



ACT
Government

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Electrification

Electrification of Government Gas Assets

Program Business Case

Environment, Planning and Sustainable
Development Directorate
15 March 2015



ACT
Government

Program Business Case

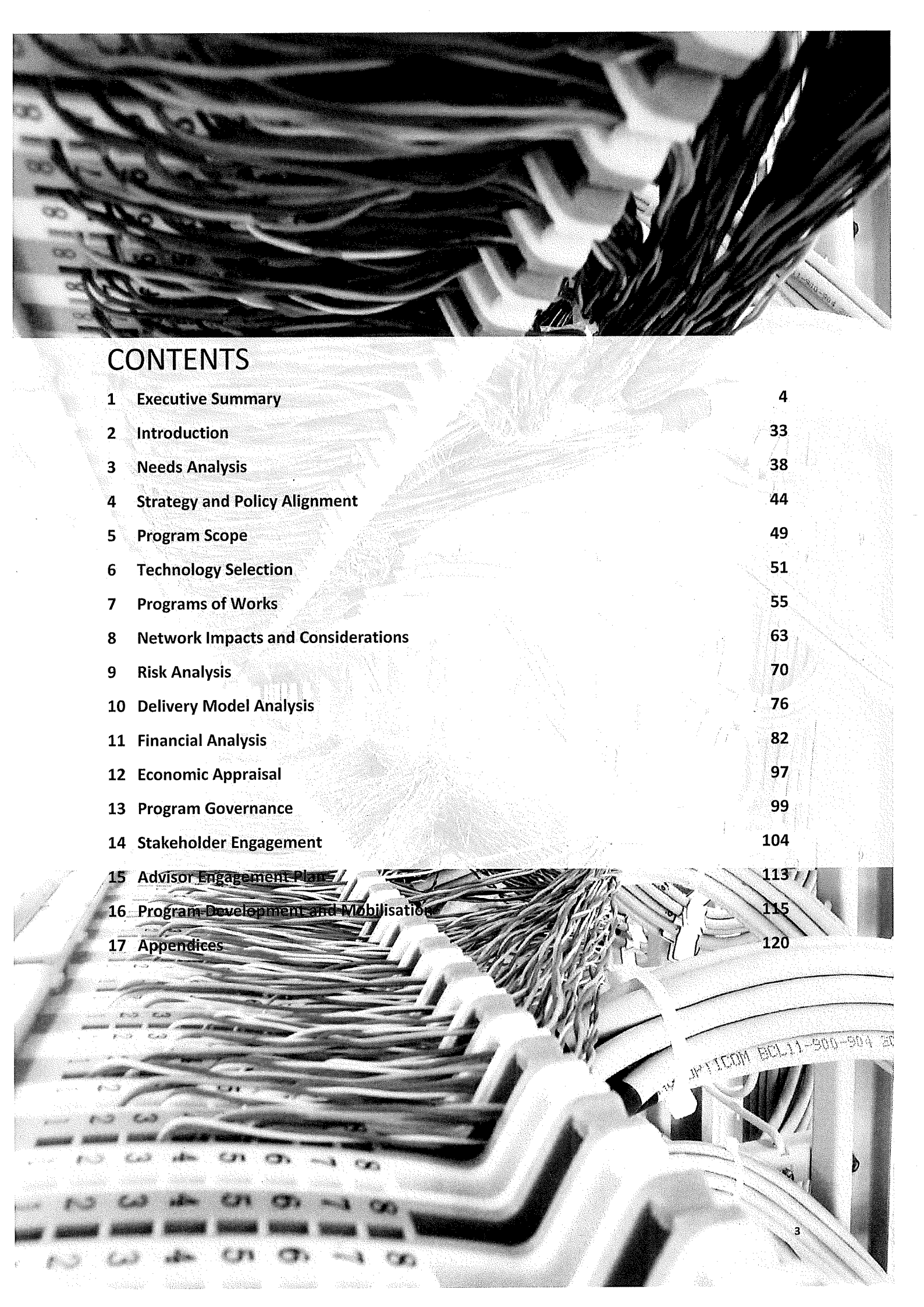
Program name:	Electrification of Government Gas Assets
Tier:	Tier 1
Risk assessment (high/med/low):	Refer to Risk Register (Appendix C – Program Risk Register)
Total estimated Program capital cost (\$m, nominal):	\$1,223 million
Funding Requested (\$m, nominal):	\$323.05 over the forward estimates
Sponsoring Agency:	Environment, Planning and Sustainable Development Directorate
Sponsoring Minister:	Shane Rattenbury, Minister for Climate Change and Sustainability
Contact officer:	Cameron Knight, Environment, Planning and Sustainable Development Directorate
Business Case advisors:	KPMG

Sign Offs

Sponsoring Agency:

Print name

Signature



CONTENTS

1	Executive Summary	4
2	Introduction	33
3	Needs Analysis	38
4	Strategy and Policy Alignment	44
5	Program Scope	49
6	Technology Selection	51
7	Programs of Works	55
8	Network Impacts and Considerations	63
9	Risk Analysis	70
10	Delivery Model Analysis	76
11	Financial Analysis	82
12	Economic Appraisal	97
13	Program Governance	99
14	Stakeholder Engagement	104
15	Advisor Engagement Plan	113
16	Program Development and Mobilisation	115
17	Appendices	120

1 Executive Summary

1.1 Recommendations

This business case considers the Program of Works required to support the Government in meeting its target for net zero emissions from Government operations (the Program). The Program involves the asset replacement works and coordination of associated network upgrade works required for the electrification of over 1,000 gas heating and hot water assets in facilities owned and operated by the ACT Government over the next 17 years.¹ The cost estimates in this business case do not consider the avoided cost of replacing gas assets with new gas assets.

This business case makes the following recommendations:

Recommendation 1: The Program proceed on the basis of the Program C (as defined in Section 1.7.2), noting the estimated cost for the whole Program is estimated to be approximately \$1.223 billion over the next 17 years. However, it is noted that further work will need to be undertaken to refine this figure.

Recommendation 2: The Program be delivered as a centralised whole-of-Government program by Major Projects Canberra (MPC) as a Designated Project in accordance with the governance structure set out in Section 13 with MPC being responsible for planning and investigations, procurement, and delivery of the Program of Works.

Recommendation 3: That MPC engage a Program Delivery Partner (as defined in Section 1.10) from Financial Year (FY) 2025 to assist with the delivery of the Program and that MPC undertake further work to refine the overall delivery strategy.

Recommendation 4: The Program commence in 2023 and the Government commits to \$297.79 million in capital funding over the forward estimates (the first four years of the Program):

- FY2024: \$11.12 million
- FY2025: \$85.13 million
- FY2026: \$109.64 million
- FY2027: \$91.90 million

Recommendation 5: Government commits to \$21.98 million in operating funding for Program Development Costs over the forward estimates:

- FY2024: \$4.05 million
- FY2025: \$6.42 million
- FY2026: \$6.14 million
- FY2027: \$5.37 million

Recommendation 6: Government commits to provide ongoing funding for Environment, Planning and Sustainable Development Directorate (EPSDD) resources (\$3.30 million over the forward estimates):

- FY2024: \$0.81 million
- FY2025: \$0.82 million
- FY2026: \$0.83 million
- FY2027: \$0.84 million

1.2 Introduction

The Parliamentary and Governing Agreement sets out the shared commitments, actions, and outcomes of the 10th Legislative Assembly for the Australian Capital Territory (ACT). This includes a commitment to take the next essential steps to a net-zero ACT through 'phasing out of fossil-fuel-gas in the ACT by 2045' by ensuring all new ACT Government buildings and facilities are fossil fuel gas free (including new leases) and all retrofitting in Government buildings and facilities will have a goal of net-zero emissions post retrofit.

¹ At the time of writing, the available asset data had identified approximately 1,056 assets to be replaced.



In 2019, the ACT Government released the ACT Climate Change Strategy 2019-2025 (the Strategy) which sets the path towards achieving a 50-60 per cent reduction in emissions from 1990 levels by 2025 and outlines the initial steps towards achieving net zero emissions by 2045. These targets are legislated under the *Climate Change and Greenhouse Gas Reduction Act 2010*.

In August 2022, the ACT Government released the position paper, *Powering Canberra: Our Pathway to Electrification*. This paper announced that the ACT will transition away from fossil fuel gas use to renewable electricity by 2045.

In pursuit of the above commitments, the ACT Government is seeking to reach net zero emissions from Government operations by 2040. ACT Government operations account for around 7 per cent of total fossil fuel gas emissions in the ACT. Government is pursuing an interim target of 33 per cent reduction in its own emissions by 2025 towards net zero by 2040.

Transport currently comprises 61 per cent of the Government's emissions. The Government's Zero-Emission Transition Plan for Transport Canberra outlines the pathway to achieve a zero-emission public transport system by 2040. This started with the delivery of the light rail from Gungahlin to the City with planning work for stage 2 to Woden currently underway.

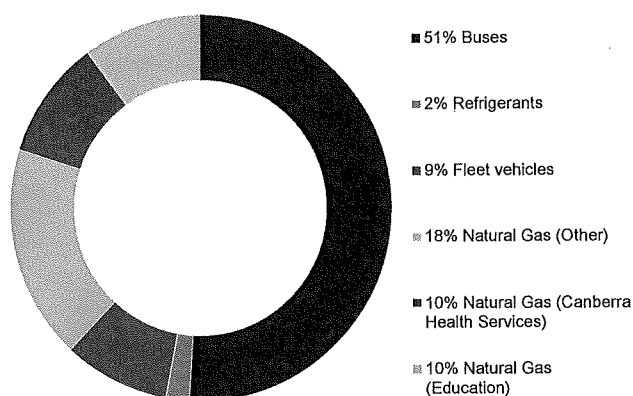
In addition, the ACT Government is currently undertaking a range of procurement processes to replace its current bus fleet with zero-emission alternatives. The ACT Government also ensures that all newly leased government passenger vehicles are zero emissions where fit for purpose.

The remaining 39 per cent of ACT Government's emissions come from natural gas assets currently used across schools, hospitals and other ACT Government buildings. As part of the Parliamentary and Governing Agreement, the ACT Government has committed that all new ACT Government buildings and facilities are fossil-fuel-gas free, including new leases. In addition, all retrofits of Government facilities have the goal of net-zero emissions post retrofit. However, of the residual ACT Government owned and operated facilities, there remains approximately 1,056 gas assets (primarily used for space heating and domestic hot water) located in 189 sites across the Territory.

The 2022-23 ACT Government Budget provided funding to develop a business case to investigate a potential whole-of-Government program to replace natural gas assets in ACT Government facilities by 2040. This business case considers:

- **Replacement of gas assets:** the replacement of heating and hot water gas assets across all ACT Government owned and operated sites with electric technology (the Program or Program of Works);
- **Timing:** the Program of Works to be delivered across three tranches: Short Term, Medium Term and Long Term from approval of the Program under this business case to 2040;
- **Indicative Short-Term Program:** prioritisation of the asset replacements required in the first four years of the Program based on asset condition;
- **Electricity network impacts:** the impacts of the Program on the electricity network including potential network upgrades, coordination with Evoenergy and cost implications;
- **Program Costs:** estimated capital costs of the asset replacement and network upgrades required to implement the Program to 2040;
- **Short-Term funding:** the funding required for the Short-Term Program including capital costs of asset replacement and network upgrades and Program establishment, delivery and management; and
- **Delivery:** considerations of delivery of the Program including centralisation of delivery by a Program office, governance structure and resourcing, delivery model approach, initial risk analysis and Program development and mobilisation.

Figure 1 - ACT Government Emission Sources

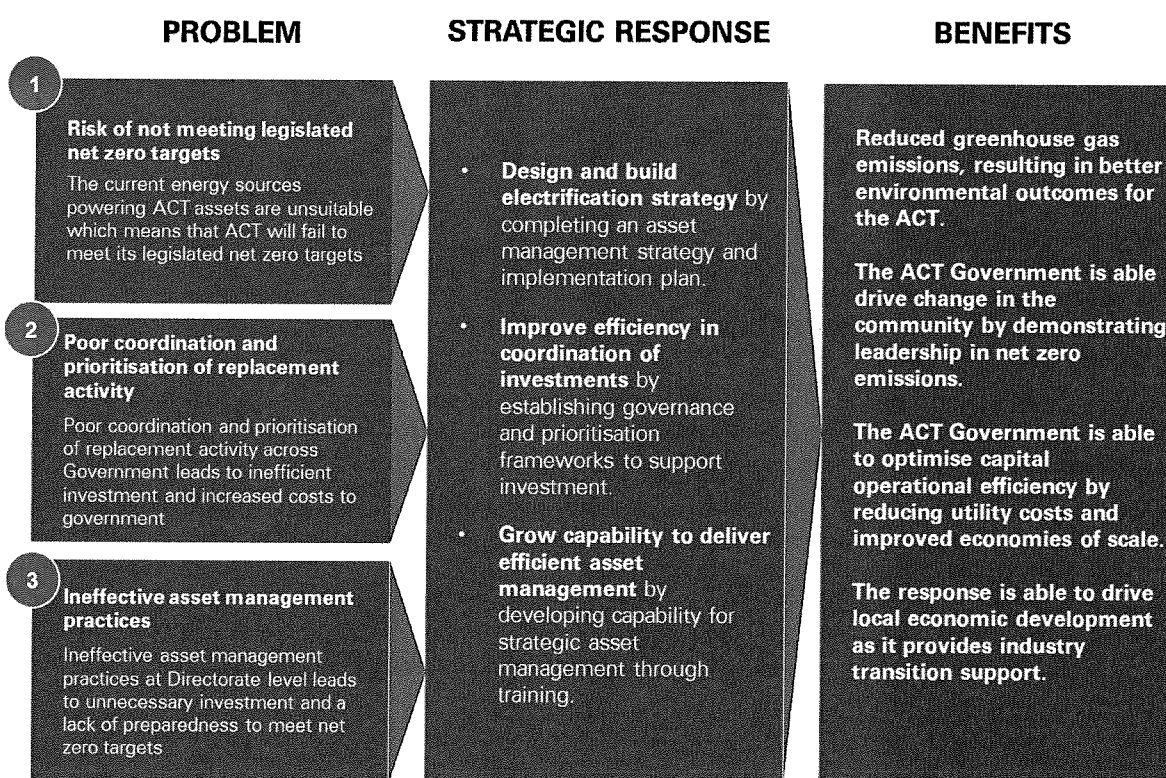


1.3 Needs Analysis

Two Investment Logic Workshops (ILWs) were undertaken on 20 December 2022 and on 20 January 2023 with representatives from EPSDD, Chief Minister, Treasury and Economic Development Directorate (CMTEDD), MPC, Office of Climate Action (OCA) and facilitated by KPMG.

During the workshops an Investment Logic Map (ILM) identified three problem areas, the strategic responses to the problems and the associated benefits that will be realised by addressing the problems. Figure 2 summarises the ILM and the problems, proposed responses and anticipated benefits identified in the ILM (the ILM is included in [Appendix A – Investment Logic Map](#)), together with the proposed response and the anticipated benefits, are discussed and evidenced in further at Section 3.

Figure 2 – Summary of Problems, Strategic Responses and Benefits of the Program



Source: Appendix A – Investment Logic Map

1.4 Strategic and Policy Alignment

The Program is aligned to several key government policies and strategies. This includes:

- Parliamentary and Governing Agreement – 10th Legislative Assembly Australian Capital Territory;
- ACT Climate Change Strategy 2019-2025;
- Powering Canberra: Our Pathway to Electrification (Position Paper);
- Zero-Emission Transition Plan for Transport Canberra;
- Canberra's Living Infrastructure Plan: Cooling the City;
- ACT Climate Change Adaptation Strategy;
- ACT Planning Strategy 2018;
- ACT Housing Strategy 2018;
- Moving Canberra 2019-2045: Integrated Transport Strategy;
- ACT Transport Strategy 2020;
- ACT's Zero Emissions Vehicles Strategy 2022-30; and
- Infrastructure Plan 2019 – Planning for the Future.

1.4.1 Wellbeing Impact Assessment

The ACT Government has established the ACT Wellbeing Framework (the Wellbeing Framework), which has been developed with extensive community consultation, including input from over 3,000 Canberrans, to capture aspects of wellbeing and quality of life that are important to Canberrans.

The Program will contribute to the 'Climate resilient environment and community' indicator of the Wellbeing Framework. This indicator measures climate mitigation and adaptation by tracking greenhouse gas emissions, tree canopy coverage, waste, community preparedness for climate change impacts and extreme weather events.

The Program will:

- replace the gas-powered assets currently used within Government owned buildings; and
- reduce the Government's greenhouse gas emissions and will result in net zero gas emissions by 2040.

1.5 Program Scope

The business case considers the replacement of existing gas space and water heating assets in ACT Government owned and operated facilities. Table 1 sets out the assets that are in and out of scope of the analysis.

Table 1 - Summary of assets in and out of scope

In Scope	Out of Scope
✓ Gas space heating ✓ Water heating assets	✗ Gas cook tops ✗ Teaching assets (e.g., gas turbines, Bunsen burners) ✗ Steam boilers at Capital Linen Services¹ ✗ Back up diesel generators ✗ Opportunities for solar and battery storage² ✗ Sites out of scope set out in Table 20
Note 1: Steam boilers are not considered as part of this business case as a replacement option is not available, which means an appropriate cost cannot be estimated. Further work will be required to understand replacement of these assets once technology becomes available. Note 2: To be targeted by EPSDD using Zero Emissions Government framework and loan framework.	

1.6 Technology Selection

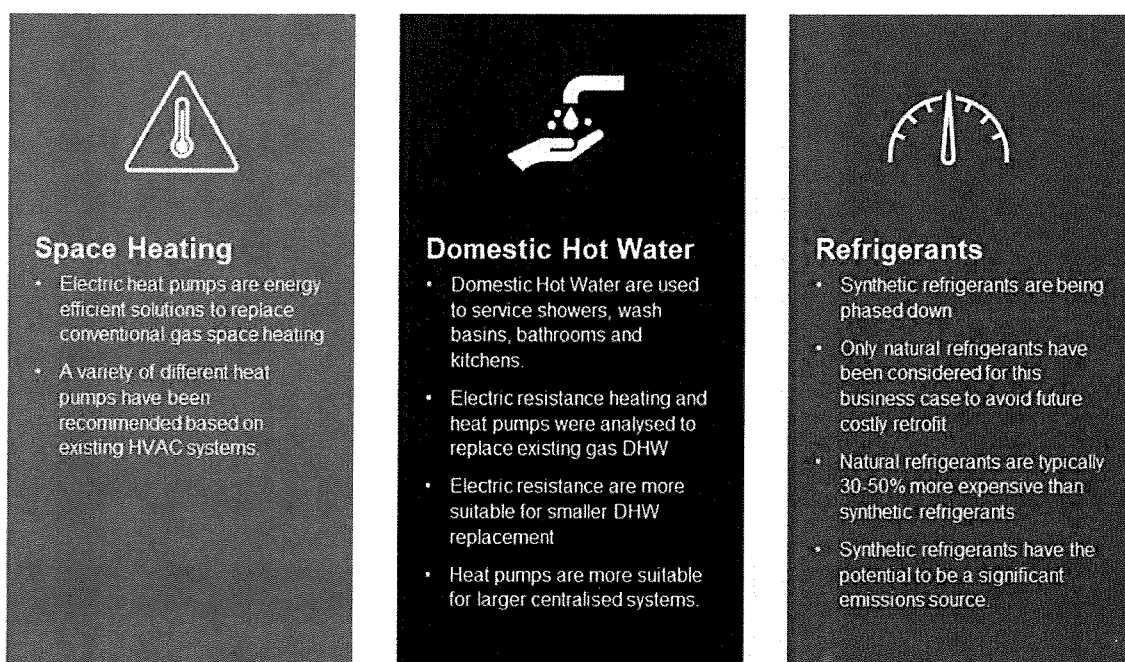
A range of technologies have been considered to select an appropriate replacement for each of the existing gas assets on a site-by-site basis. To select the most suitable replacement technology, the assessment considered the following asset characteristics:

- the type of existing asset in use;
- the areas serviced by the existing asset;
- the required capacity output (kW) and original gas asset input (MJ/hr); and
- the age and condition of the existing gas asset.

The above criteria have been used to identify a potential technology solution to inform the cost estimates for the Program and the network modelling. However, further work will be required following this business case to finalise the assessment of each asset and determine the actual replacement technology. Technology assessment and selection is likely to change based on a more detailed assessment of the specific sites and noting the potential for technology change and improvement over the life of the Program. On this basis, it is suggested that technology selection be regularly reviewed and revisited for each site.



Figure 3 - Summary of Technology Options



While natural refrigerants have been assumed in the costings for this business case, refrigerant types will be finalised during detailed design for each project subject to site-specific constraints. Future national or ACT policy may also impact this choice. See section 6.4 for a discussion on refrigerants.

1.7 Programs of Works

Section 7 summarises the indicative Programs of Works to replace the gas assets by 2040. The section also outlines a conceptual approach to refining the Program of Works and prioritising when assets are replaced as more information becomes available.

Three Programs have been developed for the delivery of replacement works:

- **Program A:** schedules the replacement of assets based on end of life of the asset. This results in a large number of gas assets falling in the short term given the age and condition of the gas assets across the portfolio.
- **Program B:** this program is also based on scheduling replacement based on end of life; however, it defers replacement for an additional five years. This results in a slightly less aggressive Program of Works as the replacement time is delayed by five years for all assets.
- **Program C - Preferred:** this program is based on Program B with changes to the Short-Term to create a 'ramp up' of capital funding in year one to allow for Program mobilisation activities to occur. This is described further in [7.3 Indicative Programs of Works](#).

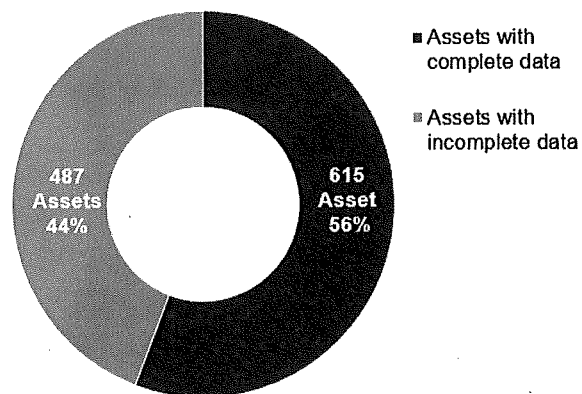
Individual asset timing across these programs is detailed in [Appendix E – Indicative Program of Works](#).

1.7.1 ACT Government Asset Registers and Data Constraints

The business case analysis has been undertaken based on the information and data provided by EPSDD and summarised at Table 22.

Based on the data contained in the current asset registers there are approximately 487 assets (44 per cent of all assets) that do not have sufficient information to accurately assess their age, condition and when they will need to be upgraded with emissions-free alternatives (as shown in Figure 4). Further work is required to develop a complete asset register for all the gas assets currently utilised across ACT Government owned buildings. This work is discussed further in section 16 and costs to undertake these works is included in section 11. Additionally, the approach to including these assets with incomplete data within the Programs of Work and how the cost estimates have been developed are discussed in sections 5 and 11 respectively.

Figure 4 – Assets with Missing Data



1.7.2 Approach and Methodology

Factors for consideration in developing the Program of Works

There are several factors that may be considered when determining the scheduling order of the asset replacement works, that is the Program of Works, including:

- **Gas asset age and condition:** age and condition of the existing gas assets;
- **Electrify full site or asset-by-asset:** whether it makes sense to undertake the full electrification of a site or undertake the works over multiple years;²
- **Required network upgrades:** whether the works will require upgrades to the electricity network and what other works are being undertaken on the electricity network;
- **Marginal Abatement Costs (MAC):** the MAC by site (full electrification) or MAC by asset;³
- **Aligning with other capital works:** the timing and extent of any other capital works being undertaken at the site and whether aligning these would be more efficient. This could also include a check to ensure that the remaining life of the building exceeds (or is equal to) the expected life of the zero-emissions asset(s) being installed;
- **Service delivery:** the impact the works may have on service delivery (e.g., works at schools may have to be undertaken during school holidays); and
- **Redundant sites:** Whether any sites or facilities may be divested or demolished in the near future.

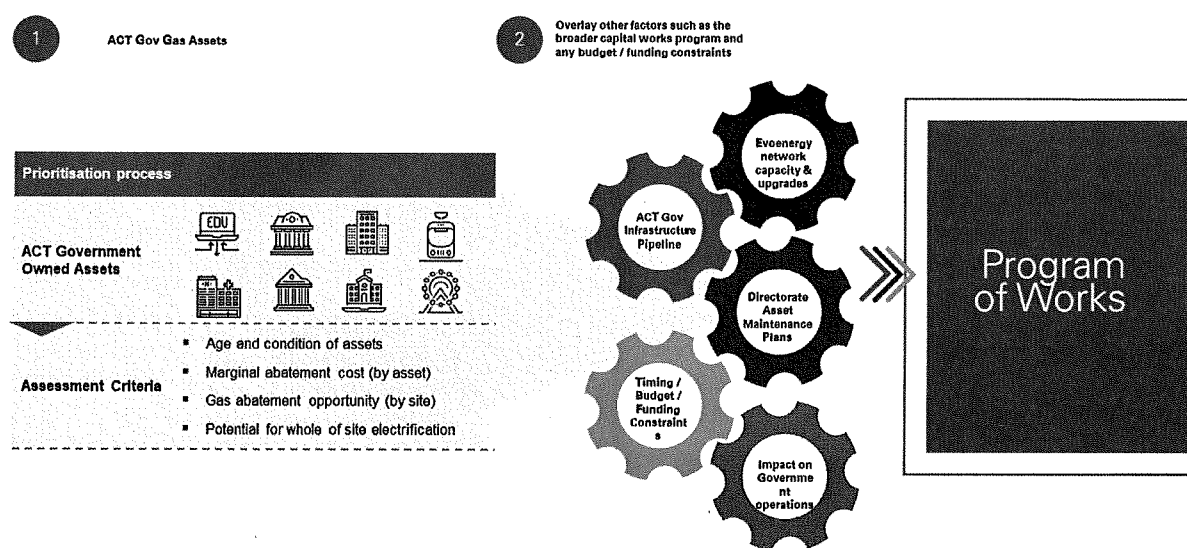
Figure 5 outlines a conceptual approach which could be used to determine how to prioritise which gas assets to replace considering the factors outlined above.

² The electrification of a full site may involve some assets being replaced prior to end of life. In these instances, further work will need to be undertaken to understand the residual life of that asset and whether the benefit of early replacement rolled into full site electrification is balanced against

³ The avoided Social Cost of Carbon (SCC) may be used instead of MAC to measure the social cost of carbon an asset or site electrification will avoid. Further work will be required to determine the preferred measure.



Figure 5 - Conceptual Approach to Prioritising Asset Replacement



Indicative Programs of Work

The approach to developing the indicative Program of Works for this business case has focussed primarily on the age and condition of the assets with consideration also given to the potential electricity network impact.

The process for developing the indicative Programs of Works as part of this business case has involved reviewing the age, remaining life and condition of the gas assets. The oldest assets and those furthest past their end-of-life are prioritised as the functionality, maintenance and risk of breakdown are greatest. There is a risk that if these assets are not prioritised it may result in the need to replace them with new gas equipment. Based on this assessment assets are categorised into three tranches:

- Short-term (FY2024 to FY2027);
- Medium-term (FY2028 to FY2031); or
- Long-term (FY2032 to FY2040).

The assets have been placed into tranches of similar size (assets and cost). Assets with data gaps have been included in the long-term tranche.

Further work will be required to update and finalise the Program as discussed in Section 16.5 including obtaining asset and site data for the sites without sufficient data (discussed in Section 7.1) and understanding the market capacity to support the delivery of the Program (see Section 10.5.2).

The Programs of Works are summarised in Table 2 and shown annually in Figure 6.

Table 2 – Indicative Programs of Works

Document	Program A	Program B	Program C (preferred)
Short-Term (FY2024 to FY2027)¹	Year 1: 109 assets at 7 sites Year 2: 51assets at 18 sites Year 3: 99 assets 19 sites Year 4: 51 assets 23 sites Total: 310 assets at 67 sites	Year 1: 109 assets at 7 sites Year 2: 56 assets at 14 sites Year 3: 54 assets at 21 sites Year 4: 26 assets at 13 sites Total: 245 assets at 55 sites	Year 1: 13 assets at 3 sites Year 2: 56 assets at 14 sites. Year 3: 61 assets at 22 sites. Year 4: 115 assets at 16 sites. Total: 245 assets at 55 sites
Medium-Term (FY2028 to FY2031)	Gas assets: 160 No. of sites: 41	Gas assets: 225 No. of sites: 53	Gas assets: 225 No. of sites: 53

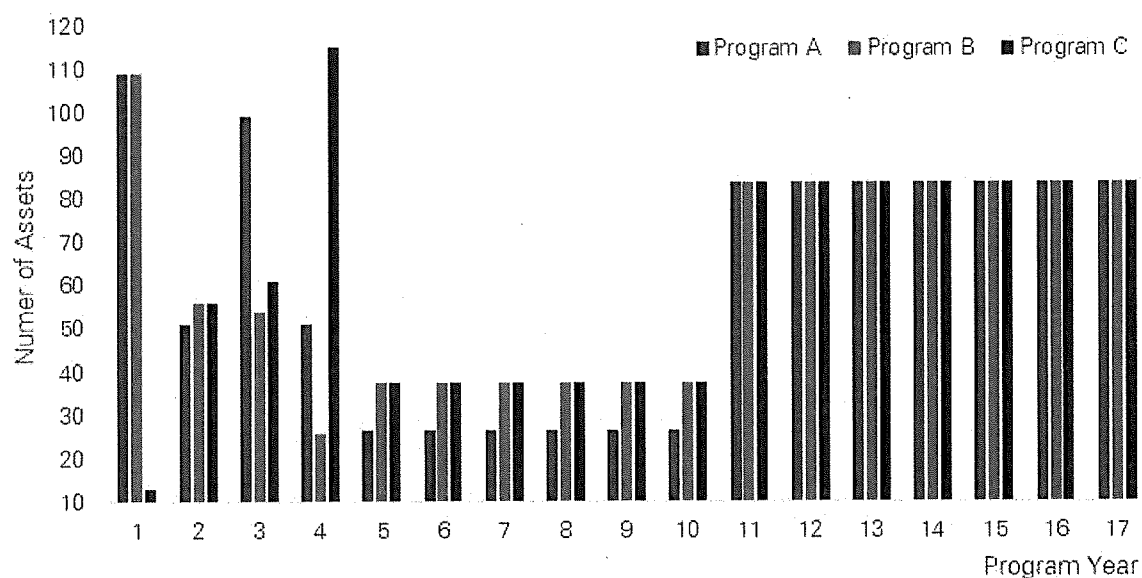
Document	Program A	Program B	Program C (preferred)
Long-Term (FY2032 to FY2040)	Gas assets:158 No. of sites: 47	Gas assets: 158 No. of sites: 47	Gas assets: 158 No. of sites: 47
Assets with insufficient data (assumed Long- Term)²	Gas assets: 428 No. of sites: 89	Gas assets: 428 No. of sites: 89	Gas assets: 428 No. of sites: 89
Total	Total: 1,056 assets at 189 sites	Total: 1,056 assets at 189 sites	Total: 1,056 assets at 189 sites

Source: Appendix E – Indicative Program of Works

Note 1: The first year of Program A and Program B includes replacing a number of gas assets at EPIC including 64 gas radiant heaters. In Program C, EPIC has been deferred to Year four based on EPSDD's instructions.

Note 2: Where there is currently insufficient data to determine when an asset will reach end of life or require replacement, these assets have been grouped in the Long-Term tranche. Further investigations are required to determine when to replace them. This accounts for 428 out of the 1,056 assets that are currently in used in the ACT Government buildings.

Figure 6 – Program A, B & C Electrification Rollout⁴



Short-Term Program of Works

As noted in Table 3, the number of assets that would be replaced with electric alternatives would be 324 (across 79 separate sites) and 247 (across 59 separate sites) under Program A and Program B/Program C respectively. Table 3 shows the number of assets to be replaced over the next four years under Program A, Program B and Program C across the different Directorates.

⁴ The medium term and long term works have been spread evenly across the respective periods for the purposes of this chart.



Table 3 – Short-Term Program by Directorate

Directorate	Program A		Program B & Program C	
	# Assets	# Sites ¹	# Assets	# Sites ¹
Education Directorate	166	47	133	42
Health Directorate	5	1	-	-
Justice and Community Safety Directorate	21	6	8	1
Property Group (CMTEDD)	82	3	82	3
Transport Canberra and City Services	10	2	10	2
Canberra Health Services	10	4	6	2
EPSDD	1	1	1	1
CIT	15	2	5	2
Total	310	66	245	53
Source: Appendix E – Indicative Program of Works				
Note 1: This is the number of sites that works will be undertaken at, not the number of sites fully electrified.				

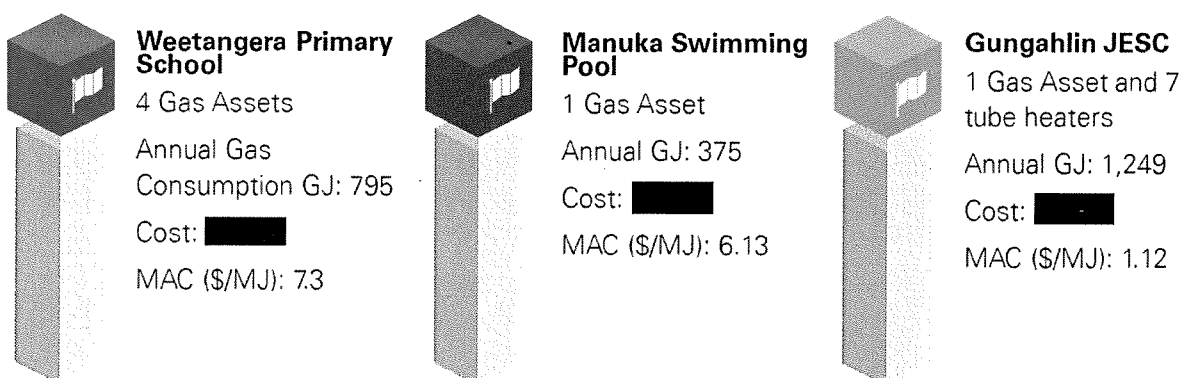
During the risks workshops it was noted by MPC and other stakeholders that capital works will be limited in year one (FY2023-24) as the program team, governance structures and procurement processes are established. As such, under the Programs B and C limits the upgrades in year one, with a ramp up throughout year two. If the program is established and capacity increases faster than expected, there will be flexibility to draw funding forward using the capital reserve.

There may be updates to the program of work as the Program is established and throughout its life due to:

- Interactions with other capital works by directorates;
- Changes to divestment or master plans for sites;
- Electricity network upgrade requirements and the impact on timing of projects; and
- Market capacity and capability.

Noting the points above, a number of electrification works have been identified as potential projects to be considered as part of the first year of the Program as set out in **Table 7** and detailed further in **Table 28**.

Figure 7 –Potential sites for Year one of Program C



1.8 Network Impacts and Considerations

Section 8 provides a description of the ACT electrical network, and the impact on the electricity network as a consequence of this Program including the approach adopted for estimating the impact on the network.

1.8.1 Evoenergy

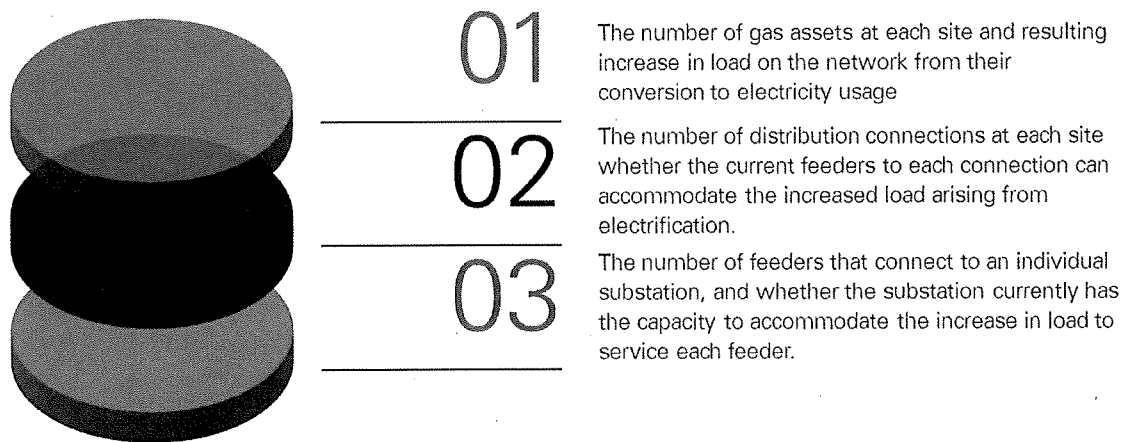
Evoenergy owns and operates the ACT electricity network, and the gas networks in the ACT, Queanbeyan, Jerrabomberra, Bungendore and Nowra. The transition away from gas across the ACT will be dependent upon Evoenergy's electrical network's ability to safely and reliably transport the required energy to satisfy the increase electrical load. In other words, the electrification program is dependent on Evoenergy's network capacity and capital expenditure (Capex) and augmentation expenditure (Augex) programs, as some locations will see a significant demand increase. At the time of writing, the gas electrification program is not factored into Evoenergy's network planning.

1.8.2 Network Modelling

The delivery of the Program will increase the electricity loads on the network and create network impacts. The conversion of Government gas assets to electricity will produce a higher load on the electrical network. The full program will replace approximately 301GJ/annum of gas usage for Domestic Hot Water (DHW) and space heating with 34GWh/annum of electricity. Certain parts of the electricity network do not currently have the required hosting capacity to accommodate this increase in load. In the circumstance that there is insufficient upstream hosting capacity including both for feeders (electrical lines and poles), as well as where substations do not have sufficient capacity, this could result in damage to the electrical infrastructure and blackouts for consumers. Moreover, adding greater load to the distribution network can impact its overall reliability and potentially result in failure of the network.

Consequently, there may need to be upgrades to the distribution network not only to avoid overload, but also to maintain a level of reliability which may involve augmentations to current feeders and substations, or the installation of new feeders and substations. The volume and level of upgrade required will differ on a site-by-site basis and is contingent upon several key considerations set out in Figure 8.

Figure 8 - Considerations for network impact of electrification works



To measure site-specific network impacts, each site's maximum demand was mapped firstly against the current hosting capacity of their connecting feeders, and subsequently the load that this would place upstream on the closest substation (aggregated across all of a specific substation's connecting feeders).

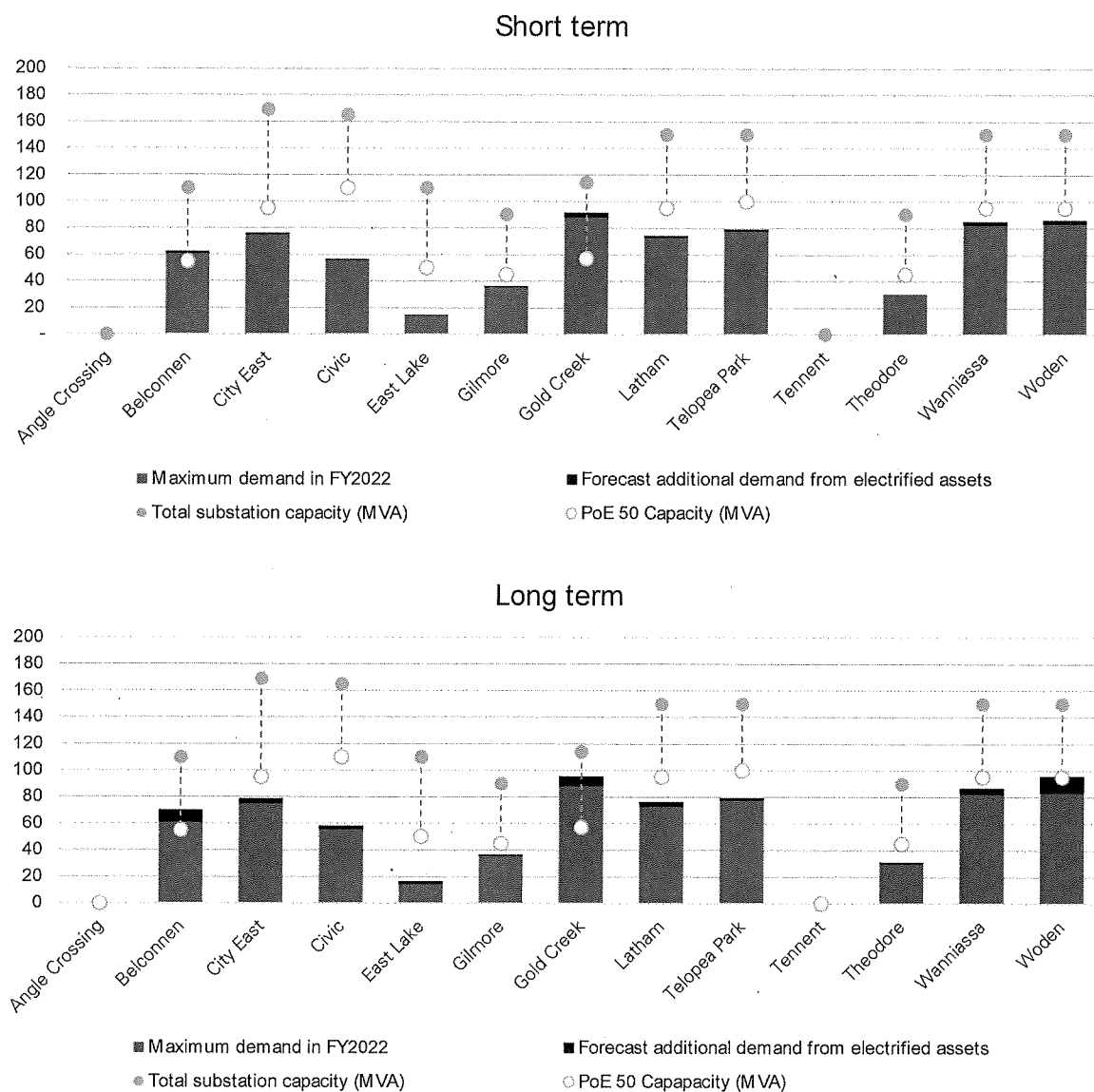
Figure 9 illustrates each substations current capacity (in MVA⁵). Where the total demand exceeds a substation's firm capacity, this will necessitate an upgrade to the substation. A substation's firm capacity is derived by using a demand probability of exceedance of 50 per cent.. Probability of Exceedance (PoE) refers to the probability that a particular value will be met or exceeded.

In the short term, the increased load is distributed relatively evenly across Government sites. However, in the long term, load becomes visibly more concentrated in Central Canberra, Woden, Belconnen, and Gungahlin

⁵ Apparent power is the amount of power supplied to customers on an electrical system and is quantified in units of volt-amperes (VA), kilovolt-amperes (kVA), and megavolt-amperes (MVA).

region. The increase in load across zone substations is detailed further in Figure 25 below but does not take into account increases in load from sources of electrification outside of this program (e.g., Electric Vehicle uptake).

Figure 9 – Existing demand by substation and short-term vs long-term additional demand from electrification of gas assets

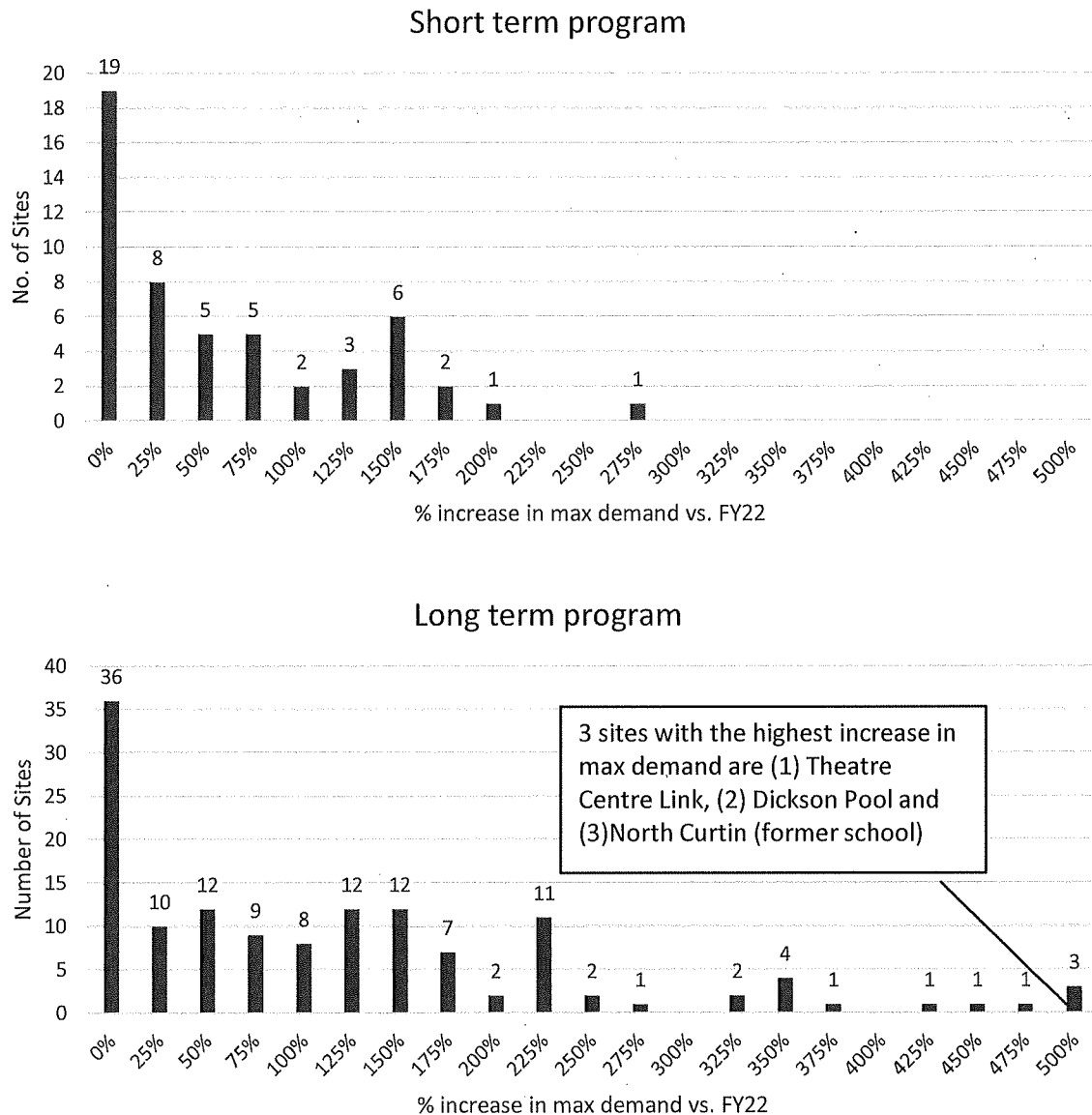


From a zone substation perspective, the electrification upgrades are not material compared to the current electrical loads. The max load increases 1.6 per cent in the short term, and 6.5 per cent by 2040, assuming ACT maintains FY22 max demands. It is unlikely the program will trigger any major upgrades at the HV or transmission level.

For all zone substations, except Woden where substations are currently below firm capacity, the increase in load from the Program does not cause exceedance to firm capacity (PoE 50).

For the zone substations that are already at capacity, that is Woden, Evoenergy has plans to upgrade the network infrastructure. To accommodate the increase in load at Woden substation, Evoenergy is planning to build an additional zone substation in close proximity at Molonglo Valley, which will provide an initial additional capacity of 15MVA, followed by an ultimate 55MVA of capacity in future years.

Figure 10 – Number of sites by percentage increase in load compared to FY22: max demand under Short-Term Program B vs Long-Term (by 2040)



Although the impact to zone substations is minimal, the increase in maximum demand on a site level is significant. The additional load will require electricity supply upgrades and, in some instances, uplift from a low voltage network to high voltages. Upgrade works may be required at both the customer site (such as main switchboards and customer specific transformers) and the shared network level (such as feeders and community transformers and switching stations). In the short term, all sites will experience at least a 4 per cent increase to their maximum demand vs FY22.

1.9 Risk Analysis

A comprehensive risk assessment was undertaken in accordance with the ACT Government Risk Management Framework and the Australian/New Zealand Standard *AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines*.

Two risk workshops were undertaken on 8 February 2023 and 15 February 2023 to identify, assess, and mitigate risks associated with the Program (Risk Workshops) with representatives from EPSDD, ACT Education, CMTEDD, MPC, OFC and KPMG. The workshop stakeholder group identified major Program and process risks, along with the measures and treatments to mitigate these risks. The output of the Risk Workshops is the Program Risk Register which is set out at [Appendix C – Program Risk Register](#).

The ACT Government Capital Framework requires:

'For Programs, the Project Team must undertake the risk analysis process documented in these Guidelines for the full Program, including the development of a Risk Register. The Project Team should discuss the method to develop contingency allowances for the Program and Precinct with MPC, FABG and IFR.'

At the Risk Workshop the approach to contingency, risk identification and risk assessment for the Program was discussed with representatives of MPC, FABG and IFR. It was agreed that:

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

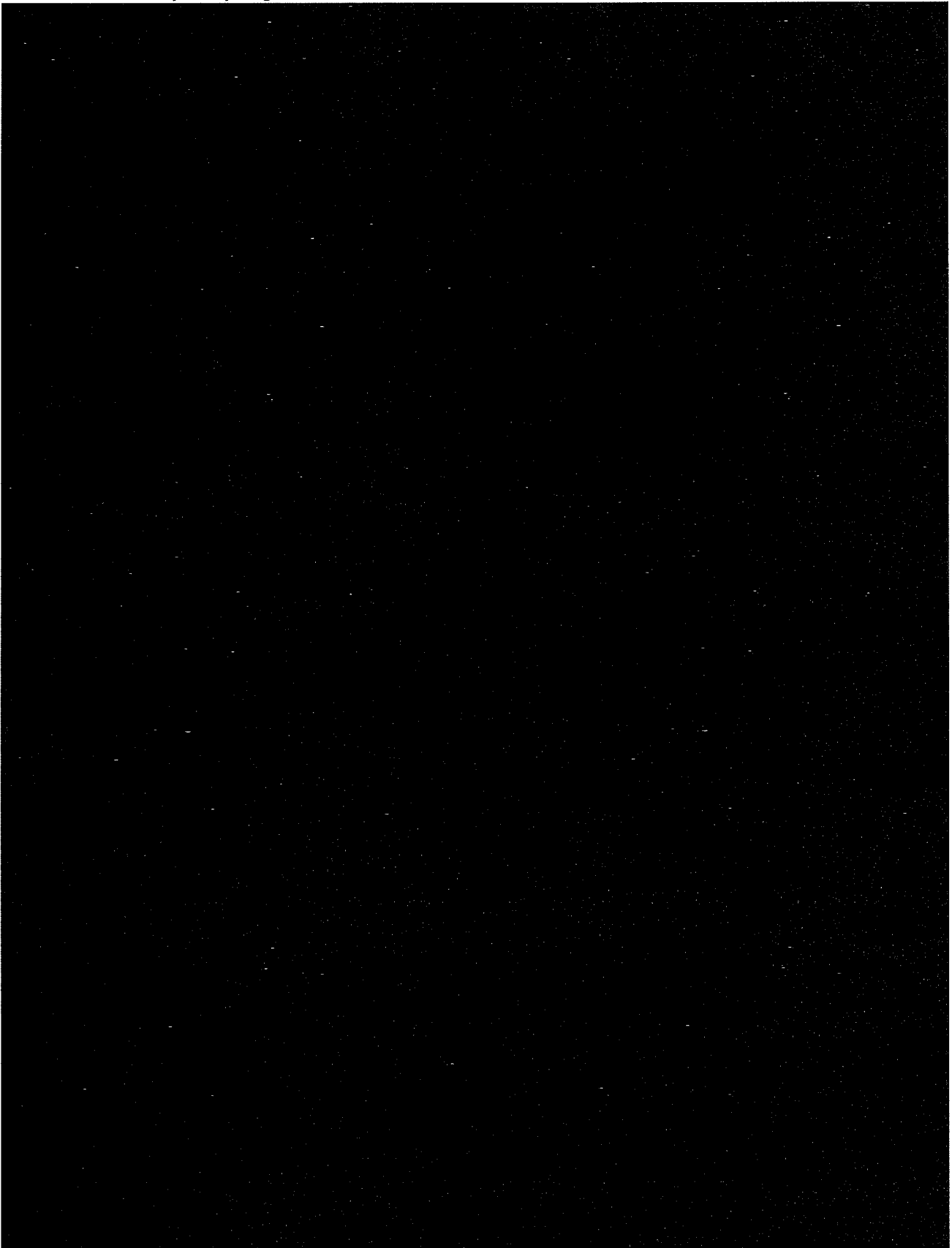
Figure 11 shows the risks identified and their ratings.

Figure 11 - Risk categories and ratings



Key Program risks are summarised in Table 4 and detailed further at Table 29.

Table 4 - Summary of Key Program Risks



1.10 Delivery Model Analysis

A delivery model workshop was undertaken on 24 February 2023 with representatives from MPC, EPSDD and KPMG to discuss potential approaches to deliver the Program. Section 10 summarises the outcomes of that workshop including:

- the need to engage a private sector partner to assist with the planning, procurement, contracting and delivery of the Program;
- the need to develop a bespoke 'Program' delivery model, which is likely to involve ACT Government engaging a private sector partner to assist with the planning, procurement, contracting and delivery of the Program (Program Delivery Partner);
- the need for additional private sector support to deliver specific aspects of the Program, under an approach that maximises competition and economies of scale, is flexible and can be adapted to specific project elements to drive the optimal Value for Money solution for the Territory; and
- the allocation of responsibilities between the ACT Government and private sector.

1.10.1 Applicability of Capital Framework Delivery Models

The ACT Capital Framework identifies 16 delivery models that are typically used to deliver ACT Government capital works projects. The Workshop team reviewed the applicability of these models and concluded that 12 of the 16 models are not relevant to delivery of a Program as they are only suitable as Project delivery models.

The Delivery Model analysis considers the following delivery models from the Capital Framework that involve the engagement of a private sector delivery partner:

- **Managing Contractor:** The government appoints a managing contractor (MC) who engages subcontractors to deliver the works. The MC is responsible for administering these subcontracts and accepts some delivery risk.
- **Project Management Agreement:** Flexible delivery model allowing ACT Government to source a Project Manager (without design or detailed scope) from a panel to deliver a range of services from design and construction to construction only.
- **Construction Management:** ACT Government engages a Construction Manager (or Program Manager) as its agent to manage the program of works.
- **Delivery Partner:** ACT Government engages a Delivery Partner to assist in project planning, programming, design management and construction management, typically for a Program of projects, in return for a management fee.

1.10.2 Need to Develop a Bespoke Delivery Model

During the workshop the suitability of each of the above models was discussed. While it was agreed that the above models were more applicable to a 'Capital Works' Project, it was considered that it would be possible to adapt the identified models to deliver a 'Program' of works. However, it is likely that a reasonable degree of changes would be required to adjust the project documentation to reflect the specifics of any 'capital works' delivery model to reflect the specifics of delivering a 'Program'. It was agreed that further work would be necessary to articulate the 'Program Scope' that would be delivered by the private sector partner and that it may be possible to draw on elements of the different delivery models to tailor a bespoke approach for the Program.

For the purpose of the workshop discussion, it was agreed that a private sector partner would be required to support the ACT Government in delivering the program. While noting that the delivery model would likely be a 'bespoke' model, it was determined that the term 'Program Delivery Partner' (PDP) broadly reflected the support that would be required.

Consistent with any major Project or Program, it is commonplace that the Government Project Team would work closely with its Private Sector partners. This was noted by MPC who identified that they would need team members with the relevant skills and experience to work for/with MPC to assist with the planning, coordination, procurement, contracting and delivery of the Program. It is intended that the PDP would support MPC in delivering the Program.

It was agreed that further work would be required to determine the preferred contract form and commercial terms (i.e., payment mechanism, risk allocation, etc.) for the PDP. It is anticipated that due to the level of uncertainty that the PDP arrangement may need to be on a time and materials basis (or some other form of non-fixed fee arrangement). Engaging a private sector partner is similar to how other programs have been delivered both in the ACT and other jurisdictions.

1.10.3 Allocation of Responsibilities

It was also noted that the PDP may be restricted from delivering certain elements of the Program, with the PDP responsible for procuring other private sectors partners to deliver those elements. The workshop participants discussed the various elements of the Program and how they are best allocated between the ACT Government, the PDP and other private sector organisations. The specific components are: (detailed further in Table 31):

- Project Scoping;
- Project Management
- Procurement of PDP;
- Procurement of Contractors;
- Design Works;
- Equipment supplier;
- Replacement Works; and
- Commissioning.

High-level commentary is provided for each component in Table 31, but further work would be required to optimise how each component could be structured. For example, for the Supply of Equipment/Technology component the commentary provides some options as to how this component could be structured (via a panel arrangement or multiple single or bundled procurements). It is anticipated that the PDP would be provided with sufficient flexibility to optimise the approach to deliver the optimal value for money for the Territory.

Table 32 summarises the discussion of the expected allocation of the various project elements between the ACT Government, PDP, and other private sector entities.

The structure being proposed has the following key benefits to the ACT Government:

- The PDP would bring expertise in the delivery of large-scale programs to complement and augment the existing ACT Government skillset and experience. This model allows the ACT Government to take on a larger role in delivery over time as it develops the necessary skills and expertise inhouse;
- It provides an opportunity to tailor the delivery of individual projects or packages, or work based on key characteristics on a best for program basis. For example, packaging a number of schools projects together where it makes sense to do so while also being able enter bespoke arrangements for complex projects such as Canberra Hospital;
- It allows cost competition from contractors who are tendering for specific packages of work. Some of which may be on fixed price arrangements providing the Territory with a level of cost certainty; and
- It provides the opportunity for either the PDP or the ACT Government to leverage economies of scale in the purchase of equipment through either panel arrangements or through large scale orders (where it makes sense to do so).

1.10.4 Delivery Strategy

A key driver of success for the Program to be delivered on schedule and within budget is ensuring the Program is delivered efficiently. Given the high volume and ambitious time frames, a tailored delivery strategy will need to be developed prior to ramping up the delivery of the Program. As noted above, further work will be required to tailor a quality delivery strategy for the Program once further information is available and the Program Team is established.

The Program delivery strategy will need to consider the following:

- **Packaging of projects:** considering the assets/sites that could be packaged together for the Asset Replacement Works;
- **Procurement/contract model:** considering the appropriate procurement/contract model for the Asset Replacement Works;
- **Equipment purchasing:** consider whether there is any benefit in bulk buying equipment directly from equipment suppliers such as reducing lead time, leveraging buying power, and how this might affect risk allocation of the asset replacement works;
- **Market capability and capacity:** taking into account the outcome of the market soundings in relation to market capacity to deliver the asset replacement works; and
- **Diverse projects:** considering whether a one-size-fits-all approach will work or whether differing delivery approaches may need to be adopted for different projects (for example groups of similar assets such as schools compared to larger and more complex projects such as the Canberra Hospital).

The delivery strategy will require input from a number of other workstreams including additional site investigations and data gathering (see Section 16.2), testing approach as part of the Year one sites (see Section 16.3.2), confirming technology selection (see Section 16.3.4) and market soundings (see below).

Market soundings

There remains uncertainty as to the market's capacity to deliver the Program of Works at the pace and scale as required to achieve the Governments targets. The Risk Workshop noted that market capacity is a high risk to the Program and actions should be undertaken to engage with industry to understand market capacity.

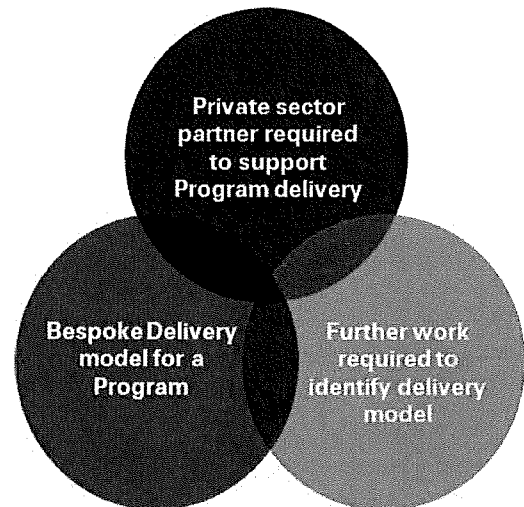
To develop the delivery strategy, the Program Team may also wish to consider the benefits of undertaking a market sounding with:

- equipment suppliers to understand market capacity, lead times, implications of bulk buying and test technology selection;
- installers and electrical works contractors to understand market capacity for installation works; and
- construction managers to understand whether the capability, capacity and interests exists in the market to undertake the management of the Program on behalf of the Government.

A market sounding process would involve targeted consultation with selected participants, such as existing providers in the ACT and New South Wales (NSW) markets, to obtain market feedback on the Program delivery. The market sounding could be used to:

- develop an understanding of market capacity, constraints, and opportunities in relation to delivery of the asset replacement works; and
- seek market feedback on the Program including identifying challenges and opportunities;
- test the market interest and views on the Program works and identify areas that could be optimised to increase market interest;
- optimising the structure of the delivery model and testing the commercial terms; and
- benefit from market experience and lessons learned from other recent relevant projects.

Figure 12 – Delivery strategy



Overall Program Cost Estimates

Table 6 outlines a rough order of magnitude (ROM) cost estimate for the Program excluding any Government fees and costs and any costs associated with network upgrades. It is important to note that the cost estimates have been developed in line with the approach outlined earlier in this section and that the Program cost estimates will need to be updated on a periodic basis as it will be impacted by actual cost inflation, updated asset data collected during site inspections and changes in technology over the Program duration.

Table 6 – Overall Program Cost Estimate (Nominal Costs \$'m)

ACT Gov Fees			
MPC fee (4%)	44.98	45.04	45.16
Other Directorate costs (4%) ²	44.98	45.04	45.16
ACTIA costs (0.25%)	2.81	2.81	2.82
ACTGS costs (0.10%)	1.12	1.13	1.13
ACT Gov Fees (B)	93.90	94.02	94.28
Total (A + B)	1,218.41	1,219.97	1,223.36

Source: KPMG Analysis

Note 1: PM Fees calculated as  of Risk Adjusted Real Capital Costs + Design Fees

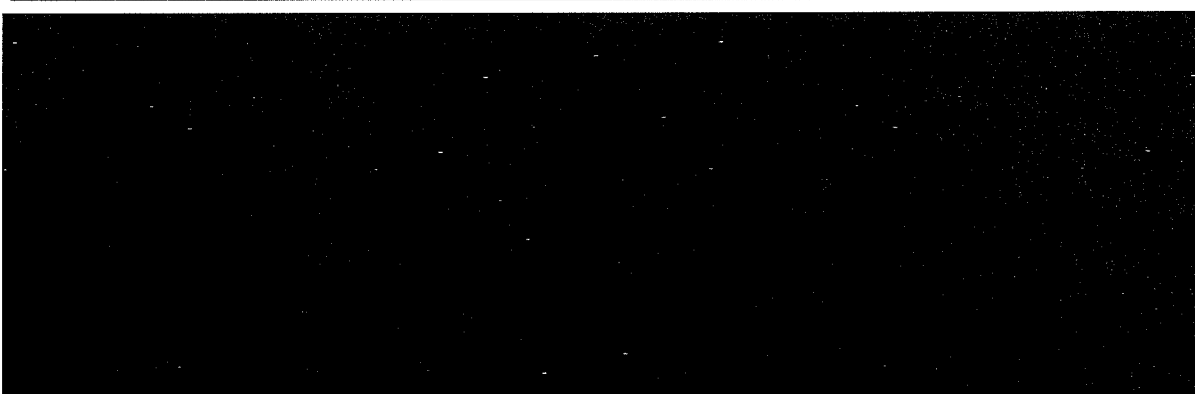
Note 2: While it is anticipated that MPC will lead the delivery of the Program it will still require involvement with the Directorates who are responsible for the buildings to ensure they are managed to minimise the impact on Government operations. It was flagged during a number of workshops that the Directorates currently do not have enough resourcing to manage the scale of the works. Other Directorate costs covers the additional resourcing for these Directorates.

Note 3: Totals may differ due to rounding

Tranche 1 (Short Term) Capital Costs

A more detailed cost estimate was developed for the works proposed over the forward estimates (FY2023/24 to FY2026/27). The costs for the preferred option (Program C) are summarised in **Table 7** with costs by asset in [Appendix E – Indicative Program of Works](#) and further details in [Appendix G – Capital Cost Estimates](#). Short term capital costs for programs A and B are in the main body of the report: [Replacement Capital Costs](#).

Table 7 – Tranche 1 Estimated Capital Costs (\$'million) (Program C, preferred)



ACT Gov Fees					
MPC fee (4%)	0.36	3.02	3.84	3.27	10.49
Other Directorate costs (4%) ²	0.36	3.02	3.84	3.27	10.49
ACTIA costs (0.25%)	0.02	0.19	0.24	0.20	0.66
ACTGS costs (0.10%)	0.01	0.08	0.10	0.08	0.26
ACT Gov Fees (B)	0.75	6.31	8.02	6.82	21.89
Total (A + B)	11.12	85.13	109.64	91.90	297.79
Source: KPMG Analysis Note 1: PM Fees calculated as  of Risk Adjusted Real Capital Costs + Design Fees Note 2: While it is anticipated that MPC will lead the delivery of the Program it will still require involvement with the Directorates who are responsible for the buildings to ensure they are managed to minimise the impact on Government operations. It was flagged during a number of workshops that the Directorates currently do not have enough resourcing to manage the scale of the works. Other Directorate costs covers the additional resourcing for these Directorates. Note 3: Totals may differ due to rounding					

1.11.2 Electricity Network Upgrade Costs

Whilst the overall forecast increased load from the electrification program accounts only for a ~1.3 per cent increase in total annual ACT electricity usage (current total ACT annual usage ~2,800Gwh, the annual increase from the Program is ~37GWh⁶), parts of the network are constrained and may not have enough capacity to cater for the increased electrical load as a result of this Program (and other ACT Government electrification initiatives). Network upgrades may therefore be required in certain areas to accommodate the increased electrical load and as a result the ACT Government may have to pay capital contributions to Evoenergy to make the necessary network upgrades.

Network cost impacts are determined by Evoenergy and can be negotiated for large consuming locations. For the purpose of this business case, a high-level estimate of the cost to ACT Government is based on FY22 load data and publicly available information from the AER and Evoenergy.

The methodology is summarised in Figure 13 and cost information is summarised in Table 8.

⁶ Evoenergy (2023). "Regulatory Proposal". Retrieved from https://www.evoenergy.com.au/-/media/evoenergy/documents/electricity-five-year-plan/evoenergy-regulatory-proposal-january-2023_public.pdf?la=en&hash=D496F73884C6CF45E1FE222BF3C65232DF0FD0D7



Figure 13 - Capital contributions equation

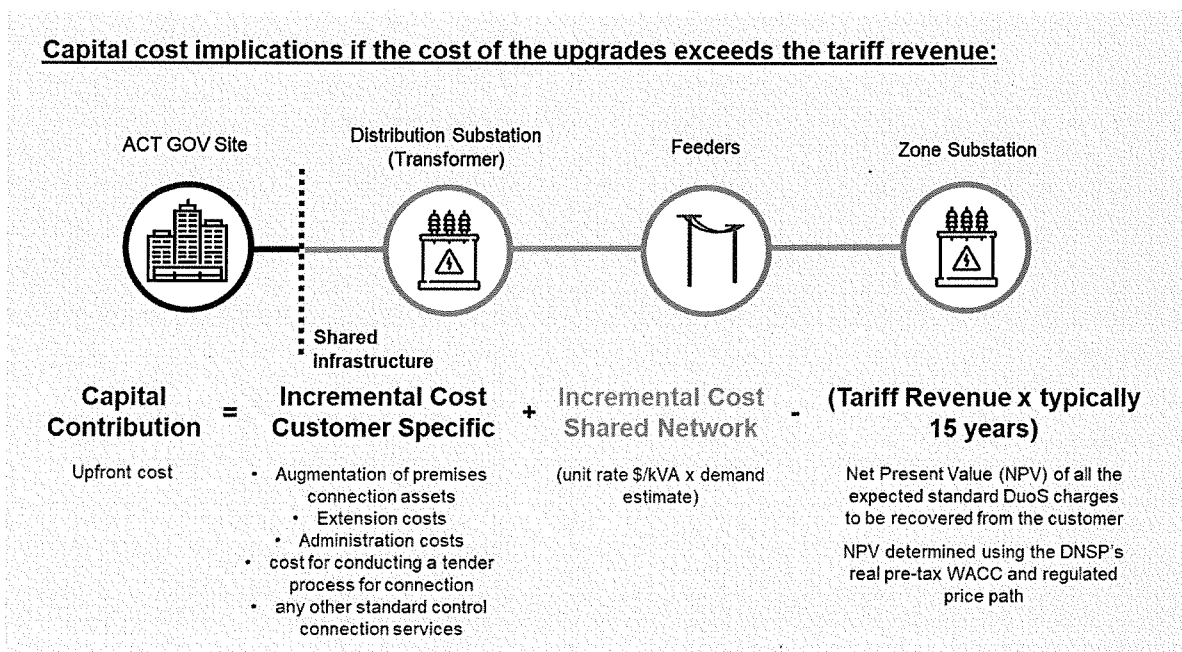


Table 8 – Upstream augmentation (per KVA of capacity)⁷ used to calculate the incremental cost shared network (ICSN)

Code	Category	Unit	Cost (excl GST)	Cost (incl GST)
585	HV Feeder	\$/kVA	\$41.68	\$45.85
586	Distribution substation	\$/kVA	\$24.14	\$26.55

The high-level cost estimates have been included in this business case to outline the potential cost to the ACT Government. It should be noted that the actual costs of any network upgrades will have to be negotiated with Evoenergy. It will be important for ACT Government to negotiate any capital contribution amounts in the context of other network upgrades being undertaken.

Table 9 summarises the Network Upgrade Costs that may be payable by ACT Government as a result of the Program A and Program B works increasing the electrical demand. The network modelling was not re-run for Program C due to the time constraints of completing the business case and as there would be minimal difference when compared to Program B.

Table 9 – Network Upgrade (Nominal \$'million)

	2023-24	2024-25	2025-26	2026-27	Total
Program A	1.40	3.70	5.60	6.50	17.20
Program B ²	1.40	3.30	5.60	3.40	13.70

Source: Network modelling and approach outlined in section

Note 1: Totals may differ due to rounding

Note 2: The network modelling was not re-run for Program C due to the time constraints of completing the business case and as there would be minimal difference when compared to Program B

⁷ Evoenergy (2022). Schedule of electricity network charges 2022/23. Retrieved from <https://www.evoenergy.com.au/-/media/evoenergy/documents/electricity/evoenergy-electricity-schedule-of-charges-2022-23.pdf?la=en&hash=8AC305508DBCEE9958F7D55F0BE6464A1B5C401D>

1.11.3 Program Development Costs

Table 10 summarises the Project Development Costs that are required to undertake further planning and due diligence for the Program. These activities are outlined further in section 15 and section 16. It is important to note that the costs below are estimates to cover some of the project development activities that are required over the next four years. As noted in section 16 undertaking the necessary program development activities will ensure that the Program is set up for success to achieve the 2040 target date.

