FY2025 GHG Inventory
Basis of Preparation
Christchurch International Airport Limited

CONVERSIO

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1. Introduction

This greenhouse gas (GHG) inventory report presents the emissions profile for Christchurch International Airport Limited (CIAL) for the 2024–25 financial year (FY25). It has been prepared to support dual reporting objectives:

- Airport Carbon Accreditation (ACA) Level 5 submission; and
- Mandatory climate-related disclosures under New Zealand's Climate Standards.

Total gross GHG emissions for the reporting year were:

Basis of reporting	Scope 1 (t CO_2-e)	Scope 2 (t CO_2-e)	Scope 3 (t CO_2-e)	Total (t CO_2-e)
Location-based	257	1,503	724,324	**726,084**
Market-based	257	0	724,324	**724,581**

CIAL's inventory includes Scope 1, Scope 2, and a broad set of Scope 3 categories in line with ACA Level 5 expectations and the GHG Protocol. Notably, full-flight aircraft emissions (Scope 3 Category 11) represent over 97% of reported emissions, highlighting the airport's role as a facilitator of downstream aviation activity.

This report has been prepared in accordance with the GHG Protocol Corporate Standard, the Scope 2 Guidance, the Corporate Value Chain (Scope 3) Standard, the accompanying Technical Guidance for Calculating Scope 3 Emissions, the ACA Application Manual (Issue 14) and guidance from the New Zealand Ministry for the Environment (MfE).

It is structured to meet the disclosure requirements set out in Aotearoa New Zealand Climate Standard 1: Climate-related Disclosures (NZ CS 1) and Aotearoa New Zealand Climate Standard 3: General Requirements for Climate-related Disclosures (NZ CS 3), and to support independent assurance in accordance with New Zealand Standard on Assurance Engagements 1: Assurance Engagements over Greenhouse Gas Emissions Disclosures (NZ SAE 1).

2. Purpose and intended use

This report documents the Basis of Preparation is to document the basis of preparation for CIAL's GHG inventory for the FY25 reporting period. It supports:

- Submission to the ACA program; and
- Inclusion in CIAL's climate-related disclosures under the Financial Sector (Climate-related Disclosures and Other Matters) Amendment Act.

The report is intended for multiple audiences:

- Internal stakeholders (management, board, risk and sustainability teams)
- Independent assurance providers
- Regulatory bodies (External Reporting Board, Financial Markets Authority)
- Investors and external reviewers of CIAL's climate-related disclosures

The Basis of Preparation outlines the methodology, assumptions, boundaries, and data sources used in compiling the GHG inventory. It defines the organisational and operational boundaries, explains how activity data was collected and validated, and documents how emissions factors, estimation techniques, and data

limitations have been applied. This foundation ensures transparency, consistency, and auditability, meeting the requirements for independent assurance under NZ SAE 1.

To support this broad audience, the content has been structured to balance the technical rigour required for assurance and compliance with a clear, accessible format that promotes traceability and understanding. Methodologies, assumptions, and key decisions are presented using consistent, professional language and supported by relevant standards and references, ensuring the final report is technically robust while remaining appropriate for both technical and non-technical readers.

3. Alignment with New Zealand Climate Standards and assurance framework

This report aligns with the Metrics and Targets requirements in NZ CS 1: Climate-related Disclosures, as follows:

- Disclosure [22]: Gross GHG emissions are disclosed by scope (1, 2, and 3), including location- and market-based approaches for Scope 2.
- Disclosure [23]: Methodologies, emission factors, assumptions, and limitations are detailed in the methodology section.
- Disclosure [24]: The emissions inventory is prepared using the GHG Protocol Corporate Accounting and Reporting Standard, the Scope 3 Standard, and ISO 14064-1. These are supplemented by airport-specific requirements in the ACA Manual (Issue 14).
- Disclosure [25]: The emissions boundary is defined using the operational control approach, with a full description of included operations and justifications for exclusions.
- Disclosure [26]: Emissions metrics in this report provide an auditable baseline for use in CIAL's broader climate strategy, risk assessment, and external disclosures.

This report also reflects the qualitative characteristics of useful climate-related information, as outlined in NZ CS 3, including:

- Relevance: Focused on emission sources and categories that are material to CIAL's operations and stakeholders.
- Faithful representation: Emissions estimates are based on traceable data, reasonable assumptions, and consistent application of standards.
- Comparability: Boundaries, categories, and calculation methods are consistent with prior years and internationally recognised frameworks.
- Verifiability: All data sources, assumptions, and calculation steps are documented to support independent assurance.
- Understandability: Presented using structured, professional language with explanatory content appropriate for both technical and non-technical readers.

Although this report does not include scenario analysis or quantified financial impacts of climate-related risks, it provides the emissions baseline and explanatory context that support those assessments in CIAL's broader climate-related disclosure suite. This is consistent with the forward-looking intent of NZ CS 1.

As CIAL is not a first-time preparer of climate-related disclosures, the transitional provisions under NZ CS 2 do not apply.

