SCIENCE MUSEUM GROUP

OPERATIONAL RAIL VEHICLE STRATEGY 2019-2034

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INTRODUCTION

The Science Museum Group (SMG) through the National Railway Museum (NRM) owns the largest fleet of operating historic locomotives in the United Kingdom, so it's essential that we have a strategy to ensure the most effective and efficient use of these vehicles.

The NRM, Locomotion and Science & Industry Museum in Manchester (SIM) will continue to operate a select number of rail vehicles from our collection. Showing our collections in action is one of the most direct tools we have to share our key values with visitors: revealing wonder, igniting curiosity and sharing authentic stories.

What's more, our visitors expect a train ride. We need to meet that expectation whilst managing our collection in the most professional and responsible manner.

A commercially viable and deliverable plan will see a core selection of operating vehicles at York and Locomotion within the maintenance capabilities of teams at those locations. These have been chosen for reasons of accessibility, affordability, income potential, attractiveness to visitors, practicality of operation and sustainable repair as well as the railway stories they reveal.

We use our rail vehicles in various ways with priority always given for static display for our visitors at York and Shildon. Other ways in which we use them are: operation on museum sites; static loans to accredited museums; operating loans to heritage railways; main line operation. Our loans reach diverse audiences across the UK, making the national collection accessible to many. These vehicles are brand ambassadors for our mission of inspiring future engineers and scientists.

A number of collection vehicles have been operated over the last 40 years, including the diesel locomotive collection, and these require high quality collections care and conservation to ensure their continued survival, even as static objects for display.

This strategy takes account of curatorial, interpretive, conservation and engineering considerations and provides a sustainable future for rail operations for the next fifteen years. Its enaction is dependent on suitable funding and team capacity being in place.

EXECUTIVE SUMMARY

This strategy outlines the principles for operating rail vehicles for the next 15 years at three SMG sites – the National Railway Museum in York, Locomotion in Shildon and the Science and Industry Museum in Manchester.

- It identifies five core steam locomotives for operating on SMG sites, so that four can be in service at any one time.

- It also identifies three diesel locomotives, three diesel railcars or units, and three electric locomotives which might operate. In the longer term there is potential for the electric vehicles to be battery operated.

- SMG will consider acquiring non-collection locomotives purely for operating on its sites. It will identify vehicles suited to its lines and the stories we wish to tell.

- SMG will run both passenger and goods trains for visitors to our sites, with rolling stock to match specific periods and seasons.

- Basic maintenance and repairs will be carried out at SMG sites, overhauls and heavy repair work will be contracted out.

- As the NRM does not have the capacity to manage operating main line locomotives this work will be contracted out to third parties. Flying Scotsman is currently the only operational main line locomotive. There is potential to operate both Oliver Cromwell and Green Arrow on the main line. As the NRM's key focus in coming years will be the transformation of its York and Shildon sites, no further main line steam restorations will be considered until 2021. Vehicles selected for long-term exhibition at SMG sites will not be considered for loan or operation.

- SMG will not operate diesel and electric locomotives on the main line, but they will be kept in a condition that allows them to be transported by rail if required.

- The NRM will continue to lend vehicles for operation on heritage railways, provided these meet accepted museum standards and best practice. Completion of a new vehicle store at Locomotion will limit the number of vehicles loaned only for collections care. Vehicles will not be returned to working order purely to meet the needs of external stakeholders.

- This strategy will be updated and revised once survey works and accurate costings have been established. Thereafter, it will be reviewed on an annual basis.

1. BACKGROUND

The Science Museum Group's Conservation Policy (incorporating an earlier Policy on Operating Objects) sets out the parameters by which objects to be worked can be selected and managed appropriately in order to inspire innovation, engage understanding, motivate learning or preserve the collections.

The operation of collection items is not a primary function of the National Railway Museum and has never been. Such restorations as the museum has undertaken have tended to be under controlled parameters very different to locomotives under private ownership or operating on preserved railway lines.

