

Meadowbank Education and Employment Precinct Schools Project Operational Waste Management Plan Report

SSD 18_9343

Prepared by Foresight Environmental

For School Infrastructure NSW

11th October 2019



This report is based on information provided by The NSW Department of Education c/o Woods Bagot coupled with Foresight Environmental's knowledge of waste generated within the education and commercial sectors. 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 Woods Bagot.

This report is not a substitute for legal advice on the relevant environmental related legislation, which applies to businesses, contractors or other bodies. Accordingly, Foresight Environmental will not be liable for any loss or damage that may arise out of this project, other than loss or damage caused as a direct result of Foresight Environmental negligence.

Revision No.	Issue date	Author	Reviewed by	Reason/comments
1	18 April '19	Scott Ebsary	Patrick Arnold	Draft issue for review
2	3 May '19	Patrick Arnold	-	Minor updates throughout based on project team feedback
3	6 June 19	Scott Ebsary		Update with current plans and amend green waste procedure
4	14 June 19	Scott Ebsary		Updated cover and intro text
5	11 October 19	Scott Ebsary		Updated project name throughout

Table of Contents

1.	INTRODUCTION	4
2.	WASTE GENERATION ESTIMATE	6
3.	WASTE MANAGEMENT SYSTEMS	7
3.1	COMMON WASTE SYSTEMS	7
3.2	LIQUID/HAZARDOUS WASTE	8
3.3	BULKY DESIGN/TECHNOLOGY WASTE	9
3.4	OTHER WASTE/RECYCLING	9
4.	WASTE AND RECYCLING STORAGE AREA	10
4.1	SIGNAGE AND COLOUR-CODING	12
5.	COLLECTION	12
6.	ONSITE MANAGEMENT PROTOCOLS	14
6.1	WASTE SYSTEMS ON EACH LEVEL (INTERNAL)	14
6.2	OUTDOOR AREAS	17
6.3	WASTE STREAM COLLECTION PRACTICES	19
7.	ADDITIONAL OPPORTUNITIES	21
7.1	WASTE DIVERSION OPPORTUNITIES	21
7.1.1.	ORGANICS RECOVERY/RECYCLING	21
8.	OPERATIONAL MONITORING AND PERFORMANCE	23
8.1	ONGOING MONITORING AND REVIEW	23
8.2	RECYCLING PERFORMANCE AND TARGETS	23
9.	GREEN STAR MANAGEMENT 8 – OPERATIONAL WASTE	25
9.1	OPERATIONAL WASTE MANAGEMENT PLAN (8.1A)	25
9.2	SEPARATION OF WASTE STREAMS (8.1, B.1)	26
9.3	DEDICATED WASTE STORAGE AREA (8.1, B.2)	26
9.4	ACCESS TO WASTE STORAGE AREA (8.1,B.3)	26
10.	APPENDICES	27
	APPENDIX 1: APPROXIMATE DIMENSIONS OF PROPOSED BIN SYSTEMS	27
	APPENDIX 2 – CONSULTANT EXPERIENCE	29

1. Introduction

This operational waste management plan has been prepared by Foresight Environmental on behalf of the NSW Department of Education (the Applicant). It accompanies an Environmental Impact Statement (EIS) in support of State Significant Development Application (SSD 18_9343) for the new Meadowbank Education and Employment Precinct Schools Project (hereafter referred to as MEEPSP) at 2 Rhodes Street, Meadowbank (the site).

The K-12 MEEPSP will cater for 1,000 primary school students and 1,620 high school students. The proposal seeks consent for:

- A multi-level, multi-purpose, integrated school building with a primary school wing and high school wing. The school building is connected by a centralised library that is embedded into the landscape.

The school building contains:

- Collaborative general and specialist learning hubs, with a combination of enclosed and open spaces;
 - Adaptable classroom home bases;
 - Four Storeys central library, with primary school library located on ground floor and high school library on levels 1 to 3.
 - Laboratories and workshops;
 - Staff workplaces;
 - Canteens;
 - Indoor gymnasium;
 - Multipurpose communal hall;
 - Outdoor learning, play and recreational areas (both covered and uncovered).
- Associated site landscaping and public domain improvements; and
 - An on-site car park for 60 parking spaces;
 - Construction of ancillary infrastructure and utilities as required.

The purpose of this operational waste management plan is to demonstrate how the MEEPSP will implement best practice measures for the ongoing management of waste and recycling during the ongoing operation of the facility.

Response to SEARs

The operational waste management plan is required by the Secretary's Environmental Assessment Requirements (SEARs) for SSD 18_9343. This table identifies the SEARs and relevant reference within this report.

Table 1 – SEARs and Relevant Reference

SEARs Item	Description
4. Built form and Urban Design	Detail how services, including but not limited to waste management, loading zones and mechanical plant are integrated into the design of the development
20. Waste	Identify, quantify and classify the likely waste streams to be generated during construction and operation and describe the measures to be implemented to manage, reuse, recycle and safely dispose of this waste. Identify appropriate servicing arrangements (including but not limited to waste management, loading zones, mechanical plant) for the site.

2. Waste Generation Estimate

The following waste generation estimates have been produced based on the information provided regarding the projected activities throughout the schools, the projected student and staff numbers, along with extensive benchmark and audit data from similar facilities/developments.

