Network Rail Buildings and Architecture

The CP7 Buildings and Architecture Policy

Additional information for asset managers

CP7 Buildings and Architecture Policy: Additional information for asset managers was informed by a roundtable review, to which the following industry leaders were invited: Lynda Addison (Design Council Expert), Maayan Ashkenazi (Design Council Expert), Hiro Aso (Design Council Expert), Xavier Brice (CEO, Sustrans), Adam Brown (Landolt and Brown Architects/Design Council Expert), Andrew Cameron (Design Council Expert), Annie Coombs (Design Council Ambassador), Anthony Dewar (Professional Head of Buildings & Architecture, Network Rail), Kay Hughes (Design Director, HS2), Jane Findlay (President, Landscape Institute), Karl FitzGerald (Infrastructure and Projects Authority/Design Council Expert), Hanif Kara (AKT II/Design Council Ambassador), Alister Kratt (LDA Design), Victoria Hills (President, RTPI), Andrew Jannaway (Principal Engineer, Buildings & Architecture, Network Rail), Sadie Morgan (National Infrastructure Commission Design Group/Design Council Ambassador), Alan Pottinger (David Bonnett Associates Inclusive Design), Katje Stille (Chair, Urban Design Group), Elli Thomas (Design Council), Alan Thompson (Design Council) and Camilla Ween (Design Council Expert).

It was written by Lynda Addison, Maayan Ashkenazi, Hiro Aso, Andrew Cameron, Andrew Jannaway, Elli Thomas and Camilla Ween; copy edited by Joe Hannam Maggs and designed by Jason Badrock.

Contents

Section A

Section B

Section C

Section D

Section E

Overview and context

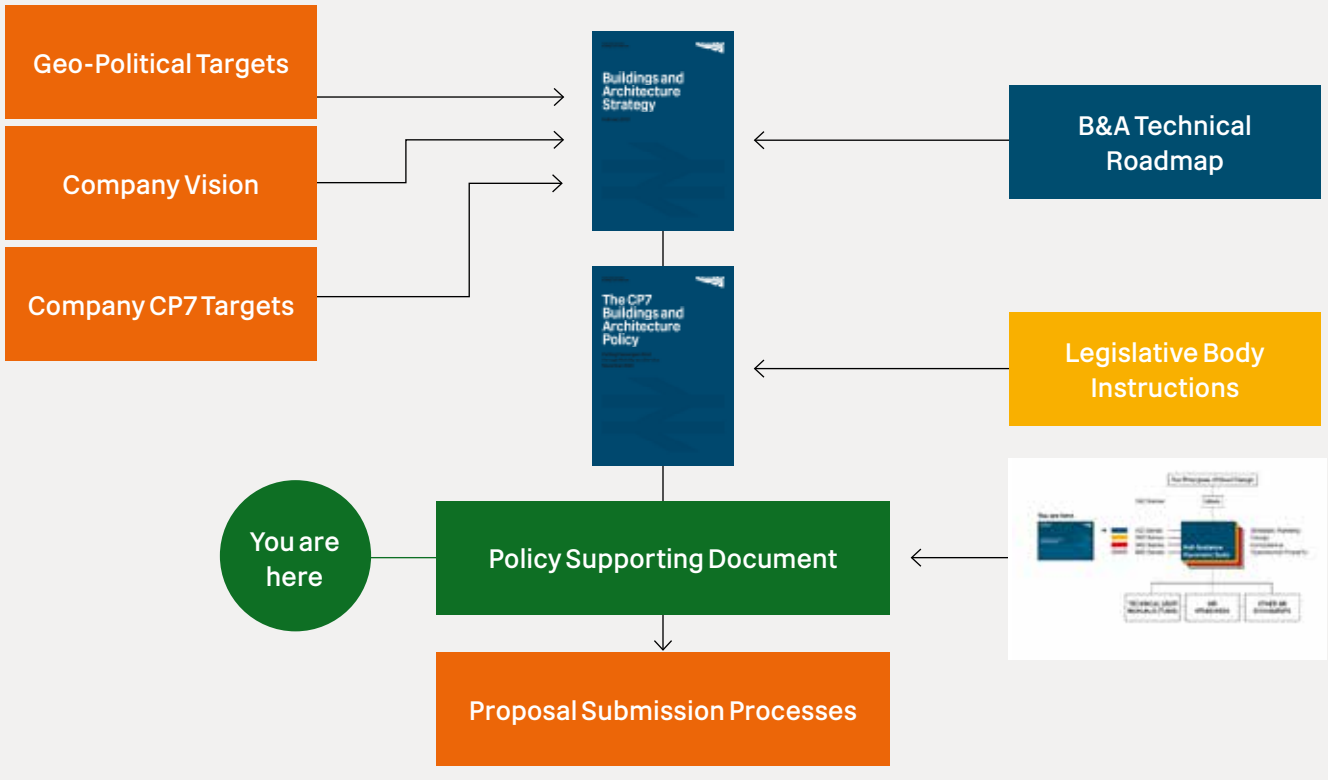
Introduction

This document provides further advice for asset managers in relation to the key differences in the CP7 Building and Architecture Policy published in November 2020. It focuses on our new strategic priorities (the 4 S's), including:

- **What they are,**
- **Why they are important,**
- **How they fit into the CP7 policy, and**
- **How to implement the evaluation.**

The CP7 policy aligns to the Network Rail framework as follows:

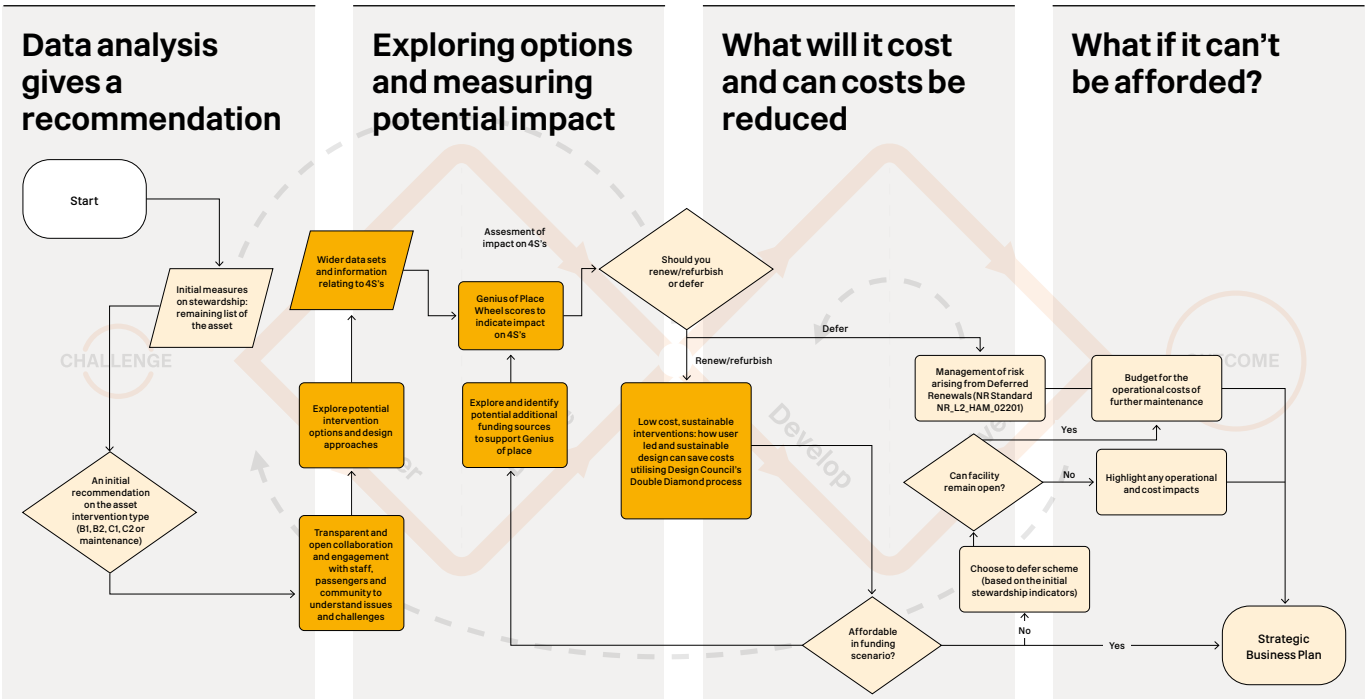
Figure 1
Network Rail Buildings & Architecture Policy Framework



The improved business planning process for CP7 is shown in Figure 2. This is explained in detail in Section B.

Figure 2

The business planning process for CP7



Principle:
Policy and Asset lifecycle planning is to be followed. If an intervention is not affordable in a funding scenario, it is to be declared as a deferred renewal

Key

- Start or end
- Process
- Input or output
- Decision
- Part of the pre-CP7 process
- New to CP7

The CP7 policy and this supporting document for asset managers fit into the Network Rail suite of policy documents.

The information and tools in this document outline the asset management process for Buildings and Architecture assets. They include the key methodologies and assessments required but also add four new areas of evaluation. These complement and follow on from the qualitative assessment of condition and support the evaluation of what choice of intervention is the most effective in line with the Network Rail vision and objectives.

This document is designed to support the policy for asset managers in understanding how and why CP7 has changed. Section A gives an overview & context and Section B explains the refined process. It includes what our new strategic priorities (the 4 S's) mean for you (Section C). How to optimise your interventions (Section D) and includes appendices with further details on indicators and measures (Section E).

The long established matrix of Condition and Asset Risk continues to be the leading intervention identification method, but for CP7, there is an upper boundary for B2 and a new zone has been added beyond which C1/C2 Predictive & Prevent interventions would be suitable (see Figure 3) and it has been acknowledged that other intervention triggers can proxy for the PARL and ARS assessments, including Structural Assessment Condition and Electrical Test & Inspection reports.

In an effort to address the findings of degradation modelling, in that assets degrade significantly quicker when into the last 20% of their design life, for CP7 the PARL intervention renewal trigger for platforms, canopies and MDUs has been raised to 20%.

Additionally, this document introduces a suite of new tools to help identify & justify interventions. They include the Design Council's Double Diamond iterative design process and the 4S's wheel, The Genius of Place. This new semi-quantitative approach has been designed by industry leading experts to help convey the need for intervention through several additional lenses and the positive impacts an intervention could have and conversely the negative impacts of not intervening.

The new policy also highlights the need to reveal the state of pre- Strategic Business Plan Deferred renewals. If a Policy compliant intervention cannot be made, it needs to be declared so that funders can see the true picture of the asset base.

Figure 3
Baseline measures to trigger an intervention

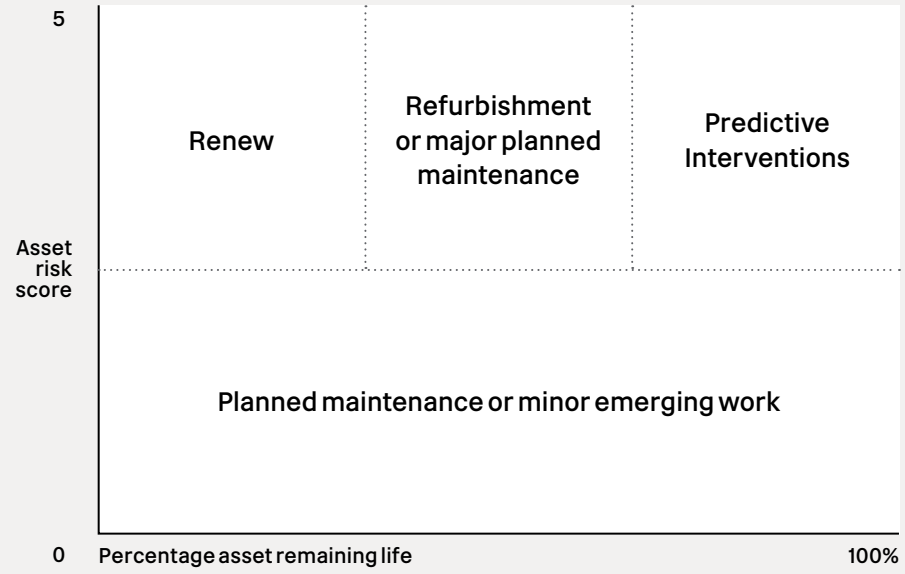


Figure 4
The Genius of Place

● Existing score
○ Future target

Indicator scoring

0	Urgent action needed (**black**)
1	Absolute basics delivered, action needed (**red**)
2	Enhanced basics (**amber**)
3	Heading towards excellence (**green**)

Implementing the new elements of the CP7 Policy

2

Network Rail aims to be an industry leader in rail transportation that 'Puts Passengers First'. To do so, our Technical Authority for Buildings and Architecture is implementing a new and improved policy framework – Control Period 7 (CP7). CP7 covers a five-year timespan and its aim is:

"To promote and embed a Design and Asset Engineering approach for the Railway Built Environment as a whole, and for Operational Property in particular, that improves Passenger Satisfaction, Safety, Stewardship and Sustainability."

Anthony Dewar, Network Rail Tech Lead for Buildings and Architecture

The CP7 Buildings and Architecture Policy Summary outlines the steps that the five Network Rail Regions should focus on for CP7 across 2024-29 to support delivery of the vision:

"A carbon neutral built environment enabling Mobility as a Service"

Mobility as a Service (MaaS) describes the end to end experience of rail journeys and the service it provides to all who interact with it. The CP7 Policy is a stepping stone on the journey to achieving this Vision and our current mission.

This policy will help establish a new style of asset management that moves beyond the current 'patch and mend' approach towards resilient stewardship. It builds on the current process for shaping Strategic Business Plans (SBPs). It addresses asset types B1 (total renewal); B2 (major refurbishment); C1 (minor refurbishment); and C2 (minor planned interventions, categorised as OPEX expenditure). It also expands on how to prioritise interventions to deliver **Network Rail's strategic priorities (the 4 S's): Stewardship, Safety, Satisfaction and Sustainability.**

Together, these will enable Network Rail to be an industry leader in transport provision that puts passengers first.

The Future of Rail:
What do we need to respond to?

3

"There can be few more important tasks than ensuring that the greenest form of mass transport becomes greener still. That's our ambition in rail, as we deliver innovations that support the UK's net zero carbon target."

Andrew Haines, CEO Network Rail

CP7 comes in the context of huge economic, social and environmental upheaval that is affecting the role of rail travel. The key factors follow.

i Climate emergency

With the UN stating that we have only nine years remaining before irreversible damage from climate change, the climate emergency is perhaps the greatest challenge of our time.[1]

To deliver the sustainable railway set out in the Network Rail Environmental Strategy[2] and our vision to serve the nation with the cleanest, greenest mass transport, we need to put users and the environment first.

This means helping passengers and freight users to make green choices. It means supporting local communities and being a good neighbour. It also means reducing emissions, improving biodiversity and ensuring the sustainable use of waste and materials. For the design and management of our assets, it means sustainable construction and working towards net zero carbon emissions.

In response to the climate emergency, the UN has established 17 sustainable development goals[3] as follows:

Figure 5
UN Sustainable Development Goals

1 https://www.un.org/press/en/2019/ga12131.doc.htm
2 https://www.networkrail.co.uk/wp-content/uploads/2020/09/NR-Environmental-Strategy-FINAL-web.pdf
3 https://sdgs.un.org/goals

The definition of sustainability as set out by the Brandt Report[4] identified three pillars of sustainability: economic, social and environmental. These are reflected in the above and underpin the UK approach to sustainable development.

The majority (if not all) of the sustainable development goals relate back in some way to our railway and its built environment. That is because transport sits at the heart of how we live and access education, work, opportunity, wellbeing and economic activity. This is reflected in the Government setting out a decarbonisation target for the country in the Climate Change Act 2018 of net zero greenhouse gases by 2050. It is also currently pursuing a strategy for the decarbonisation of transport to be published in 2021. In addition, the National Planning Policy Framework[5] sets out the UK definition of sustainable development and the planning policy framework to achieve it – of which transport is a key part. Network Rail[6] has also established a forerunner to an international standard and the 2080 target is focused on climate change.

ii A post-COVID world and changing travel patterns

The coronavirus pandemic led to an immediate 90% drop in passenger numbers across the network. While the long-term effects on travel, commuting and daily life have yet to become clear, some of the trends already in play pre-COVID mean we are unlikely to return to the previous 'normal' pattern of mobility. Demand for rush hour commuting may decline by up to 20% as home-working continues. Yet leisure journeys and use of the network at the weekends may increase as people swap international flights for UK trips. Overall, we are likely to see a greater need for flexibility in how passengers use the network.[7] This could involve shifting maintenance closures from weekends to quieter weekdays. Or providing more personal space on trains, platforms and stations. Or more space for luggage and bicycles.

iii Digital transformation

Digitalisation in other areas of their lives will affect what people need from the railway and its facilities. From staying connected all the time to accessing live journey information or making bookings on-the-go. It also has a significant impact on how we go about designing and managing our railways. Digital technologies – including digital twins, 3D scanning, the internet of things (IoT) and the widespread use of Building Information Modelling (BIM) – could give us more cost-effective and carbon-efficient ways of designing, building, operating and maintaining rail infrastructure. As well as enhancing passenger experiences.

4 http://www.brandt21forum.info/BrandtEquation-19Sept04.pdf

5 https://www.gov.uk/government/publications/national-planning-policy-framework--2

6 Network Rail 'Climate action design manual' NR/GN/CIV/100/04: Designing for Low Whole-Life Carbon – Decarbonisation Programme Workstream 13

7 https://www.railnews.co.uk/news/2021/02/26-more-trains-for-leisure-and.html

iv Inclusive design and an ageing population

The railway should meet the needs of a diverse population. An inclusive approach to how we design and manage railway assets will make sure that anyone – regardless of their disability, gender, age, race or other characteristics – can use the railway safely, easily and with dignity. In 50 years' time, the ONS projects there will be an additional 8.2 million people aged 65 years and over in the UK – a population roughly the size of present-day London.[8] Whether it is an ageing population or shifting birth rates, the way we design and manage our railway assets needs to respond to the changing needs of users.[9]

v End-to-end journeys and enabling Mobility as a Service

The rail network is an essential piece of the mobility puzzle across the UK and internationally for passengers and freight users. One of our long-term aspirations is to achieve 'total journey solutions' that enable integrated, smooth and painless journeys across the UK. Mobility as a Service (MaaS) will play a key role here. It integrates various forms of transport services into a single mobility service that is accessible on demand, with an operator able to offer a range of transport solutions to facilitate journeys. For asset managers, this includes creating safe, welcoming and pleasing environments both physically and digitally, covering live-time information, signalling and seamless modal interchanges.

vi The changing High Street and supporting local economic growth

Our high streets and town centres are at the heart of local economies and communities. However, their role is changing. In the aftermath of the pandemic, there is an opportunity to reimagine the rail network's relationship with local high streets. Helping high streets provide for health, work, social integration, green space as well as creative and cultural uses that meet the needs of a diverse population is a new area of focus. Network Rail assets such as stations, car parks and footbridges can play a central role in reforming local economies, including (where appropriate) the High Street and by bringing communities together.

