

Gillieston Public School redevelopment and new public preschool

**NSW SUSTAINABLE BUILDINGS SEPP
EMBODIED EMISSIONS MEMORANDUM**



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1 Background

1.1 Introduction

In response to the increasing severity of natural hazards resulting from changing climate, there has been a growing global focus on sustainable and innovative solutions to mitigate the effects of climate change and drastically reduce human activity related GHG emissions and therefore contain global warming and its flow-on effects. Governments, organizations, and leaders around the world have established sustainability targets to promote sustainable development and address the challenges of climate change.

The NSW Government has set whole-of-economy targets to reduce greenhouse gas emissions by 50 per cent by 2030 compared to 2005 levels, and net zero emissions by 2050. Achieving these targets will require all new and existing buildings in NSW to be operating at net zero well before 2050.

The NSW Sustainable Buildings State Environmental Planning Policies aims to simplify, measure and report the way buildings are planned and designed in NSW. Sustainable Buildings SEPP was introduced to measure the performance of new buildings in NSW and to ensure that new buildings are in alignment with the Net Zero commitments set by the state government.

As per the requirements outlined in NSW Sustainable Buildings SEPP, all new commercial buildings >1,000 m² should measure and report on the embodied emissions for the building. The existing school is located at 100 Ryans Road, Gillieston Heights, NSW fits this criterion and is required to measure and report the embodied emissions of the project as part of the REF. The measurement and reporting of embodied emissions also align with the broader sustainability strategy and goals of School Infrastructure NSW to reduce embodied carbon in the construction of the school.

The purpose of this memorandum is to outline the purpose, methodology, assumptions and report on the embodied emissions for Gillieston Public School as per NSW Sustainable Buildings SEPP requirements for the REF

1.2 Activity

The Gillieston Public School have been identified by the NSW Department of Education (DoE) as requiring redevelopment. The proposed redevelopment of Gillieston Public School is driven by service need including increase in expected student enrolments and the and removing demountable structure and replacement with permanent teaching spaces.

The redevelopment of Gillieston Public School comprises the following works:

- Demolition and removal of existing temporary structures.
- Site preparation works, including demolition, earthworks, tree removal.
- Construction of new:
 - 32 permanent general learning spaces and 3 support teaching spaces
 - Administration and staff hubs
 - Hall, canteen and library
 - Out of school hours care
 - Public preschool (standalone building for 60 places)
 - Covered Outdoor Learning Areas (COLAs)
 - Outdoor play areas, including games courts and yarning circle
 - New at-grade car parking
 - Extension of the existing drop-off / pick-up area and new bus bay
 - Realignment of the existing fencing
 - Associated stormwater infrastructure upgrades
 - Associated landscaping
 - Associated pedestrian and road upgrade activity

1.3 Significance of Environmental Impacts

Based on the identification of potential impacts and an assessment of the nature and extent of the impacts of the proposed activity, it is determined that all potential impacts can be appropriately mitigated to ensure that there is minimal impact on the locality, community and/or the environment.

1.4 Site Description

The Site is identified as 100 Ryans Road and 19 Northview Street, Gillieston Heights, legally described as Lot 51 DP 1162489 and Lot 2 DP1308605. The Site is located within the Maitland Local Government Area (LGA) and is zoned RU2 Rural Landscape and R1 General Residential zone under the provisions of the Maitland Local Environmental Plan 2011 (MLEP2011).

Existing attributes of the subject site are noted as follows:

- The subject site exhibits an area of approximately 23,385m² and is located in the suburb of Gillieston Heights;
- The subject site has a frontage to Ryans Road to the east, Gillieston Road to the north, and Northview Street to the south;
- In its existing state, the subject site comprises the existing Gillieston Public School. Existing school buildings are primarily located in the west portion of the subject site with a large area of open space situated in the eastern portion. There are limited permanent structures located on the subject site with thirteen (13) existing demountable classrooms currently occupying the subject site. Permanent buildings consist of the Main Administration Building, Original Brick Cottage, Library and GLS building located in the centre of the subject site; and
- Carparking is provided from Gillieston Road for staff. Pedestrian access is available via this main entrance from Gillieston Road and via a separate pedestrian-only access gates on Northview Street and Ryans Road.

