

# Preliminary Business Case

## Rockhampton Operational Technology Hosting Facility



Part of the Energy Queensland Group



## Executive Summary

[REDACTED]

Energex and Ergon Energy require secure and highly resilient hosting facilities for critical operational technologies and have adopted levels of resilience consistent with the Australian Energy Market Cyber Security Framework (AESCSF). [REDACTED]

[REDACTED]

This business case considers five options:

- **Base Case (Counterfactual)**

[REDACTED]

- **Option A: Establish the OTHF** [REDACTED] (Preferred)

[REDACTED]

- **Option B: Establish the OTHF** [REDACTED]

[REDACTED]

- **Option C: Establish the OTHF** [REDACTED]

[REDACTED]

- **Option D: Establish the OTHF**

[REDACTED]

The options assessment also includes a sensitivity analysis which assesses the merits of each option with alternative financial and timing scenarios.

The business case recommends that the optimal proposal is Option A, with the capital investment to commence in the 2020/21 financial year. The total capital expenditure associated with this option is [REDACTED] (2018/19 real terms) in the 2020-25 regulatory control period (RCP) with an NPV of [REDACTED] over 20 years.

Prior to investment, a Gate 3 business case will be prepared with further detail to be assessed in accordance with established investment governance processes.

The proposed investment will mitigate risks including:

[REDACTED]

The proposed investment will enable benefits including:

[REDACTED]

This investment will support customers and the communities of Queensland through provision of a secure and reliable OTHF for business critical technology infrastructure that enables the safe, reliable and secure operation of the distribution network.





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## 1. Introduction

This business case proposes investment to replace the Rockhampton Richardson Road Operational Technologies Hosting Facility (OTHF) to ensure the ongoing safe, reliable and secure operations of the distribution network.

### 1.1 Purpose of document

This is a preliminary business case describing the need for investment in replacement of the existing OTHF [REDACTED]

[REDACTED] Prior to investment a Gate 3 business case will be prepared with further detail to be assessed in accordance with the established Energy Queensland investment governance processes.

### 1.2 Scope of document

This document describes the scope and options for investment in a replacement of Rockhampton Richardson Road OTHF to meet the investment needs outlined below.

### 1.3 Investment need

Energex and Ergon Energy have Network Operations Centre (NOC) capability in three locations across Queensland - Brisbane, Rockhampton and Townsville. [REDACTED]

Energex and Ergon Energy require secure and highly resilient hosting facilities for critical operational technologies and have adopted levels of resilience consistent with the Australian Energy Market Cyber Security Framework (AESCSF)<sup>1</sup>. [REDACTED]

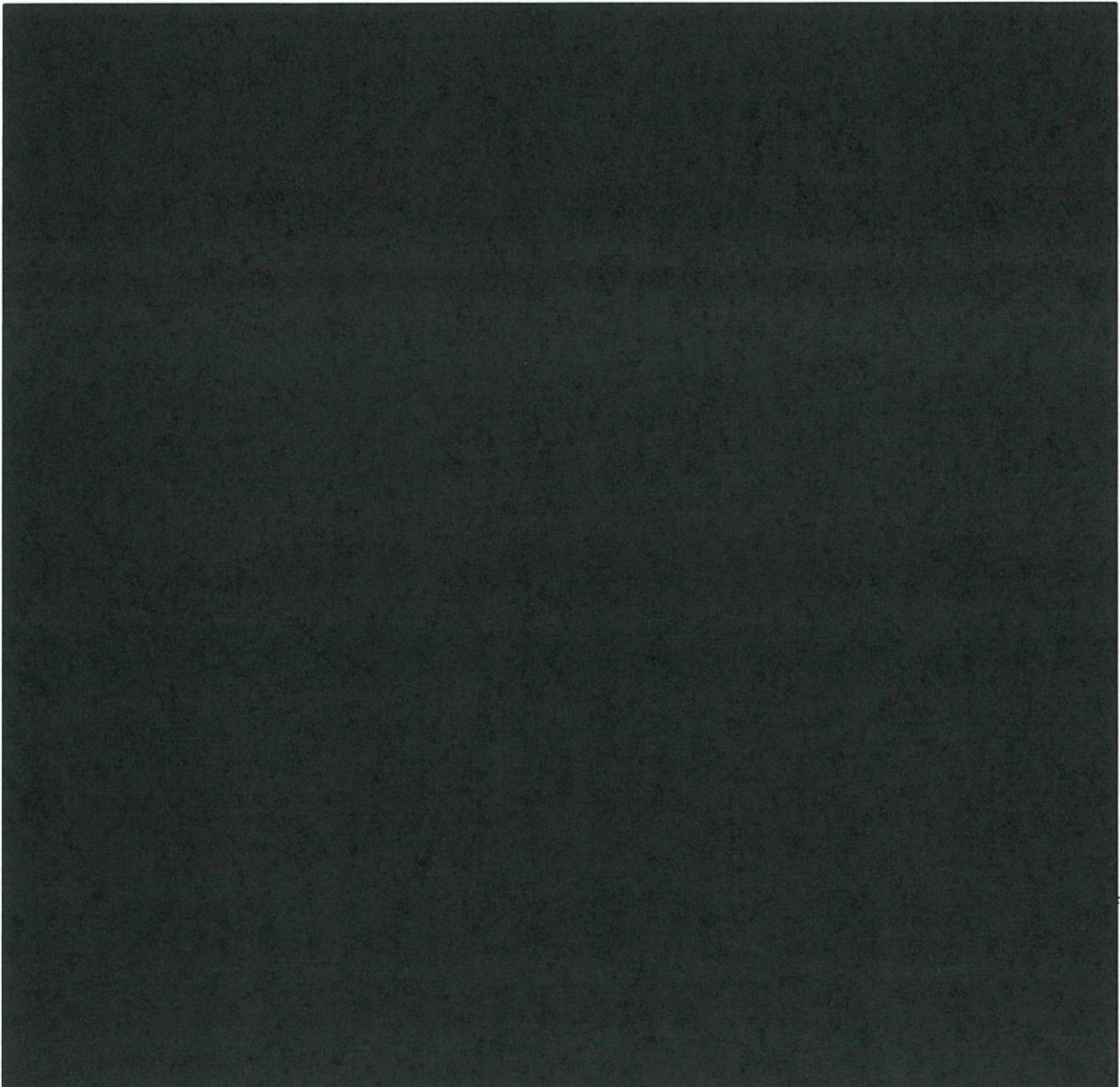
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<sup>1</sup> The AESCSF leverages recognised industry frameworks including the US Department of Energy's Cybersecurity Capability Maturity Model (ES-C2M2), US National Institute of Standards and Technology (NIST) Cyber Security Framework (CSF) and various global best-practice control standards including ISO/IEC 27001, NIST SP 800-53 and the Australian Signals Directorate (ASD) Top 37 Strategies to Mitigate Cybersecurity Incidents.

<sup>2</sup> [REDACTED]



### 1.3.1 Technology Hosting Facility Overview

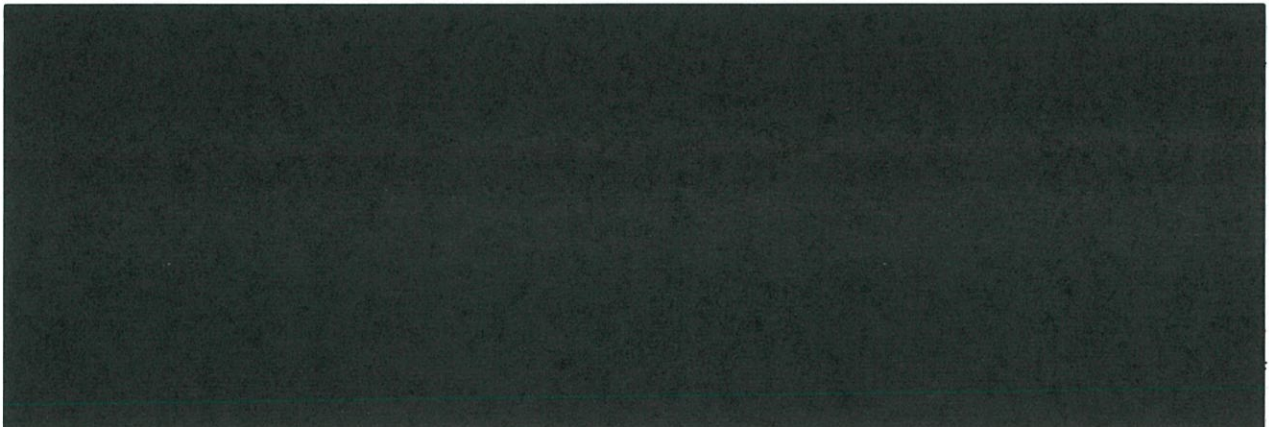


### 1.3.2 Rockhampton Property Strategy

Ergon Energy is executing a long term Rockhampton property consolidation strategy which will result in the consolidation of the Rockhampton property portfolio down from four to two sites. The remaining two sites will be the Glenmore Road Operational Hub, primarily for in-field and field support staff, and Alma Street for office based staff. These sites are designed to be flexible and support the changing needs of the modern workforce.





The redevelopment of the Glenmore Road site for the main office and operational buildings completed in July 2016, enabling partial decommissioning of the Richardson Road site. The Glenmore Road site is a cost-efficient, compliant, safe and modern operational site able to service the business needs for the foreseeable future. During the redevelopment of the Glenmore Road site, allowance was made to 'future-proof' the site by incorporating a building "shell" to accommodate both the NOC and the OTHF<sup>4</sup>.



## **1.4 Rockhampton Property Rationalisation and Consolidation**

### **Investment Drivers**

To facilitate the planned rationalisation and consolidation of property assets in Rockhampton, investment will be required in the 2020-25 RCP. This investment is to   replace the current OTHF in Richardson Road.

The proposed investment is required to ensure the ongoing safety, sustainability and efficiency of the Rockhampton property portfolio and to ensure the operations of the distribution network is supported by the OTHF as part providing safe and reliable electricity supply to Energex and Ergon Energy customers and communities.

The specific drivers for this investment include:

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## 1.5 Energy Queensland Strategic Alignment

Table 1 below details how the investment contributes to Energy Queensland's strategic objectives.

Strategic Objectives	Relationship of Initiative to Objectives
<b>1. Community and customer focused</b> Maintain and deepen our communities' trust by delivering on our promises, keeping the lights on and delivering an exceptional customer experience every time.	<p>The Rockhampton OTHF must provide a highly available and resilient environment to support the safe and reliable operation of a large part of the Queensland electricity network.</p> <p>It will support community safety through minimising the risk of disruption to Energy Queensland's core operational and telecommunications technologies that support the delivery of energy supply to customers and communities.</p>
<b>2. Operate safely as an efficient and effective organisation</b> Continue to build a strong safety culture across the business and empower and develop our people while delivering safe, reliable and efficient operations.	<p>The Rockhampton OTHF development will consolidate operations into a single, fit for purpose facility that supports operational efficiencies and reduces staff safety hazards.</p>
<b>3. Strengthen and grow from our core</b> Leverage our portfolio business, strive for continuous improvement and work together to shape energy use and improve the utilisation of our assets.	<p>Ergon Energy and Energex have market obligations to maintain system security and reliability in accordance with the standards defined the Australian Energy Market Operator.</p> <p>A highly available and secure OTHF is an essential component in supporting the safe and reliable operations of the electricity network.</p>
<b>4. Create value through innovation</b> Be bold and creative, willing to try new ways of working and deliver new energy services that fulfil the unique needs of our communities and customers.	

Table 1: Strategic Alignment



## 1.6 Legislative compliance obligations

The Rockhampton OTHF needs to comply with a range of legislation, standards and codes of practice as indicated in Table 2 below.

Legislation, Regulation or Code	Obligations	Relevance to this investment
<b>Queensland Work Health and Safety Act 2011</b> and <b>Work Health and Safety Regulation 2011</b>	<p>We have a duty of care, ensuring so far as is reasonably practicable, the health and safety of our staff and other parties. This includes the suitable provision and maintenance of work environments, premises, plant and structures, such that workers are not exposed to risks to health and safety.</p>	<p>The proposed OTHF investment must ensure the staff, service providers and visitors to the site are not exposed to health and safety risks so far as is reasonably practicable.</p>
<b>Queensland Building Act 1975 (QBA)</b>	<p>We must comply with development obligations as defined through the QBA. This includes obligations for development approvals, building certification and compliance with the Queensland Development Code and the Building Code of Australia.</p>	<p>Any new construction or redevelopment of the OTHF must be undertaken in compliance with the QBA, NCC, BCA, QDC, and with the Queensland Building Regulation. Particular considerations for the Rockhampton OTHF include:</p> <ul style="list-style-type: none"> <li>• Maintaining access and egress standards, energy efficiency and overall safety.</li> <li>• The new development must maintain safe work conditions in and around the building, while also designing for the continued safe operation of the buildings smoke and fire management systems etc.</li> </ul>
<b>National Construction Code (NCC)</b> and <b>the Building Code of Australia (BCA)</b>	<p>The NCC and the BCA provides the minimum necessary requirements for safety, health, amenity, accessibility and sustainability in the design, construction, performance and liveability of new buildings (and new building work in existing buildings) throughout Australia. This includes provisions related to:</p> <ul style="list-style-type: none"> <li>• building structures and fire resistance</li> <li>• access and egress (including access for people with a disability)</li> <li>• services and equipment (including firefighting, smoke management, lifts, lighting)</li> <li>• health and amenity (including weatherproofing, sanitary facilities, ventilation, noise insulation)</li> <li>• energy efficiency</li> <li>• other (atrium construction, construction in bushfire prone areas etc)</li> </ul>	

Legislation, Regulation or Code	Obligations	Relevance to this investment
<b>Queensland Development Code (QDC)</b>	We must comply with the QDC, which complements the NCC and BCA, defining Queensland-specific obligations relating to fire safety installations and maintenance, development in flood prone areas, building sustainability and others.	
<b>Queensland Building Regulation 2006</b>	We must comply additional regulations prescribed through the Queensland Building Regulation, consistent with our obligations under the Queensland Building Act. The regulations define acceptable building works, development on land liable to flooding and bush fires, water saving targets and other regulated obligations.	
<b>Safe Work Australia - Managing the Work Environment and Facilities. Code of Practice - Dec 2011</b>	Consistent with the Work Health and Safety Act, this code of practice defined specific safe work obligations relating to: <ul style="list-style-type: none"> <li>• access and egress</li> <li>• work areas and workstations</li> <li>• flooring, lighting and housekeeping</li> <li>• ventilation, heating and cooling</li> <li>• provision of worker facilities</li> <li>• emergency planning</li> </ul>	As above.
<b>Ring-fencing Guideline Electricity Distribution Version 2 - Oct 2017</b>	Consistent with the guideline the Energex and Ergon Energy DNSPs must use offices with physical separation from related electricity service provider that provides contestable electricity services i.e. Ergon Energy Retail and Nexium Telecommunications.	The configuration of the OTHF will need to comply with the ring-fencing guidelines.