8 https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/articles/overviewoftheukpopulation/august2019

9 https://blog.ons.gov.uk/2020/12/07/what-could-the-impact-of-covid-19-be-on-uk-demography/

Achieving resilient stewardship: A new approach to CP7

As we know, the only certainty in the future is change. So the complex system that is the railway network will operate best when it can respond to change and recover from stressors, rather than hope to sidestep them. This means being resilient in our approach to designing and managing the rail network. A resilient approach is tied to our sustainability goals and achieving net zero too.

Instead of a reactive, 'maintenance and condition' driven renewal approach, we need the rail network to anticipate and adjust to moments of change.

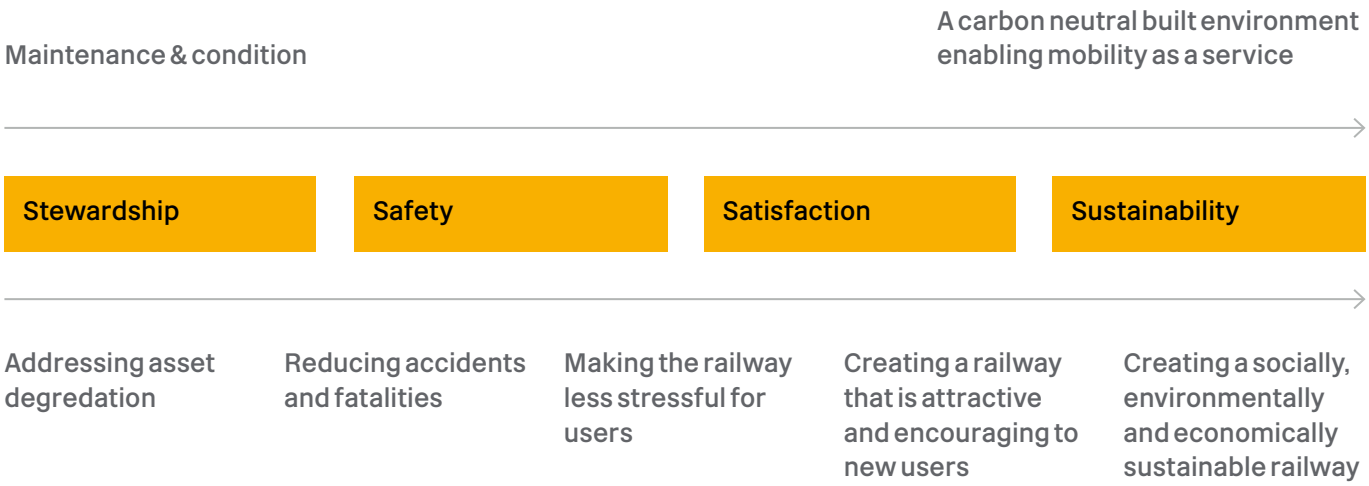
The framework in this document will enable you to take a proactive role in stewarding a network that is fit for the future. In particular, helping you answer two key questions:

1 Is the current state of assets adequate or do they require an intervention?

2 How can this intervention increase resilience in the future and achieve our wider objectives?

Responding effectively depends on recognising early warning signs. Asset managers who know how their assets are faring can highlight issues and help ensure they can meet changing user needs. This means not only thinking about assets in isolation but applying systems thinking to assess how the assets interrelate, how they are used, and how they combine to deliver wider outcomes.

Figure 6
Resilient stewardship and the 4S's: A continuum



4

The processes set out in this document are about **risk reduction** and closely align with our Corporate Risk Assessment Matrix (CRAM)(See Appendix 6 for more detail). They should also be used alongside individual risk registers that asset managers develop. That way, early intervention can save time and money and prevent any negative impact on safety, satisfaction and sustainability.

The Percentage Asset Remaining Life (PARL) system is a useful tool for standardising and comparing need. However, it overlooks the insight that individual asset managers have. The CP7 framework builds on PARL and incorporates your crucial input. This change focuses on the new ambitions for the network as a whole.

The new approach to CP7 is based on the 4S's and the shift to a holistic approach. Greater acknowledgement is given to the knowledge of individual asset managers and the insight they gain from speaking to and collaborating with staff, passengers and asset users. This is not to replace the current quantitative process but to enhance it and build a better case through further quantitative and semi-quantitative representations of these factors.

'Genius of Place'

An important component of resilient stewardship is *Genius of Place*. This is about recognising locally specific challenges and possibilities and thinking about how different parts of a place work together. Changes to Network Rail assets can have considerably wider benefits to a community than just rail passengers. For example, bridges over the railway can contribute to walking and cycling networks if open at least in part to people other than passengers and staff. Renewing facilities could assist wider accessibility for a soon-to-be ageing population. Ancillary facilities like cafes can provide a wider service. Building a case for asset interventions requires this focus on interrelationships to the place and its community. This includes identifying existing initiatives that could be strengthened by an integrated approach with an asset intervention to help build the case.

Section B of this document illustrates the overall process you should take in formulating Strategic Business Plans and for assessing each asset in the portfolio. It also highlights the new elements covered by this document. Baseline stewardship measures will be the trigger for the initial intervention. You can then carry out analysis against the 4S's to determine the optimal strategic decision using the indicators set out.

The new CP7 process improves the process for asset interventions. It utilises the design process in a more **holistic way** and is less rigid. This document provides practical ways you can successfully extend the existing process in CP7.

The 4 S's: Enhancing the process of asset management

5

The 4 S's form a spectrum of indicators to assess asset intervention beyond the existing indicators. Although it is right to think of each one in turn, it is important to see their interconnections.

Stewardship is about ensuring asset reliability and functionality do not fall below present standards. This also includes the impact of, say, climate change on resilience and reliability, which is covered under Sustainability. Flooding and long term drought is likely to have a significant impact on the stewardship of assets in the future.

Safety builds on positive stewardship with consideration of wider mental and physical health factors for passengers and staff. (For example, inadequate working environments for staff makes the network vulnerable and increases stressors or risk of injury, which has a knock-on effect on all users.)

Satisfaction builds on proper safety and is about generating loyalty and strengthening rail's role in the future by making rail travel desirable, convenient and sustainable.

Sustainability builds on high levels of satisfaction so that when people's needs are taken into account everyone shares responsibility for embedding resilience into our assets.

This section sets out more detail on each of the 4 S's and their contribution to the delivery of CP7 objectives. Figure 2 highlights where they sit in the overall process.

Looking specifically at the 4S's the process is as follows for each of them:

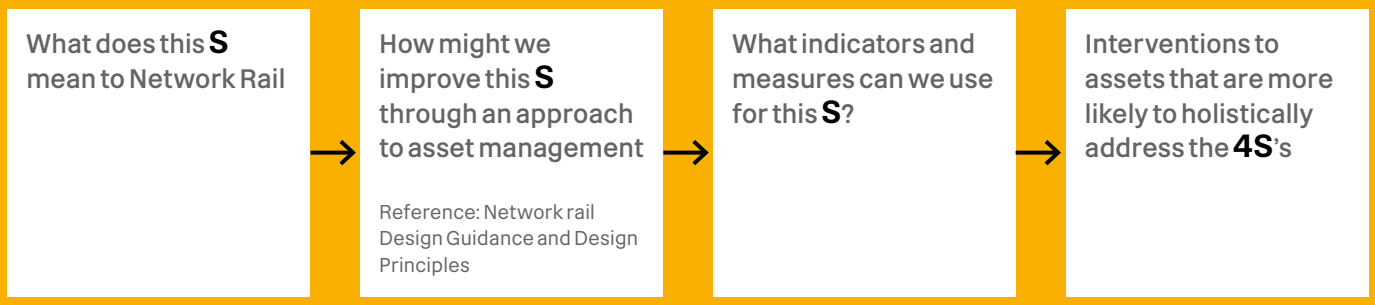


Figure 7
Measuring and understanding potential impact

Stewardship

A

a What do we mean by Stewardship and why is it important?

Stewardship is the art and skilful care of managing assets, places and people. Vital repair, safety-driven maintenance and building in resilience are entwined with fostering and championing a better future state, including responding to climate change. This concept of 'resilient stewardship' pushes us to think beyond what needs to be done today towards a holistic and integrated approach that serves the needs of tomorrow.

Our Station Stewardship Measure (SSM) is the highest level measure for the condition of assets.[10] In recent years, the SSM scores for stations and depots has shown a general improving trend. However, enhancement interventions can mask a reduction in the condition of the core asset.

b How can we improve Stewardship through asset management?

Current measures show that we need to improve Stewardship. Overall, stations are in Fair condition but at the lower end of that category (avg. 55%). LMDs are predominantly in the Fair category. For Maintenance Delivery Units (MDUs) and Staffed Lineside Buildings, around 40% are rated Poor. The worst performance is on Unstaffed Lineside Buildings, with nearly 50% in Poor or Very Poor condition. Unmanned assets are critical to the overall safety, operation and resilience of the rail network. Unless they are well maintained they can lead to safety risks and incidents. They are also harmful to the environment because they have a large carbon footprint due to higher heating and cooling costs.

The National Rail Passenger Survey (NRPS) highlights that upkeep is the biggest factor in overall satisfaction. With an insecure future for rail travel, ensuring satisfaction through successful upkeep is critical.

Table 1
Standard Stewardship Measure (SSM)

Station Stewardship Measure (SSM)

		2010-11	2011-12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	Comment	Trend
Network-wide	Category A	2.32	2.25	2.22	2.19	2.04	2.07	2.06	2.04	2.05	2.06		
Network-wide	Category B	2.41	2.38	2.34	2.31	2.29	2.28	2.28	2.28	2.25	2.17		
Network-wide	Category C	2.47	2.44	2.41	2.35	2.35	2.35	2.35	2.33	2.29	2.20		
Network-wide	Category D	2.48	2.41	2.39	2.34	2.34	2.34	2.34	2.32	2.29	2.23		
Network-wide	Category E	2.50	2.43	2.39	2.35	2.35	2.35	2.35	2.35	2.31	2.28		
Network-wide	Category F	2.51	2.47	2.48	2.44	2.43	2.43	2.42	2.41	2.39	2.37		
England & Wales	Category A	2.35	2.29	2.21	2.16	2.06	2.07	2.06	2.04	2.05	2.07		
England & Wales	Category B	2.43	2.39	2.34	2.32	2.29	2.28	2.28	2.29	2.27	2.19		
England & Wales	Category C	2.48	2.45	2.40	2.36	2.35	2.35	2.35	2.33	2.31	2.20		
England & Wales	Category D	2.50	2.43	2.39	2.35	2.33	2.34	2.34	2.32	2.32	2.26		
England & Wales	Category E	2.51	2.48	2.39	2.36	2.35	2.36	2.36	2.35	2.35	2.30		
England & Wales	Category F	2.54	2.51	2.47	2.44	2.43	2.43	2.42	2.41	2.43	2.40		
Scotland		2.33	2.28	2.33	2.23	2.21	2.20	2.20	2.17	2.15	2.15		

Light Maintenance Depot Stewardship Measure (LMDSM)

	2005/06	2006/07	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	Comment
Network-wide	-	-	2.39	2.37	2.31	2.32	2.33	2.28	2.24	2.10	
England & Wales	-	-	2.38	2.37	2.34	2.36	2.36	2.34	2.29	2.13	
Scotland	-	-	2.41	2.38	2.12	2.07	2.05	1.98	1.96	1.94	

10 SSM, is a 1-5 scale with 1 being very good and 5 being very poor. It roughly equates to PARL as: >76%=1, 46-75% = 2, 16-45% = 3, 1-15% = 4, 0%= 5.

Setting a baseline for the resilient stewardship approach

In CP7, our baseline Stewardship measures will remain as they are. Intervention decisions will still be justified by PARL and the Asset Risk Score (ARS) matrix. The main difference in CP7 compared to CP6 is that decisions should also be made and justified with due regard to the combined 4S's. Intervention trigger thresholds have been adjusted to reflect this.

In CP7, the **PARL** intervention renewal trigger for platforms, canopies and MDUs has been **raised to 20%** with the **ARS** for canopies and platforms **reduced to 3.**

Changes to baseline measures for CP7

— Platforms – The trigger point for renewal has increased to a PARL of 20%. This is to enable stepping distances and surface conditions to be addressed on renewal, in order to reduce slips, trips and falls and improve the NRPS upkeep score. Modelling suggests this means 44 platforms can be recommended for renewal and there can be interventions for 103 platform surfaces compared to previous intervention thresholds.

— Canopies – The PARL intervention for roof renewal has increased to 20% in order to reduce slips, trips and falls and improve the NRPS upkeep score.

— Maintenance Delivery Units – The MDU renewal intervention has increased to 20% to improve accommodation for our frontline workers.

— Footbridge – The unit rate for renewal now reflects the provision of lifts. It is also legitimate to focus on the stairs PARL condition in order to reduce slips, trips and falls, a Structural Assessment can trigger an intervention that PARL may not highlight.

— Train sheds – As per previous control periods, these major interventions will need to be assessed separately but they should now take into account the 4 S's.

— Listed buildings – allow for managing listed buildings (in particular closed signal boxes and closed footbridges).

— Lineside buildings – Those that are in poor condition need to be addressed (in particular operationally critical lineside buildings). For example through roofing renewals, wrapping or replacement. This Policy also enables greater focus on the safety and energy consumption of these assets.

— Other buildings – The improved inspection regime for all buildings will lead to further interventions to minimise risk of objects falling from height, vegetation management, rainwater goods management and water ingress.

— Seating and signage – These are now incorporated into the Intervention Trigger table so that we can help improve the passenger experience, wayfinding and ease of movement.

Resilient stewardship addressed for different asset types

Predicting or preventing future change is now crucial to your assessments and part of the quantitative and qualitative evaluation. CP7 broadens what you should take into consideration in terms of Stewardship. Any new intervention strategy should include both a prediction of future issues and prevention, taking account of each of the 4 S's to create a holistic set of recommendations.

In keeping with Genius of Place, your assessments will harness specific local advantages, address local challenges, or include knowledge of local characteristics. The following examples show how this can be applied to different asset classes.

Stations

Network Rail and Design Council's initiative, ThinkStation, highlights how our local railway stations need to function as true places.[11] They will have local character, accommodate a diversity of users and blend with their local surroundings – socially, environmentally and economically. This means engaging with the local community and connect with other transport modes, users and digital interfaces. We also need to notice how the outside spaces of the station link with onward journeys and create adequate, safe and inviting interfaces for all.

MDUs and Staffed Lineside Buildings

Adapting to sudden stressors, such as climate change, will require a better interface between people and the station. This includes better working environments for staff. The stewardship measure for MDUs had not been previously reported but in 2019 it was 2.43, with 40% in the Poor category. This is far lower than for stations and depots and raises the urgent need for improvements.

Buildings, footbridges, platforms, access, car parks, concourses, waiting shelters or canopies

The long-term ambition for Mobility as a Service (MaaS) calls for broader digitisation and improvements to the way stations interlink with other modes of transport. Lifts and escalators are important. So too are soft mobility modes within the perimeter of the station – especially as integration with any soft transport that can bridge the last mile is key. Any car park safety assessment should account for higher volumes of vulnerable mobility modes so that private cars do not risk people's safety. As demographics change, sensory factors (such as lighting stress, noise, and tactile features) as well as circulation, seating and passive safety throughout places that are occupied all day will future-proof stations for an ageing population and reduce slips, trips and falls.

Unstaffed Lineside Buildings

Nearly 50% are in Poor or Very Poor condition, which increases safety risk and incidents. These assets are typically inefficient with high energy costs. As a result, modelling suggests renewal and/or rationalisation is required across 800,000 sq. metres using further Safety, Satisfaction and Sustainability indicators.

Asset managers working with the baseline Stewardship measures to establish an intervention strategy must be mindful of future change. What is considered adequate now will shift with demographic, technological and environmental change as covered by the remaining S's of Safety, Satisfaction and Sustainability.

11 https://www.designcouncil.org.uk/resources/report/download-design-councils-thinkstation-report

Safety

B

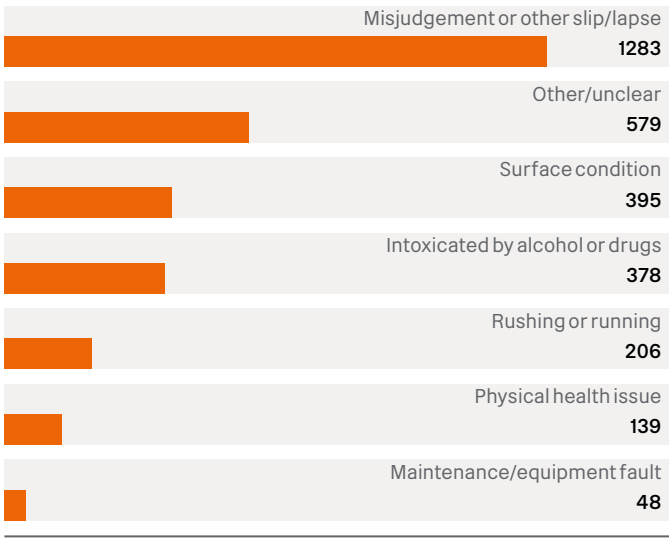
a What do we mean by Safety and why is it important?

The safety of colleagues and passengers is of the utmost importance to Network Rail.

Our teams should be able to go about their duties and tasks in a safe manner across all our assets – from the biggest station to the smallest lineside building. We must also support a culture of reporting issues and defects that could lead to an accident or safety issue. Those who travel on the railways and visit Network Rail assets should know we have done everything possible to make sure their journeys are efficient, enjoyable and pass without incident.

Accidents are the primary way by which we can assess Safety. These are measured by the Fatality Weighted Index (FWI), where 1 serious injury is considered equivalent to 0.1 fatalities. Our aspiration is for zero harm. However, as of autumn 2019 the FWI is 47.2, with an upward trend over time. So we need to intervene earlier to reduce the likelihood of injuries and accidents in stations and Network Rail environments. Stations have a higher accident rate (FWI of 54/year) compared to trains (FWI of 9/year), which makes them a key point of focus for asset managers.

Table 2
Passenger/public slips, trips and falls in station by possible cause (2018/19). Source – RSSB Annual Report



b How can we improve Safety through asset management?

Too often we think about safety in terms of outcomes (accidents) rather than the causes. Yet we already know some of the main underlying issues.

The third most significant factor is surface condition, which shows direct asset intervention is critical to Safety. The current 'patch and mend' approach has meant some issues have not gone away and so we need to focus on refurbishing and renewing assets instead. In particular, using the C1/2 predictive intervention trigger to reduce the likelihood of trips.