The existing site context is shown in Figure 1 and Figure 2 below.



Figure 1 – Cadastral Map (Source: NSW Spatial Viewer, 2024)



Figure 2 – Site Aerial Map (Source: Near Map, 2024)

2 Methodology

The Sustainable Buildings (SB) SEPP requires to measure and report on the upfront embodied emissions, referred to as cradle-to-gate emissions or stages A1-A3 of a building's life cycle. The following steps were undertaken to measure and report on the embodied emissions for SEPP.

2.1 Material Data collection

As the project is in its early stages, purchased material quantities were not available. The Quantity Surveyor (Muller Partnership) estimated the bill of quantities based on architectural, structural and services drawings. When data could not be estimated based on the drawings, the material quantities were estimated based on buildings of similar scale and size.

Reference documents:

- Architectural – Schematic Architectural Drawings
- Structural – NS221454_ GPS-ACOR-00-XX-RP-S_Structural Services Draft SD Report Rev A
- Mechanical – GPS Schematic Design Report – Mechanical and Electrical

2.2 2. Reporting and sign off

As per the NSW SEPP SB, the embodied emissions from the project must be documented and calculated in the NABERS Embodied Emissions tool. At the time of writing the tool has not been released and the interim NABERS Material Form was used. The tool will be used for later stages of the project once available. Following the data collection, the material quantities were input into the NABERS Materials Form.

The NABERS Material Form only captures the material quantities and not the associated embodied emissions.

The NABERS material emissions form was signed off by Peter Dally (Muller Partnership). Please refer to **Appendix A – NABERS material emissions form**:

3 Assumptions

- The material emissions were calculated based on estimates from drawings and reports available at the time of writing. The calculations will be updated to reflect more accurate quantities once available.
- The NABERS Embodied Emissions Tool is the required format for non-residential reporting. However at the time of writing, the NABERS Embodied Emissions Tool is not released and the interim form - NABERS Embodied Emissions Materials Form was used to report on the material quantities as per the guidelines outlined in Embodied Emissions Technical Note by Department of Planning and Environment.

Appendix A – NABERS material emissions form

Step 2: Quantity of materials

Complete all blue cells that are applicable to the building. Leave items that aren't applicable blank.

Fill out blue cells

Material category	Sub-category 1	Sub-category 2	Sub-category 3	Value	Unit of measure
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Structure

The structural parts of the building that are below ground (substructure) and above ground (superstructure).

This includes fill below the substructure, foundations, basement levels, suspended floors, wall structure, roof structure, stairs, lift shafts and balconies.

It excludes external areas such as hardstands, carpark, patios, etc.

Coverage of structural material spend	-	-	-	80	%
Concrete in-situ	≤10 MPa	-	-		m³
Concrete in-situ	>10 MPa to ≤20 MPa	-	-		m³
Concrete in-situ	>20 MPa to ≤32 MPa	-	-	214.0	m³
Concrete in-situ	>32 MPa to ≤40 MPa	-	-		m³
Concrete in-situ	>40 MPa to ≤50 MPa	-	-	3,664.4	m³
Concrete in-situ	>50 MPa to ≤60 MPa	-	-		m³
Concrete in-situ	>60 MPa to ≤80 MPa	-	-		m³
Concrete in-situ	>80 MPa to ≤100 MPa	-	-		m³
Concrete in-situ	>100 MPa	-	-		m³
Concrete pre-cast panel	-	-	-		m³
Concrete block	Hollow core	-	-	1,221.2	m³
Concrete block/brick	Solid	-	-	112.0	m³
Concrete block/brick	Solid AAC	-	-		m³
Mortar	-	-	-		kg
Reinforcing steel	Bar & mesh	-	-	333,730	kg
Reinforcing steel	Fibre & strand	-	-		kg
Structural steel	Hot rolled structural	-	-	46	t

