

NEXTDC

NEXTDC S5

State Significant Development Application (SSDA) - Greenhouse Gas Assessment Report

Reference: S5-GHG-00-000-REP-D-DVA-APP-GHG REPORT

D | 7 October 2025



This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 296866-16

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Executive summary

This NEXTDC S5 Data Centre and Innovation Hub Architectural Design Report has been prepared by Arup on behalf of NEXTDC Limited to accompany a detailed State Significant Development Application (SSDA) for the data centre development at 269 Lane Cove Road. The legal description of the site is Lot 3 in Deposited Plan (DP) 1129811.

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued for the project (SSD-63168959).

An assessment of the GHG emissions during the construction and operation of the Proposal was conducted to quantify the impact and consider mitigation measures included in the design to reduce GHG emissions.

GHG emissions were calculated using information and data specific to the Proposal where possible, supplemented by benchmark data. Over the 50-year project life, the Proposal will result in 0.97 Mt CO₂-e of GHG emissions. A summary of the GHG emissions for the Proposal is outlined below.

Table 1 – Summary of Scope 1, 2 and 3 emissions for the Proposal – construction phase

Scope	Emissions category	Construction emissions (t CO ₂ -e) ¹	Construction emissions as % of all GHG emissions
Scope 1	Construction fuel use - stationary equipment	1,350	0.14%
	Construction fuel use - mobile equipment	70	0.0072%
Scope 2	Construction electricity use	20	0.0021%
	Commissioning electricity use	1,350	0.14%
Scope 3	Materials	177,680	18%
	Construction material transport	8,840	0.92%
	Landfilling construction waste	90	0.0093%
	Transport of construction employees to site	2,040	0.21%
Total (construction)		191,440	20%

1. Values rounded to two significant figures for reporting.

Table 2 – Summary of Scope 1, 2 and 3 emissions for the Proposal – operation phase (over 50 years)

Scope	Emissions category	Operation emissions over 50 years (t CO ₂ -e) ¹	Operation emissions as % of all GHG emissions
Scope 1	Diesel generator - testing	13,500	1.4%
	Refrigerant leakage	79,840	8.3%
Scope 2	Operation electricity use (accounting for reduction in GHG emissions from the grid based on projections, and excludes hyperscale electricity use (~60% of total electricity use))	498,590	52%
Scope 3	Water use	165,030	17%
	Transport of employees to work	17,700	1.8%

Scope	Emissions category	Operation emissions over 50 years (t CO _{2-e}) ¹	Operation emissions as % of all GHG emissions
	Fuel use for waste collection and deliveries	460	0.048%
Total (operation)		775,120	80%

1. Values rounded to two significant figures for reporting.

Operational emissions over a 50-year design life account for 80% of total GHG emissions for construction and operation of the Proposal, primarily due to the high electrical loads for the proposal. The Proposal's total GHG emissions of 0.97 Mt CO_{2-e} is 0.22% and 0.87% respectively of national (ending June 2024) and state (ending June 2022) GHG emissions.

Mitigation measures which are being considered to address emissions from construction and operation are further discussed in the separate Greenhouse Gas Mitigation Plan (S5-GHG-00-000-REP-C-DVA-APP-GHG Mitigation Plan) for the Proposal.

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1. Project introduction

This Greenhouse Gas (GHG) Assessment report has been prepared to accompany a detailed SSDA for the proposed data centre development at 269 Lane Cove Road, Macquarie Park (SSD-63168959).

The application seeks consent for construction and operation of a data centre development and includes site preparation works, bulk earthworks and infrastructure, and construction of the buildings, ancillary facilities, and associated site works. The application also includes the delivery of one internal road and an urban plaza adjacent to the Macquarie Park Metro Station entrance.

Specifically, the Project comprises the redevelopment of the site as summarised below:

- Site preparation works including demolition and removal of existing structures, tree removal and bulk earthworks.
- Staged construction and operation of two connected data centre buildings (Building A and Building B) with a maximum height of 65 metres and a combined total gross floor area (GFA) of 47,285m² comprising 33,142m² of technical data hall floor space and 14,143m² of office, retail and innovation hub floor space.
- Building A will be delivered in Stage 1 and will comprise the following:
 - Basement parking for 51 car spaces including two accessible spaces and 10 EV spaces.
 - Seven storeys of technical data floor space accommodating seven data houses: 16,571m².
 - Utilities including diesel generators (3MWe), above-ground water tanks for industrial water (600kL each), above-ground diesel storage tanks (100kL each) and an aboveground water tank for fire water (400kL each).
 - Business identification signage facing Waterloo Road and Lane Cove Road.
 - Integrated 'Building O' component within Building A, comprising:
 - Two retail tenancies at ground level: 326m².
 - Lobby and innovation hub including auditorium and training rooms: 3,186m².
 - NEXTDC and ancillary office floor space on upper levels: 10,631m².
- Building B will be delivered in Stage 2 and will comprise the following:
 - Seven storeys of technical data floor space accommodating seven data halls: 16,571m².
 - Utilities including diesel generators (3MWe), above-ground water tanks for industrial water (600kL each), above-ground diesel storage tanks (100kL each) and an aboveground water tank for fire water (400kL each).
 - Business identification signage on the western and southern building facades.
- Landscaping across the site in accordance with the project staging, delivering a mix of native and endemic plant species, shrubs and grasses, including 90 additional trees within a total area of 4,959m² deep soil and a resultant tree canopy cover of 5,707m².
- Staged delivery of public domain works including:

- Stage 1: construction of Road 13 within the subject site and urban plaza.
- Stage 2: construction of Road 6 (half-width) within the subject site, including provision for a future pedestrian/cycle overbridge (to be delivered by others), and works along Lane Cove Road.
- Delivery of 90 megawatts of power with a 33kV switching station to be accommodated on site, as well as other site services, including stormwater infrastructure.

The key components of the Proposal are listed in the following Table 3.

Table 3 – Project details

Description	Proposal Details
Project Area	The site has a total area of approximately 22,381m ² . The entire site area will be disturbed as a result of the Project. The site does not contain any environmental constraints.
Proposed Use	Data centre with ancillary office and innovation space. Two retail premises at ground level.
Project Description	• Demolition of existing buildings and structures. • Site preparation works including tree removal, bulk earthworks, excavation and construction of retaining walls. • Staged construction of the data centre buildings including technical data hall floor space, ancillary office and innovation space and two ground floor retail premises. • Vehicle access via Waterloo Road with on-site car parking and loading within the building footprint. • Associated landscaping including extensive trees, shrubs and grasses. • Business identification signage. • Staged delivery of public domain works via a Planning Agreement, including construction of Road 13 • Staged delivery of public domain works via a Planning Agreement, including construction of Road 13, Road 6 and an urban plaza between Building A and Waterloo Road. • Provision of required utilities, including an on-site switching station.
Gross Floor Area	Total GFA of 47,285m ² , broken down as follows: • Data halls/technical: 33,142m² • Lobby and innovation hub: 3,186m² • MCX office: 10,631m² • Retail including BOH: 326m² • Total number of data houses: 14 data houses
Building Height	• Building A: office and innovation hub – 49 metres over 10-storeys • Building A: data centre – 65 metres over nine-storeys • Building B: data centre – 60 metres over nine-storeys:
Proposed Floor Space Ratio	2.11:1
Deep Soil Area	4,959m ² of deep soil area (22.16% of total site area or 35.6% of future site area)
Car Parking	51 parking spaces, including 10 EV and 2 accessible spaces

Description	Proposal Details
Motorbike Spaces	17 spaces
Bicycle Spaces	20 spaces
Utilities	Provision of required utilities, combined for both buildings, including: • 48 x diesel generators (3MWe). • 16 x above-ground diesel storage tanks (100kL each). • Eight above-ground water tanks for industrial water (600kL each). • One 400kL above-ground water tank for fire water. • 33kV switching station.
Power Consumption	90 megawatts
Operations and Management	The facility will be constructed and operated by NEXTDC. The site will be operated on a 24-hour, 7 day a week basis.
Existing Services and Infrastructure	The site is fully serviced; however, existing services and infrastructure will be extended, adapted and augmented to meet the demands of the Project. A new 33kV switching station will be required to provide power to the site in the event of an emergency blackout to facilitate power to the generators.
Staging/Phasing	The Project will be constructed in two stages: • Stage 1 will include the early works for the entire site, construction of Building A, the urban plaza and Road 13 within the subject site. • Stage 2 will include construction of Building B and Road 6 (half-width) within the subject site, including provision for a future pedestrian/cycle overbridge (to be delivered by others), and works along Lane Cove Road.

2. SEARS response

The purpose of this report is to respond to the Secretary’s Environmental Assessment Requirements (SEARs) and other subsequent comments by providing a GHG assessment (Scope 1, Scope 2 and Scope 3) for the proposed NEXTDC S5 Data Centre at 269 Lane Cove Road, Macquarie Park (the Proposal). The relevant SEARs are outlined in Table 4.

This report provides an assessment of GHG emissions during the construction and operation of the Proposal and compares the Proposal’s GHG emissions against state and national GHG emissions.

Table 4 – SEARs Compliance

Item	Description of Requirement	Section Reference (this Report)
Air Quality	The Department notes that no assessment of greenhouse gas (GHG) emissions has been undertaken as part of the AQIA. The AQIA should be updated to include an assessment of the developments greenhouse gas emissions including a breakdown of the developments Scope 1, 2 and 3 (GHG) emissions, the consideration of any mitigation measures proposed to be implemented to reduce GHG emissions and a comparative analysis of the development against the state and national contributions to GHG emissions.	This report (separate to the AQIA) Greenhouse Gas Mitigation Plan (separate to this report)

3. Policy and planning context

Table 5 presents relevant legislation, regulations, policies and guidelines that have been referenced during the preparation of the GHG assessment of the Proposal.

Table 5 – Relevant legislation, regulations, policies and guidelines

Document	Description	Relevance to the GHG assessment
Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard¹	Provides internationally recognised guidelines on developing a GHG emission inventory.	Supports the justification of the methodology and definition of emission boundary.
Corporate Value Chain (Scope 3) Accounting and Reporting Standard²	Supplement to the Greenhouse Gas Protocol Corporate Accounting and Reporting Standard.	Provides further guidance on corporate value chain (Scope 3) assessment.
Embodied Carbon Measurement for Infrastructure Technical Guidance (incorporating NSW Embodied Carbon Databook)³ (hereafter known as ‘Technical Guidance’)	Supports consistency in how NSW Government delivery agencies measure embodied carbon by providing common methodology, assumptions and approaches to data use and reporting.	Provides methodologies for estimating whole-of-life GHG emissions from projects in the built environment.
National Greenhouse Accounts (NGA) Factors⁴	Draws on the National Greenhouse and Energy Reporting (Measurement) Determination 2008 and provides emissions factors to estimate a broad range of GHG emissions inventories.	Provides emissions factors for estimating Scope 1, 2 and 3 emissions.
Australian Life Cycle Inventory Database (AusLCI) emission factors⁵	Provides industry recognised embodied emission factors for materials.	Supports the calculation of embodied emissions from materials.
Australia’ s Emissions Projections 2024⁶	Provides the latest estimates of Australia’ s future greenhouse gas emissions to 2040.	Supports the future projections of GHG emissions for NSW related to grid electricity in Scope 2 calculations (‘baseline’ scenario).

¹ Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard, Revised Edition. World Business Council for Sustainable Development and World Resources Institute, 2004. (<https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf>).

² Corporate Value Chain (Scope 3) Accounting and Reporting Standard (https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporting-Standard_041613_2.pdf).

³ Embodied Carbon Measurement for Infrastructure Technical Guidance. Infrastructure New South Wales, April 2025. (https://www.infrastructure.nsw.gov.au/media/ak2o0bqg/embodied-carbon-measurement-technical-guide_april-2025.pdf).

⁴ Australian National Greenhouse Accounts Factors 2024. Australian Government Department of Climate Change, Energy, the Environment and Water, August 2024. (<https://www.dcccew.gov.au/sites/default/files/documents/national-greenhouse-account-factors-2024.pdf>).

⁵ The Australian Life Cycle Inventory Database Initiative, Version 1.45. Australian Life Cycle Assessment Society, June 2025 (<https://www.auslci.com.au/index.php/EmissionFactors>).

⁶ Australia’s Emissions Projections 2024, Australian Government Department of Climate Change, Energy, the Environment and Water, November 2024 (<https://www.dcccew.gov.au/sites/default/files/documents/australias-emissions-projections-2024.pdf>).

Document	Description	Relevance to the GHG assessment
Australia' s Emissions Projections 2023⁷	Provides the latest estimates of Australia's future greenhouse gas emissions to 2035.	Supports the future projections of GHG emissions for NSW related to grid electricity in Scope 2 calculations ('with additional measures' scenario).

⁷ Australia's Emissions Projections 2023, Australian Government Department of Climate Change, Energy, the Environment and Water, November 2023 (<https://www.dcceew.gov.au/sites/default/files/documents/australias-emissions-projections-2023.pdf>).

4. Methodology

This chapter outlines the methodology used to assess the GHG emissions.

4.1 Assessment methodology

The assessment methodology consisted of the following steps:

1. Defining emission boundary and sources: the emission boundary was defined identifying GHG emission sources that are relevant to the assessment.
2. Quantifying emission sources: the quantity of each relevant emission source was estimated in its relevant units, utilising proposal specific data and information where possible/available.
3. Calculating emissions: Once the emission sources had been estimated in their relevant units, these were then converted to CO₂-equivalent units using known emission factors and industry recognised calculation methods to estimate the GHG emissions from the identified sources.
4. Proposal of mitigation measures: Proposed mitigation measures to reduce GHG emissions for significant GHG emission sources.

4.1.1 Guiding principles

The following best practice principles (from GHG Protocol) were used when calculating the GHG emissions:

- **Relevance:** ensure the GHG emission inventory appropriately reflects the GHG emissions attributable to the Proposal.
- **Completeness:** account for and report all GHG emissions sources within the defined boundary, justifying any exclusions.
- **Consistency:** use consistent data and calculation methodologies to allow for meaningful comparisons.
- **Transparency:** compile, analyse and document GHG information clearly so that auditors and the public may evaluate its credibility.
- **Accuracy:** ensure the quantification of GHG is unbiased and uncertainties are reduced as much as reasonably practicable.