Accidents from getting on and off the train (formally the Platform Train Interface) have attracted industry attention and the trend is still growing. The Rail Safety and Standards Board (RSSB) has identified many non-infrastructure measures to help address this. However, infrastructure intervention is required, be it track and/or the platform asset, in order to address stepping distances, cross falls and tactiles. In order to prioritise any interventions reference is to be made to the RSSB research on Crossfalls and it's associated risk assessment tool used to identify mitigations and manage operations. At existing intervention rates it will be well over 100 years before assets are replaced to meet current standards. This reinforces the need to increase the intervention thresholds to 20% in CP7.

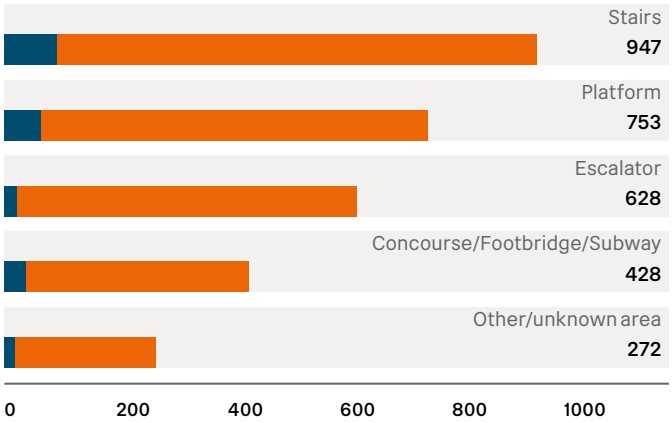
The most critical contributing factor noted in the data on station accidents is people's misjudgement or lapse. Behavioural psychologist Charlie Munger identified how uncertainty and stress can be the cause of such misjudgement and means that people do not read their environments.[12]

In CP7, asset managers need to consider Safety in the broadest terms, including the health and wellbeing of employees, visitors and passengers. You will need to consider contributing factors too. Not only uneven surfaces or wide platform-to-train gaps but the stress of travel or lack of inclusivity. This is where Safety ties in with Satisfaction and the ways we can create environments that do not exacerbate stress.

12 https://jamesclear.com/great-speeches/psychology-of-human-misjudgment-by-charlie-munger

The data about where slips, trips and falls take place in stations (see Table 2) is a useful starting point for where you can prioritise your focus.

Table 3
Location of passenger and public slips, trips and falls in stations (2018/19). Source RSSB Annual Report



Creating a stress-free environment that reduces the likelihood of incidents means thinking differently for a variety of users.

- A young, able-bodied commuter may be concerned by speed, efficiency, and punctuality.
- A young family may be concerned about sitting together or access to changing facilities, toilets and luggage.
- A senior leisure traveller may be concerned with comfort, the dwell experience, walking distances, information, facilities and being able to find the right platform.

Using HSE advice and ALARP

The Health and Safety Executive (HSE) has published guidance[13] to ensure that operators take 'all measures necessary' (AMN) to ensure that risk is reduced 'as low as reasonably practicable' (ALARP).

The principle is that short-term, low-cost risk reduction measures should be taken regularly and voluntarily by asset managers with greater risk reduction achieved by longer-term, proactive safety interventions. This supports our stated aim of resilient stewardship – planning for the future (not only the present) and taking action where risks are high.

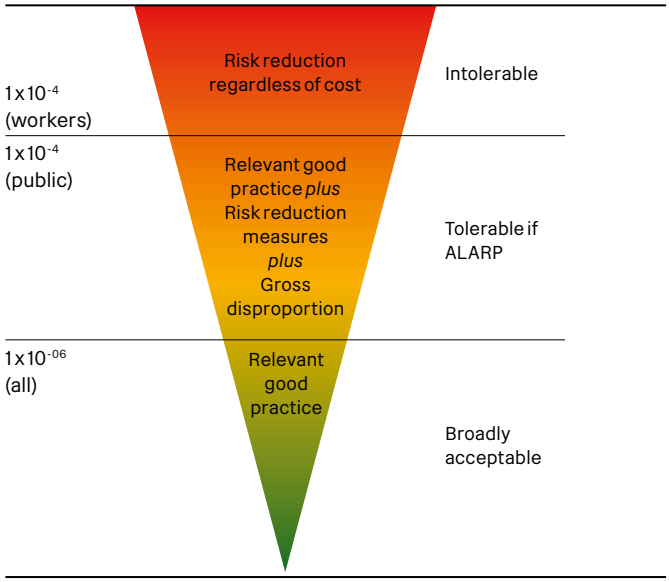
Three key questions you will need to ask are:

1 Are my risks ALARP?

2 What more can I do to reduce the risks?

3 Why have I not done it?

Figure 8
Tolerability and ALARP assessment



Individual risk, (probability of death per annum)	
≥1.0E^{-04} (1 in ≥10,000 years)	Risk is intolerable and must be reduced (e.g. the station pedestrian crossing should be closed of safety enhancements made.)
1.0E^{-04} to 1.0E^{-06} (1 in 10,000 to 1 in 1,000,000 years)	Risk is considered to be tolerable but improvements should be implemented when it it reasonably practicable to do so. Included within the assesment of reasonable practicability should be a comparison of the benfits of the improvement against the costs (and other disbenfits as appropriate) arising.
≥1.0E^{-6} (1 in ≥1,000,000 years)	The risk is considered to be broadly acceptable. No further action to control this risk is considered to be necessary, but risk levels must be kept under review.
1.0E^{-6} (1 in 1,000,000 years)	This is the risk target for new level crossings of all types.

13 https://www.hse.gov.uk/foi/internalops/hid_circs/permissioning/spc_perm_37/

Satisfaction

C

a What do we mean by Satisfaction and why is it important?

We have been collecting data on how customers feel about our stations and assets for years through customer satisfaction surveys. A decreasing number of satisfied customers will lead to declining passenger numbers. We also have a range of assets that are only used by operational staff and are currently not covered in satisfaction surveys. So this is a key area of focus for the future.

Public transportation operators and asset providers must continue to attract, retain and grow customers. Network Rail is no exception. COVID-19 may have created a further emotional barrier to our efforts. With a forthcoming drop in passenger numbers predicted, we need to work harder than ever to ensure that passengers are encouraged back to the railway.

We know from the National Rail Passenger Survey (NRPS) that overall satisfaction with franchised stations was 80% in 2019. This has remained steady for several years but we need to work hard to keep it steady.

We also know that of all the factors that contribute to this, **upkeep is one of the most significant overall** (almost twice as important as information about train times/platforms, ticket buying facilities and cleanliness of the station). This underlines the critical importance of ensuring stations are maintained and kept in good repair.

Network Rail must be 'match-fit' to compete for customers. They are better informed, more demanding and happier to share their feelings about good or bad experiences. Bad experiences become complaints that tend to gain attention more than praise about good experiences. Prevention, rather than reactive remediation, of poor customer reviews has become important. Especially when there is a time-lag between the point of experience and response to a satisfaction survey. This increases the urgency of dealing with the cause of customer dissatisfaction when it is reported.

Public transport service providers are also part of a wider agenda to encourage sustainable and healthy travel. Customers are not just travelling passengers but, increasingly, include members of the surrounding community. The station is being judged as an end point (or destination) in its own right. This shifting role of stations and consideration of the Genius of Place should encourage us to think in new ways about our assets.

b How can we improve Satisfaction through asset management?

Across our asset base, there is headroom to improve customer satisfaction by 20% and, in many cases, by a lot more than 20%. Our customer satisfaction surveys show there is a significant opportunity to improve how people experience our assets. They also tell us which aspects of our assets are considered more or less important. Asset managers can use this information to target efforts to improve satisfaction levels.

Here, staff satisfaction is crucial too. At staffed stations, our employees are the ones who have the clearest views on how satisfying or not the asset is to use. Managing staff satisfaction will have a positive effect on customer satisfaction.

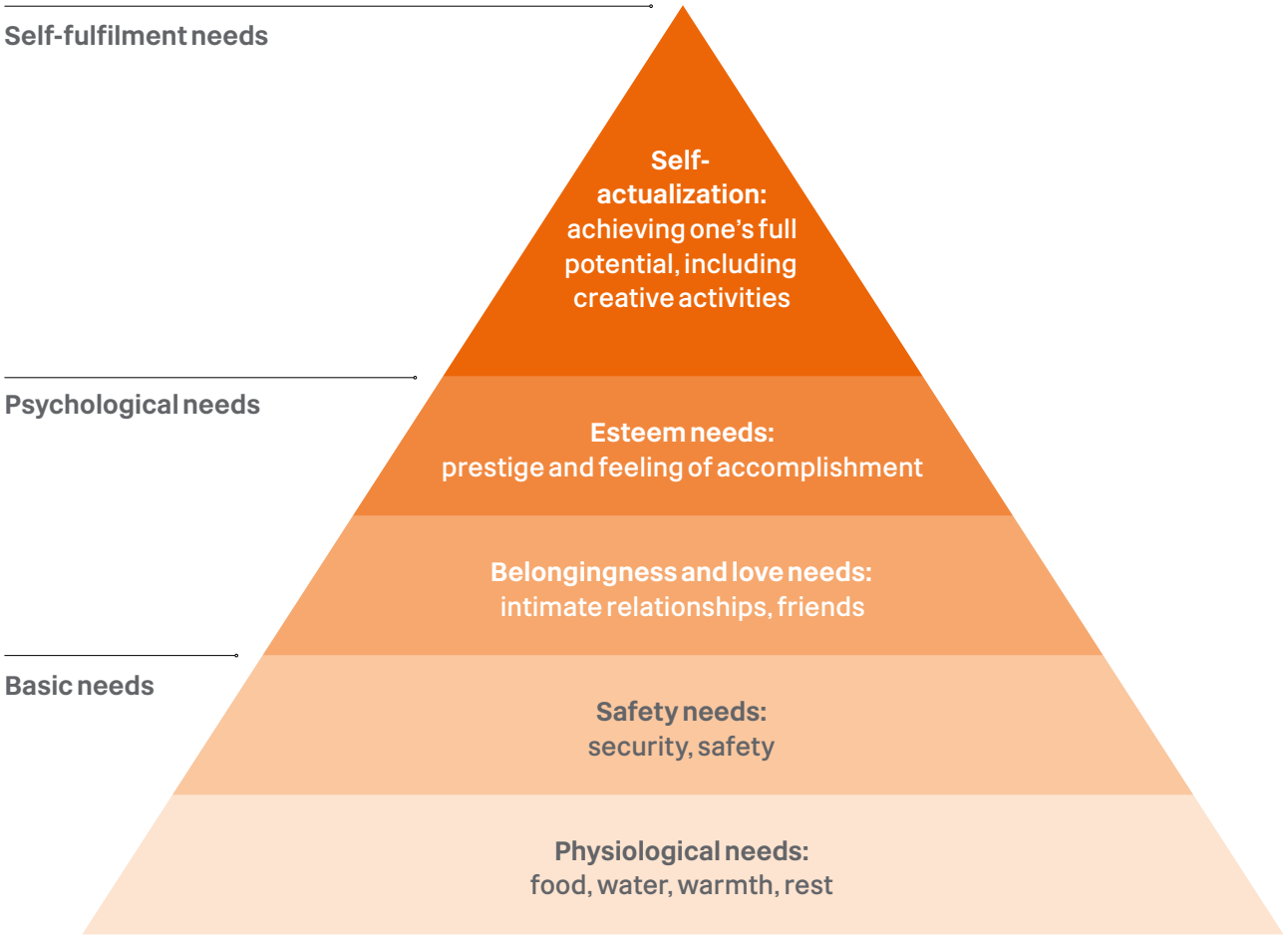
Understanding the needs of our customers and users

A useful way of understanding how people experience their environments is Maslow's hierarchy of needs. This is a psychological model with five core needs, often depicted as hierarchical levels within a pyramid. As shown in Figure 9, we can map the impact of our service provision to this hierarchy.

Crucially, the needs lower down in the hierarchy must be satisfied before individuals can attend to the needs higher up. This helps us prioritise what we do.

By mapping the pyramid onto the specific environment of the railway station, convenience and comfort are clearly the base levels of need. Next is the delight and surprise that provides enjoyment. This leads to the fostering of respect and pride in the facility. And all of these factors contribute to meeting ambitions at the highest level.

Figure 9
Maslow's Hierarchy of Needs



In Maslow's Hierarchy of Needs, the bottom four levels are often referred to as 'deficiency' needs and the top level is known as 'growth' or 'being' needs. Deficiency needs are said to motivate people when they are unmet. For example, the longer a person experiences inconvenience, the more impatient and strongly disenfranchised they will become. Yet when a deficiency need has been satisfied it will go away. However, growth needs are felt continuously and may even become stronger once engaged. In the context of stations, this might be displayed in a strong sense of loyalty among customers towards the facility.

Unfortunately, progress up the levels is disrupted by a failure to meet lower level needs. Station experiences – like having to wait in discomfort or being unable to use a lift because it is out of service – may mean someone fluctuates between levels. This reinforces the value of continued efforts to deal with all aspects of our assets. In particular, at the lower levels with activities such as maintenance of our station buildings and platforms. For asset managers, having a multi-level strategy that deals with as many levels of need as possible (within resource limitations) will provide the most resilient approach.[14]

14 [*Based on Maslow's Hierarchy of Needs, Saul McLeod, December 2020*]

Sustainability

D

a What do we mean by Sustainability and why it is important?

We use the term 'sustainability' and its relevance to business practices as defined in the 1987 UN report, *Our Common Future:*

> "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."[15]

This broad definition encompasses three main pillars – social, environmental, and economic. While environmental sustainability is generally understood, social and economic sustainability is less obvious. However, the best possible sustainable solutions are reached when all three pillars are addressed.

As well as our commitment to the UN's Sustainable Development Goals, we take our role in moving towards zero carbon seriously through PAS 2080[16]. By adding a sustainability framework to our decision-making, we can play our part in the UK's legislative commitment to future net zero greenhouse gases by 2050 as well as preserving and protecting our environment.

The challenge of improving Sustainability will be addressed in CP7 through tactical checkpoints for **Design**, **Delivery** and **Management** and these are enshrined within all of the 4 S's. When considering your own options for asset interventions, it is important to evaluate the environmental implications of your choices. In particular, weighing 'replace' against 'repair' or 're-purpose', as well as thinking about how salvaged building materials might be reused.

b How can we improve Sustainability through asset management?

There are areas where we can push beyond the Condition Sustainability Index (CSI) and think more broadly about how assets perform in the environment and for society at large. Figure 10 highlights how Sustainability can fit into the evaluation process as part of the wider business planning process. It shows how the three pillars of Sustainability link to asset construction and performance characteristics.

Moving from our former practices to a more sustainable way of doing things will require a shift in mindset for all of us. A sustainable approach to asset care and renewal will require us to find environmentally friendly solutions that connect with Genius of Place and our vision as well as the railways' role in the local community and economy. Our approach to Sustainability must address climate and environmental protection alongside social justice and economic prosperity too, as embraced by the Mobility as a Service vision.

At the same time, the process of making intervention decisions must be inclusive and transparent. For the end result to be truly sustainable, it should meet local expectations. This will mean taking into account local circumstances and the needs and aspirations of local people.

Measuring Carbon

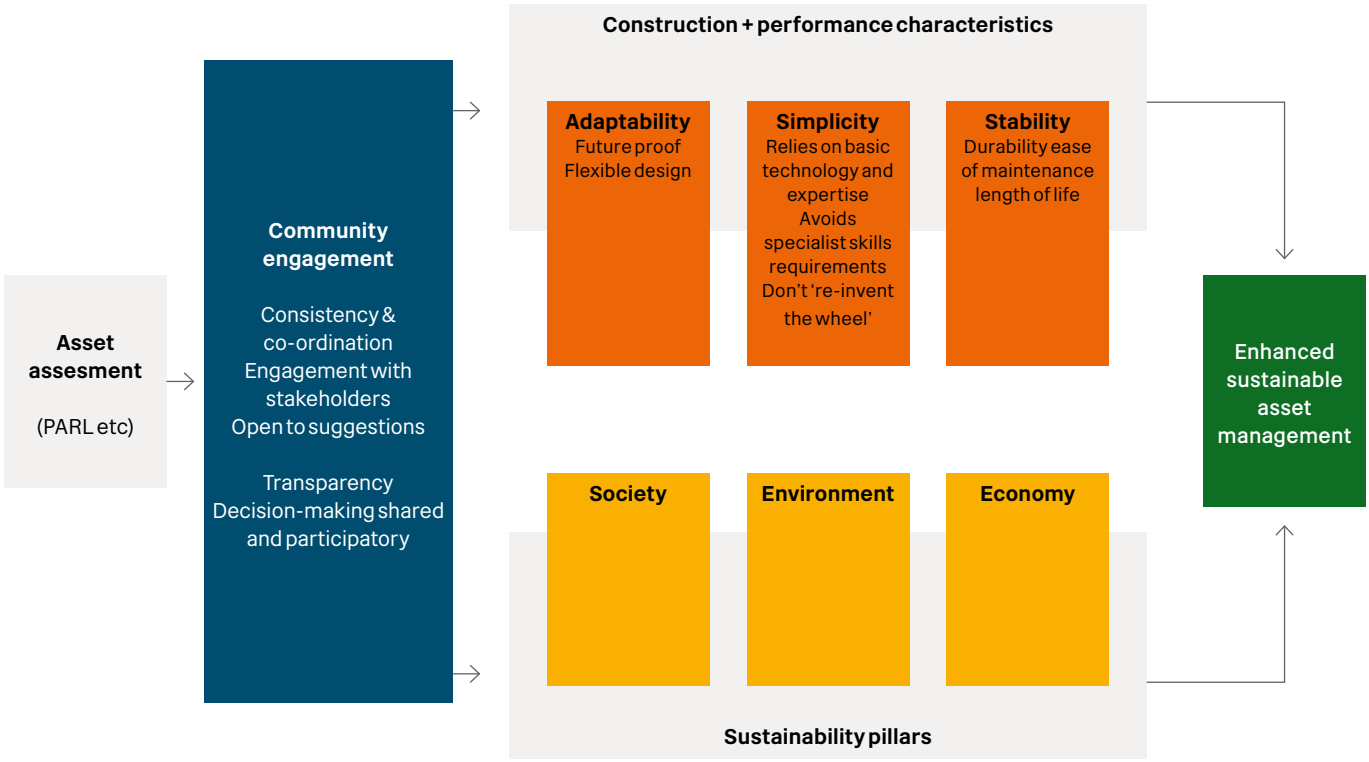
In CP7, asset managers will need to consider social value, the net zero carbon initiative and the circular economy. Ways that you can incorporate these wider objectives include:

— Compliance to EPC ratings: By 2030, it is likely that all leased buildings will need to have a rating of B. Currently only 10% have this rating. However, all leased buildings will need to be compliant with the current government requirements that say all leased property must have a rating above F by 2023.

