Contents

1. Executive Summary

The Midland Main Line (MML) Programme will reduce journey times, increase capacity for passenger and freight services and improve the passenger experience. It will reduce operating costs and the environmental impact of railway operations. The proposed approach is to create distinct intercity and commuter markets to improve the service offered and the efficiency by which it is provided; to:

- Relieve over-crowding and reduce journey times on long distance services by reducing the number of calls at outer commuter stations, in order to stimulate long distance demand both now and for the future in order to deliver increased revenues;
- Introduce higher capacity electric rolling stock on the outer commuter services to make more efficient use of a new 6th train path per hour; and
- Switch from diesel to electric traction for the Corby services to reduce rolling stock operating costs, improve air quality impacts and reduce the carbon footprint of rail services on this route.

Key Output 1 of the MML Programme includes line speed improvement works between Derby and Sheffield, at Derby, at Leicester, and at Market Harborough. Track capacity works between Bedford and Corby will enable a sixth long distance train per hour into and out of London, which will be delivered alongside electrification of the railway between Bedford, Kettering and Corby. Realisation of the majority of the benefits of this investment will be contracted through the next East Midlands franchise, which is due to start in August 2019.

Background

The Strategic/Outline Business Case for the Key Output 1 elements of the MML Enhancements Programme was endorsed by BICC and approved by the Secretary of State in autumn 2016.

In July 2017, the Secretary of State announced the cancellation of Key Output 2 of the MML Enhancement Programme (electrification from Kettering to Nottingham and Sheffield), proposing instead investment in new bi-mode trains for services between Nottingham and Sheffield and London.

The public consultation for the next East Midlands franchise was launched in parallel with this announcement on Key Output 2. This outlined the planned investment in Key Output 1 to enable electric services from Corby, and, following that, the introduction of new bi-mode trains for services from Nottingham and Sheffield. This Full Business Case covers Key Output 1. The infrastructure investment required to enable the bi-mode trains will be subject to a separate business case decision prior to the Invitation to Tender (ITT) for the franchise being issued in April 2018. The 'Do Something' assumptions here are consistent with the 'Do Minimum' assumptions in the East Midlands Franchise comparator model suite.

Costs, Benefits, & Programme Delivery

The total Anticipated Final Cost (AFC) for Key Output 1 is £1,418m (cash prices), with 94% of the overall AFC being confirmed to at least P80 certainty[1]. Cost of work done or contractually committed totals £577m, or 41% of total costs.

[1] P80 certainty means that there is an 80% confidence level that costs will be this amount or less

This programme is affordable against the CP5 Portfolio defined by the Hendy Review in 2015 and the Hendy Review forecast for the MML in CP6.

Investing in Key Output 1 has been assessed as offering medium to very high value for money, with a benefit to cost ratio of 1.7 to 52.9. The wide range is a product of uncertainty over the ability to deliver journey time savings through a workable timetable. The lower range is based on resolving all conflicts without necessarily giving priority to the long distance services; the upper range is based on the assumption that other services can be adjusted without loss of benefit. The sizeable passenger benefits come from a significant reduction in crowding for all passengers and improved journey times for the long distance services between London and the major cities on the route.

The July 2017 demand forecasts used in this business case show lower demand growth than those from January 2016 used in the Outline Business Case (OBC). This change is the main driver causing the shift away from the financially positive position reported in the OBC. Benefits for freight have not been included in the central case and, while uncertain, could offer upwards of £350m PV of additional benefits.

The focus for the MML programme is delivering the infrastructure to time and cost, and managing the interdependencies with the East Midlands franchise competition to ensure effective delivery of key passenger benefits.

Following a detailed financial and schedule planning process, the entry into service date for Key Output 1 infrastructure is now planned for August 2020, to at least P80 certainty. The franchise will plan for benefits to be realised from December 2020, although this is subject to confirmation at the franchise ITT stage in April 2018.

Risks, Issues, & Opportunities

Interaction between different services along the route impose some risk to benefits realisation, with the planned uplifts to Thameslink services at the southern end of the route from May 2018 introducing further complexities, as both service groups seek to increase frequencies. To this end, a range of timetable scenarios have been tested; these demonstrate that the investment still demonstrates medium value for money in the most pessimistic timetable scenario. The franchise competition offers the opportunity for further timetable iteration across a number of bidders.

The current plans for HS2 Phase 2b would shift some demand from the long distance East Midlands services onto High Speed services when these are introduced (assumed to be 2033, and noting that this outcome assumes fares for both sets of services are comparable). This scenario changes the value for money of KO1 to a more marginal position, with a BCR of 0.9, rising to 1.7 when freight benefits are included. The position is particularly sensitive to the opening year assumed for HS2, with the BCR for KO1 rising to 1.2 if the HS2 opening year is assumed to be 2036. On balance, the strategic case for splitting the commuter and long distance markets on the MML remains. Crowding on these services is significant today and will continue to worsen throughout the period to 2033. An electric railway to Corby offers the medium term potential to extend Thameslink services further north than Bedford and introduce new connections for these passengers. Journey time improvements will be enabled sooner for long distance passengers in the Midlands and the North; there has been significant negative reaction to the cancellation of KO2 from stakeholders in these areas.

Recent analysis of the May 2018 timetable change as proposed under the Thameslink Programme indicates that East Midlands services will no longer be able to call at Bedford and Luton during peak times. Investment in Key Output 1 would allow the reinstatement of East Midlands services calling at these stations during peak times at these locations from December 2020.

2. Strategic Case

2.1 Business Strategy

The Midland Main Line (MML) is part of the strategic rail network and plays a key role in enabling economic, environmental and community benefits at national, regional and local level. It serves a diverse set of markets for rail services including inter-regional, commuter, long distance and freight. (See Figure 1 Midland Main Line).

The Government has committed to a continued programme of investment in rail to meet projected increases in demand from passengers and freight[2]. The Government's Transport Investment Strategy commits to maintaining and upgrading our transport infrastructure, to connect communities and businesses and help deliver balanced growth across the country[3]. The Government has also committed to carbon emission, greenhouse gas and air quality targets.[4]

These commitments are reflected in the DfT's strategic objectives, namely to:

- *Boost economic growth and opportunity;*
- *Build a One Nation Britain;*
- *Improve journeys;*
- *Be safe, secure, sustainable; and*
- *Drive efficiency and innovation.*

The MML Programme is designed to contribute to the objectives set out above by achieving the following outcomes:

- *Deliver shorter journey times into St Pancras;*
- *Increase passenger capacity into St Pancras through the addition of a 6th path;*
- *Reduce crowding on services;*
- *Reduce operating costs and environmental impact through electrification of the line from Bedford to Corby, and;*
- *Increase freight capacity.*

[2] National Infrastructure Delivery Plan 2016 -2021, Infrastructure and Projects Authority (reporting to HM Treasury and Cabinet Office) March 2016

[3] Transport Investment Strategy, Department for Transport, July 2017

[4] The Government's first four Carbon Budgets have been set covering the period out to 2027. The Government is also committed to implementing the EU's 2030 Green House Gas (GHG) target of at least a 40% reduction in domestic EU GHG emissions through EU Emission Trading System (EU ETS).