To support independent assurance in accordance with NZ SAE 1, the report provides the necessary inputs for an assurance practitioner to issue a limited or reasonable assurance conclusion. These include:

- Clear and auditable definitions of scope, boundary, and criteria
- Transparent calculation methodologies, emission factors, and assumptions
- Documented limitations, uncertainties, and estimation techniques
- Alignment with accepted frameworks, such as the GHG Protocol and the ACA Application Manual

These elements directly support the practitioner's responsibilities under:

- NZ SAE 1 paragraphs 7–8 – defining the scope of the GHG assurance engagement
- Paragraph 11(a) – confirming use of ISO 14064-3 or ISAE (NZ) 3410 as the applicable standard
- Paragraphs 14–27 – establishing evidence-gathering and evaluation procedures
- Paragraphs 43–59 – setting out the form and content of the independent assurance report

Together, these attributes ensure that CIAL's GHG emissions reporting aligns with the expectations of NZ CS 1, supports formal assurance under NZ SAE 1, and reflects best practice in both carbon accounting and airport-sector climate disclosures.

4. Organisational boundary and control approach

4.1 Boundary and control concepts

To interpret this emissions inventory accurately, it is important to distinguish between three related but distinct concepts:

- Organisational control: The authority to introduce and implement operating policies, particularly those relating to health and safety, environmental management, and operational decision-making. Under the operational control approach, an entity is considered to have organisational control where it holds this authority, regardless of ownership or financial interest.
- Organisational boundary: The scope of operations included in the GHG inventory, based on where the entity exercises organisational control. This determines which facilities, services, and assets are included for the purposes of Scope 1 and Scope 2 emissions reporting.
- Operational boundary: The classification of emissions by scope, based on the nature of the emissions source:
    - Scope 1: Direct emissions from sources owned or controlled by the reporting entity
    - Scope 2: Indirect emissions from the generation of purchased electricity consumed by the entity
    - Scope 3: Other indirect emissions that occur as a result of the entity's operations but originate from sources outside its control (e.g. business travel, capital goods, aircraft movements)

This structure reflects the principles outlined in the GHG Protocol, supports the boundary-setting expectations under NZ CS 1 Disclosure [25], and aligns with the requirements of the ACA program.

4.2 Application of the operational control approach at CIAL

CIAL applies the operational control approach to define its organisational boundary. This method is consistent with the GHG Protocol Corporate Accounting and Reporting Standard and the expectations of NZ CS 1, which require entities to disclose their boundary-setting method and to clearly identify which activities are included or excluded, and why.

Under this approach, CIAL reports 100% of the GHG emissions from operations over which it has operational control — defined as having the greatest authority to introduce and implement operating policies, particularly those relating to work health and safety (WHS), environmental management, energy use, and day-to-day operational practices. Operational control does not require ownership or financial interest but rather depends on the entity's ability to direct how operations are conducted on the ground.

In practical terms, this means CIAL has operational control where it has:

- The primary responsibility and authority to make decisions about how activities are managed
- The power to set and enforce site-level policies relating to WHS, environmental compliance, and operational standards
- The ability to control inputs and outputs, such as resource use, maintenance schedules, and contractor management

Oversight of compliance with legal and regulatory obligations for areas and activities under CIAL's operational responsibility, including the ability to set and enforce site-wide operational policies.[1]

This approach is consistent with international practice and reflects the principles embedded in frameworks used in comparable infrastructure sectors.

CIAL exercises operational control over the majority of Christchurch Airport's core infrastructure and services, including:

- Terminal facilities and common-use base building services
- Airside and landside operating surfaces and infrastructure
- Vehicle and equipment fleets managed by CIAL
- Fire training grounds and emergency response areas
- Utility systems and energy infrastructure under CIAL's management
- Corporate offices and shared-use service areas

These facilities and activities define the organisational boundary for Scope 1 and Scope 2 reporting.

4.3 Inclusion of Scope 3 emissions

In addition to emissions from operations under its control, CIAL also reports material Scope 3 emissions from sources outside its organisational boundary, in accordance with the GHG Protocol Scope 3 Standard, NZ CS 1, and the Airport Carbon Accreditation (ACA) Manual. These emissions occur as a consequence of CIAL's activities and infrastructure but originate from sources CIAL does not directly control.

Scope 3 categories reported in this inventory cover both upstream and downstream value chain impacts and include:

- Category 1 – Purchased goods and services
- Category 2 – Capital goods (construction materials, plant)
- Category 3 – Fuel- and energy-related activities not included in Scope 1 or 2 (including energy on-charged to tenants)
- Category 5 – Waste generated in operations
- Category 6 – Business travel
- Category 7 – Employee commuting
- Category 11 – Use of sold products (notably full-flight aircraft emissions)
- Category 13 – Downstream leased assets (tenant energy use not managed by CIAL)

These inclusions ensure that the inventory captures material indirect emissions arising from CIAL's operations, infrastructure, and broader value chain, even where those sources are outside CIAL's direct control. This approach aligns with ACA Level 5 requirements and the expectations of NZ CS 1, providing a more complete and decision-useful view of CIAL's climate impacts.

Emissions have been classified in accordance with the GHG Protocol Scope 3 Standard, with consistent categorisation applied year-on-year to ensure comparability. This supports the metric consistency and reliability requirements under NZ CS 1 Disclosure [26] and enables robust external assurance in accordance with NZ SAE 1.