Nevertheless, operating passenger and demonstration trains on SMG sites is good for the visitor, providing movement, enjoyable experiences and an effective means of interpreting railways. These encourage longer stays and increase income generation.

This strategy provides a framework for operating a selected group of locomotives, powered units and rolling stock on SMG sites at York, Shildon and Manchester, and will consider the use of vehicles both on the main line and with loan partners on heritage railways. The strategy also identifies actual vehicles that could be operated, surveys and inspection works required and financial considerations.

The conservation of non-operational vehicles is covered in a separate paper – but is key to the timing and phasing of aspects of this strategy due to the abilities of the operations and workshops team to service the needs of the operating vehicles, along with the demands of our Masterplan and public programme.

2. TIMESCALES

The paper covers a 15 year period from 2019 until 2034. This timescale takes into account statutory boiler certification on working steam locomotives (ten years) and re-developments at the National Railway Museum, Locomotion and the Science and Industry Museum (SIM) which include operation of passenger rides. The timeframe also takes into account approaching significant anniversaries including the 200th anniversaries of the opening of the Stockton & Darlington Railway (2025) and the Liverpool & Manchester Railway (2030).

A detailed, fully-costed programme of restoration works will be one of the required next steps following the approval of the principles set out in this paper. A strategy for the care of static vehicles in the collection has been produced alongside this document,

3. PRINCIPLES FOR OPERATING AT SMG SITES:

3.1. GENERAL

This strategy covers all three of the SMG sites where rail operations take place. Whilst some of the vehicles are place specific, the basic tenet has been taken that a pool of operating vehicles has been created which can work at any of the museum locations.

The selection of vehicles has been made using the SMG Policy for Operating Objects apart from where they are not collection items.

3.2. STORIES

Each of the chosen vehicles tells a specific story which relates to its suitability for operation. Engagement and interpretation should be a major part of the decision to operate, not just the physical suitability of a vehicle. In a number of cases, operating several vehicles together can enhance the stories they tell, for example, when wagons of a suitable type complement a locomotive. We should explain and interpret those stories for our visitors.

A focused, enhanced operating programme will fit with a much-improved approach to interpretation. The selection of operating vehicles will provide greater depth and bring added meaning to our programme, and also enhance the locations of each museum. The visitor experience is also greatly improved. We will also factor in the different operating schedules for each site – and adjust the requirement accordingly.

The presence of operating trains also offers greater opportunities for interpreting the landscape and context through which the trains run. For example, running the replica Locomotion on part of the trackbed of the original Stockton & Darlington route at Shildon or the replica Rocket or Planet hauling trains at SIM's Liverpool Road site, the original Manchester terminus of the Liverpool & Manchester Railway, offers an experience that could not be offered elsewhere.

3.3.1. WHAT AND WHERE? STEAM ON SMG SITES

The core of our operational group is the steam locomotives. Our visitors expect to see a railway locomotive at work and enjoy being able to travel behind one in operation.

Although our rides are short we have the ability to provide an immersive, inspiring and enjoyable experience giving a real flavour of our subject at prices considerably less than are available on established heritage railway lines or main line charter trains. In recent years this has included, for example, the chance to have a short ride behind Flying Scotsman for a small sum.

Our operating days also provide an excellent opportunity to explain how a locomotive works. Five core locomotives have been identified, of which there should be four in service at one time – one on each site plus a 'spare' able to circulate or cover for repairs as required. There should be a further two locomotives being overhauled to cover the period when the others are withdrawn for statutory overhauls.

Consideration will be given to acquiring a small steam locomotive for use as plant, rather than a collections item. This would be considerably cheaper to acquire and maintain than overhauling a collection locomotive.

The locomotives have been selected for their ability to be maintained in workshop facilities at or proposed for NRM, Locomotion and SIM.

The three replica locomotives listed below have compatibility of air braking systems.

