ARUP

NEXTDC

# NEXTDC S5

## Greenhouse Gas Mitigation Plan

Reference: S5-GHG-00-000-REP-B-DVA-APP-GHG Mitigation Plan

B | 03 October 2025




Job number 296866-16

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# Document Verification

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Issue Document Verification with Document ☑

# Executive summary

## Purpose of report

This NEXTDC S5 Mitigation Plan of greenhouse gas (GHG) emissions have 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) and to address the NSW EPA Guide for Large Emitters.

This report outlines the greenhouse gas mitigation measures proposed for the proposal. In combination with the Greenhouse Gas Assessment Report (S5-GHG-00-000-REP-D-DVA-APP-GHG REPORT-20251001) it aligns to the matters outlined in the NSW EPA Guide for Large Emitters.

## Emissions estimate

The proposed data centre will be all-electric in operation, with the majority of its associated carbon emissions being accounted for within the Scope 2 bracket of purchased electricity (52%).

The large remainder of emissions associated with the proposed development are those emitted through the material specification of the building itself (18.8%).

Any remaining emissions are largely accounted for through water use and scope 1 operational activities, however, these are considered nominal (9.7%) in comparison to the purchased electricity.

## Measures to reduce emissions

NEXTDC recognises the importance of aligning with NSW Net Zero Plan, which has set ambitions to tackle climate change through the setting of GHG reduction targets of 50%, 70% and Net Zero by 2030, 2035 and 2050 respectively.

To align with these net zero targets, the proposed facility will include multiple GHG mitigation measures to address its scope 1, 2 and 3 emissions. These mitigation measures will aim to reduce GHG emissions immediately, through smart design in design and construction, as well as forward thinking strategies to ensure that the facility has a clear path to decarbonisation. The facility will be designed to be flexible and adaptable, acknowledging the rapidly changing technological advances in the industry, ensuring that future technologies can be retrospectively applied.

The table below outlines the considered mitigation measures by scope and project applicability.

**Table 1 Proposed GHG mitigation measures by scope and applicability to current design or for future consideration**

| Scope | Implemented in design | Potential future studies |
|---|---|---|
| Scope 1 | Global Warming Potential Leak detection<br>Rationalised backup power redundancy<br>Uninterruptible power supply (UPS) optimisations | Exploration into Low Global Warming Potential Refrigerants<br>Feasibility into Fossil fuel alternative backup generators |
| Scope 2 | Customer driven renewable energy contracts<br>On-site Solar Photovoltaic panels<br>Energy reduction and equipment optimisations | Adaptable design to accommodate potential future liquid cooling |

| Scope | Implemented in design | Potential future studies |
|---|---|---|
| | Submetering<br>NABERS – Building O (energy office category) & Buildings A & B (energy data centre infrastructure category)<br>Energy efficient lighting | |
| Scope 3 | Backup battery reduction<br>Prefabricated building modules<br>Onsite battery powered construction equipment<br>Low-carbon Front of House (FOH) fitout<br>Sewer mining to offset potable water consumption | Low-carbon concrete specification<br>Low-carbon steel specification<br>Copper busbar study<br>Local procurement opportunity assessment<br>On-site e-waste recycling |

Mitigating carbon emissions through smart design and lean operation are the best ways to reduce to environmental footprint of the development, however, even with these measures in place some residual emissions will need to be mitigated through an offset scheme.

NEXTDC operate their own carbon offsetting scheme, NEXTneutral, which supports offsets through initiatives like tree planting and funding a transition from fossil fuels to renewable energy projects. Through the NEXTneutral scheme, each kilowatt offset compensates for 0.492 tonnes of emissions.

# Contents



## Tables

# 1. Project introduction

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessment Requirements (SEARs) dated 8 November 2023 issued for the SSDA (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 data centre development, ancillary facilities, and associated site works. The application also includes the delivery of internal roads 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 47,285m$^2$ comprising 33,142m$^2$ of technical data hall floor space and 14,143m$^2$ 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: 16,571m$^2$
    - 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 Land Cove Road.
    - Integrated 'Building O' component within Building A, comprising:
        - Two retail tenancies at ground level: 326m$^2$
        - Lobby and innovation hub including auditorium and training rooms: 3,186m$^2$
        - NEXTDC and ancillary office floor space on upper levels: 10,631m$^2$
- Building B will be delivered in Stage 2 and will comprise the following:
    - Seven storeys of technical data floor space accommodating seven data halls: 16,571m$^2$
    - 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 139 additional trees within a total area of 4,959m$^2$ deep soil and a resultant tree canopy cover of 5,707m$^2$
- 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 on site, as well as other site services, including stormwater infrastructure.