Table 10 – Project Development Costs (Nominal \$'million)

Cost item	2023-24	2024-25	2025-26	2026-27	Total
Site / Asset Investigations	2.00	1.00	0.50	0.30	3.80
Development of Procurement Strategy	0.50	0.30	-	-	0.80
Updating Program of Works	0.30	0.20	-	-	0.50
Updates to Business Cases	0.50	0.50	0.40	0.40	1.80
Dedicated Evoenergy Resource ¹	0.30	0.50	0.50	0.50	1.80
Legal and Comms Advisors	0.25	0.50	0.50	0.50	1.75
Probity Advisor	0.10	0.20	0.20	0.20	0.70
Worksafe Costs	0.10	0.20	0.20	0.20	0.70
PDP ²	-	3.02	3.84	3.27	10.13
Total	4.05	6.42	6.14	5.37	21.98

Source: Internal funding allocation estimate. Evoenergy resourcing cost provided by Evoenergy

Note 1: Cost estimate provided by Evoenergy

Note 2: PDP cost estimates are based on 4% of the Program C capital costs. No cost for a PDP has been included for 2023-24 as any works undertaken during this year would be managed by MPC and learnings from this would inform the future delivery approach including whether to engage a PDP.

Note 3: Totals may differ due to rounding

1.11.4 Resourcing Costs

This business case represents a significant step forward in the ACT Government's commitment to a Zero Emissions Government by 2040. The EPSDD Zero Emissions Government (ZEG) team is funded under the 2019-20 budget for the ACT Climate Change Strategy, which will expire at the end of 2022-23. Under the Zero Emissions Government Framework, the ZEG program requires an extension to existing roles to support the 'electrification of government gas assets' program, and to aid monitoring and reporting of progress towards the 2040 zero emissions. Another essential role is the management of the data the Enterprise Sustainability Platform (ESP), which is a central online platform used by all Directorates for the collection, analysis and reporting of electricity, gas, water and fleet fuel consumption, greenhouse gas emission data and the associated utility costs.

These ZEG roles have existing permanent officers engaged and ongoing funding is recommended due to the *Zero Emissions in Government Operations Program* end date of 2040.

Three in-house technical Energy Project Officers (EPOs) are critical to the delivery of the ZEG emissions reduction targets, interpreting data—including analysis, monitoring, and reporting to support energy efficiency and track performance of Directorates. The EPOs are responsible for the technical advice to all 9 Directorates, covering more than 600 Government buildings, including technical and procurement advice on asset upgrades, particularly in situations where gas assets fail unexpectedly.

The EPOs investigate and promote technical and process innovations with Directorate partners and are currently developing options for the introduction of zero emission refrigerant technologies in government sites. Refrigerants are a key remaining source of ACT Government and Territory emissions.

The Administrative Services Officer (ASO) Class 5 ZEG Project Officer works closely with the Zero Emissions Government, Schools and Community Director on the delivery of the Community Zero Emissions grants, as well as coordinating the ACT Government emissions reporting in Directorate annual reports and Minister's Annual Report

under the Climate Change and Greenhouse Gas Reduction Act. The Project Officer as Secretariat of the Zero Emissions Government Implementation Committee, the central forum to identify opportunities, barriers, and solutions to achieving a zero emissions government; manages the ZEG Fund loan and coordinated case study development sharing ACT Government experiences in its own electrification process with local community and industry.

For note: the ZEG Loan Fund will be updated to complement the electrification program. Currently the Fund is focussed on gas replacement projects. However, with the electrification program in place, the ZEG Loan Fund will be recalibrated to focus on solar and energy efficiency projects. This work will complement the delivery of the Program, as continued electrification will increase overall electricity consumption which will in turn improve the case for increased solar generation and energy efficiency. These projects will pay themselves back through energy cost savings. They will be timed to coincide with electrification upgrades to minimise disruption to ACT Government services and reduce overall capital works costs.

This business case seeks the continuation of **five existing staff in the ZEG program team**, specifically:

- 1x Senior Officer Grade (SOG) SOGB Director
- 3x SOGC Energy Project Officers
- 1x ASO5 Administrative Officer

Table 11 – EPSDD Resourcing Costs (Nominal \$'million)

	2023-24	2024-25	2025-26	2026-27	Total
Resourcing Costs	0.81	0.82	0.83	0.84	3.30
FTE	5.0	5.0	5.0	5.0	
Source: EPSDD					
Note: Total may differ due to rounding					

A detailed resourcing plan has not been developed for MPC or other impacted Directorates as it will depend on the final delivery model and governance arrangements for the Program. However, an allowance has been included within the cost plans summarised in section 11.1.

1.11.5 Financial Benefits

The fuel transition presents opportunities to reduce operational costs (via energy bills) and reduce the damage costs associated with carbon emissions. In FY2022, the program sites consumed approximately 398TJ - ~6 per cent of the total gas use in ACT. The program is expected to reduce 301TJ at the end of the last tranche in 2040. The remaining 97TJ is used in sterilisation and thermal purposes and is excluded from this program.

Based on the simple assessment of Program B, a total savings is approximately \$1.32mil per annum (real\$2022) from energy and \$310k per annum in carbon (15,500t of CO₂e).

Table 12 summarises the cost and carbon savings obtained from transitioning from gas to electric fuelled assets.

1. **Cost of Electricity** – Additional annual retail and network charges. Calculated based on current tariffs. Where there are gaps, the available data was extrapolated based on usage (kWh).
2. **Energy savings from gas** – Total cost of gas in FY22. A blended rate of 2.92cents/MJ is applied.⁸
3. **Carbon per annum** – in accordance with the Social Cost of Carbon program, the avoided damage costs of carbon as a result from eliminating gas consumption for heating and DHW is 20\$/tCO₂⁹, avoided carbon emissions from going from gas to electricity. The ACT Government's emissions factor for electricity is zero.

⁸ The FY22 price of gas does not include any forecasted change in gas price over the life of the Program. Any increase or decrease in price of gas will affect the cost savings from transitioning to electric.

⁹ ACT Government (2021). "Considering the 'social cost of carbon'. Retrieved from [Considering the 'social cost of carbon' - Chief Minister, Treasury and Economic Development Directorate \(act.gov.au\)](#)

Table 12 – Financial Benefits (\$'m) - Program B (cumulative per annum Real\$2022)

Cost item	Short term	Medium term	Long term
Electricity Costs (retail + network charges) (A)	1.50	4.24	7.67
Energy savings (gas) (B)	2.28	5.35	8.72
Total energy annual savings (B – A)	0.78	1.11	1.04
Carbon emissions savings	0.08	0.19	0.31
Total annual savings	0.86	1.30	1.35

Source: Envizi account style data extract and monthly data summary for FY22.

Note 1: Sites with no consumption or billing data are excluded due to the lack of information. This results in lower long-term savings as there is a significant number of unknown assets in the final tranche.

Note 2: The network modelling was not re-run for Program C due to the time constraints of completing the business case and as there would be minimal difference when compared to Program B

1.11.6 Budget Implications

Table 13 the budget impact of the Program over the period 2023-24 to 2026-27 based on Program C. The budget impact also includes the potential network upgrade costs as calculated in section 11.2 and Program development activities calculated in section 11.3. The budget impact summary has been based on Program C as this option, based on the discussions with cross-Directorate stakeholders throughout the development of this business case, represents a more realistic schedule for undertaking the replacement works.

Table 13 – Budget Summary

	2023-24	2024-25	2025-26	2026-27	Total
Capital impacts					
Capital injection¹	11.12	85.13	109.63	91.89	297.77
Capital inflows	-	-	-	-	-
Capital offset – existing provision	-	-	-	-	-
Expense impacts					
Expenses²	4.86	7.24	6.97	6.21	25.28
Expenses – offsets	-	-	-	-	-
Expenses – offsets – existing provision	-	-	-	-	-
Depreciation⁵	-	0.68	6.20	13.25	20.12
Revenue/Commonwealth contribution/savings impacts					
Revenue	-	-	-	-	-
Commonwealth contribution	-	-	-	-	-
Savings³	0.19	0.25	0.41	0.01	0.86
Staffing impact					
Total additional FTEs (no.)⁴	5.0	5.0	5.0	5.0	

Note 1: Program C estimated capital costs (Table 7) plus the estimated network upgrade costs Program B (Table 9)

Note 2: Program development costs (Table 10) plus FTE costs (Table 11)

Note 3: Real energy saving estimates (Table 12)

Note 4: This includes the existing EPSDD staffing

Note 5: No depreciation has been calculated for the existing assets as the book value of each of the assets is not currently available. Straight line depreciation has calculated for the electric assets based on a 15-year expected life.

Note 6: Totals may differ due to rounding

1.11.7 Funding Strategy

This business case is seeking a funding allocation (both capital and operating funding) for the next four years. While it is not possible to determine with certainty which specific works will be undertaken over the next four years (due to the issues discussed in section 5) a level of funding certainty is required over this period to ensure works can be appropriately planned for with a level of certainty. There is a material risk that if funding is provided on a shorter-term basis (i.e., requiring more frequent business case requests and updates) then it will delay the works and the Government may not achieve its target of net zero emissions from Government operations by 2040.

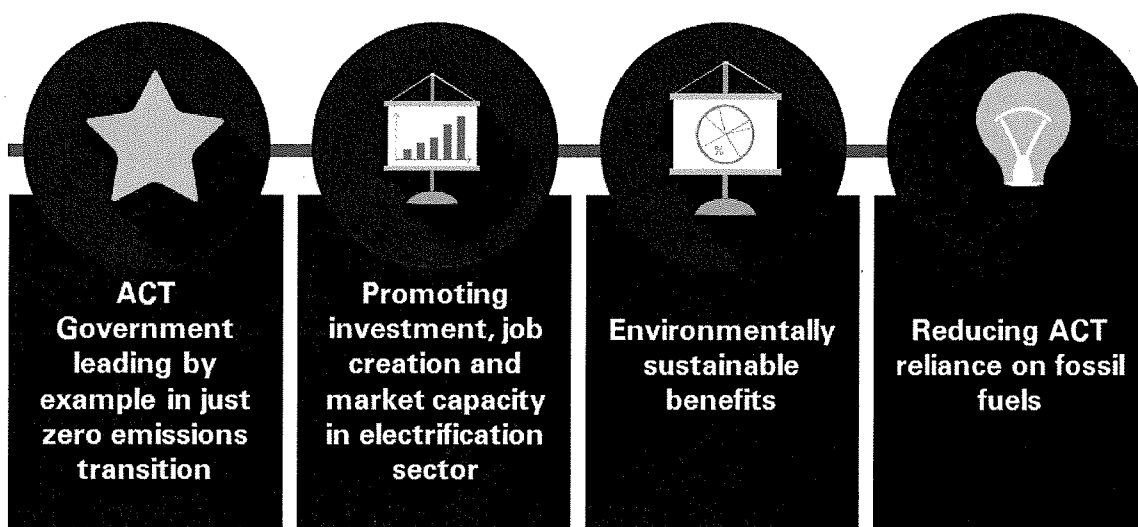
It is anticipated that this Program will be a Designated Project (refer to section 13 for further discussion on the proposed governance structure) and as such the Program Board structure will allow the Program to progress efficiently (i.e., to manage which works are undertaken within the allocated funding) while providing Government with an appropriate level of surety and oversight. This structure has been used successfully on other major infrastructure projects and programs by the Government.

1.12 Economic Appraisal

The economic appraisal takes the form of a qualitative analysis of the wider economic benefits of the program. This has been determined as the most appropriate methodology on the basis that the key driver for the Program is policy rather than economic benefits. Further, whilst economic benefits are not the primary driver for the Program, the reduction of ACT Government emissions are likely to provide economic, social and health benefits for residents. Figure 14 outlines the socio-economic benefits detailed in Section 12.

In addition to the socio-economic benefits discussed in Section 12, the Program's alignment with the ACT Wellbeing Framework is discussed in Section 4.2 and the financial benefits (including savings) of the Program are set out in Section 11.5.

Figure 14 - Socio-economic benefits identified in Section 12.2



1.13 Program Governance

The successful delivery of the Program will be dependent on establishing an appropriate governance structure that facilitates efficient decision making and is flexible to adapt as required across the Program. Establishing an appropriate governance structure is a key issue for the Program as noted in the Risk Workshops and the ILM.

A Governance workshop with attendees from EPSDD, MPC and Treasury was held to discuss the appropriate governance structure for the Program noting the size, complexity, range of stakeholders and prolonged delivery timeframes for Program delivery.

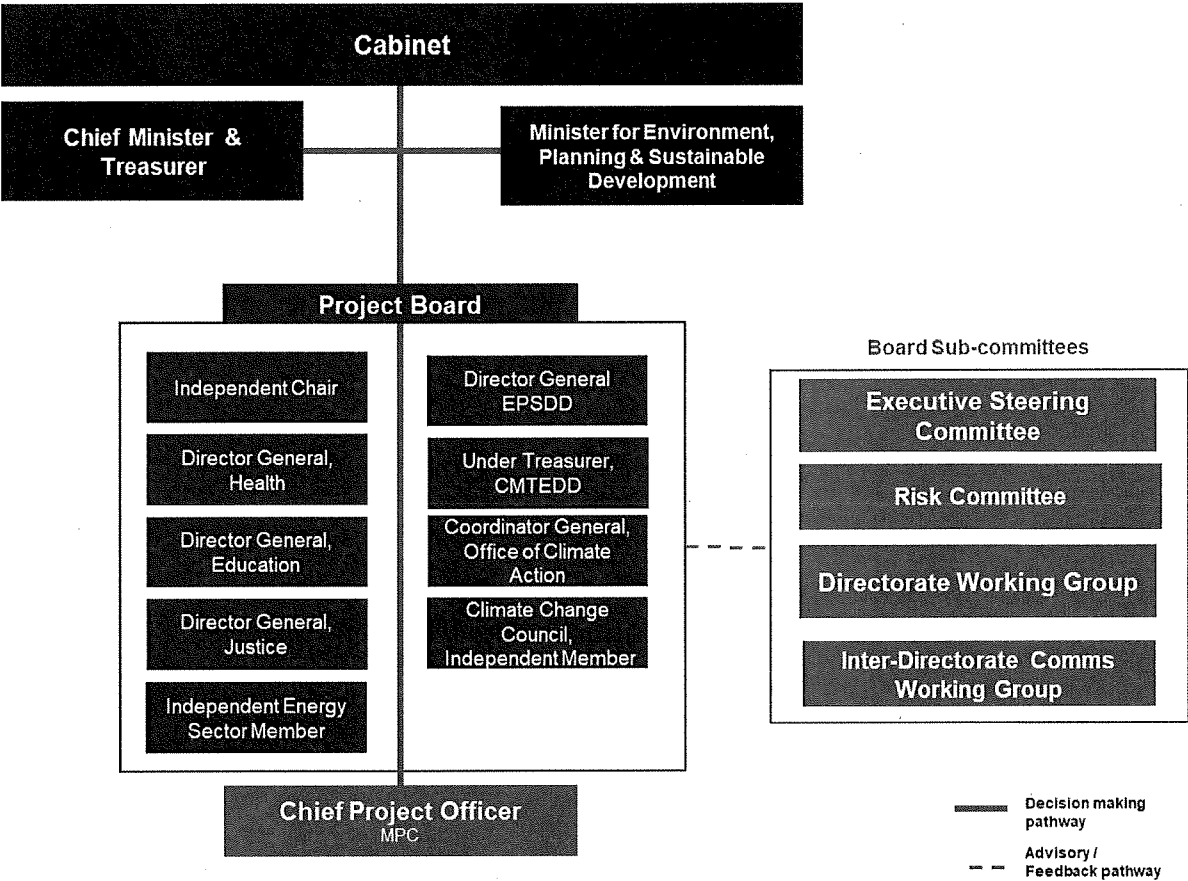
1.13.1 Recommended Governance Structure

The proposed governance structure for overseeing the delivery of the Program is set out in Figure 15. MPC will lead the Program delivery as a Designated Project.

MPC is an ACT Government directorate which has responsibility for directing and managing all aspects of major projects invested in by the ACT Government. It was established on 1 July 2019 to lead the procurement and delivery of the Territory’s infrastructure program.

Under a Designated Project edict, the funding for the Program will be provided to MPC for Program delivery and MPC will bear budget accountability for those projects and have accountability to the relevant Minister responsible for those projects. The Governance Workshop noted this would respond to the issues that Treasury has faced in terms of managing differing funding requests and electrification approaches from across the different Directorates.

Figure 15 – Proposed Program Governance Structure

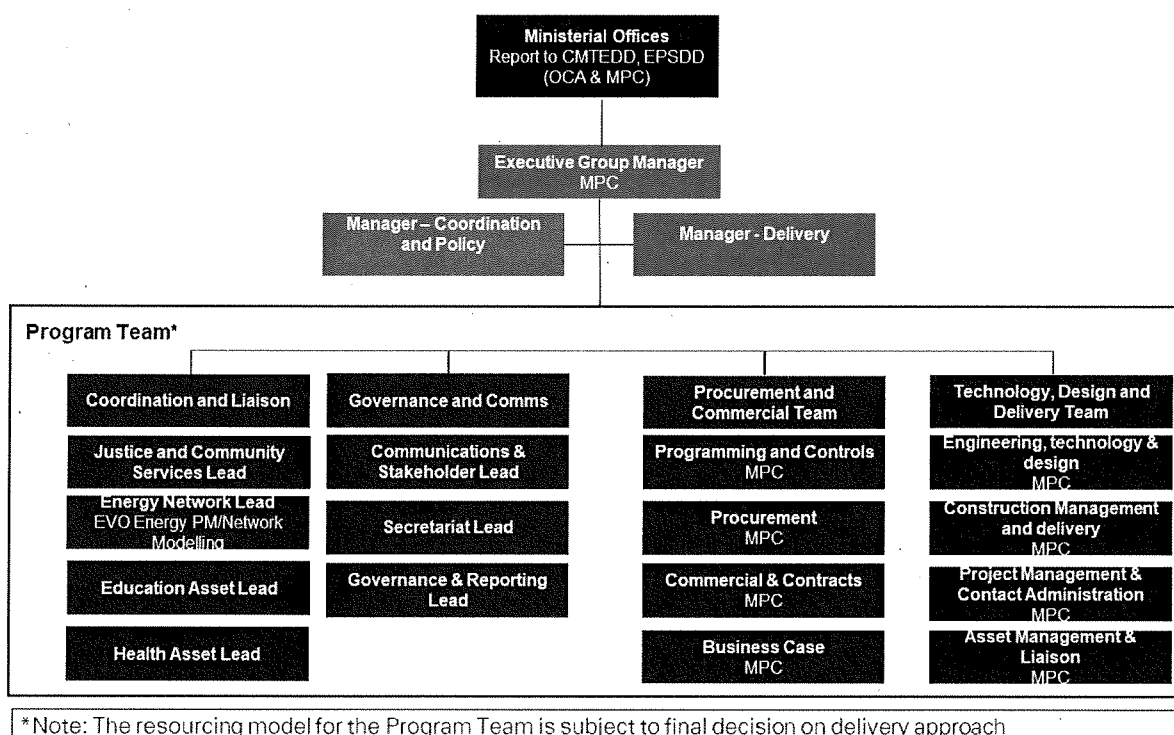


1.13.2 Program Team

A Program Team is required for the procurement and delivery of the Program following its consideration by Government and approval to proceed. The Program Team will include a team of resources to undertake the delivery, coordination and liaison and communication activities required for the Program. Dedicated resources for Directorate coordination and stakeholder communications may be required to work with Directorates and alleviate concerns that Directorates will lose control over their assets and have already developed stakeholder relationship management. The Program Team will be led by a dedicated Executive Group Manager from MPC and will report to the Chief Project Officer (CPO).

Figure 16 outlines an indicative Program Team. It is anticipated that the structure and resourcing of the Program Team will need to be revisited for the delivery of the Program as the level of resourcing required will depend on the delivery model selected which is discussed in Section 13.6.

Figure 16 - Anticipated Program Team



1.13.3 Program Resourcing Strategy

Section 10 considers the delivery model for the Program including the level of services bundling. As noted in Section 10, at this stage of the Program development it is difficult to identify the appropriate delivery model and further work will be required following this business case to develop a tailored delivery strategy for the Program. The delivery strategy is discussed further in section 10.5.

The level of resourcing required for the Program Team will depend on the outcome of the delivery strategy. The delivery approaches being considered differ in the level of contractor management that is undertaken by the Program Team, which will in turn affect the level of resourcing required to be provided by the Program Team.

On this basis, costs for MPC and other Directorates to resource the Program Team are included within the capital costs estimates set out at Section 11.1. Resourcing costs for EPSDD are set out in Section 11.4.

1.14 Stakeholder Engagement

Section 14 sets out an overview of key Program stakeholders, their interests and engagement need, and the plan for stakeholder engagement for the Project following Project approval.

A preliminary stakeholder analysis has been undertaken to identify key stakeholders, examine their interests and define their required level of engagement during the Program. Table 14 summarises the stakeholders identified.

Table 14 - Summary of stakeholders

Directorates	Other Stakeholders
▪ Chief Minister, Treasury and Economic Development Directorate (CMTEDD) ▪ Environment, Planning and Sustainable Development Directorate (EPSDD) ▪ Major Projects Canberra (MPC) ▪ Education Directorate (ACT Education) ▪ ACT Health Directorate (ACT Health) ▪ Canberra Health Services (CHS) ▪ ACT Property Group ▪ Justice and Community Safety Directorate (JACS) ▪ Office of the Coordinator General for Climate Action (OCA) ▪ Community Services Directorate (CSD) ▪ Transport Canberra and City Services Directorate (TCCS) ▪ Cultural Facilities Corporation (CFC) ▪ Canberra Institute of Technology (CIT)	▪ Evoenergy ▪ Worksafe ACT ▪ Providers (design, installation) ▪ Equipment suppliers ▪ Facility Users ▪ Community ▪ Relevant Unions

1.14.1 Evoenergy

Engaging power utilities early on in major projects is crucial for ensuring a smooth and successful outcome. This is particularly important on this Program which is set to interface with Evoenergy across 72 sites where upgrades will be required at approximately 60 per cent of these.

Dedicated Evoenergy resource

One way of facilitating ongoing collaboration is to include an Evoenergy resource on the Program Team as a direct point of contact for interaction between the Program Team and Evoenergy. This could be achieved through a secondment of the resource to MPC.

A dedicated Evoenergy resource seconded to the Program team provides an opportunity for better collaboration and a greater level of understanding between the Program Team and Evoenergy. At the discussion with Evoenergy on 7 February 2023, Evoenergy was generally supportive of including an Evoenergy resource on the Program Team and noted this would be beneficial for the Program as:

- The Program would have a dedicated representative. This would mean rather than 'joining the queue' for each request, the Program Team could coordinate all upgrade requests through the dedicated Evoenergy resource.
- The dedicated Evoenergy resource will ensure the approach to Program related upgrades is consistent.
- Placing an Evoenergy resource on the Program Team will foster a strong relationship between the two organisations and allow for direct sharing of expertise.¹⁰

Costs for a dedicated resource for Evoenergy have been included in the Program Development costs at Section 11.3 however the terms of the arrangement (secondment to Program Team or if the resource does not sit with the Program Team) will need to be discussed further with Evoenergy as discussed in Section 16.1).

1.15 Advisor Engagement Plan

Section 15 sets out the various advisors that may need to be engaged on the Program including:

- Legal;
- Communications;
- Financial, commercial and procurement;
- Technical advisors including design and engineering, asset and site due diligence and investigations, cost estimation and programming;
- Probity;

¹⁰ Meeting with Evoenergy on 7 February 2023.



- Transaction management;
- Stakeholder management and communication; and
- Environment and sustainability.

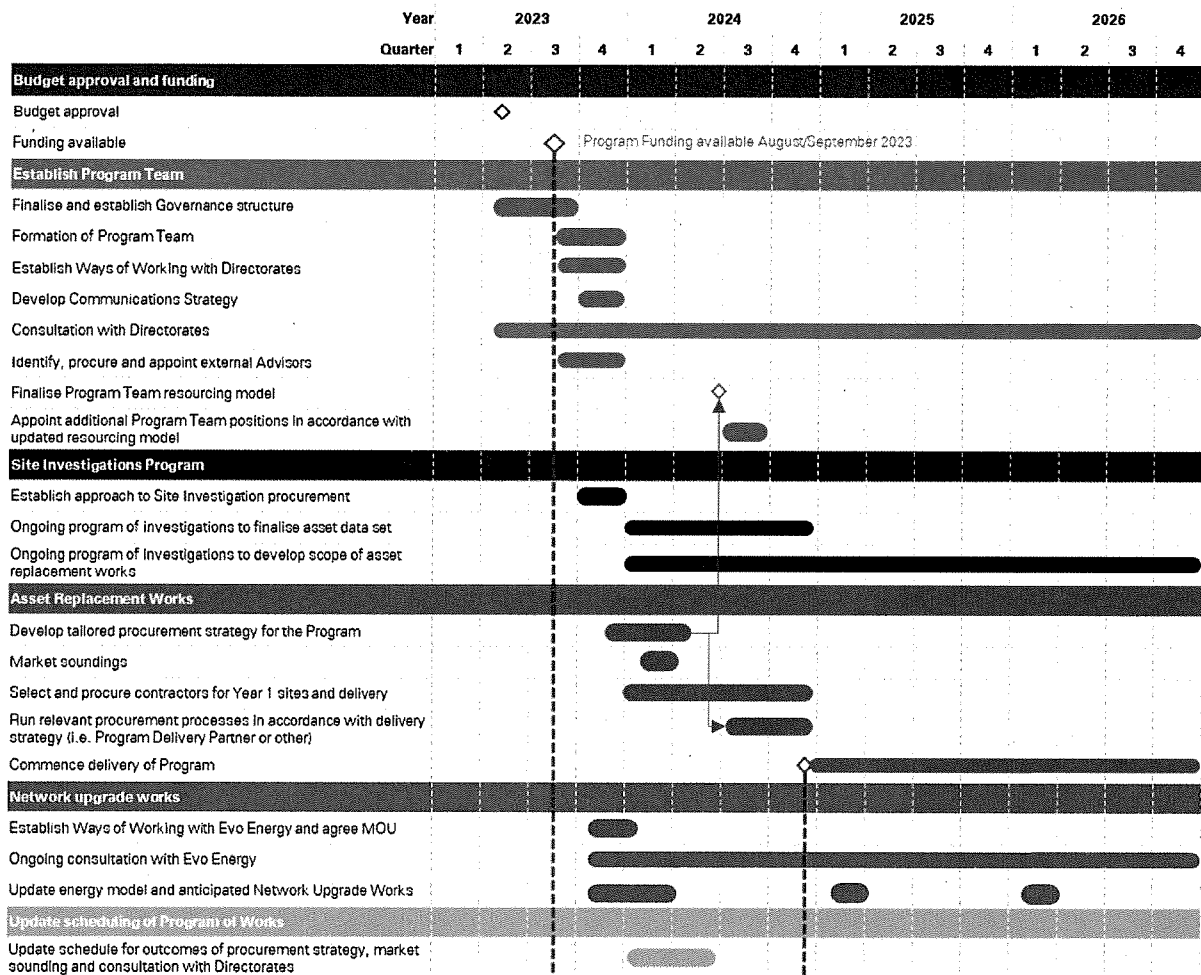
1.16 Program Development and Mobilisation

Section 16 sets out the potential next steps to progress the Program development including:

- mobilisation activities to establish the Program Team;
- procuring a range of asset and site investigation services;
- developing, testing and mobilising an appropriate delivery strategy for the asset replacement works;
- establishing working relationship with Evoenergy; and
- updating the schedule for the Program based on additional information.

A high-level overview and indicative schedule of the Program development and mobilisation activities is set out in Figure 17.

Figure 17 - Indicative schedule of Program development and mobilisation activities



2 Introduction

2.1 Overview

The Parliamentary and Governing Agreement sets out the shared commitments, actions and outcomes of the 10th Legislative Assembly for the Australian Capital Territory including a commitment to take the next essential steps to a net-zero ACT through ‘phasing out of fossil-fuel-gas in the ACT by 2045’ by ensuring all new ACT Government buildings and facilities are fossil fuel gas free (including new leases) and all retrofitting in Government buildings and facilities will have a goal of net-zero emissions post retrofit.¹¹

In 2019 the ACT Government released the ACT Climate Change Strategy 2019-2025 (the **Strategy**) which sets the path towards achieving a 50-60 per cent reduction in emissions from 1990 levels by 2025 and outlines the initial steps towards achieving net zero emissions by 2045. These targets are legislated under the *Climate Change and Greenhouse Gas Reduction Act 2010*.

In pursuit of the above commitments, the ACT Government is seeking to reach net zero emissions from Government operations by 2040. ACT Government operations account for around 7 per cent of total fossil fuel gas emissions in the ACT. Approximately 61 per cent of the Government’s emissions come from transport (buses and fleet vehicles) and the remaining 39 per cent of Government’s emissions come from natural gas assets currently used across schools, hospitals, and other ACT Government buildings.

The 2022-23 ACT Government Budget provided funding to develop a business case to investigate a potential whole-of-Government program to replace natural gas assets in ACT Government facilities by 2040 (the **Program**). This business case considers:

- **Replacement of gas assets:** the replacement of heating and hot water gas assets across all ACT Government owned and operated sites with electric technology (**Program of Works**);
- **Timing:** the Program of Works to be delivered across three tranches: Short Term, Medium Term and Long Term from approval of the Program under this business case to 2040;
- **Indicative Short-Term Program:** prioritisation of the asset replacements required in the first 4 years of the Program based on asset condition;
- **Electricity network impacts:** the impacts of the Program on the electricity network including potential network upgrades, coordination with Evoenergy and cost implications;
- **Program Costs:** estimated capital costs of the asset replacement and network upgrades required to implement the Program up to 2040;
- **Short-Term funding:** the funding required for the Short Term Program including capital costs of asset replacement and network upgrades and Program establishment, delivery and management; and
- **Delivery:** considerations of delivery of the Program including centralisation of delivery by a Program office, governance structure and resourcing, delivery model approach, initial risk analysis and Program development and mobilisation.

2.2 Recommendations

This business case considers the Program of Works required to support the Government in meeting its target for net zero emissions from Government operations. The Program involves the asset replacement works and coordination of associated network upgrade works required for the electrification of over 1,000 gas heating and hot water assets in facilities owned and operated by the ACT Government over the next 17 years.¹² It is important to note that the cost estimates outlined in this business case do not consider the avoided cost of replacing gas assets with new gas assets.

¹¹ [Parliamentary-Agreement-for-the-10th-Legislative-Assembly.pdf \(act.gov.au\)](#).

¹² At the time of writing, the available asset data had identified approximately 1,056 assets to be replaced.



This business case makes the following recommendations:

Recommendation 1: The Program proceed on the basis of the Program C, noting the estimated cost for the whole Program is estimated to be approximately \$1.223 billion over the next 17 years. However, it is noted that further work will need to be undertaken to refine this figure.

Recommendation 2: The Program be delivered as a centralised whole-of-Government program by MPC as a Designated Project in accordance with the governance structure set out in Section 13 with MPC being responsible for planning and investigations, procurement and delivery of the Program of Works.

Recommendation 3: That MPC engage a PDP from FY2025 to assist with the delivery of the Program and that MPC undertake further work to refine the overall delivery strategy.

Recommendation 4: The Program commence in 2023 and the Government commits to \$297.79 million in capital funding over the forward estimates (the first four years of the Program):

- FY2024: \$11.12 million
- FY2025: \$85.13 million
- FY2026: \$109.64 million
- FY2027: \$91.90 million

Recommendation 5: Government commits to \$21.98 million in operating funding for Program Development Costs over the forward estimates:

- FY2024: \$4.05 million
- FY2025: \$6.42 million
- FY2026: \$6.14 million
- FY2027: \$5.37 million

Recommendation 6: Government commits to provide ongoing funding for EPSDD resources (\$3.30 million over the forward estimates:

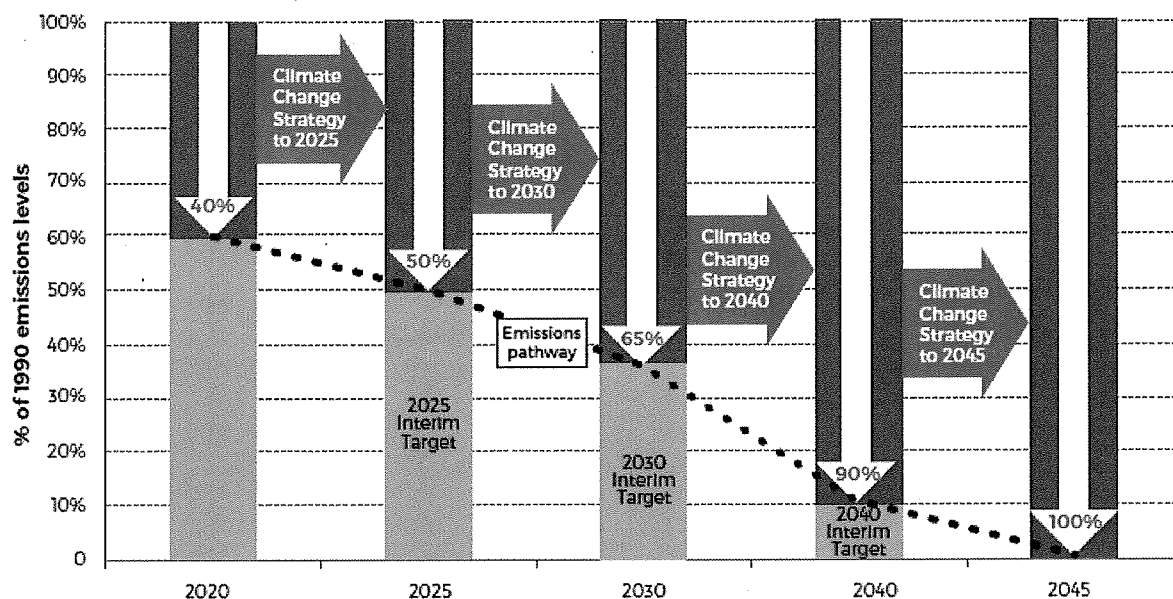
- FY2024: \$0.81 million
- FY2025: \$0.82 million
- FY2026: \$0.83 million
- FY2027: \$0.84 million.

2.3 Program Background

In 2019 the ACT Government released the ACT Climate Change Strategy 2019-2025 which sets the path towards achieving a 50-60 per cent reduction in emissions from 1990 levels by 2025 and outlines the initial steps towards achieving net zero emissions by 2045. These targets are legislated under the *Climate Change and Greenhouse Gas Reduction Act 2010*. Figure 18 shows the ACT emission reduction targets to 2045 (at the lower level of the target range e.g., the 2025 target of 50-60 per cent below 1990 levels is shown as 50 per cent).¹³

¹³ ACT Climate Change Strategy to 2019-25.

Figure 18 – ACT Emission Reduction Targets to 2045



Source: ACT Climate Change Strategy 2019-2025

The key priorities and goals of the Strategy are summarised in Table 15.

Table 15 – ACT Climate Change Strategy 2019-2025 Key Priorities

Key Priority	Goals
Community leadership and just transition	- Encourage community-driven solutions to climate change - Collaborate for resilient communities - Support low-income residents - A just transition for workers
Transport	- Support sustainable travel choices - Plan for a compact and efficient city - Increase use of public transport - Encourage active travel - Reduce car use - Smarter use of roads - Encourage zero emissions vehicles
Energy, buildings and urban development	- Maintain 100 per cent renewable electricity supply Reduce emissions from gas - Climate-wise, zero emissions rental homes - Climate-wise, zero emissions public housing - Climate-wise, zero emissions low-income homes - Climate-wise, zero emissions homes Climate-wise, zero emissions buildings - Climate-wise built environment - Reduce urban heat and improve liveability
ACT Government leadership	- Reducing risk in a changing climate Leading by example - Collaborating for increased ambition Zero emissions Government
Waste avoidance and management	- Reduce waste generation - Reduce emissions from waste treatment
Land use and biodiversity	- Protect local species and habitats - Sequester carbon in the landscape

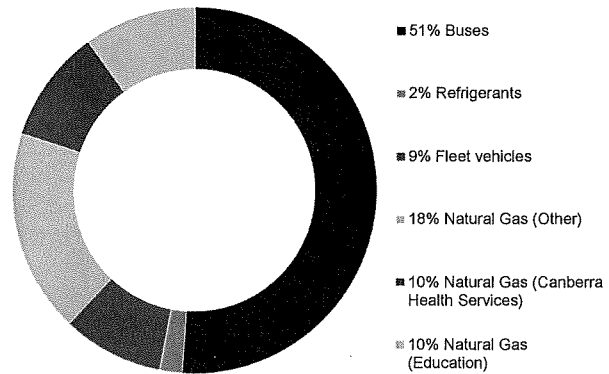
Key Priority	Goals
	Encourage sustainable and resilient farming
Source: ACT Climate Change Strategy 2019-2025	

2.4 Current State

ACT Government operations account for around 7 per cent of total fossil fuel gas emissions in the ACT. Government is pursuing a 33 per cent reduction in its own emissions with a target of net zero by 2040.

Transport currently comprises 61 per cent of the Government's emissions. The Government's Zero-Emission Transition Plan for Transport Canberra¹⁴ outlines the pathway to achieve a zero-emission public transport system by 2040. This started with the delivery of the light rail from Gungahlin to the City with planning work for stage 2 to Woden currently underway. In addition, the Government is currently undertaking a range of procurement processes to replace its current bus fleet with zero-emission alternatives. The Government also ensures that all newly leased government passenger vehicles are zero emissions where a zero emissions vehicle is fit for purpose.

Figure 19 – ACT Government Emission Sources



Source: ACT Climate Change Strategy 2019-25

The remaining 39 per cent of Government's emissions come from natural gas assets currently used across schools, hospitals and other ACT Government buildings. As part of the Parliamentary and Governing Agreement¹⁵, the ACT Government has committed that all new ACT Government buildings and facilities are fossil-fuel-gas free, including new leases. In addition, all retrofits of Government facilities have the goal of net-zero emissions post retrofit. However, of the residual ACT Government owned and operated facilities, there remains approximately 1,056 gas assets (primarily used for space heating and domestic hot water) across 189 sites across the Territory. The assets included and excluded in the scope of this business case are discussed in more detail at Section 5.

Table 16 sets out the types and quantities of the gas assets used in ACT Government facilities.

Table 16 – Overview of Government Gas Asset - types and quantity

Asset Type	Quantity	Description
Atmospheric Boiler	179	Atmospheric boilers are gas fired boilers that have an air intake at the source thereby combustion is drawn into the boiler without a fan. Atmospheric boilers are usually located in a well-ventilated plantroom.
Condensing Boiler	143	Condensing boilers are highly efficient gas boilers that capture latent heat and reheat the gases and condensed water enabling a highly efficient gas boiler. There are 150 condensing boilers that service space heating and domestic hot water.
Domestic Hot Water System	14	Domestic hot water is a generic term for gas fired hot water boilers. Further details on the system need to be determined from other data columns.
Gas Boiler	175	Gas boiler is a generic term for gas fuelled boilers and most likely a centralised boiler. It can be attributed to domestic hot water or space heating.
Gas Driven VRF	14	Gas Variable Refrigerant Flow (VRF) units are powered by a gas engine. The systems often comprise a gas-driven outdoor unit connected to several indoor units. These systems operate in both heating and cooling modes.
Gas Electric Packaged Unit	6	These are self-contained gas packaged units and operate using the gas vapour-compression cycle, to provide cooling and heating.

¹⁴ ACT Government, *ACT Climate Change Strategy to 2019-25* (2019)

¹⁵ [Parliamentary-Agreement-for-the-10th-Legislative-Assembly.pdf \(act.gov.au\)](#).

Asset Type	Quantity	Description
Gas Heat Pump	5	These are reverse air-source heat pumps powered by a gas engine. The units operate using the vapour-compression cycle, providing cooling and heating. In heating mode, some systems can reclaim heat from the gas engine.
Gun Fired Boiler	26	Gun fired boilers are similar to fire tube boilers but contain a unit with a fan variable speed drive (VSD) that forcefully emits the gas into the boiler to create a jet flame.
Hot Air Furnace	271	Hot air furnaces generate warm air by burning natural gas at the source and circulating heat through the building in ducts by gravity convection or fans. Hot air furnaces are inefficient heaters.
LPG Boiler	2	LPG boilers require LPG fuel that usually requires importing to the facility. These are most when natural gas mains are not available.
Radiant Heater	18	Radiant heaters are localised heaters that generate heat at the source and are therefore, efficient as they eliminate losses usually attributed to ductwork and heat transfer.
Radiant Tube Heater	177	Radiant tube heaters work in the same manner as the radiant heaters, they are usually suspended from the ceiling and can be found in school halls, exhibition building and outdoor restaurants.
Other	9	Gas heater (5), Gas cogen (1), Gas burner (3)
Unknown	17	Assets with no information.
Total	1,056	
<i>Source: Information sources outlined in Table 22</i>		

ACT Government gas assets included in the scope of this business case, that is primarily heating and hot water assets, used approximately 384 terajoules (TJ) of gas in FY22.



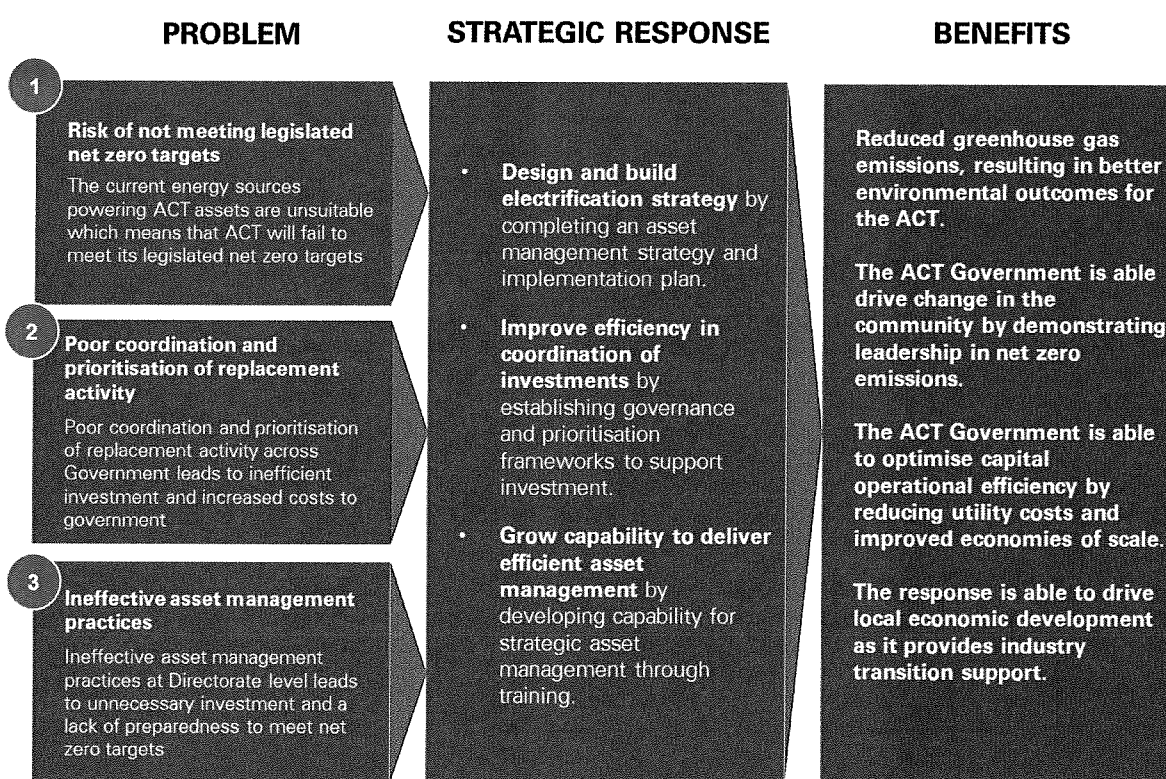
3 Needs Analysis

3.1 Problem and Strategic Responses

Two Investment Logic Workshops (ILWs) were undertaken on 20 December 2022 and on 20 January 2023 with representatives from Environment Planning and Sustainable Development Directorate (EPSDD), Chief Minister, Treasury and Economic Development Directorate (CMTEDD), Major Projects Canberra (MPC), Office of Climate Action (OCA) and facilitated by KPMG.

During the workshops an Investment Logic Map (ILM) was developed which identified three problem areas, the strategic responses to the problems and the associated benefits that will be realised by addressing the problems. Figure 20 provides a summary of the linkages between the problems, strategic responses and the benefits that will be delivered by addressing the problems (which have been derived from the ILM which is included in [Appendix A – Investment Logic Map](#)).

Figure 20 – Summary of Problems, Strategic Responses and Benefits of the Program



Source: Appendix A – Investment Logic Map

3.1.1 Problem 1 - Risk of not meeting legislated net zero targets

The ACT Government is committed to emissions reduction as evidenced by its Climate Change and Greenhouse Gas Reduction Act 2010 (the **Act**). The Act is the legislation through which Government ensures the ACT's emissions reduction and renewable energy targets and interim targets are met. The principal target in the Act is to reduce greenhouse gas emissions in the ACT to achieve zero net emissions by 30 June 2045.¹⁶ The ACT Government's strategy is to reach zero net emissions progressively in line with the following targets:

- 50 to 60 per cent by 2025;
- 65 to 75 per cent by 2030; and

¹⁶ Climate Change and Greenhouse Gas Reduction Act 2010. Republication No. 9 (15 December 2022)



- 90 to 95 per cent by 2040.¹⁷

The Strategy outlines the ACT Government's strategy to achieving zero net emissions by 2045. The Strategy has a focus on lowering emissions from transport and gas, which are the two largest sources of emissions in the ACT. The ACT Government is undertaking a range of measures to reduce greenhouse gas emissions across the ACT including (but not limited to):

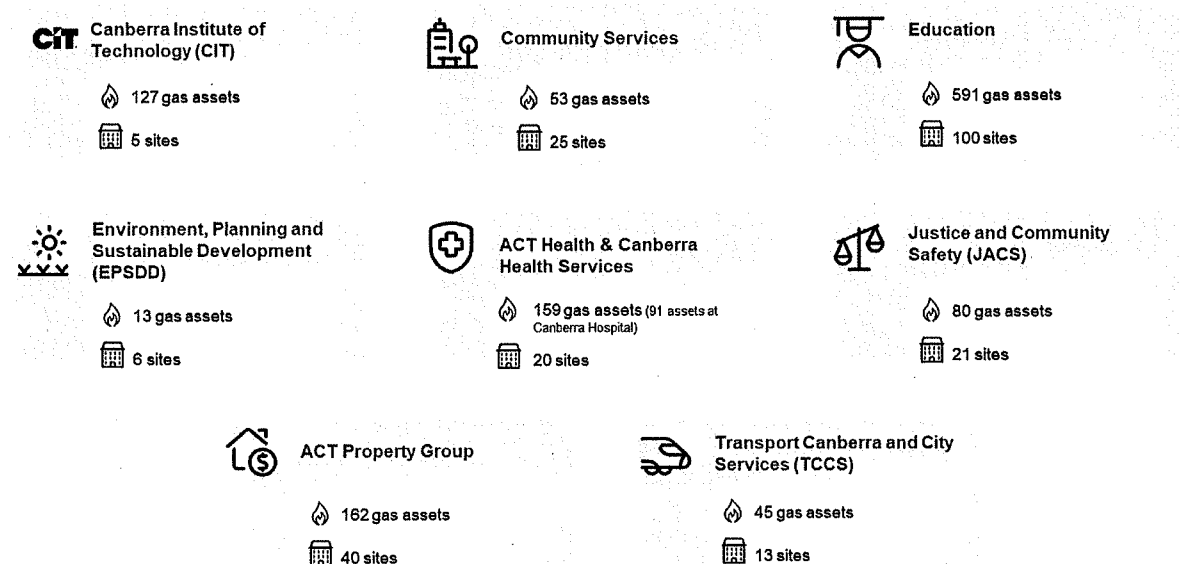
- progressing with its Zero-Emission Transition Plan for Transport Canberra¹⁸ to reduce greenhouse gas emissions from public transport;
- progressing with its Zero Emissions Vehicles Strategy 2022-30¹⁹ to reduce the emissions from vehicles through an uptake in zero-emissions vehicles by making them more affordable and expanding the EV charging network;
- progressing its Integrated Transport Strategy²⁰ to reduce emissions by undertaking measures to increase active travel and use of public transport;
- providing rebates and interest free loans to encourage homeowners to install energy efficient products, rooftop solar and battery storage;
- developing an Integrated Energy Plan; and
- developing legislation to prevent new gas connections for some new developments.

Government Leadership

A key priority outlined in the Strategy is ACT Government leadership including becoming net zero emissions from Government operations by 2040. ACT Government operations account for around 7 per cent of total fossil fuel gas emissions in the ACT – of which approximately 61 per cent is through transport, while 39 per cent is from natural gas assets currently used across schools, hospitals and other ACT Government buildings.

The problem identified in the ILM is focussed on the emissions from the natural gas assets used across ACT Government owned buildings with emissions from transport outside the scope of this business case. As outlined in section 2.4, there are a large number of gas assets currently used across ACT Government buildings. Figure 21 summarises the ACT Government owned buildings by Directorate and Figure 22 provides a further breakdown by the type of assets used in the Government buildings.

Figure 21 – Overview of Government Owned Assets by Directorate



¹⁷ ACT Government Policy and Programs – ACT Climate Change Strategy (<https://www.climatechoices.act.gov.au/policy-programs/act-climate-change-strategy>)

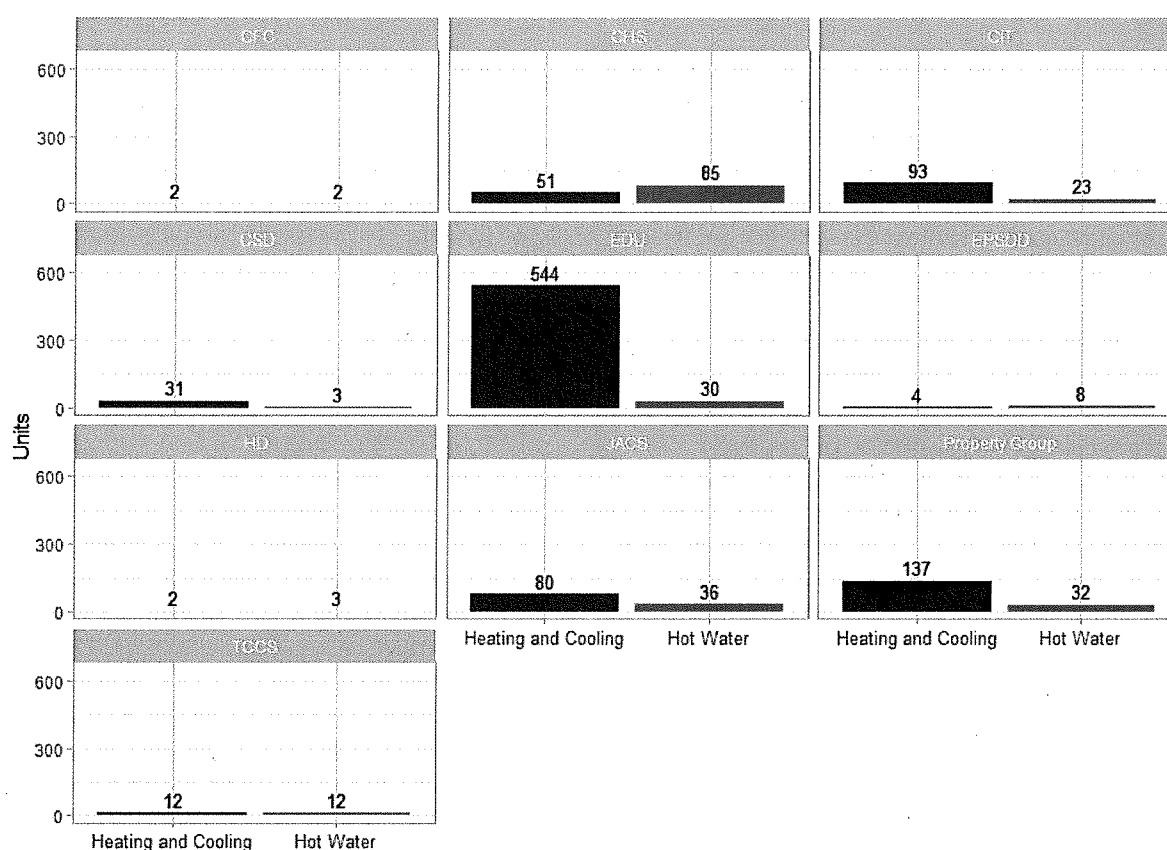
¹⁸ ACT Government, [ACT Transport Strategy 2020](#) (2020)

¹⁹ ACT Government, [ACT's Zero Emissions Vehicles Strategy 2022-30](#) (2022)

²⁰ ACT Government, [Moving Canberra 2019-2045: Integrated Transport Strategy](#) (2018)



Figure 22 – Gas Powered Assets²¹ by Directorate



Strategic Response

To ensure that the ACT Government meets its legislated net zero targets and deliver on target for net zero from Government operations a program of works needs to be undertaken to replace the current natural gas assets across ACT Government buildings with zero emissions alternatives.

This business case outlines an implementation pathway to delivering on the necessary works to replace the gas assets utilised across ACT Government buildings and facilities.

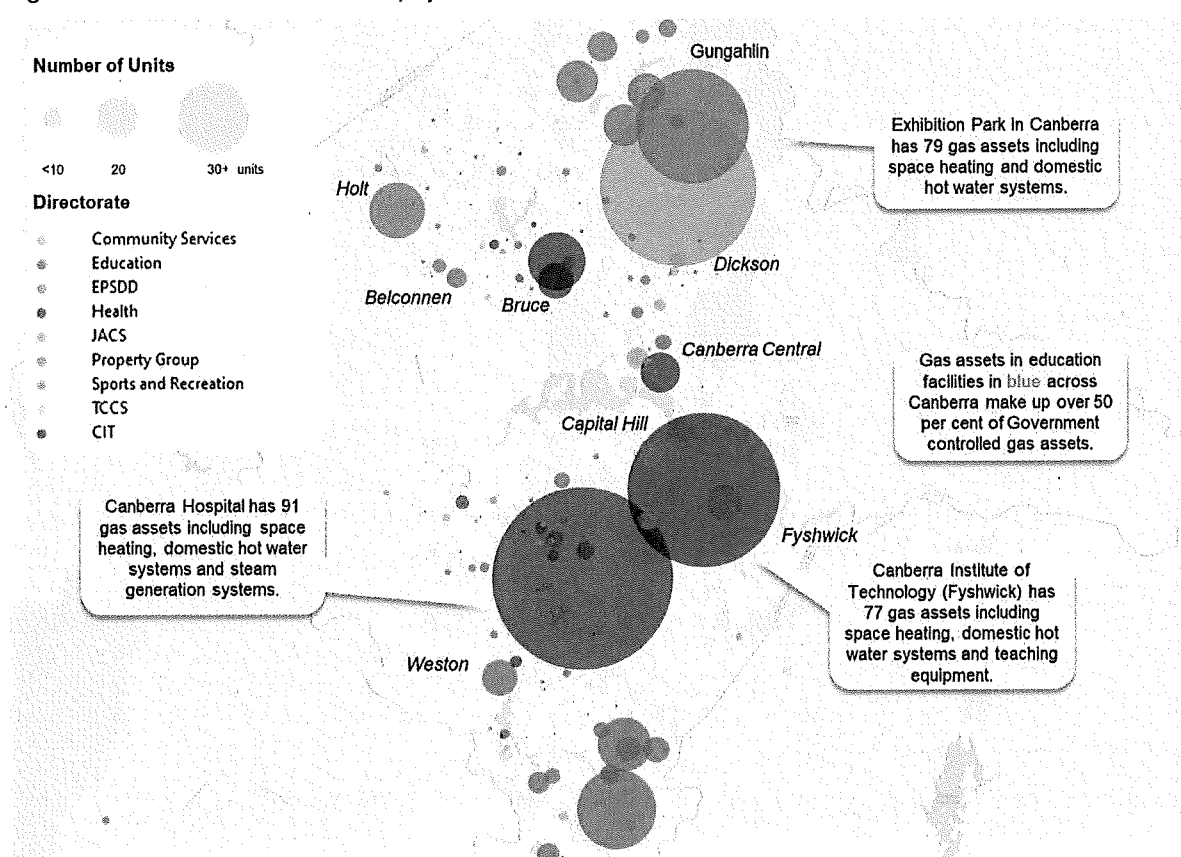
3.1.2 Problem 2 - Poor coordination and prioritisation of replacement activity

As highlighted in Figure 22 the replacement of the gas assets used across Government buildings will impact every ACT Government Directorates and several government agencies using the affected facilities. Figure 23 shows the location of the gas assets spread across the Territory. Currently, each Directorates is responsible for the maintenance and capital replacement of their asset portfolio including gas assets. Each Directorate is given funding to maintain and manage its asset portfolio which has resulted in each Directorate developing its own approach to asset management, maintenance and renewal and risk management.

²¹ Gas Powered assets within scope of this Business Case, that is, heating and hot water.



Figure 23 – Gas assets across the ACT, by location and volume



An asset replacement task of this scale has not been previously undertaken by the ACT Government, and as noted in the ILM there is currently a lack of capability to efficiently deliver the required program of asset replacement that spans multiple sectors and portfolios.

During the ILWs a range of issues associated with pursuing a government-wide transition from gas to electric of this scale under the existing decentralised Directorate-led asset portfolio management framework were discussed. Some of the issues included:

- delays to the works caused by differing approaches across Directorates to the prioritisation of gas asset replacement works which may also increase the risk that some assets are replaced with another gas asset;
- limited coordination of replacement works likely to contribute to strain on market capacity which could result in delays and/or increased costs;
- numerous and inconsistent funding requests by different Directorates to Treasury to fund gas replacement works;
- inability to track and manage the network impact of electrification and decentralised coordination could result in delays and additional costs; and
- limited ability to achieve value for money through efficient packaging of works, maximising economies of scale (where possible) and leveraging from lessons learned.

Strategic Response

Managing the replacement of gas assets is a significant undertaking and will need a coordinated whole-of-government approach to prioritise their replacement to minimise disruption to service delivery and optimise investment value for ACT Government.

The strategic response identified in the ILM involves ensuring the Program of Works is undertaken on a centralised program basis rather than managed by each of the individual Directorates.

Key to this will be:

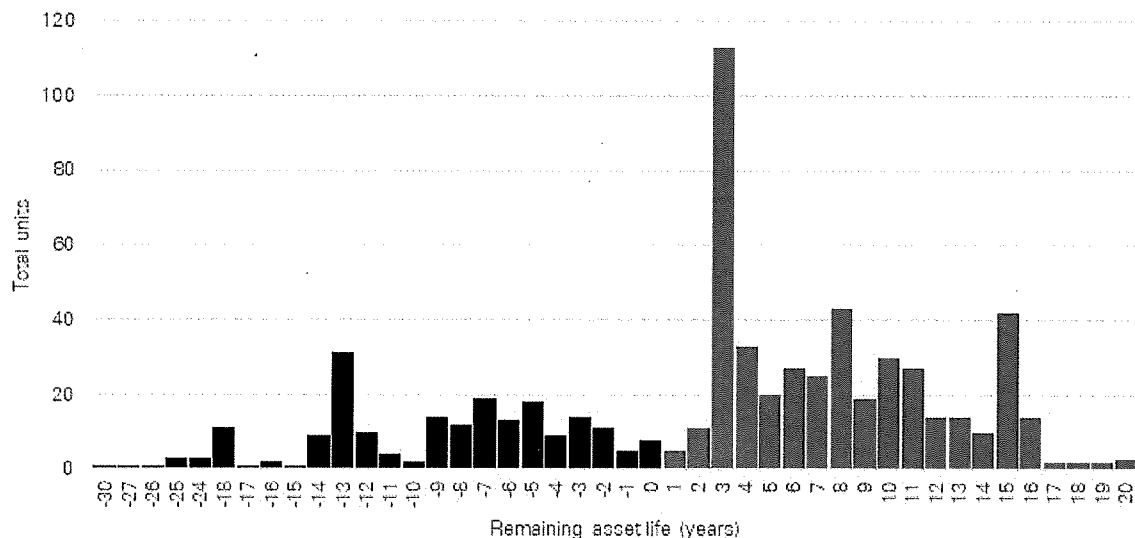
- developing an asset management strategy and implementation plan; and
- establishing the appropriate governance structures and prioritisation frameworks to support the delivery of these works.

3.1.3 Problem 3 - Lack of capability of effective asset management

The third problem identified in the ILM relates to the current lack of capability in effective asset management across the ACT Government which could result in unnecessary investment and a lack of preparedness to meet net zero targets.

As seen in Figure 24, over 30 per cent of government-owned gas assets with known asset lives have either reached or exceeded their asset life, and 50 per cent are within three years of life expiry. This poses operational and potential financial risk in the short-term to the delivery of public services, as expired assets are more prone to failure and increases the potential risk of needing to replace like-for-like gas assets in the event of asset failure. As discussed in Section 7.1.2, a portion of the assets within scope do not have sufficient information to accurately assess their age, condition and are not depicted in Figure 24.

Figure 24 - Remaining life of government owned gas assets of assets with known asset lives



Based on the current asset registers there appears to be different levels of preparedness across Directorates to replace gas-powered assets including information gaps such as:

- the number and condition of assets, and whether they can be replaced with zero emissions replacement; and
- whether assets are still fit for purpose and aligned with government policy and service delivery objectives.

Strategic Response

To deliver the Program of Works efficiently, there will need to be a whole-of-government approach to effectively manage the existing gas assets and their replacement. This will ensure a consistent approach in identifying and monitoring associated asset risks and considering the full life cycle costs, inclusive of the risks and costs of acquiring, holding, using and decommissioning of the gas assets.

The strategic response identified in the ILM to manage this involves ensuring the Program of Works is undertaken on a centralised program basis rather than managed by each of the individual Directorates.

Key to this will be:

- developing an asset management strategy and implementation plan including a detailed and systematic assessment of the assets and sites to ensure that the Government has the information required to effectively plan for the works;
- establishing the appropriate governance structures and prioritisation frameworks to support the delivery of these works; and
- providing training across the Directorates to ensure that asset management of the gas assets is undertaken effectively across their remaining life and that replacement of zero-emissions assets are managed appropriately.

3.2 Benefits

The Program will deliver several benefits that align to the Investment Logic Map for the *Electrification of government assets program*²². Table 17 outlines the Project specific benefits and indicative Key Performance Indicators (KPIs) and measurements.

Table 17 – Project Specific Benefits and KPIs and Measurements

Benefits	KPIs	Measurements
Reduced greenhouse gas emissions	Achieve the electrification of government-operated gas assets by 2040, and achieve legislated net zero targets by 2045 Territory-wide	Greenhouse gas emission measurements
Demonstrated leadership in net zero emissions	Enhance community capability and collaboration with other jurisdictions	Completion of asset management strategy and implementation plan
Optimised capital operational efficiency	Reduce utility costs and improve economies of scale	Cost savings on investment
Local economic development	Industry transition support	Local workforce size

²² Appendix A – Investment Logic Map

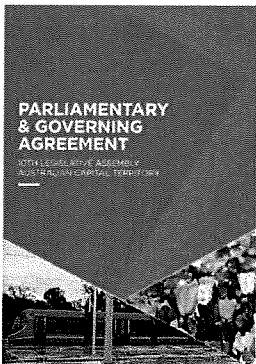
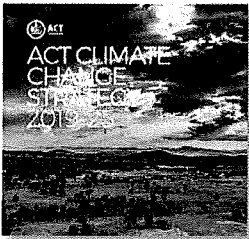
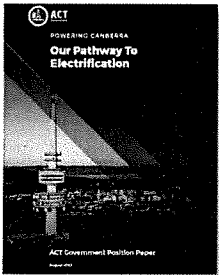


4 Strategy and Policy Alignment

4.1 Alignment with Government Policies

The Program is aligned to several key government policies and strategies as outlined in Table 18.

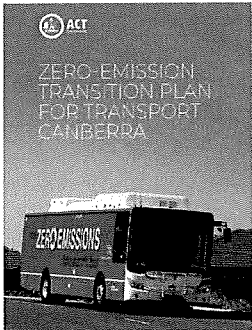
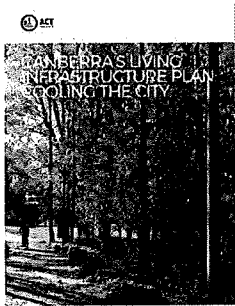
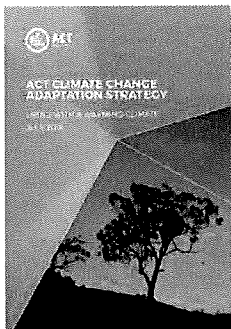
Table 18 – Strategy and Policy Alignment

Policy / Strategy Document	Description
Key policy framework	
Parliamentary and Governing Agreement – 10th Legislative Assembly Australian Capital Territory²³ 	The Parliamentary and Governing Agreement sets out the shared commitments, key priorities and outcomes of the two-party Government (made up of Australian Labor Party ACT Branch and the ACT Greens) for the 10th Legislative Assembly. Action A(1)ix of the Parliamentary and Governing Agreement states that Government will ensure all new ACT Government buildings and facilities are fossil fuel gas free, including new leases. All retrofitting in Government buildings and facilities will have a goal of net-zero emissions post retrofit. Delivery of the Program is a key action agreed under the Parliamentary and Governing Agreement.
ACT Climate Change Strategy 2019-2025²⁴ 	In 2019 the ACT Government released the ACT Climate Change Strategy 2019-2025, which sets the path towards achieving a 50-60 per cent reduction in emissions (from 1990 levels) by 2025 and outlines the initial steps towards achieving net zero emissions by 2045. This can be achieved by driving innovation in energy and transport industries, helping businesses and households save energy costs. The Program outlines the recommended approach to transition to all-electric Government buildings by 2040 which is a key priority outlined in this strategy.
Powering Canberra: Our Pathway to Electrification (Position Paper)²⁵ 	The 2022 Position Paper outlines the ACT Government's pathway to reaching net zero emissions by 2045. The primary focus is to reduce fossil fuel gas emissions in the two most significant remaining sources – transport and the use of gas by households and businesses. This Position Paper is a precursor to 'The Integrated Energy Plan', which is currently under development by the ACT Government. It will outline the gas transition pathway and the introduction of renewable infrastructure to support the transition. This is due to be delivered by 2024. The Program outlines an approach to reaching a target of net zero emissions from Government operations by 2040.

²³ [Parliamentary-Agreement-for-the-10th-Legislative-Assembly.pdf \(act.gov.au\)](https://act.gov.au/parliamentary-agreement-for-the-10th-legislative-assembly.pdf)

²⁴ ACT Government, [ACT Climate Change Strategy to 2019-25](#) (2019)

²⁵ ACT Government, [Powering Canberra. Our Pathway to Electrification. ACT Government Position Paper. August 2022](#) (2022)

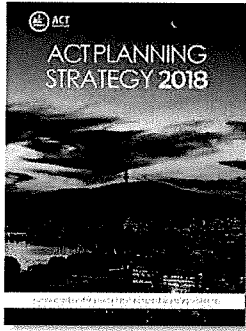
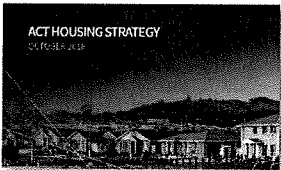
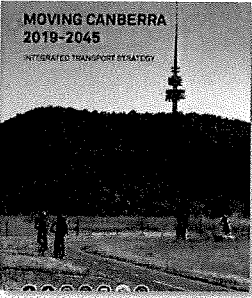
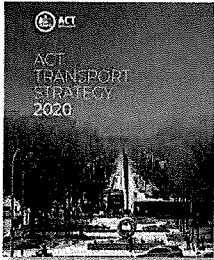
Policy / Strategy Document	Description
Other aligned policies	
Zero-Emission Transition Plan for Transport Canberra²⁶ 	The Zero-Emission Transition Plan for Transport Canberra details the pathway to achieve the ACT Government's goal of a zero-emission public transport system by 2040. Currently, Canberra's transport sector is the largest source of emissions comprising of 62 per cent. The Plan strives to transition Canberra's light rail and bus fleet to zero-emissions, including the infrastructure, investment and skills needed to make the transition operationally successful. The transition to zero-emissions transport will enable the ACT Government to achieve the zero-emissions by 2045. However, this will put additional strain on the renewable electricity network. The plan notes additional investments, undertaken in a coordinated manner with other Government initiatives, will be required to ensure the renewable electricity network can handle additional demand.
Canberra's Living Infrastructure Plan: Cooling the City²⁷ 	Canberra's Living Infrastructure Plan: Cooling the City 2019 sets out a plan that will ensure the ACT Government will plan, design, construct and manage the city in a way that values, incorporates, and protects natural assets. The overarching goal is to adopt and progress targets by 2045 that provide Canberra's urban footprint with: the equivalent benefits of a 30 per cent tree canopy cover, and 30 per cent permeable surfaces. This will serve to reduce Canberra's climate vulnerability and safeguard its liveability. The Plan's goal to scale living infrastructure and tree canopy coverage across Canberra is intended to reduce the effects of heatwaves and urban heat islands. This is a supporting component of the Program's electrification program, with living infrastructure assisting to cool households and businesses, reducing overall energy consumption, and relieving the burden on the renewable electricity network.
ACT Climate Change Adaptation Strategy²⁸ 	The Adaptation Strategy 2016 identifies the climate change adaptation challenges facing the ACT and puts forward a vision that Canberra will be a sustainable and carbon neutral city by 2050. It details the importance of embedding climate change policies and practices across Government, households, businesses, and the community. This is achieved by communicating the risks and impacts of climate change, incorporating risk considerations into ACT Government policies, programs and practices, and encouraging action by the collective community. The Adaption Strategy notes the importance of broad climate change adaptation through the planning and delivery of places, systems and essential services, such as buildings, power, water and health services, as well as in the management of natural resources and ecosystems. The Adaption Strategy aligns with the Program as the ACT Government seeks to meet net zero emissions targets in Government operations by 2040.
ACT Planning Strategy 2018²⁹	The ACT Planning Strategy 2018 focuses on Canberra being a sustainable, competitive and equitable city, while being responsive to the future and resilient to change.