[1] This does not mean that all activities occurring on airport grounds fall within CIAL's operational control. While CIAL may impose access requirements or procedural expectations (e.g. safety protocols, airside behaviour), these do not constitute control over how third parties conduct their core operations. Airlines, ground handlers, and other tenants typically retain their own legal obligations and operational autonomy, and their emissions are treated as Scope 3 unless CIAL has the authority to manage how those emissions-generating activities are undertaken.

Scope 3 reporting is a mandatory requirement for ACA Level 5, which requires airports to disclose all material upstream and downstream emissions sources. However, it is important to note that ACA's interpretation of Scope 3 categories may not always align with the original intent of the GHG Protocol.

For example:

- ACA requires the inclusion of full-flight aircraft emissions under Category 11 (Use of Sold Products). This source represents combustion emissions from aircraft operated by third parties. While it could be argued under the GHG Protocol Scope 3 guidance that these are a form of indirect energy use enabled by the airport's services, the Category 11 definition is intended for products sold by the reporting entity that emit GHGs during use, typically where the entity sells the fuel itself. In the case of airports, the direct emission-producing activity is the combustion of aviation fuel purchased by an airline from a fuel provider or refuelling agent, not from the airport itself. The link between the airport's service provision and the fuel transaction is therefore indirect, passing through third-party fuel supply arrangements. For this reason, it may be more technically accurate to classify this source under "Other Scope 3" to better allocate the emissions to the entity undertaking both the fuel procurement and the direct combustion activity.
- The ACA includes all electricity consumed by tenants under Category 13 (Downstream Leased Assets), regardless of whether the electricity is directly procured by tenants or on-charged by CIAL. Under the GHG Protocol, energy that is on-charged to tenants would usually be reported under Category 3 (Fuel- and Energy-Related Activities), whereas Category 13 is intended for assets leased to others where the tenant procures energy from a utility directly.

ACA's treatment reflects a broader sectoral interpretation that prioritises physical enablement and infrastructure-related emissions, rather than strict contractual or value chain attribution. CIAL has followed the ACA framework in full to maintain alignment with Level 5 accreditation requirements, while ensuring that boundary choices and classification logic are clearly documented for transparency and assurance purposes.

This divergence affects only the classification of emission sources within Scope 3. It does not alter the description, characteristics, or underlying emissions estimates associated with those sources.

By clearly distinguishing between operational control (which defines Scopes 1 and 2) and operational relevance (which supports the inclusion of Scope 3), CIAL ensures that its GHG inventory is both comprehensive and defensible. This boundary approach aligns with accepted international frameworks, meets the disclosure expectations of NZ CS 1, and supports robust external assurance under NZ SAE 1.

5. Summary of GHG emission sources included in the FY25 GHG inventory

This section provides an overview of the emission sources included in CIAL'sFY25 GHG inventory. Each source is classified by scope and category in accordance with the GHG Protocol and the requirements of the Airport Carbon Accreditation (ACA) program. While CIAL follows the GHG Protocol's classification principles, certain sources have been grouped or categorised differently to align with ACA Level 5 expectations. The table below outlines the nature of each emission source, the rationale for its inclusion, and the applicable reporting treatment under both frameworks.

Table 1: Summary of GHG sources in FY25 GHG inventory

Emission source	Description	Scope	Scope 3 category	Notes on categorisation/ ACA treatment
Stationary and transport fuels	Combustion of fuels for both stationary purposes (e.g. generators) and transport-related use in CIAL-operated vehicles.	1	-	Standard Scope 1 source under both GHG Protocol and ACA.
Fire training	Controlled combustion of LPG or other fuels during scheduled emergency training exercises conducted by CIAL.	1	-	Treated as a direct Scope 1 source under GHG Protocol and ACA.
Fugitive emissions – refrigerants	Emissions from leaks or servicing losses of refrigerant gases from HVAC and refrigeration systems.	1	-	Included as a Scope 1 fugitive source per standard GHG accounting practice.
De-icing fluids (CIAL use)	Use of glycol- or chemical-based de-icing fluids by CIAL operations.	1	-	Fuel/chemical use treated as direct combustion or process emissions depending on composition.
Grid electricity (CIAL use)	Electricity purchased from the grid for use in terminal facilities, operations, and infrastructure managed by CIAL.	2	-	Location- and market-based emissions disclosed; reported in line with ACA requirements and in accordance with the GHG Protocol Scope 2 Guidance.
Aircraft full-flight emissions	Combustion emissions from all aircraft departing Christchurch Airport, based on aircraft type, distance, and fuel burn modelling.	3	11	ACA reports full-flight aircraft emissions in Category 11 (Use of sold products) to capture emissions from aircraft operations enabled by the airport's services. Under GHG Protocol logic, these would not be Category 11 unless the airport sold the fuel; if purchased directly from third parties by airlines, they remain Scope 3 but would typically be reported as "Other Scope 3" for the airport. ACA's