4.2 Defining emission boundary and sources

4.2.1 Introduction

The first step in calculating the GHG emissions involved establishing the perimeter of the emission boundary, as this defines which emissions sources are to be either included in or excluded from the assessment. Emission sources are typically categorised into three scopes (scope 1, 2 and 3) to provide clarity and consistency:

- **Scope 1** – direct GHG emissions which occur within the site boundary from owned or controlled sources, e.g. emissions from site plant and equipment.
- **Scope 2** – indirect GHG emissions which occur outside the site boundary, relating to the generation of purchased energy.

- Scope 3 – indirect GHG emissions (not included in Scope 2) that occur in the value chain of the reporting body.

Whilst the above scopes are generally applicable, there are some nuances within the data centre industry when looking at GHG reporting, most notably for co-location providers such as NEXTDC. For the purposes of this report, emissions owned and controlled by the reporting company (NEXTDC) refer to those associated with the base build and are exclusive of tenant-driven emissions. This means that Scope 2 GHG emissions relating to acquired electricity purchase by prospective tenants of the Proposal (i.e. incoming hyperscale occupants) are not included in the GHG inventory, as provided in this report. Based on the design of the Proposal and information provided by NEXTDC in its latest Environmental, Social and Governance (ESG) Report (2025 financial year), on average, the electricity purchase by hyperscale occupants is estimated to be about 69%⁸ of the total annual electricity use of the Proposal.

4.2.2 Emissions sources considered

Table 6 provides the emissions sources of the Proposal relevant for this assessment, across both the construction (including commissioning) phase and operation phase.

Table 6 – Emission sources considered and exclusions

Scope	Emission categories	Emission sources
Scope 1	Liquid fuel	• Fuel use for on-site stationary plant and equipment during construction • Fuel use for mobile equipment during construction • Fuel use for diesel generator testing during operation
	Refrigerant	• Leakage of refrigerants during operation
Scope 2	Electricity	• Grid electricity for stationary plant and equipment during construction • Grid electricity during commissioning (part of construction) • Grid electricity during operation (excluding electricity purchased by incoming hyperscale occupants)
Scope 3	Materials	• Embodied emissions released during the manufacture of materials used during construction • End-of-life treatment for construction materials waste during construction
	Fuel	• Fuel use for construction materials transport to site during construction • Fuel use for transport of construction waste to end destination during construction • Fuel use for deliveries during operation
		• Fuel use for workforce during construction (including commissioning) • Fuel use for staff during operation

⁸ NEXTDC FY25 Environmental, Social and Governance Report
<https://www.nextdc.com/hubfs/ASX%20Announcements/FY25%20Environmental%2c%20Social%20and%20Governance%20Report.pdf>

Scope	Emission categories	Emission sources
	Waste	End-of-life treatment of construction waste during construction
	Water	- Water use for utilities (toilets, urinals, taps, showers, fire testing, heat rejection and irrigation) during operation - Water use for cooling systems during operation

The Embodied Carbon Measurement for Infrastructure Technical Guidance (‘Technical Guidance’) provided the following guidance for construction stage minimal inclusions for all asset types (applicable to the Proposal) in NSW:

- Electricity purchased (excluding electricity purchased by incoming hyperscale occupants) – included as per Table 6.
- Fuel consumption associated with plant, equipment and site vehicles – included as per Table 6.
- Land use change (stored carbon and loss of future sequestration from vegetation removal) – not applicable.
- Transport of materials to site – included as per Table 6.
- Waste generated during construction (on-site) – included as per Table 6.
- Inert waste from earthworks – not assessed; estimated to represent a negligible impact (<1%) compared to the total GHG emissions for the construction phase.
- Construction material wastage – not assessed; estimated to represent a negligible impact (<1%) compared to the total GHG emissions for the construction phase.
- Vegetation waste - not applicable.
- Site office waste - not assessed; estimated to represent a negligible impact compared to the total GHG emissions for the construction or operational phase <1%.
- Transport of waste to end destination – included as per Table 6.

4.3 Quantifying GHG emission sources

4.3.1 Data hierarchy

As per the Technical Guidance, the data hierarchy adopted to quantify GHG emissions is summarised as follows:

- Actual data – resource use quantities estimated for the Proposal.
- Estimated quantities – resource use quantities estimated from design of the Proposal (quantity surveyor estimates) or from existing comparable NEXTDC data centres.
- Early asset details (linked to sub-asset or element specific carbon intensity benchmarks) – project scope information broken down to the sub-asset element of the Proposal, for example, m³ of concrete.
- Material/capital spend (asset level carbon intensity benchmarks) – project scope information at the asset level (material spend for the Proposal).

All the above data types have been used for this GHG assessment.

4.3.2 Emission factor types and hierarchy

For the GHG calculations, the following emission factor types and hierarchy was adopted from the Technical Guidance:

1. Product specific emission factor – this type of emission factor was not used as the current stage (planning) of the Proposal meant that products and suppliers have yet to be selected/finalised, with exceptions for the water-cooled chiller, computer room air conditioned (CRAC) units, outside air pressurisation (OAP) units and variable refrigerant flow (VRF) systems, where the information used for calculations are based upon performance specifications from equipment suppliers (where available).
2. Industry average emission factor – the Australian National Greenhouse Account Factors and the Technical Guidance industry average emission factors were used for this assessment (Table 5).
3. Generic emission factor from database – Technical Guidance generic emission factors were used for this assessment (Table 5).
4. Generic emission factor from global literature scan – not used for this assessment.
5. Sub-asset or element level carbon intensity benchmark – not used for this assessment.
6. Asset level carbon intensity benchmark – not used for this assessment.

4.3.3 Input data and assumptions

Table 7 provides a summary of the data used for this assessment. Most of the data used for this assessment is available only on a high-level and/or generic basis at this stage, with assumptions made where needed.

The construction works are expected to include the following activities:

- Demolition.
- Excavation and site preparation.
- Construction and building works.
- Public domain works.

At the time of writing, based on information provided by NEXTDC, the construction and commissioning periods are estimated to total approximately 36 months, as follows:

- Construction works – 33 months.
- Commissioning works – 3 months.

Hours are assumed as follows:

- Construction: Weekdays (Monday to Friday) – 8 hours and Saturday – 5 hours.
- Commissioning: Weekdays (Monday to Friday) – 8 hours.

Operations are anticipated to commence in Q1 2029. The operational design life is assumed to be 50 years.

Table 7 – Summary of input data used

Scope	Emission category	Phase	Emission source	Quantity	Unit	Method of estimation	Exclusions
Scope 1	Fuel	Construction	Diesel (stationary plant/equipment)	499	kL	The construction programme is not confirmed yet, so the power usage is based on best estimate at this stage. Assumed 50% of usage for each stationary plant/equipment during applicable periods of construction activities. Converted to kL using fuel consumption/hr. Refer to Appendix A.	None
			Diesel (mobile equipment)	26	kL	The construction programme is not confirmed yet, so the power usage is based on best estimate at this stage. Assumed 50% of usage for each type of construction vehicle during applicable periods of construction activities. Refer to Appendix A.	None
		Operation	Diesel	100	kL/yr	Diesel used on site is solely to test backup generator (proposed maintenance schedule is up to one generator tested at any time). Assume 100% load testing as worst-case. Amount based on one test per quarter per generator, average about 55 minutes per test per generator.	Fuel use during emergency use of generators
	Refrigerant	Operation	Refrigerants	17 (R513A) 4.3 (R410A)	tonnes/yr	Based on preliminary equipment selection, as follows: a. 12 × chillers - Refrigerant R513A used for the assessment, based on specifications of the selected chiller (Smardt Chiller Group). b. 28 × computer room air condition (CRAC) units for enterprise data centre – Refrigerant R410A used for the assessment, based on specifications of the selected CRAC (Vertiv Liebert). c. 96 × computer room air condition (CRAC) units for electrical rooms – Refrigerant R410A used for the assessment, based on specifications of the selected CRAC (Vertiv Liebert). d. 8 × outside air pressurisation (OAP) units – Refrigerant R410A used for the assessment, based on specifications of the selected OAP (Air Change). e. 25 × variable refrigerant flow (VRF) systems – Refrigerant R410A used for the assessment, based on specification of the selected VRF (Mitsubishi).	None
Scope 2	Electricity	Construction	Grid electricity (stationary plant/equipment)	50	MWh	The construction programme is not confirmed yet, so the power usage is based on best estimate at this stage. Assumed 50% of usage for each stationary plant/equipment during applicable periods of construction activities. Converted to MWh using assumed equipment power rating. Refer to Appendix A.	Electricity use in site office.
			Grid electricity (Commissioning)	2,880	MWh	Based on preliminary projection of electricity use during 3 months of commissioning.	None
		Operation	Grid electricity	946,080	MWh/yr	Based on preliminary projection of annual electricity use (as per Ecologically Sustainable Development (ESD) Report for the Proposal, using target PUE (power usage effectiveness) of 1.35. Refer to Appendix A.	Total electricity use for hyperscale

Scope	Emission category	Phase	Emission source	Quantity	Unit	Method of estimation	Exclusions			
							and enterprise occupants			
Scope 3	Materials	Construction	Structure					None		
			Concrete in-situ - >40 MPa to ≤50 MPa	69,377	m³	Data from quantity surveyor proforma (Embodied Emissions Materials Form). Refer to Appendix A.				
			Reinforcing steel – bar & mesh	12,933,971	kg	The following GHG emissions are calculated from materials used: • Manufacture of materials. • Transport of materials to site. • End-of-life treatment of construction waste.				
			Structural steel – hot rolled structural	200	tonnes					
			Reinforced concrete piles - concrete	1,233	m³					
			Reinforced concrete piles – steel reinforcing	308,332	kg					
			Waterproofing membrane - bituminous	1,397	m²					
			Envelope							
			Roof cladding – profiled aluminium	11,090	m²	Data from quantity surveyor proforma (Embodied Emissions Materials Form). Refer to Appendix A.				
			Wall cladding – profiled aluminium	19,896	m²	The following GHG emissions are calculated from materials used: • Manufacture of materials. • Transport of materials to site. • End-of-life treatment of construction waste.				
			Curtain wall – single skin façade, glazed panel, double glazed	3,170	m²					
			Wall louvre system - aluminium	6,356	m²					

Scope	Emission category	Phase	Emission source	Quantity	Unit	Method of estimation	Exclusions	
			Insulation – expanded polystyrene	30,986	m²			
			Permanent internal walls and doors					
			Interior wall (permanent) - plasterboard	20,158	m²	Data from quantity surveyor proforma (Embodied Emissions Materials Form). Refer to Appendix A.	None	
			Interior wall (permanent) - blockwork	36,161	m²	The following GHG emissions are calculated from materials used: • Manufacture of materials. • Transport of materials to site. • End-of-life treatment of construction waste.		
			Services					
			Mechanical services	50,819,235	AUD, excluding GST	Data from quantity surveyor proforma (Embodied Emissions Materials Form). Refer to Appendix A.	None	
			Vertical transportation	5,688,078	AUD, excluding GST	The following GHG emissions are calculated from materials used: • Manufacture of materials. • Transport of materials to site.		
			Electrical services	86,120,417	AUD, excluding GST			
			Plumbing/ hydraulic services	15,873,381	AUD, excluding GST			
			Fire services	35,866,486	AUD, excluding GST			
			Security, fuel, CSMS, communications	38,142,106	AUD excl. GST			
			External works					

Scope	Emission category	Phase	Emission source	Quantity	Unit	Method of estimation	Exclusions
			Concrete in-situ - >10 MPa to ≤20 MPa	1,321.8	m ³	Data from quantity surveyor proforma (Embodied Emissions Materials Form). Refer to Appendix A.	None
			Reinforcing steel – bar & mesh	112,349	kg	The following GHG emissions are calculated from materials used: • Manufacture of materials. • Transport of materials to site. • End-of-life treatment of construction waste.	
	Fuel	Construction	Transport of construction materials to site (road, rail and sea, where applicable)	-	-	Calculated using default factors from the Technical Guide, based on the materials inventory. Refer to Appendix A.	None
			Petrol (construction worker transport)	3,764	kL	Based on estimated 942 construction workers (as per Social Impact Assessment). Assumes driving distance within 25 km and that all workers drive to work as worst-case. Refer to Appendix A.	None
			Petrol (commissioning worker transport)	40	kL	Based on estimated 60 commissioning workers. Assumes driving distance within 25 km and that all workers drive to work as worst-case. Refer to Appendix A.	None
		Operation	Diesel (transport)	14	kL/yr	Based on deliveries (rigid truck and carrier vans) and waste pick-up to nearest landfill. Refer to Appendix A.	None
			Petrol (staff transport)	602	kL/yr	Based on estimated 490 staff during operation (as per Social Impact Assessment). Assumes driving distance within 25 km and that 90% staff drive to work as worst-case (10% as local workers and will take public transport). Refer to Appendix A.	None
	Waste	Construction	Landfilling (end-of-life treatment)	-	-	Calculated using default factors from the Technical Guide, based on the materials inventory. Refer to Appendix A.	Recycling of construction waste
	Water	Operation	All potable water use	1,805,994	kL/yr	Based on water utilities consumption (toilets, urinals, taps, heat rejection, irrigation etc) for the Proposal, taking into account water reduction measures through ESD initiative (referenced from ESD Report).	Water usage during construction (used in water cart)

4.4 Summary of calculations methods and emission factors

This section details the calculation methods and emission factors that were used to convert the baseline quantity of emission sources as reported in Table 7 into tonnes of CO₂-equivalent (tCO_{2-e}). A summary of the approach taken is provided for each scope and emission source. Where emission sources exist in both the construction and operation phase, the emission factor is identical therefore has not been reported separately. Section 5 provides a summary of the results.

4.4.1 Scope 1

4.4.1.1 Fuel use

The following method was used to calculate the Scope 1 baseline emissions from the combustion of diesel (stationary energy) during the testing of the emergency generators:

$$\text{GHG emissions (tCO}_{2\text{-e}}) = ((Q \times \text{ECF})/1000) \times (\text{EF}_{\text{GHG}})$$

Where:

Q is the quantity of fuel (kL).

ECF is the relevant energy content factor (GJ/kL).

EF_{GHG} is the total GHG emission factor, taking into account the carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O) emission factors, expressed in CO₂ equivalent (tCO_{2-e}/GJ).

Table 8 outlines the ECF and GHG emission factor for diesel used in the Scope 1 assessment.

