HEART OF THE SOUTH WEST STUDY

ECONOMIC APPRAISAL OF RAIL NETWORK UPGRADE PROPOSALS

MAY, 2016

WSP | PARSONS BRINCKERHOFF

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Heart of the South West Local Enterprise Partnership

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1 EXECUTIVE SUMMARY

1.1 BACKGROUND

The Peninsular Rail Task Force (PRTF) has been tasked by government with preparing a 20 year rail investment strategy for the South-West peninsula.

This comes in the wake of severe disruption suffered as a result of storms and flooding in the winters of 2012/13 and 2013/14. The problems experienced then highlighted the importance of the rail network to business and the community in the South-West peninsula, and the susceptibility of the existing rail network to disruption.

For over a decade it has been well established that the productivity of the South-West peninsula is related to its poor connectivity. The long journey times to London and the South-East, and to key markets, constrain the ability to improve the fortunes of the South-West economy.

The Peninsular Rail Task Force strategy has three over-arching aims:

- To improve theresilience of the network
- To deliver faster journeys times
- To deliver extra capacity to meet growth in demand

The 20 year strategy will include measures to address this three point plan. In preparing the strategy there are work streams to identify, and cost, infrastructure enhancements which will reduce journey times, provide additional capacity, and improve resilience by making alternative routes available.

This work focuses on quantifying the economic impact of such infrastructure enhancements.

- It aims to provide information for testing the value for money of the infrastructure enhancements as transport investments. This includes improvements which will raise the route speed, track and signalling developments which will increase network capacity or flexibility, and measures to enable alternative routes to be used for diversion during adverse weather or other engineering need.
- It builds on previous studies to assess the scale of the wider economic impact of journey time improvements in tackling the productivity gap.
- It indicates the scale of growth and in employment and housing which will be supported by enhanced transport
- It assesses the wider impact on the visitor economy of improved rail connectivity to the Southwest Peninsula

1.2 OVERVIEW

WSP | PB have been commissioned by the Heart of the South West Local Enterprise Partnership (HotSW LEP) to undertake a study of the proposed improvements to the South West Rail Network to help inform and develop the transport strategy for the South West.

This outline report has assessed three proposed packages of infrastructure enhancements to the South West rail network. These are:

- London Paddington to Penzance – Journey time reductions through a combination of investments in track, signalling and the introduction of the new AT300 train fleet. Key components include re-signalling west of Totnes and in Cornwall to enable additional services which will allow the main expresses to run faster and omit some intermediate station calls, and engineering based line speed improvements, particularly between Reading and Taunton.
- London Waterloo to Exeter – Journey time reductions through a combination of investments in track and signalling to enable trains such as the existing Class 159 fleet to attain higher speeds for more of the journey. Key components include reinstatement of former double track sections between Salisbury and Yeovil to enable enhanced frequency services with the faster services omitting intermediate station calls, additional signal sections and engineering based line speed improvements.
- Provision of diversionary route between London and South West via Yeovil and Castle Cary to enable Great Western services to continue operating if the route between Exeter and Westbury is closed either due to flooding (e.g Somerset Levels or Cowley Bridge) or planned maintenance work. The key requirement is to provide capacity for a diverted Great Western train each hour without disruption to the Exeter to Waterloo services.

The appraisal methodology for appraising direct benefits is WebTAG compliant. Indirect benefits have been developed by using available evidence to quantify the impact of increased productivity of the South West and increased tourism to the South West through improved connectivity with London.

Journey time savings and service alterations have been reflected in MOIRA to assess the impact of new timetables.

Table1 summarises the quantified benefits of each scheme.

Table 1: Summary of Appraised Benefits

PROPOSAL	TOTAL ESTIMATED BENEFIT (£M)	
	10 Years	60 Years
London Paddington – Penzance (Direct Benefits)	£128.3	£1,135.4
London Paddington – Penzance (Indirect Benefits)	£1,214.7	£7,218.3
London Waterloo – Exeter (Direct Benefits)	£127.4	£677.6
London Paddington – Penzance Diversionary Route (Direct Benefits)	£23.3	£135.0

This outline report describes the methodology and findings for the three proposed packages of infrastructure enhancements to the South West rail network.