Emission source	Description	Scope	Scope 3 category	Notes on categorisation/ ACA treatment
				placement in Category 11 reflects reporting simplicity rather than a direct GHG Protocol mapping.
APU usage and engine run-ups	Emissions from auxiliary power units and aircraft engine maintenance (run-ups) while parked.	3	11	ACA places APU usage and engine run-ups in Category 11 (Use of sold products) as part of its catch-all grouping for aircraft emissions associated with airport operations. Under GHG Protocol logic, these would not be Category 11 unless the airport sold the fuel. If performed entirely by airlines using their own fuel and equipment, they could instead be Category 13 (Downstream leased assets) if occurring in leased space, or "Other Scope 3" if on common-use infrastructure. ACA's placement in Category 11 reflects reporting simplicity rather than a direct GHG Protocol mapping.
Tenant electricity	Electricity on-charged by CIAL to tenants (via sub-metering).	3	13	ACA treats electricity supplied to tenants as Category 13 (Downstream leased assets) because it is tenant Scope 2 and therefore airport Scope 3, applying a "leased asset" lens rather than the GHG Protocol's "energy retailer" lens. Even if the airport is not legally a retailer, the GHG Protocol would still classify the on-sold portion as Category 3 (Fuel- and energy-related activities (not included in Scope 1 or Scope 2).
Tenant fuel use	Combustion of diesel, petrol, or LPG by tenants for space heating, cooking, equipment operation, or vehicle use.	3	13	Included as downstream leased asset; not under CIAL's operational control. Fuel data from metering or estimates.
Agricultural emissions	This source covers the indirect emissions from agricultural activities on airport-owned land that is leased to a tenant farmer. It includes the tenant's emissions from livestock and the use of fertiliser.	3	13	Included as a downstream leased assets as operations occur on airport-owned land.
Fuel and energy-related activities	Emissions associated with the upstream production and transmission of fuels and electricity consumed by CIAL.	3	3	Not directly mandated under ACA Level 5 but expected as part of comprehensive Scope 3 coverage. Their inclusion is also consistent with common practice in GHG reporting frameworks and recommended under the GHG Protocol Scope 3 Standard.
Purchased goods and services	Operational and administrative procurement of goods (e.g., stationery, uniforms), services (e.g., ICT, cleaning), and reticulated water.	3	1	Standard Category 1 inclusion under both GHG Protocol and ACA.

Emission source	Description	Scope	Scope 3 category	Notes on categorisation/ ACA treatment
Water	Emissions from water supply based on CIAL's consumption volumes.	3	1	Treated as Category 1 but reported separately from general procurement due to distinct activity-based estimation and data source requirements. Expected under ACA.
Capital goods	Construction-related purchases and long-lived equipment, such as vehicles, plant, and infrastructure.	3	2	Standard Category 2 inclusion for long-lived asset purchases; typically vehicles and material for infrastructure operators.
Waste disposal	Emissions from landfill, composting, and recycling activities, including both operational and project-related waste streams.	3	5	Reported by waste type, destination, and treatment method; consistent with both ACA and GHG Protocol requirements.
Wastewater	Emissions from water supply and wastewater treatment based on CIAL's consumption volumes.	3	5	Although paid for as a service, wastewater is classified under Category 5 (Waste generated in operations), consistent with GHG Protocol guidance. Required under ACA.
Business travel	Emissions from air travel, ground transport, and hotel accommodation related to work trips taken by CIAL employees.	3	6	Adjusted to exclude flights departing Christchurch (already captured in full-flight totals).
Staff commute	Travel between employees' homes and workplace, estimated by mode, distance, and frequency.	3	7	Based on staff surveys and extrapolation; GHG Protocol and ACA-aligned.
Ground/surface access	Emissions from vehicles accessing the airport site, including tenant/contractor fleets, tenant staff commuting, visitors, taxis, rideshare, busses, and shuttles.	3	11	Treated as Category 11 (Use of Sold Products) under the ACA framework, which includes all access-related transport such as public vehicles, tenant staff commuting, contractor fleets, taxis, rideshare, busses, shuttles, and cargo-related traffic. From a GHG Protocol perspective, this treatment is not strictly aligned with the original intent of Category 11, which is reserved for emissions from the use of goods or services sold by the reporting entity, typically manufactured products with end-use emissions. Since airports generally do not sell transport services directly to these users, these emissions would more appropriately fall under Scope 3 – Other indirect emissions, where full-flight aircraft emissions are also reported. Some sources, particularly tenant staff, may in fact represent Scope 3 of a Scope 3 source, and would ordinarily be captured under Category 4 (Upstream transportation

Emission source	Description	Scope	Scope 3 category	Notes on categorisation/ ACA treatment
				and distribution (for goods and cargo)), Category 7 (Employee commuting (for tenant staff)}, and Category 9: Downstream transportation and distribution (for visitor or cargo delivery access)). Inclusion in this inventory is justified based on CIAL's ownership or operational control over car parks, access roads, and associated infrastructure (e.g. EV charging stations), which materially enable and influence these emissions. This reflects CIAL's facilitative role and the ACA Level 5 requirement to account for all material sources of access traffic, even where they fall outside strict GHG Protocol category boundaries.

6. GHG emissions quantification approach and data sources

This section outlines the methodology for quantifying GHG emissions in CIAL's FY25 inventory. Emissions estimates have been calculated by multiplying measured or estimated activity data by the relevant emission factors, applying appropriate conversion constants, and, where required, additional calculation parameters such as uplift factors.