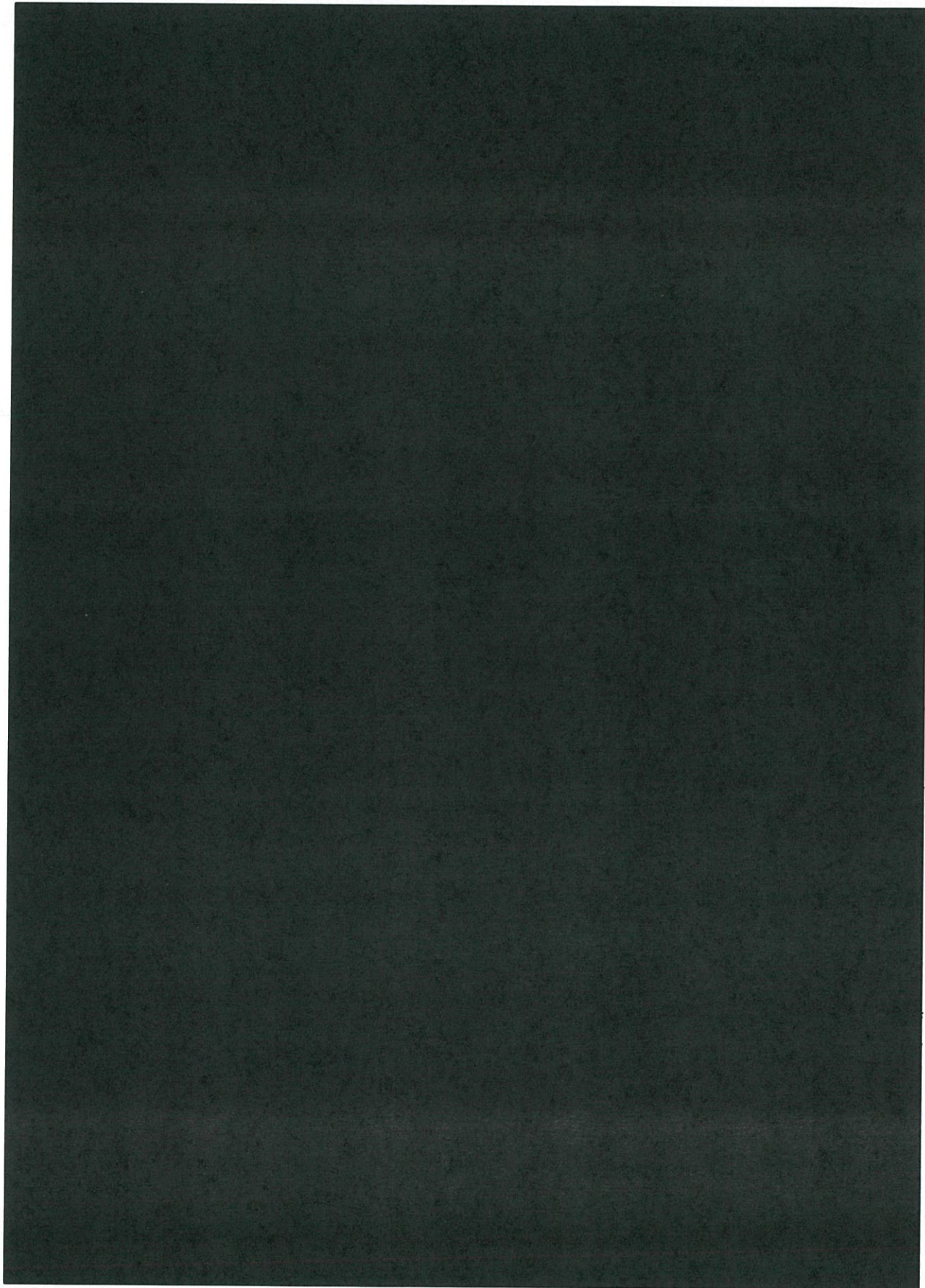


Legislation, Regulation or Code	Obligations	Relevance to this investment
Protection of Critical Infrastructure	<p>Energy Queensland has adopted a security posture in line with the Australian Energy Market Cyber Security Framework (AESCSF) that leverages recognised industry frameworks including:</p> <ul style="list-style-type: none"> <li>• Queensland Government Information Standard Information Security (IS18);</li> <li>• Queensland Government, Network Transmission Security Assurance Framework;</li> <li>• Trusted Information Sharing Network for Critical Infrastructure Protection;</li> <li>• Queensland Infrastructure Protection and Resilience Framework;</li> <li>• US Department of Energy's Cybersecurity Capability Maturity Model (ES-C2M2);</li> <li>• NIST Cyber Security Framework (CSF);</li> <li>• Global best-practice control standards (e.g. ISO/IEC 27001, NIST SP 800-53, COBIT) and</li> <li>• Australian Signal Directorate (ASD) Top 37 Strategies to Mitigate Cybersecurity Incidents for the security of telecommunications and SCADA critical infrastructure.</li> </ul>	

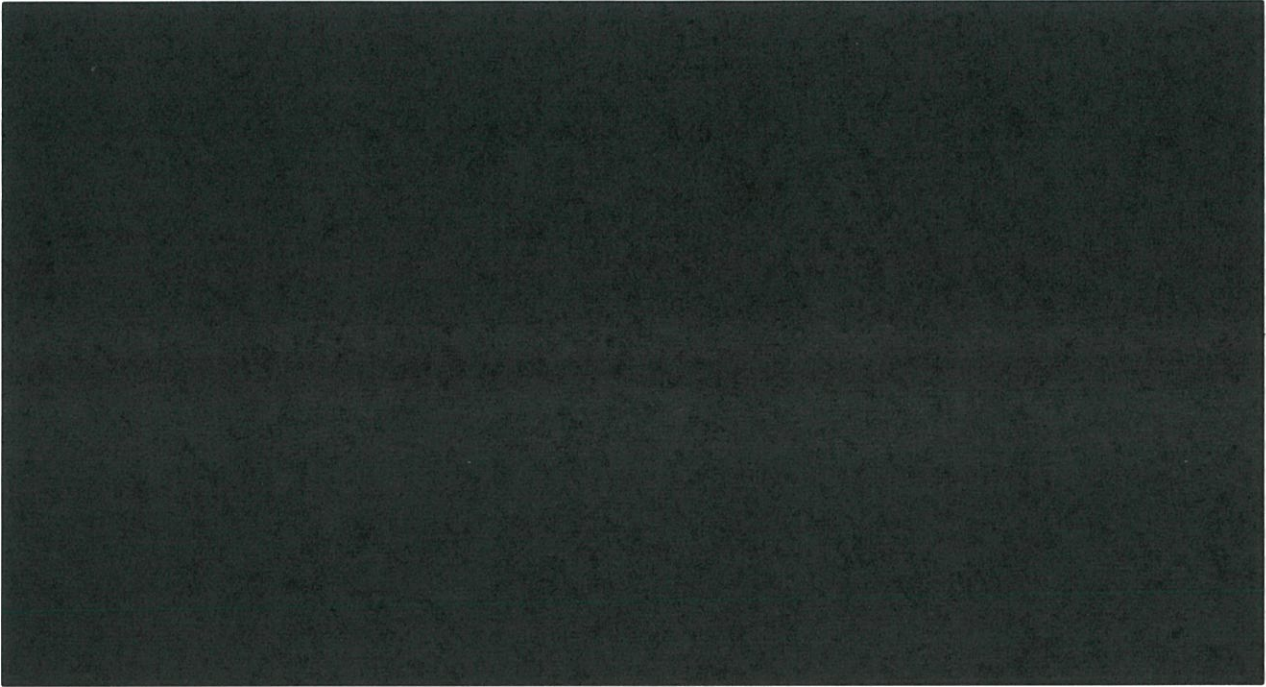
**Table 2: Relevant Legislation, Regulations and Codes**



## 1.7 Limitation of existing assets

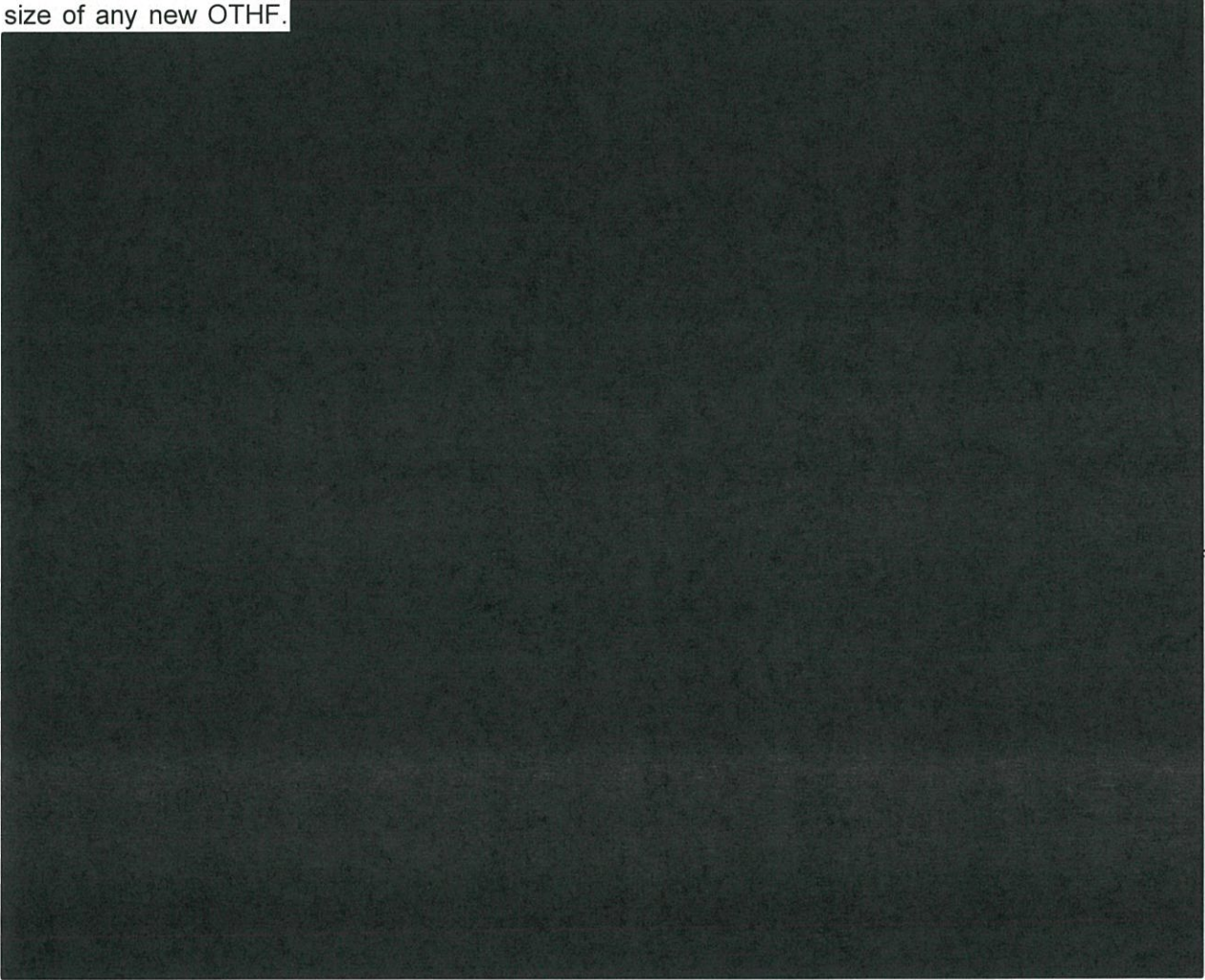




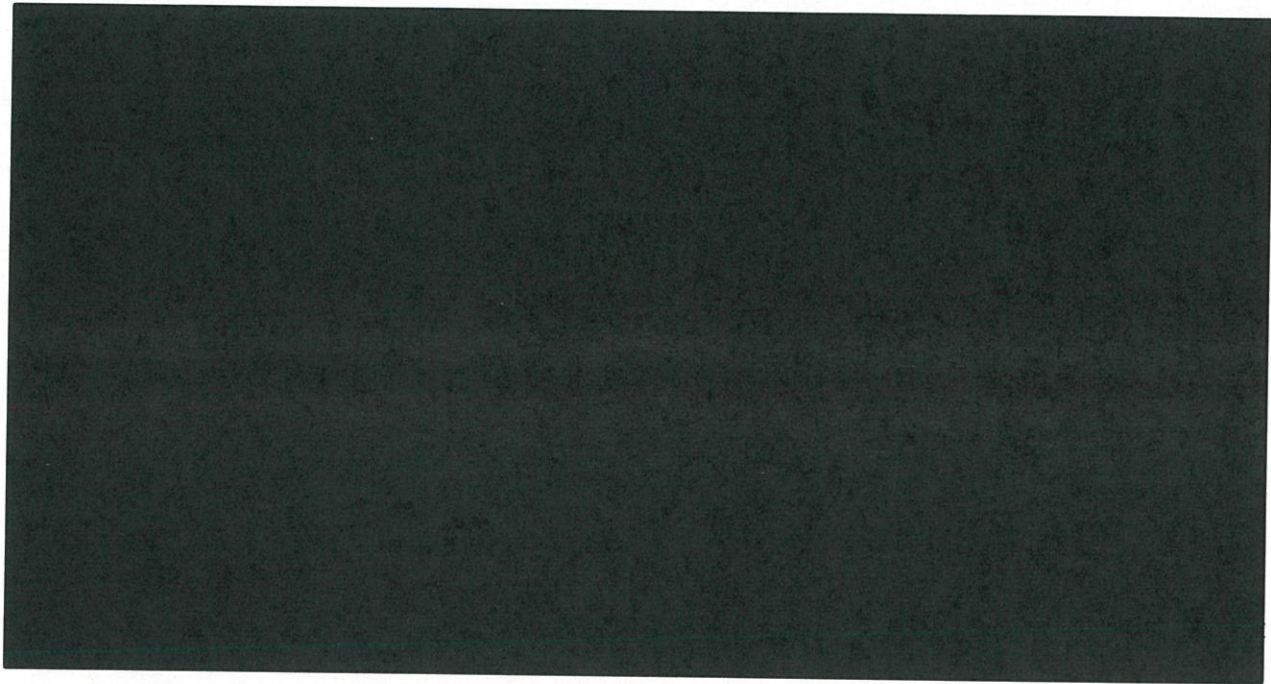


**1.8 Future OTHF Capacity Requirements**

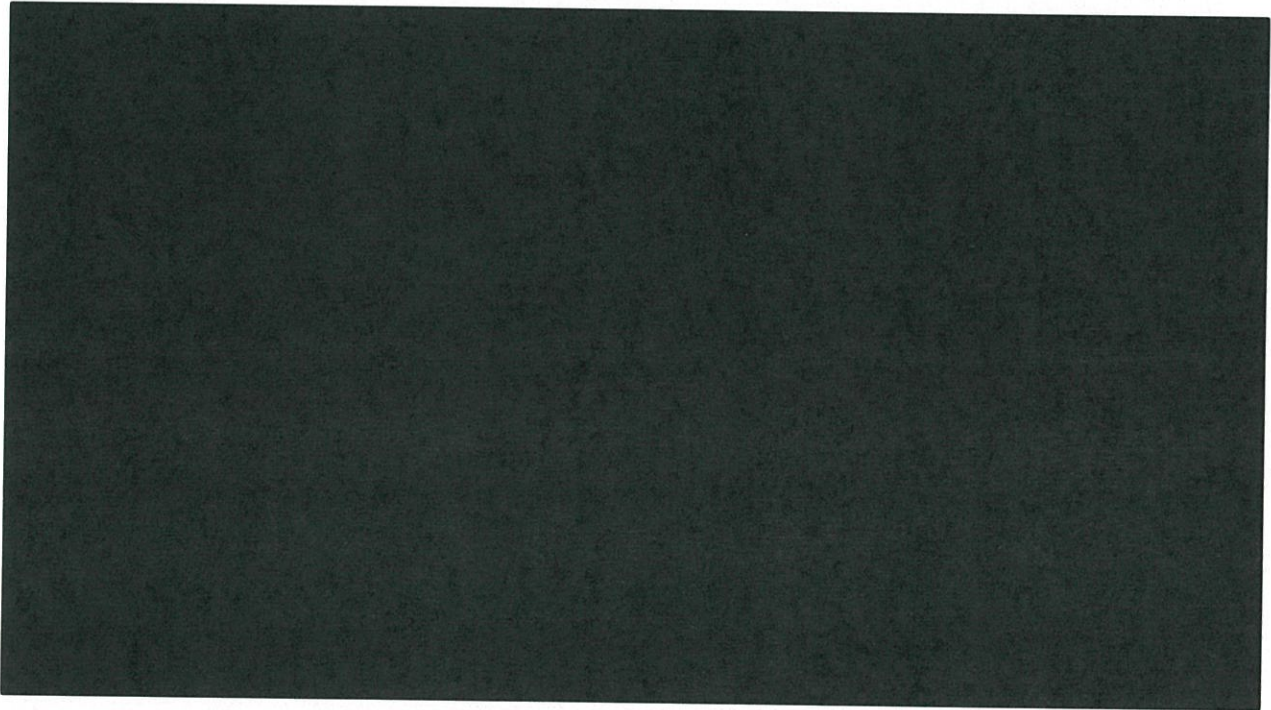
An assessment of the existing Richardson Road facility has been conducted to determine the optimal size of any new OTHF.








**1.9 Consideration of Remediation / Relocation and Migration Approaches**





## 2 Counterfactual Analysis (Base Case)

The counterfactual analysis describes the base case scenario if the proposed investment were not to proceed.




