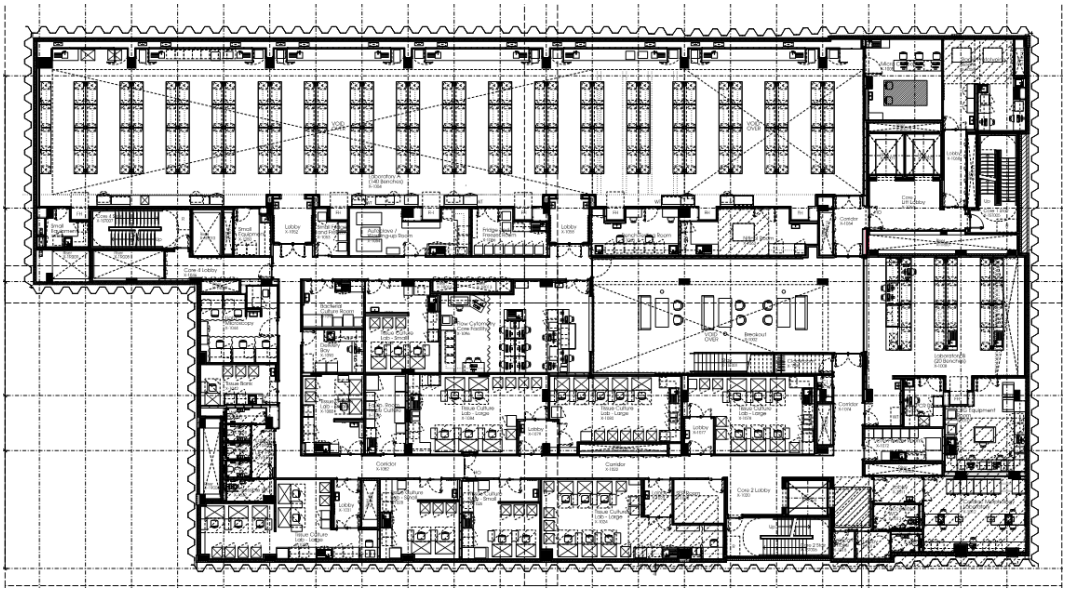
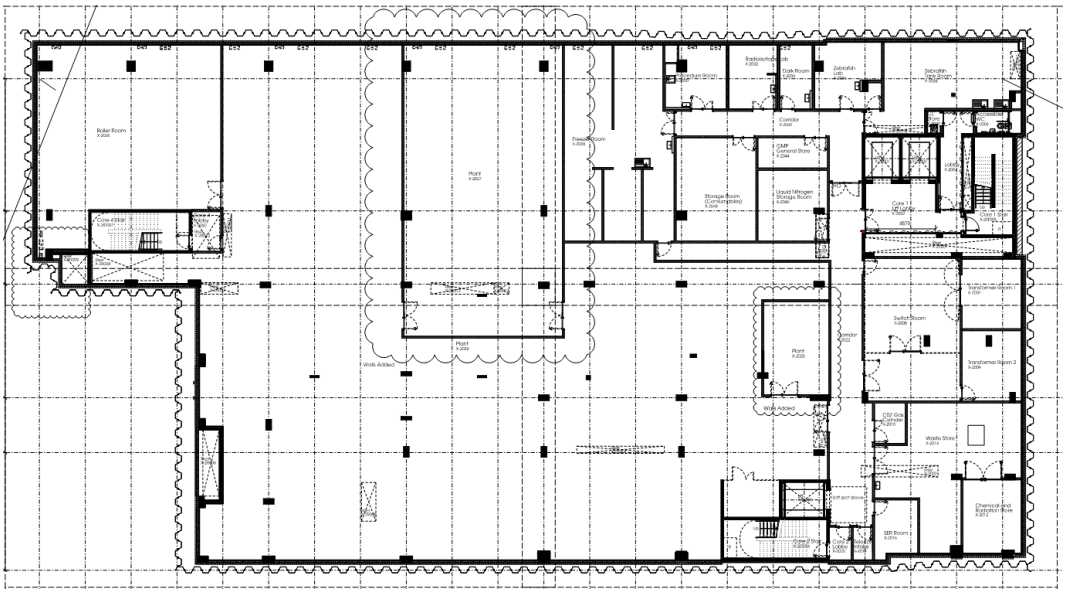


Figure 3 Basement



1.3 Design Brief

Waste generation and storage requirements have been calculated in accordance with LB Camden's Planning Guidance document (CPG1 2015), supplemented by the British Standard for Waste Management in Buildings – code of practice (BS5906:2005).

In line with LB Camden's Planning Guidance document (CPG1 2015), the location of waste storage areas will meet the following requirements:

- Be constructed so that they are designed to contain a fire, are ventilated, provided with wash down facilities and are well lit;
- Comply with BS5906:2005;
- Provide signage to discourage the deposit of recyclables in refuse containers;
- The distance between the containers and collection vehicle should not exceed 10 metres at the time of collection;
- All paths between the container collection point and the collection vehicles should be a minimum two metres in width, free from steps and have a smooth, hard wearing surface capable of withstanding the loading imposed by a fully wheeled container;
- All approaches to the refuse storage areas should be level unless the slope falls away from the storage area at a gradient no steeper than 1:12;
- Roads should have a minimum width of five metres and arranged so that the collection vehicle can continue mainly in a forward direction. Vehicles should not be expected to reverse more than 50 metres to reach a loading position;
- Roads to withstand a 26 tonne gross vehicle weight with a minimum axle weight of 11 tonnes;
- Ensure access to the waste collection is not impeded – consider traffic control measures if necessary; and
- Vehicles should enter and leave in a forward direction.

2 Waste Generation and Storage

This section outlines the waste strategy for the CRRDC building, including waste streams, waste generation and storage requirements for the University College London (UCL), General Manufacturing Plant (GMP) and Out Patients Department (OPD) components of the building. The area schedule is shown in Table 1.

Table 1 Area Schedule

GOSH Area Schedule (Stanton Williams Revision 01 10.06.16)	
Department	**Gross Area GIA (m^2)**
ICT	78.6
Facilities Management	234.5
Manufacturing	657.4
General Laboratories	719.7
Entrance Zones	1,199.6
Laboratory Support Services	1,072.3
Outpatients	1,517.3
Workspace	2,226.5
Plant Space	1,535.6
Total	**9,241.5**

This section details the assumptions employed for the generation of waste, for the following departments/users within the building:

UCL

- Confidential waste;
- Chemical waste;
- Radioactive waste;
- Clinical waste (including sharps and offensive waste); and
- Domestic waste.