TABLE A: STEAM LOCOMOTIVES FOR PASSENGER RIDES ACROSS SMG SITES

Name	Current Location	Future Location	Status	Key dates
Locomotion No.1 (replica) 	Locomotion	Locomotion/NRM	Static	S&D anniversary 2025
Rocket (replica) 1979-7002 	NRM	NRM/SIM/Locomotion	Being overhauled	Service to 2028 2029 and 2030
Planet (replica) YD1995.128 	SIM	SIM/Locomotion/NRM	Repair	2030
Agecroft 	NRM	NRM/Locomotion	Operational	Service to 2020
Beattie Well Tank 1978-7018 	NRM	NRM/Locomotion	Repair	Service to 2023

3.3.2. WHAT AND WHERE? DIESEL, ELECTRIC AND ROLLING STOCK AT SMG SITES

The railway story does not end with steam locomotives. Our aim is to demonstrate diesel and – ultimately – electric traction also. Consequently, three diesel locomotives, three railcars/diesel units and three electric vehicles are also identified as possibilities for operation in the period covered by this strategy.

The Class 02 is the only locomotive on site at York which can access parts of the South Yard, including the Learning Space, whilst the Class 37 is popular for rides on site and visits to other heritage venues. There is also the need to cover for breakdowns if the plant locomotive on site is out of action for whatever reason.

The remainder of the diesel locomotive collection including the Class 20, Class 40, Class 52 (Western) and Class 55 (Deltic) are not to be operated, but should be repaired so that they are physically complete and safe to be moved. We recognise that having a number of locomotives with damaged or missing components does not represent good collections care. The cost of these repairs is currently being assessed and will be factored in to future plans.

For locomotive hauled trains a number of passenger vehicles have been identified. These will fit with the locomotives to form 'representative trains' helping enhance interperation and understanding for our visitors. Riding brake vans and open coaches offer an historic passenger experience in an immersive way, especially with the replica early locomotives – giving something unique that no heritage railway can offer. Seasonality also needs to be considered: open coaches being used in Summer, closed vans being necessary in other seasons.

The inclusion of the china clay wagon allows a representative goods train to be assembled with locomotive and brake van at York with just three vehicles. Likewise, the Mogo van at Locomotion. The railcars and units have the added attraction of having passenger seating built in making 'instant trains' with minimal preparation time required. All vehicles are accessible physically, having either been built as such or adapted in their time with the museum.

The use of innovative battery technology to power electric units overcomes problems of operating or maintaining an electric train capable of taking live power from an overhead wire or third rail. As with the replicas, operating an electric unit is something only the NRM could offer, and has potential to attract assistance from railway engineering companies, both practical and financial. Keeping the vehicles live protects systems within the units and assists with collections care. However, there are significant conservation and cost implications associated so this is currently viewed as a longer term aspiration.

TABLE B: DIESEL LOCOMOTIVE AND POWERED UNITS FOR PASSENGER RIDES AT NRM AND ACROSS SMG SITES

Name	Current Location	Future Location	Status
02 Shunter 1978-7001 	NRM	NRM	Operational
03 Shunter 1976-7005 	Locomotion	Locomotion	Operational
Class 37 2001-7861 	NRM	NRM	Repair
Class 108 DMU 1993-7000 	NRM	NRM	Static

LEV1 Railcar 1987-7017 	Wensleydale Railway (on loan)	Locomotion	Repair
Class 142 Pacer 	Northern Rail	NRM/Locomotion	In service/ operational

TABLE C: CARRIAGES AND WAGONS FOR PASSENGER RIDES ACROSS SMG SITES

Name	Current Location	Future Location	Status
L&M 3rd class open 1975-7036 	NRM	NRM	Operational
SR goods brake van 1980-7002 	NRM	NRM	Operational
BR China Clay Hood wagon 1995-7146 	NRM	NRM	Operational
BR brake van 	Locomotion	Locomotion	Operational
LMS brake van 	Locomotion	Locomotion	Operational