### 2.1 Summary





## 2.2 Assumptions

For this case, it is assumed that:

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## 2.3 Benefits

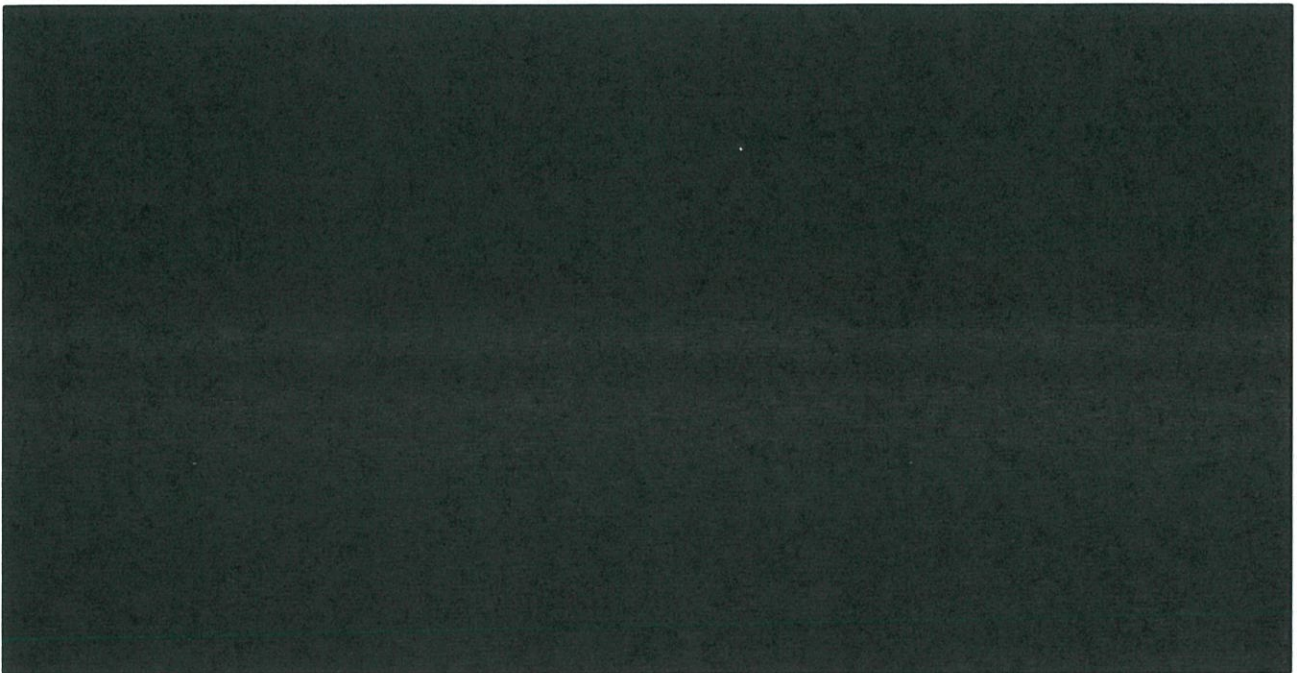
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Table 6: Counterfactual (Base Case) Benefits

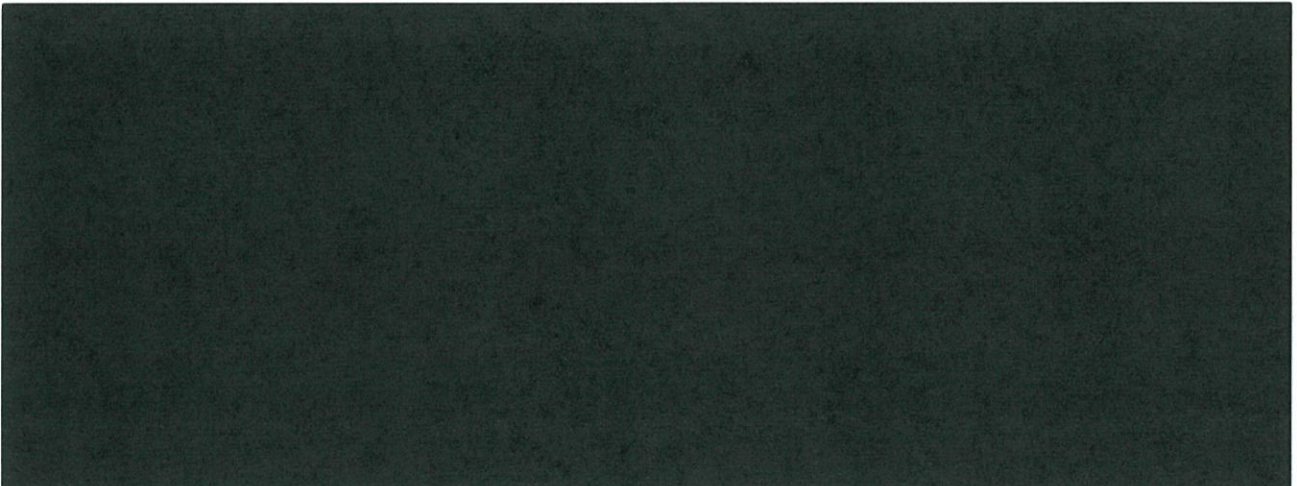
## 2.4 Risks

The risks described in Table 7 represent the inherent risk exposure by the end of the coming regulatory period (2024/25) if the Base Case “Counterfactual” were favoured over the preferred investment option. The subsequent options analysis (Section 3 below) describes the mitigations associated with each option and the resultant residual risk exposure. The risk analysis has been performed based on the Energy Queensland Network Risk Framework (Appendix 10).



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**Table 7: Counterfactual Risks (Base Case) Risks**

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## **2.5 Retirement decision**

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### 3 Options Analysis

This section considers the following options, in comparison against the counterfactual (base case) as described above:

- Option A: Establish the OTHF

[Redacted]

- Option B Establish the OTHF

[Redacted]

- Option C: Establish the OTHF

[Redacted]

- Option D: Establish the OTHF

[Redacted]

#### 3.1 Option A: Establish the OTHF

(Preferred)

[Redacted]

##### 3.1.1 Summary

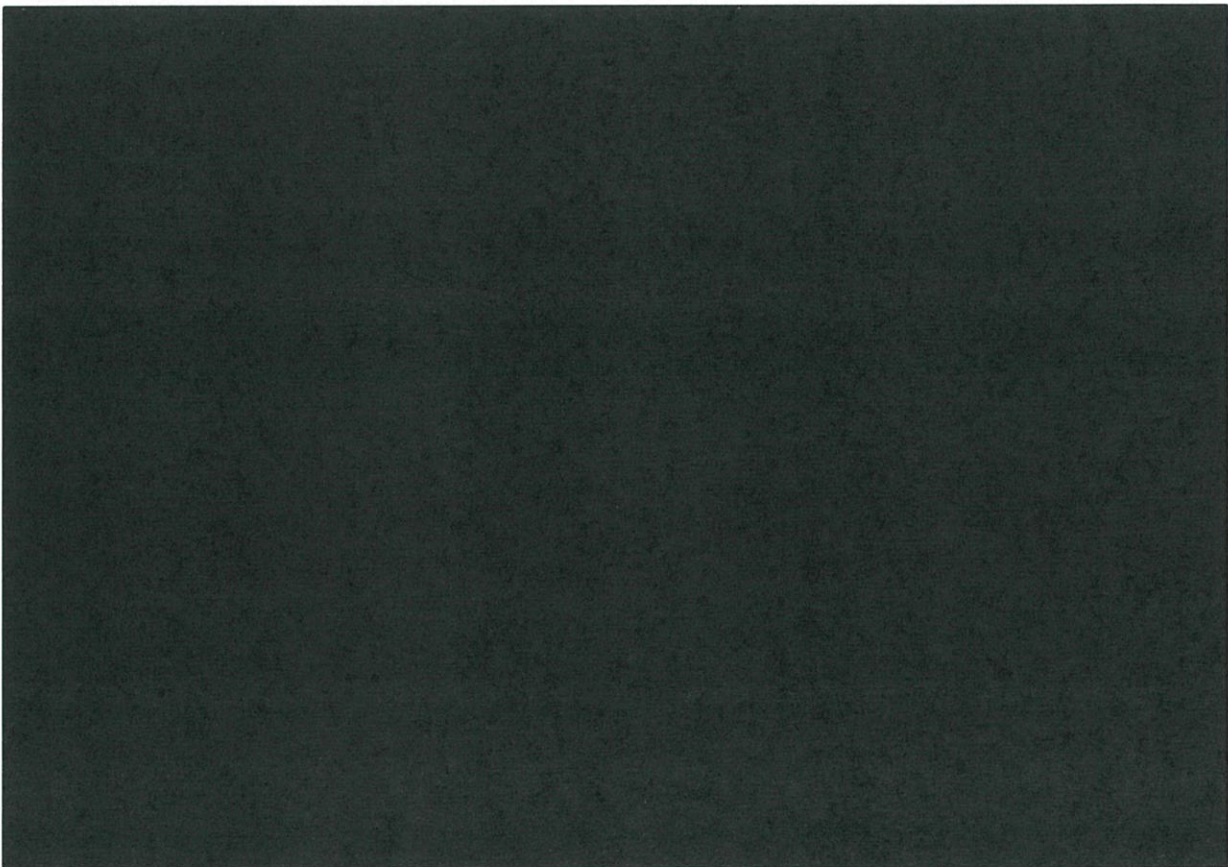
[Redacted]






### 3.1.2 Assumptions

For this case, it is assumed that:

- 
- The scope, inclusions, exclusions, costs and impacts of the initiative will be further detailed through the Gate 3 business case prior to investment. This may be subject to competitive procurement processes as appropriate to ensure cost efficiency of delivery.

### 3.1.3 Benefits

Table 9 summarises the benefits to be enabled through implementation of this option.

Area	Benefits Identified	Value
		



Area	Benefits Identified	Value

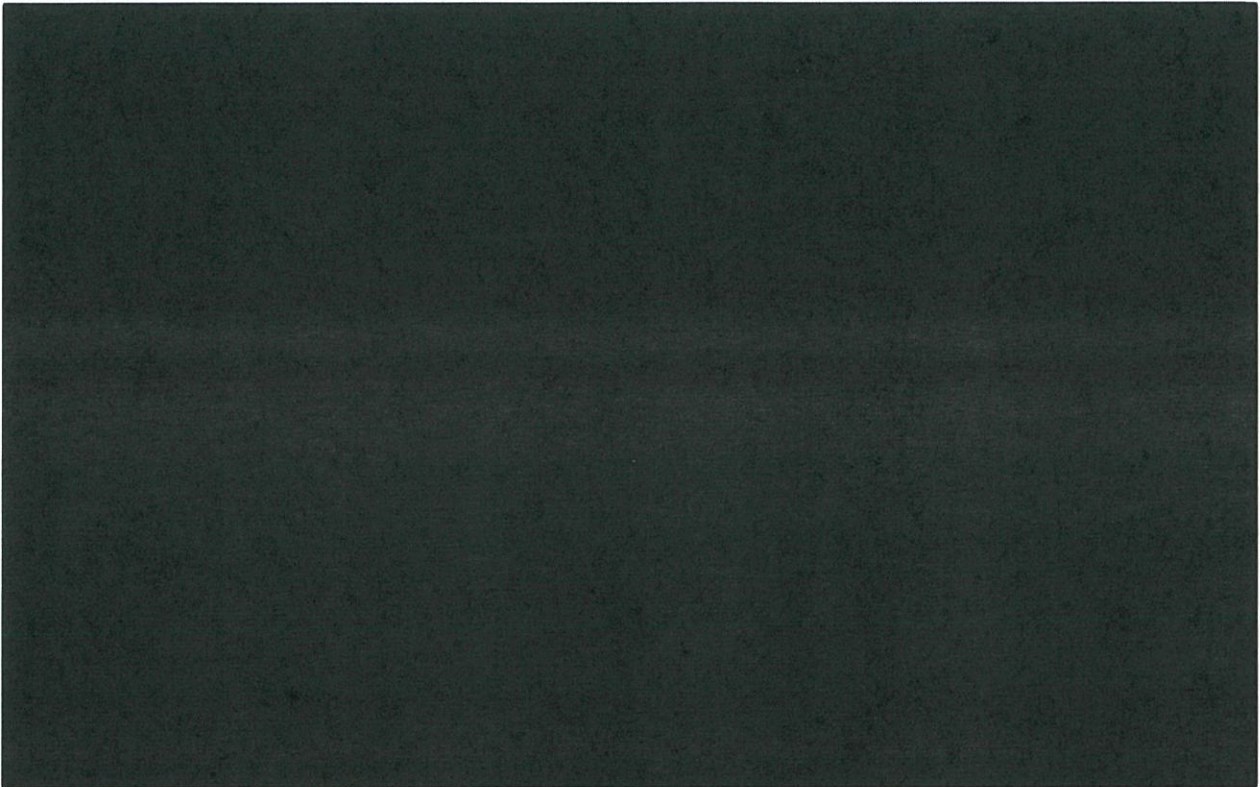
**Table 9: Option A Benefits**

### 3.1.4 Risks

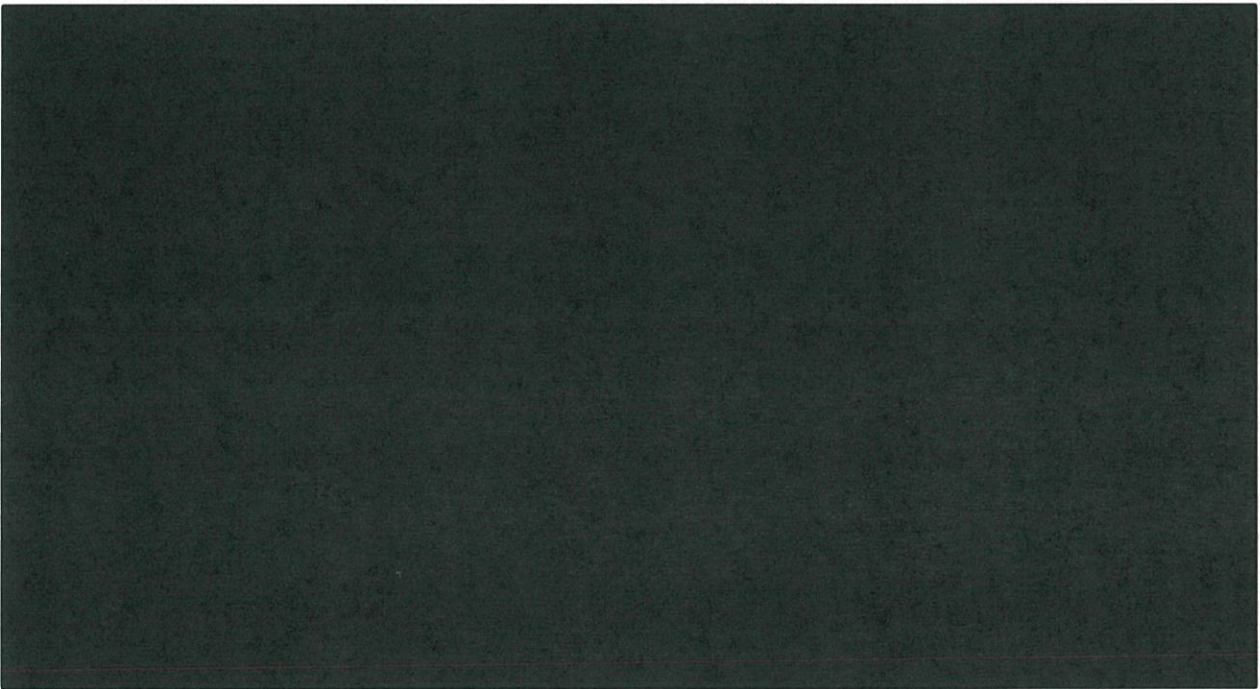
Table 10 summarises the mitigations of 2024/25 inherent risks identified in the base case. The risk analysis has been performed based on the Energy Queensland Network Risk Framework (Appendix 10).

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**Table 10: Option A Risks**

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**Table 11: Option A Interim Business Operations Risk**



## **3.2 Option B: Establish the OTHF**

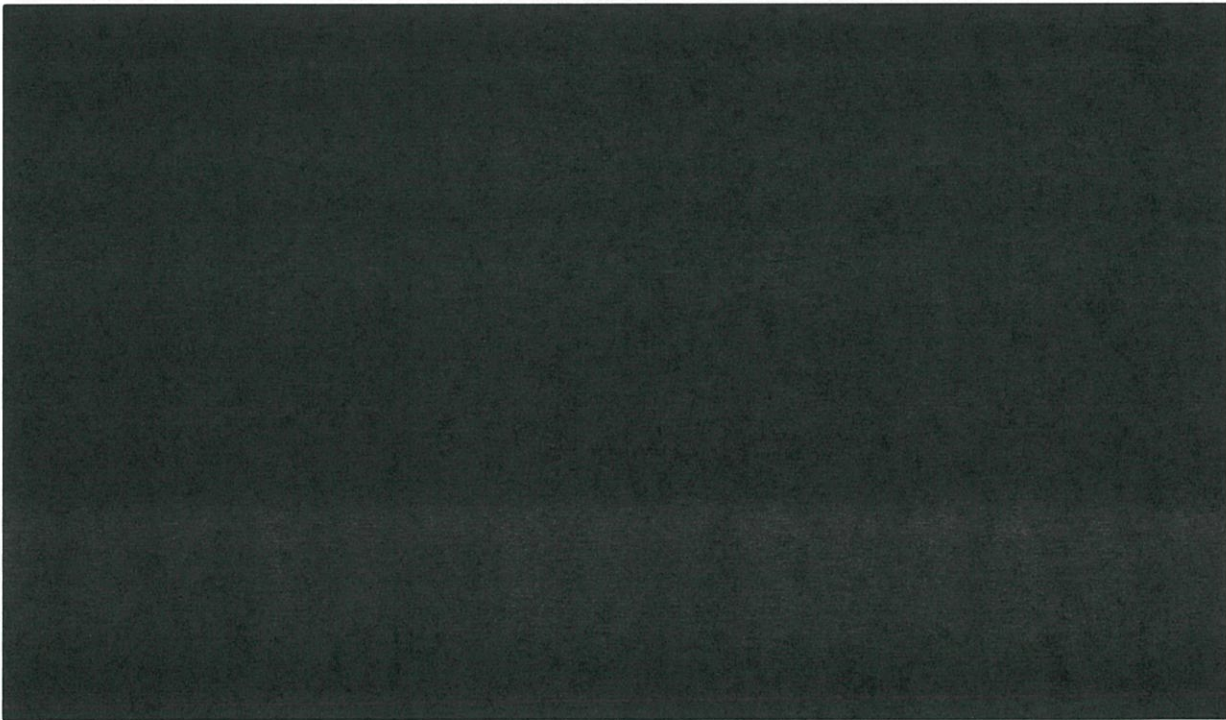


### **3.2.1 Summary**



### **3.2.2 Assumptions**

For this case, it is assumed that:







- The scope, inclusions, exclusions, costs and impacts of the initiative will be further detailed through the Gate 3 business case prior to investment. This may be subject to competitive procurement processes as appropriate to ensure cost efficiency of delivery.

