FORESIGHT ENVIRONMENTAL

UNSW SYDNEY

UNSW D14

Operational Waste Management Plan

This report is based on information provided by the D14 project team coupled with Foresight Environmental's knowledge of waste generated within the education/commercial property sector. To that extent this report relies on the accuracy of the information provided to the consultant. It has been compiled by Foresight Environmental on behalf of Lendlease.

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Revision No.	Issue date	Author	Reviewed by	Reason/comments
1	19 October 2018	Scott Ebsary	Kyle Renwick	Draft issue for review
2	6 November 2018	Scott Ebsary	Kyle Renwick	Updated incorporating UNSW comments for SSDA
3	7 November 2018	Scott Ebsary	Kyle Renwick	Update per feedback
4	8 November	Scott Ebsary	Kyle Renwick	Further updates incorporating UNSW comments

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1. Introduction

This report supports a State Significant Development Application (SSDA) submitted to the Department of Planning and Environment (DPE) pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for a new multi-purpose educational building referred to as the "new Building D14" within the University of New South Wales (UNSW) Kensington campus.

This proposal relates specifically to the construction of a new eight storey multi-purpose building that can accommodate a variety of uses including a new study space, new flexible teaching and learning environments, faculty workplace and retail opportunities and a function room at ground level.

This report has been prepared having regard to the Secretary's Environmental Assessment Requirements issued for the project by DPE, ref no SSD9606 issued on 27/9/18.

2. Background

The subject site is located within the grounds of the UNSW Kensington Campus and is identified as Building D14. Site enabling works within the 'Lower Campus' to allow the proposed development, are to be carried out by way of a separate Review of Environmental Factors (REF) under Part 5 of the *EP&A Act* 1979. The Part 5 REF proposes activities including demolition of existing structures, removal of trees, diversion, installation and/or upgrade of hydraulic, stormwater and electrical infrastructure and minor regrading/resurfacing to selected access pathways, College Road and landscaped areas within the site.

3. The Site

The site is located at the UNSW Kensington campus which is situated within the Randwick Local Government Area (LGA). The UNSW Kensington campus lies to the south of the Royal Randwick Racecourse, to the west of the Prince of Wales Hospital Campus / Randwick Health Precinct, and between the Kensington and Kingsford town centres on Anzac Parade. The campus is located 8km south of the Sydney CBD and about 6km north-east of Sydney Airport.

Within the campus, the site is located centrally between Alumni Park (west), the Fig Tree Theatre (north), the UNSW Quadrangle (south) and Fig Tree Lane and Goldstein Hall (east). The site for the proposed SSDA, in its entirety, is situated within Lot 3 in Deposited Plan 1104617. A site location map identifying the site within the context of the wider campus is shown at Figure 1.