15 World Commission on Environment and Development's 1987 **Brundtland** report ´Our Common Future`

16 PAS 2080: 2016 Carbon management in infrastructure, BIS. UK carbon reporting guide

Figure 10
Sustainability evolution process



— Energy consumption m² (see Table 4): An energy consumption analysis has been undertaken on MDUs. The table shows gas and electricity energy consumption from meters identified as MDUs only.

At 124,000 kwh/yr and 752 kwh/m2, MDU energy usage is some three times higher than modern averages. For comparison:

— 95,000 kwh is the average medium size business consumption in UK
— European average non-domestic premises consumption is 250kwh/m2
— UK domestic 150-200m2 property consumption is 160/ m²

In line with our decarbonisation initiatives, we have made an effort in CP7 to reduce this consumption. Asset managers need to consider boiler replacements or alternatives, Building Management Systems, air conditioning alternatives, additional insulation, glazing replacements and lighting schemes. These can be adopted as part of any renewal or accelerated renewal intervention. They should reflect PAS 2080 and also Network Rail carbon reduction commitments for CP7.

Table 4
MDU energy usage

Energy	kwh/yr median (Averages are higher)	Comments
Electric	53,000	excludes 5 highest (>300,000) and 1 lowest (<10,000) (92 sites)
Gas	71,000	excludes 5 highest (>500,000) and 5 lowest (<5,000) (50 sites)
Total	124,000	
/m²/yr	160 m² (avg.)	752 kwh/m²

B

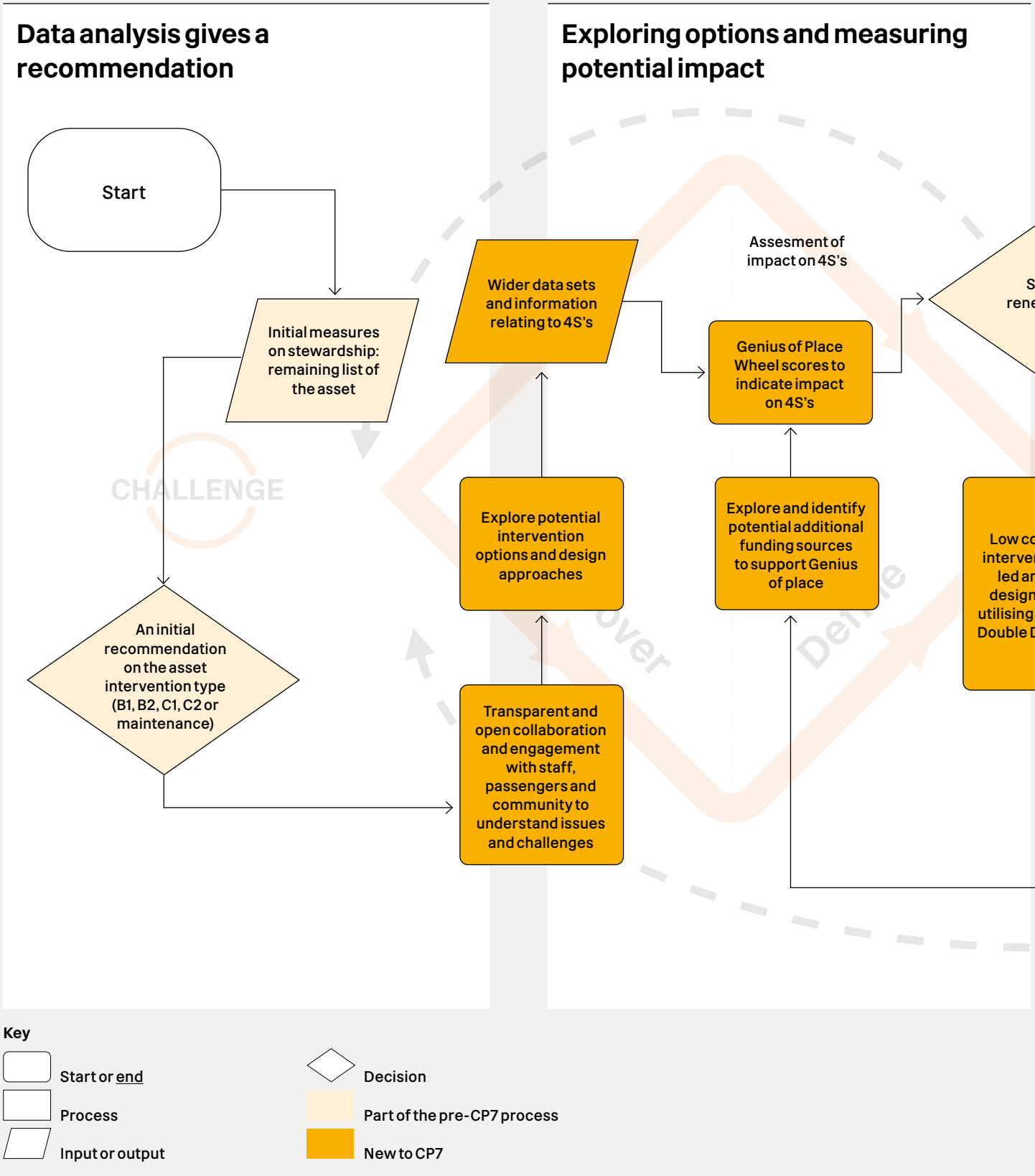
The business process for CP7

This section provides the ‘How’ of utilising the above contextual information.

The CP7 business process

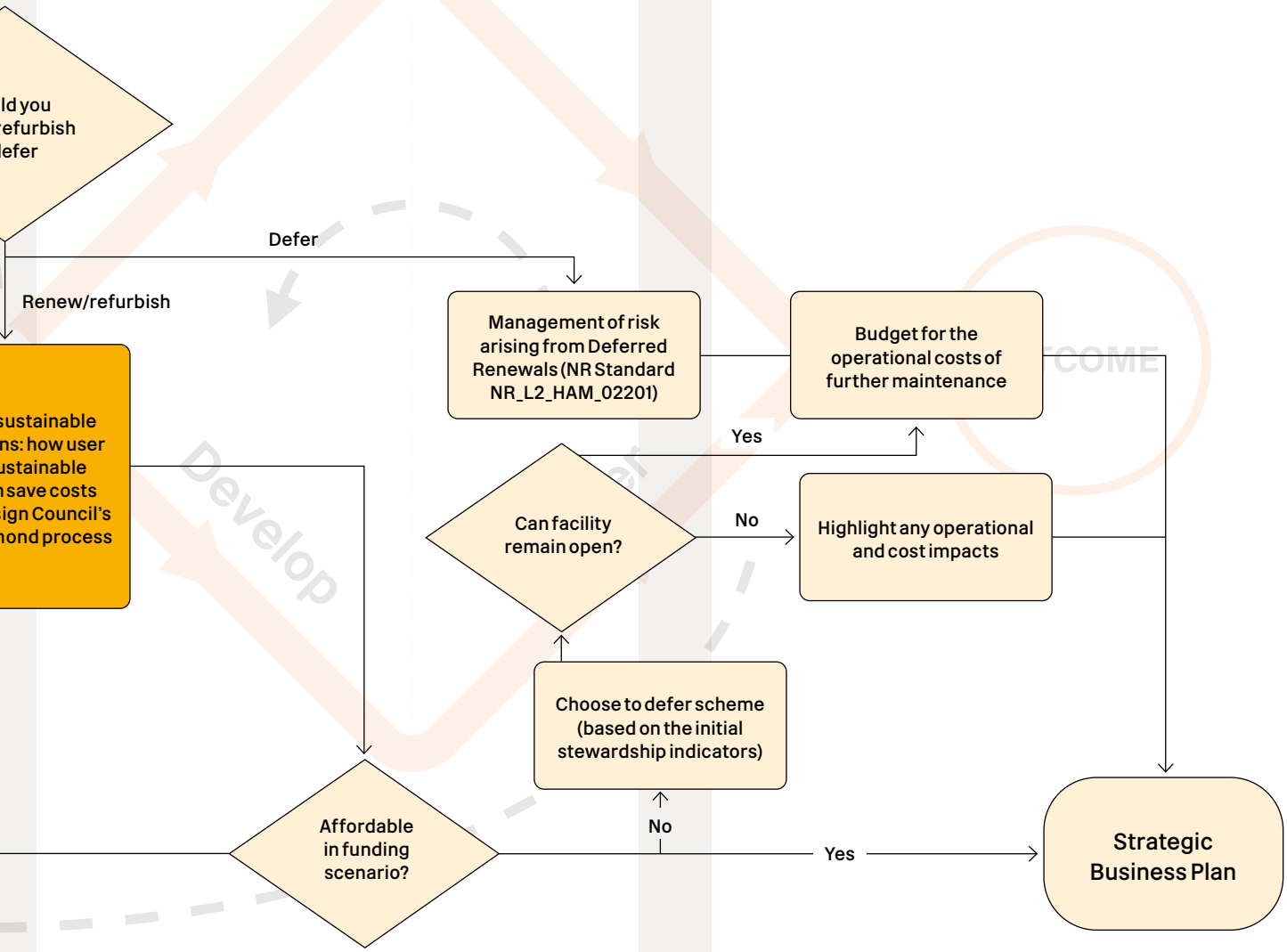
Figure 11 highlights the improved business planning process for CP7. As an end to end process, it covers four key areas that help you make decisions on interventions.

Figure 11



What will it cost and can costs be reduced

What if it can't be afforded?



Data Analysis

The first step is to extract your condition data from your various data sources. This is the information to be used to identify your interventions using the following triggers.

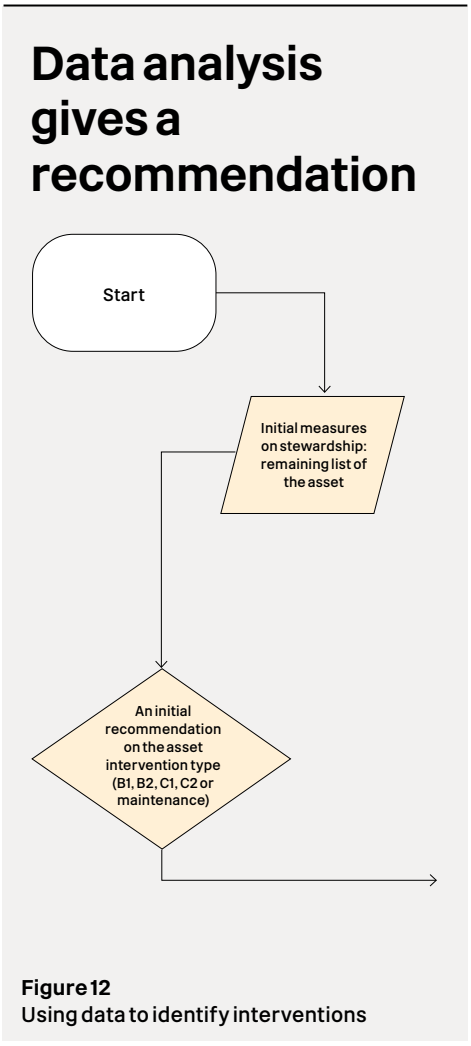
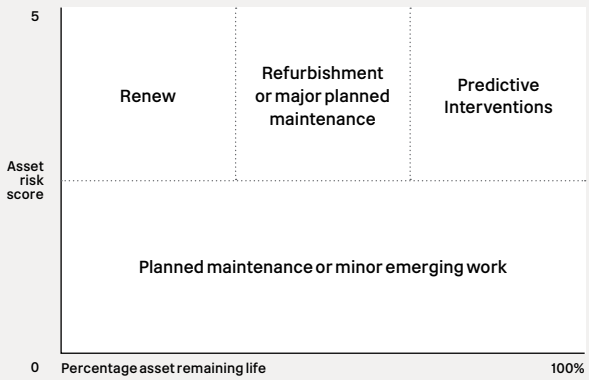


Figure 12
Using data to identify interventions

Figure 13
Baseline measures to trigger an intervention



Triggers for intervention

The trigger for intervention on all assets will continue to be through PARL and ARS. Interventions types are:

B1 A total renewal with all elements removed and rebuilt. A brand new asset block – with a full design life compliant with current standards – will take the predecessor's place.
B2 A major refurbishment in which the scope of work provides an overall PARL of at least 50% or an intervention that will last at least 25 years.
C1 A minor refurbishment in which the scope of work provides an overall PARL improvement to 25-50% or an intervention that will last at least 10 years.
C2 Minor planned or reactive interventions that would be categorised as OPEX expenditure.

CP7 interventions will be identified first by the Asset Condition analysis information obtained from the annual and five-yearly surveys for the key blocks (or types of asset). See Table 5 for the current intervention trigger points.

Recommending a type of intervention

A matrix of Condition and Asset Risk is a long established method and is validated by the Buildings Research Establishment (BRE). For CP7, there is an upper boundary for B2 and a new zone has been added beyond which C1/C2 Predictive & Prevent interventions would be suitable.

In the first instance you should prioritise by Percentage Asset Remaining Life (PARL) & Asset Risk Score (ARS). The contributory Assets you use to derive these can be adjusted. For example you could refine to focus on those contributing to the Condition Sustainability Index (CSI) (see Appendix 1). Other intervention triggers can augment / proxy for the PARL and ARS assessments, including Structural Assessment Condition reports, additional inspections and qualified RICS Surveyor reports (for buildings). For Mechanical and Electrical (M&E), these include analysis of Electrical Test & Inspection, Lifting Operations and Lifting Equipment Regulations (LOLER) and Lifts & Escalators inspection information.

Table 5 gives the intervention trigger points for differing asset classes. These need to be plotted on the Figure 13 to adjust the dividing lines for the asset class in question.

i Intervention trigger points

	Condition driven intervention thresholds			
	B1	B2	C1/C2 Predictive	
Key Asset	*PARL%			ARS
Building	5	5-50	50+	3.5
Canopy	20*	20-50	50+	3
Footbridge	20	20-50	50+	3
Platform	20*	20-50	50+	3
Train Shed	10	10-50	50+	0
LMD Buildings	5	5-50	50+	2
LMD Sheds	5	5-50	50+	2
MDU Buildings	20*	20-50	50+	1.5
NDS Buildings	10	10-50	50+	1.5
Critical L/sides Buildings	20*	20-50	50+	1.5
Non-critical L/side Buildings	5	5-50	50+	3.5
M&E	20	20-50	50+	3
Access routes	10	10-50	50+	3
Apron/Hard Standing	10	10-50	50+	3
Car Parks	10	10-50	50+	3
Concourse	10	10-50	50+	3
Subway	10	10-50	50+	3
Waiting Shelters	10	10-50	50+	3

Table 5 Existing intervention trigger points
*revised intervention threshold from CP6

Signage and Seating were not covered before CP7. Yet they are important to the presentation of Managed Stations, can reduce station accidents and influence passenger satisfaction. The new intervention trigger points are covered in Table 6.

	B1	B2	C1/C2 Predictive	ALE
Key Asset				
Seating	33	N/A	N/A	15
Signage	25	N/A	N/A	20

Table 6 New intervention trigger points in CP7

ii The nature of degradation

Clearly different buildings and materials degrade at different rates. Chart 1 highlights the bow wave of steel and platform deck interventions that will become due in future control periods. Chart 2 highlights the bathtub curve of how assets degrade more quickly as they get towards the end of their asset lives. It is important to remember when building your Strategic Business Plans and funding scenarios that ongoing degradation will occur until an intervention is made.

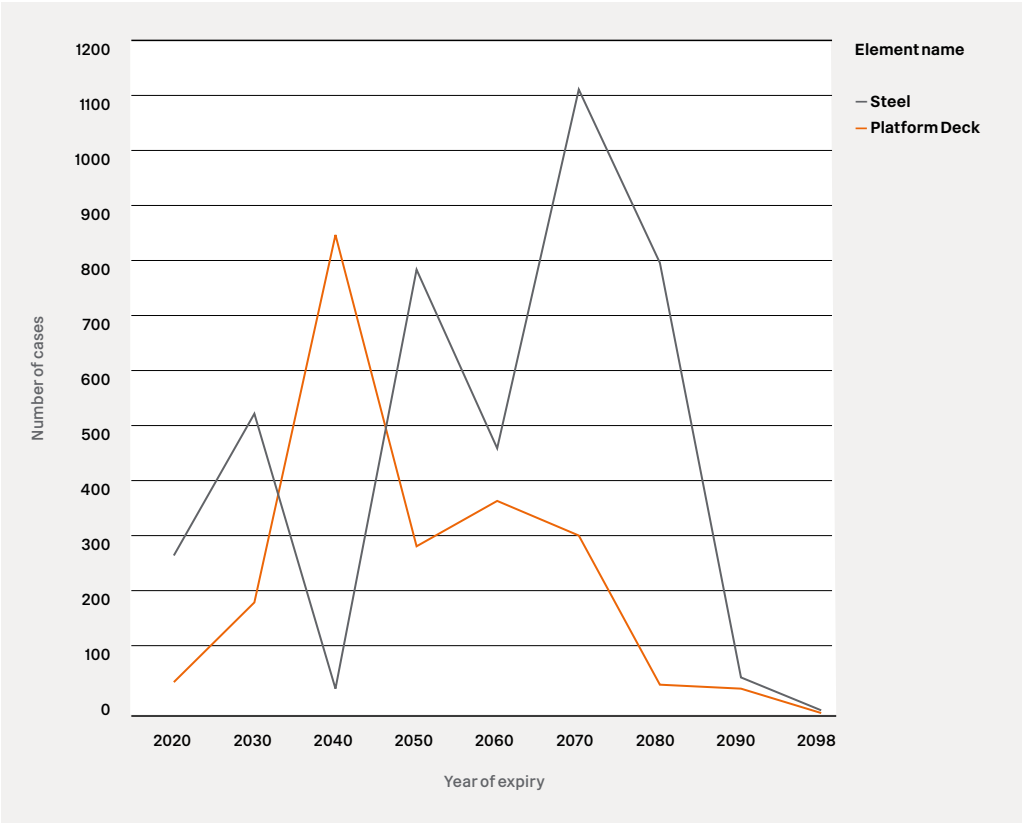


Chart 1
Materials degradation.
Predicted Year of Expiry of steel and platform decks

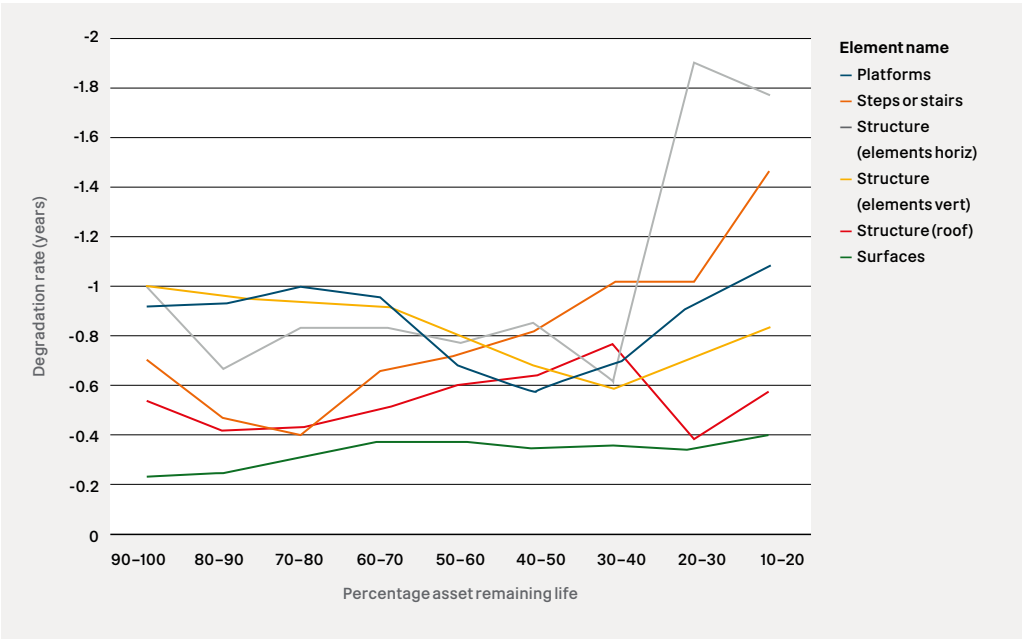


Chart 2
Materials degradation.
Degradation bathtub curves for key Element types

Statutory Maintenance

Statutory or legal requirements are base activities and must be met on all assets – irrespective of criticality. Regulatory or mandatory maintenance requirements are also essential in order to meet our Licence obligations or company standards. (Although you might be able to acquire a derogation from regulatory or mandatory requirements where compliance is not possible.)

