TAFE Meadowbank

Phase 2.1
Combined Multi-Trades and Digital Technology Hub

Operational Waste Management Plan
September 2019

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1. Introduction

This Operational Waste Management Plan for Phase 2.1 of the TAFE Meadowbank Education Precinct has been developed by Waste Audit & Consultancy Services (Aust) Pty Ltd for Gray Puksand and TAFE Meadowbank.

It provides advice and guidance on management of general waste and recyclable materials that will be generated during the development's operational phase, and addresses current legislation and general best practices, including relevant SEARs and Green Star requirements.

The combined Multi-Trades Hub and Digital Technology Hub will generate a total of around 2,100 litres per day of various types of operational general waste and recyclable materials, each of which will require different management processes as detailed in this report.

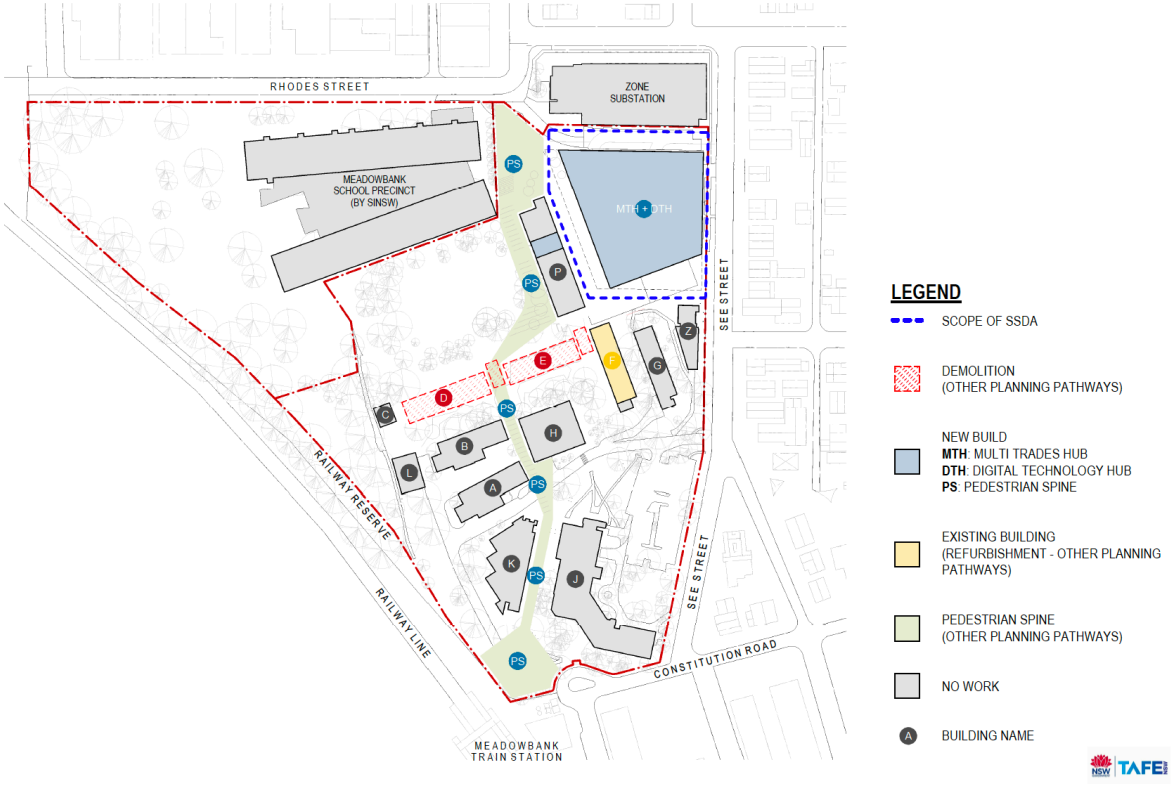
All waste management provisions, including internal bins, central storage areas, management and handling protocols, and contractor requirements, have been designed to ensure safe and sustainable management of all materials, consistent with TAFE NSW's objectives and SEARs and Green Star requirements.