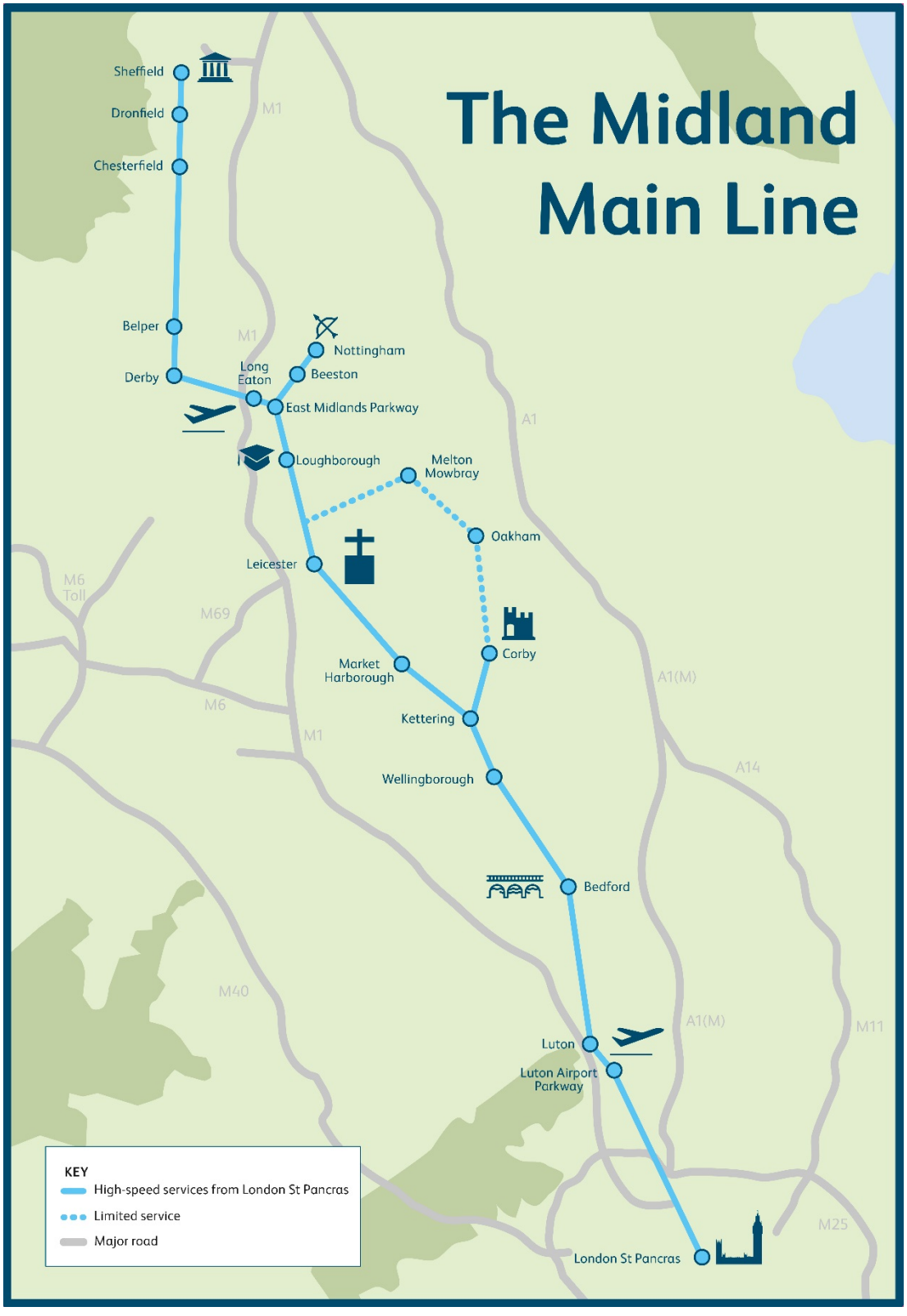


Figure 1 Midland Main Line

2.2 Drivers for Change

The drivers for change represent the problems, issues and opportunities that have instigated this approach to investment in the Midland Main Line. In doing so they provide the rationale for the proposals for change.

2.2.1 Crowded passenger services

The Passenger in Excess of Capacity (PIXC) measures from 2015 are shown below, providing a comparison between East Midlands Trains and other operators. This shows that crowding is worse on the MML than other intercity operators in London.

Operator	*Morning Peak*	*Evening Peak*
Virgin Trains East Coast	0%	0%
Virgin Trains West Coast	0%	0%
East Midlands Trains	10%	7%
Great Western Railway	9%	4%

Table 1: Percentage Passengers in Excess of Capacity (PIXC) on intercity services into London[5]

The average for all services into London in the morning peak was 6%.

2.2.2 Extended passenger journey times

In order to provide capacity for peak time commuters, the services from Nottingham, Sheffield and Derby into London additionally call at outer suburban London commuter stations. This extends the journey time of peak time services. By way of example, the journey time for services from Sheffield are up to 30 minutes longer in peak times than in off peak times.

2.2.3 Revenue opportunity

The financial performance of the East Midlands franchise is driven primarily by the intercity long distance market, which accounts for 58% of demand and 81% of total passenger revenue.[6] The combination of crowded services and extended peak journey times is suppressing demand in this high value market, which is reducing the franchise premium to the DfT.

2.2.4 Congested infrastructure

The section of the Midland Main Line between Cricklewood and Leicester via Market Harborough and Corby has been designated ‘congested infrastructure’ by Network Rail, confirming that there is no capacity for additional requests for services from passenger or

[5] Rail passenger numbers and crowding on weekdays in major cities in England and Wales: 2015, DfT July 2016
[6] East Midlands Rail Franchise Renewal – Market Review September 2016

freight operators.[7] This is one of only two locations on the national rail network that are currently designated as congested infrastructure.

For the Midland Main Line, this is of particular concern between:

- Kettering and Leicester via Market Harborough where there are currently only two lines, and Kettering and Corby where there is currently only one line.
- Bedford and Kettering where for the majority of the distance there are only three lines, one of which is bi-directional.

