Investment Evaluation Summary (IES) IT.INF.02

Project Details:

Project Name:	Storage Refresh and Backup Review
Project Id:	IT.INF.02
Thread:	IT Infrastructure
CAPEX / OPEX:	CAPEX + OPEX
Scope Type:	C
Service Classification:	Standard Control
Work Category Code:	AMITS
Work Category Description:	IT Software General – Standard Control
Project File Location:	DD17 Infrastructure
Preferred Option Description:	Continue hosting of storage infrastructure underpinning business service delivery from TasNetworks facilities, with replacement of storage hardware according to the Asset Management Plan.

	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27
Estimate ($M)	[redacted]									
Total ($) 2017-2019	**4,828,000**									
Total ($)	**19,390,000**									

Governance:

Project Initiator:	[redacted]		
Thread Approved:	[redacted]		
Project Approver:	[redacted]	**Date:**	< APPROVALTIMESTAMP>

Document Details:

Version Number:	1.0

Section 1 (Gated Investment Step 1)

1. Background

This Investment Evaluation Summary (IES) documents planned expenditures for the determination period for storage platforms (including dedicated hardware appliances). The document is one of eight planned documents covering anticipated activities as described in the IT Infrastructure Asset Management Plan.

TasNetworks currently operate and maintain a relatively large number of both current-technology and legacy storage systems as a result of the merger with Aurora Energy's distribution business in 2014. It is anticipated and assumed that infrastructure consolidation operations aimed at reducing the number of platforms in service will be completed by 2017. At that time, TasNetworks can be reasonable expected to operate the following platforms:

[redacted]

At that time, the total useable amount of SAN and NAS storage under management is expected to be in the vicinity of [redacted] across the [redacted] ata centre locations.

Similarly, backup of data currently takes place through a variety of hardware and software platforms. Consolidation of backup infrastructure to a common platform by 2017 is anticipated and assumed.

The initiative scope is documented in detail below in Scope, at a high level the document scope extends to:

1. Centralised storage hardware, including both SAN and NAS platforms
2. Storage networking hardware and software
3. Storage management software provided by the storage platform vendor
4. Hardware and software used to provide backup, restore and DR /Business Continuity functionality

1.1 Investment Need

Investment drivers fall into the following categories:

1. Reliable and effective delivery of IT services to the TasNetworks business and external customers.
2. Compliance with state and federal legislative and regulatory requirements, including:
    a. Industry-specific requirements
    b. State and federal privacy legislation
    c. Occupational Health and Safety requirements
3. The need to maximise the efficiency and cost-effectiveness of service delivery.

Potential disruption of TasNetworks transmission and distribution services due to failure of control systems

- Delays to business operations arising from interruptions to or degraded performance of business applications
- Degraded performance across all application services used by business and operations teams arising from capacity constraints
- Reduced ability to restore business application services in the event of a disaster
- Potential breaches of TasNetworks systems hosted on obsolete platforms
- Increased operational costs associated with support of obsolescent and obsolete platforms
- Increased cost and duration of business application delivery project activities

Activities and requirements driving the need for capital expenditure in this IES are documented in Section 4 of the IT Infrastructure Asset Management Plan. To summarise, storage platform upgrade and replacement activities will arise from:

1. Lifecycle replacement and capacity management activities.
2. Requirements to maintain appropriate levels of software assurance and vendor technical support.
3. Installation of additional capacity in response to project requirements and organic growth.
4. Requirement to maintain the capability to restore business application and data services in the event of a disaster.

1.2 Customer Needs or Impact

TasNetworks storage infrastructure is critical to the reliable, timely and effective delivery of business application and data services to operational and administrative staff. These services are directly related to TasNetworks ability to deliver efficient and effective services to our external customers.

The Corporate IT department is strongly focussed on service delivery to internal customers. These services are delivered in a manner that aligns with TasNetworks mission

statement,vision, strategy, commitments and values. The customer consultation program for the Infrastructure Program of Work documented in this IES reflects an approach of constant and direct engagement with business customers through:

- Regular direct meetings with management teams from all business units at least every six months. These meetings are broadly scoped and cover all services provided by Corporate IT as well as discussing current and emerging requirements from the business.
- A formal project prioritisation process that includes full transparency, extensive customer consultation and business-determined priorities.
- A fully consultative project management methodology that embeds Corporate IT and business customers in every stage of the project.

1.3 Regulatory Considerations

As the infrastructure documented in this Investment Evaluation Summary constitutes a supporting platform for TasNetworks business operations, there are no identified direct regulatory considerations.

However, the platforms documented in this Investment Evaluation Summary host applications and data used by TasNetworks staff in day-to-day operational and administrative processes. These processes are critical to ensuring business compliance with regulatory requirements.