Figure 1: UNSW Site Location and Context Plan

Figure 2: Ariel map of the D14 SSDA site

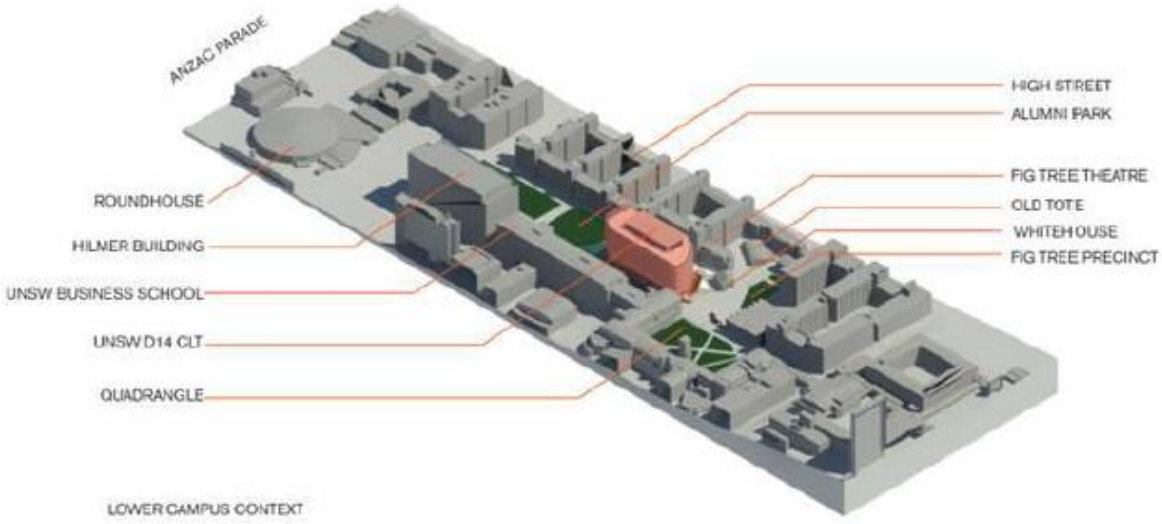


Figure 3: Photograph of the site, facing east from Alumni Park

4. Overview of Proposed Development

This SSD Application seeks approval for a new multipurpose Building D14 on campus. Specifically, consent is sought for the following:

- Construction of a 7-storey building with a total GFA of 14,288m^2 comprising of flexible student study space, faculty office space, ground level retail and a function room;
- Associated public domain, ramps and landscaping works

5. Planning Context

This application is SSD by way of clause 8 and schedule 1 under *State Environmental Planning Policy (State and Regional Development) 2011* on the basis that the development is for the purpose of a tertiary institution and has a capital investment value of more than $30 million.

6. Waste Generation Estimate

This waste management plan details the way in which the proposed UNSW D14 development will manage the waste and recycling generated from the ongoing use of the development in accordance with the City of Sydney Council Waste Guidelines 2018 along with industry best practice guidelines including the Better Buildings Partnership Operational Waste Guidelines.

Based on the information provided and benchmark data from similar developments, the primary waste streams expected to be generated in the ongoing operation of the development would be:

- Cardboard/paper recycling
- Comingled recycling
- Food organics recycling
- Soft plastics
- E-waste
- Cooking Oil
- General waste

Additional smaller waste streams may include toner cartridge recycling, fluoro tube/globe recycling and battery recycling.

The Foresight Environment (FE) benchmark data is based primarily on actual weights received from waste contractors and derived from platform scales installed at commercial and mixed-use assets throughout Australia. Currently 5.6 million m^2 of commercial and retail NLA is reported through FE's database each month. As such, we are confident that the FE benchmark data represents the most accurate and current weight-based waste data available in Australia. The densities used for any conversions are in line with the Nabers Waste Rating tool.

6.1 Standard Usage

The following tables represent the estimated waste to be generated based on average workplace, learning areas and retail use – assuming full use during weekdays for the high estimate of 970 faculty population and 1170 students.

Table 1: Workplace areas waste estimate

Stream	Kg/day	L/day	Kg/week	L/week
Paper/Cardboard	129.68	2,074.96	713.27	11,412.28
Confidential Paper	54.81	685.07	301.43	3,767.90
Co-mingled Recycling	13.10	218.38	72.06	1,201.06
General Waste*	68.66	479.18	377.61	2,635.47
Total**	**254.26**	**3,457.59**	**1,398.44**	**19,016.72**

Table 2: Student learning areas waste estimate

Stream	Kg/day	L/day	Kg/week	L/week
Paper/Cardboard	38.39	614.25	211.15	3,378.38
Co-mingled Recycling	21.06	351.00	115.83	1,930.50
General Waste*	128.99	789.75	709.46	4,343.63
Total	**188.44**	**1,755.00**	**1,036.44**	**9,652.50**

*Food waste is included with general waste due to challenges of contamination within public areas, however, options can be investigated for separation of this stream should the operator wish to pursue organics capture throughout all public areas.

**E-waste estimates have not been included in this Standard Usage waste estimate due to the ad-hoc and variable nature of this stream. Further details are provided in section 7.1.

Table 3: Retail waste estimates (assume café/food)

Stream	Kg/day	L/day	Kg/week	L/week
Paper/Cardboard	17.79	284.70	97.86	1,565.83
Food organics	196.66	702.35	1,081.62	3,862.94
Co-mingled Recycling	7.16	119.32	39.38	656.28
Cooking Oil	27.00	30.00	148.50	165.00
General Waste	23.40	222.87	128.71	1,225.80
Total	**272.01**	**1,359.25**	**1,496.07**	**7,475.85**

Table 4: Combined totals for standard operational use

Stream	Kg/day	L/day	Kg/week	L/week
Paper/Cardboard	181.93	2,910.91	1,000.62	16,009.98
Confidential Paper	54.81	685.07	301.43	3,767.90
Food organics	196.66	702.35	1,081.62	3,862.94
Co-mingled Recycling	39.16	652.70	215.39	3,589.84
Cooking Oil	27.00	30.00	148.50	165.00
General Waste	207.82	1,410.80	1,143.02	7,759.40
Total	**707.38**	**6,391.83**	**3,890.59**	**35,155.07**

6.2 Function Waste

The function space on level 7 has a capacity of up to 210 people. Due to the ad-hoc frequency of functions, the estimate has not been included in the standard operational waste estimate – table 5 below shows the waste estimate per event assuming a food service function for 210 people.