2 KEY APPRAISAL ASSUMPTIONS

The appraisal methodology for appraising direct benefits is WebTAG compliant. Indirect benefits have been developed by using available evidence to quantify the impact of increased productivity of the South West and increased tourism to the South West through improved connectivity with London.

Journey time savings and service alterations have been reflected in MOIRA to assess the impact of new timetables.

The study has focused on quantifying the economic benefits of each scheme. Costs have not been assessed in the appraisal, and are not included in this report.

The key appraisal assumptions applied to all three schemes are detailed in Table 2.

Table 2 Appraisal Assumptions

APPRAISAL PARAMETER	ASSUMPTION	SOURCE
Appraisal period	10 years, 60 years	Assumed franchise length and asset life
Assumed Opening Year	London – Penzance : 2019 partial, 2025 full completion London – Exeter: 2025 Diversionary Route: 2021	Heart of the South West Local Enterprise Partnership
Discount rate	Year 1-30: 3.5% pa Year 31-60: 3.0% pa	TAG data book A1.1.1
Demand growth cap	20 years from Appraisal Year	TAG A5.3 Rail Appraisal (para 2.3.1)
Appraisal Base Year	2010	WebTAG
Current Year (for discounting)	2015	MOIRA data year
Value of Time	Business 31.96 £/h Commuting 6.81 £/h Other 6.04 £/h	TAG data book A1.3.1
Journey Type split	Full – Business Reduced – Leisure Seasons – Commuting	MOIRA
Demand to GJT elasticity	-0.9	PDFH 5.1
Background passenger demand growth	4% pa then capped 20 years after the current appraisal year	Based on historical growth of South West stations using the Office of Rail and Road Annual Station Usage.
GDP deflator 2015 to 2010 Base	0.91	TAG data book GDP deflator
Regulated fare growth	1% pa	Government policy

3 LONDON PADDINGTON – PENZANCE IMPROVEMENTS

3.1 DESCRIPTION OF IMPROVEMENTS

The basis for this assessment is the reduced journey times along the London Paddington – Penzance route as set out in the PRTF Interim Report of October 2015. This assumed two elements of journey time reduction:

- Signalling improvements; and
- Timetabling and station dwell improvements.

The sectional journey time improvements from the PRTF Interim Report are shown in Table 3.

Table 3: Summary of Journey Time Improvements between London Paddington and Penzance

ROUTE SECTION	REDUCTION DUE TO LINE SPEED IMPROVEMENT (MIN)	REDUCTION DUE TO OPERATIONAL IMPROVEMENT (MIN)	TOTAL (MIN)
Penzance – Truro	3	8	11
Truro – Plymouth	1	1	2
Plymouth – Exeter	3	2	5
Exeter – Taunton	1	1	2
Taunton – Reading	4	2	6
Reading - Paddington	0	0	0
Total	**12**	**14**	**26**

These journey time reductions are considered by HotSW LEP to be a conservative estimate. It should be noted that additional work is currently under way to examine more closely the scope for line speed enhancements between Reading and Exeter through the 'Speed to the West' study. This analysis can be updated for the outcome of that review.

3.2 METHODOLOGY

The MOIRA weekday, Saturday and Sunday timetables were extracted and edited to give all trains running between Penzance and London Paddington the journey time benefits detailed in Table 2.

Upon submission of the revised timetables, the new timetable was compared against the base (existing) timetable, and the following was extracted from MOIRA:

- Journey Benefits by Station;
- Revenue Benefits by Station; and
- Value of Time and Passenger Miles Benefits by Origin-Destination and Journey Purpose.