The primary waste streams expected to be generated in the ongoing operation of the development include all common waste and recycling streams:

- Cardboard/paper recycling
- Comingled recycling
- Food organics recycling
- General waste

In addition to these common streams, it is anticipated that various specialty and ad-hoc waste streams will be produced throughout the ongoing operation of the schools including:

- Bulky wastes (scrap timber, metal etc)
- Special/hazardous wastes (solvents, paints, chemicals etc)
- Flouro tube/globe recycling
- Battery recycling
- Confidential documents
- Vegetation/green waste from maintenance

Table 2 details the waste generation estimate for the common operational waste and recycling streams. It should be noted that the following waste generation profile is an estimation only, based on average teaching and office use assuming full use during weekdays and limited use during weekends.

Table 2 – Waste generation estimate

	kg/day	L/day	kg/wk	L/wk
Paper/Cardboard	116	1,969	582	9,873
Mixed Recycling	31	511	154	2,560
Food Waste	216	770	1,082	3,863
General Waste	304	2,045	1,524	10,256
Total	667	5,295	3,342	26,552

3. Waste Management Systems

3.1 Common Waste Systems

Table 3 below demonstrates how the current onsite systems provide ample capacity for the estimated waste volumes detailed in Table 2 above.

Table 3 - Recommended equipment and collection frequency

Waste Stream	Bin Type	No. of Bins	Weekly Clearance Frequency	Capacity (weekly)	Estimated volume / week	Footprint per bin (m ²)	Total Footprint (m ²)
Paper/Cardboard	MGB 1100L	4	3	13,200	9,873	1.69	6.74
	MGB 240L*	10	3	7,200		0.43	4.26
Mixed Recycling	MGB 1100L	2	3	6,600	2,560	1.69	3.37
Food Waste	MGB 120L*	20	3	7,200	3,863	0.27	5.43
General Waste	MGB 1100L	5	3	16,500	10,256	1.69	8.43
Total bin footprint							28.23
Recommended Storage Area (including circulation space)							40
Current Waste Store Area							47

*note: these bins will be stored throughout the school for use at the point of generation – they will only be brought to the waste storage/collection area as required for collection. It is unlikely that they will all be located at the collection area at any one time.

3.2 Liquid/Hazardous waste

In addition to the above systems for common wastes, it is recommended that a bunded liquid/hazardous waste storage cabinet be implemented where required in visual arts store rooms and in science prep/chemical store rooms for the safe storage of any paints, solvents or liquid chemicals associated with class/science lab activities. These wastes would then be collected by a specialist contractor directly from the storage cabinet upon request by facilities management for appropriate disposal i.e. Chemsal (see figure 1 below for example of cabinet).

Figure 1 – example of liquid/hazardous waste storage cabinet



3.3 Bulky design/technology waste

It is proposed for consideration that manoeuvrable crates/cages be located within design/technology workshops for the storage of scrap materials (timber, metal etc). These crates will have a dual function – scraps and offcuts can be placed in the crates and made available to other users for re-use. It is anticipated that most materials will be reused with only limited quantities of materials needing disposal periodically. When crates become full and the materials are deemed unfit for reuse, they can be wheeled to the waste storage area to be collected by the appointed waste contractor upon request.

Figure 2 – Examples of manoeuvrable metal/timber recycling crate



3.4 Other waste/recycling

The following waste stream will be collected on call as needed:

- Green Waste/vegetation – vegetation generated from onsite maintenance activities will be managed by grounds staff. An 1100L rear lift bin is recommended for the management of this stream which can be wheeled to where the garden work is being conducted and then returned to the waste storage area for storage and collection. This bin should be collected on request as required.
- Battery Recycling – Battery recycling boxes will be present where deemed necessary e.g. copy rooms, office/study common areas. These boxes will be collected when full by a dedicated contractor.
- Toner Cartridge Recycling – Used toners will be collected by administration staff and consolidated for collection by specialty cartridge recycler (usually provided by office supplier).

4. Waste and Recycling Storage Area

The proposed waste storage area is located off Rhodes Street and provides ample capacity for the bins proposed in table 3 above.