GMP

- Confidential waste;
- Clinical waste; and
- Domestic waste.

OPD

- Confidential waste;
- Clinical waste;
- Sharps waste;
- Domestic waste; and
- Café waste.

Note: GOSH, UCL and OPD chemical and radioactive waste must be clearly identified and stored in separate containers. This is because it is essential that waste for these streams is accountable and traceable to UCL and GOSH in case waste is contaminated. Provided clinical waste bags have full traceability, they can be stored together and collected by a single waste contractor.

2.1 Assumptions

The waste generation, storage and collection requirements have been calculated in accordance with LB Camden's Planning Guidance document (CPG1 2015), supplemented by the British Standard for Waste Management in Buildings – code of practice (BS5906:2005). This assessment has been based on a number of key assumptions:

- A total of 472 employees (172 GOSH, 250 UCL, 6 FM and 44 OPD) in the building;
- One employee generates 50 litres of domestic waste per week;
- A3 retail generates 75 litres per cover;
- Two thirds of the floor area is front of house for the A3 retail accommodating one cover per 1.5 m^2 NIA;
- Office: 20% residual and 80% recyclable;
- Retail A3: 60% residual and 40% recyclable (11% recyclables, 5% glass and 24% food waste);
- Commercial domestic waste storage has been sized for two days of waste generation with collections to be undertaken daily;
- Waste collections will be undertaken by a private contractor;
- It is noted that food waste would need to be collected by a private contractor that collects food waste;
- The provision of separate storage for glass from the cafe; and
- The provision of separate storage for food waste.

Waste streams generated within the building will be stored in the following containers:

- 1,280 litre eurobins for residual and recyclable waste;
- 770 litre eurobins for hazardous waste;
- 360 litre eurobins for glass; and
- 240 litre eurobins for food waste.

2.2 UCL Requirements

Information on the storage requirements for the following materials has been specified by UCL:

- Radiation waste;
- Chemical (non-chlorinated and chlorinated) waste; and
- Hazardous (clinical) waste.

2.2.1 Radiation Waste Generation

Radiation waste materials will be store in 50 litre red plastic drums. Drums will be kept in a lockable cabinet or cupboard sized at 1,500mm x 1,000mm. This storage is for UCL use only. These materials are estimated to be stored for twelve months on-site before being despatched to a licenced disposal facility. The storage requirements for radiation waste is summarised in Table 2.

Table 2 UCL Radiation Waste

UCL – Radiation Waste Storage						
Waste Type	**Amount of Storage**	**Waste Generated**	**Waste Container**			**Comments**
			Description	**Volume (m^3)**	**Number**	
Radiation	12 months	-	Red Plastic Drums (50 litre)	-	4	Specified by client

2.2.2 Chemical Waste Generation

UCL chemical waste is stored as follows:

- 2.5 litre glass bottles with vented lids -boxes of 4 (chlorinated/unchlorinated);
- 10 litre plastic drums (chlorinated/unchlorinated);
- 25 litre plastic drums (chlorinated /unchlorinated); and
- 30 litre blue or white plastic drums (solids).

The chemical waste bottles and drums will be stored in a lockable cabinet or cupboard sized at 2,500mm x 1,250mm divided vertically into two sections in a ratio 75:25. This storage is for UCL use only. The storage requirements for chemical waste is summarised in Table 3.

Table 3 UCL Chemical Waste

UCL – Chemical Waste Storage					
Waste Type	**Amount of Storage**	**Waste**	**Waste Container**		**Comments**
			Description	**Number**	
Non Chlorinated	1 month	Liquid	Blue or White Drums (25 or 10 litre)	10	Specified by client
		Solid	Blue or White Plastic Drums (30 litre)		
		Liquid	Glass Bottles with Ventilated Lids (2.5 litre, boxes of 4)		
Chlorinated	1 month	Liquid	Blue or White drums (25 or 10 litre)	5	Specified by client
		Solid	Blue or White Drums Plastic Drums (30 litre)		
		Liquid	Glass Bottles with Ventilated Lids (2.5 litre, boxes of 4)		
Bulk Chemicals	1 month	-	Boxes (4 x 2.5 litres ethanol)	10	Stored in racking
Methylated Spirits	-	-	5 litre bottles	10	Stored in racking

2.2.3 Clinical Waste Generation

UCL has indicated a requirement to store 135 bags of clinical waste a day (i.e. 9.45m^3). A single bag holds approximately 70 litres of waste materials. Clinical waste will be stored in 770 litre eurobins and each eurobins holds approximately 10 bags. Therefore, 13 No. 770 litre eurobins are required to store a single day's waste. This is summarised in Table 4.

Table 4 UCL Clinical Waste

UCL – Clinical Waste Storage						
Waste Type	**Amount of Storage**	**Waste Generated**	Waste Container			**Comments**
			Description	**Volume (m^3)**	**Number**	
Clinical	1 day	135 clinical waste bags	770 litre eurobin	0.77	13	Specified by client

2.2.4 UCL Summary

Drums containing radiation waste will be kept in a lockable cabinet or cupboard sized at 1,500mm x 1,000mm. All chemical waste drums will be stored in a lockable cabinet or cupboard sized at 2,500mm x 1,250mm. The waste storage requirements for UCL are as follows:

- 13 No. 770 litre eurobins for the storage of clinical waste;
- Glass bottles (2.5 litre) non-chlorinated chemicals;
- White or blue drums (10 or 25 litre) non-chlorinated chemicals;
- Glass bottles (2.5 litre) chlorinated chemicals;
- White or blue drums (10 or 25 litres) chlorinated chemicals;
- White or blue drums (30 litre) solid non-chlorinated chemicals;
- White or blue drums (30 litre) non-chlorinated chemicals; and
- 4 No. Red Plastic Drums (50 litre) radio-active waste.

2.3 GMP Requirements

Information on the storage requirements for the following materials has been specified by GMP:

- Clinical waste.