Table 8 – Fuel emission factors (Scope 1)

Fuel type	Energy content factor (GJ/kL)	Emission factor (tCO _{2-e} /GJ)	Source
Diesel (Stationary energy purposes)	38.6	70.2	Table 8, NGA Factors

For standby generators to be ready to operate should an unexpected interruption to mains power occur, a regular maintenance schedule is required. The proposed standby generator testing schedule is provided in Table 9 (as per the Air Quality Impact Assessment Report (S5-EN-00-000-REP-J-DVA-APP-EN REPORT) of the Proposal). A total of 10,060 minutes (168 hours) of generator run time (where diesel fuel is used) has been estimated.

Table 9 – Proposed standby generator testing schedule

Test	Run Time (Minutes)	Cooldown (excluded from Runtime)	No of Gens	Generator Per Test	Number of Test	Total Run Times (Minutes)	Description
Quarter 1	40	10	48	1	1	1920	Operational Run – Tested under 55% minimum load
Quarter 2	40	10	48	1	1	1920	Maintenance Run – Tested under 50% load
Quarter 3	40	10	48	1	1	1920	Operational Run – Tested under 55% minimum load

Test	Run Time (Minutes)	Cooldown (excluded from Runtime)	No of Gens	Generator Per Test	Number of Test	Total Run Times (Minutes)	Description
Quarter 4	90	10	48	1	1	4320	Maintenance – Tested under 100% load
Total						10080	168 hours

The diesel usage rate of the testing of the emergency generators for different loads (100%, 75%, 50%, 25%) is calculated based on the information as shown in Table 10 from the generator manufacturer (MTU), with the assumption of 0.85 kg/L as the density of diesel. The diesel use for 55% generator load (i.e. 450 L/hr) has been based on interpolation from manufacturer-provided data.

Table 10 – Diesel usage rate

Generator load	Rated power (kW)	Diesel consumption rate (g/kWh)	Diesel consumption rate (L/hr)
100%	3308	205	798
75%	2480	200	584
50%	1653	215	418
25%	827	233	227
55%	-	-	450 (interpolated using best-fit line equation)

4.4.1.2 Refrigerant

The following method was used to calculate the Scope 1 baseline emissions from the use of refrigerants, as sourced from product specific information and the NGA Factors:

$$\text{GHG emissions (tCO}_2\text{-e)} = Q \times \text{GWP}/1000 \times \text{LR}$$

Where:

Q is the quantity of refrigerant (kg).

GWP is the global warming potential of refrigerants used (kgCO₂-e/kg refrigerant) as per the equipment specification.

LR is the annual leakage rate.

Table 11 outlines the GWP and leakage rate of the refrigerant used in the Scope 1 assessment.

Table 11 – Refrigerant emission factors (Scope 1)

Refrigerant type	GWP (AR5)	Source	Annual leakage rate	Source
R513A	573	https://ww2.arb.ca.gov/resources/documents/high-gwp-refrigerants	0.09	National Greenhouse and Energy Reporting (Measurement) Determination 2008
R410A	1924			

4.4.2 Scope 2

4.4.2.1 Grid Electricity

The following method was used to calculate the Scope 2 GHG emissions from the consumption of electricity:

$$\text{GHG emissions (tCO}_2\text{-e)} = Q \times \text{EF}$$

Where:

Q is the quantity of purchased grid electricity (MWh).

EF is the emission factor for NSW (tCO_{2-e}/MWh).

The emissions per MWh of grid electricity consumed is dependent on the process used in its generation, e.g. the more fossil fuels used, the higher the emission factor per MWh. Since the energy mix within the electricity grid is constantly changing, the electricity emission factor is also changing in response. With NSW targeting net zero emissions in 2050, the rate of uptake of renewable energy onto the grid is expected to increase in the coming years resulting in lower emission factors moving forwards.

The latest available document on Australia's emissions projections (Australia's Emissions Projections 2024), provides annual estimates of GHG emission factors up to 2040 for a baseline scenario. However, the 2024 projections did not include annual GHG emission factors for the 'with additional measures' scenario, so the 2023 projections were used instead. Under the baseline scenario, the 2024 emissions projections indicate Australia will achieve a 42.6% reduction on 2005 levels by 2030. The 'with additional measures' scenario incorporates additional policies that have been announced but where detailed design is still under consultation. Under this scenario, Australia's emissions are projected to be at 42.7% below 2005 levels by 2030.

The current estimate is that construction is due to commence Q1 2026 with an operational design life of 50 years (operations assumed to start in Q1 2029). As such, the emission factors are projected forwards to capture the anticipated change. In acknowledgment that Stage 1 of NSW government's Net Zero Plan (2020 – 2030) will be almost completed by the anticipated start of the operation phase, it is assumed that government action will begin to take greater effect by then. Hence, the assumption of 'with additional measures' scenario was used for the operation phase as the pathway towards the end of asset life (around 2078). Beyond 2035 (which is the last year for the projected emission factors), the assumption is that the emission factors remain the same to that of 2035. Table 12 provides a summary of emission factors used for Scope 2 calculations for the operation phase.

Table 12 – NSW grid electricity emission factors – operation phase (Scope 2)

Year	Emission factor (tCO _{2-e} /MWh)	Source
2029	0.17	Australia's Emissions Projections 2023 (Appendix E, for NSW, with additional measures scenario)
2030	0.09	
2031	0.06	
2032 – 2034	0.02	
2035 – 2078	0.03	

For the construction phase, the 'baseline' scenario emission factors are used as a conservative assumption. As the construction programme is still being finalised, for the construction phase

(including commissioning phase), an emission factor of 0.47 tCO_{2-e}/MWh (2026 basis) has been applied across the whole phase.

4.4.3 Scope 3

4.4.3.1 Materials

The following method was used to calculate the Scope 3 embodied material emissions:

$$\text{GHG emissions (tCO}_{2-e}\text{)} = Q_t \times \text{EF}$$

Where:

Q_t is the quantity of material (tonnes)

EF is the relevant emission factor (converted to CO_{2-e}/tonne as relevant).

The Technical Guide references were utilised to obtain emission factors for the relevant materials, as follows:

- Product stage emission factors, based on quantity of materials used or cost spent for materials.
- Default assumptions for distance travelled (truck, rail and sea) for material transfer to site.
- Default transport emission factors for materials to site.
- Default wastage rate and end-of-life landfilling rate.
- Emission factors for landfilling waste.

Table 13 to Table 17 provide the relevant default values and emission factors used in the calculations.

Table 13 – Product stage materials emission factors (Scope 3)

Products	Emission factor	Source
Concrete in-situ (>40 MPa to ≤50 MPa)	354 kg CO _{2-e} /m ³	Table 1.1, NSW Embodied Carbon Databook (part of Technical Guide)
Reinforcing steel (bar & mesh)	1600 kg CO _{2-e} /tonnes	
Structural steel (hot rolled structural)	2270 kg CO _{2-e} /tonnes	
Reinforced concrete piles (concrete)	339 kg CO _{2-e} /m ³	
Reinforced concrete piles (steel reinforcing)	1600 kg CO _{2-e} /tonnes	
Waterproofing membrane (bituminous)	591.77 kg CO _{2-e} /tonnes	
Roof cladding (profiled aluminium)	11.80 kg CO _{2-e} /kg	
Wall cladding (profiled aluminium)	11.80 kg CO _{2-e} /kg	
Curtain wall (single skin façade, double glazed panel)	412 kg CO _{2-e} /m ²	

Products	Emission factor	Source
Wall louvre system (aluminium)	18200 kg CO _{2-e} /tonnes	
Insulation (expanded polystyrene)	3.47 kg CO _{2-e} /kg	
Interior wall (plasterboard)	3.37 kg CO _{2-e} /m ²	
Interior wall (blockwork)	159 kg CO _{2-e} /tonnes	
Concrete in-situ (>10 MPa to ≤20 MPa)	201 kg CO _{2-e} /m ³	

Table 14 – Product stage materials emission factors based on cost (Scope 3)

Products	Emission factor (mid-range)	Source
All services	0.538 kg CO _{2-e} /\$ spent	Table 1.2, NSW Embodied Carbon Databook (part of Technical Guide)

Table 15 – Materials transport default assumptions for distance travelled - NSW (Scope 3)

Products	Equivalent product as per Table A4.1 of Technical Guidance	Truck (km)	Rail (km)	Sea (km)	Source
Concrete in-situ (>40 MPa to ≤ 50 MPa)	Concrete (ready mix)	20	0	0	Table 4.1, NSW Embodied Carbon Databook (part of Technical Guide)
Reinforcing steel (bar & mesh)	Steel - reinforcing	650	0	2500	
Structural steel (hot rolled structural)	Steel – structural	60	510	860	
Reinforced concrete piles (concrete)	Concrete (pre-cast)	100	0	0	
Reinforced concrete piles (steel reinforcing)	Steel - reinforcing	650	0	2500	
Waterproofing membrane (bituminous)	Regionally manufactured in NSW (assumption)	300	0	0	
Roof cladding (profiled aluminium)					
Wall cladding (profiled aluminium)					
Curtain wall (single skin façade, double glazed panel)					
Wall louvre system (aluminium)					
Insulation (expanded polystyrene)					
Interior wall (plasterboard)					
Interior wall (blockwork)	Concrete (pre-cast)	100	0	0	

Products	Equivalent product as per Table A4.1 of Technical Guidance	Truck (km)	Rail (km)	Sea (km)	Source
Concrete in-situ (>10 MPa to ≤ 20 MPa)	Concrete (ready mix)	20	0	0	

Table 16 – Transport emission factors - NSW (Scope 3)

Transport mode	Emission factor (tCO _{2-e} /tonne.km.)	Source
Articulated truck	0.00010	Table 1.2, NSW Embodied Carbon Databook (part of Technical Guide)
Concrete agitator truck	0.00018	
Rail, bulk transport	0.000037	
Shipping	0.000013	

Table 17 – Wastage rate, landfilling rate and landfilling emission factor (Scope 3)

Products	Equivalent product as per Table A4.2 of Technical Guidance	Wastage rate (%)	Landfilling rate (%)	Landfilling emission factor (tCO _{2-e} /tonnes)	Source
Concrete in-situ (>40 MPa to ≤50 MPa)	Concrete (in-situ)	2%	10%	0.2	Table 4.2, NSW Embodied Carbon Databook (part of Technical Guide)
Reinforcing steel (bar & mesh)	Steel reinforcement	5%	10%	0.2	
Structural steel (hot rolled structural)	Metals (excluding reinforcement)	1%	10%	0.2	
Reinforced concrete piles (concrete)	Concrete (pre-cast)	0%	10%	0.2	
Reinforced concrete piles (steel reinforcing)	Steel reinforcement	5%	10%	0.2	
Waterproofing membrane (bituminous)	Miscellaneous materials - waste	6%	100%	0.2	
Roof cladding (profiled aluminium)	Miscellaneous materials - waste	6%	100%	0.2	
Wall cladding (profiled aluminium)	Miscellaneous materials - waste	6%	100%	0.2	
Curtain wall (double glazed panel)	Miscellaneous materials - waste	6%	100%	0.2	
Wall louvre system (aluminium)	Miscellaneous materials - waste	6%	100%	0.2	
Insulation (expanded polystyrene)	Miscellaneous materials - waste	6%	100%	0.2	
Interior wall (plasterboard)	Miscellaneous materials - waste	6%	100%	0.2	

Products	Equivalent product as per Table A4.2 of Technical Guidance	Wastage rate (%)	Landfilling rate (%)	Landfilling emission factor (tCO _{2-e} /tonnes)	Source
Interior wall (blockwork)	Concrete (pre-cast)	0%	10%	0.2	
Concrete in-situ (>10 MPa to ≤20 MPa)	Concrete (in-situ)	2%	10%	0.2	

4.4.3.2 Fuel use

The following method was used to calculate the Scope 3 emissions from the combustion of diesel and petrol for transport (workers, goods and waste):

$$\text{GHG emissions (tCO}_{2\text{-e}}) = ((Q \times \text{ECF})/1000) \times (\text{EF}_{\text{GHG}})$$

Where:

Q is the quantity of fuel (kL).

ECF is the relevant energy content factor (GJ/kL).

EF_{GHG} is the total GHG emission factor, taking into account the carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O) emission factors, expressed in CO₂ equivalent (tCO_{2-e}/GJ).

Table 18 outlines the ECF and GHG emission factor for diesel and petrol used in the Scope 3 assessment.

Table 18 – Fuel emission factors (Scope 3)

Fuel type	Energy content factor (GJ/kL)	Emission factor (tCO _{2-e} /GJ)	Source
Diesel (transport)	38.6	17.3	Table 9, NGA Factors
Petrol (transport)	34.2	17.2	

4.4.3.3 Water use

The following method was used to calculate the Scope 3 emissions from the usage of water for utilities and cooling systems of the Proposal:

$$\text{GHG emissions (tCO}_{2\text{-e}}) = Q \times \text{EF}$$

Where:

Q is the quantity of water use (m³/yr).

EF is the emission factor for water use (kgCO_{2-e}/m³).

Table 19 outlines the emission factor for water use in the Scope 3 assessment. It is noted that a conservative assumption has been used with a constant emission factor over the 50-year design life. In reality, the emission factor is likely to reduce as water utility operations decarbonise in the future.

Table 19 – Water emission factors (Scope 3)

Product	Emission factor (kgCO _{2-e} /m ³)	Source
Water use	1.83	AusLCI database (Carbon Neutrality Assumption, excluding infrastructure)

5. Summary of GHG emissions

5.1 Scope 1, 2 and 3 emissions for construction and operation

Table 20 and Table 21 provide a summary of the Scope 1 to Scope 3 emissions, divided into construction emissions and operation emissions, respectively. Further details of the calculations of the GHG emissions are provided in Appendix A.