The constraint with the highest priority has been identified as the section between Bedford and Kettering where the introduction of any additional freight or passenger services will require the infrastructure to be enhanced.

During an average weekday in 2015, around 15% of intercity services using the Midland Main Line are crowded, with some passengers standing as there is insufficient seating. About a third of all weekday services have at least 80% of seated capacity in use.[6]

Demand for intercity services on this route has seen a 13% increase between 2008 and 2014; this is expected to continue to grow[6]. Total passenger demand growth on Midland Main Line services between 2016/17 and 2036/37 is forecast to be 32%[8].

2.2.5 Opportunities for Freight

Rail freight generates more than £1.6 billion a year in economic benefits for the United Kingdom including productivity gains for UK businesses, reduced road congestion and environmental benefits.[9] Freight growth across Great Britain is forecast to increase in terms of tonne kilometres by 2.9 per cent annually through to 2043; this compares to a growth of about 2.5 per cent per year since the mid-1990s. There is also a projected increase in intermodal freight traffic on the Midland Main Line increasing the proportional national share.[10]

2.2.6 Environmental impact of operations

The Government has committed to challenging targets for carbon emissions, greenhouse gases and air quality. The Prime Minister confirmed on 20 September 2016 that the UK would implement measures to reduce UK emissions by the end of the year to enable ratification of the Paris Agreement. The aims of this Agreement (i.e. to limit the rise in global temperatures to well below 2°C, to pursue efforts to hold it to 1.5°C and to reach net zero carbon emissions in the second half of the century) are more ambitious than the basis of the UK's statutory target for 2050.[11] Accordingly, the UK will likely have to reduce emissions further than currently planned.

[7] Declaration of congested infrastructure: Cricklewood to Leicester inclusive (under Regulation 23 of the Railways Infrastructure (Access & Management) Regulations 2005), Network Rail, October 2014

[8] Assessed using the most recent demand forecasts from July 2017, without KO1 interventions

[9] Rail Freight Strategy, DfT, September 2016

[10] NR East Midlands Route Study, March 2016

[11] https://www.gov.uk/government/speeches/theresa-mays-speech-to-the-un-general-assembly

All intercity services on the Midland Main Line are currently operated using diesel trains. The railway industry can contribute towards achieving the environmental targets described above through the introduction of electric rolling stock, which is estimated to reduce carbon emissions by 20% to 30% per vehicle kilometre when compared to the current diesel rolling stock.[12]

2.2.7 Whole life industry cost savings

Compared to diesel traction, the use of electric traction reduces whole life industry costs:

- For passenger vehicles fuel savings are estimated at between 19 pence and 26 pence per vehicle mile, a saving of around 50% over diesel traction. Savings in maintenance costs are estimated at 20 pence per vehicle mile which represents a saving of around 33%. Electric vehicles also have higher levels of vehicle reliability and availability.
- The lease costs for electric trains are typically 20% lower [13] However data from recent rolling stock leases (for electric trains) indicate that the cost differential between traction types is increasing, as a result of the market for electric rolling stock becoming increasingly competitive.

2.2.8 Opportunity to reinstate peak services for Luton and Bedford

From May 2018, the Thameslink programme requires a recast of the timetable in order to increase the number of Thameslink services. The latest timetable development work for this change indicates that peak-time East Midlands Trains services will not be able to call at Bedford and Luton. While Bedford and Luton will continue to be served by Thameslink trains, this will cause significant challenges for commuters that currently use these services.

[12] Study on further electrification of Britain's railway network, Railway Safety and Standards Board, 2007
[13] Network Rail Electrification Strategy 2009

2.3 The Programme

The MML Programme is designed to contribute to the industry strategies and drivers for change set out above by achieving the following outcomes:

- *Deliver shorter journey times into St Pancras;*
- *Increase passenger capacity into St Pancras through the addition of a 6th path;*
- *Reduce crowding on services;*
- *Reduce operating costs and environmental impact through electrification of the line from Bedford to Corby, and;*
- *Increase freight capacity.*

2.3.1 Background to the MML Programme

Electrification of the line from Bedford to Corby, Nottingham and Sheffield was first proposed in the 2011 Initial Industry Plan and confirmed in the Secretary of State's July 2012 High Level Output Strategy (HLOS); as a result it was included in Network Rail's CP5 Delivery Plan published in March 2014.

Following a pause to the Programme in June 2015 and as part of the Hendy review later that year, the MML Programme was re-phased and converted into two key output stages to be delivered by 2019 and 2023 respectively. The revised Enhancement Delivery Plan set these out as follows:

Key Output 1 – December 2019 Working Timetable:

- Provision of 25kv electrification from the existing limits at Bedford to Kettering and Corby;
- enabling of improved journey times through the delivery of key infrastructure schemes;
- Additional capacity for a 6th Long Distance High Speed service to serve between St Pancras and Kettering / Corby; and 3 freight paths per hour between Bedford and Kettering;
- Enhanced capability at key stations south of Leicester through extension of platforms and other operational measures; and
- New stabling facilities at Kettering.

Key Output 2 – CP6:

- Provision of 25kv electrification from Kettering to Nottingham and to Sheffield via Derby;
- Enabling improved journey times through the delivery of key infrastructure schemes;

- Completion of adjustments to existing Fast Line Overhead Line Equipment (OLE) south of Bedford, increasing the permissible speed for electric trains; and
- Enhancing the capability at key stations north of Leicester through extension of platforms and other operational measures and completion of gauge enhancement works to provide W12 clearance.

In September 2016 the Secretary of State accepted the report by Sir Peter Hendy on the re-planning of Network Rail's Investment Programme, subject to affordability and value for money.

The Single Departmental Plan from February 2016 confirmed the DfT's intent to implement Sir Peter Hendy's proposals for delivering the rail enhancements programme including electrification of the Midland Main Line. The delivery of infrastructure to enable electric train services to Corby by 2019 is one of the key performance indicators monitored by the Department.

The Strategic/Outline Business Case for the Key Output 1 elements of the MML Enhancements Programme was approved by BICC and Secretary of State in October and November 2016.

In July 2017, the Secretary of State announced the cancellation of Key Output 2, electrification to Nottingham and Sheffield. The consultation for the next East Midlands franchise was launched at the same time and included the Key Output 1 proposals as outlined in this business case, and the further proposal to introduce new bi-mode trains on services between Nottingham, Sheffield and London from 2022. (The infrastructure required to enable these new trains will be subject to a separate business case decision prior to the Invitation to Tender for the franchise being issued in April 2018. This Full Business Case applies to Key Output 1 only.)