3.3 ECONOMIC APPRAISAL

Using a bespoke appraisal model, the following benefits were derived:

1. Revenue (fare) benefit to the rail network
2. Rail user perceived journey time benefits;
3. Non user benefits arising from road decongestion;
4. Non user benefits arising from accidents and noise reduction and air quality improvement;
5. Disbenefit from indirect taxation;
6. Wider GVA benefits to the South West through increased tourism spending; and
7. Wider GVA benefits to the South West based on increased productivity.

The outputs of MOIRA were used to directly determine benefits 1-5.

WIDER GVA BENEFITS TO THE SOUTH WEST BASED ON INCREASED TOURISM SPENDING

Benefit 6, Wider GVA benefits to the South West through increased tourism spending was determined at flow level using outputs from MOIRA. Only flows directly impacted by the proposals were counted. This calculation focuses on trips between London and the South West only.

All trips were assumed to be return trips, and therefore the number of journeys halved to reflect two journeys making up a single Leisure trip. Commuter and Business Trips were completely omitted.

Research from Visit England showed that in 2014 14.7m domestic tourism trips were made to the South West from London and 25.6m trips were made to London from the South West. This gives a ratio of Leisure return trips for South East-London of 36:64.

The same research also showed that the average Domestic Tourism spend per trip to the South West was £285. This has been assumed to not include travel costs.

A factor of 1.4 was used to reflect the monetary recycle of each £1 spent within the South West economy.

Table 4 shows the benefits derived. Benefits have been determined for 10 years and 30 years to reflect both a short term (franchise length) and long term (asset life/strategic) outlook.

WIDER GVA BENEFITS TO THE SOUTH WEST BASED ON INCREASED PRODUCTIVITY

Benefit 7, Wider GVA benefits to the South West based on increased productivity, is based on the findings from the *Productivity and Wider Economic Impact Study*, a study carried out by WSP | Parsons Brinckerhoff on behalf of the Peninsula Rail Task Force in 2015.

One of the key underpinning statistics the report uses and verifies as still being relevant today, is the statistic that productivity reduces by up to 6% for every 100 minutes journey time from London. This was originally identified in a report by the Universities of Bath and Universities of the West of England in a report entitled, *Meeting the Productivity Challenge*.

The report calculated the impact of reduced journey times between London Paddington and all principal stations west of Taunton (Tiverton Parkway, Exeter St.Davids, Newton Abbot, Torquay,

Totnes, Plymouth, Liskeard, St Austell, Truro and Penzance) in standard reduced times of 15, 30, 45 and 60 minutes.

The original findings of this report were used to factor annual GVA benefits based on the journey time reductions detailed in Table 3. Values for the first year of appraisal are shown in Table 4.

Table 4: Wider GVA Benefits to the South West based on Increased Productivity

AREA	2015 PRODUCTIVITY AND WIDER ECONOMIC IMPACT STUDY				LONDON PADDINGTON – PENZANCE IMPROVEMENTS			
	Minutes Saving	Productivity Gain	GVA Uplift	FTE Equivalent*	Minutes Saving	Productivity Gain	GVA Uplift	FTE Equivalent
Somerset	15	0.9%	£78.5	371	6	0.4%	£31.4	148
Devon	15	0.9%	£111.6	547	8	0.5%	£59.5	292
Torbay	15	0.9%	£15.5	76	10	0.6%	£10.3	51
Plymouth	15	0.9%	£40.8	200	13	0.8%	£35.4	173
Cornwall	15	0.9%	£63.4	350	18	1.1%	£76.1	420
Total			**£309.8**	**1,544**			**£212.7**	**1,084**

*FTE – Full Time Employment Equivalent

Table 5 shows the benefits derived. Benefits have been determined for 10 years and 60 years to reflect both a short term (franchise length) and long term (asset life/strategic) outlook.