**3.2.3 Benefits**

Table 12 summarises the benefits to be enabled through implementation of this option.

Area	Benefits Identified	Value

Table 12: Option B Benefits



### 3.2.4 Risks

Table 13 summarises the mitigations of 2024/25 inherent risks identified in the base case. The risk analysis has been performed based on the Energy Queensland Network Risk Framework (Appendix 10).

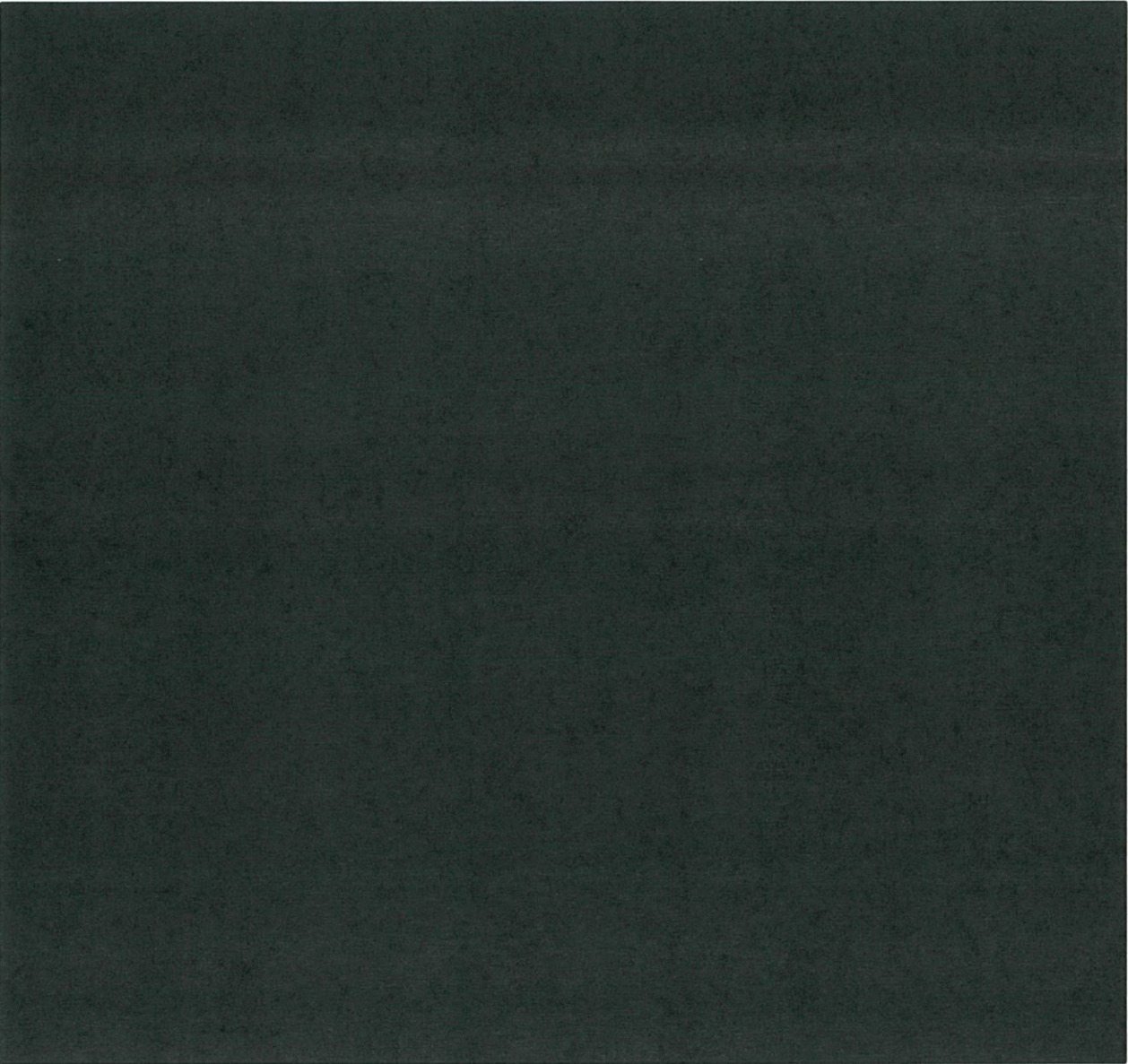


Table 13: Option B Risks



Table 14 summarises the mitigation of the interim risk to business operations while the remediation works are undertaken as part of this option.

Risk Scenario	Risk Type	Mitigation Status	Consequence	Likelihood	Risk Score

Table 14: Option B Interim Business Operations Risk



### **3.3 Option C: Establish the OTHF**

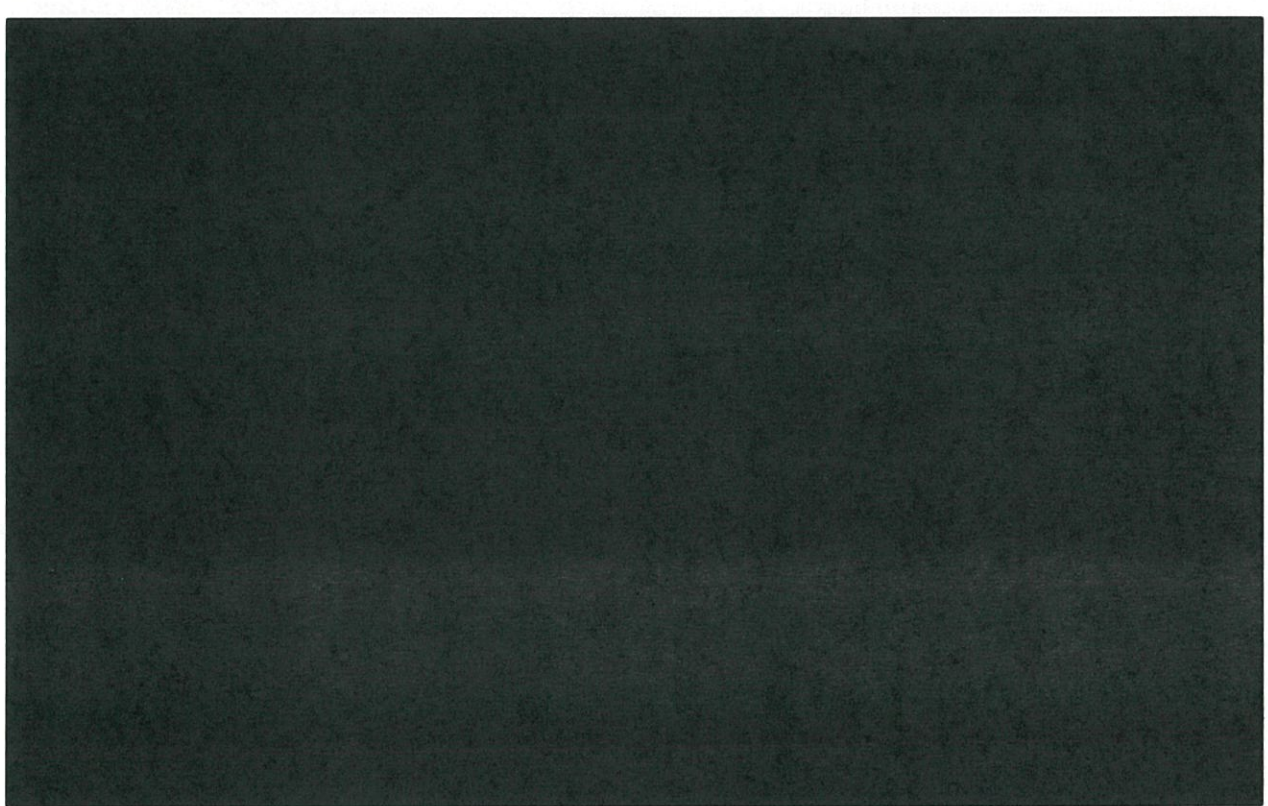


#### **3.3.1 Summary**



#### **3.3.2 Assumptions**

For this case, it is assumed that:







- The scope, inclusions, exclusions, costs and impacts of the initiative will be further detailed through the Gate 3 business case prior to investment. This may be subject to competitive procurement processes as appropriate to ensure cost efficiency of delivery.

**3.3.3 Benefits**

Table 15 summarises the benefits to be enabled through implementation of this option.

Area	Benefits Identified	Value

Table 15: Option C Benefits



3.3.4 Risks

Table 16 summarises the mitigations of 2024/25 inherent risks identified in the base case. The risk analysis has been performed based on the Energy Queensland Network Risk Framework (Appendix 10).

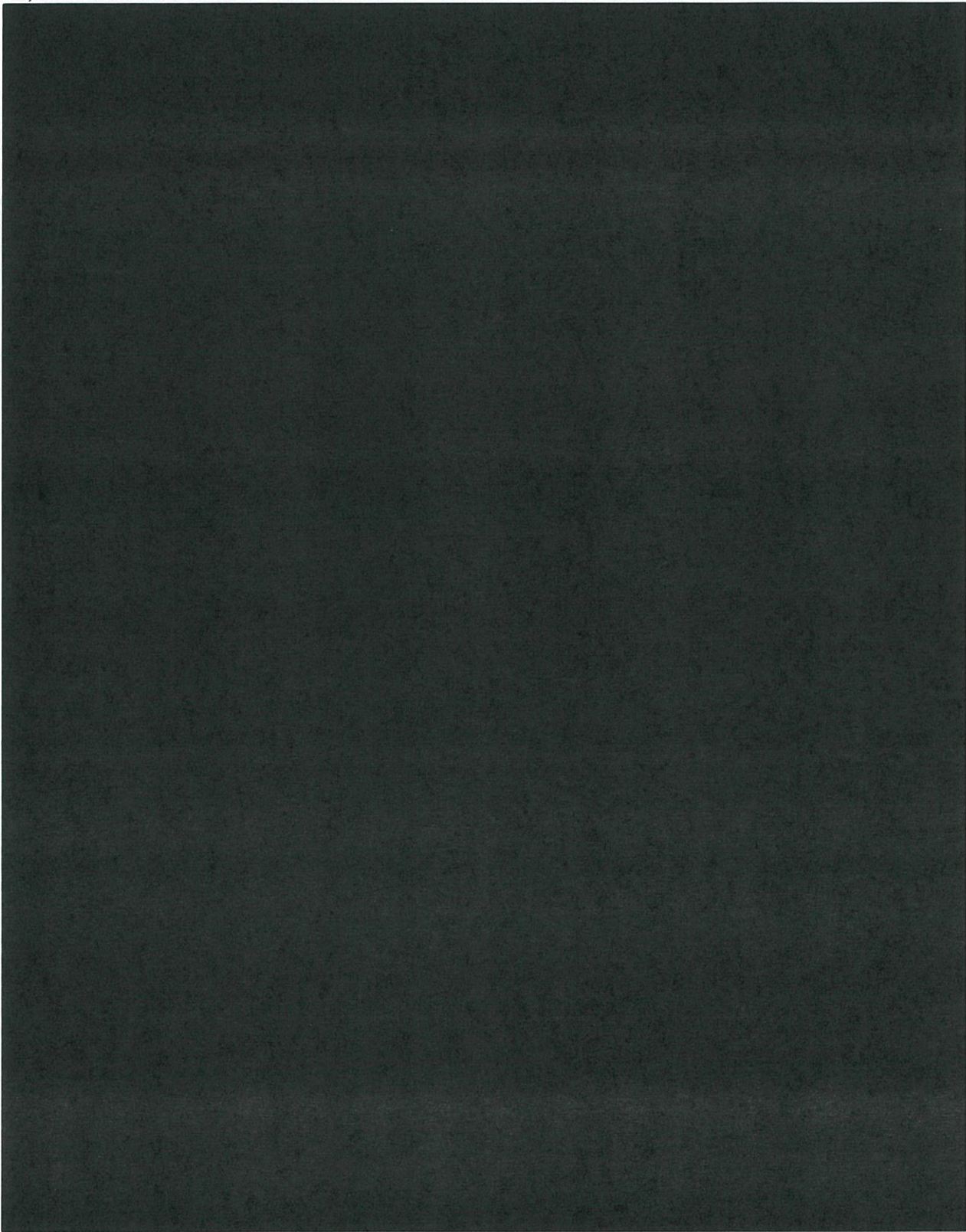


Table 16: Option C Risks



Table 17 summarises the mitigation of the interim risk to business operations while the remediation works are undertaken as part of this option.

Risk Scenario	Risk Type	Mitigation Status	Consequence	Likelihood	Risk Score

Table 17: Option C Interim Business Operations Risk



### 3.4 Option D: Establish the OTHF



#### 3.4.1 Summary



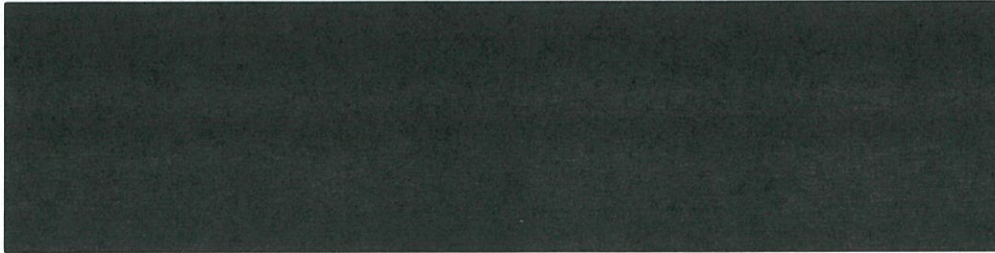


### 3.5 Economic analysis of identified options

#### 3.5.1 Cost versus benefit assessment of each option

Table 18 summarises the Net Present Value (NPV) of the costs and benefits of each option.

Note that avoided property cost benefits (such as avoided lease costs or planned capital works) are reflected as reduced costs in comparison with the base case, rather than as direct benefits.



**Table 18: Net present value of options**

As indicated in the above table, Option A represents the best overall NPV  over 20 years.

#### 3.5.2 Cash flow forecast

Table 19 summarises the forecast cashflow of capex and opex costs for Option A (preferred).



**Table 19: Option A Cashflow forecast**

#### 3.5.3 NPV Calculation Parameters

In addition to the assumptions specific to each option (listed in sections 2 and 3 above), the following parameters apply to the economic analysis as a whole:

- The NPV has been calculated based on a 20 year financial analysis period using the Energy Queensland Non-Network NPV calculation model.
- 2.42% Consumer Price Index (CPI) is used for annual cost escalation.
- 5.13% Regulated Rate of Return/WACC (Pre-tax Nominal) is applied with present values discounted to 2018/19.

### 3.6 Scenario Analysis

#### 3.6.1 Cost Benefit Sensitivity Parameters

In order to validate the sensitivity of the above NPV analysis to potential variability of key parameters, a scenario analysis has been performed. Through this analysis, a “best” scenario and “worst” scenario for each option has been assessed, for comparison against the primary (“most likely”) scenario as reflected in the primary NPV analysis.



Table 20 summarises the cost benefit sensitivity parameters used in the scenario analysis for this business case.

Type	Element	Worst	Best	Rationale

Table 20: Cost Benefit Sensitivity Parameters

3.6.2 Scenario Analysis

Table 21 summarises the NPV sensitivity to the above listed parameters for each of the options. This business cases recommends the “most likely” scenario associated with the “preferred” option (i.e. Option A).

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Table 21: Scenario Analysis

3.7 Qualitative comparison of identified options

Table 22 summarises the advantages and disadvantages of each option considered.

Option	Advantages	Disadvantages



Option	Advantages	Disadvantages

Table 22: Qualitative Comparison of Options

### 3.8 Change Impacts

Table 23 details the potential impacts across Energy Queensland during and after implementation of this investment.

Unit / Team	Impact	Rating Low / Med / High

Table 23: Change Impact Summary



### 3.9 Investment Alignment with the National Electricity Rules (NER)

Table 24 details the alignment of the proposed solution with the NER capital expenditure requirements as regulated by the AER.