Structural steel	Cold formed structural	-	-	2	t
Structural steel	Other welded structural	-	-		t
Structural steel	Plate	-	-		t
Structural steel	Sheet	-	-		t
Stainless steel		-	-		t
Reinforced concrete piles	Concrete	-	-	83	m³
Reinforced concrete piles	Steel reinforcing				kg
Steel piles	-	-	-		t
Timber poles/piles	-	-	-		m³
Timber (solid)	Sawn softwood	-	-		m³
Timber (solid)	Sawn hardwood	-	-		m³
Timber (engineered)	CLT	-	-		m³
Timber (engineered)	Glulam	-	-		m³
Timber (engineered)	LVL	-	-		m³
Timber (engineered)	OSB	-	-		m³
Brick	Heat cured	-	-		m³
Structural Insulated Panel (SIP)	Steel outer	-	-		m²
Structural Insulated Panel (SIP)	Aluminium outer	-	-		m²
Structural Insulated Panel (SIP)	Engineered timber outer	-	-		m²
Fill	-	-	-	32,175	t
Sand & gravel	-	-	-		t
Waterproofing membrane	Bituminous	-	-		m²
Waterproofing membrane	Polyethylene	-	-		m²
Other structural (Describe and add unit >>)		-	-		
Other structural (Describe and add unit >>)		-	-		
Other structural (Describe and add unit >>)		-	-		

Envelope

The skin of the building that separates the internal building from the external environment.

This includes the roof cladding, wall cladding, windows, doors and internal/external shading. It also includes insulation and the internal wall lining of envelope walls.

Coverage of envelope material spend	-	-	-	80 %
Roof cladding	Profiled steel	-	-	1,319 m ²
Roof cladding	Profiled aluminium	-	-	m ²
Roof cladding	Profiled zinc	-	-	m ²
Roof cladding	Membrane	-	-	m ²
Roof cladding	Tiles (traditional clay)	-	-	m ²
Roof cladding	Tiles (concrete)	-	-	m ²
Roof cladding	Other (Please describe >>)	Aramax Mate (It is rollformed from prepainted steel and aluminium and is a deeper profile than conventional steel cladding.)		3,337 m ²
Wall cladding	Bricks (heat cured)	-	-	m ²
Wall cladding	Bricks (air dried)	-	-	m ²
Wall cladding	Bricks (under fired)	-	-	m ²
Wall cladding	Bricks (concrete)	-	-	m ²
Wall cladding	Mortar and render	-	-	kg
Wall cladding	Profiled steel	-	-	m ²
Wall cladding	Profiled aluminium	-	-	m ²

Wall cladding	Profiled zinc	-	-		m²
Wall cladding	GRC cladding	-	-		m²
Wall cladding	Timber weatherboards	-	-		m²
Wall cladding	Fibre cement board (Cemintal Barestone)	-	-	2,884	m²
Wall cladding	Terracotta	-	-		m²
Wall cladding	Brick tiles / veneers	-	-		m²
Wall cladding	Plasterboard	-	-		m²
Wall cladding	Plywood	-	-		m²
Wall cladding	Other (Please describe >>)	Aramax external wall cladding	-	620.0	m²
Windows & doors	Aluminium frame	Single glazed	-		m²
Windows & doors	Aluminium frame	Double glazed	-	818	m²
Windows & doors	Aluminium frame	Triple glazed	-		m²
Windows & doors	Timber frame	Single glazed	-		m²
Windows & doors	Timber frame	Double glazed	-		m²
Windows & doors	Timber frame	Triple glazed	-		m²
Windows & doors	uPVC frame	Single glazed	-		m²
Windows & doors	uPVC frame	Double glazed	-		m²
Windows & doors	uPVC frame	Triple glazed	-		m²
Windows & doors	Frameless	Single glazed			m²
Windows & doors	Frameless	Double glazed			m²
Windows & doors	Frameless	Triple glazed			m²
Windows & doors	Other (Please describe >>)		-		m²