BR brake van 	SIM	Locomotion	Operational but needs work
GWR Mogo van 1988-7016 	Locomotion	Locomotion	Operational
L&M replica carriages 	SIM	SIM	Operational

TABLE D: ELECTRICAL MULTIPLE UNITS FOR POTENTIAL PASSENGER RIDES ACROSS SMG SITES AND MAIN LINE USE

Name	Current Location	Future Location	Status
Class 313 EMU 	Beacon Rail	Locomotion	In service on national network/ Operational
Class 306 EMU 	Locomotion	Locomotion	Aspire to operate

3.3.3. WHAT AND WHERE? USE OF NON COLLECTION VEHICLES ('PLANT')

The use of our collection vehicles should be controlled with a clear conservation and maintenance plan for each vehicle. Collection items should not be used as 'plant', for instance in shunting operations. Therefore, two diesel locomotives that are not part of the collection are also included in the table in Appendix E.

Consideration will also need to be given to future shunting operations – at least one additional shunter will be required for work across sites and options and associated costs will be investigated. This is particularly true of Locomotion, where the absence of a run-round loop in the track layout means that two shunters are required to avoid a locomotive being trapped at the wrong end of a vehicle. The EE battery locomotive at SIM will still be required to move Planet in and out of the Power Hall for days when Planet is to be steamed.

Having locomotives to rescue failed passenger trains, cover breakdowns, and maintenance periods is essential. The costs of statutory inspections of air tanks etc on a regular basis should be allowed for.

Vehicles for use as plant are recorded in Table E.

TABLE E: NON COLLECTION LOCOMOTIVES TO BE USED AS PLANT

Name	Location	Status
08 Shunter 	Locomotion	Operational
09 Shunter 	NRM	Operational
EE Battery loco 	SIM	Operational

3.4. COSTS

There are substantial costs involved in restoring, repairing, maintaining, conserving and operating rail vehicles from the national collection. To establish exact costs for restoration and upkeep each listed vehicle will require an inspection. Some inspection work can be carried out by the NRM's own engineering team but mandatory specialist work – such as boiler inspections for steam locomotives – will need to be undertaken by external independent specialists.

As operating vehicles, an asbestos survey is also required for each item. We will not operate any vehicle which contains asbestos.

Each vehicle listed in this strategy has been identified for continued operation or its potential to operate. The inspections may reveal hidden issues that may prevent operation or reveal that repair works would be so costly as to preclude restoration. Each vehicle will, therefore, require a full budget plan for this strategy to be put into full operation.

Decisions on whether to operate vehicles will be made on a case-by-case basis in line with this strategy. Internal funding will be limited and fundraising activity will be focussed on delivering the biggest redevelopment of the National Railway Museum since it opened in 1975. The Masterplan – Vision 2025 – remains our key strategic priority. The museum will consider fully-funded proposals to restore any vehicles listed in this strategy from suitable third parties.

3.5. TIMING/PHASING

There is a requirement to have enough vehicles to operate at three sites, covering for statutory maintenance, repairs and special events, and recognising SIM's focus on Liverpool & Manchester Railway's replicas.

Major anniversaries of particular locomotives or events also need to be factored in. For example, the replica Locomotion No.1 should be in steam for 2025 and replica Rocket for 2029, being the respective 200th anniversaries of the original vehicles.

These aspirations renain dependent on the practicalities set out in 3.4 above.

3.6. PEOPLE & CAPABILITIES

None of the strategy is possible to enact without individuals and facilities, both of which are limited by the requirements of other projects across the museum sites.

General maintenance and basic repair work will be carried out on site and facilities provided accordingly, but heavy repair, such as boiler work, tyre turning and heavy overhaul is to be contracted out. Training of skills for future sustainability is also important and should be factored into operations. The potential for apprentices or heritage skills training/projects will be investigated.