NER Capital Expenditure Requirements	Rationale
<b>6.5.7 (a) (2)</b> The forecast capital expenditure complies with all applicable regulatory obligations or requirements associated with the provision of standard control services	<p>This business case proposes the establishment of a new [REDACTED] OTHF for business critical operational technology in Rockhampton consistent with the strategy to consolidate Energy Queensland's existing Rockhampton property portfolio for operational cost efficiency purposes.</p> <p>Through this replacement, Energex and Ergon Energy can maintain the required safe and efficient operation of their networks (standard control services), compliance with all regulated, legislative and policy obligations.</p>
<b>6.5.7 (a) (3)</b> The forecast capital expenditure maintains the quality, reliability and security of supply of standard control services	<p>Through the provision of a cost effective and fit for purpose OTHF, Energex and Ergon Energy can maintain the quality, reliability and security of standard control services.</p>
<b>6.5.7 (c) (1) (i)</b> The forecast capital expenditure reasonably reflects the efficient costs of achieving the capital expenditure objectives	<p>[REDACTED]</p> <p>Energy Queensland undertakes competitive market procurement processes to ensure cost efficiency in project cost and operational expenditure.</p> <p>Currently this investment has been analysed to a "Preliminary Gate 2" level. Prior to investment, a Gate 3 business case will be prepared with further detail to be assessed in accordance with the established investment governance processes.</p>
<b>6.5.7 (c) (1) (ii)</b> The forecast capital expenditure reasonably reflects the costs that a prudent operator would require to achieve the capital expenditure objectives	<p>[REDACTED]</p> <p>Energy Queensland undertakes competitive market procurement processes to ensure cost efficiency in project cost and operational expenditure.</p> <p>Currently this investment has been analysed to a "Preliminary Gate 2" level. Prior to investment, a Gate 3 business case will be prepared with further detail to be assessed in accordance with the established investment governance processes.</p>
<b>6.5.7 (c) (1) (iii)</b> The forecast capital expenditure reasonably reflects a realistic expectation of the demand forecast and cost inputs required to achieve the capital expenditure objective	<p>[REDACTED]</p> <p>These estimates include a build-up with realistic input costs informed by property industry expertise.</p> <p>Further detailed cost build-up will take place in development of the Gate 3 business case. This detailed cost build up may be subject to competitive market procurement processes, sourcing analysis and peer consultation.</p>

**Table 24: Alignment with the National Electricity Rules**



## 4 Recommendation

"Option A: Establish the OTHF [REDACTED]

[REDACTED] is the recommended option as:

- It has the best overall NPV of all options. [REDACTED]
- It is aligned with Energy Queensland's strategic objectives;
- [REDACTED]
- It is consistent with Energex and Ergon Energy's capital expenditure requirements under the National Electricity Rules; and
- The identified efficiency benefits and operating cost savings contribute to Energex and Ergon Energy's forecast opex reductions for the 2020-25 period. [REDACTED]

Total forecast capex in the 2020-25 RCP for this option is [REDACTED] (2018/19 real terms).

Prior to investment, a Gate 3 business case will be prepared with further detail to be assessed in accordance with established investment governance processes.

This is a joint Energy Queensland investment. The Cost Allocation Model (CAM) allocates the total forecast asset cost between Ergon Energy and Energex Standard Control Services, Alternative Control Services and unregulated business functions, reflecting usage of the asset across the Energy Queensland group.



## Appendix 1. Uptime Institute Data Centre Tiering Standards

Below is a summary of the attributes of the Tiers 1 to 4 in the UpTime Institute Tiering standards.

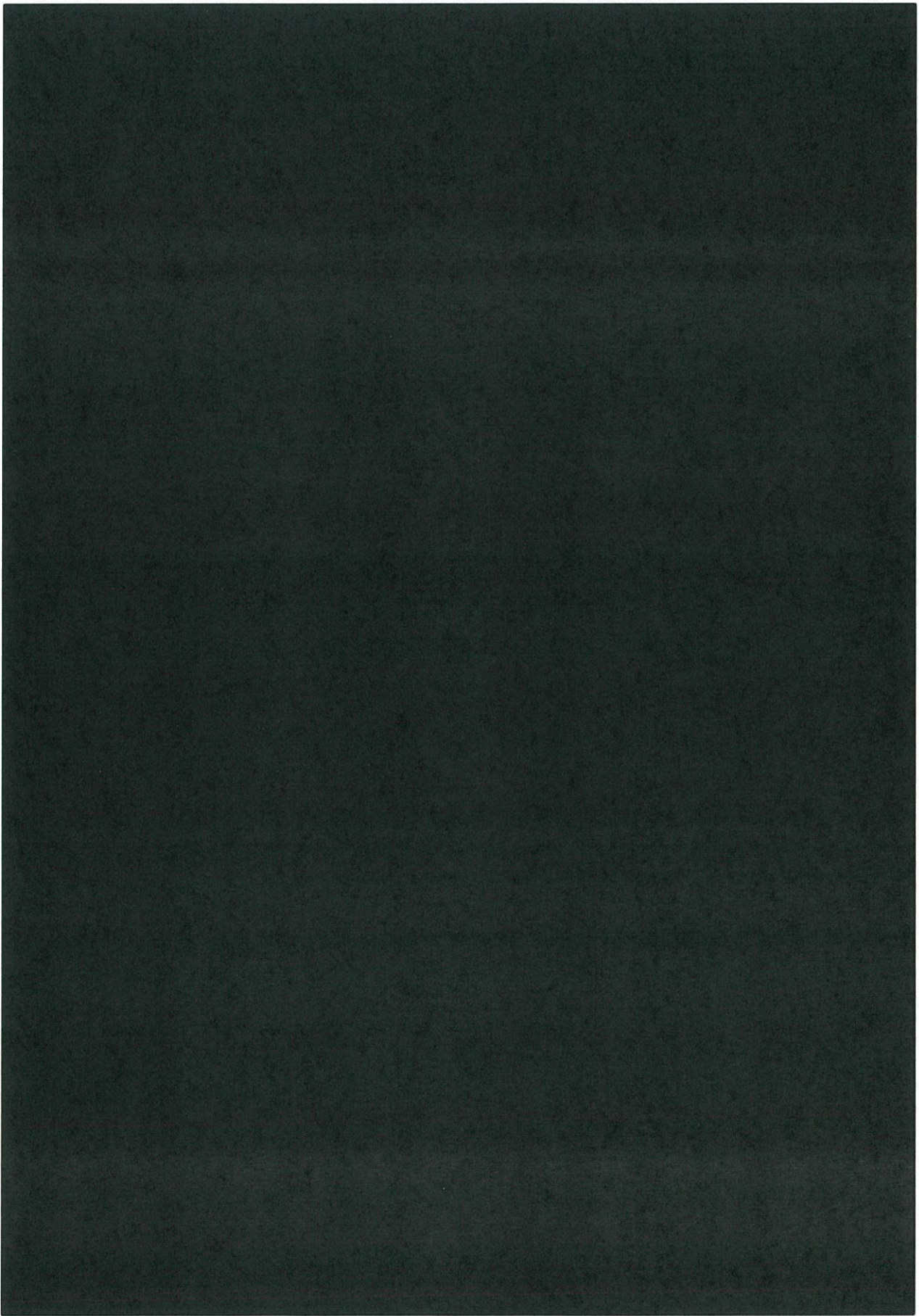
<b>Tier 1 – Basic: 99.671% Availability</b> <ul style="list-style-type: none"> <li>• Susceptible to disruptions from both planned and unplanned activity</li> <li>• Single path for power and cooling distribution, no redundant components (N)</li> <li>• May or may not have a raised floor, UPS, or generator</li> <li>• Takes 3 months to implement</li> <li>• Annual downtime of 28.8 hours</li> <li>• Must be shut down completely for perform preventive maintenance</li> </ul>	<b>Tier 2 – Redundant Components: 99.741% Availability</b> <ul style="list-style-type: none"> <li>• Less susceptible to disruption from both planned and unplanned activity</li> <li>• Single path for power and cooling disruption, includes redundant components (N+1)</li> <li>• Includes raised floor, UPS, and generator</li> <li>• Takes 3 to 6 months to implement</li> <li>• Annual downtime of 22.0 hours</li> <li>• Maintenance of power path and other parts of the infrastructure require a processing shutdown</li> </ul>
<b>Tier 3 – Concurrently Maintainable: 99.982% Availability</b> <ul style="list-style-type: none"> <li>• Enables planned activity without disrupting computer hardware operation, but unplanned events will still cause disruption</li> <li>• Multiple power and cooling distribution paths but with only one path active, includes redundant components (N+1)</li> <li>• Takes 15 to 20 months to implement</li> <li>• Annual downtime of 1.6 hours</li> <li>• Includes raised floor and sufficient capacity and distribution to carry load on one path while performing maintenance on the other.</li> </ul>	<b>Tier 4 – Fault Tolerant: 99.995% Availability</b> <ul style="list-style-type: none"> <li>• Planned activity does not disrupt critical load and data center can sustain at least one worst-case unplanned event with no critical load impact</li> <li>• Multiple active power and cooling distribution paths, includes redundant components (2 (N+1), i.e. 2 UPS each with N+1 redundancy)</li> <li>• Takes 15 to 20 months to implement</li> <li>• Annual downtime of 0.4 hours</li> </ul>

Tier Description	Tier1 Basic Site infrastructure	Tier 2 Redundant Site Infrastructure	Tier 3 Concurrent Maintainable Site Infrastructure	Tier 4 Fault Tolerant Site Infrastructure
Active capacity components to support IT load	N	N+1	N+1	N after any component failure
Distribution paths	1	1	1 active & 1 alternative	2 simultaneously active
Concurrently maintainable	No	No	No	Yes
Fault tolerant	No	No	Yes	Yes
Compartmentalisation	No	No	No	Yes
Continuous cooling	No	No	No	Yes
Power Distribution paths serving critical infrastructure	Non-redundant	Non-redundant	Multiple independent	Multiple independent
Physical isolation of power distribution paths to prevent system or distribution path impact	No	No	No	Yes
IT equipment power supply	Single supply	Single supply	Dual supply	Dual supply
Power transfer devices for devices that don't have dual power supply	Not installed	Not installed	Transfer switches installed	Transfer switches installed
Dedicate space for IT Systems	Non-redundant	Non-redundant	Dedicated	Dedicated

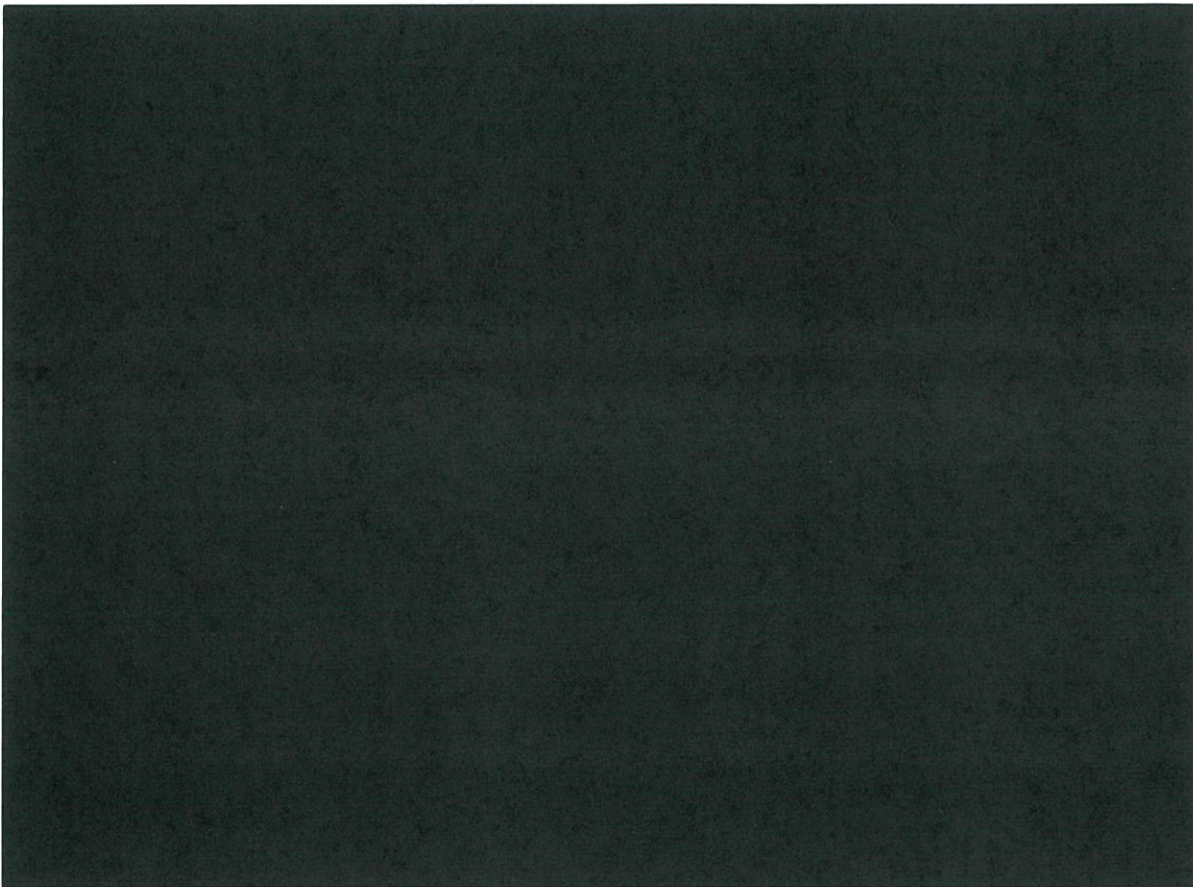


Tier Description	Tier1 Basic Site infrastructure	Tier 2 Redundant Site Infrastructure	Tier 3 Concurrent Maintainable Site Infrastructure	Tier 4 Fault Tolerant Site Infrastructure
Uninterruptible power sources	Non-redundant	Redundant	Redundant	Redundant
Dedicated cooling equipment	Non-redundant	Redundant	Redundant	Redundant
Power generation to protect against extended power outages	Non-redundant	Redundant	Redundant	Redundant
On-site fuel storage for power generators	12 hours capacity	12 hours for "N" capacity	12 hours for "N" capacity	12 hours for "N" capacity
Capacity to meet current site needs	Sufficient	Sufficient	Sufficient	Sufficient
Redundant capacity to meet current site needs when component is removed without causing shutdown	Requires shutdown	Requires shutdown	Systems continue to operate without impact	Systems continue to operate without impact
Response to failure of infrastructure component	Non-autonomous	Non-autonomous	Non-autonomous	Autonomous
Sufficient permanent installed capacity to meet site needs when a redundant component is removed for planned maintenance work	Shutdown of systems	Systems continue to operate without impact	Systems continue to operate without impact	Each & every component can be removed without impact
Susceptibility to planned and unplanned activities/operations (human) errors	Can cause disruption	Can cause disruption	Can cause disruption	Not susceptible and will not cause interruption
Impact of single point of failure of component, distribution or capacity component	Unplanned outage	Possible disruption	Systems continue to operate without impact	Systems continue to operate without impact
Performance of preventive maintenance or repairs	Site shutdown required	Site shutdown required	Continuity of operation but with an elevated risk	Continuity of operation but with an elevated risk
Power generation is fault tolerant	Not fault tolerant	Not fault tolerant	Fault tolerant	Fault tolerant
Power generation is concurrently maintainable	Not concurrently maintainable	Not concurrently maintainable	Concurrently maintainable	Concurrently maintainable
Power Generation limits on consecutive hours of operations	Have limits for consecutive hours of operations	Have limits for consecutive hours of operations	No limits of consecutive hours of operations	No limits of consecutive hours of operations
Communications routing concurrently maintainable	Not concurrently maintainable	Not concurrently maintainable	Concurrently maintainable - fault tolerant	Concurrently maintainable - compartmentalised
Backup site makeup water supply for evaporative cooling	Not concurrently maintainable	Not concurrently maintainable	Concurrently maintainable with 12 hour duration of supply	Concurrently maintainable with 12 hour duration of supply