GMP has indicated a requirement to store 100 bags of hazardous waste a week i.e. 20 bags a day (1.4m^3). A single bag holds approximately 70 litres of waste materials. Clinical waste will be stored in 770 litre eurobins and each eurobin holds 10 bags. Therefore, 2 No. 770 litre eurobins are required to store a single day's waste. This is summarised in Table 5.

Table 5 UCL Clinical Waste

GMP – Hazardous (clinical) Waste Storage						
Waste Type	**Amount of Storage**	**Waste Generated**	**Waste Container**			**Comments**
			Description	**Volume (m^3)**	**Number**	
Clinical	1 day	100 clinical waste bags per week (20 bags/day)	770 litre eurobin	0.77	2	Specified by client

2.3.1 GMP Summary

The waste storage requirements for UCL are as follows:

- 2 No. 770 litre eurobins for the storage of clinical waste.

2.4 OPD

Waste generated by the OPD element of CRRDC comprises:

- Clinical waste; and
- Sharps.

OPD has indicated a requirement to store 42 bags of clinical waste a day (i.e. 2.94m^3). A single bag holds approximately 70 litres of waste materials. Clinical waste will be stored in 770 litre eurobins and each eurobins holds 10 bags. Therefore, 4 No. 770 litre eurobins are required to store a single day's waste. Sharps waste (syringes etc.) will be stored in 7 litre bins. OPD is expected to generate 12 bins of sharps waste a week. The OPD storage requirements is summarised in Table 6.

Table 6 UCL Chemical Waste

OPD – Clinical Waste Storage						
Waste Type	**Amount of Storage**	**Waste Generated**	**Waste Container**			**Comments**
			Description	**Volume (m^3)**	**Number**	
Clinical waste	1 day	42 clinical waste bags	770 litre eurobin	0.77	4	Specified by client
Sharps waste	1 week	12 no. 7 litre bin	7 litre bin	0.07	12	Specified by client Stored in racking

2.4.1 OPD Summary

The waste storage requirements for OPD are as follows:

- 4 No. 770 litre eurobins for the storage of clinical waste; and
- 12 No. 7 litre bins for sharps waste.

2.5 Domestic Waste Requirements

This section sets out the waste generation and storage of all domestic waste generated within the laboratories, workspaces, out patients and the café.

Domestic waste storage requirements have been sized for two days of waste storage. This is the minimum amount of space usually provided in developments even if collections are made every day, in order to ensure sufficient resilience in case of a failed collection.

2.5.1 Café Waste

The estimated two day waste generation for the café will be 1.50 m^3 of un-compacted waste. Table 7 sets out the number of bins required to accommodate two days of waste generation.

Table 7 Café (A3) Two Day Waste Generation and Storage

Cafe – Two Day Waste Storage						
Waste Type	**Un-compacted Waste (m^3)**	**Compaction Ratio**	**Compacted Waste (m^3)**	**Waste Container**		
				Description	**Volume (m^3)**	**Number Required**
Residual	0.90	2	0.45	1,280 litre eurobin	1.28	1
Recyclable	0.17	2	0.09	1,280 litre eurobin	1.28	1
Glass	0.08	1	0.08	360 litre eurobin	0.36	1
Food Waste	0.35	1	0.36	240 litre eurobin	0.24	2
Total	**1.50**	**-**	**0.98**	**-**	**-**	**5**

2.5.2 Domestic Waste Requirements

It is estimated that the two day waste generation from the 472 employees will be 9.44m^3 of un-compacted. Table 8 sets out the number of bins required to accommodate two days of waste generation. To reduce the number of waste bins required to be stored in the waste room a 1,100 litre eurobin compactor will be used to compact the waste. The eurobin compactor has approximately the same footprint as a eurobin. The compactor requires a clear headroom of 2.6m. An example is illustrated in Appendix B.

Table 8 Domestic Waste: Staff Waste Generation and Storage

Domestic Employee – Two Day Waste Storage						
Waste Type	**Un-compacted Waste (m^3)**	**Compaction Ratio**	**Compacted Waste (m^3)**	**Waste Container**		
				Description	**Volume (m^3)**	**Number Required**
Residual	1.89	2	0.95	1,280 litre eurobin	1.28	1
Recyclable	7.55	2	3.77	1,280 litre eurobin	1.28	3
Total	**9.44**	**-**	**4.72**	**-**	**-**	**4**

2.5.3 Combined Domestics Waste Storage

The combined requirement for domestic waste storage is set out in Figure 9.

Table 9 Domestic Waste, Combined Waste Generation and Storage

Total Domestic Waste – Two Day Waste Generation and Storage						
Waste Type	**Un-compacted Waste (m^3)**	**Compaction Ratio**	**Compacted Waste (m^3)**	**Waste Container**		
				Description	**Volume (m^3)**	**Number Required**
Residual	2.79	2	1.36	1,280 litre eurobin	1.28	2
Recyclable	7.71	2	3.85	1,280 litre eurobin	1.28	3
Glass	0.08	1	0.08	360 litre eurobin	0.36	1
Food Waste	0.36	1	0.36	240 litre eurobin	0.24	2
Total	**10.94**	**-**	**5.70**	**-**	**-**	**8**

The domestic element therefore requires:

- 2 No. 1,280 litre eurobins for the storage of compacted residual waste;
- 3 No. 1,280 litre eurobins for the storage of compacted recyclable waste;
- 1 No. 360 litre eurobin for the storage of glass;
- 2 No. 240 litre eurobins for the storage of food waste; and
- 1 No. wheeled eurobin compactor.

2.5.4 Photocopier and Printer Cartridges

Photocopier and printer cartridges will be collected in pots by the photocopiers and printer stations. These will be periodically collected by the FM team prior to collection and disposal by a waste contractor.

2.5.5 Batteries

Batteries will be collected in pots (separate for lithium and alkaline types) by the photocopiers and printer stations. When full, the pots will be emptied by the FM team prior to collection by a waste contractor.

Note: The terminals of lithium batteries will require covering with an insulating, non-conductive material e.g. using electrical tape, to prevent the risk of fire. The FM team will ensure this is completed, though staff disposing the batteries will be expected to complete this where possible.

2.5.6 fluorescent Tubes

Fluorescent tubes should not be removed by non-FM staff. A request should be sent to the FM team for the removal and collection of fluorescent tubes and light bulb waste. Upon collection, the FM team will take it to the general waste store prior to collection by a waste contractor.