Table 20 – Summary of Scope 1, 2 and 3 emissions for the Proposal – construction phase

Scope	Emissions category	Construction emissions (t CO _{2-e}) ¹	Construction emissions as % of all GHG emissions
Scope 1	Construction fuel use - stationary equipment	1,350	0.14%
	Construction fuel use - mobile equipment	70	0.0072%
Scope 2	Construction electricity use	20	0.0021%
	Commissioning electricity use	1,350	0.14%
Scope 3	Materials	177,680	18%
	Construction material transport	8,840	0.92%
	Landfilling construction waste	90	0.0093%
	Transport of construction employees to site	2,040	0.21%
Total (construction)		191,440	20%

1. Values rounded to two significant figures for reporting.

Table 21 – Summary of Scope 1, 2 and 3 emissions for the Proposal – operation phase (over 50 years)

Scope	Emissions category	Operation emissions over 50 years (t CO _{2-e}) ¹	Operation emissions as % of all GHG emissions
Scope 1	Diesel generator - testing	13,500	1.4%
	Refrigerant leakage	79,840	8.3%
Scope 2	Operation electricity use (accounting for reduction in GHG emissions from the grid based on projections)	498,590	52%
Scope 3	Water use	165,030	17%
	Transport of employees to work	17,700	1.8%
	Fuel use for waste collection and deliveries	460	0.048%
Total (operation)		775,120	80%

1. Values rounded to two significant figures for reporting.

5.2 Comparison against Australian and NSW GHG emissions

The comparison of the Proposal's GHG emissions against the Australian and NSW GHG emissions is shown in Table 22. The Proposal's total GHG emissions of 0.97 Mt CO_{2-e} is 0.22% and 0.87% respectively of national (ending June 2024) and state (ending June 2022) GHG emissions.

Table 22 – Comparison of Proposal's GHG emissions against that of NSW and Australia

GHG emissions	Total GHG emissions (MtCO _{2-e})	Source
National (ending June 2024)	441	Australia's Emissions Projections 2024
NSW (ending June 2022)	111	NSW State of the Environment Report 2024 ¹¹
Proposal (construction and operation over 50 years)	0.97	-
Proposal as a % of national emissions	0.22%	-
Proposal as a % of NSW emissions	0.87%	-

5.3 Mitigation

Mitigation measures which are being considered to address emissions from construction and operation are further discussed in the separate Greenhouse Gas Mitigation Plan (S5-GHG-00-000-REP-C-DVA-APP-GHG Mitigation Plan) for the Proposal.

¹¹ NSW State of the Environment Report 2024 <https://www.soe.epa.nsw.gov.au/all-themes/air-and-atmosphere/greenhouse-gas-emissions#nsw-greenhouse-gas-emissions-status-and-trends>)

Appendix A

Scope 1 to Scope 3 calculations

A.1 Scope 1 calculations

Table 23 – Construction stationary equipment diesel use emissions (33 months)

Equipment type	Assumed construction weeks	Assumed construction hours (8-hour weekdays, 5-hour Saturdays)	Diesel consumption rate (L/hr) ¹	Diesel consumed (kL)	Energy content factor (GJ/kL)	Total energy used (GJ)	Emission factor (tCO _{2-e} /MWh)	GHG emissions (tCO _{2-e})
Angle grinder	Assumed electric driven (see Scope 2)							
Backhoe	7.0	315	5.7	1.8	38.6	69	70.2	4.9
Concrete Pump	103	4,635	44	203	38.6	7,844	70.2	551
Concrete Pump Truck	Included above							
Crane (Mobile)	118	5,310	22	115	38.6	4448	70.2	312
Crane (Tower)	177	7,965	12	96	38.6	3689	70.2	259
Elevated work platform	118	5,310	2.5	13	38.6	504	70.2	35
Excavator (30ft)	14	630	18	11	38.6	438	70.2	31
Forklift	63	2,813	3.1	8.7	38.6	337	70.2	24
Generator (diesel)	125	5,625	7.2	41	38.6	1563	70.2	110
Hand tools (electric)	Assumed electric driven (see Scope 2)							
Hand tools (pneumatic)	Assumed electric driven (see Scope 2)							
Jackhammer (electric)	Assumed electric driven (see Scope 3)							
Loader (front-end) (23ft)	7.0	315	16	5.0	38.6	802	70.2	56

Equipment type	Assumed construction weeks	Assumed construction hours (8-hour weekdays, 5-hour Saturdays)	Diesel consumption rate (L/hr) ¹	Diesel consumed (kL)	Energy content factor (GJ/kL)	Total energy used (GJ)	Emission factor (tCO _{2-e} /MWh)	GHG emissions (tCO _{2-e})
Piling rig (bored)	3.5	158	10	1.6	38.6	252	70.2	18
Roller (vibrator)	3.5	158	20	3.1	38.6	495	70.2	35
Welder	Assumed electric driven							
Total	-	-	-	499	-	-	-	1.352

1. From average fuel consumption rate as per Survey of Motor Vehicle Use, Australia (<https://www.abs.gov.au/statistics/industry/tourism-and-transport/survey-motor-vehicle-use-australia/latest-release>)

Table 24 – Construction mobile equipment diesel use emissions (33 months)

Equipment type	Assumed construction weeks	Assumed construction hours (8-hour weekdays, 5-hour Saturdays)	Average speed on site (km/hr)	Distance travelled (km)	Fuel efficiency (L/km)	Fuel consumption (kL)	Energy content (GJ/kL)	Total energy used (GJ)	Emission factor (tCO _{2-e} /MWh)	GHG emissions (tCO _{2-e})
Truck (>20t)	14	630	15	9,450	0.286	2.7	38.6	104	70.37	7.3
Truck (water cart)	62.5	2,813	15	42,188	0.286	12	38.6	466	70.37	33
Vehicle (light commercial)	132	5,940	15	89,100	0.286	11	38.6	430	70.41	30
Total	-	-	-	-	-	26	-	-	-	70

Table 25 – Standby generators maintenance testing diesel use emissions during annual operations

Test	Total Run Times (Minutes)	Generator load	Diesel consumption (L/hr)	Total diesel used (kL)	Energy content of diesel (GJ/kL)	Total energy used (GJ)	Emission factor (tCO _{2-e} /MWh)	GHG emissions (tCO _{2-e} /yr)
Quarter 1	1920	55% load	450	14	39	556	70	39
Quarter 2	1920	50% load	418	13	39	516	70	36
Quarter 3	1920	55% load	450	14	39	556	70	39
Quarter 4	4320	100% load	798	57	39	2217	70	156
Total	-	-		100	-	-	-	270

Table 26 – Refrigerant emissions during annual operations

Type	Number of units/systems	Refrigerant type	GWP (AR5)	Refrigerant charge per unit/system (kg)	Total refrigerant charge (tonnes)	Annual leakage rate	GHG emissions (tCO _{2-e} /yr)
Chillers	12	R513A	573	1387	17	0.09	858
CRAC – enterprise	48	R410A	1924	28	1.3	0.09	233
CRAC – electrical room	96	R410A	1924	15	1.4	0.09	249
OAP	8	R410A	1924	35	0.28	0.09	48
VRF							
VRF – Ground floor (EOT) – FCU13	1	R410A	1924	11.3	0.0075	0.09	1.3
VRF – Level 1 (serving staging room) – FCU10	1	R410A	1924	10.8	0.011	0.09	2.0
VRF – Level 1 (lunchroom) – FCU11	1	R410A	1924	11.3	0.011	0.09	1.9

Type	Number of units/systems	Refrigerant type	GWP (AR5)	Refrigerant charge per unit/system (kg)	Total refrigerant charge (tonnes)	Annual leakage rate	GHG emissions (tCO _{2-e} /yr)
VRF – Level 1 (security office) – FCU12	1	R410A	1924	11.3	0.011	0.09	2.0
VRF – Level 2 (corridors) – FCU 1/2/3	1	R410A	1924	58.4	0.058	0.09	10
VRF – Level 2 (corridors) – FCU 4/5/6	1	R410A	1924	48.5	0.049	0.09	8.4
VRF – Level 2 (corridors) – FCU 7/8/9	1	R410A	1924	58.7	0.059	0.09	10
VRF – Level 3 (corridors) – FCU 1/2/3	1	R410A	1924	58.4	0.058	0.09	10
VRF – Level 3 (corridors) – FCU 4/5/6	1	R410A	1924	48.5	0.049	0.09	8.4
VRF – Level 3 (corridors) – FCU 7/8/9	1	R410A	1924	58.7	0.059	0.09	10
VRF – Level 4 (corridors) – FCU 1/2/3	1	R410A	1924	58.4	0.058	0.09	10
VRF – Level 4 (corridors) – FCU 4/5/6	1	R410A	1924	48.5	0.049	0.09	8.4
VRF – Level 4 (corridors) – FCU 7/8/9	1	R410A	1924	58.7	0.059	0.09	10

Type	Number of units/systems	Refrigerant type	GWP (AR5)	Refrigerant charge per unit/system (kg)	Total refrigerant charge (tonnes)	Annual leakage rate	GHG emissions (tCO ₂ -e/yr)
VRF – Level 5 (corridors) – FCU 1/2/3	1	R410A	1924	58.4	0.058	0.09	10
VRF – Level 5 (corridors) – FCU 4/5/6	1	R410A	1924	48.5	0.049	0.09	8.4
VRF – Level 5 (corridors) – FCU 7/8/9	1	R410A	1924	58.7	0.059	0.09	10
VRF – Level 6 (corridors) – FCU 1/2/3	1	R410A	1924	58.4	0.058	0.09	10
VRF – Level 6 (corridors) – FCU 4/5/6	1	R410A	1924	48.5	0.049	0.09	8.4
VRF – Level 6 (corridors) – FCU 7/8/9	1	R410A	1924	58.7	0.059	0.09	10
VRF – Level 7 (corridors) – FCU 1/2/3	1	R410A	1924	58.4	0.058	0.09	10
VRF – Level 7 (corridors) – FCU 4/5/6	1	R410A	1924	48.5	0.049	0.09	8.4
VRF – Level 7 (corridors) – FCU 7/8/9	1	R410A	1924	58.7	0.059	0.09	10
VRF – Level 8 (corridors) – FCU 1/2/3	1	R410A	1924	58.4	0.058	0.09	10

Type	Number of units/systems	Refrigerant type	GWP (AR5)	Refrigerant charge per unit/system (kg)	Total refrigerant charge (tonnes)	Annual leakage rate	GHG emissions (tCO _{2-e} /yr)
VRF – Level 8 (corridors) – FCU 4/5/6	1	R410A	1924	48.5	0.049	0.09	8.4
VRF – Level 8 (corridors) – FCU 7/8/9	1	R410A	1924	58.7	0.059	0.09	10
Total	-	-	-	-	17 (R513A) 4.3 (R410A)	-	1597

A.2 Scope 2 calculations

Table 27 – Grid electricity calculations – construction (33 months)

Equipment type	Assumed construction weeks	Assumed construction hours (8-hour weekdays, 5-hour Saturdays)	Assumed power rating (kW)	Energy used (MWh)	Emission factor (tCO _{2-e} /MWh), 2026 basis	GHG emissions (tCO _{2-e})
Angle grinder	118	7,080	2.5	18	0.39	6.9
Hand tools (electric)	118	7,080	0.6	4.1	0.39	1.6
Hand tools (pneumatic)	59	3,540	3.1	11	0.39	4.3
Jackhammer (electric)	14	840	2.4	2.0	0.39	0.79
Welder	52	3,090	5.0	15	0.39	6.0
Total	-	-	-	50	-	19.6

Table 28 – Grid electricity calculations during period of commissioning (3 months)

Commissioning period	Grid electricity used during commissioning (MWh)	Emission factor (tCO _{2-e} /MWh)	GHG emissions (tCO _{2-e})
3 months (Q1 2026)	2,880	0.39	1,123

Table 29 – Grid electricity calculations during annual operation

Operation year	Grid electricity used (MWh/yr) – total	Grid electricity used (MWh/yr) – hyperscale only (not included in the GHG inventory, presented for informational purposes only)	Grid electricity used (MWh/yr) – enterprise only	Emission factor (tCO _{2-e} /MWh)	GHG emissions (tCO _{2-e} /yr) – enterprise only
1 (2029)	946,080	652,795	293,285	0.17	49,858

Operation year	Grid electricity used (MWh/yr) – total	Grid electricity used (MWh/yr) – hyperscale only (not included in the GHG inventory, presented for informational purposes only)	Grid electricity used (MWh/yr) – enterprise only	Emission factor (tCO _{2-e} /MWh)	GHG emissions (tCO _{2-e} /yr) – enterprise only
2 (2030)	946,080	652,795	293,285	0.09	26,396
3 (2031)	946,080	652,795	293,285	0.06	17,597
4 (2032)	946,080	652,795	293,285	0.02	5,866
5 (2033)	946,080	652,795	293,285	0.02	5,866
6 (2034)	946,080	652,795	293,285	0.02	5,866
7 (2035)	946,080	652,795	293,285	0.03	8,799
8 (2036)	946,080	652,795	293,285	0.03	8,799
9 (2037)	946,080	652,795	293,285	0.03	8,799
10 (2038)	946,080	652,795	293,285	0.03	8,799
11 (2039)	946,080	652,795	293,285	0.03	8,799
12 (2040)	946,080	652,795	293,285	0.03	8,799
13 (2041)	946,080	652,795	293,285	0.03	8,799
14 (2042)	946,080	652,795	293,285	0.03	8,799

Operation year	Grid electricity used (MWh/yr) – total	Grid electricity used (MWh/yr) – hyperscale only (not included in the GHG inventory, presented for informational purposes only)	Grid electricity used (MWh/yr) – enterprise only	Emission factor (tCO _{2-e} /MWh)	GHG emissions (tCO _{2-e} /yr) – enterprise only
15 (2043)	946,080	652,795	293,285	0.03	8,799
16 (2044)	946,080	652,795	293,285	0.03	8,799
17 (2045)	946,080	652,795	293,285	0.03	8,799
18 (2046)	946,080	652,795	293,285	0.03	8,799
19 (2047)	946,080	652,795	293,285	0.03	8,799
20 (2048)	946,080	652,795	293,285	0.03	8,799
21 (2049)	946,080	652,795	293,285	0.03	8,799
22 (2050)	946,080	652,795	293,285	0.03	8,799
23 (2051)	946,080	652,795	293,285	0.03	8,799
24 (2052)	946,080	652,795	293,285	0.03	8,799
25 (2053)	946,080	652,795	293,285	0.03	8,799
26 (2054)	946,080	652,795	293,285	0.03	8,799
27 (2055)	946,080	652,795	293,285	0.03	8,799