Figure 3 – Site plan and waste storage area location

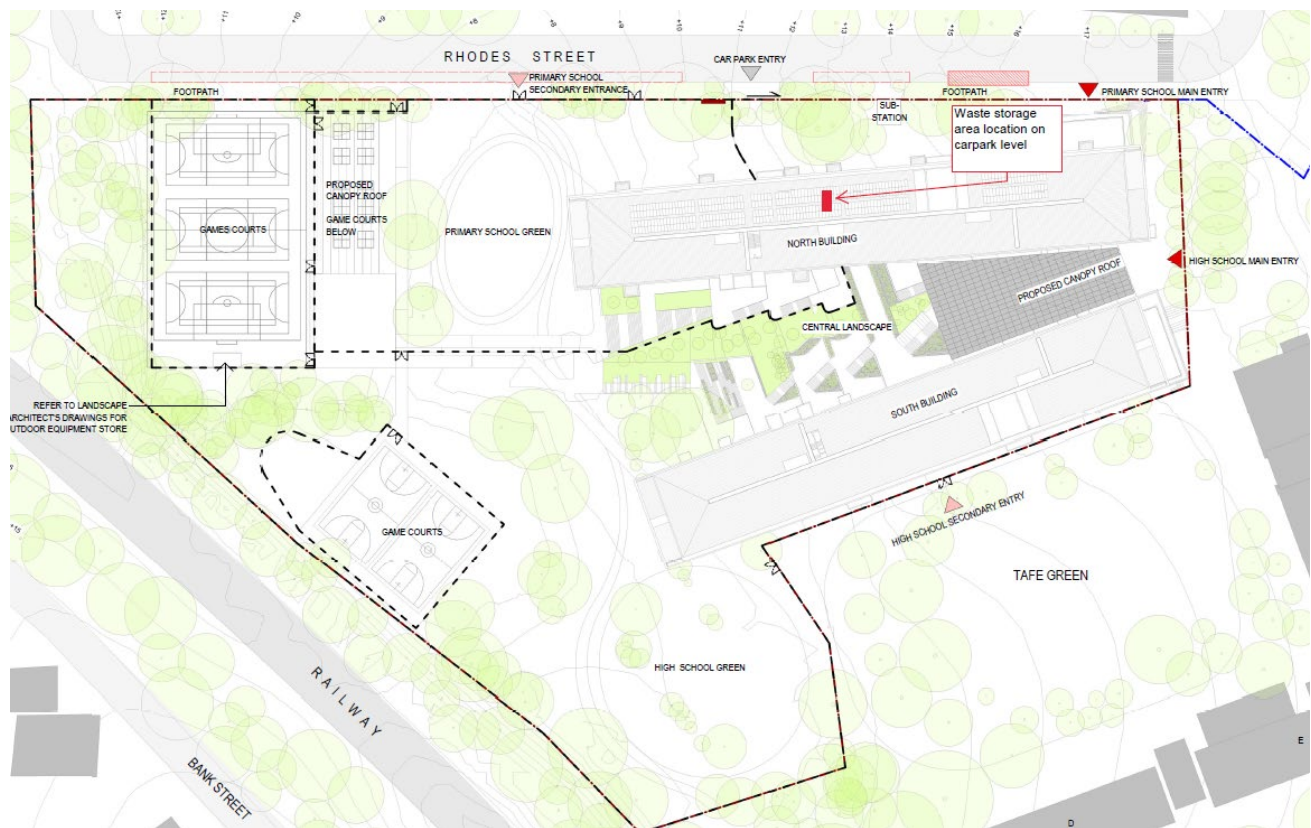
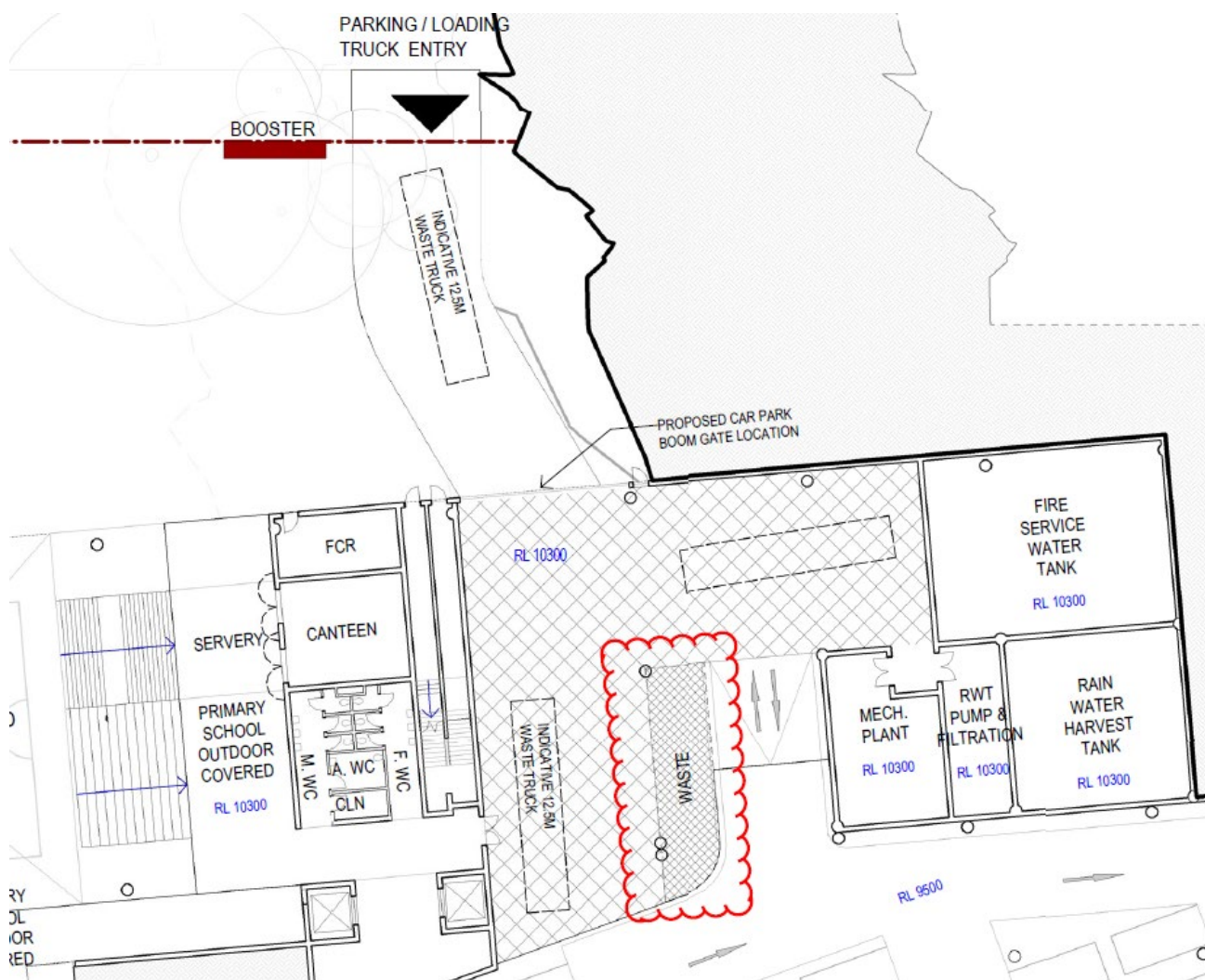


Figure 4 – Waste storage area



4.1 Signage and Colour-coding

All waste and recycling streams should be differentiated with clear signage and colour-coding 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.