2.3.2 Approach and Scope

Key Output 1 aims to improve the way that the long distance intercity market is served whilst also increasing capacity for the commuter market. This will better serve passengers in each market, improve operational (cost) efficiency and reduce environmental impacts.

The proposed approach is to create distinct intercity and commuter markets to improve the service offered and the efficiency by which it is provided, to:

- Relieve over-crowding and reduce journey times on the long distance services by reducing the number of calls at outer commuter stations and to stimulate long distance demand both now and for the future in order to deliver increased revenues.
- Introduce higher capacity electric rolling stock on the outer commuter services to make more efficient use of a new 6th train path per hour
- Switch from diesel to electric traction for the outer commuter services to reduce rolling stock operating costs, improve air quality impacts and reduce the carbon footprint of rail services on this route.

Future freight capacity will also be protected on the main route via Leicester and increased on the route via Corby. Inter-regional Cross Country services will also benefit from faster journeys through the Derby area.

The infrastructure works planned to enable this strategy are given in Figure 2 below.

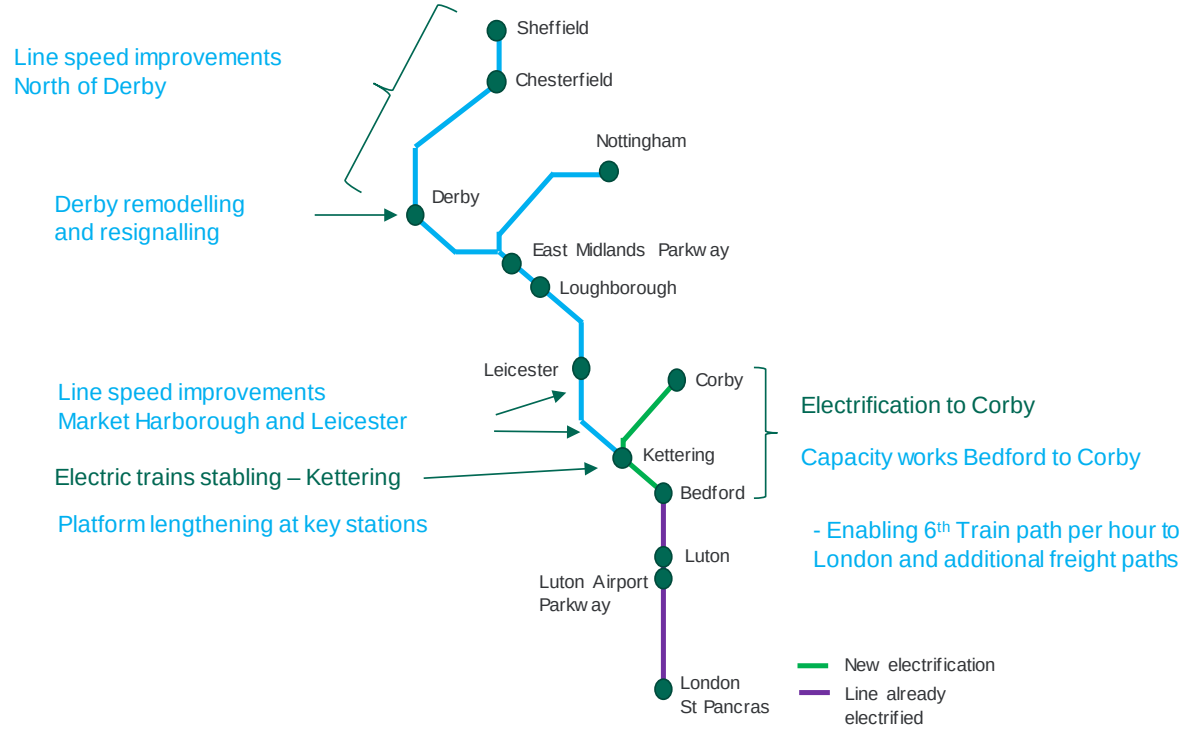


Figure 2 Infrastructure elements of KO1 of the MML Programme

The total Anticipated Final Cost (AFC) for KO1 is **£1.418bn**; 94% of this AFC is to P80 certainty or greater. Cost of work done or contractually committed totals £577m, or 41% of total costs.

This programme is affordable against the CP5 Portfolio defined by the Hendy Review in 2015 and the Hendy Review forecast for the MML in CP6.

Delivering the majority of the benefits of the MML Programme will be dependent on the next East Midlands franchise operator procuring electric rolling stock for the Corby services and introducing a new timetable to make use of the enhanced infrastructure.

Figure 3 below shows the average off peak pattern today, given for the purposes of comparison, and the proposed all day train service pattern which has been tested in this business case.

The proposed two trains per hour from Corby are assumed to be operated with higher density electric stock and with longer trains of up to 12 vehicles during the peak periods, thus delivering significant crowding benefits, alongside operating cost savings and environmental benefits. For the purposes of this business case, it is assumed that the remaining services from Nottingham and Sheffield would be operated with the current diesel fleet with improved journey times enabled by enhanced infrastructure and changes to stopping patterns. The MML railway would not be electrified north of Kettering. (The outline business case for the franchise and the investment in new trains will build on this scenario and replace diesel trains with bi-mode trains for Sheffield and Nottingham services; this will be presented to BICC at ITT stage for the franchise.)