4. MAIN LINE OPERATIONS

Main line work is a resource heavy aspect of operation, and whilst it is a very special spectacle to see one of our locomotives at speed on the national network, we do not have the team capacity, funding or time to manage a main line locomotive directly. Consequently, any main line operations of SMG locomotives should be through a third party, which is able to support both the financial, practical, technical and administrative requirements that such operation demands.

Nonetheless, there is a need to plan for which main line capable locomotives are selected for operation – what is practical, what is desirable and what is likely to attract funding. Operating locomotives must cover their costs.

Visitors to the NRM will be able to view main line locomotives in the Preparation Bay adjacent to the North Yard and we will continue to work with partners who use that facility for their own locomotives whilst it makes operational and financial sense to do so.

Locomotives for main line running are recorded in Table G.

4.1. MAIN LINE OPERATIONS: STEAM LOCOMOTIVES

The museum's strength lies in the unique locomotives. It is not viable to operate anything which the private sector already covers and for which there are multiple examples – such as the majority of our diesel fleet, or a Black 5 or Castle Class steam locomotive.

Practicalities of routes and ability to travel nationwide have also been factored into this policy – the Great Western locomotive King George V, for example, is too tall and heavy for main line running whilst Evening Star has a long rigid wheelbase that significantly restricts its capacity for main line operations.

Flying Scotsman is currently the only main line operating steam locomotive in the collection. This locomotive attracts considerable positive publicity and is seen across the country by a large audience. Flying Scotsman will remain in operation until at least 2023, its 100th anniversary.

The future operation of Flying Scotsman beyond 2023 will be considered in more detail closer to that date. Currently, only two other locomotives, Oliver Cromwell and Green Arrow, could be realistically considered for main line operations.

Oliver Cromwell has enjoyed a successful period of main line operation, is popular, well maintained and occupies a unique position in UK railway history for hauling the last steam powered passenger train on British Rail in 1968. The locomotive is fully fitted with modern safety systems.

Green Arrow has a good history of operation in preservation, is popular and has a wide range of routes it can travel on across the country. The expense and complexity of a potential repair of Green Arrow means that it is not a priority for operation, but it remains in the strategy as the possibility exists for overhaul during the period covered by this paper.

With the largest redevelopment of the site at York since the museum opened in 1975, no further main line steam locomotive restorations should be contemplated until at least 2021 when Great Hall is expected to reopen. The museum's priority will be to have vehicles chosen for museum display above operation.

The future for main line steam operating remains uncertain. The introduction of the digital railway, Network Rail's willingness and capacity to accommodate steam, the availability of crew trained to the correct standard, the availability of good steam coal and the viability of main line operators are all risk factors.

TABLE F: STEAM LOCOMOTIVES FOR CONSIDERATION FOR MAIN LINE OPERATION

Name	Current Location	Current Status	Key Dates
Flying Scotsman 2004-7103 	NRM	Operational	Centenary in 2023
Oliver Cromwell 1978-7044 	Great Central Railway	Boiler certicate expired Dec 2018. Proposal to return to operation currently being considered	
Green Arrow 1975-7025 	Locomotion	Static Last ran in 2008	

4.2 MAIN LINE OPERATIONS: DIESEL AND ELECTRIC LOCOMOTIVES

Operation of the museum's main line diesel and electric locomotives on a regular basis is not to continue as this is well covered by the private and heritage sectors. However, on occasions, there may be a requirement to move the locomotives by rail. Therefore, as set out in 3.3.2, the diesel locomotives should be repaired to make them complete and mechanically fit to be towed. Likewise, if locomotives are borrowed for display at other museums or heritage railways, they need to be fit to be moved by main line – albeit not under their own power. It is not envisaged at this stage that any of the electric locomotives in the collection will need to be moved off site by rail.

The plant diesel shunters need to be fit to move from yard to yard at York and should be equipped with the necessary main line gear such as TPWS, OTMR and GSMR.