Operation year	Grid electricity used (MWh/yr) – total	Grid electricity used (MWh/yr) – hyperscale only (not included in the GHG inventory, presented for informational purposes only)	Grid electricity used (MWh/yr) – enterprise only	Emission factor (tCO _{2-e} /MWh)	GHG emissions (tCO _{2-e} /yr) – enterprise only
28 (2056)	946,080	652,795	293,285	0.03	8,799
29 (2057)	946,080	652,795	293,285	0.03	8,799
30 (2058)	946,080	652,795	293,285	0.03	8,799
31 (2059)	946,080	652,795	293,285	0.03	8,799
32 (2060)	946,080	652,795	293,285	0.03	8,799
33 (2061)	946,080	652,795	293,285	0.03	8,799
34 (2062)	946,080	652,795	293,285	0.03	8,799
35 (2063)	946,080	652,795	293,285	0.03	8,799
36 (2064)	946,080	652,795	293,285	0.03	8,799
37 (2065)	946,080	652,795	293,285	0.03	8,799
38 (2066)	946,080	652,795	293,285	0.03	8,799
39 (2067)	946,080	652,795	293,285	0.03	8,799
40 (2068)	946,080	652,795	293,285	0.03	8,799

Operation year	Grid electricity used (MWh/yr) – total	Grid electricity used (MWh/yr) – hyperscale only (not included in the GHG inventory, presented for informational purposes only)	Grid electricity used (MWh/yr) – enterprise only	Emission factor (tCO _{2-e} /MWh)	GHG emissions (tCO _{2-e} /yr) – enterprise only
41 (2069)	946,080	652,795	293,285	0.03	8,799
42 (2070)	946,080	652,795	293,285	0.03	8,799
43 (2071)	946,080	652,795	293,285	0.03	8,799
44 (2072)	946,080	652,795	293,285	0.03	8,799
45 (2073)	946,080	652,795	293,285	0.03	8,799
46 (2074)	946,080	652,795	293,285	0.03	8,799
47 (2075)	946,080	652,795	293,285	0.03	8,799
48 (2076)	946,080	652,795	293,285	0.03	8,799
49 (2077)	946,080	652,795	293,285	0.03	8,799
50 (2078)	946,080	652,795	293,285	0.03	8,799
Total					498,584

A.3 NABERS Embodied Emissions Materials Form

NABERS Embodied emissions materials form

New non-residential developments must complete this form

From 1 October 2023, all new non-residential developments must report on embodied emissions using this form in NSW, where the NSW government's State Environmental Planning Policy (Sustainable Buildings SEPP) 2022 applies. You must disclose the amounts of key materials at the development application and construction certificate stages.

[More on the Sustainable Buildings SEPP](#)

Embodied carbon emissions are generated across the full life cycle of a building from "cradle to grave". Embodied carbon made up 16% of the whole-of-life carbon footprint of Australia's buildings in 2019 [1]. The purpose of this form is to report on material quantities only, to support project team discussions about potential reduction in emissions from key materials. The form does not include embodied emissions factors. This reporting form will be updated to reflect the NABERS Embodied Carbon tool when it's available in 2024.

Step 1: About the building

In the 'About the building' tab, you will add the location, function, and type of building you are planning to construct. You will also need to add information that describes the building, including gross floor area, number of floors, area of carpark, and more. Collecting this information will allow the NSW Government to compare similar buildings.

Step 2: Quantity of materials

In the 'Quantity of materials' tab, you will add the amounts of materials that you will use to construct your building. You only need to complete those fields relevant to your building. Leave fields that aren't relevant to your building blank. We recognise that there will be uncertainty, particularly at DA stage, so please use your best estimates where information is unknown (e.g., based on past projects).

How much do I need to include?

You must include all parts of the building delivered by the main contractor, covering at least 80% of the total materials bill. For example, if you spent \$100,000 on materials, you need to include the material amounts of at least \$80,000 of those materials in this form.

Wherever possible, consider materials costs only, not labour, plant or equipment. However, where you cannot split out the materials costs, please simply be consistent in the way the costs are reported throughout the spreadsheet.

Enter the **quantity of materials** (excluding labour, plant, equipment, margins and taxes) for:

- (1) Structure (substructure and superstructure) within the envelope of the building. Also include any ancillary buildings that are necessary for the main building to function (for example, plant that is in a separate building).
- (2) Envelope (cladding, curtain walls, roofing, windows, doors etc.)
- (3) Permanent internal walls and doors. At minimum, this should include all structural walls.
- (4) External works (hard landscaping, carparks, etc.) outside of the building envelope.

Enter the **cost of materials** (excluding labour, plant, equipment, margins and taxes) for:

- (5) Building services (mechanical, electrical, plumbing, vertical transport, etc.) required to run the core of the building. Exclude special equipment required by a particular tenant.

You must enter the amounts of materials in SI units (commonly known as the metric system). These are generally consistent across the various products on the market. However, you might need to convert the units of some materials (for example, convert volume to kg).

Step 3: Certifier details

In the 'Certifier' tab you will add the details of the person who has entered data, and the person who has certified the accuracy of the data. The certifier must be a quantity surveyor, designer, engineer or NABERS assessor.

Step 4: Attach to approval

Attach this Excel spreadsheet to your development application or construction certificate application.

The data collected in this form will be used by the NSW Government to inform future policy development.

Help!

If you have general questions about reporting on the embodied emissions of your building, you should contact your local council or consent authority.

If you have technical questions about this spreadsheet, please contact NABERS:
nabers@environment.nsw.gov.au

[1] Green Building Council of Australia, 2021, <https://new.gbca.org.au/news/gbca-news/gbca-and-thinkstep-release-embodied-carbon-report/>

Step 1: About the building

Fill out blue cells

Building location and site data	Value	Unit	Note	Comment
Building address	269 Lane Cove Road, Macquarie Park			
Postcode	2113		Required	Postcode of building
Town/city	2113		Town/city/suburb/region automated from postcode (may not give exact town name)	Town/city/suburb/region of the building site.
Distance to nearest major city/town	2	km	Enter for rural/regional locations only	Declare the shortest route by road to your site from the centre of your nearest major city (>100,000 people). The route must be traversable by a semitrailer truck.
Project stage	Development Application		Required	Stage of development
New build or major renovation?	New build		Required	
Brownfield or greenfield site?	Brownfield		Required	

Floor area by NCC building classification	Gross (GFA)	Net (NLA/NSA/UFA)	Unit	Note	
Please enter all floor areas relevant to your building. Leave areas blank if not applicable. Please enter Gross Floor Area (GFA) for all building classifications. Please also enter the corresponding net area (Net Lettable Area, Net Sellable Area or Usable Floor Area) where it is commonly used for that building classification.					
Class 1a: Detached residential buildings			m²	Required for Class 1a: Detached residential houses, townhouses	Gross Floor Area (GFA), as defined by the AIGS Australian Cost Management Manual
Class 1b: Boarding houses and hostels			m²	Required for Class 1b: Boarding house, guest house, hostel	Net area (Net Lettable Area, Net Sellable Area, Usable Floor Area), as defined by the PCA's Method of Measurement
Class 2: Multi-unit residential buildings			m²	Required for Class 2: Multi-unit residential, including apartment buildings	
Class 3: Other residential buildings			m²	Required for Class 3: Other residential buildings	
Class 4: Residential inside non-residential			m²	Required for Class 4: Residential building inside a non-residential building, e.g., caretaker residence	
Class 5: Office buildings			m²	Required for Class 5: Office building	
Class 6: Retail buildings			m²	Required for Class 6: Retail building, e.g., shop, restaurant, café	
Class 7a: Carparks			m²	Required for Class 7a: Carparks	
Class 7b: Warehouse-type buildings			m²	Required for Class 7b: Warehouses, wholesalers and storage facilities	
Class 8: Industrial buildings	101,283	101,283	m²	Required for Class 8: Industrial buildings, e.g., factories and workshops	
Class 9a: Healthcare buildings			m²	Required for Class 9a: Healthcare, e.g., hospitals, clinics, day surgeries	
Class 9b: Civic buildings			m²	Required for Class 9b: Civic buildings, e.g., theatres, civic centres, train stations	
Class 9c: Aged care and personal care buildings			m²	Required for Class 9c: Aged care and personal care	
Class 10a: Non-habitable buildings			m²	Required for Class 10a: Non-habitable buildings including sheds, carports and private garages	
Class 10b: Miscellaneous structures			m²	Required for Class 10b: Miscellaneous structures, including fences, masts, antennas, retaining walls and swimming pools	
Class 10c: Bushfire shelters			m²	Required for Class 10c: Bushfire shelters not attached to a Class 1a building	
Total	101,283	101,283	m²	Required: Sum of m² inputs must be more than 0.	

Project information	Value	Unit	Note	
Total cost of project	1,532,941,000	AUD excl. GST	Required	Include labour, materials, transport, plant, equipment and professional fees. Exclude GST, land, finance, escalation and other costs.
Building design life	50	years	Required	If uncertain, enter 50 years
Estimated envelope life		years	Optional	
Estimated replacement cycle for mechanical services		years	Optional	
Estimated replacement cycle for vertical transportation		years	Optional	

Dimensions of the building and the site	Value	Unit	Note	
Site area	22,393	m²	Required	Total area of site to external boundary.
Shared services or infrastructure	Yes		Required	Indicate if there are shared services that the building utilises, or shared foundations, basement or podium
Building footprint area	11,090	m²	Required	Total floor area of the ground floor measured to the outside edge of the floorplate. Total 5 buildings.
Typical floor area (if different to building footprint area)		m²	Only needed if different to row above	For one building only.
Typical floor perimeter	491	m	Required	
Area of external carpark (not included in GFA)		m²	Required. Enter 0 if not applicable.	
Area of external hardstand (not included in GFA)	5,287	m²	Required. Enter 0 if not applicable.	
Area of other hard landscaping (not included in GFA)		m²	Required. Enter 0 if not applicable.	Include all other impervious areas. For example, patios, paths and driveways (not already included in carparks and hardstands above).
Number of floors/storeys above ground, including ground floor	9	no.	Required	
Number of floors/storeys below ground	0	no.	Required. Enter 0 if not applicable.	
Number of floors/storeys of car parking	0	no.	Required. Enter 0 if not applicable.	
Total height above ground	65	m	Required	Measured from the average finished grade to the highest point of the building, excluding protrusions (lighting rods, masts, chimneys, etc.)

Structural material choices	Value	Unit	Note	
Foundation type	Piles		Required	
Frame type (dominant)	Reinforced concrete		Required	
Suspended floor type (typical)	Reinforced concrete		Only needed for multi-storey buildings	
Describe low carbon materials specified in your building (e.g. green concrete, low carbon bricks)			Required	
Describe recycled content specified in your building (e.g. recycled steel)			Required	

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	Comment	AIQS ACMM Code	ICMS3 (Level 3 Codes Construction
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, carparks, patios, etc.								
Coverage of structural material spend	-	-	-	82.5%	%	Required. Coverage of spend for structural elements entered below. Minimum requirement = 80%. Exclude head contractor preliminaries and margins.		
Concrete in-situ	≤10 MPa	-	-		m³	Please enter reinforcing steel as part of "Reinforcing steel" below	01_SB or 02-11	02 or 03
Concrete in-situ	>10 MPa to ≤20 MPa	-	-		m³	Please enter reinforcing steel as part of "Reinforcing steel" below	01_SB or 02-11	02 or 03
Concrete in-situ	>20 MPa to ≤32 MPa	-	-		m³	Please enter reinforcing steel as part of "Reinforcing steel" below	01_SB or 02-11	02 or 03
Concrete in-situ	>32 MPa to ≤40 MPa	-	-		m³	Please enter reinforcing steel as part of "Reinforcing steel" below	01_SB or 02-11	02 or 03
Concrete in-situ	>40 MPa to ≤50 MPa	-	-	69,377	m³	Please enter reinforcing steel as part of "Reinforcing steel" below	01_SB or 02-11	02 or 03
Concrete in-situ	>50 MPa to ≤60 MPa	-	-		m³	Please enter reinforcing steel as part of "Reinforcing steel" below	01_SB or 02-11	02 or 03
Concrete in-situ	>60 MPa to ≤80 MPa	-	-		m³	Please enter reinforcing steel as part of "Reinforcing steel" below	01_SB or 02-11	02 or 03
Concrete in-situ	>80 MPa to ≤100 MPa	-	-		m³	Please enter reinforcing steel as part of "Reinforcing steel" below	01_SB or 02-11	02 or 03
Concrete in-situ	>100 MPa	-	-		m³	Please enter reinforcing steel as part of "Reinforcing steel" below	01_SB or 02-11	02 or 03
Concrete pre-cast panel	-	-	-	0	m³	Please enter reinforcing steel in relevant line items below. If not known at DA stage, please make your best estimate. If not known at CC stage, please ask your supplier.	01_SB or 02-11	02 or 03
Concrete block	Hollow core	-	-		m³	Enter as cubic metres, calculated as (area in m²) * (thickness in mm / 1000). Please include all block fill concrete and all reinforcing steel in relevant line items above/below.	01_SB	02 or 03
Concrete block/brick	Solid	-	-		m³	Enter as cubic metres, calculated as (area in m²) * (thickness in mm / 1000)	01_SB	02 or 03
Concrete block/brick	Solid AAC	-	-		m³	Solid Aerated Autoclaved Concrete (AAC) block. Enter as cubic metres, calculated as (area in m²) * (thickness in mm / 1000).	01_SB	02 or 03
Mortar	-	-	-		kg		01_SB	02 or 03
Reinforcing steel	Bar & mesh	-	-	12,933,971	kg	Include all reinforcing steel bar/mesh in the building's structure in this row. Usually this is calculated as kg/m³ per concrete element and then summed. Example: 10 m³ of 40 MPa concrete @ 100 kg/m³ + 5 m³ of 50 MPa concrete @ 150 kg/m³ = 1,750 kg reinforcing steel.	01_SB or 02-11	02 or 03
Reinforcing steel	Fibre & strand	-	-		kg	Include all steel fibre reinforcing and steel strand in the building's structure in this row.	01_SB or 02-11	02 or 03
Structural steel	Hot rolled structural	-	-	200	t	Examples include universal beams, universal columns and welded beams	01_SB	02 or 03
Structural steel	Cold formed structural	-	-		t	Examples include C purlins, Z purlins and all light gauge steel framing	01_SB	02 or 03
Structural steel	Other welded structural	-	-		t		01_SB	02 or 03
Structural steel	Plate	-	-		t	Include any allowance for connections here	01_SB	02 or 03
Structural steel	Sheet	-	-		t		01_SB	02 or 03
Stainless steel	-	-	-		t	Primarily for engineered timber structure connections	02_11	02 or 03
Reinforced concrete piles	Concrete	-	-	1,233	m³	Please enter reinforcing steel in the line below. If not known at DA stage, please make your best estimate. If not known at CC stage, please ask your supplier.	01_SB	02 or 03
Reinforced concrete piles	Steel reinforcing	-	-	308,332	kg	If not known at DA stage, please make your best estimate. If not known at CC stage, please ask your supplier.	01_SB	02 or 03
Steel piles	-	-	-		t	Where concrete and reinforcing steel are also used, enter these in the rows above.	01_SB	02 or 03
Timber poles/piles	-	-	-		m³	Where concrete and reinforcing steel are also used, enter these in the rows above.	01_SB	02 or 03
Timber (solid)	Sawn softwood	-	-		m³		02_11	02 or 03
Timber (solid)	Sawn hardwood	-	-		m³		02_11	02 or 03
Timber (engineered)	CLT	-	-		m³		02_11	02 or 03
Timber (engineered)	Glulam	-	-		m³		02_11	02 or 03
Timber (engineered)	LVL	-	-		m³		02_11	02 or 03
Timber (engineered)	OSB	-	-		m³	Enter as cubic metres, calculated as (area of wall in m²) * (thickness in mm / 1000)	02_11	02 or 03
Brick	Heat cured	-	-		m³	Enter as cubic metres, calculated as (area of wall in m²) * (thickness in mm / 1000)	02_11	02 or 03
Structural Insulated Panel (SIP)	Steel outer	-	-		m²		01_SB	02 or 03
Structural Insulated Panel (SIP)	Aluminium outer	-	-		m²		01_SB	02 or 03
Structural Insulated Panel (SIP)	Engineered timber outer	-	-		m²		01_SB	02 or 03
Fill	-	-	-		t	Include purchased material only. Exclude site-won material.	01_SB	01
Sand & gravel	-	-	-		t	Include purchased material only. Exclude site-won material and sand/gravel in concrete.	01_SB	01
Waterproofing membrane	Bituminous	-	-	1,397	m²		01_SB	01 or 02 or 03
Waterproofing membrane	Polyethylene	-	-		m²		01_SB	01 or 02 or 03
Other structural (Describe and add unit >>)		-	-			Please enter a description for any structural material that does not fit a predefined classification		
Other structural (Describe and add unit >>)		-	-			Please enter a description for any structural material that does not fit a predefined classification		
Other structural (Describe and add unit >>)		-	-			Please enter a description for any structural material that does not fit a predefined classification		