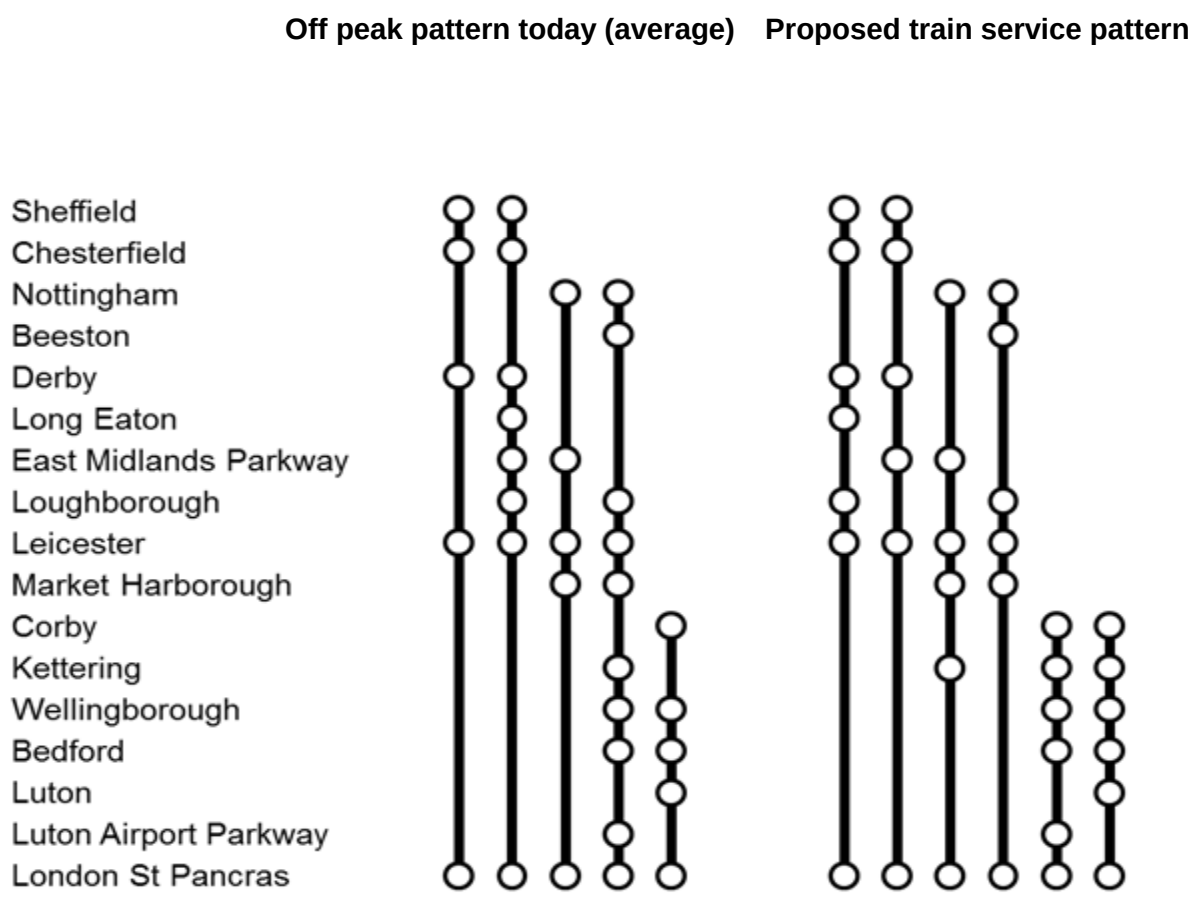


Figure 3 Assumed service pattern for business case

2.4 Strategic Benefits

Passenger experience

- Reduced crowding on all services, due to new or cascaded rolling stock providing increased seating capacity on services from Corby, and an additional service each hour;
- Faster journey times for long distance passengers from Sheffield and Nottingham;
- Reinstate peak time East Midlands services at Bedford and Luton (proposed for removal from May 2018) by introducing a dedicated commuter service of two trains an hour from Corby.

Economic growth

- Improved access to employment and learning opportunities, due to improved journey times and additional services resulting from a change in services and increased line speeds.

Capacity

- A planned increase in peak hour seats on East Midlands services into London from around REDACTED today to around REDACTED;

- Increased track capacity due to Corby re-doubling and four tracking south of Kettering, enabling an extra service per hour;
- On-board capacity from the introduction of modern rolling stock for Corby services with increased seating capacity.

Train service performance

- Improved train availability for Corby services due to introduction of a modern and more reliable fleet. Electric trains generally have a lower failure rate than diesel trains with mile per casualty being typically around double that for diesel trains.[14]

Whole industry benefits

- Reduction in costs due to the introduction of electric rolling stock on Corby services;
- Increased passenger revenue, through attracting and accommodating increased passenger demand.

Environmentally sustainable

- A reduction in carbon and nitrous oxide emissions per mile for Corby services;
- Freight modal shift from highway to rail as a result of increased route capacity;
- Reduced point of source emissions and lower operating noise levels with the introduction of modern electric rolling stock on Corby services.

Franchise value

- The value of the franchise is anticipated to increase;
- Delivering an increase in capacity and a reduction in journey times for long distance passengers triggers a significant increase in demand for these services, which translates to revenue;
- Rolling stock cost savings will also deliver cost efficiencies to the operator.

2.5 Value for money

Investing in Key Output 1 has been assessed as offering medium to very high value for money, with a benefit to cost ratio of 1.7 to 52.9. The wide range is a product of uncertainty over the ability to deliver journey time savings. The lower range is based on resolving conflicts at the north of the route, and not necessarily giving priority to the long distance services, and the upper range assumes that other services can be adjusted without loss of benefit.

EMT bid recently for the May 2018 timetable, with five paths, thus providing an alternative view on the potential Do Minimum scenario. Having adjusted this EMT bid timetable to re-instate calls at Bedford, Luton and Luton Airport Parkway, the comparison of this alternative Do Minimum with the worst case Do Something results in a BCR of 6.9.

[14] Network RUS: Electrification Network Rail (2009)

The July 2017 demand forecasts used in this business case show lower demand growth than the January 2016 forecasts assumed for the Outline Business Case last year. This is the key reason for a shift away from the financially positive position seen at OBC stage.