2. Project Objectives

The primary objective of this initiative is to ensure TasNetworks ability to deliver prescribed, negotiated and non-prescribed services to customers. This objective is achieved through meeting the following initiative objectives:

1. Provide sufficient capacity for the following resources in order to meet IT service level requirements through the determination period:
    a. Production and Development data storage
    b. Disaster Recovery/Business Continuity data storage
2. Provide sufficient capacity over the period for:
    a. Growth in existing business services and activities
    b. Anticipated new business services and activities
3. Ensure that the availability of storage hardware meets or exceeds IT service level targets through procurement of appropriate support agreements.
4. Support the ability of TasNetworks to recover IT business services and data in accordance with TasNetworks Disaster Recovery/Business Continuity requirements.
5. Ensure that data storage services are operated to meet TasNetworks compliance requirements for data privacy and data retention.
6. Ensure that all storage management software is:
    a. Licensed, and installed in compliance with vendor license requirements
    b. Supported by the vendor to a level appropriate to IT service level objectives

c. Upgraded or replaced as necessary to meet the requirements above

7. Ensure replacement of storage hardware in line with the IT Infrastructure Lifecycle policy to meet the investment needs documented above.

The objectives will be met through the execution of maintenance, upgrade and replacement activities as described below.

3. Strategic Alignment

3.1 Business Objectives

The following table highlights the problems that the initiative will solve.

Strategic Goal	Problems this initiative will address
"we enable our people to deliver value"	• The activities proposed in this initiative help to ensure a stable platform to support all IT systems.
"we care for our assets, delivering safe and reliable network services while transforming our business"	• There is substantial risk of doing nothing (see chapter titled 'Current Risk Evaluation'). • 'Do nothing' means TasNetworks IT may fail its remit to provide effective and efficient business systems solutions.

3.2 Business Initiatives

The activity proposed in this initiative underpins most other IT activity as it supports the basic underlying infrastructure to almost all IT systems.

4. Current Risk Evaluation

The TasNetworks Risk Framework details the level of risk the business finds acceptable in each category (Safety & People, Financial, Customer, Regulatory Compliance, Network Performance, Reputation and Environment & Community).

This initiative addresses Financial risks, of which TasNetworks has a **Moderate** appetite.

Not maintaining TasNetworks storage infrastructure increases the risk of failure due to either aging or capacity demands; this results in outages of systems and applications which affects TasNetworks ability to operate normally.

4.1 5x5 Risk Matrix

TasNetworks business risks are analysed utilising the 5x5 corporate risk matrix, as outlined in TasNetworks Risk Management Framework.

Relevant strategic business risk factors that apply are follows:

Risk Category	Risk	Impact	Likelihood	Consequence
Financial	Aging hardware has	Hardware failure will cause system	Likely	Negligible

	an increased likelihood of failure	outages which impact normal operations; significant outages to systems and unable to mitigate with additional resources		
Financial	Capacity demand outstrips current resource availability	Inability to maintain existing systems or deploy new systems	Almost Certain	Minor

Section 1 Approvals (Gated Investment Step 1)

Project Initiator:	[Enter name]	Date	
Line Manager:	[Enter name]	Date	
Manager (Network projects) or Group/Business Manager (Non-network projects):	[Enter name]	Date	
[Send this signed and endorsed Summary to the Capital Works Program Coordinator.]			

Actions			
CWP Project Manager commenced initiation:	[Enter date here]	Assigned CW Project Manager:	[Enter name here]
PI notified project initiation commenced:	[Enter date here]	Actioned by:	[Enter name here]

Section 2 (Gated Investment Step 2)

5. Preferred Option

The preferred option is for TasNetworks to supply production and DR/BC storage services from [redacted]

- Production data at [redacted] with the ability to fail over critical workloads between these locations when required
- Disaster recovery and long-term archival storage at [redacted]

[redacted] Available capacity is expected to double over the 5 year period of this IES in response to increasing demand for data storage.

Given the time frames involved in this IES, more detailed specification of the storage hardware and associated software is not possible.

The scope of activities documented below represent the preferred option for continued delivery of storage services in support of business activities and initiatives.