The key components of the Proposal are listed in the following Table 2 - Project Details

**Table 2 - 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.<br>Two retail premises at ground level. |
| **Project Description** | Demolition of existing buildings and structures.<br>Site preparation works including tree removal, bulk earthworks, excavation and construction of retaining walls.<br>Staged construction of the data centre buildings including technical data hall floor space, ancillary office and innovation space and two ground floor retail premises.<br>Vehicle access via Waterloo Road with on-site car parking and loading within the building footprint.<br>Associated landscaping including extensive trees, shrubs and grasses.<br>Business identification signage.<br>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.<br>Provision of required utilities, including an on-site switching station. |
| **Gross Floor Area** | Total GFA of 47,285m$^2$, broken down as follows:<br>Data halls/technical: 33,142m$^2$<br>Lobby and innovation hub: 3,186m$^2$<br>MCX office: 10,631m$^2$<br>Retail including BOH: 326m$^2$<br>Total number of data houses: 14 data houses |
| **Building Height** | Building A: office and innovation hub – 49 metres over 10-storeys<br>Building A: data centre – 65 metres over nine-storeys<br>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 |
| **Motorbike Spaces** | 17 spaces |
| **Bicycle Spaces** | 20 spaces |
| **Utilities** | Provision of required utilities, combined for both buildings, including:<br>48 x diesel generators (3MWe).<br>16 x above-ground diesel storage tanks (100kL each). |

| Description | Proposal Details |
|---|---|
| | Eight above-ground water tanks for industrial water (600kL each).<br>One 400kL above-ground water tank for fire water.<br>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:<br>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.<br>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. |

## 1.1 Purpose of the GHG mitigation plan

Arup have prepared the GHG Mitigation Plan to evidence the requirements outlined in the Environment Protection Authority NSW Guide for Large Emitters (January 2025). The expected contents of the GHG Mitigation Plan are outlined in Appendix C of the guide. These requirements have formed the basis of this report, and we have summarised how each section has been addressed in Table 3.

**Table 3 GHG Mitigation Plan report alignment with Appendix C of the Guide for Large Emitters**

| Section / subsection | Subsection | Requirements | How it has been addressed |
|---|---|---|---|
| Legislative and policy context | | Provide an overview of the legislative and policy context as it related to GHG emissions assessment, mitigation and reporting.<br>This should include the Climate Change (Net Zero Future) Act 2023, Net Zero Plan Stage 1: 2020–2030, Protection of the Environment Administration Act 1991, Protection of the Environment Operations Act 1997 and other relevant legislation and policies, including anticipated NGER and Safeguard Mechanism requirements (if applicable) | Table 4 and 5 below acknowledge the relevant legislative and policy context relating to this GHG mitigation plan, and evidence how the following report has addressed each section. |
| GHG emissions assessment | Assessment boundary | Describe the GHG assessment boundary clearly indicating sources to be included and excluded. | Outlined in the accompanying Greenhouse Gas Assessment Report (S5-GHG-00-000-REP-B-DVA-APP-GHG REPORT-20250212). |
| | Emissions scenarios | Describe the 'project only' scenario for new developments and projects involving modifications, and the 'business-as-usual' and 'modified-business' scenarios for modification projects | Outlined in the accompanying Greenhouse Gas Assessment Report (S5-GHG-00-000-REP-B-DVA-APP-GHG REPORT-20250212). |

| | | | |
|---|---|---|---|
| | Emissions sources | List GHG emissions sources within the project assessment boundary.<br><br>Address the scope 1, 2 and 3 emissions sources.<br><br>Prioritise sources for mitigation and, if required, referencing initial emission estimates excluding mitigations to inform prioritisation. | Outlined in the accompanying Greenhouse Gas Assessment Report (S5-GHG-00-000-REP-B-DVA-APP-GHG REPORT-20250212). |
| | Mitigation measures | Provide a description of measures to be implemented to avoid and reduce the project's scope 1, scope 2 and scope 3 emissions | Mitigation measures for each scope emission category have been outlined in Section 4 below. |
| | Assessment methodology | Document emission estimation methods applied, and underlying assumptions used to develop emissions estimates | Outlined in the accompanying Greenhouse Gas Assessment Report (S5-GHG-00-000-REP-B-DVA-APP-GHG REPORT-20250212). |
| | Scope emission estimate | Provide the underlying activity data, emissions factors and emissions intensities | Outlined in the accompanying Greenhouse Gas Assessment Report (S5-GHG-00-000-REP-B-DVA-APP-GHG REPORT-20250212). |
| | Independent review | Describe the outcome from the independent expert review | An independent review has not been undertaken for this work. |
| Emission benchmarking | Reporting obligations and safeguarding | If applicable, provide information relevant to Safeguard Mechanism reporting. | Not applicable |
| Goal setting | Goals | Describe scope 1 emissions goals (long-term and interim), scope 2 emission goals, and consider scope 3 goals | Requires NEXTDC input |
| | Emissions trajectory | Consider developing a graphical figure which shows the project's estimated emissions trajectory taking into account emission goals. | Requires NEXTDC input |
| Offset strategy | | Provide an estimate of the number of offsets planned to be used for the project | NEXTDC operate their 'NEXTneutral' offsetting service which allows customers to offset all carbon generated by their IT equipment when collocated in one of their facilities. |

# 2. Legislative and policy context

This report has been developed in the context of legislative drivers in NSW in which the proposed project resides. An overview of key policy and its relevance to the GHG mitigation report has been outlined in Table 4 below.