Table 6: Event waste estimates

Stream	Kg/day	L/day
Co-mingled	4.60	252.00
Food Organics	5.29	126.00
General Waste	58.21	462.00
Total	**68.10**	**840.00**

7. Waste Management Systems

Using the estimates from table 5 above, the following systems are recommended to adequately manage the estimated everyday operational waste in the waste storage area.

Table 7: Everyday operational waste systems for entire development (includes retail)

Stream	Bin Type	No. of Bins	Weekly Clearance Frequency	Weekly Capacity (L)	Estimated volume / week (L)	Footprint per bin (m^2)	Total Footprint (m^2)
Paper/Cardboard*	MGB - 1100L	6	3	19,800	19,778	1.33	7.96
Co-mingled**	MGB - 1100L	2	3	6,600	3,590	1.33	2.65
Food Waste***	MGB - 120L	7	5	4,200	3,863	0.27	1.90
Cooking Oil	200L Heated tank	1	1	200	165	0.88	0.88
E-waste	MGB – 240L	1	On call as required	-	-	0.43	0.43
General Waste	MGB - 1100L	3	3	9,900	7,759	1.33	3.98
Total bin footprint							**17.81**
Recommended Room Size – including circulation space							**26.71**
Available Space							**60**

*Does not include confidential paper – see section 7.1 below.

**Pending confirmation from the appointed waste contractor, this stream might not be separated on-site but rather collected within the general waste stream and sorted off-site.

*** The 120L food bin will be used only by F&B retailers.

Table 8 shows the additional bins required to be housed within the waste storage area to manage the additional waste generated from a full capacity event held in the function space.

Table 8: Events additional waste systems

Stream	Bin Type	No. of Bins	Weekly Clearance Frequency	Weekly Capacity (L)	Estimated volume / week (L)	Footprint per bin (m^2)	Total Footprint (m^2)
Co-mingled	MGB 1100L	1	1	1,100	252	1.33	1.33
Food Waste	MGB 120L	2	1	240	126	0.27	0.54
General Waste	MGB 1100L	1	1	1,100	462	1.33	1.33
Total bin footprint							**3.20**
Additional Room Required – including circulation space							**4.80**

7.1 Other waste/recycling

The following waste streams are unlikely to be generated regularly but can be collected on call as needed:

- Confidential Paper – 240L bins will be located throughout faculty workplace areas at the discretion of faculty staff/management. These bins will not be placed in the main waste storage room on ground floor as they will be collected directly from their designated locations throughout workplace areas by the specialty confidential paper service provider and replaced with an empty bin for continued use. Collection frequency will be on an agreed schedule (likely once weekly/fortnightly).
- E-waste - collected by facilities management staff and consolidated for collection by specialty e-waste contractor for recycler (usually provided by the appointed waste contractor on an on-call basis) – indicative 240L MGB has been proposed within waste storage room.
- Bulky waste – it will be the duty of tenants to inform facilities management staff of any bulky waste that will be required to be removed from site, including material generated during defit/refurbishments. The material/s will be stored in the tenancy until facilities management can coordinate with the waste contractor to organize an appropriate receptacle to be temporarily supplied in the loading dock.

Contractor/delivery waste – Waste generated onsite by contractors/deliveries must be taken back unless prior consent has been negotiated with facilities management.

