

Scottish Canals
Asset Management Strategy
2018-2030

Scottish Canals Asset Management Strategy 2018-2030

Executive Summary

Scottish Canals is responsible for five historic canals that form a network covering 140 miles across Scotland. Over the last 20 years we have re-imagined and changed the purpose of these waterways beyond recognition and secured significant investment from public, private and third sector sources. This vision and subsequent investment has ensured that the canals' contribution has widened significantly from simple navigations to delivering for the people of Scotland in many ways including regeneration and place making, tourism and destinations, active travel and health and utilities and flood defence.

Over the last five years, we have continued to develop our understanding of the canal infrastructure which we manage and maintain, as well as monitoring the growing issue of climate change and increasing diversification of use. This insight has informed our approach to developing our Asset Management Strategy 2018-2030.

A piece of work we did in 2015 illustrated to us that the demands put on our assets and infrastructure significantly outweighed the revenue and capital available to the organisation by around £6m-£9m per annum, and while investment has increased, it is not currently at the required level. In line with our predictions, over the last three years we have seen a significant increase in the number of asset failures and defects identified.

This Strategy defines our approach to asset management and asset risk, however, with the level of investment currently available it will not reduce the likelihood of further asset failures. The aim of the strategy is to ensure that failures are identified where possible and risk is mitigated. Our focus will always be on ensuring that assets are safe, protecting the wider public, local infrastructure, our staff and visitors, while also aiming, when funds allow, to maintain operational functionality.

The Strategy defines the approach Scottish Canals will use to deploy the necessary processes and professional vigilance to our asset base. However, substantial failures may occur and these will need to be considered in partnership with Transport Scotland/Scottish Government.

With present available investment asset decline is inevitable. However, through the clear and strategic approach defined in this strategy Scottish Canals will manage this process and prioritise the delivery of a safe and productive canal network for the many as well as the few.

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Scottish Canals Asset Management Strategy 2018-2030

1 Introduction

With more than 22 million visitors every year Scotland's canal network is a valuable national resource. Their contribution to regeneration, place making, tourism, leisure and travel has delivered significant benefits for communities and transformed their relevance to the Scottish people. From their popularity it is clear that Scotland's canals are there for all Scotland's people.

But with popularity comes challenge. Rapidly increasing visitor numbers and significant new canalside developments and waterways being used in new and innovative ways stretches our canals' capacity and puts an ever-increasing strain on our historic assets. Our focus will always remain on ensuring that these assets are safe, protecting the wider public and local infrastructure, our staff and visitors, while also aiming to maintain operational functions.

This strategy defines how we will maintain asset integrity on a managed risk basis to ensure that the likelihood of major failure is as low as possible and outlines a clearly defined approach of how we achieve this in years to come.

Funding for our waterway network has remained static and, therefore, decreased in real terms over recent years. While our asset processes ensure vigilance, external environmental influences that challenge the structures we manage could result in major failures which may have public safety implications. These could potentially render entire sections of canal unusable for long periods of time. Climate change and the inevitable deterioration of very old structures means that the likelihood of this happening is growing. The asset base presents a significant challenge with a number of major failures occurring in recent years.

Maintaining the integrity of assets with Scheduled Ancient Monument status can be both labour intensive and expensive. It depends not only on rigorous prioritisation but also on being able to predict failures and allocate limited resources to take preventative action. This is relatively simple in regard to modern structures with available design records. However, it is much harder when it comes to historic civil engineering structures and especially mechanical and electrical failures where vital moving parts are hidden from view. Improving resilience, therefore, depends as much on monitoring asset condition and predicting failure as it does on regular maintenance.

This Asset Management Strategy will deliver:

- Longer term asset aims combined with shorter term plans, which are subject to regular review
- Flexibility to respond to Scottish Government yearly funding allocations
- A clear, prioritised and risk-based programme of repair and investment to maximise the use of available resources

- An approach to asset investment that allows Scottish Canals to deliver a safe environment for local communities, customers and staff, protects income generation and when funds allow, facilitates navigation

2 History

Scottish Canals is the custodian of a significant heritage asset. The history of the asset goes back to the formation of the first canals in the 1760's. A timeline of the canals is shown in **Figure 1**. As can be seen the canals have been in multiple ownership and differing levels of commercial success and investment over the last 250 years. This has left Scottish Canals with significant legacy issues in relation to the structures and the present asset condition.