Any activities that fall below these requirements may be determined by a risk based assessment and should be done to avoid safety, performance, environmental, reputational or financial impacts. A method of identifying this is to use the Asset Criticality Rating.

The Asset Criticality Rating (ACR) is determined by a number of factors and their impact on failure using a Very High to Very Low scoring system in combination with the asset and location or block it serves. (Safety -- F4, Performance --F3, Probability -- F5 and collateral damage --F6) These are added together to give an ACR that will tell you the risk based maintenance regime that applies to your asset. An ACR above 49 indicates that you will need to follow that regime B in Table 7.

The maintenance tasks you apply should also align with Standard Maintenance Specifications for Building Services (SFG20) job descriptions as published by B&ES Publications.

Corporate Risk Assessment Matrix (CRAM)

Evaluation of asset interventions overlaps with elements of the CRAM assessment. Note the direct relationship of safety, health and environmental factors to the S's of Safety, Satisfaction and Sustainability. Also, the performance indicators as they relate to resilience in the face of unexpected change. The Matrix is shown in Appendix 6.

Table 7
Factors determining operational maintenance regime

S. Statutory and Legal Standards		**Must do**
A. Regulatory/mandatory		**Must do**
B. Risk based critical tasks	Asset Criticality Score (ACR) & Asset/Block Prioritisation determines applicable PPM regime	**Should do**
C. Non critical tasks		**Ought to do, if funding permits**
D. Decommissioning requirements		**Ought to do, if funding permits to avoid maintenance or accelerated asset degradation**

C

How to use the 4S's in decision-making

Building on the asset assessment process using the 4 S's

Using the 4 S's to demonstrate the need for CP7 funding

Figure 14 identifies how to evaluate each of the different S's and the indicators to use. The indicators are designed to help you establish a case for asset intervention and to formulate a robust justification for CP7 funding. The wheel shows you how to evaluate and score each of the 4 S's. Using the indicator scoring below, it will be easier to see what action needs to be taken and the progress being achieved over time.

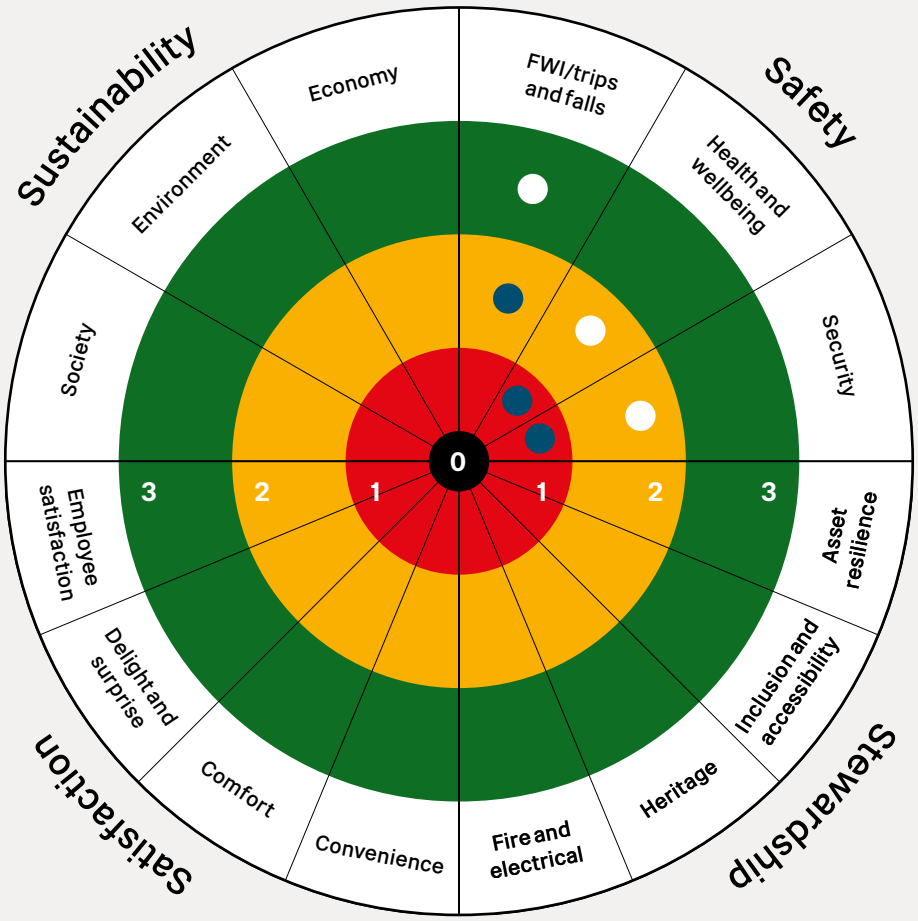
● Existing score
○ Future target

Indicator scoring

0	Urgent action needed (**black**)
1	Absolute basics delivered, action needed (**red**)
2	Enhanced basics (**amber**)
3	Heading towards excellence (**green**)

Figure 14

Stewardship elements of the Genius of Place Wheel



How to assess Stewardship:

The indicators

There are four Stewardship indicators that form part of the Genius of Place Wheel. These indicators augment the previous assessment

(More detail on how to score each indicator is included in Appendix 2a.)

i Heritage

Enhancing heritage is one of Network Rail's 10 Principles of Good Design. For CP7, the assessment of heritage value needs to include the potential to add to a sense of place, contribute to local character or form meaningful connections with the nearby community.

Historic England's Assessment of Network Rail's performance in its 2017-2019 report[17] shows Network Rail scoring 79/100 overall. Yet we are performing poorly on managing assets with Heritage At Risk designations. This opens up Network Rail to risk of fines or improvement action. The Chair of the Rail Heritage Trust recommends focus on the management of disused listed assets, in particular signal boxes and footbridges. Guidance on how to manage heritage assets and Redundant Signal Boxes is included in the Design Series.

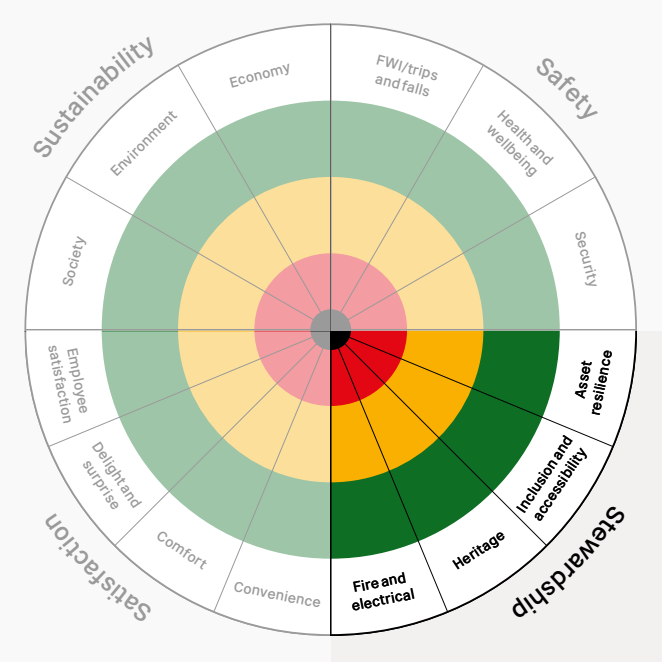


Figure 15
The four Stewardship indicators

17 https://historicengland.org.uk/images-books/publications/biennial-report-care-of-government-historic-estate-2017-19/he0024-biennial-report-care-ghe-2017-19/

ii Fire safety

Following Grenfell, the Fire Safety Act 2021 passed through Parliament and amends the Fire Safety Order 2005. It clarifies that the responsible person or duty-holder for multi-occupied residential buildings must manage and reduce the risk of fire for the structure and external walls of the building, including cladding, balconies and windows

Fire and rescue services will be able to take enforcement action and hold building owners to account if they are not compliant. This new responsibility should be included in CP7 plans alongside *BS9992: Fire safety in the design, management and use of rail infrastructure code of practice.* You should also consider fire safety in terms of how assets contribute to the resilience of the whole system.

iii Inclusive design

An inclusive environment is about more than accessibility. It is also about recognising diverse users and learning how the environment may produce barriers, difficulties or vulnerabilities affecting convenience, safety or a sense of welcome for some users.

There is a range of forms of discrimination, including ageism, gender inequalities and ableist bias. Responding to these forms of discrimination will require a certain degree of culture change in the way we design, manage and provide assets. Inclusion is a complex, human-centred approach. To help you make assessments, refer to Part M of the building regulations and the Equality Act 2010, which includes users of wheeled mobility (wheelchairs, pushchairs), their carers, elderly people, people with coordination or respiratory problems, people with sight and hearing impairments, and people with children. It might be useful to consider the three main ways we navigate our environment: moving, seeing, hearing. Thinking about the user and empathising with their vulnerabilities or sources of delight will also help.

iv Asset resilience

The risk affecting any given asset is mitigated by its ability to respond or adapt to change. A resilient asset should be able to adapt to macro factors like extreme weather conditions as well as stressors such as a pandemic (see WRACCA[18]) or broader socio-economic trends like supply shortages.

Resilience is also about striking a balance between the competing demands of the present and the future. So procurement decisions that establish undue dependencies – such as a reliance on proprietary technology – can severely hamper asset resilience. In short, resilient assets are informed by future issues, reparable through skills not procurement, have feedback mechanisms and alternatives in place and are able to withstand repeated stress. In CP7, you should prioritise asset intervention to avoid critical asset failure in the next two control periods.

18 Weather Resilience and Climate Change Adaptation

How to assess Safety:

The indicators

When thinking about our buildings and structures, you should consider how 'just maintaining' or 'patch and mend' could affect Safety. Proactive maintenance, renewal or refurbishment is likely to offer better value to our organisation and our users. There are three types of indicators you can use to measure the impact of an intervention.

(More detail on how to score each indicator is included in Appendix 2b.)

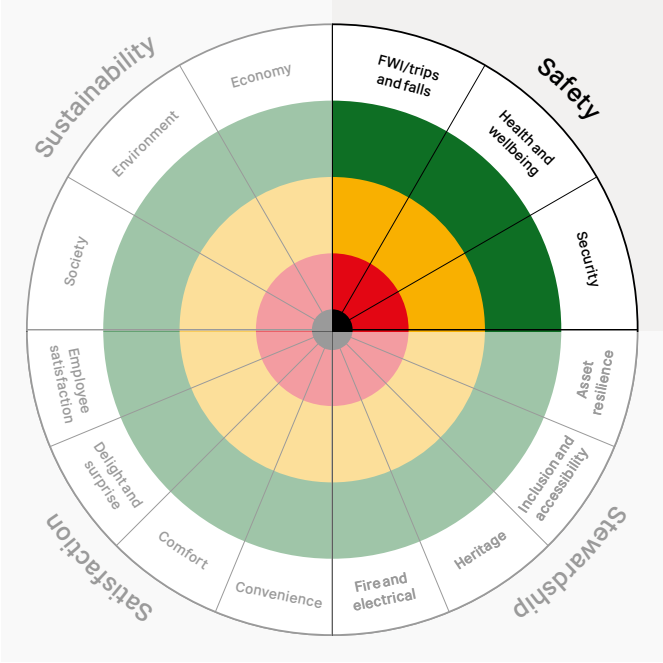


Figure 16
The three Safety indicators

i Accidents

The reduction of accidents is key to ensuring good safety. The Fatality Weighted Index (FWI) provides a scored metric to help us understand accidents (a significant number of which are slips, trips and falls).

ii Health, wellbeing and effort

Measuring exerted customer or employee effort is considered one of the easiest and most cost-efficient metrics. It can also be done alongside other satisfaction metrics such as National Rail Passenger Survey. It will show you how people feel about a station or workplace. In particular, whether the appearance, upkeep and ambiance make it feel safer, which is key to sustainable use. The Customer Effort Score (CES) and Employee Effort Score (EES) include qualitative ways to measure Safety. They cover everything from wayfinding and parking through to ticket collection, waiting room experience and arriving at the right time and place. (See Appendix 4a for example CES and EES survey questions.)

iii Security

The design, management and upkeep of our assets is critical to security on our railway – from physical security and dealing with people's behaviour to acts of terrorism. Factors you should take into consideration include whether assets:

- Are in a good state of repair
- Ensure good visibility and lighting
- Create natural surveillance
- Offer a good layout and easy wayfinding (incl. signage)
- Provide good passenger information at all times

How to assess Satisfaction:

The indicators

Customer satisfaction of a station can be influenced by the following key indicators.

(More detail on how to score each indicator is included in Appendix 2c.)

Although the asset manager is not responsible for all the following matters, it is important that they are considered holistically as the experience of the place will determine the overall level of customer satisfaction. Further information on this can be found in 'NRPS Simulator 1109 Routes and TOCs' and 'NRPS Simulator 1609 Routes and TOCs' files.

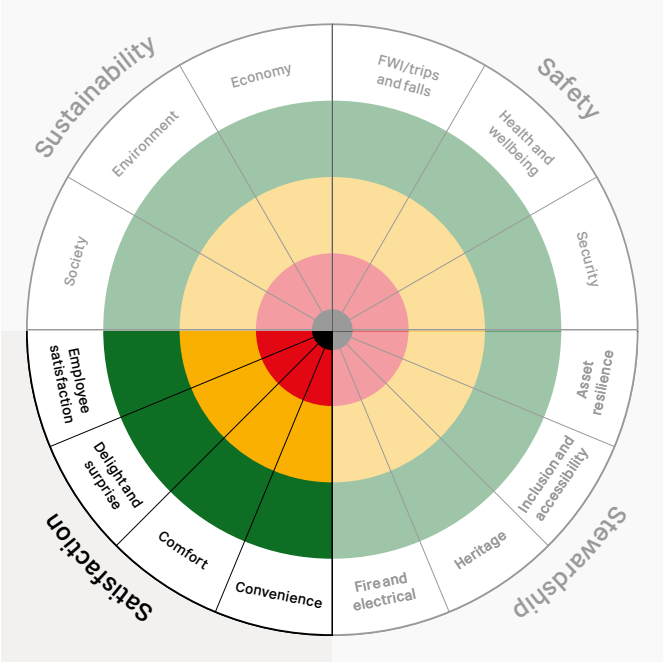


Figure 17
The four Satisfaction indicators

i Convenience

How convenient the station feels to people will depend on the availability of the following elements. Each of which directly affects how customers spend their time. They may be more or less relevant depending on whether a station is staffed and whether it is managed directly by Network Rail.

- Clear wayfinding, signage and information
- Wi-Fi
- Shopping, food and beverage provision
- Click & Collect type service provision
- Toilets

ii Comfort

How comfortable the station feels is determined by evidence of the following characteristics:

— Clean and well maintained
— Safe and secure
— Provides protection from the elements
— Provides space for circulation, standing and seating

Convenience and comfort are foundational considerations. We can address some elements that fall within our remit. Others will fall to the Train Operating Companies. Ideally, we would be able to offer convenience and comfort through a shared approach.

iii Delight and surprise

Stations can provide experiences above and beyond basic needs and expectations. Especially by providing amenities that would not be considered core to the operation of a railway system, such as:

— Art integration
— Green and open space and local wildlife provision
— Local cultural experience
— Community facility, events and participation

Addressing the desire for delight and surprise will help elevate Satisfaction. For example, showcasing the work of a local artist within the ticket hall would demonstrate support for the local community and improve customer experiences.

iv Employee satisfaction

Our people spend the most time not just within staffed stations but buildings such as maintenance units, depots and other types of operational property. They are clearly affected by their work environment and their experiences will also affect our customers' experiences. Whilst this is beyond the management of physical assets, it is worth noting that employee satisfaction will also be affected by convenience, comfort and delight and surprise as well as the extent to which they feel:

— Cared for in an environment that is pleasant to occupy
— Empowered to be effective and purposeful
— Able to be attentive to customers and make them feel recognised

See Appendix 4a for key questions you can ask when making your assessment as well as a tool for using this qualitative data to prove the value of interventions based on Satisfaction.

How to assess Sustainability:

The indicators

In CP7, we are aiming for improvements in each of the three pillars of Sustainability:

I Society
II Environment
III Economy

The list of potential sustainability indicators is extensive, so we have pulled out a key theme for each pillar that you can use to score the before and after characteristics of the asset in question.

What is appropriate for one type of asset will not apply to another. By taking an individual approach, we hope you will arrive at appropriate solutions that are sustainable and affordable. Establishing Sustainability indicator scores will often rely on your informed judgement with support of local people and others involved in managing the assets.

(More detail on how to score each indicator is included in Appendix 2d.)