Storage areas have been designed to achieve compliance with general best practice requirements as regards design, sizing, location, and finishes, and will, as designed, be adequate to manage the expected types and volumes of materials that will be generated.

We would like to thank all those whose knowledge and insights contributed to development of this report.

2. Site Boundary

The site boundary relevant to this Waste Management Plan is highlighted in yellow in the drawing below:



3. The Development

The combined Multi-Trades and Digital Technologies Hub will be a purpose-built new facility within the TAFE Meadowbank Education Precinct, with a net area of 14,000 m^2 excluding circulation space, consisting of the following functional spaces:

Table 1: Functional Spaces

Functional Area	GFA m^2
Workshop	4,619
Applied Research	69
Industry Engagement	1,857
Workplace	980
Learning Spaces	3,219
Café	45
Amenities	666
Circulation Space	2,612
Total	**14,065**

As detailed in Section 3, these functional spaces will generate different types of waste materials, at different rates.

General waste and recycling will be stored in and collected from the dedicated area on Level 3 of the Multi-Trades Hub building.

Calculations showing expected volumes of materials are shown in Section 4.

4. Operational Waste Generation Rates

To calculate total operational general waste and recycling generation, the following rates in litres/day/100 m^2 of GFA have been used for each functional area of the building as shown in Table 2 for the combined Multi-Trades and Digital Technology Hub buildings.

These rates are based on standard waste and recycling generation rates for educational facilities and other supporting functions such as cafes and amenity areas.

Table 2: Waste Generation Rates in Litres/Day per 100 m^2

Functional Area	General Waste	Paper/Cardboard Recycling	Commingled Recycling
Workshop	10.0	7.0	3.0
Applied Research	10.0	7.0	3.0
Industry Engagement	5.0	3.0	2.0
Workplace	5.0	3.0	2.0
Learning Spaces	5.0	4.0	1.0
Café	8.0	2.0	4.0
Amenities	8.0	0.0	0.0
Circulation Space	0.0	0.0	0.0

5. Total Waste Volumes

Total predicted daily operational general waste and recycling volumes for each building are shown in Table 3. These daily figures have been converted to weekly (Mon-Fri) totals for the purpose of calculating required equipment and storage space, as shown in Section 6.

Table 3: Predicted Total Waste Generation in Litres/Day

Functional Area	General Waste	Paper/Cardboard Recycling	Commingled Recycling
Workshop	461.9	323.3	138.6
Applied Research	6.9	4.8	2.1
Industry Engagement	92.9	55.7	37.1
Workplace	49.0	29.4	19.6
Learning Spaces	161.0	128.8	32.2
Café	3.6	0.9	1.8
Amenities	53.3	0.0	0.0
Circulation Space	0.0	0.0	0.0
TOTALS	**828.5**	**542.9**	**231.4**

6. Storage Facilities & Equipment

6.1 Storage Space Calculations

Table 4: Storage Space Calculations – Combined MTH + DTH

Material Stream/Function	Weekly Litres Generated	Bin Size Litres	No. of Bins	Collections per Week	Required Area (m^2)*
General Waste	4,142	1100	2	3	4.09
Paper/Cardboard Recycling	2,715	1100	2	2	4.09
Commingled Recycling	1,157	660	1	2	2.79
Bulky/Reusable Waste	Variable	N/A	N/A	On demand	10.00
Bin Wash Area					5.00
TOTAL FOOTPRINT					**31 m^2**

* Includes 20% allowance for circulation space between bins and bin movement in and out of the storage room

The above bin numbers and weekly collection frequencies are predicated on the maximum predicted generation of each of the expected materials streams, based on the GLA totals provided and knowledge of existing site operations and waste volumes.

The waste storage area as currently designed has an area of **40 m^2** and therefore, based on the above calculations, is adequately sized to accommodate bins for all waste and recycling generated between collections.

Should actual operational volumes exceed these estimates, there will still be sufficient space within the main storage room to accommodate additional bins/equipment if required.

6.2 Storage Space Location & Accessibility

The waste storage area will be located on Level 3, in close proximity to the building's external loading yard, affording easy access to waste contractor vehicles and their staff who will be responsible for loading of waste into collection vehicles.