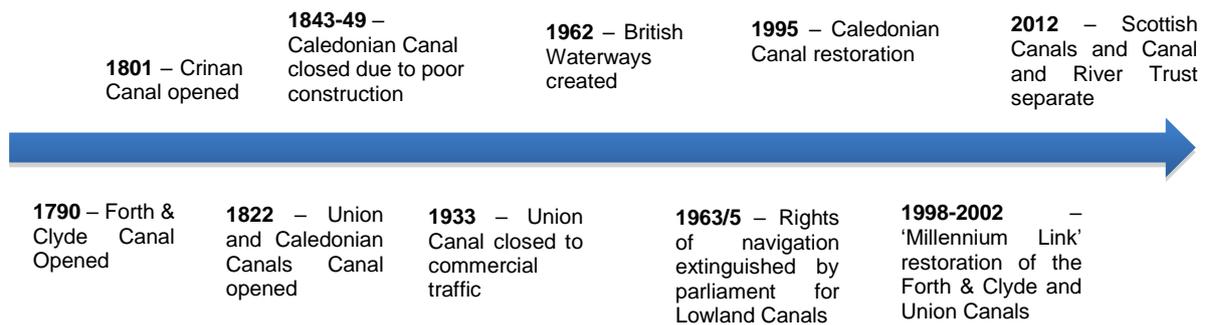


Figure 1 - Scottish Canals' historical timeline

Scottish Canals' current asset base includes:

- Assets with a replacement value of c.£1.78bn
- Over 4,100 assets
- 140 miles of waterway
- 19 reservoirs
- 92 Listed buildings
- 137 miles of Scheduled Ancient Monument
- 22 sites of special scientific interest (SSSI) adjacent to the canals

In 2015, we produced a model which clearly illustrated that the asset demand significantly outweighed the revenue and capital available to the business by around £6m-£9m per annum. This model demonstrated that, without investment, the number and potential consequence of asset failures would accelerate in the coming years. Capital investment from Scottish Government has risen, but not to the levels required. Critically, revenue has, in real terms, fallen, resulting in a significant decrease in available investment that is critical to the care and maintenance of the canal network. Over the last three years we have seen a significant increase in the number of asset failures and defects identified in line with the modelled forecast.

3 Asset Management Strategy

Scottish Canals will use asset management to support a safe and sustainable long-term approach to managing Scotland's historic inland waterways.

Our Asset Management Strategy 2018-2030 (AMS) and Asset Management Plan (AMP) 2018-2021 are based upon the BS ISO 55000 2014 and PAS55 framework for asset management. This describes asset management as:

'the systematic and coordinated activities and practices through which an organisation optimally manages its assets and their associated performance, risks and expenditures over their life cycle for the purpose of delivering the organisational strategic plan.'

The purpose of asset management is to enable an organisation to realise value from its assets by implementing a systematic approach to achieving a desired outcome, using documented processes and procedures to describe what is to be done, checking it happens as intended and making adjustments, described as the Deming Cycle of Plan-Do-Act-Review.

4 Asset Management Aims

The key aim of asset management is to provide sufficient information and prediction of future conditions so that informed decisions can be made and recorded. This information can then be used to protect the wider public, our visitors and staff and allow us to continue to derive value from our canals by keeping them open to as many people as possible.

This will be done while considering likely asset risks and future conditions as a result of visitor usage, investment or climate change, and internal factors from across the organisation.

The AMS aims to:

- Describe an optimised risk-based approach to managing, maintaining and operating the network to meet the Scottish Canals Corporate Plan
- Set out a strategy which is realistic and considers resources, timescales and enabling activities
- Maintain a clear line of sight from Corporate Plan and canal visions to asset maintenance and operation
- Identify challenges and opportunities within asset management and set objectives to develop asset management within Scottish Canals
- Optimise the deployment of finite resources in an open, evidence based and analytical way

5 Health & Safety

Scottish Canals has statutory duties under the Health and Safety at Work Act 1974 and Occupiers Liability (Scotland) Act 1960 to protect its employees, contractors, volunteers, customers and the public from harm. We have additional duties under a wide range of statutory instruments concerning the operation and maintenance of our assets.