²⁶ ACT Government, [Zero-Emission Transition Plan for Transport Canberra](#)

²⁷ ACT Government, [Canberra's Living Infrastructure Plan \(act.gov.au\)](#) (2019)

²⁸ ACT Government, [ACT Climate Change Adaptation Strategy](#) (2016)

²⁹ ACT Government, [ACT Planning Strategy 2018](#) (2018)

Policy / Strategy Document	Description
	The strategy outlines five key themes for the development of the city, including making Canberra a great place to live and work through the development of social infrastructure, open spaces and public places, strong activity hubs and housing choices. This strategy highlights the importance of integrating climate change policies into ACT's housing and transport policies. A key priority of the strategy is to reduce gas emissions from transport and buildings and improve energy efficiency so the ACT Government can cost effectively maintain its 100 per cent renewable electricity supply. The Program is aligned with this strategy as it outlines a pathway to reduce emissions from Government owned buildings with a target of reaching net zero emissions from Government operations by 2040.
ACT Housing Strategy 2018³⁰ 	The ACT Housing Strategy 2018 provides a roadmap that identifies key policy interventions required for the ACT to meet its diverse and changing needs into the future, including the sustainable supply of affordable housing. The strategy is centred around five goals that focus improvements to the housing market. This includes: an equitable, diverse and sustainable supply of housing for the ACT community; reducing homelessness; strengthening social housing assistance; increasing affordable rental housing; and increasing affordable home ownership. The ACT Housing Strategy centralises existing housing policies, objectives and priorities into a single integrated strategy, which aligns with the Program through its emphasis on urban renewal and sustainable development.
Moving Canberra 2019-2045: Integrated Transport Strategy³¹ 	Moving Canberra 2019 – 2045 is the ACT Government's integrated transport strategy which provides the strategic direction for policies, infrastructure, programs and services required to meet Canberra's transport needs and expectations into the future. The strategy identifies how Canberra will connect and integrate its transportation modes, to ensure a transport network which is modern, sustainable, one which provides a real alternative to driving. The Moving Canberra strategy sets a direction that supports Canberra's strategic ambitions of net zero emissions by 2045, through the promotion of sustainable travel options and integrated land use planning.
ACT Transport Strategy 2020³² 	ACT Transport Strategy 2020 is the ACT Government's integrated transport strategy, providing the strategic direction for policies, infrastructure, programs and services required to meet Canberra's future transport needs and expectations. The strategy identifies how Canberra will connect and integrate its transportation modes (including active travel) to ensure a transport network that is modern, sustainable and provides a real alternative to driving. The Transport Strategy is part of the ACT's strategy to lead Australia in the switch to zero emission technologies and provide choices that will reduce ACT carbon emissions.
ACT's Zero Emissions Vehicles Strategy 2022-30³³	ACT's Zero Emissions Vehicles (ZEV) Strategy is a key pillar of the Government's policies to decarbonise the transport sector. It adopts a target for 80 – 90 per cent of new car sales to be ZEVs by 2030, which will be underpinned by supportive policies such as a fit-for-purpose charging

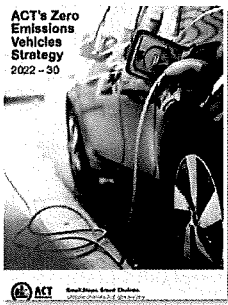
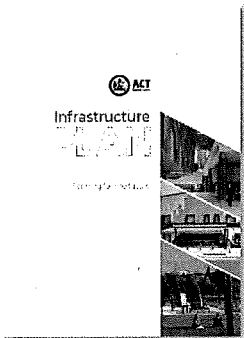
³⁰ ACT Government, [ACT Housing Strategy](#) (2018)

³¹ ACT Government, [Moving Canberra 2019-2045: Integrated Transport Strategy](#) (2018)

³² ACT Government, [ACT Transport Strategy 2020](#) (2020)

³³ ACT Government, [ACT's Zero Emissions Vehicles Strategy 2022-30](#) (2022)



Policy / Strategy Document	Description
	network, introducing incentives and facilitating the required regulatory reforms. Workforce planning and training are also a significant part of the transition plan. The ZEV Strategy represents a complementary component of ACT's efforts to eliminate all greenhouse gas emissions. As part of the transition program, the strategy states an intention for proactive planning for increased loads on the electricity grid and supporting zero-emissions neighbourhoods by requiring ZEV charging infrastructure in new buildings.
	The 2019 ACT Government Infrastructure Plan outlines the Government's blueprint for a \$14bn infrastructure spend to invest in the growing needs of the Canberra community. The Plan includes several flagship infrastructure projects to enhance the Government's delivery of services. The Infrastructure Plan supports the ACT's target of net zero emissions by 2045 by stating the need for the reliable and clean provision of energy and noting the pipeline of supporting projects such as new energy storage programs, substation developments and energy-efficient buildings.

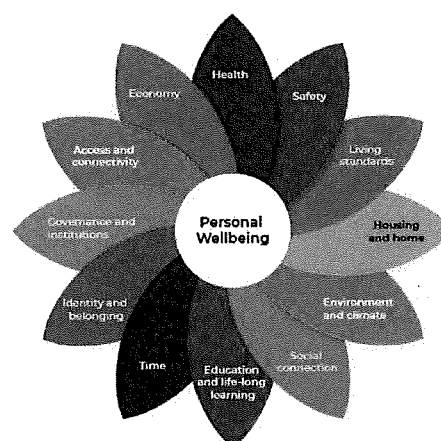
4.2 Wellbeing Impact Assessment

The ACT Government has established the ACT Wellbeing Framework (the Wellbeing Framework), which has been developed with extensive community consultation, including input from over 3,000 Canberrans, to capture aspects of wellbeing and quality of life that are important to Canberrans. The Wellbeing Framework has 12 domains of wellbeing, reflecting key factors that impact quality of life. A range of indicators have been developed to measure progress for each domain. The indicators for each domain provide a broad snapshot of the desired outcomes that are being sought by the ACT Government in each domain. Figure 26 shows the twelve domains of the Wellbeing Framework.

The ACT Government is focused on improving wellbeing for all Canberrans by ensuring that the formulation of budgets and investment decisions has regard to factors that contribute to the wellbeing and quality of life. The Wellbeing Framework guides the development of budget and policy proposals and ensures the ACT Government to considers wellbeing attributes of budget proposals put forward for decision – including business cases for major infrastructure projects.

One of the domains of the Wellbeing Framework is 'Environment and Climate'. This domain centres on the importance of climate change mitigation and adaption. The ACT Government has identified one indicator to measure progress and outcomes for this domain. Table 19 outlines the indicator for the purpose of the Program and describes how the Program will contribute to these indicators.

Figure 25 – ACT Wellbeing Framework



³⁴ ACT Government, *ACT Government Infrastructure Plan* (2019)

Table 19 – How the Program will contribute to ACT Wellbeing Framework indicators

Indicator and description	How the Program will contribute
Climate resilient environment and community – This indicator will measure climate mitigation and adaptation by tracking greenhouse gas emissions, tree canopy coverage, waste, and community preparedness for climate change impacts and extreme weather events.	▪ The Program will replace the gas-powered assets currently used within Government owned buildings. ▪ This will reduce the Government’s greenhouse gas emissions and will result in net zero gas emissions by 2040.



5 Program Scope

This section outlines the assets and sites that are included within the scope of the Program.

5.1 Assets

This business case considers the replacement of existing gas space and water heating assets. Other assets such as chillers and cooling towers have not been included as this information was not available on the asset registers provided. The ACT Government may consider accounting for all assets on each site when performing heating, ventilation and air conditioning (HVAC) upgrades as these assets can be collectively installed to improve the entire HVAC systems.

The following assets and sites have been excluded from the scope of this business case:

- **Gas cook tops:** Gas cook tops that are used in kitchens and educational facilities, for example at Canberra Institute of Technology (CIT) have been excluded from the scope of this business case based on instructions from EPSDD.
- **Teaching assets:** gas operated teaching assets (e.g., gas turbines, Bunsen burners) have been excluded from the scope of this business case based on instructions from EPSDD.
- **Steam boilers:** There are seven steam boilers located at the Mitchell Depot operated by Capital Linen Services. The steam boilers have an approximate power output of 22.1 MW and are used for sterilisation. A review of available technology replacement options in the Australian market has indicated that there are currently very limited options in Australia to replace the functionality of these steam boilers.³⁵ On this basis, it is not possible to identify an available replacement and therefore difficult to estimate costs of such replacement. The replacement of the steam boilers will need to be revisited once technology is more widely available to satisfy the functionality requirements of replacing these particular assets.
- **Back-up diesel generators:** There is a power generator with an output capacity of 325 kW at CIT Bruce. It is anticipated that there are further back up diesel generators across the ACT Government facilities however these were not included in the data set. A review of current available technology indicates that there are limited options for backup power. Potential alternatives with different level of availability and maturity include biomass, hydrogen and biogas boilers. However, there are limited options in Australia and with a limited level of maturity. As such, it was not feasible to accurately calculate the replacement costs of these assets. The replacement of diesel generators will need to be revisited as technology replacements mature and become widely available in Australia.
- **Opportunities for solar and battery storage:** Installation of solar and battery storage is outside the scope of this business case however there may be some cost efficiencies and benefits from exploring the opportunity to install solar and battery storage in parallel with electrification works and further work will be required to understand the costs and benefits of such an approach.

5.2 Sites

The sites and assets outlined in Table 20 have been excluded from this business case based on the instructions from EPSDD. No funding is requested for the electrification of these sites as part of this business case.

Table 20 – Sites and assets out of scope

Site	Reason
Canberra Hospital	Buildings 1, 4 and 10 are scheduled to be demolished within ten years as part of a broader Canberra Hospital redevelopment.
255 Canberra Avenue	This site has been included in a separate business case that was considered in the 2022-23 budget.

³⁵ Zero Emissions Pathway Advisory, Final Report by GHD, page 75 on Steam Generation.



Site	Reason
Child Development Services	The gas assets at this site have been replaced with electric equivalents after the development of the asset registers.
CIT Bruce	Gas assets located in the Glass House are scheduled to be replaced for electric equivalent and are not included within the scope of the Program, however, other gas assets at CIT Bruce are included within the scope.
Tuggeranong Bus Depot	Gas boiler servicing the workshop building is being replaced under the Zero Emissions Government Fund.
Winchester Police Centre and CIT Reid	These sites are scheduled to (or are in the process of) be divested.
Woden Police Station	The gas assets at this location are being replaced with funding from the Social Cost of Carbon (SCC) Fund.
Maitland Centre Charnwood Neighbourhood & Coinda Conder Community House & Child Care Centre Downer Community Centre Flynn Childcare and Community Centre Flynn Community Hub Gungahlin Childcare Centre Kama Homestead Maitland Centre Majura Community Centre Narrabundah Children's Cottage (Nimbin) Narrabundah Children's Cottage (Yamba) National Convention Centre Nature Conservation House Base Building Ngunnawal Neighbourhood Centre Noah's Ark Resource Centre Palmerston Community Hall Pearce Community Centre Southside Community Centre Spence Children's Cottage Tuggeranong Homestead Weston Creek Children's Centre	These sites have been deemed out of scope for a variety of reasons including some of these sites are operated by non-government entities, if the building is scheduled to be demolished or there is a scheduled upgrade to that facility.
Monash Primary School Gaunt Place.	The gas assets at these sites have already been disconnected.
Source: EPSDD instructions and information provided	



6 Technology Selection

This section summarises the technology selection to replace the gas assets which has informed the cost estimates in this business case and the network modelling. Further detail on the technology selection is included in [Appendix D – Technology Options](#).

6.1 Approach

A range of technologies have been considered to select an appropriate replacement for each of the existing gas assets on a site-by-site basis. To select the most suitable replacement technology, the assessment considered the following asset characteristics:

- the type of existing asset in use;
- the areas serviced by the existing asset;
- the required capacity output (kilowatt / kW) and original gas asset input (megajoule/MJ per hr); and
- the age and condition of the existing gas asset.

It is important to note that this assessment has been used to identify a potential technology solution to inform the cost estimates for the Program and the network modelling. However, further work will be required following this business case to finalise the assessment of each asset and determine the actual replacement technology. Technology assessment and selection is likely to change based on a more detailed assessment of the specific sites and noting the potential for technology change and improvement over the life of the Program. On this basis, it is suggested that technology selection be regularly reviewed and revisited for each site.

The following sections provide an overview of the approach adopted to assess different technology options for space heating and domestic hot water systems in this business case. [Appendix D – Technology Options](#) provides information on each technology option considered for each asset type.

Site Specific Technology Selection

As a detailed assessment of each site has not been conducted, the technology selection has been based on like-for-like output capacity (kW) with the existing gas assets. Whilst this approach is appropriate for the purposes of developing cost estimates for this business case, further work is required to do a detailed assessment to determine the best value for money replacement technology on a site-by-site basis. For example, Erindale College has three 45 kW instantaneous gas DHW boosters that can be replaced with 3x 45 kW heat pumps [REDACTED], however during the site inspection it was noted the same units can be replaced with four 35kW instantaneous electric units [REDACTED]. Similarly, Exhibition Park in Canberra has 64 gas radiant tube heaters suspended from ceiling showrooms in five pavilions and while these can be replaced like-for-like with electric heater other options may be worth considering for viability and performance such as underfloor heating, and heat pumps.

6.2 Space Heating

Electric heat pumps are energy efficient solutions that are recommended for the replacement of conventional gas assets currently used for space heating. Heat pumps work by transferring heat from a low temperature source typically from the outdoor air, ground or water sources and emitting the heat inside a building or a higher temperature heat sink. The energy efficiency is achieved as heat is transferred rather than generated, which is how conventional gas-fired boilers operate.

The measurement of efficiency used for HVAC systems is referred to as coefficient of performance (COP), which is the ratio of the heating capacity output to the energy input and is measured by the following equation.

$$COP = \frac{\text{kW of Energy Output}}{\text{kW of Energy Input}}$$

The higher the COP the more efficient the system operates.

Heat pump solutions analysed for the Program of Works have COPs ranging from 1.9 to 4.5, which is at least twice as efficient as modern condensing boilers that operate at 0.95 COP. The efficiency is driven by the type and capacity of the system, refrigerant and the likely temperature ranges the system will operate in. In low temperatures, such as during ACT winter nights, heat pump COPs are reduced as more energy is required to transfer the heat and service facilities with 24/7 operations.



A variety of different heat pumps have been recommended based on the existing HVAC systems. The analysis considered several factors including:

- the existing gas asset power input (MJ/hr), heating capacity (kW) and COP;
- proposed heat pump capacity, COP, modularity, service areas and expected distance between service areas;
- the inclusion of heat pump accessories such as pipework, buffer tanks and modular zoning of assets;
- whether the existing gas asset is centralised, decentralised or a stand-alone system;
- the type of refrigerant to be applied in the new HVAC system;
- the location of the existing plantroom and potential for a new rooftop/ outdoor plantroom; and
- the availability of space within the current plant room (site visits required) and potential installation of the unit if the plantroom has insufficient space.

6.3 Domestic Hot Water

Domestic Hot Water (DHW) systems are used to service showers, wash basins, bathrooms and kitchens and are typically gas hot water storage units or instantaneous hot water units. Electric resistance heating systems and heat pumps were analysed as options to replace the existing gas DHW systems.

Electric resistance DHW systems are more suitable replacements for smaller gas systems, instantaneous DHW systems or systems with limited space or confined spaces. DHW heat pumps are more suitable for larger centralised systems with good ventilation. Where the gas DHW assets could be replaced with like-for-like an electric resistance system (i.e., with a system designed to meet the heating and delivery capacity of the gas asset with a system of similar shape and size), an electric resistance heating solution was selected. Where this was not possible a natural refrigerant heat pump with sufficient thermal tank storage was selected. The specific technology selected for the analysis was then determined based on the following considerations

- the existing gas asset power input (MJ/hr), heating capacity (kW), delivery capacity (L/min) and COP;
- the inclusion of heat pump accessories (as required) such as pipework and thermal storage;
- whether the existing DHW system is centralised or decentralised;
- the availability of space within the current plant room (site visits required) and potential installation of the unit if the plantroom has insufficient space; and
- an aerial investigation of space availability for an external enclosure.

This assessment also relied upon the following assumptions in relation to the existing gas DHW systems:

- the system provides 65°C hot water;
- the system receives a 9°C cold water supply from site mains;
- the system requires an equal replacement heating capacity (kW); and
- the system requires an equal replacement delivery capacity (L/min).

6.4 Refrigerants

Refrigerants are natural or synthetic heat transfer fluids used to move heat in HVAC systems from a heat source to a heat sink by changing state from a liquid to vapour and then condensing back to liquid. The type of refrigerant used in building HVAC equipment can vary greatly the whole-life greenhouse gas emissions (GHG), as well as CAPEX and OPEX costs. This means a transition from gas to electricity requires consideration of the role of refrigerants including the GHG impact from leakage and operational efficiency.

While all refrigerants have been considered, assets using natural refrigerants have been prioritised for larger centralised HVAC systems in the business case analysis as they:

- better align with decarbonisation program and as certain synthetic refrigerants are being phased down (in Europe) inclusion of assets using synthetic refrigerants may result in additional scrutiny on the Program;
- they are typically more expensive in terms of capital costs (in the region of 30 per cent to 50 per cent) as plant equipment needs to be designed specifically for pressure and temperature, however this initial investment has an ongoing return as natural refrigerant gases have excellent thermodynamic properties and are more efficient to operate. Therefore, this assumption provides a more conservative cost estimate (a sensitivity has been included in section 11.1.6); and

- natural refrigerants are more energy efficient (higher COP), have a lower Global Warming Potential (GWP) and improved longevity as many synthetic refrigerants and some carbon-fluorine bonds (in Europe) are progressively being phased out. Synthetic refrigerants that are scheduled to be phased out (or phased down) may require costly retrofitting at a later date.

Assets with synthetic refrigerants have been recommended for like-for-like replacements where there is an absence of appropriate natural refrigerant technology.

Table 21 summarises the details of the natural refrigerants used in heat pumps.

Each refrigerant type is provided a GWP and an Ozone Depleting Potential (ODP) indicator that measure the impact on the environment. GWP compares the amount of heat trapped by a certain mass of the gas to the equivalent amount of heat trapped by carbon dioxide, whereas ODP measures how much damage a chemical can cause to the ozone layer compared with a similar mass of trichlorofluoromethane (CFC-11), which has an ODP of 1.0.

Refrigerants bearing high GWP and ODP were outlawed or are being phased out under the Montreal (1987), Kyoto (1997) protocols, F-Gas law (2015), Paris Accord (2016), and recent Kigali Amendment to Montreal Protocol (2019). Australia has committed to the Montreal Protocol international ban on hydrochlorofluorocarbons (HCFCs) and phase-down of hydrofluorocarbons (HFC) to achieve an 85 per cent reduction in HFCs by 2036. Synthetic refrigerants are being replaced with no or low GWP alternatives including ammonia, carbon dioxide, hydrocarbons and hydrofluoroolefins (HFO). Natural refrigerants support the move towards sustainability by ensuring safe and efficient application of refrigerants.

Table 21 – Details of natural refrigerants used in heat pumps

Refrigerant	Refrigerant name	GWP (ASHRAE Safety)	Notes
Natural/ Environmentally friendly Refrigerants	R-744	Carbon dioxide (CO ₂)	1.0 (A1) CO ₂ can be used in high temperature heat pumps and have high pressure and low water temperature onto the heat pump maximising the COP for heating. Compared to other refrigerants CO ₂ is safe, environmentally friendly and energy-efficient refrigerant. CO ₂ has been recommended for large centralised asset upgrades.
	R-717	Ammonia (NH ₃)	0.0 (BL2) Ammonia is typically used for large cooling plant and is highly efficient, low-cost and environmentally friendly refrigerant with a long history of use in industrial applications. Its mildly flammable and medium toxicity levels require careful handling and safety precautions.
	R1234ze	hydrofluoroolefin (HFO) refrigerant trans-1,3,3,3-tetrafluoro-1-propene	<1 (A2L) An HFO refrigerant used in heat pumps and chillers. It is mildly flammable.
	R1234yf	HFO refrigerant 2,3,3,3-tetrafluoro-1-propene	<1 (A2L) Considered a sustainability replacement for R134a this can be applied in heat pumps however they are approximately 10 per cent less efficient for generating heat than R134a.
	R-290 R-50 R-170	Propane (C ₃ H ₈) Methane (CH ₄) Ethane (C ₂ H ₆)	4.0 25.0 3.0 Hydrocarbons occur naturally in the atmosphere and have a low GWP comparatively to synthetic refrigerants. Propane is the most common hydrocarbon (HC) refrigerant.

	Refrigerant	Refrigerant name	GWP (ASHRAE Safety)	Notes
	R-600	Butane (C ₄ H ₁₀)	3.0	Propane works with high flow temperatures so improves COPs at higher flow. It is highly flammable and leaks can cause risk of suffocation. It is a by-product of natural gas processing and petroleum refining and therefore linked to the oil industry.
	R-600a	Isobutane (C ₄ H ₁₀)	3.0	
	R-1150	Ethylene	148	
	R-1270	Propylene (C ₃ H ₆)	2.0 (A3 for all hydrocarbons)	
Synthetic Refrigerants	R410a	R-32/125 (50.0/50.0)	2088 (A1)	R410a is a blended refrigerant commonly used for conventional HVAC systems including heat pumps and chillers. Contains high GWP values and the requirement in centralised systems require large volumes to be used and therefore an increased risk of leakage.
	R134a	1,1,1,2-tetrafluoroethane (CH ₂ FCF ₃)	1433 (A1)	Application for heat pumps and chillers in centralised HVAC systems it often requires large volumes increasing the risk of leakage.
	R32	Difluoromethane (methylene fluoride) (CH ₂ F ₂)	633 (A2L)	Commonly used in large HVAC systems for centralised chillers and heat pumps it often requires large volumes increasing the risk of leakage. R32 is mildly flammable.



7 Programs of Works

This section summarises the indicative Programs of Works to replace the gas assets by 2040. The section also outlines a conceptual approach to refining the Program of works and prioritising when assets are replaced as more information becomes available.

Three Programs have been developed for the delivery of replacement works:

- **Program A:** schedules the replacement of assets based on end of life of the asset. This results in a large number of gas assets falling in the short term given the age and condition of the gas assets across the portfolio.
- **Program B:** this program is also based on scheduling replacement based on end of life; however, it defers replacement for an additional five years. This results in a slightly less aggressive Program of Works as the replacement time is delayed by five years for all assets.
- **Program C:** this program is based on Program B with changes to the Short-Term to create a 'ramp up' of capital funding in year one to allow for Program mobilisation activities to occur.

Individual asset timing across these programs is detailed in [Appendix E – Indicative Program of Works](#).

7.1 ACT Government Asset Registers

7.1.1 Information Sources

Table 22 sets out the information provided by EPSDD that has been used as the basis of the analysis undertaken for this business case. As agreed with EPSDD, any data inconsistencies encountered during the analysis have been resolved based on the order of precedence of the documents outlined in Table 22.

Table 22 – Information sources in order of precedence

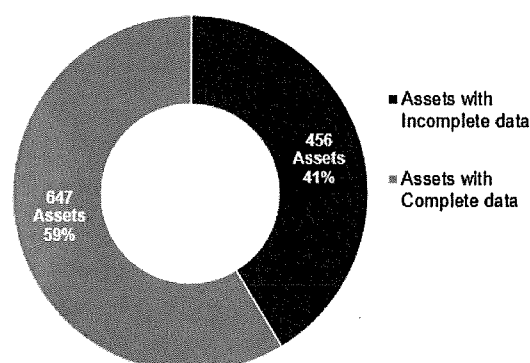
Document	Filename	Description of document
List of Gas Assets	Attachment 1a – 2019 ACT Government Gas Infrastructure Audit	List of 546 gas assets located across 60 sites. This document excludes the majority of assets within ACT public schools.
Gas Asset Audits	ACTPG owned buildings with gas asset	This dataset contains information based on a condition assessment of gas assets and audits conducted across several building types. The document includes the address and location of the ACT Government owned properties.
Gas Asset Audit	SENSITIVE – 2019-EDU-Audit-BoilerLifeCycle – 20190826 (November 2022 Update)	This dataset contains information based on a condition, assessment including the number and type of gas assets across schools including boilers, gas heaters, radiant heaters and gas driven variable refrigerant flow.
Electricity Rates	ACT31131 – Contracted electricity rates	Overview of the ACT Government's electricity rates for large, small and un-metered sites.
Large Gas Consuming Assets Audit	12581232 – CHS Zero Emissions Pathway Advisory – Final Report – RA	This document provides an overview of a Zero Emission Pathway for Canberra Health Services which was developed by GHD
Large Gas Consuming Assets Audit	GHD Survey of large gas consuming assets – Stage 2 audit – 2022	GHD undertook a review of several large gas consuming assets. The document provides an overview of the replacement options for gas assets.

Document	Filename	Description of document
Type 2 Energy Audit	REP00262-B-001 – Dickson Aquatic Centre Energy Audit	Type 2 Energy Audit of the Dickson Aquatic Centre conducted by Delta Q to identify opportunities to reduce carbon and energy costs and emissions.
Type 2 Energy Audit	ACTPG Pools Energy Audit – Gungahlin LC	Type 2 Energy Audit of the Gungahlin Leisure Centre conducted by ESBS in July 2018 to identify potential energy conservation and cost savings opportunities to displace gas consumption.
Type 2 Energy Audit	ACTPG Pools Energy Audit – Lakeside LC	Type 2 Energy Audit of the Lakeside Leisure Centre conducted by ESBS in July 2018 to identify potential energy conservation and cost savings opportunities to displace gas consumption.
Type 2 Energy Audit	REP00262-C-001 – Manuka Pool Energy Audit	Type 2 Energy Audit of Manuka Pool conducted by DeltaQ in June 2022 to identify energy consumption and to propose a site upgrade strategy with short-, medium- and long-term measures.
Heating Plant Upgrade Feasibility Study	CR180886_EM01_02_Tuggeranong Bus Depot – Feasibility Study	Feasibility Study of Tuggeranong Bus Depot conducted by Northrop in November 2018 to review mechanical services and energy consumption, and to propose site upgrade options.

7.1.2 Data Constraints

Based on the data contained in the current asset registers approximately 456 assets (41 per cent of all assets) do not have sufficient information to accurately assess their age, condition and when they will need to be upgraded with emissions-free alternatives (Figure 27). Further work is required to develop a complete asset register for all the gas assets currently utilised across ACT Government owned buildings. This work is discussed further in section 16 and costs to undertake these works is included in section 11. Additionally, the approach to including these assets with incomplete data within the Programs of Work and how the cost estimates have been developed are discussed in sections 5 and 11 respectively.

Figure 26 – Assets with Missing Data



7.2 Approach and Methodology

There are several factors that may be considered when determining the scheduling order of the asset replacement works, that is the Program of Works, including:

- **Gas asset age and condition:** age and condition of the existing gas assets;
- **Electrify full site or asset-by-asset:** whether it makes sense to undertake the full electrification of a site or undertake the works over multiple years;³⁶
- **Required network upgrades:** whether the works will require upgrades to the electricity network and what other works are being undertaken on the electricity network;
- **Marginal Abatement Costs (MAC):** the MAC by site (full electrification) or MAC by asset;³⁷

³⁶ The electrification of a full site may involve some assets being replaced prior to end of life. In these instances, further work will need to be undertaken to understand the residual life of that asset and whether the benefit of early replacement rolled into full site electrification is balanced against

³⁷ The avoided Social Cost of Carbon (SCC) may be used instead of MAC to measure the social cost of carbon an asset or site electrification will avoid. Further work will be required to determine the preferred measure.

- **Aligning with other capital works:** the timing and extent of any other capital works being undertaken at the site and whether aligning these would be more efficient. This could also include a check to ensure that the remaining life of the building exceeds (or is equal to) the expected life of the zero-emissions asset(s) being installed;
- **Service delivery:** the impact the works may have on service delivery (e.g., works at schools may have to be undertaken during school holidays); and
- **Redundant sites:** whether any sites or facilities may be divested or demolished in the near future.

Two indicative Programs have been developed for the purposes of estimating the costs for the Program for this business case. However, further work will be required to update and finalise the Program as discussed in Section 16.5 including obtaining asset and site data for the sites without sufficient data (discussed in Section 7.1.2) and understanding the market capacity to support the delivery of the Program (see Section 10.5.2). Table 23 summarises some items that will need to be considered when further refining the schedule for the Program of Works based on the factors outlined above.

Table 23 – Program of Works Considerations

Factor	Considerations
Age and condition of gas assets	• Prioritising the oldest gas assets past their end-of life as these assets have the highest risk of failure and therefore the risk of having to replace with a similar gas asset.
Full site electrification	• There may be benefits to look to electrify a full site in one go rather than undertake replacement works over multiple years. • For example, where a site has some assets which are currently beyond their expected life whereas other assets are still operating well and have several years left before they are due to be replaced, it may be beneficial to replace all the gas assets at that location. • This will need to be considered on a site-by-site basis and consider the benefits of doing the full site concurrently versus replacing assets which are still in good working order.
Network upgrades	• As noted in section 8 Evoenergy will need to make upgrades to the electricity network because of increasing the electrical load from the replacement of gas assets. • Where network upgrades are required there will be a lead time before the gas replacement works can occur. The Program will have to be coordinated with Evoenergy's plans to upgrade the network as a result of the Program and other factors such as the ACT Government's EV strategy, other electrification works across the Territory and general population growth and urban infill.
Marginal abatement cost	• Marginal abatement cost (MAC) is a metric used to measure the CO2 savings/benefits and the financial cost of replacing the gas assets with a zero-emissions alternative.³⁸ Lower MAC values mean that the CO2 reduction is higher relative to the costs and therefore provides a more efficient way of reducing CO2 emissions. • MAC could be used as a method for determining which gas replacements to prioritise (i.e., by undertaking the more efficient upgrades first). However, MAC values need to be considered carefully as facilities that operate efficiently or have shorter operating hours can have a higher MAC value than other facilities which operate 24/7 or have constant heating requirements.
Timing and extent of other capital works	• The 2022-23 Budget included \$237 million for the delivery of infrastructure projects, which increased the total value of the ACT Government's capital works program to \$5.376 billion over five years to 2026-27.³⁹ It is critical for the success of the Program that the timing of the electrification works is scheduled to align with the broader ACT Government capital works program. • For example, where major capital works are being undertaken at a Government site/building it may be appropriate to undertake the electrification works at the same time which may result in lower costs (through lower preliminaries and site establishment costs) and may reduce the

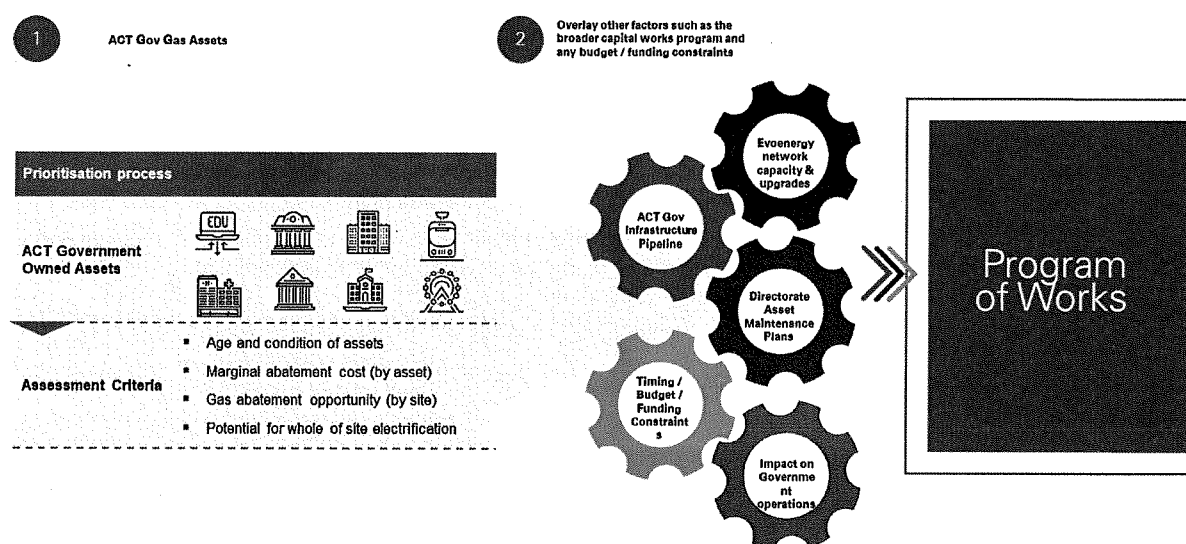
³⁸ MAC can be used to provide a metric for implementing other emissions reduction measures not just the replacement of gas assets.

³⁹ Act Treasury (2023). "Budget 2022-23". Capital Works Program. Retrieved from <https://www.treasury.act.gov.au/budget/budget-2022-23/budget-2022-23/capital-works-program>

Factor	Considerations
	impact on the services provided at the site. Further work will be required to understand parallel capital works programs and how best to align the Program with planned works to achieve cost efficiencies as discussed in Section 16.5.
Impact on operations	The timing of works will need to be scheduled to minimise disruption to ACT Government services. For example, works may need to be undertaken during school holidays, site closures or other planned shutdowns.
Strategic considerations	There may be other strategic factors that require consideration including: - funding limitations and budget constraints; - whether there are any synergies of doing blocks of some technology as replacement (e.g., grouping several new hot water units to procure and install); - whether the remaining life of the building is greater than or equal to the expected life of the zero-emissions asset being installed; and - whether there are benefits to group works on a geographic basis which may better align with upgrades to the electricity network.

Figure 27 outlines a conceptual approach which could be used to determine how to prioritise which gas assets to replace considering the factors outlined in Table 23.

Figure 27 – Conceptual Approach to Prioritising When Assets are Replaced



7.3 Indicative Programs of Works

7.3.1 Approach

The approach to developing the indicative Program of Works for this business case has focussed primarily on the age and condition of the assets with consideration also given to the potential electricity network impact.

The process for developing the indicative Programs of Works as part of this business case has involved reviewing the age, remaining life, and condition of the gas assets. The oldest assets and those furthest past their end-of-life are prioritised as the functionality, maintenance, and risk of breakdown for these assets are greatest. There is a risk that if these assets are not prioritised it may result in the need to replace them with new gas equipment. Based on this assessment assets are categorised into three tranches as needing to be replaced in the:

- Short-term (2023-24 to 2026-27 – aligning with the forward estimates period);
- Medium-term (2027-28 to 2030-31); or
- Long-term (2031-32 to 2039-40).

The assets have been placed into tranches of similar size (assets and cost). Assets with data gaps have been included in the long-term tranche.

Three indicative Programs of Works have been developed for this business case:

- **Program A:** this program is based on the approach outlined above where assets are replaced at the end of asset life. Due to the age and condition of a large number of the gas assets (as evidenced in Figure 26) this results in a large number falling within the short-term category.
- **Program B:** this program is also based on the approach outlined above; however, it defers replacement for an additional five years (which will require appropriate maintenance works to extend the functional life of the assets). This results in a slightly less aggressive Program of Works as the replacement time is delayed by five years for all assets.
- **Program C:** Program C is based on Program B, however it defers a number of projects that were potentially earmarked for year 1 based on analysis undertaken by EPSDD. These changes are explained further below.

Program C

Due to the number of assets nearing end of life across the Territory, Program A and Program B both schedule 109 assets in Year one and 51 and 56 assets in Year 2, respectively.⁴⁰

At the risk workshop and delivery model workshop, MPC and other stakeholders noted that it is expected that the Program may start slowly over the initial few years due to a number of reasons including:

- If the Program is funded, the funding in year one (FY2023-24) will not be appropriated until August/September 2023 which means it may be difficult to get many projects underway or completed within the first year (i.e. it may take three to nine months to undertake further planning and procurement activities before any works could commence as discussed in Section 16). This is particularly true for works that must be undertaken at certain times of the year such as within school holiday periods;
- There will need to be more cross-Directorate planning work to go through the indicative Program of Work to overlay other capital works projects which may impact the choice of sites to electrify;
- There will be a need to engage with Evoenergy to determine the network implications of the Program which will likely impact the timing of when projects can be undertaken;
- It may take time for the market capability and capacity to develop around the Program which may result in more gas assets being replaced across the medium to long-term; and
- Due to the amount of planning work required to get projects “shovel ready” and the work associated with establishing the Program office and undertaking recruitment processes, it is unlikely that the works outlined for year one (FY2023-24) in Program A and Program B will be achievable.

Noting the above, **Program C** was developed. Program C is based on Program B with the following changes:⁴¹

- Weetangera Primary School, Manuka Swimming pool and Gungahlin JESC are proposed for year one.
- Works at Erindale College and Theatre were reprofiled into year three of the Program;
- Works at Tuggeranong Bus Depot were reprofiled into year four of the Program as there are some electrification works currently being undertaken at that site (but not for the full scope) and it would be challenging to try and undertake additional works until these are complete;
- Works at Yarralumla Nursery were reprofiled into year four of the Program as there are current heritage issues with some of the buildings which need to be worked through; and
- Works at Exhibition Park were reprofiled into year four of the Program as there is a range of additional planning and analysis for the site that needs to be undertaken before any works could be undertaken.

The reprofiled Program is not intended to slow down the rollout of the Program. Treasury have noted that should MPC be able to undertake the works faster than anticipated in in Program C, they will be able to draw down capital funding from future years within the forward estimates to undertake these works.

The Programs of Works are summarised in Table 24 and shown annually in Figure 28.

⁴⁰ This includes the replacement of 64 gas radiant heaters at EPIC.

⁴¹ Selection of Sites for Year 1 and deferral of sites to years 3 and 4 was identified by EPSDD by email dated 9 March 2023.



Table 24 – Indicative Programs of Works

Document	Program A	Program B	Program C (preferred)
Short-Term (FY2024 to FY2027)¹	Year 1: 109 assets at 7 sites Year 2: 51 assets at 18 sites Year 3: 99 assets 19 sites Year 4: 51 assets 23 sites Total: 310 assets at 67 sites	Year 1: 109 assets at 7 sites Year 2: 56 assets at 14 sites Year 3: 54 assets at 21 sites Year 4: 26 assets at 13 sites Total: 245 assets at 55 sites	Year 1: 13 assets at 3 sites Year 2: 56 assets at 14 sites. Year 3: 61 assets at 22 sites. Year 4: 115 assets at 16 sites. Total: 245 assets at 55 sites
Medium-Term (FY2028 to FY2031)	Gas assets: 160 No. of sites: 41	Gas assets: 225 No. of sites: 53	Gas assets: 225 No. of sites: 53
Long-Term (FY2032 to FY2040)	Gas assets: 158 No. of sites: 47	Gas assets: 158 No. of sites: 47	Gas assets: 158 No. of sites: 47
Assets with insufficient data (assumed Long-Term)²	Gas assets: 428 No. of sites: 89	Gas assets: 428 No. of sites: 89	Gas assets: 428 No. of sites: 89
Total	Total: 1,056 assets at 189 sites	Total: 1,056 assets at 189 sites	Total: 1,056 assets at 189 sites

Source: Appendix E – Indicative Program of Works
Note 1: The first year of Program A and Program B includes replacing a number of gas assets at EPIC including 64 gas radiant heaters. In Program C, EPIC has been deferred to Year 4 based on EPSDD's instructions.
Note 2: Where there is currently insufficient data to determine when an asset will reach end of life or require replacement, these assets have been grouped in the Long-Term tranche. Further investigations are required to determine when to replace them. This accounts for 456 out of the 1,056 assets that are currently in used in the ACT Government buildings.

Figure 28 – Program A, B and C Electrification Rollout by Asset⁴²

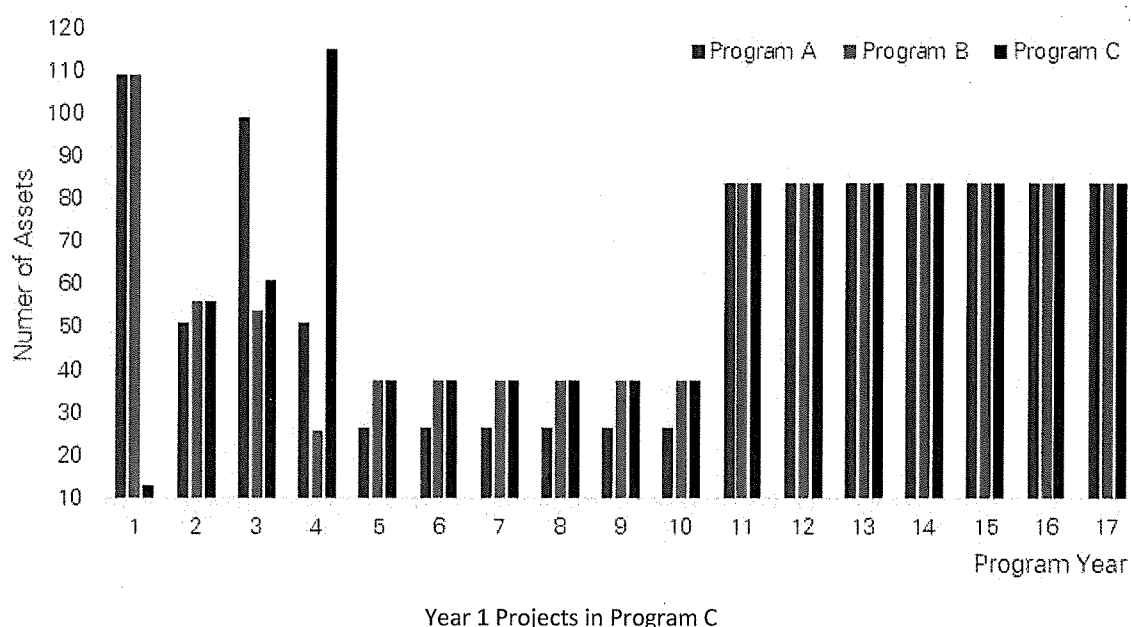


Table 25 and Figure 29 set out more detail on the potential sites identified for Year 1 in Program C.

⁴² The medium-term and long-term works have been spread evenly across the respective periods for the purposes of this chart.

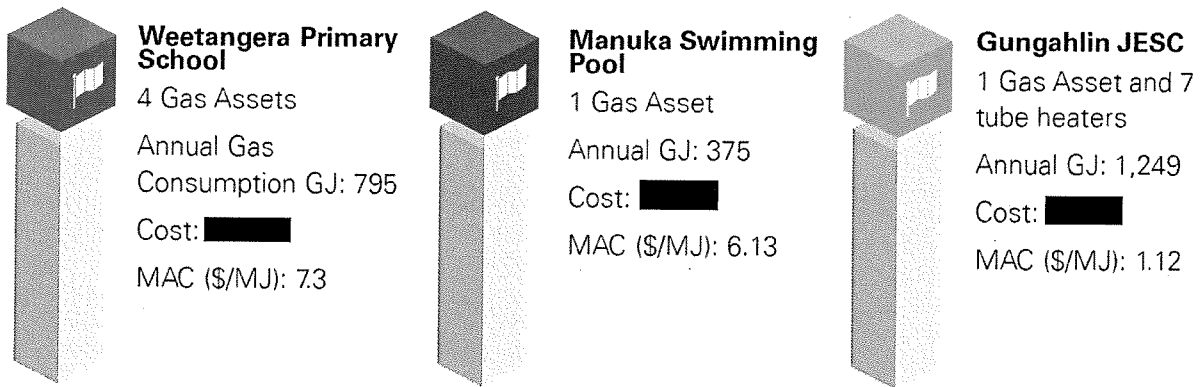


Table 25 –Potential Sites Identified for Year 1 in Program C

Site	Description of Gas Assets	Considerations
Weetangera Primary School Annual GJ: 795 Cost: [REDACTED] MAC (\$/MJ): 7.3	<u>Buildings 1-6</u> 1x 800kW Atmospheric boiler services (1972) <u>Building 7</u> 2x Radiant Tube Heaters (2007) 1x Sime Hydronic space heating (2007)	- The existing boiler was installed in 1972 making this the oldest gas asset in the ACT and is having regular performance issues. A 15Amp connection in the main switchboard (MSB) is set up for an emergency boiler when breakdowns occur. - The works may need to be undertaken during school holiday periods or potentially in spring or autumn where the HVAC requirements may be lower. - There may potential capital works required (such as removing a plant room wall) to complete the decommissioning and removal of the existing asset and installation of the new system. - The ACT Government may want to consider replacing the heating assets located in Building 7 at the same time to fully electrify the site, however, the Building 7 assets appear to be working fine. Network Impacts - The significant increase in maximum demand may trigger customer specific and shared network upgrade, which could incur a capital contributions cost paid by the ACT Government to Evoenergy. - Evoenergy should be notified of estimated additional load to ensure wider network can facilitate the new demand. The additional works may impact the program timeline.
Gungahlin JESC Annual GJ: 1,249 Cost: [REDACTED] MAC (\$/MJ): 1.12	<u>Plantroom</u> 1x 275 kW Hunt boiler (1998) <u>Engine Bay</u> 7x 28kW HeatRay Radiant Tube Heaters (1998) – Located in the Engine Bay to keep firefighters warm when cleaning the vehicles	- The boiler is located within the outdoor plantroom and is used to heat the common areas. - There are radiant tube heaters suspended from the ceiling in the engine bay and used intermittently by personnel when performing maintenance on the vehicles. - The assets at the site have not been upgraded since the site was built and are already beyond their expected life. - The site operates 24/7 and should therefore generate a faster payback with a new electric heatpump. - It has been assumed that the complete site would be fully electrified in the initial four-year period. - There is also an opportunity to install solar and battery system due to the available north facing roof and batteries to capture surplus energy and provide the 24/7 operations.
Manuka Swimming Pool Annual GJ: 375 Cost: [REDACTED] MAC (\$/MJ): 6.13	<u>Plant Room</u> 1x 300 kW Hunt boiler (1993)	- There is one gas asset (the boiler) located in this facility which is used to heat the swimming pool which has a high heating demand. - The boiler is 10 years past the end-of-life and requires replacement. - The facility is closed from April to October providing an opportunity to upgrade the asset without impacting on its operations.
Source: Gas usage data has been sourced from Envizi report - Monthly data summary for FY22 Note: Costs are nominal inclusive of contingency and ACT Government costs		



Figure 29 – Potential Sites identified for Year 1



7.3.2 Short-Term Program of Works

As noted in Table 24 the number of assets that would be replaced with electric alternatives would be 324 (across 79 separate sites) and 247 (across 59 separate sites) under Program A and Program B/Program C respectively. Table 26 shows the number of assets to be replaced over the next four years under both Program A, Program B and Program C across the different Directorates.

Table 26 – Short-Term Program by Directorate

Directorate	Program A		Program B and Program C	
	# Assets	# Sites ¹	# Assets	# Sites ¹
Education Directorate	166	47	133	42
Health Directorate	5	1	0	0
Justice and Community Safety Directorate	21	6	8	1
Property Group (CMTEDD)	82	3	82	3
Transport Canberra and City Services	10	2	10	2
Canberra Health Services	10	4	6	2
Environment, Planning and Sustainable Development Directorate	1	1	1	1
CIT	15	2	5	2
Total	310	66	245	53

Source: Appendix E – Indicative Program of Works
Note 1: This is the number of sites that works will be undertaken at, not the number of sites fully electrified.

8 Network Impacts and Considerations

This section provides a description of ACT electrical network and the impact of the Program on the electricity network and outlines the approach adopted for estimating the impact on the network.

8.1 Evoenergy

Evoenergy owns and operates the ACT electricity network, and the gas networks in the ACT, Queanbeyan, Jerrabomberra, Bungendore, and Nowra. Evoenergy's role includes:

- maintaining a safe, quality and reliable supply;
- conducting all required maintenance, upgrade, and extension work;
- performing connections, alterations, disconnections and re-connections;
- providing emergency response; and
- reading and maintaining Evoenergy owned meters.

The transition away from gas across the ACT will be dependent upon Evoenergy's electrical network's ability to safely and reliably transport the required energy to satisfy the increase electrical load. In other words, the electrification program is dependent on Evoenergy's network capacity and capital expenditure (Capex) and augmentation expenditure (Augex) programs, as some locations will see a significant demand increase. At the time of writing, the Program is not factored into Evoenergy's network planning; this is explained further below.

8.1.1 Electricity Distribution Network

At the time of writing, Evoenergy is in the process of finalising their 2024 – 29 regulatory submission. The draft proposal submitted to the Australian Energy Regulator (AER) outlines the network upgrades planned for the 2024-2029 regulatory period. The Program upgrades should aim to align with Evoenergy's pipeline where possible, to ensure a cost-effective outcome.

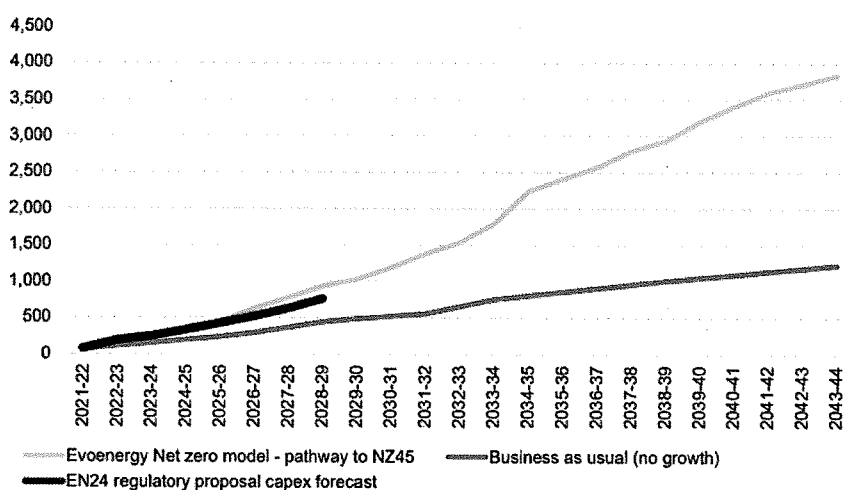
Evoenergy's distribution network expansion, as outlined in their Distribution Annual Planning Report (DAPR) and regulatory submission summary, is summarised below. The draft submission and the proposed approach and upgrades will be subject to AER's final approval and any changes required.

- Under Evoenergy's full electrification scenario (net zero and decommissioning of the gas network by 2045), the projected max demand is forecast to increase to 1,600MW by FY45 from 650MW in FY21⁴³. The gas electrification program is expected to contribute 38MW of additional peak maximum demand.
- Evoenergy's Regulatory Proposal for 1 July 2024 to 30 June 2029 (published January 2023)⁴⁴ notes that under their model to achieve net zero emissions, there would be additional investment in the order of \$2.5-3.0 billion beyond what would be needed under a BAU no growth scenario. This translates to \$0.75 billion needed for the 2024-29 regulatory period.
- Evoenergy's proposed 2024-29 capex program (EN24), for the AER program, has been informed (but not based on) the net zero model and is based on current policy settings – which does not reflect the full extent of investment needed to remain on a steady path to net zero by 2045 (e.g., higher uptake of ZEV, nor the electrification program).

⁴³ Evoenergy (2023). "Appendix 1.4: Evoenergy Net Zero Modelling Journey". Retrieved from <https://www.evoenergy.com.au/-/media/evoenergy/documents/electricity-five-year-plan/evoenergymarsden-jacobsappendix-14-net-zero-modelling-journeyjanuary2023public.pdf?la=en&hash=62CD47AB8F88746F7EA07CD23527A8603CC60E27>

⁴⁴ Evoenergy (2023). "Regulatory Proposal". Retrieved from https://www.evoenergy.com.au/-/media/evoenergy/documents/electricity-five-year-plan/evoenergy-regulatory-proposal-january-2023_public.pdf?la=en&hash=D496F73884C6CF45E1FE222BF3C65232DF0FD0D7

Figure 30 - Evoenergy Net zero model forecast cumulative capex to achieve net zero by 2045 (\$million, \$2023/24)⁴⁵



Source: Evoenergy – Regulatory Proposal (2023)

Evoenergy's modelling as above in Figure 30 (Net Zero model – pathway to NZ45) reflects the cumulative capex spend required to achieve the ACT Government's zero emission policies and targets (full electrification – providing energy services through electricity network only, decommissioning the gas network). Under this scenario, the Program may already be incorporated into these costs, and it is not expected that any major additional capex costs (outside of what is included in Evoenergy modelling) will be identified to facilitate the delivery of the Program. Of note, the net zero model capex trajectory is higher than Evoenergy's EN24 regulatory proposal capex forecast – which translates to greater required capital contributions. This underscores the importance of the ACT Government working collaboratively with Evoenergy to maximise planning efficiency and value for money.

According to the annual planning report, Evoenergy has proposed several upgrades to both feeders and zone substations experiencing capacity and voltage limitations.

8.1.2 Network Bill impacts

Under the EN24 regulatory proposal capex forecast, Evoenergy estimates the network component of electricity bills will increase by about 1.3 per cent on average through the 2024–29 regulatory period in real terms. This is about \$7 increase per year for residential customers and \$43 increase per year for commercial customers (on an after-inflation basis). Table 27 summarises the cost impacts on electricity bills.

Table 27 - Indicative network bill impacts (\$nominal)⁴⁶

	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29
Indicative network charges – residential customer	579	656	663	679	694	709
Annual change \$	-	77	7	16	15	15
Annual change %	-	13.3%	1.0%	2.4%	2.2%	2.2%
Indicative network charges – LV commercial customer	3,370	3,818	3,857	3,948	4,034	4,124
Annual change \$	-	449	39	91	86	90
Annual change %	-	13.3%	1.0%	2.4%	2.2%	2.2%

Source: Evoenergy – Regulatory Proposal (2023)

⁴⁵ Evoenergy (2023). "Regulatory Proposal". Retrieved from https://www.evoenergy.com.au/-/media/evoenergy/documents/electricity-five-year-plan/evoenergy-regulatory-proposal-january-2023_public.pdf?la=en&hash=D496F73884C6CF45E1FE222BF3C65232DF0FD0D7

⁴⁶ Evoenergy (2023). "Regulatory Proposal". Retrieved from https://www.evoenergy.com.au/-/media/evoenergy/documents/electricity-five-year-plan/evoenergy-regulatory-proposal-january-2023_public.pdf?la=en&hash=D496F73884C6CF45E1FE222BF3C65232DF0FD0D7

Evoenergy's capex escalates moderately in the next regulatory period – these higher costs will be borne and repaid for by network users. The revenue networks can recover from customers is based on the rate of return set by the AER, which correlates to interest rates. The overall required return is a weighted average of return required on the equity and the return required on the debt used to fund the network investment (Capex). The weighting used is 60 per cent debt and 40 per cent equity.

There will likely be higher charges in later regulatory periods as networks historically experienced low rates of return as shown in Table 28. This is likely to translate to greater electricity bills in the form of higher network charges for the ACT Government as they continually electrify. The incremental cost is captured when calculating the electricity supply costs (Section 11.2).

Table 28 – AER Rate of Return Instrument⁴⁷

Year	Indicative overall rate of return (nominal vanilla)
2018 Instrument (as at Nov 2018)	5.36%
2019 Instrument (as at Aug 2019)	3.45%
2020 Instrument (as at Aug 2020)	3.27%
2021 Instrument (as at Aug 2021)	3.41%
2022 Instrument (as at Feb 2023) ⁴⁸	5.75%

8.2 Impact on the Network from the Program

The conversion of ACT Government gas assets to electricity will produce a higher load on the electrical network. The full program will replace approximately 302TJ/annum of gas usage for DHW and space heating with 34GWh/annum of electricity⁴⁹. Certain parts of the electricity network do not currently have the required hosting capacity to accommodate this increase in load. In the circumstance that there is insufficient upstream hosting capacity (including both for feeders (electrical lines and poles), as well as where substations do not have sufficient capacity) this could result in damage to the electrical infrastructure and blackouts for consumers. Moreover, adding greater load to the distribution network can impact its overall reliability and potentially result in failure of the network.

Consequently, there may need to be upgrades to the distribution network not only to avoid overload, but also to maintain a level of reliability which may involve augmentations to current feeders and substations, or the installation of new feeders and substations. The volume and level of upgrade required will differ on a site-by-site basis and is contingent upon several key considerations. These considerations include:

- The number of gas assets at each site, and the resulting increase in load on the network from their conversion to electricity. The maximum demand profile (determined by the combination of the size and number of assets with their usage) for each site differs based on the size and type of the facility.
- The number of distribution connections at each site, and whether the current feeders to each connection can accommodate the increased load arising from electrification.
- The number of feeders that connect to an individual substation, and whether the substation currently has the capacity to accommodate the increase in load to service each feeder.

8.2.1 Network Modelling

The Program is not currently factored into Evoenergy's network planning. To measure site-specific network impacts, each site's maximum demand was mapped firstly against the current hosting capacity of their connecting feeders,

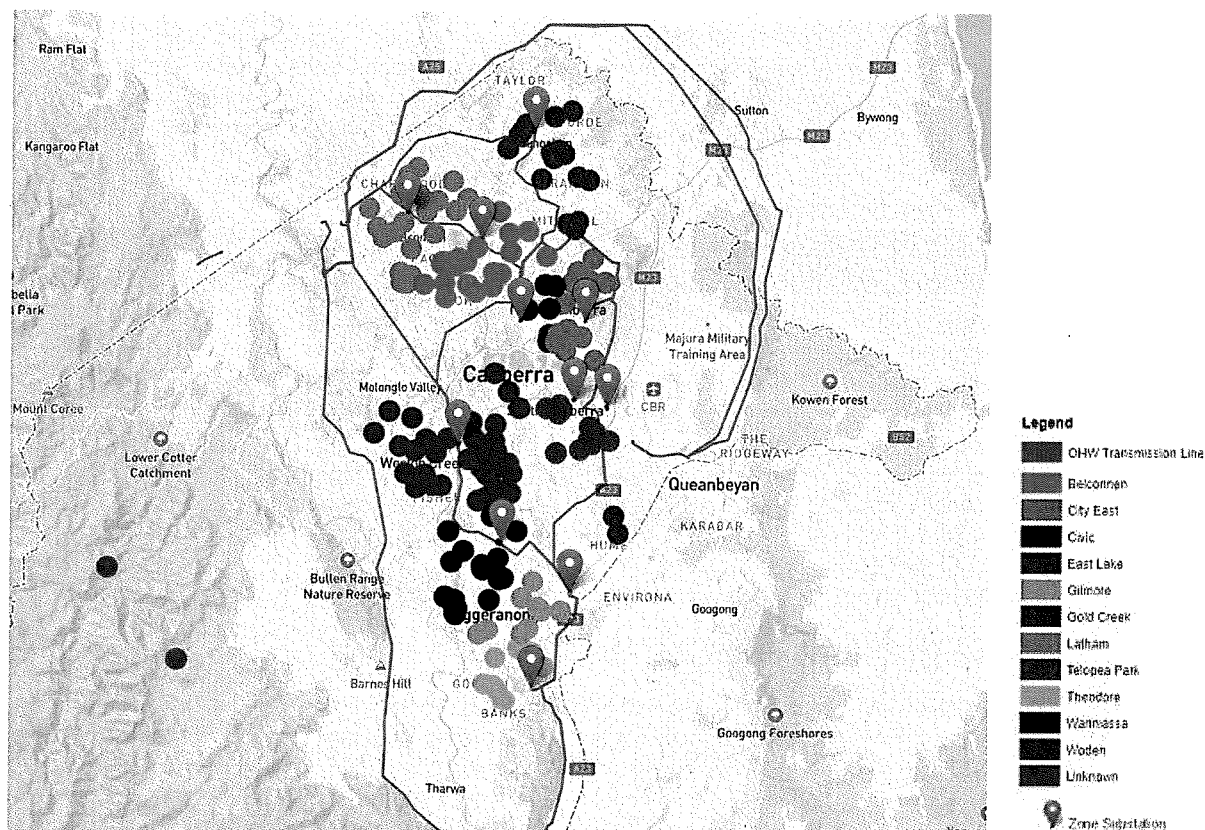
⁴⁷ AER (2021) "Rate of return Annual Update" Retrieved from <https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/rate-of-return-annual-updates-2019%E2%80%932022>

⁴⁸ AER (2023) "Rate of return overview for consumers" Retrieved from <https://www.aer.gov.au/publications/guidelines-schemes-models/rate-of-return-instrument-2022>

⁴⁹ 1 TJ = 0.277 GWh of energy, 302 TJ = 83.8 GWh. As electrical assets are more energy efficient than gas assets, there is therefore less overall energy required per annum.

and subsequently the load that this would place upstream on the closest substation (aggregated across all of a specific substation's connecting feeders). Figure 31 shows all Program sites and zone substation locations.

Figure 31 – Map of all Program sites and zone substation locations



The figures below illustrate each substations current capacity (in MVA). Where the total demand exceeds a substation's firm capacity, this will necessitate an upgrade to the substation. A substation's firm capacity is derived by using a demand probability of exceedance of 50 per cent. Probability of Exceedance (PoE) refers to the probability that a particular value will be met or exceeded. For example, a PoE 50 demand forecast refers to the level of demand that is expected to be exceeded 50 per cent of the time. We used POE50, a conservative approach, to consider the reliability and redundancy of the network.

Figure 32 – Heat map of the estimated increase load by short-term and long-term sites in Program A (Short Term)

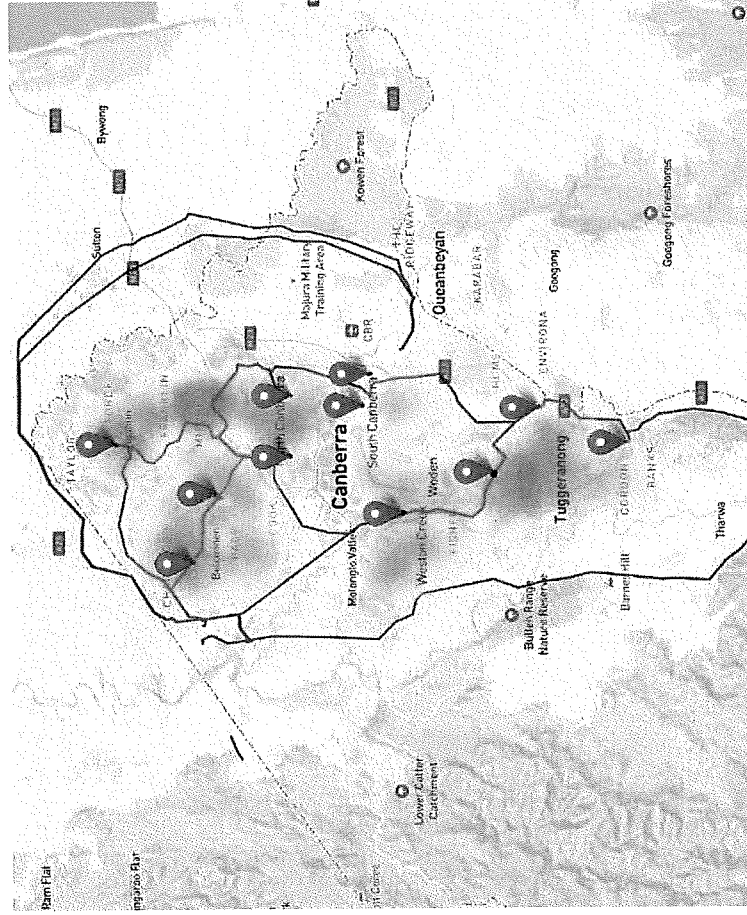
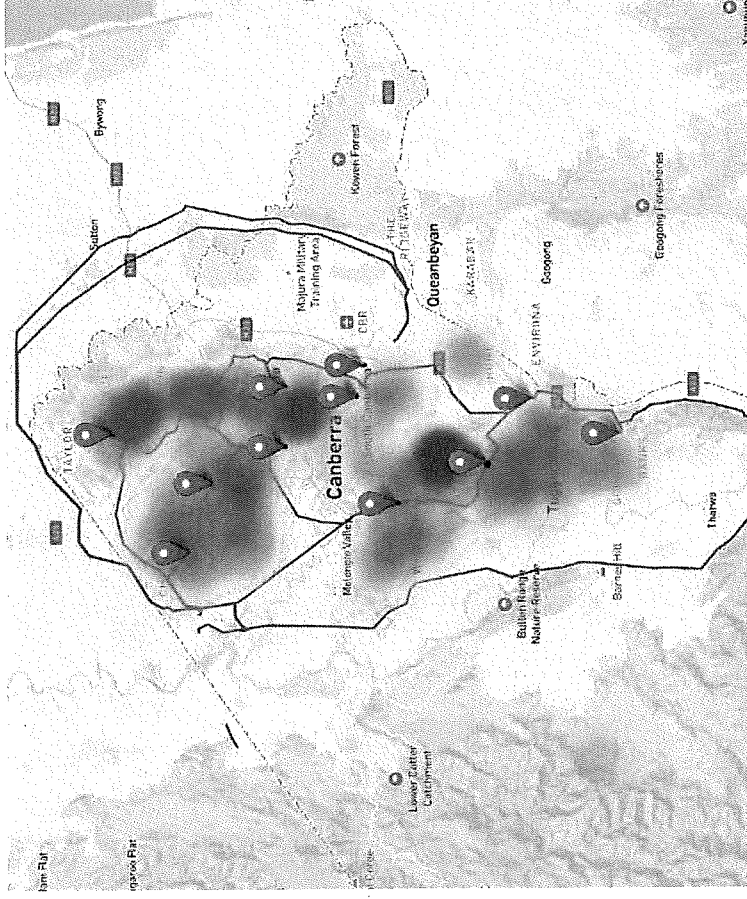
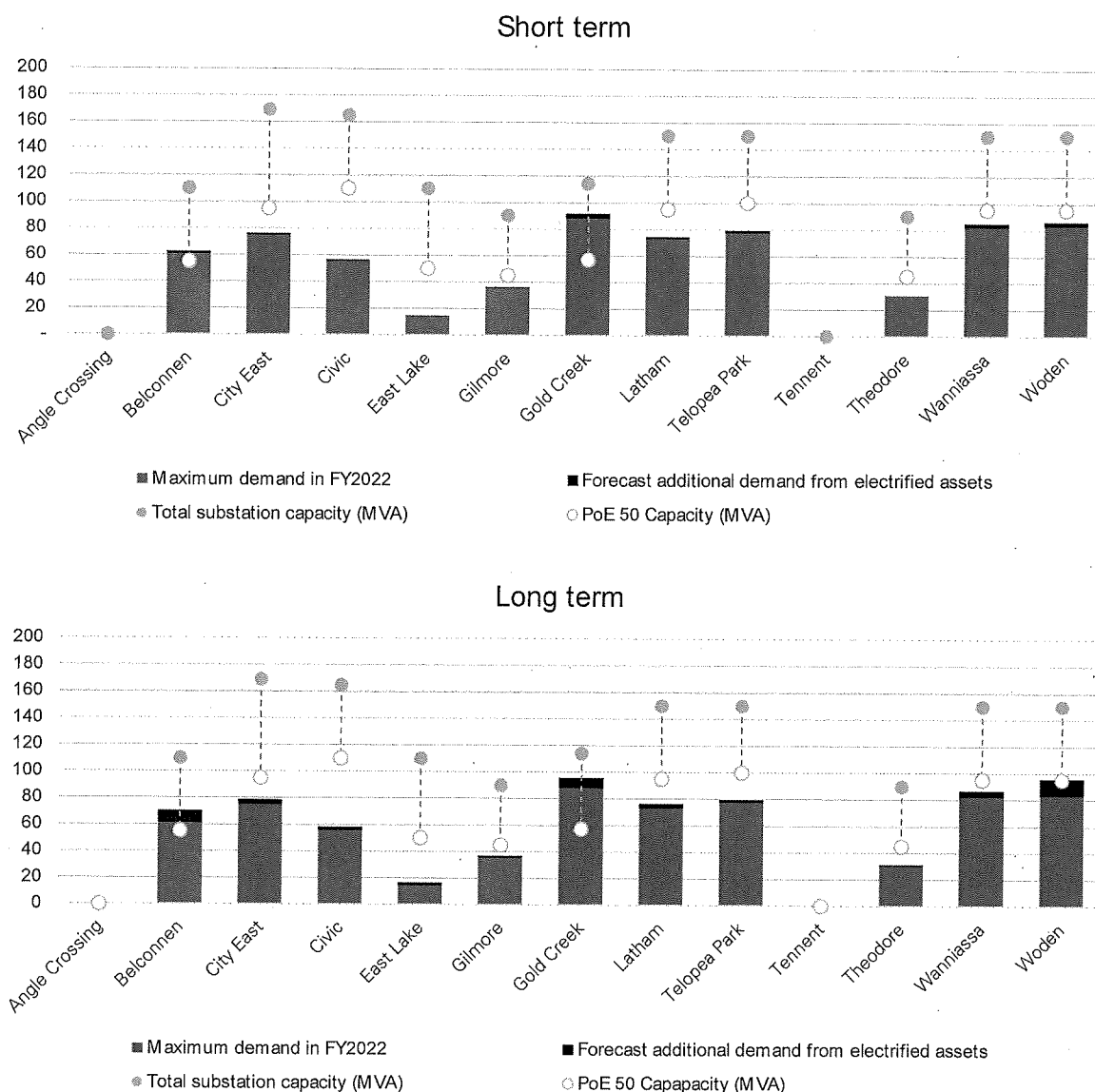


Figure 33 – Heat map of the estimated increase load by short-term and long-term sites in Program A (Long Term)



In the short term, the increased load is distributed relatively evenly across ACT Government sites. However, in the long term, load becomes visibly more concentrated in Central Canberra, Woden, Belconnen and Gungahlin region. The increase in load across zone substations is detailed further in Figure 34 below but does not consider increases in load from sources of electrification outside of the Program (e.g., EV uptake).