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	-	-	-	82.5%	%	Required. Coverage of spend for the envelope items you have entered below. Minimum requirement = 80%. Exclude head contractor preliminaries and margins.		
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Roof cladding	Profiled steel	-	-		m²	Enter as m² of roof area. Exclude allowances for overlap in the roofing sheets. This row includes all metal-coated and pre-painted steel sheets where steel is the base metal. Examples include: galvanised steel, zinc-aluminium (zincalume) coated steel and zinc-aluminium-magnesium (ZAM) coated steel, whether painted or unpainted.	05_RF	03 or 04
Roof cladding	Profiled aluminium	-	-	11,090	m²	Enter as m² of roof area. Exclude allowances for overlap in the roofing sheets. This row also includes pre-painted aluminium sheets.	05_RF	03 or 04
Roof cladding	Profiled zinc	-	-		m²	Enter as m² of roof area. Exclude allowances for overlap in the roofing sheets. This row also includes pre-painted zinc sheets.	05_RF	03 or 04
Roof cladding	Membrane	-	-		m²	Enter as m² of roof area. Exclude allowances for overlap in the membrane sheets.	05_RF	03 or 04
Roof cladding	Tiles (traditional clay)	-	-		m²	Enter as m² of roof area. Exclude allowances for overlap between the tiles.	05_RF	03 or 04
Roof cladding	Tiles (concrete)	-	-		m²	Enter as m² of roof area. Exclude allowances for overlap between the tiles.	05_RF	03 or 04
Roof cladding	Other (Please describe >>)		-		m²	Please enter a description for any roofing that does not fit a predefined classification	05_RF	03 or 04
Wall cladding	Bricks (heat cured)	-	-		m²	Enter as m² of wall area. Heat-cured bricks use a kiln or furnace to raise the brick temperature above ambient temperature during curing process.	06_EW	03 or 04
Wall cladding	Bricks (air dried)	-	-		m²	Enter as m² of wall area. Air-dried bricks are cured using ambient temperature.	06_EW	03 or 04
Wall cladding	Bricks (under fired)	-	-		m²	Enter as m² of wall area.	06_EW	03 or 04
Wall cladding	Bricks (concrete)	-	-		m²	Enter as m² of wall area	06_EW	03 or 04
Wall cladding	Mortar and render	-	-		kg		06_EW	03 or 04
Wall cladding	Profiled steel	-	-		m²	Enter as m² of wall area. Exclude allowances for overlap in the cladding sheets, offcuts, etc. This row includes all metal-coated and pre-painted steel sheets where steel is the base metal. Examples include: galvanised steel, zinc-aluminium (zincalume) coated steel and zinc-aluminium-magnesium (ZAM) coated steel, whether painted or unpainted.	06_EW	03 or 04
Wall cladding	Profiled aluminium	-	-	19,896	m²	Enter as m² of wall area. Exclude allowances for overlap in the cladding sheets, offcuts, etc. This row also includes pre-painted aluminium sheets.	06_EW	03 or 04
Wall cladding	Profiled zinc	-	-		m²	Enter as m² of wall area. Exclude allowances for overlap in the cladding sheets, offcuts, etc. This row also includes pre-painted zinc sheets.	06_EW	03 or 04
Wall cladding	GRC cladding	-	-		m²	Enter as m² of wall area. GRC = Glass Reinforced Concrete.	06_EW	03 or 04
Wall cladding	Timber weatherboards	-	-		m²	Enter as m² of wall area. Exclude allowances for overlap between weatherboards, offcuts, etc.	06_EW	03 or 04
Wall cladding	Fibre cement board	-	-		m²	Enter as m² of wall area. Exclude allowances for offcuts, etc.	06_EW	03 or 04
Wall cladding	Terracotta	-	-		m²	Enter as m² of wall area. Exclude allowances for offcuts, etc.	06_EW	03 or 04
Wall cladding	Brick tiles / veneers	-	-		m²	Enter as m² of wall area. Exclude allowances for offcuts, etc.	06_EW	03 or 04
Wall cladding	Plasterboard	-	-		m²	Enter as m² of wall area. Exclude allowances for offcuts, etc. Include both external wall linings and internal wall linings for envelope walls.	12_WF or 06_EW	03 or 04
Wall cladding	Plywood	-	-		m²	Enter as m² of wall area. Exclude allowances for offcuts, etc. Include both external wall linings and internal wall linings for envelope walls.	12_WF or 06_EW	03 or 04
Wall cladding	Other (Please describe >>)		-		m²	Please enter a description for any wall cladding that does not fit a predefined classification	06_EW or 12_WF	03 or 04
Windows & doors	Aluminium frame	Single glazed	-		m²	Include all single glazing, including standard, toughened, laminated and low-E	07_WW or 08_ED	03 or 04
Windows & doors	Aluminium frame	Double glazed	-		m²	Include all double glazing, including standard, toughened, laminated and low-E	07_WW or 08_ED	03 or 04
Windows & doors	Aluminium frame	Triple glazed	-		m²	Include all triple glazing, including standard, toughened, laminated and low-E	07_WW or 08_ED	03 or 04
Windows & doors	Timber frame	Single glazed	-		m²	Include all single glazing, including standard, toughened, laminated and low-E	07_WW or 08_ED	03 or 04
Windows & doors	Timber frame	Double glazed	-		m²	Include all double glazing, including standard, toughened, laminated and low-E	07_WW or 08_ED	03 or 04
Windows & doors	Timber frame	Triple glazed	-		m²	Include all triple glazing, including standard, toughened, laminated and low-E	07_WW or 08_ED	03 or 04
Windows & doors	uPVC frame	Single glazed	-		m²	Include all single glazing, including standard, toughened, laminated and low-E	07_WW or 08_ED	03 or 04
Windows & doors	uPVC frame	Double glazed	-		m²	Include all double glazing, including standard, toughened, laminated and low-E	07_WW or 08_ED	03 or 04
Windows & doors	uPVC frame	Triple glazed	-		m²	Include all triple glazing, including standard, toughened, laminated and low-E	07_WW or 08_ED	03 or 04
Windows & doors	Frameless	Single glazed	-		m²	Include all single glazing, including standard, toughened, laminated and low-E	07_WW or 08_ED	03 or 04
Windows & doors	Frameless	Double glazed	-		m²	Include all double glazing, including standard, toughened, laminated and low-E	07_WW or 08_ED	03 or 04
Windows & doors	Frameless	Triple glazed	-		m²	Include all triple glazing, including standard, toughened, laminated and low-E	07_WW or 08_ED	03 or 04
Windows & doors	Other (Please describe >>)		-		m²	Please enter a description for any windows or doors that do not fit a predefined classification	07_WW or 08_ED	03 or 04
Curtain wall	Single skin façade	Glazed panel	Single glazed		m²	Please declare all single-skin façade area in this section. All double-skin façade area should be entered in the next section. Include all single glazing, including standard, toughened, laminated and low-E	06_EW	03 or 04
Curtain wall	Single skin façade	Glazed panel	Double glazed	3,170	m²	Include all double glazing, including standard, toughened, laminated and low-E	06_EW	03 or 04
Curtain wall	Single skin façade	Glazed panel	Triple glazed		m²	Include all triple glazing, including standard, toughened, laminated and low-E	06_EW	03 or 04
Curtain wall	Single skin façade	Opaque panel	Aluminium cladding		m²		06_EW	03 or 04
Curtain wall	Single skin façade	Opaque panel	GRC cladding		m²	GRC = Glass-fibre Reinforced Concrete	06_EW	03 or 04
Curtain wall	Single skin façade	Opaque panel	Insulated shadow box		m²		06_EW	03 or 04
Curtain wall	Single skin façade	Opaque panel	Brick cladding		m²		06_EW	03 or 04
Curtain wall	Single skin façade	Opaque panel	Stone cladding		m²		06_EW	03 or 04
Curtain wall	Double skin façade	Glazed panel	Single glazed		m²	Please declare all double-skin façade area in this section. Please declare as the area of the curtain wall and do not enter the inner and outer skins twice. Include all single glazing, including standard, toughened, laminated and low-E.	06_EW	03 or 04
Curtain wall	Double skin façade	Glazed panel	Double glazed		m²	The type of glazing refers to the building's envelope wall, not including the outer skin	06_EW	03 or 04
Curtain wall	Double skin façade	Glazed panel	Triple glazed		m²	The type of glazing refers to the building's envelope wall, not including the outer skin	06_EW	03 or 04
Curtain wall	Double skin façade	Opaque panel	Aluminium cladding		m²		06_EW	03 or 04
Curtain wall	Double skin façade	Opaque panel	GRC cladding		m²	GRC = Glass-fibre Reinforced Concrete	06_EW	03 or 04
Curtain wall	Double skin façade	Opaque panel	Insulated shadow box		m²		06_EW	03 or 04
Curtain wall	Double skin façade	Opaque panel	Brick cladding		m²		06_EW	03 or 04