We have chosen to develop and implement a Health and Safety Management System (HSMS) aligned to BS OHSAS 18001: 2007. The HSMS is a systematic approach to addressing the health, safety and welfare issues within Scottish Canals. This management system applies to all Scottish Canals activities, including the work of our people and volunteers, and the impacts of our activities on contractors, volunteers and the public. In addition, it seeks to control the inherent risks on visitors and staff. Under the HSMS, health, safety and welfare issues are identified and addressed, and performance improved where reasonably practicable.

We will continue to maintain and implement an effective HSMS system to minimise the risks associated with all work activities, and minimise the risk to customers, visitors and neighbours.

6 Financial

The funding received from the Scottish Government since 2012 is shown below.

Funding to Scottish Canals	2012	2013	2014	2015	2016	2017	2018
GIA Revenue	£8.0m	£8.0m	£8.0m	£8.0m	£8.0m	£8.1m	£8.1m
GIA Capital	£2.0m	£2.0m	£2.0m	£2.0m	£2.0m	£3.0m	£3.5m
Additional SG Asset Funding				£1.0m	-	£1.3m	£1.6m

Table 1 - Scottish Canals funding 2012 to 2018

Scottish Canals' future investment will be based on prioritising assets in the worst condition and with the highest consequence of failure, to ensure a safety first approach is implemented.

The actual level of investment available beyond 2018 is expected, in the short term, to be in line with existing values.

7 Understanding Our Assets

A risk based approach is applied to asset related decisions through the application of the Consequence of Failure (CoF) and condition or operational serviceability. The condition grade provides the initial consideration of 'likelihood' and the CoF provides the 'severity' of the risk, as mapped out in **Figure 2**.

The CoF of each asset is similarly rated on a scale from 1 (low) to 5 (high). The descriptions of these grades and scoring are within the Asset Inspection Procedures (AIP). Specific descriptions are used for assets with a recognised industry grading system.

SC Risk Approach		Asset Consequence of Failure					
		Severity					
Asset Condition	Likelihood	5	1	2	3	4	5
		5	Low	Moderate	High	Severe	Severe
		4	Low	Moderate	High	High	Severe
		3	Low	Moderate	Moderate	High	High
		2	Insignificant	Low	Moderate	Moderate	Moderate
1	Insignificant	Insignificant	Low	Low	Low		

Figure 2 - Mapping asset risk to Scottish Canals Risk Appetite

Each asset is assigned a condition grade from A to E, where A represents an asset in prime condition and E represents a seriously deteriorated asset. The Asset Management Database (AMX) directly provides the top tier of work, relating to critical safety considerations. The current risk associated with all assets, according to their condition grades (civil, mechanical, electrical or hydraulic) and consequence of failure as shown in **Table 2**.

All Assets	1 Single Minor Injury	2 Minor Injuries	3 Serious Injury	4 Multiple Serious Injuries	5 Loss of Life	Grand Total
E or 0%	32	16	0	0	0	48
D or 25%	57	75	20	14	11	177
C or 50%	843	251	129	76	54	1353
B or 75%	1093	229	59	24	10	1415
A or 100%	282	32	39	7	4	364
Grand Total	2307	603	247	121	79	3357

Table 2 – Consequence of Failure (CoF) and Condition of all Assets - Nov 2017

Table 2 shows that of the ~3000 assets that have been assessed in terms of condition and consequence, there are 175 assets considered to present a high or severe risk and, therefore a priority for focus, these are referred to as 'High Risk Assets'.

Table 3, below, presents the distribution of assets and risk, identifying that 5.2% of our assets are considered to be High Risk Assets, whilst 78.0% present a low or insignificant risk. The distribution of our assets across the risk grading has been compared to, and is similar to, the Canal and River Trust.

All Assets Condition vs CoF	1 Single Minor Injury	2 Minor Injuries	3 Serious Injury	4 Multiple Serious Injuries	5 Loss of Life	Grand Total
E or 0%	1.0%	0.5%	0.0%	0.0%	0.0%	1.4%
D or 25%	1.7%	2.2%	0.6%	0.4%	0.3%	5.3%
C or 50%	25.1%	7.5%	3.8%	2.3%	1.6%	40.3%
B or 75%	32.6%	6.8%	1.8%	0.7%	0.3%	42.2%
A or 100%	8.4%	1.0%	1.2%	0.2%	0.1%	10.8%
Grand Total	68.7%	18.0%	7.4%	3.6%	2.4%	100.0%

Table 3 - Consequence of Failure (CoF) and Condition of all Assets as percentage of overall assets- Nov 2017