Curtain wall	Single skin façade	Glazed panel	Single glazed		m²
Curtain wall	Single skin façade	Glazed panel	Double glazed		m²
Curtain wall	Single skin façade	Glazed panel	Triple glazed		m²
Curtain wall	Single skin façade	Opaque panel	Aluminium cladding		m²
Curtain wall	Single skin façade	Opaque panel	GRC cladding		m²
Curtain wall	Single skin façade	Opaque panel	Insulated shadow box		m²
Curtain wall	Single skin façade	Opaque panel	Brick cladding		m²
Curtain wall	Single skin façade	Opaque panel	Stone cladding		m²
Curtain wall	Double skin façade	Glazed panel	Single glazed		m²
Curtain wall	Double skin façade	Glazed panel	Double glazed		m²
Curtain wall	Double skin façade	Glazed panel	Triple glazed		m²
Curtain wall	Double skin façade	Opaque panel	Aluminium cladding		m²
Curtain wall	Double skin façade	Opaque panel	GRC cladding		m²
Curtain wall	Double skin façade	Opaque panel	Insulated shadow box		m²
Curtain wall	Double skin façade	Opaque panel	Brick cladding		m²
Curtain wall	Double skin façade	Opaque panel	Stone cladding		m²
Curtain wall	Other (Please describe >>)		-		m²
Stick-framed wall system	Aluminium frame	Glazed section	Single glazed		m²
Stick-framed wall system	Aluminium frame	Glazed section	Double glazed		m²
Stick-framed wall system	Aluminium frame	Glazed section	Triple glazed		m²
Stick-framed wall system	Aluminium frame	Opaque section	Aluminium cladding		m²
Stick-framed wall system	Aluminium frame	Opaque section	GRC cladding		m²
Stick-framed wall system	Aluminium frame	Opaque section	Insulated shadow box		m²
Stick-framed wall system	Aluminium frame	Opaque section	Brick cladding		m²
Stick-framed wall system	Aluminium frame	Opaque section	Stone cladding		m²
Stick-framed wall system	Steel frame	Glazed section	Single glazed		m²
Stick-framed wall system	Steel frame	Glazed section	Double glazed		m²
Stick-framed wall system	Steel frame	Glazed section	Triple glazed		m²

Stick-framed wall system	Steel frame	Opaque section	Aluminium cladding		m²
Stick-framed wall system	Steel frame	Opaque section	GRC cladding		m²
Stick-framed wall system	Steel frame	Opaque section	Insulated shadow box		m²
Stick-framed wall system	Steel frame	Opaque section	Brick cladding		m²
Stick-framed wall system	Steel frame	Opaque section	Stone cladding		m²
Stick-framed wall system	Other (Please describe >>)		-		m²
Wall louvre system	Aluminium	-	-		m²
External shading system	Aluminium frame	Aluminium cladding	-		m²
External shading system	Aluminium frame	GRC cladding	-		m²
External shading system	Aluminium frame	Terracotta cladding	-		m²
External shading system	Aluminium frame	Stone cladding	-		m²
External shading system	Aluminium frame	Pre-cast concrete	-		m²
External shading system	Aluminium frame	Timber	-		m²
External shading system	Aluminium frame	Glass (opaque)	-		m²
External shading system	Aluminium frame	Steel	-		m²
External shading system	Other (Please describe >>)		-		m²
Roller doors	Steel profile	-	-		m²
Roller doors	Hardwood over steel	-	-		m²
Roller doors	Softwood over steel	-	-		m²
Revolving doors	Glass/aluminium/steel	-	-		no.
Fire-rated doors	Engineered timber	-	-		no.
Fire-rated doors	Steel	-	-		no.
Fire-rated doors	Aluminium/glass	-	-		no.
Insulation	Glass wool / fibreglass	-	-	3,445.0	m²
Insulation	Stone wool	-	-		m²
Insulation	Polyester	-	-		m²
Insulation	Expanded polystyrene	-	-		m²
Insulation	Other (Please describe >>)		-		m²
Other (Please describe and add unit >>)	External Core Door	-	-	37.0	no.
Other (Please describe and add unit >>)		-	-		

Other (Please describe and add unit >>)		-	-		
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Permanent internal walls and doors

Walls and doors within the building that are either structural or designed to be permanent.

Coverage of material spend on permanent internal walls and doors				80	%
Interior wall (permanent)	Steel (light framing)	-	-	5	t
Interior wall (permanent)	Timber framing	-	-		m ³
Interior wall (permanent)	AAC panel (reinforced)	-	-		m ²
Interior wall (permanent)	Concrete-filled steel panel	-	-		m ²
Interior wall (permanent)	Plasterboard	-	-	6,022	m ²
Interior wall (permanent)	Plywood	-	-		m ²
Interior wall (permanent)	Fibre cement sheet	-	-		m ²
Interior wall (permanent)	Insulation	-	-		m ²
Interior wall (permanent)	Glass	-	-		m ²
Interior wall (permanent)	Other (Please describe >>)		-		m ²
Internal door (permanent)	Aluminium/glass	-	-		no.
Internal door (permanent)	Timber/glass	-	-		no.
Internal door (permanent)	Timber solid lightweight	-	-	93	no.
Internal door (permanent)	Fire resistant	-	-		no.
Internal door (permanent)	Steel	-	-		no.
Internal door (permanent)	Other (Please describe >>)		-		no.
Other (Please describe and add unit >>)	Operable walls	-	-	983.0	m ²
Other (Please describe and add unit >>)		-	-		
Other (Please describe and add unit >>)		-	-		