Curtain wall	Double skin façade	Opaque panel	Stone cladding		m²		06_EW	03 or 04
Curtain wall	Other (Please describe >>)		-		m²	Please enter a description for any curtain wall that does not fit a predefined classification	06_EW	03 or 04
Stick-framed wall system	Aluminium frame	Glazed section	Single glazed		m²	Include all single glazing, including standard, toughened, laminated and low-E	06_EW	03 or 04
Stick-framed wall system	Aluminium frame	Glazed section	Double glazed		m²	Include all double glazing, including standard, toughened, laminated and low-E	06_EW	03 or 04
Stick-framed wall system	Aluminium frame	Glazed section	Triple glazed		m²	Include all triple glazing, including standard, toughened, laminated and low-E	06_EW	03 or 04
Stick-framed wall system	Aluminium frame	Opaque section	Aluminium cladding		m²		06_EW	03 or 04
Stick-framed wall system	Aluminium frame	Opaque section	GRC cladding		m²	GRC = Glass-fibre Reinforced Concrete	06_EW	03 or 04
Stick-framed wall system	Aluminium frame	Opaque section	Insulated shadow box		m²		06_EW	03 or 04
Stick-framed wall system	Aluminium frame	Opaque section	Brick cladding		m²		06_EW	03 or 04
Stick-framed wall system	Aluminium frame	Opaque section	Stone cladding		m²		06_EW	03 or 04
Stick-framed wall system	Steel frame	Glazed section	Single glazed		m²	Include all single glazing, including standard, toughened, laminated and low-E	06_EW	03 or 04
Stick-framed wall system	Steel frame	Glazed section	Double glazed		m²	Include all double glazing, including standard, toughened, laminated and low-E	06_EW	03 or 04
Stick-framed wall system	Steel frame	Glazed section	Triple glazed		m²	Include all triple glazing, including standard, toughened, laminated and low-E	06_EW	03 or 04
Stick-framed wall system	Steel frame	Opaque section	Aluminium cladding		m²		06_EW	03 or 04
Stick-framed wall system	Steel frame	Opaque section	GRC cladding		m²	GRC = Glass-fibre Reinforced Concrete	06_EW	03 or 04
Stick-framed wall system	Steel frame	Opaque section	Insulated shadow box		m²		06_EW	03 or 04
Stick-framed wall system	Steel frame	Opaque section	Brick cladding		m²		06_EW	03 or 04
Stick-framed wall system	Steel frame	Opaque section	Stone cladding		m²		06_EW	03 or 04
Stick-framed wall system	Other (Please describe >>)		-		m²	Please enter a description for any wall system that does not fit a predefined classification	06_EW	03 or 04
Wall louvre system	Aluminium	-	-	6,356	m²		06_EW	03 or 04
External shading system	Aluminium frame	Aluminium cladding	-		m²	Please enter as m² of shaded area = linear metres * (width in mm / 1000)	06_EW	03 or 04
External shading system	Aluminium frame	GRC cladding	-		m²	Please enter as m² of shaded area = linear metres * (width in mm / 1000). GRC = Glass-fibre Reinforced Concrete.	06_EW	03 or 04
External shading system	Aluminium frame	Terracotta cladding	-		m²	Please enter as m² of shaded area = linear metres * (width in mm / 1000)	06_EW	03 or 04
External shading system	Aluminium frame	Stone cladding	-		m²	Please enter as m² of shaded area = linear metres * (width in mm / 1000)	06_EW	03 or 04
External shading system	Aluminium frame	Pre-cast concrete	-		m²	Please enter as m² of shaded area = linear metres * (width in mm / 1000)	06_EW	03 or 04
External shading system	Aluminium frame	Timber	-		m²	Please enter as m² of shaded area = linear metres * (width in mm / 1000)	06_EW	03 or 04
External shading system	Aluminium frame	Glass (opaque)	-		m²	Please enter as m² of shaded area = linear metres * (width in mm / 1000)	06_EW	03 or 04
External shading system	Aluminium frame	Steel	-		m²	Please enter as m² of shaded area = linear metres * (width in mm / 1000)	06_EW	03 or 04
External shading system	Other (Please describe >>)		-		m²	Please enter as m² of shaded area = linear metres * (width in mm / 1000)	06_EW	03 or 04
Roller doors	Steel profile	-	-		m²	Please note unit is <u>square metres</u> , not quantity	08_ED	03 or 04
Roller doors	Hardwood over steel	-	-		m²	Please note unit is <u>square metres</u> , not quantity	08_ED	03 or 04
Roller doors	Softwood over steel	-	-		m²	Please note unit is <u>square metres</u> , not quantity	08_ED	03 or 04
Revolving doors	Glass/aluminium/steel	-	-		no.		08_ED	03 or 04
Fire-rated doors	Engineered timber	-	-		no.	Please enter as single-leaf equivalent. For double-leaf doors, multiply the quantity by 2.	08_ED	03 or 04
Fire-rated doors	Steel	-	-		no.	Please enter as single-leaf equivalent. For double-leaf doors, multiply the quantity by 2.	08_ED	03 or 04
Fire-rated doors	Aluminium/glass	-	-		no.	Please enter as single-leaf equivalent. For double-leaf doors, multiply the quantity by 2.	08_ED	03 or 04
Insulation	Glass wool / fibreglass	-	-		m²	Please include both wall and ceiling insulation	05_RF or 06_EW	03 or 04
Insulation	Stone wool	-	-		m²	Please include both wall and ceiling insulation	05_RF or 06_EW	03 or 04
Insulation	Polyester	-	-		m²	Please include both wall and ceiling insulation	05_RF or 06_EW	03 or 04
Insulation	Expanded polystyrene	-	-	30,986	m²	Please include both wall and ceiling insulation	05_RF or 06_EW	03 or 04
Insulation	Other (Please describe >>)		-		m²	Please include both wall and ceiling insulation	05_RF or 06_EW	03 or 04
Other (Please describe and add unit >>)		-	-			Please enter a description for any envelope material that does not fit a predefined classification		
Other (Please describe and add unit >>)		-	-			Please enter a description for any envelope material that does not fit a predefined classification		
Other (Please describe and add unit >>)		-	-			Please enter a description for any envelope material that does not fit a predefined classification		

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	%	Enter the % coverage of spend for the items you have entered below. There is no minimum requirement: enter what you know. This should include all structural walls. Exclude head contractor preliminaries and margins		
Interior wall (permanent)	Steel (light framing)	-	-		t		09_NW	03 or 04
Interior wall (permanent)	Timber framing	-	-		m³		09_NW	03 or 04
Interior wall (permanent)	AAC panel (reinforced)	-	-		m²	Panels of autoclaved aerated concrete (AAC) with reinforcing steel. E.g., Hebel.	09_NW or 12_WF	03 or 04
Interior wall (permanent)	Concrete-filled steel panel	-	-		m²	Panels made from a steel sheet outer with an aerated concrete core. E.g., Speedpanel.	09_NW or 12_WF	03 or 04
Interior wall (permanent)	Plasterboard	-	-	20,158	m²	Enter as single-layer equivalent. If using 2 layers, multiply the area by 2.	09_NW or 12_WF	03 or 04
Interior wall (permanent)	Plywood	-	-		m²	Enter as single-layer equivalent. If using 2 layers, multiply the area by 2.	09_NW or 12_WF	03 or 04
Interior wall (permanent)	Fibre cement sheet	-	-		m²	Enter as single-layer equivalent. If using 2 layers, multiply the area by 2.	09_NW or 12_WF	03 or 04
Interior wall (permanent)	Insulation	-	-		m²		09_NW or 12_WF	03 or 04
Interior wall (permanent)	Glass	-	-		m²		09_NW or 12_WF	03 or 04
Interior wall (permanent)	Other (Please describe >>)	Blockwork	-	36,161	m²	Please enter a description for any internal wall that does not fit a predefined classification	09_NW or 12_WF	03 or 04
Internal door (permanent)	Aluminium/glass	-	-		no.	Please enter as single-leaf equivalent. For double-leaf doors, multiply the quantity by 2.	11_ND	03 or 04
Internal door (permanent)	Timber/glass	-	-		no.	Please enter as single-leaf equivalent. For double-leaf doors, multiply the quantity by 2.	11_ND	03 or 04
Internal door (permanent)	Timber solid lightweight	-	-		no.	Please enter as single-leaf equivalent. For double-leaf doors, multiply the quantity by 2.	11_ND	03 or 04

Internal door (permanent)	Fire resistant	-	-		no.	Please enter as single-leaf equivalent. For double-leaf doors, multiply the quantity by 2.	11_ND	03 or 04
Internal door (permanent)	Steel	-	-		no.	Please enter as single-leaf equivalent. For double-leaf doors, multiply the quantity by 2.	11_ND	03 or 04
Internal door (permanent)	Other (Please describe >>)		-		no.	Please enter a description for any internal door that does not fit a predefined classification	11_ND	03 or 04
Other (Please describe and add unit >>)		-	-			Please enter a description for any material that does not fit a predefined classification		
Other (Please describe and add unit >>)		-	-			Please enter a description for any material that does not fit a predefined classification		
Other (Please describe and add unit >>)		-	-			Please enter a description for any material that does not fit a predefined classification		

Services

Unit of measure

Building services included within the main building contract. If the building components that are the subject of the development application 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	-	-	-	50,819,235	AUD excl. GST	Where possible, enter material costs excluding labour, plant, equipment, margins and taxes	28_SS	05
Vertical transportation	-	-	-	5,668,078	AUD excl. GST	Where possible, enter material costs excluding labour, plant, equipment, margins and taxes	28_SS	05
Electrical services	-	-	-	86,120,417	AUD excl. GST	Electrical services including the main power supply, backup generators, security and communications. Excluding solar installations.	26_LP	05
Solar photovoltaic installations	-	-	-		AUD excl. GST	Where possible, enter material costs excluding labour, plant, equipment, margins and taxes.	26_LP_LPGP	05
Plumbing/hydraulic services	-	-	-	15,873,381	AUD excl. GST	Where possible, enter material costs excluding labour, plant, equipment, margins and taxes	18_PD and 19_WS	05 or 06
Fire services				35,866,486	AUD excl. GST	Where possible, enter material costs excluding labour, plant, equipment, margins and taxes	25_FPSS04 or 39_XWAW_03 or 41_XF	05
Other services (Please describe)	Security, Fuel, CSMS, Comms	-	-	38,142,106	AUD excl. GST	Please group all other services here, meaning that coverage will always be 100% for services. Enter only the material costs (excluding labour, plant, equipment, margins and taxes).	29_SS or multiple	

External works

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

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

Coverage of spend on external works	-	-	-	80%	%	Required. Coverage of spend for external works (excluding soft landscaping) entered below. Minimum requirement = 80%. Exclude head contractor preliminaries and margins.		
Asphalt	-	-	-		t		33_XR	07
Concrete in-situ	≤10 MPa	-	-		m³	Please enter reinforcing steel as part of "Reinforcing steel" below	33_XR or 34_XN or 35_XB or 36_XL	07
Concrete in-situ	>10 MPa to ≤20 MPa	-	-	1,321.8		Please enter reinforcing steel as part of "Reinforcing steel" below	33_XR or 34_XN or 35_XB or 36_XL	07
Concrete in-situ	>20 MPa to ≤32 MPa	-	-		m³	Please enter reinforcing steel as part of "Reinforcing steel" below	33_XR or 34_XN or 35_XB or 36_XL	07
Concrete in-situ	>32 MPa to ≤40 MPa	-	-		m³	Please enter reinforcing steel as part of "Reinforcing steel" below	33_XR or 34_XN or 35_XB or 36_XL	07
Concrete in-situ	>40 MPa to ≤50 MPa	-	-		m³	Please enter reinforcing steel as part of "Reinforcing steel" below	33_XR or 34_XN or 35_XB or 36_XL	07
Concrete in-situ	>50 MPa	-	-		m³	Please enter reinforcing steel as part of "Reinforcing steel" below	33_XR or 34_XN or 35_XB or 36_XL	07
Pavers, bricks and blocks	Concrete	-	-		m²		33_XR	07
Pavers, bricks and blocks	Clay	-	-		m²		33_XR	07
Reinforcing steel	Bar & mesh	-	-	112,349	kg	Include all reinforcing steel bar/mesh in the external works in this row. Usually this is calculated as kg/m³ per concrete element and then summed. Example: 10 m³ of 40 MPa concrete @ 100 kg/m³ + 5 m³ of 50 MPa concrete @ 150 kg/m³ = 1,750 kg reinforcing steel.	33_XR or 34_XN or 35_XB or 36_XL	07
Reinforcing steel	Fibre & strand	-	-		kg	Include all steel fibre reinforcing and steel strand in the external works in this row.	33_XR or 34_XN or 35_XB or 36_XL	07
Structural steel	-	-	-		t		02_11	07
Structural aluminium	-	-	-		t	Includes structures, louvre systems, etc.	35_XB	07
External roof/wall cladding	Polycarbonate	-	-		m²	Enter as profiled polycarbonate sheet that would ordered, including allowance for overlap	35_XB	07
External roof/wall cladding	PVC	-	-		m²	Enter as profiled PVC sheet that would ordered, including allowance for overlap	35_XB	07
External roof/wall cladding	Bitumen sheet	-	-		m²	Enter as bituminous sheet that would ordered, including allowance for overlap	35_XB	07
External roof/wall cladding	Steel profile	-	-		m²	Enter as profiled steel sheet that would ordered, including allowance for overlap	35_XB	07
Fill	-	-	-		t	Include purchased material only. Exclude site-won material.	33_XR or 34_XN or 35_XB or 36_XL	07
Sand & gravel	-	-	-		t	Include purchased material only. Exclude site-won material and sand/gravel in concrete.	33_XR or 34_XN or 35_XB or 36_XL	07
Timber (solid)	Sawn softwood	-	-		m³		33_XR or 34_XN or 35_XB or 36_XL	07
Timber (solid)	Sawn hardwood	-	-		m³		33_XR or 34_XN or 35_XB or 36_XL	07
Timber (engineered)	CLT	-	-		m³		33_XR or 34_XN or 35_XB or 36_XL	07
Timber (engineered)	Glulam	-	-		m³		33_XR or 34_XN or 35_XB or 36_XL	07
Timber (engineered)	LVL	-	-		m³		33_XR or 34_XN or 35_XB or 36_XL	07
Timber (engineered)	OSB	-	-		m³		33_XR or 34_XN or 35_XB or 36_XL	07
Fabric (awning/sunshade)		-	-		m²		35_XB or 36_XL	07
Other (Please describe and add unit >>)		-	-			Please enter a description for any external works that does not fit a predefined classification		
Other (Please describe and add unit >>)		-	-			Please enter a description for any external works that does not fit a predefined classification		
Other (Please describe and add unit >>)		-	-			Please enter a description for any external works that does not fit a predefined classification		

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	Dylan Hanney	Required
Company	WT Partnership	Required
ABN	65088341093	
Profession	Quantity Surveyor	Required
Qualification or registration	Bsc Quantity Surveyor and Construction Economic	Required

Person that certified the details in this form	Value	Note
Name	Aodhgan Murphy	Required
Company	WT Partnership	Required
ABN	65088341093	
Profession	Quantity Surveyor	Required
Qualification or registration	MAIQS - 25794	Required

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

Additional comments from data provider

The quantities and costs mentioned in this form are indicative and subject to change and are to be relied on as a guide only. Design information is not available to support detailed quantity take offs. Assumptions have been made in relation to all quantities and costs listed in this form. All quantities and costs listed in this form are subject to change as design information becomes available to support such. All quantities and costs in this form have been provided as a rough guide, or order of magnitude only.

Additional comments of certifier

The quantities and costs mentioned in this form are indicative and subject to change and are to be relied on as a guide only. Design information is not available to support detailed quantity take offs. Assumptions have been made in relation to all quantities and costs listed in this form. All quantities and costs listed in this form are subject to change as design information becomes available to support such. All quantities and costs in this form have been provided as a rough guide, or order of magnitude only.

Attach this Excel spreadsheet to your development application or construction certificate application.

A.4 Scope 3 calculations

Table 30 – Construction materials

Material category	Sub-category	Value	Unit of measure	Emission factor – NSW Embodied Carbon Databook	Emissions factor unit	GHG emissions (tCO _{2-e})	Description of product (as per NSW Embodied Carbon Databook) and relevant assumptions
Structure							
Concrete in-situ	>40 MPa to ≤50 MPa	69,377	m ³	354	kg CO _{2-e} /m ³	24,559	Any concrete mix with a strength rating of 50 MPa or lower and greater than 40 MPa
Reinforcing steel	Bar & mesh	12,933,971	kg	1600	kg CO _{2-e} /tonne	20,694	Steel used to reinforce concrete structures (bar, mesh, cages, fibre, strand etc.)
Structural steel	Hot rolled structural	200	t	2270	kg CO _{2-e} /tonne	454	Steel used for structural purposes (unpainted, not galvanised) that has undergone hot-rolled steel production route. Including beams, columns, angles, flange channels, hollow sections.
Reinforced concrete piles	Concrete	1,233	m ³	339	kg CO _{2-e} /m ³	418	Precast hollowcore concrete slabs including reinforcing steel
Reinforced concrete piles	Steel reinforcing	308,332	kg	1600	kg CO _{2-e} /tonne	493	Steel used to reinforce concrete structures (bar, mesh, cages, fibre, strand etc.)
Waterproofing membrane	Bituminous	1,397	m ²	591.77	kg CO _{2-e} /tonne	1.0	-
Envelope							
Roof cladding	Profiled aluminium	11,090	m ²	11.8	kg CO _{2-e} /kg	1,052	Aluminium sheeting including range of thicknesses (BMT)
Wall cladding	Profiled aluminium	19,896	m ²	11.8	kg CO _{2-e} /kg	1,888	Aluminium sheeting including range of thicknesses (BMT)
Curtain wall	Single skin façade	3,170	m ²	412	kg CO _{2-e} /m ²	1,306	Represents a generic curtain wall as named. Includes glass, framing, spandrel/cladding material in one sqm rate.