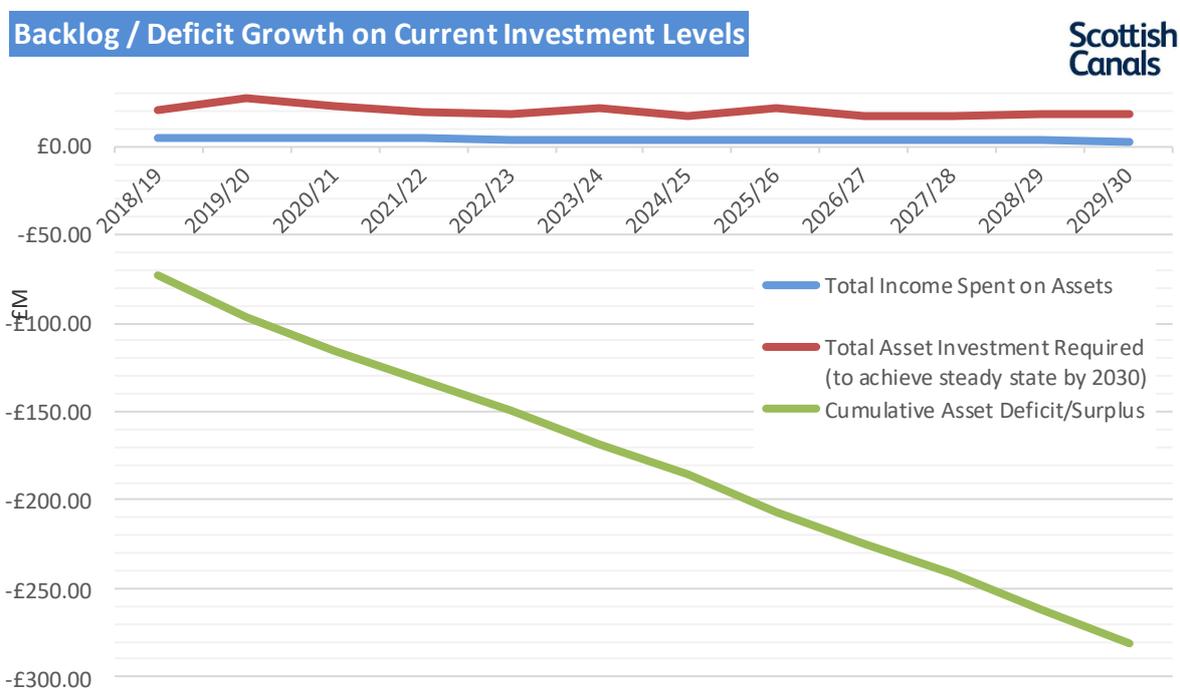


Figure 3 - Asset Investment Model - AMS representation

In 2015 the existing asset expenditure model was considered against our funding streams. Where there was a deficit in available investment, this was carried over into the following financial year. This enabled us to understand the growing backlog of work and the time it would take to address. The 2018 model can therefore be represented in a form shown in **Figure 3**.

With a scenario where the revenue GIA and Capital received remains at current levels, but overheads and inflation eats into the revenue available to spend, the backlog of work continues to grow, ending up at £280m by 2030. This is the potential deficit Scottish Canals is facing just to keep the network in its current condition.

8 Acquiring New Assets

There is on-going assessment of the need for new assets to be added to the existing network, for example the provision of additional mechanisation or automation of movable bridges or lock gates, the construction of additional water management systems or additional mooring facilities etc. Our strategy is to continue to assess these options through the Project Board, taking into account the long-term maintenance implications and the subsequent pressure on the existing asset base.

9 Maintaining and Repairing Assets

The Scottish Canals Engineering Team will prioritise the limited revenue available to deliver a programme of Planned Preventative Maintenance (PPM) to resolve priority urgent or serious defects.

Our focus will always be on ensuring that the assets are safe, protecting the wider public, infrastructure, our staff and visitors, whilst also aiming to maintain operational functions. Activities are assessed and prioritised as:

- **Avoidance of major catastrophic failure** - whenever an asset presents a danger to wide spread public safety / national infrastructure we will either fix, close or replace
- **Staff and visitor safety** - delivers a safe environment for our millions of visitors and staff
- **Operability & functionality of canals** - sustains operation of the canals

There is also a significant requirement to manage vegetation to enable ongoing inspections to be completed and ensure that there is good detectability of arising problems.