5. Collection

Waste truck specifications will vary slightly between contractors however as a guide, all streams and bins recommended in this report will be collected by a MRV rear lift waste truck – figure 5 details the indicative dimensions of a typical MRV rear-lift truck used by most commercial waste contractors and don't require any additional overhead clearance when servicing.

Figure 5 - Medium rear-lift commercial waste truck specifications

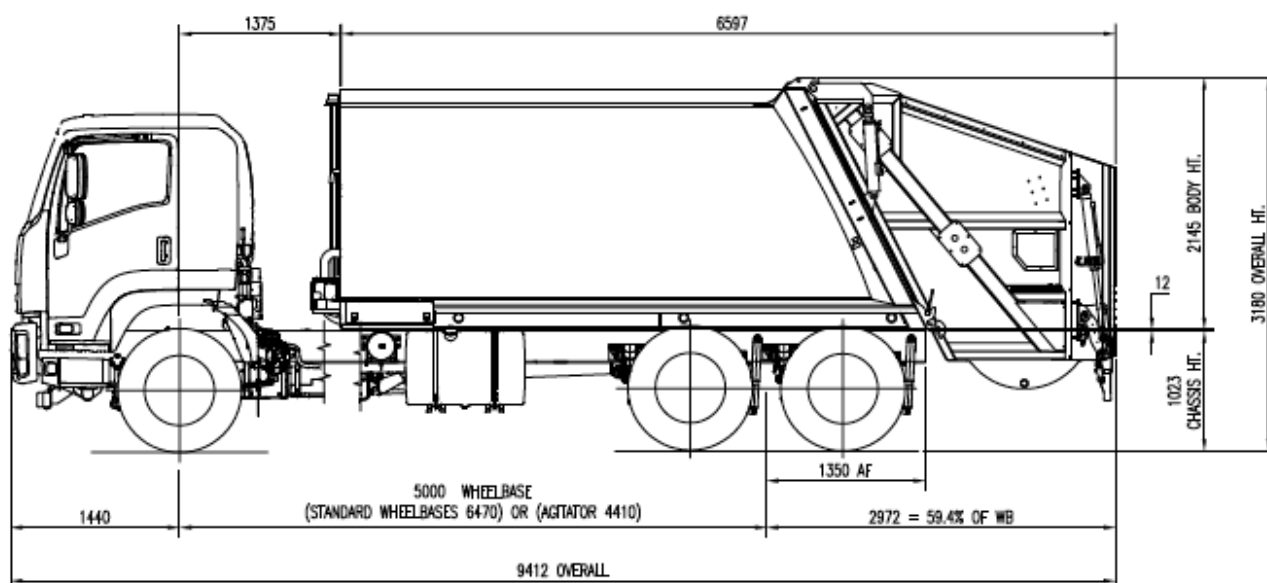
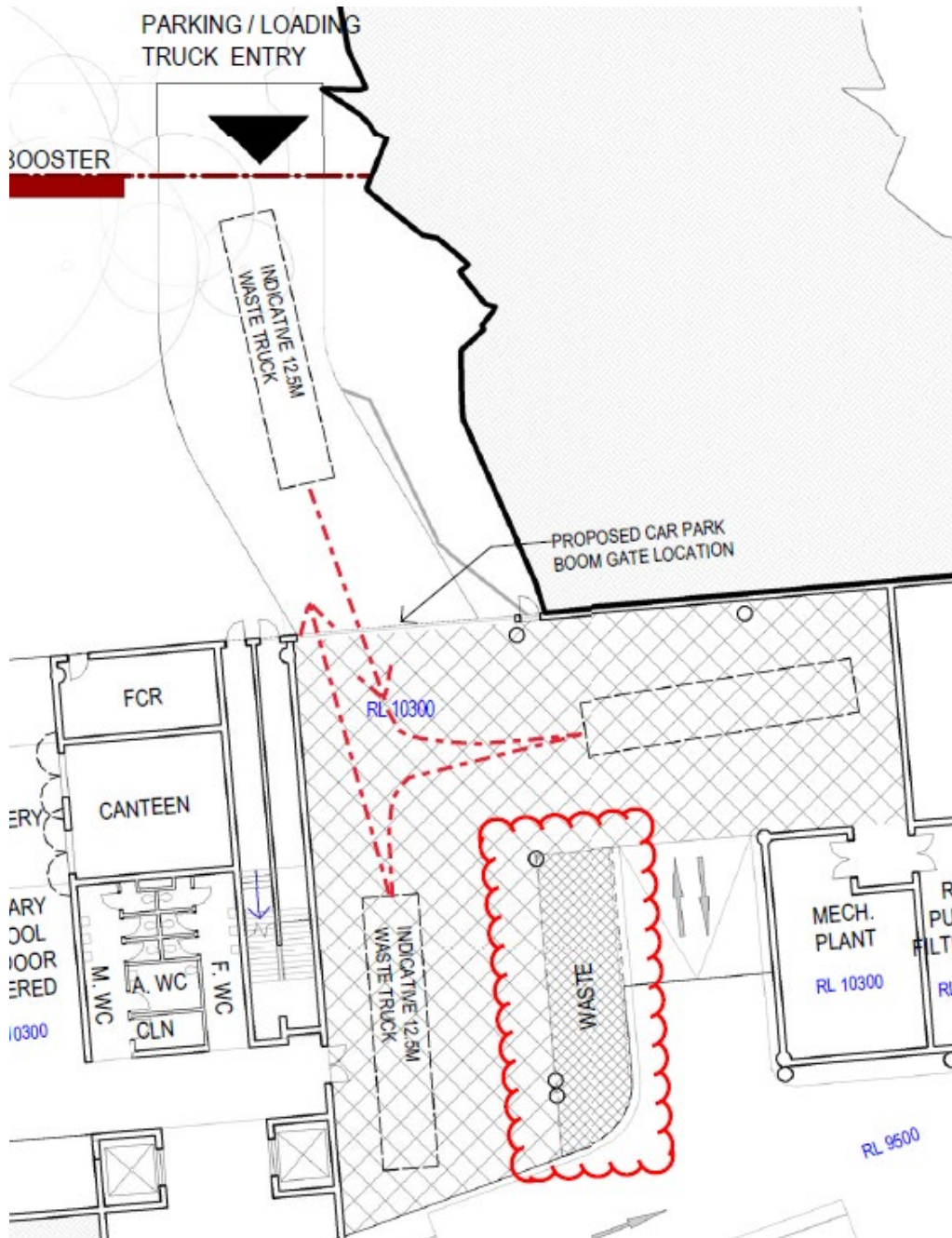