**Table 4 Outline of the relevant policy and legislation as per Appendix C (Section 2) of the Guide for Large Emitters**

| Document | Description | Relevance to the GHG mitigation assessment |
|---|---|---|
| Climate Change (Net Zero Future) Act 2023 (NSW) | Legislates a comprehensive approach to achieving net zero emissions by 2050, including setting interim targets, establishing guiding principles, and creating an independent Net Zero Commission to monitor progress | Sets legally binding targets for reducing greenhouse gas emissions, including interim targets for 2030 and 2035, and the ultimate goal of net zero emissions by 2050. It provides a framework for monitoring and reporting progress. |
| Net Zero Plan Stage 1: 2020-2030 | Outlines the state's strategy to reduce greenhouse gas emissions by 47-52% below 2005 levels by 2030, while fostering economic growth and job creation, as part of its broader goal to achieve net zero emissions by 2050 | Outlines specific strategies and initiatives to reduce emissions by 47-52% below 2005 levels by 2030. |
| Protection of the Environment Administration Act 1991 | Establishes the Environment Protection Authority (EPA) in New South Wales, outlining its responsibilities, powers, and management structure to oversee and enforce environmental protection laws | This Act establishes the Environment Protection Authority (EPA), which is responsible for enforcing environmental laws and regulations. The EPA oversee the enforcement of the Guide for Large Emitters in which this report responds to. |
| Protection of the Environment Operations Act 1997 | Primary legislation for environmental protection in New South Wales, aiming to safeguard and enhance the environment and human health through integrated pollution control and sustainable development practices | Provides the primary legal framework for pollution control and environmental protection in NSW. It includes provisions for monitoring and managing emissions from various sources. |

As per the Appendix C of the NSW Guide for Large Emitters, the GHG Mitigation report should directly address the requirements of the NSW Climate Change Act (2023) and evidence how the proposed development addressed each guiding principle. The table below seeks to address this.

**Table 5 Section 8 requirements of the Climate Change Act (2023) and alignment with the proposed development**

| Guiding Principle | Detail | How it has been addressed |
|---|---|---|
| Urgency, Necessity and Early Action | A critical need to act to address climate change, which is a serious threat to the social, economic and environmental wellbeing of New South Wales.<br>Action to address climate change should be taken as early as possible to minimise the cost and adverse impacts of climate change. | Many of the mitigations outlined in the report below will be implemented into design and provide evident GHG reductions from day-1 of building operation, as well as in construction emission reductions. |
| Fiscal Responsibility and Sustainable Growth | Action to address climate change should be taken in a way that is fiscally responsible, and promotes sustainable economic growth, and considers the economic risks of delaying action to address climate change, and considers the impact on rural, regional, and remote communities in New South Wales. | The mitigations proposed are commercially viable, have been balanced with the operational integrity of the proposed facility, and seek to reduce GHG emissions in a way that addresses climate change with the necessary urgency, whilst still ensuring the promotion of sustainable economic growth. |

| Guiding Principle | Detail | How it has been addressed |
|---|---|---|
| Ecologically Sustainable Development | Action to address climate change should be consistent with the right to a clean, healthy and sustainable environment.<br><br>Action to address climate change should be consistent with the principles of ecologically sustainable development described in the Protection of the Environment Administration Act 1991, section 6. | The proposed facility will be predominantly operated on an all-electric basis (excluding nominal generator testing requirements provided solely for emergency backup power) and will not negatively impact the local air quality. |
| Consultation | Action to address climate change should involve appropriate consultation with affected persons, communities and stakeholders. | The proposed facility has been through due stakeholder engagement processes, and the client has had engagement sessions with NSW and the EPA to ensure a satisfactory outcome as part of any planning process.<br><br>The facility will adopt industry best practice techniques and technologies to ensure that the need to address climate change is appropriately met.<br><br>This development will have a positive impact on the local industry, fostering the opportunity for high-skilled labour opportunities, in addition to wider employment benefits such as site security.<br><br>The development will also help meet the demands of a digital transition in NSW, supporting the rapid growth of a digital economy in the region. |
| Alignment with NSW Government ambitions | The Government of New South Wales is responsible for urgently developing and implementing strategies, policies and programs to address climate change, and ensuring the Government of New South Wales pursues best practice in addressing climate change. | The New South Wales Government has set targets for Net Zero by 2050, with 50% and 70% reductions over a 2005 baseline required by 2030 and 2035 respectively.<br><br>This development, for its base operator load, will be powered using a Power Purchase Agreement of 24/7 clean energy. It is also highly likely that any potential tenant of the facility will likely operate under a similar contract, and therefore it is reasonable to assume that the Scope 2 emissions associated with the facility will be 100% renewable.<br><br>In addition to this, the proposed facility has a clear path to Net Zero operation in its Scope 1 emissions. Despite the initial design proceeding with diesel powered generators, further exploration into the market viability of Hydrated Vegetable Oil (HVO) compatible generators will be undertaken.<br><br>The reduction of Scope 3 emissions poses the biggest challenge regarding emission reduction, given that much of these emissions are produced in the supply chain and out of the building owner's control. That being said, the proposed facility demonstrates several mitigations that show a willingness to tackle this challenge head-on and make meaningful reductions in that area. |
| Biodiversity | The need to reduce the risk climate change poses to the survival of all species. Action to address climate change should consider the impact on local flora and fauna. | This existing site is considered of low-ecological value, and tree retention measures will be utilised to maintain and enhance the existing land.<br><br>The project will retain 131 trees from the existing site and increase canopy coverage by 28.7%. |

# 3. Greenhouse gas emissions estimate

Arup prepared an assessment of greenhouse gas (GHG) emissions has been prepared by Arup on behalf of NEXTDC Limited for the data centre development at 269 Lane Cove Road (the Proposal). 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.