Standard formula: Emissions (t CO_2-e) = activity data × emission factor

Activity data refers to quantitative measures of the extent of an activity that causes GHG emissions. In this inventory, activity data are drawn from:

- Direct measurement, such as metered energy use, fuel dispensing records, or waste weight tickets
- Supplier or contractor invoices and statements
- Operational logs, asset registers, or maintenance records
- Modelled outputs from recognised sectoral tools (e.g., PACE, ACERT)
- Financial and procurement records (used with EEIO factors)

Where direct measurement is not practicable, industry benchmarks, engineering estimates, or survey results have been used, with assumptions documented for transparency.

Emission factors convert activity data into GHG emissions, expressed in tonnes of carbon dioxide equivalent (t CO_2-e). The factors used in this inventory are primarily sourced from the MfE Measuring emissions: A guide for organisations (2024 Detailed Guide), applying the 2025 Emissions Factors Workbook and Flat File as the most up-to-date

available datasets. As of the time of compiling this report, the MfE had not yet published a 2025 Detailed Guide. Accordingly, the 2024 methodological guidance has been retained to ensure continuity and consistency in calculation approaches.

Each table entry includes:

- Activity data & collection method – the specific data used and how it was obtained
- Primary data sources – the documents, systems, or datasets from which the activity data was sourced
- Emission factor source – the authoritative publication or dataset from which the relevant emission factor was obtained, cited at the source level (e.g. MfE 2025 Emissions Factors Workbook), rather than listing individual factor values in this public-facing report. Calculation approach – the equation or logic used to calculate emissions from the activity data
- Scope – classification as Scope 1, Scope 2, or Scope 3 in line with the GHG Protocol
- Data quality rating – an assessment of the reliability of the data (High, Medium, Low)
- Key assumptions – material assumptions, limitations, or uncertainty considerations

For clarity and practicality, the quantification approach is presented in four separate tables:

- Table 2 – Scope 1 and Scope 2 emissions – Covers direct emissions from sources under CIAL's operational control (Scope 1) and indirect emissions from purchased electricity (Scope 2). These are reported in accordance with the GHG Protocol and ACA requirements, using both location- and market-based methods for Scope 2.
- Table 3 – Scope 3: Energy and operations – Covers indirect emissions from operational activities that occur outside CIAL's direct control but are materially enabled or influenced by its infrastructure and services. Examples include aircraft movements, auxiliary power unit (APU) use, tenant energy consumption, and staff commuting.
- Table 4 – Scope 3: Procurement and waste – Covers indirect emissions from purchased goods and services, capital goods, water supply, wastewater treatment, and operational waste. These represent upstream and downstream value chain impacts that occur as a consequence of CIAL's operations.
- Table 5 – Scope 3: Agricultural activities – Covers emissions from livestock on airport-owned land leased to third parties.

6.1 Scope 1 and Scope 2 – Direct and purchased energy emissions

Covers CIAL's direct operational emissions and indirect emissions from purchased electricity. These sources are entirely within the airport's operational control and are generally quantified from measured or directly invoiced activity data, providing a high degree of accuracy and traceability.

Table 2: Scope 1 and Scope 2 basis of quantification

Emission source	Activity data & collection method	Primary data sources	Emission factor source	Calculation approach	Scope	Data quality rating	Key assumptions
Stationary fuel combustion	Fuel volumes (litres/kg) from procurement and asset team logs	Finance system; procurement logs	MfE 2025 – Stationary combustion fuels	Volume × EF (by fuel type)	1	High	Direct meter or invoice data; small

Emission source	Activity data & collection method	Primary data sources	Emission factor source	Calculation approach	Scope	Data quality rating	Key assumptions
			(Emissions Factors Workbook and Emissions Factors Flat File)				LPG quantities may be estimated.
Mobile/transport fuel combustion (vehicle fleet)	Fuel card data	Fleet management records; fuel supplier statements	MfE 2025 – Transport fuels (Emissions Factors Workbook and Emissions Factors Flat File)	Volume × EF (by fuel type)	1	High	Fuel volume tracked.
Fire training	Volume of LPG and CO_2 used for training exercises; metered usage or procurement records	Fire training logs; LPG procurement invoices	MfE 2025 – Stationary combustion fuels (Emissions Factors Workbook and Emissions Factors Flat File)	Volume x EF	1	High	All LPG used is assumed to be combusted; consistent training format year-on-year.
Fugitive emissions – refrigerants (HVAC)	Estimated charge per system × default annual leakage rate	HVAC asset register; equipment nameplates; maintenance records	MfE 2025 – Refrigerants (Emissions Factors Workbook and Emissions Factors Flat File); IPCC/TEAP 2005, Tables B1–B2 (leakage rates)	Total installed charge × leakage rate × GWP	1	Medium	Gradual operational leaks only; assumes default leakage rate for stationary equipment; excludes catastrophic or decommissioning losses unless specifically identified.
Grid electricity – CIAL consumption	Metered kWh from utility	CIAL electricity invoices	MfE 2025 – Grid electricity (Emissions Factors Workbook and Emissions Factors Flat File)	kWh × EF (location- and market-based)	2	High	Includes all directly metered consumption under CIAL control.