8. Waste and Recycling Storage Areas

The main waste area is located on ground floor in the north west corner of the building and is easily accessed from the upper floors via the goods lift. Figure 4 provides an indicative layout of the recommended systems detailed in table 7 above:

Figure 4: Waste storage room indicative layout

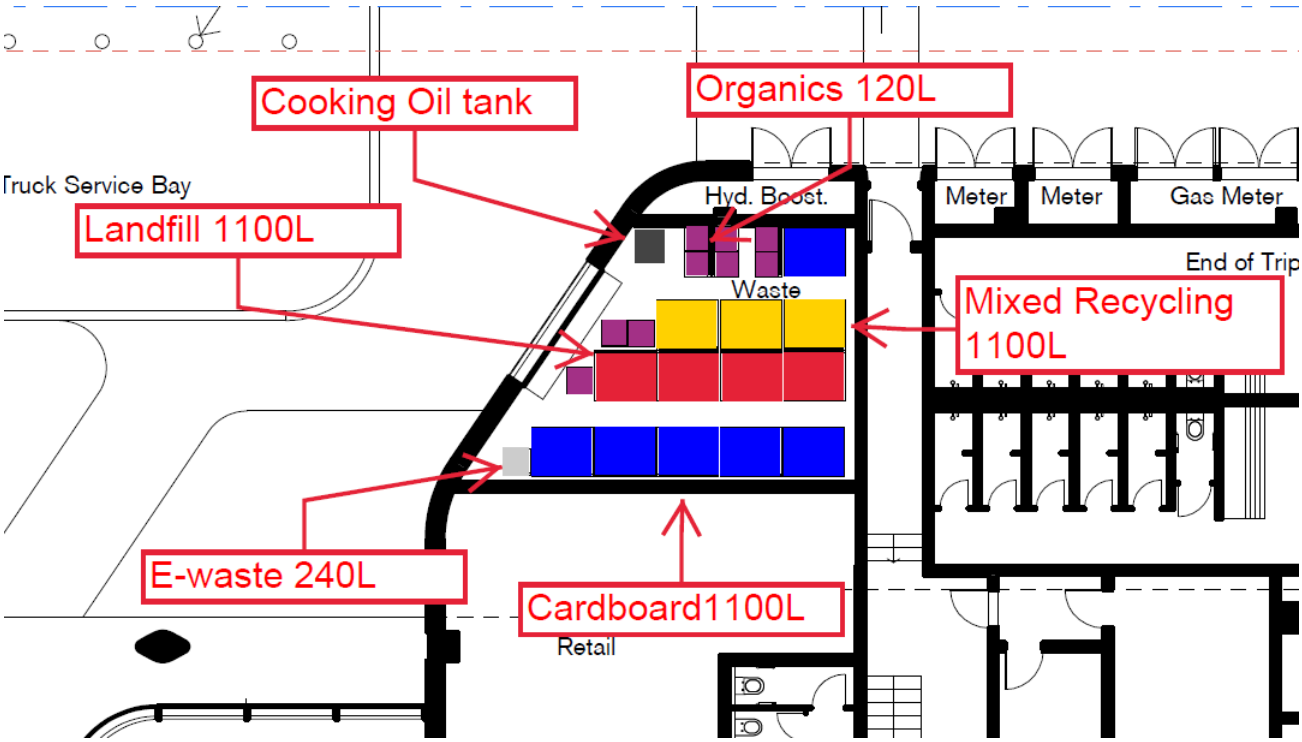


Figure 5 shows the path of access from ground floor areas and goods lift to the waste storage area.