2.5.7 Confidential Paper Waste

Confidential waste will be stored in lockable and secure bins located around the building. On collection days the on-site FM team will move full containers to the service area. The waste will then be collected by a specialist contractor and shredded and disposed of off-site. The collection frequency of this waste stream will depend on the volume of confidential waste generated each week.

2.6 Waste Storage

Appendix A sets out a summary of the waste generation and storage requirements for each of the components of the building.

The waste storage area, chemical and radiation store (blue) are provided at basement level along with the location of the goods lift is shown in Figure 4.

Figure 4 Waste Store Layout

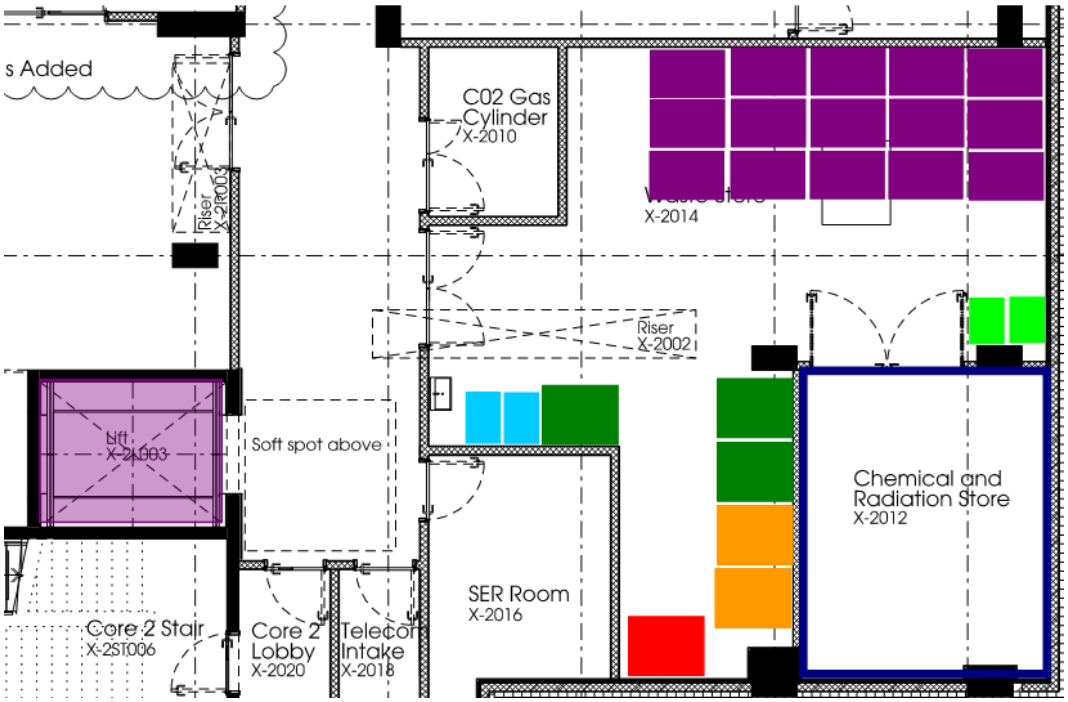


Figure 5 Key to Figure 4

3 Waste Management Strategy

This section presents the waste management strategy for processing the waste within the CRRDC. Each waste stream to be collected will be taken to the central waste store located in the basement. There are two potential routes to reach the waste store as follows:

- Direct to the basement using goods lift (1) from Level 1, ground floor and lower ground floor; and
- Indirect using goods lift (2) from Level 2 and above, and transferring to lift (1) at ground floor.

These routes are shown in Figure 6 and Figure 7.

Figure 6 Basement Access to Waste Store using Goods Lift (1)

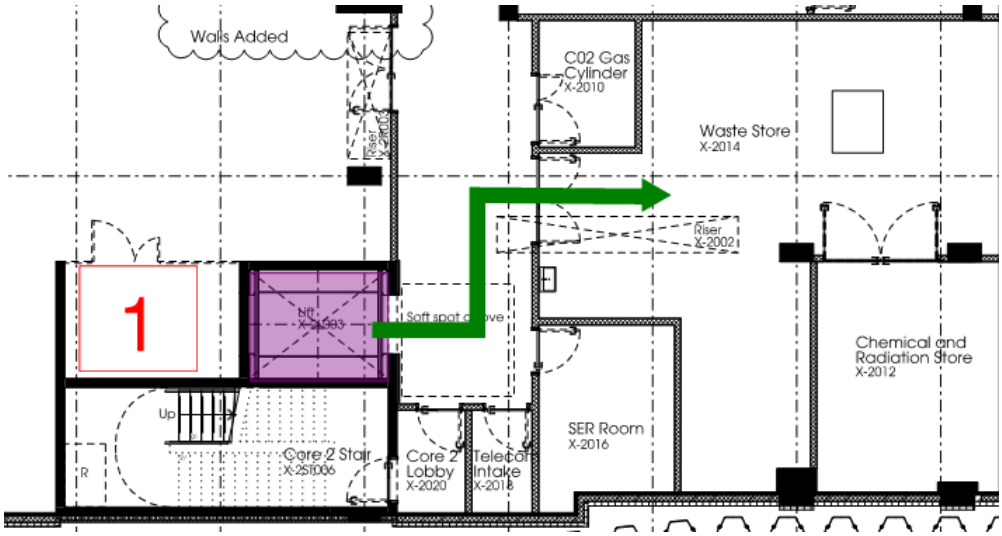
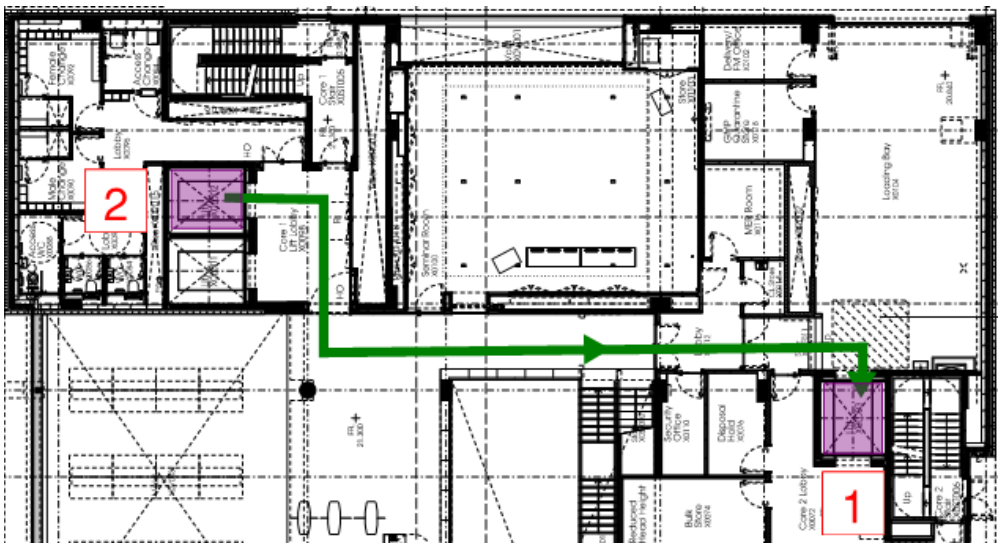