6.2 Scope 3: Energy and operations

Includes energy and operational activities outside CIAL's direct control but materially enabled or influenced by airport infrastructure and services. Examples include aircraft movements, auxiliary power unit use, ground access, tenant energy consumption, and staff commuting. Data is drawn from a combination of measurement, modelling, and estimation, with key assumptions clearly documented.

Table 3: Scope 3 - Energy and operations basis of quantification

Emission source	Activity data & collection method	Primary data sources	Emission factor source	Calculation approach	Scope	Data quality rating	Key assumptions
Aircraft – full flight	Departing flights, aircraft type, origin-destination pairs (PACE model)	CIAL movement data; PACE outputs	PACE modelled fuel burn; uplift factor for non-CO_2 effects to CO_2 emissions	Fuel burn model × EF (+ uplift)	3	Medium	Fuel allocation by departure; uplift factor 1.7 applied for effective radiative forcing
APU usage	APU use per movement (estimation based on ops schedules)	APU Summary; CIAL flight	ACERT v7.2338	Estimated avg. hours × EF	3	Medium	Average runtime per aircraft
Engine run-ups	Number & duration logged	ETMS Maintenance Logs; CIAL Ops	ACERT v7.2338	Duration × typical consumption × EF	3	Medium	Standardised L/h per engine type; average durations used
Tenant vehicles (airside)	Estimated number of vehicles and fuel		MfE 2025 – Transport fuels (Emissions Factors Workbook and Emissions Factors Flat File)	Estimated litres × EF	3	Low	Based on access estimates; minimal direct tenant data
Ground access	Traffic counts; modal split; average trip distances		ACERT v7.2338	Trips × distance × EF	3	Medium	ACERT methodology and modal split inputs
Tenant electricity	CIAL sub-metering and finance	CIAL finance and meter	MfE 2025 – Grid electricity (Emissions Factors Workbook	kWh × EF (location- and market-based)	3	High	Based on internal sub-metered data and invoiced energy use. Assumes all recorded

Emission source	Activity data & collection method	Primary data sources	Emission factor source	Calculation approach	Scope	Data quality rating	Key assumptions
			and Emissions Factors Flat File)				consumption is attributable to tenant operations.
Tenant fuel (stationary)			MfE 2025 – Stationary combustion fuels (Emissions Factors Workbook and Emissions Factors Flat File)		3	High	Based on estimates for known tenant operations where fuel is consumed on-site but not under CIAL operational control.
T&D losses – electricity	Metered kWh for CIAL and tenant electricity use	CIAL finance and metering records	MfE 2025 – T&D (Emissions Factors Workbook and Emissions Factors Flat File)	kWh × EF	3	High	Applies to all grid-purchased electricity, whether for CIAL or on-charged to tenants.
Upstream extraction, production, and distribution (EPD) of fuels	Fuel volumes from procurement, fleet, and asset logs	Finance system; procurement logs; fleet records	2024 Australian National Greenhouse Accounts (NGA) Factors – EPD factors for petrol, diesel, LPG (used as proxy; MfE does not publish upstream fuel factors)	Volume × EF (by fuel type)	3	Medium	Applies to all fuel consumption across Scope 1 and 3. Factors include upstream activities from extraction to delivery. Data quality rated Medium as some fuel consumption volumes are reported by third parties rather than directly metered or invoiced.
Staff commuting & WFH	Staff mode split, distances, WFH		MfE 2025 – Transport fuels (Emissions Factors Workbook		3	Medium	Derived from staff survey data, extrapolated to total workforce.

Emission source	Activity data & collection method	Primary data sources	Emission factor source	Calculation approach	Scope	Data quality rating	Key assumptions
			and Emissions Factors Flat File)				Commuting distances calculated using average values by transport mode.

6.3 Scope 3: Procurement and waste

Encompasses upstream and downstream value chain impacts from purchased goods and services, capital goods, water and wastewater, and operational waste. Quantification methods rely primarily on financial records paired with environmentally extended input–output (EEIO) factors, supplemented by activity-based estimates for specific resource and waste streams.

Table 4: Scope 3 - Procurement & waste basis of preparations

Emission source	Activity data & collection method	Primary data sources	Emission factor source	Calculation approach	Scope	Data quality rating	Key assumptions
Purchased goods & services	Spend records by category	CIAL finance system	EEIO factors for NZ	Spend × sector EF	3	Medium	Grouped by procurement type (e.g., cleaning, ICT, uniforms)
Capital goods (expenditure-based)	Capital expenditure records	CIAL finance system	Market Economics (2023) Consumption Emissions Modelling	Capex × EF	3	Medium	Includes major infrastructure projects, e.g., EV truck procurement
Capital goods – embodied emissions (material-based)	Quantities of construction materials used in new building and major upgrade projects	Project Bill of Quantities; contractor reports	DESNZ & BEIS, Greenhouse Gas Reporting: Conversion Factors 2025	Material quantity × EF (by material type)	3	Medium	Covers materials with significant embodied emissions (e.g. concrete, steel, glass); excludes minor fit-out items; data based on as-built quantities