For more detailed information on the Greenhouse Gas Emission impact of the project, please see the accompanying Greenhouse Gas Assessment Report (S5-GHG-00-000-REP-D-DVA-APP-GHG REPORT-20251001).

## 3.1 Scope of GHG inventory

Scope 1, 2, 3 refers to a framework that originates from the Greenhouse Gas (GHG) Protocol. The GHG Protocol Initiative is a multi-stakeholder partnership of businesses, non-governmental organisations, governments and several voluntary organisations, convened by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD). Whilst universally applicable, there are some nuances within the data centre industry when looking at GHG reporting, most notably for colocation providers such as NEXTDC.

When referring to Scope 1 emissions, the report is referring to the direct emissions from operations that are owner or controlled by the reporting company. For the purposes of this report, emissions owned and controlled by the reporting company are here referring to those associated with the base build, and exclusive of tenant driven emissions such as consumed electricity in rented tenant server spaces. In the case of data centre buildings, examples of Scope 1 emission contributing components are (but not limited to) backup generators, air conditioning units on site, on-site fleet vehicles.

Scope 2 emissions refer to the indirect emissions from the generation of purchased or acquired electricity, steam, heating, or cooling consumed by the reporting company. Scope 3 emissions refer to all other indirect emissions (i.e., those owned, controlled and generated by others) which result from the organisation's activities such as travel, procurement, water and waste.

For each scope, an example of what would typically be included for data centres is provided in Table 6.

**Table 6 Scope emissions in data centres**

| Emissions Type | Scope | Definition | Data Centre Examples |
|---|---|---|---|
| Direct emissions | Scope 1 | Emissions from operations that are owned or controlled by the reporting company | Backup generators, air conditioning units on site, on-site fleet vehicles |
| Indirect emissions | Scope 2 | Emissions from the generation of purchased or acquired electricity, steam, heating, or cooling consumed by the reporting company | Indirect emissions from the electricity the organisation purchases |
| | Scope 3 | All indirect emissions (i.e., those owned, controlled and generated by others) which result from the organisation's activities such as travel, procurement, water and waste. | All other emissions, including but not exclusive to:<br>Purchased goods and services e.g., server racks, generators, chillers |

| | | | |
|---|---|---|---|
| | | | Transportation and distribution e.g., materials for construction<br>End of life treatment e.g., for racks, facilities and other equipment<br>Energy used downstream as a result of business activity<br>Business travel<br>Employee commuting |

## 3.2 GHG emissions estimate

Arup calculated GHG emissions 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 $CO_2$-e of GHG emissions. A summary of the GHG emissions for the Proposal is outlined below.

**Table 7 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 8 Summary of Scope 1, 2 and 3 emissions for the Proposal - Operation Phase (over 50 years) 9**

| 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% |
| | Fuel use for waste collection and deliveries | 460 | 0.048% |

| Scope | Emissions category | Operation emissions over 50 years (t $CO_{2-e}$)[1] | Operation emissions as % of all GHG emissions |
|---|---|---|---|
| **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.

For detail of the methodology used for GHG calculations, please see the accompanying Greenhouse Gas Assessment Report (S5-GHG-00-000-REP-D-DVA-APP-GHG REPORT-20251001).

## 3.3 Comparison with NSW emissions

The comparison of the Proposal's GHG emissions against the Australian and NSW GHG emissions is shown in Table 9. 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 9 Comparison of the Proposal's GHG emissions against the Australian and NSW GHG emissions**

| 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[1] |
| **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% | - |

[1] 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)

# 4. Measures to avoid and reduce GHG emissions

The proponent recognises the importance of aligning with NSW Net Zero Plan, which has set ambitions to tackle climate change through the setting of GHG reduction targets of 50%, 70% and Net Zero by 2030, 2035 and 2050 respectively.

In order to align with these net zero targets, the proposed facility will include multiple GHG mitigation measures to address its scope 1, 2 and 3 emissions. These mitigation measures will aim to reduce GHG emissions immediately, through smart design in design and construction, as well as forward thinking strategies to ensure that the facility has a clear path to decarbonisation. The facility will be designed to be flexible and adaptable, acknowledging the rapidly changing technological advances in the industry, ensuring that future technologies can be retrospectively applied.

The table below provides a summary of the measures proposed for each scope, and their applicability to current or future design. This table is further expanded upon in the following sections.

**Table 1100 Proposed GHG mitigation measures by scope and applicability to current design or for future consideration**

| Scope | Implemented in design | Potential future studies |
|---|---|---|
| Scope 1 | Global Warming Potential Leak detection<br>Rationalised backup power redundancy<br>Uninterruptible power supply (UPS) optimisations | Exploration into Low Global Warming Potential Refrigerants<br>Feasibility into Fossil fuel alternative backup generators |
| Scope 2 | Customer driven renewable energy contracts<br>On-site Solar Photovoltaic panels<br>Energy reduction and equipment optimisations<br>Submetering<br>NABERS – Building O (energy office category) & Buildings A & B (energy data centre infrastructure category)<br>Energy efficient lighting | Adaptable design to accommodate potential future liquid cooling |
| Scope 3 | Backup battery reduction<br>Prefabricated building modules<br>Onsite battery powered construction equipment<br>Low-carbon Front of House (FOH) fitout<br>Sewer mining to offset potable water consumption | Low-carbon concrete specification<br>Low-carbon steel specification<br>Copper busbar study<br>Local procurement opportunity assessment<br>On-site e-waste recycling |

## 4.1 Measures to address scope 1 emissions

The measures outlined below present industry leading technology and best practice techniques to manage the Scope 1 emissions associated with the proposed facility.