Table 5: London – Penzance Improvements Summary of Benefits

BENEFITS	APPRAISAL BENEFITS	
	10 Years (£m)	60 Years (£m)
DIRECT BENEFITS		
1. Rail User Perceived Journey Time benefits (new & existing users)	£80.7	£751.8
2. Non user benefits – road decongestion	£7.5	£86.2
3. Non user benefits – noise, air quality, etc	£2.2	£20.7
4. Total Revenue benefit	£41.2	£299.9
5. Indirect Taxation	-£3.3	-£23.2
Total Direct Benefits	**£128.3**	**£1,135.4**
INDIRECT BENEFITS		
6. Impact of Increased Leisure Trips in South West	£105.9	£629.6
7. Impact of Increased Productivity in South West	£1,108.8	£6,588.7
7a. Somerset	£163.7	£972.7
7b. Devon	£310.3	£1,843.8
7c. Torbay	£53.9	£320.1
7d. Plymouth	£184.3	£1,095.4
7e. Cornwall	£396.6	£2,356.8
Total Indirect Benefits	**£1,214.7**	**£7,218.3**

4 LONDON WATERLOO – EXETER IMPROVEMENTS

4.1 BACKGROUND

The West of England Line is the route from London Waterloo via Basingstoke and Salisbury to Yeovil Junction and Exeter. It is part of the South Western franchise.

Currently the basic service between Waterloo and Exeter is one train per hour and in some hours there is a second train as far as Yeovil Junction. There are two trains per hour between Waterloo and Salisbury.

The majority of the route is single track west of Salisbury. The long single track sections are a significant constraint on the operation of the train service, limiting both the number of trains which can run along the network and their operating line speed.

As a consequence journey times between Exeter and London via this route are over three hours, which is up to an hour longer than the alternative Great Western route to London Paddington.

It has become clear that it would be possible to operate a significantly enhanced service patterns if some of the constraints imposed by the existing infrastructure were overcome.

4.2 DESCRIPTION OF IMPROVEMENTS

Reduced journey times to/from places west and south of Yeovil could be achieved if some trains were able to run non-stop between Salisbury and Yeovil. In addition to express services, the PTRF strategy includes provision for increases in line speed to 90mph where possible.

This has been assumed to provide the change in service pattern:

- Doubling of existing frequency between Yeovil Junction –Waterloo;
- ‘New’ trains to follow stopping pattern of ‘Existing; trains between Exeter St. Davids and Yeovil Junction, then becoming express services onwards to Waterloo; calling at Yeovil Junction Salisbury. Clapham Junction and Waterloo;
- ‘Existing’ trains altered to start at Yeovil Junction;

This new service pattern has been assumed to give the following journey time benefits compared to the existing timetable;

- All services to save four minutes between Yeovil Junction and Salisbury and two minutes between Salisbury and Basingstoke as a result of the increased line speed;
- ‘New’ trains to save a further 20 minutes between Yeovil Junction and Salisbury and 10 minutes between Salisbury and Waterloo as a result of the express stopping pattern.

The proposed journey improvement figures are show in in Table 6. A timetable study to confirm the scale of time savings and to identify more clearly the infrastructure required is to be commissioned in Summer 2016.

Table 6: Summary of Journey Time Improvements between London Waterloo and Exeter

ROUTE SECTION	REDUCTION DUE TO LINE SPEED IMPROVEMENT (MIN)	REDUCTION DUE TO OPERATIONAL IMPROVEMENT (MIN)	TOTAL (MIN)
Exeter – Yeovil Junction	0	0	0
Yeovil Junction – Salisbury	4	20	24
Salisbury – Waterloo	2	10	12
Total	**6**	**30**	**36**

4.3 METHODOLOGY

The MOIRA weekday timetable was extracted and edited to give all trains running between Exeter and London Waterloo the journey time benefits detailed in Table 4.

Upon submission of the revised timetables, the new timetable was compared against the base (existing) timetable, and the following was extracted from MOIRA:

- Journey Benefits by Station;
- Revenue Benefits by Station; and
- Value of Time and Passenger Miles Benefits by Origin-Destination and Journey Purpose.