5. HERITAGE RAILWAY LOANS AND OPERATIONS

The museum has enjoyed a long history of lending vehicles for operation to museums and heritage railways. This will continue, creating valued relationships and growing new audiences. The museum will take the lead in such partnerships, lending where it is appropriate and where loans can be managed properly by the borrower and museum.

Borrowers must meet the museum's standards for management, security and environment, and work with the museum on public engagement, with full recognition and promotion of the NRM-SMG brands. The borrower must meet all costs as agreed in the loan documentation, including site visits and inspections when required.

The creation of a new storage facility at Locomotion will enable us to better care for vehicles on our own sites, therefore it is likely that the number of loans out purely for collections care will decrease. The currently operable locomotives on loan should be reviewed with the borrowers when the loan periods expire due to the potential need for display on an SMG site.

The museum will not loan out key vehicles from the core gallery displays. The potential for engagement and reasoning behind loans will emphasise the importance of outreach and ensuring borrowers recognise the national collection status of objects in their care. We value the relationships with our loan partners and will seek to continue these partnerships during the period of this strategy.

SMG will be more proactive in the management of our loans. Where asbestos has been identified we will require evidence of removal or management. Removal or remediation costs could be considerable in vehicles which haven't operated in some years. The hazard status of vehicles loaned or hired in must also be clear. Any borrower must work closely with the SMG to manage hazards on loan vehicles.

Locomotives on loan for operation and their status is recorded in Table F

TABLE G: OPERATIONAL VEHICLES CURRENTLY ON LOAN OFF SITE

Name	Current Location	Current Status
King Arthur class "Sir Lamiel" steam loco 1978-7034 	Great Central Railway/5305LA	Static Proposals for future currently being considered
Britannia pacific "Oliver Cromwell" steam loco 1978-7044 	Great Central Railway/5305LA	Boiler certicate expired Dec 2018. Proposal to return to operation currently being considered
Class 33 diesel 2005-7286 	Great Central Railway/5305LA	Operational
High Speed Train prototype diesel 1988-7000 	Great Central Railway North/125 Group	Operational

Lord Nelson steam loco 1978-7035 	Mid Hants Railway	Static Engine due for overhaul in 2019
Schools class "Cheltenham" steam loco 1978-7038 	Mid Hants Railway	Operational
Class 101 Diesel Multiple Unit 2004-7105 	North Norfolk Railway	Operational
Taff Vale Railway 28 steam loco 1978-7022 	Gwili Railway	Under overhaul (2019)
Class 4F steam loco 4027 1978-7033 	Vale of Berkeley Railway	Under overhaul

Armstrong Whitworth diesel shunter 1978-7008 	Beamish	Static
Class 04 number 63601 steam loco 1975-7027 	Great Central Railway	Static Proposal to overhaul for heritage line use currently being considered.
T9 class 30120 steam loco 1978-7024 	Swanage Railway	Operational
J52 class steam loco 1247 1980-7001 	NRM	Static Could be lent for operation Was preserved with the intention of operation

LNER 3rd Class Open carriage 1987-7013 	North Yorkshire Moors Railway/LNER Carriage Association	Operational
LMS 3rd Class Open carriage 1987-7008 	Peak Rail/LMS Carriage Association	Operational
Simplex War Department armoured petrol locomotive 1981-7001 	Beamish	Operational
British Railways Mark 1 BSK coach 1990-7377 	NRM / Riley & Son (E) Ltd (Flying Scotsman Support Coach)	Operational

6. OTHER POLICIES

Formal policies and procedures for periodic inspection of operational vehicles at heritage railways (on loan or for galas) will be formulated with the NRM Engineering, Collections Services and Collections & Research departments. These will address the sometimes competing demands of engineering, restoration and conservation.

Collections vehicles will not be returned to operational condition purely because of pressure from external stakeholders.

This document will be reviewed every year.

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