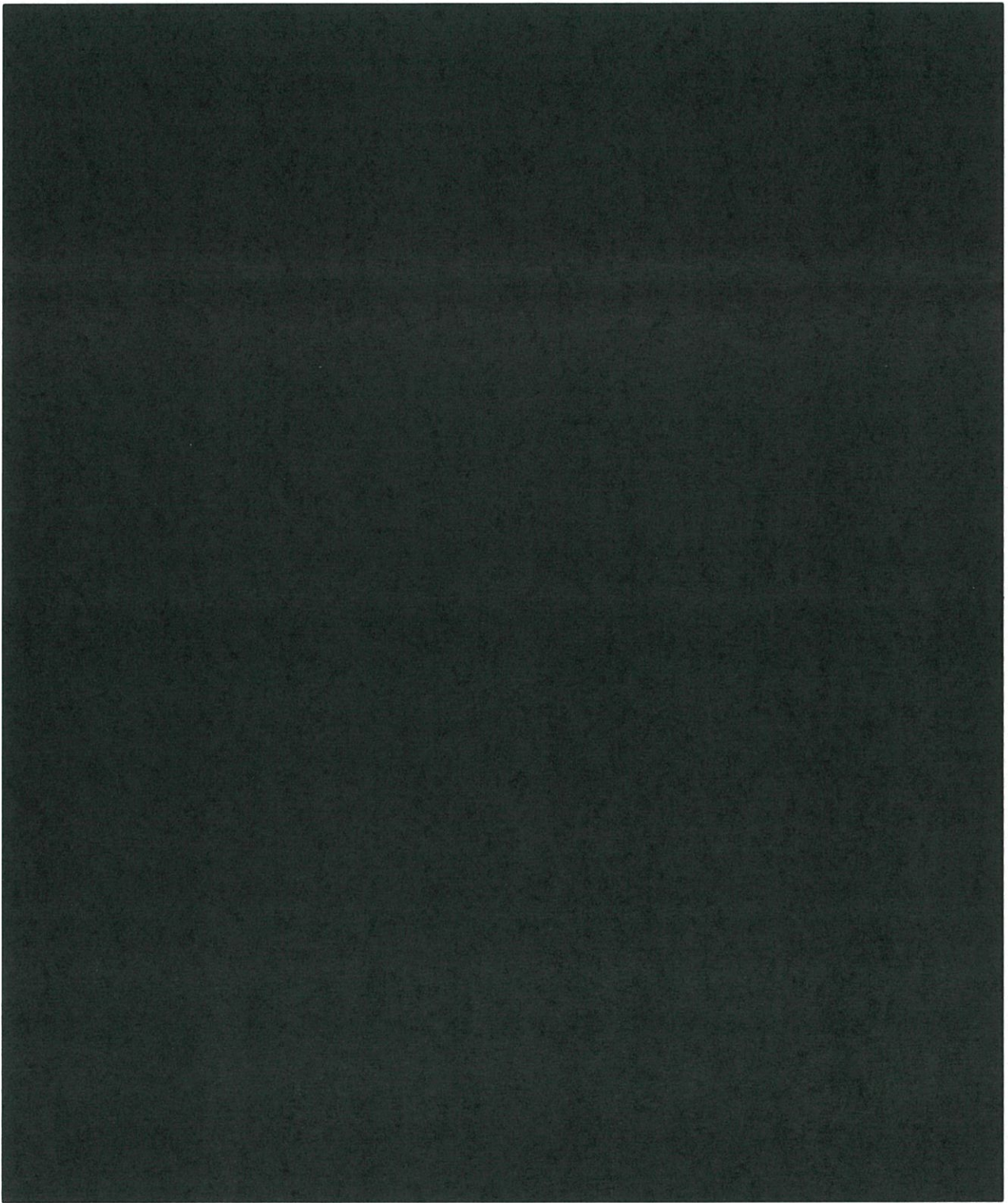




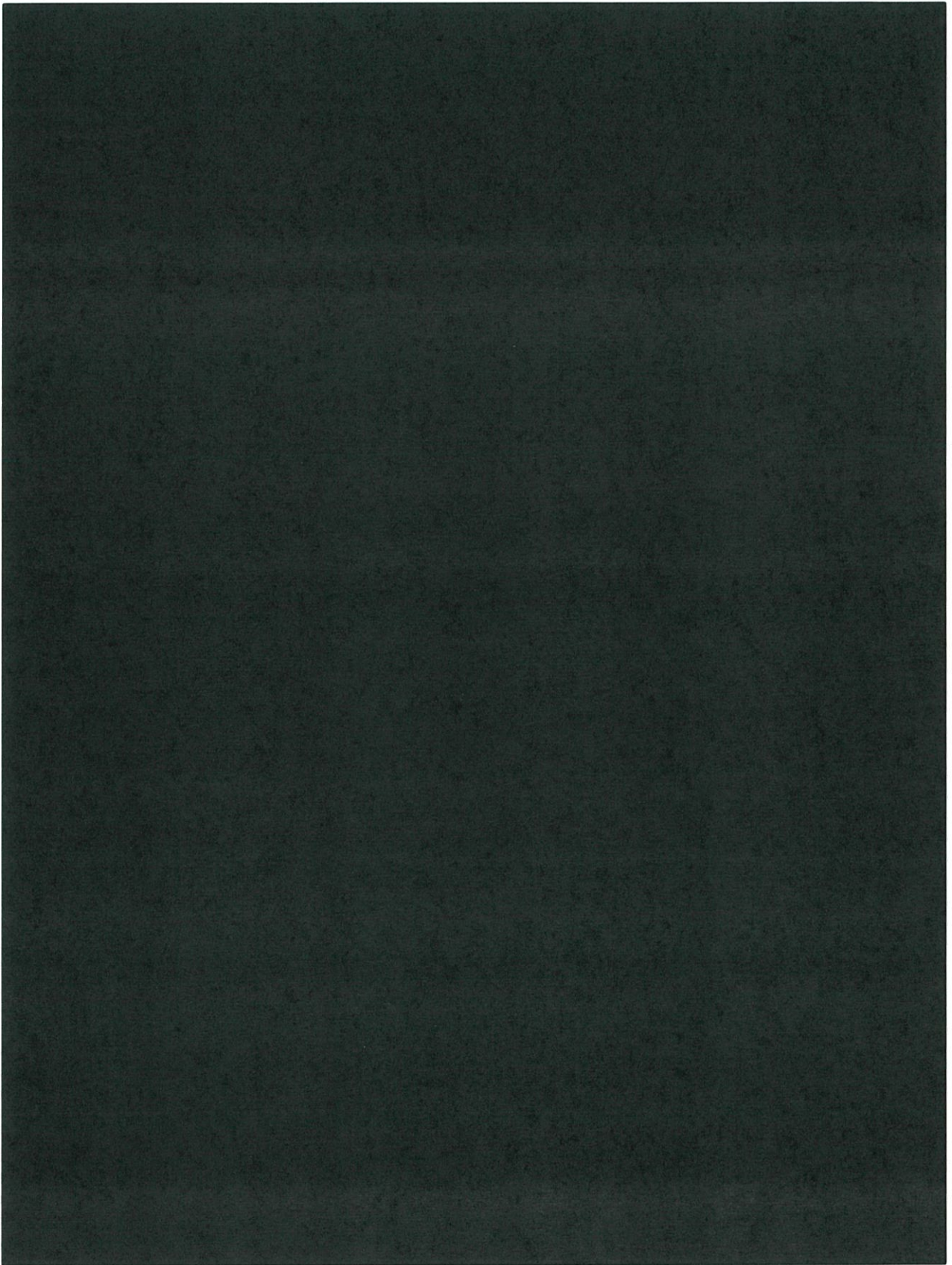




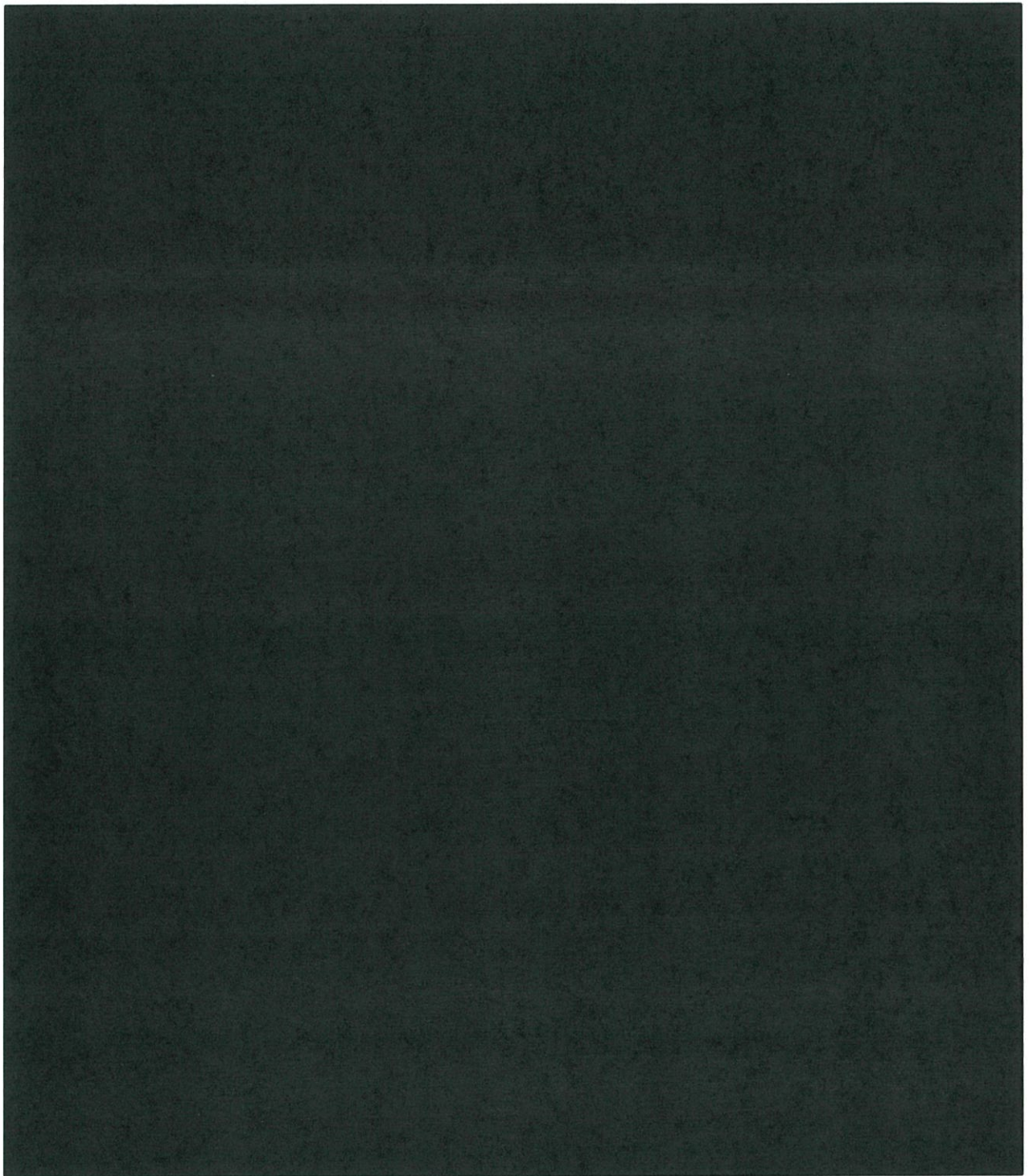




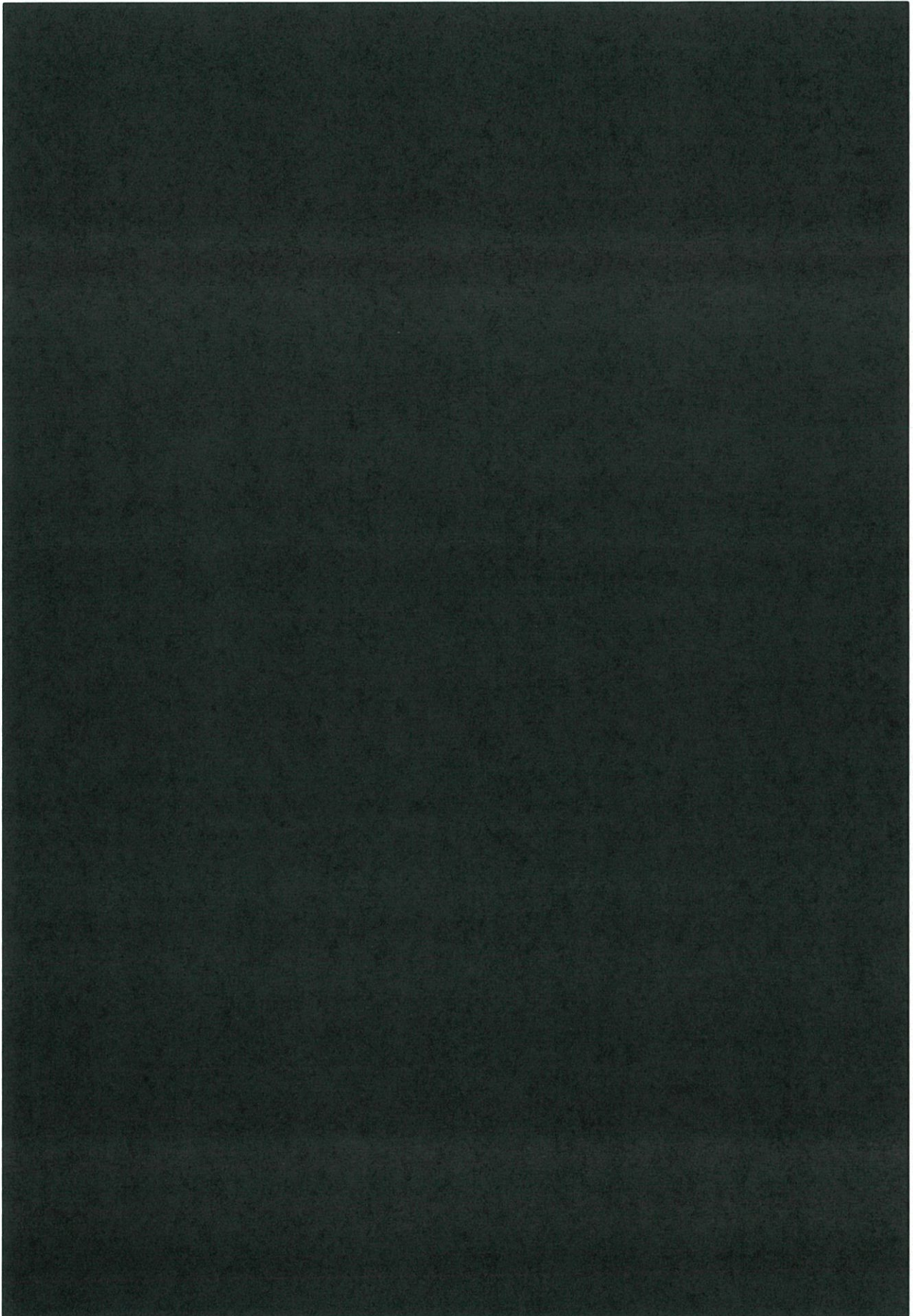




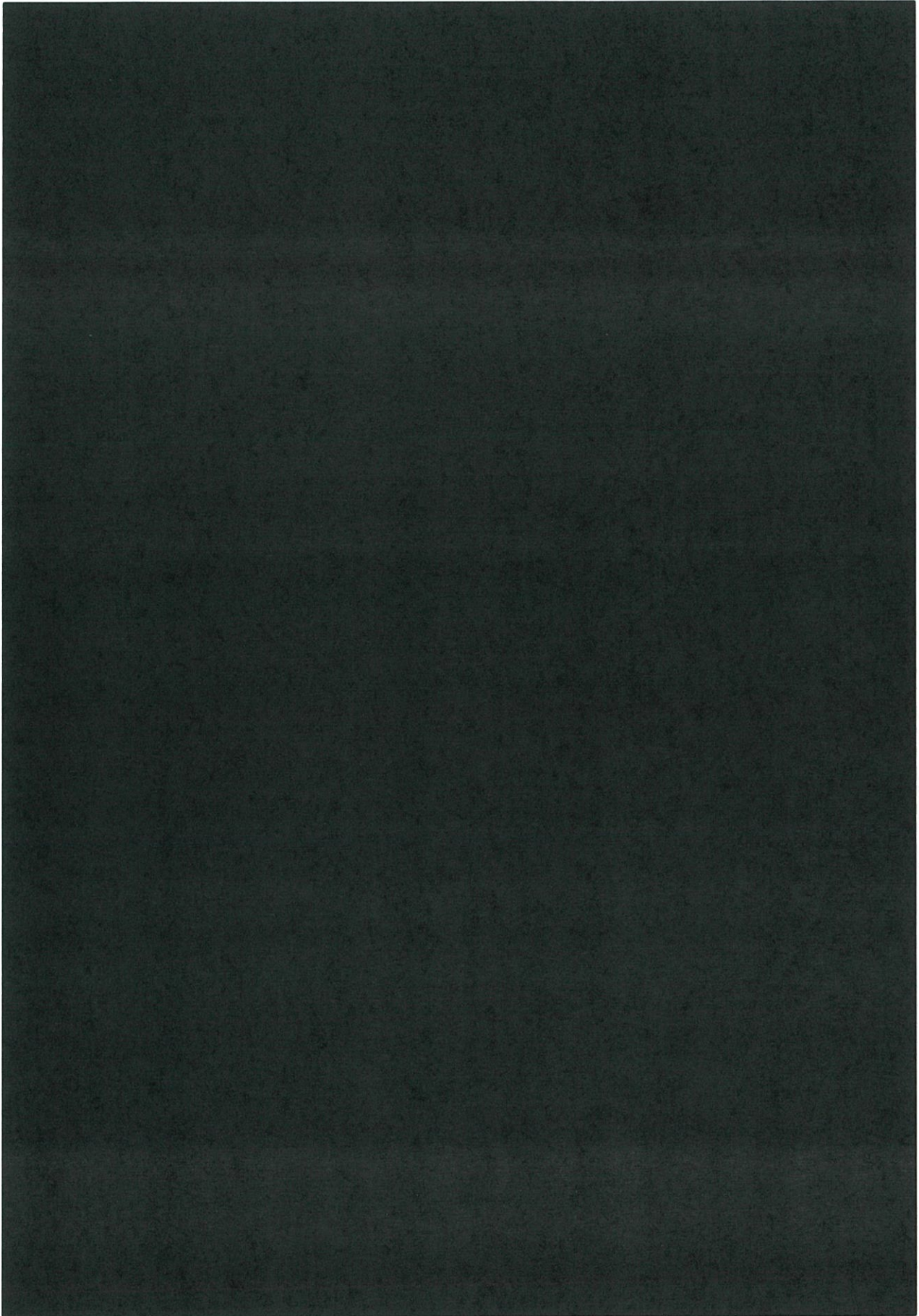




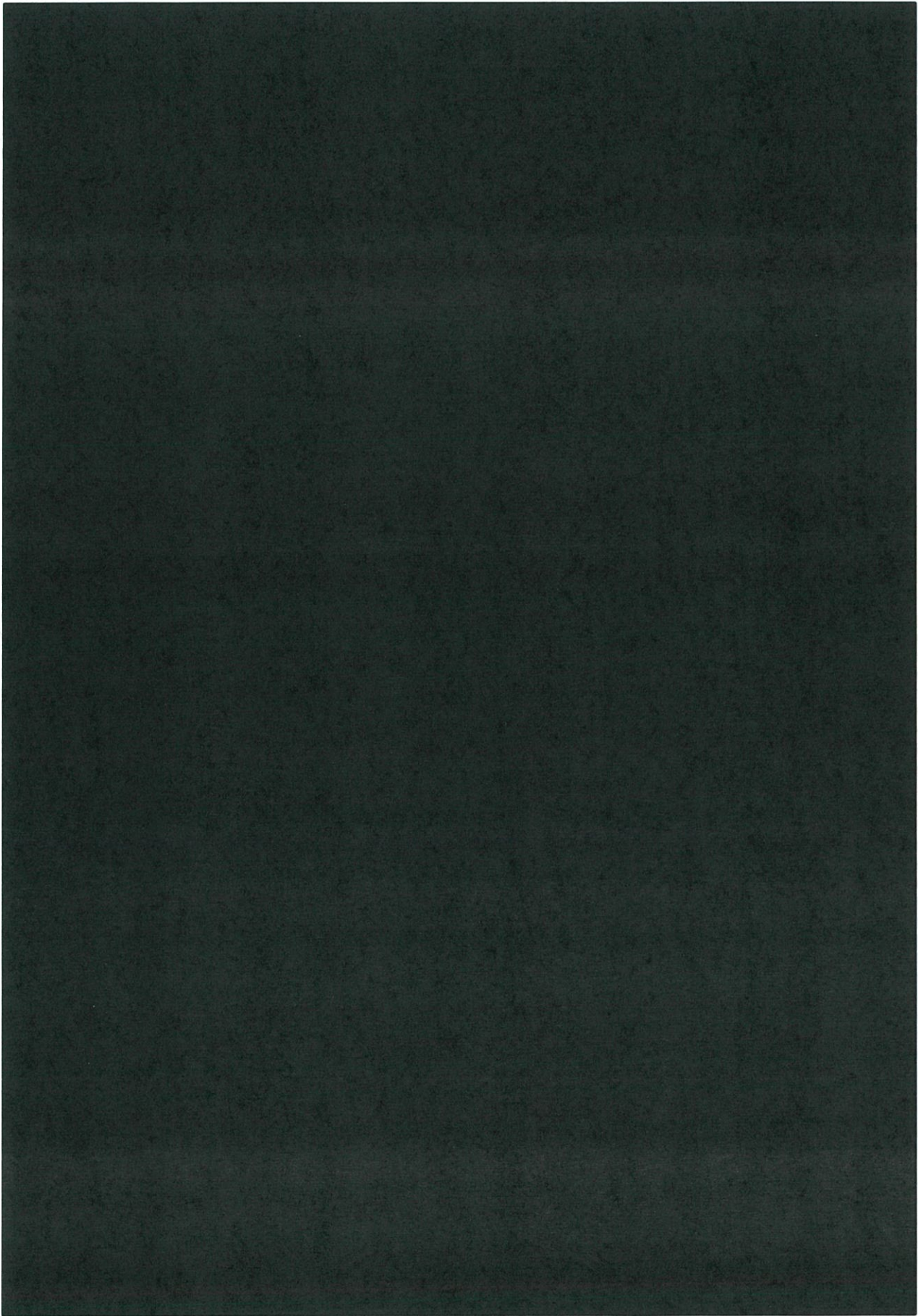




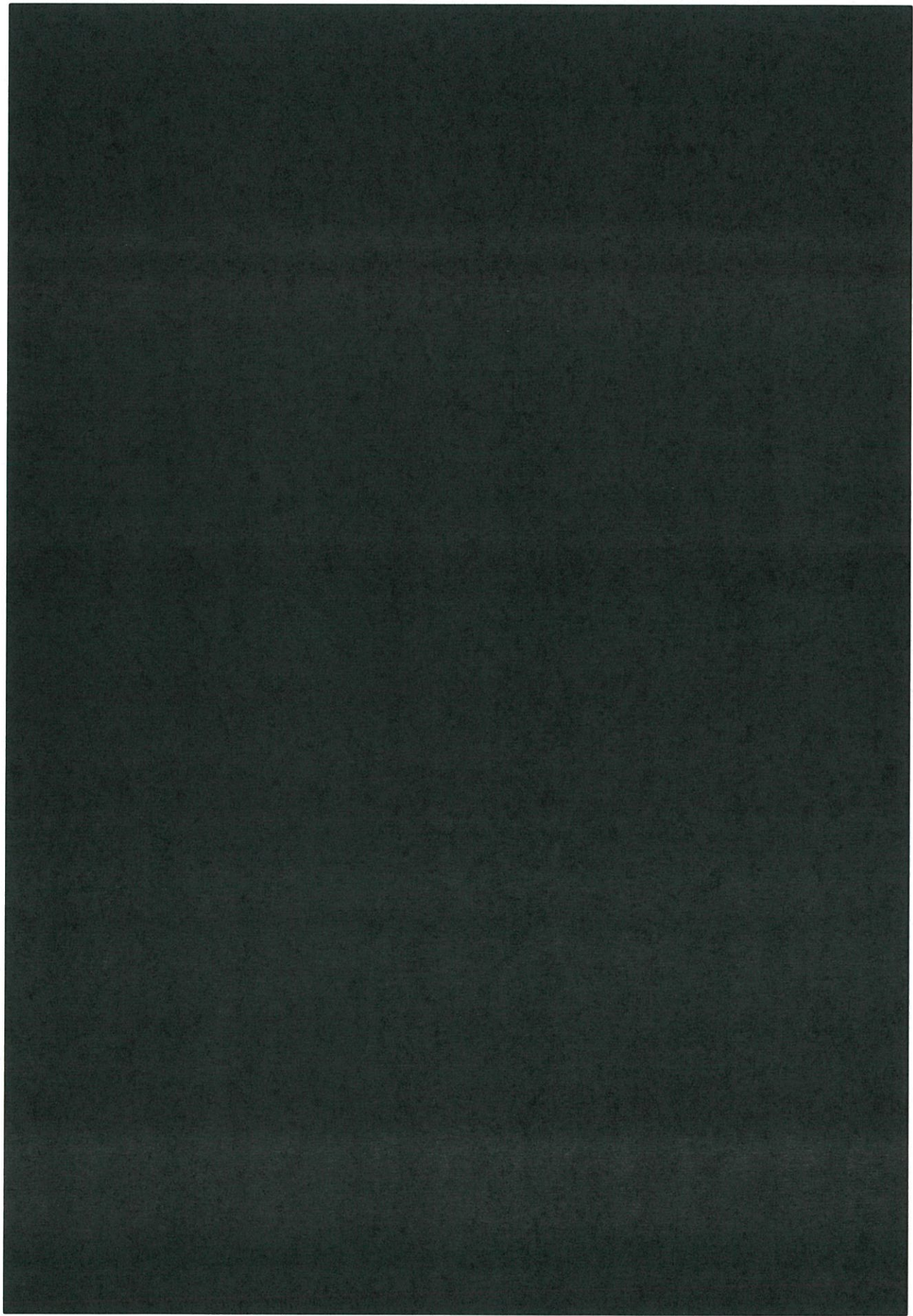




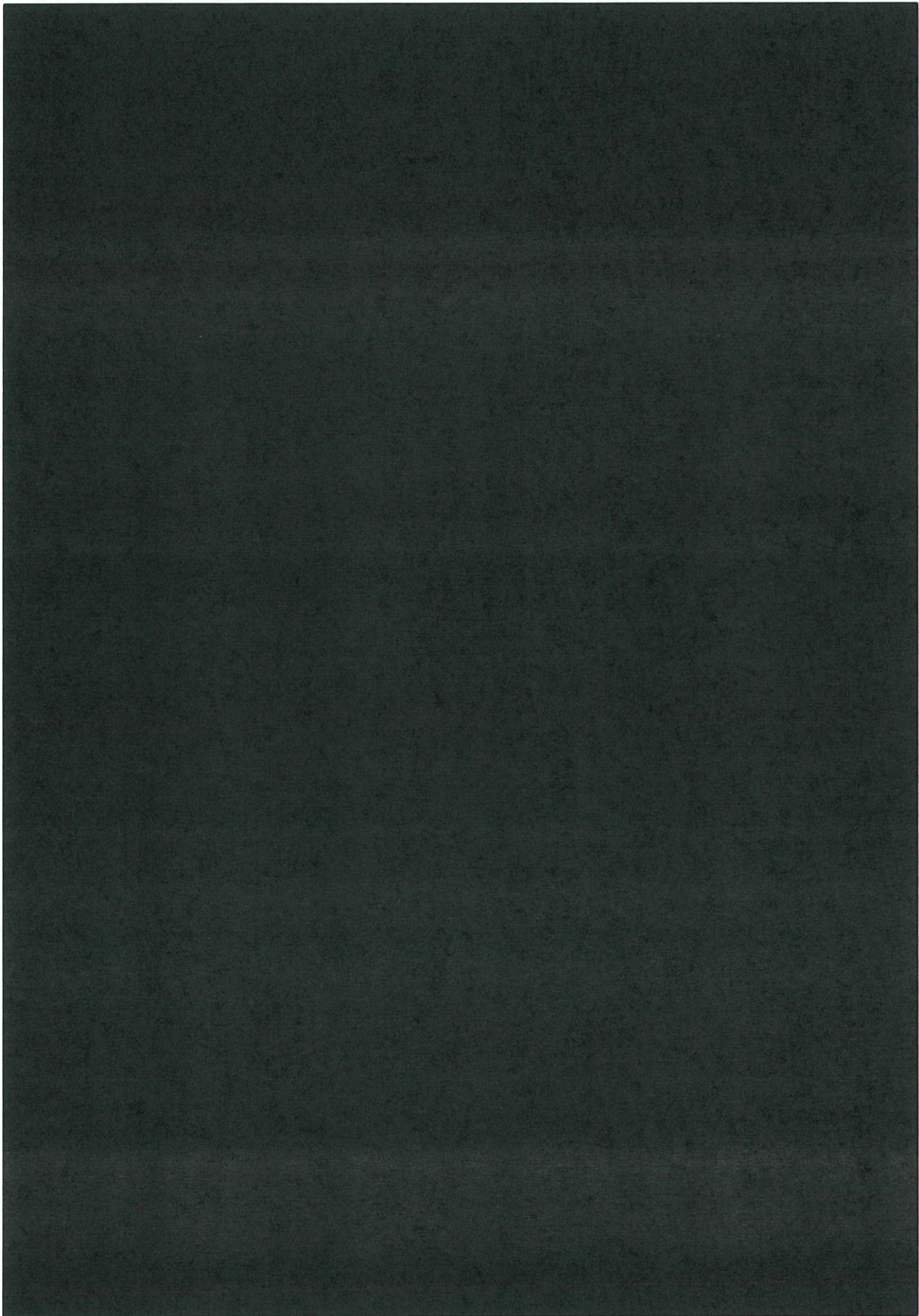




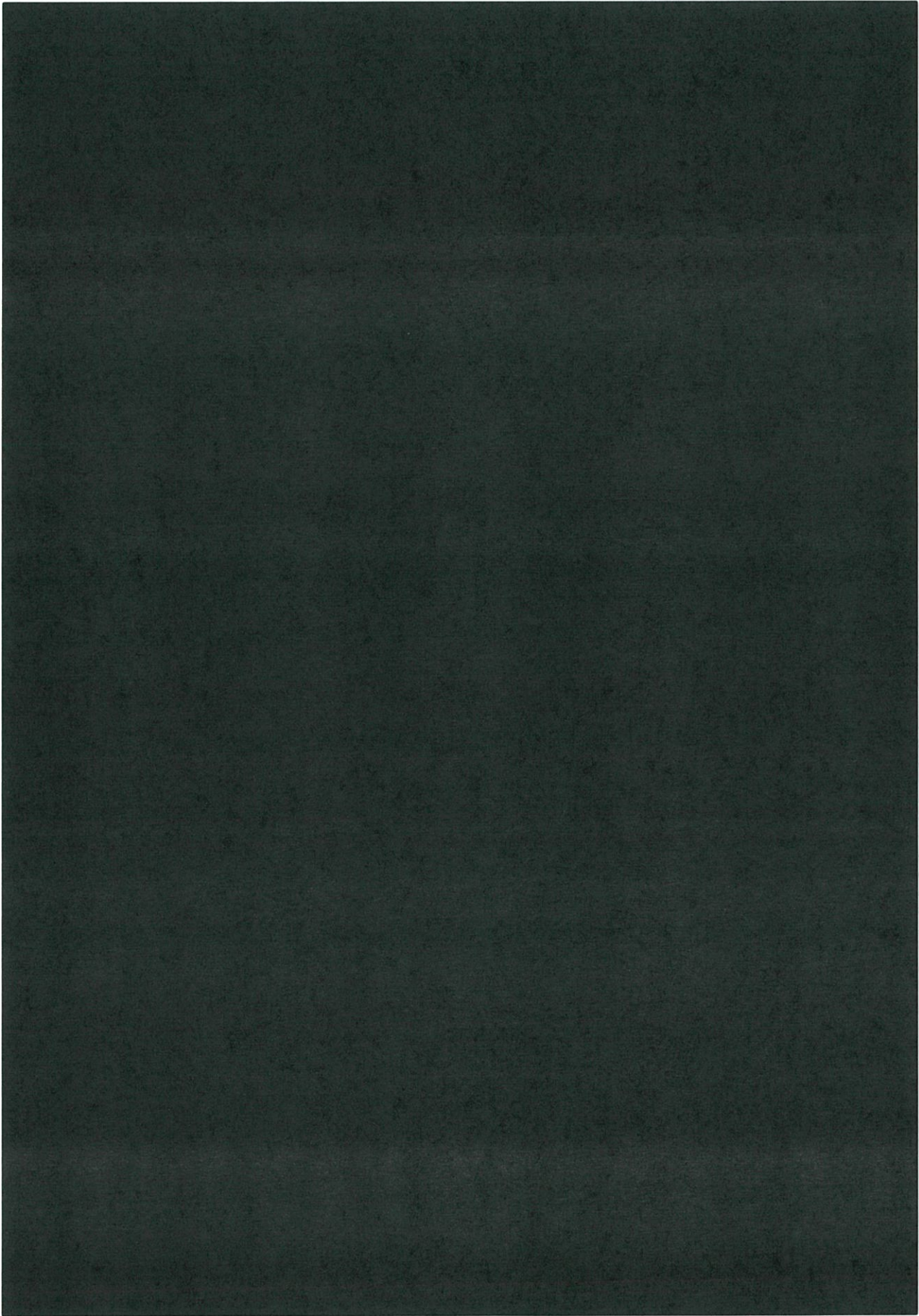




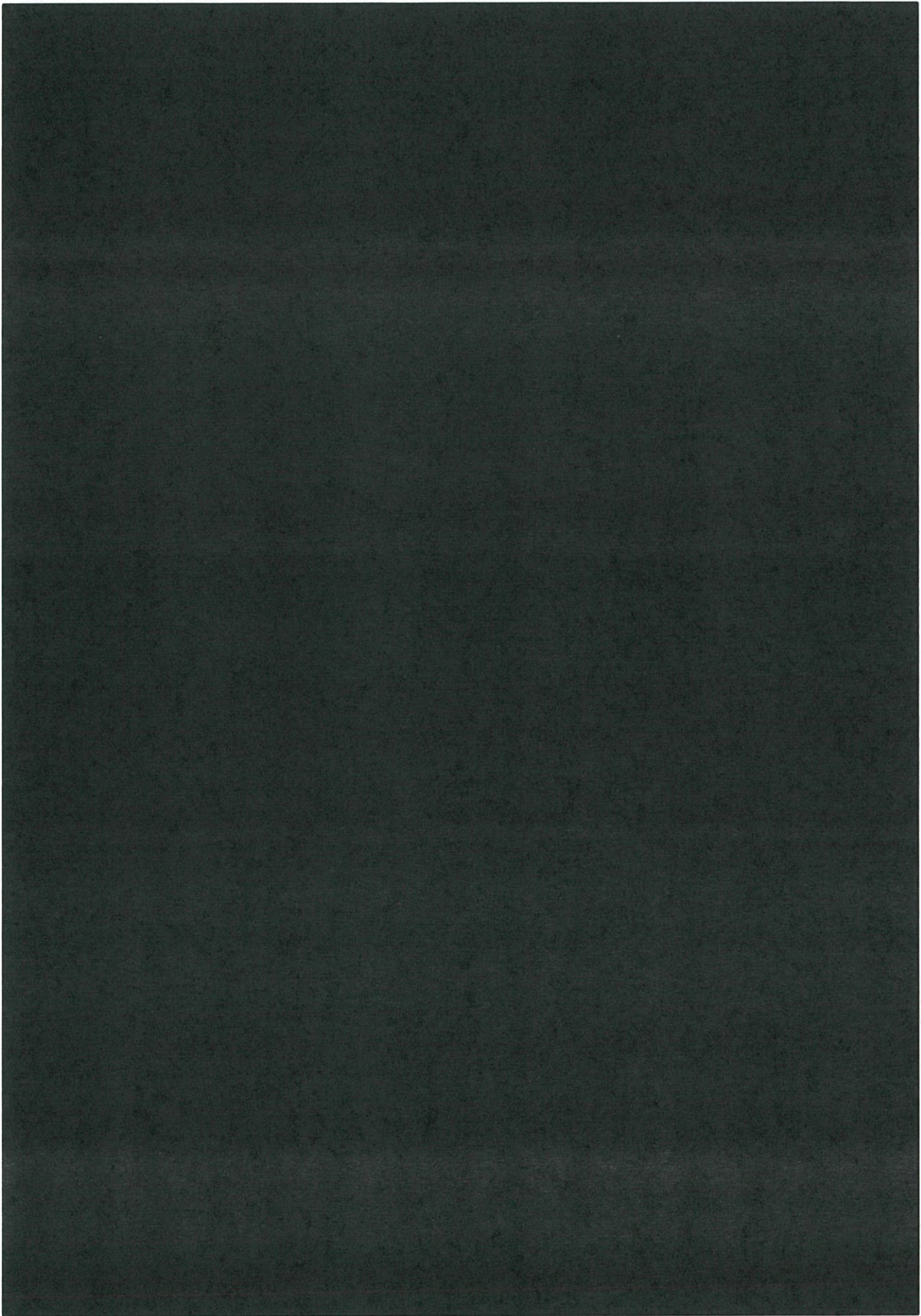
















## Appendix 10. Network Risk Framework

The Energy Queensland Network Risk Framework assesses individual risks in dimensions of Likelihood and Consequence according to a six by six risk matrix (Figure 1).

Risk Analysis 6x6 multiplication $R=C \times L$		Consequence 					
		1	2	3	4	5	6
Likelihood 	6	6	12	18	24	30	36
	5	5	10	15	20	25	30
	4	4	8	12	16	20	24
	3	3	6	9	12	15	18
	2	2	4	6	8	10	12
	1	1	2	3	4	5	6

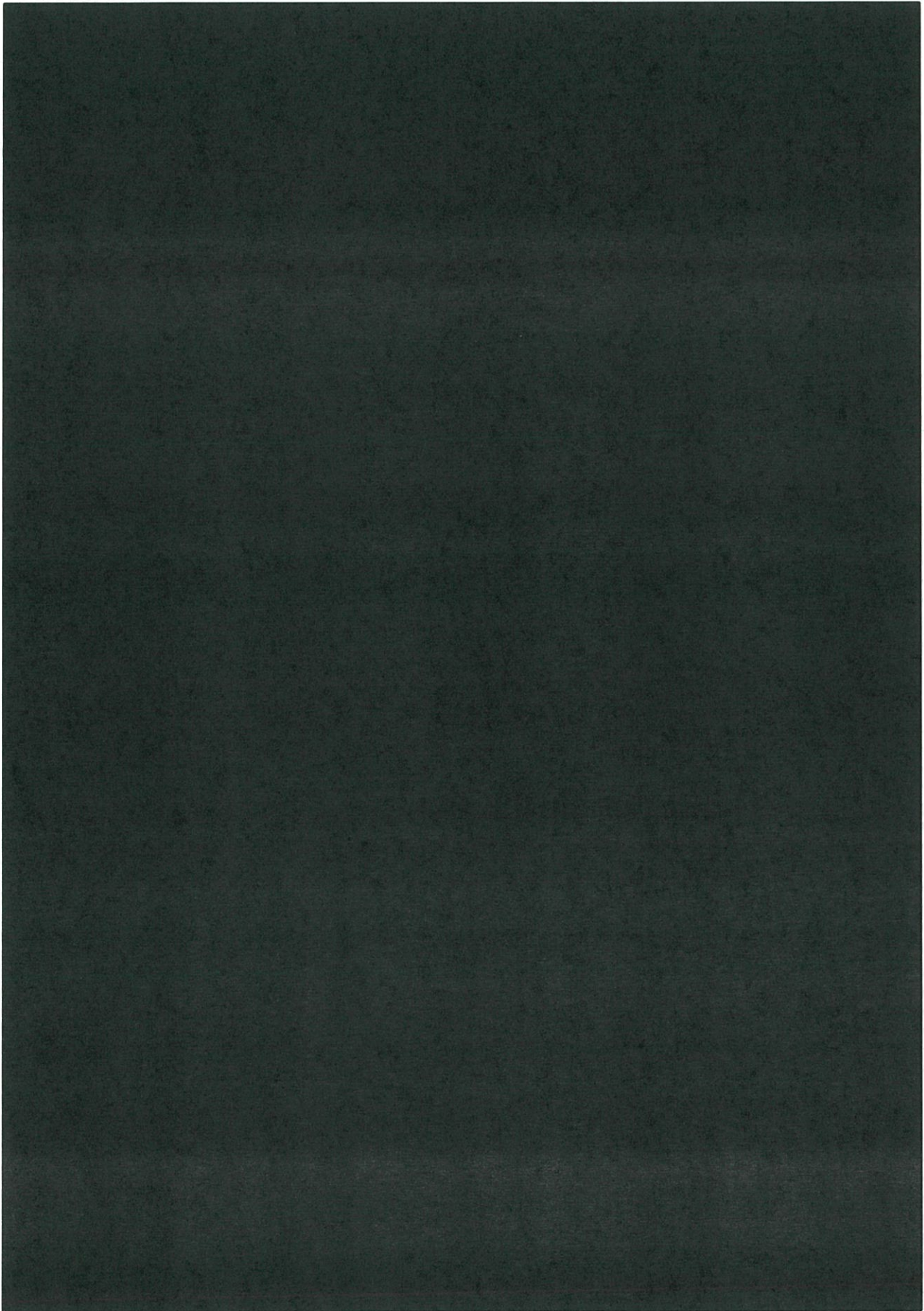
  

Network Risks - Risk Tolerability Criteria and Action Requirements				
Risk Score	Risk Descriptor	Risk Tolerability Criteria and Action Requirements		
30 – 36		<b>Intolerable</b> ( stop exposure immediately)		