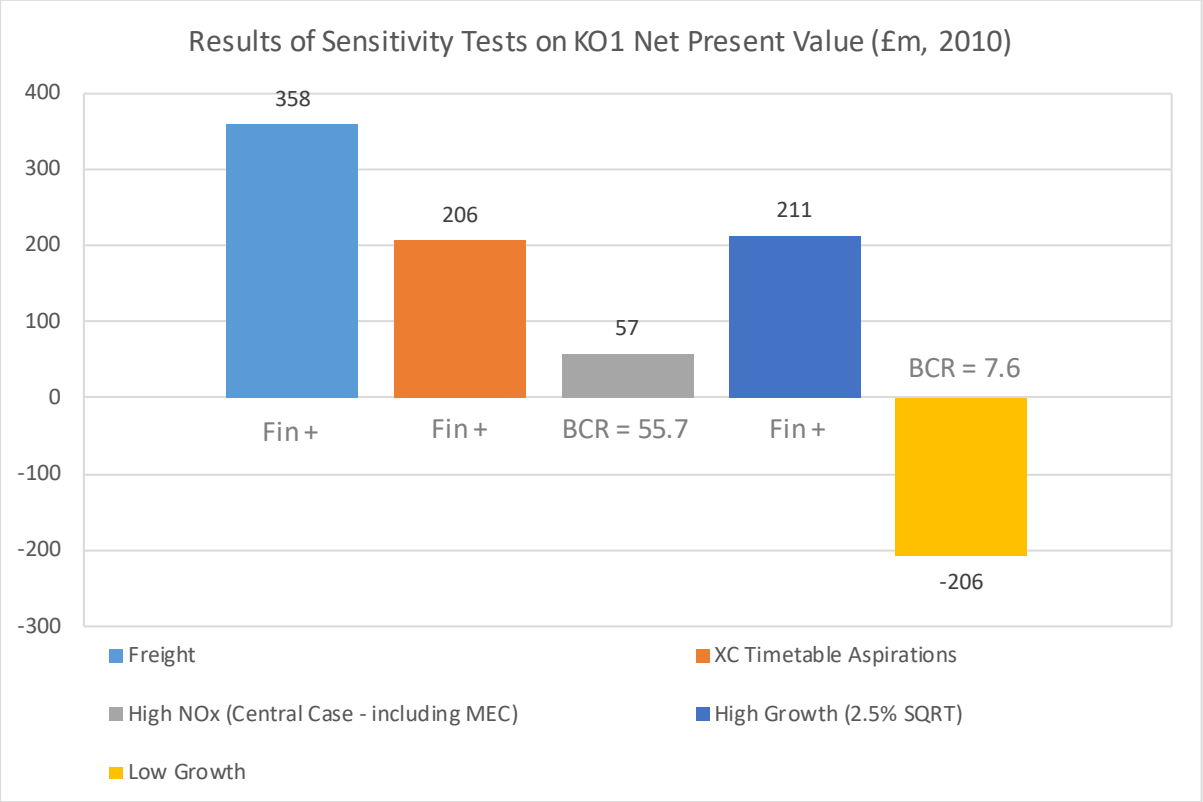


Figure 4 Sensitivity Tests on Key Output 1

2.5.1 Do Minimum

The case for Key Output 1 has been compared to a Do Minimum position whereby investment in Key Output 1 is not continued. This position could incur sunk costs of up to £577m, over 40% of the overall costs.

Given the high levels of passenger growth forecasts over the appraisal period, the Do Minimum position for the economic appraisal includes some rebalancing of first class seating to standard class to partly mitigate the high levels of crowding. Even with this mitigation, there would be significant and continued crowding on services.

These would be little strategic fit with government policy nor departmental objectives, and stakeholders' expectations for this route are that some form of investment will be made. The recent announcement of the cancellation of Key Output 2 has been received unfavourably by many stakeholders. In mitigation, the announcement stressed the benefits to journey times from key locations such as Sheffield and Nottingham enabled through the investment in Key Output 1.

The franchise competition and the associated public consultation has been launched on the basis that Key Output 1 is delivered.

2.6 Strategic Dependencies and Interfaces

2.6.1 HS2

There is a significant interface with the planned introduction of High Speed 2, in particular the second phase of HS2 which extends the route from the Midlands to Leeds, Sheffield and Newcastle.

It is assumed that all of the long distance market from Sheffield to London, along with a significant proportion of the market from Nottingham and Derby would transfer over to these new HS2 services once they are in place, assuming matched fares. Therefore, upon completion of HS2 Phase 2b, MML services would change to place stronger emphasis on inter-regional and commuter markets, in the same way services are expected to change on the East and West Coast Main Lines. This scenario has been tested and the results are reported in full in the Economic Case. In this scenario, a significant proportion of MML Programme's passenger benefits for the long distance markets are eroded after 2033 (and transferred to HS2) and this changes the economic case to a more marginal position, with a BCR of 0.9, rising to 1.7 when freight benefits are included. The position is particularly sensitive to the opening year assumed for HS2, with the BCR for KO1 rising to 1.2 if the HS2 opening year is assumed to be 2036 for example.

2.6.2 Interface with Thameslink Programme

Midland Main Line intercity services interact with Thameslink services between St Pancras and Bedford. The Thameslink programme will be introducing a significant increase in services across the day from May 2018, with a further increase in December 2018. The on-train capacity offered also sees a significant increase though the introduction of rolling stock which can carry more passengers.

When the Midland Main Line Key Output 1 enhancements were originally developed, it was assumed that they would be completed prior to the May 2018 Thameslink service uplift which will see 20tph through the central London core. The enhanced Thameslink service would then complement the enhanced Midland Main Line service thanks to overall increased route capacity. However, delays in CP5, including the pause and un-pause decisions prior to the Hendy Review, now means that the delivery of these enhancement programmes will occur in the reverse order.

Until recently it was not clear that these delays to delivering Key Output 1 would affect the current timetable when Thameslink services increased in May 2018. However, it is now understood that there is insufficient capacity on the route to provide the current journey times and stopping patterns alongside the Thameslink service uplift. The latest proposal is to remove some calls in East Midlands services in the peak from May 2018 and seek to maintain journey times wherever possible; this timetable development work is ongoing and will be reported in more detail in November this year. Given the timing of the Thameslink timetable development, this business case does not take account of these proposed changes to the 'do minimum' position; if included, they would strengthen the case for investment in Key Output 1.

The electric railway to Corby delivers under Key Output 1 offers the medium term potential to extend Thameslink services further north than Bedford and introduce new connections for these passengers.

2.6.3 East Midlands Franchise

The MML Programme is dependent on the next East Midlands Franchise to realise the majority of the benefits and design a final timetable that seeks to optimise and balance potentially conflicting passenger demands and to manage the interface with other services.

Building on the analysis carried out for the MML Programme OBC where a number of train service stopping patterns were tested, the franchise competition team have worked through these options in more detail.

The public consultation for the franchise competition is currently open and will close on 11th October 2017 and seeks the public's views on the proposals tested in both the OBC and this Full Business Case. Further analysis and the findings from the public consultation will inform the development of the train service specification to be included in the Invitation to Tender for the franchise, due to be issued in April 2018.

2.7 Strategic risks

2.7.1 Risk to benefit realisation

Interaction between different services along the route impose risk to benefits realisation, with the planned uplifts to Thameslink services at the southern end of the route from May 2018 as described in section 2.6.2 introducing further complexities, as both service groups seek to increase frequencies. Both freight and Cross Country services interactions are also key along the route, with a significant section of the route being one of only two locations nationwide that are designated as congested infrastructure.

To this end, a range of timetable scenarios have been tested and demonstrate that the investment still demonstrates medium value for money with a BCR of 1.7 in the most pessimistic timetable case.