Emission source	Activity data & collection method	Primary data sources	Emission factor source	Calculation approach	Scope	Data quality rating	Key assumptions
Water supply	Metered water consumption	Council water bills	MfE 2025 – Water supply (Emissions Factors Workbook and Emissions Factors Flat File)	kL × EF	3	High	Direct metering from utility
Wastewater treatment	Metered wastewater volume (if available) or estimated as % of water use	Council water bills	MfE 2025 – Wastewater treatment (Emissions Factors Workbook and Emissions Factors Flat File)	kL × EF	3	Medium	Assumes 100% of water used becomes wastewater
Operational waste	Waste type and weight by collection contractor	Waste contractor records	MfE 2025 – Waste by type and treatment (Emissions Factors Workbook and Emissions Factors Flat File)	Weight × EF	3	High	Covers landfill, recycling, and green waste; regular reporting from contractors
Business travel – flights & accommodation	Travel bookings and finance records	Travel portals; expense systems	MfE 2025 – Aviation fuels; MfE 2025 – Accommodation (Emissions Factors Workbook and Emissions Factors Flat File)	Segment × EF by class + room nights × EF	3	High	Departing CHC flights excluded to avoid double-counting; hotel stays added

6.4 Scope 3: Agricultural activities

Accounts for emissions from livestock activities on airport-owned land leased to third-party operators. These are derived from tenant-reported or proxy livestock numbers and grazing patterns, using Ministry for the Environment agricultural emission factors for enteric fermentation and manure management.

Table 5: Scope 3 - Agricultural activities basis of preparation

Emission source	Activity data & collection method	Primary data sources	Emission factor source	Calculation approach	Scope	Data quality rating	Key assumptions
Livestock – sheep and cattle	Number of animals by type and grazing days	Tenant lease records; site inspections	Calculate your agricultural emissions tool (updated 15 December 2022), based on Measuring Emissions: A Guide for Organisations (2022)	(Number of animals × grazing days ÷ 365) × EF (by animal type)	3	Medium	Agricultural emissions this year cover four tenant or contractor operations: TCL, Spiers, Shipley's Farm, and the Drylands Block. For Spiers, livestock activity was estimated proportionally to TCL based on grazable land (16% vs 50%), with an 85% irrigation rate and TCL figures used as proxies where direct data was unavailable.

7. GHG inventory summary

The inventory covers the following GHGs defined under the Kyoto Protocol and recognised by the GHG Protocol and NZ CS 1:

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Hydrofluorocarbons (HFCs)
- Where material, the inventory also includes emissions from other synthetic gases used in refrigerant and fire suppression systems.

The following table provides a summary of CIAL's GHG emissions for the reporting year. Emissions are presented by source and allocated to Scope 1, Scope 2, or Scope 3 in accordance with the GHG Protocol. Scope 3 sources are further classified against the relevant categories defined by the GHG Protocol.

Emissions are reported in tonnes of carbon dioxide equivalent (t CO_2-e) using 100-year global warming potentials from the Intergovernmental Panel on Climate Change Fifth Assessment Report. All estimates have been calculated by multiplying activity data and expenditure data by the relevant emission factors and applying the appropriate emission factors and other relevant factors.

If an amount is calculated that is not a whole number, the result is rounded as follows:

- the number is rounded up to the next whole number if the digit at the first decimal place equals or exceeds five; and
- the number is rounded down to the next whole number if the digit at the first decimal place is less than five.

Percentages are presented without rounding, as flight-related emissions constitute the vast majority of the inventory and maintaining decimal precision provides a clearer understanding of the relative contribution of other sources.

Table 6: CIAL's GHG emissions inventory by source, scope, and Scope 3 category

Source	Scope	Scope 3 category	Emissions (t CO_2-e)	% of total inventory
Stationary fuel combustion	1	N/A	197	0.03
Mobile fuel combustion	1	N/A	49	0.01
Fire training	1	N/A	>1	>0.01
Refrigerants	1	N/A	10	>0.01
De-icing	1	N/A	>1	>0.01
Electricity (location-based)	2	N/A	1,503	0.21
Electricity (market-based)	2	N/A	0	0
Purchased goods & services	3	1	2,010	0.28
Capital goods	3	2	2,564	0.35
Fuel- and energy-related activities	3	3	336	0.05

Source	Scope	Scope 3 category	Emissions (t CO_2-e)	% of total inventory
Waste generated in operations	3	5	263	0.04
Business travel	3	6	350	0.05
Employee commuting	3	7	84	0.01
Full flight emissions (departing flights)	3	11	701,532	96.62
APU usage	3	11	1,135	0.16
Engine run-ups	3	11	244	0.03
Landside ground access	3	11	10,044	1.38
Tenant electricity consumption (on-charged)	3	13	302	0.04
Tenant fuel consumption	3	13	591	0.08
Agricultural emissions	3	13	4,868	0.67
TOTAL (location-based)			**726,084**	**100**
TOTAL (market-based)			**724,581**	**100**

8. Methodological updates and changes from prior reporting year

Several updates to emissions estimation methodologies have been applied in the FY25 GHG inventory to reflect improved data quality, updated scientific guidance, and clarification of treatment expectations under the ACA program and the GHG Protocol. These changes are summarised below.