Figure 7 Basement Access to Waste Store using Goods Lift (2) and Goods Lift (1)

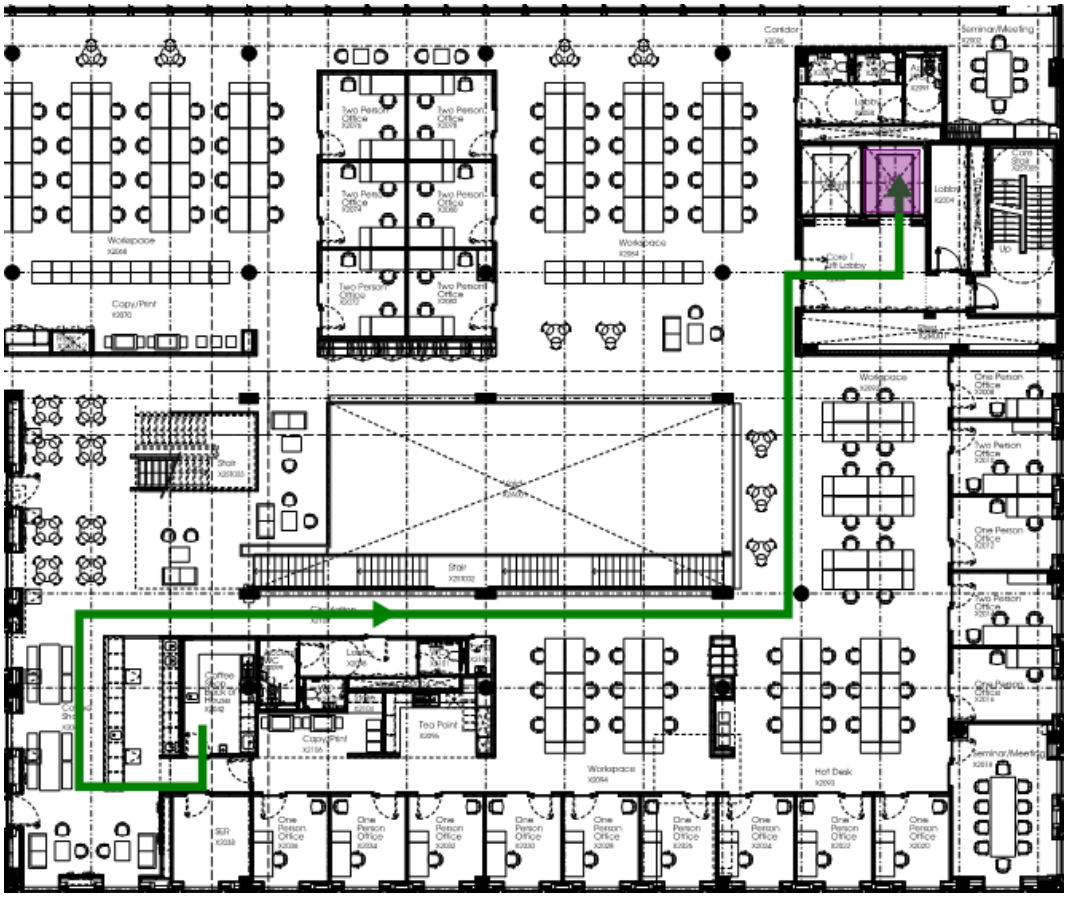


Both lifts have been sized to hold 1,280 litre eurobins (plus an operator). However, lift (1) has been designated the primary vertical transportation for the transfer of 1,280 litre waste bins to the ground floor. Lift (2) will be used by the FM team to move waste bags in trolleys or smaller eurobins from those floor that do not have direct access to lift (1).

3.1 Cafe

Waste generated within the cafe will be deposited in segregated waste bins located within the café back of house area (typically 70 litres or 100 litres capacity). On a daily basis the cleaning contractor or the FM team will move full waste bins from the café to the basement level waste room via goods lift (2) and goods lift (1) as described above, as the café is located on level 2. The collection flow is illustrated in Figure 8.

Figure 8 Second Floor Route to the Waste Store (Cafe)