### Low-Global Warming Potential (GWP) refrigerants

The proposed development will consider the GWP of any refrigerant type as part of the specification for chillers on site. Low-GWP refrigerants have a much lower potential to contribute to global warming compared to traditional refrigerants, and therefore the specification of a low-

GWP chiller refrigerant would positively contribute to the reduction of the facilities Scope 1 emissions. It has been agreed with the building owner that GHG reduction potential will form in important part of any decision made with regard to this equipment specification.

It is also noted that, whilst some low-GWP refrigerants can improve the energy efficiency of cooling systems, a life-cycle assessment analysis will be implemented to ensure that the trade-off between GWP and energy efficiency is managed appropriately, therefore ensuring that optimal GHG reduction is achieved across all Scope 1, 2 and 3 emission groups.

### Leak detection

As technology advances and systems optimise, the likelihood of refrigerant leakage decreases. For example, a general assumption for annual refrigerant leakage could be <2%. The specification of low-GWP refrigerants, as outlined above, also helps to mitigate this impact as low-GWP refrigerants, when leaked, have a significantly lower impact on global warming compared to high-GWP refrigerants.

Despite this, refrigerant leakage is a common issue that data centre operators face, and it negatively impacts their Scope 1 emission reporting. Considering this, the proposed facility will utilise industry best practice technology in the form of built-in leak detection systems for all applicable units, ensuring that systems are monitored continuously and the prevention of excessive leakage of all GWP systems is maintained.

### Hydrated Vegetable Oil (HVO) compatible generators

An emerging technology within the industry are HVO compatible generators, which aim to serve as a transitional solution away from fossil fuel use for backup power solutions, significantly reducing Scope 1 emissions. It should be noted that this technology is widely regarded as a short-term measure, and long-term solutions to net-zero backup power solutions are still largely hypothetical, and the market availability and viability of these solutions come with challenges.

That being said, the proposed facility owner recognises the importance of transitioning away from on-site fossil fuel use, even for the nominal consumption expected as part of backup power maintenance regimes and will continue to assess the site viability and market availability of this technology throughout the building lifecycle.

The proposed site will deploy HVO compatible generators, although initially powered by diesel due to market availability of the alternative fuel source. The specification of HVO fuel compatible generators demonstrates the facilities route to decarbonisation of its Scope 1 emissions, in line with New South Wales (NSW) targets of Net Zero by 2050, and the option to upgrade supporting infrastructure (diesel tank rooms to HVO tank rooms) will be assessed during the building lifetime.

### Rationalise redundancy

Data center operations are often critical to supporting the ever-growing digital economy in which we all rely on, whether that be through banking institutions, cyber security and availability, or computer systems that underpin almost all of our modern-day economies. For that reason, a key performance indicator (KPI) for any data center is its ability to be operational 24/7, 365 days a year.

In the event of a grid power outage, data centre providers use backup generators to instantaneously support their electricity requirements. Whilst these power outages occur on a very small number of occasions, it is a key requirement for any building tenant/customer that they are in place, and for a colocation provider such as NEXTDC, this is of paramount importance when advertising the space to future tenants.

That being said, in a commitment to reducing the Scope 1 GHG emissions associated with the facility, backup generator requirements for redundancy purposes have been rationalized from 6no. 5M4 2MW generator total of 30 generators to 4no. 6M5 3MW total of 24 generator per building. Despite having higher capacity per unit, efficiency will come from better fuel consumption compared to smaller generators previously specified. On top of reduced emission benefits, this has also enabled more space provision for future use of catalytic converters if deemed appropriate.

Whilst it is expected that these generators would likely only ever be used for routine testing schedules, the reduction of generator numbers will bring not only a benefit to any potential Scope 1 emissions incurred from operation, but also Scope 3 emissions associated with the production and transportation of said equipment.

### Uninterruptible Power Supply (UPS) optimisations

An uninterruptible power supply (UPS) is a device that keeps a data centre's equipment running during power outages, securing uptime and providing facility-wide protection for sensitive electronics.

These systems themselves do not contribute to the Scope 1 emissions of a facility; however, they are a key proponent in managing the systems that do. By optimising the UPS systems in place, facilities can be designed to operate in a more energy efficient manner, reducing the amount of energy wasted during power conversion and storage and subsequently reducing the amount of fuel required for backup generators and other critical systems.

The building owner has confirmed that continual studies into the optimisation of UPS systems will be undertaken, and that there will be an aim to reduce losses from 4% to 2%, which will have a tangible reduction impact on Scope 1 emissions for the facility.

## 4.2 Measures to address scope 2 emissions

The measures outlined below summarise approached to manage the Scope 2 emissions associated with the proposed facility.