Figure 5: Path of access for all users to waste storage area

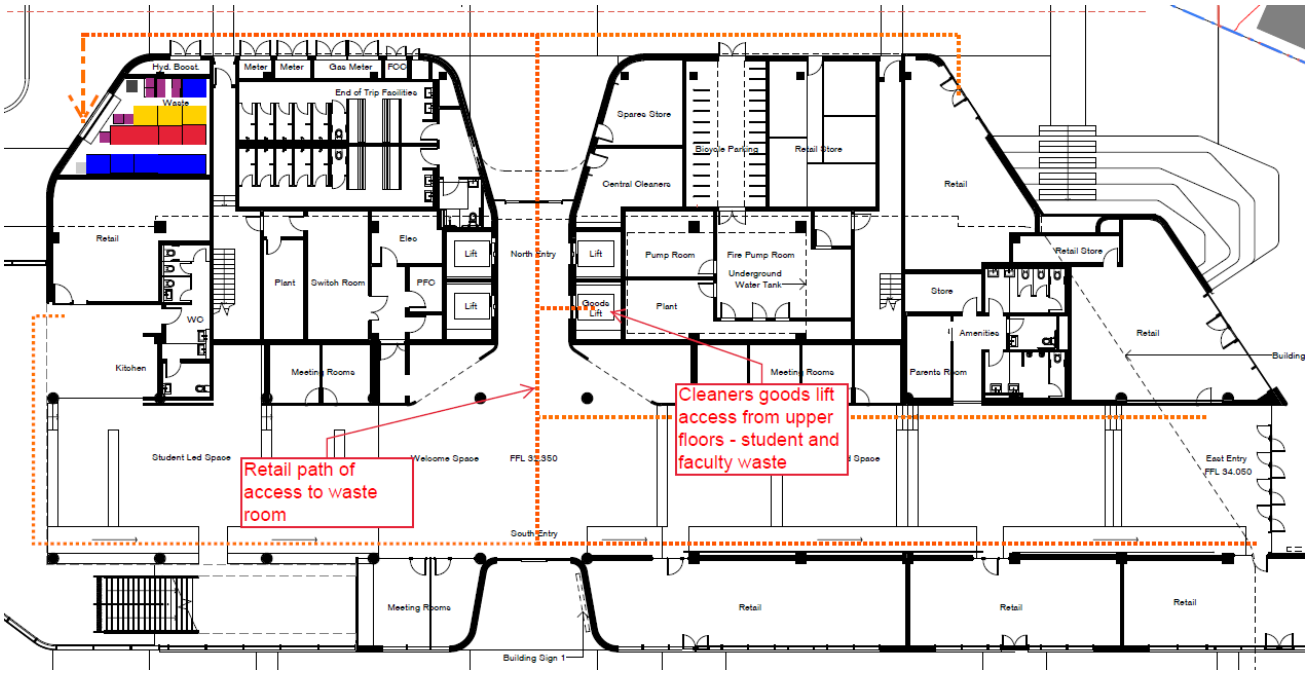


Figure 6 shows an indicative location reference for 3-stream bin hubs on typical learning/workplace floors to be serviced by cleaning staff as required – see section 7 below for more detail.

Figure 6: Indicative guidelines for bins on learning/workplace floors

8.1 Amenity

The waste and recycling storage room will have the following features:

- Ventilation: The bin storage room will be ventilated to external air or mechanically exhausted in accordance with AS 1668.2-2002
- Vermin Prevention:
    - The bin storage room will feature tightly fitted doors
    - Opening will be vermin proof
    - Cleaners are to ensure that bin lids are closed when unattended
- Floor: Structural concrete slab with smooth epoxy topping finish with coved wall and floor junctions. Provide 150mm hob to contain water in wash down zone. Ensure ramping over hob for bin movement. Ensure water does not pool and runs to graded drains to approved sewer connections – fitted with an in-floor dry basket arrestor approved by Sydney Water Corporation
- Walls: Brick work/concrete block or similar finished in a light coloured, washable paint
- Ceiling: Structural concrete slab over
- Lighting: Base building lighting with switches inside and outside waste room (sensors may also be used)
- Water Supply: hot and cold tap and hose connection
- Signage: clear signage identifying the various streams and appropriate use will be prominently displayed (see section on signage below)

The ongoing maintenance and up-keep of the waste storage room will be the responsibility of cleaning/building management staff. They will be tasked with ensuring bins are stored neatly and are cleaned as required.

8.2 Signage

All waste and recycling streams will be differentiated with clear signage on all bins and on walls within the waste storage area. Below are examples of appropriate signage incorporating textual information, pictures and colour-coding to communicate the message.

Figure 7: Stream appropriate signage

8.3 Colour-coding

To further reinforce the differentiation between waste and recycling streams, the main waste storage room will be colour-coded to ensure bins are stored in the correct area and to enable easy identification of the streams provided. This will be done by the operator in collaboration with the cleaning/waste contractor once operational. This can be done by painting borders on the floor indicating where bins should be stored. The colour of the paint should be consistent with the waste stream e.g. yellow paint for comingled recycling, red paint for general waste. The waste room walls can also be painted.