4.4 ECONOMIC APPRAISAL

Using a bespoke appraisal model, the following benefits were derived:

1. Revenue (fare) benefit to the rail network
2. Rail user perceived journey time benefits;
3. Non user benefits arising from road decongestion;
4. Non user benefits arising from accidents and noise reduction, and air quality improvement; and
5. Disbenefit from indirect taxation.

The outputs of MOIRA were used to directly determine benefits 1-5.

Table 7 shows the benefits derived. Benefits have been determined for 10 years and 30 years to reflect both a short term (franchise length) and long term (asset life/strategic) outlook.

Table 7: London – Exeter Improvements Summary of Benefits

BENEFITS	APPRAISAL BENEFITS	
	10 Years (£m)	60 Years (£m)
DIRECT BENEFITS		
1. Rail User Perceived Journey Time benefits (new & existing users)	£90.9	£504.1
2. Non user benefits – road decongestion	£6.6	£40.8
3. Non user benefits – noise, air quality, etc	£1.7	£9.7
4. Total Revenue benefit	£30.4	£133.7
5. Indirect Taxation	-£2.2	-£10.6
Total Direct Benefits	**£127.4**	**£677.6**

5 LONDON PADDINGTON – SOUTH WEST DIVERSIONARY ROUTE

5.1 BACKGROUND

The extreme rainfall and storms in winters 2012/13 and 2013/14 have highlighted the vulnerability of the Western Route between Exeter and Paddington to closure due to weather related incidents. A number of sections of the route are vulnerable to flooding, such as:-

- Cowley Bridge, Exeter
- Hele and Brandninch
- Somerset levels between Athelney and Cogload

Table 8 provides an indication of weather related closures since 2000, but is not comprehensive. It serves to provide confirmation that flooding can occur at a number of different locations, and the extent of closures is variable.

Table 8: Historical weather related closures since 2000 between Exeter and Paddington

LOCATION	FLOODING INSTANCES
Cowley Bridge, Exeter	2000 (extensive damage); 2012/13 (extensive damage)
Hele and Bradninch	30/10/2008; 13/12/2008; 10/02/2009; 30/4/2012; 24/9/2012
Tiverton Whiteball	2007; 2008; 09/2012; 04/2012;
Athelney crossing - Cogload	09/02/2009, 02/2014 – 04/2014

5.2 DESCRIPTION OF IMPROVEMENTS

The PRTF 20 year investment strategy includes upgrading the capacity of the route between Exeter and Castle Cary via Honiton and Yeovil Junction to enable a diverted Great Western train path per hour, in addition to the planned South Western route services between Waterloo and Exeter, and Axminster and Exeter.

5.3 METHODOLOGY

For this assessment a separate Do Nothing and Do Something was created within MOIRA to represent the response to flooding.

In both cases, flooding was assumed to impact the service for a week each year.

DO NOTHING

The Do Nothing is assumed to be a repeat of what has happened during previous instances of flooding, in particular during the instances of December 2012, when the South West was completely severed from London, and passengers were urged not to travel on the network. This is considered the worst case scenario should such flooding occur again.

Services between Penzance/Plymouth/Paignton and London Paddington were either completely removed from the timetable, or assumed to start or end at Taunton.

The Sleeper service was assumed to not run.

DO SOMETHING

The Do Something is assumed to be an approximate 1tph service between Penzance/Plymouth/Paignton and London Paddington. These services would no longer stop at Taunton as a result of the diversionary route. No increase in journey time has been assumed at this stage of appraisal.

The same limited service between London Paddington and Taunton as per the Do Nothing has been assumed.

The Sleeper service was assumed to run but not stop at Taunton as a result of the diversionary route.

Upon submission of the revised timetables, each new timetable was compared against the base (existing) timetable, and the following was extracted from MOIRA:

- Journey Benefits by Station;
- Revenue Benefits by Station; and
- Value of Time and Passenger Miles Benefits by Origin-Destination and Journey Purpose.