Figure 5 below shows the forwards entry and exit swept path for a 12.5m MRV waste truck to access the waste collection area off Rhodes Street.

Figure 6 – Indicative Waste collection swept path



6. Onsite Management Protocols

6.1 Waste systems on each level (internal)

Throughout each level are various areas with different functions – including teaching/study areas, office/admin areas, tutorial rooms etc.

Due to the amount of different rooms and areas it would be impractical and unnecessary to offer bins in every single room. Instead, it is recommended that bin hubs be established throughout the floors in hallways and common spaces to service the different areas. This encourages students/staff using the spaces to remove any waste they have and place it in the appropriate bin at the nearest hub – such a practice should promote recycling by giving users the choice of stream to dispose material into, and also reduce the time taken for cleaners to empty the bins. Cleaners would then service these bin hubs by collected the bin liner and transferring it into a typical cleaners trolley which would then be taken to the main waste storage area for disposal into the larger bins provided there prior to collection.

Figure 7 below provides some examples of best practice bin-hub set up using individual bins to create the bin hub.

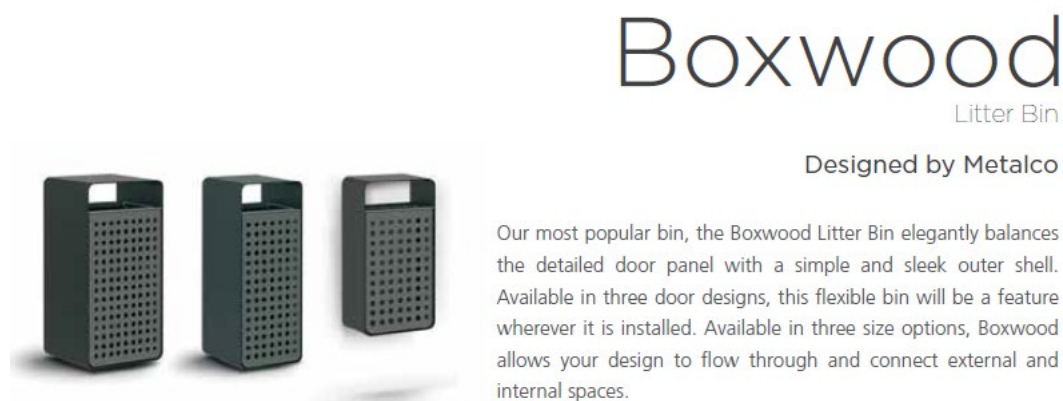
Figure 8 shows examples of more permanent bin housing which could also be used depending on operator preference.

Figure 7 – Best practice bin hub examples – individual bins





Figure 8 – Best practice bin hub examples – bin housings



6.2 Outdoor Areas

Appropriate public place bin hubs should be implemented throughout high traffic outdoor areas i.e. sporting fields, break-out/lunch areas etc. These bin hubs could be configured to be lined with a bin liner which would then be collected by cleaners using a trolley as per the examples above for the internal bin hubs. Or, to deliver greater capacity, the outdoor bin housings could be configured to house 2x240L bins (for general waste and mixed recycling). Full bins can then be transferred to the waste storage/collection area for collection by the waste contractor and replaced with an empty bin into the bin housing.

Image 9 provides examples of waste and recycling bin hubs. It is important to note that all bin hubs should provide general waste and recycling options i.e. both streams should be located next to each other – when these streams are isolated from each other the likelihood of the recycling stream being contaminated by non-recyclables significantly increases.