There are no steps or grade changes between this room and the loading yard, or the internal circulation area.

General waste and recyclables will be brought to the storage area by cleaners every night, using the goods lift to bring materials from Levels One to Six of the combined MTH and DTH building, to Level 3.

6.3 Storage Space Requirements

The storage area as currently designed is adequately sized to accommodate bins for all waste and recycling generated on the premises between collections.

All waste and recycling containers will be clearly differentiated through appropriate signage and colour coding to reflect the materials contained, with each different stream located in a designated area to assist in easy identification by cleaners and other building users.

The storage area will also have the following features:

- Adequate ventilation in accordance with applicable Australian Standards
- Provided with artificial light, controlled by switches
- Designed to prevent the entry of vermin
- Ceilings finished with a rigid smooth non-absorbent material that can be easily cleaned
- Walls and ceilings constructed of approved solid impervious material and cement rendered internally to a smooth even surface coved at all intersections
- Floors of the main waste and recycling storage room must be constructed of concrete, at least 100 mm thick, and finished to a smooth surface coved at the intersections with walls
- Bunded bin wash facilities provided with an adequate supply of hot and cold water mixed through a centralised mixing valve with hose cock, and floor graded to a 100 mm diameter floor drain outlet

7. Waste Management & Recycling

7.1 Cardboard & Paper Recycling

Most cardboard packaging will originate from deliveries of supplies and stationery. Paper materials such as non-confidential office paper, newspapers, magazines, etc. will be generated from teaching areas, learning spaces, and offices, and will be managed as follows:

- Staff and students dispose of material into designated bins
- Cleaners collect materials and transfer to the bins within storage room
- Recycling contractor services bins to designated schedule

7.2 Commingled Recycling

Commingled recycling consists of all mixed plastic bottles and containers, glass bottles, and steel and aluminium cans. This material will be managed as follows:

- Staff and students dispose of material into designated bins
- Cleaners collect materials and transfer to the bins within storage room
- Recycling contractor services bins to designated schedule

7.3 General Waste

All materials other than those discussed above will be classified as general waste, and will disposed of and collected accordingly as follows:

- Staff and students dispose of material into designated bins
- Cleaners collect materials daily and transfer to the bins within storage room
- Waste contractor services bins to designated schedule

7.4 Roles & Responsibilities

The site's Facilities Management team will have responsibility for reviewing the Operational Waste Management Plan annually, ensuring that the objectives of the Plan are met, and making adjustments where required, to ensure continued accuracy and relevance to actual operational circumstances.

7.5 Monitoring & Measurement

TAFE Meadowbank has systems in place for monitoring, measurement, and reporting of operational waste management performance. Reports and invoices provide weights of materials streams and numbers of bins collected.

Annual performance and contract reviews will be conducted with TAFE Meadowbank's facilities management, waste contractor, and cleaning manager, to assess progress towards annual waste diversion targets and other KPIs, identify operational issues, and address any shortcomings. Waste audits will also be conducted annually to benchmark performance.

7.6 Waste Diversion Targets

Based on the expected waste profiles of the combined Multi-Trades and Digital Technology Hub, we recommend setting an initial diversion target of 50% (proportion of overall waste diverted from landfill disposal through waste avoidance, reuse, and/or recycling).

This target should be reviewed by TAFE Meadowbank after the first year of operations, and annually thereafter, and adjusted accordingly based on actual measured performance.

8. Internal Bins

It is recommended that all internal functional spaces of the Phase 2.1 development are equipped with 3-stream bin hubs for:

- Paper & Cardboard Recycling
- Commingled Recycling
- General Waste

Bins should be situated in areas which effectively service a group of workstations and offices, with no bins under desks; this improves cleaning staff efficiencies by reducing the number of bins that require collection, and also reduces the number of bin liners required.

Examples of bins that are commonly used in office or educational settings are also shown below. Differently colored bin liners (general waste-black; paper-clear; commingled-blue) are recommended to assist cleaning staff to distinguish the different streams and enable them to identify contamination, prior to final disposal in the bins in the central storage area.