Figure 8: Indicative colour-coding guide

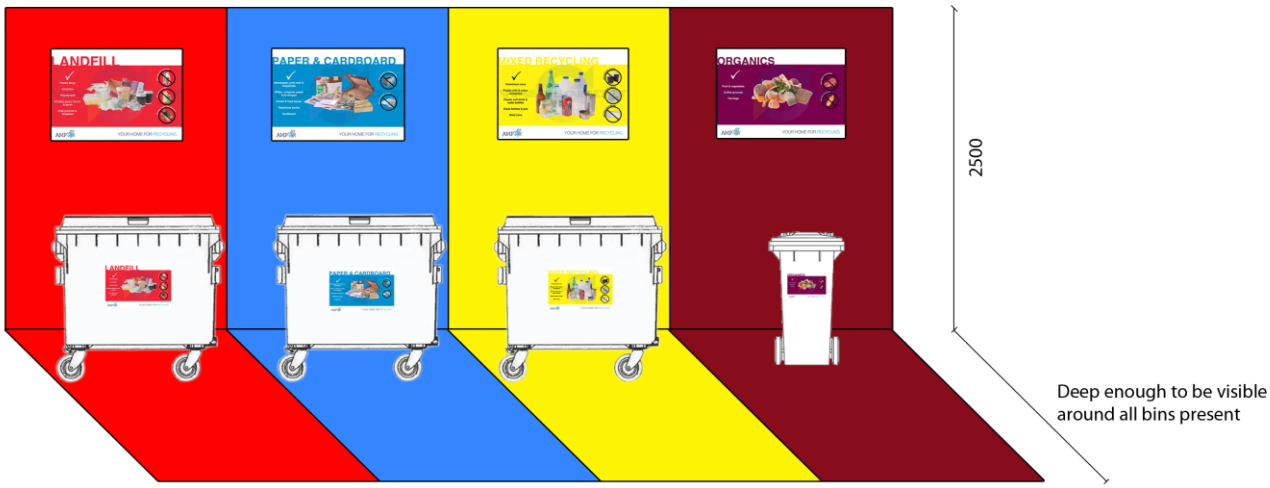


Figure 9: Example of appropriate colour-coding

9. Onsite Management Protocols

The details provided in table 9 outline a high-level management procedure for the movement of waste internally amongst the different stakeholders.

Table 9: Internal waste management guidelines for all stakeholders

Component	Management Protocol
Retail	• Retail staff/operators will be responsible for the separation of general waste, mixed recycling and organics streams in 60L/90L multi-sort bins (refer to figure 10 and 11 below) in their immediate back-of-house area. • Retailers will be required to transfer their full bins to the waste storage area as required throughout the day for disposal into the larger bins provided • Figure 12 shows a trolley system that can be used to assist in moving these bins when full.
Workplace	• A centralised "bin hub" approach will be utilised on each floor to eliminate personal desk bins – reducing contamination rates and cleaning costs. Figures 7 & 8 provide examples of bin hub configurations. • Staff will be responsible for separating their waste and recyclables into the correct bin provided on their floor. • Tenants will manage the disposal of secure paper through dedicated secure 240L bins on their workplace floors which will be collected by the tenant-managed secure paper contractor.
Cleaners	• Cleaners will be responsible for the daily collection of the bin hubs located on each workplace and student floor. They will transfer all waste and recyclables to the waste storage area on the ground floor via the goods lift in the evenings or throughout the day as required. All materials will be decanted into the larger bins provided within the waste storage area on ground floor.
Student Areas	• Rather than have bins in each classroom/learning area, multi-sort bin-hubs are to be implemented in central, high-traffic areas on student-occupied floors. • Students will be responsible for separating their waste and recyclables into the correct bin provided on their floor. • Cleaners will then transport and empty these bins to the waste storage room on the ground floor via the goods lift.

The figures below provide examples of the recommended bins for retailer/operator use.

Figure 10: Examples of small waste/recycling "multi-sort" bins for bin hubs (60L or 90L)

Figure 11: Examples of "multi-sort" bins integrated into cabinetry

Figure 12: Examples of multi-sort transport trolley

Figure 13: Organics 23L bin for retailers – to be transferred to main waste area and decanted into 120L organics bins

10. Collection

All waste and recycling systems detailed in this report will be collected by the appointed waste contractor (TBC) with a rear-lift truck from an area directly adjacent to the waste storage room – figure 14 shows the collection zone which will be accessed from High Street via Third Avenue.