Risks associated with not proceeding with this option include:

- Increased risk of service disruption due to:
  - Increased cost of or removal of vendor support for older platforms
  - Inability to meet increasing capacity requirements for data storage
  - Degradation of application performance due to increasing demand on outdated platforms
- Reduced ability to meet TasNetworks regulatory requirements for data security and data retention
- Degradation of TasNetworks ability to meet Disaster Recovery and Business Continuity objectives in the event of a disaster
- Reduced ability to respond to changing business conditions and imperatives in a timely manner

Potential business impacts associated with these risks include:

- Potential disruption of TasNetworks transmission and distribution services due to failure of control systems
- Delays to business operations arising from interruptions to or degraded performance of business applications
- Degraded performance across all application services used by business and operations teams arising from capacity constraints
- Reduced ability to restore business application services in the event of a disaster
- Potential breaches of TasNetworks systems hosted on obsolete platforms
- Increased operational costs associated with support of obsolescent and obsolete platforms
- Increased cost and duration of business application delivery project activities

5.1 Scope

The scope of this initiative encompasses the following items:

Item	Description/Notes
Storage Hardware	Includes storage arrays and controllers. 2017 estimated capacity [redacted]
Storage Networking Hardware	Storage switches, routers and cabling
Storage Management Software	Software sold or resold by the storage hardware vendor.
Backup Hardware	Including tape libraries and drives, optical and magnetic backup systems devoted exclusively to backup operations
Backup Management Software	Software dedicated to facilitating and managing data backup and restore operations
Backup Operational Activities	Operational processes and supplied services supporting backup operations. Includes off-site storage of backup media

The scope of this initiative encompasses the following activities:

Project Activity	Schedule	Description
Storage Hardware Refresh	[redacted]	Replacement of existing storage hardware with new platforms
Storage Capacity Increase	[redacted]	Incremental increase in storage capacity to meet anticipated demand growth
Backup Strategy Review	[redacted]	Review and potential replacement of backup strategy, backup hardware and backup software
Backup Hardware Platform Refresh	[redacted]	Replace backup hardware to ensure the capacity, reliability and performance of backup operations

5.2 Expected outcomes and benefits

Activities and requirements driving the need for capital expenditure in this IES are documented in Section 4 of the IT Infrastructure Asset Management Plan. To summarise, storage platform upgrade and replacement activities will arise from:

1. Lifecycle replacement and capacity management activities.
2. Requirements to maintain appropriate levels of software assurance and vendor technical support.
3. Installation of additional capacity in response to project requirements and organic growth.
4. Requirement to maintain the capability to restore business application and data services in the event of a disaster.

Implementation of the recommended option will ensure that storage and backup hardware is maintained and replaced in accordance with the Asset Management Plan, and that the associated software is appropriately licensed and supported. The capability to restore business application and data will be maintained or improved.

5.3 Regulatory Test

N/A

6. Options Analysis

6.1 Option Summary

Option 0 – Do Nothing Continue to use existing storage infrastructure until failure		
Criteria	**Advantages**	**Disadvantages**
Solution effectiveness		Unable to meet growth in demand
Cost	Reduced CAPEX	Increased OPEX
Business impact		Increased frequency and duration of IT service outages
Business strategic alignment		
IT strategic alignment		Not aligned
Project complexity	Very low	
Risk profile		Increased risk of hardware failure
Ability to achieve compliance		
Time - ability to implement within a deadline	Requires little effort	

Option 1 – Recommended Option

Upgrade and replace storage infrastructure as documented above, providing anticipated capacity for 5 years of demand growth on installation

Criteria	Advantages	Disadvantages
Solution effectiveness	Ability to meet storage demand growth	
Cost	Reduced 5-year CAPEX over option 2	Large up-front CAPEX
Business impact	Provides capacity for new business requirements	
Business strategic alignment		
IT strategic alignment	Aligns with IT strategy	
Project complexity		Moderate project complexity
Risk profile	Reduces risk of service disruption	
Ability to achieve compliance		
Time - ability to implement within a deadline	Known upgrade process	May require vendor/integrator assistance to implement

Option 2 – Expand Storage Annually

Reduce 'up-front' installed storage capacity, instead upgrading this capacity incrementally on an annual basis

Criteria	Advantages	Disadvantages
Solution effectiveness	Ability to meet storage demand growth	
Cost	Slightly higher NPV than preferred option	Large up-front CAPEX Increased 5-year CAPEX when compared to option 1
Business impact		Uncertain ability to rapidly provide capacity for new business initiatives
Business strategic alignment		
IT strategic alignment	Aligns with IT strategy	
Project complexity		Moderate project complexity
Risk profile	Reduces risk of service disruption	Slightly higher risk of service disruption compared to preferred option
Ability to achieve compliance		
Time - ability to implement within a deadline	Known upgrade process	May require vendor/integrator assistance to implement

Option 3 – Hyper-converged Architecture

Implement an alternative server and storage architecture utilizing 'hyper converged' technologies as per IT.INF.01 Option 2

Criteria	Advantages	Disadvantages
Solution effectiveness	Increased asset utilization and efficiency	
Cost	Lower CAPEX Reduced OPEX over options 1 and 2	
Business impact	Provides capacity to meet future demand growth	
Business strategic alignment		
IT strategic alignment		Partial alignment
Project complexity		Increased complexity due to use of new technologies
Risk profile		Moderate technical risk due to use of new technologies
Ability to achieve compliance		
Time - ability to implement within a deadline		Will require additional skills to implement

6.2 Summary of Drivers

The following table compares the options presented with regard to the criteria assessed in the previous chapter.