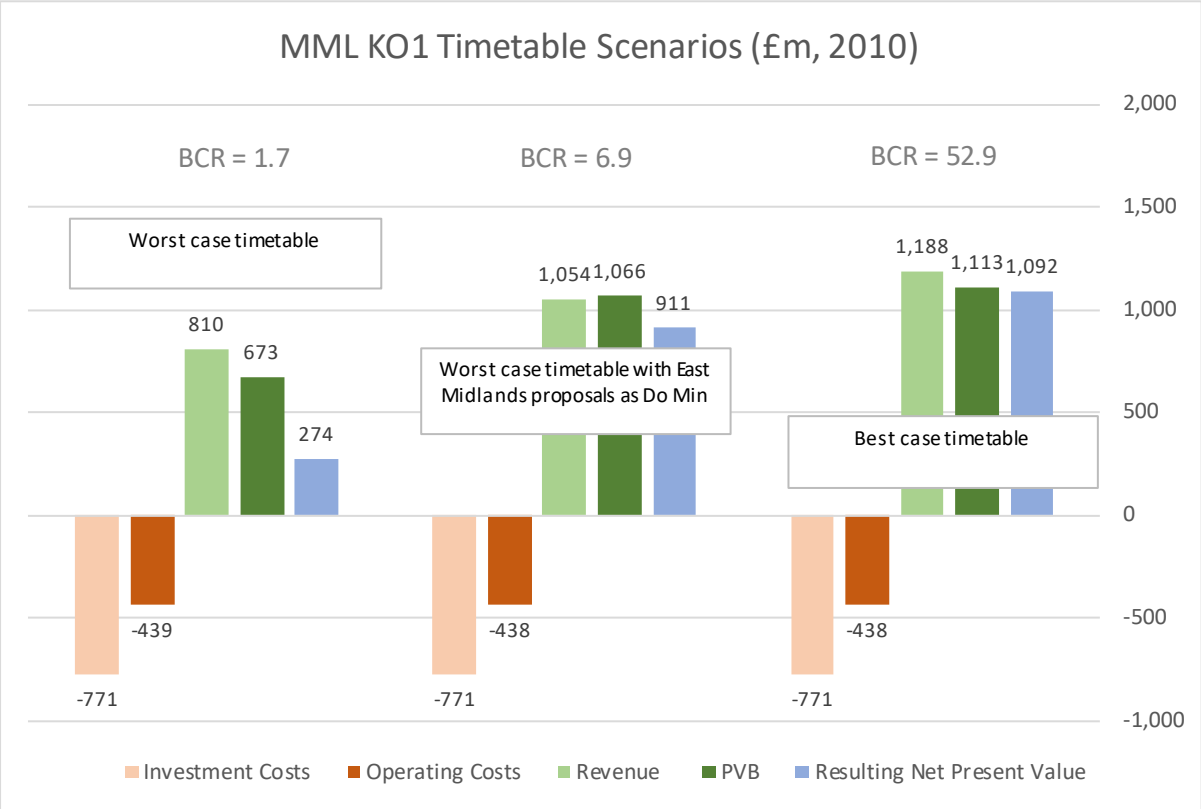


Figure 5 Sensitivity Tests on Key Output 1 timetable scenarios

The following tables give the range of journey time outcomes for key origins and destinations in the 'do minimum' compared to delivering Key Output 1.

Route	Expected off-peak journey time range		Expected peak journey time range	
	Do minimum	KO1	Do minimum	KO1
London to Sheffield	2h01 – 2h15	1h59 – 2h06	2h01 – 2h35	2h02 – 2h08
Sheffield to London	2h02 – 2h15	2h00 – 2h07	2h02 – 2h36	2h03 – 2h08
London to Nottingham	1h40 – 1h49	1h35 – 1h42	1h36 – 2h04	1h39 – 1h45
Nottingham to London	1h42 – 1h54	1h34 – 1h46	1h31 – 1h59	1h38 – 1h48

The MML Programme Board, which is accountable for oversight of this issue, has commissioned the following cross-industry workstreams to manage this risk:

The incumbent franchisee and NR are re-evaluating the quality of the sixth path in light of the identified May 2018 issues and will report back prior to further development of the train service specification for the franchise. It is clear from the analysis to date that the benefits of the resulting timetable will fall within the range tested in the sensitivities above.

The MML Event Steering Group (an industry planning process led by NR to develop timetables with major changes) has started very early to enable it to recast the overall route

timetable and allow more time for detailed and iterative development in support of the Department's aims. This is expected to enable NR, as system operator, to consider services along the entire length of the route and to optimise paths to a greater extent than the Thameslink work has allow with its focus only on the route south of Bedford.

The franchise competition, currently at consultation stage, will set bidders objectives to realise our target journey times. As better journey times drive revenue growth significantly it is expected that the incentives to bidders will be well aligned with those assessed in this business case in order to achieve a reduction in journey times for long distance services.

Finally, a working group involving NR and operators on the route is identifying small, low cost, incremental infrastructure enhancements that will relieve critical bottle necks to enable the full benefits of both Thameslink and KO1 to be realised. Costs for each are expected to be in single or low double figure millions, and would be subject to the appropriate level of governance.

2.7.2 Start date for benefits realisation and managing the requirements for the franchise competition

The evidence from most CP5 enhancement schemes delivered by NR confirms that they are typically delivered late and over-budget. This is common with major rail infrastructure projects worldwide. The choice of the public delivery date and the date to be assumed in the franchise competition is therefore key. In response to this, two main pieces of analysis have been undertaken to more robustly assess these delivery dates:

- NR's own 'bottom up' assessments (namely Quantitative Schedule Risk Assessment), which show a P80 date of August 2020.
- DfT's Reference Class Forecasting 'top down' assessments (based upon the actual outcomes of around 200 rail investment projects) which indicates a latest indicative delivery date in the range December 2020 to May 2021. This method was originally conducted by Oxford Global Projects for the OBC and updated by DfT for this FBC.

At the Outline Business Case stage in 2016 it was agreed with the SoS that although NR was forecasting infrastructure delivery in December 2019, the franchisee would not be asked to introduce electric services until December 2020, in order to provide contingency. The principle being that it was better to have the infrastructure ready before the rolling stock rather than vice versa.

The various elements of this schedule decision were considered in detail by the cross-industry MML Programme Board in July 2017, including representation from DfT, operators and NR. The Board noted that the infrastructure availability date has moved back since the OBC, and that this date now represented a more detailed assessment of NR's schedule risks. It further noted that Reference Class Forecasting is not simply a 'predict and provide' guide but helps us 'predict and prevent' the common causes of delays to projects, by identifying factors likely to lead to delay or cost overrun which can then be managed. It also noted the benefits of keeping some tension in the system, as moving the date back was seen as simply guaranteeing the work would be completed even later. The recommended position from the MML Programme Board is therefore that December 2020 should remain the date for the franchisee to introduce enhanced services, but that as before arrangements are made within the franchise to provide flexibility (for both early and late delivery). This will be developed further by the franchise team prior to ITT issue.