10 Improving Asset Data and Information

Asset information provides the foundation for asset management and wider decision-making. The scope of asset information is wide-ranging and includes information on asset type, location, condition and capability; asset failure histories, work histories, unit costs,

as-built drawings, and health & safety plans. Currently, our asset data is held in a number of information systems across a broad range of locations, staff and formats.

Over the period of the Asset Management Strategy, we will continuously improve our asset information, aligning it with business needs.

11 Developing Capability and Capacity

In 2016 a dedicated Asset Management Team was created, recently integrated into the Engineering Team. The team provides:

- leadership in defining the strategic approach and delivery of the and AMP
- a planning and scheduling team to deliver specific strategies to assets
- an inspection team to check and implement the risk management of the asset base
- financial support to teams to provide management information to review and support future development of strategies and plans

As Scottish Canals delivers the AMS, the resource required will change over time and the development of skill sets related to both heritage assets as well as modern technologies will need to be sustained. This is envisaged to be primarily through continued staff development and growth of the pool of volunteers, either directly through initiatives such as our Canal College or strategic partnerships.

Scottish Canals as part of the Asset Management Plan will outline a course of action to demonstrate continuous improvement.

12 Canal Strategies

The AMS has been developed to reflect individual canal strategies and is based on a range of investment scenarios and prioritisation of competing demands. These strategies recognise the wide range of uses that various lengths of canal support, ranging from navigation and water management through to urban regeneration, tourism, waterside activity and access to open space.

Historically our approach has been to maintain all of the canals to a similar level of service, maintaining navigation and supporting a variety of additional uses. While this has been achievable in the short term, it has resulted in a growing backlog of work and further deterioration in the serviceability of assets. Maintaining this approach is unsustainable. The asset management data is indicating an increase in the number of severe defects and reported problems indicating a decline in asset health leading to a growing risk of failure.

There is, therefore, a need to consider a more rationalised approach to budget prioritisation. Consideration must be given to the primary use and function of the various canals, recognising the wider benefits to the greatest number of people. This may not necessarily include navigation, although this is an important consideration. Purely on considering the canal networks in terms of securing navigation, the canals would be considered in the following priority:

- Caledonian Canal
- Crinan Canal

- Union Canal
- Forth & Clyde east
- Forth & Clyde central & Glasgow
- Forth & Clyde west
- Monkland Canal - *Permanently closed*

However, the canal strategies that are available to adopt, follow a hierarchy of maintenance shown in **Figure 4**, are summarised in **Table 4**.

Currently, the canal network is being managed in an ‘Operational with Risk’ position, whereby risks are being managed and works are planned to enable operation of all sections of all canals, however, this is becoming increasingly unsustainable to maintain and risks continue to grow.

Therefore, strategic decisions become necessary to enable risks to be appropriately managed through applying varying strategies across the network, ranging from investing to reach ‘Steady State’ where the condition that canal sections can be safely used for full range of activities, through ‘Restricted Services’, whereby there may be limitations on the opportunities to use the canal network, ‘Conserving’ being minimum care and maintenance to keep the canal safe and ‘Preserving’ whereby the use of assets is withdrawn, but to maximise any residual value.