Criteria	Option 0	Option 1	Option 2	Option 3
Solution effectiveness				
Cost				
Business Impact				
Business strategic alignment	N/A	N/A	N/A	N/A
IT strategic alignment				
Project complexity	N/A			
Risk profile				
Ability to achieve compliance				
Time - ability to implement within a deadline				

6.3 Summary of Costs

Option	Total Costs ($)
0 – Do Nothing	
1 – Preferred Option	$19.39 M (2017-2027)
2 – Expand storage annually	$19.63 M (2017-2027)
3 – Hyper-converged architecture	Unclear – see Economic Analysis and Expert Findings

6.4 Preferred Option Cost Breakdown

	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27
Estimate ($M)	[redacted]									
Total ($) 2017-2019	4,828,000									
Total ($) 2017-2027	19,390,000									

6.5 Summary of Risk

The preferred option addresses Financial risks, as analysed utilising the 5x5 corporate risk matrix, as outlined in TasNetworks Risk Management Framework.

Risk Category	Risk	Impact	Likelihood	Consequence
Financial	Aging hardware has an increased likelihood of failure - mitigated by replacing hardware	Hardware failure will cause system outages which impact normal operations; significant outages to systems and unable to mitigate with additional resources	Rare	Negligible
Financial	Capacity demand outstrips current resource availability - mitigated by replacing hardware with increased capacity	Inability to maintain existing systems or deploy new systems	Unlikely	Negligible

The risks associated with completing the preferred option are based on the assumptions that current 2017 workload is completed, and previous issues that have been faced occur again. These risks will see a negligible to minor impact if realised.

6.6 Economic analysis

Option No.	Option description	NPV	Reason got selection/rejection
0	Do nothing	$0	
1	Preferred option	$6.54 M	
2	Expand annually	$6.71 M	Slightly higher NPV, but higher CAPEX, increased implementation effort and complexity, more

			cost uncertainty
3	Hyper converged Architecture		Market for these technologies is still relatively volatile, high technical risk and high uncertainty regarding pricing over this planning horizon

Further details of the NPV calculations can be found here:

IT.INF.02 NPV Calculations.xls

6.6.1 Quantitative Risk Analysis

N/A

6.6.2 Benchmarking

N/A

6.6.3 Expert findings

The emerging technologies of hyper-converged systems, and software-defined storage have not been costed in detail due to the uncertainty over this planning horizon. These approaches should definitely be considered fully at the appropriate phases of the TasNetworks project management methodology. Indications from Gartner are that these technologies can save 45-55% compared to a more traditional approach[1].

6.6.4 Assumptions

ITA-015	Storage hardware will be required across 3 datacentre locations
ITA-016	Consolidation of platforms following the merger of Aurora distribution and TasNetworks is complete by 2017
ITA-017	No major SAN platform purchases in the period 2015-2017
ITA-018	Existing platforms have sufficient capacity headroom for storage needs to 2017
ITA-019	No major changes to DR/BC service level objectives in the period 2015-2017
ITA-020	No major stepwise increase in storage requirement from initiatives outside of Infrastructure
ITA-021	The outcome of the 'Backup Strategy Review' will either be OPEX neutral,

[1] Cox, Roger W. - Gartner IT Infrastructure Summit (2015) *The Economics of Storage-Defined Software*

	or decrease ongoing OPEX
ITA-022	NOCS, TNOCS supports the data centre rationalisation and does not require SAN storage at Maria / Chapel
ITA-037	Continue existing requirement for active-active data centres
ITA-107	Costs savings regarding extended annual hardware maintenance/support are based on quotes received for warranty extensions of existing storage equipment.
ITA-108	This analysis breaks down after 2 years of extension as it is no longer possible to acquire hardware maintenance contracts on equipment of this age. A more practically relevant analysis would require that replacement of storage is unavoidable at year +6 or +7 and those capital costs should be deferred those years rather than eliminated.

Section 2 Approvals (Gated Investment Step 2)

Project Initiator:	[Enter name]	**Date:**	
Project Manager:	[Enter name]	**Date:**	

Actions			
Submitted for CIRT review:	[Enter date of CIRT here]	**Actioned by:**	[Enter name]
CIRT outcome:	[Enter details here] [Reference any minutes as appropriate.]		