Figure 34 – Existing demand by substation and short-term vs long-term additional demand from electrification of gas assets

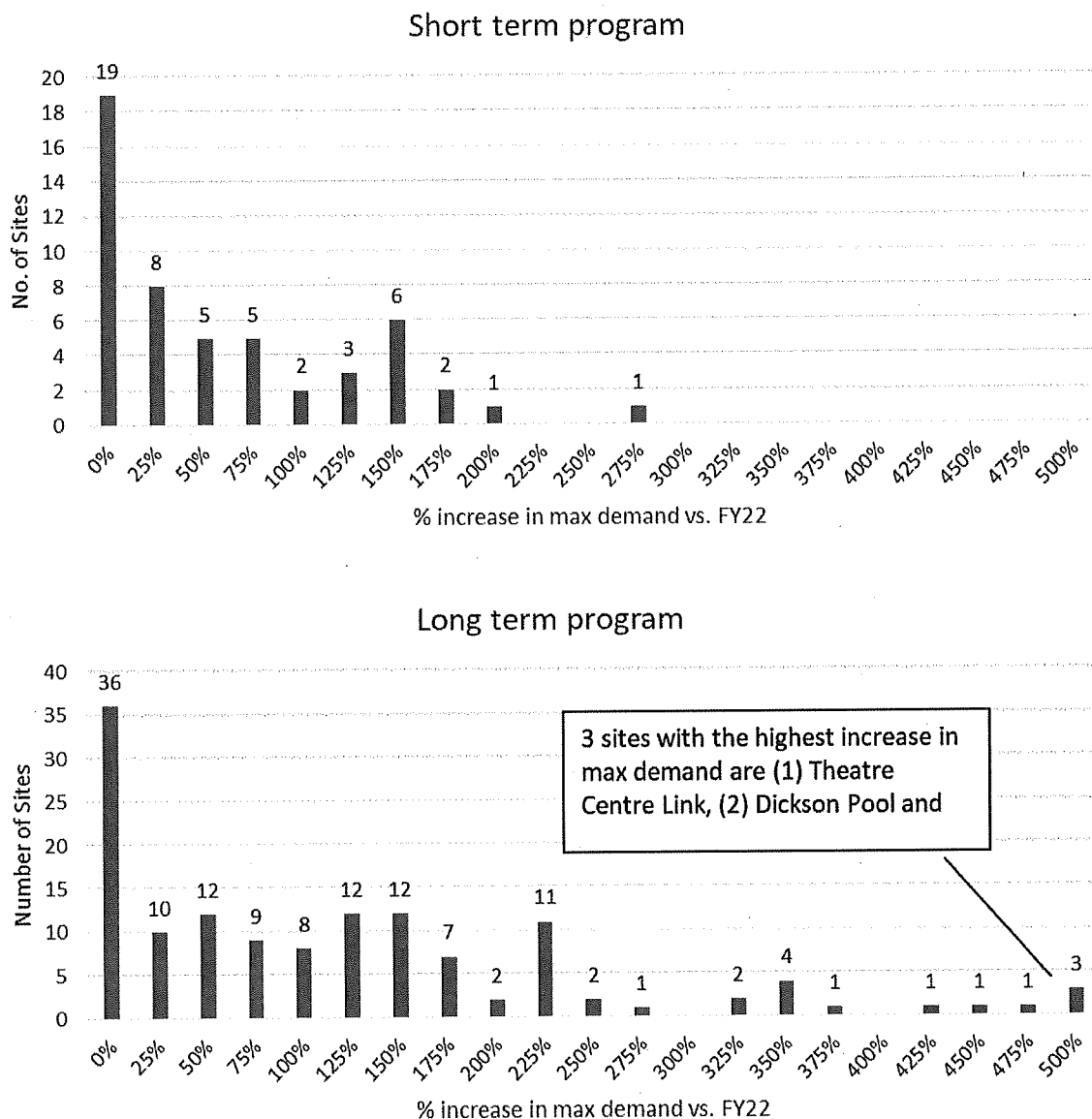


From a zone substation perspective, the electrification upgrades are not material compared to the current electrical loads. The max load increases 1.6 per cent in the short term, and 6.5 per cent by 2040, assuming ACT maintains FY22 max demands. It is unlikely the program will trigger any major upgrades at the HV or transmission level.

For all zone substations except for Woden, where substations are currently below firm capacity, the increase in load from the Program does not cause exceedance to firm capacity (PoE 50). For the zone substations that are already at capacity, Evoenergy has plans to upgrade the network infrastructure. Specifically, to accommodate the increase in load at Woden substation, Evoenergy already has plans to build an additional zone substation in close proximity at Molonglo Valley, which will provide an initial additional capacity of 15MVA, followed by a final 55MVA of capacity in future years⁵⁰.

⁵⁰ Evoenergy (2023). "Regulatory Proposal". Retrieved from https://www.evoenergy.com.au/-/media/evoenergy/documents/electricity-five-year-plan/evoenergy-regulatory-proposal-january-2023_public.pdf?la=en&hash=D496F73884C6CF45E1FE222BF3C65232DF0FD0D7

Figure 35 – Number of sites by percentage increase in load compared to FY22: max demand under Short-Term Program A vs Long-Term (by 2040)



Although the impact of the Program to zone substations is minimal, the increase maximum demand on a site level is significant. The additional load will require electricity supply upgrades and, in some instances, uplift from a low voltage network to high voltages. Upgrade works may be required at both the customer site (such as main switchboards and customer specific transformers) and the shared network level (such as feeders and community transformers and switching stations). In the short term, all sites will experience at least a 4 per cent increase to their maximum demand vs FY22.

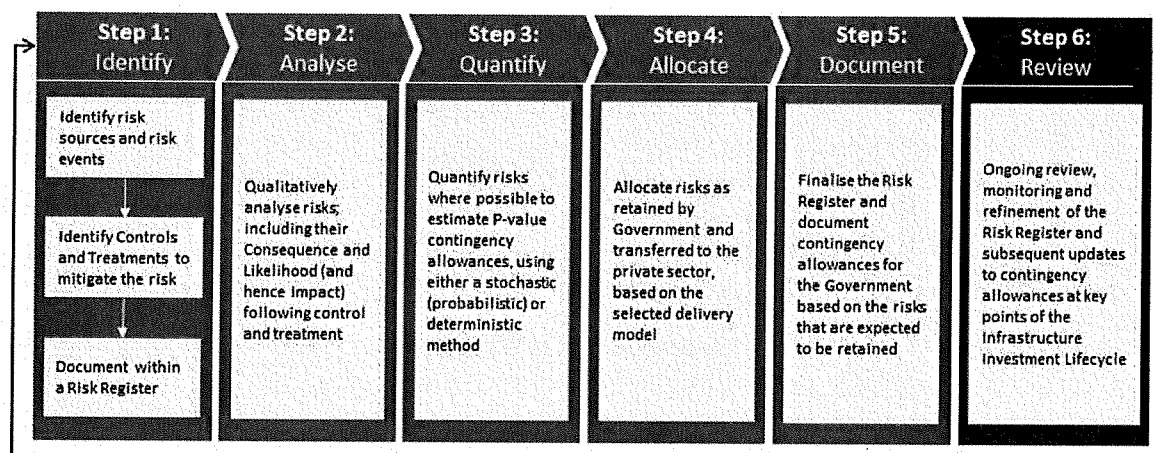


9 Risk Analysis

9.1 Risk Analysis Process

The ACT Capital Framework outlines a six-step risk analysis process as outlined in Figure 36.

Figure 36 – Capital Framework Risk Assessment Process



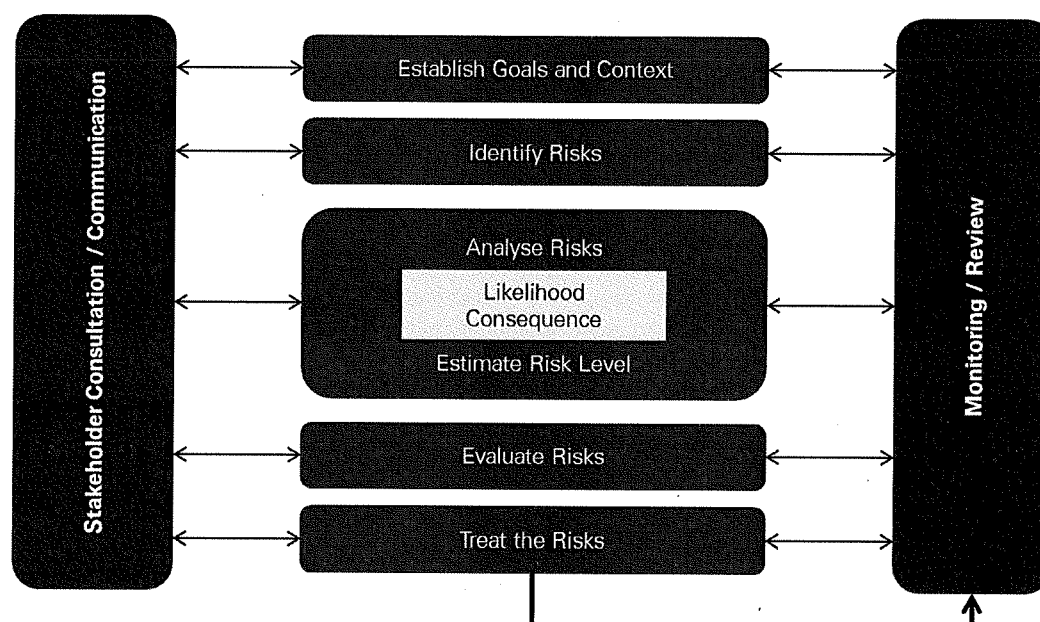
Step 4 was not undertaken as part of this business case as it will need to be determined as further procurement planning is undertaken for the Program.

9.2 Risk Assessment

A comprehensive risk assessment was undertaken in accordance with the ACT Government Risk Management Framework and the Australian/New Zealand Standard *AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines*.

Figure 37 summarises the risk management process undertaken for the Program.

Figure 37 – Risk Management Process



Source: ACT Government Risk Management Framework and the Australian / New Zealand Standard *AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines*.

The process for identifying and managing risks includes:

- **Risk Identification** – identifying the Program risks in consultation with key stakeholders;
- **Escalation** – risks are escalated (where required) through the Program governance structures for direction and/or resolution; and
- **Risk reviews** – regular risk reviews are to be undertaken with relevant stakeholders and consultants as the Program progresses.

9.2.1 Risk Workshops

Two risk workshops were undertaken on 8 February 2023 and 15 February 2023 to identify, assess, and mitigate risks associated with the Program (Risk Workshops). The Risk Workshops included representatives from EPSDD, ACT Education, IFR (Treasury), FABG (Treasury), MPC, OFC and KPMG. The workshop stakeholder group identified major Program and process risks, along with the measures and treatments to mitigate these risks. The output of the Risk Workshops is the Program Risk Register which is set out at [Appendix C – Program Risk Register](#).

9.2.2 Approach to Program Risk Assessment

The ACT Government Capital Framework requires:

'For Programs, the Project Team must undertake the risk analysis process documented in these Guidelines for the full Program, including the development of a Risk Register. The Project Team should discuss the method to develop contingency allowances for the Program and Precinct with MPC, FABG and IFR.'

At the Risk Workshop the approach to contingency, risk identification and risk assessment for the Program was discussed with representatives of MPC, FABG and IFR. It was agreed that:

- the typical approach to sizing contingencies in accordance with the ACT Government's Capital Framework is to estimate contingency based on quantification of individual project risk probabilities and impacts [REDACTED] This approach to the current Program is unlikely to be appropriate as:
 - the exercise of rating, estimating probability and range of impacts would be nearly impossible given the number of projects, moving parts and uncertainties at this stage in the Program development; and
 - undertaking Project risk registers and extrapolating these contingencies to other projects or to a Program level would be inappropriate given the diversity of projects and the level of detail currently available for each project.

9.2.3 Risk dashboard

Figure 38 shows the risks identified at the Risk Workshops and their ratings.



Figure 38 - Risk categories and ratings



9.3 Key Program Risks

Several important Program risks were identified at the risk workshop as set out in [Appendix C – Program Risk Register](#). Table 29 describes the key Program risks that were rated High or Extreme at the Risk Workshops and the proposed mitigations. Details of other medium and low rated risks are available in the [Appendix C – Program Risk Register](#).

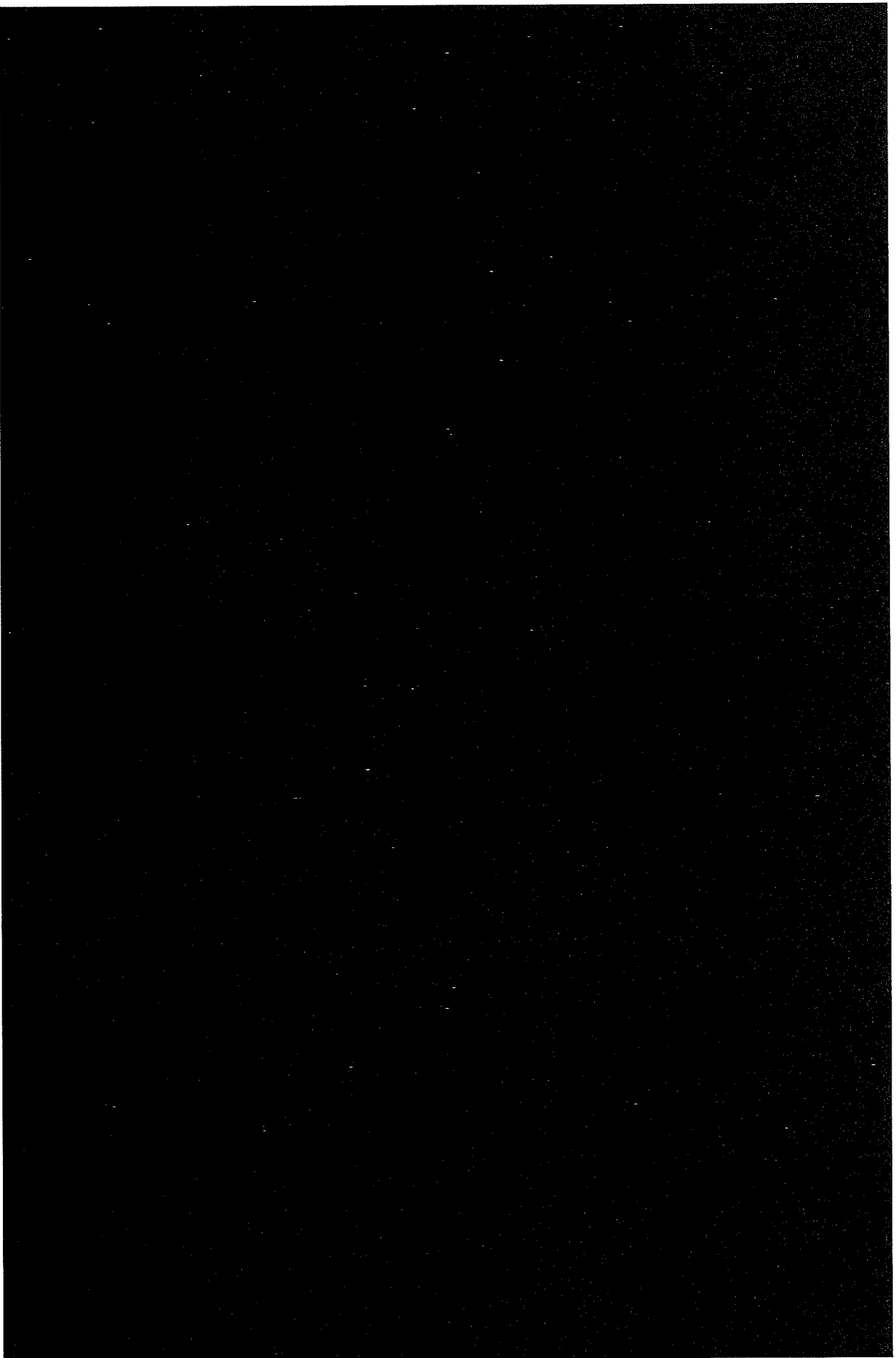
The risk analysis carried out has not identified any impediments that would prevent the program from proceeding. The Program risks were considered as part of the delivery model assessment outlined in Section 10.

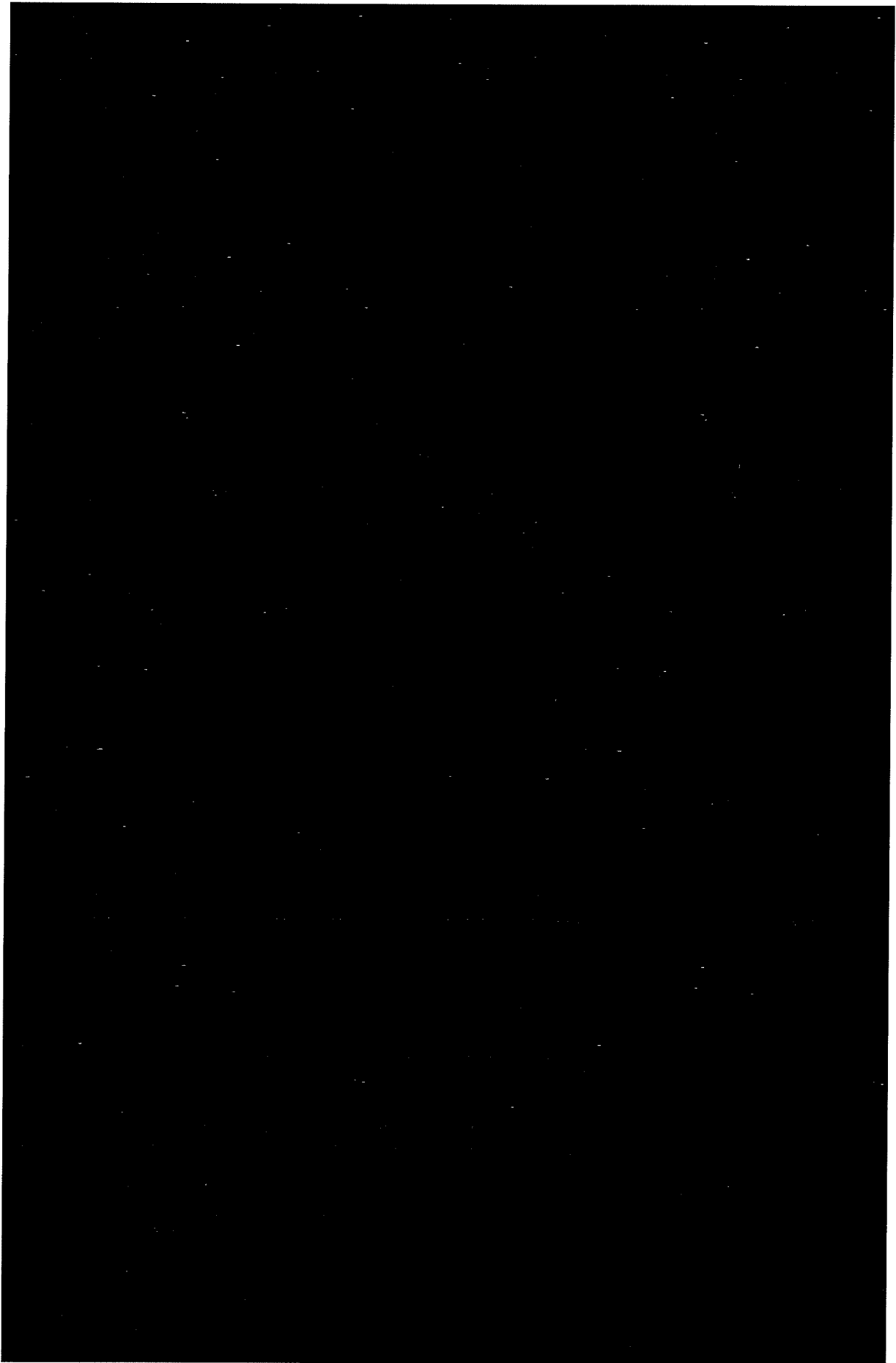
Table 29 – Key Program Risks



⁵¹ Risk Ratings are post-mitigations.









10 Delivery Model Analysis

A delivery model workshop was undertaken on 24 February 2023 with representatives from MPC, EPSDD and KPMG to discuss potential approaches to deliver the Program. This section outlines summarises the outcomes of that workshop including:

- the applicability of the delivery models outlined in the ACT Capital Framework;
- the need to develop a bespoke 'Program' delivery model, which is likely to involve ACT Government engaging a private sector partner to assist with the planning, procurement, contracting and delivery of the Program (PDP);
- the need for additional private sector support to deliver specific aspects of the Program, under an approach that maximises competition and economies of scale, is flexible and can be adapted to specific project elements to drive the optimal Value for Money solution for the Territory; and
- the allocation of responsibilities between the ACT Government and the private sector partner(s).

10.1 Applicability of Capital Framework Delivery Models

The ACT Capital Framework identifies 16 delivery models that are typically used to deliver ACT Government capital works projects. The Workshop team reviewed the applicability of these models and concluded that 12 of the 16 models are not relevant to delivery of a Program as they are only suitable as Project delivery models. The remaining four delivery models as per the Capital Framework could be used for the engagement of the private sector partner as outlined in Table 30.

Table 30 – Capital Framework Delivery Models

Component	Description	Use / Application
Managing Contractor	• ACT Government appoints a managing contractor (MC) who engages subcontractors to deliver the works. The MC is responsible for administering these subcontracts and accepts some delivery risk. • ACT Government and the MC generally negotiate a fixed management fee, plus reimbursement of subcontractor fees. • The MC may also receive incentive payments. • The MC is engaged early in the process to manage the scope definition, design documentation and construction of the works.	• Flexibility to manage design, risk, and scope. • Early engagement of contractor for project. • High visibility of subcontractor pricing.
Project Management Agreement	• Flexible delivery model allowing ACT Government to source a Project Manager (without design or detailed scope) from a panel to deliver a range of services from design and construction to construction only. • The Project Manager is the principal contractor and competitively engages and manages sub-contractors, suppliers, and consultants. • The Project Manager is required to deliver the scope of works within the nominated time and budget under an open book arrangement, receiving fixed payments for on-site and off-site costs.	• Suited to works where limited scope or potential future scope changes due to design refinement are likely. • Provides opportunity for early engagement of Project Manager to potentially fast-track commencement of the program of works. • Projects for delivery under the Panel have an upper limit budget of \$5 million which may limit the use of this of this model in this context.
Construction Management	• ACT Government engages a Construction Manager (or Program Manager) as its agent to manage the program of works. • ACT Government prepares the scope and engages the designers and contractors directly.	• Suited to projects where ACT Government needs to retain more control of the project and design. • Generally suited to lower value projects with significant scope uncertainty.

Component	Description	Use / Application
	Under this model, ACT Government bears substantial project risks (incl. price risk) as the Construction Manager typically does not bear any project risks.	- ACT Government needs to contract out project management. - Provides additional flexibility during delivery to manage uncertain risks.
Delivery Partner	- ACT Government engages a Delivery Partner to assist in project planning, programming, design management and construction management, typically for a Program of projects, in return for a management fee. - Generally, ACT Government precludes the Delivery Partner from performing design and construction work for projects, requiring it to tender them competitively and to engage contractors directly. - The model may have an incentive or 'gain-share, pain-share' structure based on target costs and completion dates, and on quality measures. - Lower cost and time certainty at the time ACT Government engages Delivery Partner.	- Suited to large programs of work, or projects with multiple works packages. - ACT Government is willing to manage integration and other risks to achieve time outcomes. - Ability to manage large programs or projects where time constraints apply, and project scope is not sufficiently well defined.

10.2 Need to Develop a Bespoke Delivery Model

During the delivery model workshop the suitability of each of the above models was discussed. While it was agreed that the above models were more applicable to a 'Capital Works' Project, it was considered that it would be possible to adapt the identified models to deliver a 'Program' of works. However, it is likely that a reasonable degree of changes would be required to adjust the project documentation to reflect the specifics of any 'capital works' delivery model to reflect the specifics of delivering a 'Program'. It was agreed that further work would be necessary to articulate the 'Program Scope' that would be delivered by the private sector partner and that it may be possible to draw on elements of the different delivery models to tailor a bespoke approach for the Program.

For the delivery model workshop discussion, it was agreed that a private sector partner would be required to support the ACT Government in delivering the program. While noting that the delivery model would likely be a 'bespoke' model, it was determined that the term 'Program Delivery Partner' (Program Delivery Partner or PDP) broadly reflected the support that would be required.

Consistent with any major Project (or Program), it is commonplace that the ACT Government Project Team would work closely with its Private Sector partners. This was noted by MPC who identified that they would need team members with the relevant skills and experience to work for/with MPC to assist with the planning, coordination, procurement, contracting and delivery of the Program. It is intended that the PDP would support MPC in delivering the Program.

It was agreed that further work would be required to determine the preferred contract form and commercial terms (i.e., payment mechanism, risk allocation, etc) for the PDP. It is anticipated that due to the level of uncertainty that the PDP arrangement may need to be on a time and materials basis (or some other form of non-fixed fee arrangement). Engaging a private sector partner is similar to how other programs have been delivered both in the ACT and other jurisdictions.

It is anticipated that an agreement with a PDP would not be for the full term of the Program and potentially only two to five years. This would provide the ACT Government with the opportunity to change approach throughout the Program and potentially undertake more of the work internally as the Program Team upskills.

10.3 Allocation of Responsibilities

It was also noted that the PDP may be restricted from delivering certain elements of the Program, with the PDP responsible for procuring other private sectors partners to deliver those elements. The workshop participants discussed the various elements of the Program and how they are best allocated between the ACT Government, PDP and other private sector organisations. The specific components are outlined in Table 31.

Table 31 – Project Components

Component	Description
Project Scoping⁵²	- Determination and assessment of specific assets for replacement, including identification of relevant technologies to be implemented as part of replacement works. - Determination of which works could be “packaged” together to create delivery and cost efficiencies.
Project Management	Management of the Program, including scoping / design, asset procurement and delivery of the works.
Procurement of PDP	Procuring and engagement of a PDP.
Procurement of Contractors	Procuring and engagement of various contractors (e.g., for the Design Works, Equipment Supply, Replacement Works etc) as outlined below.
Design Works	Design work to determine the specific design of the individual works (i.e., installation and construction works).
Equipment Supplier	Procurement of zero-emissions technologies to replace the existing gas assets.
Replacement Works	Delivery of replacement works, including installation and construction works. It is noted that a variety of works (scale and complexity) will need to occur.
Commissioning	Commissioning of new assets to test and verify function according to design and specification.

High-level commentary is provided for each component, but further work would be required to optimise how each component could be structured. For example, for the Supply of Equipment/Technology component the commentary provides some options as to how this component could be structured (i.e., via a panel arrangement or multiple single or bundled procurements). It is anticipated that the PDP would be provided with sufficient flexibility to optimise the approach to deliver the optimal value for money for the ACT Government.

Table 32 summarises the discussion of the expected allocation of the various project elements between the ACT Government, PDP and other private sector entities.

⁵² This section considers delivery of the replacement works of the Program. A discussion of the asset investigations required to support development of an accurate and consistent dataset and project scoping is set out in Section 16.2.



Table 32 – Allocation of Project Components

Component	ACT Government	Program Delivery Partner (PDP)	Contractor	Technology Supplier	Independent Commissioning Body	Commentary
Project Scoping	Oversight	Responsible				The PDP would be responsible for scoping out the project elements with oversight from the Program Team and input from other Directorates as required.
Project Management	Oversight	Responsible				The PDP would be responsible for the project management of the specific works packages with oversight from the Program Team and input from other Directorates as required.
Procurement of PDP / Commissioning Agent	Responsible					- MPC would be responsible for procuring a PDP / Commissioning Agent. - The specific scope, contract form and risk allocation will need to be determined prior to undertaking a procurement process.
Procurement of Contractors	Oversight	Responsible				- The PDP would be responsible for the procurement of contractors to undertake the necessary work with oversight from the Program Team. - The PDP (or MPC) could establish panel arrangements to streamline this process and ensure that the suppliers are appropriate / meet the ACT Government's requirements.
Design Works	Oversight	Responsible				- The PDP would be responsible for scoping out the project elements with oversight from the Program Team and input from other Directorates as required. - The extent of the Design Works may differ on a project by project basis, with potentially some of the Design Work being finalised by the Replacement Works contractor(s).
Supply of Equipment / Technology	Oversight	Oversight		Responsible		- The specific technology will be provided by technology suppliers. - The PDP or MPC could establish panel arrangements to streamline this process and ensure that the suppliers are appropriate / meet the ACT Government's requirements.
Replacement Works		Oversight	Responsible			- The replacement works would be undertaken by appropriately qualified contractors. - The PDP would enter contracts with the contractors.
Commissioning	Oversight		Responsible		Responsible	- The commissioning would be undertaken by the contractor to the satisfaction of an independent commissioning agent. - An independent commissioning agent on behalf of the ACT Government would review the commissioning process and outputs.

The structure being proposed has the following key benefits to the ACT Government:

- the PDP would bring expertise in the delivery of large scale programs to complement and augment the existing ACT Government skillset and experience. This model allows the ACT Government to take on a larger role in delivery overtime as it develops the necessary skills and expertise in house;
- it provides an opportunity to tailor the delivery of individual projects or packages, or work based on key characteristics on a best for program basis. For example, packaging several schools, projects together where it makes sense to do so while also being able enter bespoke arrangements for complex projects such as Canberra Hospital;
- it allows cost competition from contractors who are tendering for specific packages of work. Some of which may be on fixed price arrangements providing the Territory with a level of cost certainty; and
- it provides the opportunity for either the PDP or the ACT Government to leverage economies of scale in the purchase of equipment through either panel arrangements or through large scale orders (where it makes sense to do so).

10.4 Program Delivery Precedents

Table 33 outlines a number of recent and similar infrastructure programs to assist with informing the delivery model shortlisting and assessment.

Table 33 – Program Delivery Precedents

Project	Description	Delivery Model
ACT Healthy Waterways	ACT Healthy Waterways is an ACT Government initiative to improve the quality of water entering our lakes and waterways and flowing downstream into the Murrumbidgee River system. The project includes the construction of infrastructure, such as wetlands, ponds and rain gardens.	• Managing Contractor
ACT Cladding Program	In response to the challenges faced by apartment building owners to address combustible cladding, ACT Government developed a scheme in which owners can access financial and practical assistance to have building cladding assessed and appropriately remediated.	• PMA (i.e. MC model as well as GC21 (D&C))
Loose-fill Asbestos Eradication Scheme	The Asbestos Response Taskforce was established in June 2014 to deliver a coordinated response to assist homeowners and their families directly affected by the legacy of loose fill asbestos ('Mr Fluffy') insulation in the ACT. The program delivered financial assistance for resident owners and tenants of affected homes, including the financial assistance for emergency accommodation, the facilitation of asbestos assessments and subsequent demolition of affected houses.	• Specialised Taskforce set up and used a bespoke panel arrangement of consultants and Principal Contractors
NSW Government's Woolgoolga to Ballina Pacific Highway upgrade	The project involves the duplication of approximately 155 kilometres of road to a four-lane divided road on the Pacific Highway. The upgrade will begin 6 kilometres north of Woolgoolga and end approximately 6 kilometres south of Ballina.	• Delivery Partner
Easing Sydney's Congestion Problem	The NSW Government is undertaking a major infrastructure program to fix 'pinch points' across Sydney's road network to reduce traffic delays, manage congestion and improve travel times.	• Delivery Partner



10.5 Delivery Strategy

10.5.1 Develop Tailored Delivery Strategy

A key driver of success for the Program to be delivered on schedule and within budget is ensuring the Program is delivered efficiently. Given the high volume and ambitious time frames, a tailored delivery strategy will need to be developed prior to ramping up the delivery of the Program of Works. As noted above further work will be required to tailor a quality delivery strategy for the Program once further information is available and the Program Team is established.

The Program delivery strategy will need to consider the following:

- **Packaging of projects:** considering the assets/sites that could be packaged together for the Program of Works;
- **Procurement/contract model:** considering the appropriate procurement/contract model for the Program of Works;
- **Equipment purchasing:** consider whether there is any benefit in bulk buying equipment directly from equipment suppliers such as reducing lead time, leveraging buying power) and how this might affect risk allocation of the asset replacement works;
- **Market capability and capacity:** taking into account the outcome of the market soundings in relation to market capacity to deliver the Program of Works; and
- **Diverse projects:** considering whether a one-size-fits-all approach will work or whether differing delivery approaches may need to be adopted for different projects (for example groups of similar assets such as schools compared to larger and more complex projects such as the Canberra Hospital).

The delivery strategy will require input from multiple workstreams as discussed in the next sections.

10.5.2 Market Soundings

There remains uncertainty as to the market's capacity to deliver the Program of Works at the pace and scale as required to achieve the ACT Governments targets. The Risk Workshop noted that market capacity is a high risk to the Program and actions should be undertaken to engage with industry to understand market capacity.

To develop the delivery strategy, the Program Team may also wish to consider the benefits of undertaking a market sounding with:

- equipment suppliers to understand market capacity, lead times, implications of bulk buying and test technology selection;
- installers and electrical works contractors to understand market capacity for installation works; and
- construction managers and delivery partners to understand whether the capability, capacity and interests exists in the market to undertake the management of the Program on behalf of the ACT Government.

A market sounding process would involve targeted consultation with selected participants, such as existing providers in the ACT and NSW markets, to obtain market feedback on the Program delivery. The market sounding could be used to:

- develop an understanding of market capacity, constraints and opportunities in relation to delivery of the works;
- seek market feedback on the Program including identifying challenges and opportunities;
- test the market interest and views on the Program of Works and identify areas that could be optimised to increase market interest;
- optimising the structure of the delivery model and testing the commercial terms; and
- benefit from market experience and lessons learned from other recent relevant projects.

The outcomes of the market sounding can be used to feed into the delivery model strategy and the updates to the schedule for the Program discussed in Section 16.5.

11 Financial Analysis

This section outlines the financial analysis undertaken as part of this business case. This section is structured as follows:

- **Replacement capital costs:**
 - the approach, methodology and assumptions adopted to estimate the costs;
 - a summary of the overall capital costs for the three Programs of Works including escalation, contingency and ACT Government costs; and
 - a summary of the capital costs over the next four financial years (FY2023-24 to FY2026-27) including escalation, contingency and ACT Government costs.
- **Network upgrade costs:**
 - the approach, methodology and assumptions adopted to estimate the costs; and
 - a summary of the potential capital costs associated with necessary network upgrades a result of the Program.
- **Program development costs** – a summary of the cost estimates to undertake further program development activities.
- **Financial benefits** – a summary of the financial benefits from transitioning from gas to electric assets.
- **Budget funding summary** – a summary of the budget funding requested in this business case.

Unless stated otherwise costs included in this section are exclusive of GST.

A summary is included in [Appendix J – Business Costing Summary](#).

11.1 Replacement Capital Costs

Developing robust cost estimates requires a well-defined scope and delivery program. The specific works required at each site cannot be determined at this stage as detailed planning will be required prior to tendering each works package. For example, some sites may require significant works to enable both the removal of existing assets and installation of the new electric assets (e.g., demolition of existing walls, development of new plant rooms, or the extent of works required to upgrade electrical infrastructure, piping or distribution systems).

The approach adopted to develop the cost estimates for this business case has taken these factors into account. The approach and its limitations are discussed further below.

11.1.1 Approach and Methodology

To develop the capital cost estimates for the Program a cost model has been developed based on the three Program of Works summarised in section 7. The following data sources have been used as inputs into the cost estimates including:

- discussions and information provided by technology suppliers;
- industry cost benchmarks;
- industry reports and standards;
- site visits;
- site-specific audits previously undertaken; and
- publicly available information.

Noting the long-term nature of the Program, the inherent difficulties in estimating costs beyond a few years, and the issues noted in relation to the completeness of the information set, the cost estimation approach has been tailored for the Program of Works proposed to be undertaken in the next four years (short-term) and the Program of Works proposed beyond this period (medium to long-term). This approach provides a greater level of cost certainty for the short-term works while still providing an overall cost estimate for the Program.

It is important to note that the cost estimates outlined in this business case do not consider the avoided costs as a result of the Program (i.e., they do not provide an analysis of the incremental costs to the ACT Government of the Program by considering the costs if the gas assets were replaced with other gas assets on a like-for-like basis).

Short-Term

Cost estimates have been developed for the specific technology selected based on the process outlined in section 6 and assumptions outlined in Table 34. These costs are based on current pricing from technology providers which have been sought as part of this business case.

Noting the challenges developing robust cost estimates with uncertainties in relation to the extent of works at each site the approach used to develop the capital cost estimates has been to include a percentage allowance for upgrades and commissioning works and for the installation of new equipment and removal of redundant equipment. These percentage allocations are based on examples of similar types of projects and have been tailored depending on site information currently known (such as whether the boiler is a centralised unit or split unit, whether the plant room is located on the building roof, separate building or part of the main building, etc).

Further information in relation to these cost allocations is included in [Appendix G – Capital Cost Estimates](#).

[Appendix G – Capital Cost Estimates](#) provides further information about each of the cost categories and assumptions included within the capital cost estimates.

Medium to Long-Term

The approach adopted to determine a rough order of magnitude cost (ROM) estimate the technology replacement costs for the works beyond the initial four-year period involves extrapolating out the short-term cost estimates based on key site parameters such as:

- total installed capacity; and
- building typology and type of asset.

An allowance has also been included for cost escalation based on the timing of these works.

Unknown Asset Data

Where key baseline asset data such as quantity, type of asset, age and capacity are unknown, the cost estimates were based on cost averages from known assets, considering the type of asset and capacity (when known).

For example, the allowance for the replacement of an atmospheric boiler gas asset is calculated by using the average cost capacity cost (\$ per kW) times the capacity of the atmospheric boiler. When asset capacity or type are unknown, an average replacement cost has been calculated based on a dollar per unit.

11.1.2 Assumptions

The cost estimates in this business case have been developed based on several assumptions as outlined in Table 34.

Table 34 – Cost Estimation Approach and Assumptions

Cost Category	Description / Assumption
Plant CapEx	• This cost component includes the capital cost of the replacement technology and the main system components including: • the main heating plant (e.g., heat pumps, package units); • thermal energy storage tanks; • primary and secondary pumps; and • pipework and distribution systems. • This cost has been based on the assessment of available zero-emissions alternatives as outlined in section 6 and Appendix D. • The cost of the required capacity of the replacement plant is assumed to be equal to the existing capacity unless otherwise reported in the available audits. • The asset lists provided do not include data on the cooling system components present at each site. As such, the cost estimation approach is only applicable to heating system components and the upgrade of cooling components is considered as out of scope (e.g., chillers) for this business case. The ACT Government may wish to consider bringing gas cooling assets into the scope of the Program. Further work would be required to develop a detailed register of the gas cooling assets in ACT Government's buildings.



Cost Category	Description / Assumption
Upgrades & Commissioning	- This cost component includes: - the commissioning work to ensure that the systems and works have been designed, installed, tested, operated, and maintained according to the set requirements or standards; and - upgrades to the existing electrical infrastructure. Potential required infrastructure upgrades include may include adding new cabling, switchgear for new equipment, changing or upgrading main switchboards and/or distribution boards, upgrading fan coil units, air handling units or ducts. However, it is noted that it is not feasible to determine the age and condition of electrical infrastructure, piping or distribution systems for every site at this point. As such a percentage allocation has been included in the cost estimates for this work. The percentage allocations are based on examples of similar types of projects and have been tailored depending on site information currently known. - This cost component also includes the integration of the system into the current Building Management Systems (BMS). - For the purposes of developing the cost estimates it has been assumed that each building has a BMS or equivalent that could allow for the control of the plant heating equipment. For sites that do not currently have a BMS or similar system, it is recommended that options be considered to implement a control system to optimise the new replacement technology as part of the detailed design phase. Optimisation strategies include matching site occupancy to the systems' operating schedule or changing the setpoints depending on seasonal changes.
Installation of new plant & removal of redundant equipment	- This cost category includes the removal of old plant equipment such as gas boilers and associated electrical components, controls, flues, and piping. - This also includes the labour costs associated with the installation of elements, trenching, plant enclosures, lifting and craning, painting, building protection measures, service penetration and sealing. - Given the uncertainty in the specific works required to remove redundant plant and equipment at each site, a percentage allocation has been included to cover these works unless it is reasonable to assume that removal works are likely not to be required. The percentage allocations are based on examples of similar types of projects and have been tailored depending on site information currently known.
Preliminaries	- The preliminaries include the project costs associated with the contractor's general obligations, general facilities, and set up and running costs. - Preliminaries have been calculated as [REDACTED] of the sum of the plant capital costs, upgrades and commissioning costs and installation of new plant and removal of redundant equipment.
Project management costs	- The project management includes the costs associated with the pre-contract management including that of the designers and the management of the post-contract works including the management of the contractor and the management of the flow of information between the design team, contractor and client. - Project management fees have been calculated as [REDACTED] of sum of construction costs and professional fees.
Design fees	- The cost of undertaking design work in relation to the installation and capital works. - Design fees have been calculated as [REDACTED] of the construction costs plus project management costs.

Cost Category	Description / Assumption
Escalation	- The trade costs are based on January 2023 prices. - An allowance for cost escalation has been included in the cost estimates based on the three Programs of Work. - For the short-term programs escalation has been calculated on an annual basis. - Due to the uncertainty in relation to the specific timing of works over the medium to long-term escalation has been calculated to the midpoint of the respective periods. - It is noted that the construction market has been experiencing a period of significant cost escalation due to supply chain issues because of COVID-19 and the unrest in Europe as well as a very challenging construction market in Australia. However, due to the long-term nature of this Program it is expected that cost escalation will normalise over the life of the Program. - The escalation assumption used in developing the cost estimates is 5 per cent per annum for year 1 & 2 and 4 per cent for the remainder. This is based on the forecast cost escalation allowances from variety of sources including the Australian Institute of Quantity Surveyors Building Cost Index and a review of current market pressures.
Contingency Allowance	- In line with the Capital Framework a contingency allowance has been included to account for the uncertainty of unknown variables and risks. - The approach to determining the contingency allowance is outlined in section 11.1.3.
ACT Government Fees	- An allowance has been included for a number of internal ACT Government costs. These include: - MPC fees of 4 per cent to cover MPC's costs of managing the delivery of the Program; - Directorate fees of 4 per cent to cover internal Directorate costs; - ACTIA fees of 0.25 per cent to cover the Government's insurance costs; and - ACTGS fees of 0.1 per cent to cover Government Solicitor costs.

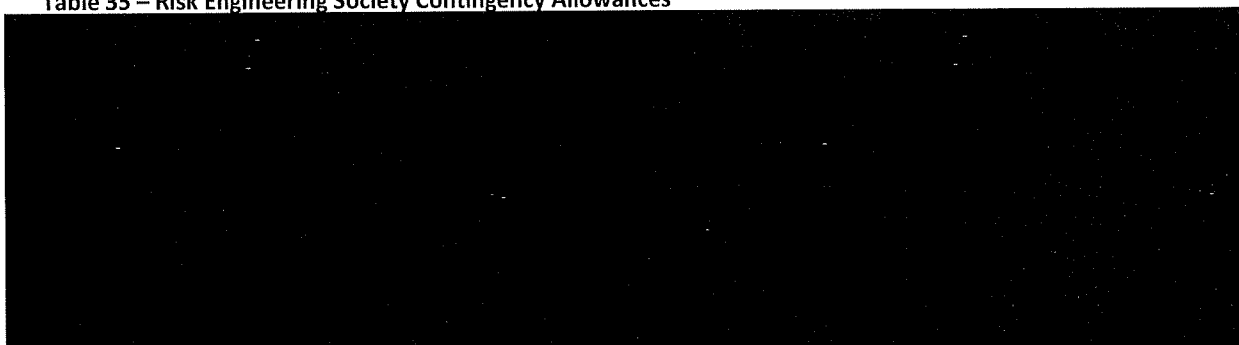
Source: Assumptions and approach agreed with EPSDD

11.1.3 Contingency

The approach set out in the Capital Framework for the quantification of contingency allowances for 'Tier 1' (and for 'Tier 2' projects that are not business-as-usual) involves undertaking a Monte Carlo analysis based on a bottom-up assessment of the project risks (a "stochastic approach"). While this approach is suitable for developing appropriate contingency allowances on a project basis, it is not appropriate when calculating a contingency allowance for a large program of works due to the diversity of projects within the Program. For example, this approach requires a detailed assessment of specific project risks such as site conditions, however, each of the 215 buildings/sites as part of this program will have unique constraints and issues.

Noting the above, the approach adopted to develop a contingency allowance for the Program is to base it on contingency allowance estimates developed by the Risk Engineering Society (**RES**). Table 35 shows the RES guidance contingency allowances at different stages of project maturity.

Table 35 – Risk Engineering Society Contingency Allowances



The Program is still in the early phase of planning and development and there is still a lot of uncertainty around the specific solutions required for each site.

As the Program begins to be rolled out and after further investigations and analysis has been undertaken it is expected that level of contingency applied to future cost estimates may be reduced.



11.1.4 Overall Program Cost Estimate

Table 36 outlines a rough order of magnitude (ROM) cost estimate for the Program excluding any Government fees and costs and any costs associated with network upgrades. It is important to note that the cost estimates have been developed in line with the approach outlined earlier in this section and that the Program cost estimates will need to be updated on a periodic basis as it will be impacted by actual cost inflation, updated asset data collected during site inspections and changes in technology over the Program duration.

Table 36 – Overall Program Cost Estimate (Nominal Costs \$'m)

ACT Gov Fees			
MPC fee (4%)	44.98	45.04	45.16
Other Directorate costs (4%) ²	44.98	45.04	45.16
ACTIA costs (0.25%)	2.81	2.81	2.82
ACTGS costs (0.10%)	1.12	1.13	1.13
ACT Gov Fees (B)	93.90	94.02	94.28
Total (A + B)	1,218.41	1,219.97	1,223.36

Source: KPMG Analysis

Note 1: PM Fees calculated as  of Risk Adjusted Real Capital Costs + Design Fees

Note 2: While it is anticipated that MPC will lead the delivery of the Program it will still require involvement with the Directorates who are responsible for the buildings to ensure they are managed to minimise the impact on Government operations. It was flagged during a number of workshops that the Directorates currently do not have enough resourcing to manage the scale of the works. Other Directorate costs covers the additional resourcing for these Directorates.

Note 3: Totals may differ due to rounding

11.1.5 Estimated Capital Cost (Tranche 1)

A more detailed cost estimate was developed for the works proposed over the forward estimates (FY2023/24 to FY2026/27). The costs for Program A are summarised in Table 37 with costs by asset in [Appendix E – Indicative Program of Works](#) and further details in [Appendix G – Capital Cost Estimates](#).

Table 37 – Tranche 1 Estimated Capital Costs (\$'million) (Program A)

ACT Gov Fees					
MPC fee (4%)	1.53	2.72	3.13	4.81	12.18
Other Directorate costs (4%) ²	1.53	2.72	3.13	4.81	12.18
ACTIA costs (0.25%)	0.10	0.17	0.20	0.30	0.76
ACTGS costs (0.10%)	0.04	0.07	0.08	0.12	0.30
ACT Gov Fees (B)	3.19	5.68	6.53	10.04	25.43
Total (A + B)	42.75	77.37	90.38	136.74	347.24

Source: KPMG Analysis

Note 1: PM Fees calculated as  of Risk Adjusted Real Capital Costs + Design Fees

Note 2: While it is anticipated that MPC will lead the delivery of the Program it will still require involvement with the Directorates who are responsible for the buildings to ensure they are managed to minimise the impact on Government operations. It was flagged during a number of workshops that the Directorates currently do not have enough resourcing to manage the scale of the works. Other Directorate costs covers the additional resourcing for these Directorates.

Note 3: Totals may differ due to rounding

The costs for Program B are summarised in Table 39, with further detail provided in [Appendix G – Capital Cost Estimates](#).

Table 38 – Tranche 1 Estimated Capital Costs (\$'million) (Program B)

ACT Gov Fees					
MPC fee (4%)	1.53	3.02	3.01	2.80	10.36
Other Directorate costs (4%) ²	1.53	3.02	3.01	2.80	10.36
ACTIA costs (0.25%)	0.10	0.19	0.19	0.18	0.65
ACTGS costs (0.10%)	0.04	0.08	0.08	0.07	0.26

Cost item	2023-24	2024-25	2025-26	2026-27	Total
ACT Gov Fees (B)	3.19	6.31	6.29	5.85	21.63
Total (A + B)	42.75	85.12	87.22	79.29	294.38
Source: KPMG Analysis Note 1: PM Fees calculated as ■ of Risk Adjusted Real Capital Costs + Design Fees Note 2: While it is anticipated that MPC will lead the delivery of the Program it will still require involvement with the Directorates who are responsible for the buildings to ensure they are managed to minimise the impact on Government operations. It was flagged during a number of workshops that the Directorates currently do not have enough resourcing to manage the scale of the works. Other Directorate costs covers the additional resourcing for these Directorates. Note 3: Totals may differ due to rounding					

The costs for Program C are summarised in Table 39, with further detail provided in [Appendix G – Capital Cost Estimates](#).

Table 39 – Tranche 1 Estimated Capital Costs (\$'million) (Program C, preferred)

ACT Gov Fees					
MPC fee (4%)	0.36	3.02	3.84	3.27	10.49
Other Directorate costs (4%) ²	0.36	3.02	3.84	3.27	10.49
ACTIA costs (0.25%)	0.02	0.19	0.24	0.20	0.66
ACTGS costs (0.10%)	0.01	0.08	0.10	0.08	0.26
ACT Gov Fees (B)	0.75	6.31	8.02	6.82	21.89
Total (A + B)	11.12	85.13	109.64	91.90	297.79
Source: KPMG Analysis Note 1: PM Fees calculated as ■ of Risk Adjusted Real Capital Costs + Design Fees Note 2: While it is anticipated that MPC will lead the delivery of the Program it will still require involvement with the Directorates who are responsible for the buildings to ensure they are managed to minimise the impact on Government operations. It was flagged during a number of workshops that the Directorates currently do not have enough resourcing to manage the scale of the works. Other Directorate costs covers the additional resourcing for these Directorates. Note 3: Totals may differ due to rounding					

11.1.6 Sensitivity Analysis

As noted in section 6.4 the technology solutions assumed for the purposes of this business case use natural refrigerants which are typically more expensive in terms of plant capital costs (in the range of 30 per cent to 50 per cent). Table 40 includes a sensitivity analysis showing the cost impact of a 50 per cent reduction in plant capital costs for Program A and Program B.

Table 40 – Sensitivity Analysis

ACT Gov Fees			
MPC fee (4%)	34.20	34.61	34.61
Other Directorate costs (4%) ²	34.20	34.61	34.61
ACTIA costs (0.25%)	2.14	2.16	2.16
ACTGS costs (0.10%)	0.85	0.87	0.87
ACT Gov Fees (B)	71.39	72.24	72.24
Total (A + B)	926.32	937.40	940.23
<i>Source: KPMG Analysis</i> <i>Note 1: PM Fees calculated as [REDACTED] of Risk Adjusted Real Capital Costs + Design Fees.</i> <i>Note 2: While it is anticipated that MPC will lead the delivery of the Program it will still require involvement with the Directorates who are responsible for the buildings to ensure they are managed to minimise the impact on Government operations. It was flagged during a number of workshops that the Directorates currently do not have enough resourcing to manage the scale of the works. Other Directorate costs covers the additional resourcing for these Directorates.</i> <i>Note 3: Totals may differ due to rounding</i>			

11.2 Electrical Network Upgrade Costs

11.2.1 Approach and Methodology

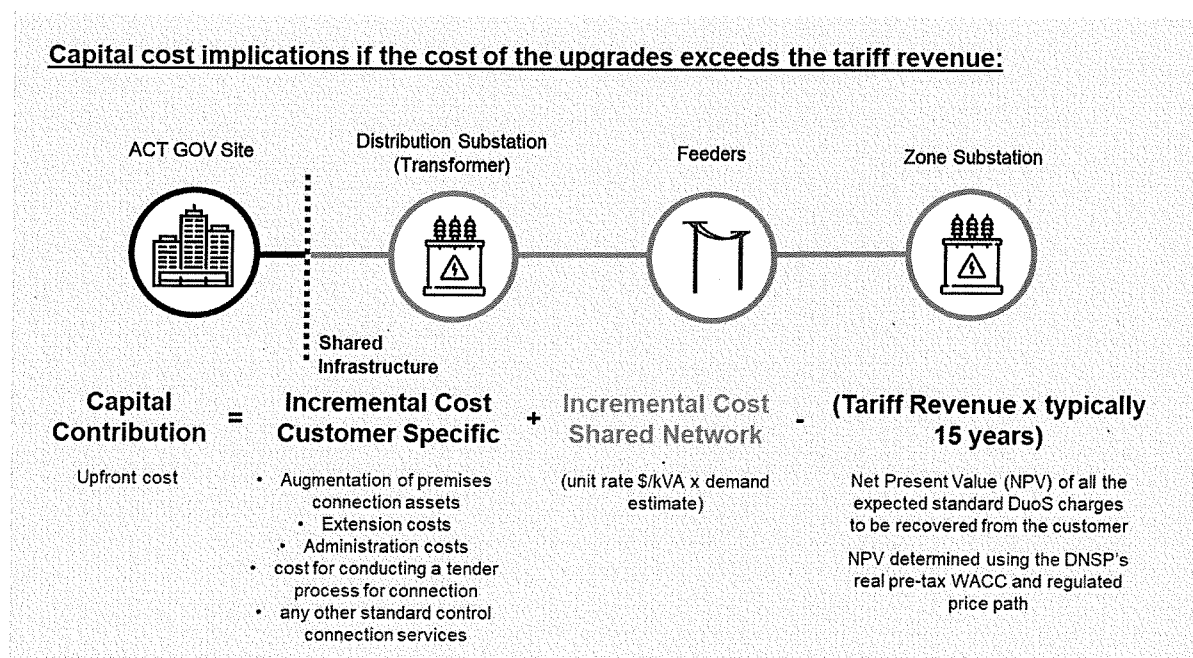
Whilst the overall forecast increased load from the electrification program accounts only for a ~1.2 per cent increase in total annual ACT electricity usage (current total ACT annual usage ~2,800GWh, the annual increase from the Program is ~34GWh⁵³), parts of the network are constrained and may not have enough capacity to cater for the increased electrical load because of the Program (and other ACT Government electrification initiatives). Network upgrades may therefore be required in certain areas to accommodate the increased electrical load and as a result the ACT Government may have to pay capital contributions to Evoenergy to make the necessary network upgrades.

⁵³ Evoenergy (2023). "Regulatory Proposal". Retrieved from https://www.evoenergy.com.au/-/media/evoenergy/documents/electricity-five-year-plan/evoenergy-regulatory-proposal-january-2023_public.pdf?la=en&hash=D496F73884C6CF45E1FE222BF3C65232DF0FD0D7



Network cost impacts are determined by Evoenergy and can be negotiated for large consuming locations. For this business case, a high-level estimate of the cost to ACT Government is based on FY22 load data and publicly available information from the AER and Evoenergy. The methodology is outlined in Figure 39.

Figure 39 - Capital contributions equation



- Estimate the load and consumption to determine the implications the electrification works will have at the relevant substation.
- A zone substation capacity check was also performed to determine any required transmission replacements on the network. If the zone substation transmission replacement is required – this would either necessitate an uprating of transformers or installation of a third transformer of equal capacity (provided there is sufficient space).
- Using these new loads, we can use the incremental cost revenue test (Evoenergy Connections Policy Attachment B included in [Appendix H – Evoenergy Connections Policy](#)) to see how much if any capital contributions will need to be made. If the cost of the upgrades exceeds the tariff revenue, there will be upfront capital contribution costs based on the formulas in Figure 39 and the information contained in Table 41. Where the cost of the upgrades does not exceed the tariff revenue, no additional capital contribution will be required from the ACT Government.

Table 41 – Upstream augmentation (per KVA of capacity)⁵⁴ used to calculate the incremental cost shared network (ICSN)

Code	Category	Unit	Cost (excl GST)	Cost (incl GST)
585	HV Feeder	\$/kVA	\$41.68	\$45.85
586	Distribution substation	\$/kVA	\$24.14	\$26.55

Table 42 summarises the Network Upgrade Costs that may be payable by ACT Government (for the short-term works) as a result of the Program A and Program B works increasing the electrical demand. It should be noted that the actual costs of any network upgrades will have to be negotiated with Evoenergy. It will be important for ACT Government to negotiate any capital contribution amounts in the context of other network upgrades being undertaken. Figure 40 shows most upgrades will be required as a result of electrifying public schools.

⁵⁴ Evoenergy (2022). Schedule of electricity network charges 2022/23. Retrieved from <https://www.evoenergy.com.au/-/media/evoenergy/documents/electricity/evoenergy-electricity-schedule-of-charges-2022-23.pdf?la=en&hash=8AC305508DBCEE9958F7D55F0BE6464A1B5C401D>



Table 42 – Network Upgrade (Nominal \$'million)

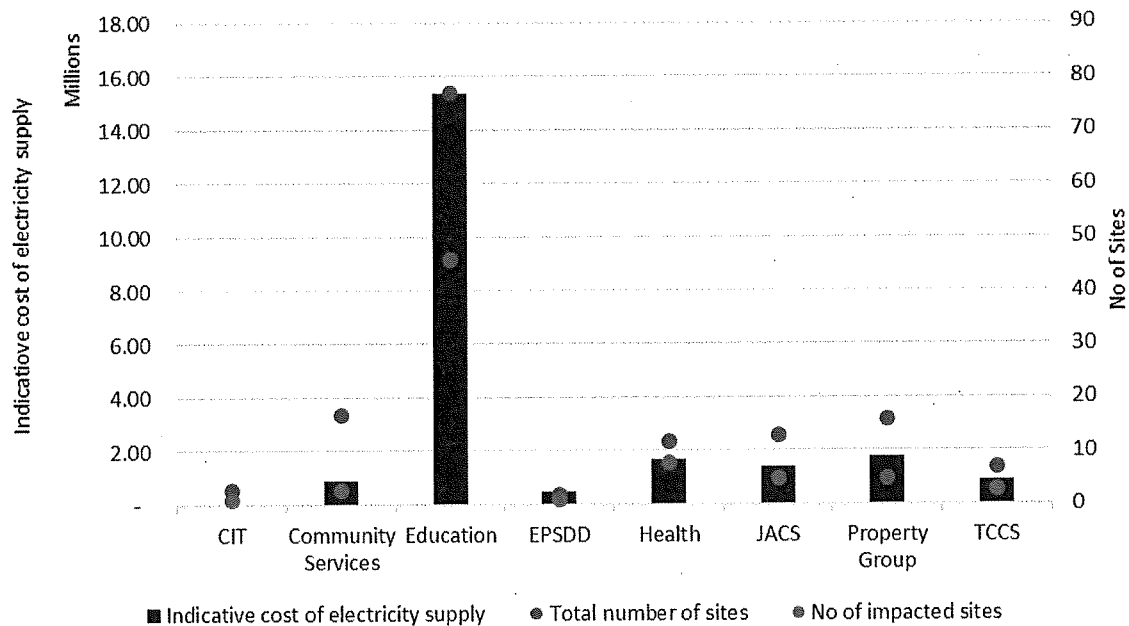
	2023-24	2024-25	2025-26	2026-27	Total
Program A	1.40	3.70	5.60	6.50	17.20
Program B	1.40	3.30	5.60	3.40	13.70

Source: Network modelling and approach outlined in section

Note 1: Totals may differ due to rounding

Note 2: The network modelling was not re-run for Program C due to the time constraints of completing the business case and as there would be minimal difference when compared to Program B

Figure 40 – Tranche 1 cost of electrical supply upgrades and number of impacted sites by Directorate



11.3 Program Development Costs

Table 43 summarises the Project Development Costs that are required to undertake further planning and due diligence for the Program. These activities are outlined further in section 15 and section 16. It is important to note that the costs below are estimates to cover some of the project development activities that are required over the next four years. As noted in section 16, undertaking the necessary program development activities will ensure that the Program is set up for success to achieve the 2040 target date.

Table 43 – Project Development Costs (Nominal \$'million)

Cost item	2023-24	2024-25	2025-26	2026-27	Total
Site / Asset Investigations	2.00	1.00	0.50	0.30	3.80
Development of Procurement Strategy	0.50	0.30	-	-	0.80
Updating Program of Works	0.30	0.20	-	-	0.50
Updates to Business Cases	0.50	0.50	0.40	0.40	1.80
Dedicated Evoenergy Resource ¹	0.30	0.50	0.50	0.50	1.80
Legal and Comms Advisors	0.25	0.50	0.50	0.50	1.75
Probity Advisor	0.10	0.20	0.20	0.20	0.70
Worksafe Costs	0.10	0.20	0.20	0.20	0.70



Cost item	2023-24	2024-25	2025-26	2026-27	Total
PDP ²	-	3.02	3.84	3.27	10.13
Total	4.05	6.42	6.14	5.37	21.98

Source: Internal funding allocation estimate. Evoenergy resourcing cost provided by Evoenergy

Note 1: Cost estimate provided by Evoenergy

Note 2: PDP cost estimates are based on 4% of the reprofiled capital costs. No cost for a PDP has been included for 2023-24 as any works undertaken during this year would be managed by MPC and learnings from this would inform the future delivery approach including whether to engage a PDP.

Note 3: Totals may differ due to rounding

11.4 Resourcing Costs

This business case represents a significant step forward in the ACT Government's commitment to a Zero Emissions Government by 2040. The EPSDD Zero Emissions Government (ZEG) team is funded under the 2019-20 budget for the ACT Climate Change Strategy, which will expire at the end of 2022-23. Under the Zero Emissions Government Framework, the ZEG program requires an extension to existing roles to support the 'electrification of government gas assets' program, and to aid monitoring and reporting of progress towards the 2040 zero emissions. Another essential role is the management of the data through the Enterprise Sustainability Platform (ESP), which is a central online platform used by all Directorates for the collection, analysis and reporting of electricity, gas, water and fleet fuel consumption, greenhouse gas emission data and the associated utility costs.

These ZEG roles have existing permanent officers engaged and ongoing funding is recommended due to the *Zero Emissions in Government Operations Program* end date of 2040. This business case seeks the continuation of five existing staff in the ZEG program team. The required staff were established under the initiative Leading the next phase of action towards a zero-emission future – ACT Climate Change Strategy 2019-2025 and Canberra's Living Infrastructure Plan:

- 1x SOGB Director
 - lead the team responsible for the implementation of the Zero Emissions Government Framework and meeting Government's zero emissions by 2040 target.
 - oversees the Enterprise Sustainability Platform (ESP), a centrally managed online platform used by all Directorates for the collection, analysis and reporting of electricity, gas, water and fleet fuel consumption, greenhouse gas emission data and the associated utility costs.
 - responsible for managing the ongoing Sustainable Schools, Community Zero Emissions, Garden Grants and Community Partnerships programs three SOGC Energy Project Officers:
- 3x Energy Project Officers (EPOs)
 - are critical to the delivery of the ZEG emissions reduction targets and interpreting data –including analysis, monitoring, and reporting to support energy efficiency and tracking performance of Directorates.
 - responsible for the technical advice, acting as conduit to all 9 Directorates, covering more than 600 Government buildings, including technical and procurement advice on asset upgrades, particularly in situations where gas assets fail unexpectedly.
 - investigate and promote technical and process innovations with Directorate partners and are currently developing options for the introduction of zero emission refrigerant technologies in government sites. Refrigerants are a key remaining source of ACT Government and Territory emissions.
- 1x ASO5 ZEG Project Officer
 - coordinates ACT Government emissions reporting in Directorate annual reports and Minister's Annual Report under the Climate Change and Greenhouse Gas Reduction Act.
 - Secretariat of the Zero Emissions Government Implementation Committee, the central forum to identify opportunities, barriers, and solutions to achieving a zero emissions government
 - manages the ZEG Fund loan and coordinated case study development sharing ACT Government experiences in its own electrification process with local community and industry.

For note: the ZEG Loan Fund will be updated to complement the electrification program. Currently the Fund is focussed on gas replacement projects. However, with the electrification program in place, the ZEG Loan Fund will be recalibrated to focus on solar and energy efficiency projects. This work will complement the delivery of the Program, as continued electrification will increase overall electricity consumption which will in turn improve the case for increased solar generation and energy efficiency. These projects will pay themselves back through energy cost savings. They will be timed to coincide with electrification upgrades to minimise disruption to ACT Government services and reduce overall capital works costs.

- 3x SOGC Energy Project Officers
- 1x ASO5 Administrative Officer

Table 44 – EPSDD Resourcing Costs (Nominal \$'million)

	2023-24	2024-25	2025-26	2026-27	Total
Resourcing Costs	0.81	0.82	0.83	0.84	3.30
FTE	5.0	5.0	5.0	5.0	
Source: EPSDD					
Note: Total may differ due to rounding					

A detailed resourcing plan has not been developed for MPC or other impacted Directorates as it will depend on the final delivery model and governance arrangements for the Program. However, an allowance has been included within the cost plans summarised in section 11.1.

11.5 Financial Benefits

The fuel transition presents opportunities to reduce operational costs (via energy bills) and reduce the damage costs associated with carbon emissions. In FY2022, the program sites consumed approximately 398TJ - ~6 per cent of the total gas use in ACT. The program is expected to reduce 301TJ at the end of the last tranche in 2040. The remaining 97TJ is used in sterilisation and thermal purposes and is excluded from this program.

Based on the simple assessment of Program B, a total savings is approximately \$1.04mil per annum (real\$2022) from energy and \$310k per annum in carbon (15,500t of CO₂e).



Table 45 summarises the cost and carbon savings obtained from transitioning from gas to electric fuelled assets.

1. **Cost of Electricity** – additional annual retail and network charges. Calculated based on current tariffs. Where there are gaps, the available data was extrapolated based on usage (kWh).
2. **Energy savings from gas** – total cost of gas in FY22. A blended rate of 2.92cents/MJ is applied.⁵⁵
3. **Carbon per annum** – in accordance with the Social Cost of Carbon program, the avoided carbon as a result from eliminating gas consumption for heating and DHW is 20\$/tCO₂⁵⁶, avoided carbon emissions from going from gas to electricity. ACT Government's emissions factor for electricity is zero.

Table 45 – Financial Benefits (\$'m) - Program B (cumulative per annum Real\$2022)

Cost item	Short term	Medium term	Long term
Electricity Costs (retail + network charges) (A)	1.50	4.24	7.67
Energy savings (gas) (B)	2.28	5.35	8.72
Total energy annual savings (B – A)	0.78	1.11	1.04
Carbon emissions savings	0.08	0.19	0.31
Total annual savings	0.86	1.30	1.35

Source: Envizi account style data extract and monthly data summary for FY22.

Note 1: Sites with no consumption or billing data are excluded due to the lack of information. This results in lower long-term savings as there is a significant number of unknown assets in the final tranche.

Note 2: The network modelling was not re-run for Program C due to the time constraints of completing the business case and as there would be minimal difference when compared to Program B

⁵⁵ The FY22 price of gas does not include any forecasted change in gas price over the life of the Program. Any increase or decrease in price of gas will affect the cost savings from transitioning to electric.

⁵⁶ ACT Government (2021). "Considering the 'social cost of carbon'. Retrieved from [Considering the 'social cost of carbon' - Chief Minister, Treasury and Economic Development Directorate \(act.gov.au\)](#)



Figure 41 Total annual savings

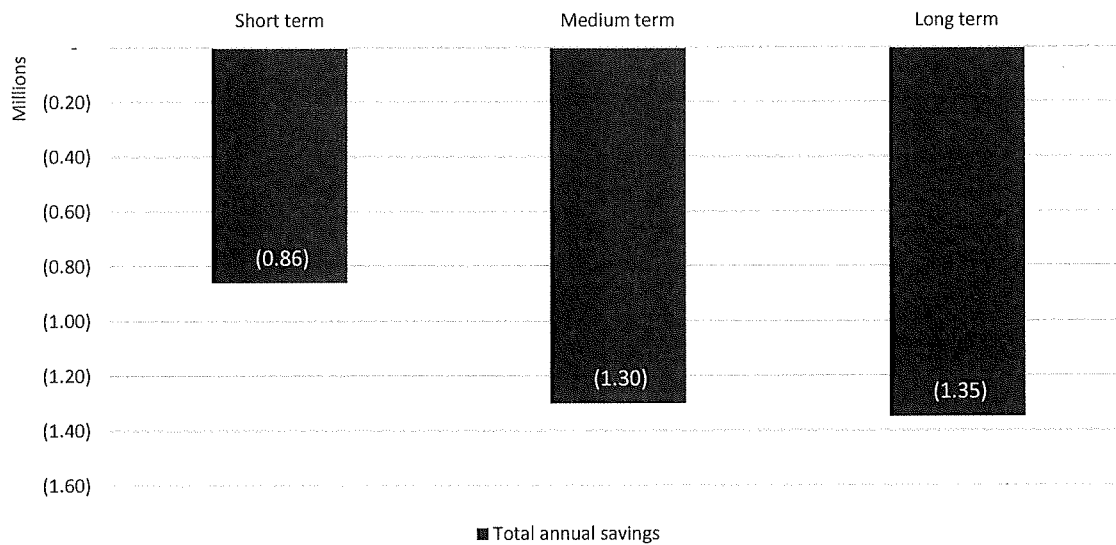
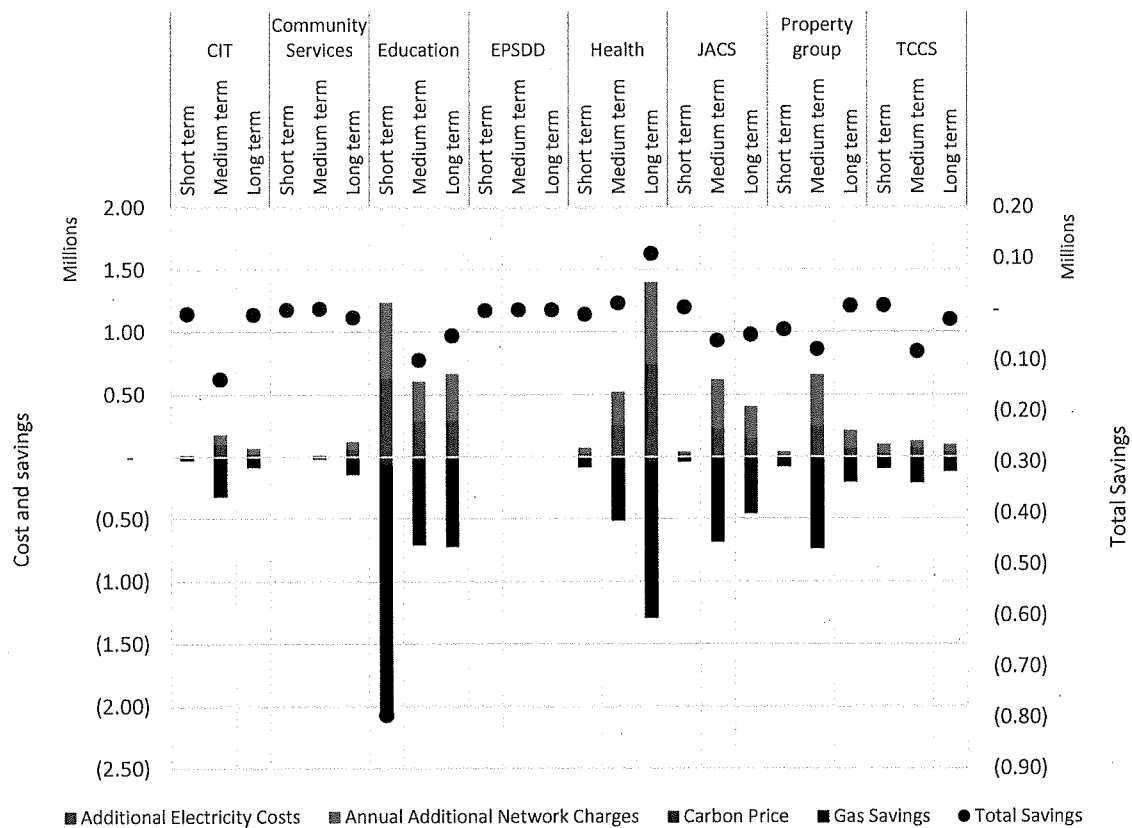


Figure 42 – Cost (positive\$) and savings (negative\$) breakdown and total savings by Directorate (at the end of the Short-, Medium- and Long-Term tranches of Program B)



As a function of having the highest number of gas assets, the Education Directorate will realise the greatest cost savings in the conversion from gas to electricity – particularly in the short and medium-term. Savings were only quantified based on the availability of existing data, and as a result, long-term savings are low for the Education Directorate because there are a material number of unknown assets.