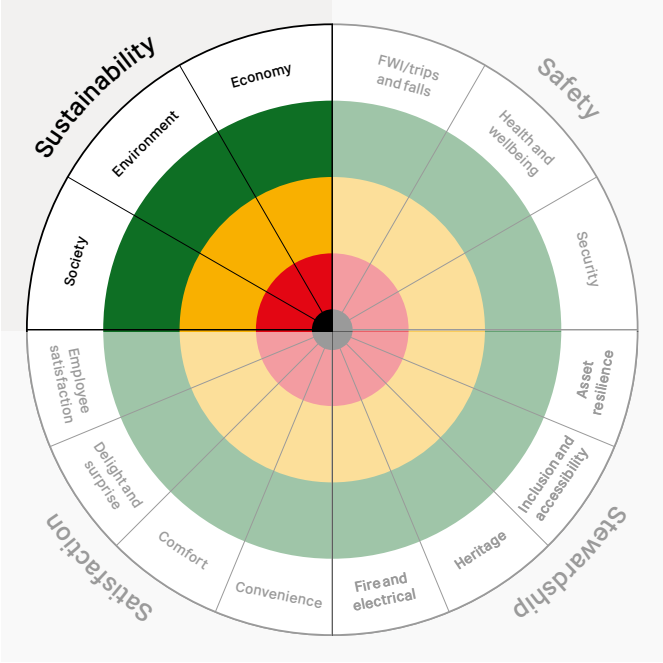


Figure 18
The three Sustainability indicators

I Environmental performance

If an asset needs to be replaced, your sustainable solution might actually go further than just replacing like for like. For example, if your asset requires a significant overhaul but its energy performance is extremely poor then the sustainable solution would be to first understand and then remedy the key causes. This could be through better insulation and windows or alternative energy sources like solar panels and wind generation. It might even mean the replacement of old, inefficient machinery with more energy-efficient models. ***This would strengthen the asset's environmental performance.***

Energy performance across our assets is generally poor. Our MDUs have an energy consumption that is 300% higher than average. Clearly, this must be addressed through the decisions we make about our assets. We will introduce new embedded carbon, energy use and energy efficiency indicators to keep us focused on Sustainability. We will also need to interrogate our supply chains to reduce emissions and encourage sustainable practices elsewhere.

Our initial focus will be on energy performance, both in construction and operation. We will add to this and energy performance can be used as an example for other quantitative and qualitative indicators in the future.

II Economic performance

If a station's main entrance faces away from the centre of local activity, a sustainable solution would be to reconfigure the design to bring people directly into that area instead. Engaging with the local community will reveal such objectives, which you can then use to help boost local economic activity. ***This would strengthen the asset's economic performance***.

III Social performance

If access to the station is unattractive, poorly lit and perceived as dangerous, the sustainable solution would be to address the environment leading to the station. In doing so, the perceived danger may decrease among vulnerable groups, particularly women, who would feel safer and included. ***This would strengthen the asset's social performance.***

Not all of these opportunities may be immediately clear to you. Quite often, they will come from local stakeholders and this requires meaningful engagement with the community. The new business planning process for CP7 should also lead you to explore a range of solutions. Simple, stable and adaptive solutions will not necessarily cost more but will add huge value to the local community and the environment. In many cases, finding the simplest solution can save money and deliver our Sustainability targets.

Some of these indicators are clearly closely related to factors in the **Corporate Risk Assessment Matrix** which you will also carry out later in the process for each asset intervention.

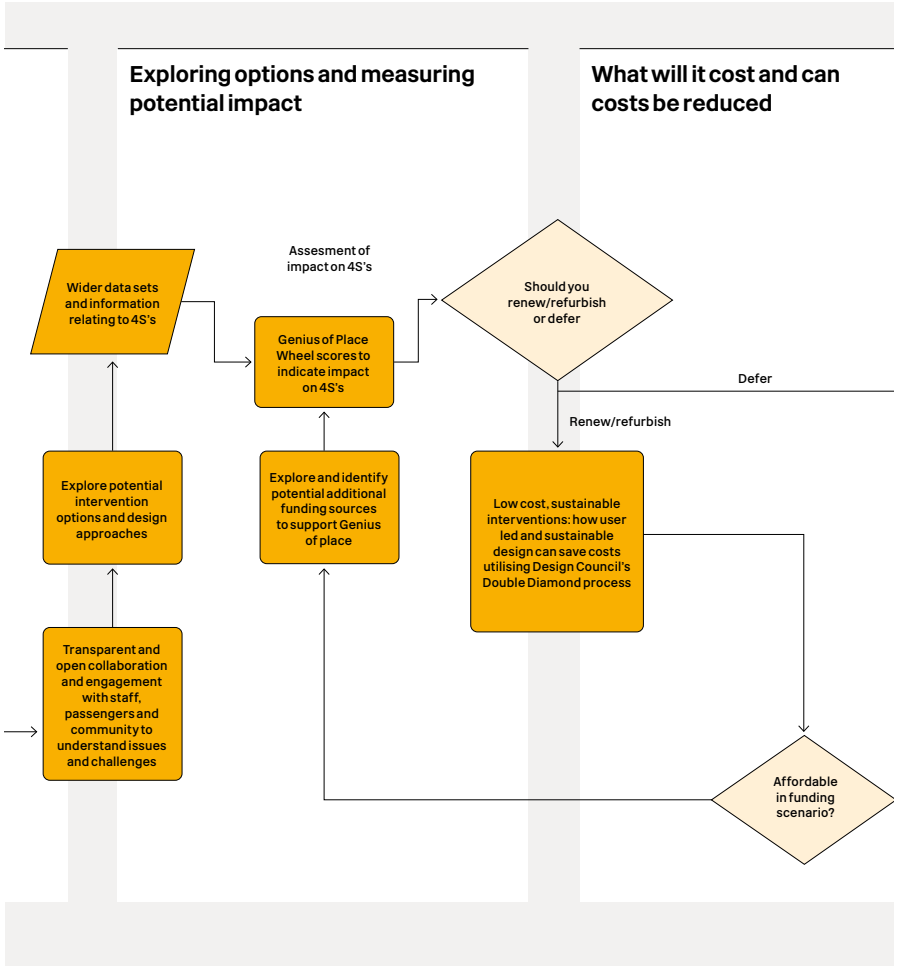
D

Determining the costs for interventions

As part of CP7 planning, you will need to develop cost proposals for interventions and assess the budget implications from interventions vs. steady state maintenance.

The diagram below shows the process to follow and the iterations involved.

Figure 19
Exploring options and measuring potential impact



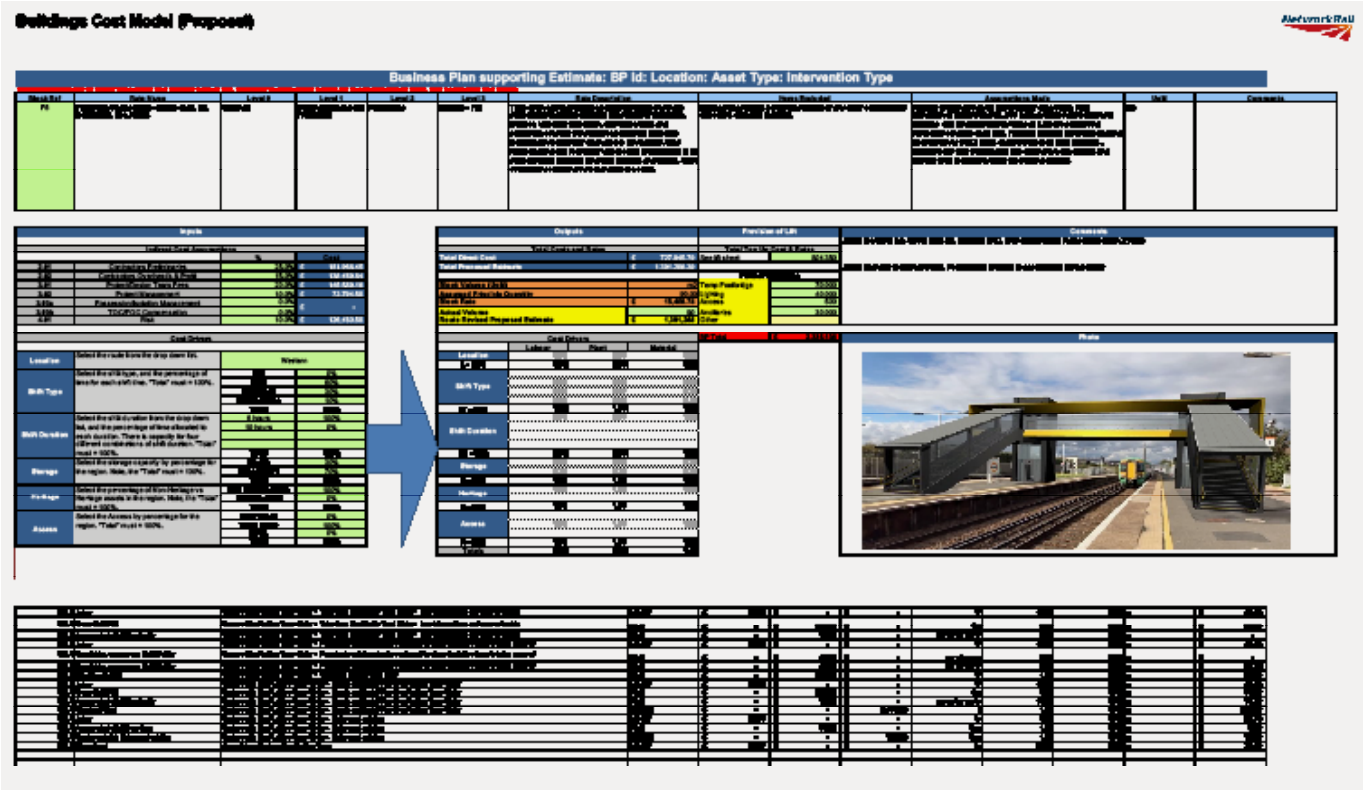


Figure 20

The starting point from this should be to establish the volumes on which to apply the block unit rates, which are provided at a high level to support with business planning. These are based on the Faithful and Gould analysis and have been updated through CP6:

Block and Intervention Type	£/m2
Footbridge B1 (incl. Lifts)	26000
Footbridge B2	5000
Footbridge C1/2	3000
Canopy C1/B2	1200
Canopy B2 incl. re-roof	3500
Train shed	1600
Platform C1/B2	1500
Platform B1	3500
M&E	130-260
Lifts	250,000 per car
Building	250

Table 8
Block unit rates

These only represent a high-level assumption of what the cost should be. Often, there will be other costs related to wider improvements, associated assets and meaningfully responding to the Genius of Place. There are also opportunities to reduce costs through smart design. (For other M&E unit rates please refer to the Building Services team.)

The tool shown in Figure 20 may help you predict, adjust and justify the cost of an asset intervention. It already takes into consideration some of the wider scope opportunities mentioned above.

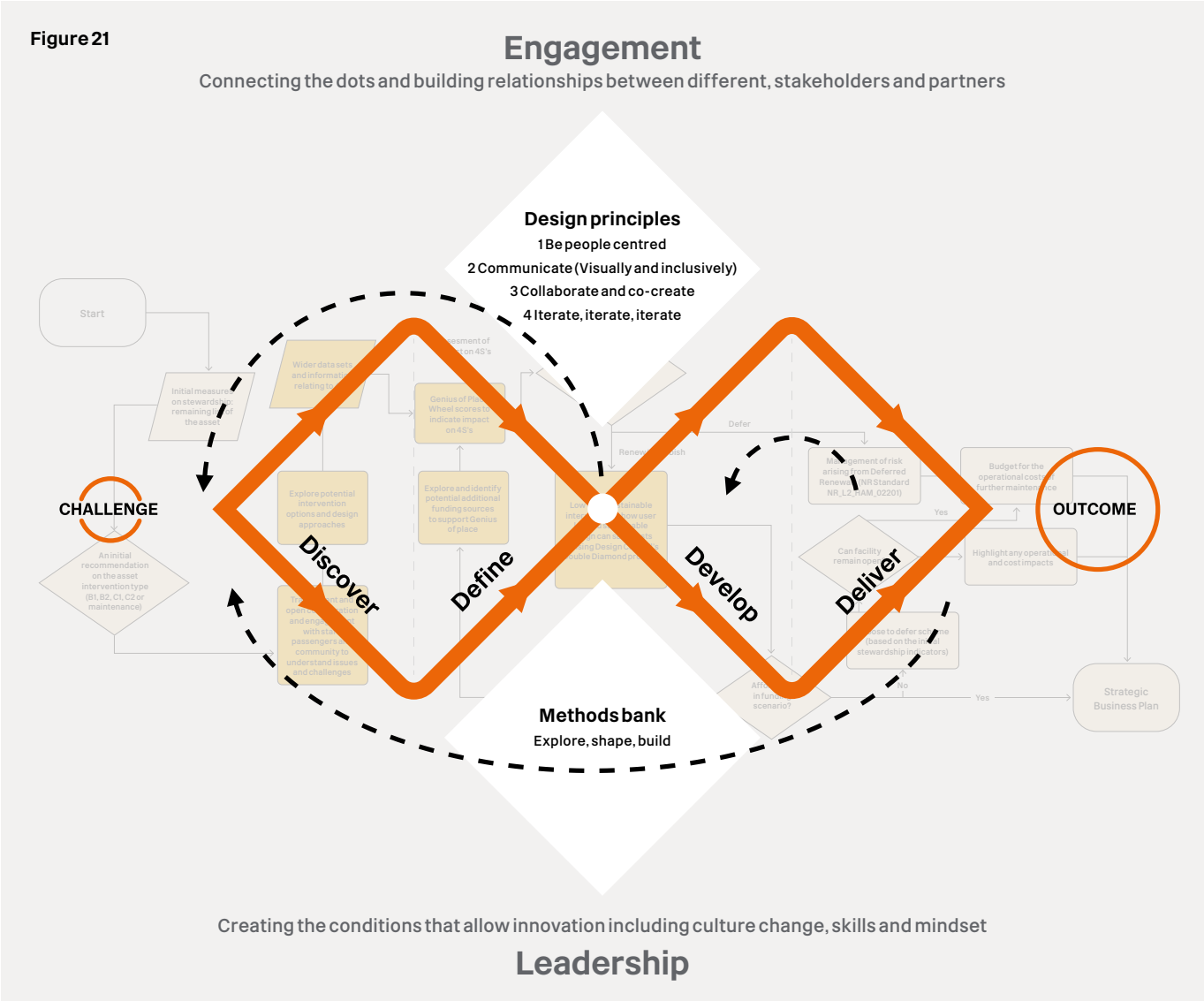
Iterative Design as a way of optimising interventions

Effective use of design can have significant benefits as part of the asset evaluation process. It is also highlighted as part of the business process diagram below Figure 21.

Design Council's Double Diamond: The Design Process

Figure 21 shows the Design Council process, known as the 'Double Diamond'. Here, you can see that design includes analysis, the identification of the issues, exploring and evaluating different solutions and coming to a clear outcome through an iterative procedure.

Figure 21



The baseline analysis of all the 4 S's is part of the 'Discover' and 'Define' phases above. This assessment will determine whether an intervention is recommended. If it is, you should then explore the wider challenges that can be addressed through an intervention as well as potential range of approaches for this asset.

This is a whole life assessment. So it is a holistic and iterative process that takes place right through the Strategic Business Planning process and beyond. It also encourages you to interrogate and ask questions about asset design linked to Network Rail's own 10 principles of good design[19].

Questions you can ask

About exploring the challenge, need and requirement for intervention:
- What is the functional requirement of the asset?
- What are the wider potential needs and opportunities that the intervention might enable?

About assessing the solutions and the approach for intervention:
- For renewal or refurbishment, what specific changes could or should be made?
- What user needs might it respond to?
- How should it be constructed so that it is resilient, sustainable, safe and delivers satisfaction?

About understanding the benefits from asset intervention:
- What are the benefits of intervention on a more whole life holistic basis looking beyond basic maintenance?

There are significant benefits for using a design based approach, some of which are set out as follows.

Reducing costs through good design

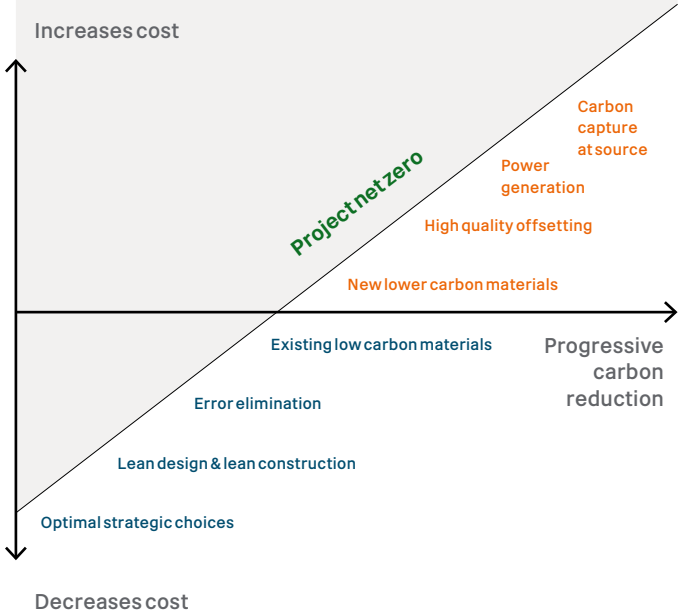
'Well designed' does not mean 'expensive'. Good design that is resilient and sustainable is proven to save costs and can improve safety, security and resilience. Figure 22 outlines our holistic approach to achieving carbon reductions through appropriate procurement and operational practice. To achieve cost-effective, resilient and sustainable design, asset managers should focus on three core principles:

Adaptability
- Creates a future-proof and flexible design that allows for change and reduces the need for future retrofit and redesign, both for new builds and refurbishments

Simplicity
- Relies on technology and expertise
- Avoids specialist skills requirements
- Does not reinvent the wheel
- Uses standardised designs, where appropriate, that fit the local context

Stability
- Offers durability
- Provides ease of maintenance
- Lengthens the potential life of the asset
- Carbon Reduction

Figure 22
Route to net zero



19 https://cdn.networkrail.co.uk/wp-content/uploads/2019/03/Our-principles-of-good-design.pdf

Collaboration and stakeholder engagement

CP7 places high importance on the knowledge that individual asset managers have acquired about the current condition of assets, the need for intervention and what will work best in that particular place. Good collaboration and engagement with stakeholders at an early stage is critical to this approach and can help justify the proposal and improve the design.

Stakeholders could include passengers, users of stations and assets, staff, people working on or around the railway, local businesses affected by the station and railway, and local communities who might live nearby. If they support the need for change then it will reinforce the conclusion to intervene with an asset.