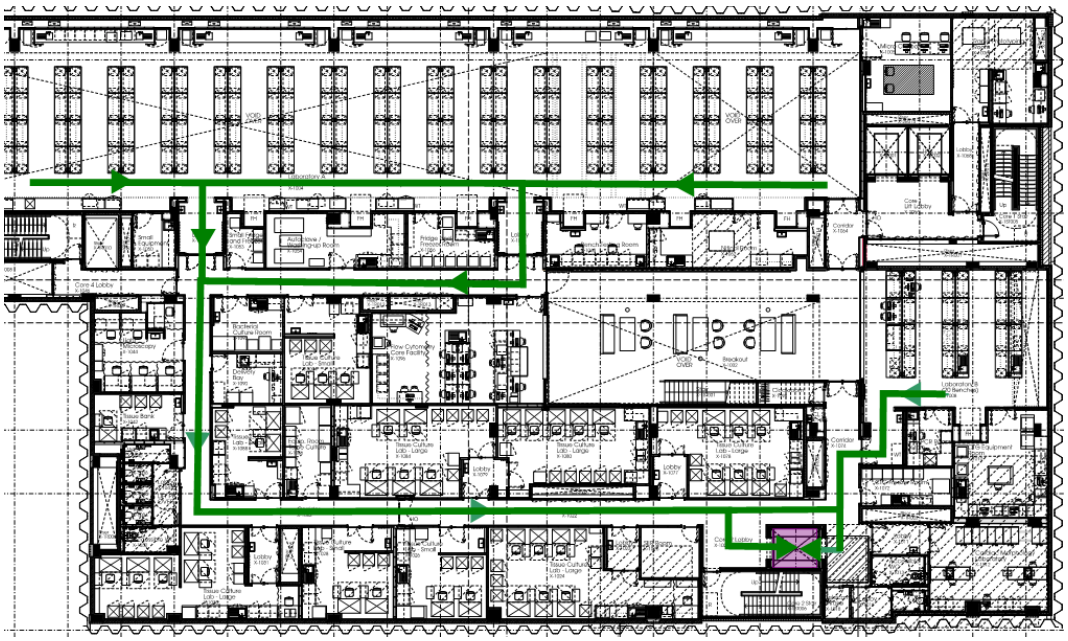


On arrival at the waste store, recyclable and residual bags will be placed into their respective 1,280 litre eurobins. A eurobin compactor will be used to compress the bags within the bins (compaction 2:1). This reduces the number of eurobins required to be stored in the waste store. Glass waste and food waste will not be compacted and will be stored in 360 litre eurobins and 240 litre eurobins respectively.

3.2 Domestic Waste

Domestic waste generated within the labs will be deposited in segregated waste bins located on each floor. The cleaning contractor or the FM team will transfer the waste to the waste room at basement level via the goods lift as described above, depending at which level the waste is generated. A typical collection flow is illustrated in Figure 9.

Figure 9 On Floor Route to the Central Waste Store (Domestic Waste from Labs and Offices)



On arrival at the waste store, recyclable and residual bags will be placed into their respective 1,280 litre eurobins. A eurobin compactor will be used to compress the bags within the bins (compaction 2:1).

3.3 Clinical Waste

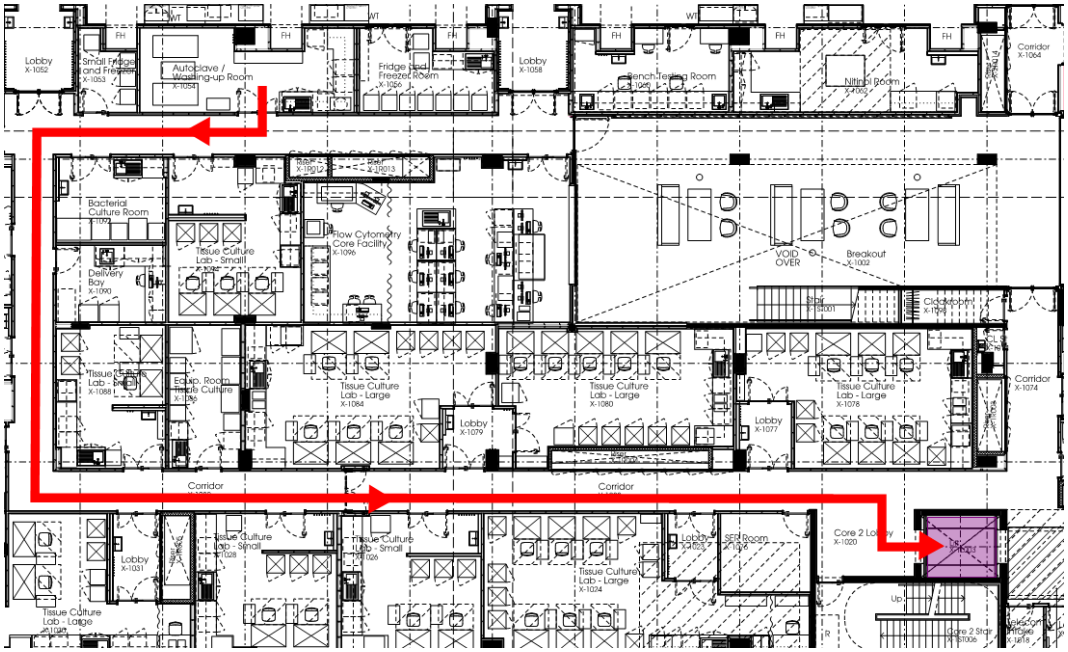
Waste to be autoclaved will be taken by GOSH/UCL staff directly to the autoclaves. Once autoclaved the offensive waste is placed into waste trucks (680mm x 1,100mm x 710mm). When fully loaded, the cleaning contractor or the FM team will transfer the waste to the waste room at basement level via the goods lift, and empty bins are returned to the autoclaves.

Clinical waste from the laboratories will be placed in waste trucks (680mm x 710mm x 1,100mm) which will be located within each laboratory space. When fully loaded, the cleaning contractor or on-site FM team will transfer the waste to the waste room at basement level via the goods lift. Empty bins are returned to the laboratories.

A typical collection flow, from the GMP and UCL are illustrated in Figure 10 and Figure 11 respectively.

Figure 10 Level 4 On Floor Route to the Central Waste Store (Clinical Waste)

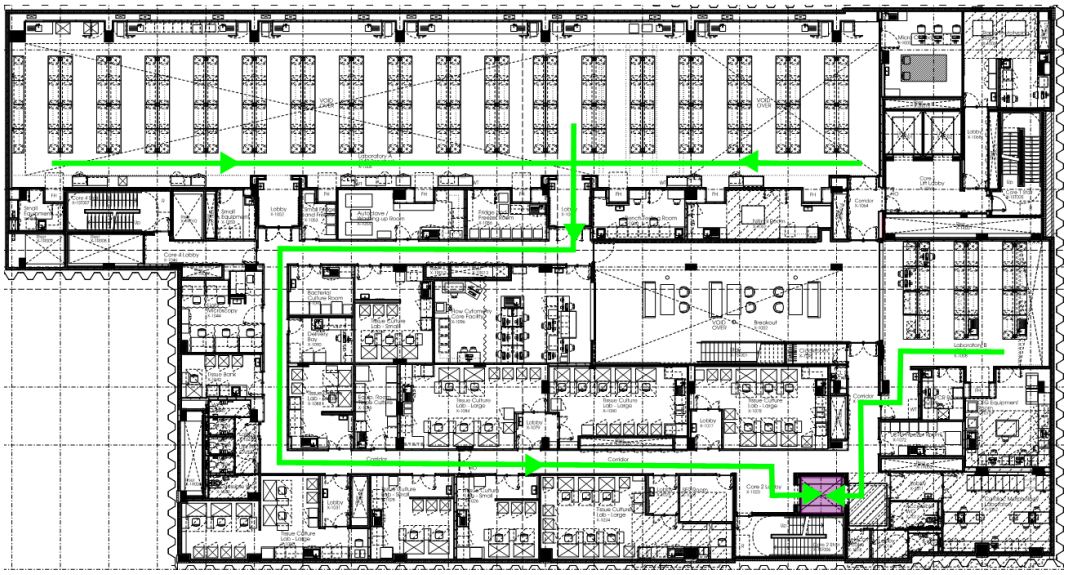
Figure 11 Lower basement On Floor Route to the Central Waste Store (Clinical Waste)