8.1 Update to spend-based emission factors (Cat. 1 & 2)

For the current reporting year, the spend-based Scope 3 calculations for goods and services and capital goods have been updated to use New Zealand–specific emission factors from the Consumption Emissions Modelling report prepared for Auckland Council by Market Economics Limited (March 2023)[2]. These factors are expressed in tonnes CO_2-e per dollar and are derived from StatsNZ's 2020 Inter-Industry Study of the New Zealand Economy and 2019 Production-based GHG Emissions Accounts.

The factors represent a top-down, input–output approach, covering 199 commodity categories, and have been adjusted for inflation to reflect current price levels. This replaces the Australian proxy factors used in previous years and is expected to provide a more accurate and representative estimate of embodied emissions within the New Zealand economy.

[2] Market Economics Limited. *Consumption Emissions Modelling*. Prepared for Auckland Council, March 2023. https://www.knowledgeauckland.org.nz/publications/consumption-emissions-modelling/.

While this change improves the accuracy of reported spend-based emissions, the same methodological framework has been retained, allowing for continued comparability of year-on-year results while enhancing alignment with national datasets and economic conditions.

8.2 Business travel (Cat. 6)

In previous years, CIAL reported all business air travel emissions, regardless of departure location. However, in accordance with updated ACA administrator guidance for Level 5, this category now only includes business air travel departing from airports other than Christchurch. This change recognises that full-flight emissions from Christchurch departures are already accounted for under Scope 3 Category 11, and including them again under business travel would constitute intra-organisational double-counting.

The impact of this adjustment is immaterial in the context of total emissions, but it improves boundary consistency and aligns with ACA's expectations for Category 6 reporting. This clarification applies only to air travel within the business travel category. Other business travel sub-categories, such as accommodation, remain unaffected.

8.3 Use of sold products – aircraft-related emissions (Cat. 11)

Use of the PACE methodology for aircraft emissions

Emissions from aircraft movements (Scope 3 Category 11) were calculated using the PACE (Performance and Compliance Engine) methodology, which models aircraft fuel burn based on flight-level data, aircraft type, engine configuration, distance flown, and airport-specific operational conditions. The methodology draws on data from sources such as Flightradar24 and EUROCONTROL's Base of Aircraft Data (BADA), and applies CORSIA-aligned emissions factors to estimate CO_2 outputs. CIAL has used PACE outputs to ensure consistency with ACA Level 5 reporting expectations. While PACE has not undergone formal third-party verification as a methodology in its own right, its results have been independently reconciled against airline-published emissions data. Emissions reported include full-flight activity from departing aircraft, with a 1.7 effective forcing multiplier applied to CO_2 only.

Effective forcing adjustment for aircraft emissions

To account for the additional climate impacts of aviation beyond direct CO_2, N_2O, and CH_4 emissions, such as contrails, water vapour, and nitrogen oxides (NO_x), an uplift factor is applied to aircraft emissions. This uplift, historically referred to as the Radiative Forcing Index (RFI), is now more commonly described as an Effective Forcing Multiplier. The updated terminology reflects a broader and more accurate representation of aviation's net climate effects.

In previous inventories, a multiplier of 1.9 was used. Recent research referenced in the UK Department for Energy Security & Net Zero methodology[3,4] supports the use of a revised factor of 1.7. This updated value is applied only to the CO_2 component of aircraft emissions, rather than to the total CO_2-equivalent figure. This approach avoids overstating climate impacts that are already captured through the global warming potentials of other gases, such as methane and nitrous oxide.

The revised methodology reflects current scientific understanding of effective climate forcing from aviation. It improves the accuracy and comparability of Scope 3 Category 11 reporting and is consistent with best-practice greenhouse gas accounting frameworks.

[3] Department for Energy Security and Net Zero. *2025 Government Greenhouse Gas Conversion Factors for Company Reporting: Methodology Paper for Conversion Factors Final Report*. June 2025. https://assets.publishing.service.gov.uk/media/6846b0870392ed9b784c0187/2025-GHG-CF-methodology-paper.pdf.

[4] Lee, DS, Fahey, DW, Skowron, A et al. (2021). The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018. Atmospheric Environment, 244.117834. ISSN 1352-2310. https://doi.org/10.1016/j.atmosenv.2020.117834.

8.4 Ground access emissions (Cat. 11)

CIAL continues to use the ACERT to estimate ground access emissions. In the latest version of the tool (v7.2338), the reporting structure has been updated. Categories previously reported separately, tenant staff, visitor vehicles, buses and shuttles, and cars and taxis, are now consolidated into a single category, "landside ground access."

This change pertains solely to the presentation of results. The underlying calculations, emission factors, and methodological assumptions applied within ACERT remain unchanged. In parallel, CIAL has incorporated minor updates to the modal split assumptions, which have had an insignificant impact on total emissions estimates.

8.5 Agricultural emissions (Cat. 13)

Agricultural emissions from CIAL's landholdings, primarily associated with livestock grazing, have been included in the inventory for the first time this year.

Agricultural emissions from livestock grazing on airport-owned land have been calculated using the MfE's Agricultural Emissions Calculator (2022 version), which applies 2022 emission factors. While the 2025 MfE factors are higher, the 2022 factors have been retained to maintain consistency with the calculator's embedded methodology and because the difference is immaterial in the context of the airport's overall emissions profile. This source remains a small proportion of reported Scope 3 emissions and reflects CIAL's role as landowner rather than direct operator of agricultural activities.