A successful approach will identify the largest number of 'challenges' at an early stage from potential risks across Stewardship, Safety, Satisfaction and Sustainability. It will also include the potential interventions that can help to overcome these. Actively collaborating with stakeholders will make this a smoother process and will help justify your reasons for change. To achieve this, good collaboration should be:

Consistent

Coordinated

Transparent

Shared and participatory

Open to suggestions

Applying Network Rail's Principles of Good Design

Network Rail's Principles of Good Design[20] sets out ten core principles that should be included in any asset intervention. These provide a clear expectation of the approaches to and outcomes from the design of any asset. In turn, this ensures that we deliver sustainable outcomes and a world-class service.

The independent Network Rail Design Advice Panel (DAP) helps ensure all our built projects are of a high design quality and optimise a scheme's potential. It does this through Design Review.

Design Review is a constructive process that brings together independent built environment experts and Network Rail project teams. These meetings are an opportunity for project teams to seek impartial and independent design advice, critical feedback and observations to improve projects but not to redesign them.

Our aim is to be an industry leader in rail transportation that puts passengers first[21]. This is a core element of the Principles of Good Design. The CP7 policy framework is key to ensuring we follow those principles.

Every decision on how we plan, design and manage our rail infrastructure is about serving the people who use the network. Their needs should be at the heart of everything we do. So it is important that these needs inform the very earliest stages of how we value rail investment.

All sorts of people interact with railway infrastructure and buildings without setting foot on a train. From those visiting shops and stalls at railway stations, using public toilets or taking a footbridge to cross a railway line to those enjoying rail architecture. The decisions we make affect them all and yet they are not all the same. An inclusive rail network is one that includes different people at the heart of the design process, allowing people to use assets equally and reducing barriers to access and participation. This means thinking about everyone, especially the most vulnerable users, and designing to meet their needs. You can use our Diversity and Impact Assessment (DIA) to support this process.

20 https://cdn.networkrail.co.uk/wp-content/uploads/2019/03/Our-principles-of-good-design.pdf

21 https://www.networkrail.co.uk/putting-passengers-first/

A DIA is like a risk management tool that ensures the right things are considered across any programme, policy or project. It anticipates the likely effects of the work on the characteristics protected by the Equality Act: age; disability; sex; gender reassignment; pregnancy and maternity; race; religion or belief; sexual orientation; and marriage and civil partnerships. If any negative impacts are identified, the DIA can be used to plan ways to remove or mitigate these. A DIA can also be used to promote best practice by helping to identify and test the specification as well as support positive changes. It can be used as an integral part of the design process in a positive way as part of the information gathering element of Figure 21.

The principles behind DIAs correspond directly to the 4 S's and support the overall assessment if you consider the following questions:

— Could this work impact on people?
— What is the diversity of the people potentially impacted by this work?
— What issues might affect their inclusion?
— What potentially negative impact could this work have on people who share protected characteristics?
— What extra could be done to have a positive impact on diversity and inclusion?

A full range of the potential users of stations and rail infrastructure you need to think about when planning asset interventions can be found in the Network Rail and Design Council ThinkStation report.[22]

Potential additional costs and sources of funding

Focusing on holistic objectives can result in a much more sustainable, resilient approach overall. For example, rather than just renewing a footbridge to meet an identified need, the project could have the potential to create connectivity with the surrounding area and this might create a wider brief.

A key early stage of the process is checking whether there are potential alternative sources of funding beyond the core intervention funding. These might include local authorities or combined authorities as part of wider regeneration efforts. Or dedicated funding from a specific public body or institution.

By identifying additional funding from elsewhere, you can:

— Satisfy, achieve and unlock wider regeneration and placemaking aims
— Improve the satisfaction, ease of use, health and wellbeing and economic viability of the wider area
— Meet critical Network Rail needs alongside much broader aims

22 https://www.designcouncil.org.uk/sites/default/files/asset/document/Design%20Council%20Think%20Station%20Report%20v%C6%92%C6%92_DS.pdf

Use of Whole Life Costing

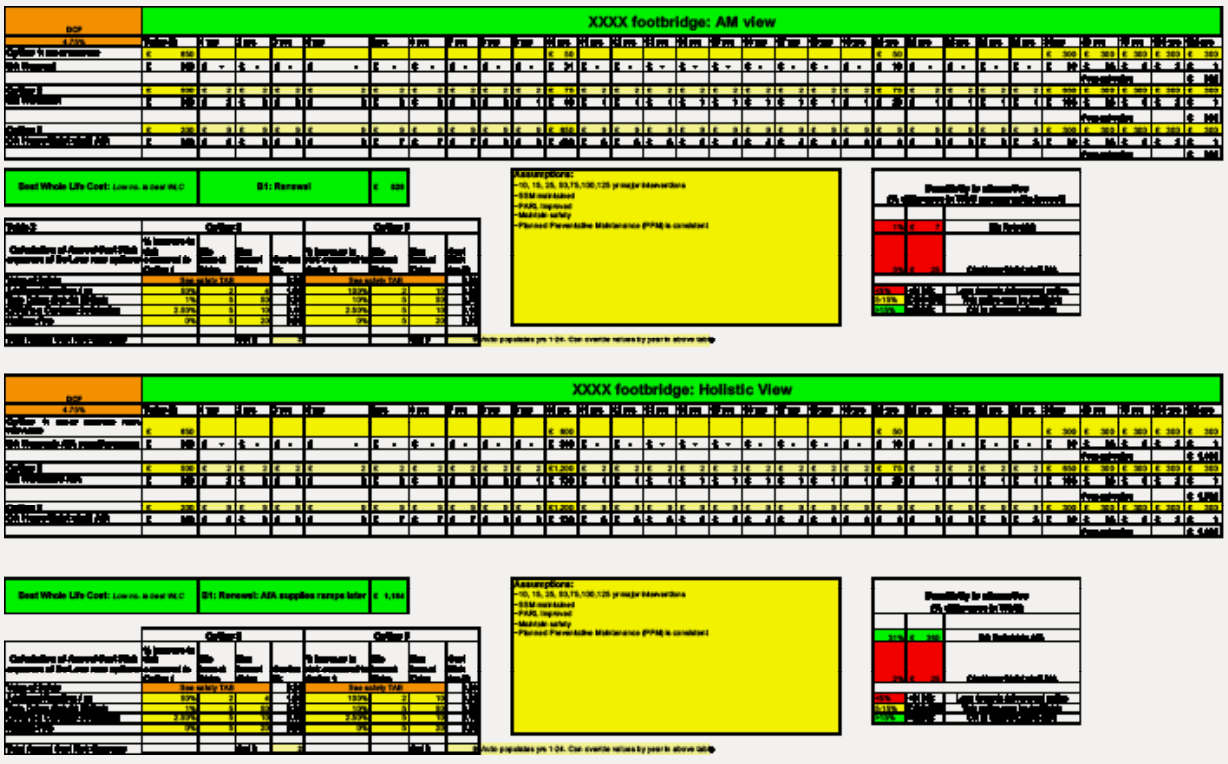
Whole Life Costing (WLC) can help you establish the best type of intervention. The Problem Statement Tool and the WLC ready reckoner below will allow you to compare renewal options to refurbishment or maintenance. Note that the policy considers the TOTEX of asset management. This is the combined spend of OPEX (individual work interventions under £50,000) and CAPEX (anything over £50,000).

Procurement

Successful and cost-effective asset maintenance requires consideration of procurement early on, including:

- What skills, expertise and knowledge will you need to scope, plan, design, maintain and operate the asset?
- How can you make use of local organisations to strengthen economic sustainability and outcomes?
- Can you use a combination of small and medium-sized businesses (SMEs) as well as larger organisations to increase the types of skills, knowledge and capacity on your team?
- What exists within the existing procurement framework and where might you need to go outside traditional frameworks to bring in appropriate skills?

Figure 23

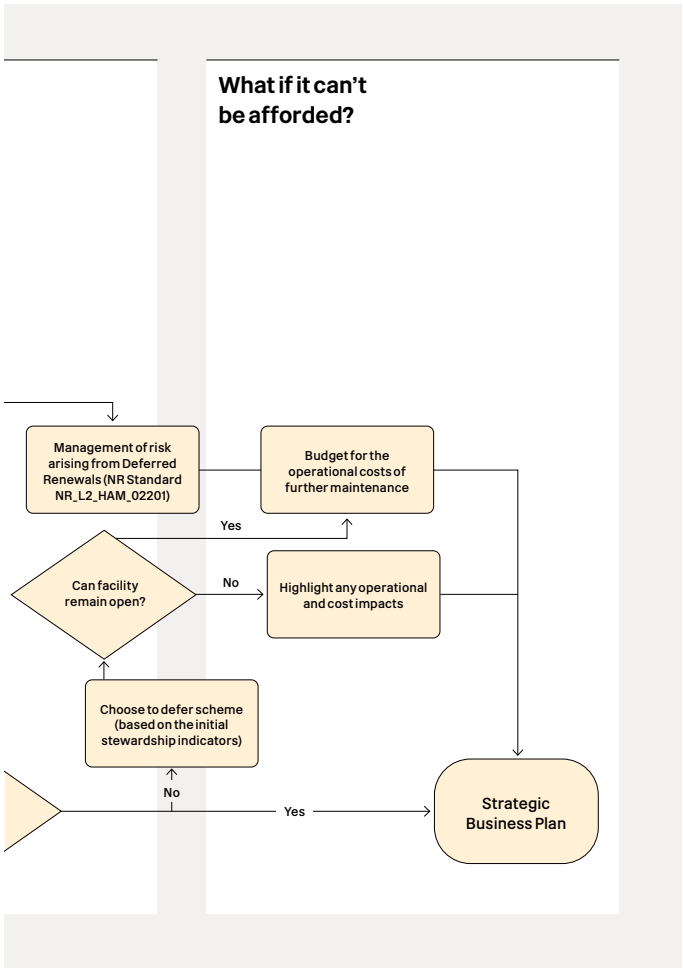


Managing funding constraints

It is important to acknowledge that funding may be constrained. In constrained scenarios, please use the deferral management process and CRAM to highlight and communicate the risks you are carrying as shown in Figure 24. In situations where the funding is inadequate or not available it will be important to highlight if the facility may not be able to stay open.

It is worth noting that around one third of the overall CP6 budget is OPEX at circa £500m. Half of this is spent on inspection & preventative maintenance, the other half on Reactive work. Of this 20% is spent on Lift & Escalators (including entrapments), 20% on Surfaces/ Platforms and 15% on structural repairs. Consideration of the balance between OPEX and CAPEX interventions is important particularly for Lifts & Escalators, surfaces and structural repairs.

Figure 24



Appendices

Appendix 1
Condition Sustainability Index (CSI) measures

As referenced in Section B.1, the CSI is the main way that Network Rail measures for sustainability. The measure for Operational Property is the replacement cost weighted percentage average remaining life (PARL) of a selection of 37 critical features in six critical block types as follows:

$$\frac{\textbf{The Sum of:}\ \text{Critical Features x F\&A Unit Costs x PARL of Assets on Critical Blocks}}{\textbf{The Sum of:}\ \text{All Critical Features on All Critical Blocks x F\&A Unit Costs x 100\%}}$$

For CP7, the Critical Blocks and Critical Features can be split into 'Shell' (Fabric) and 'Core' (Structural). The attributes of each have broadly similar Asset Life Expectancies as set out in Table 6.

	F/b	Canopy	Train / Depot Shed	Building	Platform	Ave ALE for Feature
Core						
Beans, Girders Joints Purlins	X	X	X	X		75 Compoisite:35
Columns	X	X	X			85
Piers	X					90
Deck or Floor	X			X		80 Plywood & raised: 15
Lattice Truss	X	X	X			85
Steps or Treads: open construction or solid	X					70 (excl. Timber) Timber: 40
Parapets	X					80
Cantilever Support	X	X				73
Walls			X	X		85
Platform Support					X	80 Timber: 40
Platform Deck					X	80 Composite: 40
Platform Coper					X	80
Roof Covering			X	X		Slates/Tiles: 80
Shell						
Roof Covering	X	X				Systems: 30
Drainage Downpipe	X	X	X	X		42
Drainage gutter lined / unlined	X	X	X	X		37
Floor or Ground Surfaces	X				X	30
Handrail	X					30
Balustrade	X					35
Access (Horizontal & Vertical)			X			25
Ext Fascia Board				X		30
Ext Soffit or Ceiling Board				X		30
Cladding	X					30
Drainage Channel					X	?
Platform Tactile					X	30 15 for stick down

Table 9
Average life expectancies for Critical Blocks and Critical Features in CP7

Appendix 2
Genius of Place Scoring Criteria

Appendix 2a
Stewardship

Over and above the baseline indicators, there are a number of additional indicators that are helpful when assessing resilient stewardship.

Heritage indicators

0 Asset risks damage to existing heritage value (including Heritage Assets designated at risk or any listed buildings in urgent need of a designated management plan)
1 Asset fails to deliver or preserve any heritage value.
2 Asset somewhat delivers or minimally preserves heritage value
3 Asset enhances and adds to its local heritage

Further steps to support assessing heritage are given in appendix 5

Fire safety indicators

0 Urgent action required – Does not meet current fire safety standards (Fire Safety Order 2005)
1 Meets Fire Safety Order 2005 but has not been upgraded to reflect recent updates to fire standards (Fire Safety Bill, BS9992)
2 Meets all updated standards but has few safeguards to maintain continuity of service in event of acute fire-related shock and stress
3 Exceeds current standards and has high resilience benefit to the system as a whole – supports ability to maintain continuity of service in event of fire-related shock

Inclusive design indicators

0 Does not meet current standards (Part M of building regulations)
1 Meets current standards but creates inequalities or undue effort for certain user groups
2 Meets current standards and contains as few inequalities of use as possible
3 Exceeds current standards and is welcoming of a broad spectrum of user needs

Asset resilience indicators

0 Has no resilience to acute shock and stress and could compromise the functioning of other assets
1 Has little current resilience to acute shock and stress
2 Has some resilience to acute shock and stress
3 Has a high level of resilience (adaptability, flexibility and reparability) in the face of acute shock or prolonged stress

Appendix 2b
Safety

Scoring

0 Worse than previous year period :urgent action required
1 Equivalent to previous year period and up to 10% better: absolute basics being delivered, action needed
2 >10% better than previous year period: enhanced basics
3 >20% better than previous year period: heading towards excellence

Health, wellbeing and effort indicators

The Customer Effort Score (CES) and Employee Effort Score (EES) will help quantify the ease of interactions between people and our assets (see Appendix 4a). Responses to the scoring should be based on the following:

0 Urgent action needed
— 1s on the CES and EES
— The asset is not usable/there is a safety issue

1 Absolute basics being delivered, action needed
— 2s and 3s on the CES and EES
— The asset is usable but in a condition that may cause safety issues or accidents.

2 Enhanced basics
— 4s and 5s on the CES and EES
— The asset is in a good condition, which minimizes safety issues and reduces the likelihood of an accident

3 Heading towards excellence
— 6s and 7s on the CES and EES
— The asset is functioning well and delivering a safe environment
— The user experience is going further in terms of enhancing the customer/ employee experience and reducing effort

See Appendix 4a for example Customer Effort Score and Employee Effort Score survey questions.

Security indicators

The following questions can be used as a guide to thinking about how you ensure security through asset management and intervention.

What are the potential threats to people and the assets?
— Fear of a security issue or crime
— Break-in, vandalism, graffiti, trespass
— Arson, theft, personal injury
— Data security, cyber security, espionage
— Terrorism

What is the likelihood of these events happening?
— Day-to-day
— Monthly
— Annual
— Special event
— Extreme event

What scale are the implications to people and assets?
— Local, regional, national, international implications
— One person, one building or many people and buildings
— Within Network Rail ownership and control or wider

What are the immediate actions that may need to be taken?
— Escape, containment (stay put)
— Liaison with emergency services, British transport Police, 'See it, Say it, Sorted'
— Link to National Rail security guidance for passengers[23]
— Reduce further risk of incident to people or assets
— Communication and chain of command strategy
— Implications for National Critical Infrastructure

What do you need to do to be ready and what measures are in place?
— Scenario planning
— Recovery strategies
— What is the role of the customer/user in promoting better security, reporting and sharing
— Learning from others, could the incident have been foreseen?
— Information, data, use of CCTV and AI
— What level of digital security is provided and maintained?

23 https://www.networkrail.co.uk/communities/passengers/staying-safe-and-secure/

Appendix 2c
Satisfaction

Key questions for prioritising interventions

Further to the indicators detailed in Section C, you can use the following information to understand asset satisfaction among users.

Customer needs

Q Does the asset provide for the needs of customers?

- Is it able to perform its key functions for customers and passengers who may use it?
- Does it foster confidence in Network Rail thanks to its a good state of repair and appearance?
- Does it enhance the user's experience?
- Does it provide surprise and delight (e.g. with public art or poetry on information boards)?

Scoring

Provides for basic needs?
- Is it available for use and is it functional? If not, then allocate 0 points. If so, allocate 1 point.

Provides for beyond basic needs or desires?
- Does it provide additional functionality and enhance the user experience? If yes, allocate 2 points.

Provides ambition or inspiration?
- Does it provide a sense of surprise and/or delight? If yes, allocate 3 points.

Asset/component	Level of provision	Score	Notes
Maintained station, buildings or platforms	Ambition	3	Local heritage
Information about train times/platforms	Basic	1	
Seating	None	0	Not provided
Facilities and services (excl. toilets)	Beyond basic	2	Good local grocers
Toilets	Basic	1	
Facilities for car parking	None	0	Not working

Table 10
Worked example (customer needs)

Non-travelling user needs

Q Does the asset provide for needs of non-travelling users?

— Is the asset able to perform its key functions in relation to station or railway staff, or the local community?
— Does it foster confidence in Network Rail thanks to its a good state of repair and appearance?
— Does it enhance the user's experience?
— Does it provide surprise and delight (e.g. by offering space for a market for local produce or artwork by local students)?

Scoring

Provides for basic needs?
— Is it available for use and is it functional? If not, then allocate 0 points. If so, allocate 1 point.

Provides for beyond basic needs or desires?
— Does it provide additional functionality and enhance the user experience? If yes, allocate 2 points.

Provides ambition or inspiration?
— Does it provide a sense of surprise and/or delight? If yes, allocate 3 points.

Asset/component	Level of provision	Score	Notes
MDU	Poor to basic	1	Poor heating
Staff toilets	None	0	Not provided
Pop-up café in car park	Beyond basic	2	Popular with locals and commuters alike

Table 11
Worked example (non-travelling user needs)

Performance (disruptions and delays)

Q Does the asset safeguard the successful performance of the railway?
— Does the asset condition pose any risks to operations?
— Would the asset condition passively contribute to unplanned disruptions and delays to operations?
— Does the asset condition actively safeguard operations?

Scoring

Does the asset condition pose any risks to operations?
— Is intervention needed now to avoid the asset condition interfering imminently with the operational railway?