3.4 Chemical Waste

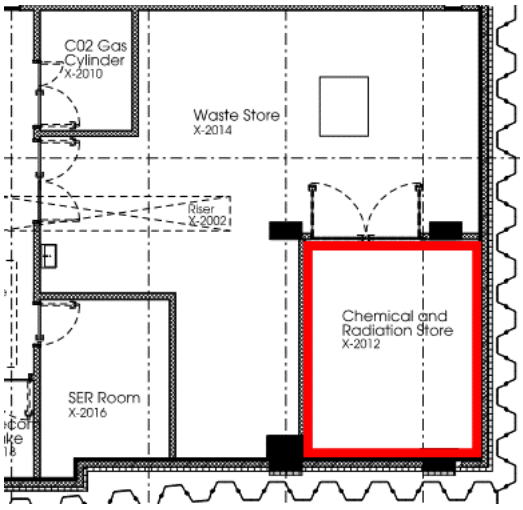
Scientists will place liquid chemical waste in secure cabinets within the laboratory spaces. UCL staff will take the chemical waste to the store at basement level via the goods lift (1) as described above. A typical collection flow is illustrated in Figure 12.

Figure 12 On Floor Route to the Central Waste Store (Chemical Waste)



Liquid chemical waste is decanted into 2.5 litre glass bottles (4 to a cardboard box), 10 litre or 25 litre plastic containers of chlorinated and non-chlorinated chemical waste. These containers will be stored in a room located within the central waste store (shared with radiation waste), until collected by a specialist and licensed contractor for safe disposal. The chemical store is shown in Figure 13.

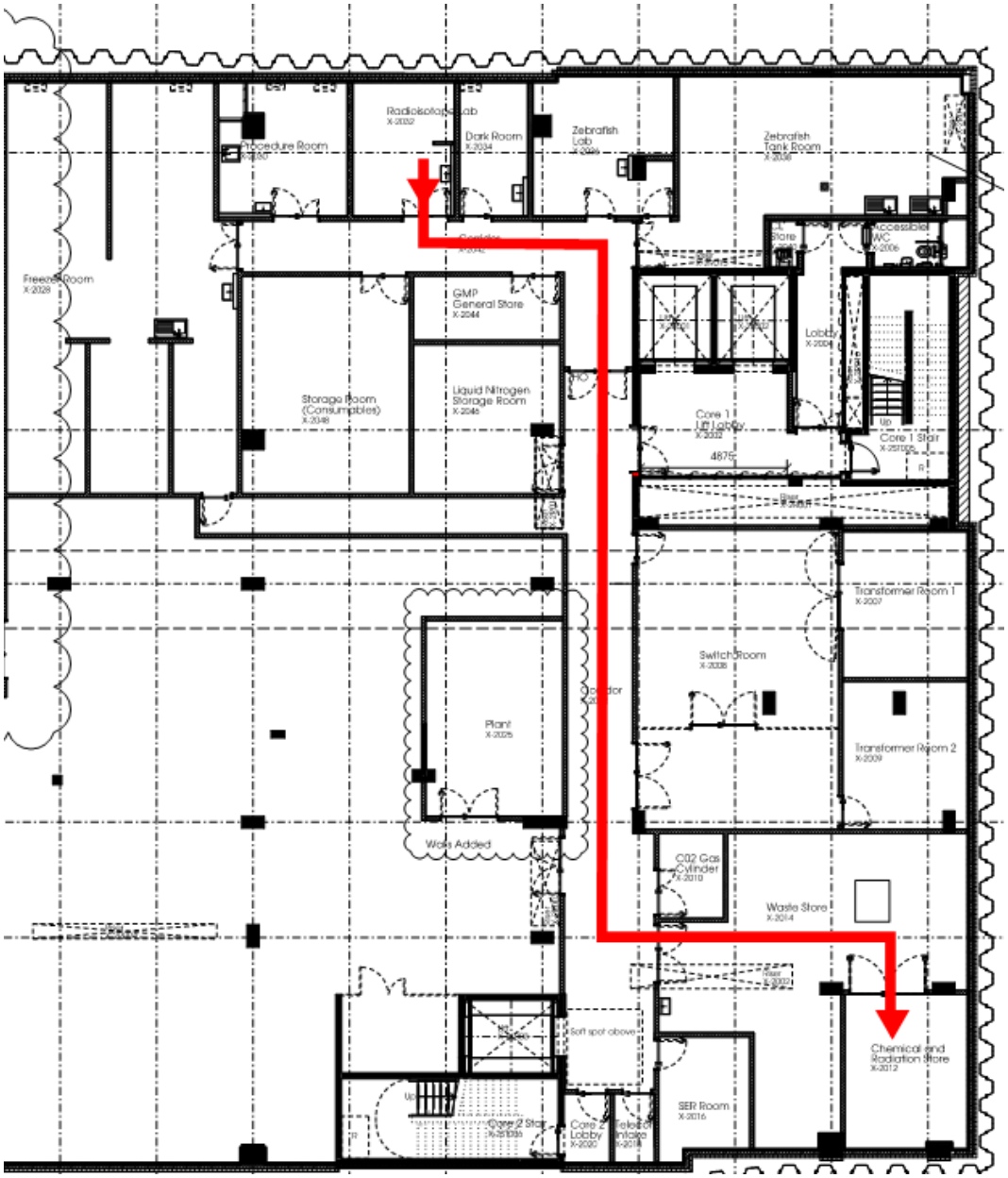
Figure 13 Chemical and Radiation Waste Store