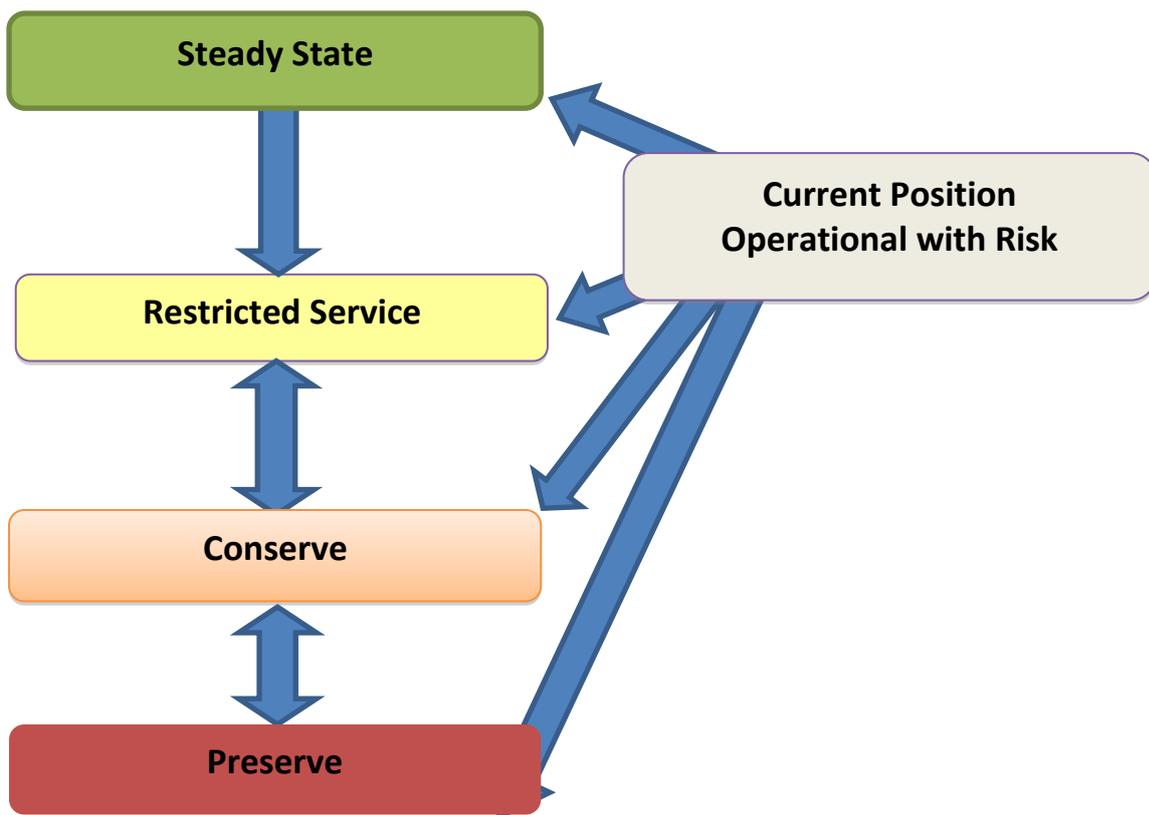


Figure 4 - Canal Strategy Interactions

Table 4 outlines the proposed canal strategies for the various model scenarios, rationalising the level of service that each canal should aim to achieve and the opportunities that should be considered to be developed.

Potential Scenario within 3 years	Opportunity	GIA £7m Rev £0 Capital	GIA £8m Rev £2m Capital	GIA £8.5m Rev £3m Capital	GIA £10m Rev £5m Capital	GIA £11m Rev £6m Capital
Caledonian West	Destination development/transit/moorings	Conserve	Restricted Service	Operational with Risk	Operational with Risk	Steady State
Caledonian Middle	Destination development/transit/moorings	Restricted Service	Restricted Service	Operational with Risk	Operational with Risk	Steady State
Caledonian East	Destination development/transit/moorings	Conserve	Restricted Service	Operational with Risk	Operational with Risk	Steady State
Crinan	Transit/moorings destination development	Conserve	Conserve	Operational with Risk	Operational with Risk	Steady State
Forth & Clyde West	Regeneration/active travel/health/linear Park/water management	Preserve	Conserve	Restricted Operation	Restricted Operation	Steady State
Forth & Clyde Central & Glasgow**	Rural development/destination development/active travel Water management	Preserve	Conserve	NGIWMS Bespoke	NGIWMS Bespoke	NGIWMS Bespoke
Forth & Clyde East	Destination development/urban regen/active travel	Conserve	Restricted Operation	Restricted Operation	Operational with Risk	Steady State
Union West	Rural regen/active travel/linear park	Preserve	Conserve	Restricted Operation	Restricted Operation	Steady State
Union Central	Rural regeneration/active travel/linear park	Preserve	Conserve	Restricted Operation	Restricted Operation	Steady State
Union East	Urban regeneration, active travel/health/linear park	Conserve	Restricted Operation	Restricted Operation	Operational with Risk	Steady State

The Falkirk Wheel (TFW) and Helix***	Tourism/ destination development/ regen	TFW Bespoke				
<p>**The North Glasgow Integrated Water Management System project is setting a bespoke strategy and funding for water management requirements on the F&C Glasgow Branch and summit pound.</p> <p>*** TFW will operate as a commercial asset and revenue generate where practical. The Helix assets relate to the Kelpies and it is expected that third party funding will aid maintenance.</p> <p>Steady State - Operation of all assets, but with no backlog.</p> <p>Operational with Risk - Asset operations for all users, but priorities given to the Canal Strategy identified users.</p> <p>Restricted operation - Asset operations maintains use until a decision is required to 'conserve' the asset.</p> <p>Conserve - Securing the asset base while maximising its best value.</p> <p>Preserve - Securing the asset base for future generations</p>						

Table 4 - Asset Strategy applied to Canal Sections

13 Implementing the Strategy

Implementation of the Strategy will be through the Strategic Asset Management Plan 2018-2021, subject to periodic review, and Asset Management Plan 2018-2021, which will be reviewed and updated annually and will be subject to variation depending on the provided level of funding.