Figure 14: Waste collection zone

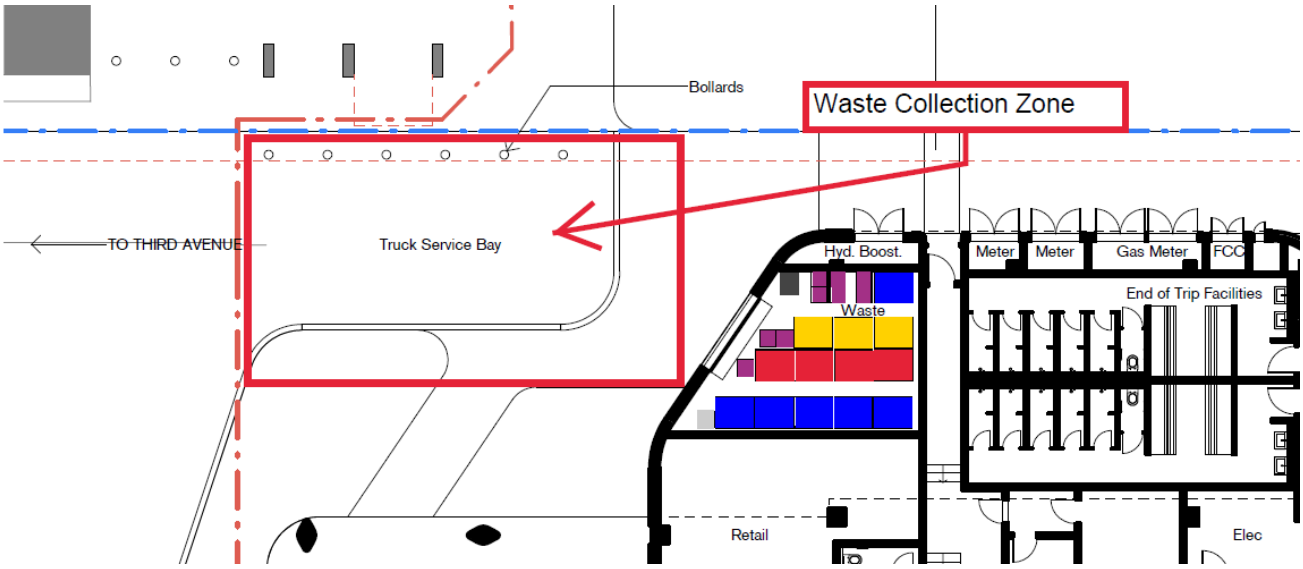


Figure 15 below shows the indicative specifications of the medium rigid rear-lift waste trucks currently servicing the UNSW campus.

Figure 15: Indicative medium rigid rear-lift commercial waste truck specifications