2.7.3 Infrastructure outputs cannot be delivered within available funds;

A significant piece of assurance work has been completed assure that the process and outcomes for establishing the cost estimates has been robust. This, combined with reference class forecasting, shows that risk provision contained with the Anticipated Final Cost is appropriate for this stage of delivery.

The new governance for enhancements will ensure cost overruns are identified early and managed. An independent value management workstream commissioned by NR has identified opportunities for reducing scope should costs rise whilst seeking to minimise reductions in outputs. A prioritisation of scope has been agreed between NR and DfT that provides options should costs rise, albeit with the potential disbenefit of worsening outputs and reliability.

An Agreed Commitments Document has been agreed between NR and DfT, which establishes a contractual type arrangement for delivery of enhancements.

The ACD has been created in response to the recommendations of the Bowe Review and the February 2017 GIAA Report on the impact of the Bowe and Hendy Reviews. The MML programme is the first enhancement programme to use a document of this kind.

The ACD provides clarity regarding the:

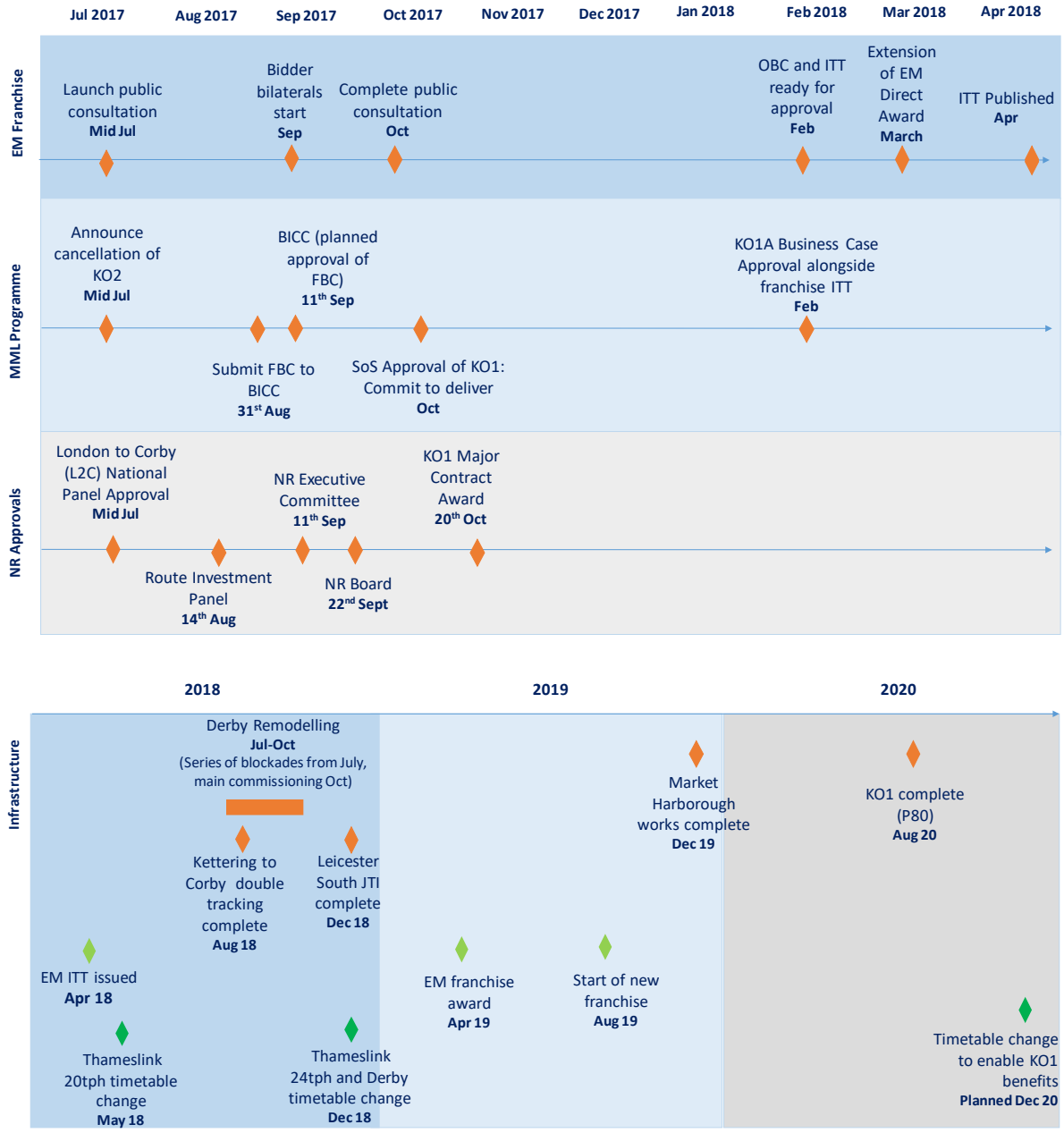
i. definition of the programme and outputs to be delivered by NR;
ii. funding envelope within which this shall be delivered;
iii. governance arrangements and change processes;
iv. delivery schedule; and
v. roles to be played and behaviours to be enacted by DfT and NR.

The ACD will also be used as the basis for infrastructure assumptions included in the relevant franchise agreements by DfT. The aim of the ACD is to foster a productive and clear relationship between DfT and NR. It has been prepared to impose similar commitments on each party to encourage reciprocity.

2.7.4 Interface with the franchising programme

The winning bidder of the next East Midlands franchise will have a critical role in realising the benefits of investment for passengers and balancing the requirements of the various passenger markets, including taking account of the franchise consultation which is currently live. In addition, the franchisee is expected to have a critical role in procuring rolling stock. This will be covered by the Outline Business Case from the East Midlands franchise team in due course, building on the analysis done to date for this business case.

To improve the integration of infrastructure enhancements with franchising, the approval schedule for both the MML Programme and the East Midlands franchise competition have been aligned, such that the franchise ITT will be published using an infrastructure baseline that has been approved at FBC stage and agreed with NR under contractual-type arrangements. This will provide an agreed baseline for the franchise and introduce a change control process to ensure infrastructure and franchise remain aligned. The following figures show key dates for each of the key elements of the programme, including key franchise dates:



An agreed list of interdependencies between the franchise and KO1 Programme has been developed and allocated an accountable Deputy Director. This list can be found in the Management Case. This is also supported by an integrated Benefits Map (also in the Management Case) which shows visually how the two programmes support each other.