The difference between the two sets of outputs was assumed to be the benefit of the Do Something over the Do Nothing.

5.4 ECONOMIC APPRAISAL

Using a bespoke appraisal model, the following benefits were derived:

6. Revenue (fare) benefit to the rail network
7. Rail user perceived journey time benefits;

The outputs of MOIRA were used to directly determine both benefits.

Non user benefits were not assessed due to the uncertainty of extensive flooding disrupting the road network such that people would either use the rail network, or choose not to travel at all.

Table 9 shows the benefits derived. Benefits have been determined for 10 years and 30 years to reflect both a short term (franchise length) and long term (asset life/strategic) outlook.

Table 9: London – South West Diversionary Route Summary of Benefits

BENEFITS	APPRAISAL BENEFITS	
	10 Years (£m)	60 Years (£m)
DIRECT BENEFITS		
1. Rail User Perceived Journey Time benefits (new & existing users)	£16.9	£103.9
2. Total Revenue benefit	£6.4	£31.1
Total Direct Benefits	**£23.3**	**£135.0**

SCHEDULE 8 PAYMENTS

One benefit that has not been quantified but could be significant is the reduction in Schedule 8 payments from Network Rail to the Train Operating Company (TOC) in the Do Something.

Schedule 8 payments are forms of compensation that are paid between Network Rail and the TOC in order to ensure trains operators and Network Rail are held financially harmless for delays one causes to the other.

In the case of flooding, it would be likely that Network Rail would be bound to compensate the TOC for loss of earnings in order to share some of the costs resulting from the flooding. The exact amount would depend on the level of disruption to the rail network and the agreed Schedule 8 rates set within the Franchise Agreement.

The Do Something therefore would reduce the level of Schedule 8 payment costs that Network Rail would be liable for, which is a further benefit to the scheme.

6 SUMMARY AND CONCLUSIONS

The Peninsular Rail Task Force (PRTF) has been tasked by government with preparing a 20 year rail investment strategy for the South-West peninsula.

The 20 year strategy will include measures to address this three point plan. In preparing the strategy there are work streams to identify, and cost, infrastructure enhancements which will reduce journey times, provide additional capacity, and improve resilience by making alternative routes available.

WSP | PB have been commissioned by the Heart of the South West Local Enterprise Partnership (HotSW LEP) to undertake a study of proposed improvements to the South West Rail Network to help inform and develop the transport strategy for the South West.

This outline report has assessed three proposed packages of infrastructure enhancements to the South West rail network. These are:

- London Paddington to Penzance – Journey time reductions through a combination of investments in track, signalling and the introduction of the new AT300 train fleet.
- London Waterloo to Exeter – Journey time reductions through a combination of investments in track and signalling to enable trains such as the existing Class 159 fleet to attain higher speeds for more of the journey.
- Provision of diversionary route between London and South West via (Yeovil and Castle Cary) to enable Great Western services to continue operating if the route between Exeter and Westbury is closed either due to flooding (e.g Somerset Levels or Cowley Bridge) or planned maintenance work.

The appraisal methodology for appraising Direct benefits is WebTAG compliant. Indirect benefits have been ascertained using available evidence to quantify the impact of increased productivity of the South West and increased tourism to the South West through improved connectivity with London.

Journey time savings and service alterations have been reflected in MOIRA to assess the impact of new timetables.

Table10 summarises the quantified benefits of each scheme.

Table 10: Summary of Appraised Benefits

PROPOSAL	TOTAL ESTIMATED BENEFIT (£M)	
	10 Years	60 Years
London Paddington – Penzance (Direct Benefits)	£128.3	£1,135.4
London Paddington – Penzance (Indirect Benefits)	£1,214.7	£7,218.3
London Waterloo – Exeter (Direct Benefits)	£127.4	£677.6
London Paddington – Penzance Diversionary Route (Direct Benefits)	£23.3	£135.0