11.6 Budget implications

Table 46 summarises the budget impact of the program over the period 2023-24 to 2026-27 based on the reprofiled funding in Table 39. The budget impact also includes the potential network upgrade costs as calculated in section 11.2 and program development activities calculated in section 11.3. The budget impact summary has been based on Program C as this option, based on the discussions with cross-Directorate stakeholders throughout the development of this business case, represents a more realistic schedule for undertaking the replacement works.

Table 46 – Budget Summary

	2023-24	2024-25	2025-26	2026-27	Total
Capital impacts					
Capital injection¹	11.12	85.13	109.63	91.89	297.77
Capital inflows	-	-	-	-	-
Capital offset – existing provision	-	-	-	-	-
Expense impacts					
Expenses²	4.86	7.24	6.97	6.21	25.28
Expenses – offsets	-	-	-	-	-
Expenses – offsets – existing provision	-	-	-	-	-
Depreciation⁵	-	0.68	6.20	13.25	20.12
Revenue/Commonwealth contribution/savings impacts					
Revenue	-	-	-	-	-
Commonwealth contribution	-	-	-	-	-
Savings³	0.19	0.25	0.41	0.01	0.86
Staffing impact					
Total additional FTEs (no.)⁴	5.0	5.0	5.0	5.0	
<i>Note 1: Program C estimated capital costs (Table 39) plus the estimated network upgrade costs for Program B (Table 42)</i> <i>Note 2: Program development costs (Table 43) plus FTE costs (Table 44)</i> <i>Note 3: Real energy saving estimates (Table 45)</i> <i>Note 4: This includes the EPSDD staffing</i> <i>Note 5: No depreciation has been calculated for the existing assets as the book value of each of the assets is not currently available. Straight line depreciation has calculated for the electric assets based on a 15-year expected life.</i> <i>Note 6: Totals may differ due to rounding</i>					

11.6.1 Funding Strategy

This business case is seeking a funding allocation (both capital and operating funding) for the next four years. While it is not possible to determine with certainty which specific works will be undertaken over the next four years (due to the issues discussed in section 5) a level of funding certainty is required over this period to ensure works can be appropriately planned for with a level of certainty. There is a material risk that if funding is provided on a shorter-term basis (i.e., requiring more frequent business case requests and updates) then it will delay the works and the Government may not achieve its target of net zero emissions from ACT Government operations by 2040.

It is anticipated that the Program will be designated a priority infrastructure project (refer to section 13 for further discussion on the proposed governance structure) and as such the Program Board structure will allow the Program to progress efficiently (i.e. to manage which works are undertaken within the allocated funding) while providing ACT Government with an appropriate level of surety and oversight. This structure has been used successfully on other major infrastructure projects and programs by the ACT Government.

12 Economic Appraisal

12.1 Approach

The economic appraisal takes the form of a qualitative analysis of the wider socio-economic benefits of the Program. This has been determined as the most appropriate methodology on the basis that the key driver for the Program is policy rather than economic benefits. Further, whilst economic benefits are not the primary driver for the Program, the reduction of ACT Government emissions are likely to provide economic, social and health benefits for residents.

In addition to the socio-economic benefits discussed in the next section, the Program's alignment with the ACT Wellbeing Framework is discussed in Section 4.2 and the financial benefits (including savings) of the Program are set out in Section 11.5.

12.2 Socio-Economic Benefits

Table 47 provides a summary of the socio-economic benefits of the Program.

Table 47 – Socio-Economic Benefits

Socio-Economic Benefit	Description
Local economic development	
ACT Government leading by example in a just zero emission transition	The Program supports Canberrans' desire for the ACT Government to be a world leader in climate action and zero emission transitions. The ACT Government has committed to transitioning from fossil fuel gas. The electrification of Government assets can be expected to reduce the Government's energy costs in the longer term, while reducing the amount of carbon dioxide released through natural gas consumption. As a first mover in this space, the ACT Government will serve as a pathfinder and example for other jurisdictions as they begin their own programs to achieving zero-emissions targets. This may result in the adoption of new technology in the ACT ahead of other jurisdictions and with it, skill development for local industry and drive growth. Further, through development of a credible pathway for like asset electrification, the Government's efforts may result in lower cost transition for business, who can be expected to electrify over time.
Promoting investment, job creation and market capacity in the electrification sector	The energy transition requires enormous investments in electrification of assets that currently rely on a fossil-fuel based energy source. The energy transition across the ACT will require strong market capacity in the relevant trades to support the works required to transition ACT Government, household and commercial premises to electric. As a first-mover towards zero-emissions government assets through this Program, the ACT Government will create early market demand for the services, technology and trades required to support the whole of Territory transition required to reach net-zero. Undertaking this work as a whole-of-government program will give the market confidence in the future pipeline and encourage investment in mobilising additional market capacity. This growth in market capacity will: • create early demand for the equipment and services required to transition the Territory from gas to electricity; • promote creation of high-value local jobs in the net-zero economy; • encourage re-training of labour resources in existing industries (such as gas plumbing) to support growth in electrification sector; • increase demand and output across other economic sectors such as construction and manufacturing and will have a positive effect on the Territory economy; and • Building capacity and expertise in the ACT and potential to export this expertise to other jurisdictions, such as NSW and Victoria, as they progress through their own energy transition.
Reduce greenhouse gas emissions	
Expediting the ACT transition to net zero emissions by 2045	This Program addresses emissions from gas, one of the largest sources of ACT Government emissions. The ACT Government is taking a proactive step to address reliance on fossil fuel gas by committing to transition all Government assets from gas to zero emission electricity. The ACT Government is leading by example as this transition from gas to electricity will



Socio-Economic Benefit	Description
	require active participation from the whole community and the Program will create the pathway for private and business premises transitions. The energy transition will contribute to positive impacts on community welfare through contributing to the global effort to curb climate change through cutting emissions from gas. The ACT's steps towards reducing emissions will assist Australia to meet its nationally determined contributions to the Paris Agreement on Climate Change, which aim to limit the increase in the global average temperature to well below 2 °C above pre-industrial levels. According to the Intergovernmental Panel on Climate Change, global warming of more than 2 °C would have serious global consequences, such as an increase in the number of extreme weather events.⁵⁷
Environmentally sustainable benefits	Delivery of the Program is proposed to be underpinned by environmentally sustainable development principles, including through improving energy efficiency, reducing carbon emissions and supporting the use of zero emission and renewable energy.
Future proofing Government Assets	
Reducing ACT reliance on fossil fuels	The Program aids the ACT Government to future proof Government assets as it moves from fossil fuel gas to zero emission electricity as the power source. This provides greater asset security and savings as the ACT Government will be less reliant on gas, which has variable price and is a commodity which has been recently increasing in cost due to supply chain issues highlighted during the COVID-19 Pandemic and the war in Ukraine.

⁵⁷ [Regulating for the prevention of new fossil fuel gas mains connections \(amazonaws.com\)](https://www.amazonaws.com).



13 Program Governance

This section of the Business Case outlines the proposed governance structure and arrangements for the delivery of the Program (i.e., following funding approval by ACT Government).

13.1 Overview

The successful delivery of the Program will be dependent on establishing an appropriate governance structure that facilitates efficient decision making and is flexible to adapt as required across the Program.

Establishing an appropriate governance structure is a key issue for the Program.

- At the Risk Workshops, a number of high rated risks were noted as being mitigated by selection of an appropriate governance structure that facilitates decision making and flexibility. Further details on these risks can be found at [Appendix C – Program Risk Register](#) and Section 9.
- The ILM noted that establishing appropriate governance structures to support delivery of the Program of Works will be key to addressing the problems identified in the ILM. Further details can be found at [Appendix A – Investment Logic Map](#) and Section 3.1.

The recommended governance structure outlined in section 13.2 has been informed by:

- lessons learned from the delivery of large programs of works by the ACT Government and in other jurisdictions;
- a Governance Workshop with attendees from EPSDD, MPC and Treasury on 16 February 2023; and
- direct input from MPC and EPSDD at a workshop to confirm the governance structure on 24 February 2023.

Given the size, complexity, range of stakeholders and prolonged delivery timeframe (to 2040) it is crucial that appropriate governance arrangements are established and that the program is sufficiently resourced. Therefore, we have indicated where additional staffing will be required to incorporate oversight and management of this major program of works over 17 years.

13.2 Recommended Governance Structure

Figure 43 outlines the proposed governance structure for overseeing the delivery of the Program. MPC will lead the Program delivery as a Designated Project.

MPC is an ACT Government directorate which has responsibility for directing and managing all aspects of major projects invested in by the ACT Government. It was established on 1 July 2019 to lead the procurement and delivery of the Territory's infrastructure program.

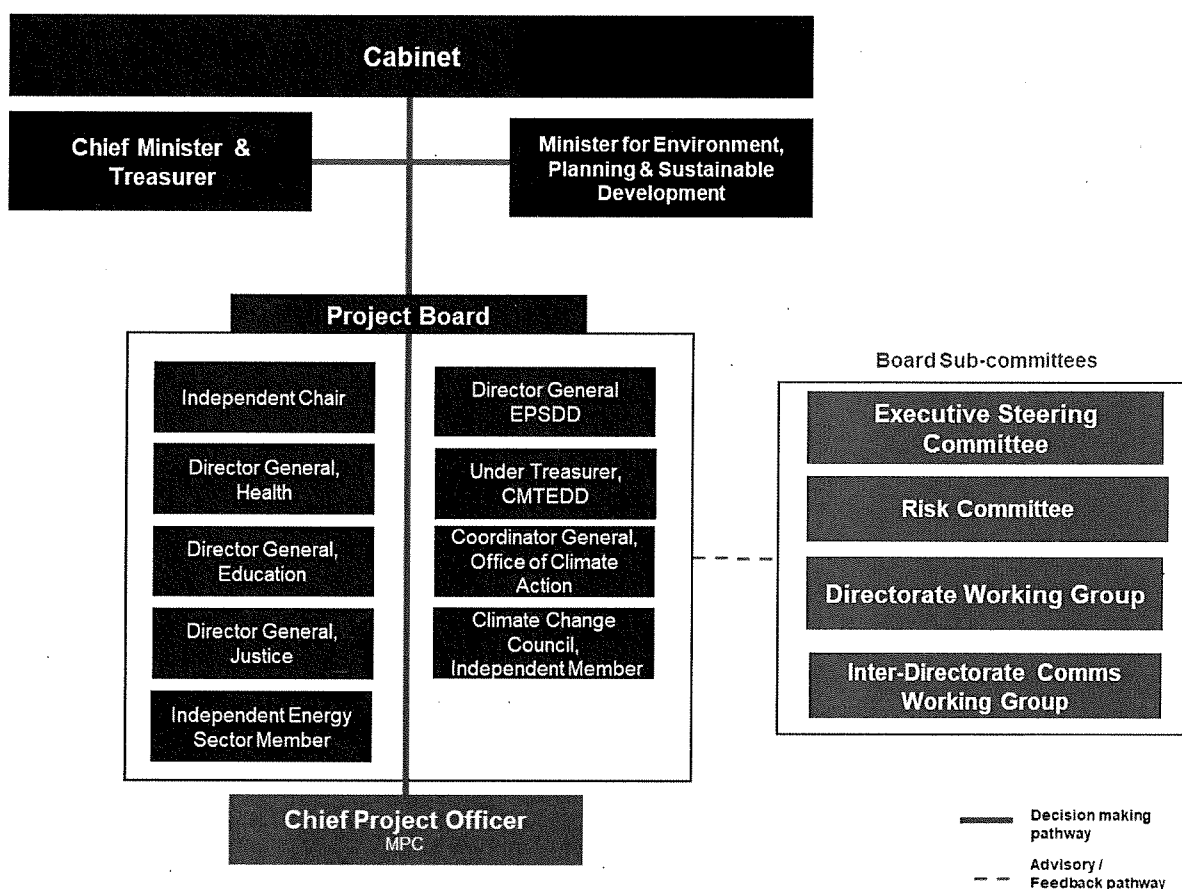
MPC's responsibility is procuring and delivering infrastructure projects designated by the Chief Minister into MPC and delivering other whole-of-government infrastructure projects in partnership with other Directorates. Other functions of MPC include contractor pre-qualification, project management and reporting, superintendency of works and coordination of WHS Active Certification.⁵⁸

Under a Designated Project edict, the funding for the Program will be provided to MPC for Program delivery and MPC will bear budget accountability for those projects and have accountability to the relevant Minister responsible for those projects. The Governance Workshop noted this would respond to the issues that Treasury has faced in terms of managing differing funding requests and electrification approaches from across the different Directorates.

⁵⁸ [ACT Government Directory](#).



Figure 43 – Proposed Program Governance Structure



13.3 Key Bodies

The key bodies that will be involved in the delivery of the Program are outlined below:

13.3.1 Cabinet

Cabinet will be the peak decision-making authority for the Program. This includes decision making to proceed or not proceed with the Program. Matters that will generally be referred to this governance group for approval or consideration include:

- business case, scope and design, and delivery and procurement strategy;
- Project budgets and global capital and operational cost estimates;
- major program decision points (e.g., RFT release and contractor/consortium award);
- governance framework and program delivery plan;
- cross-Government coordination matters; and
- risk oversight.

13.3.2 Project Board

The Project Board will provide strategic direction and advice to key Program personnel, including the CPO, the Executive Group Manager and the Program Management Office Team. The main responsibilities of the Project Board will include:

- endorsement of approvals sought from Cabinet;
- strategy formulation and program oversight;
- communicating with key strategic stakeholder groups;
- monitoring of the Program Team's performance;
- compliance relevant legislation and ACT Government policies; and

- risk oversight.

The Project Board will have independent members, including the Chair and an Energy Sector representative appointed by the Chief Minister/Minister for the Environment. The other members of the Project Board will be representatives from the lead ACT Government agencies involved with the Program and bring specialist skills, namely EPSDD, CMTEDD, OCA and MPC. The other ACT Government agencies represent those agencies with the most affected infrastructure assets by the Program. The Chief Project Officer is an observer on the Project Board and reports into the Board on matters pertaining to the Program of Works. The Project Board's independent chair is responsible for advising the Chief Minister, other Ministers and Chief Projects Officer on program progress, opportunities and challenges, and any emerging issues that may affect achievement of the Programs benefits.

13.3.3 Chief Project Officer

The CPO leads Major Projects Canberra which is responsible for the procurement and delivery of the ACT Government's infrastructure program. The CPO will be ultimately accountable for the Program during the procurement and delivery phase and will be a key interface between decision makers (e.g., Project Board and Minister), various directorates, and community stakeholders.

13.3.4 Executive Steering Committee

The Executive Steering Committee is a sub-committee of the Project Board. Its role is to escalate policy matters for consideration by the Project Board when they are of significant risk or impact to the Program and to advise agencies as required. Their primary role is to address foreseeable and immediate issues and provide direction to Directorates and the Program Team on whole of Program issues. The Executive Steering Committee will have members from an Executive level from the following: EPSDD, CMTEDD, OCA, MPC and the Program Team leadership (Executive Group Manager, Manager (Policy) and Manager (Delivery)). The Executive Group Manager of the Program Management Office team will be the chair of the Executive Steering Committee and the secretariat will be drawn from the Manager (Policy)'s team.

13.3.5 Directorate Working Group

The Directorate Working Group is a sub-committee of the Executive Steering Committee. Its role is to provide a coordinated Working Group of Program Team, lead and impacted agencies and directorates at the working officer level to ensure strategic alignment and engagement throughout the life of the Program delivery phase. This Working Group will escalate policy and delivery matters for consideration by the Executive Steering Committee when they are of significant risk or impact to the Program and to provide advice to agencies as required. The primary role of the Working Group is to facilitate collaboration and work across directorates and agencies to ensure the successful delivery of the Program. The Directorate Working Group will have members from an officer level from the following Directorates, Agencies, and the Program Team: EPSDD, CMTEDD, OCA, MPC and the Program Team leadership (Executive Group Manager, Manager (Policy) and Manager (Delivery)). The Executive Group Manager of the Program Team will be the chair of this Working Group and the secretariat will be drawn from the Program Team.

13.3.6 Inter-Directorate Communications Working Group

The Inter-Directorate Communications Working Group is a sub-committee of the Executive Steering Committee. Its role is to provide a regular touch point for the Program Team, directorates, and agencies to confirm messaging, updates and alignment of communications (including Ministerial Correspondence) and stakeholder engagement and planning. The Inter-Directorate Communications Working Group will have Communications Leads from all impacted directorates and agencies and will be chaired by the Program Team Communications Lead with secretariat functions to be drawn from the Program Team.

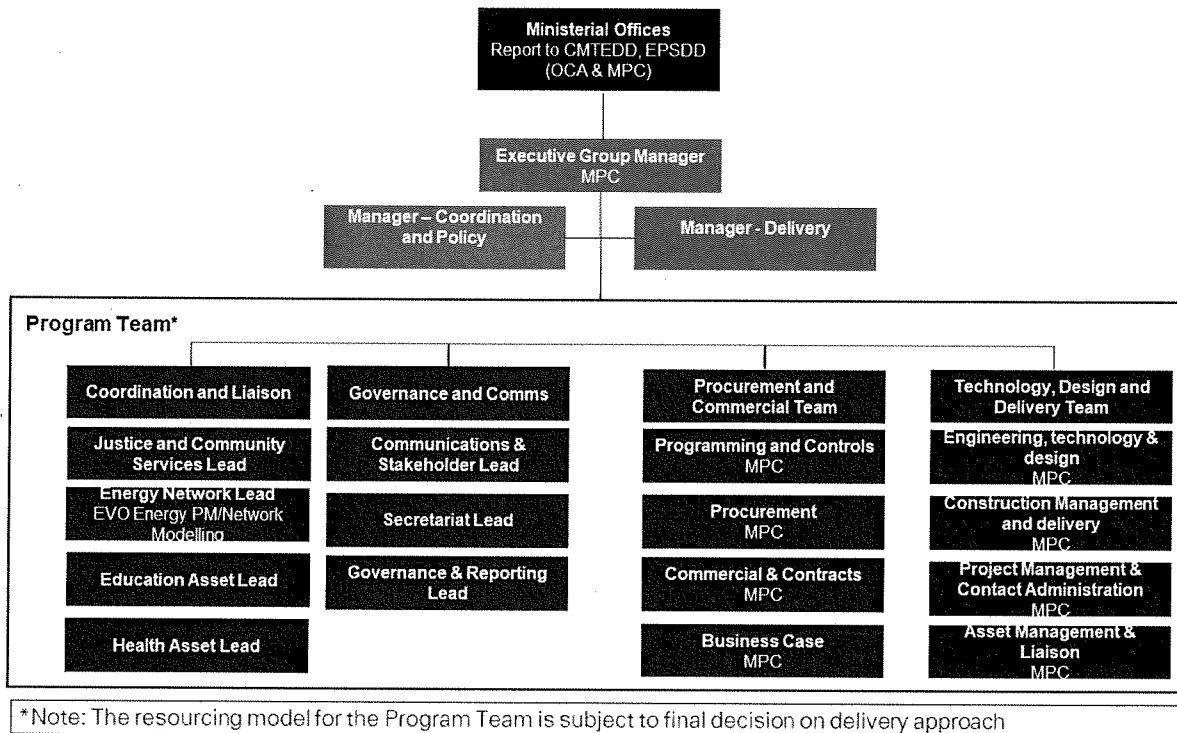
13.4 Program Team

A Program Team is required for the procurement and delivery of the Program following its consideration by Government and approval to proceed. The Program Team will include a team of dedicated resources to undertake the delivery, coordination and liaison and communication activities required for the Program. Dedicated resources for Directorate coordination and stakeholder communications may be required to work with Directorates and alleviate concerns that Directorates will lose control over their assets and have already developed stakeholder relationship management. The Program Team will be led by a dedicated Executive Group Manager from MPC and will report to the CPO.



Figure 16 outlines an indicative Program Team. It is anticipated that the structure and resourcing of the Program Team will need to be revisited for the delivery of the Program as the level of resourcing required will depend on the delivery model selected which is discussed in Section 13.6.

Figure 44 - Anticipated Program Team



13.5 Program Team Roles and Responsibilities

13.5.1 Executive Group Manager

The Executive Group Manager will report to the CPO, will lead the Program Team, and will direct and manage the Program during the procurement and delivery phase. The Executive Group Manager will represent the Program Team and will support the CPO in interfacing with other Directorates and key strategic stakeholders. The main responsibilities of the Executive Group Manager include:

- direct and manage the procurement of the Program;
- participate in Project Board meetings and endorse Program Team reports to the Project Board;
- establish and oversee working groups for the Program;
- keep the CPO and the Project Board informed of project progress, key issues and risks;
- oversee the program budget and reporting requirements for the Program; and
- take accountability for all key documentation for the Program.

13.5.2 Manager – Governance, Stakeholder, Coordination & Reporting

The Manager – Governance, Stakeholder, Coordination and Reporting will report to the Executive Group Manager and will lead the work on developing the scope and detail of the program's policy. The Manager of this stream will define and recommend actions for policy decision through the relevant Governance bodies. The Manager will have responsibility for communications and stakeholder outreach, including coordination of Directorates and project scheduling. They will also identify emerging policy issues and create new workstreams where needed. The Manager – Governance will provide secretariat support to the Project Board and the board's Sub-committees. The Manager will work closely with their counterpart Manager – Delivery.

13.5.3 Manager – Delivery

The Manager – Delivery will report to the Executive Group Manager and will lead the work on the procurement, coordination of the program of works and execute the delivery aspects of the Program. The Manager – Delivery's role will be to operate the program management and to manage risks, issues and dependencies across directorates and agencies to ensure the program is delivered efficiently, both on time and on budget. They will oversee the execution and management of the Program's portfolio of works and provide associated reporting into the secretariat team under the management of the Manager – Governance.

13.5.4 Program Team

The Program Team, under the direction of the Executive Group Manager, will provide day-to-day management of the Program during the procurement and delivery phase. Members of the Program Team will be responsible for progressing delivery of the Program in accordance with the Program's detailed Business Case, decisions of Cabinet, the Program Delivery Plan, and other key documents for the Program. The main responsibilities of the Program Team includes:

- developing and implementing the Program Delivery Plan and other key documents;
- identifying, discussing and escalating key or unresolvable issues and risks to the Executive Group Manager, CPO and the Project Board;
- managing the preparation of Project Board papers and materials; and
- develop monthly reports for escalation to the Project Board for review and/or approval.

The Program Team will also be supported by specialist external advisor roles at various periods during the procurement and delivery phase of the Program. Further details on specialist external advisor role is at Section 15.

13.6 Program Resourcing Strategy

Section 10 considers the delivery model for the Program including the level of services bundling. As noted in Section 10, at this stage of the Program development it is difficult to identify the appropriate delivery model and further work will be required following this business case to develop a tailored delivery strategy for the Program. The delivery strategy is discussed further in section 10.5.

The level of resourcing required for the Program Team will depend on the outcome of the delivery strategy. The delivery approaches being considered differ in the level of contractor management that is undertaken by the Program Team, which will in turn affect the level of resourcing required to be provided by the Program Team.

On this basis, costs for MPC and other Directorates to resource the Program Team are included within the capital costs set out at Section 11.1. Resourcing costs for EPSDD are set out in Section 11.4

14 Stakeholder Engagement

This section provides an overview of key Program stakeholders, their interests and engagement need, and the plan for stakeholder engagement for the Program following Program approval.

This Section examines the following in relation to the Program.

- the process of stakeholder identification;
- the Directorate stakeholders identified and their interest and level of engagement for the Program; and
- the other stakeholders identified and their interest and level of engagement for the Program.

14.1 Stakeholder Identification

A preliminary stakeholder analysis has been undertaken to identify key stakeholders, examine their interests and define their required level of engagement during the Program. The *'Engaging Canberrans: A Guide to Community Engagement'* describes different levels of engagement and provides a basis to define the involvement of key internal and external stakeholders in the Program.

Figure 45 – Different Levels of Community Engagement

	Inform	Consult	Involve	Collaborate
Goal	Provide balanced and objective information and assist understanding.	Obtain stakeholder feedback on analysis, alternatives, and/or decisions.	Work directly throughout the process to ensure concerns and aspirations are understood considered.	Partner each aspect of the decision including alternatives and solutions.

Source: ACT Government. (2011). *Engaging Canberrans: A Guide to Community Engagement*

There are two broad groups of stakeholders:

- **Directorate Stakeholders** – comprised of ACT Government Directorates that are directly involved or have a direct interest in the Program (e.g., for design, procurement, construction and operations), or those that may be impacted, or indirectly involved in the Program.
- **Other Stakeholders** – comprised of individuals, groups or organisations that may be indirectly involved in the Program, or that may influence, or be impacted by the Program.

14.1.1 Directorate Stakeholders

Table 48 provides a summary of the ACT Government Directorate stakeholders, their interests, influences and issues and the intended level of engagement (noting that the level of engagement may change over time).

The Program Team will need to consider the level collaboration and input required from each Directorate and how best to facilitate this. The approach will differ depending on the type and number of facilities managed by each Directorate, the kind of end users or services provided at those facilities and the Directorate's specific needs. For example, the level of collaboration and input required to schedule the Program works at ACT public schools, of which there are 90, have specific requirements in relation to scheduling (i.e. works to be undertaken in school holidays) and a sensitive user base, will require a higher level of collaboration with ACT Education than the other Directorates. The approach to Internal Stakeholder interactions, collaboration and ways of working is considered further in Section 16.1.

Table 48 – Directorate Stakeholders, Interests and Engagement Levels

Directorate	Considerations	Level of Engagement
The Chief Minister, Treasury and Economic Development Directorate (CMTEDD)	The Chief Minister, Treasury and Economic Development Directorate is the central agency overseeing the ACT Government.	Collaborate

Directorate	Considerations	Level of Engagement
	Treasury has a direct interest in how the Program will progress, and in particular the funding for, and successful completion of the Program within budget.	
Environment, Planning and Sustainable Development Directorate (EPSDD)	- The Environment, Planning and Sustainable Development Directorate promotes sustainable living and resource use, strengthens the Territory's response to climate change, and provides a planning and land use system that contributes to the sustainable development of the ACT. EPSDD is the lead Directorate developing this business case. - EPSDD has a direct interest in the Program as it will contribute to the achievement of the Strategy which is a key Environment and Climate Change policy.	Collaborate
Major Projects Canberra (MPC)	- Major Projects Canberra leads the delivery of the ACT Government's infrastructure program. - Major Projects Canberra will be responsible for procurement managing the procurement and delivery of construction and installation works for the Program.	Collaborate
Education Directorate (ACT Education)	- The Education Directorate is responsible for delivering educational services across the Territory including the management and maintenance of the 90 public schools⁵⁹ and delivery of new schools. - The Program Team will work closely with the ACT Education to: - understand user requirements for the replacement works including technical specifications and functionality; and - ensure the replacement of the gas assets in schools occurs at appropriate times to minimise the impact on school operations (e.g., within school holidays) and around the Education Directorate's broader capital works program.	Collaborate
ACT Health Directorate (ACT Health)	- ACT Health sets health policy plans the delivery of health services and ensures that health services meet community needs. - The Program Team will work closely with the ACT Health Directorate to ensure the replacement of the gas assets in the health facilities occurs at appropriate times to minimise the impact on health services and around the ACT Health Directorate's broader capital works program.	Collaborate
Canberra Health Services (CHS)	- Canberra Health Services delivers public health services to people living across the ACT and the surrounding region. CHS operates hospitals, walk-in centres, community health centres and community-based health services. - The Program Team will work closely with the CHS to ensure the replacement of the gas assets in the health facilities occurs at appropriate times to minimise the impact on health services.	Collaborate
ACT Property Group	- ACT Property Group manages more than 200 Territory-owned buildings including commercial buildings, government offices, community/multipurpose buildings, and aquatic/leisure facilities. - The Program Team will work closely with the ACT Property Group to ensure the replacement of the gas assets occurs at appropriate times to minimise the impact on facility availability.	Collaborate

⁵⁹ <https://www.education.act.gov.au/about-us/who-we-are>



Directorate	Considerations	Level of Engagement
Justice and Community Safety Directorate (JACS)	- The Justice and Community Safety Directorate comprises several agencies and is responsible for a wide range of activities and services in the areas of justice; the law; emergencies; commercial practices and government elections including managing its facilities and capital works and infrastructure programs. - The Program Team will work closely with the JACS to ensure the replacement of the gas assets in its facilities occurs at appropriate times to minimise the impact on core services and facility availability.	Collaborate
Office of the Coordinator General for Climate Action (OCA)	- The Office of the Coordinator General for Climate Action has been established to coordinate and support the ACT Government's agenda for Climate Action including establishing policy, legislative, procurement and planning reforms associated with climate adaptation and resilience. - The Program Team will involve and consult with OCA to draw on the OCA's expertise during planning and delivery of the Program.	Involve / Consult
Community Services Directorate (CSD)	- Community Services Directorate has responsibility for a range of human services functions in the ACT including multicultural and community affairs; public and community housing services and policy; children; youth and family support services and policy; disability policy and services; therapy services; Child and Family Centres; the ACT Government Concessions Program; homelessness and community services. - The Program Team will work closely with CSD to ensure the replacement of the gas assets in its facilities occurs at appropriate times to minimise the impact on core services and facility availability.	Collaborate
Transport Canberra and City Services Directorate (TCCS)	- Transport Canberra and City Services (TCCS) delivers a wide range of services which Canberrans rely on every day. These include collecting recycling and rubbish removal, libraries, maintaining urban spaces, roads, footpaths and cycle paths, public transport system, ACT NoWaste, Capital Linen Service, Yarralumla Nursery, and the ACT Public Cemeteries Authority. - TCCS includes Sports and Recreation supports sports programs through infrastructure planning, athlete support, sector partnerships and capacity building programs to contribute to health, social and economic benefits. - The Program Team will work closely with TCCS to ensure the replacement of the gas assets in its facilities occurs at appropriate times to minimise the impact on core services and facility availability.	Collaborate
Cultural Facilities Corporation (CFC)	- The Cultural Facilities Corporation manages the Canberra Theatre Centre; the Canberra Museum and Gallery (CMAG) including the Nolan Collection Gallery at CMAG; and the ACT Historic Places. - The Program Team will work closely with CFC to ensure the replacement of the gas assets in its facilities occurs at appropriate times to minimise the impact on facility availability.	Collaborate
Canberra Institute of Technology (CIT)	Canberra Institute of Technology is the ACT and region's leading training organisation providing career opportunities and partnering with industry and individuals to develop a skilled community.	Collaborate

Directorate	Considerations	Level of Engagement
	The Program Team will work closely with CIT to ensure the replacement of the gas assets in its facilities occurs at appropriate times to minimise the impact on facility availability.	

Source: ACT Government Directorates – ACT Government

14.1.2 Other Stakeholders

Table 49 provides a summary of the other stakeholders, their key interests, influences and issues, and the intended level of engagement (noting that engagement level may change over time).

Table 49 – Other Stakeholders, Interest and Engagement Levels

Stakeholders	Considerations	Level of Engagement
Evoenergy	- Evoenergy is the electricity network operator. As discussed earlier, upgrades to the network may be required to enable the rollout of the Program works. - The Program Team will need to work closely with Evoenergy to schedule and negotiate network upgrades, understand regulatory requirements and other matters. The extent of this collaboration is discussed further in the next section.	Involve / Collaborate
Worksafe ACT	- Worksafe ACT is the Regulator appointed under the Work Health and Safety Act 2011 and is responsible for monitoring and enforcing compliance with the Act, providing advice and information to duty-holders.⁶⁰ - The Risk Workshop noted that work health and safety issues will be a high/extreme risk for the Program and identified that proactive consultation and involvement of the Regulator in the roll out of the Program would be advisable (see Appendix C – Program Risk Register and Section 9.3).	Consult / Involve
Providers (design, installation)	- Work with construction contractors, utility providers and expert consultants to support the planning and delivery of the Program. - It may be worth undertaking a market sounding with design/installation providers to understand market capacity in the early years of Program delivery and provider's preference to procurement/contract model when designing the procurement strategy. The market sounding is discussed in more detail at Section 10.5.2.	Consult / Involve
Equipment suppliers	- Work with suppliers to understand technology options, costs and lead times to feed into the finalisation of the indicative Program of Works. - It may be worth considering undertaking a market sounding with equipment suppliers to understand market capacity in the early years of Program delivery.	Consult / Involve

⁶⁰ About WorkSafe ACT - WorkSafe ACT



Stakeholders	Considerations	Level of Engagement
Facility Users	- Facility users will be the end users of the sites that will be electrified as part of the Program. This stakeholder group will be very diverse and will depend on the kind of facility for example: - for Schools: principals, teachers and facility managers; - for Health facilities: health administrators, staff; and - facility users will need to be consulted and involved in developing user requirements for the relevant facility and feed into the Program schedule (i.e., downtime for their Facility). - Engagement with Facility users may be interfaced by the Directorates however this will need to be discussed and agreed with each Directorate.	Consult / Involve
Community	- The Program delivery will affect a broad range of assets across the Territory and will have an impact on the Canberra community. - The Program Team will need to develop a communication strategy to inform the local community of how the Program may impact the use of certain facilities and educate the community as to the benefits and need for the Program.	Inform
Relevant Unions	- Interest in ensuring that the infrastructure development upholds health and safety standards. - Interest in the level of local industry participation in the benefits of the Program. - The Program is expected to create additional jobs, however, will also potentially require a transition of the skills and workforce as gas assets are replaced.	Consult
Source: ACT Government and ACT Education Directorate		

Evoenergy

Engaging power utilities early on in major projects is crucial for ensuring a smooth and successful outcome. This is particularly important on this Program which is set to interface with Evoenergy across 72 sites where upgrades will be required at approximately 60 per cent of these.

One of the key benefits of early engagement with utilities is the ability to identify and address any potential issues or challenges before they become major problems. This can include everything from identifying and addressing regulatory requirements, to ensuring that the Program is aligned with the utility provider's strategic objectives.⁶¹ By working closely with Evoenergy early in the Program development process, the Program Team can better understand Evoenergy's priorities and concerns and take them into consideration when developing project plans and timelines.

Another key benefit of early engagement with utilities is the opportunity to leverage the expertise and knowledge of the utility company. This can include utilising the utility provider's data and analytics capabilities and tapping into their experience and best practices.⁶² By working closely with Evoenergy, the Program Team can take advantage of Evoenergy's experience and knowledge, which can help to ensure that the Program is able to be delivered.

Partnerships between Program Teams and utilities are also important from a project governance perspective. Partnerships can help to optimise outcomes and mitigate risk by ensuring that all stakeholders are working towards the same goals and that everyone is aware of their roles and responsibilities. By working closely with Evoenergy, the

⁶¹ Australian Energy Regulator. (2019). "Stakeholder engagement in energy infrastructure projects." Retrieved from <https://www.aer.gov.au/communication-and-stakeholder-engagement/stakeholder-engagement-in-energy-infrastructure-projects>

⁶² Energy Networks Association. (2018). "Engaging utilities early in the project development process." Retrieved from <https://www.energynetworks.com.au/wp-content/uploads/2018/08/Engaging-utilities-early-in-the-project-development-process.pdf>



Program Team can ensure that everyone is on the same page and that there is clear communication and collaboration throughout the Program.

Overall, engaging with utilities early on in major projects is crucial for ensuring a smooth and successful outcome. By working closely with Evoenergy, the Program Team can take advantage of Evoenergy's expertise and knowledge and ensure that the Program delivery is aligned with Evoenergy's strategic objectives. By engaging with utilities early on, the Program Team can also ensure that all stakeholders are working towards the same goals, and that everyone is aware of their roles and responsibilities.

Dedicated Evoenergy resource

One way of facilitating ongoing collaboration is to include an Evoenergy resource on the Program Team as a direct point of contact for interaction between the Program Team and Evoenergy. This could be achieved through a secondment of the resource to MPC.

A dedicated Evoenergy resource seconded to the Program team provides an opportunity for better collaboration and a greater level of understanding between the Program Team and Evoenergy. At the discussion with Evoenergy on 7 February 2023, Evoenergy was generally supportive of including an Evoenergy resource on the Program Team and noted this would be beneficial for the Program as:

- The Program would have a dedicated representative. This would mean rather than 'joining the queue' for each request, the Program Team could coordinate all upgrade requests through the dedicated Evoenergy resource.
- The dedicated Evoenergy resource will ensure the approach to Program related upgrades is consistent.
- Placing an Evoenergy resource on the Program Team will foster a strong relationship between the two organisations and allow for direct sharing of expertise.⁶³

Costs for a dedicated resource for Evoenergy have been included in the Program Development costs at Section 11.3 however the terms of the arrangement (secondment to Program Team or if the resource does not sit with the Program Team) will need to be discussed further with Evoenergy as discussed in Section 16.1).

⁶³ Meeting with Evoenergy on 7 February 2023.



14.2 Stakeholder Engagement to Date

14.2.1 Pre-Business Case Stakeholder Engagement

Table 50 - Stakeholder engagement undertaken prior to business case development

Engagement Point	Participants	Description
2022-23 Business case consultation November 2021 – January 2022	All Directorates	This business case was developed with funding provided in the 2022-23 ACT Budget. All Directorates were engaged in the development of this previous budget measure for the development of a program of works for the replacement of Government gas assets.
Strategic Board 7 March 2022	Directors General (All Directorates)	EPSDD presented the paper 'Gas transition – Implications for Government Assets' which included a preliminary list of government gas assets for replacement and an estimate of costs.
Zero Emissions Government Implementation Committee (ZEGIC) consultation Quarterly meetings March 2022 onwards	EPSDD CMTEDD JACS ACT Property Group ACT Health CHS ACT Education CSD CIT TCCS	The Zero Emissions Government Implementation Committee (ZEGIC) is made up of Sustainability Managers across all Directorates. The ZEGIC has been briefed on a quarterly basis since project inception. These updates included a full outline of the project, its timeframes, intent, and budget. Sustainability Managers were provided with the terms of reference for the business case consultancy and asked for input.
Asset Managers Working Group 29 September 2022	ACT Government Asset Managers Works group	EPSDD presented to Executive-level asset managers across the ACT Public Service on the development of this business case and the consultancy that would support it.
Program of Works procurement September-December 2022	MPC Treasury OCA	EPSDD collaborated with Treasury, OCA and MPC to develop the scope of works and procurement process for the Program of Works.
<i>Source: EPSDD</i>		

14.2.2 Stakeholder Engagement during business case development

Table 51 sets out the stakeholder engagement points during the development of the business case since 22 November 2022.

Table 51 - Stakeholder Engagement for development of business case

Engagement Point	Participants	Description
Electrification Business Case – Stakeholder kick-off 22 November 2022	EPSDD CMTEDD JACS ACT Property Group ACT Health ACT Education MPC CSD CIT TCCS IFR (Treasury) FABG (Treasury) KPMG	EPSDD introduced the Business Case process to the Directorate representatives including providing a summary of project objectives, approach, required directorate engagement and to answer questions from the Directorates.



Engagement Point	Participants	Description
Review of ACT Capital Framework requirements 2 December 2022	IFR (Treasury) KPMG	KPMG and IFR discussed the requirements of the updated ACT Capital Framework including the new template for Program Business Cases.
Investment Logic Workshop No. 1 20 December 2022	IFR (Treasury) FABG (Treasury) EPSDD MPC KPMG (facilitator)	KPMG facilitated an Investment Logic Workshop to articulate strong evidence-based problems associated with investment in the Program.
Investment Logic Workshop No. 2 20 January 2023	IFR (Treasury) Treasury EPSDD MPC KPMG (facilitator)	KPMG facilitated a second Investment Logic Workshop to explore the range of options that could resolve and address the problems and outline the best approach that will achieve the best outcomes for ACT and the community.
Examples of Programs delivered by MPC 2 February 2023	MPC KPMG	KPMG and MPC met to discuss recent ACT program of works that had been delivered by MPC including governance arrangements, resourcing arrangements and procurement strategy.
Costing approach for the Business Case 3 February 2023	KPMG FABG (Treasury) IFR (Treasury) EPSDD	KPMG presented its initial thoughts on the costing methodology and approach to the Program for this business case including network upgrade costs, prioritisation of assets and asset replacement cost.
Initial discussion with Evoenergy 7 February 2023	Evoenergy KPMG	KPMG had an initial discussion with Evoenergy to introduce them to the Program and discuss at a high level the interface between Evoenergy and the Program.
Risk Workshop No 1 8 February 2023	FABG (Treasury) IFR (Treasury)MPC OCA EPSDD ACT Education KPMG (facilitator)	KPMG facilitated two risk workshops to undertake risk identification (including mitigations) and ratings to develop a Program Risk Register.
Risk Workshop No 2 15 February 2023	FABG (Treasury) IFR (Treasury) MPC OCA EPSDD ACT Education KPMG (facilitator)	
Business case overview, options and governance 16 February 2023	FABG (Treasury) IFR (Treasury) MPC EPSDD KPMG	KPMG presented an overview of the business case, the potential Program options and a strawman governance framework for discussion.
Procurement strategy and Program resourcing 24 February 2023	FABG (Treasury) MPC EPSDD KPMG	KPMG facilitated a workshop to discuss potential procurement strategy for the Program and Program office resourcing requirements.
Funding flexibility 27 February 2023	FABG (Treasury) MPC EPSDD KPMG	A discussion of funding strategy including flexibility of funding allocation and certainty required by Treasury.



Engagement Point	Participants	Description
Presentation of business case to Strategic Board 6 March 2023	All Directorates	EPSDD presented a summary of business case to Directors-General across the ACT Public Service.
Presentation of business case to Asset Managers Working Group 16 March 2023	ACT Government Asset Managers	EPSDD presented to Executive-level asset managers across the ACT Public Service on the proposed business case, including implications for asset managers.
Presentation of business case concept to Climate Action Subcommittee 17 April 2023	Climate Action Subcommittee members	EPSDD presented the business case to this cabinet subcommittee ahead of the formal Budget process.
Source: ACT Government and ACT Education Directorate		



15 Advisor Engagement Plan

This section outlines the various advisors that may need to be engaged on the Program.

15.1 Program Management

The Program will be developed, procured and implemented by Major Projects Canberra, the ACT Government's dedicated major projects agency, in accordance with the Governance structure set out at Section 13. An Executive Group Manager with a dedicated Program Team will manage and oversee the procurement, construction, and delivery of the Program. The Executive Group Manager and Program Team will also oversee specialist external advisor roles.

15.2 Proposed Advisor Roles

15.2.1 Legal

The ACT Government Solicitor is the primary source of legal services for the Program, however where required, an external legal advisor will be engaged to support the Program. The external legal advisor may assist with:

- providing advice in relation to the risk allocation and legal implications for the purposes of the Delivery Strategy (discussed in Section 16.3.1);
- providing advice for the development of the contractual documentation for delivery of the Program;
- providing legal advice during the procurement process, including reviewing, and providing advice in relation to the bidders' departures, acting for the ACT Government during negotiations (if required), and supporting the finalisation of contractual processes; and
- providing ad-hoc advice during the tender and delivery phases for the Program.

If required, external legal advisors would be engaged in consultation with the ACT Government Solicitor's office.

15.2.2 Financial, Commercial and Procurement

A Commercial Advisor may be required for the next stage of the Project. The Commercial Advisor will assist during procurement for the Project including:

- providing commercial and procurement advice to support development of the Delivery Strategy for the Program (discussed in more detail at Section 10.5.1);
- providing advice and support in developing RFT and tender documents;
- providing advice on commercial, performance and pricing frameworks of the contract for delivery of the Program;
- commercial support and advice for tender evaluations and negotiations; and
- financial analysis and capacity assessments of tenderers for the Program.

15.2.3 Technical advisors

Technical design and engineering

The Program Team will procure technical design and engineering services, as required, to inform the next stages of design and procurement once Program approval and budget funding has been provided by Government.

The level of design will depend on the selected delivery model together with further understanding of the scope of works required at each site.

Asset and site due diligence and investigations

The Program Team will procure technical advisor(s) to assist with:

- **Complete asset data set:** undertaking further site investigations to gather data on the assets/sites that require additional data to inform prioritisation and cost estimates. This data will be used to complete the data set as discussed in Section 16.2; and



- **Site investigations to scope Asset Replacement Works:** undertaking detailed asset and site due diligence to understand the scope of works required for electrification of that site/asset and develop the information required to run an effective procurement process for the replacement works of that site/asset such as:
 - finalising technology selection in accordance with detailed user requirements;
 - understanding scope of work to remove existing gas asset;
 - understanding scope of works required to accommodate replacement technology (i.e., any work to extend plant room);
 - understand scope of work required to install replacement technology; and
 - developing understanding of other asset/site characteristics that will affect the scope of work and costs.

Cost estimation

The Program Team may procure a technical advisor to assist with additional cost estimates and updates of business case cost estimates to reflect new site/asset data gathered.

Programming

The Program Team may procure a technical advisor to assist with the programming aspects of the Program such as:

- developing program for individual replacement works; and
- developing, monitoring and updating the Program of Works based on updated information and progress of the Program delivery.

15.2.4 Probity

A probity advisor may be required to monitor and advise on the Program's procurement to ensure transparency and fairness throughout the process. The probity advisor will be responsible for planning and implementing procedures and frameworks that drive a robust procurement process, ensures integrity in procurement practices and conduct, and minimises probity related risks.

15.2.5 Transaction Management

The Program Team will be responsible for the transaction management relating to the Program. The Program Team may engage other advisors as required.

15.2.6 Stakeholder Management and Communication

The Program Team will be responsible for stakeholder management and communication, including the development of the detailed Communication and Engagement Plan. External stakeholder management will be undertaken by the communications team within the Program Team. The Program Team may engage other advisors as required.

15.2.7 Environment and Sustainability

The Program Team will be responsible for the environment and sustainability impacts/considerations relating to the Program in collaboration with EPSDD. The Program Team may engage other advisors as required.



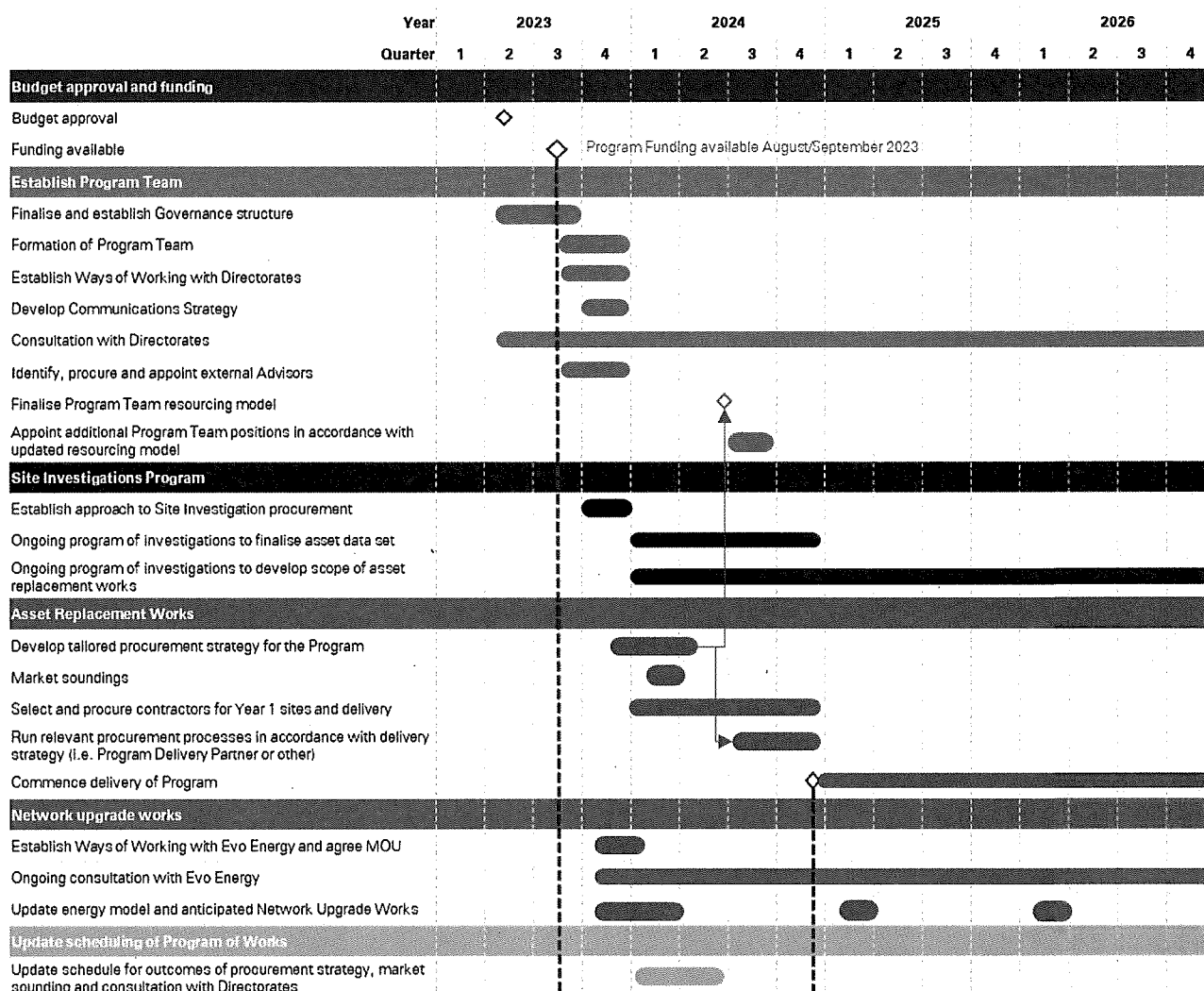
16 Program Development and Mobilisation

This Section sets out the potential next steps to progress the Program including:

- mobilisation activities to establish the Program Team;
- procuring a range of asset and site investigation services;
- developing, testing and mobilising an appropriate delivery strategy for the asset replacement works;
- establishing working relationship with Evoenergy; and
- updating the schedule for the Program of Works based on additional information.

A high-level overview and indicative schedule of the Program development and mobilisation activities is set out in Figure 46.

Figure 46 - Indicative schedule of Program development and mobilisation activities



16.1 Establish Program Team

Table 52 sets out the mobilisation activities required to establish the Program Team.

Table 52 – Mobilisation activities to establish Program Team

Activity	Participants	Description
Finalise and establish Governance Structure	MPC	- Confirm Governance structure. - Draft and formalise Terms of Reference of the Designated Project. - Appoint key members and establish key bodies of Governance Structure. - Formalise and document required delegations.
Formation of Program Team	MPC	- Identify and appoint key members of Program Team. - Allocate initial Program Team resources and positions.
Establish Ways of Working with Directorates	Program Team and Directorates	- Work with each Directorate to understand preferred ways of working. - Draft and agree Memorandum of Understanding documenting preferred ways of working including appointment of allocated Directorate resources to Program Team (if relevant), meeting schedule and communication channels.
Develop Communications Strategy	Program Team	- Develop a centralised communications strategy for the Program. - Consult with Directorates on communications strategy for facility users.
Commence consultation with Directorates	Program Team	- Commence consultation with Directorates with assets scheduled for initial tranche to understand scheduling issues, facility issues and user requirements for each asset/site. - Consultation with Directorates to understand capital works program and effect these may have on the Program (i.e., redevelopments, divestments, demolishing).
External advisors	Program Team	- Confirm the external Advisors required for initial stages of Program delivery (as discussed in Section 15). - Procure and appoint required external Advisors.
Finalise Program Team Resourcing Model	Program Board	- Based on outcome of Delivery model strategy (see section 16.3.1 below), finalise resourcing requirements for Program Team and update Program Team resourcing model for endorsement by Program Board. - Identify and appoint additional resources in accordance with updated resourcing model.

16.2 Site Investigations Program

As discussed in Section 7.1, further asset and site investigations and due diligence will be required to:

- **Complete asset data set:** as discussed in Section 7.1.2, there are several assets that require further investigations to ascertain asset information required for the purposes of scheduling and cost estimates. This will require additional site investigations and asset audits to gather the additional data required. At this stage it is likely that an additional 127 site investigations will be required to complete the asset data set. This could include a book value assessment for the purposes of calculating impairment/accelerated depreciation for the replaced assets; and
- **Site investigations to scope asset replacement:** undertaking detailed asset and site due diligence to understand the scope of works required for electrification of that site/asset and develop the information required to run an effective procurement process for the replacement works of that site/asset. Each site that is scheduled for asset replacement in the initial tranche will likely need further investigations to understand scope of work, which will roughly require an additional 59 to 79 site inspections and development of a site report to document the scope of work (as outlined in Table 24).

The risk workshop noted the importance of gathering accurate and complete data on the assets to be replaced in advance of undertaking project scoping or replacement works procurements as an important mitigation for a number of Program risks.

Noting the scale of the site investigation and data gathering activities, a coordinated and centralised approach to procuring and managing site investigations will need to be developed. The benefits associated with a centralised site investigation approach include:

- procuring these services in large volumes can leverage economies of scale and delivery value for money;



- a consistent approach to data gathering will be important to ensure an accurate and consistent data set is gathered; and
- the site investigation program can be implemented in a way that supports the Program delivery schedule (i.e. site investigations can be ordered to prioritise those assets that will affect the Program delivery schedule).

16.3 Program of Asset Replacement Works

16.3.1 Develop Tailored Delivery Strategy and Market Soundings

As outlined in Section 10.5.1 and Section 10.5.2, undertake the following activities:

- develop a tailored delivery strategy; and
- undertake market soundings.

16.3.2 Initial Projects

- As noted in Section 7.3, three sites have been identified as Year 1 sites. Delivery of the replacement works selected for Year 1 can be used to: test the delivery models;
- gather market tested pricing to test existing cost estimates;
- gain better understanding of scope of works required for the Program of Works;
- test the efficiency and functionality of other Program processes and structures such as delegations and decision making, ways of working, technology selection; and
- allow lessons learnt to be incorporated into delivery strategy.

16.3.3 Understand User Requirements

As discussed in previous Sections, the Program covers a broad range of assets replacements at a diverse range of facilities with different users and user requirements. The Program Team will need to develop an understanding of each Directorate's user requirements for the asset replacement works to ensure the new electric asset replacements satisfy the requirements of the facility, Directorate and end users.

Developing an understanding of user requirements will require consultation with Directorates.

16.3.4 Confirm Technology Selection

Section 7.1 discusses the approach taken to identify the appropriate replacement technology for the purposes of developing asset replacement costs for this business case. As noted in Section 7.1, further work will be required following this business case to finalise the assessment of each asset and determine the actual replacement technology.

Monitoring and adjusting technology selection will be an ongoing exercise for the Program Team as additional information becomes available and technology options improve over the life of the Program.

Following establishment of the Program Team, an exercise to confirm the technology selection will need to be undertaken based on the additional asset investigations, a firm understanding of Directorate user requirements is developed and further market consultations are undertaken as part of the market sounding process.

16.3.5 Commence Procurement Activities

Once the activities in the previous sections have been completed and a delivery strategy for the Program has been confirmed, the Program Team will be able to kick off the procurement processes required to deliver the Program. Depending on the delivery model strategy outcomes, this may require running procurement competitions to establish a panel of providers or running multiple competitions for select packages of multiple projects.

16.4 Establishing Working Relationship with Evoenergy

Table 53 sets out the activities required to progress the Network upgrade works.

Table 53 – Activities to progress Network upgrade works

Activity	Participants	Description
Establish Ways of Working with Evoenergy	Program Team and Evoenergy	- Work with Evoenergy to understand preferred ways of working, define responsibilities and agree streamlined process for network upgrade requests related to the Program. - Draft and agree Memorandum of Understanding documenting preferred ways of working including meeting schedule and communication channels.
Agree arrangements in relation to dedicated Evoenergy resource	Program Team and Evoenergy	- Discuss and agree level of support required from Evoenergy including embedded Evoenergy resource on Program Team (see section 14.1.2 for discussion on level of engagement with Evoenergy including benefits of a dedicated Evoenergy resource). - Agree commercial arrangements and cost of embedded Evoenergy resource.
Undertake energy model alignment review	Evoenergy and Program Team	Program Team and Evoenergy to review energy model to align understandings of capacity and required upgrades.

16.5 Update Scheduling of Works

Over the life of the Program, the scheduling of works will require ongoing monitoring and regular updates to reflect updated information and understanding of the works required and understanding of Directorate's user requirements and facility availability issues. Monitoring and updating the schedule of works was flagged as an important mitigation to several risks in the Risk Workshops to manage potential scheduling and delay issues.

Regular updates to the schedule to reflect updated information will be required, particularly in the early stages of the Program as additional information is gathered. The first schedule updating exercises should be undertaken once:

- the additional site investigations are being undertaking and additional asset data becomes available to allow for the assets with missing information to be scheduled appropriately;
- Directorates have been consulted to understand their requirements for scheduling, asset downtime and other planned capital works;
- the delivery model strategy is complete;
- more certainty on costs and time to complete projects is reached; and
- there is a better understanding of market capacity to deliver the projects.

APPENDICES



17 Appendices

Appendix A – Investment Logic Map

Appendix B – Wellbeing Impact Assessment

Appendix C – Program Risk Register

Appendix D – Technology Options

Appendix E – Indicative Program of Works

Appendix F – Glossary

Appendix G – Capital Cost Estimates

Appendix H – Evoenergy Connections Policy

Appendix I – Program Map

Appendix J – Business Costing Summary



ACT
Government



PROBLEM

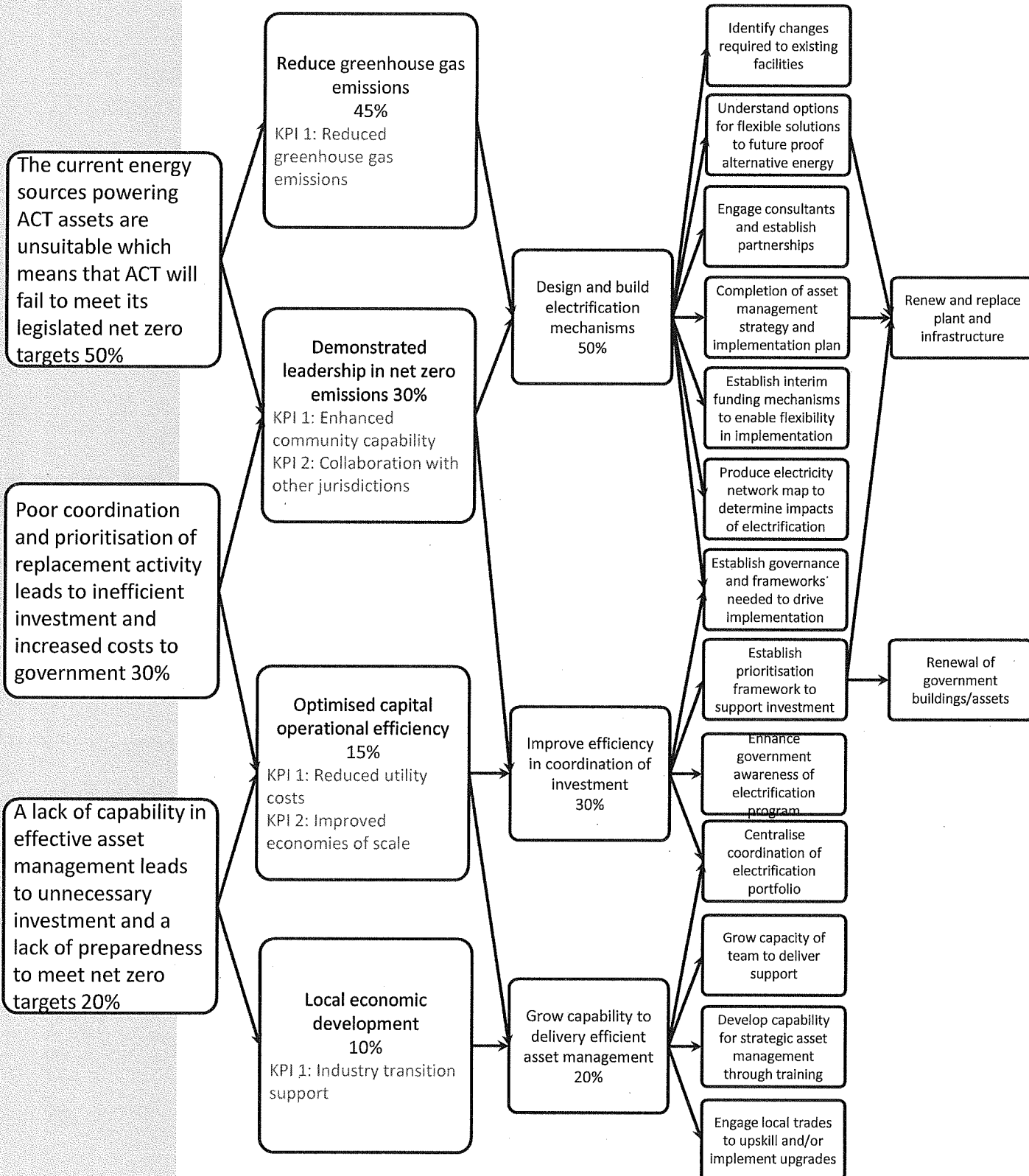
BENEFIT

RESPONSE

SOLUTION

CHANGES

ASSETS



WELLBEING IMPACT ASSESSMENT

Electrification of Government Gas Assets							EPSDD
Purpose of proposal The proposal seeks funding to commence a program of works for the replacement of heating and hot water gas assets across all ACT Government owned and operated sites with electric technology. This program of works will support the Government in meeting its target of reaching net zero emissions from Government operations by 2040.							
Impact description The proposal will have a direct impact on climate change by actively contributing to reduced greenhouse gas emissions from Government operations, resulting in better environmental outcomes for the ACT. The reduction in greenhouse gas emissions as a result of the delivery of this program of works will have a significant positive impact on the wellbeing of those who live and work in the ACT and surrounding regions. The impacts described above will have a sustained and lasting impact on reduced greenhouse gas emissions, resulting in subsequent wellbeing benefits from the improved environmental outcomes achieved. Over the forward estimates, this proposal will achieve an estimated reduction in greenhouse gas emissions of 4.01 kt CO₂-e / year in ACT Government greenhouse gas emissions. Over the life of the program (to 2040), emissions by 25.26 kt/CO₂-e per year from 2021-22 levels. The energy transition will contribute to positive impacts on community welfare through contributing to the global effort to curb climate change through cutting emissions from gas. The energy transition requires enormous investments in electrification of assets that currently rely on a fossil-fuel based energy source. The energy transition across the ACT will require strong market capacity in the relevant trades to support the works required to transition ACT Government, household and commercial premises to electric. As a first-mover towards zero-emissions government assets through this Program, the ACT Government will create early market demand for the services, technology and trades required to support the whole of Territory transition required to reach net-zero. Undertaking this work as a whole-of-government program will give the market confidence in the future pipeline and encourage investment in mobilising additional market capacity. This growth in market capacity will: • create early demand for the equipment and services required to transition the Territory from gas to electricity; • promote creation of high-value local jobs in the net-zero economy; • encourage re-training of labour resources in existing industries (such as gas plumbing) to support growth in electrification sector; • increase demand and output across other economic sectors such as construction and manufacturing and will have a positive effect on the Territory economy; and • build capacity and expertise in the ACT and potential to export this expertise to other jurisdictions, such as NSW and Victoria, as they progress through their own energy transition. The Program supports Canberrans' desire for the ACT Government to be a world leader in climate action and zero emission transitions. The ACT Government has committed to transitioning from fossil fuel gas. The electrification of Government assets can be expected to reduce the Government's energy costs in the longer term, while reducing the amount of carbon dioxide released through natural gas consumption. As a first mover in this space, the ACT Government will serve as a pathfinder and example for other jurisdictions as they begin their own programs to achieving zero-emissions targets. This may result in the adoption of new technology in the ACT ahead of other jurisdictions and with it, skill development for local industry and drive growth. Further, through development of a credible pathway for like asset electrification, the Government's efforts may result in lower cost transition for business, who can be expected to electrify over time.							
Who is affected? • The proposal impacts the entire ACT community through environmental benefits achieved from the reduction of greenhouse gases. • The proposal will also drive change in the community by demonstrating clear Government leadership in working towards a realistic future of net zero emissions.							
Aboriginal and Torres Strait Islander Peoples	Carers	Children and young people	Culturally and linguistically diverse people	LGBTIQ+ people	Older Canberrans	People with disability	Across gender
☐	☐	☐	☐	☐	☐	☐	☐
Wellbeing domain Environment and Climate Noted impacts on Economy							
Timeframe Five years plus							
Evidence base and data							

WELLBEING IMPACT ASSESSMENT

In the development of this business case, two Investment Logic Workshops (ILWs) were undertaken on 20 December 2022 and on 20 January 2023 with representatives from Environment Planning and Sustainable Development Directorate (EPSDD), Chief Minister, Treasury and Economic Development Directorate (CMTEDD), Major Projects Canberra (MPC), Office of Climate Action (OCA) and facilitated by KPMG. During the workshops an Investment Logic Map (ILM) was developed which identified three problem areas, the strategic responses to the problems and the associated benefits that will be realised by addressing the problems.

Problem 1 - Risk of not meeting legislated net zero targets

The detrimental effects of climate change are well researched and documented. The ACT Climate Change Strategy (2019 to 2025) highlights the four most significant impacts of climate change on the ACT over the coming decades, including:

- Increased frequency and severity of bushfires;
- Longer, hotter and more frequent heat waves;
- More frequent and prolonged periods of drought; and
- More frequent and severe storms, including flash flooding and violent winds.

Each of the above impacts will have a severe impact on the ACT community and action is required to mitigate the potential impact of such events (as a result of climate change) to improve wellbeing outcomes for the entire ACT community.

A key priority outlined in the ACT Climate Change Strategy is ACT Government leadership, including becoming net zero emissions from Government operations by 2040. ACT Government operations account for around 7% of total fossil fuel gas emissions in the ACT, responsible for natural gas used across schools, hospitals and other ACT Government buildings.

This Program addresses emissions from gas, the second largest source of ACT Government emissions. The ACT Government is taking a proactive step to address reliance on fossil fuel gas by committing to transition all Government assets from gas to zero emission electricity. The ACT Government is leading by example as this transition from gas to electricity will require active participation from the whole community and the Program will create the pathway for private and business premises transitions.

To mitigate these impacts and improve wellbeing outcomes, the ACT Climate Change Strategy sets a path towards achieving net zero emissions by 2045. A key component of the strategy is to transition to all-electric Government buildings by 2040, which this proposal will deliver.

Problem 2 - Poor coordination and prioritisation of replacement activity

The replacement of the gas assets used across Government buildings will impact every ACT Government Directorate and several government agencies using the affected facilities. Currently, each Directorate is responsible for the maintenance and capital replacement of their asset portfolio including gas assets. Each Directorate is given funding to maintain and manage its asset portfolio which has resulted in each Directorate developing its own approach to asset management, maintenance and renewal and risk management. An asset replacement task of this scale has not been previously undertaken by the ACT Government, and as noted in the ILM there is currently a lack of capability to efficiently deliver the required program of asset replacement that spans multiple sectors and portfolios.

Problem 3 - Lack of capability of effective asset management

The third problem identified in the ILM relates to the current lack of capability in effective asset management across the ACT Government which could result in unnecessary investment and a lack of preparedness to meet net zero targets. Over 30% of government-owned gas assets with known asset lives have either reached or exceeded their asset life, and 50% are within 3 years of life expiry. This poses operational and potential financial risk in the short-term to the delivery of public services, as expired assets are more prone to failure and increases the potential risk of needing to replace like-for-like gas assets in the event of asset failure.

The specific datasets used to measure the impacts of this business case are outlined in the *Measures of Success* section of this Assessment.

Collaboration and Engagement

- **Key internal collaborators:** The Chief Minister, Treasury and Economic Development Directorate (CMTEDD), Environment, Planning and Sustainable Development Directorate (EPSDD), Major Projects Canberra, , Office of the Coordinator General for Climate Action (OCA), ACT Education Directorate, ACT Health, Canberra Health Service, ACT Property Group, Justice and Community Safety Directorate (JACS), Community Services Directorate (CSD), Cultural Facilities Corporation (CFC) and Canberra Institute of Technology (CIT).
- **Key external stakeholders:** Evoenergy, Worksafe ACT, Design and installation providers, equipment suppliers, facility users, relevant unions and the broader ACT community who will be informed of the progress of the program.

Measures of Success

How will Government know this proposal has been successful?

This proposal will be successful if it achieves the outcome of replacing all gas-powered assets currently being used within ACT Government owned and operated buildings, reducing Government's greenhouse gas emissions and contributing to net zero emissions by 2040.

The success of the program will be measured against the benefits and KPIs identified in the Investment Logic Map in [Appendix A](#).

WELLBEING IMPACT ASSESSMENT

specifically:

1. Reduce greenhouse gas emissions
 - a. KPI1: Reduced greenhouse gas emissions
2. Demonstrate leadership in net zero emissions
 - a. KPI 1: Enhanced community capability
 - b. KPI 2: Collaboration with other jurisdictions
3. Optimised operational efficiency
 - a. KPI 1: Reduced utility costs
 - b. KPI2: Improved economies of scale
4. Local economic development
 - a. KPI 1: Industry transition support

This proposal makes provision for ongoing collection of data and information that will be essential for monitoring and assessing that the proposal's outcomes and consequent wellbeing impacts are achieved. This data will also inform essential policy work to ensure that outcomes and wellbeing impacts are sustained and, where possible, enhanced.

Measuring benefits 1a (reduced greenhouse gas emissions) and 3a (reduced utility costs) will be tracked quantitatively through the ACT Government's Enterprise Sustainability Platform (ESP), which is administered by EPSDD Zero Emissions Government program. The ESP houses all ACT Government utility billing and consumption data. At the end of years 2 and 4 of this program, an analysis of the projected costs and emissions savings of each upgrade will be undertaken against results recorded in the ESP. The results of this evaluation will inform an update of the Program of Works to reflect reported costs and emissions savings. ESP has operations data back to 2012 and will have sufficient baseline data from which to measure any changes resulting from this proposal.

The remaining benefits and KPIs relate to interactions between this program and key external stakeholders:

- a. Industry (related to capital works for the electrification projects)
- b. Groups that may wish to emulate ACT's electrification process (community and other jurisdictions)

Measuring the impact of these benefits will require a qualitative approach which determines how stakeholder behaviour and (in the case of industry) business decisions have been impacted by this proposal. This evaluation will involve direct engagement with external stakeholders in year 1 of the project to establish a baseline for their level of engagement in electrification activities and a secondary review in year 4 to determine whether a change in behaviour have occurred. These results will also be used to adjust the Program as it progresses towards its 2040 target.