14 Governance

A governance framework is established to provide direction and monitoring of the progress of the AMS and subsequent plans. The structure at the start of the Strategy period is shown in **Figure 5**.



Figure 5 - Asset Management Governance

Reputation Management

Scottish Canals will not only manage the reputational impact of unforeseen asset failure but enhance its reputation as a competent, responsible, safe public body throughout the life of this Strategy via robust planning, consistent and effective messaging, deploying appropriate channels for the right audience and delivering comprehensive, timely, stakeholder engagement.

Responsibility for the approach to asset management rests with the Board and Executive of Scottish Canals. The Executive will ensure that there is adequate and competent support in place by the management team, the asset management team, supervisors, team leaders and managers who put our asset management approach into practice on a day-to-day basis.

15 Summary

This strategy sets out a series of principles that will inform our approach to deliver safe and enjoyable canal corridors in the future.

Over the last five years, Scottish Canals have continued to develop understanding of the canal infrastructure which we manage and maintain, as well as monitoring how climate

change and diversification of use is impacting the condition of the canal network. This insight has informed our approach to developing our Asset Management Strategy 2018-2030.

It is clear, however, that the potential for asset failure will have a significant impact on both spending priorities and potential canal usage up to 2030.

Appendix A – Potential Impact of Canal Strategies

Closure of Navigation direct/ indirect loss & SC potential savings	Opportunities	Boat Movements Towpath visits (est.)	Canal Closure Implications	Direct Scottish Canals Financial Implication Navigation closure	Indirect Loss	Saving from Navigation closure Seasonal staff / volunteer	Saving if navigation completely closed (No staff redundancies)
Forth & Clyde West	Regeneration/active travel/health/linear park	200 No/2.1m	Reputational/ low traffic	£52K	£39k	£60k	£240k
Forth & Clyde Central **	Rural development/ destination development/ active travel / water management	400 No/2.7m	Reputational/ medium traffic	£75K	£97k	£40k	£240k
Forth & Clyde East	Destination development/urban regeneration/active travel	1000 No/2.3m	Significant reputational due to TFW/ Kelpies	£144k	£78k	£96k	£240k
Union Canal West	Rural regeneration/active travel/linear Park	1,500 No/2.1m	Reputational/ medium traffic	£15k	£106k	£12K	£48k
Union Canal Central	Rural regeneration/ active travel/ linear park	1,500 No/2.6m	Reputational/ medium traffic	£51k	£112k	£12k	£48k
Union Canal East	Urban regeneration, active travel/ health/ linear park	2,300 No/4.9m	Reputational/ medium traffic	£56k	£133k	£12k	£48k

Closure of Navigation direct/ indirect loss & SC potential savings	Opportunities	Boat Movements	Canal Closure Implications	Direct Scottish Canals Financial Implication	Indirect Loss	Saving from Navigation closure	Saving if navigation completely closed (No staff redundancies)
		Towpath visits (est.)		Navigation closure		Seasonal staff / volunteer	
Crinan Canal	Transit/moorings destination development	25,000 No/0.5m	Significant reputation/very high traffic	£290k	£1,519k	£160k	£380k
Caledonian Canal	Destination development/ transit/ moorings	60,000/1.8m	Significant reputation/very high traffic	£670k	£6,872k	£360k	£878k
The Falkirk Wheel and Helix***	Tourism/ destination development/ regeneration	-/2.5m	Very significant reputation	£1,799k	£4,000k	-	£789k

**The North Glasgow Integrated Water Management System project will set a bespoke strategy for water management requirements.

*** TFW will operate as a commercial asset and revenue generate where practical. The Helix assets relate to the Kelpies and it is expected that third party funding will aid maintenance.

The values contained with the above table have been verified in the 'Review of Asset Management Strategy - Review of the calculation and logic of values in the Asset Management Strategy' report, Ernst & Young, June 2018.