Figure 9 – Best practice bin hub examples – outdoor bin housings





6.3 Waste Stream Collection Practices

Table 4 outlines the cleaners and campus operational staff collection practices for each waste stream

Table 4 -

Waste Stream	Collection Practices
Paper/cardboard recycling	<ol style="list-style-type: none"> 1. Cleaners empty bin hubs into cleaner trolleys. Material is then taken to waste storage area via the lift core and transferred into the paper/cardboard bins. 2. Where possible, bulky cardboard should be taken directly to the waste storage area or left in a designated area on each level (e.g. store rooms) to be collected by cleaning staff. 3. Cleaners collect flattened cardboard as required and transfer it to the waste storage area where it is deposited into the paper/cardboard recycling 1100L MGBs 4. Bins collected from the waste storage areas directly by waste contractor via Rhodes Street.
Mixed Recycling	<ol style="list-style-type: none"> 1. Cleaners empty bin hubs into cleaner trolleys. Material is then taken to waste storage area via the lift core and transferred into the 240L MGBs comingled bins in waste storage area. 2. Bins collected from the waste storage areas directly by waste contractor via Rhodes Street.
General Waste	<ol style="list-style-type: none"> 1. Cleaners to collect general waste from bin hubs using a trolley and transport the waste to the waste storage area to be transferred into the 1100L general waste bins. 2. Bins collected from the waste storage areas directly by waste contractor via Rhodes Street.
Food Organics	<ol style="list-style-type: none"> 1. Separated within food prep areas (canteen, food technology classrooms etc) 2. Taken to onsite composting area by staff/facilities management – refer to site Operational Management Plan
Vegetation	<ol style="list-style-type: none"> 1. Managed onsite by grounds staff – transferred to 1100L bin within waste storage area. 2. Collected on call by contractor as required by grounds staff
Toner Cartridge Recycling	<ol style="list-style-type: none"> 1. Used toner cartridges will be collected by campus operations and placed into the designated toner cartridge recycling bin located in office areas 2. This will be collected on call by a dedicated contractor (i.e. Planet Ark)
Battery Recycling	<ol style="list-style-type: none"> 1. Batteries will be collected in boxes at collection point decided upon by campus management (ideally office common areas, reception areas) 2. This waste stream will be collected on call.

Figure 10 – example of segregated cleaner trolley to transfer waste from bin hubs to waste storage area



7. Additional Opportunities

7.1 Waste Diversion Opportunities

The following initiatives represent opportunities for the MEEPSP to explore in an effort to reduce total waste generation. These options are not a requirement however should be considered to move towards best practice waste management.

7.1.1. Organics Recovery/recycling

It should be noted that offering food/organic recycling throughout all areas of the school is not recommended due to the challenges of contamination, however options should be investigated for the canteen and food technology classrooms where there is more control over the type of materials being disposed ensuring that organics bins would remain free of contaminants. From here, all organics food waste can be separated and managed onsite through compost and/or worm farms. This process would produce valuable compost material which could be used onsite throughout landscaping and vegetable gardens – thus creating a closed loop scenario by utilizing food waste generated onsite for beneficial onsite outcomes. Additionally, the composting process is increasingly becoming part of land/environmental science studies in both primary and secondary school contexts – there is an opportunity for students to manage the composting program (perhaps with some input/oversight from facilities management. An onsite composting program would also reduce the schools general waste disposal costs as the organic component of the waste profile would be removed from the general waste stream collected by the appointed waste contractor.

Figure 11 – example of compost set up



Figure 12 – example of basic worm farm



8. Operational Monitoring and Performance

8.1 Ongoing monitoring and review

Ongoing monitoring of the waste and recycling program is recommended to be conducted by school operations staff. The appointed waste contractor and cleaning contractor should be required to meet regularly (quarterly) with school operations staff to ensure all stakeholders are continuously working towards best practice. The review process incorporates the following elements:

- Cleaners/managers/drivers regularly make note of any contamination in recycling streams and provide feedback to school operations staff for them to address throughout the school as appropriate.
- Waste contractor reports and invoices are reviewed and analysed on an ongoing basis to ensure the reported data and invoiced costs are reflective of onsite practices and performance.

8.2 Recycling performance and targets

Based on the estimated waste composition for the schools, approximately 61% of the total waste profile by volume could be recycled – it should be noted that this profile assumes 100% separation of common recyclables which in reality is unlikely.

With the implementation of the additional recycling streams proposed in this plan, the school will be better equipped to capture the available recyclables generated from onsite operations. It is strongly recommended that all future recycling initiatives should be focused on the continued effective capture of the basic recyclables of paper/cardboard and mixed recycling. Then, once those streams are well established, initiatives to capture organics can be implemented – though it is recommended only in areas where contamination can be monitored and controlled i.e. kitchens, canteens etc.

In an effort to drive performance improvements, a 3-year recycling target has been proposed based on achievable outcomes which allows for progressive improvements to be made to the waste program each year.

The table below outlines an achievable target progression.

Table 5 - Year-on-year target progression

	Year 1	Year 2	Year 3
School Recovery Target	30%	40%	50%
Primary focus	Paper/cardboard and mixed recycling capture	Staged roll-out of organics to limited, managed areas	Potential complete rollout of organics and maximum separation of other common recyclables

These targets are provided as a conservative guide which should be reviewed and adjusted in light of actual onsite practices once operational as greater diversion opportunities may be available to facility management.

9. Green Star Management 8 – Operational Waste

9.1 Operational Waste Management Plan (8.1A)

The Operational Waste Management Plan was prepared by Foresight Environmental, specialized experts in waste consultancy. The Waste Management Plan has been produced in accordance with best practice waste management practices and systems. The following table details the relevant sections and information to comply with the above credit:

Table 5 – Green Star OWMP criteria and information

Criteria	Information
Identify the site boundary, the waste streams relevant to this project, and the individual roles responsible for delivering and reviewing the WMP.	The site boundaries are outlined in figure 3, section 4 and the relevant waste streams are detailed in Section 2. It is the responsibility of school operational staff to deliver and review the report in accordance with Green Star criteria and best practice waste management guidelines.
Set diversion from landfill targets and/or targets for reducing total materials generation (general waste materials and recyclable/reusable materials), as well as monitoring and measurement procedures for waste and recycling streams by weight.	Refer to section 8.1 and 8.2
Outline methods for encouraging the separation of waste streams, such as bins, storage areas, or recycling facilities in public areas as required.	Section 6 details the various procedures for separating waste streams.
Identify storage areas for all waste streams and outline best practice safety and access requirements for their collection	The storage of each stream is detailed in section 4 of the OWMP. Best practice safety and accessibility is outlined in section 5 and 6.
Identify safe methods for vehicle access and transfer of waste.	Vehicle access and transfer of waste is detailed in section 5 and 6.