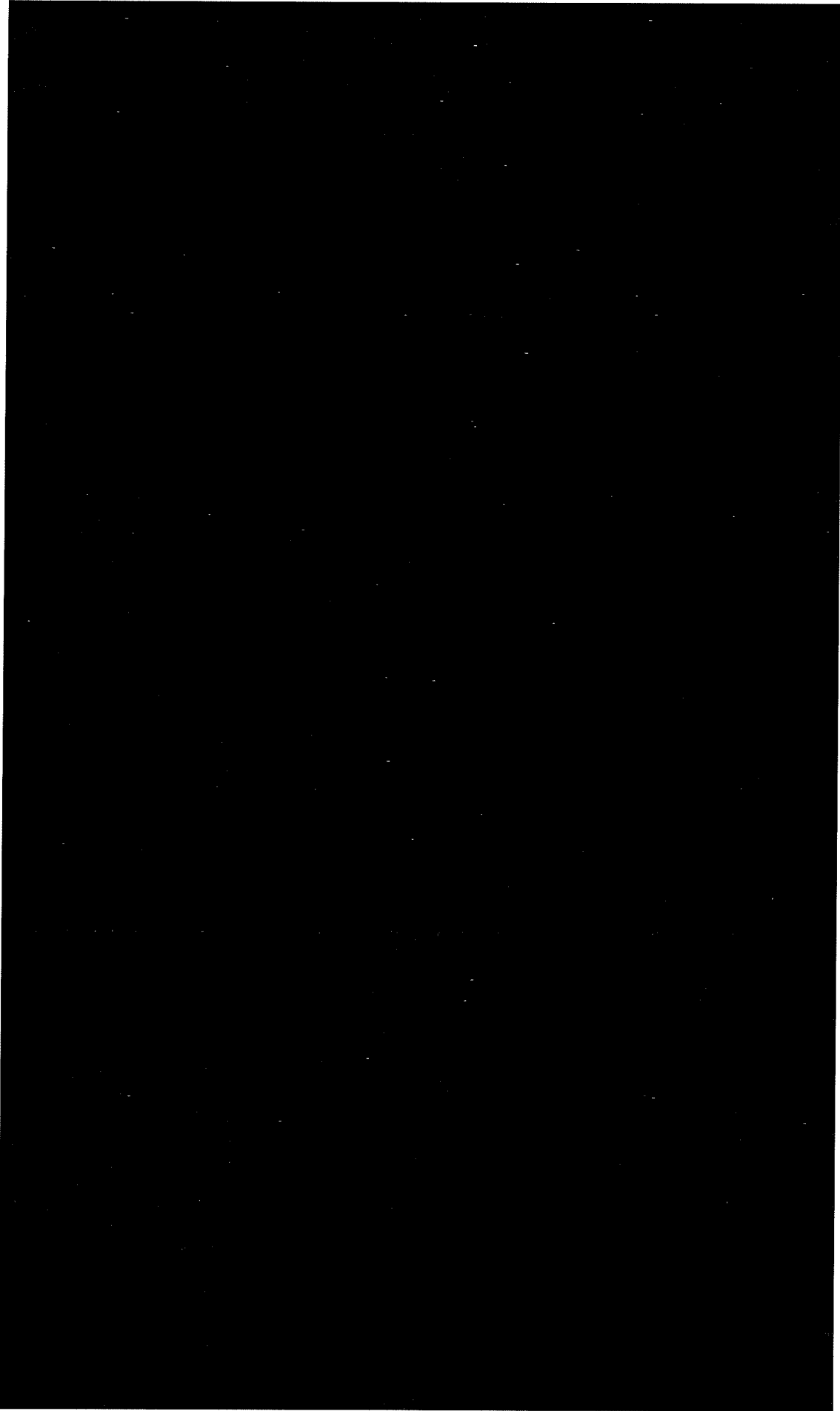
A market sounding process will involve targeted consultation with selected participants, such as existing providers in the ACT and NSW markets, to obtain market feedback on the Program delivery. The market sounding could be used to:

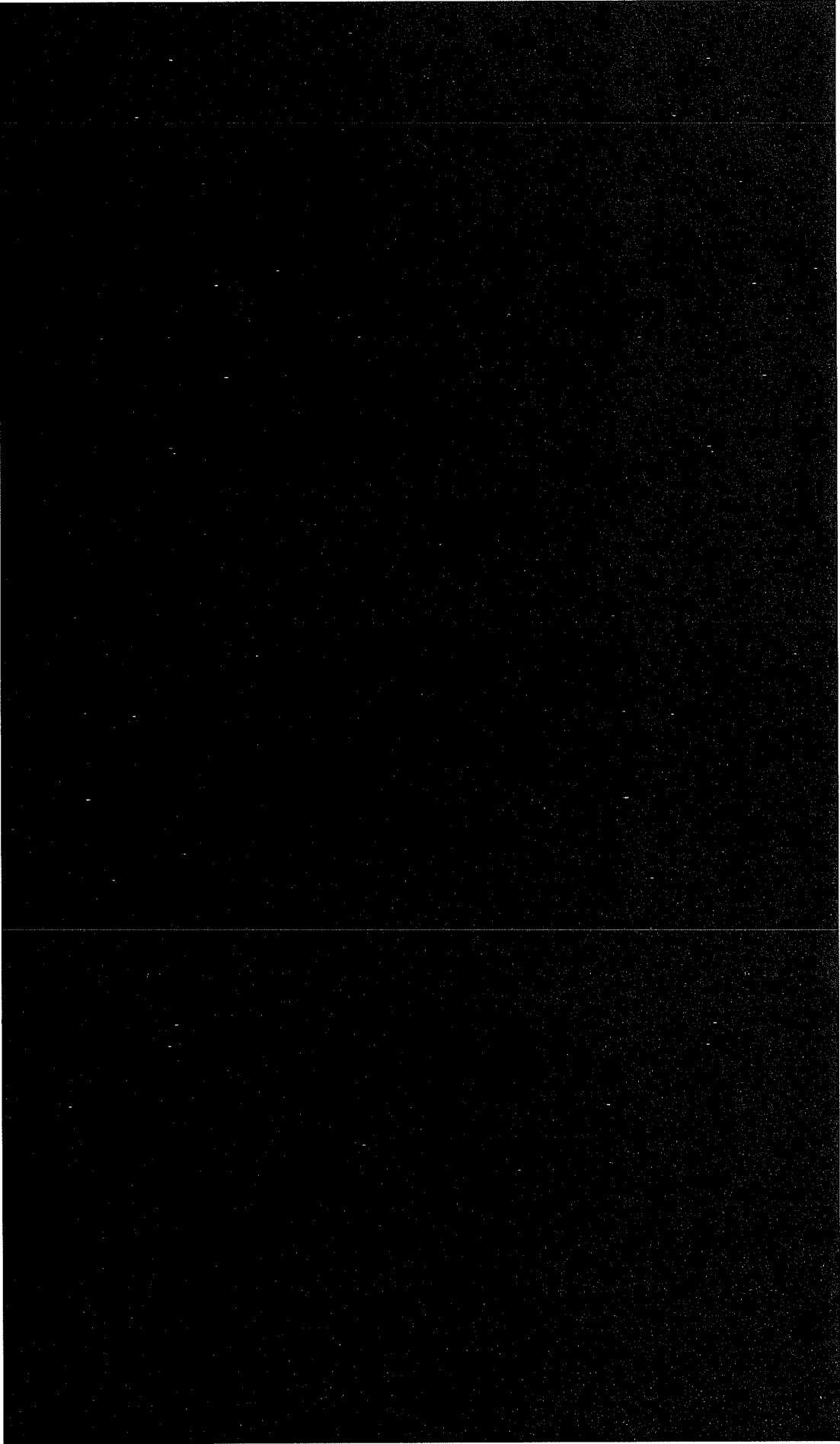
- develop an understanding of market capacity, constraints and opportunities in relation to delivery of the asset replacement works; and
- seek market feedback on the Program including identifying challenges and opportunities;
- test the market interest and views on the Program works and identify areas that could be optimised to increase market interest;
- optimising the structure of the delivery model and testing the commercial terms; and
- benefit from market experience and lessons learned from other recent relevant projects.

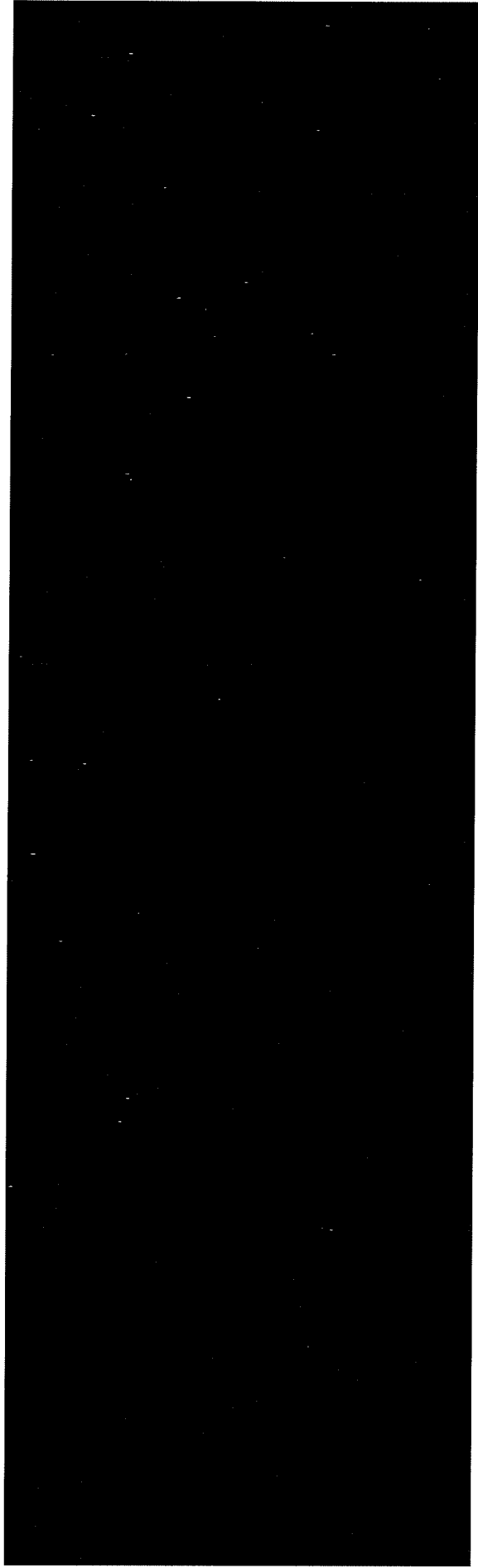
The outcomes of the market sounding can be used to feed into the delivery model strategy and the updates to the schedule for the Program.

The specific measures used determine success cannot be established until the Project Team has been established and the program delivery approach, particularly procurement, has been finalised. This will occur in year 1 of the program.

A formal performance and accountability framework for this project will be developed in year 1 by the Project Team in consultation with EPSDD Zero Emissions Government team. The Framework will be developed line with the ACT Government Evaluation Policy and Guidelines and presented to the Project Board for consideration and approval. All evaluation results will be presented to the Project Board for review.







ACTIA
Fédération Française des Associations de Transporteurs

Priority	Indicative Estimation	Priority for Action Plan	Indicative Action Plan	A-Chemistry for Action	Options/Considerations
High	1000000000	1000000000	1000000000	1000000000	1000000000
Medium	1000000000	1000000000	1000000000	1000000000	1000000000
Low	1000000000	1000000000	1000000000	1000000000	1000000000

	High Control Effectiveness
Control Effectiveness	Goal Control is well designed and operating effectively, meeting the risk levels of the risk. All control components and underlying activities are correctly designed, properly implemented and monitored, and the existing controls, controls are largely effective and all management policies and procedures are followed.
Reason for Inappropriate	Control deficiencies have been detected, show no overall controls are designed and implemented effectively addressing the risk levels of the risk. Some problems are correct and all controls are largely correct. There are opportunities to improve the implementation of some controls to improve overall effectiveness.
Inadequate	Significant control deficiencies exist. Some controls do not meet the risk levels of the risk. Control effectiveness is low. It may not be adequate. Management has the opportunity to improve the control design and the control design may be inadequate for the risk level.

1. To help achieve the effectiveness goal in section 4 of 2.00.
2. Complete a "Plan" and to include the first priority in the next morning's 15-minute time slot every week. However, the one you may have the greatest impact on the next day.
3. Let others know what is in the plan at the end of the day.
4. Review the plan, and make sure it is complete and correct by the end of the day.

LISTS		LISTS	
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	Highly toxic	Very	Moderate	Minor	Non-toxic
Almond leaves	Medium	High	High	Medium	Medium
Alfalfa	Medium	Medium	High	High	Medium
Barley	Medium	Medium	Medium	High	Medium
Buckwheat	Medium	Medium	High	High	High
Chickpea	Medium	Medium	Medium	Medium	High

on point
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moderate
many
celebrate

Technology Overview

This section provides an overview of the electric-equivalent technologies used to replace gas assets. The technology selection methodology aimed to closely match the existing asset capacity to ensure sufficient capacity was provided (e.g. space heating or domestic hot water).

For the purpose of business case, a one-to-one replacement was used, given the current information available on each asset. However, this should be tested during the planning and design stages for the Program.

Various sources of information were used, including publicly available information and direct quotes from suppliers.

Additionally, this appendix also includes a refrigerant section outlines some performance parameters of different refrigerants and key considerations in the selection process. While all refrigerants have been considered, assets using natural refrigerants have been included in the business case analysis as they:

- Better align with decarbonisation program and as certain synthetic refrigerants are being phased down (in Europe) inclusion of assets using synthetic refrigerants may result in additional scrutiny on the Program;
- They are typically more expensive in terms of capital costs (in the region of 30% to 50%) as plant equipment needs to be designed specifically for pressure and temperature, however this initial investment has an ongoing return as natural refrigerant gases have excellent thermodynamic properties and are more efficient to operate. Therefore, this assumption provides a more conservative cost estimate (a sensitivity has been included in the business case); and
- Natural refrigerants have higher Coefficient of Performance (COP) under very low temperatures, have a lower Global Warming Potential (GWP) and improved longevity as many synthetic refrigerants and some carbon-fluorine bonds (in Europe) are progressively being phased out. Synthetic refrigerants that are scheduled to be phased out (or phased down) may require costly retrofitting later.

Heat Pumps

Heat Pumps are equipment that use the refrigeration cycle to transfer heat between two mediums. In heating mode, heat is transported from a lower temperature source (e.g. water or air) into a higher temperature sink (e.g. water or air). The heat sink is the medium where heat is released to.

Generally, heat pumps have four major components: evaporator, compressor, condenser, and expansion valve. Additionally, systems are supported by several ancillary components to control and operate individual components.

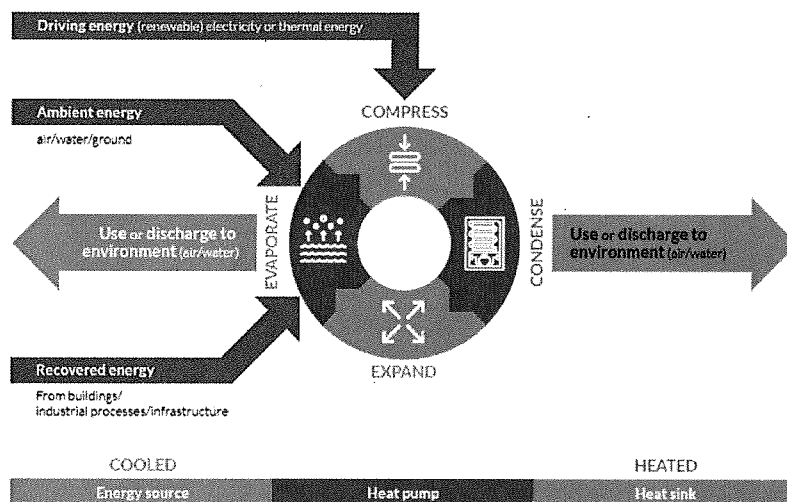


Image Source: Energy Efficiency Council, the role of heat pumps in saving energy and cutting emissions report.

Heat transfer can occur across multiple mediums, directly from the air to air (known as air-to-air heat pumps), air to water to generate heating hot water (air-to-water) or water-to-water systems (water-to-water). The applicability of each technology option depends on site-specific circumstances (e.g. space availability, proposed locations, heating and domestic hot water requirements).

For instance, the location of air-source heat pumps is particularly important as these systems require access to fresh air. Installing these devices in plant rooms with limited access to fresh air can impact the system's efficiency. Water-source heat pumps require access to water with sufficient heat capacity (e.g. access to rejected heat from cooling processes).

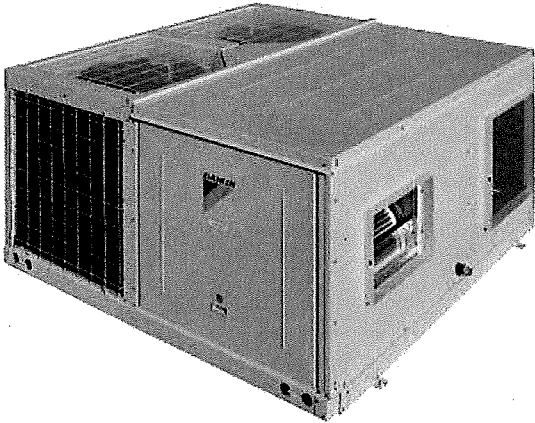
Heat pumps can operate in multiple modes: heating-only, cooling-only, or heating and cooling with an option for heat recovery, as described below.

- *Heating-only or cooling-only:* These constitute the simplest configurations and contain the four basic elements described previously. In cooling-only mode, the evaporator serves indoors. In heating-only mode, the condenser serves the indoors.
- *Reverse cycle (heating & cooling):* In this configuration, units contain a four-way valve arrangement that allows refrigerant flow reversal. Therefore, these systems provide cooling and heating, although not simultaneously.
- *Heat recovery units:* These systems can provide heating and cooling and can do so simultaneously by rejecting heat from the cooling circuit into the heating circuit.

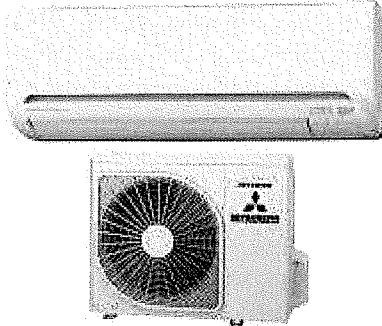
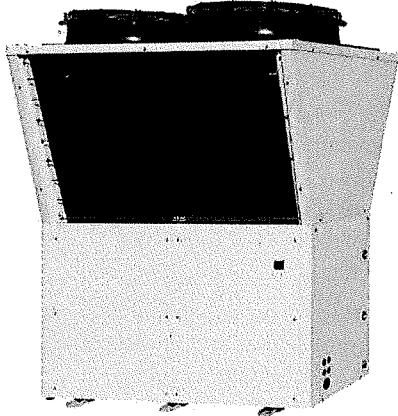
This business case focuses on identifying a replacement for only heating. The following tables provide an overview of the technologies considered during the technology selection process and outline each model's performance characteristics, focusing on selecting technology for heating.

The information on Coefficient of Performance (COP) and capacity range replacement listed in the tables only describe a particular model's performance. This approach was used to provide consistency in the calculations by assuming some aspects of the technology performance.

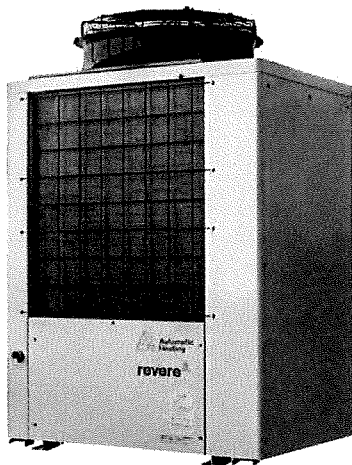
Table 1 Overview of heat pump models used to replace gas assets.

Package AC Unit  Image Source: Daikin	Specifications: Mode: Reverse cycle. Heat Pump Type: Air-to-air Duty: Space conditioning COP: 3.3 Capacity Range Replacement: 15 to 35kW. Refrigerant: Synthetic refrigerant. Refrigerant: R-410A .However, various options are available in the market with varying Global Warming Potential for this technology. Application: • Package units of varying capacities were used to replace gas assets of smaller capacities (under 35 kW) for space heating. • This unit is a self-contained system with all individual elements contained in one unit. • For the purpose of the business case, the model used for the analysis is UAYQ120CY1A by Daikin from publicly available information. • However, multiple brands are available in Australia for commercial applications, and a more detailed analysis is required during the planning and design phases.
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Appendix E – Technology Options

Split System  Image Source: Mitsubishi	Specifications : Mode: Reverse cycle. Heat Pump Type: Air-to-air Duty: Space conditioning COP: 3.8 Capacity Range Replacement: 1 to 15 kW. Refrigerant: Synthetic refrigerant. Refrigerant: R32. However, various options are available in the market with varying Global Warming Potential for this technology. Application: • Split systems were selected to replace gas assets with small capacities (1-15 kW). • The system is split into two units, with the evaporator and condensers physically separated but interconnected via refrigerant pipework. • The model SRK50ZSA-W by the Mitsubishi Heavy Industry series was used from publicly available information for the business case. • However, multiple brands are available in Australia for commercial applications, and a more detailed analysis is required during the planning and design phases.
CO₂ Air to Water Heat Pump  (76 kW model)	Specifications: Mode: Heating only. Duty: Space Conditioning and Domestic Hot Water Heat Pump Type: Air-to-water. Capacity Range Replacement: 35-185 kW Supply Water Temperature: 65-90 °C. COP: 3.9 Refrigerant: CO₂ (R744) Global Warming Potential: 1 Application: • This technology was used to replace gas assets of capacities from 35 kW to 185 kW. • Systems can be used for space heating and domestic hot water applications. • Hot water can be supplied to temperatures up to 90 °C. These duties can be combined into a centralised system. • Units are modular so that capacities can be increased to larger orders of magnitude. • CO₂, as a refrigerant, has a low GWP and is not flammable. It can achieve higher performance in low outdoor temperature conditions.

Appendix E – Technology Options

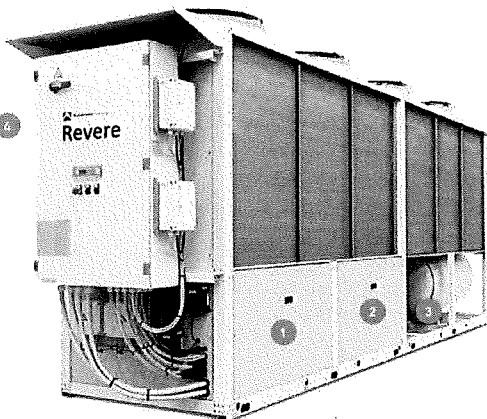
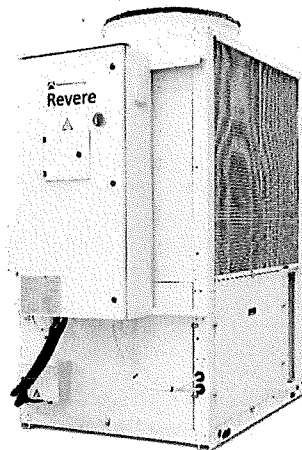


(35 kW model)

Image Source: Automatic Heating

- Maintenance costs might increase depending on the number of individual heat pumps required, and the system operates at higher pressures.
- Units need to be located on the roof or outdoors (e.g. site enclosures) as they require access to fresh air.
- These systems suit Australian conditions as they can operate from -5°C. Special units are also available to operate under even lower temperatures (e.g., 15°C to -20°C).
- Systems can be equipped with a defrost option to melt ice, suitable for climates such as Canberra's, where freezing temperatures can be experienced during winter.
- Quiet operation (60 dBa).

Propane Air to Water Heat Pump



(185 and 220 kW model)

Image Source: Automatic Heating

Specifications :

Mode: Heating Only.

Duty: Space Conditioning and Domestic Hot Water.

Heat Pump Type: Air-to-water.

Capacity Range: >185kW

Minimum External Air Temperature: -20°C

Supply Water Temperature: 62°C

Refrigerant: Propane (R290)

Global Warming Potential: 3

COP: 3.45

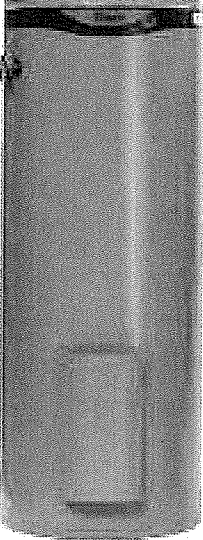
Application:

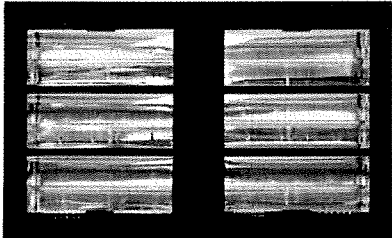
- Units are modular (185 kW and 220 kW each), so capacities can be increased to larger orders of magnitude.
- These systems have specific operating limits. Budget allowances for storage tank vessels have been made to increase system efficiency.
- Units need to be located on the roof or outdoor site enclosures as they require access to fresh air.
- The system is equipped with a refrigerant leak detector. The system will disconnect if a refrigerant leak is detected.
- Duties can be combined into a centralised system.

Electric Resistance Heating

Electric resistance systems have an efficiency of 100% compared to gas-fired appliances (usually between 65%-95%), given 100% of the electricity is converted into heat. Electric resistance can be used for space heating (e.g. electric flow boiler) and domestic hot water applications. For this business case, electric resistance was considered for domestic hot water systems for gas assets with relatively small capacities (under 36 kW).

Table 2 Overview of the electric resistance model used to replace gas assets.

Electric DHW System  Image Source: Rheem	Specifications: Mode: Heating only Duty: Domestic Hot Water COP: 1 Capacity Range Replacement: 1 to 36kW. Refrigerant: NA Application: • This technology was used to replace domestic hot water gas assets of smaller capacities (under 36 kW). • These systems do not require access to fresh air, unlike heat pumps. • There are multiple options available in the market. The units can replace gas instantaneous and gas storage system assets of similar delivery capacity. • For the business case, a model by Rheem was used from publicly available information. • However, more investigation is required to determine the most suitable model and technology based on site-specific parameters such as delivery capacity. • The delivery capacity refers to the volumetric flow rate of heated hot water that can be provided measured in litres per minute (L/min), whereas the heating capacity (kW) is the amount of energy that heats the water. Understanding of facility operations is essential to select the right technology to meet occupant delivery capacity (L/min). • Other design parameters that require further investigation include space availability and existing infrastructure.
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Radiant Electric Tube Heater  Image Source: Herschel	Specifications: Mode: Heating only Duty: Space Heating COP: 1 Capacity Range Replacement: 1 to 33 kW. Refrigerant: NA Application: • This technology was used to replace gas radiant tube heater assets of smaller capacities (33 kW), predominantly at Exhibition Park in Canberra, where two radiant electric tube heaters will replace one gas asset. • These systems do not require access to fresh air, unlike heat pumps. • For the business case, a model by Herschel was used from publicly available information. • However, more investigation is required to determine the extent of electrical upgrades required to the site and how the upgrade may impact facility operations. • Understanding facility operations is essential to ensure the proposed technology is the most adequate considering each property activity. • Other design parameters that require further investigation include space availability and existing infrastructure.
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The next section provides more detail on refrigerants. The selection of refrigerants influences the overall performance of the system. Other key selection parameters include the phasing out of some synthetic refrigerants.

Refrigerants

Due to the phasing down of synthetic refrigerants and some carbon-fluorine bonds (in Europe), natural refrigerants were considered for the electrification upgrades for most of the gas assets. This is due to the life expectancy of installed equipment extending past the phase-out timeframes, which would require costly retrofitting of equipment later should synthetic refrigerants be utilised.

Refrigerants are natural or synthetic heat transfer fluids used to move heat in HVAC systems from a heat source to a heat sink by changing state from a liquid to vapour and then condensing back to liquid. The type of refrigerant used in building HVAC equipment can account for a large portion of the whole-life greenhouse gas emissions, and it is important to minimise leakage and acknowledge the role of refrigerants when transitioning assets from gas to electricity.

Each refrigerant type is provided a Global Warming Potential (GWP) and an Ozone Depleting Potential (ODP) indicator that measures the environmental impact. GWP compares the amount of heat trapped by a certain mass of the gas to the equivalent amount of heat trapped by carbon dioxide, whereas ODP measures how much damage a chemical can cause to the ozone layer compared with a similar mass of trichlorofluoromethane (CFC-11), which has an ODP of 1.0.

Appendix E – Technology Options

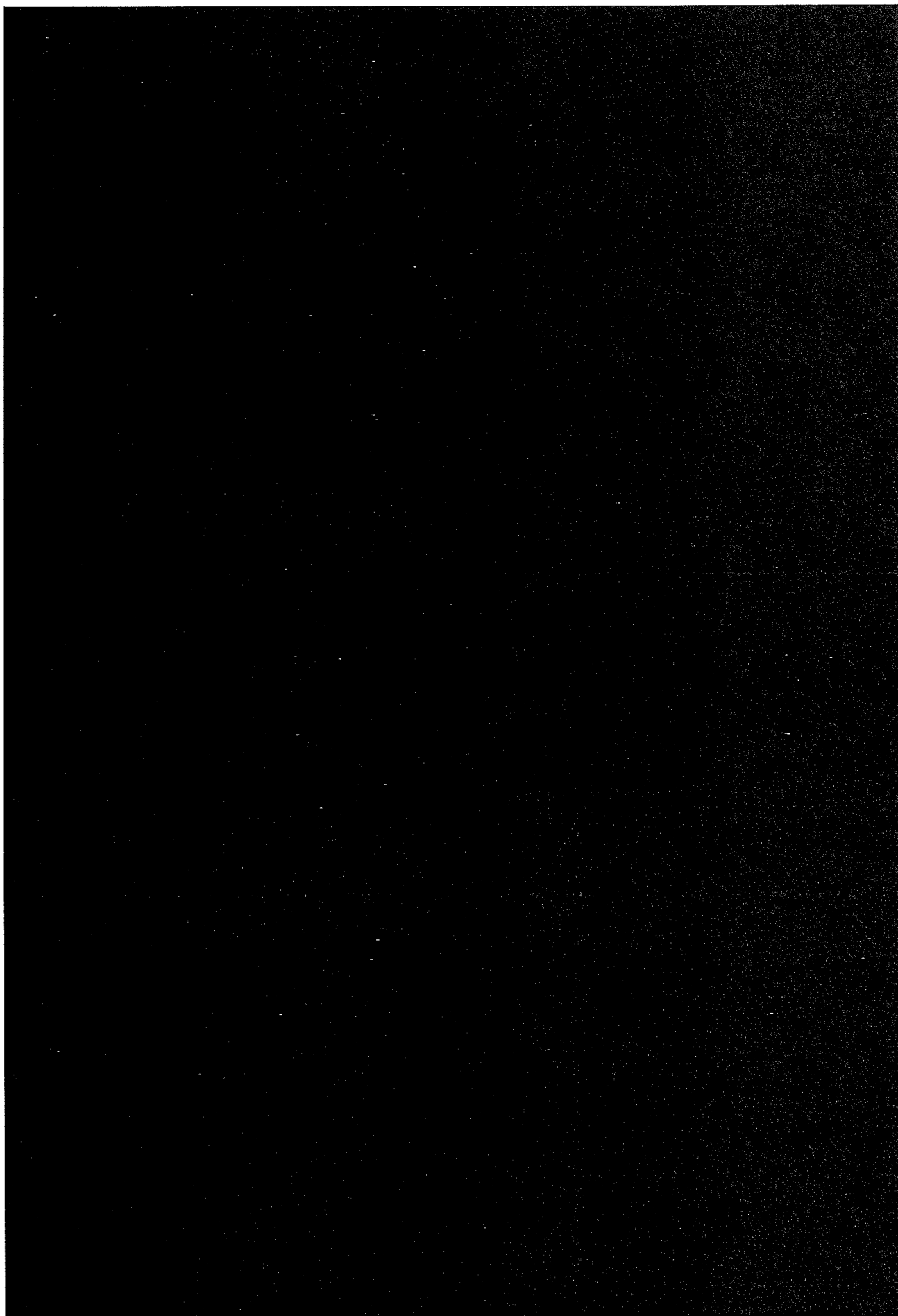
Refrigerants bearing high GWP and ODP were outlawed or are being phased out under the Montreal (1987), Kyoto (1997) protocols, F-Gas law (2015), Paris Accord (2016), and recent Kigali Amendment to Montreal Protocol (2019). Australia has committed to the Montreal Protocol international ban on hydrochlorofluorocarbons (HCFCs) and phase-down of hydrofluorocarbons (HFC) to achieve an 85% reduction in HFCs by 2036. Synthetic refrigerants are being replaced with low or no GWP alternatives, including ammonia, carbon dioxide, hydrocarbons and hydrofluoroolefins (HFO). Natural refrigerants support the move towards sustainability by ensuring refrigerants' safe and efficient application.

The CAPEX costs associated with natural refrigerants are more expensive to outlay (30–50%) as plant equipment must be designed to maintain higher pressures and specific return temperatures. However, this initial investment has an ongoing return as natural refrigerant gases have better thermodynamic properties and are more efficient to operate.

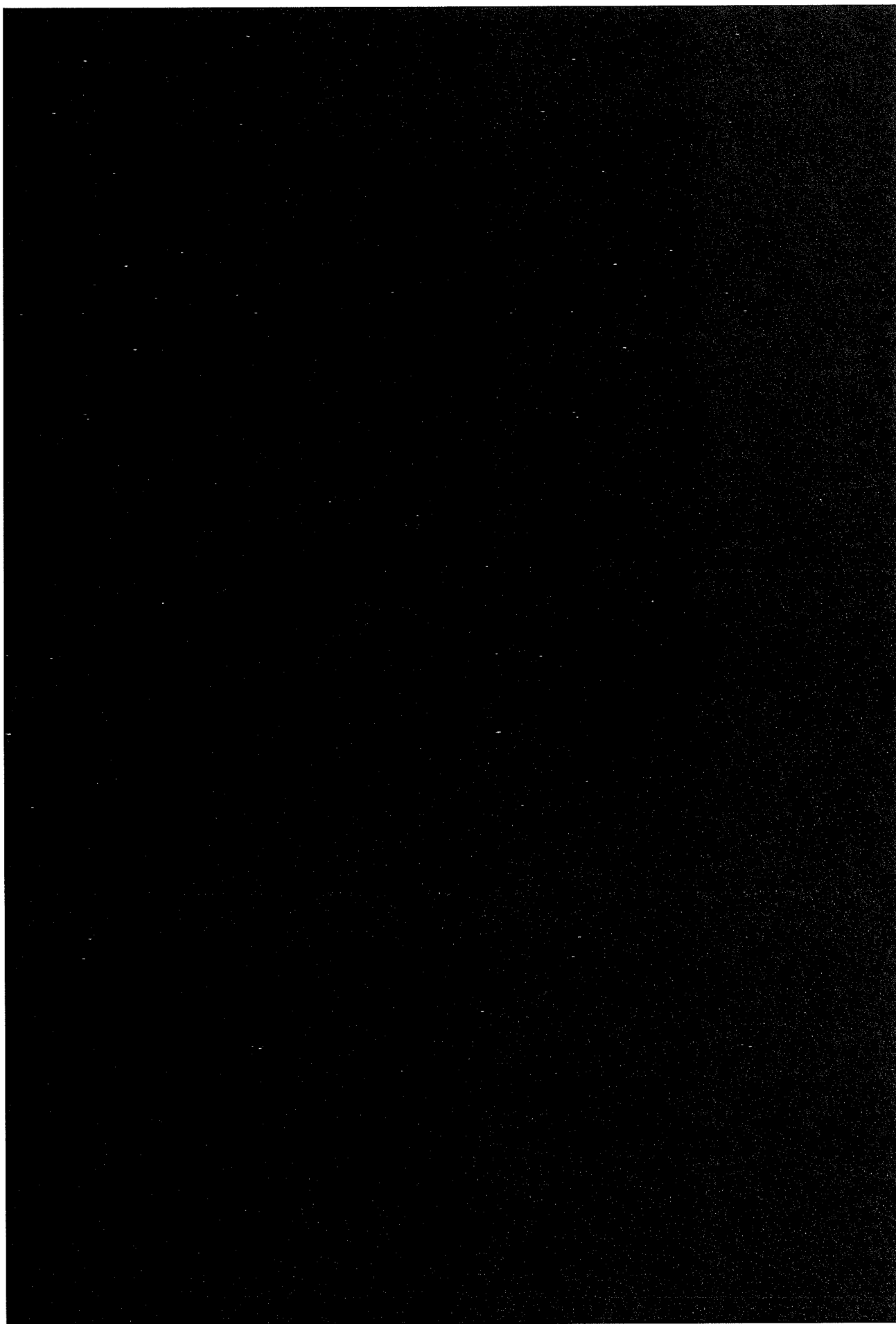
The below table summarises the details of the natural refrigerants used in heat pumps.

Table 3 Details of natural refrigerants for use in heat pumps

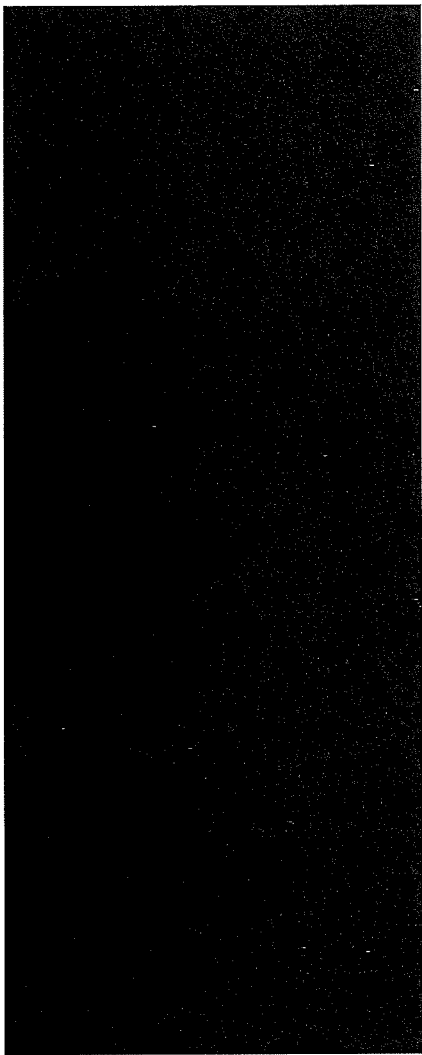
Refrigerant code	Refrigerant name	GWP	Notes	ASHRAE Safety
R-744	Carbon dioxide (CO ₂)	1.0	CO ₂ is a safe, environmentally friendly, and energy-efficient refrigerant that has the potential to replace traditional synthetic refrigerants in a variety of heating and cooling applications.	A1
R-717	Ammonia (NH ₃)	0.0	Ammonia is a highly efficient, low-cost, and environmentally friendly refrigerant that has a long history of use in industrial applications. While it requires careful handling and safety precautions, it is a safe and versatile refrigerant option that is widely used in many cooling applications today.	B2L
R-290	Propane (C ₃ H ₈)	4.0	Hydrocarbons occur naturally in the atmosphere and have a low GWP comparatively to synthetic refrigerants. Propane is the most common HC refrigerant. Propane works with high flow temperatures (75°C in hot water from heat pump is possible) so improves COPs at higher flow temp. Safety measures must be implemented in heat pumps as it is highly flammable, and leaks can cause risk of suffocation. It is a by-product of natural gas processing and petroleum refining and therefore linked to the oil industry.	A3 for all HCs
R-50	Methane (CH ₄)	25		
R-170	Ethane (C ₂ H ₆)	3.0		
R-600	Butane (C ₄ H ₁₀)	3.0		
R-600a	Isobutane (C ₄ H ₁₀)	3.0		
R-1150	Ethylene	148		
R-1270	Propylene (C ₃ H ₆)	2.0		
R-718	Water	0.0	High grade cooling (e.g. data centre). Cannot cool lower than 15°C flow temperature at 35°C ambient	A1



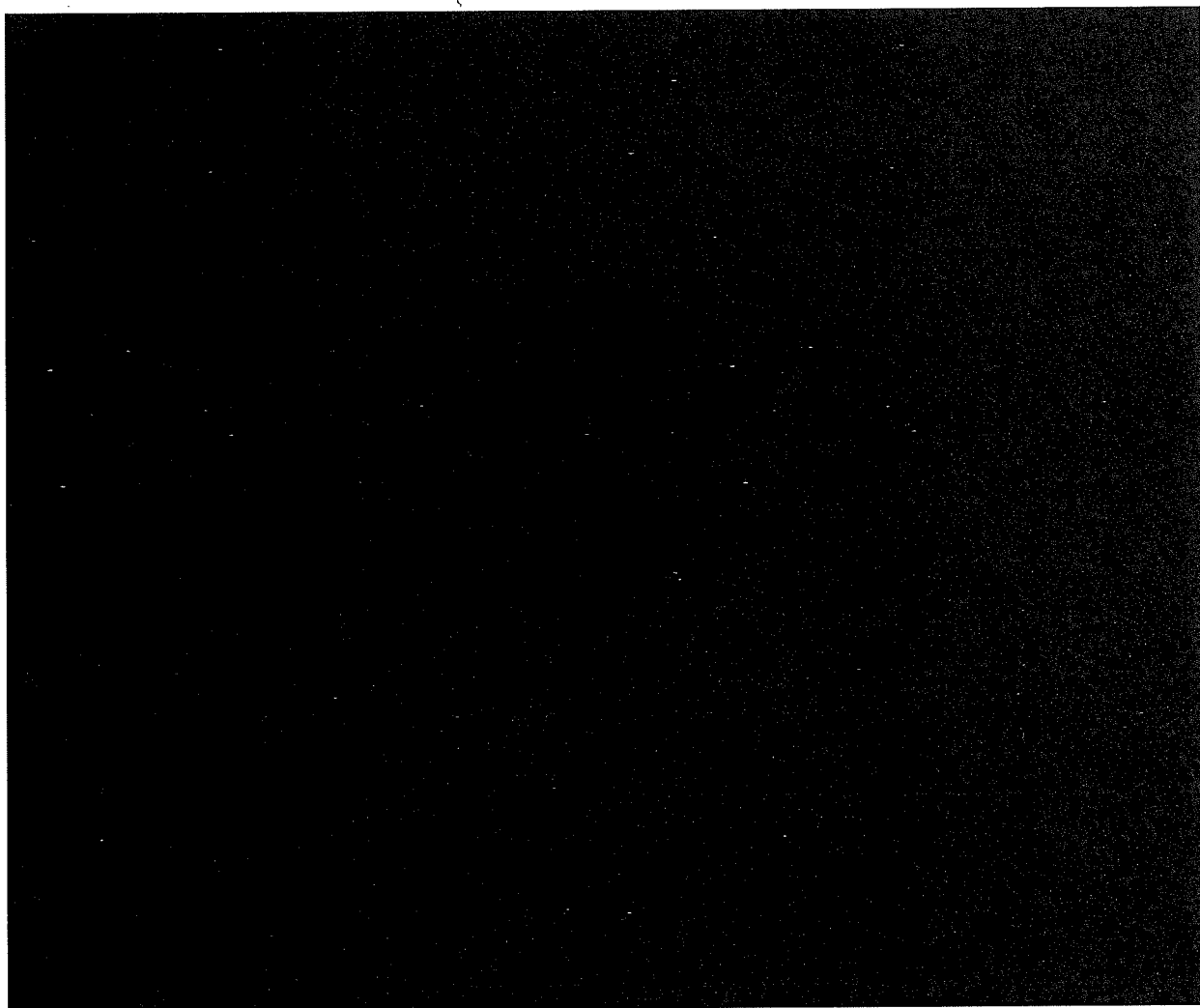




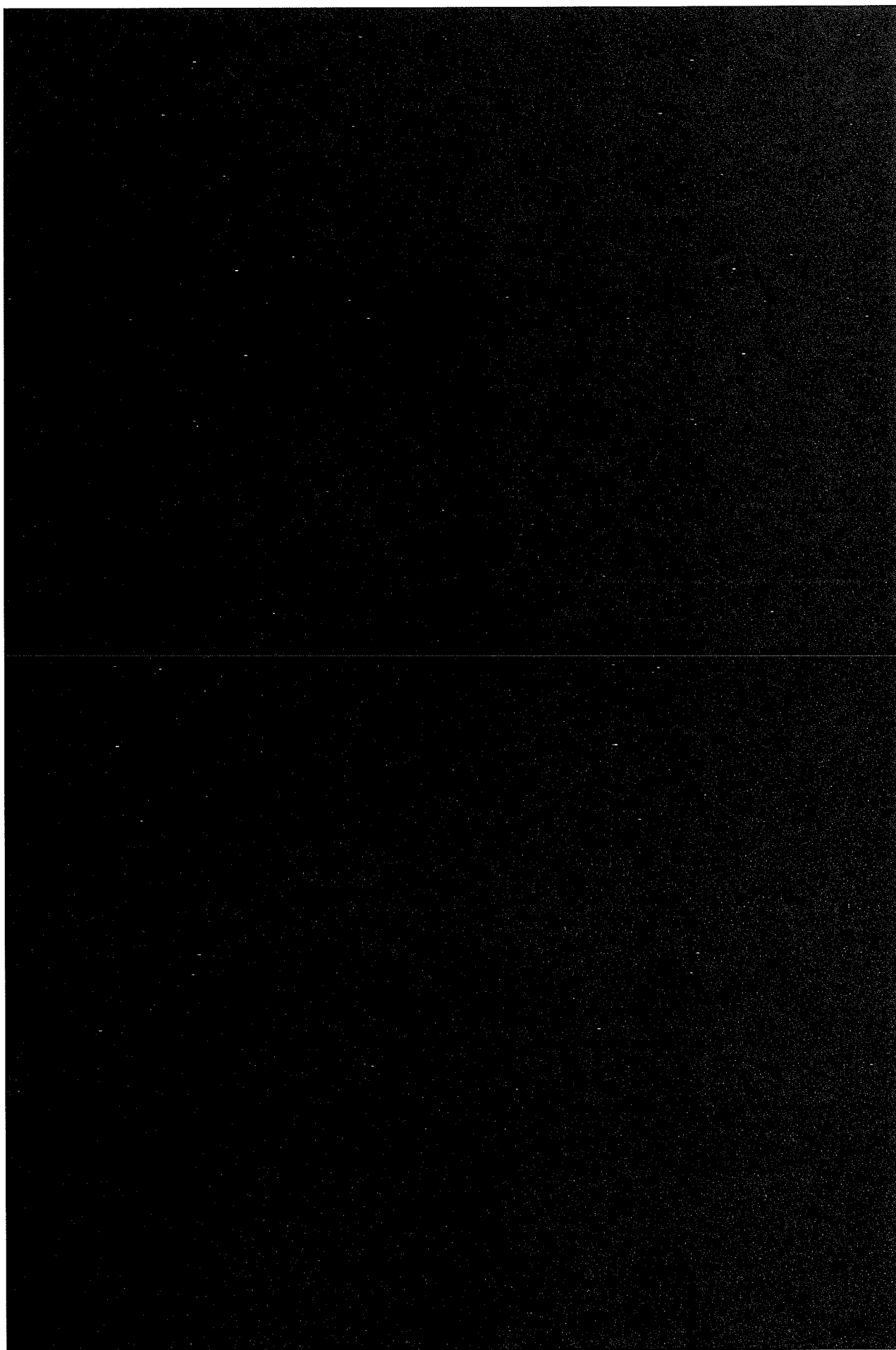




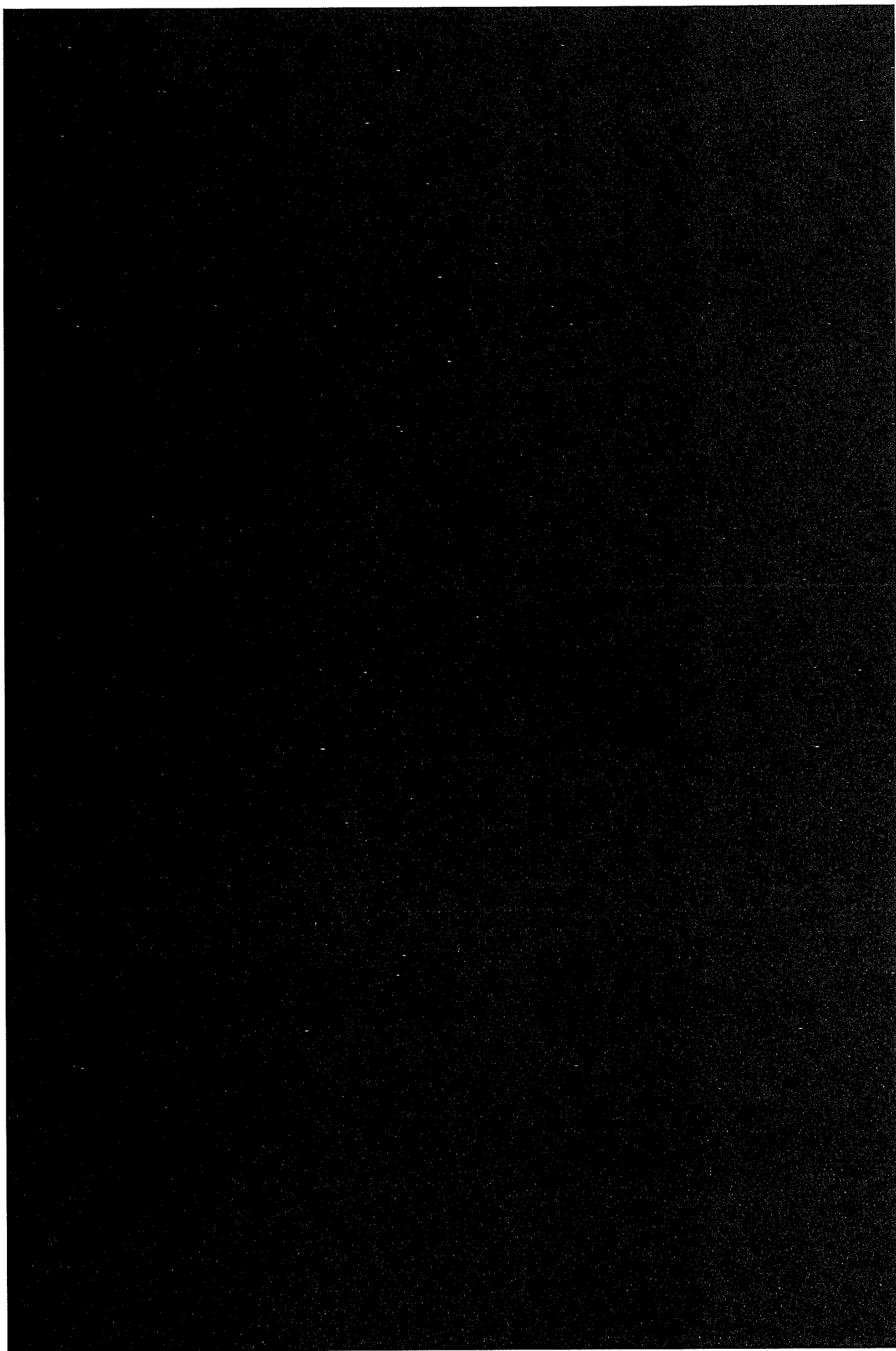


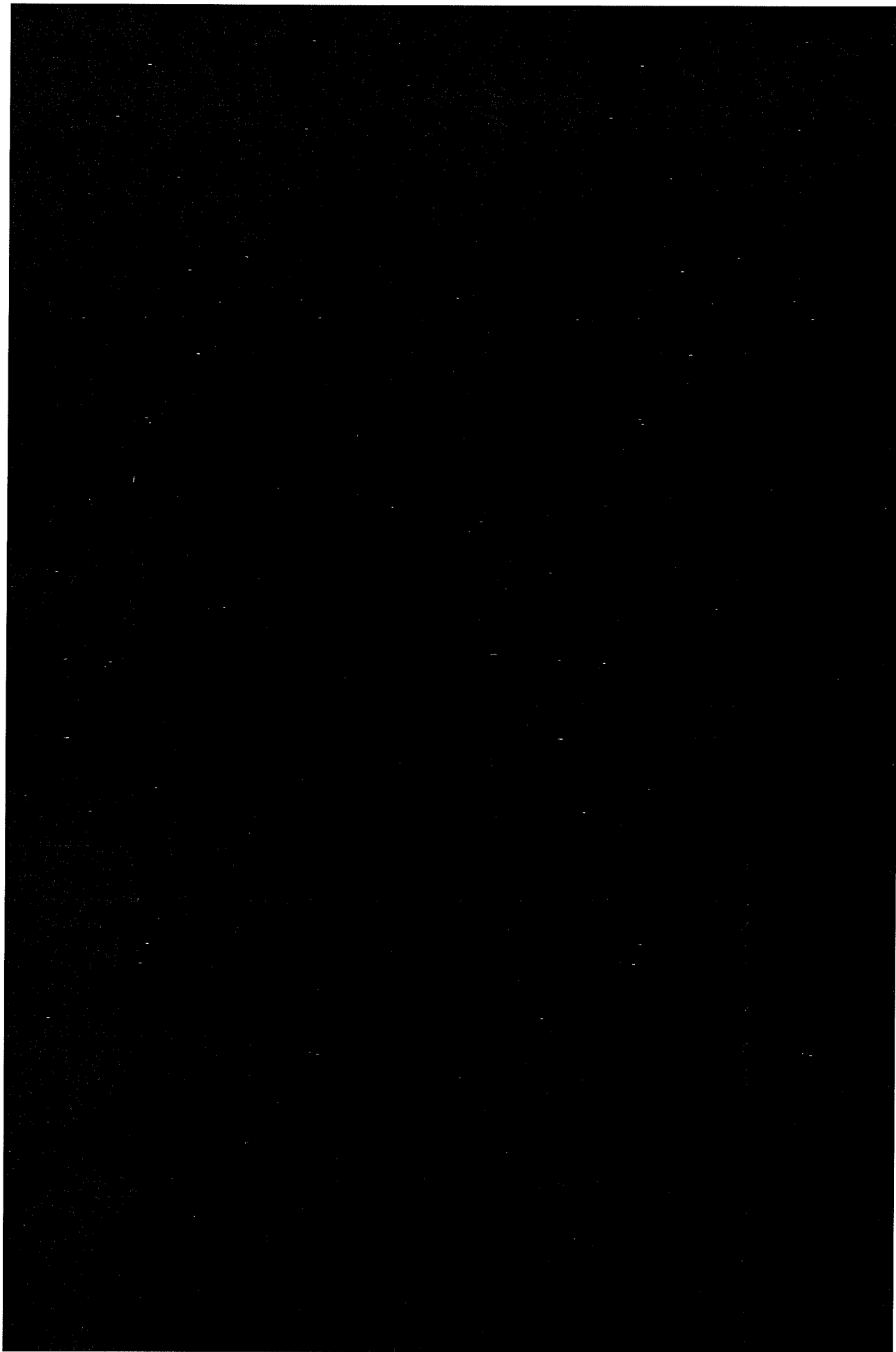


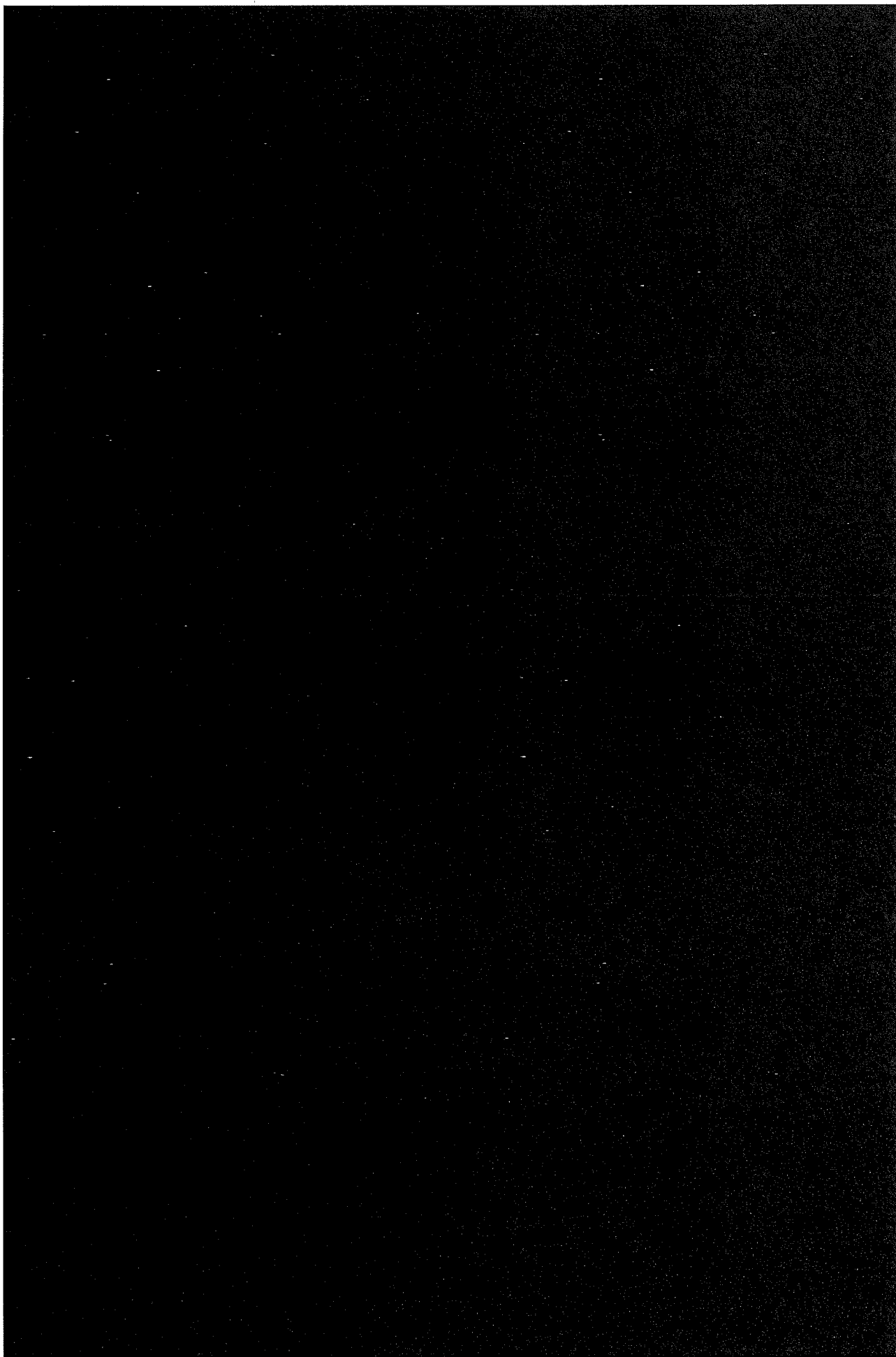




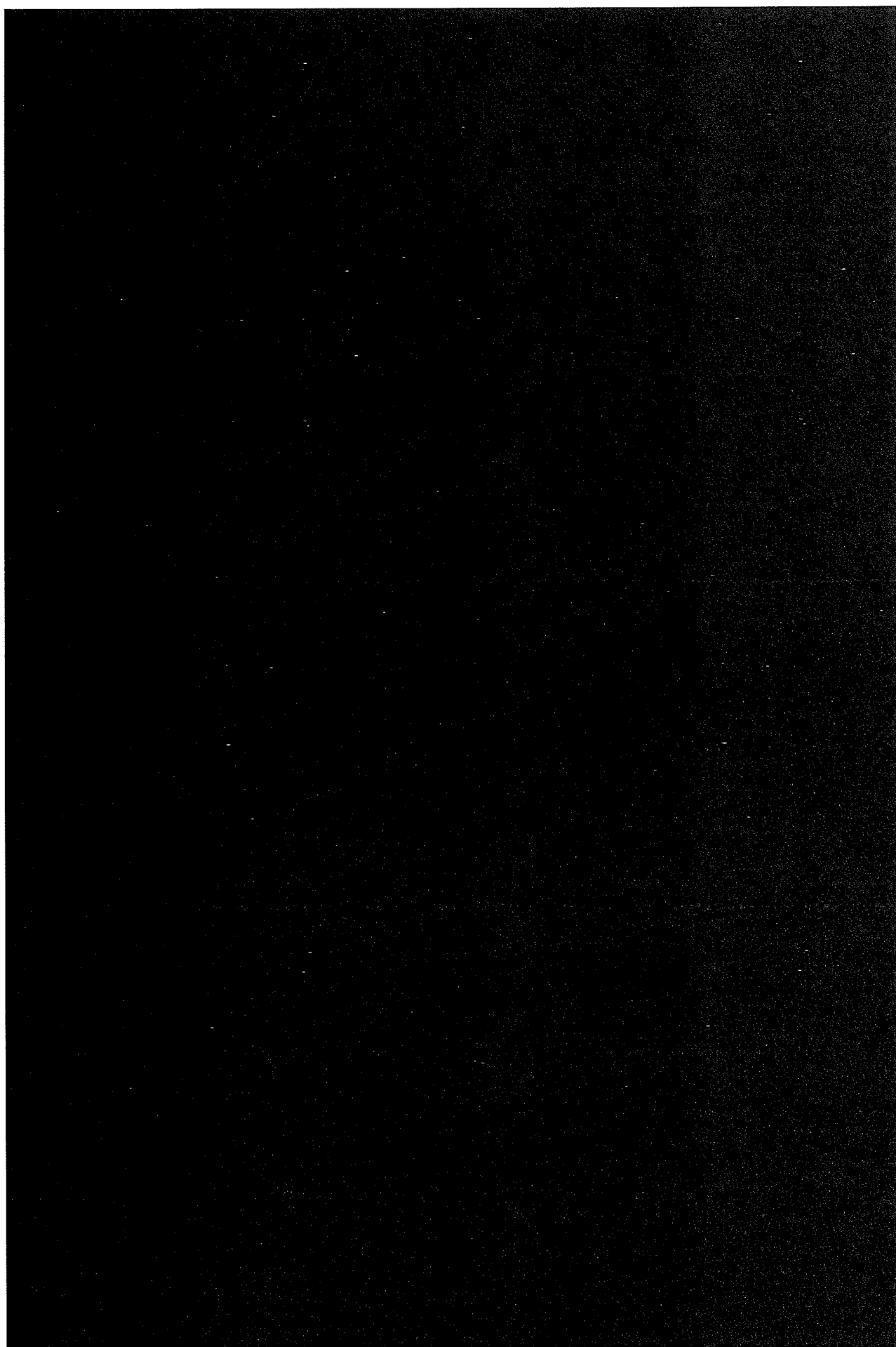


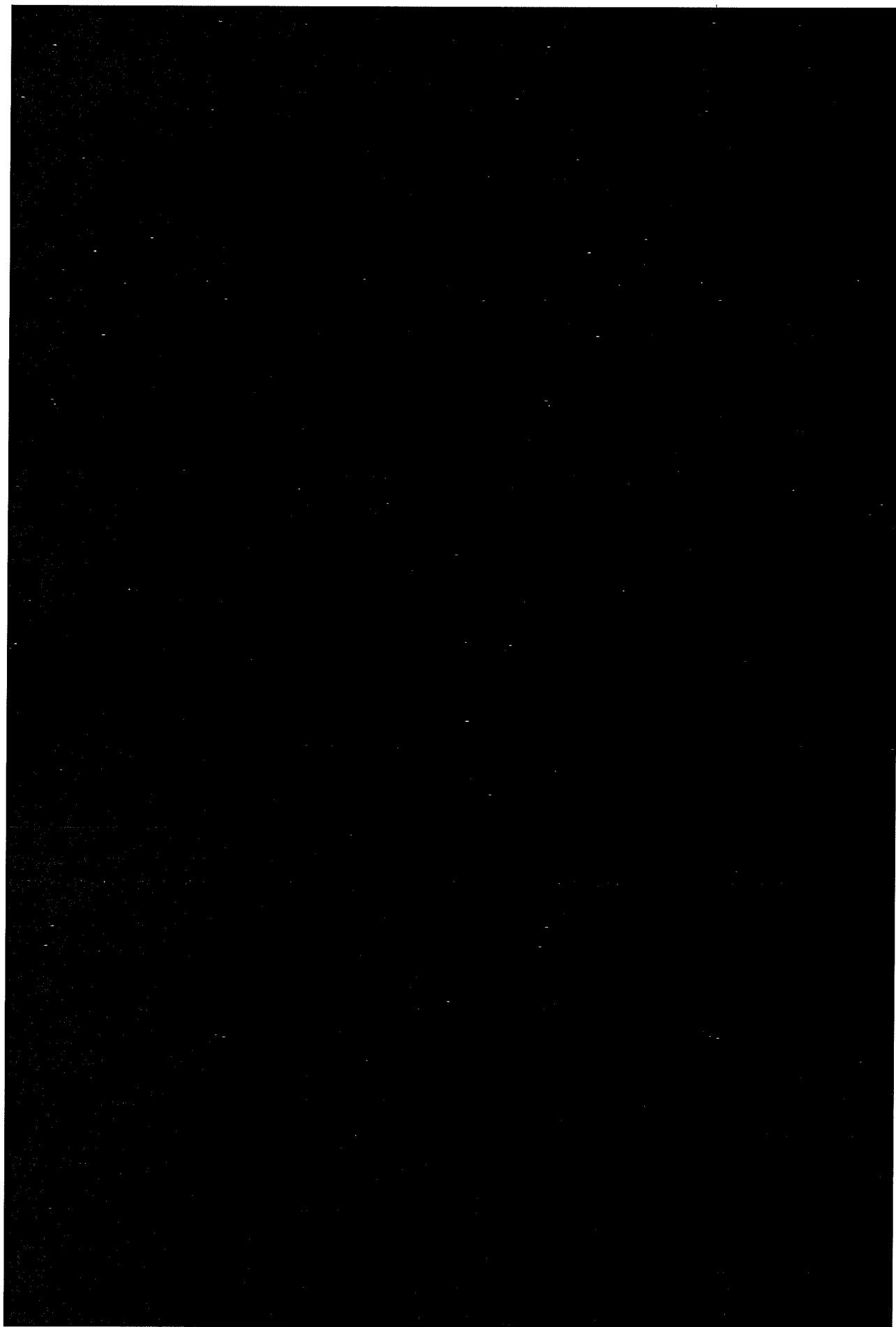


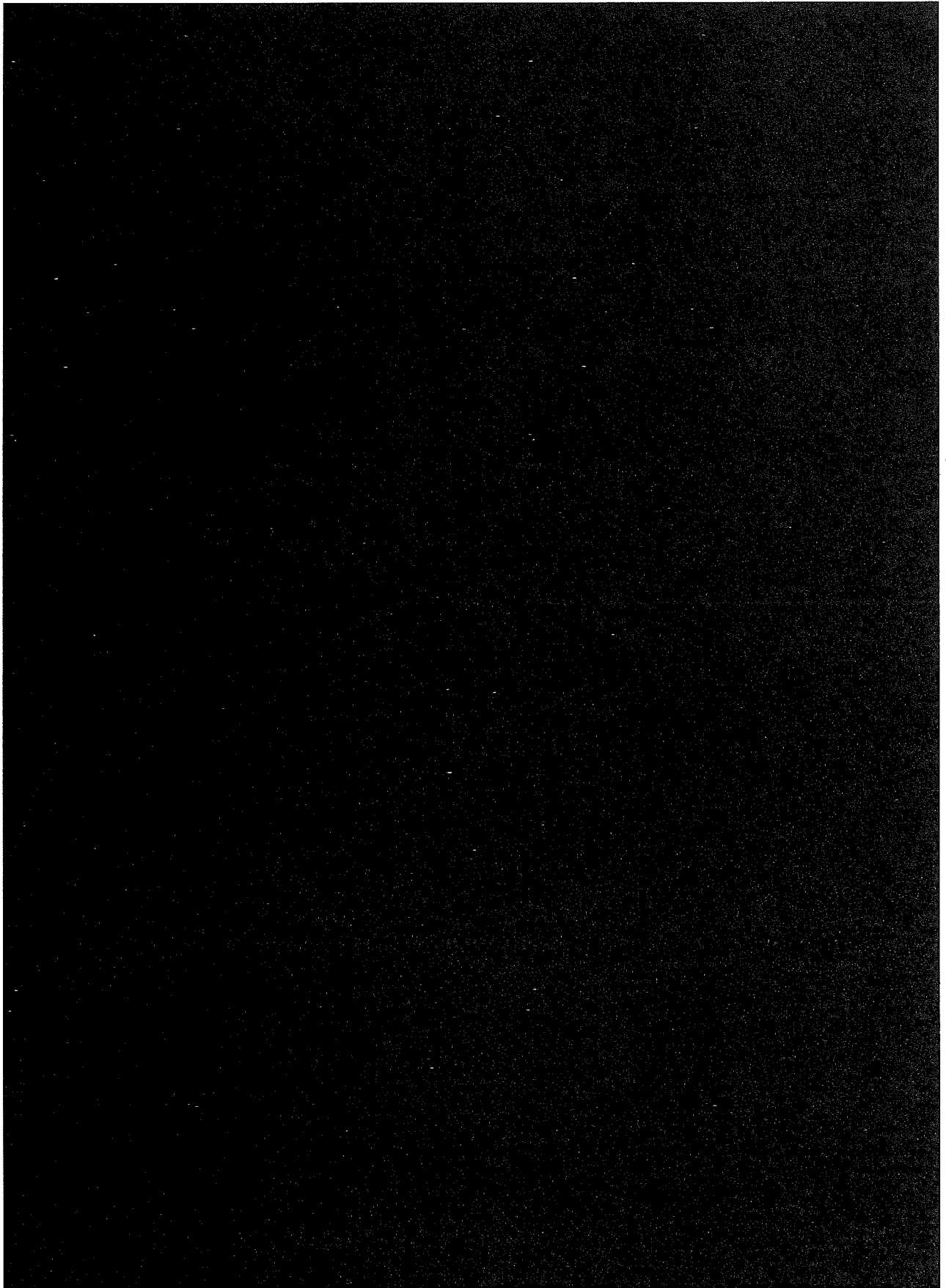




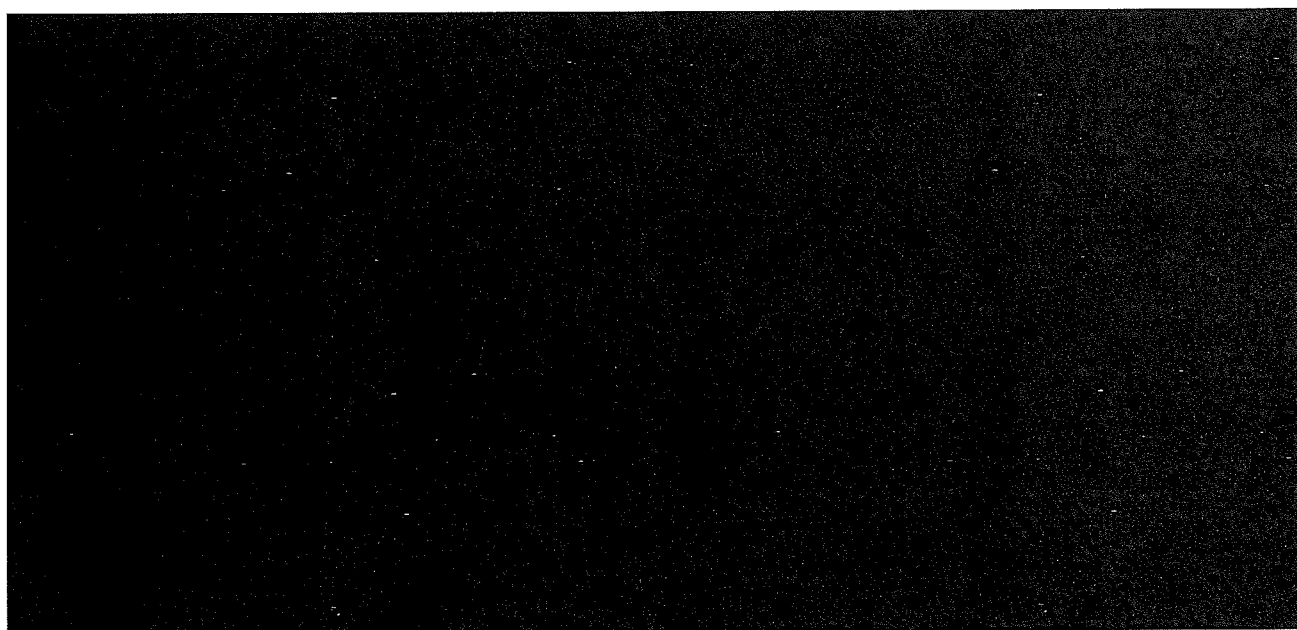
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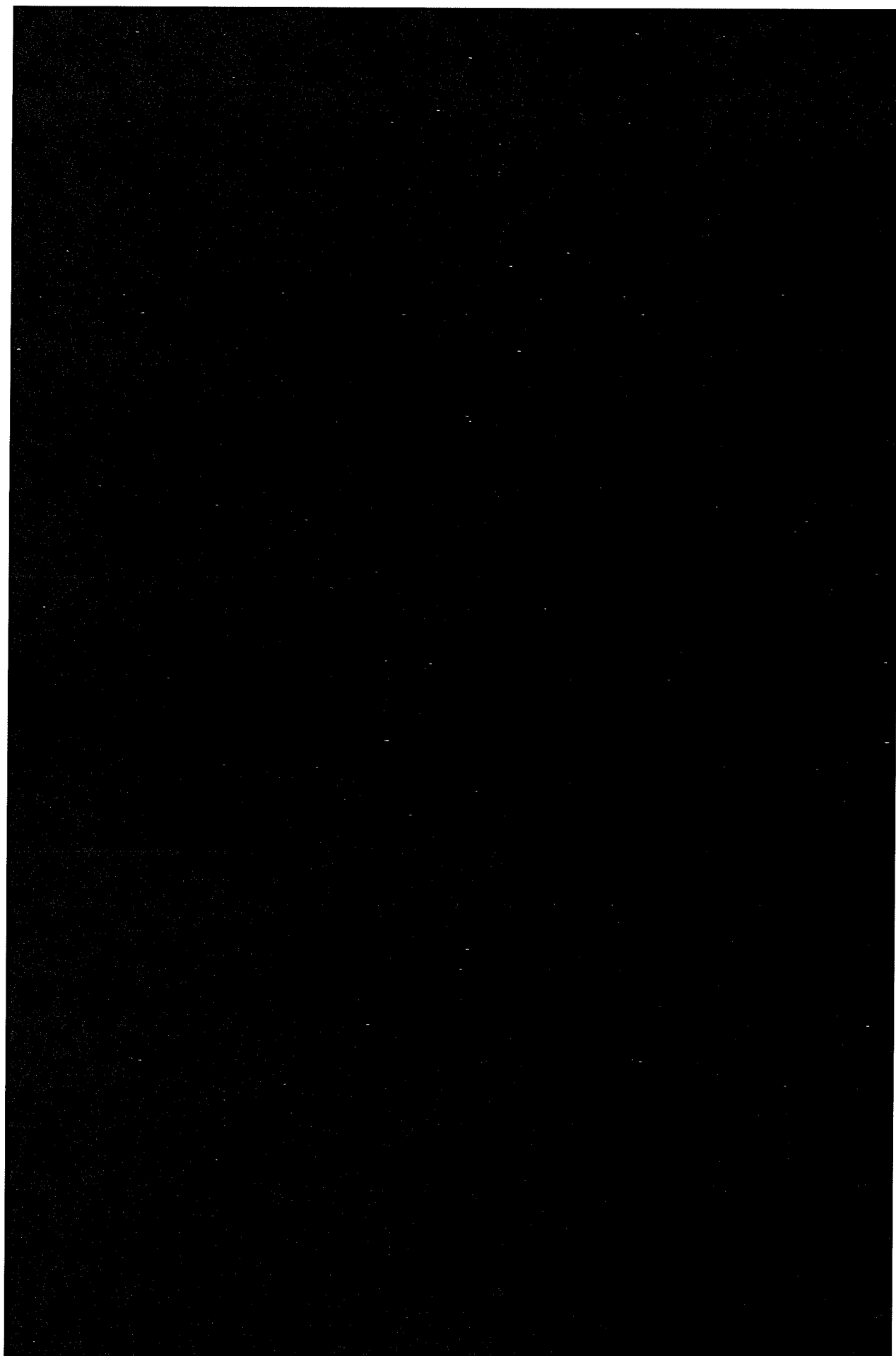