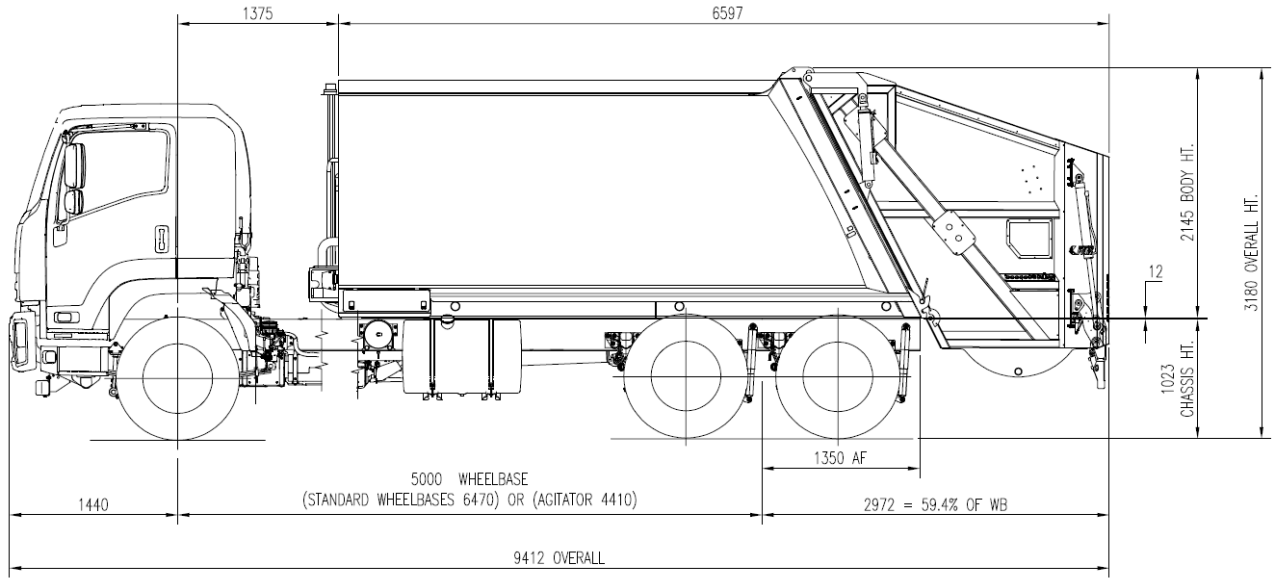
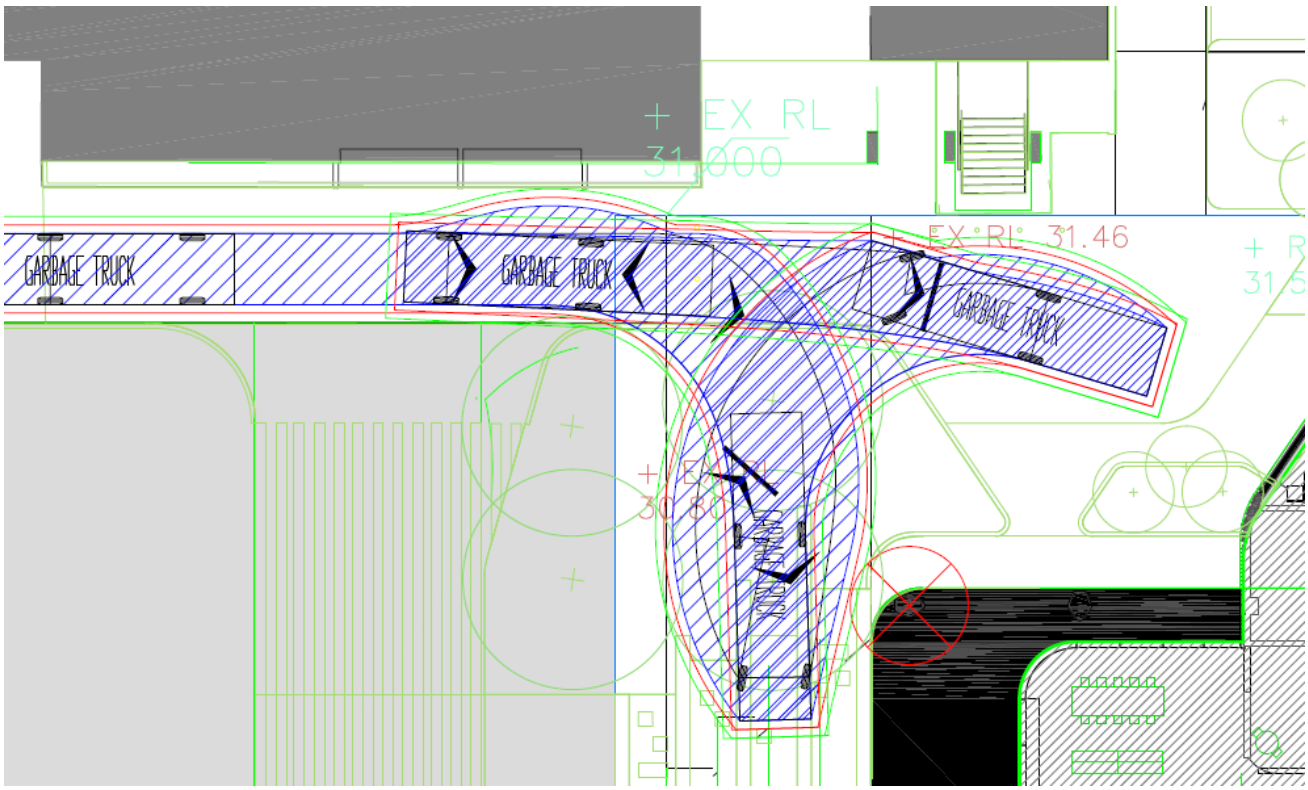


Figure 16 shows the swept path analysis demonstrating that there is adequate space for this truck to manoeuvre into position to conduct the waste collections.

Figure 16: Swept path analysis for proposed truck specification



11. Conclusion

The details of this waste management plan confirm that the waste facilities provided in the proposed new development of UNSW's D14 building adequately cater for the projected waste generation rates at the completion of development.