### Power Purchase Agreement (PPA) for Renewable Energy

PPAs have a role to play in decarbonising the electricity sector and ensuring demand growth from large energy users, such as data centres, reduces the cost of reaching renewable energy targets. A number of PPAs have been executed by data centres in recent years to finance renewable electricity generation projects. Data centre operators purchasing PPAs that add additional renewables, and use the electricity grid efficiently, can play a positive role in renewable energy transformation. These PPAs are long-term contracts between data centre operators and utility companies in which the operator will contract power at a pre-negotiated price, often stipulated to be solely sources through renewable energy sources such as solar or wind farms.

NEXTDC reported that over 70% of their Scope 2 emissions in the financial year of 2023 were driven by their major customers, most of whom offset their scope emissions through the PPAs.

It is expected that this proposed development will be the same, and the Scope 2 emissions associated with the facility will be offset through building tenant contracts.

### Energy-use reduction and equipment optimisation

The data centre design has a targeted PUE of 1.35, which performs comparably better than the industry standard PUE of 1.59. Designing to this PUE, over the industry average, results in roughly 189,216,000 kWh annual savings in energy use.

Optimisation of controls to reduce PUE and save carbon over operational life cycle of facility.

### Submetering

Data centre operators are constantly seeking optimised operational performance, not just for the capital benefits that it brings, but also for the Scope 2 emissions reductions it offers.

This facility will be no different and will be heavily sub-metered to monitor energy consumption and identify areas for continual improvement through consumption reduction. These submeters will allow for the identification of inefficiencies and areas where energy consumption can be reduced, where cooling systems can be optimised, and subsequently how the Scope 2 emission impact of the facility can be lowered.

### NABERS

The proposed development will be pursuing NABERS accreditation, with Building O targeting a 5.5-star NABERS energy rating for its office facilities, and a 6 star stretch target. The associated data hall areas will be designed to achieve a NABERS 5-star rating for energy under the Data Centre Infrastructure category, with a stretch target of 5.5 stars. It will also meet stringent façade glazing requirements from BCA which will optimise the cooling requirements associated with the Front of House (FOH) areas.

For further information on the NABERS performance of the proposed development, see the Ecologically Sustainable Development (ESD) Report (S5-ESD-00-000-REP-H-DVA-APP-ESD REPORT-20250214).

### Deployment of onsite renewable energy systems

In addition to PPAs, facilities can deploy direct, on-site renewable energy technologies to offset their Scope 2 emissions. Typically, given the electricity associated with 24/7 operation, these onsite renewables are directed away from the data hall activity (which is covered through PPAs), and focussed instead on offsetting the emissions associated with the Front-of-House (FOH) areas.

In this instance, the proposed facility will have 200kW of PV provision to offset the emissions associated with FOH areas.

### Energy efficient lighting in design

All lighting will be specified to a high standard, in compliance with Section J requirements, and operated using sensors to ensure minimised emissions in idling operation. This level of lighting efficiency is estimated to reduced energy consumption associated with lighting over traditional lighting design by 75%.

### Adaptable design for liquid-to-chip

Emerging technologies such as liquid-to-chip cooling systems have the potential to dramatically reduce Scope 2 emissions from facilities through significantly enhanced operational energy efficiency. Direct-to-chip liquid cooling is much more efficient than traditional air cooling. It directly removes heat from the server components, reducing the need for energy-intensive air conditioning systems. This efficiency translates to lower electricity consumption, thereby reducing the indirect emissions associated with power generation. On top of this, by efficiently managing the heat generated by high-performance computing equipment, direct-to-chip liquid cooling systems can lower the overall energy demand of the data center, reducing the electricity required from the grid and subsequently lowering the Scope 2 emissions impact of the facility.

Despite this technology largely being in its infancy, the proposed facility will be designed to be adaptable to incorporate future direct to chip cooling technology, with designated space areas

allocated in design, ensuring that should it become widely available to the market the building operator can upgrade the existing systems.

This mitigation measure demonstrates how the proposed facility is designed for flexibility to adopt future innovation and ground-breaking technologies as and when they become viable.

## 4.3 Measures to address scope 3 emissions

The measures outlined below summarise approached to manage the Scope 3 emissions associated with the proposed facility.

### Low-carbon concrete

Concrete is the most widely used material globally. We depend on various types of concrete daily; from the pavers we walk on to the high-performance structural concrete in our buildings and infrastructure. The cement component is responsible for up to 90% of the greenhouse gas (GHG) emissions linked to concrete.

Concrete is often one of the largest contributors to embodied carbon in data centres, accounting for up to 40% of the total emissions. The proposed facility is targeting the use of 30% supplementary cementitious materials (SCM) in concrete used.

It has been noted however that this could potentially increase footings required, and further study will be undertaken to assess the feasibility of delivering this target whilst balancing Whole Life Carbon considerations of the building footprint.

### Low-carbon steel

Reinforcement steel is a critical structural component of any building, especially for one with heavy loading requirements such as a data centre. For that reason, reinforcement and structural steel make up ~10% of the total embodied carbon footprint of a data centre.

There are however emerging companies that help to mitigate this impact through the production of ‘Green steel’. Electric Arc Furnace (EAF) steel, which uses recycled scrap metal, has a lower carbon footprint compared to Basic Oxygen Furnace (BOF) steel, which relies more on raw iron ore recycled steel, source materials locally, and adopt efficient construction practices. In addition, the deployment of Modern Methods of Construction (MMC), such as designing for disassembly using bolted connections can reduce life-cycle impacts, can help reduce the Scope 3 emission impact associated with constructable steel.