Incorporate a review process to assess the success of the WMP and make improvements, based on operational experience.	Refer to section 8.1
---	----------------------

9.2 Separation of Waste Streams (8.1, B.1)

The information on current streams and the streams that will be implemented along with the number of bins and generation rates for each stream can be found in Section 2 and 3. Each stream will clearly be identified throughout the site through Australian Standard colour-coding, different coloured bin liners and best practice signage.

9.3 Dedicated Waste Storage Area (8.1, B.2)

There is one dedicated waste storage area located on the playground level within the loading zone with direct access off Rhodes Street. Cleaners/onsite maintenance staff will transfer all waste produced on a daily basis to the waste storage area where it is stored temporarily until collection. The information for the waste storage areas can be found in section 4 of this OWMP.

9.4 Access to Waste Storage Area (8.1,B.3)

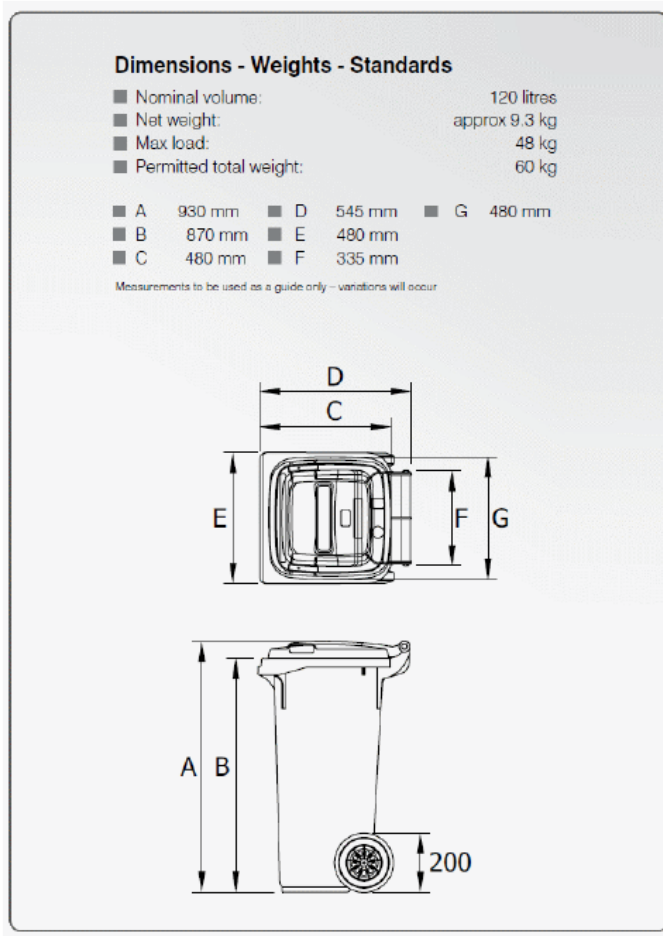
Access to the waste storage area is level and free of kerbs. The waste storage area is directly adjacent to the waste collection area so waste contractors can collect bins directly from the waste storage area with very little need to move the bins. This process is outlined in section 5 of this OWMP.

10. Appendices

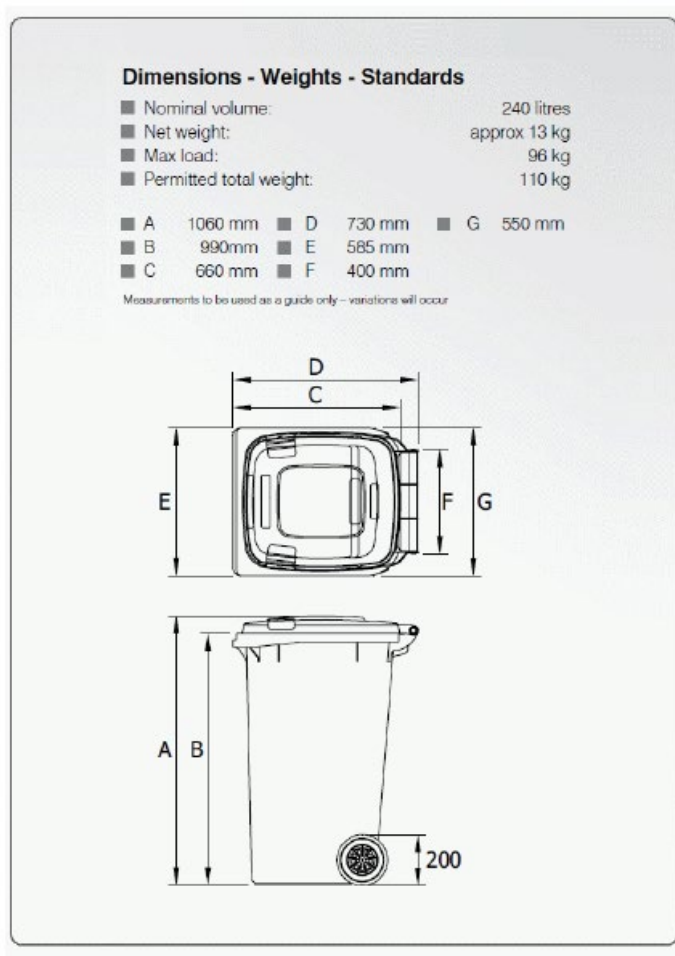
Appendix 1: Approximate Dimensions of Proposed Bin Systems

The following figures provide the approximate dimensions of the proposed bin systems.