Material category	Sub-category	Value	Unit of measure	Emission factor – NSW Embodied Carbon Databook	Emissions factor unit	GHG emissions (tCO _{2-e})	Description of product (as per NSW Embodied Carbon Databook) and relevant assumptions
Wall louvre system	Aluminium	6,356	m ²	18,200	kg CO _{2-e} /tonne	777	Extruded aluminium (powder coated)
Insulation	Expanded polystyrene	30,986	m ²	3.47	kg CO _{2-e} /kg	86.1	-
Permanent internal walls and doors							
Interior wall (permanent)	Plasterboard	20,158	m ²	3.37	kg CO _{2-e} /m ²	68	Board made from plaster typically coated in paper. Thickness from 4 mm to 22 mm.
Interior wall (permanent)	Blockwork	36,161	m ²	159	kg CO _{2-e} /tonne	350	Concrete brick, block and roof tiles i.e. cinder block or concrete finishing brick/tile used in masonry. Not including any core fill material or reinforcing. Thickness assumed as 140mm ¹² with density of 435 kg/m ³ (assume same as Autoclaved Aerated Concrete (AAC) blocks without reinforcing or fill)
Services							
Mechanical services	-	50,819,235	AUD excl. GST	0.538	kg CO _{2-e} /\$ spent	27,341	Use Mid-range, Product Stage (A1-A3), Table 2.2, NSW Embodied Carbon Databook, , 0.538 kg CO _{2-e} /\$ spent
Vertical transportation	-	5,688,078	AUD excl. GST	0.538	kg CO _{2-e} /\$ spent	3,049	
Electrical services	-	86,120,417	AUD excl. GST	0.538	kg CO _{2-e} /\$ spent	46,333	
Plumbing/hydraulic services	-	15,873,381	AUD excl. GST	0.538	kg CO _{2-e} /\$ spent	8,540	
Fire services	-	35,866,486	AUD excl. GST	0.538	kg CO _{2-e} /\$ spent	19,296	

¹² https://www.midlandbrick.com.au/Products/Blocks/150-Series?srsltid=AfmBOoq5aK06qoeYT_BnhM16g0TNZySg6qQH-ekg-7JuFMtFl0zbwVu

Material category	Sub-category	Value	Unit of measure	Emission factor – NSW Embodied Carbon Databook	Emissions factor unit	GHG emissions (tCO _{2-e})	Description of product (as per NSW Embodied Carbon Databook) and relevant assumptions
Security, fuel, CSMS, communications		38,142,106	AUD excl. GST	0.538	kg CO _{2-e} /\$ spent	20,520	
External works							
Concrete in-situ	>10 MPa to ≤20 MPa	1,321.8	m ³	201	kg CO _{2-e} /m ³	266	Any concrete mix with a strength rating of 20 MPa or lower and greater than 10MPa
Reinforcing steel	Bar & mesh	112,349	kg	1600	kg CO _{2-e} /kg	180	Steel used to reinforce concrete structures (bar, mesh, cages, fibre, strand etc.)
Total	-	-	-	-	-	177,672	-

Table 31 – Construction materials transport

Material category	Sub-category	Truck transport (km)	Truck transport emissions factor (tCO _{2-e} / t.km)	Rail transport (km)	Rail transport emissions factor (tCO _{2-e} / t.km)	Sea transport (km)	Sea transport emissions factor (tCO _{2-e} / t.km)	Materials (t)	GHG emissions (tCO _{2-e})	Description of product (as per NSW Embodied Carbon Databook) and relevant assumptions
Structure										
Concrete in-situ	>40 MPa to ≤50 MPa	20	0.00018 (Concrete agitator truck)	0	0.00002	0	0.00001	166,505	587	Concrete (ready mix)
Reinforcing steel	Bar & mesh	650	0.00010 (Articulated truck)	0	0.00002	2,500	0.00001	12,934	1,186	Steel - reinforcing
Structural steel	Hot rolled structural	60	0.00010 (Articulated truck)	510	0.00002	860	0.00001	200	5	Steel - structural
Reinforced concrete piles	Concrete	100	0.00010 (Articulated truck)	0	0.00002	0	0.00001	3,083	32	Concrete (pre-cast)

Material category	Sub-category	Truck transport (km)	Truck transport emissions factor (tCO _{2-e} / t.km)	Rail transport (km)	Rail transport emissions factor (tCO _{2-e} / t.km)	Sea transport (km)	Sea transport emissions factor (tCO _{2-e} / t.km)	Materials (t)	GHG emissions (tCO _{2-e})	Description of product (as per NSW Embodied Carbon Databook) and relevant assumptions
Reinforced concrete piles	Steel reinforcing	650	0.00010 (Articulated truck)	0	0.00002	2500	0.00001	308	28	Steel - reinforcing
Waterproofing membrane	Bituminous	300	0.00010 (Articulated truck)	0	0.00002	0	0.00001	2	0.052	Regionally manufactured in NSW (assumed)
Envelope										
Roof cladding	Profiled aluminium	300	0.00010 (Articulated truck)	0	0.00002	0	0.00001	89	2.7	Regionally manufactured in NSW (assumed)
Wall cladding	Profiled aluminium	300	0.00010 (Articulated truck)	0	0.00002	0	0.00001	160	4.9	Regionally manufactured in NSW (assumed)
Curtain wall	Single skin façade	300	0.00010 (Articulated truck)	0	0.00002	0	0.00001	190	5.9	Regionally manufactured in NSW (assumed)
Wall louvre system	Aluminium	300	0.00010 (Articulated truck)	0	0.00002	0	0.00001	51	1.6	Regionally manufactured in NSW (assumed)
Insulation	Expanded polystyrene	300	0.00010 (Articulated truck)	0	0.00002	0	0.00001	25	0.8	Regionally manufactured in NSW (assumed)
Permanent internal walls and doors										
Interior wall (permanent)	Plasterboard	300	0.00007	0	0.00002	0	0.00001	171	8.8	Regionally manufactured in NSW (assumed)
Interior wall (permanent)	Blockwork	100	0.00010 (Articulated truck)	0	0.00002	0	0.00001	12,150	214	Concrete (pre-cast)
Services										
Mechanical services	-	-	-	-	-	-	-	-	1,474	Use Mid-range, Transport Stage (A4), Table 2.2,

Material category	Sub-category	Truck transport (km)	Truck transport emissions factor (tCO _{2-e} / t.km)	Rail transport (km)	Rail transport emissions factor (tCO _{2-e} / t.km)	Sea transport (km)	Sea transport emissions factor (tCO _{2-e} / t.km)	Materials (t)	GHG emissions (tCO _{2-e})	Description of product (as per NSW Embodied Carbon Databook) and relevant assumptions
Vertical transportation	-	-	-	-	-	-	-	-	164	NSW Embodied Carbon Databook, 0.029 kg CO2-e/\$ spent
Electrical services	-	-	-	-	-	-	-	-	2,497	
Solar photovoltaic installations	-	-	-	-	-	-	-	-	-	
Plumbing/ hydraulic services	-	-	-	-	-	-	-	-	460	
Fire services	-	-	-	-	-	-	-	-	1,040	
External works										
Concrete in-situ	>10 MPa to ≤20 MPa	20	0.00018 (Concrete agitator truck)	0	0.00002	0	0.00001	3,172	11	Concrete (ready mix)
Reinforcing steel	Bar & mesh	650	0.00010 (Articulated truck)	0	0.00002	2500	0.00001	112	10	Steel - reinforcing
Total	-	-	-	-	-	-	-	-	8,837	-

Table 32 – Construction waste

Material category	Sub-category	Materials (t)	Wastage rate (%)	Waste materials (tonnes)	Recycling rate (%)	Waste to recycling (t)	Landfill rate (%)	Waste to landfill (t)	Emission factor - waste to landfill (tCO _{2-e} /t)	GHG emissions from landfill (tCO _{2-e})
Structure										
Concrete in-situ	>40 MPa to ≤50 MPa	166,505	2%	3,330	90%	2,997	10%	333	0.2	67

Material category	Sub-category	Materials (t)	Wastage rate (%)	Waste materials (tonnes)	Recycling rate (%)	Waste to recycling (t)	Landfill rate (%)	Waste to landfill (t)	Emission factor - waste to landfill (tCO _{2-e} /t)	GHG emissions from landfill (tCO _{2-e})
Reinforcing steel	Bar & mesh	12,934	5%	647	90%	582	10%	65	0.2	13
Structural steel	Hot rolled structural	200	1%	2	90%	1.8	10%	0.2	0.2	0.040
Reinforced concrete piles	Concrete	2,959	0%	0	90%	0	10%	0	0.2	0
Reinforced concrete piles	Steel reinforcing	308	5%	15	90%	14	10%	1.5	0.2	0.31
Waterproofing membrane	Bituminous	1.7	6%	0.10	0%	0	100%	0.10	0.2	0.021
Envelope										
Roof cladding	Profiled aluminium	89	6%	5.3	0%	0	100%	5.3	0.2	1.1
Wall cladding	Profiled aluminium	160	6%	9.6	0%	0	100%	9.6	0.2	1.9
Curtain wall	Single skin façade	190	6%	11	0%	0	100%	11	0.2	2.3
Wall louvre system	Aluminium	51	6%	3.1	0%	0	100%	3.1	0.2	0.61
Insulation	Expanded polystyrene	25	6%	1.5	0%	0	100%	1.5	0.2	0.30
Permanent internal walls and doors										

Material category	Sub-category	Materials (t)	Wastage rate (%)	Waste materials (tonnes)	Recycling rate (%)	Waste to recycling (t)	Landfill rate (%)	Waste to landfill (t)	Emission factor - waste to landfill (tCO _{2-e} /t)	GHG emissions from landfill (tCO _{2-e})
Interior wall (permanent)	Plasterboard	171	6%	10	0%	0	100%	10	0.2	2.1
Interior wall (permanent)	Blockwork	12,150	0%	0	90%	0	10%	0	0.2	0
Services										
Factors not available										
External works										
Concrete in-situ	>10 MPa to ≤ 20 MPa	3,172	2%	63	90%	57	10%	6.3	0.2	1.3
Reinforcing steel	Bar & mesh	112	5%	5.6	90%	5.1	10%	0.56	0.2	0.11
Total	-	-	-	4,105	-	3,657	-	448	-	90

Table 33 – Transport of construction employees to site

Transport type	Number of staff	Number of trips per day	Assumption	Time period	Assumed distance per trip	Fuel efficiency (L/km)	Fuel consumption during construction (kL)	Fuel type	Energy content (GJ/kL)	Total energy used (GJ)	Scope 3 emission factor (kg CO ₂ -e/GJ)	GHG emissions (tCO ₂ -e)
Construction workers trips	942	1,884	100% of workers drive (accounts for inbound and outbound trip)	33 months	25	Passenger vehicles 0.111	3,451	Gasoline	34.2	118,009	17.2	2,030
Commissioning workers trips	60	120	100% of workers drive (accounts for inbound and outbound trip)	3 months	25	Passenger vehicles 0.111	20	Gasoline	34.2	683	17.2	11.8
Total	-	-	-	-	-	-	3,471	-	-	-	-	2,042

Table 34 – Transport of employees to work during annual operations

Transport type	Number of staff	Number of trips per day	Assumption	Number of working days per year	Assumed distance per trip	Fuel efficiency (L/km)	Fuel consumption per yr (kL/yr)	Fuel type	Energy content (GJ/kL)	Total energy used (GJ/yr)	Scope 3 emission factor (kg CO ₂ -e/GJ)	GHG emissions (tCO ₂ -e/ year)
Staff trips	490	882	90% of workers drive (accounts for inbound and outbound trip)	246	25	Passenger vehicles 0.111	602.1	Gasoline	34.2	20,592	17.2	354

Table 35 – Fuel use for waste collection and deliveries during annual operations

Transport type	Number of trips per year	Assumption	Distance travelled (km/yr)	Fuel efficiency (L/km)	Fuel consumption per yr (kL/yr)	Fuel type	Energy content (GJ/kL)	Total energy used (GJ/yr)	Scope 3 emission factor (kg CO ₂ -e/GJ)	GHG emissions (tCO ₂ -e/year)	Fuel efficiency source and assumptions
Deliveries - Rigid Truck/ Semi-trailer	650	Based on a weekly delivery of one medium rigid truck (accounts for inbound and outbound trip)	32,500	Heavy duty vehicle 0.286	9.3	Diesel	38.6	358.8	17.3	6.21	Assume 50% of trips as rigid trucks/semi-trailer, 50% as carrier vans. Average 24-25 trips per week, use 25 as worst-case Assume 25 km as approximate distance, within Greater Sydney
Deliveries - Carrier Vans	650	Based on 3 deliveries per day of carrier vans for daily parcels (accounts for inbound and outbound trip)	32,500	Light commercial vehicle 0.128	4.2	Diesel	38.6	160.6	17.3	2.78	
Waste	108	1 x collection per week (cardboard/recycling) 1 x collection per week (general waste) 1 x collection per quarter (Styrofoam/soft plastics)	432	Heavy duty vehicle 0.286	0.1	Diesel	38.6	4.8	17.3	0.083	Assume all waste collected from NEXTDC gets sent to the nearest landfill/resource recovery centre. This is Cleanaway's North Ryde Resource Recovery Centre at 145 Wicks Road, Ryde. This is about 1.5 km from the NEXTDC site at Lane Cove Road, Macquarie Park.
Total	-	-	-	-	13.6	-	-	-	-	9.1	-

Table 36 – Water use during annual operations

Total water used (kL/yr or m ³ /yr)	Emission factor (kgCO ₂ -e/m ³)	GHG emissions (tCO ₂ -e/year)
1,805,994	1.83	3,301