The building owner for the proposed facility has committed to further understanding the supply chain availability of low-carbon steel options for this development, and exploring opportunities in which Scope 3 emissions associated with steel use can be reduced.

### Copper busbars

The use of copper busbars in place of aluminium counterparts has been found to reduce embodied carbon emissions, and subsequently Scope 3 emissions, for data centre design considering the large quantities required. However, this is a costly alternative and faces commercial scrutiny on projects if the market viability is not readily available.

The building owners have committed to exploring the commercial viability of this measure, factoring in the Scope 3 emissions reduction potential alongside the impact on project cost.

### Local procurement opportunities

In some instances, the transportation of materials to site can account for ~10% of the total embodied carbon emissions for a construction project. Whilst it is expected that this percentage ratio for a data centre would likely be smaller (given high-intensity MEP equipment), it is clear that the transportation of construction materials contributes significantly to the Scope 3 emissions of a project.

Considering this, Multiplex (building contractor) will work with NEXTDC to seek local procurement opportunities for materials where viable. This is likely to be especially prevalent when looking at more generic building materials such as facade panels, insulation and furnishings.

### Backup battery reduction

Backup battery power in a data center is a system that provides power when the main power source fails. It's used to keep critical infrastructure running, even during power outages, and forms a key part of UPS systems.

Similarly to the optimisation of UPS systems, which can help to reduce Scope 2 emissions, measures can be taken to optimise backup battery systems and in turn reduce the Scope 3 emission impact of a facility. By shortening the time in which a backup battery is in operation, the number of batteries required to support the system can also be reduced. This reduction in battery quantity decreases the demand for raw materials and the emissions associated with their extraction, processing and transportation, all of which contribute to the Scope 3 emissions of the facility.

Considering this, the proposed facility has reduced its backup battery power time from 7 minutes down to 4 minutes, which will positively mitigate the Scope 3 emission impact associated with this critical building component.

### E-waste

MEP equipment and server waste are significant contributors to the embodied carbon of a data centre, even contributing to as much as 60% of the total building impact. Furthermore, given their component make up of extracted earth materials and carbon-intensive items such as steel and copper, they are the most significant contributors of Scope 3 emissions for a data centre associated with supply chain.

Circular Economy principles, such as on-site recycling facilities for this electronic waste, can serve as a good way for facilities to reuse and recycle what would otherwise be waste items, thus reducing their Scope 3 impact both through their waste streams and subsequent need to purchase and replace waste items.

The building owners will work collaboratively to factor in recycling and waste processing facilities into the proposed design, ensuring that Scope 3 emissions associated with e-waste can be mitigated at source.

### Water use reduction

The site will adopt sewer mining technology to treat and clean water required for the cooling towers. By sourcing water straight from the existing sewer system, the proposed facility can offset its requirement for potable water by the amount of available sewer water it can draw from. The average data centre could consume around 1.8 litres of water for every kWh of energy consumed.

The site will also be designed to meet a WUE target of 1.5 compared to the industry standard of 1.8 which will result in a 17% saving in water use.

### Pre-fabricated building modules

The use of Modern Methods of Construction (MMC), such as pre-fabrication, can help to significantly reduce Scope 3 emissions associated with construction through efficient material use, reduced transportation emissions, lower on-site energy use, improved quality control and a more strategic approach to reusability and recycling.

Data centres design in general lends itself to pre-fabrication, with modular and standardised building elements being a staple of optimal design.

Considering this, the proposed facility construction will, wherever possible, look to utilise prefabricated building units such as cable tray runs, mechanical risers, and more generalist building items such as facades.

### Battery operated construction plant

A further contributor to Scope 3 emissions through construction, beyond the materials themselves, is the equipment and plant required onsite to- assemble the building. Smarter, less carbon intensive ways of working on site have emerged in recent years, deploying the use of battery-operated tools over traditional fossil-fuel consuming ones for example. Multiplex, the lead contractor on this project, will ensure that industry best-practice techniques and responsible site construction management practices are implemented throughout the proposed facility construction to reduce the Scope 3 emissions of the project wherever possible.

### Low-carbon FOH fit-out

Outside of the data hall, the specification of furniture, furnishing and wider fit out requirements can impact the Scope 3 emissions of a facility. This can be especially prevalent in products such as carpets and paints, which can have a high volatile organic compound (VOC) rate and potentially have short and long-term effects on building user health.

Considering this, the building owner will ensure that as part of any fitout of occupied spaces, the procurement and specification of low-carbon, low-VOC materials will be a key factor in any decisions.

# 5. GHG emissions goals

NEXTDC to confirm approach to goal setting

NSW have taken action to tackle climate change through legislated 2030, 2035 and 2050 targets that set a clear path to achieving Net Zero emissions.

Through a Net Zero Commission, the state will assess proposed developments on their alignment and support with the following ambitions:

- 50% GHG emission reduction by 2030 compared to 2005 levels
- 70% GHG emission reduction by 2035 compared to 2005 levels
- Interim targets to be prescribed in 2040 and 2045 based on progress against the aforementioned targets
- State Net Zero status by 2050

In addition to these Net Zero targets, the State is looking to further economic growth, supporting initiatives in the fields of Energy, Electric Vehicles, Hydrogen, Technology and the Built Environment.