Would the asset condition passively contribute to unplanned disruptions and delays to operations?
— Will intervention help reduce the risk of performance interruptions in the foreseeable future?

Does the asset condition actively safeguard operations?
— Will intervention avoid performance interruptions in the foreseeable future?

Asset/component	Level of provision	Score	Notes
Platform edge paving	Poor	1	Grout deterioration may cause loosening
Lifts	Poor	1	Oil leak in LMR

Table 12
Worked example (performance)

This methodology can highlight where further investment is needed to directly improve the satisfaction scores for our assets to assist decision making and prioritisation.

Appendix 2d
Sustainability

Indicators and measures

You can use the following questions and scoring to address each of the three pillars of Sustainability set out in Section B.4.

Environment: Operational carbon and energy efficiency

Q To what extent does the asset intervention reduce carbon footprint (emissions and embodied)?

— Smart energy consumption meters will show energy consumption levels, which can be used to calculate and compare to averages
— The internet has Average Energy Consumption Calculators (effectively ready reckoners) – e.g. www.rapidtables.com
— There are tools for assessing embodied carbon in materials – e.g. UK Green Building Council and BuildingGreen embodied carbon tools
— Check in with local decarbonisation teams

Scoring

Energy consumption:

0 -1 points:	worse than average
2 points:	average
3 points:	carbon neutral

Embodied carbon:

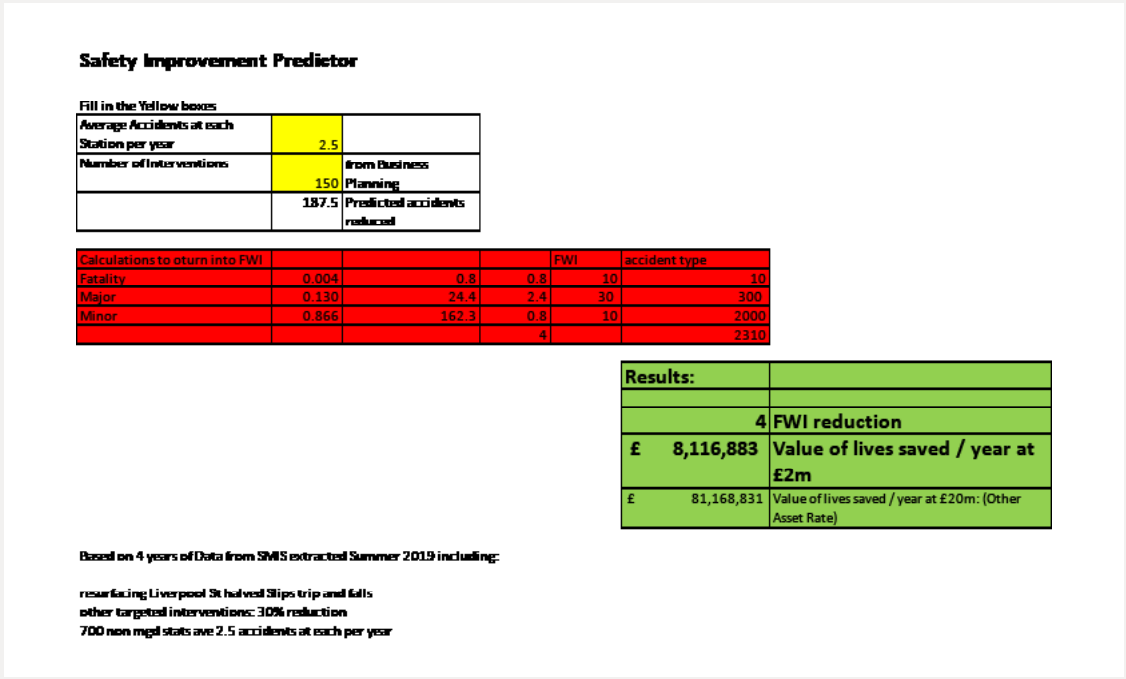
0-1 points:	high proportion of concrete, glass and steel
2 points:	some materials with high carbon footprints
3 points:	mostly sustainable materials

Appendix 3
Safety Improvement Predictor Tool

Accident indicators

The FWI Predictor tool gives you a way of estimating reductions in the Fatality Weighted Index (FWI) from asset interventions. It is based on Safety Management Information System (SMIS) data and associated mitigation actions that show:

— A target platform intervention can reduce slips, trips and falls by 30%
— A full platform surface renewal can reduce slips, trips and falls by 50%



Safety Improvement Predictor

Fill in the Yellow boxes

Average Accidents at each Station per year	2.5	
Number of Interventions	150	from Business Planning
	187.5	Predicted accidents reduced

Calculations to oturn into FWI				FWI	accident type
Fatality	0.004	0.8	0.8	10	10
Major	0.130	24.4	2.4	30	300
Minor	0.866	162.3	0.8	10	2000
			4		2310

Results:	
4	FWI reduction
£ 8,116,883	Value of lives saved / year at £2m
£ 81,168,831	Value of lives saved / year at £20m: (Other Asset Rate)

Based on 4 years of Data from SMIS extracted Summer 2019 including:

resurfacing Liverpool St halved Slips trip and falls
other targeted interventions: 30% reduction
700 non mgd stats ave 2.5 accidents at each per year

Figure 25

Appendix 4
Satisfaction Improvement Predictor Tool

How to prove the value of interventions based on satisfaction

The NRPS tool enables you to use qualitative data from the above questions to make a prediction for how cumulative interventions right across the asset portfolio can create a significant uplift in overall customer satisfaction.

Passenger Satisfaction Prediction

	Fill in Yellow Boxes		
Stations not improved	2200	73%	Average satisfaction from NRPS Scores
Stations improved	342	86%	Average post intervention upkeep score based on Paddington, New St, kings cross, Edinburgh
Proportion improved	0.14	12%	
Remainder	0.86	63%	
New NRPS score		75%	2% inc in pass sat

Figure 26

Appendix 4a
Suggested additional Satisfaction Survey Questions

Customer Effort Score and Employee Effort Score surveys

Example questions for customers and employees:

- How easy was it to find your platform today?
- How much effort was it to use the stairs/lift at the station?
- How easy was it to get on or off the train?
- How easy was it go about your work and do your job today?
- How easy is it to report and action safety issues in the workplace?
- How much effort is required to ensure there is a positive safety culture at your place of work?

The questionnaire should be scored on a scale of 1 to 7 where:

1 = Strongly disagree
2 = Disagree
3 = Somewhat disagree
4 = Undecided
5 = Somewhat agree
6 = Agree
7 = Strongly agree

Also, 0 = Not relevant

Measuring the CES/EES using the numeric scales

There are several ways in which you can calculate the CES/EES:

1. By dividing the sum of all individual customer high effort scores (i.e. answers 1-2) by the number of customers who provided a response. The lower your score, the better.
2. By subtracting the % of answers with high effort (i.e. answers 1-2) from the % of answers with Low Effort (i.e. answers 6-7). The CES will be between -100 and +100.

For the Network Rail CP7 safety assessment, score according to where the majority of scores are recorded. i.e. 1s and 2s, 2s and 3s, etc.

Network Rail Effort Score questions

User Type: **Passenger**

From which station did you board the train today?

London Euston

How did you arrive at ["Station Name"] today? (Please click all that apply if you used multiple modes)

Dropped Off	By Car	By Taxi	By Bus	By Bike	By Foot	By Subway	Other (Please specify)
○	○	○	○	○	○	○	○

How many other people are part of your travelling party today?

None (By myself)	1+ more	2+ more	3+ more
○	○	○	○

Do you, or any of your travelling party, require mobility support/assistance (e.g. wheelchair support, prams, push chairs, etc.)?

Yes	No
○	○

Using the options in the table below, based on your experience today at "[Station Name"], to what extent do you agree with the following statements:

0	1	2	3	4	5	6	7
Not relevant	Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree

	0	1	2	3	4	5	6	7
"I found it easy to access the station entrance"								
"I found it easy to find my way to the right platform"								
"I found it easy to use the stairs"								
"I found it easy to use the lift"								
"I found it easy to use the escalator"								
"I found it easy to use the footbridge"								
"I found it easy to use the subway"								
"I found it easy to get on and off the train"								
"I found it easy to open the train carriage door"								
"I found it easy to obtain assistance if required"								
"I found it easy to report a safety or security concern"								

[For any statement where the passenger has responded with either option 1, 2 or 3, the survey should automatically pop up an optional commentary box for the passenger to enter text and provide extra, qualitative information.]

The Customer Effort Score (CES) is the sum of scores divided by the total responses (where the '0' option was ***not*** selected). The CES target >=5 can split by station, passenger numbers, mobility needs, etc.

Network Rail Effort Score Questions

User Type: **Employee**

Which station did you work from today?

London Euston

Using the options in the table below, based on your experience today at "[Station Name"], to what extent do you agree with the following statements:

0	1	2	3	4	5	6	7
Not relevant	Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree

	0	1	2	3	4	5	6	7
"I found it easy to get passengers on and off the train"								
"I found it easy to manage the passenger volume"								
"I found it easy to resolve the issues passengers asked me"								
"I found it easy to help those less mobile"								
"I found it easy to report a safety risk"								

How many safety risks have you reported in the last 3 months?

None ○ 1 ○ 2 ○ 3+ ○

Using the options in the table below, based on your experience of reporting safety risks in the last 3 months, to what extent do you agree with the following statements:

	0	1	2	3	4	5	6	7
"I found it easy to get a resolution"								
"I found the time it took to resolve was satisfactory"								
"I found it easy to escalate if necessary"								
"I was kept informed of progress"								

[For any statement where the passenger has responded with either option 1, 2 or 3, the survey should automatically pop up an optional commentary box for the passenger to enter text and provide extra, qualitative information.]

The Employee Effort Score (EES) is the sum of scores divided by the total responses (where the '0' option was ***not*** selected). The EES target >=5 can split by station safety and safety risk reporting.

Appendix 5
Heritage assessment questions

Further to the heritage indicators above, the following steps are based on recommendations from Heritage England[1]:

— Nominate a heritage officer
— Ensure that professional advisers and contractors have appropriate expertise
— Ensure that the significance of any heritage asset is taken into account when planning change or development
— Commission regular condition surveys
— Implement a planned programme of repairs and maintenance
— Secure heritage at risk
— Safeguard heritage assets that are unused or in the course of disposal
— Comply with the statutory procedures that regulate works to heritage assets
— Ensure that the design quality of any new work enhances the historic environment
— Prepare biennial conservation reports
— Prepare a biennial conservation report for your senior management or for internal information?
— Create records and an archive

1 https://historicengland.org.uk/images-books/publications/biennial-report-care-of-government-historic-estate-2017-19/he0024-biennial-report-care-ghe-2017-19/

Appendix 6 CRAM Matrix

Impact area	1	2
Safety/ Health/ Environment	Event with the potential for less than 20 minor injuries or a single major injury (less than .1 FWI) Minor health effects not affecting work performance or causing disability, treatment applied by First Aider onsite e.g. minor cuts & abrasions Negligible impact to a minimal area of low environmental significance, managed by internal control procedures (e.g. Spills <20 litres; Fly tipping)	Significant event with the potential of a s major injury to five major injuries (betwe FWI) Minor health effects causing lost time inj days with some impact on local level acti e.g. MSK –musculoskeletal injury from m handling with short term health issues Minor or minimal short-term impacts to t environment (e.g. Minor spill of >20 litres dust/odour; Disturbance to locally prote Biodiversity Action Plan (BAP) species or habitat)
Performance	Planned disruption for up to a day on any one route Project <1yr = <=1 week schedule delays Project >1yr = <=2 weeks <52hrs possession; overrun <=15mins 52hrs – week possession; overrun <=1hr 1-4week possession; overrun <= 4hrs	Unplanned disruption (for up to a day) on route Project <1yr = 1-2 weeks schedule delays Project >1yr = 2-4 weeks <52hrs possession; overrun 15 - 30 minut 52hrs – week possession; overrun 1-2hrs 1-4week possession; overrun 4-7hrs
Finance	£0 - £2m OR Less than 3% of allocated budget Efficiency target 100% deliverable No Breach of cash limits	£2 - 10m OR between 3% - 5% of allocated Efficiency target >90% deliverable Minor breach of cash limits
Asset Management	Does not directly and adversely affect either railway infrastructure reliability or railway infrastructure condition **Or** Direct and adverse impact on railway infrastructure reliability or railway infrastructure condition is minimal Failure to achieve annual CRI target Failure to achieve annual contribution to the CSI target	Directly and adversely affects railway infrastructure reliability within the curre performance year **Or** Directly and adversely affects railway infrastructure condition within the curre control period Failure to deliver 50% CRI target value in concerned Failure to achieve annual contribution by margin as this threatens CSI outturn for C
Satisfaction & Reputation	Short-term reaction adverse local stakeholder reaction Short term loss of morale with poor performance of non-critical activities Minor legal issues, non-compliance or breach of regulation. Legal challenge, minor out of court settlement limited to parties involved and expected outcome known No ORR action.	Adverse local media reports over a perio Localised stakeholder concern. Minor disengagement. Effectiveness / Efficiency compromised with service fai non-critical activities Breach of regulation with investigation o to authority with prosecution and/or mo fine possible. Limited to parties involved outcome uncertain Risk scores a 1 – 2 on the ORR regulatory escalator
Likelihood criteria	**1**	**2**
	<5% Very Low likelihood the risk will occur Risk would occur less than once in 25 years	5 – 20% Low likelihood the risk will occur Risk would occur between once in 25 yea to once in 5 years

	3	4	5
ingle en .1 - .5 jury 1-20 vities, anual the ; cted its	Significant event with the potential of between five major injuries and two fatalities (between .5 and 2 FWI) Major health effects causing lost time injury 20+ days and/or redeployment, e.g. MSK with long term health issues, hand/arm vibration syndrome Significant impact to the wider environment, where short term (< 6 months) restoration works are needed (e.g. Confirmed spread of an invasive species; Disturbance to a statutorily protected site or a European/nationally protected species or habitat; Damage to a Site of Special Scientific Interest (SSSI); destroying the habitat of a protected species)	Catastrophic event with the potential of between two and 10 fatalities (between 2-10 FWI) Irreversible damage causing serious disability and more than 6 months off work or fatalities e.g. respirable crystalline silica (RCS) from ballast dust and asbestos from buildings to renewals Major, persistent and/or extensive impact to the environment where longer term remediation is required (> 6 months) e.g. Long term pollution involving toxic, hazardous or infectious materials/waste; Use of resources under threat of depletion; Damage to a statutorily protected site or a European / nationally protected species or habitat; Unlicensed killing of a small population of a European/ nationally protected species)	Catastrophic event with the potential of over 10 fatalities (10 FWI) Catastrophic health effects causing multiple fatalities from long term exposure in the work place e.g. silica and asbestos or effect of ill health on work e.g. sudden incapacity for a Lookout or Train Driver Catastrophic and irreversible environmental damage (e.g. Irreparable damage to protected sites and/or unlicensed killing of a local/ regionally significant protected species population; Direct over-consumption of natural resources causing irreversible depletion of that resource)
any one te ;	Unplanned disruption (for up to a week) on any one route or Up to a day on multiple routes Project <1yr = 2-4weeks schedule delays Project >1yr = 4-8 weeks <52hrs possession; overrun 30min to 1hr 52hrs – week possession; overrun 2-4hrs 1-4week possession; overrun 7-14hrs	Unplanned disruption for over a week on multiple routes and limited access to station facilities Project <1yr = 4-6 weeks schedule delays Project >1yr = 8-12 weeks <52hrs possession; overrun 1 – 2hrs 52hrs – week possession; overrun 4-7hrs 1-4week possession; overrun 14-26hrs	All users experience prolonged and unplanned disruption to key routes. Access to major station facilities likely to be severely restricted Project <1yr = >6 weeks schedule delays Project >1yr = >12 weeks <52hrs possession; overrun >2 hrs 52hrs – week possession; overrun >7hrs 1-4week possession; overrun >26hrs
d budget	£10 - 50m OR between 5% and 7% of allocated budget Efficiency target 80-90% deliverable Minor to moderate breach of cash limits to create minimum value	£50 - 250m OR between 7% and 10% of allocated budget Efficiency target 60-80% deliverable Moderate breach of cash limits where there is potential to create some value	Over £250m OR Greater than 10% of allocated budget Efficiency target <60% deliverable Significant breach of cash limit or where there is the potential to create significant value
nt nt year such a CP5	Directly and adversely affects railway infrastructure reliability over the current and next performance year **Or** Directly and adversely affects railway infrastructure condition over the current & next control period Failure to improve CRI target value in Control Period (or 5 yr period) Failure to achieve CSI in CP5	Directly and adversely affects railway infrastructure reliability over the next 3-4 performance years **Or** Directly and adversely affects railway infrastructure condition over the next three control periods (11+ years) Deterioration in CRI between 10% to 49% in Control Period (or 5 yr period) – (against target) Failure by up to 0.5% to deliver CSI in CP5	Directly and adversely affects railway infrastructure reliability over the next 5+ performance years **Or** Directly and adversely affects railway infrastructure condition over the next four control periods (16+ years) Deterioration in CRI by > 50% in Control Period (or 5 yr period) - (against target) A major shortfall in CSI by >0.5% in CP5
d. lures in r report derate but	Significant local and / or regional reports including social media. National media interest creating public concern. Negative national stakeholder statements from both government departments and/or TOC/ FOCs. Some disengagement leading to effectiveness / efficiency compromised in some critical activities. Serious breach of regulation. Major litigation/ Class action/ criminal prosecution/prohibition notice. Local profile and outcomes uncertain. Risk scores a 3 on the ORR regulatory escalator	Extensive prolonged diverse national reporting and public disputes with key stakeholders, e.g. breakdown of a TOC alliance. A major downturn in company-wide engagement leading to service failures within some critical activities. Significant prosecution and fines. Very serious litigation including class actions. National profile, impact on current/future business operations. Risk scores a 4 on the ORR regulatory escalator	Extensive and prolonged negative reporting nationally or public disputes with key stakeholders, including political and/or TOC/ FOCs. Escalation to external bodies inevitable & impossible to contain in medium term. Potential for significant changes imposed on NR, its responsibilities and structure A significant downturn in companywide engagement. Serious failings across most services National profile, major impact on current and future business operation. Prosecution likely. Potential prison terms for executives and/or high fines for organisation. Multiple litigations. Risk scores 5 on the ORR regulatory escalator
	3	**4**	**5**
  ars or up	21 – 50% Medium likelihood the risk will occur Risk would occur between once in 5 years to just less than once a year	51 – 75% High likelihood the risk will occur Risk would occur between 1 and 5 times a year	75% Very High likelihood the risk will occur Risk would occur 5 times a year or more