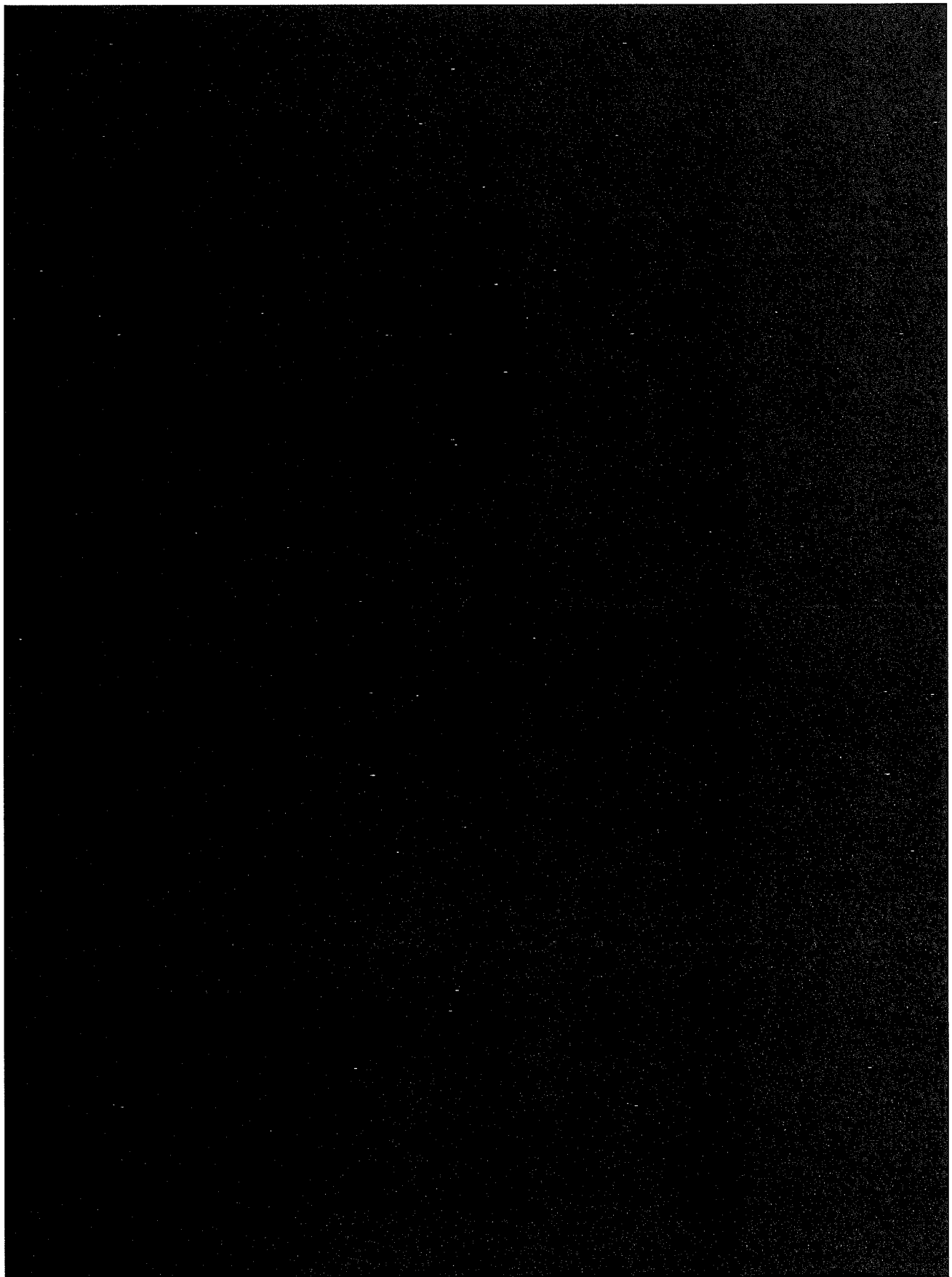


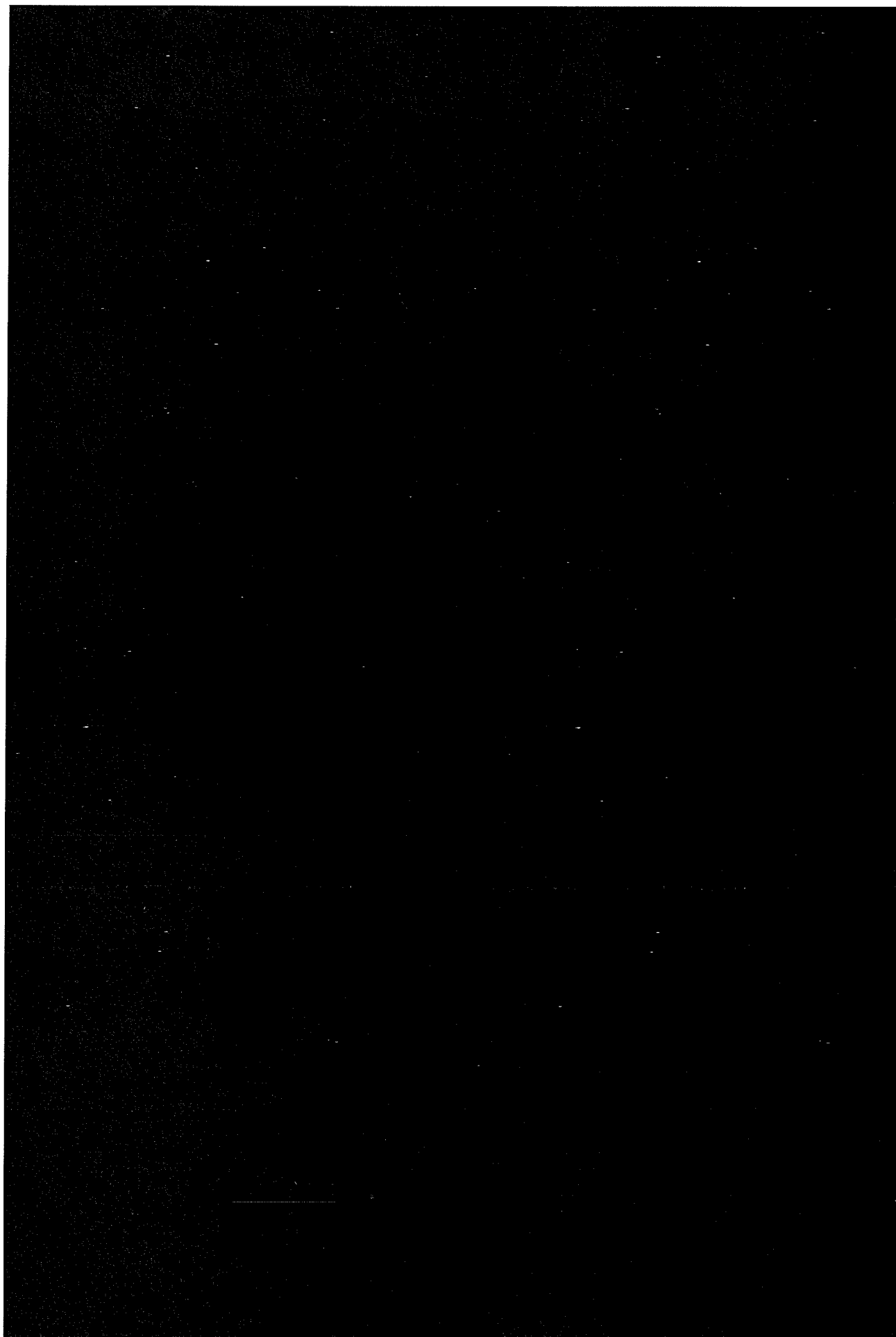


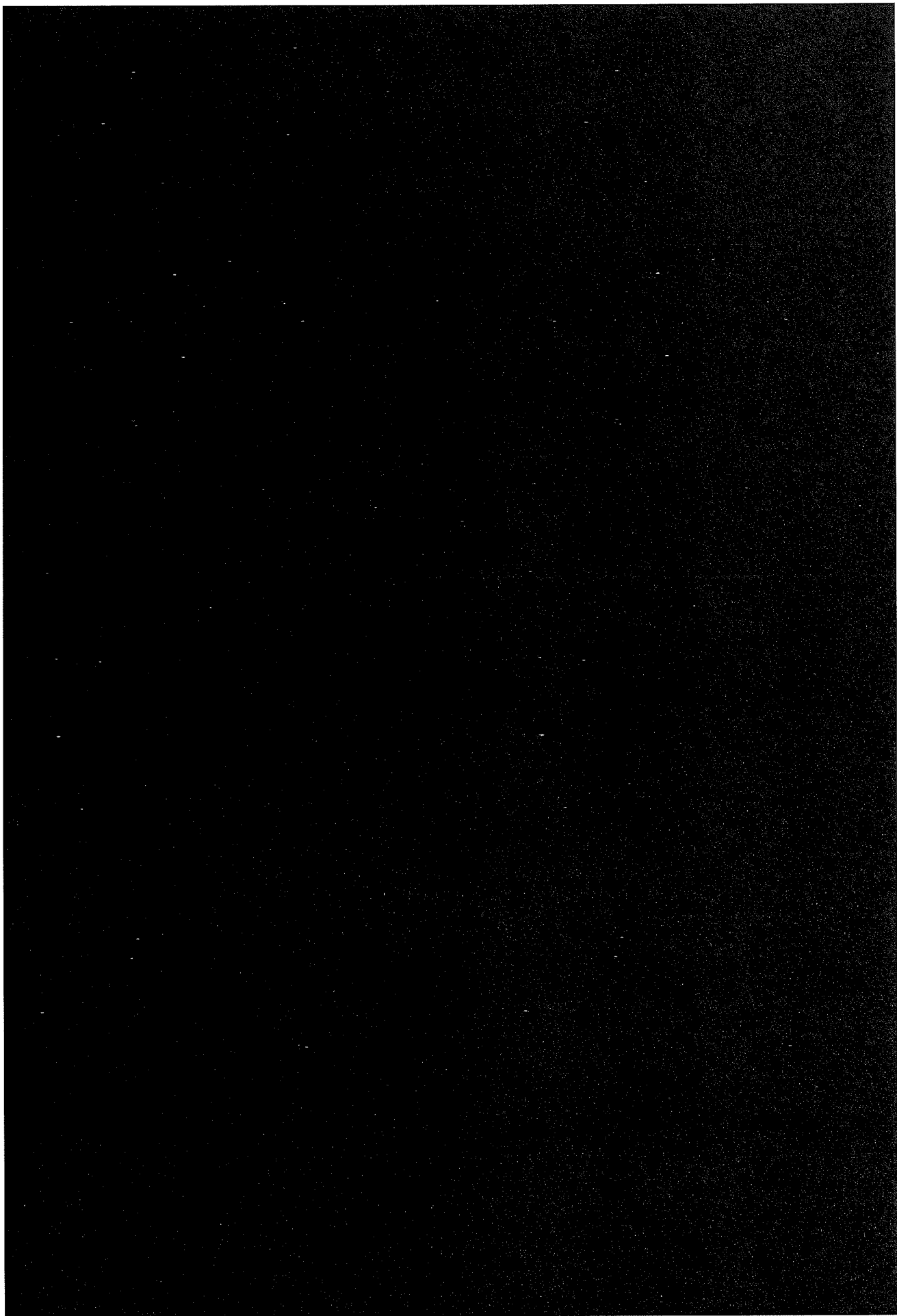




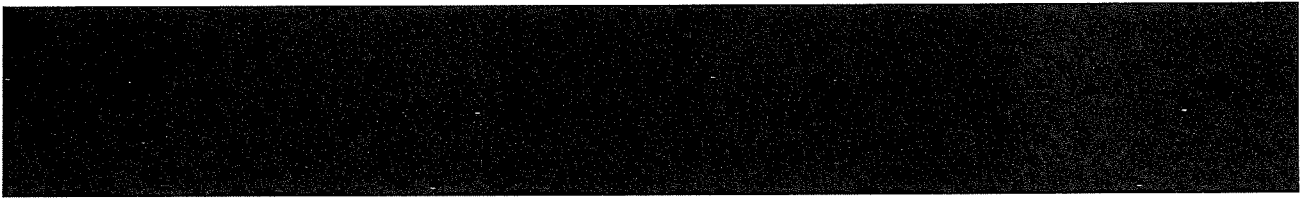


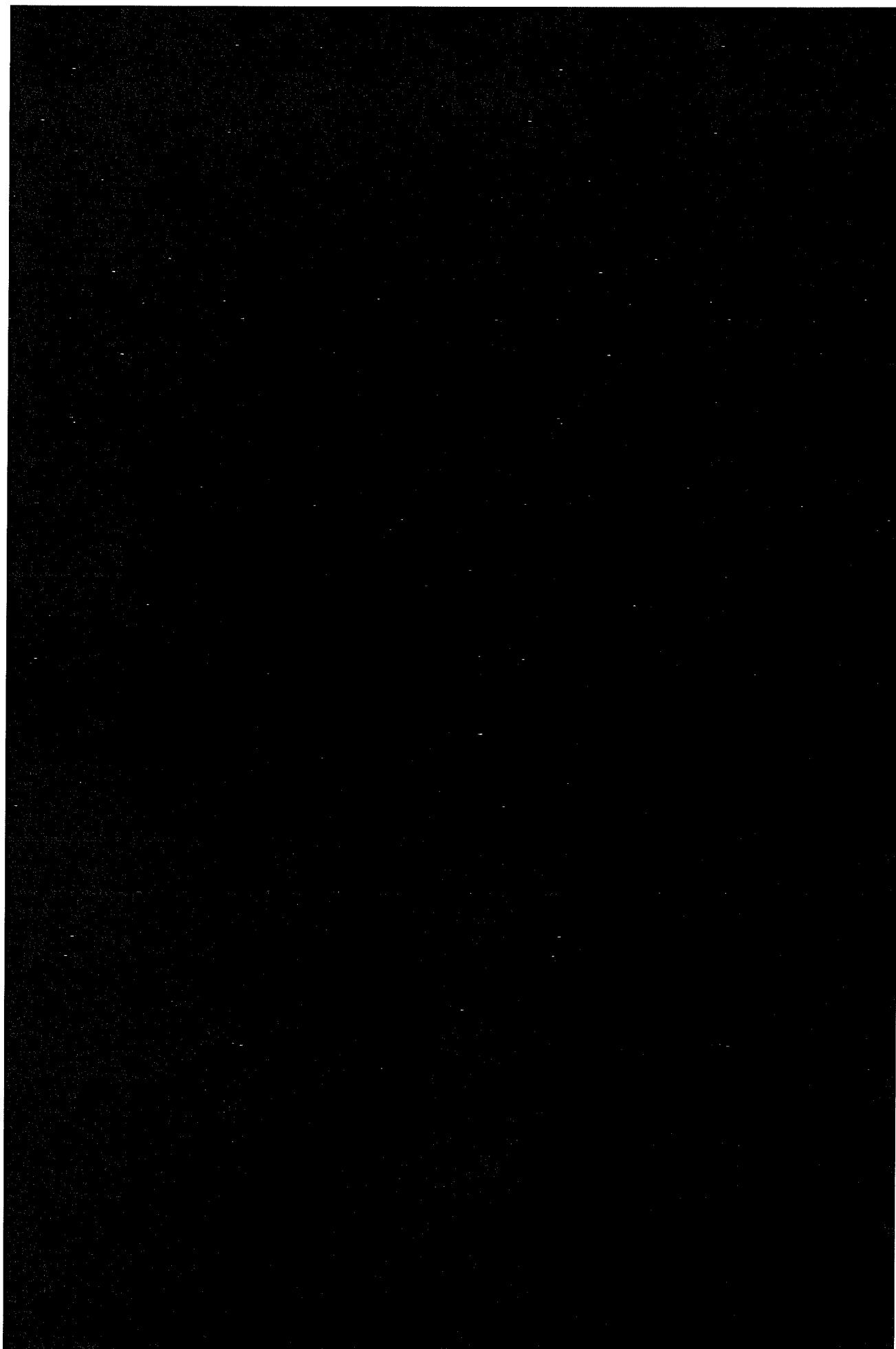


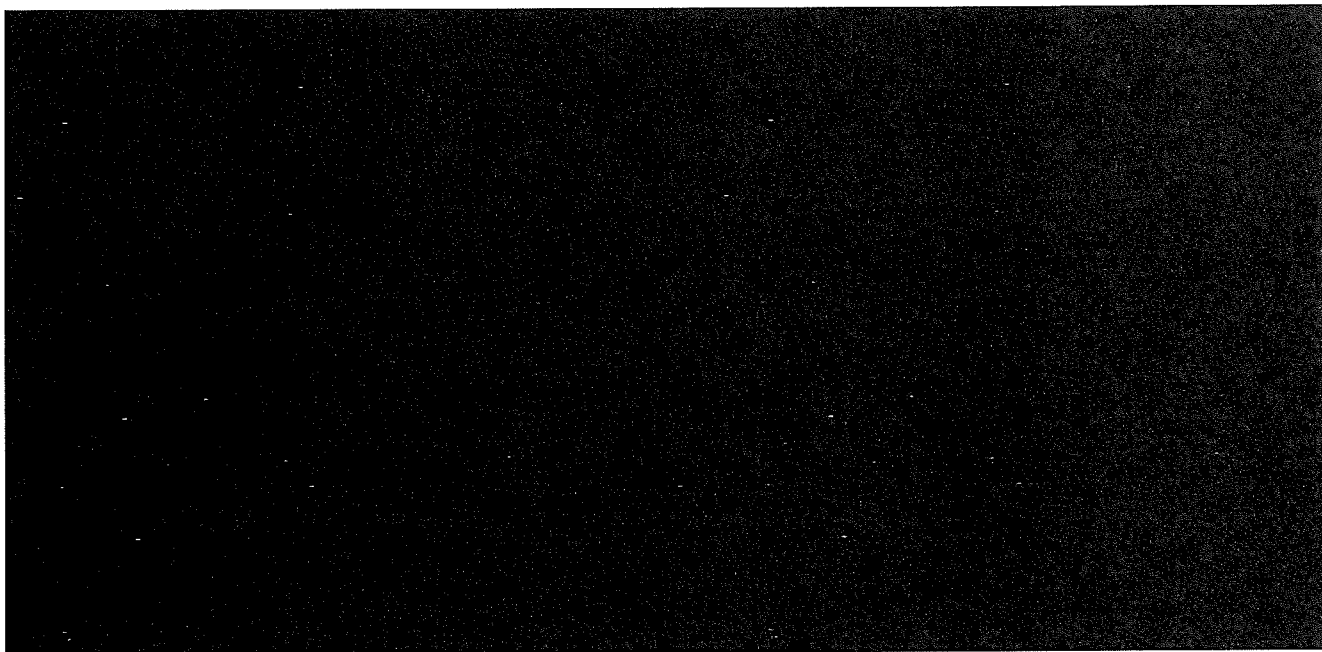


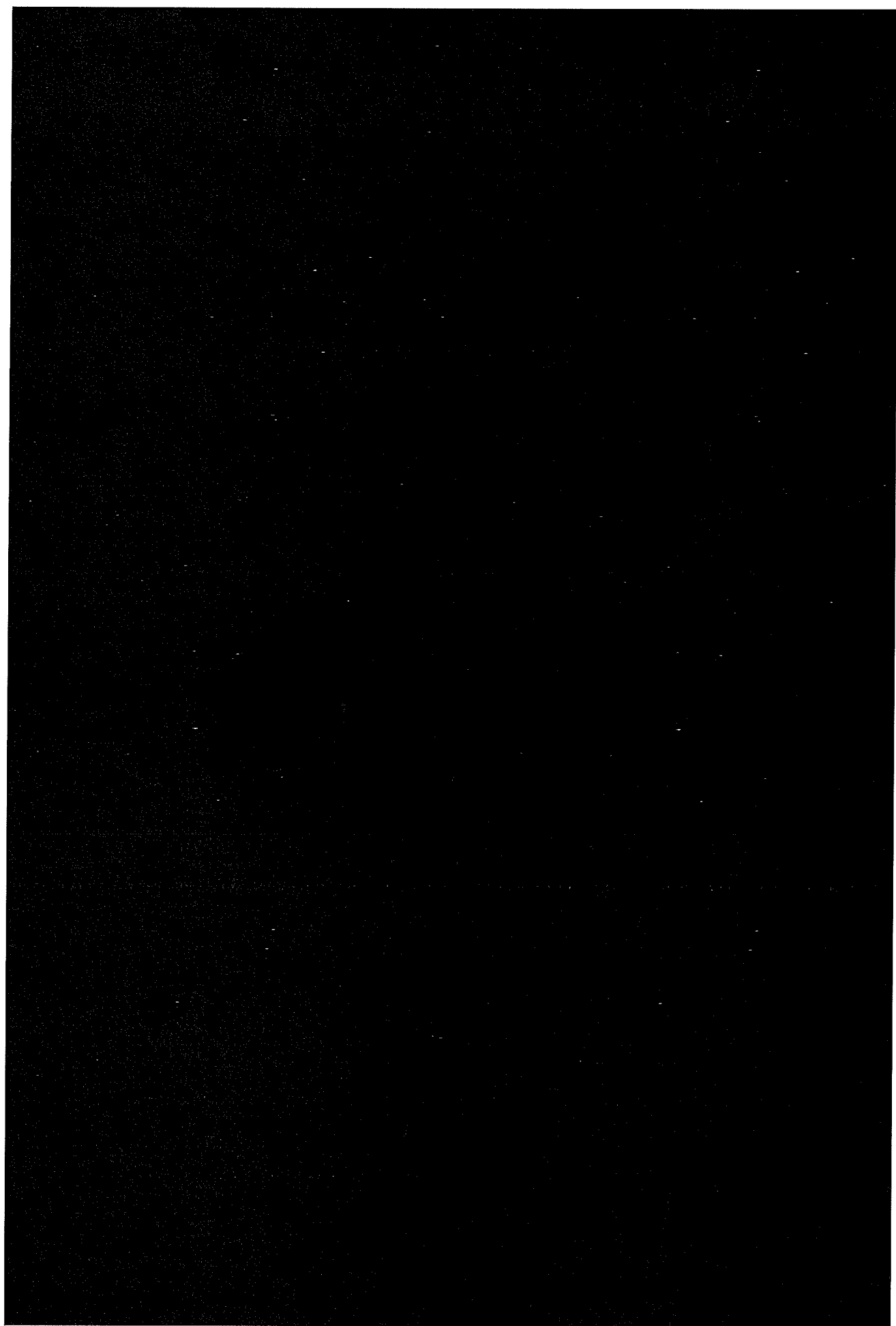


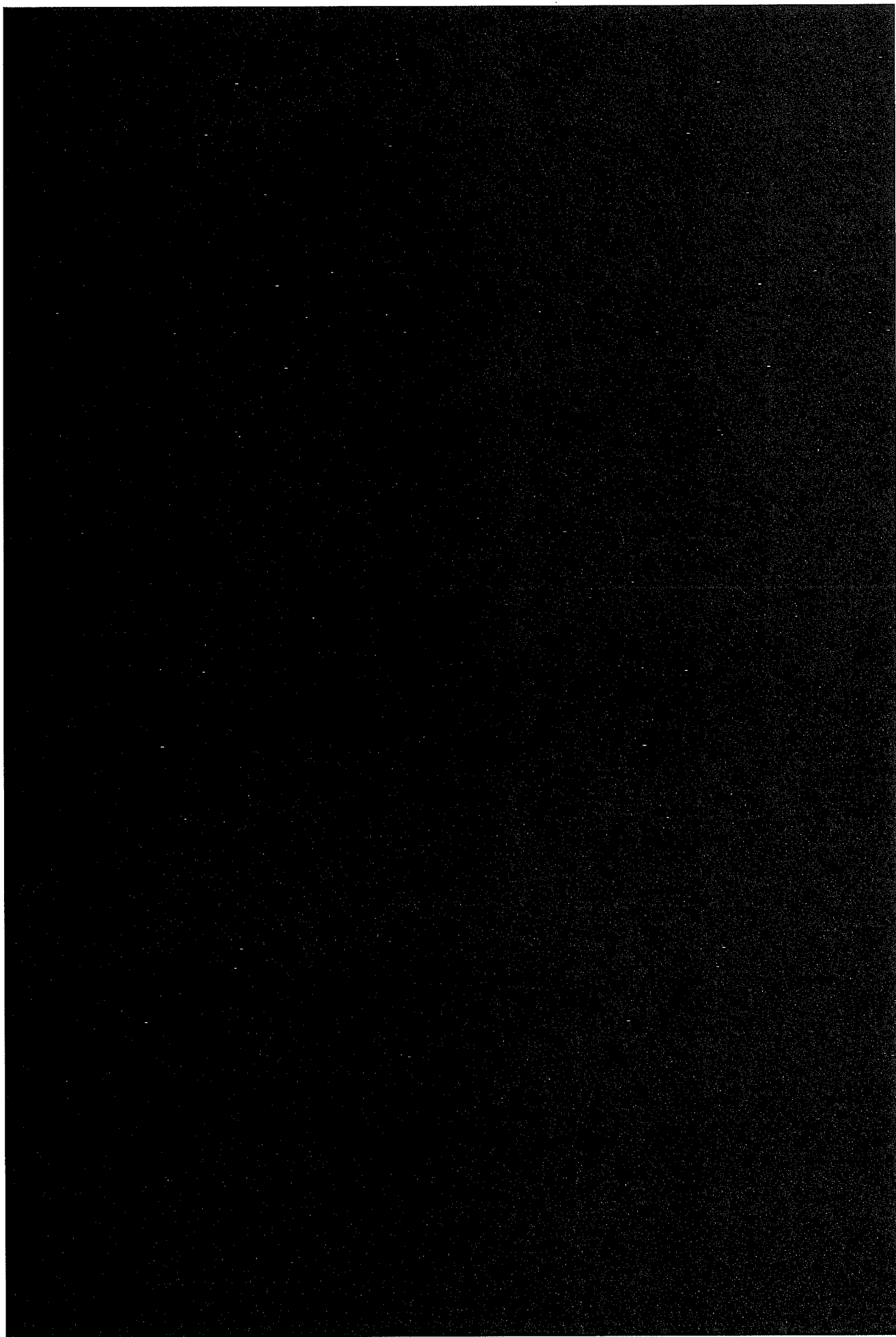






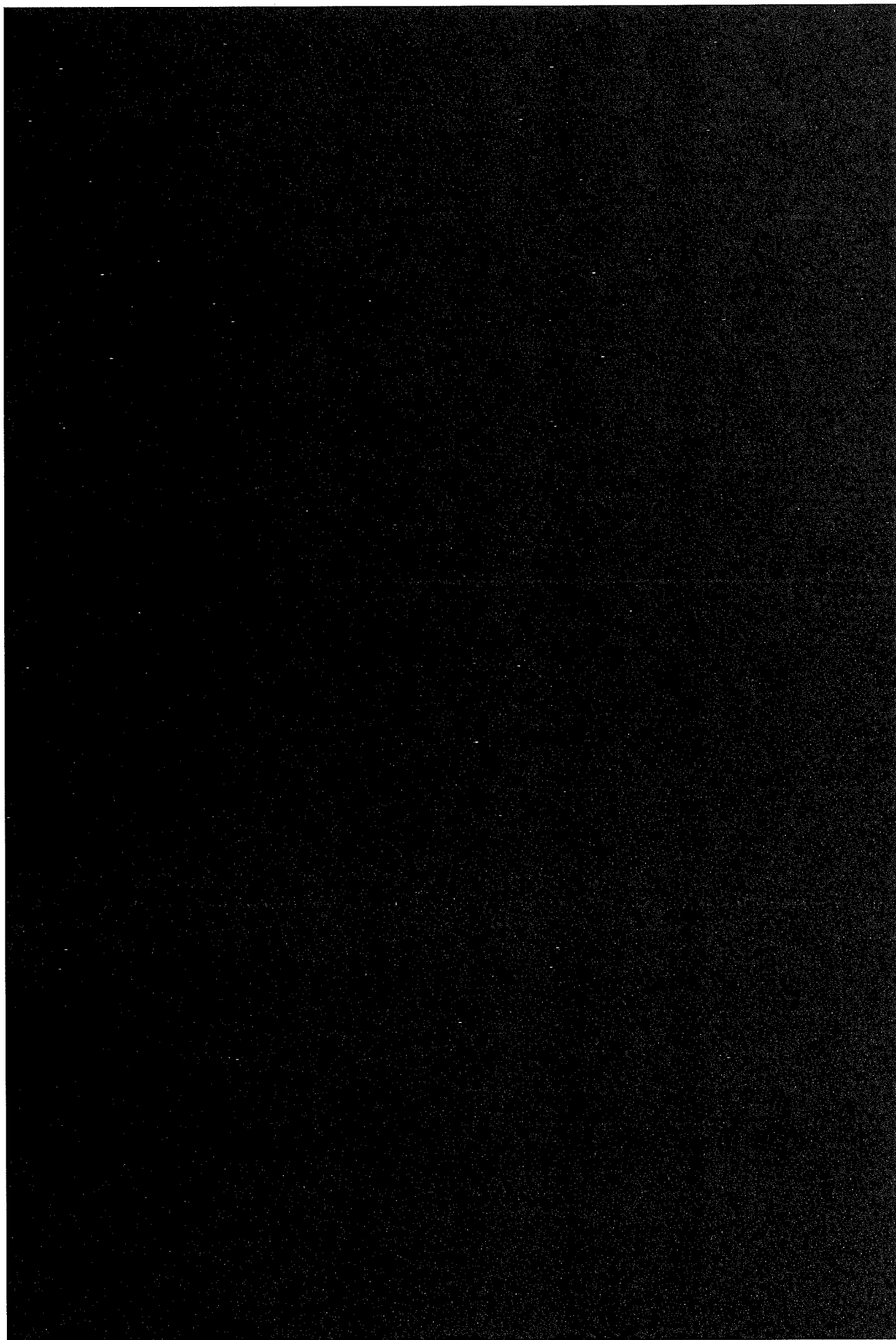


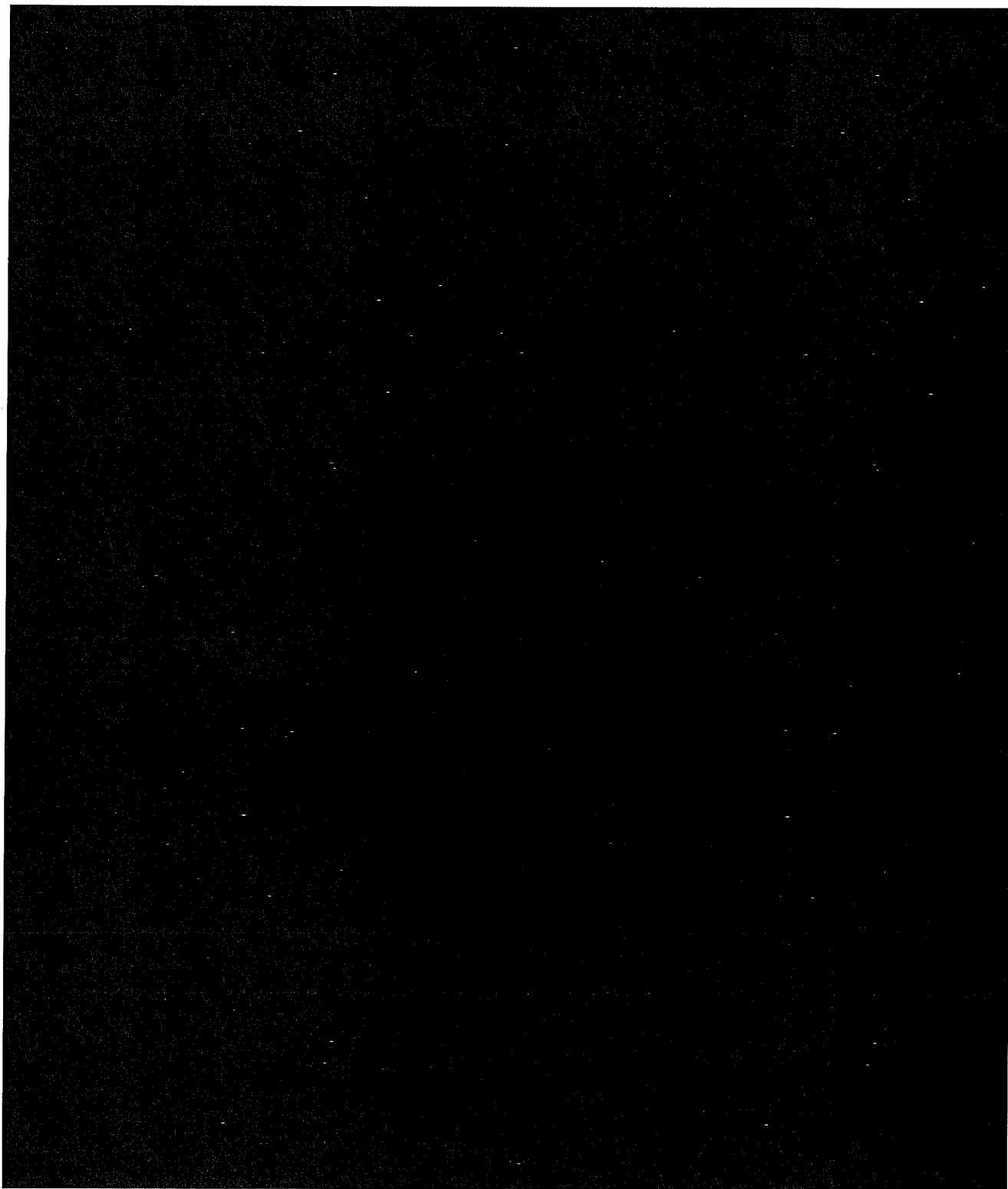


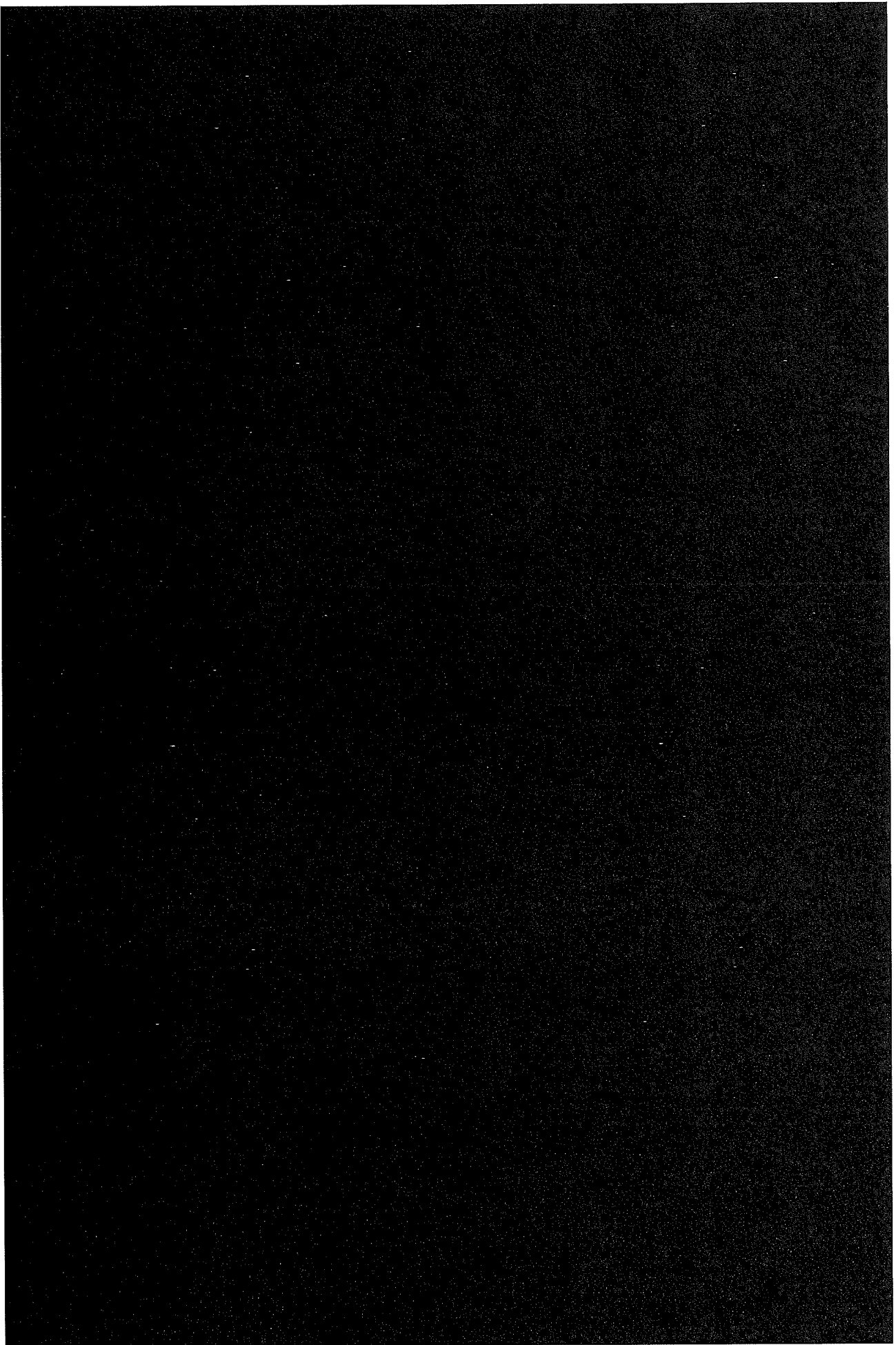


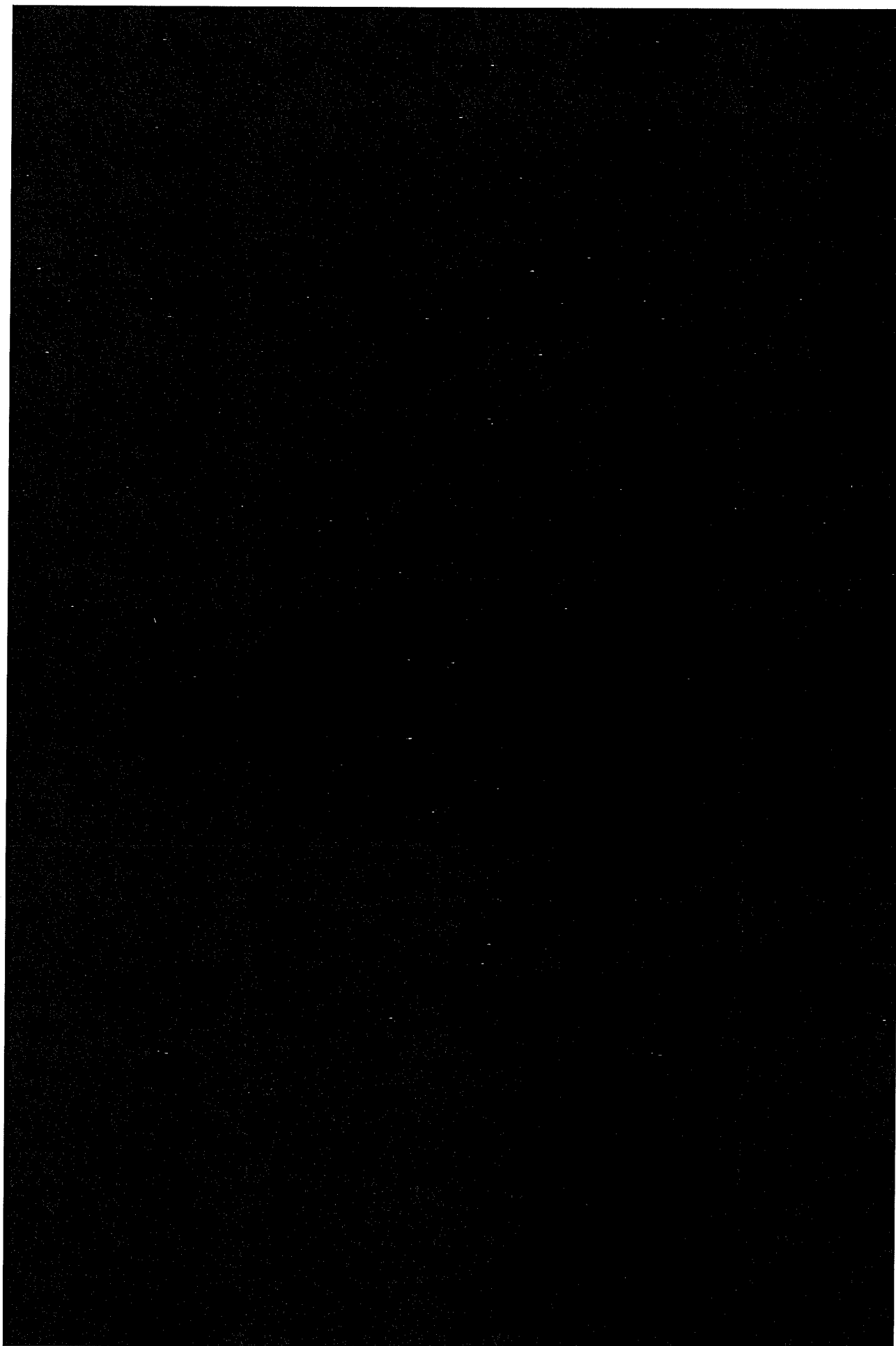


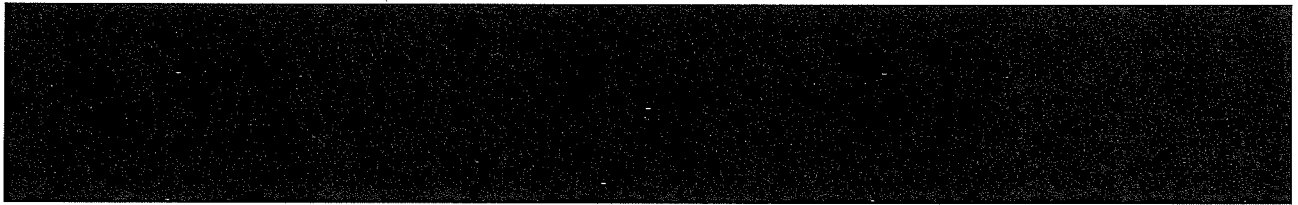








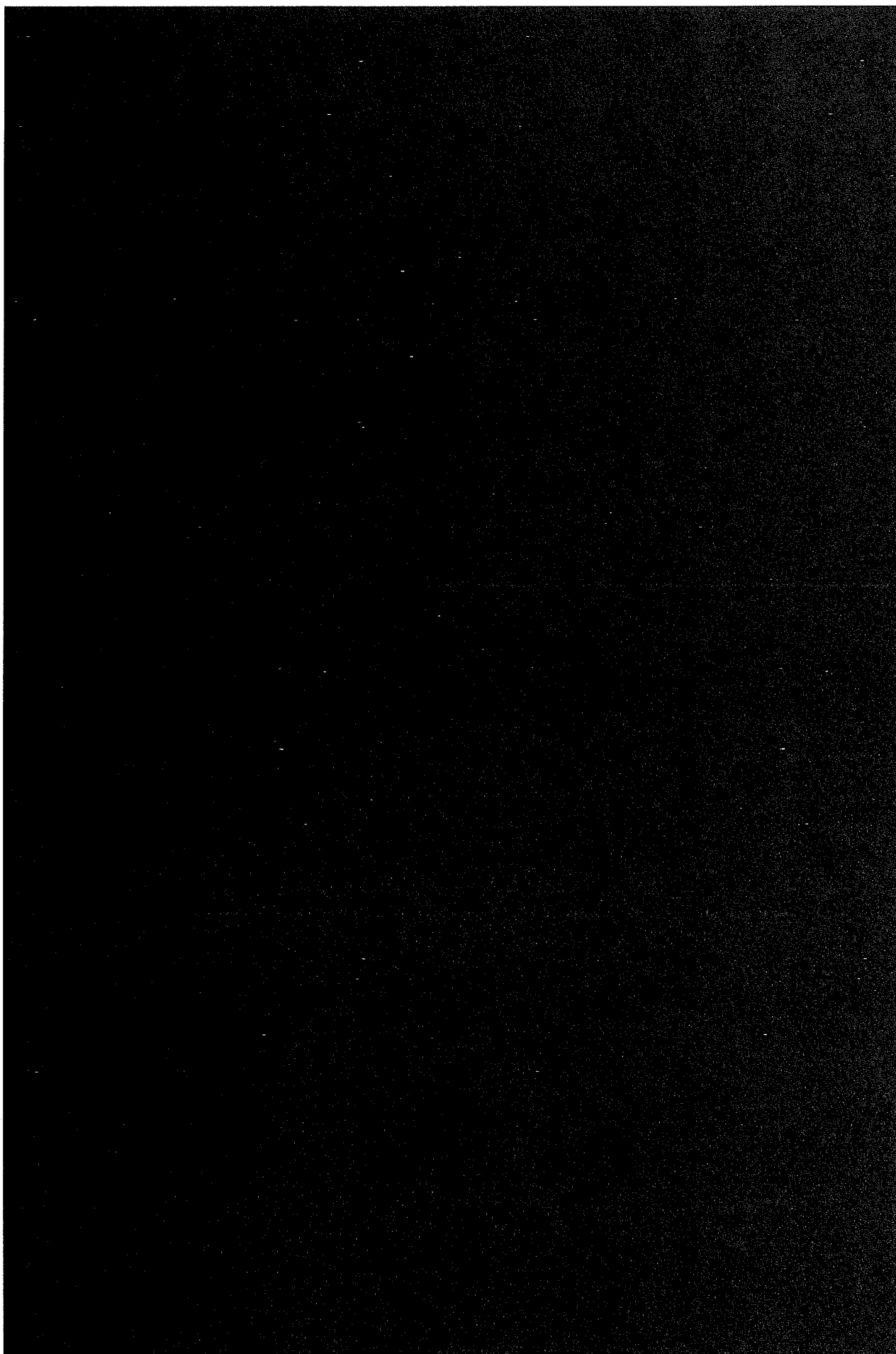


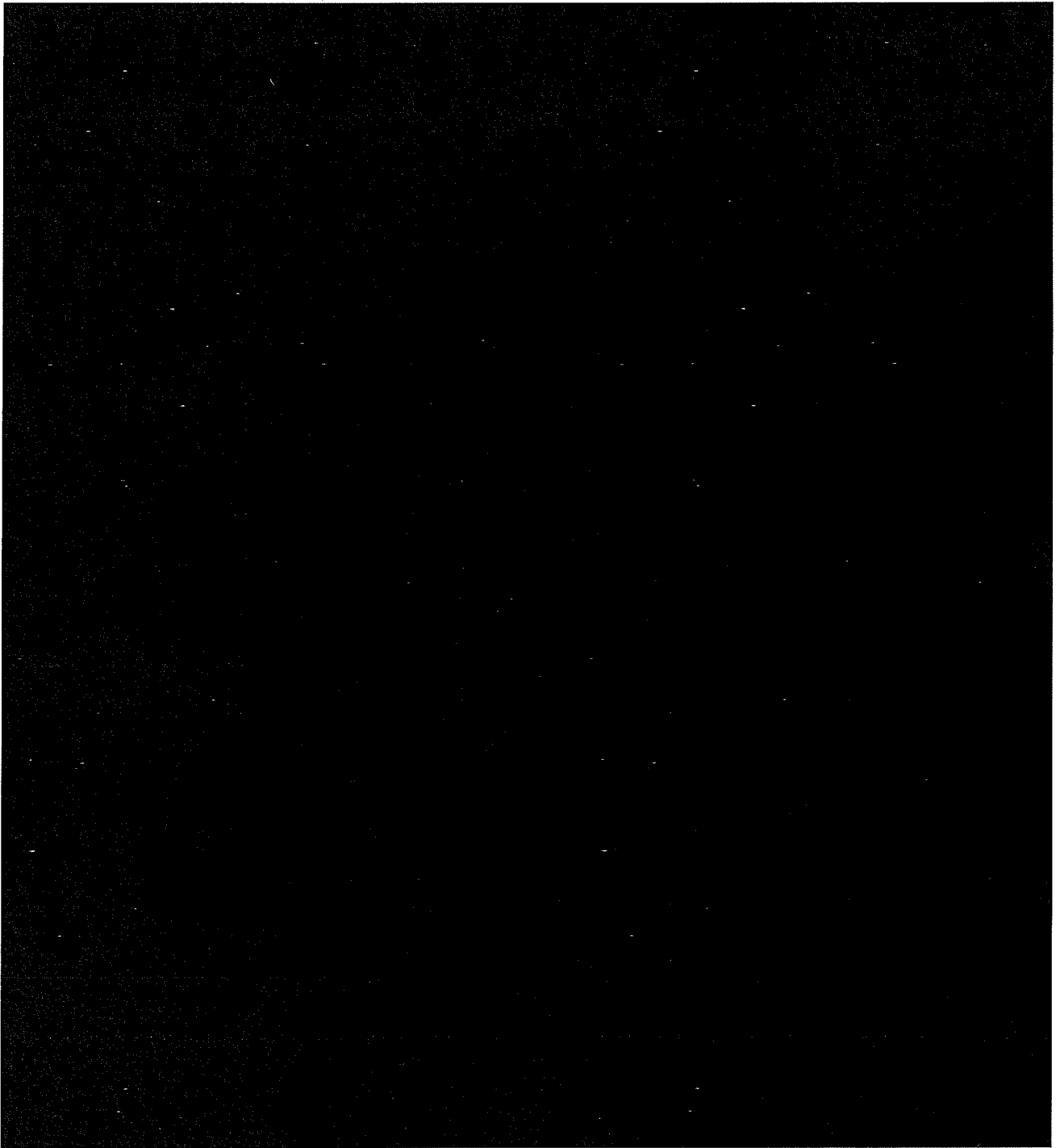


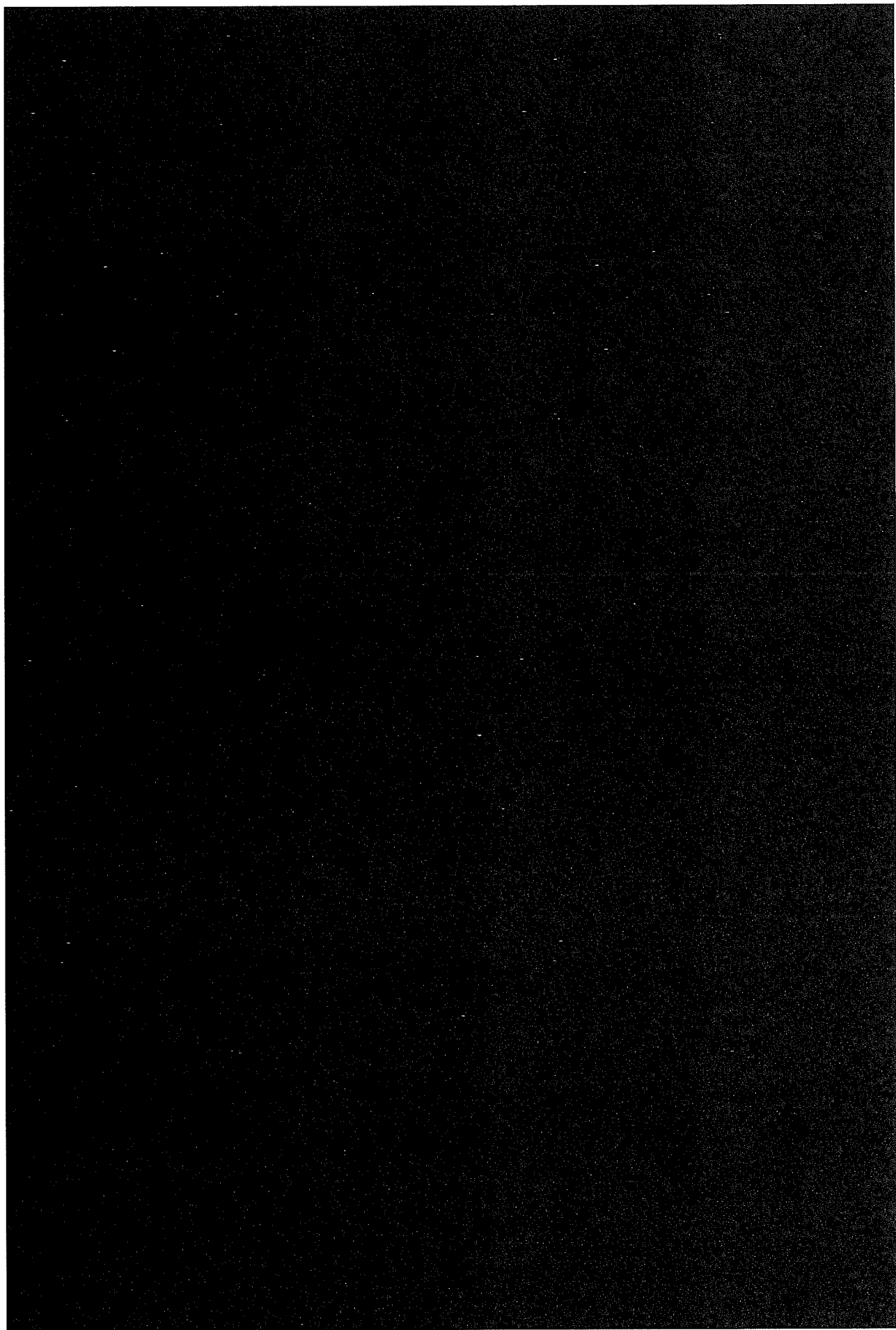


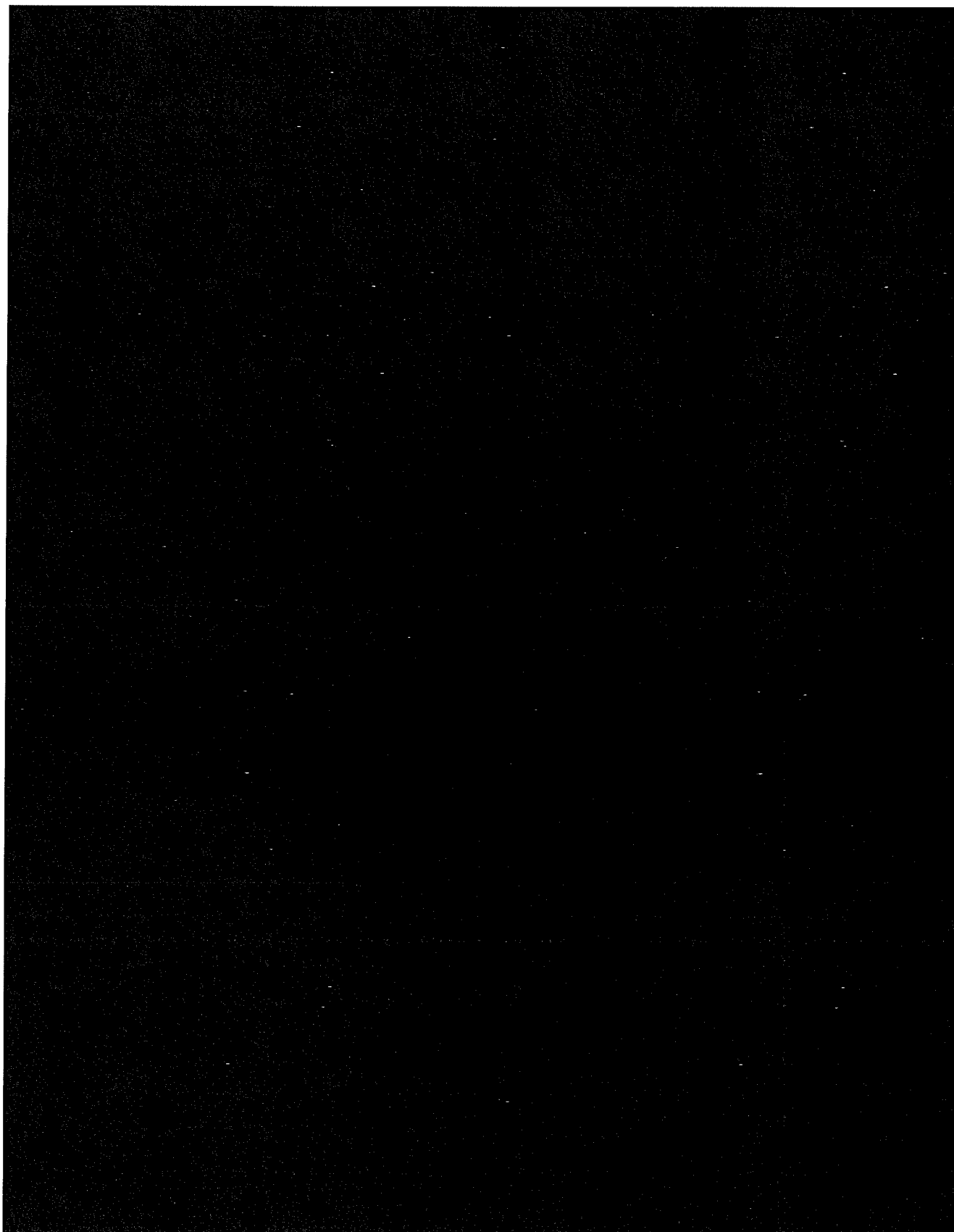












Term/ Acronym	Meaning
ACT Education	The Education Directorate, responsible for delivering educational services across the Territory
ACT Health	The ACT Health Directorate manages the delivery of health services in the ACT. The Directorate sets health policy, plans the delivery of health services and ensures that health services meet community needs
ACTGS	Australian Capital Territory Government Solicitor provides legal services, including advice and representation to the ACT, its government agencies, ministers and office holders
ACTIA	The Australian Capital Territory Insurance Authority is a statutory authority responsible for providing insurance, claims and risk management services to ACT Government Directorates and statutory authorities
ACTPG	ACT Property Group manages more than 200 Territory-owned buildings including commercial buildings, government offices, community/multipurpose buildings, and aquatic/leisure facilities
AER	Australian Energy Regulator
BAU	Business as usual
BMS	Building Management System. Each building has a BMS that could allow for the control of the plant heating equipment. The cost- component of the business case includes integration of the new infrastructure into each BMS
CFC	The Cultural Facilities Corporation manages the Canberra Theatre Centre; the Canberra Museum and Gallery (CMAG) including the Nolan Collection Gallery at CMAG; and the ACT Historic Places
CFC-11	Trichlorofluoromethane
CHS	Canberra Health Services delivers a range of health services to people living across the ACT and the surrounding region. They operate hospitals, walk-in centres, community health centres and community-based health services
CIT	Canberra Institute of Technology is the ACT and region's leading training organisation providing career opportunities and partnering with industry and individuals to develop a skilled community
CMTEDD	Chief Minister, Treasury and Economic Development Directorate
COP	Coefficient of Performance, the ratio of the heating capacity output to the energy input $COP = \frac{kW \text{ of Energy Output}}{kW \text{ of Energy Input}}$
CPO	Chief Projects Officer, and one of several individuals to whom the Project Board will provide strategic direction and advice
DHW	Domestic Hot Water Systems. Typically used to service showers, wash basins, bathrooms and kitchens
EPIC	Exhibition Park in Canberra, from which 64 gas radiant heaters will be replaced in the first year of the program
EPSDD	Environmental Planning and Sustainable Development Directorate
Evoenergy	The distributor of Gas and Electricity in the ACT, formerly known as ACTEW AGL. The Program team will need to work closely with Evoenergy to schedule and negotiate network upgrades
GWP	Global Warming Potential. GWP compares the amount of heat trapped by a certain mass of the gas to the equivalent amount of heat trapped by carbon dioxide
HCFC	Hydrochlorofluorocarbons
HFC	Hydrofluorocarbons
HFO	Hydrofluoroolefins
HVAC	Heating, Ventilation and Air Conditioning
IDP	Infrastructure Delivery Partners, a group within Major Projects Canberra
IFR	Infrastructure Finance & Reform (IFR) operates out of Treasury within the Chief Minister, Treasury and Economic Development Directorate (CMTEDD)

ILM	Investment Logic Map
ILW	Investment Logic Workshop, from which the Investment Logic Map is made
JACS	The Justice and Community Safety Directorate comprises several agencies and is responsible for a wide range of activities and services in the areas of justice; the law; emergencies; commercial practices and government elections including managing its facilities and capital works and infrastructure programs
KPI	Key performance indicators
kW	kW stands for kilowatt, referred to in the context of required capacity output
L/min	Litres per minute. The volumetric flow rate used to measure delivery capacity of a hot water unit
Long- term	2031-32 to 2039-40 IE years 8-17
MAC	Marginal Abatement Costs $MAC = \frac{\text{\$cost of asset upgrade}}{\text{tCO2 savings p. a}}$
Medium- term	2027-28 to 2030-31 IE years 4-8
MJ/hr	Megajoules per Hour, an indicator of the original gas asset input
MPC	Major Projects Canberra
MSB	Main switchboard
MVA	Megavolt Amperes is a unit used for measuring apparent power. In this business case, current substation capacity is measured using MVA
OCA	Office of Climate Action
ODP	Ozone Depleting Potential. OWP measures how much damage a chemical can cause to the ozone layer compared with a similar mass of CGC-11, which has an ODP of 1.0
PMO	Project Management Office. The PMO Team is required for the procurement and delivery of the Program following its consideration by Government and approval to proceed
PoE	Probability of Exceedance refers to the probability that a particular value will be met or exceeded
Position Paper	Refers to 'Powering Canberra: Our Pathway to Electrification' 2022
The Program	The Electrification of Government Assets is this Program
RES	Risk Engineering Society. RES is the body responsible for developing the contingency allowance estimates used in this Business Case
RFT	Request for Tender
ROM	Rough order of magnitude. A ROM Cost is a general approximation of the cost of providing a stated service. It is based on experience, costs of similar services, or on a cursory examination of other vendor's rates
Short-term	2023-24 to 2026-27 IE the next three to four years
The Act	Climate Change and Greenhouse Gas Reduction Act 2010 (ACT)
The Strategy	The ACT Climate Change Strategy 2019-2025
Wellbeing Framework	Refers to the ACT Government's Wellbeing Framework 2020.
Worksafe ACT	Worksafe ACT is the Regulator appointed under the Work Health and Safety Act 2011 and is responsible for monitoring and enforcing compliance with the Act, providing advice and information to duty-holders
ZEV	Zero Emissions Vehicle

CAPITAL COST ESTIMATE METHODOLOGY

This appendix sets out the approach adopted to develop the cost estimates for the Electrification of Government Assets business case.