3.5 Radiation Waste

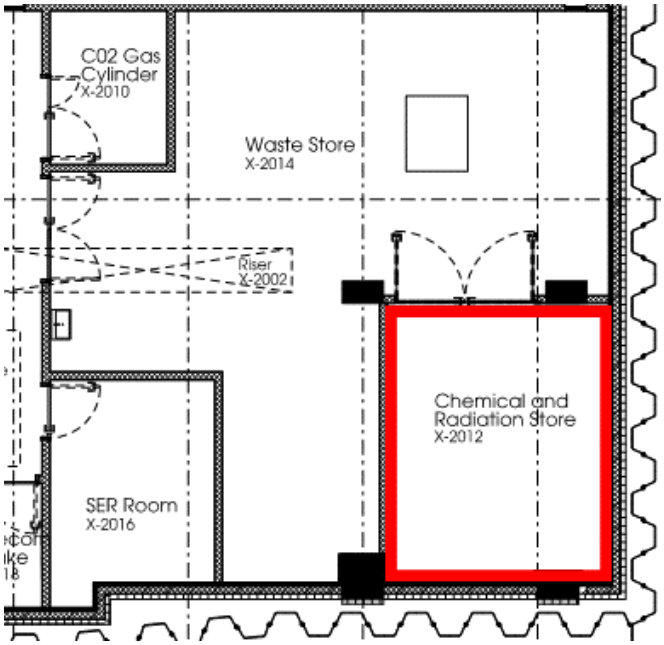
Radiation waste stored within the laboratory spaces will be taken by UCL staff to the radio-active store located within the central waste room. A typical flow route is shown in Figure 14 and Figure 6 above.

Figure 14 On Floor Route to the Central Waste Room (Radioactive Waste)



Radiation waste will be stored in 50 litre red plastic drums on site until the waste is ready to be collected by a specialist and licensed contractor for safe disposal. The drums of radiation waste will be stored in a room located within the central waste store, shared with chemical waste as shown in Figure 15.

Figure 15 Radiation and Chemical Waste Store


C02 Gas
Cylinder
X-2010
Waste Store
X-2014
Riser
X-2002
Chemical and
Radiation Store
X-2012
SER Room
X-2016

4 Waste Collection Strategy

Waste collections will be made specialist waste contractors licensed to handle and dispose of clinical, chemical and radiation waste. Domestic waste and food waste will be collected daily.

The on-site FM team or UCL / GOSH staff will transport the waste from the waste room to the loading bay on the day of collection.

Appendix A

Summary: Total Waste Generation and Storage

A1 Combined Waste Generation and Storage (UCL, GMP and OPD)

Waste Type	Amount of Storage	Waste Generated Uncompacted	Waste Container			Comments
			Description	Volume (m^3)	Number Required	
Domestic Waste (UCL, GMP and OP)						
Refuse	2 days	2.79 m^3	1,280 litre eurobin	1.28	2	Calculated Wheeled bin compaction assumed (2:1)
Dry recyclable	2 days	7.71 m^3	1,280 litre eurobin	1.28	3	Calculated Wheeled bin compaction assumed (2:1)
Glass	2 days	0.08m^3	360 litre eurobin	0.36	1	Calculated
Food waste	2 days	0.36 m^3	240 litre eurobin	0.24	2	Calculated
UCL						
Chemical (Non-Chlorinated)	1 month	-	White drums	-	10	Specified by client
Chemical (Non-Chlorinated)	1 month	-	2.5 litre glass bottles	-	-	Specified by client
Chemical (Chlorinated)	1 month	-	Blue drums	-	5	Specified by client
Chemical (Chlorinated)	1 month	-	2.5 litre glass bottles			Specified by client
Clinical	1 day	135 clinical waste bags	770 litre eurobin	0.77	13	Specified by client Assumes 10 bags per 770l bin
Radioactive	3 months	-	50 litre drums (600mm x 1000mm)	-	4	Specified by client
Bulk Chemicals	-	-	Boxes (4 x 2.5 litre ethanol)		10	Stored in racking
Methylated Spirits		-	5 litre bottles	-	10	Stored in racking
GMP						
Clinical	1 day	100 clinical bags per week (20 / day)	770 litre eurobin	0.77	2	Specified by client Assumes 10 bags per 770l bin
OPD						
Clinical waste	1 day	42 clinical waste bags	770 litre eurobin	0.77	4	Specified by client Assumes 10 bags per 770l bin
Sharps waste	1 week	12 no. 7l bin	7 litre bin	0.07	12	Specified by client Stored in racking

Appendix B

Waste Processing Equipment

B1 1,280 litre Eurobins

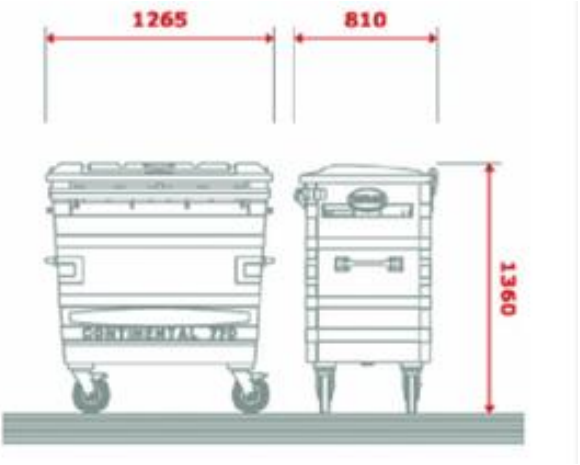
The following types of containers are proposed to store waste streams within the waste room. Bins should be colour coded and labelled to indicate the specified waste stream (refuse / dry recyclables / glass). The figure below illustrates a 1,280 litre eurobins (dimensions in millimetres).

B2 Wheeled Eurobin Compactor

Due to the scale of the waste generation from the development, it is proposed that both the domestic refuse and dry recyclables waste is compacted using a wheeled bin compactor, typically achieving a 2:1 compaction ratio. An example is shown below.

B3 770 litre Eurobins

Clinical waste will be deposited and stored in 770l eurobins, as illustrated below (dimensions in millimetres). It is estimated that approximately 10 yellow clinical sacks can be stored in each 770l eurobin.



B4 360 litre Eurobins

Glass and food waste is proposed to be stored in 360 litre eurobins (dimensions in millimetres).