Services

Unit of measure

Building services included within the main building contract. If the building components that are the subject of the REF or the construction certificate are base building only, then only enter these items. If you cannot split services by type, please enter them all in the "Other services" category at the bottom. Enter all values as material costs in dollars.

Mechanical services	-	-	-	2,475,158	AUD excl. GST
Vertical transportation	-	-	-	408,000	AUD excl. GST
Electrical services	-	-	-	2,779,184	AUD excl. GST
Solar photovoltaic installations	-	-	-	110,000	AUD excl. GST
Plumbing/hydraulic services	-	-	-	1,538,347	AUD excl. GST
Fire services				716,058	AUD excl. GST
Other services (Please describe)	External Services	-	-	2,205,580	AUD excl. GST

External activity

The materials associated with hard landscaping and outbuildings on the site but outside the building envelope.

This includes hardstands, carpark, driveways, covered walkways, decks, patios, awnings, fences, gates, etc. Soft landscaping should be excluded.

Coverage of spend on external activity	-	-	-	80	%
Asphalt	-	-	-		t
Concrete in-situ	≤10 MPa	-	-		m ³
Concrete in-situ	>10 MPa to ≤20 MPa	-	-		m ³
Concrete in-situ	>20 MPa to ≤32 MPa	-	-	978.0	m ³
Concrete in-situ	>32 MPa to ≤40 MPa	-	-		m ³
Concrete in-situ	>40 MPa to ≤50 MPa	-	-		m ³
Concrete in-situ	>50 MPa	-	-		m ³
Pavers, bricks and blocks	Concrete	-	-		m ²
Pavers, bricks and blocks	Clay	-	-		m ²
Reinforcing steel	Bar & mesh	-	-	131,152	kg
Reinforcing steel	Fibre & strand	-	-		kg
Structural steel	-	-	-		t
Structural aluminium	-	-	-		t
External roof/wall cladding	Polycarbonate	-	-		m ²
External roof/wall cladding	PVC	-	-		m ²

External roof/wall cladding	Bitumen sheet	-	-		m ²
External roof/wall cladding	Steel profile	-	-		m ²
Fill	-	-	-	18	t
Sand & gravel	-	-	-	26	t
Timber (solid)	Sawn softwood	-	-		m ³
Timber (solid)	Sawn hardwood	-	-		m ³
Timber (engineered)	CLT	-	-		m ³
Timber (engineered)	Glulam	-	-		m ³
Timber (engineered)	LVL	-	-		m ³
Timber (engineered)	OSB	-	-		m ³
Fabric (awning/sunshade)					m ²
Other (Please describe and add unit >>)		-	-		
Other (Please describe and add unit >>)		-	-		
Other (Please describe and add unit >>)		-	-		

Step 3: Certifier details

Fill out blue cells

The material quantities must be determined through an itemised list of building materials (such as a bill of quantities) and certified by a quantity surveyor, designer, engineer or NABERS Assessor.

Person that completed this form	Value	Note
Name	Yirun Du	Required
Company	Muller Partnership	Required
ABN	079 195 681	
Profession	Quantity Surveyor	Required
Qualification or registration	Bachelor of Construction Project Management	Required

Person that certified the details in this form	Value	Note
Name	Peter Dally	Required
Company	Muller Partnership	Required
ABN	079 195 681	
Profession	Director	Required
Qualification or registration	MAIQS / CQS - 28135	Required

Confirmation of certification	Value	Note
Are 80% of material costs captured for the building's structure, envelope and external activity?	Yes	Required
If no - why not?		

Additional comments from data provider
Quantities extracyed from elemental cost plan based on schematic design documentation.

Additional comments of certifier