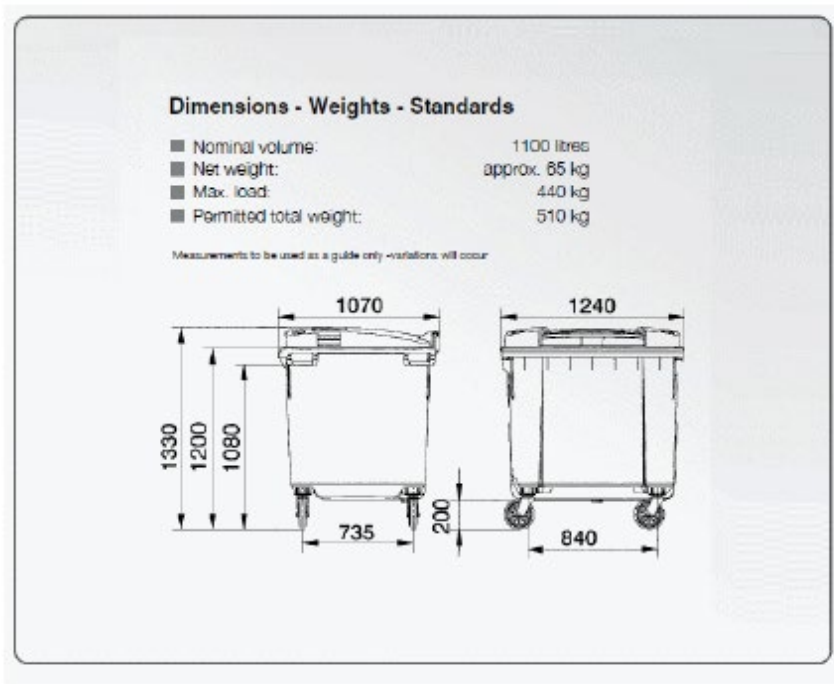
120L MGB



240L MGB



1100L MGB



Appendix 2 – Consultant Experience

Foresight Environmental (Fe.) is an industry leading waste management consultancy providing expert waste management advice to business and government organisations.

Fe. specialise in the development of tailored portfolio-wide best practice waste management strategies for retail and commercial property groups. We work with property portfolios at a national, site and tenant level to ensure multi-lateral collaboration to improve recyclable recovery, reduce landfill generation and maximise overall cost savings. Areas of focus include data integrity and reporting, tender management, dock waste management planning and tenant education programs.

Fe. also collaborate with industry groups, including Better Building Partnership, NABERS & City Switch, in an effort to build stakeholder capacity and drive change within the industry. Fe. brings extensive experience and practical solutions for real-world applications to every project and is excited to be part of projects that drive change within the industry. The team at Fe. collectively have over 30 years experience and below is a selection of our work including waste management plans and physical waste audits in line with OEH NSW Guidelines:

- Sydney Opera House – physical contamination audit, due diligence and data review. Detailed strategy and behavioral recommendations were made.
- AMP Capital (national commercial portfolio) – physical contamination audits conducted at all sites across the national portfolio to determine baseline contamination rates and densities
- Westpac (Kogarah Branch) – detailed physical audit of commercial branch offices to achieve baseline data for future recommendations and future analysis/comparison
- Westpac (275 Kent Street) - detailed physical audit of commercial floors to achieve baseline data and separate commercial waste from retail waste. Recommendations for future improvements were made and a contractor data integrity analysis was conducted.
- State Property Authority - Conducted a detailed waste audit of the SPA premises in Sydney reporting results, recommendations for future waste management and data to meet WRAPP requirements.
- Department of Human Services - Conducted detailed waste audits of seven DHS premises through Australia. Review of waste generation and waste management practices.
- Transport NSW – Annual audit of offices in Sydney, a detailed site assessment, review of waste generated and waste management practices, reporting of results, continual monitoring and site assessments.
- Sydney International Convention, Exhibition and Entertainment Precinct (Lend Lease) – preparation of waste management strategy and plans for DA encompassing all functions and components within the precinct including exhibition space, convention centre, entertainment centre, hotel, residential, commercial, retail and public domain (CoS and iNSW)
- Barangaroo (Lend Lease) – preparation of waste management plan for residential components and basement infrastructure for DA and Green Star rating (CoS and GBCA)

- Barangaroo (Lend Lease) Public Space waste management strategy (CoS).
- O'Connell Street podium retail and basement redevelopment - preparation of C&D and ongoing operation waste management plans for DA and Greenstar (CoS and GBCA)
- Green Square Community Facilities redevelopment of South Sydney Hospital Site, Zetland – preparation of waste strategy and design input, preparation of waste management plan for DA (CoS)
- Defense Housing Australia Shout Ridge Residential Development, Lindfield – development of waste management plan for DA and Green Star rating (KMC and GBCA)
- Westfield Sydney – preparation of waste management plan for DA and ongoing operational strategy/support (CoS)
- West Keira, Wollongong mixed use development (GPT) – preparation of waste management plan for DA and Green Star rating (Wollongong City Council and GBCA)
- Wet n Wild water park development (Buchan Group) - preparation of waste management plan for DA
- Craigieburn Town Centre retail development (Lend Lease) – preparation of waste management plan for DA and Green Star rating (Hume City and GBCA)