24 – 29	<b>Very High Risk</b>	*ALARP Risk in this range managed to As Low As Reasonably Practicable	<b>Executive Approval</b> ( required for continued risk exposure at this level )	May require a full Quantitative Risk Assessment (QRA) Introduce new or changed risk treatments to reduce level of risk Periodic review of the risk and effectiveness of the existing risk treatments
18 – 23	<b>High Risk</b>		<b>Divisional Manager Approval</b> (required for continued risk exposure at this level )	Introduce new or changed risk treatments to reduce level of risk Periodic review of the risk and effectiveness of the existing risk treatments
11 – 17	<b>Moderate Risk</b>		<b>Group Manager / Process Owner Approval</b> (required for continued risk exposure at this level)	Introduce new or changed risk controls or risk treatments as justified to further reduce risk Periodic review of the risk and effectiveness of the existing risk treatments
6 – 10	<b>Low Risk</b>			
1 to 5	<b>Very Low Risk</b>		No direct approval required but evidence of ongoing monitoring and management is required	Periodic review of the risk and effectiveness of the existing risk treatments

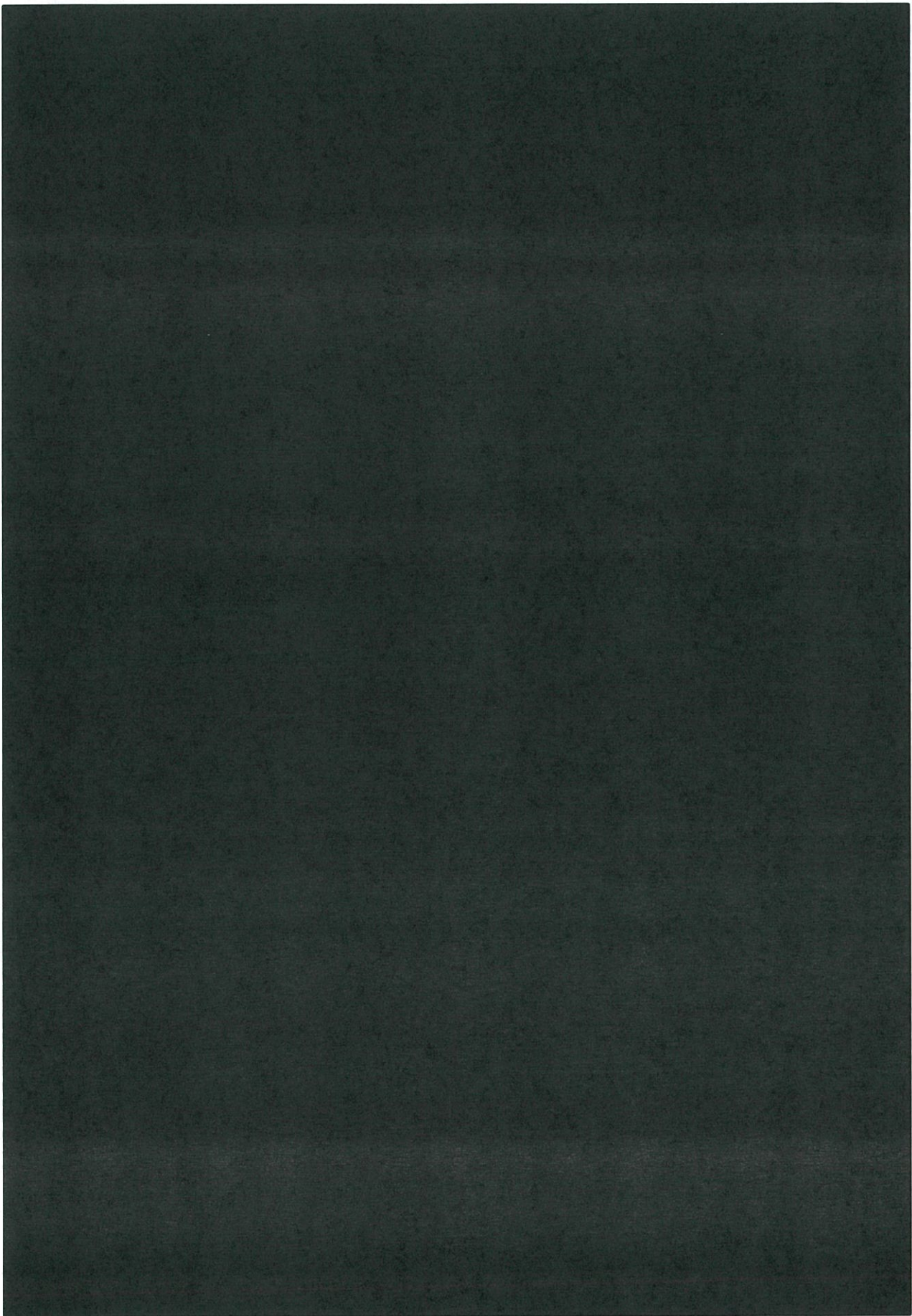
\*Note: SOFAIRP to be used for Safety Risks and ALARP for Network Risks

Figure 1: Network Risk Framework

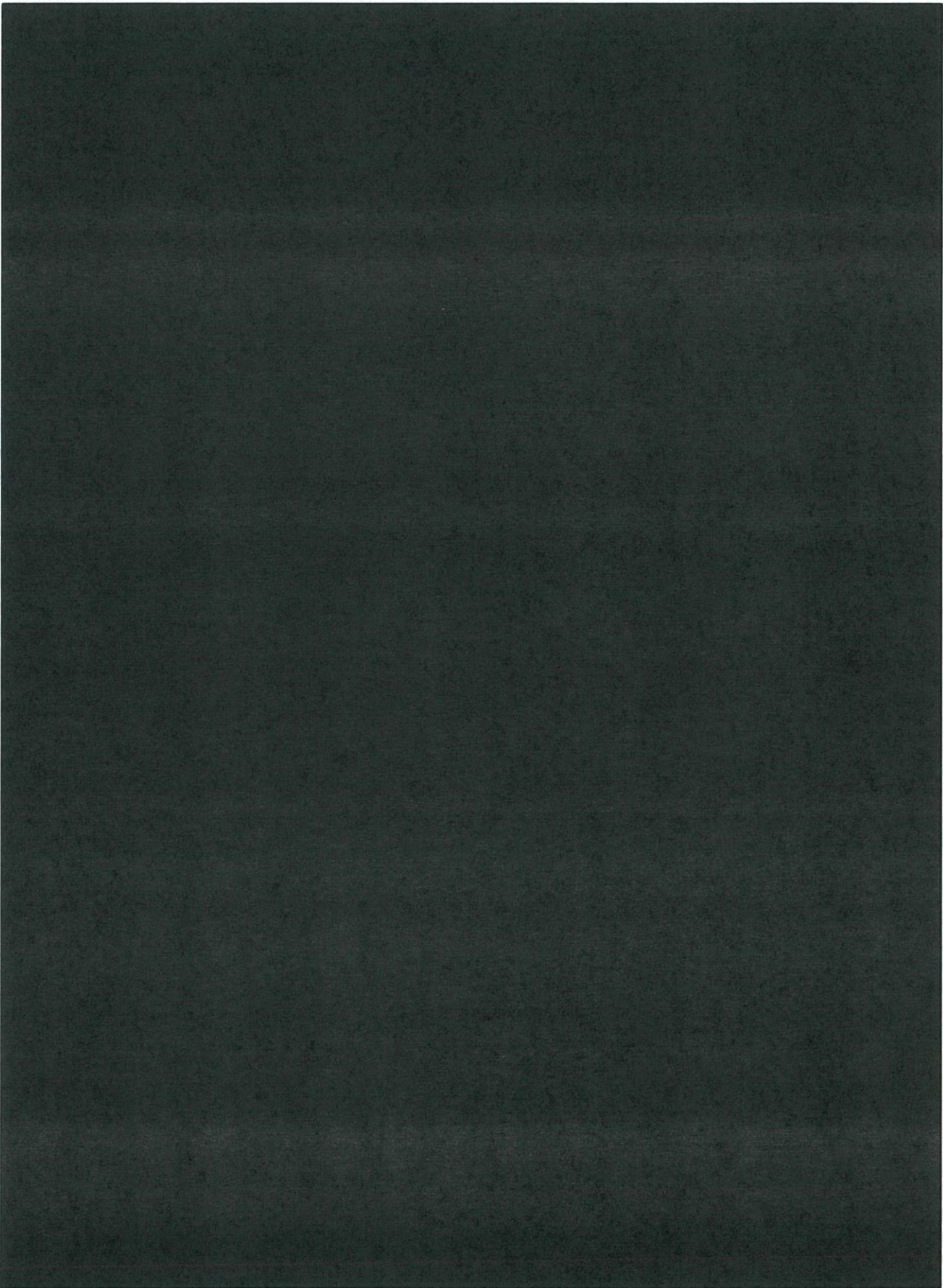














## Appendix 14. Definitions

Term	Definition
ACS	Alternative Control Services
AESCSF	Australian Energy Market Cyber Security Framework
ASD	Australian Signals Directorate
Capex	Capital Expenditure
CPI	Consumer Price Index
CRAC	Computer Room Air Conditioning
CSF	Cyber Security Framework
DMS	Distribution Management System
FY	Financial Year (e.g. FY21 refers to financial year 2020/21)
IED	Intelligent Electrical Devices
ICCP	Inter-Control Centre Communications Protocol
MPLS	Multi-Protocol Label Switching
NIST	National Institute of Standards and Technology
NPV	Net Present Value
NOC	Network Operations Centre
Opex	Operating Expenditure
RCP	Regulatory Control Period
SCADA	Supervisory control and data acquisition
SCS	Standard Control Services
SEQ	South East Queensland
SME	Subject Matter Experts
SQM	Square Metres
SVRA	Security Risk Vulnerability Assessment
WACC	Weighted Average Cost of Capital