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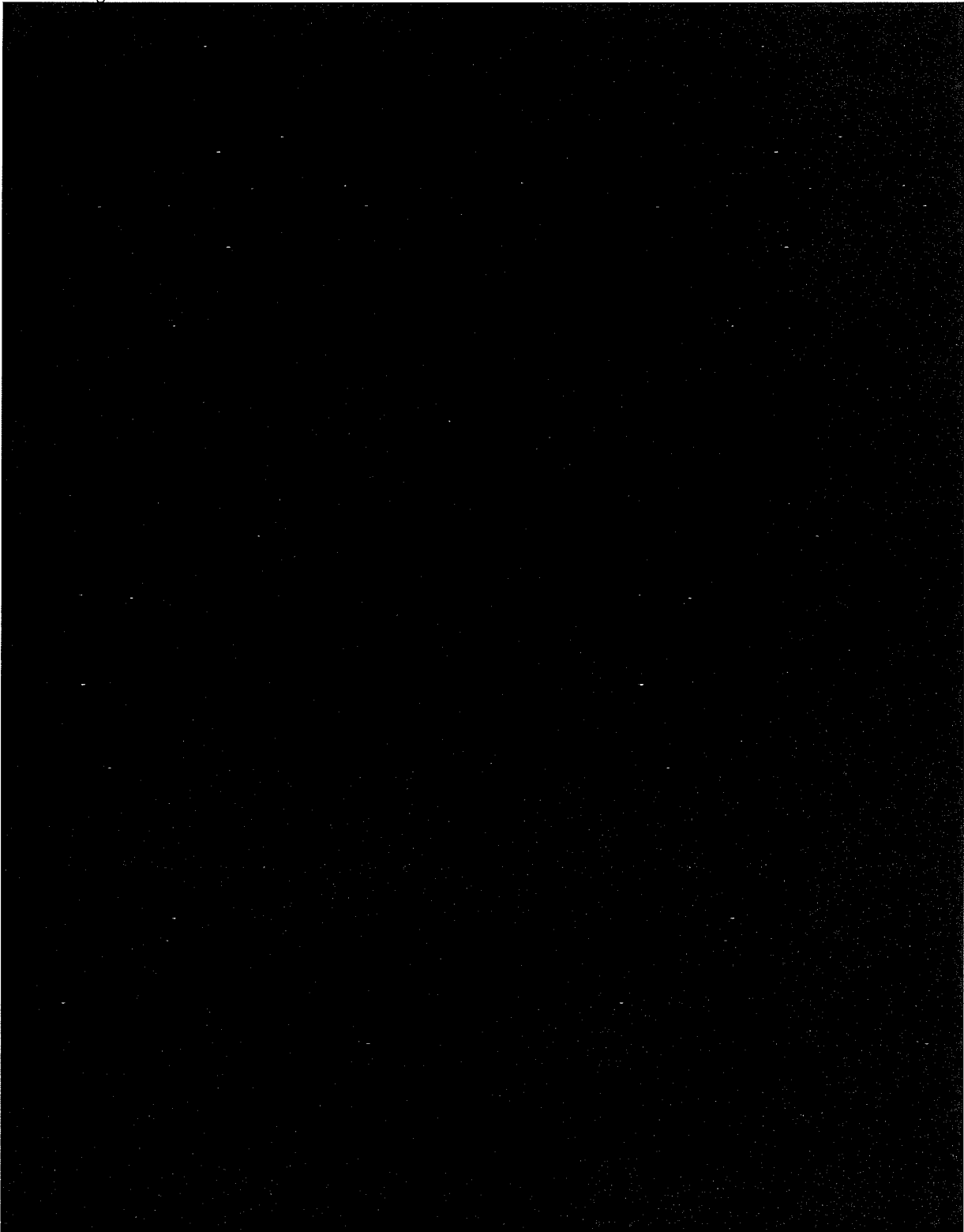
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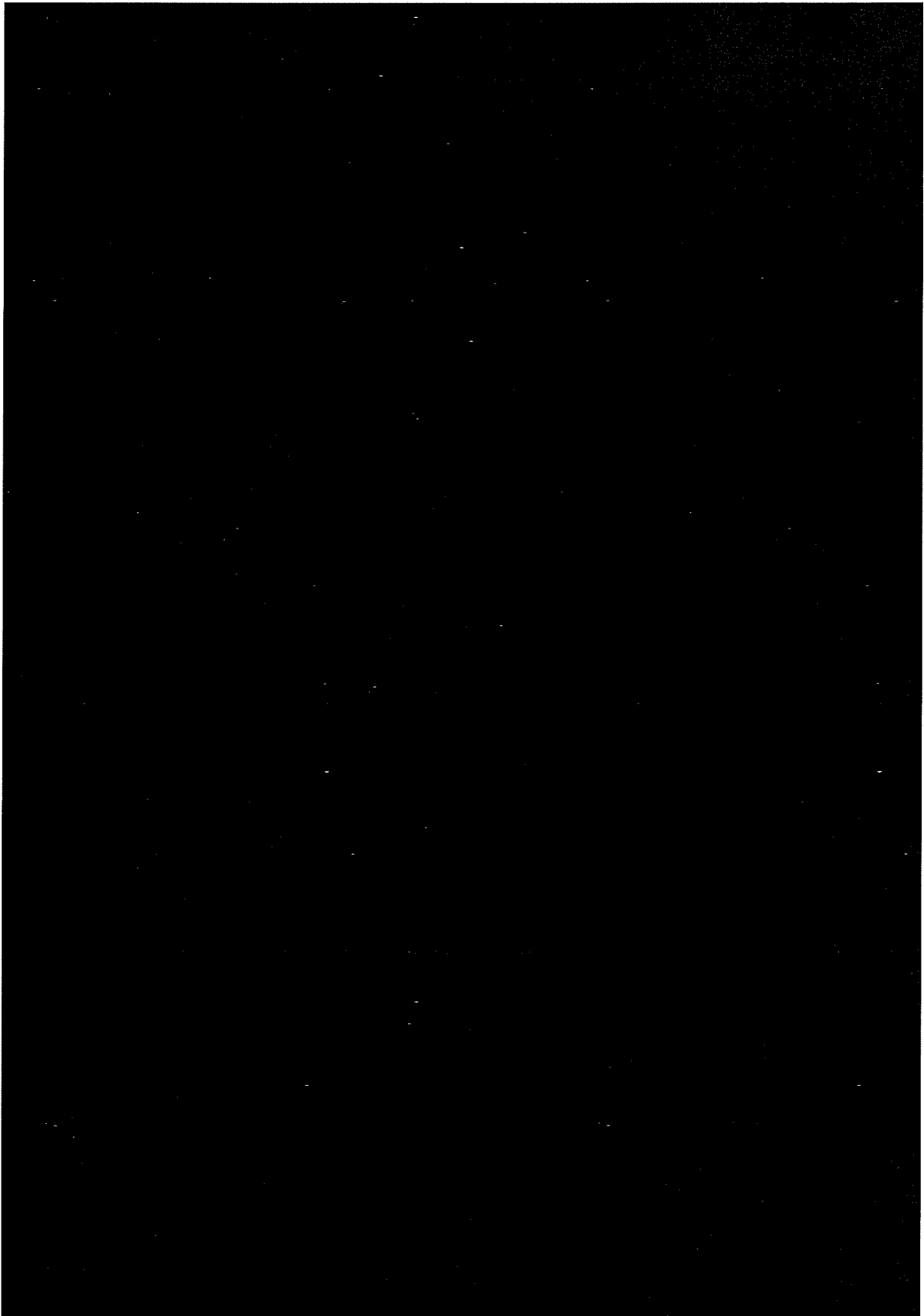
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Assumptions

The cost estimates in this business case have been developed based on several assumptions, as outlined in the following table.





Although best efforts have been made to assign a representative cost to each asset, further site/asset investigations are required to refine the cost estimates to consider site-specific conditions. The methods to develop the cost estimates for each tranche of work are discussed in greater detail below.

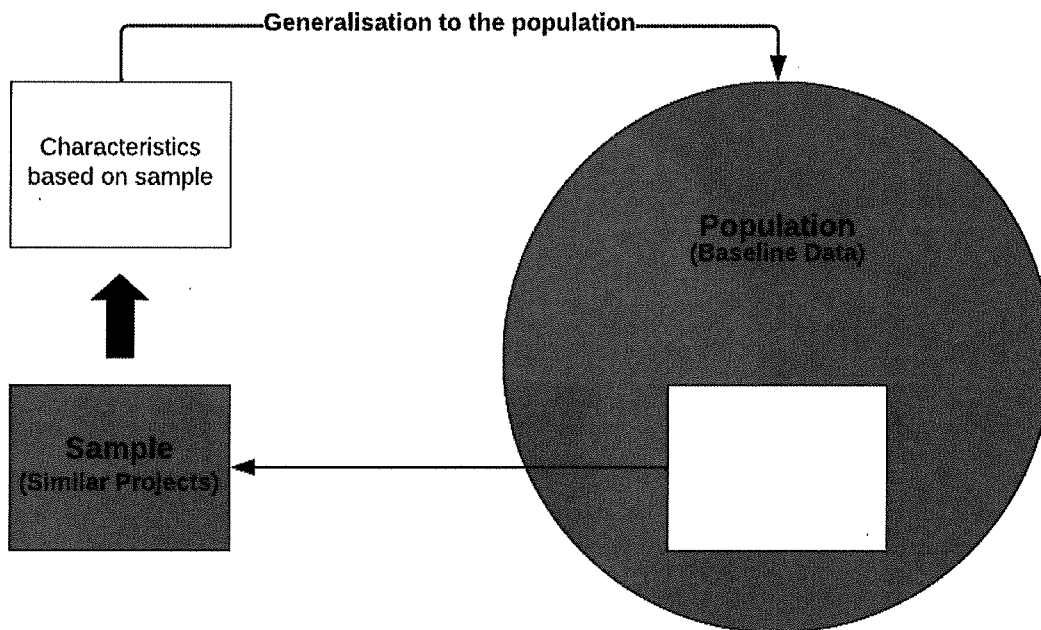
Appendix G
Capital Cost Estimates

Short-Term Cost Estimates

Statistical Inference

Given limited information was available for each site, statistical inferences have been used to develop an asset-by-asset capital cost estimate methodology for the short-term project tranche of works, as shown in Figure 1. Using the main heating plant technology costs as a basis, trade cost estimates have been developed for a subset of the replacement works (the data sample) which has then been extrapolated across the other short-term works.

Figure 1 Statistical Inference Visualisation



The various cost elements are discussed further below.

Trade Costs

The relevant trade cost components are consistent across the sample of projects, with the specific trade cost allowance dependent on the type of replacement technology proposed. The specific trade cost components and subcomponents which make up the construction subtotal for the replacement works are summarised in Table 2.

Table 2 – Trade Cost Components and Sub-Components

Cost component	Subcomponent
Plant	▪ Main heating plant (known) ▪ Thermal Energy Storage ▪ Buffer Tank ▪ Primary Pumps ▪ Secondary Pumps ▪ Expansion Tank ▪ Distribution Pipework Main Plant
Upgrades & commissioning	▪ Main plant and pipework upgrades ▪ Electrical upgrades ▪ BMS Integration ▪ Testing and Commissioning
Decommissioning & building works	▪ Demolition Works ▪ Lifting and/or delivery of equipment ▪ Services penetrations ▪ Outside enclosure, the plant works, and other works

Each asset/technology type selected across the electrification projects has a different proportion (%) of the total construction cost allocated to each trade cost component and each subcomponent. Summing each trade cost proportion across all sample electrification projects and dividing by the number of projects in the sample, an average (sample mean) is derived from generalising the proportion of cost allocated to each trade cost component and subcomponent for the broader population of projects. This process of generalising cost proportions has been undertaken for each replacement asset type: CO₂ air source heat pump (ASHP), propane system ASHP, Electric Commercial Hot Water Unit, Packaged Unit, Split System and Radiant Electric Tuber Heater.

A summary of the average percentage allocations for each technology option is shown in Table 3 below, and an example of applying this methodology is provided in the Weetangera Primary School Example section.

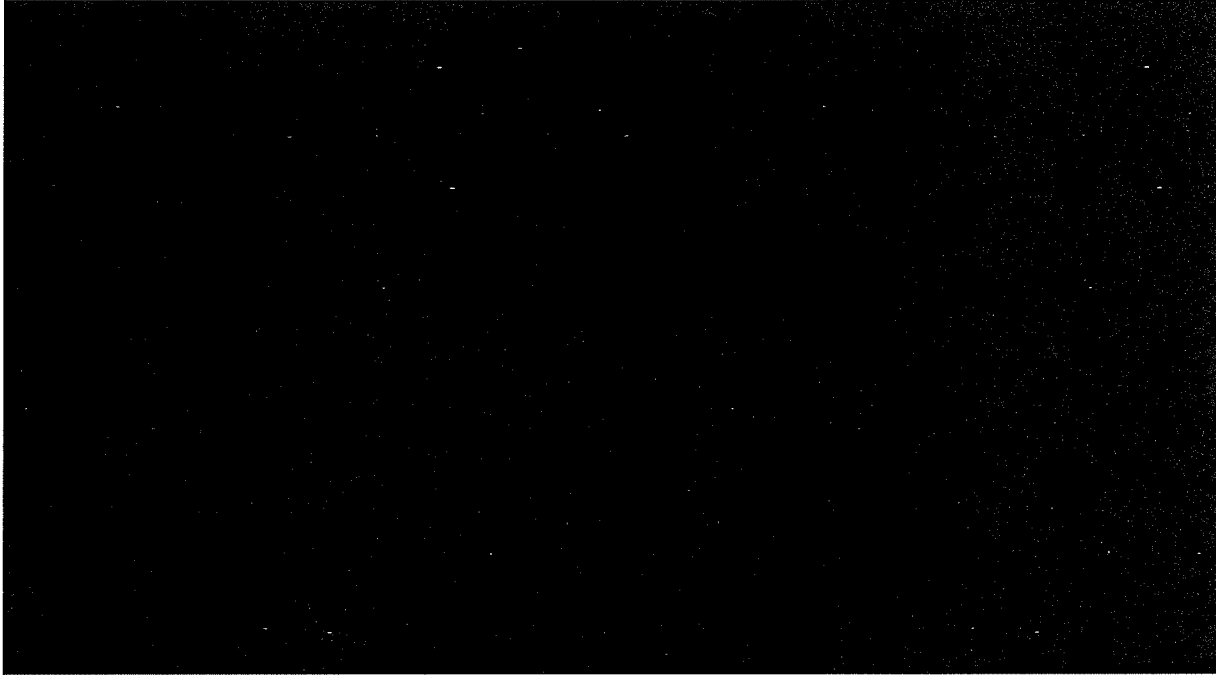
Table 3 – Trade Cost Components and Subcomponents for All Technology Options

Technology Options	Packaged Unit	Split System	ASHP CO ₂ Heat Pump	ASHP Propane System	Electric Commercial Hot Water Unit	Radiant Electric Tube Heater
CAPEX Plant	45%	45%	53%	53%	81%	81%
Main Heating Plant	85%	85%	81%	81%	100%	100%
Thermal Energy Storage	0%	0%	4%	4%	0%	0%
Primary Pumps	0%	0%	8%	8%	0%	0%
Secondary Pumps	0%	0%	3%	3%	0%	0%
Expansion Tank	0%	0%	1%	1%	0%	0%
Distribution & Pipework Main Plant	15%	15%	3%	3%	0%	0%
Upgrades & Commissioning	28%	28%	37%	37%	16%	16%
Distribution Main Plant and Pipework Upgrades.	35%	35%	18%	18%	0%	0%
Electrical Upgrades	22%	22%	60%	60%	96%	96%
BMS Integration	16%	16%	12%	12%	0%	0%
Testing and Commissioning	27%	27%	9%	9%	4%	4%
Building Works	27%	27%	10%	10%	3%	3%
Demolition Works	20%	20%	26%	26%	100%	100%
Lifting and/or Delivery of Equipment	20%	20%	10%	10%	0%	0%
Services Penetrations	24%	24%	6%	6%	0%	0%
Outside Enclosure, Plant Works and Other Works	36%	36%	59%	59%	0%	0%

Main Heating Plant Technology Costs

Main heating plant technology costs have been gathered through external stakeholder consultation with equipment suppliers, including Hunt Heating, Automatic Heating and Stiebel Eltron. Work undertaken with suppliers and research of publicly available information has developed the understanding of technology options and lead times to establish the quotations summarised in Table 4.

Table 4 – Main Heating Plant Technology Costs



The cost per unit (\$) in Table 4 comprises the main heating plant technology costs applied to assets in the short-, medium- and long-term tranches. Through statistical inference, explained further below, the known main heating plant costs are used as a basis in the short-term tranche and extrapolated across the remaining tranches to develop asset-by-asset cost estimates.

Oncosts

The following oncost allowances were added to the subtotal construction cost.

Table 5 – Oncosts

Cost component	Assumption
Preliminaries	■ Preliminary costs from projects of a similar nature have been utilised to derive a sample mean (average) percentage allocation that is applied as a generalisation to the broader group of projects in the Program.
Contingency	■ Contingency has been calculated utilising the "Risk Engineering Society – Contingency Guideline". This aspect is explained further in the business case.

Other Costs

The following allowances were added to the total construction cost in developing the total project costs.

Table 6 – Other Costs

Cost component	Assumption
Design fees	■ - Design fees from projects of a similar nature have been utilised to derive a sample mean (average) percentage allocation that is applied as a generalisation to the broader group of projects in the Program.
Project management fees	■ - Project management fees from projects of a similar nature have been utilised to derive a sample mean (average) percentage allocation that is applied as a generalisation to the broader group of projects in the Program.
Escalation	- Escalation was included in the cost plans based on the forecasts from industry sources, including but not limited to the Australian Institute of Quantity Surveyors (AIQS). - Year 1 & Year 2 – ■ per annum (compounded) - Year 3 onwards ■ per annum (compounded)
ACT Government Fees	The following ACT Government fees were included: - IDP fee 4.00% - Other Directorate costs 4.00% - ACTIA costs 0.25% - ACTGS costs 0.10%

Weetangera Primary School Example

Trade Costs

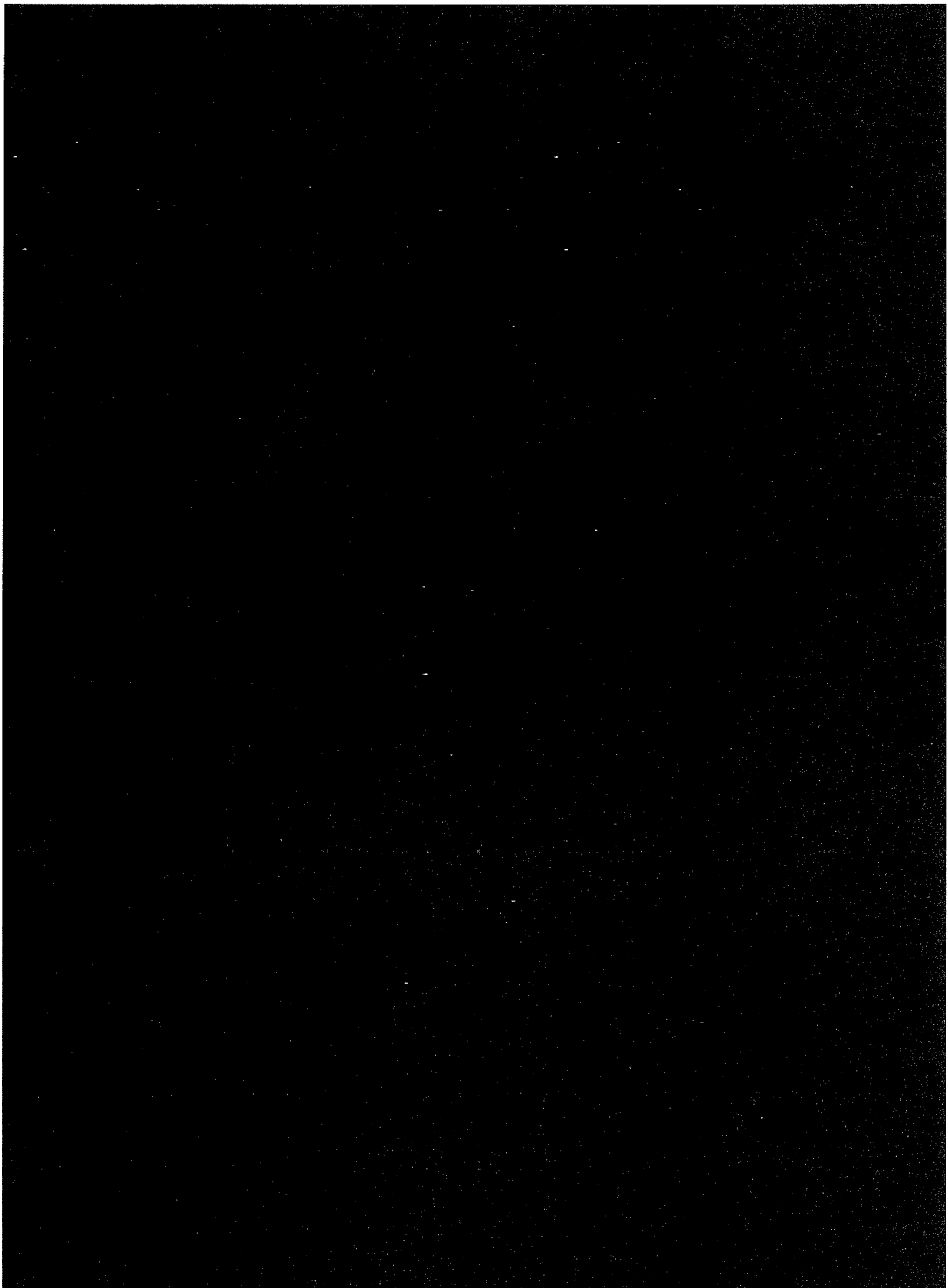


Table 10 – Weetangera Primary School Cost Summary

Cost component	Cost (\$)
Trade Costs (\$)	██████
Oncosts (\$)	██████
Other Costs (\$)	██████
Grand Total (\$)	██████

Medium to Long-Term

In developing the trade costs for the medium- and long-term tranches, a cost per kW for each asset type and replacement technology has been adopted, derived from the calculations for the short-term tranche. Similar to the short-term tranche, oncosts and other costs have been included to produce a grand total project cost.

Trade Costs

Given that data for projects in the short-, medium- and long-term tranches offer key site parameters such as current asset type, total installed Capacity and building typology, short-term projects are aligned to projects with similar current asset types and building typology in the medium- and long-term tranches. Since CAPEX costs in the short-term have been calculated, an average short-term \$/kW rate for each replacement technology type can be derived, shown in Table 11.

Table 11 – Medium- and Long-term Asset Replacement Trade Cost Rate



Applying the rates in Table 11 as a generalisation, the trade costs for proposing any one of these technology options can be inferred if the installed capacity is known. An example of this process for one medium- and long-term asset project works at Woden Library is shown below.

Oncosts

The following oncost allowances were added to the subtotal construction cost.

Table 12 – Oncosts

Cost component	Assumption
Preliminaries	■ - Preliminary costs from projects of a similar nature have been utilised to derive a sample mean (average) percentage allocation that is applied as a generalisation to the broader group of projects in the Program.
Contingency	■ - Contingency has been calculated utilising the "Risk Engineering Society – Contingency Guideline". This aspect is explained further in the business case.

Other Costs

In developing the total project costs, the following allowances were added onto the total construction cost.

Table 13 – Other Costs

Cost component	Assumption
Design fees	■ - Design fees from projects of a similar nature have been utilised to derive a sample mean (average) percentage allocation that is applied as a generalisation to the broader group of projects in the Program.
Project management fees	■ - Project management fees from projects of a similar nature have been utilised to derive a sample mean (average) percentage allocation that is applied as a generalisation to the broader group of projects in the Program.
Escalation	- Escalation was included in the cost plans based on the forecasts from industry sources, including but not limited to the Australian Institute of Quantity Surveyors (AIQS). - Year 1 & Year 2 – ■ per annum (compounded) - Year 3 onwards ■ per annum (compounded)
ACT Government Fees	The following ACT Government fees were included: - IDP fee 4.00% - Other Directorate costs 4.00% - ACTIA costs 0.25% - ACTGS costs 0.10%

Woden Library Example

Trade Costs

Taking one gas domestic hot water system with a total heating capacity output of **6 kW** at Woden Library, a proposed technology of appropriate duty (Domestic Hot Water) and heating capacity (>6 kW) is selected. In this example, the electric commercial hot water unit with a rated capacity of 22 kW is selected. Table 14 shows the process of applying the **\$217/kW** rate in Table 11 to the installed capacity of 6 kW for a sub-total construction cost of **\$1,369**.

Table 14 – Applying Trade Cost Rate to 4kW Asset

Site	Facility Type	Duty	Type of unit	# Units	Asset Capacity Output	(\$/kW)	Sub-total
Woden Library	Library	Domestic Hot Water	Domestic Hot Water System	1	6 kW	217	\$1,369

Oncosts

Adding the Oncosts described in Table 12 onto the construction subtotal of **\$1,369** takes the total construction cost for the replacement of a gas Domestic Hot Water System at Woden Library to **\$2,205**, shown in Table 15.

Table 15 – Summary of Preliminary and Contingency Fees

Preliminaries	Construction Cost Exc Contingency	Contingency	Total Construction Cost
			\$2,205

Other Costs

Adding the Other Costs described in Table 13 onto the total construction cost of **\$2,205** takes the grand total cost for the replacement of one gas Domestic Hot Water system of 6 kW output capacity at Woden Library to approximately **\$4,856**.

Woden Library Cost Summary

Table 16 summarises the cost estimate for Woden Library, including trade costs, oncosts, other costs and grade total cost.

Table 16 – Woden Library Cost Summary

Cost component	Cost
Trade Costs	\$1,369
Oncosts	\$835
Other Costs	\$2,651
Grand Total Cost	

Unknown Asset Data

Where key baseline asset data such as quantity, type of asset, age and capacity are unknown, the trade cost estimates are based on the cost averages of known assets, taking into consideration the type of asset and capacity (when known).

Trade Cost

Where the capacity and/or type of asset are unknown, an average replacement cost has been calculated based on a dollar-per-unit figure from each proposed technology replacement type, summarised in Table 17. Where the asset's capacity is known, the approach used for the medium and long-term tranches has been undertaken.

Table 17 -- Unknown Asset Replacement Trade Cost Rate

Proposed Technology	Technology Make / Description	Average Cost per Unit
ASHP CO ₂ heat pump	CHP-080Y2	██████
	CHP-35H	██████
ASHP Propane system	AHGR290HP185	██████
	AHGR290HP220	██████
Radiant Electric Tube Heater	M-VULCAN-12L	██████
Electric Commercial Hot Water Unit	616 315-2	██████
Split System	SRK50ZSA-W	██████
Packaged Unit	UAYQ120CY1A	██████

Oncosts

The following oncost allowances were added to the subtotal construction cost.

Table 18 – Oncosts

Cost component	Assumption
Preliminaries	██████ - Preliminary costs from projects of a similar nature have been utilised to derive a sample mean (average) percentage allocation that is applied as a generalisation to the broader group of projects in the Program.
Contingency	██████ - Contingency has been calculated utilising the "Risk Engineering Society – Contingency Guideline". This aspect is explained further in the business case.

Other Costs

In developing the total project costs, the following allowances were added onto the total construction cost.

Table 19 – Other Costs

Cost component	Assumption
Design fees	■ - Design fees from projects of a similar nature have been utilised to derive a sample mean (average) percentage allocation that is applied as a generalisation to the broader group of projects in the Program.
Project management fees	■ - Project management fees from projects of a similar nature have been utilised to derive a sample mean (average) percentage allocation that is applied as a generalisation to the broader group of projects in the Program.
Escalation	- Escalation was included in the cost plans based on the forecasts from industry sources, including but not limited to the Australian Institute of Quantity Surveyors (AIQS). - Year 1 & Year 2 – ■ per annum (compounded) - Year 3 onwards ■ per annum (compounded)
ACT Government Fees	The following ACT Government fees were included: - IDP fee 4.00% - Other Directorate costs 4.00% - ACTIA costs 0.25% - ACTGS costs 0.10%



User Guidance for Business Case Costing Template

- a. This spreadsheet provides eight sheets (tabs 3 -10) that can be used to provide costing input for the business case.. Tabs that require input from business case preparers are highlighted green.
- b. All cells/rows/columns that require input are highlighted in green. Please go through each Tab carefully and provide data input where applicable in green highlighted cells. Other cells are locked and should not be changed
- c. **Tab 3 - Recurrent Staff Cost** is for additional FTEs required for delivery of the **expense** component of the proposed project. You are required to input FTE numbers against the correct classification by filling columns C to T.
- d. **Tab 4 - Capital Staff Cost** is for additional FTEs required for delivery of the **capital** component of the proposed project. This is generally staff who are building or commissioning the asset (not design work). You are required to input FTE numbers against the correct classification by filling columns C to T.
- e. **Tab 5 - Unfunded staffing** is for existing staffing resources that will be utilised for the delivery of the proposal for which no additional funding is being sought.
- f. **Tab 6 - Recurrent Supplier Cost** is for non-employee costs associated with expense components of the proposal. Examples of the cost breakdown names are provided for reference, please update the cost categories as per resourcing needs of the business case. Please also specify the resource to be engaged within the corporate areas such as fleet costs or equipment in addition to the standard ICT equipment.
- You are also required to select the expense type (GBMS Account Name) for each cost category.
- Tab 7 - Capital Supplier Cost** is for non-employee costs associated with **capital** components of the proposal. Capital should
- g. Provide the basis for costing estimates ie what is driving the costing numbers (these may include quotations, cost of similar projects previously completed etc)
- Training Levy Assessment:**
- Construction works are subject to a training levy of 0.2%. A self-assessment is required for each component of the capital works costs against below criteria, and amount to be entered in the specified cells in Tab 7.
- Assessment criteria for construction works subject to training levy:
- building and construction works as defined under **Schedule 1** of the *Building and Construction Industry Training Levy Act 1999* are subject to Training Levy (<https://www.legislation.act.gov.au/View/a/1999-30/current/html/1999-30.html>) – with the following exceptions:
 - constructions works that require building approval through EPSDD
 - works that may not be construction works in nature such as planning, feasibility studies and design works etc.
- h. **Tab 8 - Asset rollout** - Used by business areas to indicate when they will complete work in progress and when it will become a completed asset in use. It also captures how long the asset will provide benefit to the government. This will be used for several back end accounting calculations, such as depreciation.
- i. **Tab 9 - Revenue, Savings and Offsets** complete when a business case delivers either quantifiable efficiencies, reduction in expenses or demonstrable increase in revenue. Use this tab only if there are realisable offsets and financial benefits in the business case. If agreed by the Cabinet, these savings or offsets will have an impact on the business division's budget.
- j. **Tab 10 - Procurement forecast** - Allows for forecast of signing contracts and other procurement activity.

EPSDD Business Case Costing Template - Summary

Business Case No:	
Business Case Name:	Electrification of government gas assets
Output Class	02 Environment
Funding: Ongoing or non-ongoing?	Non-ongoing
Cross Directorate Impact (pick from the drop-down list)	All
Has a component of DSGC? (Yes/No)	No

Financial Impact Summary	2023-24	2024-25	2025-26	2026-27	Total
	\$'000	\$'000	\$'000	\$'000	\$'000
Capital Impact					
Capital (staff and supplier)	11,121	85,126	109,638	91,900	297,785
Expense Impacts (a)					
Expenses (staff and supplier)	4,857	7,240	6,972	6,214	25,283
Expenses - Depreciation/Amortisation	-	676	6,197	13,245	20,118
Revenue/Savings/Offsets Impacts					
Revenue	-	-	-	-	-
Savings	190	250	410	10	860
MPC Fees (included in capital)	-	-	-	-	-

Staffing Impact	2023-24	2024-25	2025-26	2026-27	Total \$'000
FTE	5.0	5.0	5.0	5.0	
Capital staffing costs (\$'000)	-	-	-	-	-
Recurrent staffing costs (\$'000)	807	820	832	844	3,303

The information contained in this table should feed into the Business Case Financial Impacts Summary table.

Positive Low	Standard of 1 in 10 ⁶ (%)	Total Cases (n = 100)
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PDFA 2	0.2	0
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PDFA 4	0.2	0
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PDFA 7	1.0	1
PDFA 8	1.0	1
PDFA 9	1.0	1
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PDFA 12	1.0	1
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PDFA 14	1.0	1
PDFA 15	1.0	1
PDFA 16	1.0	1
PDFA 17	1.0	1
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202-517		Study Group	Number of Tests
Practice Law			Total Cases (C) = (T) × (C/T)
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Pratika D	0.5		
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Pratika CB	0.5		
Pratika CC	0.5		
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Pratika CG	0.5		
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Process Level		
Process Level	Number of HRT/RT G	Total Core Fuel Elements
RTS1A	2.0	2
RTS1B	2.0	2
RTS1C	2.0	2
RTS1A	2.0	2
RTS1B	2.0	2
RTS1C	2.0	2
RTS2A	2.0	2
RTS2B	2.0	2
RTS2C	2.0	2
RTS2A	2.0	2
RTS2B	2.0	2
RTS2C	2.0	2
RTS3A	2.0	2
RTS3B	2.0	2
RTS3C	2.0	2
RTS3A	2.0	2
RTS3B	2.0	2
RTS3C	2.0	2
RTS4A	2.0	2
RTS4B	2.0	2
RTS4C	2.0	2
RTS4A	2.0	2
RTS4B	2.0	2
RTS4C	2.0	2
RTS5A	2.0	2
RTS5B	2.0	2
RTS5C	2.0	2
RTS5A	2.0	2
RTS5B	2.0	2
RTS5C	2.0	2
RTS6A	2.0	2
RTS6B	2.0	2
RTS6C	2.0	2
RTS6A	2.0	2
RTS6B	2.0	2
RTS6C	2.0	2
RTS7A	2.0	2
RTS7B	2.0	2
RTS7C	2.0	2
RTS7A	2.0	2
RTS7B	2.0	2
RTS7C	2.0	2
RTS8A	2.0	2
RTS8B	2.0	2
RTS8C	2.0	2
RTS8A	2.0	2
RTS8B	2.0	2
RTS8C	2.0	2
RTS9A	2.0	2
RTS9B	2.0	2
RTS9C	2.0	2
RTS9A	2.0	2
RTS9B	2.0	2
RTS9C	2.0	2
RTS10A	2.0	2
RTS10B	2.0	2
RTS10C	2.0	2
RTS10A	2.0	2
RTS10B	2.0	2
RTS10C	2.0	2
RTS11A	2.0	2
RTS11B	2.0	2
RTS11C	2.0	2
RTS11A	2.0	2
RTS11B	2.0	2
RTS11C	2.0	2
RTS12A	2.0	2
RTS12B	2.0	2
RTS12C	2.0	2
RTS12A	2.0	2
RTS12B	2.0	2
RTS12C	2.0	2
RTS13A	2.0	2
RTS13B	2.0	2
RTS13C	2.0	2
RTS13A	2.0	2
RTS13B	2.0	2
RTS13C	2.0	2
RTS14A	2.0	2
RTS14B	2.0	2
RTS14C	2.0	2
RTS14A	2.0	2
RTS14B	2.0	2
RTS14C	2.0	2
RTS15A	2.0	2
RTS15B	2.0	2
RTS15C	2.0	2
RTS15A	2.0	2
RTS15B	2.0	2
RTS15C	2.0	2
RTS16A	2.0	2
RTS16B	2.0	2
RTS16C	2.0	2
RTS16A	2.0	2
RTS16B	2.0	2
RTS16C	2.0	2
RTS17A	2.0	2
RTS17B	2.0	2
RTS17C	2.0	2
RTS17A	2.0	2
RTS17B	2.0	2
RTS17C	2.0	2
RTS18A	2.0	2
RTS18B	2.0	2
RTS18C	2.0	2
RTS18A	2.0	2
RTS18B	2.0	2
RTS18C	2.0	2
RTS19A	2.0	2
RTS19B	2.0	2
RTS19C	2.0	2
RTS19A	2.0	2
RTS19B	2.0	2
RTS19C	2.0	2
RTS20A	2.0	2
RTS20B	2.0	2
RTS20C	2.0	2
RTS20A	2.0	2
RTS20B	2.0	2
RTS20C	2.0	2
RTS21A	2.0	2
RTS21B	2.0	2
RTS21C	2.0	2
RTS21A	2.0	2
RTS21B	2.0	2
RTS21C	2.0	2
RTS22A	2.0	2
RTS22B	2.0	2
RTS22C	2.0	2
RTS22A	2.0	2
RTS22B	2.0	2
RTS22C	2.0	2
RTS23A	2.0	2
RTS23B	2.0	2
RTS23C	2.0	2
RTS23A	2.0	2
RTS23B	2.0	2
RTS23C	2.0	2
RTS24A	2.0	2
RTS24B	2.0	2
RTS24C	2.0	2
RTS		

0.0 0

Position Level	Number of Staff (FT)	Total Cost (Per Year)
RTM-1	0.5	0
RTM-2	0.5	0
RTM-3	0.5	0
RTM-4	0.5	0
RTM-5	0.5	0
ISOC-1	0.5	0
ISOC-2	0.5	0
ISOC-3	0.5	0
ISOC-4	0.5	0
ISOC-5	0.5	0
ISOC-6	0.5	0
ISOC-7	0.5	0
ISOC-8	0.5	0
ISOC-9	0.5	0
ISOC-10	0.5	0
ISOC-11	0.5	0
ISOC-12	0.5	0
ISOC-13	0.5	0
ISOC-14	0.5	0
ISOC-15	0.5	0
ISOC-16	0.5	0
ISOC-17	0.5	0
ISOC-18	0.5	0
ISOC-19	0.5	0
ISOC-20	0.5	0
ISOC-21	0.5	0
ISOC-22	0.5	0
ISOC-23	0.5	0
ISOC-24	0.5	0
ISOC-25	0.5	0
ISOC-26	0.5	0
ISOC-27	0.5	0
ISOC-28	0.5	0
ISOC-29	0.5	0
ISOC-30	0.5	0
ISOC-31	0.5	0
ISOC-32	0.5	0
ISOC-33	0.5	0
ISOC-34	0.5	0
ISOC-35	0.5	0
ISOC-36	0.5	0
ISOC-37	0.5	0
ISOC-38	0.5	0
ISOC-39	0.5	0
ISOC-40	0.5	0
ISOC-41	0.5	0
ISOC-42	0.5	0
ISOC-43	0.5	0
ISOC-44	0.5	0
ISOC-45	0.5	0
ISOC-46	0.5	0
ISOC-47	0.5	0
ISOC-48	0.5	0
ISOC-49	0.5	0
ISOC-50	0.5	0
ISOC-51	0.5	0
ISOC-52	0.5	0
ISOC-53	0.5	0
ISOC-54	0.5	0
ISOC-55	0.5	0
ISOC-56	0.5	0
ISOC-57	0.5	0
ISOC-58	0.5	0
ISOC-59	0.5	0
ISOC-60	0.5	0
ISOC-61	0.5	0
ISOC-62	0.5	0
ISOC-63	0.5	0
ISOC-64	0.5	0
ISOC-65	0.5	0
ISOC-66	0.5	0
ISOC-67	0.5	0
ISOC-68	0.5	0
ISOC-69	0.5	0
ISOC-70	0.5	0
ISOC-71	0.5	0
ISOC-72	0.5	0
ISOC-73	0.5	0
ISOC-74	0.5	0
ISOC-75	0.5	0
ISOC-76	0.5	0
ISOC-77	0.5	0
ISOC-78	0.5	0
ISOC-79	0.5	0
ISOC-80	0.5	0
ISOC-81	0.5	0
ISOC-82	0.5	0
ISOC-83	0.5	0
ISOC-84	0.5	0
ISOC-85	0.5	0
ISOC-86	0.5	0
ISOC-87	0.5	0
ISOC-88	0.5	0
ISOC-89	0.5	0
ISOC-90	0.5	0
ISOC-91	0.5	0
ISOC-92	0.5	0
ISOC-93	0.5	0
ISOC-94	0.5	0
ISOC-95	0.5	0
ISOC-96	0.5	0
ISOC-97	0.5	0
ISOC-98	0.5	0
ISOC-99	0.5	0
ISOC-100	0.5	0

^aThe applicable *Worker's Compensation* rate should be used. The figure is

302524		302525	
Function (and)	(number of bits) P1 Q	(total bits) P1+Q	
PIRMA.1	0.0	0	0
PIRMA.2	0.0	0	0
PIRMA.3	0.0	0	0
PIRMA.4	0.0	0	0
PIRMA.5	0.0	0	0
PIRMA.6	0.0	0	0
PIRMA.7	0.0	0	0
PIRMA.8	0.0	0	0
PIRMA.9	0.0	0	0
PIRMA.10	0.0	0	0
PIRMA.11	0.0	0	0
PIRMA.12	0.0	0	0
PIRMA.13	0.0	0	0
PIRMA.14	0.0	0	0
PIRMA.15	0.0	0	0
PIRMA.16	0.0	0	0
PIRMA.17	0.0	0	0
PIRMA.18	0.0	0	0
PIRMA.19	0.0	0	0
PIRMA.20	0.0	0	0
PIRMA.21	0.0	0	0
PIRMA.22	0.0	0	0
PIRMA.23	0.0	0	0
PIRMA.24	0.0	0	0
PIRMA.25	0.0	0	0
PIRMA.26	0.0	0	0
PIRMA.27	0.0	0	0
PIRMA.28	0.0	0	0
PIRMA.29	0.0	0	0
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PIRMA.31	0.0	0	0
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PIRMA.34	0.0	0	0
PIRMA.35	0.0	0	0
PIRMA.36	0.0	0	0
PIRMA.37	0.0	0	0
PIRMA.38	0.0	0	0
PIRMA.39	0.0	0	0
PIRMA.40	0.0	0	0
PIRMA.41	0.0	0	0
PIRMA.42	0.0	0	0
PIRMA.43	0.0	0	0
PIRMA.44	0.0	0	0
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PIRMA.46	0.0	0	0
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PIRMA.48	0.0	0	0
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PIRMA.50	0.0	0	0
PIRMA.51	0.0	0	0
PIRMA.52	0.0	0	0
PIRMA.53	0.0	0	0
PIRMA.54	0.0	0	0
PIRMA.55	0.0	0	0
PIRMA.56	0.0	0	0
PIRMA.57	0.0	0	0
PIRMA.58	0.0	0	0
PIRMA.59	0.0	0	0
PIRMA.60	0.0	0	0
PIRMA.61	0.0	0	0
PIRMA.62	0.0	0	0
PIRMA.63	0.0	0	0
PIRMA.64	0.0	0	0
PIRMA.65	0.0	0	0
PIRMA.66	0.0	0	0
PIRMA.67	0.0	0	0
PIRMA.68	0.0	0	0
PIRMA.69	0.0	0	0
PIRMA.70	0.0	0	0
PIRMA.71	0.0	0	0
PIRMA.72	0.0	0	0
PIRMA.73	0.0	0	0
PIRMA.74	0.0	0	0
PIRMA.75	0.0	0	0
PIRMA.76	0.0	0	0
PIRMA.77	0.0	0	0
PIRMA.78	0.0	0	0
PIRMA.79	0.0	0	0
PIRMA.80	0.0	0	0
PIRMA.81	0.0	0	0
PIRMA.82	0.0	0	0
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PIRMA.84	0.0	0	0
PIRMA.85	0.0	0	0
PIRMA.86	0.0	0	0
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PIRMA.93	0.0	0	0
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PIRMA.97	0.0	0	0
PIRMA.98	0.0	0	0
PIRMA.99	0.0	0	0
PIRMA.100	0.0	0	0
PIRMA.101	0.0	0	0
PIRMA.102	0.0	0	0
PIRMA.103	0.0	0	0
PIRMA.104	0.0	0	0
PIRMA.105	0.0	0	0
PIRMA.106	0.0	0	0
PIRMA.107	0.0	0	0
PIRMA.108	0.0	0	0
PIRMA.109	0.0	0	0
PIRMA.110	0.0	0	0
PIRMA.111	0.0	0	0
PIRMA.112	0.0	0	0
PIRMA.113	0.0	0	0
PIRMA.114	0.0	0	0
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PIRMA.130	0.0	0	0
PIRMA.131	0.0	0	0
PIRMA.132	0.0	0	0
PIRMA.133	0.0	0	0
PIRMA.134	0.0	0	0
PIRMA.135	0.0	0	0
PIRMA.136	0.0	0	0
PIRMA.137	0.0	0	0
PIRMA.138	0.0	0	0
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PIRMA.141	0.0	0	0
PIRMA.142	0.0	0	0
PIRMA.143	0.0	0	0
PIRMA.144	0.0	0	0
PIRMA.145	0.0	0	0
PIRMA.146	0.0	0	0
PIRMA.147	0.0	0	0
PIRMA.148	0.0	0	0
PIRMA.149	0.0	0	0
PIRMA.150	0.0	0	0
PIRMA.151	0.0	0	0
PIRMA.152	0.0	0	0
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PIRMA.159	0.0	0	0
PIRMA.160	0.0	0	0
PIRMA.161	0.0	0	0
PIRMA.162	0.0	0	0
PIRMA.163	0.0	0	0
PIRMA.164	0.0	0	0
PIRMA.165	0.0	0	0
PIRMA.166	0.0	0	0
PIRMA.167	0.0	0	0
PIRMA.168	0.0	0	0
PIRMA.169	0.0	0	0
PIRMA.170	0.0	0	0
PIRMA.171	0.0	0	0
PIRMA.172	0.0	0	0
PIRMA.173	0.0	0	0
PIRMA.174	0.0	0	0
PIRMA.175	0.0	0	0
PIRMA.176	0.0	0	0
PIRMA.177	0.0	0	0
PIRMA.178	0.0	0	0
PIRMA.179	0.0	0	0
PIRMA.180	0.0	0	0
PIRMA.181	0.0	0	0
PIRMA.182	0.0	0	0
PIRMA.183	0.0	0	0
PIRMA.184	0.0	0	0
PIRMA.185	0.0	0	0
PIRMA.186	0.0	0	0
PIRMA.187	0.0	0	0
PIRMA.188	0.0	0	0
PIRMA.189	0.0	0	0
PIRMA.190	0.0	0	0
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PIRMA.201	0.0	0	0
PIRMA.202	0.0	0	0
PIRMA.203	0.0	0	0
PIRMA.204	0.0	0	0
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PIRMA.212	0.0	0	0
PIRMA.213	0.0	0	0
PIRMA.214	0.0	0	0
PIRMA.215	0.0	0	0
PIRMA.216	0.0	0	0
PIRMA.217	0.0	0	0
PIRMA.218	0.0	0	0
PIRMA.219	0.0	0	0
PIRMA.220	0.0	0	0
PIRMA.221	0.0	0	0
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PIRMA.227	0.0	0	0
PIRMA.228	0.0	0	0
PIRMA.229	0.0	0	0
PIRMA.230	0.0	0	0
PIRMA.231	0.0	0	0
PIRMA.232	0.0	0	0
PIRMA.233	0.0	0	0
PIRMA.234	0.0	0	0
PIRMA.235	0.0	0	0
PIRMA.236	0.0	0	0
PIRMA.237	0.0	0	0
PIRMA.238	0.0	0	0
PIRMA.239	0.0	0	0
PIRMA.240	0.0	0	0
PIRMA.241	0.0	0	0
PIRMA.242	0.0	0	0
PIRMA.243	0.0	0	0
PIRMA.244	0.0	0	0
PIRMA.245	0.0	0	0
PIRMA.246	0.0	0	0
PIRMA.247	0.0	0	0
PIRMA.248	0.0	0	0
PIRMA.249	0.0	0	0
PIRMA.250	0.0	0	0
PIRMA.251	0.0	0	0
PIRMA.252	0.0	0	0
PIRMA.253	0.0	0	0
PIRMA.254	0.0	0	0
PIRMA.255	0.0	0	0
PIRMA.256	0.0	0	0
PIRMA.257	0.0	0	0
PIRMA.258	0.0	0	0
PIRMA.259	0.0	0	0
PIRMA.260	0.0	0	0
PIRMA.261	0.0	0	0
PIRMA.262	0.0	0	0
PIRMA.263	0.0	0	0
PIRMA.264	0.0	0	0
PIRMA.265	0.0	0	0
PIRMA.266	0.0	0	0
PIRMA.267	0.0	0	0
PIRMA.268	0.0	0	0
PIRMA.269	0.0	0	0
PIRMA.270	0.0	0	0
PIRMA.271	0.0	0	0
PIRMA.272	0.0	0	0
PIRMA.273	0.0	0	0
PIRMA.274	0.0	0	0
PIRMA.275	0.0	0	0
PIRMA.276	0.0	0	0
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PIRMA.279	0.0	0	0
PIRMA.280	0.0	0	0
PIRMA.281	0.0	0	0
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PIRMA.287	0.0	0	0
PIRMA.288	0.0	0	0
PIRMA.289	0.0	0	0
PIRMA.290	0.0	0	0
PIRMA.291	0.0	0	0
PIRMA.292	0.0	0	0
PIRMA.293	0.0	0	0
PIRMA.294	0.0	0	0
PIRMA.295	0.0	0	0
PIRMA.296	0.0	0	0
PIRMA.297	0.0	0	0
PIRMA.298	0.0	0	0
PIRMA.299	0.0	0	0
PIRMA.300	0.0	0	0
PIRMA.301	0.0	0	0
PIRMA.302	0.0	0	0
PIRMA.303	0.0	0	0
PIRMA.304	0.0	0	0
PIRMA.305	0.0	0	0
PIRMA.306	0.0	0	0
PIRMA.307	0.0	0	0
PIRMA.308	0.0	0	0
PIRMA.309	0.0	0	0
PIRMA.310	0.0	0	0
PIRMA.311	0.0	0	0
PIRMA.312	0.0	0	0
PIRMA.313	0.0	0	0
PIRMA.314	0.0	0	0
PIRMA.315	0.0	0	0
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PIRMA.318	0.0	0	0
PIRMA.319	0.0	0	0
PIRMA.320	0.0	0	0
PIRMA.321	0.0	0	0
PIRMA.322	0.0	0	0
PIRMA.323	0.0	0	0
PIRMA.324	0.0	0	0
PIRMA.325	0.0	0	0
PIRMA.326	0.0	0	0
PIRMA.327	0.0	0	0
PIRMA.328	0.0	0	0
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PIRMA.331	0.0	0	0
PIRMA.332	0.0	0	0
PIRMA.333	0.0	0	0
PIRMA.334	0.0	0	0
PIRMA.335	0.0	0	0
PIRMA.336	0.0	0	0
PIRMA.337	0.0	0	0
PIRMA.338	0.0	0	0
PIRMA.339	0.0	0	0
PIRMA.340	0.0	0	0
PIRMA.341	0.0	0	0
PIRMA.342	0.0	0	0
PIRMA.343	0.0	0	0
PIRMA.344	0.0	0	0
PIRMA.345	0.0	0	

¹¹The applicable *Walker* of Compression, pp. 100–104, and The Figure 11.

PEAS-27	Product Stock	
Product Level	Number of Unit (P1) □	Total Cost (P1=19)
RF2A1	0.0	0.0
RF2A1.1	0.0	0.0
RF2A1.2	0.0	0.0
RF2A1.3	0.0	0.0
RF2A1.4	0.0	0.0
RF2A1.5	0.0	0.0
RF2A1.6	0.0	0.0
RF2A1.7	0.0	0.0
RF2A1.8	0.0	0.0
RF2A1.9	0.0	0.0
RF2A1.10	0.0	0.0
RF2A1.11	0.0	0.0
RF2A1.12	0.0	0.0
RF2A1.13	0.0	0.0
RF2A1.14	0.0	0.0
RF2A1.15	0.0	0.0
RF2A1.16	0.0	0.0
RF2A1.17	0.0	0.0
RF2A1.18	0.0	0.0
RF2A1.19	0.0	0.0
RF2A1.20	0.0	0.0
RF2A1.21	0.0	0.0
RF2A1.22	0.0	0.0
RF2A1.23	0.0	0.0
RF2A1.24	0.0	0.0
RF2A1.25	0.0	0.0
RF2A1.26	0.0	0.0
RF2A1.27	0.0	0.0
RF2A1.28	0.0	0.0
RF2A1.29	0.0	0.0
RF2A1.30	0.0	0.0
RF2A1.31	0.0	0.0
RF2A1.32	0.0	0.0
RF2A1.33	0.0	0.0
RF2A1.34	0.0	0.0
RF2A1.35	0.0	0.0
RF2A1.36	0.0	0.0
RF2A1.37	0.0	0.0
RF2A1.38	0.0	0.0
RF2A1.39	0.0	0.0
RF2A1.40	0.0	0.0
RF2A1.41	0.0	0.0
RF2A1.42	0.0	0.0
RF2A1.43	0.0	0.0
RF2A1.44	0.0	0.0
RF2A1.45	0.0	0.0
RF2A1.46	0.0	0.0
RF2A1.47	0.0	0.0
RF2A1.48	0.0	0.0
RF2A1.49	0.0	0.0
RF2A1.50	0.0	0.0
RF2A1.51	0.0	0.0
RF2A1.52	0.0	0.0
RF2A1.53	0.0	0.0
RF2A1.54	0.0	0.0
RF2A1.55	0.0	0.0
RF2A1.56	0.0	0.0
RF2A1.57	0.0	0.0
RF2A1.58	0.0	0.0
RF2A1.59	0.0	0.0
RF2A1.60	0.0	0.0
RF2A1.61	0.0	0.0
RF2A1.62	0.0	0.0
RF2A1.63	0.0	0.0
RF2A1.64	0.0	0.0
RF2A1.65	0.0	0.0
RF2A1.66	0.0	0.0
RF2A1.67	0.0	0.0
RF2A1.68	0.0	0.0
RF2A1.69	0.0	0.0
RF2A1.70	0.0	0.0
RF2A1.71	0.0	0.0
RF2A1.72	0.0	0.0
RF2A1.73	0.0	0.0
RF2A1.74	0.0	0.0
RF2A1.75	0.0	0.0
RF2A1.76	0.0	0.0
RF2A1.77	0.0	0.0
RF2A1.78	0.0	0.0
RF2A1.79	0.0	0.0
RF2A1.80	0.0	0.0
RF2A1.81	0.0	0.0
RF2A1.82	0.0	0.0
RF2A1.83	0.0	0.0
RF2A1.84	0.0	0.0
RF2A1.85	0.0	0.0
RF2A1.86	0.0	0.0
RF2A1.87	0.0	0.0
RF2A1.88	0.0	0.0
RF2A1.89	0.0	0.0
RF2A1.90	0.0	0.0
RF2A1.91	0.0	0.0
RF2A1.92	0.0	0.0
RF2A1.93	0.0	0.0
RF2A1.94	0.0	0.0
RF2A1.95	0.0	0.0
RF2A1.96	0.0	0.0
RF2A1.97	0.0	0.0
RF2A1.98	0.0	0.0
RF2A1.99	0.0	0.0
RF2A1.100	0.0	0.0
RF2A1.101	0.0	0.0
RF2A1.102	0.0	0.0
RF2A1.103	0.0	0.0
RF2A1.104	0.0	0.0
RF2A1.105	0.0	0.0
RF2A1.106	0.0	0.0
RF2A1.107	0.0	0.0
RF2A1.108	0.0	0.0
RF2A1.109	0.0	0.0
RF2A1.110	0.0	0.0
RF2A1.111	0.0	0.0
RF2A1.112	0.0	0.0
RF2A1.113	0.0	0.0
RF2A1.114	0.0	0.0
RF2A1.115	0.0	0.0
RF2A1.116	0.0	0.0
RF2A1.117	0.0	0.0
RF2A1.118	0.0	0.0
RF2A1.119	0.0	0.0
RF2A1.120	0.0	0.

8.9 8

Recurrent Supplier Costs

- Note:
- Below listed supplier costs are examples only. Please update them as per your business case need
 - If engaging contractor(s), please explain why this can't be done by internal staff, and what task/s
 - Identify corporate FITs as corporate support in below table if they are heavily involved.
 - Please manually enter estimated cost into the relevant month in green cells.
 - Provide the basis for all your costing estimates in what is driving the costing numbers (these may include a)

Supplier Costs (recurrent)*	Costs by Month (Jul to Dec)			
	Jul 2023-24	Jul 2023-24	Jul 2023-24	Jul 2023-24
Contract Manager	75,000	75,000	75,000	75,000
Business Development	50,000	50,000	50,000	50,000
Business Development	50,000	50,000	50,000	50,000
Total Supplier Cost (recurrent)	175,000	175,000	175,000	175,000

2023-24		2023-24		2023-24		2023-24	
Supplier Costs (recurrent)*		Full 2023-24		GRMS Account Name (Pick from dropdown)		Jul-2023	
Site / Asset Investigations		1,000,000		Consultants, Contractors and Professional Services		1,000,000	
Development of Procurement Strategy		500,000		Consultants, Contractors and Professional Services		500,000	
Upstream Program of Works		300,000		Consultants, Contractors and Professional Services		300,000	
Upstream to Business Cases		500,000		Consultants, Contractors and Professional Services		500,000	
Operational Oversight Resource		300,000		Supplies and Services		300,000	
Legal and Compliance		250,000		Consultants, Contractors and Professional Services		250,000	
Project Advisor		100,000		Consultants, Contractors and Professional Services		100,000	
Workable Costs		100,000		Supplies and Services		100,000	
Program Delivery Partner		-		Consultants, Contractors and Professional Services		-	
Training Levy		-		-		-	
Total Supplier Cost (recurrent)		4,050,000		-		4,050,000	

2024-25		2024-25		2024-25		2024-25	
Supplier Costs (recurrent)*		Full 2024-25		GRMS Account Name (Pick from dropdown)		Jul-2024	
Site / Asset Investigations		1,000,000		Consultants, Contractors and Professional Services		1,000,000	
Development of Procurement Strategy		300,000		Consultants, Contractors and Professional Services		300,000	
Upstream Program of Works		200,000		Consultants, Contractors and Professional Services		200,000	
Upstream to Business Cases		500,000		Consultants, Contractors and Professional Services		500,000	
Operational Oversight Resource		300,000		Supplies and Services		300,000	
Legal and Compliance		500,000		Consultants, Contractors and Professional Services		500,000	
Project Advisor		200,000		Consultants, Contractors and Professional Services		200,000	
Workable Costs		200,000		Supplies and Services		200,000	
Program Delivery Partner		3,000,000		Consultants, Contractors and Professional Services		3,000,000	
Training Levy		-		-		-	
Total Supplier Cost (recurrent)		6,450,000		-		6,450,000	

2025-26		2025-26		2025-26		2025-26	
Supplier Costs (recurrent)*		Full 2025-26		GRMS Account Name (Pick from dropdown)		Jul-2025	
Site / Asset Investigations		500,000		Consultants, Contractors and Professional Services		500,000	
Development of Procurement Strategy		-		Consultants, Contractors and Professional Services		-	
Upstream Program of Works		-		Consultants, Contractors and Professional Services		-	
Upstream to Business Cases		400,000		Consultants, Contractors and Professional Services		400,000	
Operational Oversight Resource		500,000		Supplies and Services		500,000	
Legal and Compliance		500,000		Consultants, Contractors and Professional Services		500,000	
Project Advisor		200,000		Consultants, Contractors and Professional Services		200,000	
Workable Costs		200,000		Supplies and Services		200,000	
Program Delivery Partner		3,840,000		Consultants, Contractors and Professional Services		3,840,000	
Training Levy		-		-		-	
Total Supplier Cost (recurrent)		6,140,000		-		6,140,000	

Note:
• below listed Task numbers are examples only. Please update them as per the tasks/cost category relevant to the business case.

- if engaging contractor(s), please explain why this can't be done by Internal staff, and what tasks/objectives will be undertaken or achieved.

- Access to any training levy is payable

Formula based, no input required					
	2023-24	2024-25	2025-26	2026-27	Total
Overall Total Capital Costs	11,120,738	85,125,670	106,637,529	91,899,374	297,784,011

Fill in the Revenue, Savings and Offsets per financial year in the table below
Provide commentary around the Revenue, Savings and Offsets field in column 'G'
For e.g. If there's any Savings associated with the BC please highlight that in here/ If there is any Offsets to the associated BC that's coming to closure, it would be justified by referencing the BC name and number

	2023-24	2024-25	2025-26	2026-27	Total	Justification
Revenue	-	-	-	-	-	
Savings	190,000	250,000	410,000	10,000	860,000	
Offsets						
Overall Total Revenue	190,000	250,000	410,000	10,000	860,000	

*Relevant procurement field needs to be completed in the below table

Procurement Forecast

What contracts are required to deliver this initiative?

Contract Title	Dependencies	Category	Planned Procurement Method	Total expected contract value	Expected Contract Start Date	Expected Contract End Date	ATSIPP	SLJ
Please be descriptive	Does this contract depend on the outcome of a related contract (if yes, include 1, 2, 3 etc)	Goods, Services and/or works	See note below	\$ (GST inc)	(mm -yyy)	(mm -yyy)	Y/N See note below	Y/N See note below
(1)								
(2)								
(3)								
(4)								
(5)								
ESTIMATED TOTAL				\$0				

NOTES

Procurement Method	Panel Contract - i.e. contract under an established panel arrangement (Deed of Standing Offer); WhoG - utilise an existing whole
ATSIPP	Will this contract contribute towards EPSDD's Aboriginal and
SLJ	Will the contract be subject to the Secure Local Jobs Code?
	More information about the ATSI Procurement Policy
	More information about Secure Local Jobs

For any questions about completing this Plan, contact the EPSDD Procurement Team at EPSDDProcurement@act.gov.au

		Budget year	Year 1	Year 2	Year 3
		2023-24	2024-25	2025-26	2026-27
WPI	as per GBMS	0.00%	1.30%	1.30%	1.30%
Superannuation Rate		11.50%	11.50%	11.50%	11.50%
LSL/LL		4%	4%	4%	4%
Works compensation		1.44%	1.44%	1.44%	1.44%
Admin		21,871	22,418	22,979	23,553

Password: BudgetTemp

Salary rates:

Base year	
INFRA 1	83,967
INFRA 2	98,869
INFRA 3	123,406
INFRA 4	148,020
INFRA 5	165,438
SOG C	120,870
SOG B	144,203
SOG A	159,244
ASO 1	57,038
ASO 2	64,612
ASO 3	72,185
ASO 4	81,612
ASO 5	89,661
ASO 6	97,265
Ranger 1	64,614
Ranger 2	72,207
Ranger 3	80,528
SOG C(T)	120,870
SOG B(T)	145,225
Technical Officer 1	64,973
Technical Officer 2	73,514
Technical Officer 3	85,308
Technical Officer 4	98,689
SPO C	120,870
SPO B	145,225
SPO A	159,245
Park Ranger 1	72,207
Park Ranger 2	80,528
Park Ranger 3	88,391
PO1	77,032
PO2	98,689
GSO 2	52,515
GSO 3	55,585
GSO 4	58,413
GSO 5	62,096
GSO 6	65,147
GSO 7	70,530
GSO 8	76,465
GSO 9	85,012
GSO 10	98,689

The above calculations include administrative on-cost for new employees. If there is any additional admin on-costs that are relevant to the recurrent staff cost please include those expenses in Recurrent Supplier Cost tab.

*Administrative On-Cost	2022-23	2023-24	2024-25	2025-26	2026-27
Administrative Component (including items such as desktop IT items and support, accommodation, insurance, training etc)	\$ 18,777	\$ 19,106	\$ 19,440	\$ 19,781	\$ 19,820
Corporate Component (Human Resource and Finance Services)	\$ 2,561	\$ 2,605	\$ 2,651	\$ 2,697	\$ 2,703
Total Admin ON-Cost	\$ 21,338	\$ 21,711	\$ 22,091	\$ 22,478	\$ 22,523

Current Agency

Access Canberra
Access Canberra (Core)
ACT Audit Office
ACT Electoral Commission
ACT Government Executive
ACT Health Directorate
ACT Integrity Commission
ACT Legislative Assembly
ACT Long Service Leave Authority
ACT Teacher Quality Institute
ACTIA
Building & Construction Industry Training Board
Calvary Health Care
Canberra Cemeteries
Canberra Health Services
Canberra Institute of Technology
Capital Linen Service
Chief Minister Stream
Chief Minister, Treasury & Economic Development
City Renewal Authority
Community Services Directorate
Cultural Facilities Corporation
Economic Development
Economic Development (Core)
Education Cleaners
Education Directorate
Environment, Planning and Sustainable Development
Gambling and Racing Commission Board
Housing ACT
Independent Competition and Regulatory Commission
Integrity Commission
Justice and Community Safety
Legal Aid ACT
Legislative Assembly Members Staff
Major Projects Canberra
Office of the Legislative Assembly
Property Group
Public Transport Operations
Public Trustee and Guardian
Shared Services
Suburban Land Agency
Transport Canberra and City Services Directorate
Transport Canberra and City Services Other
Treasury
Treasury (core)
University of Canberra

Asset	Class	Recommended Standard Useful		Asset Sub Class	FV Classification
		Life	Actual U/L range		
Land	Land	no dep	no dep	2001	2
Land Improvements	Land	no dep	n/a	2002	2
Land Toilet	Land	no dep	no dep	2003	2
Land Forest	Land	no dep	n/a	2004	2
Land Restoration	Land Restoration	Various		3001	3
Buildings	Buildings	40		4001	3
Buildings - other	Buildings	Various		4004	3
Building Toilet	Buildings	40		4005	3
Building	Leasehold improvement	Various	5-20	5001	3
BBQ	P&E	15	15-100	6001	3
Bins	P&E	10	13-94	6002	3
Waste Wheelie Bins	P&E	10	10-101	6002	3
Bollard	P&E	30	30-123	6003	3
Boom	P&E	50		6004	3
Buoy	P&E	25	33-43	6005	3
Drinking Fountain	P&E	30	30-103	6006	3
Fitness Circuits	P&E	20	4-24	6007	3
Flagpole	P&E	30		6008	3
Mower	P&E	3		6009	2
P&E - Other	P&E	Various		6009	2/3
Playgrounds	P&E	20	20	6011	3
Seats	P&E	20	20-120	6012	3
Tables	P&E	20	20-120	6013	3
Water Tank	P&E	20		6014	3
Trailers	P&E	5	4-16	6015	2
Vehicles	P&E	3-5		6015	2
Library Materials	H&C	3.5	2-50	7001	3
Leased P&E	P&E Leased	Various		8001	3
Motor Vehicles - Leased	Motor Vehicles - Leased	Various		9001	3
Bridge	Infrastructure	100	100-125	10001	3
Driveway	Infrastructure	50	50-109	10002	3
Shopping Centre Pavement	Infrastructure	50	50-109	10003	3
Site Improvements	Infrastructure	25		10004	3
Road - Arterial	Infrastructure	75	75-113	10005	3
Road - Gravel	Infrastructure	40	40-106	10005	3
Road - Municipal	Infrastructure	90	90-116	10005	3
Barrier	Infrastructure	100	100-136	10006	3
Carpark - Bitumen, Concrete	Infrastructure	50	50-100	10007	3
Carpark - Gravel	Infrastructure	40	40-106	10007	3
Streetlight - Columns	Infrastructure	70	70-131.5	10008	3
Streetlight - inside Contactors	Infrastructure	50	50-77	10008	3
Streetlight - outside Contactors	Infrastructure	50	50-96	10008	3
Stormwater - all	Infrastructure	100	100-138	10009	3
Stormwater - Culverts	Infrastructure	80	80-115	10009	3
Traffic Signals set with Controller	Infrastructure	15	15	10010	3
Traffic Signals set without Controller	Infrastructure	35	35-54.6	10010	3
Community Paths	Infrastructure	40	40-107	10011	3
Waste Infrastructure	Infrastructure	Various		10012	3
Fence	Infrastructure	30	30-123	10013	3
Gate	Infrastructure	30	30-122	10014	3
Irrigation	Infrastructure	20	15-59	10015	3
Rockwall	Infrastructure	100	100-109	10016	3
Signs (PCL)	Infrastructure	10	10-100	10017	3
Signs (Roads)	Infrastructure	10	10-120	10017	3
Skate Park	Infrastructure	40	40	10018	3
Boat Ramp	Infrastructure	50	29-43	10019	3
Bridges and Boardwalks	Infrastructure	100	50	10020	3
Jetty	Infrastructure	50	50	10021	3
Other Infrastructure	Infrastructure	Various		10022	3
TV Transmitter	Infrastructure	5	2	10023	3
Retaining Wall	Infrastructure	100	100-109	10024	3
Bus Shelter	Infrastructure	40	40-107	10025	3
Bus Stops	Infrastructure	40	40-107	10025	3
Traffic Calming Measures - Plastic/Rubber speed Humps	Infrastructure	10		10026	3
Traffic Calming Measures - Concrete/Asphalt speed Humps	Infrastructure	20		10026	3
Beach	H&C	100	100	11001	3
Land (reserves)	H&C	no dep	no dep	11002	2
Water Feature	H&C	50		11003	3
Artwork	H&C	no dep	no dep	11004	3
Fountain	H&C	50	17-50	11005	3
Memorial	H&C	no dep	no dep	11006	3
Ground Improvements	H&C	Various		11007	3
H&C - Other	H&C	Various		11008	3
H&C - Building	H&C	Various		11009	3
H&C - Land	H&C	no dep	no dep	11010	2

Land Under Roads	H&C	no dep	no dep	11011	3
Sculptures	H&C	no dep	no dep	11012	3
Shelter (Parks)	H&C	30	7-57	11013	3
Urban Open Space (UOS)	H&C	no dep	no dep	11015	3
Software Internal	Software	5		12001	3
Software External	Software	5		12002	3

Instructions for Analysts (Finance Officers) reviewing costing for GBMS entry:

- Business Divisions preparing the business case are responsible for filling the Tabs 3-10 (where applicable)
- Tab 15 - 'GBMS Salary Split' reflects the split and apportionment of the Recurrent and Capital staffing costs, as input by business areas, into various employee expense account codes, as required for GBMS entries. It is formula driven and does not require any manual input.
- Tab 16 - 'GBMS Flatfile' draws data from various tabs through pre-filled formulas in order to organise information in the format suitable for GBMS entries.
- Analysts should pay close attention to depreciation columns in Tab 8, to ensure total project value has been accounted for and there are no duplication or omissions. Check whether the business case has one class of asset with a singular estimated life or multiple assets with different useful lives. The current formula in GBMS Flatfile tab
- When reviewing this costing for the purpose of GBMS entries, Analysts should check that balances in Tab 16 match to Recurrent and Capital Salary tabs. Amounts in Tab 16 must match to their source and account codes used must reflect the nature of the cost.
- It is also important for Analysts to check that totals of the Flatfile for GBMS entry align with the Summary tab amounts.
- Checks have been set up through out the template to ensure consistency of numbers across the tabs.

[illegible]

Section 1

Item	Quantity	Unit	Description
1	1	EA	Item 1 Description
2	1	EA	Item 2 Description
3	1	EA	Item 3 Description
4	1	EA	Item 4 Description
5	1	EA	Item 5 Description
6	1	EA	Item 6 Description
7	1	EA	Item 7 Description
8	1	EA	Item 8 Description
9	1	EA	Item 9 Description
10	1	EA	Item 10 Description

Section 2

Item	Quantity	Unit	Description
11	1	EA	Item 11 Description
12	1	EA	Item 12 Description
13	1	EA	Item 13 Description
14	1	EA	Item 14 Description
15	1	EA	Item 15 Description
16	1	EA	Item 16 Description
17	1	EA	Item 17 Description
18	1	EA	Item 18 Description
19	1	EA	Item 19 Description
20	1	EA	Item 20 Description

Section 3

Item	Quantity	Unit	Description
21	1	EA	Item 21 Description
22	1	EA	Item 22 Description
23	1	EA	Item 23 Description
24	1	EA	Item 24 Description
25	1	EA	Item 25 Description
26	1	EA	Item 26 Description
27	1	EA	Item 27 Description
28	1	EA	Item 28 Description
29	1	EA	Item 29 Description
30	1	EA	Item 30 Description

Section 4

Item	Quantity	Unit	Description
31	1	EA	Item 31 Description
32	1	EA	Item 32 Description
33	1	EA	Item 33 Description
34	1	EA	Item 34 Description
35	1	EA	Item 35 Description
36	1	EA	Item 36 Description
37	1	EA	Item 37 Description
38	1	EA	Item 38 Description
39	1	EA	Item 39 Description
40	1	EA	Item 40 Description

Section 5	Section 6
Section 7	Section 8
Section 9	Section 10
Section 11	Section 12
Section 13	Section 14
Section 15	Section 16
Section 17	Section 18
Section 19	Section 20
Section 21	Section 22
Section 23	Section 24
Section 25	Section 26
Section 27	Section 28
Section 29	Section 30
Section 31	Section 32
Section 33	Section 34
Section 35	Section 36
Section 37	Section 38
Section 39	Section 40
Section 41	Section 42
Section 43	Section 44
Section 45	Section 46
Section 47	Section 48
Section 49	Section 50
Section 51	Section 52
Section 53	Section 54
Section 55	Section 56
Section 57	Section 58
Section 59	Section 60
Section 61	Section 62
Section 63	Section 64
Section 65	Section 66
Section 67	Section 68
Section 69	Section 70
Section 71	Section 72
Section 73	Section 74
Section 75	Section 76
Section 77	Section 78
Section 79	Section 80
Section 81	Section 82
Section 83	Section 84
Section 85	Section 86
Section 87	Section 88
Section 89	Section 90
Section 91	Section 92
Section 93	Section 94
Section 95	Section 96
Section 97	Section 98
Section 99	Section 100

Pro Rata
Manual

Enter Output Class	GBMS Account Code	Entity Code
01 Statutory Planning	080.1.01	1
02 Environment	080.1.02	1
03 Climate Change and Energy	080.1.05	1
04 Development and Implementation	080.1.04	1
05 Loose fill Asbestos	080.1.03	1
06 Planning and Urban Policy	080.1.06	1