The proposed facility not only acts as a critical service to supporting these ambitions for economic growth, digitalisation and the energy transition, but also highlights the ability to do in a sustainable manner.

The Scope 1 emissions for the proposed facility are 93,340 $TCO_2e$ and account for 9.7% of the total development emissions.

Prior to any potential offset, the proposed facility will aim to deliver reductions in Scope 1 emissions through the mitigation of high-intensity GWP products, rationalising required redundancy levels where possible, in addition to paving a clear path to future Scope 1 decarbonisation through adaptable generator specification and fossil-free backup equipment.

The Scope 2 emissions for the proposed facility are 489,590 $TCO_2e$ and account for 52% of the total development emissions.

Scope 2 emission reductions will be driven through operational efficiency and optimisation measures that are continually assessed, implemented and then further reassessed. A clear path to decarbonisation of these emissions also sits within the proponent's ability to procure 24/7 renewable energy through a PPA contract for their owned and controlled electricity consumption. Likewise, any remaining emissions that are associated with tenant occupation and thus out of the building owner control can still be mitigated through privately sourced PPA contracts.

The mitigation of Scope 3 emissions is an ongoing challenge with the industry and requires continued collaborative effort between the data centre operators and supply chain to decarbonise. As previously highlighted, the proponent of this proposed development will strive to mitigate its Scope 3 impact wherever commercially viable, working with both its supply chain and head contractor to seek innovative, best-practice solutions.

Data centres now are widely classed as critical infrastructure, acting as the backbone of an ever-growing digital economy that is so heavily reliant on cloud computing, data storage, artificial intelligence and real time digital services. This proposed facility, in addition to aligning with NSW's ambitions for Net Zero by 2050, will be a valuable addition to the digital economy of the region and serve as best-practice example of sustainable data centre design and build.

# 6. Offsetting

Mitigating carbon emissions through smart design and lean operation are the best ways to reduce to environmental footprint of the development, however, even with these measures in place it is likely that some residual emissions will need to be mitigated through an offset scheme.

NEXTDC are Australia's only data centre provider to be certified carbon neutral by offsetting the carbon created from within their organisation. They leverage Climate Active-accredited carbon offset partnerships to offset carbon emitted, with those offsets funding the critical ecological projects.

NEXTDC operate their own carbon offsetting scheme, NEXTneutral, which supports offsets through impactful initiatives like tree planting and funding a transition from fossil fuels to renewable energy projects. Through the NEXTneutral scheme, each kilowatt offset compensates for 0.492 tonnes of emissions.

An overview of sustainable projects supported by NEXTDC as part of their NEXTneutral programme are shown in the table below.

**Table 11 11 Overview of NEXTDC's NEXTneutral sustainability programme**

| Sustainable project | Description |
|---|---|
| Native vegetation and reforestation | Native vegetation projects are carbon offset initiatives that improve water quality and help to preserve pristine natural habitats. These projects re-introduce carbon absorbing plant life to areas stripped by development which significantly reduces the effects of carbon pollution |
| Cool fire burning | Fire abatement projects improve the health of our country, through the prevention of destructive wildfires. By enabling controlled back burning techniques that prevent the spread of wildfires, it encourages the natural regeneration of the land and prevents the creation of harmful carbon emissions. |
| Renewable energy | From all over the world, the shift to clean energy is in overdrive. Through important renewable energy projects, NEXTDC help to replace polluting energy sources with more efficient or carbon neutral ones and create a surplus of clean power for local communities. |

# 7. Performance monitoring and reporting

## GHG mitigation plan review, monitoring and reporting

NEXTDC monitors and reports its greenhouse gas emissions in alignment with recognised frameworks such as the GHG Protocol and Australia's Climate Active program, covering Scope 1 and Scope 2 emissions across its data centre operations.

In FY2025, the company disclosed 7,927 $tCO_2$-e for Scope 1 and 358,348 $tCO_2$-e for Scope 2, supported by rigorous internal review and third-party assurance.

Performance is tracked through key efficiency metrics, including a portfolio Power Usage Effectiveness (PUE), Water Usage Effectiveness (WUE), climate resilience, circularity and diversion of waste from landfill.

These measures, detailed in the FY2025 ESG report, demonstrate NEXTDC's commitment to reducing environmental impact while enabling sustainable digital infrastructure growth.

# 8. Conclusion

This report, prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued for the project (SSD-63168959), identifies mitigation measures for the main sources of greenhouse gas emissions associated with the development, as outlined in the partnered Greenhouse Gas Assessment Report (S5-GHG-00-000-REP-D-DVA-APP-GHG REPORT-20251001).

This report recognises the legislative context in which it resides, and outlines compliance and alignment with key policies such as the Climate Change (Net Zero Future) Act 2023 (NSW), the Net Zero Plan Stage 1: 2020-2030, the Protection of the Environment Administration Act (1991) and the Protection of the Environment Operations Act (1997).

Through the mitigation measures proposed, the development will seek to minimise its scope 1, 2 and 3 emission impact and align with the NSW Net Zero Plan GHG reduction targets of 50%, 70% and Net Zero by 2030, 2035 and 2050 respectively.

Finally, where emissions are unavoidable, the report provides an overview of the offsetting strategy consistent with NETXDC's internal NEXTneutral plan, which they currently utilise across their business to act as Australia's only certified carbon neutral data centre provider.