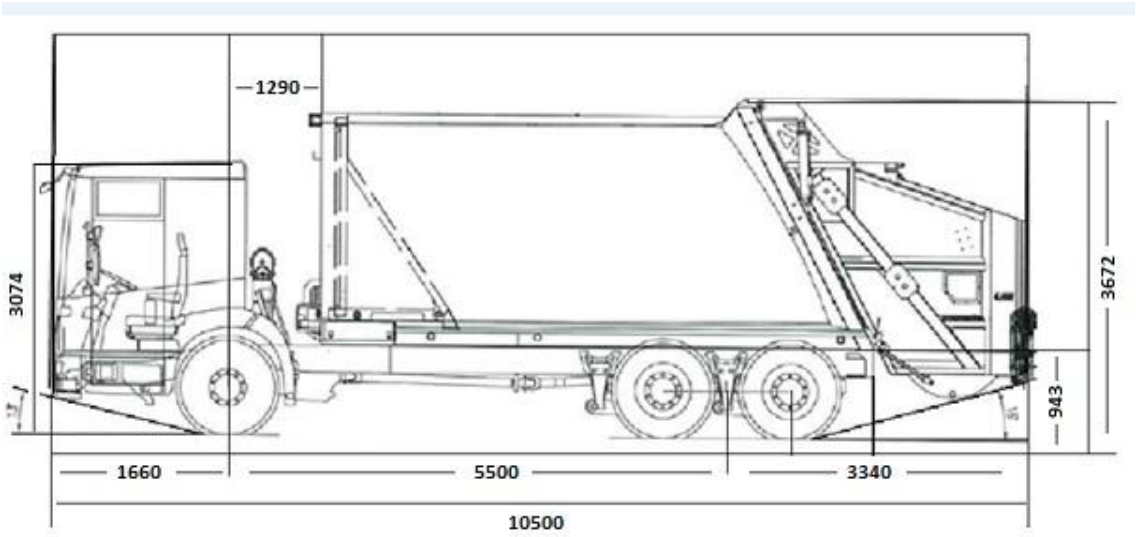
For areas with bins kept within housings or pull-out drawers in kitchens and central areas, care must be taken to ensure these systems are well designed and provided with clear signage to foster proper separation. An example of best practice drawer design is shown below which provides for two or three streams (paper recycling, commingled recycling, and general waste).

9. Vehicle Access & Site Safety

Contractors responsible for the removal of general waste and recycling will be required to undertake a site induction process to ensure their operational practices are conducted safely and efficiently. Additional specific requirements for waste contractors are listed in Section 9.

Appendix 1 provides diagrams showing bin movement and collection pathways for the development area and for the site as a whole. Appendix 2 shows the waste storage and loading area located on Level 3 of the Building.

General waste and recycling will be collected in standard trucks as shown below:



A turntable has been installed, as shown in Appendix 2, to accommodate a collection vehicle with the above dimensions (10.5 m + 1 m front and rear clearance = 12.5 m diameter).

10. Stakeholder Education

For the proposed waste management systems to be successful an intensive education program will be implemented for staff and students. New procedures may need to be written into contract specifications, including requirements for monitoring and feedback to TAFE Meadowbank's management team on waste management performance (e.g. visual observations of recycling stream contamination, condition of bins and equipment, etc.).

11. Waste Contractor Requirements

TAFE Meadowbank's waste contractors will comply with the following specific requirements:

- Reliable and efficient servicing, and meeting agreed schedules
- Working with the site to achieve continuous improvements in recovery rates
- Providing monthly reports on diversion and financial outcomes
- Providing tenant engagement and education programs
- Maintaining current details of processing facilities used
- Having collection vehicles fitted with weighing technology
- Maintaining evidence of compliance with relevant Green Star reporting criteria

12. Relevant Legislation, Standards and Guidelines

The following guidelines and standards have been used as references in compiling this Waste Management Plan:

- NSW EPA *Protection of the Environment Operations Act 1997* and *Protection of the Environment Operations (Waste) Regulation 2014, Part 11*
- NSW EPA *Waste Classification Guidelines* 2014
- *AS 1668.1 Mechanical Ventilation and Air Conditioning code, Part 1* and *AS 1668.2 Mechanical Ventilation and Air Conditioning code, Part 2*
- GBCA *Green Star Operational Waste* Criteria
- *SEARs Requirements*

This report has been prepared by:

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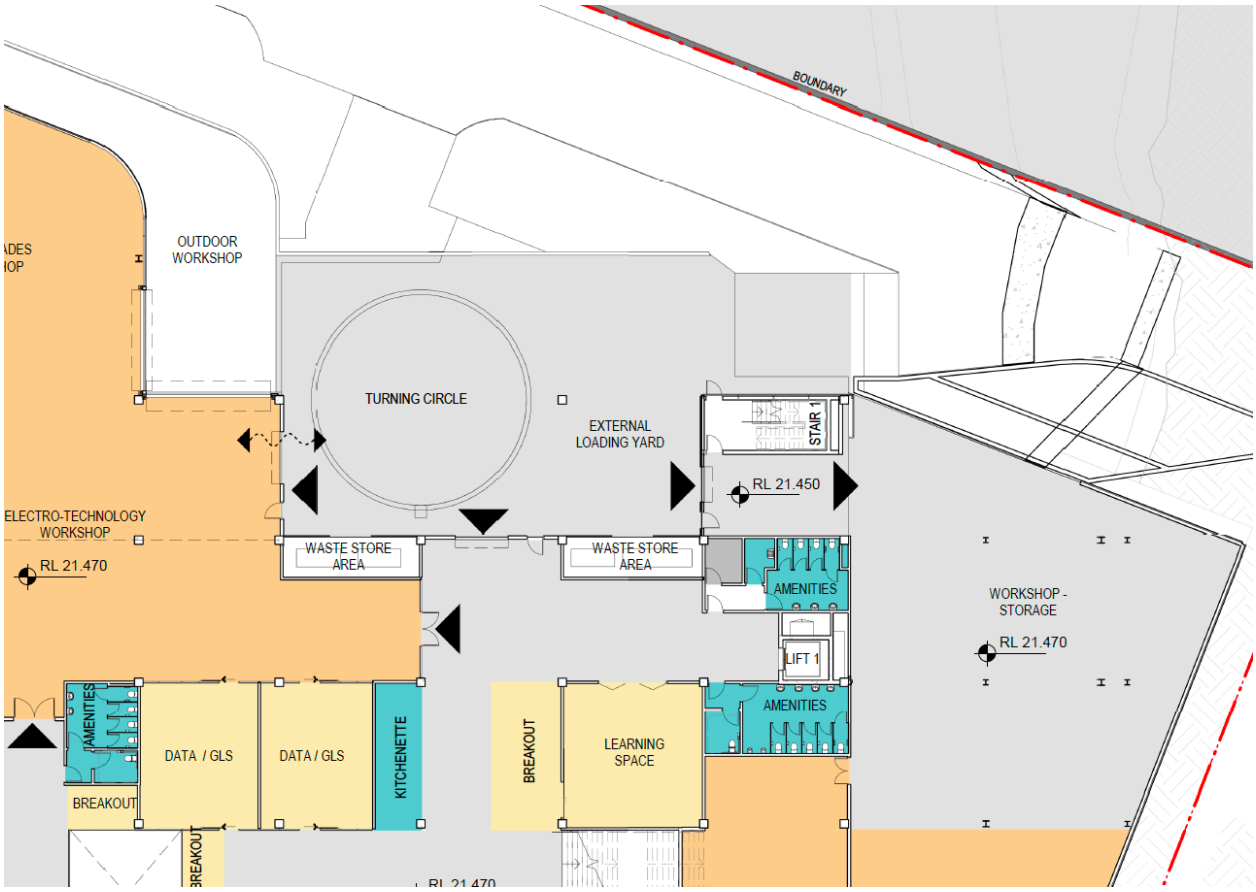
September 6, 2019

Appendix 1 – Bin Storage and Loading Area



Appendix 2 – Signage Examples